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OF THE
ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE THIRTY-EIGHTH.



1868.

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CONTENTS OF VOL. XXXVIII.

	PAGE
Council Report, Balance-Sheet for 1867, and Estimate for 1868 ..	v
Library Regulations	xiv
List of Council, Officers, Honorary and Honorary Corresponding Members, and Fellows	xv
List of Public Institutions, &c., to which the Publications are presented	lxxxii
Individuals to whom the Royal Premium has been awarded	lxxxiii
Accessions to Library and Map-rooms, with Names of Donors ..	lxxxvii
Instruments lent out. Presentation of Gold Medals	cxxvi, cxxvii
Anniversary Address, by Sir R. I. Murchison	cxxxiii

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

ARTICLES.	PAGE
1.—The Portuguese Expeditions to Abyssinia in the Fifteenth, Sixteenth, and Seventeenth Centuries. By C. R. MARKHAM, Esq., Secretary, Royal Geographical Society	1
2.—Geographical Results of the Abyssinian Expedition: By C. R. MARK- HAM, Esq., Secretary, Royal Geographical Society	12
3.—Sketch of a Journey from Canton to Hankow. By ALBERT S. BICK- MORE, M.A.	50
4.—Account of Scientific Explorations in the Isthmus of Darien in the years 1861 and 1865. By M. LUCIEN DE PUYDT	69
5.—Report of the Livingstone Search Expedition. By E. D. Young, Esq., Leader of the Expedition	111
6.—On the Geography and Mountain Passes of British Columbia in Con- nection with an Overland Route. By A. WADDINGTON, Esq. ..	118
7.—Report of a Route-Survey made by PUNDIT ———, from Nepal to Ihassa; and thence through the Upper Valley of the Brahmaputra to its Source. By Captain T. G. MONTGOMERIE, R.E., of the Great Trigonometrical Survey, in charge of the Trans-Himalayan Survey Parties	129
8.—A Journey from Norton Sound, Behring Sea, to Fort Youkon (Junc- tion of Porcupine and Youkon Rivers). By FREDERICK WHYMFER, Esq.	219
9.—On the Peninsula of Sinai. By the Rev. F. W. HOLLAND, M.A., F.R.G.S.	237

ARTICLES.	PAGE
10.—A Visit to the North-East Coast of Labrador, during the Autumn of 1867, by H.M.S. <i>Gannet</i> , Commander W. CHIMMO, R.N.	258
11.—Journal of a Tour in Armenia, Kurdistan, and Upper Mesopotamia, with Notes of Researches in the Deyrsim Dag, in 1866. By J. G. TAYLOR, H.M. Consul for Kurdistan	281
12.—On the Geography and Recent Volcanic Eruption of the Sandwich Islands. By the Right Rev. THOMAS STALEY, D.D., Bishop of Honolulu	361
13.—Notes on the Physical Geography, Climate, and Capabilities of Somerset and the Cape York Peninsula, Australia. By Dr. ALEXANDER RATTRAY, M.D. (Edin.), R.N.	370
14.—On the Elevation of the Country between Bushire and Teheran. By MAJOR O. ST. JOHN	411
15.—On the Confluence of the Rivers Mantaro and Apurimac, in the Huanta Mountains. By Professor ANTONIO RAIMONDI, Honorary Corresponding Member, R.G.S.	413
16.—The Jaxartes or Syr-Daria, from Russian Sources. By ROBERT MICHELL, F.R.G.S.	429
INDEX	460

MAPS AND ILLUSTRATIONS.

	PAGE
1. MARKHAM Abyssinia. Coast to Adigerat	12
2. " " Adigerat to River Takkazyè	25
3. " " Wadela, Dalanta, and Mágda	35
4. BICKMORE Canton to Hankow	50
5. DE PUYDT Darien	69
6. WADDINGTON British Columbia and Overland Route	118
7. MONTGOMERIE Lhasa and the Brahmaputra	129
8. WHYMPER Alaska	219
9. CHIMMO Labrador	258
10. TAYLOR Kurdistan	281
11. BISHOP OF HONOLULU Sandwich Islands	361
12. RATTRAY North-East Australia	370
13. " Physical Chart, Australia	380
14. ST. JOHN Section, Bushire to Teheran	411
15. RAIMONDI River Mantaro	413

ILLUSTRATIONS to Taylor's Tour in Armenia, &c.:—Copies of Inscriptions on Altars, Slabs, &c., 288, 294, 295, 299, 300, 301; Roman Milestone, 302; Inscription on Arch of Bridge over the "Giaour Yazı Su," 314.

* * * A Map to illustrate the Rev. Mr. Holland's Memoir on Sinai (by Stanford), and a Map of Western Turkistan (by Arrowsmith) to accompany Mr. Michell's Memoir on the Jaxartes, could not be finished in time for the publication of the present volume of the 'Journal,' and will appear in the next.

Royal Geographical Society.

1868.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 25TH MAY.

THE Council have again the pleasure of submitting a most satisfactory Report of the financial condition and general progress of the Society.

Members.—Since the last Anniversary 190 Fellows have been elected, of whom two were Honorary Corresponding, and 19 have paid their Life Compositions. Last year the number was only 147, three being Honorary Corresponding. The number lost by death is 41, by resignation 22, and 48 have been struck off the list for arrears of subscription: the net increase being 79, or 53 more than last year. The present total number is 2150 Ordinary, and 72 Honorary and Honorary Corresponding Fellows.

A special Collector having been appointed towards the commencement of the last financial year, for the purpose of recovering long outstanding arrears of subscriptions, the Council have the satisfaction of reporting so far a successful result, the amount thus recovered being 421*l*. By the same means the Finance Committee have been able to ascertain the defaulters whose arrears are not expected to be made good, and to recommend to the Council the enforcement of the rule providing for the exclusion of such from the List of Fellows. On the recommendation of the Auditors it has been decided to continue the employment of the special collector, on terms of commission varying according to the length of the arrears. The control and

examination of the subscription accounts have been much facilitated this year by a complete tabulated list of the Fellows and payments, prepared by the chief clerk according to a method proposed by the Auditors in the previous year.

Finances.—The Balance-Sheet (Appendix A) exhibits a large increase in the receipts over previous years, and a corresponding increase in the balance available for investment or grants in furtherance of Geography. The receipts for the year (exclusive of the balance in hand) were 5462*l.* 7*s.* 11*d.* In 1866 they were 5085*l.* 8*s.* 3*d.*, in 1865, 4905*l.* 8*s.* 3*d.*, and in 1864, 4977*l.* 8*s.* 6*d.* The expenditure during the past year was 3943*l.* 17*s.* 4*d.*; showing a decrease on the two previous years, the amount in 1866 having been 4052*l.* 15*s.*, and in 1865, 4307*l.* 4*s.* 5*d.*: in 1864 it was 3647*l.* 7*s.* 10*d.* Of the amount expended, 193*l.* 11*s.* 2*d.* was for the promotion of expeditions. The excess of income over expenditure was 1621*l.* 13*s.* 8*d.*; and this has enabled the Council, on the recommendation of the Finance Committee, to invest a further 1000*l.* (in the India 5 per cent. Debentures). The total amount of the Funded Capital at the present date is 15,500*l.*

The Council have to remind the Fellows of the Society that the whole of this sum will be required for the erection of a building for their use, the want of which is more and more felt as the Society increases in numbers, and will shortly become still more urgent when we are deprived of the use of the Hall at Burlington House, where the evening meetings are (by permission) now held, and which is to be pulled down. A special Committee of the Council has already had this subject under their consideration, and a site for a building facing the new Thames Embankment has been promised by the Chief Commissioner of Crown Lands. The first sketch-plan of a building made by Mr. James Fergusson includes rooms for the convenient arrangement of the rapidly-increasing Map Collection and Library, as well as a large Hall for meetings, and Offices.

The legacy of 4000*l.*, mentioned in the Reports of the last two years as having been bequeathed to the Society by the late Benjamin Oliveira, Esq., is still under litigation. Progress has, however, been made towards a final decision, in judgment having been delivered against the claimants of the property

under a prior settlement; and the Council have been encouraged by their legal advisers to expect, in course of time, the receipt of a portion of the legacy.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec. 1867.

STATEMENT showing the Progress of the INVESTMENTS of the Society from the Year 1832 to the 31st Dec. 1867.

Year.	Cash Receipts within the Year.			Cash Amounts Invested in Funds.			Deducting Amounts Invested in Funds; actual Expenditure.			End of the Year, Dec. 31.	Cash Invested.			Amount of Stock purchased.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.		£.	s.	d.	£.	s.	d.
1848	696	10	5	..	..	..	755	6	1	1832	3657	10	0	4000	0	0
1849	778	3	0	..	..	..	1098	7	6	1833	4130	0	0	4500	0	0
1850	1036	10	5	..	..	..	877	2	10	1834	4426	0	0	4800	0	0
1851	1056	11	8	..	..	..	906	14	7	1835	4426	0	0	4800	0	0
1852	1220	3	4	..	..	..	995	13	1	1836	4426	0	0	4800	0	0
1853	1917	2	6	..	..	..	1675	6	0	1837	4426	0	0	4800	0	0
1854	2565	7	8	..	..	..	2197	19	3	1838	4426	0	0	4800	0	0
1855	2584	7	0	..	..	..	2636	3	1	1839	4129	15	0	4500	0	0
1856	3373	5	1	533	10	0	2814	8	1	1840	3788	10	0	4150	0	0
1857	3142	13	4	378	0	0	3480	19	9	1841	2801	0	0	3150	0	0
1858	3089	15	1	..	..	..	2944	13	6	1842	2801	0	0	3150	0	0
1859	3471	11	8	950	0	0	3423	3	9	1843	2219	18	6	2578	4	4
1860	6449	12	1	466	17	6	5406	3	7	1844	2219	18	6	2578	4	4
1861	4792	12	9	1358	2	6	3074	7	4	1845	2219	18	6	2578	4	4
1862	4659	7	9	1889	7	6	3095	19	4	1846	1933	1	0	2278	4	4
1863	5256	9	3	1837	10	0	3655	4	0	1847	2133	1	0	2502	6	2
1864	4977	8	6	1796	5	0	3647	7	10	1848	1886	16	8	2224	1	10
1865	4908	8	3	1041	5	0	4307	4	5	1849	1886	16	8	2224	1	10
1866	5085	8	3	1028	15	0	4052	15	0	1850	1886	16	8	2224	1	10
1867	5162	7	11	1029	0	6	3943	17	4	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
										1864	10365	7	4	11500	0	0
										1865	11406	12	4	12500	0	0
										1866	12435	7	4	13500	0	0
										1867	13464	7	10	14500	0	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.

As in former years, the Finance Committee have held their monthly meetings and supervised the expenditure and receipts

* Of which 2000*l.* is India 5 per Cents., and 1000*l.* India 5 per Cent. Debentures.

of the Society. The auditors appointed by the Council (whose names are appended to balance-sheet, Appendix A) have also made their annual examination of the accounts, and testified their approval. The Council feel that the thanks of the Society generally are due to these able and experienced gentlemen, who devoted three days of their valuable time to the arduous labour of testing the accounts in detail.

Publications.—The 37th volume of the 'Journal' was published at the end of April, and is now being delivered to Fellows who apply for their copies at the offices of the Society. The 11th volume of the 'Proceedings' has also been published during the year, and two parts of volume 12 have been printed.

The Index to the third ten volumes of the 'Journal,' compiled by Colonel H. Yule, has been printed and distributed since the last Report.

Library.—The additions to the Library during the year amount to 1025 volumes of books and pamphlets; of which 190 were purchased, and the rest presented or obtained in exchange for our own publications.

Among the more important accessions may be mentioned the costly illustrated works on Abyssinia, by Messrs. Ferret and Galinier, and M. Lefebre, complete, with Atlases and plates of Natural History; together with numerous other works, ancient and modern, relative to Abyssinia, the acquisition of which has rendered the Library exceedingly rich in this department. The sumptuous volume 'Plantæ Tinneanæ,' executed as a memorial of the adventurous voyage of the Dutch ladies on the White Nile and Ghazal River, is also amongst the accessions, presented by the originator of the work, our Associate Mr. J. A. Tinné.

Under the supervision of the Library Committee, which has held frequent meetings throughout the year, the Librarian has completed the arrangement of the books on the shelves, and made progress in the compilation of a new Catalogue, wherein all works and important memoirs in Transactions and Periodicals will be classified according to countries and places. When printed, and in the hands of Fellows and Students, this will be found a most useful index to geographical literature.

It is satisfactory to your Council to report that the Library

has been more used for the purpose of research than in former years. During the preliminary arrangements for the Abyssinian campaign, the numerous books and drawings relating to Abyssinia possessed by the Society were lent for the use of the Topographical Department of the War Office, and the Director-General of that department has since expressed, in an official letter to the Librarian, his thanks for the assistance thus afforded. A similar letter was received also from the Director of the Army Medical Department, to which works were lent and aid rendered in procuring information regarding the climate and diseases of North-Eastern Africa.

Map Collection.—The accessions to the Map Department during the year consist of 2380 sheets of Maps and Charts, 5 Atlases, 12 Diagrams, and 50 Views. All have been mounted, catalogued, and incorporated into the classified collection.

The following are the most important accessions:—

1350 Sheets of the Ordnance Survey of Great Britain and Ireland. Presented by the Topographical Office through Sir Henry James, Director.

109 Sheets of Admiralty Charts. Presented by the Admiralty through Captain G. H. Richards, R.N., Hydrographer.

309 Sheets of French Charts. Presented by the *Dépôt de la Marine*.

18 Sheets of Cadastral Map of the Province of Madrid. Presented by Don Juan de Villa Nova.

Geological Map of Switzerland. Presented by M. J. M. Ziegler.

Map of Alaska. Presented by the United States Naval Department.

Plans and Surveys of Nicaragua. Presented by J. Collinson, Esq., C.E.

6 Sheets of Map of Buenos Ayres. Presented by Don Saturnino Salas.

2 Sheets of Boundary Survey Map of the United States. Presented by A. Campbell, Esq.

Maps of British Columbia. Presented by A. Waddington, Esq.

Catalogue of Maps.—Two copies of the Manuscript Catalogue of Maps, to the end of 1867, have now been completed, and the

services of the extra assistant in the Map Department, engaged for this labour, dispensed with. The maps are classified according to countries and places, and great facility of reference is thereby attained, to the benefit of Fellows and the public who consult the collection. The question of printing the catalogue for distribution is under the consideration of the Council.

Grants to Travellers.—In the estimate for last year the sum of 200*l.* was given as the probable disbursement of the Society, on account of the Livingstone Search-Expedition under Mr. Young. The amount paid by the Society under this head is only 160*l.*—namely, 100*l.* as gratuity to Mr. Young; 50*l.*, the same, to Mr. Reid, the mechanic who managed the steel boat; and 10*l.*, for fishing and collecting apparatus, to Mr. Faulkner. All the other costs of the expedition were defrayed by Her Majesty's Government.

The sums paid to Mr. Young and Mr. Reid will appear in the accounts of the next financial year, and of the amount 193*l.* 11*s.* 2*d.* for expeditions, entered in the present balance-sheet, 78*l.* 6*s.* 8*d.*, salary to Mr. Reid, has since been refunded by the Admiralty, as will appear in the next balance-sheet. The balance, 115*l.* 4*s.* 6*d.*, is composed of the following grants:—50*l.* to M. Géhard Rohlf's, in aid of his journey from Tripoli to Lagos; 7*l.* 7*s.* for instruments to Mr. E. Whymper, Greenland Expedition; 10*l.* to Mr. Faulkner, as above stated; 13*l.* for instruments to Mr. H. Whitely, South Peru; and 34*l.* 17*s.* 6*d.* for instruments to the Rev. F. W. Holland, in aid of his Sinai exploration.

Geographical Prizes.—During the present session the Council have had under their earnest consideration a proposal of Mr. Francis Galton, Vice-President, to encourage the study of geography in Great Britain by the offer, on the part of the Society, of prizes for competition in the principal public schools. Already an annual prize of 5*l.*, termed "The Royal Geographical Society's Prize," is granted by the Council, as they learn, with beneficial results, to the Society of Arts, and awarded at their annual examination. The principle and details of the extended proposal have been examined by a special Committee, and on

their report the following course has been determined on by the Council :—

1. To offer two medals of gold and two of bronze, of appropriate size and design; one of each to successful candidates in an annual examination, on subjects of Political Geography and Physical Geography respectively. The examination to take place in the beginning of 1869, and to be repeated in each succeeding year until further notice.
2. To invite to competition about twenty-three of the principal English public schools, and a proportionate number in other parts of the United Kingdom. The claims of other schools to be considered hereafter. The number of candidates in each school to be confined within such limits as the Council may hereafter determine.
3. The examination to be conducted by two Examiners engaged by the Society, and to be carried out by sealed papers sent simultaneously to the schools.

The Council will be prepared to issue full particulars of the proposed competition before the close of the session; meantime they cite, to shew the connection between the present action of the Council and the movement now taking place in public school education, the following passages from the recent Reports upon School Education :—

“From the observations which we have made on the study of history and geography, it will appear that greater attention should in our opinion be paid to them than they now receive at schools. A taste for history may be gained at school; the habit of reading intelligently should certainly be acquired there, and few books can be intelligently read without some study of history, and no history without geography.”—*Report of the Royal Commission on Public School Examination, 1864, vol. i. p. 33.*

[Speaking of Natural Science], “We cannot consider any scheme of education complete which omits a subject of such high importance. . . . The best starting-point would probably be found in the outlines of physical geography. This subject is already taught with much success in many elementary schools. . . . It has many points of connection with the other usual subjects of instruction.”—*Report of Schools Inquiry Commission, 1868, p. 34.*

APPENDIX A.

BALANCE-SHEET FOR THE YEAR 1867.

Receipts.

Expenditure.

	£.	s.	d.	£.	s.	d.		£.	s.	d.
Balance in Banker's hands 31st Dec., 1866	87	15	1				Rent, Taxes, and House Expenses ..			443 5 6
Ditto Accountant's Ditto	15	8	0				Salaries and Wages			1371 13 2
				103	3	1	Library and Map-Rooms			215 8 1
Subscriptions	2735	10	0				Subscriptions, &c., returned			30 0 0
Entrance Fees	432	0	0				Gold Medals, and other awards			47 12 0
Life Compositions	671	0	0				Postages, &c.			110 5 1
Arrears of Subscription	456	0	0				Office Expenses			247 19 9
				4294	10	0	Publications and Illustrations			1128 16 5
Parliamentary Grant					500	0	Furniture and Repairs			63 3 2
Royal Premium					52	10	Expeditions			193 11 2
Sale of Publications					90	15	Miscellaneous			92 3 0
Advertisements					39	9				
Half Year's Dividend on 2000 <i>l.</i> India 5 } per Cents.	49	3	4				Addition to Funded Property (1000 <i>l.</i>)			3943 17 4
Half Year's Dividend on 11,500 <i>l.</i> New 3 } per Cents.	169	12	6				India 5 per Cent. Debentures)			1029 0 6
Half Year's Dividend on 2000 <i>l.</i> India 5 } per Cents.	49	3	4				Balance in Banker's hands	584	10	9
Half Year's Dividend on 1000 <i>l.</i> India 5 } per Cent. Debentures	24	11	8				Ditto Accountant's ,,	8	2	5
Half Year's Dividend on 11,500 <i>l.</i> New 3 } per Cents.	169	12	6							592 13 2
Miscellaneous					462	3				
					23	0				
				£5565	11	0				£5565 11 0

Royal Geographical Society.

REGINALD T. COCKS, *Treasurer.*

Audited 17th April, 1868.

THOMAS H. BROOKING,
G. BALFOUR,
CHARLES WHITE,
H. JONES WILLIAMS,

Auditors.

APPENDIX B.

ESTIMATE FOR THE YEAR 1868.

<i>Receipts.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>	<i>Expenditure.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
Cash Balance, 1st Jan., 1867	592	18	2	Rent, Taxes, and House Expenses	..	..	..
Annual Subscriptions	2700	0	0	Salaries (whole Staff) and Wages	..	..	..
Life Compositions	450	0	0	Library and Map-Rooms	..	..	..
Entrance Fees	420	0	0	Gold Medals and other Awards	..	..	..
Arrears of Subscriptions	200	0	0	Postages, &c.	..	..	..
Royal Premium for 1868	52	10	0	Office Expenses	..	..	..
Parliamentary Grant	500	0	0	Journal, with Maps, and Proceedings	..	..	..
Sale of Publications, Advertisements, &c.	110	0	0	Library Catalogue (classified)	..	..	..
Dividends and Small Receipts	500	0	0	Livingstone Search Party:—	..	..	..
Refund by Admiralty of Salary and Expenses of Mr. John Reid, attached to Livingstone Search Party	122	15	4	Grant to Mr. E. D. Young	..	..	..£100
Amount of compensation due from Waterloo and White- hall Railway for the Society's Stables	150	0	0	„ Mr. Reid	..	..	.. 50
				Amount available for investment or advancement of Geographical Science	4095	0	0
				Cash Balance	1200	0	0
					502	18	6
					£5797	18	6

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 1st 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.

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(ELECTED 26th MAY, 1863.)

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Assistant Secretary and Editor of Transactions,

H. W. BATES, Esq.

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1ST JANUARY, 1869.

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H. I. M. Dom Pedro II., Emperor of Brazil.	His Imperial Highness the Grand Duke Constantine, Pres. Imp. Geo. Soc. of St. Petersburg.
His Majesty the King of Sweden and Norway.	His Royal Highness the Duke of Edinburgh.
His Majesty the King of the Belgians.	His Imperial Highness Ismail Pasha, Viceroy of Egypt.
His Imperial Highness the Ex-Grand Duke of Tuscany.	

HONORARY CORRESPONDING.

ABICH, Dr. William Hermann, St. Petersburg	HANSTEIN, Prof., For. M.R.S. Christiania
AKRELL, Gen. Carl, Topo. Corps of Sweden, Stockholm	HAZELIUS, M.-Gen. J. A., Chief of the Topo. Corps of Sweden .. Stockholm
ALMEIDA, Dr. Candido Mendes de	HELMERSEN, Col. P. .. St. Petersburg
BAER, Chev. de K. E., Mem. Imp. Acad. of Sciences St. Petersburg	HÜGEL, Baron Ch. von Brussels
BALBI, M. Eugène de Milan	IRMINGER, Rear-Admiral C. L. C., R.D.N., Copenhagen
BASTIAN, Dr. Adolph Bremen	JANSEN, Capt. M. H., D.R.N., Delft, Holland
BERBRUGGER, M. M. Algiers	JOCHMUS, Field Marshal Lieutenant Baron Vienna
BERGHAUS, Prof. Heinrich Berlin	KENNELLY, D. J. Esq., F.R.A.S.
BURMEISTER, Dr. Hermann, Buenos Ayres	KHANIKOF, M. Paris
CHALK, Prof. Paul Geneva	KIEPERT, Dr. H. Berlin
COELLO, Don Francisco Madrid	LEAL, His Exc. Senhor Fernando da Costa, Governor of Mozambique
DANA, Professor James D., New Haven, Connecticut	LEAL, José da Silva Mendes, Minister of the Colonies Lisbon
D'AVEZAC, M. Paris	LINANT Pasha Alexandria
DUFOUR, Gen., Director of the Topo. Depart., Switzerland Geneva	LIVINGSTONE, David, Esq., M.D., LL.D.
DUVEYRIER, M. Henri Paris	LÜTKE, Admiral F. B., Pres. of the Imp. Academy of Sciences .. St. Petersburg
EHRENBERG, C. P., For. M.R. and L.S., Berlin	MACEDO, J. J. da Costa de Lisbon
ERMAN, Prof. Adolph Berlin	MADOZ, Don Pascual Madrid
FAIDHERBE, Général L., Général Commandant à Bone Algérie	MALTE-BRUN, M. V. A., Sec. Geogr. Soc. of Paris
FIGANIERE, Command. Jorge César Lisbon	MAURY, Commodore M. F.
FORCHHAMMER, Prof. P.W. .. Kiel	NARDI, Monsignor Francesco .. Rome
FREMONT, General New York	NEGRI, Chevalier Cristoforo .. Turin
GRINNELL, Henry, Esq. V.P. Geogr. Soc. of New York	PETERMANN, Dr. Augustus .. Gotha
GUYOT, Prof., LL.D., Princeton, New Jersey	PHILIPPI, Dr. Rodulfo Armando .. Chili
HADINGER, Dr. William, V.P. Imp. Geogr. Soc. of Vienna	PLATEN, His Excellency Count.

RAIMONDY, Don Antonio Lima	SYDOW, Lt.-Col., Emil von (Chief of the Geographical Department of the Staff of the Prussian Army), Behren Strasse, 66, Berlin
RANUZZI, Count Annibale Bologna	TCHIHATCHEF, M. Pierre de .. Paris
RÜPPELL, Dr. E., For. M.L.S. .. Frankfort	Tschudi, Herr T. T. von Vienna
SALAS, Don Saturnino, Pres. Topo. Depart., Argentine Repub. Buenos Ayres	VANDER MAELEN, Mr. Ph. .. Brussels
SCHEDA, Herr von, Director of the Imp. Inst. of Military Geogr. Vienna	VERNEUIL, M. E. de Paris
SCHERZER, Dr. Karl von Vienna	VILLAVICENCIO, Don Manuel Guayaquil
SOLDAN, Don Marino Felipe Paz, Lima.	WRANGELL, Admiral Baron, St. Petersburg
SONKLAR, Lieut.-Col. the Chev. de, Wiener, Neustadt, Vienna	ZIEGLER, M. J. M. Winterthur
STROVE, Prof. Otto, Imp. Observ. of Pulkowa St. Petersburg	

F E L L O W S .

(To 1st JANUARY, 1869.)

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

Year of Election.	
1868	*Abbott, Wm., S. D., Esq. 28, <i>Pembridge Crescent, W.</i>
1868	Abdy, Rev. Albert, M.A. <i>Hillingdon End, Uxbridge.</i>
1860	À Beckett, Arthur M., Esq., F.R.C.S.E.
1851	Abinger, W. F. Scarlett, Lord. <i>Guard's Club, S.W.</i>
1865	Abercromby, Hon. J. <i>4th Battalion Rifle Brigade, Chester.</i>
1865	Acheson, Frederick, Esq., C.E. 7, <i>College-hill, Highbury-park, North, N.</i>
1861	Acland, J. Barton Arundel, Esq. <i>Mount Peel, Canterbury, New Zealand. Care of A. Mills, Esq., 34, Hyde-park-gardens, W.</i>
1853	Acland, Sir Peregrine Palmer F. P., Bart. <i>Fairfield, Somerset.</i>
1830	*Acland, Sir Thomas Dyke, Bart., F.R.S. 34, <i>Hyde-park-gardens, W.; and Killerton, Exeter, Devon.</i>
1867	10 Adair, Col. Alex. Shafto. 7, <i>Audley-square, W.</i>
1867	Adare, Viscount. <i>Clearwell-court, Coleford, Gloucestershire.</i>
1861	Addington, Right Hon. H. U. 78, <i>Eaton-place, S. W.</i>
1862	Addison, Col. Thomas, C.B.
1859	Ainslie, Col. H. Francis. <i>Junior United Service Club, S. W.; and Burlington-chambers, 180, Piccadilly, W.</i>
1830	*Ainsworth, W. F., Esq., F.S.A. <i>Ravenscourt-villa, New-road, Hammersmith, W.</i>
1859	Airlie, David Graham, Earl of. <i>Holly-lodge, Kensington, W.</i>
1860	Aitchison, David, Esq. 180, <i>Piccadilly, W.</i>
1830	*Albemarle, George Thomas, Earl of. 11, <i>Grosvenor-square, W.; Quiddenham-hall, Larkingford, Norfolk; and Elvedon-hall, Suffolk.</i>
1862	Alcock, Sir Rutherford, K.C.B. <i>Athenæum Club, S. W.</i>
1838	20* Aldam, William, Esq. <i>Frickley-hall, near Doncaster.</i>
1865	Aldom, Joseph R. Esq., M.A., PH. DR. <i>Sahway-house, Leyton, Essex.</i>
1857	Aldrich, Captain Robert D., R.N. <i>Windmill-road, Croydon, Surrey, S.</i>
1830	Alexander, Colonel Sir Jas. Ed., K.C.L.S., F.R.A.S., F.R.S.E., etc., 14th Regt. <i>United Service Club, S. W.; and Westerton-house, Bridge of Allan, N.B.</i>
1864	Allan, C. H., Esq. <i>Lloyds, E.C.; and 31, Park-street, Stoke Newington, N.</i>
1857	Allan, G. W., Esq. <i>Moss Park, Toronto, Canada. Care of Gen. J. H. Lefroy, R.A., Royal Arsenal, Woolwich, S.E.</i>

- Year of Election.
- 1858 Allan, Jas., Esq. 122, *Leadenhall-street, E.C.*
- 1867 Allen, Alderman Wm. F. 6, *Petersham-terrace, South Kensington, W.*
- 1865 Allen, James Pearce, Esq. 13, *Waterloo-place, S.W.*
- 1854 Ancona, J. S., Esq. 8, *John-street, Adelphi, W.C.*
- 1860 30 Anderson, John Edmund, Esq. *Henlade House, Taunton, Somerset.*
- 1867 Anderson, Sir Henry L., K.C.B. *India-office, S.W.*
- 1863 Anderson, James, Esq. 1, *Billiter-court, City, E.C.*
- 1861 Anderson, John, Esq. Messrs. W. R. Adamson and Co. *Shanghai. Care of Messrs. Jao. Burd and Co., Hong Kong. Per Messrs. Adam, Thomson, and Co., 48, Lime-street, E.C.*
- 1861 *Anderson, Col. W., C.B. 19, *Gloucester-square, Hyde-park, W.*
- 1868 Anderson, John, Esq. *Conservative Club, S.W.*
- 1868 Anderson, Joseph, Esq. 7, *Cleveland-square, Hyde-park, W.*
- 1856 *Andrew, William P., Esq.
- 1867 Andrews, G. H., Esq. *The Cedars, New Brentford.*
- 1866 Andrews, John R., Esq. *East-hill-house, Wimbledon, S.W.*
- 1868 40 Angas, George F., Esq. 72, *Portland-road, Notting-hill, W.*
- 1861 Annealey, Col. the Hon. Hugh, M.P. 25, *Norfolk-street, Park-lane, W.*
- 1860 *Anson, Sir John William Hamilton, Bart. 55, *Portland-place, S.W.; and Sherley-house, Croydon.*
- 1853 Ansted, Prof. D. T., M.A., F.R.S., etc. 33, *Brunswick-square, W.C.; Athenæum Club, S.W.; and Chateau Vieux, St. Léonard, Boulogne-sur-Mer.*
- 1868 *Anstey, Chisholm, Esq. 2, *Plowden-buildings, Temple, E.C.*
- 1857 Anstruther, M.-Gen. Phillip, C.B., Madras Artill.
- 1864 Anstruther, Lieut. R. L., Rifle Brigade. *Montreal, Canada. Care of Lt.-Col. L. Anstruther, Hintlesham-hall, Ipswich.*
- 1830 *Antrobus, Sir Edmund, Bart. 146, *Piccadilly, W.; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.*
- 1863 Arber, Edward, Esq., A.K.C. *Admiralty, W.C.; Civil Service Club, S.W.*
- 1858 Arbuthnot, George, Esq. 23, *Hyde-park-gardens, W.*
- 1862 50 Arbuthnot, Lieut. George, R.H.A. *Cowarth, Sunningdale.*
- 1860 Arcoedeckne, Andrew, Esq. 35, *Albemarle-street, W.*
- 1861 Archer, Graves Thos., Esq. 1, *Ennismore-place, Prince's-gate, S.W.*
- 1866 Arconati, The Marquis Giarmmartino. *Casa Prini, Pisa. Care of Mr. Bernard Quarich, 15, Piccadilly, W.*
- 1855 *Arden, Richard Edward, Esq. *Sunbury-park, Middlesex, S.W.*
- 1858 *Armistead, Rev. Charles John, M.A., F.S.A. *United University Club, S.W.; National Club, S.W.; and Withcall-rectory, near Louth, Lincolnshire.*
- 1863 Armitage, Edward, Esq. 3, *Hall-road, St. John's-wood, N.W.*
- 1867 Armitstead, Geo., Esq., M.P. *Errol Park, Errol, N.B.*
- 1857 Armstrong, Alexander, Esq., M.D., Inspector-General, R.N., F.R.C.P. *Junior United Service Club, S.W.*
- 1830 *Arrowsmith, John, Esq., F.R.A.S. 35, *Hereford-square, Old Brompton, S.W.*
- 1863 60 Arthur, Captain William, R.N. *The Priory, Leatherhead.*
- 1863 Ashburton, Alex. Hugh, Lord.

Year of Election.	
1864	* Ashton, R. J. Esq. <i>Hatton-court, Threadneedle-street, E.C.</i>
1853.	* Ashwell, James, Esq., M.A., F.G.S.
1851	Astley, Francis D. P., Esq., M.B.L. 67, <i>Eaton-square, S. W.</i>
1830	* Atkins, John Pelly, Esq., F.S.A. <i>Halsted-place, near Sevenoaks.</i>
1860	Attwell, Professor Henry. <i>Barnes, S. W.</i>
1859	Austen, Capt. Henry H. Godwin, 24th Foot, Trig. Survey, Panjab. <i>Junior United Service Club, S. W.; and Chilworth-manor, Guildford, Surrey.</i>
1863	Austin, John G., Esq.
1854	Ayrton, Acton S., Esq., M.P. 8, <i>Essex-court, Temple, E.C.</i>
1845	70* Ayrton, Frederick, Esq.
1866	* Babington, William, Esq., 23, <i>Fulham-place, Maida-hill, West, W.; and Bonny River, West Coast of Africa.</i>
1836	* Back, Admiral Sir Geo., D.C.L., F.R.S. 109, <i>Gloucester-place, Portman-sq., W.</i>
1863	* Backhouse, John Henry, Esq. <i>Darlington.</i>
1866	Bacon, Geo. Washington, Esq. 337, <i>Strand, W.C.</i>
1864	Badger, Rev. Geo. P. 21, <i>Leamington-road Villas, Westbourne-park, W.</i>
1863	Bagot, Christopher N., Esq. <i>Oriental Club, W.</i>
1862	Bagot, Capt. L. H. <i>Care of C. S. Bagot, Esq., 40, Chancery-lane, W.C.</i>
1859	Bailey, L. C., Esq., Staff Commander, R.N. <i>Topographical Department, New-street, Spring-gardens, S. W.</i>
1857	Baillie, Major John, Bengal Staff Corps. 22, <i>Palace-gardens-terrace, Kensington, W.</i>
1862	80 Baillie, John B., Esq. <i>Leys-castle, Inverness.</i>
1861	Baillie, William Henry, Esq. 12, <i>Chapel-street, Belgrave-square, S. W.</i>
1857	Baines, Thomas, Esq.,
1861	* Baker, John, Esq.
1862	Baker, Capt. Robert B. <i>Oriental Club, Hanover-square, W.</i>
1865	Baker, Sir Samuel White. <i>Hedenham-hall, Bungay, Norfolk; and 118, Belgrave-road, S. W.</i>
1855	Baker, Major Wm. T., 85th Regt. <i>Junior United Service Club, S. W.; and 31, Grosvenor-place, Bath.</i>
1861	Baldwin, William Charles, Esq. <i>Leyland-vicarage, Preston.</i>
1861	Balfour, David, Esq. <i>Balfour-castle, Kirkwall, N.B.</i>
1847	Balfour, M.-General George, R.A., C.B. 27, <i>Gordon-street, Gordon-square, W.C.; and Oriental Club, Hanover-square, W.</i>
1853	90 Balfour, John, Esq. <i>New South Wales; and Colinton, Queensland; 39, James'-street, S. W.</i>
1863	Balfour, John Osborn, Esq. 7, <i>The Common, Woolwich.</i>
1863	Balfour, William, Esq. <i>Post-office, Deal, Kent.</i>
1860	Ball, John, Esq. <i>Oxford and Cambridge Club, S. W.</i>
1863	Bamforth, Rev. J., Principal of Doveton College. <i>Madras. Care of Messrs Jackson, Walford, and Hodder, 27, Paternoster-row, E.C.</i>
1852	Bancroft, Capt. W. C., 16th Regt. <i>Aide de Camp and Military Secretary, King's House, Jamaica; M'Gregor and Co., Charles-street, S. W.</i>

- 1863 Banks, George F., Esq., Surgeon R.N.
- 1858 Bannerman, Sir Alexander, Bart. 46, *Grosvenor-place, S.W.*
- 1868 Barber, Captain Harby, J. A. 55, *Parliament Street, S.W.*
- 1840 *Barclay, Arthur Kett, Esq., F.R.S. *Park-street, Southwark, S.E.; and Bury-hill, Dorking, Surrey.*
- 1863 100 Barford, A. H., Esq., M.A. 1, *Cornwall-terrace, Regent's-park, N.W.*
- 1835 *Baring, John, Esq. *Oakwood, Chichester.*
- 1844 *Baring, Thomas, Esq., M.P. 41, *Upper Grosvenor-street, W.*
- 1862 Barlee, Frederick Palgrave, Esq. *Care of G. Laurence, Esq., 12, Marlboro'-road, Lee, S.E. Perth, Western Australia.*
- 1868 Barlow, Frederick Thomas Pratt, Esq. 26, *Rutland-gate, S.W.*
- 1864 Barnett, H. C., Esq. *Care of Alex. Whytock, Esq., 9, George-st., Edinburgh.*
- 1858 Barratt, James, Esq. *Lymne-hall, near Harrington, Cheshire.*
- 1838 Barrington, Lord, M.P. 19, *Hertford-street, Mayfair, W.*
- 1867 Barrington Ward, Marcus J., Esq., F.L.S. *Magdalens-hall, Oxford.*
- 1833 Barrow, John, Esq., F.R.S., F.S.A. 17, *Hanover-terrace, Regent's-park, N.W.*
- 1863 110 Barry, Alfred, Esq.
- 1857 Bartholomew, John, Esq. 4, *North-bridge, Edinburgh.*
- 1861 Bartlett, Herbert Lewis, Esq. *Union Club, S.W.*
- 1802 Barton, Alfred, Esq., M.D. *Oriental Club, W.; and Hampton Court.*
- 1864 Basevi, Capt. J. P., R.E. 100, *Belgrave-road, S.W.; Messrs. Grindlay & Co., Parliament-street, S.W.*
- 1867 *Bateman, James, Esq., F.R.S., L.S. *Knipersley-hall, Staffordshire.*
- 1850 Bateman, John F., Esq., C.E. 16, *Great George-street, Westminster, S.W.*
- 1800 Bates, Henry Walter, Esq., F.Z.S. 15, *Whitehall-place, S.W.*
- 1800 Bateson, George, Esq. 45, *Green-street, Park-lane, W.*
- 1800 Batten, John H., Esq. *Alverne Hill, Penzance; and Oriental Club, Hanover-square, W.*
- 1864 120 Bax, Capt. Henry G. 2, *Sussex-place, Hyde-park-gardens, W.*
- 1807 *Baxter, Sir David, Bart. *Dundee; 5, Moray-place, Edinburgh; and Kilmarnock-castle, Cupar, Fife.*
- 1867 Baxter, Richard, Esq. (Barrister-at-Law). 19, *Letnater-gardens, Bayswater, W.*
- 1858 Bazendale, Joseph H., Esq. 78, *Brook-street, W.; and Scott's-bridge, near Rickmansworth, Herts.*
- 1800 Bayley, Chas. Jno., Esq., C.B., M.A. 51, *Victoria-road, Kensington, W.*
- 1800 Bayley, H. Esq. *Blackheath-park, Kent.*
- 1802 Bayly, Lieut.-Col. John, R.E. *Ordnance Survey Office; 131, St. George's-road, Pimlico, S.W.*
- 1802 Baynes, Lieut.-Col. R. Stuart. *Army and Navy Club, S.W.; and 38, Jermyn-street, S.W.*
- 1800 Baynton, Capt. Edward. *Trafalgar Lodge, Shirley, Southampton.*
- 1806 Beamish, Captain H. H., R.N. 9, *Cadogan-place, S.W.*
- 1800 130 Beardmore, Nathaniel, Esq., C.E. 30, *Great George-street, Westminster, S.W.*
- 1858 Beauclerk, Aubrey de Vere, Esq. *Ardglass, Co. Belfast.*

Year of Election	
1854	Beaufort, William Morris, Esq., Bengal Civil Service. <i>Bengal.</i>
1856	Beaumont, John Aug., Esq. <i>Wimbledon-park-house, Wimbledon, S.W.; and 50, Regent-street, W.</i>
1851	*Beaumont, Wentworth B., Esq., M.P. 144, <i>Piccadilly, W.; Bywell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.</i>
1863	Beavan, Hugh J. C., Esq., F.A.S.L. 13, <i>Blandford-square, Regent's-park, N.W.; 4, Middle-temple-lane, E.C.; and Junior Carlton Club, S.W.</i>
1867	Beazeley, Alexander, Esq., C.E. <i>Engineers' Office, Trinity-house, E.C.</i>
1867	Beazeley, Michael, Esq., M.I.C.E. <i>Trinity Works, Penzance, Cornwall.</i>
1865	Bebb, Horatio, Esq. 13, <i>Gloucester-place, W.; and Leamington.</i>
1861	Beckett, James F., Esq., Staff Commander, R.N., F.R.S.A. 6, <i>Boyne-terrace, Notting-hill, W. Care of Captain George.</i>
1838	140 Beckford, Francis L., Esq. <i>Ruxley-lodge, Esher, Surrey.</i>
1859	*Bedford, Capt. G. Augustus, R.N. 5, <i>Ormond-terrace, Regent's-park, N.W.</i>
1860	Beston, Samuel Orchart, Esq.
1861	*Begbie, James, Esq. 17, <i>Trinity-square, Tower Hill, E.C.</i>
1860	Begbie, Thomas Stirling, Esq. 4, <i>Mansion-house-place, E.C.</i>
1846	Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. <i>Bekebourne-house, near Canterbury.</i>
1853	Belcher, Rev. Brymer. <i>St. Gabriel's, Pimlico, S.W.</i>
1830	*Belcher, Vice-Adm. Sir Edward, K.C.B., F.R.A.S. 22A, <i>Connaught-square, W.</i>
1858	Beldam, Edw., Esq. <i>Royston, Herts.</i>
1863	Belmore, The Earl of. <i>Dover-street, Piccadilly, W.</i>
1863	150*Bell, Charles, Esq., M.P. <i>Richmond.</i>
1858	*Bell, C. Davidson, Esq., Surveyor-General, Cape of Good Hope. <i>Cape Town. Care of the S. A. Pub. Library, Cape Town. Per Messrs. H. S. King and Co.</i>
1830	Bell, James Christian C., Esq. 42, <i>Westbourne-terrace, W.; and 15, Angel-court, Throgmorton-street, E.C.</i>
1868	Bell, Wm. A., Esq. B.A., M.B., 18, <i>Hereford-street, May Fair, W.</i>
1864	Bellamy, Edward, Esq. 10, <i>Duke-street, St. James's, S.W.</i>
1830	*Bennett, John Joseph, Esq., F.R.S. <i>British Museum, W.C.</i>
1857	Bennett, J. Risdon, Esq., M.D. 15, <i>Finbury-square, E.C.</i>
1856	*Benson, Robert, Esq. 16, <i>Craven-hill-gardens, Bayswater, W.</i>
1856	*Benson, William, Esq., Barrister-at-Law. 16, <i>Craven-hill-gardens, Bayswater, W.</i>
1830	Bentham, George, Esq., Pres. L.S. 25, <i>Wilton-place, S.W.</i>
1868	160 Bentley, George, Esq. <i>Upton-park, Slough.</i>
1833	Bentley, Richard, Esq. <i>New Burlington-street, W.</i>
1859	Berens, H. Hulse, Esq. <i>Sidcross, Foot's Cray, Kent.</i>
1861	Berkley, George, Esq., C.E. 9, <i>Victoria Chambers, Victoria-street, S.W.</i>
1865	Bernard, P. N., Esq. 8, <i>Finch-lane, E.C.</i>
1866	Berridge, F., Esq. <i>Winchester-house, Winchester-road, Adelaide-road, N.W.</i>
1856	Berry, Josiah, Esq. 16, <i>Regent-square, W.C.</i>
1863	Best, William, Esq. 3, <i>Belle-vue-place, Southampton.</i>
1867	Best, William John, Esq. 104, <i>Franklin-street, New York.</i>

- Year of
Election
- 1867 Bethune, Alexander M., Esq. *Otterburn, Hamlet-road, Upper Norwood; and 122, Leadenhall-street, E.C.*
- 1842 170* Bethune, R., Adm. C. R. Drinkwater, C.B. 4, *Cromwell-rd., South Kensington, W.*
- 1864 *Betts, E. L., Esq. *Preston-hall, Maidstone, Kent.*
- 1836 Betts, John, Esq. 115, *Strand, W.C.*
- 1866 Bevan, William, Esq. 8, *Cedars-road, Clapham-common, S.*
- 1862 Bicker-Caarten, Peter, Esq. 30, *Northumberland-place, Bayswater, W.*
- 1866 Bicknell, Algernon S., Esq. 37, *Onslow-square, S.W.*
- 1860 Bidder, G. Parker, Esq., C.E. 24, *Gt. George-st., S.W.; and Mitcham, Surrey, S.*
- 1865 Bidwell, Charles Toll, Esq. *Garrick Club, 35, King-st., Covent Garden, W.C.; and 28, Grosvenor-st., Eaton-sq., S.W. Care of John Bicholl, Esq., Foreign Office.*
- 1859 Bigge, Frederick W., Esq. *Debden-hall, Saffron Walden.*
- 1850 Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square, W.*
- 1858 180 Birch, Augustus F., Esq., M.A.
- 1860 Birch, H. W., Esq. 46, *Welbeck-street, Cavendish-square, W.*
- 1858 Birch, John William, Esq. 9^a, *New Broad-st., E.C.; and 27, Cavendish-sq., W.*
- 1859 Birch, Capt. Thomas, R.M. *United Service Club, S.W.*
- 1862 *Birchill, Capt. B. H. H. *St. Stephen's, Bedford, near Hounslow.*
- 1867 *Bischoffsheim, Henri Louis, Esq. 7, *Grafton-street, New Bond-street, W.*
- 1858 Bishop, George, Esq., F.R.A.S. *Union Club, S.W.; and The Meadows, Twickenham, S.W.*
- 1861 Bishop, James, Esq. 11, *Portland-place, W.*
- 1867 Bissou, Fredk. S. de Carteret, Esq. (Lieut. R.I.M.). 70, *Berners-street, W.*
- 1836 *Blaauw, William H., Esq., M.A., F.S.A., F.Z.S. *Beechlands, near Uckfield, Sussex.*
- 1860 190* Black, Francis, Esq. 6, *North-bridge, Edinburgh.*
- 1867 Black, Thomas, Esq., Superintendent P. and O. Steam Navigation Company's Dockyard. *Oriental-place, Southampton.*
- 1858 Blackett, Henry, Esq. 13, *Great Marlborough-street, W.*
- 1849 Blackie, W. Graham, Esq., PH. DR. 36, *Frederick-street, Glasgow.*
- 1861 *Blackney, William, Esq., R.N. *Hydrographic-office, S.W.*
- 1862 *Blackstone, Frederick Elliot, Esq., B.C.L. *British Museum, W.C.*
- 1854 Blaine, D. Robertson, Esq., Barrister-at-Law. 3, *Paper-buildings, Temple, E.C. and 8, Southwick-place, Hyde-park-square, W.*
- 1868 Blair, William Edward, Esq. 12, *Green-street, Grosvenor-square.*
- 1865 Blake, Brig.-Gen., H. W. *Maulmein, British Burmah.*
- 1857 *Blake, Wollaston, Esq. 8, *Devonshire-place, W.*
- 1859 200 Blakeley, Capt. Alexr., R.A.
- 1868 Blakiston, Matthew, Esq. *Mobberley, Knutsford, Cheshire.*
- 1857 Blakiston, Captain Thomas, R.A. 28, *Wellington-street, Woolwich, S.E.*
- 1868 Blanc, Henry, Esq., M.D., &c. 9, *Bedford-street, Bedford-square, W.C.*
- 1830 *Blanshard, Henry, Esq., F.R.A.S.
- 1861 *Blanshard, Henry, Esq. 78, *Westbourne-terrace, W.; and 53, Chancery-lane, W.C.*
- 1857 Blanshard, Richard, Esq. *Fairfield, Lymington, Hants.*
- 1865 Blaxall, Fras. H., Esq., M.D. *Tendring, near Colchester.*

Year of Election.	
1854	Blencowe, W. Robert, Esq. <i>The Hook, Lewes.</i>
1861	Blenkin, William, Esq. <i>Addlestone, Surrey.</i>
1839	210* Blewitt, Octavian, Esq. 4, <i>Adephi-terrace, Strand, W.C.</i>
1864	Blore, Edward, Esq., D.C.L., F.R.S., F.S.A., &c. 4, <i>Manchester-square, W.</i>
1866	Blew, William Wootton, Esq. <i>Care of Mrs. Evons, Belvedere-park, North Kent.</i>
1861	Bloxsome, Oswald, jun., Esq. <i>Wherstead Park, Ipswich, Suffolk.</i>
1837	* Blunt, Jos., Esq.
1863	* Blunt, Wilfred, Esq.
1868	Blyth, Philip P., Esq. (J.P. for Middlesex). 53, <i>Wimpole-street, W.</i>
1858	Boln, Henry G., Esq. <i>York-st., Covent-garden, W.C.; and North-end-house, Twickenham, S.W.</i>
1863	Boileau, Sir John P., Bart., F.R.S. 20, <i>Upper Brook-street, W.</i>
1850	Bollaert, William, Esq. 21A, <i>Hanover-square, W.</i>
1862	220 Bolton, Capt. Francis John, 12th Regt. <i>Chatham.</i>
1861	Bompas, George Cox, Esq. 15, <i>Stanley-gardens, Kensington-park, W.</i>
1864	Bone, John William, Esq., B.A., F.R.S.L., F.S.S. 42, <i>Bedford-square, W.C.</i>
1861	Bonney, Charles, Esq. <i>Adelaide, Australia.</i>
1858	Bonnor, George, Esq. 49, <i>Pall-mall, S.W.; and 2, Bayswater-terr., Kensington-square, W.</i>
1865	Bonwick, James, Esq. <i>St. Kilda, Melbourne. Care of W. Beddow, Esq., 22, South Audley-street, W.</i>
1866	Booker, Wm. Lane, Esq. <i>Care of F. B. Alston, Esq., Foreign Office.</i>
1859	Borough, Sir Edward, Bart. 4, <i>Nassau-street, Dublin.</i>
1845	* Borrer, Dawson, Esq. <i>Altmont Ballon, Co. Carlow, Ireland.</i>
1856	* Botcherby, Blckett, Esq., M.A. 48, <i>Brompton-row, S.W.</i>
1858	230* Botterill, John, Esq. <i>Flower-bank, Burley-road, Leeds.</i>
1860	Boustead, John, Esq. 34, <i>Craven-street, Strand, W.C.</i>
1866	* Boucher, Emanuel, Esq. 12, <i>Oxford-square, Hyde-park, W.</i>
1865	Bouverie, P. P., Esq. 32, <i>Hill-street, Berkeley-square, W.</i>
1855	Bovet, Charles, Esq. 135, <i>Camden-road, N.W.</i>
1867	Bowell, Wm., Esq., M.C.P. <i>Gate-house Grammar-school, Hereford.</i>
1861	* Bowen, Charles Christopher, Esq. <i>Christchurch, Canterbury, New Zealand. Care of A. O. Ottywell, Esq., 16, Charing-cross, S.W.</i>
1854	* Bowen, Sir George Ferguson, K.C.M.G., M.A. <i>Governor of New Zealand.</i>
1866	Bower, Anthony Maw, Esq. 8, <i>Rochester-road, Camden-town, N.W.</i>
1862	Bowie, John, Esq. <i>Conservative Club, S.W.</i>
1833	240 Bowles, Admiral Sir William, K.C.B. 8, <i>Hill-street, Berkeley-square, W.</i>
1868	Bowly, William, Esq. <i>Cirencester.</i>
1856	Bowman, John, Esq. 9, <i>King William-street, E.C.</i>
1865	Bowring, John, Esq. <i>Larkbeore, Exeter.</i>
1866	Bowring, Samuel, Esq. 1, <i>Westbourne-park, W.</i>
1868	Bowser, Alfred T., Esq. <i>Cromwell-house, Hackney, N.E.</i>
1862	Boyce, Rev. W. B., Secretary to Wesleyan Missionary Society. 38, <i>Münner-square, Islington, N.; and Wesleyan Mission House, Bishopsgate-street, E.C.</i>

Year of
Election.

- 1845 *Boyd, Edward Lennox, Esq., F.S.A. 35, *Cleveland-square, Hyde-park, W.*
- 1865 Boyle, Frederick, Esq. *The Firs, Bebington, Cheshire.*
- 1856 Boyne, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, S.W.*; *Bramcote-castle, Durham*; and *Burwarton-hall, Ludlow, Salop.*
- 1851 250 Bracebridge, Charles Holte, Esq. *Atherstone, Warwick.*
- 1862 Braithwaite, Isaac, Esq. 68, *Old Broad-street, E.C.*
- 1863 *Bramley-Moore, John, Esq. *Langley-lodge, Gerrard's Cross, Bucks.*
- 1859 *Brand, James, Esq. 109, *Fenchurch-street, E.C.*
- 1868 Brand, Jas. Ainsworth, Esq. 42, *Mornington-road, Regent's-park, N.W.*
- 1867 Brandis, Dr. D., F.L.S. *Director of Forests, Calcutta. Care of W. H. Allen, Esq., 13, Waterloo-place, S.W.*
- 1860 Brassey, T., Esq. 4, *Great George-street, S.W.*; and 56, *Lowndes-square, S.W.*
- 1859 Braybrooke, Philip Watson. *Assistant Colonial Secretary, Ceylon. Messrs. Price and Co., Craven-street.*
- 1861 *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.*
- 1853 260 *Brereton, Rev. John, LL.D., F.S.A. *Bedford.*
- 1834 *Breton, Wm. Henry, Esq., Commd. R.N., M.R.I. *The Rectory, Charmouth, Dorset.*
- 1862 Brett, Charles, Esq. 16, *Pembridge-square, Bayswater, W.*
- 1867 Bridge, John, Esq. *Altrincham, Cheshire.*
- 1859 Bridges, Nathaniel, Esq.
- 1852 *Brierly, Oswald W., Esq. 8, *Lidlington-pl., Harrington-sq., Hampstead-rd., N.W.*
- 1865 Briggs, Major, J. P. *Linthill, Lilliesleaf, Selkirk, N.B.*
- 1861 *Bright, Sir Charles T., F.R.A.S. 6, *Westminster-chambers, Victoria-street, S.W.*; and 69, *Lancaster-gate, W.*
- 1868 Bright, Henry Arthur, Esq. *Fairfield, Liverpool.*
- 1860 Bright, James, Esq., M.D. 12, *Wellington-square, Cheltenham.*
- 1854 270 Brine, Major Frederic, R.E. K.T.S. *Executive Engineer, Punjaub, Athenæum Club, S.W. Army and Navy Club, S.W.*; *Care of Mrs. F. Brine, Edgcumbe, Torquay.*
- 1856 Brine, Commander Lindsay, R.N. *Army and Navy Club, S.W.*; *care of Messrs. Woodhead.*
- 1861 Bristowe, Henry Fox, Esq.
- 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, Hon. George C., Esq. 32A, *Mount-street, W.*
- 1864 *Brooke, Sir Victor A., Bart. *Colebrooke-park, Co. Fermanagh, Ireland.*
- 1862 Brookes, Thomas, Esq. *Mattock-lane, Ealing, W.*
- 1856 280 *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. 15, *New Broad-street, City, E.C.*; and 5, *Norfolk-crescent, Hyde-park, W.*
- 1863 *Broughall, William, Esq. *Broadwater, Down, Tunbridge-Wells.*

Year of Election.	
1850	Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, <i>Berkeley-square, W.</i> ; and <i>Erlestoke-park, Westbury, Wilts.</i>
1868	Brown, Col. David (Madras Staff Corps). 14, <i>St. James's-square, S. W.</i>
1856	*Brown, Daniel, Esq. <i>The Elms, Larkhall-rise, Clapham, S.</i>
1864	Brown, Edwin, Esq., F.G.S. <i>Burton-on-Trent.</i>
1867	Brown, Geo. H. Wilson, Esq. <i>Victoria, Vancouver Island, British Columbia.</i> <i>Care of H. C. Beeton, Esq., 5, Bow-churchyard, E.C.</i>
1860	Brown, James, Esq. <i>Rossington, Yorkshire.</i>
1863	190 Brown, Jas. P., Esq. <i>Cocoes, Brazil. Care of Mr. C. Williams, 25, Poultry, E.C.</i>
1865	*Brown, James R., Esq., F.R.S.N.A. Copenhagen. 5, <i>Langham-chambers, Langham-place, W.</i>
1867	Brown, Rev. J. C., LL.D., &c. <i>Haddington, Scotland.</i>
1861	*Brown, John Allen, Esq. <i>The Laurels, The Haven, Ealing, W.</i>
1867	Brown, Richard, Esq., C.E. 115, <i>Lansdowne-road, Notting-hill, W.</i>
1867	Brown, Robert, Esq. 4, <i>Gladstone-terrace, Hope-park, Edinburgh.</i>
1856	*Brown, Samuel, Esq. 11, <i>Lombard-st., E.C.</i> ; and <i>The Elms, Larkhall-rise, Clapham, S.</i>
1858	*Brown, Thomas, Esq. 8, <i>Hyde-park-terrace, Hyde-park, W.</i>
1859	Brown, William, Esq. <i>Loat's-road, Clapham-park, S.</i>
1863	Browne, H. H., Esq. 70, <i>Westbourne-park-villas, Harrow-rd., Paddington, W.</i>
1862	300 Browne, John Comber, Esq., Superintendent and Inspector of Government Schools. <i>Port Louis, Mauritius.</i>
1858	Browne, John H., Esq. <i>Port Gawler, S. Australia.</i>
1864	*Browne, Capt. Wade. 6, <i>Charles-street, Berkeley-square, W.</i>
1858	Browne, William J., Esq. <i>Marston Lodge, Pitville, Cheltenham.</i>
1852	Browning, H., Esq. 72, <i>Grosvenor-st., W.</i> ; and <i>Ampton-hall, Bury St. Edmund's.</i>
1856	*Browning, Thomas, Esq. 6, <i>Whitehall, S. W.</i>
1859	Bruce, Henry Austin, Esq. <i>Duffryn, Aberdare, Glamorganshire.</i>
1863	Brunton, John, Esq., M.I.C.E., F.G.S. 42, <i>Blenheim-crescent, Notting-hill, W.</i>
1856	Bryant, Walter, Esq., M.D., F.R.C.S. 7, <i>Bathurst-street, Hyde-park-gardens, W.</i>
1843	*Buchan, John Hitchcock, Esq. <i>The Grove, Hanwell, W.</i>
1867	310*Bucleuch, his Grace the Duke of, K.G., F.R.S. <i>Dalkeith Palace, near Edinburgh;</i> <i>and Montagu-house, Whitehall, S. W.</i>
1859	Buckland, Edward C., Esq. 36, <i>Lansdowne-road, Notting-hill, W.</i>
1863	Budd, J. Palmer, Esq. <i>Ynisdoren, near Swansea.</i>
1868	*Bull, William, Esq., F.L.S. <i>King's-road, Chelsea, S. W.</i>
1865	Buller, Sir Edward M., Bart., M.P. <i>Old Palace-yard, S. W.</i> ; and <i>Dilhorn-hall, Cheadle, Staffs.</i>
1867	*Bulger, Capt. George Ernest, F.L.S., &c. <i>Care of Mr. Booth, 307, Regent-st., W.</i>
1863	Bullock, Commander Charles J., R.N. <i>Hydrographic-office, S. W.</i>
1830	*Bullock, Rear-Admiral Frederick. <i>Woolwich, S. E.</i>
1864	Bullock, W. H., Esq. <i>Grosvenor-hill, Wimbledon, S. W.</i>
1860	*Bunbury, Sir Charles James Fox, Bart.; F.R.S. <i>Barton-hall, Bury St. Edmund's.</i>
1839	320 Bunbury, E. H., Esq., M.A. 35, <i>St. James's-street, S. W.</i>

Year of Election.

- 1863 Bundoock, F., Esq. *Windham Club, S.W.*; and 4, *Radnor-pl., Gloucester-sq., W.*
- 1861 Burges, William, Esq. *Fethard, Co. Tipperary.*
- 1866 Burgess, James, Esq., M.R.A.S., Principal of Sir J. Jejeebhoy's Parsee B. Institution. *Hornby-rose, Bombay. Care of T. E. Gillespie, Esq., 31, Essex-st., Strand, W.C.*
- 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.*
- 1830 *Burton, Alfred, Esq. 36, *Marina, St. Leonard's.*
- 1833 330 *Burton, Decimus, Esq., F.R.S. 14, *Spring-gardens, S.W.*; and *St. Leonard's-cottage, Hastings.*
- 1859 *Burton, Capt. Richd. Fras., 18th Regt. Bombay N.I., H.B.M. Consul at Santos, Brazil. 14, *St. James's-sq., S.W.* Care of R. Arundell, Esq., *Admiralty, Somerset House, W.C.*
- 1858 Bury, William Coutts, Viscount. 48, *Rutland-gate, S.W.*
- 1861 Bush, Rev. Robert Wheeler, M.A. 1 *Milner-square, Islington, N.*
- 1868 Busk, William, Esq., M.C.P., &c. 28, *Bessborough-gardens, S.W.*
- 1861 Butler, Charles, Esq. 3; *Connaught-place, Hyde-park, W.*
- 1867 Butler, E. Dundas, Esq. *Geographical Department, British Museum, W.C.*
- 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.*
- 1866 340 Byass, Robert B., Esq. *Melville-park, Tunbridge Wells.*
- 1864 Bythsea, Capt. J., R.N., V.C. 20, *Grosvenor-place, Bath.* Care of G. J. Noel, Esq., *Admiralty, S.W.*
- 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.*
- 1866 Caldbeck, Capt. J. B. (P. and O. Sup. at Aden). 17, *West Mall, Clifton*, and 122, *Leadenhall-st., E.C.* Care of Mrs. Caldbeck, 8, *Oxford-road, Islington, N.*
- 1857 *Caldwell, Capt. Henry, R.N. *H.M.S. 'Mersey,' Portsmouth*; and 3, *Audley-square, W.*
- 1863 Callaghan, Thos. F., Esq. *Garrick Club, W.C.*
- 1861 Calthorpe, the Hon. Augustus Gough. 33, *Grosvenor-square, W.*
- 1855 *Calthorpe, F. H. Gough, Lord. 33, *Grosvenor-square, W.*
- 1854 Calvert, Frederic, Esq., Q.C. 5, *Tinley-street, Park-lane, W.*; and 8, *New square, Lincoln's-inn, W.C.*
- 1858 Cameron, Capt. Charles D. Care of E. Hertlet, Esq., *Foreign-office, S.W.*
- 1861 350 Cameron, Donald, Esq., M.P. *Auchnacarry, Invernesshire.*
- 1858 Cameron, Major-General Sir Duncan Alexander, R.E. C.B. *New Zealand.*
- 1864 Cameron, J., Esq. *Singapore.* Care of Messrs. H. S. King and Co.
- 1866 Cameron, R. W., Esq. *Staten Island, New York.* Care of Messrs. Brooks and Co., *St. Peter's-chambers, Cornhill, E.C.*

Year of
Election.

- 1861 Campbell, Capt. Frederick, R.N. 12, *Connaught-place, Hyde-park, W.*
- 1866 Campbell, George, Esq. 16, *St. George's-rd., Pimlico, S.W.*; and *Athenæum Club.*
- 1861 Campbell, James, Esq. 158, *Regent-street, W.*; and *Thornton Steward, York.*
- 1844 *Campbell, James, Esq. *Grove-house, Hendon, Middlesex*; and 37, *Seymour-street, W.*
- 1857 Campbell, James, Esq., Surgeon R.N. *Bangkok, Siam. Care of Messrs. H. S. King and Co.*
- 1834 *Campbell, James, Esq., jun. *Hampton-court-green, S.W.*
- 1863 360 Campbell, Jas. Duncan, Esq. *Peking. Care of H. C. Batclior, Esq., 155, Cannon-street, E.C.*
- 1857 Camps, William, Esq., M.D. 40, *Park-street, Grosvenor-square, W.*
- 1866 Canning, Sir Samuel, C.E. *The Manor-house, Abbots Langley, nr. Watford, Herts.*
- 1864 Canuon, John Wm., Esq. *Castle-grove, Tuam.*
- 1857 Cannon, Lieut.-General R. 10, *Kensington-gardens-terrace, W.*
- 1853 *Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square, S.W.*
- 1863 *Carew, R. Russell, Esq., J.P. *Carpenders-park, Watford, Herts*; and *Oriental Club, W.*
- 1862 Cargill, John, Esq., Member of the Legislative Assembly of New Zealand and Legislative Council of Otago. *Dunedin, Otago, New Zealand.*
- 1863 *Cargill, Wm. W., Esq. 4, *Connaught-place, Hyde-park, W.*
- 1864 *Carmichael, L. M., Esq., M.A., 5th Lancers, *Canterbury. Care of H. T. Clark, Esq., 50, Leicester-square, W.*
- 1865 370* Carnegie, David, Esq. *Eastbury, by Watford, Herts.*
- 1863 Carnegie, Commander, the Hon. J., R.N. 26, *Pall-Mall, S.W.*
- 1864 Carrington, R. C., Esq. *Admiralty, S.W.*
- 1861 Carter, Captain Hugh Bonham, Coldstream Guards. *Guards' Club, S.W.*; and 1, *Carlisle-place, Victoria-street, S.W.*
- 1868 Carter, Thomas Tupper, Esq., Lt. R.E. *Care of Messrs. H. S. King and Co., 45, Pall Mall.*
- 1860 Cartwright, Capt. Henry, F.S.A. *Barbican-lodge, Gloucester.*
- 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.E.*
- 1858 Casella, Louis P., Esq. 23, *Hatton-garden, E.C.*; and *South-grove, Highgate, N.*
- 1860 Cave, Amos, Esq. 109, *New-road, Kennington-park, S.*; and *Rathbone-place, Oxford-street, W.*
- 1857 380 Cave, Capt. Laurence Trent. 75, *Chester-square, W.*
- 1858 Cave, Right Hon. Stephen, M.P. 35, *Wilton-place, S.W.*
- 1863 Challis, John Henry, Esq. *Reform Club, S.W.*
- 1865 Chambers, Charles Harcourt, Esq., M.A. 2, *Chesham-place, S.W.*
- 1864 Chambers, David, Esq. *Paternoster-row, E.C.*
- 1858 Champion, John Francis, Esq. *High-street, Shrewsbury.*
- 1866 *Chandless, Wm., Esq., B.A. 1, *Gloucester-place, Portman-square, W.*
- 1867 Chapman, James, Esq. *Cape Town, Cape of Good Hope.*

Year of
Election.

- 1863 *Chapman, Spencer, Esq. *Roehampton, S.W.*
- 1860 Charlemont, Lord. *Charlemont-house, Dublin.*
- 1861 390 Charnock, Richard Stephen, Esq., PH.D.^r, F.S.A. 8, *Gray's-inn-square, W.C.*; and *The Grove, Hammersmith.*
- 1864 Chesdle, Walter, Esq., B.A., M.D. Camb. 2, *Hyde-park-place, Cumberland-gate, W.*
- 1861 Chestham, John Frederick, Esq. *Eastwood, Staleybridge.*
- 1855 Cheahire, 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.*
- 1859 Cbetwode, 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. *Hydrographic-office, S.W.*
- 1830 *Church, W. H., Esq.
- 1849 400 Churchill, Lord Alfred Spencer. 16, *Rutland-gate, S.W.*
- 1856 Churchill, Charles, Esq. *Weybridge-park, Surrey.*
- 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 *Eceswell-house, Maidens, Newport, Monmouthshire.*
- 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.*
- 1868 Clark, William, Esq. *The Cedars, South Norwood.*
- 1868 Clark, John Gilchrist, Esq. *Speddock, Dumfries, Dumfriesshire.*
- 1845 Clark, W. H., Esq. 6, *Leinster-terrace, Hyde-park, W.*
- 1859 Clarke, Capt. A., R.E. *Army and Navy Club, S.W.*
- 1855 410 *Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales. Mccsrs. Richardson, Cornhill.*
- 1859 Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge.*
- 1868 Clarke, W., Esq. 3, *Rosedale-terrace, Ladbrooke-square, W.*
- 1862 Claude, Eugène, Esq. *Villa Helvetia, Carlton-road, Tufnell-park, N.*
- 1842 *Clavering, Sir William Aloysius, Bart., M.A. *United University Club, S.W.* *Azwell-park, near Gateshead.*; and *Greencroft, Durham.*
- 1863 Clay, Sir Wm., Bart. 91, *Eaton-square, S.W.*
- 1863 Clayton, Capt. John W., late 15th Husars. 14, *Portman-square, W.*
- 1866 Clayton, Sir W. R. *Harleyford, Great Marlow, Bucks.*
- 1866 *Cleghorn, Hugh, Esq., M.D., Conservator of Forests. *Madras.*
- 1863 Clements, Rev. H. G. *United University Club, S.W.*
- 1860 420 Clerk, Capt. Claude. *Military Prison (Queen's Bench) Southwark, S.*
- 1858 Clermont, Thomas, Lord. *Ravensdale-park, Newry, Ireland.*
- 1845 *Cleveland, His Grace the Duke of. *Cleveland-house, 17, St. James's-square, S.W.*
- 1861 Clifford, Sir Charles. *Coldham-hall, Suffolk.*
- 1858 Clifford, Charles Cavendish, Esq. *House of Lords, S.W.*

Year of
Election.

- 1866 Clinton, Lord Edward. *Army and Navy Club, S.W.*
- 1865 Clipperton, Robert Charles, Esq., H.B.M. Consul, Kertch. *Care of T. G. Staveley, Esq., Foreign Office, S.W.*
- 1856 Clive, Rev. Archer. *Whitfield, Hereford.*
- 1863 Clowes, E., Esq. *Salisbury-square, Fleet-street, E.C.*
- 1854 Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.E.; Charing-cross, S.W.; and Surbiton, Surrey.*
- 1864 430 Clowes, Rev. George, B.A. *Surbiton, Surrey.*
- 1854 Clowes, William, Esq. *Duke-street, Stamford-street, Blackfriars, S.E.; Charing-cross, S.W.; and 51, Gloucester-terrace, Hyde-park, W.*
- 1861 Clowes, William Charles Knight, Esq., M.A. *Duke-street, Stamford-street, Blackfriars, S.E.; and Surbiton, Surrey.*
- 1852 Cobbold, John Chevalier, Esq. *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, Captain George. 9, *Bolton-gardens, South-Kensington, W.*
- 1859 Cocks, Colonel C. Lygon, Coldstream Guards. *Treverbyn-Vean, near Liskeard.*
- 1865 Cocks, Major Octavius Yorke. 180, *Piccadilly, W.*
- 1841 *Cocks, Reginald Thistlethwayte, Esq. 43, *Charing-cross, S.W.; and 22, Hertford-street, May-fair, W.*
- 1857 440 Coghlan, Edward, Esq. *Training-institution, Gray's-inn-road, W.C.*
- 1861 Coghlan, J., Esq., Engr.-in-Chief to the Government. *Buenos Ayres. Care of Messrs. J. Fair and Co., 4, East India-avenue, Leadenhall-street, E.C.*
- 1862 Coghlan, Major Gen. Sir William M., K.C.B., B.A. *Ramsgate, Kent.*
- 1865 Colchester, Reginald Charles Edward, Lord. *All Souls' College, Oxford.*
- 1867 Colebrook, John, Esq. 15, *St. Leonard's-terrace, King's-road, Chelsea, S.W.*
- 1841 *Colebrooke, Sir Thomas Edward, Bart., F.R.A.S. 37, *South-st., Park-lane, W.*
- 1834 Colebrooke, Lt.-General Sir Wm., B.A., M.G., C.B., K.H., F.R.A.S. *Datohet, 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.*
- 1868 Cole, William H., Esq. 23, *Portland-place, W.*
- 1848 Coles, Charles, jun., Esq. 86, *Great Tower-street, E.C.*
- 1835 450* Collett, William Rickford, Esq.
- 1867 Collier, C. T., Esq. (Barrister of the Middle Temple). *Cedar-villa, Sutton, Surrey; and Oriental Club, W.*
- 1858 Collinson, Henry, Esq. 17, *Devonshire-place, Portland-place, W.*
- 1866 Collinson, John, Esq., C.E. 9, *Clarendon-gardens, Maida-hill, W.*
- 1855 Collinson, Rear-Admiral Richard, C.B. *Haven-lodge, Ealing, W.; and United Service Club, S.W.*
- 1866 Collison, Francis, Esq. *Herne-hill, Surrey, S.*
- 1864 Colnaghi, Dominic E., Esq. *Care of F. B. Alston, Esq., Foreign-office, S.W.*
- 1862 Colquhoun, Sir Patrick, M.A.
- 1866 Colquhoun, Sir Robert G., K.C.B. 6, *Ulster-terrace, Regent's-park, N.W. and 14, Arlington-street, W.*

Year of
Election.

- 1861 *Colville, Charles John, Lord. 42, *Eaton-place, S. W.*
- 1865 460 Colvin, Binney J., Esq. 26, *Oxford-square, Hyde-park, W.*
- 1868 Colvin, Captain W. B. *Shirley-cottage, Croydon.*
- 1868 Combe, Lieut. B. A.
- 1861 Combe, Thomas, Esq., M.A. *University Press, Oxford.*
- 1864 Commerell, Commr. J. E., R.N., V.C. *Aberbank, near Gosport.*
- 1864 Conder, John, Esq. *Hallbrooks-house, New Wandsworth, S. W.*
- 1868 Coney, Rev. T., M.A. *Chaplain to the Forces, Chatham.*
- 1861 Constable, Capt. Chas. Golding, L.M. 68, *Hamilton-ter., St. John's-wood, N. W.*
- 1868 Cook, Edward, Esq. *Kingston-on-Thames.*
- 1859 Cook, H. Esq., M.D., &c. (Care of Messrs. Forbes and Co.) 12, *Leadenhall-st., E. C.*
- 1863 470 Cooke, Lt.-Colonel 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.Z.S., F.G.S., Accad. Bell. Art. Venet, et Holm Socius. *Glen-Andred, Groombridge, Sussex, and Athenaeum Club, S. W.*
- 1856 Cooke, John George, Esq. 18, *Pelham-place, Brompton, S. W.*
- 1866 Cooke, Rev. J. Hunt. *Victoria-house, Southsea, Hants.*
- 1860 Cooke, Nathaniel, Esq. 5, *Ladbrooke-terrace, Notting-hill, W.*
- 1852 Cooke, Robt. F., Esq. 50, *Albemarle-street, W.*
- 1860 Cooke, William Henry, Esq., Barrister-at-Law. 4, *Elm-court, Temple, E. C.*
- 1830 Cooley, William Desborough, Esq. 136, *Euston-road, N. W.*
- 1862 Cooper, Sir Daniel. 20, *Prince's-gardens, Hyde-park, S. W.*
- 1856 Cooper, Lt.-Col. Edward, Grenadier Guards. 5, *Bryanston-square, W.*
- 1860 480 Cooper, Lt.-Col. Joshua H., 7th Fusiliers. *Dunboden, Mullingar.*
- 1853 Coote, Charles C., Esq. *C4, Albany, W.; and Mount-Coote, Limerick, Ireland.*
- 1857 *Coote, Captain Robert, R.N. *Shales, Bittern, Southampton.*
- 1862 Cope, Walter, late H.M.'s Chargé d'Affaires at the Equador. 14, *The Terrace, Camberwell, S.*
- 1853 Copley, Sir Joseph William, Bart. *Sprotborough, Doncaster.*
- 1864 Cork and Orrery, Earl of. 1, *Grafton-street, W.*
- 1868 Cork, Nathaniel, Esq. 33, *Cornhill, E. C.; and Ivy-lodge, 9, Warwick-road, Upper Clayton.*
- 1868 Corner, Wm. M., Esq. *Cobden-house, Leytonstone; and 104, Leadenhall-st., E. C.*
- 1868 *Cornish-Brown, Charles, Esq. 7, *Lansdowne-place, Clifton, Bristol.*
- 1865 Cornthwaite, Rev. T., M.A. *Forest, Walthamstow.*
- 1860 490 Cornwell, James, Esq., PH. DR. *Trev'er-byn, Dartmouth-park, Forest-hill.*
- 1839 *Corrance, Frederick, Esq. *Parkham-hall, Wickham Market, Suffolk.*
- 1868 Cory, Frederic C., Esq., M.D. 8, *Nassau-place, Commercial-road, S.*
- 1853 *Cosway, William Halliday, Esq. *Oxford and Cambridge Club, S. W.*
- 1863 Courtenay, L. W., Esq. *British Post-office, Constantinople. Care of R. Wood, Esq., 139, Fleet-street.*
- 1865 Cowan, John E., Esq. 58, *Denbigh-street, S. W.*
- 1862 Coward, William, Esq. 7, *Southsea-terrace, Southsea, Portsmouth.*
- 1857 *Cowell, Major Sir J. C., K.C.B., R.E. *Buckingham-palace, S. W.*

Year of Election.	
1854	Cowley, Norman, Esq. 4, <i>Montagu-place, Montagu-square, W.</i>
1862	Cowper, Sedgwick S., Esq. <i>Messrs. J. Chinch and Son, Abchurch-lane, E.C.</i>
1862	500 Cox, Edward Wm., Esq., Barrister-at-Law; Recorder of Falmouth. <i>'Law Times' Office, 10, Wellington-st., Strand, W. C.; and Moat-mount, High-wood, Middlesex.</i>
1865	Coysh, John S., Esq. <i>Levant-house, St. Helen's-place, E.C.</i>
1867	Crane, Leonard, Esq., M.D. 7, <i>Albemarle-street, W.</i>
1857	Craufurd, Lieut.-General James Robertson, Grenadier Guards. <i>Travellers' Club, S. W.; and 36, Prince's-gardens, W.</i>
1848	Crawford, Robert Wigram, Esq., M.P. 71, <i>Old Broad-street, E.C.</i>
1866	Crawford, O. J., Esq. <i>Athenæum Club, S. W.</i>
1861	Creswell, Rev. S. F., M.A. <i>The Grammar School, Dartford, North Kent.</i>
1859	*Creyke, Capt. Richard Boynton, R.N. <i>Ulverstone, Lancashire.</i>
1856	Croker, T. F. Dillon, Esq. 19, <i>Peiham-place, Brompton, S. W.</i>
1864	Croll, A. A., Esq., C.E. <i>Southwood, Southwood-lane, Highgate.</i>
1868	510 Croll, Alex., Esq. <i>Sussex-house, Tudor-road, Upper Norwood.</i>
1860	*Croskey, J. Rodney, Esq. 84, <i>King William-street, E.C.; and Forest-house, High Beech, Essex.</i>
1860	Crosse, the Rev. Thomas, D.C.L., M.R.A.S. <i>Hastings.</i>
1862	Crossman, James Hiscutt, Esq. <i>Rolls-park, Chigwell, Essex.</i>
1863	*Crowder, Thos. Mosley, Esq., M.A. <i>Thornton-hall, Bedale, Yorkshire.</i>
1852	Crowdy, James, Esq. 17, <i>Serjeant's-inn, E.C.</i>
1859	Cull, Richard, Esq., F.S.A. 13, <i>Tavistock-street, Bedford-square, W. C.</i>
1857	Cumming, William Fullarton, Esq., M.D. <i>Athenæum Club, S. W.; and Athol-crescent, Edinburgh.</i>
1847	*Cunard, Sir Edward, Bart. <i>Care of Messrs. D. and C. MacIver, Liverpool.</i>
1860	Cunliffe, Roger, Esq. 24, <i>Lombard-street, E. C.; and 10, Queen's-gate, South Kensington, W.</i>
1864	520 Cunningham, H. Esq.
1853	Cunningham, John Wm., Esq., Sec. King's College. <i>Somerset-house, W. C.; and Harrow, N. W.</i>
1862	*Cunynghame, Major-Gen. A. T., C.B. <i>Commanding Dublin Division, Royal Barracks, Dublin.</i>
1865	Cure, Capel, Esq. 51, <i>Grostenor-street, W.</i>
1868	Currie, A. A. Hay, Esq., C.E. <i>The Manor-house, Tunbridge-wells.</i>
1843	*Cursetjee, Manockjee, Esq., F.R.S.N.A. <i>Villa-Byculla, Bombay.</i>
1889	*Curtis, Timothy, Esq.
1865	Curzon, Hon. R. 24, <i>Arlington-street, W.; and Parham-park, Steyning, Susse.</i>
1867	Cuttance, John Fras. J., Esq. <i>Clelland-house, Greville-road, Kilburn, N. W.</i>
1864	Dallas, A. G., Esq. 36, <i>Beaufort-gardens, W.</i>
1863	530*Dalgety, Fred. G., Esq. 8, <i>Hyde-park-terrace, W.</i>
1865	D'Almeida, W. B., Esq. 19, <i>Green-park, Bath.</i>
1863	Dalrymple, Donald, Esq. <i>Norwich.</i>
1867	Dalrymple, Geo. Elphinstone, Esq. <i>Logie, Elphinstone, Aberdeenshire.</i>

Year of Election.

- 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 120, Belgrave-road, S.W.*
- 1868 Dalziel, William R., Esq. 5, *Gresham-park, Brixton, S.*
- 1866 Damer, Lt.-Col. Lionel S. Dawson. 2, *Chapel-street, Grosvenor-square, W.*
- 1862 Darvall, John Bayly, Esq.
- 1838 *Darwin, Charles, Esq., M.A., F.R.S. 6, *Queen Anne-street, Cavendish-square, W.*
- 1860 540 Desent, John Bury, Esq. 22, *Warwick-road, Maida-hill, W.*
- 1863 Davies, R. H., Esq.
- 1865 *Davis, Alfred, Esq. *Norfolk-hotel, Norfolk-square, Hyde-park, W.*
- 1866 Davis, Edmund F., Esq. 6, *Cork-street, Bond-street, W.*
- 1858 Davis, Dr. Francis William, Surgeon R.N. *H.M.S. 'Alert;' and Elm-lodge, St. Ann's-hill, Wandsworth, S.W.*
- 1866 Davis, Frederick E., Esq. 20, *Blandford-square, N.W.*
- 1868 Davis, Richard, Esq. 9, *St. Helen's-place, E.C.*
- 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-hull, Newton-upon-Ouse, Yorkshire.*
- 1865 550 Debarry, Rev. Thomas, M.A. 35, *Mount-street, W.*
- 1866 Debenham, William, Esq. 3, *Porchester-square, Hyde-park, W.*
- 1859 De Blaquièrè, John, Lord. 9, *Stratford-place, 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.*
- 1865 De Laski, A., Esq.
- 1868 Dell, William, Esq. *Messrs Combe, Del'field, and Co., Long Acre.*
- 1862 Denham, Adm. Sir Henry Mangles, R.N., K.C.B. 21, *Carlton-road, Maida-vale, W.*
- 1860 560 Denison, Alfred, Esq. 6, *Albemarle-street, W.*
- 1834 *Denison, Sir William Thomas, K.C.B., Lieut.-Col. R.E., F.R.S. *Observatory, East Sheen.*
- 1836 Denman, Rear-Admiral the Hon. Joseph. *Commander-in-Chief, Pacific; and 17, Eaton-terrace, S.W.*
- 1833 *Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square, S.W.; and Knowsley-park, Prescott, Lancashire.*
- 1867 De Salis, Col. Rodolph, C.B. 123, *Pall-mall, S.W.*
- 1854 *Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N.W.*
- 1837 *Devonshire, William Cavendish, Duke of, LL.D., D.C.L., M.A., F.R.S. *Devonshire-house, Piccadilly, W.; and Hardwicke-hall, Derbyshire.*
- 1865 Dew, Capt. Roderick, C.B., R.A. *Army and Navy Club, S.W.; and St. James's-street, S.W.*
- 1864 Dick, A. H. Esq., M.A., L.L.B. *Free Church Normal College, Glasgow.*
- 1862 Dick, Capt. Charles Cramond. *Exeter, Devon.*

- Year of Election.
- 1866 570* Dick, Fitzwilliam, Esq., M.P. 20, *Curzon-street, Mayfair, W.*
- 1861 Dick, Robert Kerr, Esq., Bengal Civil Service. *Oriental Club, W.*
- 1866 Dick, William Græme, Esq. 29, *Leinster-square, W.*
- 1854 *Dickenson, Sebastian Stewart, Esq., M.P., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
- 1831 *Dickinson, Francis Henry, Esq., F.S.A. 119, *St. George's-square, Pimlico, W.; and Kingeston-park, Somerset.*
- 1833 Dickinson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street, W.; and Abbott's-hill, Hemel-Hempstead.*
- 1852 Dickinson, John, Esq., jun. 3, *Essex Court, Temple, E.C.; and Abbott's-hill, Hemel-Hempstead.*
- 1859 Dickson, A. Benson, Esq. 4, *New-square, Lincoln's-inn, W.C.*
- 1858 Dickson, Charles Hammer, Esq. *H.B.M. Consul, Sukum Kaid, Black Sea. Care of J. Murray, Esq., Foreign-office, S.W.*
- 1890 Dickson, Lieut.-Col. Lothian Sheffield. 10, *Stanhope-terrace, Hyde-park, W.*
- 1860 580 Dietz, Bernard, Esq., of Algoa Bay. 3, *Dorset-square, W.*
- 1859 Digby, G. Wingfield, Esq. *Sherborne-castle, Dorset.*
- 1860 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., M.P. 76, *Sloane-street, S.W.*
- 1856 Dillon, the Hon. Arthur. 17, *Clarges-street, W.*
- 1864 Dimsdale, J. C., Esq. 50, *Cornhill, E.C.; and 52, Cleveland-square, S.W.*
- 1867 Dix, Thomas, Esq. 10, *Amwell-street, W.C.*
- 1861 Dixon, Lieut.-Colonel John. 10, *Seymour-street, Portman-square.*
- 1854 Dixon, W. Hepworth, Esq., F.S.A. 6, *St. James's-terrace, Regent's-park, N.W.*
- 1857 590 Dobie, Robert, Esq., M.D., B.N. 7, *Houghton-pl. Amphill-sq., Hampstead-rd., N.W.*
- 1854 Dodson, John George, Esq., M.P. 6, *Seamore-place, Mayfair, W.*
- 1854 Domville, William T., Esq., M.D., B.N. *Army and Navy Club, S.W.; Naval Dockyard, Malta.*
- 1867 Donald, James, Esq. 20, *Melville-terrace, Edinburgh.*
- 1858 Donne, John, Esq. *Instow, North Devon.*
- 1864 Doran, Dr. John, F.S.A. 33, *Lansdowne-road, Notting-hill, W.*
- 1868 Douglas, James A., Esq. 14, *Porchester-square, W.*
- 1868 Douglas, Capt. N. D. C. F. *Guards' Club, S.W.*
- 1850 Dover, John William, Esq. 132, *Stanley-street, Belgravia, S.W.*
- 1853 Doyle, Sir Francis Hastings C., Bart. *Custom-house, E.C.*
- 1845 600* Drach, Solomon Moses, Esq. F.R.S. 39, *Howland-street, Fitzroy-square, W.*
- 1864 Drew, Major H. 14, *St. James's-square, S.W.; Abroad.*
- 1865 Drummond, E. A., Esq. 2, *Bryanston-square, W.*
- 1846 Drummoud, Lieut.-General John. *The Boyce, Dymock, Gloucestershire.*
- 1846 Drury, Capt. Byron, B.N. *The United Services Club, S.W.*
- 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.*

Year of
Duration.

- 1859 Duckworth, Henry, Esq. 2, *Gambier-terrace, Liverpool.*
- 1860 *Duff, Mountstuart Elphinstone Grant, Esq., M.P. 4, *Queen's-gate-gardens, South Kensington, W.*
- 1868 610 Duff, Wm. Pirie, Esq. *Calcutta. Care of Messrs. John Watson, and Co., 34, Fenchurch-street, E.C.*
- 1857 *Dufferin, Right Hon. Lord, K.P., K.C.B. *Dufferin-lodge, Fiteroy-park, Highgate, N.*
- 1866 *Dugdale, Captain Henry Charles G. *Merevale-hall, Atherstone, Warwick.*
- 1867 *Dugdale, John, Esq. 1, *Hyde-park-gardens; and Llwyn, Llanfyllin, Ononstry.*
- 1868 Dunbar, John Samuel A., Esq. 28, *Pembridge-crescent, Baywater, W; and 4, Barnard's Inn, Holborn.*
- 1863 Duncan, Capt. Francis, R.A., M.A., F.R.S. *The Citadel, Plymouth.*
- 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 Ochertyre, Stirling.*
- 1860 Dunell, Henry James, Esq. 12, *Hyde-park-square, W.*
- 1859 *Dunlop, R. H. Wallace, Esq., C.B., Indian Civil Service. *Messrs. Grindlay and Co., Parliament-street.*
- 1860 620 *Dunmore, Charles Adolphus Murray, Earl of. 24, *Carlton-house-terrace, S.W.*
- 1868 Dunn, Capt. F. J. A. *Portillon, Tours, France, and 4, Cambrian-grove, Gravesend, E.C.*
- 1837 *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. Care of Jas. Searight, Esq., 7, East India Avenue, E.C.*
- 1852 D'Urban, M.-Gen. W. J. *Deputy Quartermaster-General, Canada; U. S. Club, S.W.; and Newport, near Exeter.*
- 1865 Dutton, F. S., Esq. *Reform Club, S.W.; and Adelaide, Australia.*
- 1868 Dutton, Frederick H., Esq. 45, *Dozer-street, W.*
- 1867 Eadie, Robert, Esq. *Blaydon-on-Tyne, Durham.*
- 1854 Eardley-Wilmot, Capt. A. P., R.N., C.B. *Deptford Dockyard, E.*
- 1856 Eardley-Wilmot, Major-Gen. F., M.R.A. 22, *Victoria-rd., Clapham-common, S.W.*
- 1866 630 Eardley-Wilmot, Sir John E. 3, *Elvaston-place, Queen's-gate, W.*
- 1865 Easle, William, Esq., F.L.S., 5, *Bath-villas, The Park, Gloucester.*
- 1857 Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park, W.*
- 1863 Eaton, F. A., Esq. *New University Club, St. James's-street, S.W.*
- 1862 *Eaton, H., Esq. 16, *Prince's-gate, Hyde-park, W.*
- 1862 *Eaton, Henry William, Esq., M.P. 16, *Prince's-gate, Hyde-park, W.*
- 1864 *Eaton, William Meriton, Esq., 16, *Prince's-gate, Hyde-park, W.*
- 1866 Eatwell, Surgeon-Major W. C. B., M.D. 17, *Kensington-park-terrace, Notting-hill, 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 640 Eden, Rear-Adm. Charles, C.B. 20, *Wilton-place, S.W.*
- 1858 Edge, Rev. W. J., M.A. *Benenden-vicarage, near Staplehurst, Kent.*

Year of Election.	
1863	Edgeworth, M. P., Esq., BENG.C.S. <i>Mastrim-house, Anerly, S.</i>
1867	*Edward, James, Esq. <i>Balruddery, by Dundee, N.B.</i>
1866	*Edwardes, Thomas Dyer, Esq. 5, <i>Hyde-park-gate, Kensington, W.</i>
1865	Edwards, G. T., Esq., M.A. 60, <i>Gloucester-terrace, W.</i>
1861	*Edwards, Henry, Esq. 53, <i>Berkeley-square, W.</i>
1860	Edwards, Major J. B., R.E. <i>United Service Club, S.W. Messrs. H.S. King and Co.</i>
1868	Edwards, Rev. A. T., M.A. 39, <i>Upper Kennington-lane, S.</i>
1857	Egerton, Commander Charles Randell, R.N. 7, <i>Rutland-gate, S.W.</i>
1853	650 Egerton, Captain the Hon. Francis, R.N., M.P. <i>Bridgewater-house, S.W.; and H.M.S. 'St. George.'</i>
1863	*Elder, George, Esq. <i>Knock-castle, Ayrshire.</i>
1868	Elder, A. L., Esq. <i>Carlisle-house, Hampstead.</i>
1867	Eley, Charles John, Esq. <i>Old Brompton, S.W.</i>
1865	Elias, Ney, Jun., Esq. 64, <i>Inverness-terrace, Bayswater, W.</i>
1845	Ellenborough, Edward, Earl of, G.C.B. <i>Southam-house, near Cheltenham.</i>
1863	Ellerton, John L., Esq. 6, <i>Connaught-place, Hyde-park, W.</i>
1860	Elliot, G., Esq., M.P., C.E. <i>The Hall, Houghton-le-Spring, near Fence Houses, Durham.</i>
1857	*Elliot, Capt. L. R. <i>La Mailleraye-sur-Seine, Seine Inferieure. Care of J. L. Elliot, Esq., 10, Connaught-place, W.</i>
1830	*Elliott, Rev. Charles Boileau, M.A., F.R.S. <i>Tattingstone, Suffolk.</i>
1865	660 Ellis, W. E. H., Esq. <i>Hasfield-rectory, Gloucester; Oriental Club, W.; and Byculla Club, Bombay.</i>
1868	Ellis, C. H. Fairfax, Esq., Lieut. R.A. <i>Shoeburyness, Essex.</i>
1858	Elphinstone, Major Howard C., R.E. <i>Buckingham-palace, S.W.</i>
1857	Elton, Sir A. H., Bart. <i>Athenæum Club, S.W.; and Clevedon-court, Somersetshire.</i>
1862	*Emanuel, Harry, Esq. 8, <i>Clarence-terrace, Regent's-park 'N.W.</i>
1866	Emanuel, Joel, Esq., F.A.S. <i>Norfolk-villa, Lansdowne-road, Notting-hill, W.</i>
1863	Emslie, John, Esq. 47, <i>Gray's-inn-road, W.C.</i>
1830	Enderby, Charles, Esq., F.R.S., F.L.S. 18, <i>Great St. Helen's, E.C.</i>
1860	Enfield, Edward, Esq., F.S.A. 19, <i>Chester-terrace, Regent's-park, N.W.</i>
1863	Engleheart, Gardner D., Esq. 1, <i>Eaton-place-south, S.W.</i>
1852	670 Erskine, Vice-Admiral John Elphinstone, M.P., C.B. <i>H.M.S. 'Edgar; 1 L, Albany, W., and Cardross, Stirling, N. B.</i>
1857	*Esmearde, G. M. M., Esq. 29, <i>Park-street, Grosvenor-square, W.</i>
1850	Espinasse, Major J. W., 12th Regt. <i>Messrs. Richardson, and Co., Cornhill.</i>
1865	Evans, Colonel William Edwyn. 24, <i>Great Cumberland-place, Hyde-park, W.</i>
1857	Evans, F. J., Esq., Staff Commander, R.N., F.R.S., F.R.A.S. 4, <i>Wellington-terrace, Charlton, Blackheath, S.E.</i>
1830	*Evans, Vice-Admiral George. 1, <i>New-street, Spring-gardens, S.W.; and Englefield-green, Staines.</i>
1857	Evans, Thos. Wm., Esq. 1, <i>Dartmouth-street, Westminster, S.W.; and Allestree-wall, Derby.</i>
1830	*Evans, W. Esq.
1867	Evans, W. Herbert, Esq. 32, <i>Hertford-street, Mayfair, W.</i>

Year of Election.	
1861	Evelyn, Lieut.-Colonel George P. 34, <i>Onslow-gardens, Brompton, S.W.</i>
1851	680* Evelyn, William J., Esq., F.S.A. <i>Evelyn Estate Office, Evelyn-street, Deptford.</i>
1830	*Everett, James, Esq., F.S.A.
1865	Everitt, George A., Esq. <i>Oakfield, Moseley, near Birmingham.</i>
1859	Ewart, William, Esq. 6, <i>Cambridge-square, W.</i>
1856	Ewing, J. D. Crum, Esq. 21, <i>Birchin-lane, E.C.</i>
1857	Eyre, Edward J., Esq.
1861	Eyre, George E., Esq. 59, <i>Loundes-square, Brompton, S.W.</i>
1856	Eyre, M.-Gen. Sir Vincent, C.B. <i>Athenæum Club, S.W.</i> ; and 33, <i>Thurloe-sq., S.W.</i>
1861	Fairbairn, William, Esq., C.E., F.R.S. <i>Manchester.</i>
1856	Fairholme, George Knight, Esq.
1866	690 Fairman, Edward St. John, Esq., F.G.S., &c. 874, <i>Via Santa Maria, Pisa.</i> <i>Care of H. Fairman, Esq.</i>
1838	Falconer, Thomas, Esq. <i>Usk, Monmouthshire.</i>
1868	Falconer, William, Esq. 23, <i>Leadenhall-street, E.C.</i> ; and 42, <i>Hilldrop-road, Camden New Town, N.</i>
1857	Falkland, Lucius Bentinck, Viscount. <i>Skutterskelfe, Yorkshire.</i>
1855	*Fanshawe, Admiral E. G. 63, <i>Eaton-square, S.W.</i>
1868	Farquharson, Lieut.-Col. G. M ^o B. <i>Junior United Service Club, S.W.</i>
1863	*Farrer, W. Jas., Esq. 24, <i>Bolton-street, Piccadilly, W.</i>
1864	Faulkner, Charles, Esq., F.S.A., F.G.S. <i>Deddington, Oxon.</i>
1863	*Faulthorpe, Rev. J. P., B.A. <i>Training-college, Battersea.</i>
1853	*Fayrer, Joseph, Esq., M.D. <i>Calcutta. Care of General Spens, 14, Drummond-place, Edinburgh.</i>
1858	700 Fazakerley, J. N., Esq. 17, <i>Montagu-street, Portman-square, W.</i>
1866	Felkin, Wm., Esq., Jun., F.Z.S. <i>Beeston, near Nottingham.</i>
1864	Ferguson, J., Esq. 6, <i>Gloucester-square, Hyde-park.</i>
1863	Ferguson, Alex., Esq. <i>Champion-hill, Camberwell, S.</i>
1840	*Ferguson, James, Esq., F.R.S. 20, <i>Langham-place, W.</i>
1863	Ferreira, Baron De. 12, <i>Gloucester-Place, Portman-square, W.</i>
1860	Ferro, Don Ramon de Silva.
1865	Field, Hamilton, Esq. <i>Thornton-road, Clapham-park.</i>
1830	Findlay, Alexander, Esq. <i>Hayes, Kent, S.E.</i>
1844	Findlay, Alex. George, Esq. 53, <i>Fleet-street, E.C.</i> ; and <i>Duwoich-wood-park, S.</i>
1862	710 Finnis, Thomas Quedsted, Esq., Alderman. <i>Wanstead, Essex, N.E.</i>
1863	Fisher, John, Esq. 60, <i>St. James's-street, S.W.</i>
1859	Fisher, Robert, Esq.
1857	*Fitzclarence, Commander the Hon. George, R.N.
1863	Fitzgerald, J. F. V., Esq. 11, <i>Chester-square, S.W.</i>
1861	Fitzgerald, Captain Keane. 2, <i>Portland-place, W.</i>
1864	Fitz-Patrick, Lieut. Francis Skelton, 42nd Regt. Madras Army.
1859	*Fitz-Roy, George Henry, Esq. <i>Downshire-house, Roehampton; and Office of Maritime Customs, Shanghai.</i>

Year of Election.	
1857	Fitzwilliam, the Hon. C. W., M.P. <i>Brooks' Club, St. James's-street, S. W.</i>
1837	*Fitzwilliam, William Thomas, Earl. 4, <i>Grosvenor-square, W.; and Wentworth-house, Rotherham, Yorkshire.</i>
1865	720*Fitzwilliam, Wm. S. Esq. 28, <i>Ovington-square, Brompton, S. W.</i>
1863	Fleming, G., Esq. <i>Brompton Barracks, Chatham.</i>
1861	*Fleming, John, Esq. 18, <i>Leadenhall-street, E. C.</i>
1865	Fleming, Rev. T. S. <i>Roscoe-place, Chapel-town-road, Leeds.</i>
1853	*Fleming, Rev. Francis P.
1862	Fletcher, John Charles, Esq. <i>Dale-park, Arundel; and Eaton-place, S. W.</i>
1857	Fletcher, Thomas Keddey, Esq. <i>Union-dock, Limehouse, E.</i>
1868	Fletcher, John Thompson, Esq. 15, <i>Upper Hamilton-terrace, St. John's Wood, N. W.</i>
1866	Flood, John Edwin, Esq. 126, <i>High-street, Poplar, E.</i>
1864	Flower, Capt. L. 19, <i>Great College-street, S. W.; Banstead, Surrey; and Queen's United Service Club, S. W.</i>
1863	730 Foley, Col. the Hon. St. George, C. B. 24, <i>Bolton-street, W.</i>
1861	Foord, John Bromley, Esq. 52, <i>Old Broad-street, E. C.</i>
1860	Forbes, Commander Charles S., R.N. <i>Army and Navy Club, S. W.; and Care of Messrs. Woodhead.</i>
1863	Forbes, Capt. C. J. F. Smith. 5, <i>Hatch-street, Dublin.</i>
1867	Forbes, Geo. Edward, Esq. <i>Union Club, S. W.; 11, Melville-street, Edinburgh; New Club, Edinburgh.</i>
1860	Forbes, Lord, M.A. <i>Castle Forbes, Aberdeenshire.</i>
1845	Forster, Rev. Charles, B.D. <i>Stisted-rectory, Essex.</i>
1839	*Forster, William Edward, Esq. <i>Burley, near Otley.</i>
1868	Forster, Hon. Anthony. <i>Newsham Grange, Winston, Darlington, Durham.</i>
1867	Forsyth, T. Douglas, Esq., C.B. (B.C.S.) <i>Commissioner, Jullundhur, Punjab. Care of Messrs. H. S. King and Co., 65, Cornhill, E. C.</i>
1861	740 Forsyth, William, Esq., M.P., Q.C. 61, <i>Rutland-gate, S. W.</i>
1858	Fortescue, Right Hon. Chichester S., M.P. 7, <i>Carlton-gardens, S. W.</i>
1861	*Fortescue, Hon. Dudley F., M.P. 9, <i>Hertford-street, W.</i>
1864	Foster, Capt. W. J. <i>Stubington-house, Fareham, Hants.</i>
1866	Foster, Edmond, Esq., Jun. 79, <i>Portsmouth-road, Maida-vale, W.</i>
1864	Foster, H. J., Esq.
1863	*Fowler, J. T., Esq. <i>Government Inspector of Schools, Adyar, Madras, India. Care of Rev. A. Wilson, National Society's Office, Sanctuary, Westminster.</i>
1850	*Fowler, Robert N., Esq., M.P., M.A. 50, <i>Cornhill, E. C.; and Tottenham, N.</i>
1861	Fox, Arthur Douglas, Esq., C.E. 1, <i>Chesham-place, Brighton; and 8, New-street, Spring-gardens, S. W.</i>
1859	Fox, Lieut.-Colonel A. Lane. 10, <i>Upper Phillimore-gardens, Kensington, W.</i>
1830	750*Fox, Lieut.-General C. R. <i>Travellers' Club, S. W.; and 1, Addison-road, Kensington, W.</i>
1866	Fox, D. M., Esq., Chief Engineer of the Santos and St. Paulo Railway. <i>S. Paulo, Brazil.</i>
1864	*Fox, F. E. Esq., B.A. <i>Elmslea, Tottenham, Middlesex.</i>

Year of
Election.

- 1865 Fox, Samuel Crane, Esq. *Woodford-house, Granville-park, Blackheath, S.E.*
- 1865 *Franks, Aug. W., Esq. 55, *Upper Seymour-street, W.*
- 1860 Franks, Charles W., Esq. *Local Government Act Office, 8, Richmond-terrace, Whitehall.*
- 1867 Fraser, Edward John, Esq. (Solicitor). 1, *Percy-villas, Campden-hill, Kensington, W.*
- 1862 Fraser, Capt. H. A., L.M.
- 1860 Fraser, Thos., Esq.
- 1866 Fraser, Capt. T. *Otago, New Zealand.*
- 1868 760 Frater, Alexander, Esq. *Canton. Care of Thomas Frater, Esq., National Provincial Bank of England, Brecon, Wales.*
- 1860 Freeman, Daniel Alex., Esq., Barrister-at-law. *Plowden-buildings, Temple, E.C.*
- 1868 Freeman, Henry, W., Esq. *Junior Athenæum Club, S.W.*
- 1864 Fremantle, Lieut.-Col. Arthur. *Guards' Club, S.W.*
- 1863 Fremantle, Captain 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.*
- 1844 Freme, Major James H. *Wrentnall-house, Shropshire; and Army and Navy Club, S.W.*
- 1850 Frere, Bartle John Laurie, Esq. 45, *Bedford-squares, W.C.*
- 1839 *Frere, George, Esq. *Cape of Good Hope. Care of the Foreign Office, S.W.*
- 1867 Frere, Sir Hy. Bartle Edw., K.C.B., G.C. Star of India. 44, *Princes-gardens, W.*
- 1842 770 Frere, William Edw., Esq., F.R.A.S. *The Rectory, Bitton, Gloucestershire.*
- 1859 Fryer, William, Esq. 39, *Marlborough-hill-gardens, St. John's-wood, N.W.*
- 1863 Fuidge, William, Esq. 5, *Park-row, Bristol.*
- 1860 Fussell, Rev. J. G. Curry. 16, *Cadogan-place, S.W.*
- 1868 Fyfe, Andrew, Esq., M.D. 112, *Brompton-road, S.W.*
- 1861 Fynes Clinton, Rev. Charles J., M.A. 3, *Montagu-place, Russell-squares, W.C.; and Cromwell, Notts.*
- 1866 Fytche; Colonel Albert. *Reform Club, S.W.*
- 1863 *Gabrielli, Antoine, Esq. 6, *Queen's-gate-terrace, Kensington, W.*
- 1858 Gaisford, Thomas, Esq. *Travellers' Club, S.W.*
- 1861 Gallagher, John, Esq., M.D. *Reform Club, S.W.; and 109, Westbourne-terrace, W.*
- 1855 780 *Galloway, John James, Esq.
- 1848 *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, Bartie-terrace, Leamington.*
- 1854 *Gammell, Major Andrew. *Drumtochty, Kincardineshire, N.B.*
- 1861 Garden, Robert Jones, Esq. 30, *Cathcart-road, South Kensington, S.W.*
- 1865 Gardner, Capt., G. H., R.N. *Coast-Guard-office, Spring-gardens, S.W.*
- 1866 Gardner, John Dunn, Esq. 19, *Park-street, Park-lane, W.*
- 1863 Gascoigne, Frederic, Esq. *Parlington, Yorkshires.*
- 1859 *Gasiot, John P., Jun., Esq. 6, *Sussex-place, Regent's-park, N.W.*

Year of Election.	
1866.	Gastrell, Lieut.-Col. James E. (B. Staff Corps). <i>Surveyor-General's Office, Calcutta. Care of H. T. Gastrell, Esq., 36, Lincoln's-inn-fields, W.C.</i>
1866	790*Gatty, Charles H., Esq., M.A., <i>Felbridge-park, East Grinstead, Sussex.</i>
1838	*Gawler, Colonel George, K.H. <i>United Service Club, S.W.; and Southsea-villa, Southsea.</i>
1865	George, Rev. H. B. <i>New College, Oxford.</i>
1859	Gerstenberg, Isidore, Esq. <i>Stockley-house, North-gate, Regent's-park, N.W.</i>
1865	*Gibbons, Sills John, Esq., Alderman. 13, <i>Upper Bedford-pl., Russell-sq., W.C.</i>
1866	*Gibb, George Henderson, Esq., 13, <i>Victoria-street, Westminster, S.W.</i>
1859	*Gibbs, H. Hucks, Esq. <i>St. Dunstan's, Regent's-park, N.W.</i>
1866	Gibson, John, Esq. 2, <i>Piccadilly, Bradford, Yorkshire; and 2, Field-court, Gray's-inn. British Consulate, Hankow, China.</i>
1855	Gillespie, Alexander, Esq. <i>Heathfield, Walton-on-Thames, Surrey.</i>
1866	*Gillespie, William, Esq. (of Torbane-hill). 46, <i>Melville-street, Edinburgh.</i>
1857	800 Gillespy, Thomas, Esq. <i>Brabant-court, Philpot-lane, E.C.</i>
1863	*Gillett, William, Esq. 6L, <i>Albany, W</i>
1868	*Gillett, Alfred, Esq. 113, <i>Piccadilly, W.; and Banbury, Oxon.</i>
1861	Gilliat, Alfred, Esq. <i>Exton-house, Bishop's Waltham, Hants.</i>
1868	Gilliat, Algernon, Esq. <i>Fernhill, near Windsor; and 7, Norfolk-crescent, W.</i>
1863	Gillies, Robert, Esq., C.E. <i>Dunedin, Otago, New Zealand.</i>
1867	Gisborne, Fred. N., Esq., Engineer and Electrician. 445, <i>West Strand, W.C.</i>
1836	Gladdish, Col. William. <i>Bycliffes, Gravesend.</i>
1864	Gladstone, George, Esq. <i>Clapham-common, S.</i>
1863	Gladstone, J. H., Esq., Ph.D. 17, <i>Pembridge-square, W.</i>
1862	810*Gladstone, Robert Stuart, Esq. 11, <i>New Broad-street, E.C.</i>
1846	*Gladstone, William, Esq. 57½, <i>Old Broad-street, E.C.</i>
1864	*Gladstone, W. K., Esq. 39a, <i>Old Bond-street, W.; and Fitzroy-park, Highgate, N.</i>
1860	Glascott, Commander Adam Giffard, R.N., Acting Commissioner on the Turko-Persian Frontier. <i>Messrs. Chard, 3, Clifford's Inn, Fleet-street, E.C.</i>
1867	Glass, H. A., Esq. 4, <i>Gray's-inn-square, W.C.</i>
1857	Gleig, Rev. G. R., M.A. <i>Chaplain-General, Chelsea-hospital, S.W.</i>
1854	Glen, Joseph, Esq., Mem. Geogr. Soc. of Bombay. <i>Oriental Club, W.</i>
1857	Glover, Commr. John H., R.N. <i>Lagos; and Army and Navy Club, S.W.</i>
1866	Glover, Robert Reaveley, Esq. 30, <i>Great St. Helen's, E.C.</i>
1860	Glyn, Capt. H. Carr, R.N. 1, <i>Eccleston-street, Belgrave-square, S.W.</i>
1868	820 Glyn, Richard H., Esq. 10, <i>King's-Arms-yard, E.C.; and Oriental Club, S.W.</i>
1864	Glyn, Sir Richard George, Bart. <i>Army and Navy Club, S.W.</i>
1862	Goddard, James, Jun., Esq. 14, <i>Mincing-lane, E.C.</i>
1868	Goldsmid, Sir Francis, Bart., M.P. <i>Inner Circle, Regent's-park, N.W.</i>
1863	Goldsmid, Lt.-Colonel Frederick John. <i>Harrow-on-the-hill; Southborough, Kent; and United Service Club, S.W.</i>
1861	Goldsmid, Julian, Esq. 49, <i>Grosvenor-street, S.W.</i>
1860	Gooch, Thomas Longridge, Esq. <i>Team-lodge, Saltwell, Gateshead-on-Tyne.</i>

- Year of Election.
- 1864 Goodall, George, Esq. *Messrs. Cox and Co., Craig's-court; and Junior Carlton Club, W.*
- 1867 *Goodenough, Fred. Addington, Esq. *Care of F. Jennings, Esq., 34, Cannon-street, E.C.*
- 1863 *Goodenough, Capt. J. G., R.N. *U. S. Club, S.W. Care of Messrs. Stilwell, 22, Arundel-street, Strand, W.C.*
- 1864 830 *Goodenough, Major W., R.A. *Royal Artillery, Aldershot.*
- 1861 Gooldin, Joseph, Esq. *48, Upper Hyde-park-gardens, W.*
- 1865 *Goolden, Charles, Esq. *United University Club, S.W.*
- 1856 *Gordon, Colonel the Hon. Alexander H., C.B.
- 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, Richard Thomas, Esq. *6, Queen-square, Bath.*
- 1866 Gore, Augustus F., Esq. *Colonial Secretary, Barbadoes. Civil Service Club, S.W.*
- 1859 Goaling, Fred. Solly, Esq. *18, New-street, Spring-gardens, S.W.*
- 1862 840 Goss, Samuel Day, Esq., M.D. *111, Kennington-park-road, S.*
- 1868 Gough, the Hon. George Stephen, F.L.S. *Lough Cutra Castle, Gort., Co. Galway.*
- 1835 Gould, Lieut.-Colonel Francis A. *Buntingford, Herts.*
- 1846 Gould, John, Esq., F.R.S., F.L.S. *26, Charlotte-street, Bedford-square, W.C.*
- 1865 Gowen, Colonel J. E.
- 1867 Grabham, Michael, Esq., M.D. *Madeira. Care of C. R. Blandy, Esq., 25, Crutched Friars, E.C.*
- 1868 Graeme, H. M. S., Esq. *Junior Athenæum; and East India U. S. Club, S.W.*
- 1858 Graham, Cyril C., Esq. *9, Cleveland-row, St. James's, S.W.; and Debroe-house, Watford, Herts.*
- 1868 *Graham, Thomas Cuninghame, Esq. *Carlton Club, S.W.; and Dunlop-house, Ayrshire.*
- 1861 Grant, Alexander, Esq. *Oakfield-house, Hornsey, N.*
- 1861 850 Grant, Daniel, Esq. *11, Warwick-road, Upper Clapton, N.*
- 1865 *Grant, Francis W., Esq. *Army and Navy Club, S.W.*
- 1860 Grant, Major James A., C.B. *E. India U. S. Club, S.W.; and Dingwall, Rosshire, N.B.*
- 1862 Grant, Lieut. J. M. (late 25th Reg.) *Elands Port, Cape of Good Hope. Care of Messrs. Ridgway and Sons, 2, Waterloo-place, S.W.*
- 1860 Grantham, Capt. James, R.E. *Scavby, Brigg, Lincolnshire; and Royal Engineer Office, Devonport.*
- 1867 Graves, Rev. John. *Underbarrow Parsonage, Milnthorpe, Westmoreland.*
- 1830 *Gray, John Edw., Esq., PH. DR., F.R.S., Z.S. and L.S. *British Museum, W.C.*
- 1868 Gray, Lieut.-Col. William, M.P. *26, Prince's-gardens, W.; and Darcy Levers Hall, near Bolton.*
- 1862 Greathed, Lieut.-Colonel Wilberforce, W. H., C.B.
- 1863 Greaves, Rev. Richard W. *1, Whitehall-gardens, W.*

Year of Election.	
1861	860 Green, Capt. Francis. 89, <i>Eccleston-square, S.W.</i>
1830	Greene, Thomas, Esq. <i>Whittington-hall, near Burton, Westmoreland.</i>
1857	*Greenfield, W. B., Esq. 59, <i>Porchester-terrace, Hyde-park, W.; and Union Club, S.W.</i>
1865	Greg, W. R., Esq., Comptroller of H.M.S. Stationery Office. <i>Wimbledon, S.W.</i>
1858	Gregory, Charles Hutton, Esq., C.E. 1, <i>Delahay-street, Westminster, S.W.</i>
1860	*Gregory, Francis Thomas, Esq. <i>Queensland.</i>
1858	*Gregory, Isaac, Esq. <i>Chorlton-hall, Victoria-park, Manchester.</i>
1857	*Grellet, Henry Robert, Esq. <i>Savage-gardens, Tower-hill, E.C.</i>
1865	Grenfell, Henry R., Esq., M.P. 15, <i>St. James's-place, S.W.</i>
1858	Grenfell, Pascoe St. Leger, Esq. <i>Maasteg-house, Swansea.</i>
1853	870 Grenfell, Riversdale W., Esq. 27, <i>Upper Thames-street, E.C.</i>
1830	*Greswell, Rev. Richard, M.A., F.R.S. 39, <i>St. Giles, Oxford.</i>
1866	Grey, Charles, Esq. 13, <i>Carlton-house-terrace, S.W.</i>
1837	*Grey, Sir George, K.C.B. <i>Governor and Commander-in-Chief, New Zealand. Colonial Office.</i>
1844	*Grey, Ralph Wm., Esq., Commissioner of Customs. 47, <i>Belgrave-square, S.W.; and Chipchase-castle, Hexham.</i>
1864	Grierson, Charles, Esq. <i>Alexandria. Care of John Baker, Esq., 3, Cloak-lane, Cannon-street, E.C.</i>
1868	Griffin, Daniel, Esq. 2, <i>Cavendish-terrace, Clapham-common, S.</i>
1862	Griffin, James, Esq. 2, <i>Eastern-parade, Southsea; and The Hard, Portsea, Hants.</i>
1861	*Griffith, Daniel Clewin, Esq. 20, <i>Gower-street, W.C.</i>
1839	Griffith, John, Esq. 16, <i>Finsbury-place-south, E.C.</i>
1863	880 Griffith, Sir Richard. 20, <i>Eccleston-square, S.W.</i>
1836	Griffith, Richard Clewin, Esq. 20, <i>Gower-street, W.C.</i>
1867	Griffiths, Captain A. G. F., 63rd Reg. (Major of Brigade, Gibraltar). <i>Care of E. S. Codd, Esq., 35, Craven-street, Strand, W.C.</i>
1855	Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. <i>Townsend-house, Malvern.</i>
1864	Grinnell, C., Esq. <i>Burlington-chambers, 180, Piccadilly, W.</i>
1861	Grosvenor, Lord Richard, M.P. 33, <i>Upper Grosvenor-street, W.</i>
1858	Grote, George, Esq. 12, <i>Savile-row, W.</i>
1857	Gruneisen, Charles Lewis, Esq. 16, <i>Surrey-street, Strand, W.C.</i>
1861	Gunnell, Commander Edmund H., R.N. <i>Army and Navy Club, S.W.; 21, Argyll-road, Campden-hill, W.</i>
1859	*Gurney, John H., Esq. <i>Marldon, Totnes.</i>
1857	890 Gurney, Samuel, Esq. 20, <i>Hanover-terrace, Regent's-park, W.</i>
1862	Guthrie, James Alexander, Esq. 30, <i>Portland-place, W.</i>
1865	Gwyther, John H., Esq. <i>Meadowcroft, Lower Sydenham.</i>
1863	Hadfield, Wm., Esq. 11, <i>Inverness-road, W.</i>
1865	Hadley, Henry, Esq., M.D. <i>Needwood-lodge, Bay's-hill, Cheltenham.</i>

Year of
Election.

- 1863 Hadow, P. D., Esq. *Saisbury-priory, Middlesex.*
- 1865 Halcombe, Rev. J. J. *Charter-house, E.C.*
- 1835 Hale, Warren S., Esq., Alderman. 71, *Queen-street, Cheapside, E.C.*
- 1860 Haliday, Lieut.-Colonel William Robert. *United Service Club, S.W.*
- 1853 Halifax, Viscount, G.C.B. 10, *Belgrave-square, S.W.*; and *Hickleton, Yorkshire.*
- 1853 900* Halkett, Rev. Dunbar S. *Little Bookham, Surrey.*
- 1853 *Halkett, Lieut. Peter A., R.N. *Windham Club, S.W.*
- 1861 Hall, Charles Hall, Esq. *Park-street, Cirencester.*
- 1863 Hall, Henry, Esq. 109, *Victoria-street, S.W.*
- 1862 Hall, James Febbutt, Esq. *Fore-street, Limehouse, E.*
- 1863 Hall, Thomas F., Esq., F.C.S. 29, *Warwick-square, S.W.*
- 1853 Hall, Admiral Sir William Hutcheson, K.C.B., F.R.S. *United Service Club, S.W.*; and 48, *Phillimore-gardens, Kensington, W.*
- 1865 Hallett, Lieut. Francis C. H., R.H.A. *Junior United Service Club, S.W.*
- 1864 Halliday, Sir Fred., K.C.B. 14, *Queen's-gate-gardens, South Kensington, W.*
- 1858 Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Heavitree, Exeter.*
- 1862 910 Hamilton, Archibald, Esq. *South Barrow, Bromley, Kent, S.E.*
- 1866 Hamilton, Rear-Admiral C. Baillie. 50, *Warwick-square, S.W.*
- 1861 Hamilton, Lord Claude, M.P. 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., 32, New Broad-street, E.C.*
- 1830 Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.*
- 1846 Hamilton, Rear-Admiral W. A. Baillie. *Macartney-house, Blackheath, S.E.*
- 1853 *Hand, Admiral George S., R.N., C.B. *United Service Club, S.W.*; and *H.M.S. 'Victory.'*
- 1860 *Handley, Benjamin, Esq., *Chandos-road, Stratford*; and *Grafton Club, Grafton-street, W.*
- 1866 920 Hanham, Commr. T. B., R.N. *Manston-house, near Blandford, Dorset.*
- 1861 *Hankey, Blake Alexander, Esq.
- 1857 Hankey, Thomson, Esq. 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., F.R.S.L., F.S.S., F.A.S.L. *Grafton Club, 10, Grafton-street, Piccadilly, W.*
- 1864 Harding, J. J., Esq. 1, *Baronsbury-park, Islington, N.*
- 1864 Hardinge, Capt. E., R.N. 32, *Hyde-park-square, W.*
- 1861 930 Hardinge, Henry, Esq., M.D. 18, *Grafton-street, Bond-street, W.*
- 1862 Hardman, William, Esq., M.A. *Norbiton-hall, Kingston-on-Thames.*

Year of Election.	
1864	Hardwick, B. Esq. 157, <i>Fenchurch-street, E.C.</i>
1855	Harris, Archdeacon the Hon. C. A.
1853	Harris, Admiral the Hon. E. A. J., C.B. <i>H.B.M.'s Envoy Extraordinary and Minister Plenipotentiary, Legation Britannique, Berne. Messrs. Woodhead.</i>
1852	Harris, George Frederick, Esq., M.A. <i>Harrow-park, Middlesex, N. W.</i>
1859	Harris, Capt. Henry, H.C.S. 35, <i>Gloucester-terrace, Hyde-park, W.</i>
1865	Harris, John M., Esq. 12, <i>Holland-terrace, Holland-road, Kensington, W.</i>
1863	Harrison, Chas., Esq. <i>Lavrie-park, Sydenham; and 3, Great Tower-st., E.C.</i>
1865	*Harrison, William, Esq., F.S.A., F.G.S., &c. <i>Conservative Club, S.W.; Royal Thames Yacht Club, 7, Albemarle-street, W.; and Samlesbury-hall, near Blackburn, Lancashire.</i>
1838	940 Harrowby, Dudley, Earl of. <i>Sandon-ho., Lichfield; and Norton, Gloucestershire.</i>
1868	*Hart, J. L., Esq. 20, <i>Pembridge-square, W.</i>
1854	*Hartland, F. Dixon, Esq., F.S.A., &c. <i>The Oaklands, near Cheltenham.</i>
1863	Harvey, Charles, Esq. <i>Rathgar-cottage, Streatham, S.</i>
1865	Harvey, C. H., Esq., M.D. 17, <i>Whitehall-place, S.W.</i>
1867	Harvey, James, Esq. (Solicitor). <i>Esk-street, Invercargill, Southland, New Zealand. Care of the Bank of Otago, Old Broad-street, E.C.</i>
1864	Harvey, John, Esq. <i>Ichwell Bury, Biggleswade.</i>
1864	Harvey, John, Esq. 7, <i>Mincing-lane, E.C.</i>
1866	Harvey, Richard M., Esq. <i>Oxford and Cambridge Club, S.W</i>
1864	Harvey, W. D., Esq. 52, <i>Notting-hill-square, S. W.</i>
1865	950 Harvey, Edward H. Esq. <i>Hill Grove House, Bembridge, Isle of Wight; and Carlton Club, S. W.</i>
1858	Hawker, Edward J., Esq. 37, <i>Cadogan-place, S. W.</i>
1834	Hawkins, Francis Bisset, Esq., M.D., F.R.S. 29, <i>Upper Harley-street, W.; and Lewell-lodge, Dorchester.</i>
1857	Hawkins, Capt. Frank K., R.N. <i>Army and Navy Club, S. W. Care of Messrs. Woodhead.</i>
1840	*Hawkins, John, Esq.
1858	*Hawkins, Col. J. Summerfield, R.E. <i>Woolwich, S.E.</i>
1861	Hawksley, Thomas, Esq., C.E. 14, <i>Phillimore-gardens, Kensington, S. W.</i>
1860	Haworth, Frederick, Esq.
1852	*Hay, Rear-Admiral Sir J. C. Dalrymple, Bart., M.P., F.R.S. 108, <i>St. George's-square, S. W.; U. S. Club, S. W.; Dunragit, Glentuce; and Harrow-on-the-hill, N. W.</i>
1863	*Hay, Lord John, M.P. 15, <i>Cromwell-road, South Kensington, W.</i>
1865	960 Hay, Lord William. 2, <i>Cleveland-row, S. W.</i>
1859	Hay, Major W. E. 7, <i>Westminster Chambers, Victoria-road, S. W.; and Garrick Club, Garrick-street, W. C.</i>
1864	Haysman, James, Esq. <i>Burdett-house, Burdett-road, E.</i>
1868	Haysman, David, Esq. <i>Portway House, Weston, Bath.</i>
1862	Head, Alfred, Esq. 13, <i>Craven-hill-gardens, Bayswater, W.</i>
1863	Headlam, Right Hon. Thos. E., M.P. 27, <i>Ashley-place, Victoria-street, S. W.</i>

Year of
Election.

- 1856 Heath, J. Benj., Esq., F.R.S., F.S.A., Consul for Sardinia. 31, *Old Jewry, E.C.*
- 1866 Heathcote, Charles George, Esq. 40, *Pall-mall, S.W.*
- 1863 Heathfield, W. E., Esq. 20, *King-street, St. James's, S.W.*
- 1861 Hector, Alexander, Esq. 6, *Stanley-gardens, Bayswater, W.*
- 1861 970 Hector, James, Esq., M.D. *Care of E. Stanford, Esq.*
- 1862 Hemans, Geo. Willoughby, Esq., C.E. *Westminster-chambers, Victoria-st., S.W.*
- 1837 *Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.*
- 1853 Henderson, John, Esq. *Conservative Club, S.W.; and Valparaiso.*
- 1866 Henderson, Patrick, Esq. *Care of Captain H. J. Strutt, Royal Mail Steam Packet Company, Southampton.*
- 1864 Henderson, R., Esq. 7, *Mincing-lane, E.C.*
- 1852 Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens, W.*
- 1844 *Heneage, Edward, Esq. *Stag's-end, Hemel Hempstead.*
- 1861 Henn, Rev. J., B.A., Head Master of the Manchester Commercial Schools. *Old Trafford, Manchester.*
- 1860 Hennessey, J. B. N., Esq. *1st Asst. Trig. Survey of India, Dehra in the Dhoon, N.W. Provinces, India. Care of Messrs. H. S. King, and Co.*
- 1838 980*Henry, Wm. Chas., Esq., M.D., F.R.S. *Haffield, near Ledbury, Herefordshire.*
- 1861 *Henty, Douglas, Esq. *Chichester.*
- 1864 Herbert, George, Esq., F.C.P. *University School, near Nottingham.*
- 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.*
- 1840 *Heywood, James, Esq., 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. 29, *King-street, St. James's, S.W.*
- 1867 990 Higgins, Edmund Thomas, Esq., M.R.C.S. 9, *Richmond-crescent, Barnsbury, N.*
- 1868 Hiley, Rev. W., M.A. 3, *Cambridge-gardens, Richmond-hill, S.W.*
- 1856 Hill, Arthur Bowdler, Esq. *South-road, Clapham-park, Surrey, S.*
- 1866 Hill, Berkeley, Esq. 14, *Weymouth-street, Portland-place, W.*
- 1867 Hill, O'Dell Travers, Esq. 1, *Landsdowne-villas, Bridge-road West, Battersea, S.W.*
- 1854 Hill, Lieut.-Colonel Stephen J. *Care of Capt. E. Barnett, R.N., 14, Woburn-square, W.; Army and Navy Club, S.W.; and Governor of Antigua.*
- 1865 Hill, Samuel S., Esq. *Reform Club, S.W.; and 37, Sackville-st., Piccadilly, W.*
- 1861 Hilliard, Major George Towers, Madras Staff Corps. 11, *Lansdowne-road, Kensington-park, Notting-hill, W.*
- 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 1000*Hinde, Samuel Henry, Esq. *Windham Club, S.W.*

- | Year of Election. | |
|-------------------|---|
| 1846 | *Hindmarsh, Frederick, Esq. 4, <i>New Inn, Strand, W.C.</i> |
| 1861 | Hoare, Deane John, Esq. <i>Royal Thames Yacht Club, Albemarle-street, W.</i> |
| 1868 | Hoare, Samuel, Esq., M.A. 1, <i>Upper Hyde-park-street, W.</i> |
| 1868 | Hobson, Stephen James, Esq. 32, <i>Nicholas-lane, Lombard-street; and 10, Regent's-park-road, N.W.</i> |
| 1855 | Hobbs, Wm. Geo. Ed., Esq. <i>Master of Grammar School, Wareside, near Ware.</i> |
| 1830 | *Hobhouse, Henry William, Esq. 24, <i>Cadogan-place, S.W.</i> |
| 1866 | Hockly, John Minett, Esq., R.N. Harbour Master, Shanghai, and Conservator of the Yang-tse-Kiang River. <i>Care of Messrs. Woodhead and Co., Charing Cross, S.W.</i> |
| 1856 | *Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Compan. |
| 1861 | *Hodgson, James Stewart, Esq. 8, <i>St. Helen's-place, E.C.</i> |
| 1857 | 1010 Hodgson, Kirkman Daniel, Esq. 8, <i>St. Helen's-place, E.C.</i> |
| 1856 | Hogg, James, Esq. 217, <i>Piccadilly, W.</i> |
| 1830 | Hogg, John, Esq., M.A., F.R.S., F.L.S., V.-Pres. Royal Society of Literature, &c. 8, <i>Sergeants'-inn, Temple, E.C.; and Norton-house, Stockton-upon-Tees.</i> |
| 1868 | Holdich, Thos. Hungerford, Esq., Lt. R.E. 4, <i>New-street, Spring-gardens, S.W.</i> |
| 1865 | Hole, Charles, Esq. <i>Loughborough-house-school, East Brixton, S.</i> |
| 1839 | *Holford, Robert S., Esq. <i>Dorchester-house, Park-lane, W.</i> |
| 1867 | Holland, Rev. Fred. Whitmore. 6, <i>Portsea-place, Connaught-square, W.</i> |
| 1830 | Holland, Sir Henry, Bart., M.D., F.R.S. 25, <i>Lower Brook-street, W.</i> |
| 1861 | Holland, Colonel James. <i>Southside, The Park, Upper Norwood, S.E.</i> |
| 1863 | Holland, Loton, Esq. 6, <i>Queen's-villas, Windsor.</i> |
| 1862 | 1020 Holland, Robert, Esq. <i>Stanmore-hall, Great Stanmore, Middlesex.</i> |
| 1868 | Holland, Major T. J. <i>Care of Col. Holland, Southside, The Park, Upper Norwood.</i> |
| 1861 | *Hollingsworth, John, Esq., M.R.C.S. <i>Maidenstone-house, Greenwich, S.E.</i> |
| 1861 | Holme, J. Wilson, Esq., M.A. <i>Downswood, Beckenham, Kent, S.E.</i> |
| 1835 | *Holmes, James, Esq. 4, <i>New Ormond-street, Queen-square, W.C.</i> |
| 1839 | *Holroyd, Arthur Todd, Esq., M.D., F.L.S. <i>Athenæum Club, S.W.</i> |
| 1857 | Holroyd, Henry, Esq. Barrister-at-Law. 2, <i>Elm-court, Temple, E.C.</i> |
| 1867 | *Holstein, The Marques de Souza. <i>Lisbon. Care of Messrs. Kraentler and Mieville, 12, Angel-Court, E.C.</i> |
| 1864 | Holt, Vesey, Esq. 17, <i>Whitehall-place, S.W.</i> |
| 1857 | Homfray, William Henry, Esq. 6, <i>Storey's-gate, S.W.</i> |
| 1865 | 1030 Honeywood, Robert, Esq. <i>Manor-house, Wethersfield, Braintree; Windham Club, S.W.</i> |
| 1864 | *Hood, Sir Alex. Acland, Bart. <i>St. Andrie's-park, Bridgewater, Somerset.</i> |
| 1862 | Hood, Henry Schuback, Esq. <i>War Office, S.W.; and 10, Kensington-park-gardens, W.</i> |
| 1861 | Hood, T. H. Cockburn, Esq. <i>Stoneridge, Bervickshire.</i> |
| 1859 | *Hood, William Charles, Esq., M.D. <i>Bethlehem Hospital, S.</i> |
| 1866 | *Hooker, Joseph, Esq., M.D., F.R.S., F.L.S., &c. <i>Director of the Royal Gardens, Kew.</i> |
| 1868 | Hooper, Alf., Esq. <i>Fairfield, Upper Sydenham; and 30, Moorgate-street, E.C.</i> |

Year of
Election.

- 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.*
- 1868 1040 Horton, James Africanus B., Esq., M.D., &c. *Care of Sir John Kirkland, 17, Whitehall-place, S.W.*
- 1861 Hoskins, Capt. A. H., R.N. *Army and Navy Club, S.W. Care of Messrs. Woodhead.*
- 1859 Hoskyns, Chandos Wren, Esq. *Wrazhall-abbey, Warwickshire.*
- 1853 Houghton, Lord. 16, *Upper-brook-street, W.*; *The Hall, Bawtry*; and *Fryston-hall, Ferrybridge, Yorkshire.*
- 1856 Howell, William Hilton, Esq. *Goulburn, New South Wales. Care of Mr. W. Chamberlin, 74, Fleet-street, E.C.*
- 1864 Howell, W. G., Esq.
- 1853 Howard, Sir Ralph, Bart. 17, *Belgrave-sq., S.W.*; and *Bushy-park, Wicklow.*
- 1857 Howard, Samuel Lloyd, Esq. *Goldings, Loughton, Essex.*
- 1842 *Hubbard, J. Gellibrand, Esq. 24, *Prince's-gate, Hyde-park, S.W.*
- 1867 *Hubbard, William Egerton, Esq. *St. Leonard's-lodge, Horsham.*
- 1867 1050 *Hubbard, William Egerton, Esq., Jun., R.A. *St. Leonard's-lodge, Horsham.*
- 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. Care of Rev. A. Hume, 24, Fitzclarence-street, Liverpool.*
- 1861 Hunt, George S. Lennox, Esq., H.B.M. Consul, *Pernambuco.*
- 1866 Hunt, Joseph, Esq. *Cave-house Uxbridge, Middlesex.*
- 1865 Hunt, Capt. Thomas, R.H.A. *The Barracks, Maidstone.*
- 1868 Hunt, John Percival, Esq., M.D. *Great Ouseburn, near York, Yorkshire.*
- 1857 Hunt, Zacharias Daniel, Esq. *Aylesbury.*
- 1862 1060 Hunter, Henry Lannoy, Esq. *Beech-hill, Reading.*
- 1868 Hunter, Major Edward. *Junior United Service Club, S.W.*
- 1864 Hutchinson, Capt. R. R. 13, *Holland-terrace, Holland-road, Kensington, W.*
- 1858 Hutchinson, Thomas J., Esq., F.R.S.L., F.R.S., F.A.S.L., H.B.M. Consul, *Rosario, Argentine Republic. Care of J. B. Alston, Esq., Foreign-office.*
- 1860 *Hyde, Captain Samuel. 8, *Billiter-square, E.C.*
- 1865 Illingworth, Rev. Edward A. 3, *Mecklenburg-street, W.C.*
- 1852 Illingworth, Richard Stonhewer, Esq. 9, *Norfolk-crescent, Hyde-park, W.*
- 1850 *Imray, James Frederick, Esq. 102, *Minorities, E.*; and *Beckenham, Kent, S.E.*
- 1867 Ince, Joseph, Esq., F.L.S., &c., &c. 26, *St. George's-place, Hyde-park-corner.*
- 1861 *Ingall, Samuel, Esq. *Forest-hill, Kent, S.E.*
- 1860 1070 Ingilby, the Rev. Sir Henry John, Bart. *Ripley-castle, Ripley, Yorkshire.*
- 1851 Inglefield, Captain Edward A., R.N., F.R.S. *United Service Club, S.W.*; and 10, *Grove-end-road, St. John's Wood, N.W.*

Year of Election.	
1846	Ingram, Hughes Francis, Esq. <i>University Club, S. W.</i>
1860	*Inskip, G. H., Esq., Master R.N. <i>H.M. Surveying Vessel 'Porcupine;' and 6, Park-place-west, Sunderland.</i>
1852	*Inskip, Rev. Robert Mills. 8, <i>Boon's-place, Plymouth.</i>
1840	*Irby, Frederick W., Esq. <i>Athenæum Club, S. W.</i>
1864	*Irving, John, Esq.
1853	Irving, Thomas, Esq. 46, <i>Marquess-road, Canonbury, N.</i>
1861	Irwin, James V. H. 8, <i>Duke-street, St. James's, S. W.</i>
1864	Ives, W. F., Esq. <i>St. John's School, Limehouse, E.</i>
1865	1808 Izard, Frederick, Esq., 141, <i>High Holborn, W. C.</i>
1866	Jackson, Robert Ward, Esq. 28, <i>Inverness-road, Hyde-park, W.</i>
1855	Jackson, William, Esq. 10, <i>Mansfield-street, W.</i>
1862	Jacomb, Thomas, jun., Esq. 23, <i>Old Broad-street, Gresham-house, E. C.</i>
1857	James, Colonel Sir Henry, R.E., F.R.S. <i>Director of the Ordnance Survey, Southampton.</i>
1861	James, William Bosville, Esq. 13, <i>Blomfield-road, Maida-hill, W.</i>
1868	Jamieson, Richard Alexander, Esq., M.A. <i>St. Luke's, Cork; and care of J. P. Watson, Esq., Lime-street, E. C.</i>
1868	Jamieson, Hugh, Esq. <i>Cox's Hotel, Jermyn-street, S. W.</i>
1862	*Jaques, Leonard, Esq. <i>Wentbridge-house, Pontefract, Yorkshires.</i>
1863	*Jardine, Andrew, Esq. <i>Lanrick-castle, Stirling.</i>
1863	1090*Jardine, Robert, Esq., M.P. <i>Castlemilk, Lockerby, N. B.</i>
1868	Jardine, Robert, Esq., B.A. <i>Bengal Club, Calcutta. Care of W. Jardine, Esq., J. P., Dunstable, Beds.</i>
1857	Jefferson, Richard, Esq. A4, <i>The Albany, W.</i>
1865	Jeffreys, J. G., Esq. 25, <i>Devonshire-place, W.</i>
1860	*Jejeebhoy, Sir Jamssetjee, Bart. <i>Bombay.</i>
1854	Jellicoe, Charles, Esq. 12, <i>Cavendish-place, W.</i>
1859	Jencken, H. Diedrich, Esq. 1, <i>Brick-court, Temple, E. C.; and 2, York-terrace, Upper Sydenham, S. E.</i>
1854	Jenkins, Capt. Griffith, I.N., C.B. <i>East India Club, St. James's-square, S. W., and Derwen, Welch Pool, Montgomeryshire.</i>
1837	*Jenkins, R. Castle, Esq. <i>Beachley, near Chepstow.</i>
1854	*Jennings, William, Esq., M.A. 13, <i>Victoria-street, Westminster, S. W.</i>
1860	1100Jermyn, Rowland Formby, Esq. <i>War Office, S. W.</i>
1860	Jessopp, Rev. Augustus, M.A., Head Master, King Edward VI. School. <i>Norwich.</i>
1864	*Jeula, Henry, Esq. <i>Lloyd's, E. C.</i>
1864	*Jeyes, F. F., Esq. <i>Castle-hill, Ealing, W.</i>
1847	Johnson, Edmund Chas., Esq. 12, <i>Wilton-street, Belgrave-square, S. W.</i>
1859	*Johnson, Henry, Esq. 39, <i>Crutched-friars, E. C.</i>
1854	Johnson, John Hugh, Esq.
1861	Johnson, William, Esq., R.N. <i>Junior Carlton Club, S. W.</i>

Year of Election.	
1866	Johnson, W. H., Esq., Civil Assistant G. T. S. India. <i>Dehra Dun, N.W. Provinces, India.</i>
1843	Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., &c. <i>March-hall-park; and 4, St. Andrew-square, Edinburgh.</i>
1856	1110 Johnston, A. R., Esq., F.R.S. <i>Athenæum Club, S.W.</i>
1857	Johnston, J. Brookes, Esq. 29, <i>Lombard-street, E.C.</i>
1866	Johnstone, Colonel H. C. <i>Murree, Punjab, India. Care of the United Service Company, 9, Waterloo-place, S.W.</i>
1867	*Johnstone, John, Esq. <i>Castlenau-house, Mortlake, S.W.</i>
1853	Johnstone, Sir John V. B., Bart., M.P., D.C.L. 34, <i>Belgrave-square, W.; and Hackness-hall, near Scarborough.</i>
1858	Jones, Capt. Edward Monckton, 20th Regt. <i>Adjutant, Staff College, near Farnboro' Station, Hants.</i>
1863	Jones, Capt. H. M., V.C.
1864	Jones, Capt. Felix. <i>Fernside, Church-road, Westow-hill, Upper Norwood, S.</i>
1857	Jones, Lt.-Colonel Jenkin, Royal Engineers. 1, <i>Lennard-place, Circus-road, St. John's-wood, N.W.; and India.</i>
1862	Jones, John, Esq. 338, <i>Strand, W.C.</i>
1861	1120 Jones, John Pryce, Esq. <i>Grove-park School, Wrexham.</i>
1861	Jones, Sir Willoughby, Bart. <i>Cranmer-hall, Fakenham, Norfolk.</i>
1858	Jones, William S., Esq. 2, <i>Verulam-buildings, Gray's-ian, W.C.</i>
1867	*Jordan, Wm. Leighton, Esq. 1, <i>Povis-square, Notting-hill, W.</i>
1863	Joshua, Moss, Esq. <i>Melbowne; and 22, Clifton-gardens, Maida-hill, W.</i>
1863	Jourdain, Frederick John, Esq. 10, <i>Austin-friars, E.C.</i>
1858	Kay, David, Esq. 17, <i>Abingdon-terrace, Kensington, W.</i>
1865	Kaye, J. W., Esq. <i>India Office, S.W.</i>
1860	Keate, R. W., Esq., Lieutenant-Governor, <i>Trinidad.</i>
1857	Keating, Sir Henry Singer, Q.C., one of the Judges of the Court of Common Pleas. 11, <i>Prince's-gardens, S.W.</i>
1857	1130 Keene, Rev. C. E. Ruck. <i>Swynscombe-park, Henley-upon-Thames.</i>
1863	Keir, Simon, Esq. <i>Conservative Club, S.W.</i>
1845	*Kellett, Rr.-Adm. Henry, C.B. <i>Clonmel, Ireland.</i>
1868	Kellie, Right. Hon. the Earl of. 28, <i>Eaton-place, S.W.; Carlton-Club and Alloa-park, Scotland.</i>
1861	Kelly, William, Esq. <i>Royal Thames Yacht Club, 7, Albemarle-street, W.</i>
1860	*Kemball, Col. Arnold Burrowes, C.B., Indian Army. <i>H.M.'s Consul-General, Bagdad; and 6, Chester-place, Hyde-park, W.</i>
1863	Kempster, J., Esq. 1, <i>Portsmouth-place, Kennington-lane, Surrey, S.</i>
1861	Kennard, Adam Steinmetz, Esq. 7, <i>Fenchurch-street, E.C.</i>
1859	Kennard, Coleridge J., Esq. 14, <i>Lombard-street, E.C.</i>
1861	Kennard, Robert William, Esq. 37, <i>Porchester-terrace, Hyde-park, W.</i>
1861	1140 Kennedy, Edward Shirley, Esq.
1854	Kennedy, Rev. John, M.A. 4, <i>Stepney-green, E.</i>

List of Fellows of the

Year of Election.	
1863	Kerr, J. H., Esq., R.N. <i>Hydrographic-office, S.W.</i>
1867	Kerr, Robt. M., Esq., (Judge of the City of London Court). <i>7, Chester-terrace Regents'-park, N.W.</i>
1864	Kerr, Lord Schomberg. <i>15, Bruton-street, W.</i>
1862	Kershaw, Wm., Esq. <i>16, St. Mary Axe, E.C.; and Suffolk-lodge, Brixton-road, S.</i>
1859	Key, Admiral Astley Cooper, R.N., C.B. <i>United Service Club, S.W.</i>
1862	Key, J. Binney, Esq. <i>Oriental Club, W.</i>
1857	Keysell, Francis P., Esq. <i>Sycamore-villa, 35, Carlton-hill, St. John's-wood, N.W.</i>
1864	*Kiddle, W. W., Esq. <i>East Dereham, Norfolk.</i>
1864	1150 Kimber, Dr. E. <i>Murchison-house, Dulwich, S.E.</i>
1846	King, Lieut.-Colonel Edward R., 36th Regt. <i>Junior United Service Club, S.W.</i>
1866	King, John, Esq. <i>Rushetts-house, Thames Ditton, Surrey.</i>
1861	King, Major W. Ross, Unatt., F.S.A. Scot. <i>Tertowie, Kinellar, Aberdeenshire and Army and Navy Club, S.W.</i>
1868	Kingsley, Henry, Esq. <i>Wargrave, Henley-on-Thames, Berks.; and Garrick Club, W.C.</i>
1857	*Kinnaird, Hon. Arthur F., M.P. <i>2, Pall-mall-east, S.W.</i>
1867	Kinnaird, George William Fox, Lord, K.G. <i>Rossie-priory, Inchture, N.B.; and 33, Grosvenor-street, W.</i>
1860	Kinns, Samuel, Esq., PH. DR., F.R.A.S. <i>Highbury-new-park College, N.</i>
1858	Kirk, John, Esq., M.D. <i>45, George-square, Edinburgh.</i>
1863	Kirke, John, Esq., Barrister. <i>C. Thorold, Esq., Welham, Retford, Notts.</i>
1861	1160 Kirkland, Sir John. <i>17, Whitehall-pl., S.W.; and Foot's-cray-pl., Kent, S.E.</i>
1868	Kisch, Daniel Montagu, Esq. <i>1, Devonshire-place, Seven Sisters'-road, Upper Holloway, N.</i>
1866	*Kitson, James, Jun., Esq. <i>Hanover-square, Leeds.</i>
1868	Kitto, Richard L. Middleton, Esq. <i>Church-hill-villa, Fryerstown, Victoria, Australia.</i>
1835	*Kjaer, Thomas Andreas, Esq. <i>Hjornet af Kongens Nyetow og Gathersgaden, No. 26, 3d Sahl, Copenhagen.</i>
1867	Knight, Andrew Halley, Esq. <i>76, Westbourne-terrace, Hyde-park, W.</i>
1862	Knollys, Lieut.-General Sir William T., K.C.B., V.-Pres. Council of Military Education. <i>Eaton-square, S.W.</i>
1867	Knox, Alex. A., Esq. <i>91, Victoria-street, Westminster, S.W.</i>
1861	Knox, Thomas G., Esq. <i>India. Care of Messrs. H. S. King and Co., 45, Pall-mall, S.W.</i>
1866	Kopsch, Henry, Esq. <i>Custom-house, Shanghai. Care of H. C. Batchelor, Esq., 155, Cannon-street, E.C.</i>
1861	1170 Kyd, Hayes, Esq., M.R.C.S. <i>Wadebridge, Cornwall.</i>
1859	Labrow, Lieut.-Colonel Valentine H., F.S.A., F.G.S. <i>Mitre-court-chambers, Temple, E.C.; and Club-chambers, S.W.</i>
1849	*Laffan, Capt. Robert Michael, R.E. <i>Army and Navy Club, S.W.; and Otham-lodge, Kent.</i>

- Year of Election.
- 1859 Lamb, Lieut. Henry, I.N. *H.M. India Store Department, Belvedere-road, Lambeth, S.*
- 1863 *Lambert, Alan, Esq. *Heath-lodge, Putney-heath, S.W.*
- 1864 Lambert, Charles, Esq. 2, *Queen-street-place, Upper Thames-street, E.C.*
- 1867 Lambert, Wm. Blake, Esq., C.E. 21, *Queen Anne-street, Cavendish-square, W.*
- 1868 Lambert, Francis D., Esq. 20, *Devonshire-place, Portland-place, W.*
- 1864 Lamert, Capt. G. F. 20, *Albemarle-street, W.*
- 1861 Lamont, James, Esq., M.P. *Knockdon, Greenock, N.B.*
- 1866 1180 Lampray, John, Esq. 16, *Camden-square, N.W.*
- 1865 Lampray, Thomas, Esq. *Warrior-lodge, The Grove, Hammersmith, W.*
- 1867 Lamprey, Jones, Esq., M.B., 67th Regt. *Waterford, Ireland.*
- 1864 Lampson, C. M., Esq. 64, *Queen-street, Cheapside, E.C.*
- 1838 *Lance, John Henry, Esq., F.L.S. *The Holmwood, Dorking.*
- 1861 *Lang, Andrew, Esq. *Dunmore, Hunter-river, New South Wales; and Dunmore, Teignmouth, Devon.*
- 1859 *Lange, Daniel A., Esq. 21, *Regent-street, W.*
- 1867 Langlands, John, Esq., Engineer. *Melbourne, Australia.*
- 1865 Langley, Edward, Esq. *Well-hall, Eltham, Kent.*
- 1856 *Langler, John R., Esq., B.A. *Wesleyan Training College, Westminster; and Gothic Villas, 2, Bridge-road West, Battersea, S.W.*
- 1833 1190 *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 Latrobe, Ch. J., Esq. *Clapham-house, Lewes, Sussex.*
- 1846 *Law, Hon. H. Spencar, M.A. 40, *Eaton-place, S.W.*
- 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.*
- 1868 Lawrie, James Esq., 63, *Old Broad-street, E.C.*
- 1867 Lawson, Wm., Esq. 21, *Walham Grove, Fulham, S.W.*
- 1862 *Lay, Horatio, N., Esq., Commissioner of Foreign Customs in China.
- 1857 1200 Layard, Austen H., Esq., M.P., D.C.L. 130, *Piccadilly, W.*
- 1866 *Layard, Lieutenant Brownlow Villiers (3rd W. India Regt.). 38, *Upper Mount-street, Dublin; and Lane's Hotel, 1, St. Alban's-place, S.W.*
- 1868 Laybourne, Augustine, Esq. 9, *King-street, Finsbury-square, E.C.; and Loughton, Essex.*
- 1863 *Leaf, Chas. J., Esq. *Old-change, E.C.; and The Rylands, Norwood, S.*
- 1861 *Learmonth, Dr. John. *Gothic-lodge, Queen's-road, Clapham-park.*
- 1866 Lebour, G. A., Esq. 6, *Addison-crescent, Kensington, W.*
- 1853 *Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, N.W.*
- 1868 Le Couteur, Lt.-Col. J. Halkett. 17, *Chapel-street, Belgrave-square, S.W.*
- 1865 Le Feuvre, W. H., Esq., C.E. 9, *Dowgate-hill, Cannon-street, E.C.*
- 1861 Leckie, Patrick C., Esq. 7, *Palace-road, Roupell-park, Streatham, S.*
- 1868 1210 Lee, John, Esq. 80, *Berkeley-villas, Loughborough-park, S.*

Year of Election.	
1868	Lee, Sir Geo. Philip, Bart. 28, <i>Bryanston-square, W.</i>
1839	Lee, Thomas, Esq. <i>Royal Institution, Albemarle-street, W.</i>
1833	*Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 18, <i>Spring-gardens, S.W.</i>
1853	Lefroy, General John Henry, R.A., F.R.S. <i>Royal Arsenal, Woolwich, S.E.</i>
1862	Leggatt, Clement Davidson, Esq. 43, <i>Inverness-terrace, W.</i>
1861	Legh, Wm. John, Esq. 37, <i>Loundes-square, S.W.</i> ; and <i>Lyme-park, Cheshire.</i>
1861	*Lehmann, Frederick, Esq. 139, <i>Westbourne-terrace, W.</i>
1845	Leigh, John Studdy, Esq., F.G.S. 27, <i>Leadenhall-street, E.C.</i>
1863	Le Mesurier, Henry P., Esq., C.E. <i>St. Martin's, Guernsey.</i>
1863	1220 Le Messurier, M.-Gen. A. P. 2, <i>Stanhope-terrace, Hyde-park, W.</i>
1856	Leslie, the Hon. G. W. 4, <i>Harley-street, W.</i>
1867	L'Estrange, Carleton, Esq. <i>Carlton Club, S.W.</i>
1840	*Letts, Thomas, Esq. 8, <i>Royal Exchange, E.C.</i>
1863	Leveaux, E. H., Esq. 25, <i>The Cedars, Putney, S.W.</i>
1857	Leverson, George B. C., Esq. 73, <i>Gloucester-terrace, Hyde-park, W.</i>
1862	Levick, Joseph, Esq. 8, <i>Great Winchester-street, Old Broad-street, E.C.</i>
1866	Levinge-Swift, Richard, Esq. <i>Levinge-lodge, Richmond, Surrey.</i>
1859	Levinsohn, Louis, Esq. <i>Vernon-house, Clarendon-gardens, Maida-hill, W.</i>
1865	Lèvy, William Hanks, Esq. <i>Institution of the Association for the Welfare of the Blind, 210, Oxford-street, W.</i>
1852	1230 Leycester, Captain Edmund M., R.N. 5, <i>Donegal-terrace, Stoke, Devonport.</i>
1861	Leyland, Luke Swallow, Esq. <i>The Leylands, Hatfield, Doncaster.</i>
1859	Lichfield, Thomas George, Earl of. <i>Shugborough, Staffordshire.</i>
1856	Lilford, Thomas Lyttleton Powys, Lord. 10, <i>Grosvenor-place, W.</i>
1860	Lindsay, H. Hamilton, Esq.
1857	Lindsay, Major-General the Hon. J., Grenadier Guards, M.P. 20, <i>Portman-square, W.</i>
1867	*Lindsay, Col. Robert J. L., M.P., V.O. <i>Lockinge-house, Wantage, Berks; and 2, Carlton-gardens, S.W.</i>
1855	*Lindsay, Wm. S., Esq. <i>Manor-house, Shepperton, Middlesex.</i>
1868	Linton, Robert P., Esq., Surg-Major. 14, <i>St. James-square, S.W.</i>
1858	Lister, John, Esq.
1866	1240 Little, Archibald J., Esq. 34, <i>Brook-street, Grosvenor-square, W.</i>
1857	*Lloyd, George A., Esq. <i>George-yard, Lombard-street, E.C.</i>
1863	Lloyd, Sir Thomas Davis, Bart. <i>United University Club, S.W.; and Bronwydd, Carmarthen.</i>
1864	Lloyd, W., Esq. <i>Moor-hall, near Sutton Coldfield.</i>
1867	Lloyd, Rev. Wm. V., M.A. 16, <i>Lancaster-gate, W.</i>
1861	Lluelyn, Capt. Richard. 20, <i>Montagu-square, W.</i>
1868	Lobley, James L., Esq. 50, <i>Lansdowns-road, Kensington-park, W.</i>
1863	Loch, George, Esq. 12, <i>Albemarle-street, W.</i>
1859	Loch, Henry Brougham, Esq. <i>Government-house, Isle of Man.</i>
1861	Loch, John Charles, Esq. 12, <i>Albemarle-street, W.; and Hong-Kong.</i>

Year of
Election.

- 1857 1250 Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.*
- 1864 Locke, John, Esq. 83, *Addison-road, Kensington, W.*
- 1858 Lockhart, William, Esq., F.R.C.S. *Park-villas, Granville-par^k, 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 Londeborough, Wm. Henry Forester, Lord. *Thomas's-hotel, 25, Berkeley-sq., W.*
- 1830 Long, George, Esq., M.A. 22, *Buckingham-street, Brighton.*
- 1857 *Long, W. Beeston, Esq.
- 1853 Longden, Morrell D., Esq. 4, *Ennismore-place, Hyde-park, S.W.*
- 1865 *Longley, Major George, R.E. 60, *Prince's-gate, W.*
- 1847 1260 Longman, Thos., Esq. *Paternoster-row, E.C. ; and 8, Sussex-sq., Hyde-park, W.*
- 1858 Longman, William, Esq. 36, *Hyde-park-square, W.*
- 1861 Lonsdale, Arthur Pemberton, Esq.
- 1860 Looker, William Robert, Esq. *Melbourne, Australia. Cure of Mr. Ashhu st, 16, Bishopsgate-street-within, E.C.*
- 1863 Lovell, Capt. 6, *Granville-park-villas, Blackheath, S.E.*
- 1856 Lovett, Phillips Cosby, Esq. *Liscombe-ho., Liscombe, Leighton Buzzard, Bucks.*
- 1867 Low, Alex. F., Esq. 84, *Westbourne-terrace, W.*
- 1861 Low, Robert, Esq. 17, *Woburn-square, W.C.*
- 1863 Low, S. P., Esq. 55, *Parliament-street, S.W.*
- 1858 Lowden, Rev. George Rouse. *Brent-villa, Hanwell, Middlesex.*
- 1859 1270 Lowe, Capt. W. Drury. *Myria, Bettws-y-Coed, Llanrwst, North Wales.*
- 1863 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.*
- 1866 Luard, Wm. Charles, Esq. *Llanduff-house, Cardiff ; and Athenæum 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.*
- 1866 Lydall, J. H., Esq. 12, *Southampton-buildings, Chancery-lane, W.C.*
- 1830 *Lyell, Sir Charles, Bart., M.A., LL.D., F.R.S. 73, *Harley-st., Cavendish-sq., W.*
- 1837 1280 *Lynch, Capt. H. Blossie, 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 *Macarthur, Major-Gen. Sir Edward, K.C.B. 27, *Prince's-gardens, W.*
- 1863 Macbraire, James, Esq. *Broadmeadows, Berwick-on-Tweed.*
- 1862 Macdonald, Chessborough C., Esq. 32, *Belsize-park, Hampstead, N.W.*
- 1843 Macdonnell, Sir Richard Graves, C.B., late Governor of S. Australia.
- 1865 Macfarlan, John G., Esq. *Clyde-villa, Anerley-hill, Upper Norwood.*

Year of Election.	
1865	Macfie, Rev. M. <i>Moseley-road, Birmingham.</i>
1868	MacGregor, Capt. C. M. <i>Simla.</i>
1861	1290 Mackintosh, Alexander Brodie, Esq. <i>Oriental Club, W.; and Dussou, Scotland.</i>
1839	Macintosh, Lieut.-General Alex. Fisher, K.H.
1845	*Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act.
1868	Mackay, Dr. A. E., R.N. <i>Admiralty, Somerset-house, W.C.</i>
1859	Mackay, Rev. Alexander, A.M. <i>Free Manse, Rhynie, Aberdeenshire.</i>
1859	*Mackean, Thos. W. L., Esq. 24, <i>Oxford-square, Hyde-park, W.</i>
1845	Mackenzie, Right Hon. Holt, F.R.A.S. <i>Athenæum Club, S.W.; and 28, Wimpole-street, W.</i>
1861	Mackenzie, Sir James J. Randall, Bart. <i>Travellers' Club, S.W.; and Seatwell, Rosehaugh, Munloch, N.B.</i>
1860	*Mackenzie, James T., Esq. 69, <i>Lombard-street, E.C.</i>
1863	Mackenzie, John H., Esq. <i>Wallington, Carshalton, Surrey.</i>
1864	1300* Mackeson, Edward, Esq. 59, <i>Lincoln's-inn-fields, W.C.</i>
1830	Mackillop, James, Esq., F.R.A.S. 30, <i>Grosvenor-square, W.</i>
1867	Mackinlay, John, Esq., J.P., M.I.C.E., Chief Engineer and Inspector of Machinery, H.M. Dockyard, and Surveyor to the Port, Bombay. <i>Care of Charles Bannerman, Esq., 193, Camberwell-new-road, Kennington, S.</i>
1862	Mackinly, D., Esq. <i>Oriental Club, W.</i>
1864	Mackinnon, C. D., Esq. <i>Care of Messrs. J. Clunch and Sons, 31, Abchurch-lane, E.C.</i>
1861	Mackinnon, Lachlan, Esq. <i>Menabily, Par-Cornwall; and Reform Club, S.W.</i>
1855	*Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, <i>Hyde-park-place, W.</i>
1865	*Mackinnon, W., Esq. 150, <i>Hope-street, Glasgow.</i>
1860	Mackirdy, M.-Gen. Elliot, 69th Rgt. <i>U. S. Club, S.W.; and Tonghoo, Birmah.</i>
1860	Maclean, William Crichton, Esq., F.G.S. 31, <i>Camperdown-pl., Great Yarmouth.</i>
1859	1310 MacLeay, George, Esq. 35, <i>Hyde-park-gardens, W.</i>
1867	Macloughlin, David, Esq., M.D., Member of Legion of Honour, &c. 36, <i>Bruton-street, Berkeley-square, W.</i>
1855	Maclure, Andrew, Esq. <i>Maclure, Macdonald, and Macgregor, 37, Walbrook, E.C.</i>
1861	Maclure, John William, Esq. <i>Fallowfield, near Manchester.</i>
1860	Macmillan, Alex., Esq. 16, <i>Bedford-street, Covent-garden, W.C.</i>
1865	Mackmurdo, G. W., Esq. 7, <i>New Broad-street, E.C.</i>
1855	Macnab, John, Esq. <i>Findluter-lodge, Trinity, near Edinburgh.</i>
1868	Macnair, Geo. Esq. <i>Oriental Club, Hanover-square; 24, Kensington-gardens-square, W.</i>
1861	Macpherson, William, Esq. 32, <i>Lancaster-gate, W.</i>
1845	*Macqueen, James, Esq., K.C. Tower and Sword of Portugal. 10, <i>Honiton-street, Kensington, W.</i>
1864	1320 Macrae, Colin W., Esq. <i>Oriental Club, Hanover-square, W.</i>
1865	Mactaggart, Malcolm, Esq. <i>Sydney, New South Wales.</i>
1863	McArthur, Alex., Esq. <i>Raleigh-hall, Brixton-rise, Brixton, S.</i>
1867	McArthur, William, Esq. 1, <i>Guyder-houses, Brixton-rise, S.</i>
1860	McClintock, Capt. Sir Francis Leopold, R.N. <i>United Service Club, S.W.</i>

- Year of Election.
- 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 United Service Club, S.W.*
- 1855 *McClure, Captain Sir Robert J. le M., R.N. *Chipperfield, Herts; and Athenæum Club, S.W.*
- 1865 McDonald, James, Esq. *Oriental Club, Hanover-square, W.*
- 1865 McEuen, D. P., Esq. 24, *Pembridge-square, Bayswater, W.*
- 1865 1330 McEwan, James, Esq. 30, *Holland-park, Kensington, W.*
- 1855 McGregor, Duncan, Esq. *Board of Trade, S.W.; and Athenæum Club, S.W.*
- 1867 McGregor, Duncan, Esq. *Clyde-place, Glasgow.*
- 1866 *McIvor, W. G., Esq., *Superintendent of Chinchona Plantations, Ootacamund, Madras.*
- 1858 McKerrell, Robert, Esq. 45, *Inverness-terrace, W.; and Mauritius.*
- 1867 McLean, Hon. John, *Oamaru, New Zealand; care of Messrs. Redfern, Alexander, and Co., 3, Great Winchester-street-buildings, E.C.*
- 1868 McLean, Frank, Esq., M.A., C.E. 23, *Great George-street, Westminster, S.W.*
- 1852 McLeod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.*
- 1866 McNair, Capt. John F. A., R.A.
- 1839 McNeil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*
- 1859 1340 Maitland, Geo. Gammie, Esq. *Shotover-house, Wheatley, Oxon.*
- 1845 *Major, Richard Henry, Esq., F.S.A. *British Museum, W.C.*
- 1868 *Makins, Henry F., Esq. 19, *Prince of Wales-terrace, Kensington-palace, W., and Reform Club, S.W.*
- 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 *Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
- 1853 *Mallet, Charles, Esq. *Audit Office, W.C.; and Belmont, Hampstead, N.W.*
- 1836 *Manchester, Rt. Rev. James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S.W.; and Sedgley-hall, Manchester.*
- 1860 1350 Mann, James Alexander, Esq., M.R.A.S. *Kensington-palace, W.*
- 1866 Mann, Robert James, Esq., M.D. 1, *Douglas-villas, Surbiton-hill, and 15, Zuckingham-street, Strand, W.C.*
- 1866 Manley, Geo., Esq., F.S.A. *Lansdowne-road, Croydon.*
- 1868 Manne-Sutton, Graham, Esq., 7, *Gloucester-terrace, Hyde-park, W.*
- 1856 Manning Frederick, Esq. *Byron-lodge, Leamington; and 8, Dover-street, W.*
- 1864 *Mansell, Commander A. L. *H.M.S. 'Hydra;' care of W. Blackney, Esq., Hydrographic office, Admiralty, S.W.*
- 1859 Mantell, Water Baldock Durant, Esq. *Wellington, New Zealand. Care of E. Stanford, Esq.*
- 1860 Mariette, Prof. Alphonse, M.A. 27, *St. Stephen's-square, Bayswater, W.*
- 1854 Markham, Clements Robert, Esq. *India Office, S.W.; and 21, Eccleston-sq. S.W.*
- 1857 Marlborough, George, Duke of. *Blenheim, Woodstock. Care of E. Stanford, Esq.*
- 1864 1360 Marsden, Rev. Canon J. H. *Higher Broughton, Manchester.*

Year of Election.	
1857	Marsh, Matthew Henry, Esq. <i>Oxford and Cambridge Club, S.W.; and 41, Rutland-gate, S.W.</i>
1862	Marshall, Capt. J. G. Don. <i>Highwood, Romsey, Hampshire.</i>
1854	Marshall, Jas. Garth, Esq. <i>Headingley, nr. Leeds; and Monk Coniston, Ambleside.</i>
1862	Marshall, William, Esq. 4, <i>Paper-buildings, Inner Temple, E.C.</i>
1859	*Marsham, the Hon. Robert. <i>The Mote, Maidstone, Kent.</i>
1857	Marshman, J. C., Esq. 7, <i>Kensington-palace-gardens, W.</i>
1867	Marthin, Guillermo E. de, Con.-General United States of Columbia. 12, <i>Orchard-street, Portman-square, W.</i>
1857	Martin, Francis P. B., Esq.
1861	Martin, Henry, Esq. <i>Sussex-house, Highbury-new-park, N.</i>
1860	1370* Martin, Richard Biddulph, Esq. <i>Clarewood, Bickley, S.E.</i>
1862	Martin, Thomas, Esq. 5, <i>Compton-terrace, N.</i>
1867	Martin, Wm., Esq. 37, <i>Cleveland-square, Paddington, W.</i>
1865	Masarvon, Wm. R., Esq.
1845	*Matheson, Sir James, Bart., F.R.S. 13, <i>Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.</i>
1858	Mathieson, James Ewing, Esq. 77, <i>Lombard-street, E.C.; and 16, Queen's-gardens, Bayswater, W.</i>
1868	Mavrogordato, M. Lucas. <i>Belgrave-mansions, Grosvenor-gardens, S.W., and Messrs. Ralli, Brothers, 25, Finsbury-circus, E.C.</i>
1860	*Maxwell, Sir William Stirling, Bart. 128, <i>Park-street, Grosvenor-sq., W.</i>
1855	May, Daniel John, Esq., R.N. <i>Cape of Good Hope. Care of Case and Loudenack.</i>
1858	Mayer, Joseph, Esq., F.S.A. 68, <i>Lord-street, Liverpool.</i>
1861	1380 Mayers, William S. F., Esq., Interpreter to H.M. Consulate. <i>Shanghai. Care of F. J. Angier, Esq., 12, George-yard, Lombard-street, E.C.</i>
1867	Mayhew, Rev. Samuel Martin. 158, <i>New Kent-road, S.</i>
1862	Mayne, Captain Richard Charles, R.N. <i>H.M.S. 'Eclipse;' and 80, Chester-square, S.W.</i>
1858	Mayo, Capt. John Pole. <i>Army and Navy Club, S.W.</i>
1867	Mayson, John S., Esq. (J. P. for county of Lancashire). <i>Oakhill, Fallowfield, near Manchester.</i>
1863	Meade, the Hon. Robert Henry. <i>Foreign Office, S.W.; and 3, Belgrave-sq. S.W.</i>
1862	*Medlycott, Lieut. Mervyn B., R.N. <i>Care of Messrs. Woodhead.</i>
1860	*Meinertzhagen, Daniel, Esq. 10, <i>Moorgate-street, E.C.; and 28, Devonshire-place, Portland-place, W.</i>
1865	Meller, Charles James, Esq., M.D. 48, <i>Queen Anne-street, Coventry-square, W.</i>
1854	Melville, Col. Sir Peter Melville, Mil. Sec. to the Bombay Gov. 27, <i>Palmeira-square, Brighton.</i>
1838	1390 Melville, Philip, Esq., F.R.A.S. <i>Ethy-house, Lostwithiel, Cornwall.</i>
1868	Merewether, Col. William Lockyer, C.B. <i>Kurrachee.</i>
1863	Mercier, Rev. J. J. <i>Hanwell, W.</i>
1842	*Merivale, Herman, Esq., C.B., Under Sec. of State for India. <i>India Office, S.W.; and 26, Westbourne-terrace, W.</i>
1866	Messiter, Charles A., Esq. <i>Barwick, near Yeovil, Somerset.</i>

Year of Election.	
1867	Metcalfe, Frederic Morehouse, Esq. <i>Wisbech, Cambridgeshire.</i>
1837	*Mexborough, John Chas. Geo. Earl of. 33, <i>Dover-street, W.</i> ; and <i>Methley-park, near Leeds.</i>
1865	*Michell, Lieut.-Colonel J. E., R.H.A. <i>Syward-lodge, Dorchester.</i>
1868	Michell, Robert, Esq. 6, <i>Oxford-terrace, Hyde-park, W.</i>
1860	Michell, Thomas, Esq. <i>St. Petersburg.</i>
1863	1400*Michie, A., Esq. 26, <i>Austin-friars, E.C.</i>
1848	Middleton, Rear-Admiral Sir G.N. Broke, Bart., <i>H.M.S. 'Hero,' Sheerness</i> ; and <i>Broke-hall, Suffolk.</i>
1868	*Miers, Jno. William, Esq., C.E. 74, <i>Addison-road, Kensington, W.</i>
1859	Miland, John, Esq. <i>Clairville, Lansdown-road, Wimbledon.</i>
1866	Mildmay, Capt. Herbert St. John (Rifle Brigade). 19, <i>Charles-street, Berkeley-square, W.</i>
1866	Miles, John George, Esq. 4, <i>Stationers'-hall-court, Ludgate-hill, E.C.</i>
1860	Miles, Rev. R. <i>Bingham, Notts.</i>
1861	Miller, George T., Esq. 59, <i>Portland-place, W.</i>
1861	*Miller, Commander Henry Matthew, R.N. <i>The Grove, Exeter</i> ; and <i>Junior United Service Club, S.W.</i>
1853	*Miller, Capt. Thos., R.N. <i>H.M.S. 'Royal George,' and United Service Club, S.W.</i>
1861	1410Milligan, Joseph, Esq. 15, <i>Northumberland-street, W.C.</i>
1857	Mills, Arthur, Esq. 34, <i>Hyde-park-gardens, W.</i>
1863	*Mills, John R., Esq. <i>Kingswood-lodge, Tonbridge-wells.</i>
1864	Mills, Rev. John. 40, <i>Lonsdale-square, N.</i>
1863	*Milton, Viscount, M.P. 4, <i>Grosvenor-square, W.</i>
1860	Milman, Capt. Everard, Madras Horse Artillery. 9, <i>Berkeley-square, W.</i>
1866	Milne, Vice-Adml. Sir Alex., K.C.B. <i>United Service Club, S.W.</i>
1867	Milner, Rev. John, B.A. <i>Chaplain of H.M.S. 'Galatea.'</i>
1860	Mitchell, Capt. Alexander. 6, <i>Great Stanhope-street, Park-lane, W.</i>
1862	*Mitchell, George, Esq. 22, <i>Bolton-street, Piccadilly, W.</i>
1864	1420Mitchell, J. W., Esq. <i>Mansfeld, Woodhouse, Notts.</i>
1864	Mitchell, Thomas, Esq., C.E. <i>Oldham.</i>
1859	Mitchell, Sir William. 6, <i>Hyde-park-gate, Kensington-gore, W.</i>
1865	Mitchell, Wm. H., Esq. <i>Junior Carlton Club, S.W.</i>
1851	*Mocatta, Frederick D., Esq. 35, <i>Gloucester-place, Portman-square, W.</i>
1853	Moffatt, George, Esq. 103, <i>Eaton-square, S.W.</i>
1868	Moffitt, John, Esq. 5, <i>Canning-place, South Kensington, W.</i>
1861	Mollison, Alexander Fullerton, Esq. 10, <i>Lansdowns-terrace, Notting-hill, W.</i>
1861	Money, Lieut.-Col. George Henry. 9, <i>Berkeley-street, W.</i>
1842	*Montagu, Major Willoughby. <i>Clapham-common, S.</i>
1862	1430*Montague, Capt. Horace. 24, <i>Chapel-street, Park-lane, W.</i>
1830	*Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, <i>Grosvenor-gate, Park-lane, W.</i> ; and <i>East-cliff-lodge, Ramsgate.</i>
1859	Montgomerie, F. Butler, Esq. 2, <i>Cleveland-row, St. James's, S.W.</i> ; and <i>St. Leonard's-on-Sea.</i>

Year of Election.	
1859	Montgomerie, Capt. T. G., Engrs., 1st Assist. Trig. Survey. <i>Care of Messrs. Alexander Fletcher & Co., 10, King's-arms-yard, Moorgate-street, E.C.</i>
1865	Montgomery, Sir Robert, K.C.B. <i>7, Cornwall-gardens, Queen's-gate, W.</i>
1839	Moody, General R. C., R.E. <i>Caynham-house, near Ludlow, Shropshire.</i>
1857	*Moor, Rev. Allen P., M.A., F.R.A.S. <i>Sub-Warden St. Augustine College, Canterbury.</i>
1863	Moore, H. Byron, Esq. <i>Survey Office, Melbourne, Australia. Care of Mr. Wadson, 100, St. Martin's-lane.</i>
1861	Moore, John Carrick, Esq. <i>Corswall, Wigtonshire; Geological Society, W.C.; and 23, Bolton-street, W.</i>
1857	Moore, Major-General W. Y. <i>United Service Club, S.W.</i>
1863	1440 More, R. Jasper, Esq. <i>Linley-hall, Salop.</i>
1864	Morgan, D. L., Esq. <i>H.M.S. 'Euryalus.'</i>
1861	Morgan, Junius Spencer, Esq. <i>13, Prince's-gate, Hyde-park, S.W.</i>
1861	Morgan, William, Esq., R.N. <i>1, Sussex-place, Southsea, Hants.</i>
1866	Morland, Lieut. Henry, late I.N. <i>Assistant Dockmaster, &c., Bombay.</i>
1839	*Morris, Charles, Esq. <i>University Club, S.W.</i>
1868	Morris, Eugene, Esq. <i>Birchwood, Sydenham, Kent.</i>
1863	Morrison, Col. J. D. <i>7, Albemarle-street, W.</i>
1868	Morrison, Martin C., Esq. <i>134, Shooter's-hill-road, Blackheath.</i>
1867	Morrison, Pearson, Esq. <i>Anglo-Italian Mining Co., 52, Moorgate-street, E.C.;</i>
1865	1450 Morson, T., Esq. <i>124, Southampton-row, Russell-square, W.C.</i>
1861	*Mount, Frederick J., Esq., M.D., Surgeon-Major and Inspector-General of Prisons, Bengal Army, &c. <i>Athenæum Club, S.W.; and 45, Arundel-gardens, Notting-hill, W. Care of Messrs. A. C. Lepage & Co., 1, Whitefriars-street, Fleet-street, E.C.</i>
1868	*Mounsey, Aug. Henry, Esq. <i>British Legation, Florence. Care of F. B. Alston, Esq., Foreign Office, S.W.</i>
1858	Mudie, Charles Edward, Esq.
1858	Mueller, Ferdinand, Esq., M.D., PH. DR. <i>Director of the Botanical Gardens, Melbourne. Care of Messrs. Dulau and Co., 37, Soho-square, W.</i>
1862	Muir, Francis, Esq., LL.D.
1855	Muir, Thomas, Esq. <i>24, York-terrace, Regent's-park, N.W.</i>
1867	*Muir, Thomas, Esq., Jun. <i>Madeira; and 24, York-terrace, Regent's-park, N.W.</i>
1866	Mundella, A. J., Esq. <i>Nottingham.</i>
1866	*Murchison, John H., Esq. <i>Surbiton-hill, Kingston-on-Thames; and Junior Carlton Club, S.W.</i>
1859	1460 Murchison, Kenneth R., Esq. <i>Manor-house, Bathford, Bath.</i>
1830	*Murchison, Sir Roderick Impey, Bt., K.C.B., G.C.ST.A., 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., Foreign Mem. of the Academy of Sciences, Paris, Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., etc. etc. <i>16, Belgrave-square, S.W. and 28, Jermyn-street, S.W.</i>
1864	Murchison, Capt. R. M. <i>Bath.</i>

- | Year of Election. | |
|-------------------|--|
| 1830 | *Murdock, Thomas W. C., Esq. 8, <i>Park-street, Westminster, S. W.</i> ; and <i>River-bank, Putney, S. W.</i> |
| 1860 | Murray, George J., Esq. <i>Hook-cottage, Horndean</i> ; and <i>Jun. Carlton Club, S. W.</i> |
| 1868 | *Murray, Henry, Esq. <i>Care of Messrs. Jardine, Matheson, and Co., Hong Kong.</i> |
| 1844 | *Murray, James, Esq. <i>Foreign Office, S. W.</i> |
| 1830 | Murray, John, Esq. 50, <i>Albemarle-street, W.</i> ; and <i>Newstead, Wimbledon, S. W.</i> |
| 1860 | *Murray, Lt. W., 68th Beng. N. Inf., Topo. Assist. G. Trig. Survey. <i>Mussoorie, India. Messrs. H. S. King and Co.</i> |
| 1865 | Mussy, H. G. de, Esq., M.D. 4, <i>Cavendish-place, W.</i> |
| 1865 | 1470 Nairne, P. A., Esq. 2, <i>Grove-hill, Camberwell, S.</i> |
| 1853 | Napier, Maj.-General Geo. Thomas Conolly, C.B. <i>Jun. United Service Club, S. W.</i>
<i>Care of Sir J. Kirkland.</i> |
| 1868 | Napier, of Magdala, Lord, G.C.B. 49, <i>Cleveland-square, S. W.</i> |
| 1861 | Napier, William, Esq. |
| 1859 | *Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. <i>Bhooj, Bombay</i> ;
5, <i>Charlotte-street, Edinburgh.</i> |
| 1857 | *Nesbitt, Henry, Esq. 6, <i>The Terrace, South Hackney, N. E.</i> |
| 1868 | Newbatt, Benjamin, Esq., F.S.S., etc. 7, <i>Vicarage-gardens, Campden-hill, W.</i> |
| 1867 | Newdigate, Lieut.-Col. Francis W. (Coldstream Guards). <i>Byrkley-lodge, Nedd-wood Forest, Burton-upon-Trent.</i> |
| 1856 | Newman, Thomas Holdsworth, Esq. 43, <i>Green-street, Grovenor-square, W.</i> |
| 1868 | Nicol, Geo. William, Esq. <i>Care of Messrs. Glyn, Mills, and Co., 87, Lombard-street, E. C.</i> |
| 1866 | 1480 Nicol, James D., Esq., M.P. 13, <i>Hyde-park-terrace, Cumberland-gate, W.</i> |
| 1868 | Nicol, William, Esq. 41, <i>Victoria-street, and Fawsyde, Kenneff, Kincardine.</i> |
| 1865 | *Nichols, Robert C., Esq. 5, <i>Sussex-place, W.</i> |
| 1856 | Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 26,
<i>Devonshire-place, Portland-place, W.</i> |
| 1836 | Nicolson, Rear-Admiral Sir Frederick Wm. Erskine, Bart. 15, <i>William-street, Lowndes-square.</i> |
| 1864 | Nissen, H. A., Esq. <i>Mark-lane, E. C.</i> |
| 1858 | Nix, John H., Esq. 77, <i>Lombard-street, E. C.</i> |
| 1861 | Noel, the Hon. Roden. 11, <i>Chandos-street, Cavendish-square, W.</i> ; and
<i>Exton-hall, Oakham, Rutlandshire.</i> |
| 1857 | *Nolloth, Captain Matthew S., R.N. <i>Hong-Kong</i> ; <i>United Service Club, S. W.</i>
and <i>St. Mary's-cottage, Peckham, Surrey, S. E.</i> |
| 1865 | Norman, H. J., Esq. 106, <i>Fenchurch-street, E. C.</i> |
| 1860 | 1490 Norris, Harry, Esq. <i>Colonial Office, S. W.</i> ; and 4, <i>Little St. James's-street, S. W.</i> |
| 1861 | North, Alfred, Esq. 20, <i>Royal York-crescent, Clifton, Bristol.</i> |
| 1856 | North, Frederic, Esq., M.P. 3, <i>Victoria-street, Pinlico, S. W.</i> ; and <i>Hastings-lodge, Hastings.</i> |
| 1865 | Northumberland, Algernon George, Duke of. <i>Northumberland-house, S. W.</i> |

Year of
Election.

- 1862 Notman, Henry Wilkes, Esq. 7, *Great Marlborough-street, W.*
- 1862 Nourse, Henry, Esq. *Conservative Club, S. W.*
- 1858 *Oakeley, R. Banner, Esq. *Kilmarnaig, Inverary, Argyllshire, N.B.*
- 1867 O'Brien, James, Esq. 109, *Belgrave-road, Pimlico, S. W.*; and *Clare, Ireland.*
- 1863 O'Callaghan, Chas., Esq., Staff Surgeon. *Killarney, Ireland.*
- 1856 O'Connor, Major-General Luke Smyth, C.B., late Governor of the Gambia. *U.S. Club, S. W.*
- 1858 1500 Ogilvie, Edward D., Esq. *Fulgillar, Clarence-river, New South Wales. Care of Messrs. Marryat and Sons, Lawrence Pountney-lane, E.C.*
- 1863 Ogilvy, Col. Thos. 23, *Grafton-st., Piccadilly, W.*; and *Ruthven, Forfarsh., N.B.*
- 1864 Ogilvy, Thos., Esq. 62, *Prince's-gate, Hyde-park, W.*
- 1859 Ogle, John W., Esq., M.D. 13, *Upper Brook-street, W.*
- 1861 Oldershaw, Capt. Robert Piggott. 74, *Warwick-square, Belgrave-road, S. W.*
- 1855 Oliphant, Laurence, Esq. *Athenæum Club, S. W.*
- 1861 Oliphant-Ferguson, G. H., Esq. *Broadfield-house, Carlisle.*
- 1866 Oliver, Lieut. S. P., 12th Brigade R.A. 1, *Buckingham-villas, Brockhurst-road, Gosport, Hants.*
- 1845 *Ommanney, Adml. Erasmus, C.B., F.R.A.S. 6, *Talbot-square, Hyde-park, W.*; and *United Service Club, S. W.*
- 1838 *Ommanney, H. M., Esq. *Blackheath, S.E.*
- 1864 1510 O'Reilly, E., Esq.
- 1853 Osborn, Sir George R., Bart. *Travellers' Club, S. W.*; and *Chicksand-priory, Beds.*
- 1864 Osborn, Samuel, Esq., M.D. 19, *Manor-terrace, Brixton, S.*
- 1856 Osborn, Capt. Sherard, R.N., C.B., Officier de Légion d'Honneur, etc. *Athenæum Club, S. W.*; and 119, *Gloucester-terrace, W.*
- 1861 Osborne, Lieut.-Col. Willoughby. *Political Agent, Bhopal, Schira, India.*
- 1852 Oswell, William Cotton, Esq.
- 1855 Otway, Arthur John, Esq., M.P. *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.*
- 1868 Owden, Thomas S. Esq. *Mount-pleasant, Philip-lane, Tottenham.*
- 1867 1520 Owen, Capt. Chas. Lanyon (Adj. R. M. Light Inf., Portsmouth Division). *Glendowan-lodge, Bury-road, Gosport.*
- 1865 Owen, H. Burnard, Esq.
- 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.*
- 1861 Page, Thomas, Esq., C.E., 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.*
- 1855 Palmer, Major Edm., R.A. *Boxhill, Pennycross, Plymouth.*

Year of
Election.

- 1865 *Palmer, Commander George, R.N. *H.M.S. 'Rosario,' Australia; and Covers, Hawick, Roxburghshire, N.B.*
- 1862 Palmer, Rev. Jordan, M.A., F.S.A., Chaplain to St. Ann's Royal Society. *Streatham, S.*
- 1838 *Palmer, Samuel, Esq.
- 1865 *Papengouth, Oswald C., Esq., C.E. 46, *Russell-square, W.C*
- 1863 1530*Paris, H.R.H. Le Comte de. *Claremont.*
- 1864 Parish, Capt. A. *Chislehurst, Kent.*
- 1849 *Parish, Capt. John E., R.N. *Army and Navy Club, S.W. Care of Messrs. Stilwell.*
- 1833 *Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonard's-on-Sea.*
- 1866 Parker, Capt. Francis G. S., F.G.S., A.I.C.E. *Barracks, Belfast.*
- 1862 Parker, Robert Deane, Esq. *Union Club, S.W.; and Barham, Canterbury.*
- 1850 Parkes, Sir Harry S., C.B., &c. *Oriental Club, W.; and 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. 38, *Mincing-lane, E.C.*
- 1867 Paterson, John, Esq. 19A *Coleman-street, City, E.C.*
- 1857 1540Paton, Andrew A., Esq. *H.B.M.'s V.-Consul, Missolonghi, Greece.*
- 1863 Pattinson, J., Esq. 21, *Bread-street, E.C.*
- 1868 Paul, J. H., Esq., M.D. *Camberwell-house, Camberwell, S.*
- 1858 Paul, Joseph, Esq. *Ormonde-house, Ryde, Isle of Wight.*
- 1865 Payne, Captain J. Bertrand, M.R.I., F.R.S.L., Mem. Geograph. Soc. of France. *Conservative Club, S.W.; Royal Thames Yacht Club, W.; and Tempsford-house, The Grange, Brompton, W.*
- 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 Peacock, George, Esq. *Starcross, near Exeter.*
- 1863 Pearse, Capt. R. B., R.N. *Arthur's Club. Care of Messrs. Woodhead.*
- 1863 Pearson, Fred., Esq. 13, *Cleveland-square, W.*
- 1853 1550*Peckover, Alexander, Esq. *Wisbeach.*
- 1860 *Peek, Henry William, Esq., M.P. *Wimbledon-house, S.W.¹*
- 1861 Peel, Archibald, Esq. *The Gerwyn, Wrexham, N. Wales.*
- 1858 Peel, Sir Robert, Bart., M.P. 4, *Whitehall-gardens, S.W.; and Drayton manor, Tamworth.*
- 1868 *Pender, John, Esq. 18, *Arlington-street, W.*
- 1863 *Pennant, Col. S. S. Douglas. *Penrhyn-castle, Bangor, N.B.*
- 1859 *Penrhyn, Lord. *Penrhyn-castle, Bangor.*
- 1853 Percy, Major-General (the Hon. Lord Henry M. (Guards). 40, *Eaton-square, S.W.*
- 1865 Pereira, Francisco E., Esq. *Care of Messrs. Richardson, 13, Pall-mall.*
- 1865 Perkes, Samuel, Esq., late Hon. E.I.C.S., Bombay, F.G.S., F.Z.S., M.S.A., &c. *Belvedere-house, West Dulwich, S.*
- 1860 1560Perkins, Frederick, Esq. *Mayor of Southampton.*
- 1865 Perkins, William, Esq. *Rosario, Argentine Republic. Care of W. Bollaert, Esq.*
- 1859 Perry, Sir Erskine, Member Indian Council. 36, *Eaton-place, S.W.*

Year of Election.	
1859	Perry, William, Esq., H.B.M.'s Consul, Panama. <i>Athenæum Club, S.W.</i>
1862	*Perry, William, Esq. 9, <i>Warwick-road, Upper Clapton, N.E.</i>
1862	Peter, John, Esq.
1857	*Peters, William, Esq. 35, <i>Nicholas-lane, Lombard-street, E.C.</i>
1860	Petherick, John, Esq. <i>Henley-on-Thames.</i>
1858	Peto, Sir S. Morton, Bart. 12, <i>Kensington-palace-gardens, W.</i>
1861	Petrie, Alexander S., Esq. 4, <i>St. Mark's-square, N.W.</i>
1860	1570 Petrie, Captain Martin, 14th Regiment. <i>Hanover-lodge, Kensington-park, W.</i>
1866	Pharazyn, Robert, Esq. <i>Wellington, New Zealand. Care of Messrs. Scales and Rogers, 24, Mark-lane, E.C.</i>
1867	Phayre, Col. Sir Arthur. <i>East India United Service Club, S.W.</i>
1854	Phelps, William, Esq. 18, <i>Montagu-place, Russell-square, W.C.</i>
1862	Phené, John Samuel, Esq. 34, <i>Oakley-street, Chelsea, S.W.</i>
1860	Philip, George, Esq. 32, <i>Fleet-street, E.C.</i>
1865	Phillips, Edward B., Esq. 105, <i>Onslow-square, S.W.</i>
1857	Phillimore, Capt. Augustus, R.N. 25, <i>Upper Berkeley-st., W.; and U.S. Club, S.W.</i>
1859	Phillimore, Chas. Bagot, Esq. <i>India Office, S.W.; and 25, Upper Berkeley-st., W.</i>
1860	Phillimore, Wm. Brough, Esq., late Capt. Grenadier Guards. 5, <i>John-street, Berkeley-square, W.</i>
1830	1580*Phillips, Sir Thomas, Bart., M.A., F.R.S., F.S.A. <i>Middle-hill, Broadway, Worcestershire.</i>
1854	Phillips, Major-General Sir B. Travell. <i>United Service Club, S.W.</i>
1856	Phillips, John, Esq., Solicitor. <i>Hastings.</i>
1867	Pierce, Charles A., Esq. <i>South Kensington Museum, W.</i>
1864	*Pigou, F. A. P., Esq. <i>Dartford, Kent.</i>
1865	Pigou, Rev. F., M.A. 14, <i>Suffolk-street, Pall-mall East, S.W.</i>
1861	Pike, Frederick, Esq. 44, <i>Charing-cross, S.W.</i>
1852	*Pike, Commander John W., R.N. 26, <i>Old Burlington-street, W.; Junior United Service Club, S.W.</i>
1855	Pilkington, James, Esq. <i>Blackburn.</i>
1865	Pilkington, William, Esq. <i>War-office.</i>
1852	1590*Pim, Capt. Bedford C. T., R.N. <i>Belsize-square, Hampstead, N.W.; and Senior and Junior United Service Club, S.W.</i>
1858	Pincott, James, Esq. <i>Telham-house-school, Brixton-hill, S.</i>
1859	Pinney, Colonel William. 30, <i>Berkeley-square, W.</i>
1867	Plant, Nathaniel, Esq. <i>Hotel Exchange, Rio de Janeiro; and De Montfort-house, Leicester.</i>
1865	Player, John, Esq. 24, <i>Duchess-road, Edgbaston, Birmingham.</i>
1860	Playfair, Lieut.-Col. Robert Lambert. H.B.M. Consul-General, Algiers. <i>Care of E. Hertslet, Esq., Foreign-office.</i>
1866	Plowden, Charles, C., Esq. 15, <i>York-street, Portman-square, W.</i>
1868	Plowden, Trevor, Esq. 80, <i>Gloucester-place, Portman-square, W.</i>
1858	*Plowes, John Henry, Esq. 88, <i>York-terrace, Regent's-park, N.W.</i>

Year of
Election.

- 1868 Plumberg, George F., Esq.
- 1855 1600*Pollerfen, Capt. J. J. *India.*
- 1866 *Pollington, Jno. Horace, Viscount. 33, *Dover-street, W.*
- 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. 12, *Stanhope-place, Hyde-park, W.*
- 1863 *Porcher, Commander Edwin A., B.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.
- 1868 Potter, Archibald Gilchrist, Esq. *Woodham-lodge, Lavender-hill, Wandsworth, S.W.*
- 1867 1610Potter, Wm. Henry, Esq. *Dunsden-lodge, Soving, near Reading.*
- 1861 *Pouden, Captain Lonsdale. *Junior United Service Club, S. W.; and Browns-wood, Co. Wexford.*
- 1862 Povah, Rev. John V., M.A. 11, *Endsleigh-street, W.C.*
- 1864 *Powell, F. S., Esq. 1, *Cambridge-square, Hyde-park, W.*
- 1859 Power, E. Rawdon, Esq. *Heywood-lodge, Tenby, South Wales; and Civil Service Club.*
- 1854 Power, John, Esq. 3, *College-terrace, Cambridge-road, Hammersmith, W.*
- 1854 Power, John Arthur, Esq., M.A., B.M. 52, *Burton-crescent, W.C.*
- 1868 Pownall, John Fisher, Esq. 63, *Russell-square, W.C.*
- 1864 Powys, Hon. C. J. F.
- 1864 Powys, the Hon. E. R.
- 1864 1620Powys, Hon. Leopold. 17, *Montagu-street, Portman-square, W.*
- 1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*
- 1868 Price, Charles S., Esq. *Bryn Derwen, Neath.*
- 1860 *Prickett, Rev. Thomas William, M.A., F.S.A.
- 1868 Prideaux, W., F. Esq., Bombay Staff Corps. 13, *Avenue-road, Regent's-pk., N. W.*
- 1865 *Pringle, A. Esq. *Yair, Selkirk, N.B.*
- 1855 *Pringle, Thomas Young, Esq. *Reform Club, S. W.*
- 1866 *Prinsep, Edw. Aug., Esq., B.C.S., Commissioner of Settlements in the Punjab. *Umritsur. Care of Messrs. H. S. King and Co., 65, Cornhill, E.C.*
- 1868 Pritchard, Lieut.-Col. Gordon Douglas, *Chatham.*
- 1868 Pryce, James E. Coulthurst, Esq. *Conservator of the Port of Bombay.*
- 1861 1630*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, Major J. 8th *Hussars, Hamilton, near Glasgow.*
- 1860 Puller, Arthur Giles, Esq. *Athenæum Club, S. W.; Arthur's Club, S. W.; and Youngsbury, Ware.*
- 1857 Purcell, Edward, Esq., LL.D. 2, *Mase-hill, Greenwich, S.E.*
- 1865 *Pusey, Sidney E. Bouverie, Esq. 7, *Green-street, Grosvenor-square, W.*

Year of Election	
1867	Quin, Francis Beaufort Wyndham, Esq. <i>Wistanswick-house, near Market Drayton, Salop.</i>
1861	Quin, Lord George. 15, <i>Belgrave-square, S. W.</i>
1862	Quin, John Thos., Esq. <i>Care of Mr. Lambson, Epsom.</i>
1854	*Quin, Admiral Michael. <i>Senior United Service Club, S. W.; and 18, Albion-villas, Albion-road, Islington, N.</i>
1868	1640Quin, T. Francis, Esq. 9, <i>Grafton-square, Clapham,</i>
1858	*Radstock, Graville Augustus, Lord. 30, <i>Bryanston-square, W.</i>
1862	*Rae, James, Esq. 32, <i>Phillimore-gardens, Kensington, W.</i>
1853	Rae, John, Esq., M.D. <i>Medical Club, 9, Spring-gardens.</i>
1867	Raleigh, Rev. A., D.D. <i>Arran-house, Highbury-new-park.</i>
1866	Ramsay, Alex., Jun., Esq. 45, <i>Norland-square, Notting-hill, W.</i>
1867	Ramsay, John, Esq. <i>Islay, N.B.</i>
1851	*Ramsay, Rear-Admiral Wm., C.B., F.R.A.S. <i>Junior United Service Club, S. W.; and 23, Ainslie-place, Edinburgh.</i>
1866	*Ramsay, Admiral G. <i>United Service Club, S. W.</i>
1867	*Ramsden, Richard, Esq., B.A. <i>Camp-hill, Nuneaton, Warwickshire.</i>
1868	1650Rankin, William, Esq. <i>Tiernaleague, Carndonagh, Donegal.</i>
1866	Ransom, Edwin, Esq. <i>Kempstone, near Bedford.</i>
1864	Ranyard, A. C., Esq. 13, <i>Hunter-street, W. C.</i>
1859	Ratcliff, Charles, Esq., F.S.A. <i>National Club, S. W.; Edgbaston, Birmingham; and Downing College, Cambridge.</i>
1861	Rate, Lachlan Macintosh, Esq. 9, <i>South Audley-street, W.</i>
1846	Ravenshaw, E. C., Esq., M.R.A.S. <i>Oriental Club, W.; and 36, Eaton-sq., W.</i>
1859	Ravenstein, Ernest G., Esq. <i>Topographical Depot, Spring-gardens, S. W.</i>
1865	Rawlings, Thos., Esq.
1861	Rawlinson, Sir Christopher. <i>Hum-hall, Upton-on-Severn. United University Club, S. W.</i>
1844	*Rawlinson, Maj.-General Sir Henry C., M.P., K.C.B., D.C.L., F.R.S. <i>Athenæum Club, S. W.; and 1, Hill-street, Berkeley-square, W.</i>
1838	1660Rawson, His Excellency Rawson Wm., C.B., Colonial Secretary. <i>Bahamas.</i>
1866	Ray, W. H., Esq. <i>Thorn-house, Ealing.</i>
1863	Reade, W. Winwoode, Esq. <i>Conservative Club.</i>
1865	Redhead, R. Milne, Esq. <i>Springfield, Seedley, Manchester; Conservative Club, S. W.; and Junior Carlton Club, S. W.</i>
1868	*Redman, John, B., Esq., C.E. 6, <i>Westminster-chambers, Victoria-street, S. W.</i>
1861	*Reid, David, Esq. 95, <i>Piccadilly, W.</i>
1858	Rees, L. E. R., Esq. 43, <i>Lime-street, E. C.</i>
1859	Reeve, John, Esq. <i>Conservative Club, S. W.</i>
1866	*Rehden, George, Esq. 9, <i>Great Tower-street, E. C.</i>
1856	Reid, Henry Stewart, Esq. <i>Bengal Civil Service. Messrs. H. S. King and Co.</i>
1857	Reid, Lestock R., Esq. <i>Athenæum Club, S. W.; and 122, Westbourne-ter., W.</i>

Year of Election.

- 1861 1670 Reid, William, Esq., C.E. 27, *Chalcot-villas, Haverstock-hill, N. W.*
- 1861 Reilly, Anthony Adams, Esq. *Belmont, Mullingar.*
- 1830 *Rennie, Sir John, C.E., F.R.S., F.S.A. *Care of — Rennie, Esq., Mitre-court-chambers, Temple, W.C.*
- 1866 *Rennie, John Keith, Esq., M.A. Camb. 56, *Gloucester-terrace, Hyde-park, W.*
- 1834 *Rennie, M. B., Esq., C.E. *Care of James Rennie, Esq., 9, Motcombe-strcet, Belgrave-square, S. W.*
- 1864 Rennie, W., Esq. 14, *Hyde-park-square, W.*
- 1830 *Renwick, Lieutenant, R.E.
- 1861 Reuter, Julius, Esq. 1, *Royal Exchange-buildings, E.C.*
- 1858 Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.*
- 1867 Rhodes, Arthur John, Esq. 1, *Monmouth-road, Westbourne-groce, Bays-water, W.*
- 1857 1680 Richards, Capt. George H., R.N., F.R.S. *Admiralty, Whitehall, S. W.; and 12, Westbourne-terrace-road, W.*
- 1860 Richards, the Rev. George, D.D.
- 1868 Richards, Alfred, Esq. *Lamb's-buildings, Temple, E.C.*
- 1864 Richardson, F., Esq. *Park-lodge, Blackheath-park.*
- 1859 Rickards, Edward Henry, Esq. 4, *Connaught-place, Hyde-park, W.*
- 1862 Riddell, Henry P. A. Buchanan, Esq. *The Palace, Maidstone, Kent.*
- 1865 *Rideout, W. J., Esq. 51, *Charles-street, Berkeley-square, W.*
- 1864 Ridley, F. H., Esq. 19, *Blomfield-road, Maida-hill, W.*
- 1864 Ridley, George, Esq. 2, *Charles-street, Berkeley-square, W.*
- 1862 *Rigby, Major-General Christopher Palmer. *Oriental Club, W.; and 14, Mansfield-street, W.*
- 1862 1690 Rigby, Joseph D., Esq. *Esher, Surrey; and Kew-green, Surrey, W.*
- 1868 Riley, Capt. Charles Henry. *Junior United Service Club, S. W.*
- 1850 Rintoul, Robert, Esq. *Windham Club, S. W.*
- 1830 *Robe, Maj.-General Fred. Holt, C.B. *United Service Club, S. W.; and 5, Palace-gardens-terrace, Kensington, W.*
- 1862 Roberts, Arthur, Esq. *Ormond-house, A, Old Kent-road, S.E.*
- 1861 Roberts, Capt. E. Wynne. *Junior Carlton Club, S. W.; and 18, Great Cumberland-street, Hyde-park, W.*
- 1868 Roberts, Charles W., Esq. *Penrith-house, Effra-road, Brixton, S.*
- 1864 Roberts, R. W., Esq., B.A. *Treval, Torpoint, Cornwall.*
- 1865 Robertson, A. Stuart, Esq., M.D. *Horwich, near Bolton.*
- 1860 Robertson, D. Brooke, Esq., H.B.M.'s Consul. *Canton. H. S. King and Co.*
- 1861 1700 *Robertson, Graham Moore, Esq. 21, *Cleveland-square, Hyde-park, W.*
- 1863 Robertson, R. B., Esq. *H.M.'s Legation, Yokohama, Japan.*
- 1830 *Robinson, Rear-Admiral Charles G. 12, *Warwick-road, Maida-hill, W.*
- 1859 Robinson, Lieut.-Col. D. G., R.E., Director-Gen. of Telegraphs in India. *Calcutta.*
- 1864 Robinson, H. O., Esq. 12, *Leadenhall-street, E.O.*

Year of Election.	
1859	Robinson, Sir Hercules G. R. <i>Governor of Ceylon. Messrs. Burnett, 17, Surrey-street.</i>
1865	Robinson, J. R., Esq., F.S.A. Scot., F.R.S.A. du Nord, Copenhagen, F.G.S. Edin. Membre Société Asiatique de Paris, &c. <i>South-terrace, Deansbury.</i>
1860	Robinson, Mr. Serjeant. 8, <i>King's-bench-walk, Temple, E.C.</i> ; and 43, <i>Mecklenburgh-square, W.C.</i>
1862	Robinson, Lieut.-Col. Sir John Stephen, Bart. <i>Arthur's Club, S.W.</i> ; and 16A, <i>Park-lane, W.</i>
1864	Robinson, John, Esq. 22, <i>Abbey-gardens, St. John's-wood, N.W.</i>
1855	1710 Robinson, Thos. F., Esq., F.L.S. 9, <i>Derwent-rd., South Penge-pk., Anerley.</i>
1850	*Robinson, Capt. Walter F., R.N. 15, <i>Montpellier-villas, Brighton.</i>
1830	*Rodd, James Rennell, Esq. 29, <i>Beaufort-gardens, W.</i>
1860	Roe, Capt. Jno. Septimus, Surveyor-General, W. Australia. <i>Messrs. Stihwell, Arundel-street, Strand, W.C.</i>
1863	Rogers, John T., Esq. 38, <i>Eccleston-square, S.W.</i>
1830	*Roget, Peter M., Esq., M.D., F.R.S. 18, <i>Upper Bedford-place, Russell-sq., W.C.</i>
1861	Rollo, Lord. 18, <i>Upper Hyde-park-gardens, W.</i> ; and <i>Dumcrieff-castle, Moffat, N.B.</i>
1863	Rönn, M. Herman von. 21, <i>Kensington-park-gardens, W.</i>
1866	Rooke, Capt. W., R.A. <i>Formosa, Lynnington, Hants.</i>
1834	*Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, <i>Hyde-park-gardens, W.</i> ; and 25, <i>Southampton-buildings, Chancery-lane, W.C.</i>
1868	1720 Rose, Henry, Esq. 8, <i>Porchester-square, Hyde-park, N.W.</i>
1861	Rose, Jas. Anderson, Esq. <i>Wandsworth, Surrey, S.W.</i> ; and 11, <i>Salisbury-street, W.C.</i>
1857	*Rose, Wm. A., Esq., Alderman. 63, <i>Upper Thames-street, E.C.</i> ; and <i>Befons, Crawford.</i>
1864	Ross, B. R., Esq. <i>Care of the Hudson-bay Company, Hudson-bay-house, Fenchurch-street, E.C.</i>
1863	Ross, Wm. Andrew, Esq. 7, <i>Albemarle-street, W.</i>
1867	Rossiter, Wm., Esq., F.R.A.S. <i>South London Working Men's College, Collingwood-street, S.</i> ; and <i>White-hill-house, Frimley, Surrey.</i>
1868	Ross-Johnson, H. C., Esq. 7, <i>Albemarle-street, W.</i>
1864	*Roundell, C. S., Esq. 44, <i>Piccadilly, W.</i>
1862	Roupell, Robert Priolo, Esq., M.A., Q.C. 15, <i>Albany, W.</i>
1839	*Rous, Vice-Admiral the Hon. Henry John. 13, <i>Berkeley-square, W.</i>
1864	1730 Routh, E. J., Esq. <i>St. Peter's College, Cambridge.</i>
1862	Rowe, Sir Joshua, C.B., late Chief Justice of Jamaica. 10, <i>Queen Anne-street, Cavendish-square, W.</i>
1868	*Rowlands, Percy J., Esq. <i>India Office, S.W.</i> ; 24, <i>Notting-hill-terrace, W.</i>
1863	Rowley, Capt. C., R.N. 33, <i>Cadogan-place, S.W.</i>
1856	Rucker, J. Anthony, Esq. <i>Blackheath, S.E.</i>
1861	*Rumbold, Charles James Augustus, Esq. <i>Downing College, Cambridge</i> ; and 5, <i>Percival-terrace, Brighton.</i>
1861	Rumbold, Thomas Henry, Esq.

Year of Election.

- 1860 Rumley, Major-General Randall, Vice-President 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 1740 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.
- 1860 Rutherford, John, Esq. 2, *Cavendish-place, Cavendish-square, W.*
- 1857 *Ryder, Admiral, Alfred P. *U. S. Club, S. W.*; and *Launde-abbey, Uppingham.*
- 1864 Ryder, G., Esq. 10, *King's Bench-walk, 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. *Abergully-palace, Carmarthen.*
- 1863 St. George, Maj.-Gen. J. 17, *Rutland-gate, S. W.*
- 1868 St. John, Lieut. Oliver Beauchamp Coventry, R.E. *National Club, S. W.*
- 1863 1750 St. John R. H. St. Andrew, Esq., 60th Rifles.
- 1862 St. John, Spenser, Esq., Chargé d'Affaires, Port-au-Prince, Haiti. 25, *Grove-end-road, St. John's-wood, N. W.*
- 1863 Sale, Lieut. M. T., R.E. *The Crescent, Rugby*; and *Cherrapoonjee, Bengal.*
- 1867 Salkeld, Colonel J. C. (H.M.I. Forces). 29, *St. James's-street, S. W.*
- 1868 Salles, J. de, Esq. *Belgrave Mansions, Grosvenor-gardens.*
- 1845 *Salomons, David, Esq., M.P., Alderman, F.R.A.S. 26, *Great Cumberland-place, Hyde-park, W.*; and *Broom-hill, near Tunbridge-wells.*
- 1863 *Salt, Henry, Esq. 29, *Gordon-square, W. C.*
- 1861 Salting, William Severin, Esq. 24, *St. James's-street, S. W.*
- 1861 *Sandbach, Wm. Robertson, Esq. 10, *Prince's-gate, Hyde-park, S. W.*
- 1867 Sandeman, David George, Esq., *Cambridge-house, Piccadilly, W.*
- 1862 1760 Sanford, Major Henry Ayahford. 29, *Chester-street, Grosvenor-place, W.*; and *Nynehead-court, Wellington, Somerset.*
- 1860 Sarel, Lieut.-Colonel H. A., 17th Lancers. *Army and Navy Club, S. W.*; and *Shanghai.*
- 1862 Sargood, F. J., Esq. *Moorgate-street-buildings, E. C.*
- 1860 Sartoris, Alfred, Esq. *Abbottswood, Stou-on-the-Wold.*
- 1852 Saumarez, Captain Thomas, R.N. *The Firs, Jersey.*
- 1866 Saunders, James E., Esq., F.L.S., F.G.S., F.R.A.S. 9, *Finsbury-circus*; and *Granville-park, Blackheath, S.E.*
- 1864 Saurin, Admiral E. *Prince's-gate, S. W.*
- 1863 Sawyer, Col. Charles, 6th Dragoon Guards. 50, *Sussex-square, Kemp-town, Brighton.*
- 1863 Sayer, Captain Frederik. *Gibraltar*; and *Manor-house, Richmond, S.*
- 1838 Scariott, Lieut.-General the Hon. Sir J. Yorke, K.C.B. *Portsmouth.*
- 1861 1770 Schenley, Edward W. H., Esq. 14, *Prince's-gate, S. W.*

Year of Election.	
1866	Scott, Adam, Esq. 3, <i>Blomfield-crescent, Westbourne-terrace, W.</i>
1866	Scott, Arthur, Esq. <i>Travellers' Club, S.W.</i>
1859	Scott, Lord Henry. 3, <i>Tinney-street, Park-lane, W.</i>
1861	*Scott, Hercules, Esq. <i>Brotherton, near Montrose, N.B.</i>
1855	Scott, Admiral Sir James, K.C.B. <i>United Service Club, S.W.</i>
1866	Scott, John, Esq., M.D.
1868	Scott, William Cumin, Esq. <i>Mayfield-house, Blakheath-park.</i>
1863	Scovell, George, Esq. 34, <i>Grosvenor-place, S.W.</i>
1861	Searight, James, Esq. 80, <i>Lancaster-gate, W.</i>
1867	1780Seaton, Col. the Right Hon. Lord. D 3, <i>Albany, W.</i>
1830	*Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. <i>Athenæum Club, S.W. ; and Cambridge.</i>
1862	Seemann, Berthold, Esq., PH. DR., F.L.S. 57, <i>Windsor-road, Holloway, N.</i>
1866	Sendall, Walter T., Esq., Inspector of Schools in Ceylon. <i>Colombo, Civil Service Club, S.W.</i>
1865	Sercombe, Edwin, Esq. 49, <i>Brook-street, Grosvenor-square, W.</i>
1858	*Serocold, Charles P., Esq. <i>Brewery, Liquorpond-street, E.C.</i>
1853	Sevin, Charles, Esq. 155, <i>Fenchurch-street, E.C.</i>
1867	Seymour, Alfred, Esq., M.P. 47, <i>Eaton-square, S.W.</i>
1858	Seymour, George, Esq. 12, <i>Sussex-square, Hyde-park, W.</i>
1855	Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, <i>Eaton-square, S.W.</i>
1853	1790*Seymour, Henry Danby, Esq. 39, <i>Upper Grosvenor-street, W. ; Knoley-Haidon, Wilts ; and Glastonbury, Somersetshire.</i>
1854	*Shadwell, Captain Charles F. A., R.N., C.B. <i>Royal Naval Hospital, Haslar, Gosport.</i>
1860	*Shadwell, Lieut.-Colonel Lawrence.
1856	*Share, James Masters, Esq., R.N. <i>H.M.S. 'St. George,' Portland, Dorsetshire.</i>
1866	Sharp, Henry T., Esq. 102, <i>Piccadilly, W.</i>
1861	Sharp, Peter, Esq. <i>Oakfield, Ealing, W.</i>
1861	*Sharpe, William John, Esq. 1, <i>Victoria-street, Westminster, S.W. ; and Norwood, Surrey, S.</i>
1862	*Shaw, John, Esq. <i>Finegand, Otago, New Zealand.</i>
1861	Sbaw, John Ralph, Esq. <i>Arrowe-park, Birkenhead.</i>
1858	Shea, John, Esq., M.D., Surgeon R.N. 84, <i>Blackfriars-road, S.</i>
1846	1800Sheffield, George A. F. C., Earl of. 20, <i>Portland-pl., W. ; and Sheffield-pk., Sussex.</i>
1857	Sheil, Major-Gen. Sir Justin, K.C.B. 13, <i>Eaton-place, Belgrave-square, S.W.</i>
1868	*Shelley, Capt. G. Ernest. 32, <i>Chesham-place, W.</i>
1861	Shephard, Chas. Douglas, Esq., Surg. R.N. <i>H.M.S. 'Frederick William,' Foynces, County Limerick.</i>
1867	Shepherd, Chas. Wm., Esq., M.A., F.Z.S. <i>Trotterscliffe, Maidstone.</i>
1861	Shepherd, Rev. Edwd. John, M.A. <i>Trotterscliffe, Kent ; and Athenæum Club, S.W.</i>
1867	Sherer, General Sir George Moyle. 31, <i>Inverness-road, Hyde-Park, W.</i>
1860	Sheridan, H. Brinsley, Esq. <i>Bellefield-house, Parson's-green, Fulham, S.W.</i>
1863	Sheridan, Richd. B., Esq., M.P. 48, <i>Grosvenor-place, S.W.</i>

Year of Election.	
1857	Sherrin, Joseph Samuel, Esq., LL.D., PH. DR. <i>Leyton-house, Leyton-crescent, Kentish-town, N.W.</i>
1859	1810* Sherwill, Lt.-Col. W.S., F.G.S. <i>Prof. of Surveying, Civil Engr. College, Calcutta; and Perth, N.E.</i>
1858	*Shipley, Conway M., Esq. <i>Twyford Moors, Winchester; and Army and Navy Club, S.W.</i>
1866	Sholl, Charles, Esq., C.E.
1862	Showers, Lieut.-Col. Charles S.
1856	Shuttleworth, Sir J. P. Kay, Bart. 38, <i>Gloucester-square, W.; and Gawthorp-hall, Burnley, Lancashire.</i>
1865	*Silva, Frederic, Esq. 12, <i>Cleveland-square, Bayswater, W.</i>
1859	Silver, the Rev. Fred., M.A., F.R.A.S. <i>Norton-rectory, Market Drayton, Salop.</i>
1859	*Silver, Stephen Wm., Esq. 66, <i>Cornhill, E.C.; and Norwood-lodge, Loucr Norwood, S.</i>
1860	Sim, John Coysgame, Esq. 13, <i>James-street, Buckingham-gate, S.W.</i>
1853	Simmons, Edward R., Esq., Barrister-at-Law. 4, <i>Hyde-park-gate, S.W.</i>
1848	1820* Simmons, Colonel John L. A., R.E., O.B. <i>H. B. M.'s Consul, Warsaw; United Service Club, S.W.</i>
1866	Simons, Henry M., Esq. <i>Tyersall-crescent, Wood-road, Sydenham-hill, S.E.</i>
1853	Simpkinson, Lieut. Francis G., R.N. 55, <i>Victoria-street, Westminster, S.W.</i>
1864	Simpson, Frank, Esq. 17, <i>Whitchall-place, S.W.</i>
1862	Simpson, Henry Bridgeman, Esq. 44, <i>Upper Grosvenor-street, W.</i>
1861	Simpson, James, Esq., C.E., F.G.S. 29, <i>Great George-street, Westminster, S.W.</i>
1863	*Simpson, Wm., Esq. 64, <i>Lincoln's-inn-fields, W.C.</i>
1866	*Sims, Richard Proctor, Esq., C.E. <i>Malabar-hill, Bombay. Care of Messrs. Smith, Elder, and Co.</i>
1858	Skelmersdale, Edward, Lord. <i>Lattom-park, Ormskirk, Lancashire.</i>
1866	Skinner, John E. H., Esq. 3, <i>Dr. Johnson's-buildings, Temple, E.C.</i>
1863	1830 Skrine, Hy. D., Esq. <i>Warleigh-manor, near Bath.</i>
1861	Sladen, Rev. Edward Henry Mainwaring. <i>Alton, near Marlborough, Wilts.</i>
1861	Sligo, G. J. Browne, Marquis of. 14, <i>Mansfield-street, W.; and Westport, County Mayo.</i>
1865	Smedley, Joseph V., Esq., M.A. <i>Oxford and Cambridge Club, S.W.</i>
1860	*Smith, Augustus Henry, Esq. <i>Flexford-house, Guildford.</i>
1857	*Smith-Bosanquet, Horace, Esq. <i>Broxbourne-borough, Hoddesdon.</i>
1866	Smith, Drummond Spencer-, Esq. 7, <i>Mount-street, Berkeley-square, W.</i>
1859	Smith, Edward, Esq. <i>Windham Club, S.W.</i>
1867	Smith, Frederick, Esq. <i>The Priory, Dudley.</i>
1853	Smith, George, Esq. <i>Glinton, near Market Deeping, Lincolnshire.</i>
1857	1840 Smith, George R., Esq. 73, <i>Eaton-square, S.W.; and Telsden-park, Surrey.</i>
1865	Smith, Guildford, Esq. 63, <i>Charing-cross, S.W.</i>
1861	Smith, Jervoise, Esq. 47, <i>Belgrave-square, S.W.</i>
1854	Smith, John, Esq., Memb. Geograph. Soc. Bombay. 27, <i>Prince's-gate, S.W.</i>
1853	Smith, John Harrison, Esq. 49, <i>Inverness-terrace, W.</i>
1853	Smith, John Henry, Esq. 1 <i>Lombard-st., E.C.; and Purley, Croydon, Surrey.</i>

Year of Election.	
1861	Smith, J. Sidney, Esq., Barrister-at-Law. <i>Sidney-lodge, Wimbledon-common, S. W.</i>
1861	*Smith, Joseph Travers, Esq. 25, <i>Throgmorton-street, E. C.</i>
1838	*Smith, Octavius Henry, Esq. <i>Thames-bank, Westminster, S. W.</i>
1857	Smith, Captain Philip, Grenadier Guards.
1841	1850*Smith, Thomas, Esq.
1859	*Smith, W. Castle, Esq. 1, <i>Gloucester-terrace, Regent's-park, N. W.</i>
1857	Smith, Wm. Gregory, Esq. <i>Hudson-bay Company, Fenchurch-street, E. C.</i>
1859	Smith, William Henry, Esq., M.P. 1, <i>Hyde-park-street, W.</i>
1837	*Smyth, Rear-Adm. William. <i>Care of Messrs. Child and Co., Temple-bar.</i>
1850	*Smythe, Colonel William J., R.A.
1863	Snowden, Francis, Esq., M.A. 1, <i>Dr. Johnson's-buildings, Temple, E. C.</i>
1865	Solomons, Hon. Geo. <i>Craven Hotel, W. C.; and Jamaica.</i>
1839	*Somers, Charles, Earl. 33, <i>Prince's-gate, S. W.; Eastnor-castle, Herefordshire; and The Priory, Reigate, Surrey.</i>
1862	Somerset, Capt. Leveson E. H., R.N. <i>Care of Messrs. Chard, 3, Clifford's-inn, Fleet-street, E. C.</i>
1858	1860*Some, Joseph, Esq. <i>Burntwood-lodge, Wandsworth-common, S. W.</i>
1855	Sopwith, Thos., Esq., M.A., C.E., F.R.S. 103, <i>Victoria-street, Westminster, S. W.</i>
1845	*Sotheby, Lt.-Col. Fred. S., C.B., F.R.A.S. 100, <i>Park-lane, W.</i>
1861	South, John Flint, Esq. <i>Blackheath-park, S. E.</i>
1860	Southesk, James Carnegie, Earl of. <i>Kinnaird-castle, Brechin, N. B.</i>
1860	*Southey, Jas. Lowther, Esq. <i>Care of Messrs. Stilwell.</i>
1865	Spalding, Samuel, Esq. 7, <i>Upper Park-road, South Hampstead.</i>
1850	*Spencer-Bell, James, Esq. 1, <i>Devonshire-place, Portland-place, W.</i>
1867	Spicer, Edward, Esq. <i>Highbury-erescent, N.</i>
1863	Spickernell, Dr. Geo. E., Principal of Eastman's Royal Naval Establishment. <i>Eastern-parade, Southsea.</i>
1861	1870Spofforth, Markham, Esq. 3, <i>Porchester-terrace, W.</i>
1855	*Spottiswoode, William, Esq., F.R.S. 50, <i>Grosvenor-place, S. W.</i>
1859	*Spratt, Capt. Thos. A. B., R.N., C.B. <i>Mount Ephraim, Tunbridge-wells, Kent.</i>
1866	Spruce, Richard, Esq., PH. DR. <i>Welburn, Castle Howard, York.</i>
1859	Stafford, Edward W., Esq. <i>Colonial Secretary of New Zealand; care of Mr. J. S. Tytler, 19, Castle-street, Edinburgh.</i>
1868	Staley, Dr. Thomas (Bishop of Honolulu). <i>Upper Gore, Kensington; and Honolulu, Hawaiian Islands.</i>
1853	Stanford, Edward, Esq. 6, <i>Charing cross, S. W.</i>
1855	Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. 3, <i>Grosvenor-place-houses, Grosvenor-place, S. W.; and Chevening, Sevenoaks, Kent.</i>
1860	*Stanhope, Walter Spencer, Esq. <i>Cannon-hall, Barnsley, Yorkshire.</i>
1856	Stanley, Edmund Hill, Esq. <i>Craven-hotel, Strand, W. C.</i>
1853	1880*Stanley, Edward Henry, Lord, M.P., D.C.L. 23, <i>St. James's-square, S. W.</i>
1863	Stanton, Geo., Esq. <i>Coton-hill, Shrewsbury; and Conservative Club, S. W.</i>
1867	Stanton, Henry, Esq. 1, <i>River-street, Myddleton-square, W. C.</i>
1856	Statham, John Lee, Esq. 60, <i>Wimpole-street, W.</i>

Year of Election.

- 1863 *Staveley, Miles, Esq. *Old Steningford-hall, Ripon.*
- 1868 Staveley, Major-Gen. Sir Charles, K.C.B. *United Service Club, S. W.*
- 1867 Steel, J. P., Esq., Lieut. R.E. *Care of Messrs. Grindlay and Co.; Junior United Service Club, S. W.*
- 1868 Steel, William Strang, Esq. 13, *Leadenhall-street, E.C.*
- 1830 *Stephen, Sir George. *Melbourne. Care of Mr. H. W. Ravenscroft, 7, Gray's-inn-square, W. C.*
- 1857 Stephenson, Sir R. Macdonald, C.E. 72, *Lancaster-gate, W.; and East-cottage, Worthing.*
- 1868 1890 Stephenson, Henry P., Esq. 8, *St. Mary-axe, E.C.*
- 1866 Stepney, A. K. Cowell, Esq. 6, *St. George's-terrace, Knightsbridge, W.*
- 1860 Sterling, Col. Sir Anthony. *South-lodge, South-place, Knightsbridge, W.*
- 1862 Sterry, Henry, Esq. 7, *Paragon, Southwark, S.E.*
- 1855 Stevens, Henry, Esq., F.S.A. 4, *Trafalgar-square, W.C.*
- 1841 Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street, W.*
- 1866 Stewart, Rev. Dr. James. *Lovedale, Alice, South Africa.*
- 1860 *Stewart, Major J. H. M. Shaw, Royal Madras Engineers.
- 1860 Stirling, Capt. Frederick H., R.N. *H.M.S. 'Hero,' and United Service Club, S. W.*
- 1863 Stirling, Sir Walter, Bart. 36, *Portman-square, W.*
- 1868 1900 Stirling, the Hon. Edward. 34, *Queen's-gardens, Hyde-park.*
- 1868 Stock, Thomas Osborne, Esq., M.P. 20, *King-street, St. James.*
- 1860 Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.*
- 1845 *Stokes, Rear-Admiral John Lort. *United Service Club, S. W.; and Scotchwell, Haverfordwest, Wales.*
- 1868 Stone, David H., Esq., Alderman. *Sydenham-hill, S.*
- 1867 *Story, Edwin, Esq., M.A. 30, *Almorah-road, Downham-road, Islington, N.*
- 1868 Stovin, Rev. Charles F. 8, *Grosvenor Mansions, Victoria-street, S. W.*
- 1866 Strachey, Colonel Richard, R.E., F.R.S. 29, *Lancaster-gate, Hyde-park, W.*
- 1861 Strange, Lieut.-Col. Alex. *India Store Department, Belvedere-rd., Lambeth, S.*
- 1858 Strangford, Percy Ellen, Viscount. 58, *Cumberland-street, W.*
- 1858 1910 Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.*
- 1864 Straton, N. D. J., Esq. *Aylestone, Leicester.*
- 1860 Strickland, Edward, Esq., C.B., Commissary-General. *Halifax, Nova Scotia.*
- 1868 *Strode, Alf. Rowland Chetham, Esq. *Dunedin, Otago, New Zealand. Care of J. G. Cooke, Esq., 47, Mount-street, Grosvenor-square, W.*
- 1865 Strong, F. K., Esq., K.H. *Hamburg, Germany; 8, St. Martin's-place, S. W.*
- 1853 Strutt, George H., Esq., F.R.A.S. *Bridge-hill, Belper.*
- 1858 Strutt, Captain Hammel Ingold, F.R.A.S. *Royal Mail Steam Packet Company, Southampton.*
- 1859 *Strutt, Captain William. 26, *Richmond-place, Southampton.*
- 1853 *Strzelecki, Count P. E. de, C.B., F.R.S. 23, *Savile-row, W.*
- 1859 Stuart, Lieut.-Col. J. F. D. Crichton. 25, *Wilton-cres., Belgrave-sq., S. W.*
- 1861 1920 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.*

Year of Election.	
1866	Stuart, Major Robert. <i>Janina, Albania. Care of Messrs. Bull, Hunter, and Co., 52, Wigmore-street, W.</i>
1833	*Sturt, Capt. Charles, F.L.S. <i>St. Edmond's, Tivoli, Cheltenham.</i>
1862	Stutfield, William, Esq. 15, <i>Leinster-terrace, Hyde-park, W.; and Mystoke-park, Canterbury.</i>
1858	Sudeley, Lord. 5, <i>Seamore-place, Curzon-street, W.</i>
1857	Sullivan, Rear-Admiral Bartholomew J., R.N., C.B.
1865	Sullivan, Capt. T. W., C.B., R.N. <i>Kimpton, Welwyn, Herts.</i>
1862	Surridge, Rev. Henry Arthur Dillon, M.A. 21, <i>Berners-street, W.</i>
1862	Surtees, Capt. Charles Freville. <i>Chalcott-house, Long Ditton, Surrey.</i>
1861	*Sutherland, George Granville William, Duke of. <i>Stafford-house, St. James's Palace, S.W.</i>
1840	1930*Sutherland, Robert, Esq. <i>Carmona Bank, Dunoon, Argyleshire.</i>
1857	Swanzy, Andrew, Esq. 38, <i>Cannon-street, E.C.</i>
1836	*Swinburne, Rear-Admiral Charles H. <i>Capheaton, near Newcastle-upon-Tyne.</i>
1862	*Swinburne, Lieut. Sir John, Bart., R.N. <i>Capheaton, Newcastle-on-Tyne.</i>
1863	Swinhoe, R., Esq., H.B.M. Consul, Formosa. <i>Care of Messrs. H. S. King and Co.</i>
1859	Sykes, Christopher, Esq., M.P. <i>Sledmere, Malton.</i>
1851	Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.B.I.A. <i>Athenæum Club, S.W.; and 47, Albion-street, Hyde-park, W.</i>
1864	Symonds, F., Esq., M.D. <i>Beaumont-street, Oxford.</i>
1852	*Synge, Col. Millington H., R.E. <i>Birmingham.</i>
1852	Tagart, Courtenay, Esq. <i>Rockleaze Point, Durham Down, near Bristol.</i>
1859	1940Tagart, Francis, Esq. 31, <i>Craven-hill-gardens, Hyde-park, W.</i>
1866	Taintor, Edward C., Esq. (Impl. Chinese Customs). <i>Tientsin, China. Care of H. C. Batchelor, Esq., 155, Cannon-street, E.C.</i>
1864	Tait, P. M., Esq. 162, <i>Adelaide-road, N.; and Oriental Club, W.</i>
1857	*Tait, Robert, Esq. 14, <i>Queen Anne-street, W.</i>
1867	Talbot, Right Hon. Richard Gilbert. 45A, <i>Chester-square, S.W.; and Ballincloew, Kingstown, County Dublin.</i>
1861	Talbot de Malahide, James Talbot, Lord. <i>Malahide Castle, Co. Dublin.</i>
1861	Taylor, Joseph Walter, Esq.
1861	Taylor, Commander A. Dundas, I.N. 2, <i>Gloucester-villas, Upper Eglinton-road, Shooter's-hill, S.E.</i>
1865	Taylor, H. L., Esq. <i>Reform Club, S.W.; and 23, Phillimore-gardens, Kensington, W.</i>
1865	Taylor, Rev. Jas. Hudson. <i>Ningpo, China. Care of Mr. Berger, Saint-hill, East Grinstead.</i>
1863	1950Taylor, John, Esq. 1, <i>Leadenhall-street, E.C.</i>
1854	*Taylor, John Stopford, Esq., M.D. 1, <i>Springfield, St. Anne-street, Liverpool.</i>
1863	Taylor, Col. R. C. H. 16, <i>Eaton-place, S.W.; and Carlton Club, S.W.</i>
1867	*Taylor, John George, Esq. <i>H.B.M. Consul in Kurdistan, Diarbekr.</i>
1864	Taylor, W. R., Esq.

Year of
Election.

- 1857 Teesdale, John M., Esq. *Eltham-house, Eltham, S.E.*
- 1863 Tegg, Wm., Esq. 13, *Doughty-street, Mecklenburg-square, W.C.*
- 1865 Temple, Sir Richard, R.C.S.I. *Oriental Club, W.*
- 1860 Templeton, John, Esq. 24, *Budge-row, E.C.*
- 1857 Tennant, Professor James. 149, *Strand, W.C.*
- 1830 1960* Thatcher, Colonel E.I.C.
- 1865 Theed, William S., Esq. 18, *Carlisle-terrace, Kensington, W.*
- 1863 Thomas, G., Esq. 6, *Queen's-gate-terrace, Hyde-park, W.*
- 1854 Thomas, Henry Harrington, Esq. *Lansdowne-crescent, Bath.*
- 1864 Thomas, J. R., Esq., Staff Assist. Surg. *Castle-hill, Fishguard, Pembrokeshire.*
- 1865 Thomas, John Henwood, Esq. *East India Dept., Custom-house, E.C.*
- 1854 Thompson, William C., Esq.
- 1863 Thomson, James, Esq. *Dunstable-house, Richmond.*
- 1863 Thomson, James Duncan, Esq., Portuguese Consul. *St. Peter's-chambers, Cornhill, E.C.*
- 1848 *Thomson, J. Turnbull, Esq., Chief Surveyor. *Otago, New Zealand.*
- 1866 1970 Thomson, John, Esq. 4, *Montague-street, Edinburgh. Care of John Little, Esq., 21, Cannon-street, E.C.*
- 1861 *Thomson, Ronald Ferguson, Esq., 1st Attaché to the Persian Mission. *Care of F. B. Alston, Esq., Foreign-office, S.W.*
- 1854 *Thomson, Thomas, Esq., M.D., F.R.S. *Hope-house, Kew, W.*
- 1865 Thomson, W. T., Esq. *Arlary-house, Kinross.*
- 1862 *Thorne, Augustus, Esq. 4, *Cullum-street, City, E.C.*
- 1867 Thornton, Edward, Esq., C.B. *Harrow.*
- 1847 Thornton, Rev. Thomas Cooke, M.A., M.R.I. *Brook-hall, near Weedon, Northamptonshire.*
- 1858 Thorold, Rev. A. W. 16, *Bedford-square, W.C.*
- 1854 Thorold, Henry, Esq. *Cuxwold, Lincolnshire.*
- 1868 Thorold, Alexander W. T. Grant, Esq. *Measley, Great Grimsby, Lincolnshire.*
- 1861 1980 Thrupp, John, Esq.
- 1859 Thuillier, Lt.-Col. H. L., Surveyor-General of India. *Calcutta; Messrs. Grindlay, and Co. Care of J. Walker, Esq., India Office.*
- 1865 Thurburn, C. A., Esq. 29, *Queensborough-terrace, Kensington-gardens, W.*
- 1864 *Thurburn, Hugh, Esq. 108, *Westbourne-terrace, W.*
- 1861 Thurlow, the Hon. Thos. J. Hovell. *British Embassy, The Hague. Care of J. B. Alston, Esq., Foreign Office, S.W.*
- 1868 Tilley, Henry Arthur, Esq. *Hanwell, Middlesex.*
- 1846 *Tindal, Charles John, Esq. *New South Wales.*
- 1839 *Tinne, John A., Esq. *Briarley, Aigbuth, near Liverpool.*
- 1862 Todd, John, Esq. *Sydney. Messrs. Bligh and Harbottle, 1, Alderman-walk, E.C.*
- 1865 Todd, Rev. John W. *Tudor-hall, Forest-hill, Sydenham, S.*
- 1853 1990* Tomlin, George Taddy, Esq., F.S.A. *Combe-house, Bartonfields, Canterbury.*
- 1853 Tomline, George, Esq. 1, *Carlton-house-terrace, S.W.*
- 1835 *Tooke, Arthur Wm., Esq., M.A. *Pinner-hill-house, near Watford, Middlesex.*

Year of Election.	
1856	Torrance, John, Esq. 5, <i>Chester-place, Hyde-park-square, W.</i>
1866	Torrrens, Robert Richard., Esq. 2, <i>Gloucester-place, Hyde-park, W.; and The Cott, Holm, near Ashburton, South Devon.</i>
1859	Townsend, Commander John, R.N. <i>Lona, Weston-super-Mare.</i>
1866	Townson, Wm. Parker, Esq., B.A. Cantab. <i>Care of Miss Townson, Ash-house, Caton, near Lancaster.</i>
1846	*Towry, George Edward, Esq.
1858	Towson, J. Thomas, Esq. <i>Secretary Local Marine Board, Liverpool.</i>
1864	*Toynbee, Capt. Hy. <i>Commanding the East-India Ship 'Hotspur;' 25, Inverness-road, Kensington-gardens, W.</i>
1863	1000*Tozer, Rev. H. F., M.A. <i>Exeter College, Oxford.</i>
1864	Tracy, the Hon. C. H. 11, <i>George's-street, W.</i>
1863	*Travers, Arch., Esq. <i>Addison-road (opposite the Napier-road), Kensington, W.</i>
1867	Tremenheere, Col. C.W., R.E. <i>Bombay.</i>
1859	Tremlett, Rev. Francis W., M.A. <i>Belsize-park, Hampstead, N. W.</i>
1865	*Trench, Capt. the Hon. Le Poer, R.E. 32, <i>Hyde-park-gardens, W.; and Ordnance Survey Office, Pimlico, S. W.</i>
1863	Trestroll, Rev. Frederick. <i>Stansmore-villa, Beulah-hill, Upper Norwood, S.</i>
1862	Trevelyan, Sir Charles Edward, K.C.B. 8, <i>Grosvenor-crescent, S. W.</i>
1830	Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.N.A., &c. <i>Athenæum Club, S. W.; Wallington, Northumberland; and Nettlecombe, Somerset.</i>
1864	Trimmer, Edmund, Esq. <i>Care of Messrs. Trimmer and Co., New City-chambers, Bishopsgate-street, E. C.</i>
1867	2010Tritton, Joseph Herbert, Esq. 54, <i>Lombard-street, E. C.</i>
1867	Tryon, Capt. George, R.N. <i>Army and Navy Club, S. W.</i>
1862	Tuckett, Fras. Fox, Esq. <i>Frenchay, near Bristol.</i>
1835	*Tuckett, Frederick, Esq. 4, <i>Mortimer-street, Cavendish-square, W.</i>
1865	Tuckett, Philip D., Esq. 28, <i>Cleveland-gardens, Hyde-park, W.</i>
1852	Tudor, Edward Owen, Esq., F.S.A. 80, <i>Portland-place, W.</i>
1857	Tudor, Henry, Esq. 80, <i>Portland-place, W.</i>
1864	Turnbull, George, Esq., C.E., F.R.A.S. 23, <i>Cornwall-gardens, South Kensington, W.</i>
1834	*Turnbull, Rev. Thos. Smith, F.R.S. <i>University Club, S. W.; and Blofield, Norfolk.</i>
1863	Turner, Thos., Esq. <i>Guy's Hospital, Southwark, S.</i>
1867	2020Tweedie, Capt. Michael, R.A. <i>Care of R. W. Tweedie, Esq., 5, Lincoln's-inn-fields.</i>
1864	*Twentyman, A. C., Esq. <i>Tettenhall-wood, near Wolverhampton.</i>
1863	Twentyman, Wm. H., Esq. <i>Manor-house, St. John's-wood, N. W.</i>
1863	*Twiselton, Hon. E. F. <i>Rutland-gate, S. W.</i>
1849	Twiss, Sir Travers, D.C.L., F.R.S. 19, <i>Park-lane, W.</i>
1858	Twyford, Capt. A. W., 21st Hussars. <i>Reform Club, S. W.; and Cosham-house, Cosham, Hants.</i>
1865	Tyer, Edward, Esq., C.E., F.R.A.S. 15, <i>Old-jewry-chambers, E. C.</i>
1862	*Tyler, George, Esq. 24, <i>Holloway-place, Holloway-road, N.</i>
1859	Tytler, Capt. W. Fraser. <i>Aldowrie, Inverness.</i>

Year of
Election.

- 1862 Underhill, Edward Bean, Esq., LL.D. *Derwent-lodge, Thurlow-road, Hampstead, N. W.*
- 1868 2030 Unwin, Howard, Esq., C.E. 24, *Bucklersbury, E.C.*
- 1861 Usaher, John, Esq. *Arthur's Club, St. James's-street, S. W.*
- 1858 *Uzielli, Theodosius, Esq.
- 1844 *Vacher, George, Esq. *Manor-house, Teddington.*
- 1862 *Vander Byl, P. G., Esq., M.P. *Care of Mr. H. Blyth, 17, Gracechurch-st., E.C.*
- 1865 Vane, G., Esq. *Ceylon. Messrs. Price and Boustead.*
- 1856 *Vaughan, James, Esq., F.R.C.S., Bombay Army. *Builth, Breconshire.*
- 1861 Vaughan, J. D., Esq., Assist. Res. Councillor and Police Magistrate of Singapore. *Care of J. Tupp, Esq., 4, Lancaster-road, Notting-hill, W.*
- 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 2040 Vavasour, James, Esq. *Knockholt, near Sevenoaks, Kent.*
- 1867 Venner, Capt. Francis John S. 42, *Gloucester-place, Hyde-park, W.*; and *Elm Bank, near Worcester.*
- 1863 *Vereker, the Hon. H. P., LL.D., H.M. Consul at Rio Grande do Sul. 1, *Portman-square, W.*
- 1862 Verner, Edward Wingfield, Esq., M.P. 86, *Eaton-square, S. W.*; and *Cook-abbey, Bray, Co. Wicklow.*
- 1862 *Verney, Edmond H., Commr. R.N. 32, *South-street, Grosvenor-square, W.*
- 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.*
- 1865 Vile, Thomas, Esq. 75, *Oxford-terrace, W.*
- 1865 Vincent, Minos C., Esq., C.E. *Frankfort, Ohio, U.S., and 337, Strand.*
- 1857 2050 Vincent, John, Esq. 4, *Granville-park, Blackheath, S.E.*
- 1858 Vines, William Reynolds, Esq., F.R.A.S. *Care of R. P. Hollyer, Esq., 25, Douglas-road-north, Canonbury, N.*; and 4, *Thavies-inn, Holborn-hill, E.C.*
- 1863 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 Raxter, Esq., M.D., M.A.
- 1863 Waite, Henry, Esq. 3, *Victoria-street, Pinlicko, S. W.*
- 1867 *Waite, Rev. John. *Wesleyan Institution, King Tom's Point, Sierra Leone.*
- 1864 2060 Wakefield, E. T., Esq. 40, *Pembridge-villas, Bayswater, W.*

Year of Election.	
1868	Walker, Charles Henry, Esq. 2, <i>Alexandra-terrace, Reading.</i>
1862	Walker, Col. C. P. Beauchamp, C.B. 97, <i>Onslow-square, S. W.; and United Service Club, S. W.</i>
1861	Walker, Edward Henry, Esq., Vice-Consul at Tripoli. <i>Newton-bank, Chester.</i>
1863	*Walker, Frederick John, Esq. <i>Alltyr Odyn, Llandyssil, Carmarthen, Wales.</i>
1863	Walker, James, Esq., Managing Director of Madras Railway. 23, <i>Cambridge-square, Hyde-park, W.</i>
1859	*Walker, Lt.-Col. James, Bombay Engineers. <i>Murree, near Rawul Pindé, Punjab. Care of J. Walker, Esq., India Office.</i>
1830	Walker, John, Esq., Hydrog. India Office. 9, <i>Castle-street, Holborn, W. C.</i>
1861	*Walker, John, Esq. 60, <i>Porchester-terrace, W.</i>
1858	*Walker, Captain John, H.M.'s 66th Foot. <i>Droom-hill, Colchester.</i>
1864	2070 Walker, R. B. N., Esq. <i>Care of Mr. Blissett, 38, South Castle-st., Liverpool.</i>
1860	Walker, Robert, Esq., M.D., Ass. Surg. R.N. 4, <i>Belfield-place, Portobello, Edinburgh.</i>
1866	Walker, Sydney, Esq.
1863	*Walker, T. F. W., Esq. 6, <i>Brock-street, Bath; and Athenæum Club, S. W.</i>
1853	Walker, Captain William Harrison, H.C.S. 3, <i>Gloucester-terrace, W.; and Board of Trade, S. W.</i>
1861	Walker, Rev. William. <i>Grammar-school, Hanley Castle, Upton-on-Severn.</i>
1861	Walker, Rev. William Henry, M.A. <i>Necton-rectory, Shipham, Norfolk.</i>
1866	Walker, William, Esq., F.S.A. 48, <i>Hildrop-road, Tufnell-park, N.</i>
1866	Walker, Alexander, Esq. <i>Preston, Kirkbean, near Dumfries.</i>
1868	Walkinshaw, William, Esq. 74, <i>Lancaster-gate, Hyde-park, W.</i>
1854	2080 Wallace, Alfred Russell, Esq. 9, <i>St. Mark's-crescent, Regent's-park, N. W.</i>
1861	Wallace, Rev. Charles Hill, M.A. 3, <i>Harley-place, Clifton, Bristol.</i>
1864	Waller, Rev. Horace. <i>St. John's, Chatham.</i>
1865	Waller, Sir Thos. Wathen, Bart. 16, <i>Eaton-square, S. W.</i>
1868	Waller, Major, George Henry. 16, <i>Eaton-square, S. W.</i>
1863	Wallich, George C., Esq., M.D. 11, <i>Earl's-terrace, Kensington, W.</i>
1864	Walmsley, Joshua, Government Resident Agent. <i>Natal.</i>
1860	Walpole, Capt. the Hon. F., M.P. <i>Travellers' Club, S. W.; and Rainthorpe-hall, Long Stratton, Norfolk.</i>
1863	Walpole, Rt. Hon. Spencer, M.P. <i>Grafton-street, W.; and Ealing, W.</i>
1853	Walter, Henry Fraser, Esq. <i>Papplewick-hall, near Nottingham.</i>
1865	2090 Walton, H. C., Esq., C.E. 26, <i>Savile-row, W.</i>
1863	Walton, J. W., Esq. 26, <i>Savile-row, W.</i>
1864	Walton, R. G., Esq., C.E.
1853	*Ward, George, Esq.
1860	Ward, Admiral J. Hamilton. <i>Oakfield, Wimbledon-park, S. W.</i>
1865	Ward, Swinburne, Esq., Civil Commissioner. <i>Seychelles Islands.</i>
1868	Ward, Capt. the Hon. Wm. John, R.N. <i>H.M. Legation, Washington. Care of the American Department, Foreign-office, S. W.</i>
1868	Wardlaw, Col. Robert, C.B. <i>United Service Club, S. W.</i>

Year of
Election.

- 1862 Wardlaw, John, Esq. 57, *Prince's-gate, Kensington, W.*
- 1864 Warner, E., Esq. 49, *Grosvenor-place, S.W.*
- 1859 2100 Warre, Arthur B., Esq. 109, *Onslow-square, S.W.*
- 1862 Warren, Capt. Richard Pelham. *Worting-house, Basingstoke.*
- 1867 Washbourn, B., Esq., M.D., &c. *Eastgate-house, Gloucester.*
- 1867 Waterhouse, George Marsden, Esq. *Buckhurst, Wokingham, Berkshire.*
- 1852 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. 13, *Circus, Bath.*
- 1861 Watson, John Harrison, Esq. 28, *Queensborough-terrace, Kensington-gardens, W.*
- 1867 Watson, Robert Spence, Esq. *Moss Croft, Gateshead-on-Tyne.*
- 1868 2110 Watson, Robert, Esq.
- 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. *Ashton-lodge, Ashton, near Bristol.*
- 1858 *Webb, Capt. Sydney. *Oriental Club, Hanover-square, W.; and 24, Manchester-square, W.*
- 1862 *Webb, William Frederick, Esq. *Army and Navy Club, S.W.*
- 1868 Webb, Edward B., Esq., C.E., &c. 34, *Great George-street, S.W.*
- 1836 *Webber-Smith, Colonel James, 95th Regiment. 14, *Cambridge-square, W.*
- 1865 Webster, Alphonusus, Esq. 44, *Mecklenburg-square, W.C.*
- 1864 Webster, E., Esq. *North-lodge, Ealing, W.*
- 1858 2120 Webster, George, Esq., M.D. *Dulwich, S.E.*
- 1866 Webster, George, Esq. 40, *Finsbury-circus, E.C.*
- 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.*
- 1864 Wells, Sir Mordaunt, late Chief Puisne Judge, Bengal. 107, *Victoria-st., S.W.*
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With 4 books of letterpress. Scale 1 inch = 0.68 mile (geo.).

GEOLOGICAL SOCIETY OF SWEDEN.

SWITZERLAND—

Carte Géologique de la Suisse de MM. B. Studer et A. Escher von der Linth. 2^e Edition revue et corrigée d'après les publications récentes et les communications des Auteurs et de MM. v. Fritsch, Gilleron, Jaccard, Kaufmann, Mösch, Müller, Stoppani, Théobald. Par Isidor Bachmann. Winterthur, 1867. On 4 sheets. Scale 1 inch = 8½ miles (geo.) Prof. J. M. ZIEGLER.

Karte des Unter-Engadins mit den nördlich, östlich u. südlich angrenzenden, Theilen von Vorarlberg, Tyrol und Veltlin. Bearbeitet von J. M. Ziegler. Winterthur, 1867. On 2 sheets. Scale 1 inch = 0.68 mile (geo.) The AUTHOR.

ASIA.

ARABIA—

Compass Survey to illustrate the March of the Aden Field Force 1865-1866. Surveyed by Captain H. Pym and Lieutenants Jacob, Boileau, and Sorrel. Scale 2 miles = 1 inch.

CHINESE TARTARY—

Route Survey from British India into Great Tibet through the Lhasa Territories and along the Upper Course of the Brahmaputra River, or Nari-chu-sang-po. Made by Pundit ———, and compiled from the original Materials by Capt. T. G. Montgomerie, R.E., F.R.G.S., Great Trigonometrical Survey of India. Dehra Doon, 1867. Scale 1 inch = 16 miles (geo.)

Forschungen und Aufnahmen zweier Punditen (Indischer Eingebornen) in Tibet, am Nari-tschu Sangpo oder obern Brahmaputra in Nepal und dem Himalaya 1865-67. Auf Grund der Karten und Berichte v. Capt. T. G. Montgomerie, mit Zusätzen von A. Petermann. Gotha, 1868. Scale 1 inch = 27½ miles (geo.) A. PETERMANN, Esq.

A Road Map from Peking to Kiachta, cut on wood. To aid the funds of a Mission School at Peking, 1864. On 12 sheets. Scale 1 inch = 2.9 miles (geo.) E. C. BOWRA, Esq.,
 Imperial Maritime Customs, Canton, China.

CHINA PROPER—

Map of the Sun-on District (Kwang-tung Province), drawn from actual Observations made by an Italian Missionary of the Propaganda, in the course of his Professional Labours during a Period of Four Years. Leipzig, 1866. On 2 sheets. Scale 1 inch = 1½ mile (geo.).

J. L. SOUTHEY, Esq., R.N.

INDIA—

Map of India. By E. Weller. London, 1868. Scale 1 inch = 130 miles (geo.) The AUTHOR.

DISTRICT MAPS OF INDIA (54 in No.), viz:—

TITLE.	AUTHOR.	Date.	Scale.*
Agra	Capt. Wroughton and Fordyce ..	1837-9	4
Allahabad	Capt. Lawrence and Lieut. Stephen	1838	4
Allygurh	Capt. R. Wroughton	1837	4
Bandah	Lieuts. Abbott and Stephen	1840-41	4
Bareilly	Lieuts. Fraser and Abbott	1833-37	4
Benares	Lieuts. Abbott and Stephen	1839-40	4
Bhurlpoor	Major H. L. Thuillier	1855-8	4
Bijnour	Capt. B. Browne	1833-41	4
Boolundshuhur	Capt. W. Brown	1828-40	4
Badaoon	Capt. Bedford and Wroughton	1822-34	4
Budaon	Capt. Bedford and Lieut. Fraser ..	1822-34	2
Cawnpoor	Lieut. S. A. Abbott	1840	4
Etawah	Capt. R. Wroughton	1833-9	4
Etawah	G. H. M. Alexander	1858	2
Fattehpoor	Lieut. H. V. Stephen	1839	4
Furruckabad	Capt. Lawrence and Wroughton	1833-39	4
Gurgaon	Capt. Oliver, Simmonds, and Brown	1828-40	4
Humeerpoor	Lieut. H. V. Stephen	1839-40	4
Hurriana	Capt. Simmonds and Brown	1832-8	4
Jhansee Nos. 1, 2, and 7 ..	Major H. L. Thuillier	1859-60	1
Jhansee No. 3	"	1854-5	1
Jhansee Nos. 3 and 4	"	1859-60	1
Jhansee No. 4	"	1853-4	1
Jhansee No. 5	"	1853-5	1
Jhansee Nos. 5 and 6	"	1859-60	1
Jhansee No. 14	"	1855-6	1
Jhansee No. 15	"	1855-6	1
Jhansee No. 24	"	1856-9	1
Jaloun	Lieut. S. A. Abbott	1841-2	4
Jaloun No. 1	Major H. L. Thuillier	1852-5	1
Jaloun No. 1	"	1841-2	1
Jaloun No. 2	"	1852-5	1
Jaloun Nos. 2 and 3	"	1841-2	1
Jaloun No. 4	Lieut. S. A. Abbott	1841-2	1
Jaloun No. 5	"	1841-2	1
Jaloun No. 6	"	1841-2	1
Jaloun No. 9	Lieut. F. J. Burgess	1853-5	1
Jaloun Nos. 10 and 11	"	1853-4	1
Jubbulpoor No. 1	Capt. D. Vanrenen	1855-6	1
Jubbulpoor No. 2	"	1855-6	1
Jubbulpoor 5, 6, 7, and 12	"	1856-7	1
Jubbulpoor 13, 14, and 15	"	1856-7	1
Meeruth	Capt. W. Brown	1831-6	4
Mirzapoor	Capt. R. Wroughton	1840-1	4
Moradabad	Capt. B. Browne	1834-41	4
Mozufnugur	Capt. Brown and Lieut. Fraser ..	1827-32	2
Muthra	Capt. R. Wroughton	1835	4
Mynpooree	"	1837-9	4
Paneput	Capt. Oliver and Simmonds	1822-33	4
Pillebhoet	Capt. B. Browne	1838-40	4
Pooree	Lieut. H. L. Thuillier	1834-41	4
Rajpootana, 8 sheets	Major H. L. Thuillier	1846	8
Shahjahanpoor	Capt. Abbott and Lieut. Fraser ..	1838-9	4
Agra and Bombay Road ..	Lieut. H. L. Thuillier	1851	4

Major J. BAILLIE, Bengal Staff Corps.

* Inches to a mile.

Maps, Charts, &c.

Donors.

INDIA—

Summer Route from Leh (Ladak) to the Karakoram Pass. (MS.) Compiled from the Records of the Great Trigonometrical Survey of India by Capt. T. G. Montgomerie, R.E. Scale 1 inch = 14 miles (geo.)

Summer Route from the Karakoram Pass to the City of Yarkand. (MS.) Protracted from the Journal of the Moonshee Mahamad-i-Hamid. By Capt. T. G. Montgomerie. Scale 1 inch = 14 miles (geo.).

The AUTHOR.

JAPAN—

A Native Map of Japan, divided into provinces and coloured.

PERSIA—

Sketch showing the Route and Coast-line from Mogoo Bay to the Town of Bunder-Abbass, including the Island of Kishm, 1864. Scale 1 inch = $4\frac{1}{2}$ miles (geo.).

RUSSIA—

Map of the Kirghiz-Steppe (regions of the Orenburg and Siberian Kirghizes) and of the Countries conterminous with the Central Asiatic Possessions in Russia. Copied from a Russian Map, published at St. Petersburg, by the Topographical Depot, War Office, London, 1868. Scale 1 inch = 60 miles (geo.).

TOPOGRAPHICAL DEPOT, WAR OFFICE,
through Sir H. James, R.E., Director.

Map of the Kirghiz Steppe, including the regions of the Orenburg and Siberian Kirghizes and the Provinces of Semipalatinsk and Turkestan, with the conterminous portions of the Central Asiatic States. Printed in Russian with English Translation. Scale 1 inch = 58 miles (geo.).

Die Seenbecken des Balchash und Ala-Kul in Inner-Asien. Nach den neuesten Russischen Aufnahmen und Forschungen von Balkow, Golubew u. A. zusammengestellt von A. Petermann. Gotha, 1868. Scale 1 inch = 35 miles (geo.) The AUTHOR.

SIAM—

Französische Aufnahme des Me-Khong, 1866-7, und Uebersicht der geographischen Kenntniss von Hinterindien. 1 Januar, 1868. Von A. Petermann. Gotha, 1868. Scale 1 inch = $8\frac{1}{2}$ miles (geo.).

The AUTHOR.

TURKEY—

Turkish Map of Asia Minor, in two parts. Constructed and Photographed by his Excellency Ahmed Vefyk Effendy. Scale 1 inch = 24 miles (geo.) The AUTHOR.

Map of part of Armenia, shewing Lake Van and surrounding country. By Major Frederick Millingen. 2 copies. Scale 1 inch = $9\frac{1}{2}$ miles (geo.).

AFRICA.

NORTHERN—

Sketch of a Map to illustrate the Arab Geography of Negroland. By W. D. Cooley, Esq. London, 1841. Scale 1 inch = 150 miles (geo.).

W. D. COOLEY, Esq.

Uebersicht von Gerhard Rohlfs Reisen in Afrika, 1861-67. Von A. Petermann. Gotha, 1867. Scale 1 inch = $3\frac{1}{2}$ °.

Map to accompany Gerhard Rohlfs's Narrative of his last Journey. By A. Petermann. Gotha, 1868. Scale 1 inch = 48 miles (geo.).

A. PETERMANN, Esq.

Maps, Charts, &c.

Donors.

EASTERN—

- Abyssinia, Egypt, and the Red Sea. By James Wyld. London, 1867. 2 copies. Scale 1 inch = 96 miles (geo.) The AUTHOR.
- Phyto-geographische Karte des Nilgebietes und der Uferländer des Rothen Meeres nach älteren und neueren Quellen entworfen und gezeichnet von Dr. G. Schweinfurth, 1867. By A. Petermann. Gotha, 1868. Scale 1 inch = 135 miles (geo.) Dr. A. PETERMANN.
- Carte de l'Isthme de Suez. Dressée sous la direction de M. Voisin, Directeur-général des Travaux, et d'après les opérations de M. Larouse, Ingénieur hydrographique. Paris, 1866. Scale 1 inch = $2\frac{3}{4}$ miles (geo.) PURCHASED.
- Carte de l'Abyssinie, du pays des Galla, de Choa, et d'Ifat. Dressée par MM. Combes et Tamisier. Dessinée par A. Vuillemin. Paris, 1838. Scale 1 inch = 32 miles (geo.).
- Ethiopie. Carte No. 7. Gambo et Darrabe. Par Antoine d'Abbadie. Paris, 1864. Scale 1 inch = $6\frac{1}{2}$ miles (geo.).
- Ethiopie, Carte No. 8. Caw et Rare. Par Antoine d'Abbadie. Paris, 1864. Scale 1 inch = $6\frac{1}{2}$ miles (geo.).
- Ethiopie, Carte No. 9. Inarya et pays limithropes. Par Antoine d'Abbadie. Paris, 1862. Scale 1 inch = $6\frac{1}{2}$ miles (geo.).
- Ethiopie, Carte No. 10. Frontière Septentrionale du Kaffa. Par Antoine d'Abbadie. Paris, 1862. Scale 1 inch = $6\frac{1}{2}$ miles (geo.).
W. D. COOLEY, Esq.
- Abyssinia and the Sources of the Nile from Seb Munster. A.D. 1550.
Dr. J. MURIE.
- Upper Nubia and Abyssinia. By A. Keith Johnston, F.R.S.E. Edinburgh, 1867. Scale 1 inch = 39 miles (geo.) PURCHASED.
- Map of Abyssinia. By James Wyld. London, 1867. 2 copies. Scale 1 inch = 29 miles (geo.) The AUTHOR.
- Abyssinia. By Smith and Son. London, 1868. Scale 1 inch = $33\frac{1}{2}$ miles (geo.) The AUTHORS.
- Map of Abyssinia. By Dr. Beke, 1866. E. Stanford. London, 1867. Scale 1 inch = 60 miles (geo.) E. STANFORD, Esq.
- Route Maps of Abyssinia. Published by the Topographical Dépôt, War Office, under the superintendence of Sir H. James, R.E. London, 1867. Scale 1 inch = $8\frac{1}{2}$ miles (geo.). 1st, 2nd, 3rd, and 4th editions.
The TOPOGRAPHICAL DEPÔT, WAR OFFICE.
- Spezialkarte von Nord-Abessinien. Von A. Petermann. Gotha, 1867. Scale 1 inch = $13\frac{3}{4}$ miles (geo.).
- Spezialkarte des Nord-Abessinischen Gebirgslandes zwischen Massana und Halay. Von A. Petermann. Gotha, 1867. Scale 1 inch = $4\frac{1}{2}$ miles (geo.).
- Spezialkarte des Hochlandes von Abessinien zwischen Tekonda und Addigerat nach den Englischen Aufnahmen, Detailberichten und Co. Von A. Petermann. Gotha, 1868. 2 copies. Scale 1 inch = $4\frac{1}{2}$ miles (geo.).
- Die ersten Aufnahmen der Englischen Armee in Abessinien, 1867-1868. Uebersicht des voraussichtlichen Kriegsschauplatzes bis Magdala. Von A. Petermann. Gotha, 1868. Scale 1 inch = $13\frac{3}{4}$ miles (geo.).
A. PETERMANN, Esq.
- Route Surveys in Abyssinia, commencing from the landing-place at Annesley Bay. Surveyed by the Quarter Master General's Department. Camp, Senafé, 1868. Scale 1 inch = 4 miles. A photograph.

Maps, Charts, &c.

Donors.

- Compass Sketch of the Country by the Koomayli and Huddas Torrents to Senafè and Tekoonda respectively. Col. B. Phayre. Mulkutto, 1868. A tracing. Scale 1 inch = 4 miles (geo.).
- Military Sketch of the Country between Annesley Bay and Senafè. By James Wyld. London, 1868. Scale 1 inch = 5 miles.
The AUTHOR.
- Map of part of Central Abyssinia, compiled from various Authorities by the Topographical Depôt, War Office. London, 1868. Scale 1 inch = 10 miles (stat.).
Through Sir E. LUGARD, War Office, Pall Mall.
- Originalkarte von Central-Abessinien. Zum grossen Theil nach unpubli- cirten Documenten. Von A. Petermann. Gotha, 1868. Scale 1 inch = 14 miles (geo.) The AUTHOR.
- Two Maps of part of Abyssinia :—
1. Adoua. Scale 1 : 200,000.
2. Koarata and Goundet. 1 : 200,000.
By G. Lejean. Paris, 1868 The AUTHOR.
- Map of Sir S. W. Baker's Routes on the Nile Tributaries of Abyssinia. By E. Stanford. London, 1867. Scale 1 inch = 45 miles (geo.)
E. STANFORD, Esq.
- Karte von Ost-Sudan, zur Uebersicht der Reisen von Carl Graf Krockow von Wickerode, in den Jahren 1864 und 1865. Gezeichnet von B. Hassenstein. Berlin, 1867. Scale 1 inch = 25 miles (geo.)
BRUNO HASSENSTEIN, Esq.
- MS. Map to illustrate the Explorations in Eastern Africa by Count Carl Krockow, 1864-65. Scale 1 inch = 14 miles (geo.).
- Sketch Map showing the Track of Mr. Young and party in search of Dr. Livingstone, 1867. Scale 1 inch = 10 miles (geo.) Mr. YOUNG.
- Tracing of an original unpublished Map of a Journey from the Orange River to the Zambesi in 1866. By Dr. Karl Mauch. With indica- tions of the Gold Fields discovered by him in 1867. Scale 1 inch = 48 miles (geo.) A. PETERMANN, Esq.

SOUTHERN—

- Das Capland nebst den Süd-Afrikanischen Freistaaten und dem Gebiet der Hottentotten und Kaffern. By A. Petermann. Gotha, 1868. Scale 1 inch = 68 miles (geo.)
- Uebersicht der trigonometrischen und nautischen Aufnahmen im Kap- lande bis 1867. By A. Petermann. Gotha, 1868. Scale 1 inch = 25 miles (geo.) The AUTHOR.

AMERICA.

NORTH—

Arctic—

- Chart of Herald Island, discovered by H.M.S. *Herald*, Capt. Kellet. 1849.
- Chart showing the Track of Commander Moore in the Boats of H.M.S. *Plover*, from Icy Cape to Dease Inlet. July and August, 1860.
- Chart of Herald Shoal, discovered by H.M.S. *Herald*, Capt. Kellett, 29th August, 1849 Admiral R. COLLINSON.

Russian—

- North Western America, showing the Territory ceded by Russia to the United States. Compiled for the Department of State; B. Peirce, Superintendent. 1867. Scale 1 inch = 68½ miles (geo.)
U.S. NAVAL DEPARTMENT, through W. Faxon, Esq., Assist. Sec.

Maps, Charts, &c.

Donors.

British—

Map of British Columbia. Prepared under the Direction of Capt. R. M. Parsons, R.E. New Westminster, 1863. Scale 1 inch = 17 miles (geo.).

Barometric Section from the Gulf of Georgia up the Fraser and Harrison Rivers, and along the Waggon Road to Lake La Hache, 360 miles. From Observations made in September and October, 1863, by Capt. R. M. Parsons, R.E. New Westminster.

Accompanied by an Abstract of Meteorological Observations and a Table of Latitudes and Longitudes .. Capt. R. M. PARSONS, R.E.

Map of the City of Victoria (Vancouver Island). Published by Alfred Waddington. San Francisco, 1863 The AUTHOR.

Plan showing the Region explored by S. J. Dawson and his Party, between Fort William, Lake Superior, and the Great Saskatchewan River, from 1st August, 1857, to 1st November, 1858. Scale 1 inch = 10 miles.

Map of Central North America, showing the proposed Railroads across the Continent in British and American Territories. By Edward Stanford. London, 1868. Scale 1 inch = 100 miles (geo.).

ALFRED WADDINGTON, Esq.

UNITED STATES—

A Photographic Copy of the General Map of the United States Boundary Survey. Compiled and drawn by Lemuel D. Williams, Theodor Kolecki, and Edward Freyhold. Washington, 1866. On 2 sheets. Scale 1 inch = 15 miles (geo.).

UNITED STATES N.W. BOUNDARY COMMISSION, Washington, through Archibald Campbell, U.S. Commissioner.

Karte vom westl. Theile der Verein. Staaten N.-Amerikas zur Uebersicht der grossen Eisenbahnbauten nach dem Pacific Ocean, der neuesten Territorien und Aufnahmen von Hermann Berghaus. By A. Petermann. Gotha, 1867. Scale 1 inch = 192 miles (geo.).

A. PETERMANN, Esq.

Map of Colorado Territory. Paris, 1867. Scale 1 inch = 32 miles (geo.).

JACKSON BARWISE, Esq.

CENTRAL—

Central-America u. die Antillen. By E. G. Ravenstein. London, 1865. Scale 1 inch = 110 miles (geo.) The AUTHOR.

A Map of British Honduras. Compiled from Surveys by J. H. Faber, Esq., Crown Surveyor, E. L. Rhys, Esq., and others, and including the positions on and near the North-West Frontier, ascertained by Lieut. Abbe, R.N., in 1867. Scale 1 inch = 5½ miles (geo.). Two copies.

Sir F. ROGERS, Under Secretary of State, Colonial Office.

Tracing of part of the Province of Belize, showing the Course of the Principal Rivers. By Lieut. C. Abbe. Scale 1 inch = 4½ miles (geo.).

Admiral R. COLLINSON, R.N.

Mapa de la Republica de Nicaragua levantado por orden de su exa. el Presidente Capn. General Martinez bajo la inspeccion del Consul-General en Londres. Por Maximiliano de Sonnenstern. 1863. Scale 1 inch = 8 miles (geo.). JAMES L. HART, Consul-General, Nicaragua.

The International Atlantic and Pacific Junction Railway, as projected by Capt. Bedford Pim, R.N., 1866. Scale 1 inch = 16 miles (geo.).

The AUTHOR.

Plan showing the District Explored and Route Surveyed, &c., for an Inter-oceanic Railway. By John Collinson, Esq., C.E., F.R.G.S. 1863 and 1867. Scale 1 inch = 500 feet The AUTHOR.

Maps, Charts, &c.

Donors.

Trial Section across Nicaragua for an Interoceanic Railway. By John Collinson, C.E., F.R.G.S. 1863 and 1867 The AUTHOR.

SOUTH—

General—

Karte von Süd-America. By E. G. Ravenstein. On two sheets. London, 1866. Scale 1 inch = 165 miles (geo.) The AUTHOR.

Argentine Republic—

Nuevo Mapa de la Provincias que forman la Confederacion Argentina y de las Republicas Oriental del Uruguay, Paraguay, y Chile. Levantado y corregido sobre los documentos mas autenticos, y modernos, y exploraciones hechas en estos ultimos años. Paris, 1863. Scale 1 inch = 46 miles (geo.) Mr. BURGIS.

Originalkarte des nordwestlichen Theiles der Argentinischen Republik (Provinzen Tucuman und Catamarca) nach den Handzeichnungen und Beschreibungen von Prof. Dr. H. Burmeister. By A. Petermann. Gotha, 1868. Scale 1 inch = 16½ miles (geo.) .. The AUTHOR.

Registro grafico de las propiedades rurales de la Provincia de Buenos Ayres construido por el departamento topografico y publicado con autorizacion del Superior Gobierno de la Provincia, 1864. By Saturnino Salas, Mariano Moreno, German Kuhr, Pedro Benoit, Ygnacio Casagemas, and Antonio Malaver. On 6 sheets. Scale 1 inch = 6 miles (geo.) Mr. BURGIS.

Brazil—

Die Deutschen Colonien im Urwald der Brasilianischen Provinz Rio Grande do Sul und Dr. R. Hensel's Reiseroute über die Serra Geral im Jahre 1865. By B. Hassenstein. Berlin, 1867. Scale 1 inch = 14 miles (geo.) The AUTHOR.

Aufnahme der Flüsse Purús und Aquiry durch W. Chandless, 1864 und 1865. Nach den Engl. Originalkarten im Journ. R. G. S., vol. 36, zusammengestellt von A. Petermann. Gotha, 1867. Scale 1 inch = 50 miles (geo.) A. PETERMANN, Esq.

Map of the River Purús, from near its Source to its Mouth. By W. Chandless, Esq. 1864, 1865. On 2 sheets MS. Scale 1 inch = 12 miles (geo.) The AUTHOR.

Map of the River Aquiry (an affluent of the Purús). By W. Chandless, Esq. 1865. Scale 1 inch = 12 miles (geo.) .. The AUTHOR.

New Grenada—

Sketch of a Map of the part of the Isthmus of Darien, explored in the years 1861 and 1865. By M. Lucien de Puydt, MS., showing the line of proposed Canal The AUTHOR.

Map of the Province of Loreto (Peru). By Antonio Raimondo. Scale 1 inch = 15 miles (geo.) W. BOLLAERT, Esq.

Section from Iquique on the Pacific, 20° 12' 30" s., 70° 9' 30" w., across the Cordilleras and Great Salinas to Potosi. Lat. 19° 36' s., long. 65° 20' w. Scale (Ver) 1 inch = 1000 feet, (Hor) 1 inch = 2 miles. MS. By William Bollaert, Esq. The AUTHOR.

Mapa del Camino de Huánuco al Puerto General Prado. Levantado por A. Wertheman y aprobado por J. K. Tucker, Presidente de la Comision hidrográfica del Amazonas, 1867. MS., with Section.

DON M. FELIPE PAZ SOLDAN.

AUSTRALIA.

NORTHERN—

Map of the Southern part of the Gulf of Carpentaria. Scale 1 inch = 2 miles.

Maps, Charts, &c. Donors.

Peru—

Map of the South-East part of the Gulf of Carpentaria. Scale 1 inch = 2 miles.

QUEENSLAND—

Map showing lines of Electric Telegraph in the Colony of Queensland. 1867. Scale 1 inch = 68 miles (geo.).

Map of Country surveyed by F. Walker and H. E. Young for Electric Telegraph Lines from Bowen (Port Denison) and Cardwell (Rockingham Bay) to Burke Town, Gulf of Carpentaria. Also proposed Line from Cardwell, *via* Kennedy's Gap and Flinders River, to Burke Town. 1867. Scale 1 inch = 24 miles (geo.).

Map of John McKinlay's Route across the Continent of Australia, from Stuckey's Crossing to the Gulf of Carpentaria. Compiled from Mr. McKinlay's Journal, in the Surveyor-General's Office, by W. G. Harris and R. J. Loveday. 1862. On 4 sheets. Scale 1 inch = 13 miles (geo.).

Map of Landsborough's Route from Bowen Downs to Neelia Creek. MS.

Plan of Sweer's Island and Township, Parish of High Clere, County of Porchester. Scale 1 inch = 20 chains.

Plan of the Town of Carnarvon (Sweer's Island). MS. Scale 1 inch = 8 chains.

A Tracing of Annan River, to accompany Report.

A Tracing of Endeavour River, lat. 15° 27½' s., long. 145° 10' 50" e.

SOUTH—

Entdeckungen von Warburton, Walder, Kramer und Meissel im Cooper-Delta (Central-Australien), 1866 und 1867. Von A. Petermann. Gotha, 1867. Scale 1 inch = 13¼ miles (geo.).

Warburton's Entdeckung des Nordendes von Lake Eyre. 1866. Von A. Petermann. 1867. Scale 1 inch = 16¼ miles (geo.).

McIntyre's Reise in Central-Australien, 1865 und 1866. Von A. Petermann. Gotha, 1867. Scale 1 inch = 70 miles (geo.). A. PETERMANN, Esq.

NEW ZEALAND.

Map of part of the Northern Island of New Zealand, showing the Scene of the Military Operations of 1863-4. By the Topographical Depôt, War Office. London, 1867. Scale 1 inch = 8¼ miles (geo.).

TOPOGRAPHICAL DEPÔT, WAR OFFICE,
through Col. Sir H. James, B.K., Director.

OCEANS.

ATLANTIC—

Originalkarte der Canarischen Inseln Gomera, Hierro, Canaria. Nach den Messungen von K. v. Fritsch. Red. und arrangirt von A. Petermann. Gotha, 1867. Scale 1 inch = 3 miles (geo.). .. A. PETERMANN, Esq.

INDIAN—

Map of the country 20 miles around Antananarivo (Madagascar). By James Sibree, junr. Scale 1 inch = 6 miles (geo.) .. The AUTHOR.

PACIFIC—

Map of Hawaiiin Group or Sandwich Islands. By the United States Exploring Expedition, 1844, corrected to February, 1867. Scale 1 inch = 16 miles (geo.) ALFRED WADDINGTON, Esq.

CHARTS.

BRITISH ADMIRALTY—

Section 1.

- No. 2 The British Islands.
 1179 Bristol Channel (England, West Coast).
 1182 Cardiff and Penarth Roads, do. do.
 1183 Kenfig River to Nash Point, including Scarweather and Nash Sands (Bristol Channel).
 1467 Ireland (Sheet 16), Wicklow to Dublin.

Section 3.

- No. 213 Gron Sound entrance (Baltic).

Section 5.

- No. 158 Italy (West Coast), Piombino to Civita Vecchia.
 159 _____ (Sheet 3), Civita Vecchia to the Bay of Naples.
 207 West Coast of Morea, with the Island of Zante.
 249 Mehediah to Ras Makhabez (Tunis).
 250 Fratelli Rocks to Mehediah (do.)
 469 Port of Alicante (Spain, East Coast).
 1184 Tunis Bay (Africa, North Coast).
 1728 Gulf of Naples (Italy, West Coast).
 2249 Island of Malta, Valetta to Marsa Scirocco.

Section 6.

- No. 222 Indian Harbour (Labrador, North-East Coast).
 223 Anchorages on the North-East Coast of Labrador.
 225 Indian Tickle and Occasional Harbour, do.
 226 Domino Run (Labrador, East Coast).
 227 Deer and St. John's Harbour (Newfoundland).
 280 Cape Freels to Point Partridge, do.
 290 Island of Fogo, do.
 293 Trinity Harbour to Cape Freels, do.
 296 Cape Bonavista to Bay Bulls, do.
 619 Heart's Content and New Perlican, do.
 729 Sambro Island to Cape Canso (Nova Scotia).
 730 Cape Sable to Sambro Island, do.
 2427 Salem, Marblehead, and Beverley Harbours (United States).
 2516 Gulf of St. Lawrence and Newfoundland.
 2649 Bull Arm (Trinity Bay), do.
 2666 St. John's (Newfoundland) to Halifax.

Section 8.

- No. 483 Gulf of Paria (Trinidad Island).
 487 St. Christopher, Nevis, &c. (West Indies).
 488 East end of Tobago Island do.
 502 Carlisle Bay (Barbadoes) do.
 505 Tobago Island (West Indies).
 506 Trinidad Island, do.
 508 Rockly Bay, Tobago Island (West Indies).

Section 9.

- No. 539 Port Maceio, in Pernambuco (Brazil).
 1801 Trinidad to Surinam (South America, East Coast).

Section 10.

- No. 560 South America, West Coast (Sheet 1).
 561 _____ (Sheet 2).
 1901 Anchorages between Cape Caution and Port Simpson.

Maps, Charts, &c.

1923 } Cape Caution to Port Simpson, including
1923a } Hecate Strait (British Columbia) 2 Sheets.

Section 11.

- No. 5 Socotra Island (Africa, East Coast).
6a Gulf of Aden (Sheet 1).
6b ————— (Sheet 2).
8a Red Sea (Sheet 1).
8b ————— (Sheet 2).
8c ————— (Sheet 3).
8d ————— (Sheet 4).
15 Principal Harbours in the Red Sea south of Jiddah.
54 Darra Salaam, entrance (Africa, East Coast).
596 Africa, General (Sheet 4).
597 ————— (Sheet 5).
677 East Coast of Madagascar.
715 Island of Rodriguez, or Diego Riaz (Indian Ocean).
715 Amphila Bay (Red Sea).
 Ansley Bay, do.
 Howakel Bay, do.
1223 Kowie River, entrance (Africa, South Coast).
2082 Table Bay to Cape Agulhas, do. do.
2083 Cape Agulhas to Mossel Bay, do. do.
2084 Mossel Bay to Cape St. Francis, do. do.
2085 Cape St. Francis to Great Fish Point, do.
2095 Cape of Good Hope and adjacent Coasts.
2523 Red Sea.

Section 12.

- No. 10c North-East Coast of Arabia.
35 Basfidih and its Approaches (Persian Gulf).
68a Palk's Strait and Gulf of Manaar (Sheet 1).
70a Bay of Bengal (Western Sheet).
70b ————— (Eastern Sheet).
738 West Coast of India (Sheet 4).
748a Indian Ocean (Western Sheet).
823 Gulf of Bengal (Sheet 7).
1681 ————— (Sheet 5).
2056 Strait of Sunda.
2737 India, West Coast (Viziadroog to Cochin).
2837a b Persian Gulf (on 2 Sheets).

Section 13.

- No. 16 Hiogo and Oosaka (Japan).
861 River Amur (Sheet 1).
862 ————— (Sheet 2).
932 Harbours and Anchorages on the Coast of Java.
933 Batavia Roads (Java, North Coast).
941a Eastern Archipelago (Sheet 1).
941 ————— (Sheet 2).
962 Ports in the Philippine Islands.
1262 China, from Hong Kong to Liau Tung.
1968 Formosa Island and Strait.
2409 Tai-wan, or Formosa, West Coast.
2454 Northern portion of the Island of Luzon.
2578 Eastern part of the Sulu or Mindoro Sea.
2660a China Sea, Southern portion (Sheet 1).
2660 ————— (Sheet 2).
2661a —————, Northern portion (Sheet 1).
2661 ————— (Sheet 2).
2875 Seto Uchi, or Inland Sea (Japan).

Maps, Charts, &c.

Donors.

Section 14.

- No. 752 Port Victoria (South Australia).
- 1021 Port Jackson to Port Stephens (Australia).
- 1042 Cape Stewart to Port Essington (Australia).
- 1044 Australia, North Coast (Sheet 4).
- 1057 Liverpool River (Australia, North Coast).
- 1068 Moreton Bay to Sandy Cape, do.
- 1707 Port Western (Victoria), South Australia.
- 1752 Port Adelaide (Australia, South Coast).
- 1948 Rockingham Bay to Palm Islands (Australia).
- 2119 Newcastle Harbour (New South Wales).
- 2141 Australia, East Coast (Sheet 1).
- 2389 St. Vincent and Spencer Gulfs (South Australia).

Section 15.

- No. 29 Oparo Harbour (Oparo), South Pacific.
- 90 Middleton Reef (South Pacific).
- 1252 Moala (Fiji Islands), South Pacific.
- 1380 New Caledonia and New Hebrides (South Pacific).
- 1384 Bishop Sound and Wreck Bay (Loyalty Islands).
- 2421 Tonga, or Friendly Islands (South Pacific).
- Total 116 Charts.

The Hydrographic Office, Admiralty,
through Capt. G. H. RICHARDS, R.N., Hydrographer

DANISH—

Danish Chart of the Kattegat. 1867. Scale, 1 inch = 3¼ miles
(geo.) Admiral C. IRMINGER.

FRENCH (309 in number)—

- 863 La Mer des Indes (Carte Index, No. 10).
- 963 Carte des Antilles, do. No. 18.
- 1093 Océan Pacifique, No. 2, do. No. 6.
- 1095 ———, No. 4, do. No. 8.
- 1186 Méditerranée Occidentale, do. No. 15.
- 1265 ——— Orientale, do. No. 16.
- 1437 L'Amérique Septentrionale, do. No. 17.
- 1464 L'Océan Atlantique, do. No. 2.
- 2184 Golfe du Mexique do. No. 19.
- 2182 Côte d'Egypte de Ras Alem Room à Alexandrie (Mer Méditerranée).
- 2183 Carte des Isles Tambelan (Mer de Chine).
- 2184 Carte Générale du Golfe du Mexique.
- 2185 Carte des Passages au Nord de Cuba.
- 2186 Carte de la Côte de Terre Ferme de Cumana à Santa Marta (Mer des Antilles).
- 2188 Plan de l'entrée de la Baie de Pensacola (Floride).
- 2189 Plan de la Rivière Saint Marc (Floride).
- 2190 Plan de la Port de Obock (Abyssinie).
- 2191 Carte Générale de l'Océan Pacifique (Feuille 5).
- 2192 Carte Générale de la Basse Cochinchine et du Cambodge.
- 2193 Carte de la presqu'île de l'Indo-Chine depuis le Port de Quinhon dans la Mer de Chine jusqu'à l'entrée de la Rivière de Bang-kok dans le Golfe de Siam.
- 2194 Plan du Port de New Harbour (Singapoure).
- 2195 Plan de la Rade de Singapoure (Mer de Chine).
- 2197 Baie San Moon et Port Sheipoo (Côte Orientale de la Chine).
- 2198 Port Namquam (Côte Orientale de la Chine).
- 2199 Baie et Anse Samsah, do. do.
- 2200 Port Tong Sang et Baie Hutan (Côte Orientale de la Chine).
- 2201 Angleterre (Côte Sud), de Portland à Portsmouth.

Charts, &c.

- 2203 Plan du Port de Loctudy, entrée de la Rivière de la Pont l'Abbe (Côtes Occidentales de France).
- 2204 Angleterre (Côte Sud), de Beachy Head à South Foreland.
- 2205 Carte des Côtes Occidentales d'Ecosse et de la Côte Nord d'Irlande.
- 2207 Angleterre (Côte Ouest), du Trevoze Head au Canal de Bristol.
- 2208 Côte Occidentale de l'Hindoustan et de l'Île de Ceylan de Calicut à Point des Galles, Îles Maldives (Mer des Indes).
- 2209 Sound de St. Georges, passe de l'Ouest (Côte de la Floride, Golfe du Mexique).
- 2210 Sound de St. Georges, passe du Milieu (Côte de la Floride, Golfe du Mexique).
- 2211 Plan du port et du Mouillage de Suez.
- 2212 Carte des Atterrages de San Francisco (Californie).
- 2213 Amérique Méridionale (Côte Ouest), de Lobos de Afuera à l'Équateur.
- 2214 Entrée du Rio Grande du Nord (Golfe du Mexique).
- 2215 Entrée de la Rivière des Brazos de Dios, Texas (Golfe du Mexique).
- 2216 Carte des Îles Orcades et de la Côte Nord-est d'Ecosse.
- 2217 Plan du Port de Bombay (Côte Occidentale de l'Inde).
- 2218 Angleterre, partie Sud-Ouest du Cape Lizard à Trevoze Head, Îles Scilly.
- 2219 Plan du Maroni de la Mana et d'une partie du terrain compris entre ces deux fleuves (Guyane Française).
- 2220 Détroit de Jubal (Mer Rouge), Îles et Récifs d'Ashrafi, Port de Tur.
- 2221 Port de Ting-Ha (Archipel des Chusan), Côte Orientale de la Chine.
- 2222 Plan du Fleuve Oyapock, depuis son Embouchure jusqu'à Penitenceir de St. Georges (Guyane Française).
- 2223 Carte des atterrages du Cap St. Jacques, partie compris entre la pointe Kéga et le Cap St. Jacques (Basse Cochinchine).
- 2224 Port Anglaise et Port Falmouth (Île de Antigua, Mer des Antilles).
- 2225 Angleterre (Côte Sud), de Portsmouth à Beachey Head.
- 2226 Angleterre (Côte Sud), du Cap Lizard à Start Point.
- 2227 Angleterre (Côte Sud), de Start Point à Portland.
- 2228 Cours de la Loire (Feuille No. 2) du Migron à Paimbœuf.
- 2230 Embouchure de la Loire.
- 2231 Isles Pescadores (Canal de Formose), Côte Orientale de la Chine.
- 2232 Port de Chinchew et Baie Chimmo (Côte Orientale de la Chine).
- 2233 Détroit de Hai-Tau (Côte Orientale de la Chine).
- 2234 Baie Mirs (Côte Orientale de la Chine).
- 2235 Rivière Min, depuis son embouchure jusqu'à Fu-Chau-Fu (Côte Orientale de la Chine).
- 2236 Baie d'Amoy et Baie Hoo-E-Tow, Île Quemoy (Côte Orientale de la Chine).
- 2237 Île Namoa, entrée de la Rivière Han et Port de Swatow, Baie Hope et Baie Hai Mun (Côte Orientale de la Chine).
- 2238 Port d'Amoy (Côte Orientale de la Chine).
- 2239 Atterrages et entrée de la Rivière Min, Rivière de Fu-Chau-fu (Côte Orientale de la Chine).
- 2240 Athlit, autrefois Castellum Peregrinorum, Césarée (Kaisaryeh); Jaffa, autrefois Joppé ou Japho. Position probable du Port d'Yebnah (Côte de Syrie).
- 2241 Port de Point de Galle (Île de Ceylan).
- 2242 Port de Trincomalee (Île de Ceylan).
- 2243 Carte du Bassin oriental de la Mer Méditerranée,

Accessions to the Map-Room

Charts, &c.

- 2244 Chenal Kintang (Côte Orientale de la Chine).
 2245 Archipel des Chusan (partie Sud), Côte Orientale de la Chine.
 2246 Archipel des Chusan (partie Nord), Côte Orientale de la Chine.
 2247 Baie St. André (Côte de la Floride), Golfe du Mexique.
 2248 Lagune de Terminos (entrée de Puerto Réal), Golfe du Mexique.
 2249 Côte Occidentale de Borneo, les Tambelan, et Iles environnantes (Mer de Chine).
 2250 Baie de Galveston (Texas, Golfe du Mexique), entrée de Galveston.
 2251 Carte des Côtes d'Égypte et de Tripoli entre Ras Alem Roum et Dernah, Marsa Tebruk, Port Bardiah, Akabah Es Solloum, Ishaillah.
 2252 Carte des Entrées des Golfes de Bothnie et de Finlande (Mer Baltique).
 2253 Carte des Atterrages du Cap St. Jacques, partie comprise entre le Cap Tiwan et les embouchures du Co-Khien (Basse Cochinchine).
 2254 Côte Occidentale de l'Hindoustan de Bombay à Calicut, Archipel des Laquedives (Mer des Indes).
 2255 Aden et Baies adjacentes (Côte d'Arabie), Mouillage d'Aden.
 2256 Plan de la Baie de St. Vincent (Nouvelle Calédonie).
 2257 Rivière Yung ou Rivière de Ning-Po (Côte Orientale de la Chine). Plan particulier de l'entrée de la Rivière Yung.
 2258 Rade de Revel (Golfe de Finlande).
 2259 Port Baltic ou Rager Wik (Golfe de Finlande).
 2260 Les Anambas, les Natunas, et Iles environnantes (Mer de Chine).
 2261 Détroit de Rhio (Mer de Chine).
 2262 Carte de la Mer Arabique indiquant les Vents et les Courants pendant la Mousson de S. O.
 2263 Croquis de la Rade de Hodeidah (Côte de l'Yemen, Arabie).
 2264 Baie Sitia, Baie Grandes, Kalo Limniones, autrefois Kalo Limnes (Ile de Candie, Mer Méditerranée).
 2265 Ben-Ghazi (Côte Nord d'Afrique).
 2266 Carte de la Côte de Syrie comprise entre Saint Jean d'Acre et El Arish.
 2269 Port Ayas (anciennement Aegae), Rade de Karadash (Asie Mineure).
 2270 Baie de St. Jean d'Arc (Côte de Syrie).
 2271 Baie Poro ou Baie de Passage, Port Nicolo (Ile de Candie).
 2272 Carte de la Côte de Cochinchine, comprenant le Baie de Kiquik, le Cap Batangan, et Pulo Canton (Mer de Chine).
 2273 Carte des Côtes de Prusse et de Courlande de Colberg à Libau, comprenant l'Ile Bornholm et la Côte de Suède de l'Ile Hanö à Kalmar.
 2274 Port de Sto. Domingo (Côte Ouest de Patagonie).
 2275 Plan des Culao-Cham et de l'entrée de Fai-Fo (Côte de Cochinchine, Mer de Chine).
 2276 Rivière Dvina de la Rade a la Ville de Riga (Golfe de Riga, Mer Baltique).
 2277 Carte de la Baie de Phan-Rang (Côte de Cochinchine, Mer de Chine).
 2278 Plan de la Baie de Phan-ry (Côte de Cochinchine, Mer de Chine).
 2279 Plan de la Baie d'Anapa (Mer Noire, Côte d'Asie).
 2280 Plan de l'Anse de Novorossisk, do. do.
 2281 ————— Guelendjik, do. do.
 2282 Plan de la Baie de Soukoum-Kale, do. do.
 2283 ————— Batoum, do. do.
 2284 ————— Rizo, do. do.

Charts, &c.

- 2285 Plan de la Baie de Trebizonde, (Mer Noire, Côte d'Asie).
 2286 ———— Platana, do. do.
 2287 ———— Vona, do. do.
 2288 ———— d'Ounieh, do. do.
 2289 ———— de Samsoun, do. do.
 2290 ———— Kerzé, do. do.
 2291 ———— d'Ak-Liman, do. do.
 2293 ———— d'Amastro, do. do.
 2294 ———— de Koslou, do. do.
 2295 Erekli (ancienne Heraclée), do. do.
 2296 Croquis du Plan des Affluents du Grande Bassam et d'Assinie.
 2297 Baie de San Diego (Californie).
 2298 Ports Conte et Alghero (Sardaigne).
 2299 Port Makry (anciennement Telmissus), Asie Mineure.
 2300 Carte particulière du Cours du Cambodge :—
 Feuille 6. Le Tien-Giang (Fleuve Antérieur), le Hau-Giang (Fleuve Postérieure), entre Culao Mâ, Chaudoc, et le parallèle de Ca Sep.
 2301 Carte particulière du Cours de Cambodge :—
 Feuille 7. Le Tien-Giang (Fleuve Antérieur), le Hau-Giang (Fleuve Postérieur), entre les parallèles de Cap-Sep et de Ca Leida.
 2302 Carte particulière du Cours du Cambodge :—
 Feuille 8. Le Tien-Giang (Fleuve Antérieur), le Hau-Giang (Fleuve Postérieur), entre le parallèle de Ca Leida, et Phnom-penh ou Nam-Vang. Plan particulier des Quatre Bras de Phnom-penh.
 2303. Carte de la Mer Baltique.
 2304 Portsmouth, Amérique Septentrionale (Côtes Orientales).
 2305 Fjord de Christiania (Norvège).
 2306 Golfe de Siam (1^e Feuille), Côte Orientale, de la Pointe Camau à la Pointe Samit (Mer de Chine).
 2307 Golfe de Siam (2^e Feuille), Côte Orientale, de la Pointe Samit au Cap Liant (Mer de Chine).
 2308 Golfe de Siam (3^e Feuille), Côte Nord, et Côte Occidentale de l'Île Co-Samit au Cap Lem Chong P'ra (Mer de Chine).
 2309 Golfe de Siam, Mouillage de Kamput.
 2310 ————, Rivière de Bang-Kok ou Menam-Chau-Phya, depuis la Barre jusques à Bang-Kok (Mer de Chine).
 2311 Golfe de Siam, Plans particulier de Centabum, Poulo-Way ou Co-Kwang-Noi.
 2312 Port Saint-Thomas (Îles Vierges), Mer des Antilles.
 2313 Carte des Côtes Méridionales de Portugal et d'Espagne du Cap St. Vincent à Gibraltar.
 2314 Côte Occidentale de l'Hindoustan de Goa à l'Indus (Mer des Indes).
 2315 Côte de l'Inde et du Belouchistan, des Bouches de l'Indus à Ras-el-Hadd (Arabie).
 2316 Mer Adriatique (Côte Orientale), de l'Île Meleda à Antavari.
 2317 Canal de l'Arsa (Golfe de Quarnero), Mer Adriatique.
 2318 Ancône (Italie), Mer Adriatique.
 2319 Port de Swatow (entrée de la Rivière Han), Côte Orientale de la Chine.
 2320 Baie de Comau ou Leteu (Côte Ouest de Patagonie).
 2321 Baie de Tictoc, do. do.
 2322 Baie de Reloncavi, do. do.
 2323 Port Papudo, Baies Horcon et Quintero (Chili).
 2324 Baie Coliumo, entrée de la Rivière Maule (Chili).
 2325 Port San Pedro (Île de Chiloe), Anse Sheep, Petit Anse (Île Huafo), Chili.

Charts, &c.

- 2326 Baie Pichidanque, Baie Tortoralillo, Anse Maytencillo, Rade Ligua (Chili).
- 2327 Rivière de Moulmein (Golfe de Martaban), Golfe du Bengale, Côte Orientale.
- 2328 Rivière de Rangoon (Golfe de Martaban), Golfe du Bengale, Côte Orientale.
- 2329 Rivière de Canton ou Chou-Kiang (1^{re} Feuille), de l'Île Lankeet à l'Île Pottinger (Chine).
- 2330 Rivière de Canton ou Chou-Kiang (2^{me} Feuille), de l'Île Pottinger à Canton (Chine).
- 2331 Croquis de l'entrée du Mouillage de Doboy, Amérique du Nord (Côte Est).
- 2332 Croquis du Mouillage de Tadjourah (Côte d'Abyssinie).
- 2333 Rivière Bassein (Golfe du Bengale, Côte Orientale), Mer des Indes.
- 2334 Plan de Pertuis de Maumusson, comprenant la Suedre et le Château (Côte Ouest de France).
- 2335 Côte Orientale de la Chine, partie comprise entre les Îles Tai-Chow et l'Île Tung Ying.
- 2336 Côte Orientale de la Chine, partie comprise entre l'Île Tung Ying et les Îles Ockseu.
- 2337 Port de Rockport (Massachusetts), Amérique Septentrionale.
- 2338 Plan des Rades de Hampton et de la Rivière Elisabeth jusqu'à Norfolk (Virginie), Amérique du Nord.
- 2339 Rivière d'Aracan, Golfe du Bengale (Côte Orientale), Mer des Indes.
- 2340 Port de Gloucester (Côte Est de l'Amérique du Nord).
- 2341 Plan du Port de la Rade de Tuticorin (Golfe de Manar), Mer des Indes.
- 2342 Carte du Golfe de Bothnie (Partie Nord).
- 2343 ————— (Partie Sud).
- 2344 Rade et Port de Kastelorizo, Rade de Kakava et entrée de Port Tristomos, entrée S. O. de la Rade de Kakava, Croquis du Port Genovese, Plan de Tekrova (ancien Phaselis), Côtes de Caramanie, Mer Méditerranée.
- 2345 Esky-Adalia (ancien Sidé), Croquis du Port Melania, Croquis du Port Chelindreh (ancien Celinderis), Île et Port Cavalière, Agha-Liman, Korghos Kalaler (Château de Korghos, Côtes de Caramanie), Mer Méditerranée.
- 2346 Côte d'Italie, de la Pte. Mezzalina à Rimini (Mer Adriatique).
- 2347 Baie Anna Pink (Archipel Chonos), Côte Ouest de Patagonie.
- 2348 Baie de St. André (Côte Ouest de Patagonie).
- 2349 Port Low (Îles Guatecas), Côte Ouest de Patagonie.
- 2350 Rade de Vallenar (Archipel Chonos), Côte Ouest de Patagonie.
- 2351 Crique de Piti Palena (Côte Ouest de Patagonie).
- 2352 Mer Adriatique (Côte Orientale), du Port Quieto à l'Île Asinello (Golfe de Quarnero).
- 2353 Carte de l'Île Gottland et du Golfe de Riga (Mer Baltique).
- 2354 Ports de Ipswich et Annisquam (Massachusetts) (Côte Est de l'Amérique du Nord).
- 2355 Croquis du Mouillage de la Extrémité Nord-Est du Gubet Kareb (Golfe d'Aden).
- 2356 Croquis de Mouillage S.S.E. de Table Cliff (Côte d'Abyssinie), Détroit de Babel Mandeb.
- 2357 Havre de Cork (Irlande, Côte Sud).
- 2358 Carte des Côtes Méridionales de France, partie comprise entre le Cap de Creux et Cette.
- 2359 Rivière Mutlah (Golfe du Bengale, Côte Septentrionale), Mer des Indes.
- 2360 Plan du Port Saigon (Cochinchine).

Charts, &c.

- 2362 Côte Orientale de la Chine, partie comprise entre les Iles Saddle et les Iles Taichow.
- 2364 Côte Orientale de la Chine, Embouchure du Yang-tze-Kiang et Iles Saddle.
- 2365 Côte Orientale de la Chine, partie comprise entre les Iles Lamock et Hong-Kong.
- 2366 Côtes de Golconde et de Coromandel, partie comprise entre la Baie Coringah et Madras (Golfe du Bengale).
- 2367 Carte de la Mer du Nord et des Côtes des Iles Britanniques.
- 2368 Irlande (Côte Sud-ouest) du Cap Clear à Blasket Island.
- 2369 Côte de Coromandel, partie comprise entre Madras et la Pointe Calimere (Golfe du Bengale).
- 2371 Carte de la Côte Orientale de Suède, de Carlskrona à Stockholm (Mer Baltique).
- 2372 Ile de Ceylan (Partie Sud), Mer des Indes.
- 2373 Ile de Ceylan (Partie Nord), Détroit de Palk et Golfe de Manaar (Mer des Indes).
- 2374 Côte d'Oriza et de Golconde, partie comprise entre les Roches Santipilly et la Pointe Divy (Golfe du Bengale).
- 2375 Carte du Cap Henry au Port Great Egg (1^{ère} Feuille, Entrée de la Baie Chesapeake), Côtes Orientales de l'Amérique Septentrionale.
- 2376 Carte du Cap Henry au port Great Egg (2^{ème} Feuille, Cours supérieur de la Chesapeake et Delaware), Côtes Orientales de l'Amérique Septentrionale.
- 2377 Bassin d'Arcachon (Côte de France).
- 2378 Ile de Wight, Portsmouth et Southampton (chenal de l'est) Angleterre, Côte Méridionale.
- 2379 Ile de Wight, Portsmouth et Southampton (chenal de l'ouest) Angleterre, Côte Méridionale.
- 2380 Port de Smyrne (Mer Méditerranée).
- 2381 Plan de l'entrée de la Vilaine (Côte de France).
- 2384 Carte des Approches de la Rivière Derwent conduisant à Hobartown (Tasmanie).
- 2385 Baies de la Trinité et de la Conception (Terre Neuve).
- 2386 Plan des Sondes devant la Rivière de Cayenne.
- 2387 Mer Adriatique (Côte Orientale), d'Antivari à la Rivière Vojuza.
- 2388 ————— (Côte d'Italie), de Rimini à la Pte. de la Maestra.
- 2389 Port Cherso, Porto Re, Canal de Maltempo, Baie d'Unie, Port S. Pietro di Nembo (Mer Adriatique).
- 2390 Canal et Détroit de Morter (Mer Adriatique).
- 2391 Détroit de Spalatro, do. do.
- 2392 Canal de Lesina, do. do.
- 2393 Port San Giorgio, Ile Lissa, do. do.
- 2394 Grande Baie, Ile Curzola, do. do.
- 2395 Canal de Curzola, do. do.
- 2396 Ports Lago et Rosso, Ile Lagosta, do.
- 2397 Port Palazzo, Ile Meleda, do.
- 2398 Ports de Molonta, Côte de Dalmatie, do.
- 2399 Baie d'Antivari, Côte d'Albanie, do.
- 2400 Dulcigno, Côte d'Albanie, do.
- 2401 Baie de Durazzo, Côte d'Albanie, do.
- 2402 Baie d'Aulona, Côte d'Albanie, do.
- 2403 Baie Simidsu, Ile de Nipon, Côte Sud (Japon).
- 2404 Ports de Urakami et Oū-sima, Ile de Nipon, Côte Sud (Japon).
- 2405 Port Blair, ancien Port Chattam (Ile Andaman).
- 2406 Carte des Détroits de Singapour, Durian, Jombol et Rhio (Mer de Chine).
- 2407 Port de Carrisal, Baie Chañeral, Herradura de Carrisal (Côte du Chili).

Charts, &c.

- 2408 Baie Lavata, Mouillage du Pain de Sacre, Port Flamengo, Port de Copiapo (Côte du Chili).
- 2409 Mer Adriatique, Côte Orientale de l'Île Asinello à Port Peles.
- 2410 Rade de Dunes (Angleterre, Côte Sud-est).
- 2411 Port d'Hobartown, Rivière Derwent (Tasmanie).
- 2412 Port de Portland (Maine), États Unis.
- 2413 Vues des Côtes de l'Amérique Méridionale (Pérou), de la Baie de Pisco à l'Equateur.
- 2414 Baie Vendeloos, Rade Batticaloa (Île de Ceylan), Mer des Indes.
- 2415 Baie Dodandowe, Port de Colombo (Île de Ceylan), Mer des Indes.
- 2416 Plan de l'entrée de la Rivière Rio Grande do Norte (Brésil).
- 2417 Plan de la Barre d'Amaracao (Barra-Velha d'Iguarçu), Bouche Orientale du Rio Paranahyba (Brésil).
- 2418 Carte particulière des Côtes du Brésil, partie comprise entre l'Île Santa Anna et la Barra Velha d'Iguarçu.
- 2419 Atterages de Maranhao (Côte du Brésil).
- 2420 Plan de l'Estuaire formé par le Don-nai entre le bras de Saïgon et le Soïrap Cochinchine.
- 2421 Carte des services à vapeur sur les Côtes d'Europe baignées par l'Océan Atlantique, la Mer du Nord et la Mer Baltique.
- 2422 Carte des services à vapeur dans la Méditerranée, la Mer Noire et la Mer d'Azof.
- 2423 Carte des services à vapeur dans l'Océan Atlantique.
- 2424 Carte des services à vapeur dans la Mer des Indes et la Grand Océan.
- 2425 Plan du Port de Santos (Brésil).
- 2426 Plan du Mouillage de Busios (Brésil).
- 2427 Irlande, Côte Sud, de Kinsale Head à Carnsore Point.
- 2428 Carte particulière du Cours du Cambodge (Feuille 2). Le Tien Giang (Fleuve antérieur) et Song Mitho (bras du Mitho entre le Rach Cahon et Culaï Lao).
- 2429 Carte particulière du Cours du Cambodge (Feuille 3). Le Tien Giang (Fleuve antérieur) entre Culaï Lao, le bras de Mytho et la pointe sud de Culaï Tchoum.
- 2430 Carte particulière du Cours du Cambodge (Feuille 4). Le Tien Giang (Fleuve antérieur) entre Culaï-Mundao et la pointe sud de Culaï Tay.
- 2431 Carte particulière du Cours du Cambodge (Feuille 5). Le Tien-Giang (Fleuve antérieur et le Hau Giang (Fleuve postérieur), entre la pointe Sud de Culaï-Tay le Viam-nao, Culaï Ma et Chaudoc.
- 2432 Port de San Carlos de Ancud et Détroit de Chacao (Chili), Amérique du Sud.
- 2433 Carte des Îles Nicobar (Golfe du Bengale).
- 2435 Irlande (Côte Sud) du Cap Clear à Youghal Harbour, comprenant le Hâvre de Cork.
- 2436 Détroit de Cheduba, Rade et Port de Ramree (Golfe du Bengale).
- 2437 Plan du Mouillage de Cambriu (Brésil).
- 2438 Baie Independencia (Pérou), Amérique du Sud.
- 2439 Ports de San Nicolas et San Juan, Rade de Lomas (Pérou), Amérique du Sud.
- 2440 Plan du Mouillage des Îles du Salut (Guyane Française).
- 2441 Baie Casma, Baie Guarmey (Pérou), Amérique du Sud.
- 2442 Baie de Samanco ou Guambacho, Baie Ferrol (Pérou), Amérique du Sud.
- 2443 Baie de Santa, Rade de Malabriga, Rade de Lambayeque, Rade de Pacasmayo, Rade de Huanchaco (Pérou), Amérique du Sud.
- 2444 Île des Princes (Mer de Marmara).

Maps, Charts, &c.

- 2445 Port de Falmouth (Angleterre, Côte Sud).
 2447 Carte d'Atterage des Côtes Occidentales de France, comprenant les Côtes Sud-ouest d'Angleterre et d'Irlande et les Côtes Nord et Ouest d'Espagne.
 2448 Rade de Kirinde, Baie Belligam ou Baie Rouge (Ile de Ceylan), Mer des Indes.
 2450 Plan de la Baie de Kiel (Denmark).
 2451 Plan du Port et de l'Entrée de Neustadt (Denmark).
 2452 Port de Kyouk-Phyou (Côte d'Aracan), Golfe de Bengale.
 2453 Iles Cocos ou Keeling (Mer des Indes).
 2454 Carte du Passage Javi-Javi et des Iles Baniak (Côte Ouest de Sumatra).
 2455 Baie de Pooloo, Rade de Bencoolen (Côte Ouest de Sumatra).
 2456 Cap Rivers ou des Courants (Célèbes).
 2457 Plan du Port d'Aratu (Baie de Todos os Santos), (Brésil).
 2458 Entrée du Port de Maranhão (Côte de Brésil).
 2460 Royaume de Cambodge ou de Khmer (1^{re} Feuille) le Tien-Giang (Fleuve antérieur) et le Han Giang (Fleuve postérieur), de Nam-Vang à Vam-Nao, le Canal de Vinh-The ou d'Hatien, de Chaudoc au Golfe de Siam.
 2461 Royaume de Cambodge ou de Khmer (2^{me} Feuille), le Cambodge (Fleuve) de Phnom-Penh ou Nam-Vang aux Rapides de Sam-bor, le Tonly-Sap ou Song-di-bien-ho (bras du Lac de Phnom-Penh) au Camnan-Tien (Petit Lac).
 2462 Royaume de Cambodge ou de Khmer (3^{me} Feuille), les Lacs et le Tonly-Sap ou Song-di-bien-ho (bras du Lac), l'arroyo d'Angcor à l'arroyo de Bathom-Bang.
 2463 Madère, Porto Santo, Isles Désertes (Océan Atlantique).
 2464 Cours de l'Elbe (1^{re} Feuille), partie comprise entre Cuxhaven et Glückstadt (Mer du Nord).
 2465 Cours de l'Elbe (2^{me} Feuille), partie comprise entre Glückstadt et Hambourg (Mer du Nord).
 2466 Carte des Bouches du Gange (partie orientale), Rivière Megna, Côtes d'Aracan et de Chittagong (Golfe du Bengale).
 2467 Plan du Mouillage et de l'Entrée de la Rivière de Tutoia (Province de Maranhao, Brésil).
 2468 Carte du Golfe de Finlande (Mer Baltique).
 2470 Port de la Caye de l'Ouest et ses Environs (Recifs de la Floride), Côte Est de l'Amérique Septentrionale.
 2471 Carte de la Côte de Cochinchine, partie comprise entre le Cap Padaran et la Pointe Kega.
 2473 Baie de Mobile (Golfe du Mexique), Côte Orientale de l'Amérique Septentrionale.
 2474 Carte des Côtes Meridionales de France, partie comprise entre Cette et Marseille.
 2475)
 to) Carte générale de la Basse Cochinchine et du Cambodge.
 2478)
 2479 Carte de l'Entrée Sud du Canal Ste. Catherine, depuis l'Iilha do Coral jusqu'à N^o S^o do Desterro (Brésil).
 2480 Embouchure de l'Elbe (Mer du Nord).
 2481 Baie de Segoro-Wedie (Côte Sud de Java).
 2482 Baie Zand (Côte Sud de Java).
 2483 Baie Winkoups (Côte Sud de Java).
 2484 Baie de Paré-Paré, Baie de Melassor, Rade de Balanipa (Célèbes).
 2485 Baie Mamoudja, Rade de Palos, Rade Dangola, Rade de Mem-bora, Baie de Wani, Baie de Negri-Barou (Célèbes).

Maps, Charts, &c.

Donors.

- 2486 Rade de Madiena, Rade de Penamboung, Baie de Tynrana, Rades de Tapalling et Kait (Célebes).
 2500 Baie de Sanca Poura (Ile Bavian ou Lubeck), Mer de Java.
 2501 Plan du Port de Calcombyan, Iles et Détroit de Lagoondy, Plan de Radja-Bassa, Carte des Iles Zutphen (Hounds ou Hog), Côte Sud de Sumatra.
 2502 Baie Taliwang, Baie de Sumbawa, Baie Sapie, Baie Bima (Sumbawa), Rade de Potta, Baies Terang et Barrie (Flores).
 2503 Canal Crocotoa, Baie de Poulo Merak, Baie Peper (Côte Ouest de Java).
 2504 Mouillage de Labouan Amok et Anse Padang, Baies de Bali-Badong et Pante Timor (Côte Sud-ouest de Bali).
 2505 Rade de Simenajou (Ile Poggy du Nord), Baie de Se-Labba (Ile de Si-Pora), Détroit de Se-Cockup ou Sikakap (Iles Poggy), Iles à la Côte Ouest de Sumatra.
 2506 Rivière de Tjitando depuis l'Embouchure jusqu'à Kalie Pontjang, Entree de Tjitando, Chenal entre la Baie Tjilatjap et la Rivière Tjitando (au nord de l'Ile Kam bangan), Baie de Pangoul, Baie de Patjitan, (Côte Sud de Java).
 2507 Rade de Macassar (Côte Ouest de Célebes).
 2508 Rade de Tjilatjap (Côte Sud de Java).
 2509 Entrée de la Rivière Benjermassim, Détroit de Poulo-Laut (Bornéo).
 2510 Rivière Mahakkan ou Koutie (Bornéo).
 2511 Carte particulière du Cours du Cambodge (Feuille 1), le Tien-Giang (Fleuve antérieur), Song Mitho (Basse Cochinchine et Cambodge).
 2516 Baie de Nangamessie (Ile de Sandal-wood), Port Cyrus (Ile de Rotti), Port de Poura-Poura (Ile de Kisser), Baie de Delhi, Baie de Koupang (Ile de Timor).

DÉPÔT DE LA MARINE, PARIS.

MISCELLANEOUS.

- A pictorial Atlas of the Victoria Falls, Zambesi River. Sketched on the spot by T. Baines, F.R.G.S. Containing 11 chromo-lithographed Engravings.
 Also 44 Photographs of Scenery in South Africa .. T. BAINES, Esq.
 View of Magdala (from the East). From a copy furnished by Dr. A. Petermann from an original Sketch by Th. von Heuglin. Lithographed at the Topographical Depot, War Office. London, 1868.
 2 copies TOPOGRAPHICAL DEPOT, WAR OFFICE, through Sir H. James, B.E., Director
 View of Herald Island discovered by H.M.S. *Herald*, 17th August, 1849.
 Three sketches of ditto ditto
 View of High Land seen from the vicinity of "Herald Island," 17th August, 1849, supposed to be a continuation of the Mountains seen by the natives of "Jakan" Admiral R. COLLINSON, C.B.
 Sixteen Views in South Australia, viz. :-
 1. Lake Müller, looking East.
 2. Peculiar formation of Quartz Reefs, Kingston Range.
 3. Natives frightened near Mount Kingston.
 4. Lake Eyre from Hermit Hill, looking N.E.
 5. Freeling Springs at the foot of Mount Kingston.
 6. Native Mia Mia or Hut.
 7. Davenport Range, from the highest point of Younghusband Range.
 8. The Springs of Hope.

Maps, Charts, &c.

Donors.

9. Jersey Springs and Beresford Hill.
10. Elizabeth Springs, looking North.
11. Water-hole 3 miles N.E. of the Elizabeth.
12. The Neales, looking East.
13. Sandstone and Gypsum Formation between Chambers Creek and Mount Hamilton.
14. Collura Springs, looking North.
15. The Hermit Hill, looking West.
16. Desolation Camp, looking West.

Sketched from nature by D. D. Herrgott. Drawn by N. Chevalier.

A bark canoe from Tierra del Fuego. Length $8\frac{1}{2}$ feet, breadth 2 feet, depth 15 inches; with 3 paddles, 2 fishing spears, 2 baling buckets, and 1 fish basket WILLIAM ROBINSON, Esq.
Governor of the Falkland Islands.

Index-Map of the Cartographical Plates contained in the Journals of the Royal Geographical Society of London. Vols. I. to XX., or 1831 to 1850. By Bruno Hassenstein. Berlin, 1867.

Index-Map of the Plates contained in the Journals of the Royal Geographical Society of London. Vols. XXI. to XXXVI., or 1851 to 1866. By Bruno Hassenstein. Berlin, 1867 .. The AUTHOR.

Gang der mittleren täglichen Temperatur von December 1863 bis November 1865 (Switzerland). ∴

Mittlere tägliche Barometerstände und Temperaturen. April and May, 1867 (Switzerland) Prof. J. M. ZIEGLER.

INSTRUMENTS LENT 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, "
Rain Gauge.

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.

The late 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.

H. WHITELY, Esq., in South Peru, March 23, 1867.—

Pocket Aneroid, No. 89, graduated to 15 inches, by Cary.
Hypsometrical Apparatus, and 3 Boiling-point Thermometers, by Casella.

Rev. F. W. HOLLAND, Sidai, June 25, 1867—

Prismatic Compass and Stand, by Cary.
Pocket Aneroid, graduated to 15 inches, "
Hypsometrical Apparatus, and 3 Thermometers, B.P.
Two Thermometers, divided to 230° for hot springs.
Three Alpine minimum Thermometers.

PRESENTATION
OF THE
ROYAL AWARDS.

(*At the Anniversary Meeting, May 25, 1868.*)

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THE Founder's Gold Medal is awarded to Dr. AUGUSTUS PETERMANN, for his important services as a Writer and Cartographer in advancing our Science, and for his well-known publication the 'Geographische Mittheilungen,' which for twelve years has greatly aided the progress of Geography. The Patron's Gold Medal to M. GERHARD ROHLFS, for his extensive travels in the interior of Northern Africa, and especially for the great journey in which he traversed the continent from Tripoli to Lagos in the Gulf of Guinea.

In presenting the Founder's Medal to Dr. Petermann, the PRESIDENT addressed him in the following words:—

“DR. PETERMANN,—

“The terms of the award of a gold medal, as approved by the Council, express in brief outline your deserts as a geographer. I need scarcely say that in this decision I heartily concur. The spirit and ability with which you have so successfully conducted for the last twelve years the publication of the 'Mittheilungen' have called forth our entire approbation, and have aided the diffusion of a taste for scientific geography throughout all civilised countries. For, whilst popularising the science by the continuous issue of clear explanatory maps and highly interesting memoirs, you have striven to give it a wider scope, by connecting it with various collateral branches of knowledge, thus rendering it a grand and comprehensive study.

“The zeal you have displayed in promoting the researches of travellers in distant lands, and the hearty manner in which you have appealed to the public for aid to enable them to carry out their plans, are well known to every reader of the 'Mittheilungen.' In proof of this commendable feature in your career, I may especially advert to your fostering care of Gerhard Rohlfs, your brother Medallist of this day, and your advocacy of the claims of Carl Mauch, on whose adventurous travels in Southern Africa I

am about to dwell in my Address. The accuracy with which you so rapidly brought out the results of the recent British explorations in Abyssinia have been highly appreciated by us.

“I must also specially advert to the steady enthusiasm with which you have laboured in the cause of North Polar exploration, until at length you have succeeded in exciting the maritime enterprise of your countrymen in this direction, and have, at your own risk and with your small means, actually raised a sum sufficient to send a Norwegian yacht to the North-east coast of Greenland. Your long-continued studies of Arctic and Antarctic Geography,—including highly instructive maps, representing the comparative amount of exploration towards either Pole, and the physical conditions which determine the currents and temperature of high latitudes, as bearing upon the routes to be followed in attempting to reach the North Pole,—I may truly say, give you another strong claim to our acknowledgment.

“For these substantial reasons, I welcome you once more back to England, and have the sincerest pleasure in presenting you with the Founder's Medal.”

Again addressing Dr. Petermann, the recipient of the Patron's Medal on behalf of M. Gerhard Rohlfs, the PRESIDENT thus spoke:—

“In awarding the Patron's Gold Medal to your intrepid countryman M. Gerhard Rohlfs, of Bremen, the Council and myself have been moved by the self-sacrifice and disinterestedness with which this young traveller applied himself to his task, as well as by the extent and importance of the journeys he has accomplished. Commencing in 1861, Gerhard Rohlfs continued for five years exploring the northern part of the African continent. His journeys in Morocco in 1863-4 are the most important that any European has performed, and, in crossing the Atlas southward to the oases of Tuat and Tidikelt, he reached a point farther than was attained by any of the French explorers. On returning *via* Ghadames and Tripoli, he made a short visit to Germany, and went back to Africa with the noble purpose of penetrating to Waday, to recover the lost papers of his unfortunate predecessor in bold adventure, Dr. Vogel. Entering at Tripoli he reached Kúka, on the shores of Lake Chád; whence, prevented by the Sultan of Waday from entering his territory, he pushed southwards, and, reaching the Benuwe River at its upper course, followed it to the Niger, and travelled onward by land across the Yoriba country to Lagos in the Gulf of Guinea. All these great

undertakings were performed with means so slender as to excite admiration of the hardihood of the man who could undergo so much privation in the cause of science. In his great Morocco journey he travelled for eighteen months at a cost of 80*l.* Fortunately his patriotism and love of science carried him forward, and on his last expedition he was assisted by subscriptions raised in his native town of Bremen and in Berlin, as well as by a contribution of 100*l.* granted by our Society. Since his return the King of Prussia has acceded to his request, to send to the Sultan of Bornu, who protected the traveller whilst in the region of Lake Chád, a royal present, consisting of a new throne, a state-carriage, and a gold watch.

“At the close of our last session, Gerhard Rohlfs visited England on his return from Africa, with his faithful Moorish attendant, and delighted us by his lively description of the wild countries he had traversed, and the difficulties he had surmounted. The scientific results of his journeys have been elaborated by yourself, and published by you, together with the narrative of his travels.

“A traveller so courageous and devoted has well earned this mark of our approval; and it is with pride and pleasure that I deliver to you, who have been his best supporter, the Patron's or Victoria Medal, to be placed in his hands.”

Dr. Petermann, having received both medals, replied as follows:—

“Sir,—I receive these Medals with the deepest gratitude. There can be no higher reward to a devoted servant in Geographical Science, no better stimulus to further efforts, than this distinguished mark of approbation of the leading Geographical Society of the world.

“That I have come here to receive these Medals at your own hands, is a living proof how highly I value your approbation and kindness.

“I consider, Sir, that I have done no more than my duty, in endeavouring to add my mite to the stock of geographical knowledge. As, nevertheless, you have done me the great honour to bestow on me your award, I must confess that I owe it in great part to yourself and the Society. For, when I first came to England, 23 years ago, I experienced such kindness among my brother Geographers in this country, that I shall never forget it to the end of my life. And when afterwards, 14 years ago, I followed a call to my own country, I tried to second your noble efforts, and to labour along with you as well as I could. In these endeavours I have at all times been most kindly and liberally assisted by yourself and many British geographers and British authorities all over the world, while I have found in the enterprising geographical

establishment of Justus Perthes a suitable sphere of activity, and in my assistant and friend, Dr. Ernest Behm, a hearty co-operator in everything that tends to advance geographical knowledge. Ours is a laborious and tedious work; and, whilst you English are pre-eminently discovering and exploring in all quarters of the globe, we Germans chiefly try to make ourselves useful in the study at home, assisting to digest the information obtained.

"I accept with sincere pleasure the second Medal for my friend Gerhard Rohlfs, an honest and persevering traveller, who, kindly assisted by your Society, has done some good work.

"In his name and my own I offer you, Sir, the Council, and the Members of this great Society, our sincerest thanks. At the same time I cannot but consider it as a national honour; and I am sure that millions of my countrymen will read with pleasure the kind words you have spoken on this occasion.

"To receive these high rewards is a new proof that Science is not bounded by the limits of nations; but that its cultivators all over the world are one united brotherhood. Geography is the most universal of human inquiries. They cannot make war, they cannot make peace without Geographers. They cannot build a railway or lay out a ship's track without maps or surveys, or have trade and commerce without geography; our explorers must find out the gold-fields of the world; and not even a holiday-tour to Switzerland, or elsewhere, can be fully enjoyed without a good map. In fact, Geography is a great pioneer of culture and progress; and, moreover, the privations, hardships, and trials our travellers and explorers have to undergo, are an excellent school for bringing out the good qualities and forming fine characters.

"Having had the honour to be a Member of the Royal Geographical Society for a quarter of a century, I have witnessed with great gratification and admiration its rise, its present eminent position, its prospering condition, and extensive influence; and, while it is a great happiness for me to be once more among you, my hope and great wish is that the Society will advance and become more prosperous than ever."

A Gold Watch, value thirty guineas, awarded to the Pundit employed by Captain Montgomerie, for his route-survey from Manasarowar to Lhasa in Great Thibet, was next presented to Lord Strangford on behalf of the Pundit, now in India.

In presenting the watch, the President spoke as follows:—

"MY LORD,

"I have sincere gratification in placing in your hands this handsome gold watch, which the Council have awarded to that skilful Pundit whose remarkable travels in Thibet will shortly be published in our Journal. In requesting you, at the commencement of this day's proceedings, to receive this reward on behalf of the Pundit,



your Lordship stated that Sir Henry Rawlinson was the most fitting person to perform this office, from having proposed the award in Council; but whether preference should be given to your Lordship, to Sir Henry Rawlinson, or to Sir Andrew Scott Waugh, who was so long Director of the Great Trigonometrical Survey, I am sure you will, as a scholar and geographer, deeply versed in Asiatic subjects, willingly respond on behalf of the Pundit, and unite with us all in saying that there never was a gift more worthily obtained. I need not recapitulate all that the Pundit has done. He has laid down, in travelling from Nepal to Lhasa, and along the great Thibetan road to Lake Manasarowar, a route-survey of 1200 miles of country previously scientifically unexplored, and has taken, besides, a measurement of the city of Lhasa. The details of his journey have been communicated to the Society, in the admirable report of Captain Montgomerie, to whom I beg you will convey our feelings of warm approbation of the skill and energy with which he is instructing these native explorers, and fitting them for important geographical discoveries."

Lord STRANGFORD replied :—

"Mr. PRESIDENT,—You take me a little by surprise in naming me as the deputy of the remarkable Pundit who is to receive this award of the Royal Geographical Society. The rightful sponsor of the Pundit is our still more learned Pundit Sir Henry Rawlinson, on whose suggestion the award was made. But as you have done me the honour to choose me to speak vicariously, I need only say that I acknowledge with gratitude on his behalf the very high honour which you have done him. And in this I see a recognition not only of his services, but also, through him, of the common brotherhood and common intellectual capacity of natives of India with ourselves to share in our scientific honours. I am certain that the award will be duly appreciated at the present time, when the native public of India is being thoroughly educated to express its own wants and its own sentiments through the public press. It will resound through the length and the breadth of the land to the honour of the Society. I cannot leave the subject without speaking in my own person in appreciation of the Pundit's merits, as shown in his great geographical achievement. It is not only that he, a native of the plains, has emulated the Alpine Club, by climbing to a height of 15,000 feet, and showing wonderful endurance of Alpine hardships in journeying for two or three months along a plateau at this height, but also that he has shown extraordinary tact, a wonderful power of conciliation and knowledge of human nature, in overcoming so many political difficulties when accomplishing this really remarkable task. Captain Montgomerie conveys an adequate idea of the man and his work, by saying

how much he wishes the President and the Society could get a sight of this man, who has the power of making friends with every one he sees. He had shown himself a conscientious Geographer in taking such continual observations, which had been tested and verified by Captain Montgomerie himself, and in short he had proved himself in every way worthy of Captain Montgomerie's selection."

Mr. Le Neve Foster, Secretary of the Society of Arts, then presented to the President Mr. William John Wilson, as the successful Candidate of the present year for the Royal Geographical Society's Prize of Five Pounds, in the Examinations conducted by the Society of Arts. In delivering the amount to Mr. Wilson, the President congratulated him on having being the first recipient of the Prize who had been publicly rewarded and honoured at the Anniversary Meeting of the Society.

# A D D R E S S

TO

## THE ROYAL GEOGRAPHICAL SOCIETY.

*Delivered at the Anniversary Meeting on the 25th May, 1868.*

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

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GENTLEMEN,

The tide of prosperity, which for some years has marked the progress of the Royal Geographical Society, continues, I am happy to say, to flow on without symptoms of an ebb. Rejoicing as I do in our popularity and usefulness, it becomes me now to state, that I have seen with regret the great difficulties which have occurred in affording sitting room to our greatly-augmented numbers, and the visitors who are introduced to our meetings. Complaints having proceeded from many of our old Associates as to the impossibility of finding places for themselves, the Council were under the necessity of devising a remedy, and the following arrangement has been made:—The large central portion of the hall will henceforward be exclusively occupied by Fellows, the sides only being set apart for ladies and visitors.

Though this plan is as good as present circumstances will admit, it is merely temporary; for the wings of Burlington House, in one of which we have been permitted to assemble, through the courtesy of the Royal Society and the University of London, are ere long to be pulled down; and when the new rooms of the Royal Society are built, no one of them will be large enough to receive the audiences that attend our meetings. Now, as under any circumstance we shall be compelled to raise a great edifice for ourselves, I have the pleasure to announce, that, ever mindful of the coming necessity, the Council have applied to the Chief Commissioner of Woods and

Forests, and obtained a promise that we shall be considered, on the allotment of the ground about to be cleared between Whitehall and the Thames. I trust that an advantageous site may be ceded to us, as the public body which, for the small sum of 500*l.* per annum granted to us by Parliament, keeps up for the use and consultation of the public a well-furnished Map Office.

I may add that it is my hope that when, through the demolition of the building in which we are now assembled, we shall be obliged to seek for a temporary asylum whilst a large edifice is being raised out of our own funds, we may, upon application, be allowed to meet *ad interim* in the grand new hall of the University of London, now nearly finished, the Council of which body, in conjunction with the Royal Society, has hitherto treated us with so much consideration.

In the following review of the affairs of the Society, and the progress of Geography, during the past year, I commence, as on previous occasions, with a notice of the career of the distinguished men lost to us by death, since the last anniversary.

#### OBITUARY.

Mr. WILLIAM JOHN HAMILTON.—By the decease of our former excellent President, Mr. W. J. Hamilton, Geography has lost an enlightened and zealous supporter, whilst I have to grieve for one of my best and most attached friends. Born in London (5th July, 1805), his education was commenced at the Charter House, and completed at Göttingen, where he acquired that facility in German which was of great use to him in his subsequent career.

His first pursuit in public life was diplomacy. He was attached to the mission at Madrid in 1827, in 1829 was removed to Paris as an Attaché to the Embassy, and subsequently became Précis Writer at the Foreign Office, under the Earl of Aberdeen. In this commencement of an active life, he very naturally followed the steps of his eminent father, Mr. W. Hamilton, so long distinguished as a diplomatist, and not less so for his learning and that love of fine art which rendered him in his latter days one of the most efficient of the Trustees of the British Museum. On our part, also, we must never forget that Mr. Hamilton, senior, was the first of our Presidents who delivered one of these Anniversary Addresses, which, since his time, have formed an integral and essential part of the volumes of our Journal. As soon as the father perceived that his son had

reached an age when his talents required to be directed to a special pursuit in Science, to be combined with Art, and which would elicit all his energy, he requested me to attract William's attention to Geology. In this way I had not only the satisfaction of giving my friend his first lessons on geology in the field (anno 1835), but also of making him known to the accomplished naturalist, the late Hugh Strickland; and soon after was formed the scientific and antiquarian project of these two fine young men, who embarked together with the noble intention of investigating the Bosphorus and Asia Minor. The son was thus enabled to gratify the wish of his parent in working out the comparative geography of these regions, whilst with his companion he was sure to unravel many phenomena in Natural History.

As respects Turkey in Europe, Hamilton and Strickland speedily threw a new light on the geological structure of the environs of Constantinople; but their friendly partnership was soon dissolved, for Mr. Strickland was compelled to return home on family affairs.

Left to himself, Mr. W. Hamilton carried out and completed that survey of Asia Minor, which, being published in 1842, justly obtained for him a high position among travellers, and elicited the warmest commendation of Baron A. von Humboldt. No one indeed can peruse these volumes, or examine the map which accompanies them, without being struck with the varied qualifications which our deceased associate brought to bear, in illustrating the geography, both physical and comparative, as well as the geology of this remarkable region. More recently, indeed, our Honorary Member, M. Pierre Tchihatchef, after several excursions in Asia Minor, has produced a more complete map, particularly as regards geology; but still, I am sure that my eloquent Russian friend will unite with me in admiring the previous efforts of Hamilton. In fact, the minute notice of every mile on his route, as noted in his Itinerary, the exact time of departure and arrival, the constant observation of each turn of the road with compass in hand, and the minutest notice of every natural feature, was an earnest of what this most persevering and conscientious man was destined to be through life.

In the year 1843 Mr. Hamilton was honoured with the Founder's Medal of the Society for these researches in Asia Minor; and it is a remarkable fact that he and the lamented and excellent Admiral Smyth are the only Presidents who, since the foundation

of our Society, have received our Gold Medals for actual journeys and discoveries in geography.

In the sister science of Geology Mr. Hamilton was distinguished, not only as a good sketcher and a clear writer, but also as having been so much looked up to by his associates, that having presided over the Geological Society from the years 1854 to 1856, he was again chosen President in 1864, and served till 1866. Besides his Anniversary Addresses, which are models of accurate research, he had in previous years been of signal use to the Geological Society, by acting as Secretary and Foreign Secretary. His great merits in all these capacities have, indeed, already had justice done to them by Mr. Warrington Smyth, the late President of the Geological Society.

In the years 1837-41-42 and 1847, Mr. Hamilton acted as the President of this Society, and his Anniversary Addresses were distinguished by the perspicuous observations with which they were filled, whilst it was his constant and earnest endeavour to improve and fix the principles and regulations by which we have ever since been governed.

In his last Address, when speaking of the means by which the advancement of geographical science was to be best attained,—some persons being of opinion that we should confine ourselves entirely to purely scientific subjects, others preferring descriptive travels and more amusing topics,—Mr. Hamilton very wisely condemned such exclusive practice, and thus left it recorded:—"They whom I am now addressing will probably agree with me, that it is only by a complete union of scientific truth with popular interest, that we can hope to see the science of geography take that hold of the public mind in this country, which shall ensure it the support necessary to secure its efficiency and to maintain it in a healthful and powerful condition."

This principle you well know, gentlemen, has ever guided me since I first presided over you; and it is unquestionably through its steady application that our members have risen from 668, when Mr. Hamilton last presided, to our present potent cypher of 2150 Fellows.

In a public capacity Mr. Hamilton represented the borough of Newport, in the Isle of Wight, in the Conservative interest, from 1841 to 1847. In later years he devoted himself assiduously to the cultivation of several branches of geology, and by a patient study of

conchology became an adept in his acquaintance with all tertiary fossils, as testified by various memoirs published in the Quarterly Journal of the Geological Society.

As a President he was highly esteemed for the fidelity, urbanity, and integrity with which he discharged his duties, in the course of which he made many sincere friendships; and I can truly testify that his death, which alas! came upon him at much too early a period, was as deeply lamented by geologists and geographers as it was by a large body of private friends. In addition to his scientific pursuits, Mr. W. Hamilton was an excellent man of business, whether as member of Committees of the House of Commons, or as Chairman of the Great India Peninsula Railway Company, with which body he was connected from the year 1849 till his death on the 27th June, 1867.

He was twice married. By his first wife, Miss Margaret Trotter, to whom he was united in 1832, he had one son, now Lieutenant-Colonel Robert Hamilton, of the Grenadier Guards. By his second wife, the Hon. Miss Margaret Dillon, he has left three sons and four daughters, all surviving; and who, with their excellent and affectionate mother, deeply deplore their loss.

Among the scientific distinctions of Mr. W. Hamilton, it is to be noted that he had not only presided with credit over the Royal Geographical and Geological Societies, but that he was also a Fellow of the Royal Society, and a Honorary Member of various Foreign Scientific bodies.

The EARL OF ROSSE.—By the death of this nobleman, Science has been deprived of one of her most illustrious cultivators,—one who, by his marvellous skill and perseverance, constructed a telescope of such power that he was enabled to open out a long vista through the distant heavens, and make observations of celestial bodies, of which mankind had hitherto been entirely ignorant. By means of his gigantic instrument, astronomers have been able to examine those remote nebulous bodies which seem to be in a transitionary state, or as the germs of future planetary systems; and thus we peer into the innermost secrets of Nature, and aid is lent to the sister science of Geology by the light thrown on the subject of the origin of the planet on whose surface we live.

It would be presumptuous on my part to attempt to do justice to the services rendered by Lord Rosse to Astronomy; the more so as they have been admirably expounded by the Rev. Dr. Robinson, the celebrated astronomer, from whose sketch of the career of his

lamented friend, in the Obituary of Fellows of the Royal Society, I derive the following details :—

William Parsons, third Earl of Rosse, was born at York on the 17th of June, 1800, of a family which had been settled in Ireland from the time of Elizabeth. He was educated at home by a private tutor, and, when eighteen years old, entered Trinity College, Dublin. Although his career there was eminently successful, he did not graduate, but went to Oxford, where he entered Magdalen College, and, on leaving the University, commenced public life as the representative of King's County in Parliament. His political career was intermitted at the end of eight years, in order that he might devote himself with more freedom to his favourite scientific pursuits, and discharge more completely the duties of a landed proprietor, which he did most conscientiously. But, although kind and considerate as a landlord, he was not the less resolute in supporting the authority of law and putting down the murderous societies which were the terror and curse of that part of Ireland. This, of course, made him a mark for the assassin. He knew his danger; but the knowledge neither made him shrink from his duty, nor embittered his feelings against the misguided people who were conspiring against him. This continued until the time of the famine, which crushed under the weight of real misery the imaginary grievances of the agitators, and showed them who were their real friends. None stood the test better than Lord Rosse, who, during some years, applied nearly all the income of his Irish property to relieve the unhappy sufferers. This told on their hearts, and they thenceforward became proud of his increasing fame, and regarded him as an honour to their nation. He was elected an Irish Representative Peer on the death of his father in 1841; and previously, in 1831, he had been appointed Lord Lieutenant of his county. In 1836 he married Miss Field, a partner worthy of him, who sympathised in his pursuits, and even mastered enough of astronomy to help him in his calculations.

Although most widely known as an astronomer, Lord Rosse was by no means exclusively devoted to this science. In fact, few minds of our day have grasped so wide a range of knowledge. He was skilled to an extraordinary degree in mechanics, and applied his abilities, as is well known, with unusual patience and success to experiments on the casting and polishing of metallic specula for the reflecting telescope. He was a good chemist, and would have attained a high position as a civil engineer, if he had devoted himself to this profession. He was also a master of political economy,



and devoted for years much attention to the great question of national education, and the loss of his authority on that subject is deeply felt in Ireland at the present day.

Independently of the great telescope at Parsonstown, constructed by himself, Lord Rosse's chief titles to scientific fame are furnished by the memoirs he contributed to the Royal Society, and which were published in their 'Transactions' for 1840, 1850, and 1861. It would be foreign to my present purpose to detail the processes by which, through many years' well-directed labour, he arrived at the completion of his renowned instrument. Suffice it to say, that his attention was first directed to this subject in 1826, and it was not before 1845 that his efforts were crowned with success, and his mighty telescope so far complete that he was enabled, on the 13th of February in that year, to make, in company with his friend Sir James South, his first observation of the celestial bodies. Since then, however, he continued to improve the instrument for many years.

With all his scientific merit, the Earl of Rosse was also a model man in his social qualities; his conduct being guided by the highest moral principles. Those who, like myself, were attracted to him by old personal friendship when visiting him at his seat in Ireland, and seeing how he enjoyed the companionship of his estimable Countess, and how wisely he instructed his children, could not fail to love him as much for his kindheartedness and simplicity of character, as they admired him for his great acquirements. It is, indeed, a source of the greatest satisfaction to the numerous friends of the late Earl, that he so brought up his sons that his successor has already, by new discoveries in astronomy, given us the assurance that he is a worthy inheritor of the name of his illustrious father.

Intimately dependent as Geographers are upon Astronomers, I reflect with some pride on the fact, that this eminent cultivator of the sister science was so long connected with our Society, having been elected in 1844, on being introduced by myself; and I well know how warm was the interest he took in our prosperity.

Lord Rosse was President of the Royal Society from 1848 to 1854; and in 1862 was elected Chancellor of the University of Dublin.

His appearance promised a long life, but an accident, so trifling that it was neglected till too late, broke down his strength and brought him to his end. A slight sprain of the knee produced, after

some months, a tumour, which was ultimately removed by a severe operation. The wound was slowly healing, but he sunk under the process; and, on October 31st last, he died as he had lived, patient and uncomplaining under his long and acute suffering, gentle and considerate to all around him, and strong in Christian hope.

Admiral Lord COLCHESTER.—By the decease of Lord Colchester, our Society has lost one of its most earnest supporters, who, having joined us in 1838, and having during many years assisted us by his advice as member of the Council, was during the years 1846 and 1847 the President of our body.

Lord Colchester was born in 1798, and educated at Westminster School. He entered the navy in 1811, and served successively on board the *Revenge*, Admiral the Hon. A. Legge, in the Mediterranean, the *Bacchante*, Captain Hoste, in the Adriatic, and later, during the hostile operations of the year 1814, on the coast of America. Between these two periods of service he completed the theoretical part of his naval education at the Naval College at Portsmouth. In 1816 he joined the *Alceste*, which conveyed Lord Amherst and his embassy to China. On arriving in that country he occupied a place in Lord Amherst's suite, and accompanied him to the palace of Yuen-men-yuen, near Peking, since rendered famous by its destruction at the hands of the British troops in the last war, and returned with the Ambassador through the interior of China to Canton. He also drew the sketches contained in the history of this embassy by Sir Henry Ellis. He was further employed in making a plan of the River Yang-tsze-Kiang, and it was this acquaintance with the internal water-communications of this great region which enabled him, as we shall presently see, to render a great service to his country, by a plan which he communicated in 1840 for the invasion of China, and which was eventually adopted with most successful results by the Earl of Ellenborough when Governor-General of India.

Obtaining the rank of Lieutenant in 1817, he again, in 1818, went to sea, on board the *Liffey*, Captain the Hon. H. Duncan, and visited the West Indies, the Baltic, and Mediterranean. On obtaining the rank of Commander he was appointed to the *Racehorse*, and was in the Levant during the Greek war of independence. As Commander of the *Columbine* he was, subsequently, again in the same part of the world. During these cruises he made an examination of the harbours of the Gulf of Kolohythia, and in 1826 received his commission as Post-Captain. After the death of his father and his succession to the Peerage he was appointed to the command of the *Volage*, and pro-

ceeded to the South American station, whence he made a voyage to Europe to convey the Emperor and Empress of Brazil to Cherbourg. On the completion of this duty he returned to his station and visited both the eastern and western coasts of South America, making an inland journey to Arequipa when off the coast of Peru. Subsequently, during the Belgian revolution, the *Volage* was despatched to the North Sea, and, on the surrender of the citadel of Antwerp, recalled home. With this closed Lord Colchester's active service; for, having afterwards devoted himself to Parliamentary duties, he never again held a command afloat, and became in course of time an Admiral on the reserved list.

In his parliamentary career Lord Colchester consistently adhered to the Conservative interest, and spoke occasionally, from his first session in 1833, both on naval and general topics. On the approach of the Chinese war in 1839 he drew up a plan, which he had long previously conceived, for intercepting the interior communications of the empire by sending a fleet up the Yang-tze-Kiang. He consulted on this subject the veteran Chinese scholar Sir George Staunton, who strongly approved of it, and it was placed in the hands of Lord Palmerston, the Foreign Minister at that period; but nothing beyond a preliminary survey of the mouth of the river was then undertaken, and it was reserved for the new ministry, after the change of government in 1841, to profit by the suggestion. Lord Colchester's map of the Yang-tze-Kiang, relating to the course of the river between the entrance of the Great Canal and Nankin, was engraved by the Admiralty, and when Lord Ellenborough was appointed Governor-General of India he sent reinforcements in March, 1842, to Sir Hugh Gough and Sir W. Parker, with orders at once to proceed to action on the Yang-tze. The capture of Tching-Kiang-Foo, at the junction of the canal with the great river, closed the struggle, and Lord Colchester's claim to have aided in winning this triumph for his country was fully recognised by the Governor-General, who carried his suggestions into execution.

On the formation of Lord Derby's first administration, in 1852, Lord Colchester was appointed to the united offices of Paymaster-General and Vice-President of the Board of Trade. In 1853 he received the honorary degree of D.C.L. from the University of Oxford, and in 1858, Lord Derby being again Prime Minister, he was appointed to the office of Postmaster-General. He discharged the duties of that office with great industry; but, unhappily, at this time his general health underwent a deterioration, of which the principal

symptom was a swelling of the leg, from which he never completely recovered. He continued, however, to attend the House and exert himself in behalf of the various charitable institutions with which he was connected as Chairman, until 1866, when his health was further undermined, and from February, 1867, to his death, which took place on the 18th of October last, he was almost entirely confined to his bed.

Lord Colchester married in 1836 Elizabeth Susan, second daughter of the first Lord Ellenborough, by whom he had an only son, the present Lord, who as one of our young associates is, I trust, destined to fill the post so worthily occupied by his excellent parent, whose modest and retiring manners, accomplishments and good sense, accompanied as these qualities were by the truest kindness and the highest sense of honour, endeared him to every one who knew him.

The Right Hon. Sir George CLERK.—By the death of this useful and highly-respected man, in his eighty-first year, I have lost a friend with whom I began life fifty-two years ago, and whose many good qualities I have never ceased to esteem during that long period.

For many years he was the representative in Parliament of his native county of Edinburgh, and he would doubtlessly have continued to enjoy that honour to the day of his death, had not the Reform Bill of 1832 entirely broken up the old social system on which Scotch society had been based for centuries. That Bill, which was a salutary reform in England, produced a complete revolution in Scotland, where up to that day landed proprietors only who were possessed of a certain rental returned the county member, who was thus chosen as the true representative of their broad acres. Such has been the change resulting from this Act, that the landed proprietors have to a very great extent lost their legitimate influence. But whilst Sir George was ever a Conservative in politics and occupied several public offices of mark, he steadily supported Sir Robert Peel when that great statesman felt it to be his duty to abrogate the Corn Laws.

Among the public offices he filled, Sir G. Clerk had been Secretary of the Treasury, Vice-President of the Board of Trade, Master of the Mint, and for many years the so-called "Whip" of the old Tory party in Parliament.

Sir George Clerk was a true lover and patron of the Fine Arts, and was noted through life as a warm supporter of the Academy of Music

and all good musical meetings, as well as the supporter of many a promising proficient in the art.

He was also much attached to our Science of Geography and its Natural History applications, having been a Fellow of our body since our foundation, and having acted during the last six years of his well-spent career as President of the Zoological Society.

He married Miss Maria Law in 1810, and this very estimable lady, who bore him twelve children, predeceased him only by one year. He is succeeded by his eldest son, now Sir James Clerk.

Captain James MANGLES, R.N.—As one of the scientific officers of the Navy, Captain Mangles well deserves to be favourably noticed on this occasion, particularly from the interest he had always taken, during a long life, in the advancement of geographical science. He entered the Navy so long ago as the year 1800, and for several years saw much active service in various parts of the world, on board the *Narcissus*, 32 guns, under Captain Ross Donnelly. Subsequently, as Lieutenant of the *Penelope*, he aided in the reduction of Martinique in February, 1809, and bore his share generally in the naval enterprises of those stirring times until 1815, when, having attained the rank of Commander, he retired on half-pay.

I formed an acquaintance with Captain Mangles as early as the year 1816, when he was travelling in Italy on his way to the East with his companion and brother officer, the Hon. C. L. Irby. The results of their tour were published under the title of 'Travels in Egypt, Nubia, Syria, and Asia Minor,'—a work that soon attained a wide popularity. Since then he devoted a great portion of his time to the study of Geography and Hydrography, and published at intervals several treatises, which evince his zeal in the study of these sciences: such were his 'Geography, Descriptive, Delineative, and in Detail,' his 'Illustrated Geography and Hydrography,' and others. He was elected Fellow of the Royal Society in 1825, and was one of the earliest Members of our own body, having been enrolled in 1830. His death took place on the 18th of November last.

Mr. Ashurst MAJENDIE.—One of our original members, Mr. Ashurst Majendie, the proprietor of Castle Hedingham, in Essex, was a man of considerable knowledge and of a very inquiring mind. To geographers he was chiefly known as the brother-in-law of Lady Franklin, and for the lively interest which he took in advocating, with myself and others, the search after the great Arctic hero.

Mr. John Minet LAURIE, of Maxwelton House, Glencairn, was

known as a profound historian. He formerly sat in Parliament for Dover, and for Maidstone. He was elected a Fellow of the Royal Geographical Society in 1861, and died on the 25th of February, 1868, in the fifty-sixth year of his age.

Rev. PIERCE BUTLER.—By the death of the Rev. Pierce Butler, rector of Ulcombe, Kent, we have lost, in the prime of life, an associate who was a true Geographer at heart, and an experienced traveller, and who, for some months prior to his death, devoted a large share of his time and energies to a project for a survey of the peninsula of Sinai, with a view to extending our knowledge of Biblical geography.

Mr. Butler was born in 1826, and was the third son of Lieutenant-General the Honourable Henry Edward Butler, and grandson of the third Earl of Carrick. He graduated at Trinity College, Cambridge, in 1848, and soon afterwards took holy orders. At the close of 1853, his eldest brother, Captain H. I. Butler, of the 55th Regiment, an officer of great ability and promise, received special leave of absence from Government for the purpose of exploring a portion of the peninsula of Sinai, and, attracted by this opportunity of visiting, in his brother's company, a country in which from boyhood he had ever felt the deepest interest, Mr. Butler resolved to go with him. Their preliminary researches led them to the conclusion that a careful survey and systematic examination were essential to the solution of the many interesting problems of the peninsula. This task had scarcely been commenced when news reached them of the outbreak of the war with Russia; and Captain Butler, obeying the call of duty, relinquished his interesting work, and sailed eastward from Alexandria in April, 1854, to join the expeditionary army. Mr. Butler, after visiting the Holy Land and Constantinople, returned, at the end of May, to England; but the soldier-brother was destined never to follow him, for, ere the year was out, his friends at home received the sad intelligence that he had fallen on the battle-field of Inkerman, whilst serving on the Staff of the First Division of the army. On the 21st of the preceding June, another gallant brother, Captain James Armar Butler, the intrepid "hero of Silistria," had died of wounds received during that memorable siege—struck down in the height of a career so brave and so distinguished that the sorrow his father and friends felt at his death was shared, as Lord Hardinge feelingly expressed it, "by the country, the army, and the Sovereign."

Two noble brothers had thus fallen in their country's cause within

the short space of five months; and now, Pierce Butler himself, animated by that chivalrous spirit which was one of the finest traits of his character, determined to go out at once to Turkey, for the special purpose, amongst others, of volunteering his ministrations to the sick and wounded soldiers of our army, in whatever sphere they might be most acceptable: he felt, indeed, that some such useful Christian service was the most fitting tribute he could offer to the memory of his lamented brothers. He accordingly proceeded to Constantinople in December, 1854, and shortly afterwards accepted the offer of an appointment as one of the chaplains to our army in the East. In discharging this voluntary duty his gentle, genial manners and amiable disposition won the hearts of officers and men; and those now living who were present with the Second Division in the camp before Sevastopol, must retain a clear and grateful recollection of his ministrations.

At the close of the Crimean war Mr. Butler resigned his appointment as chaplain, and for the next five years was a constant traveller in America and in many parts of Europe. In 1861, he was presented to the rectory of Ulcombe, near Staplehurst, a living in the patronage of his family, which he held until his death; and in the same year he married. In the retirement of a country life, the interest which his visit to the Desert of Sinai in 1854 had created was ever prominently before him, and to carry out, if possible, the work of survey and exploration in that region, which his gallant brother had been so reluctantly compelled to relinquish, was the one object which, of all others, he was most desirous to effect. Encouraged by the assistance which Government had afforded towards the recent survey of Jerusalem, he determined last year to endeavour to obtain, from amongst his own relatives and friends, and other persons likely to take an interest in Biblical and geographical research, sufficient funds for a topographical survey of at least the most interesting portions of the peninsula of Sinai; and, if successful in this, to solicit the aid of Government in its execution. In a few weeks he had obtained so many liberal promises of support from noblemen and gentlemen interested in the subject as to justify him in laying his plan before the Secretary of State for War. Sir John Pakington readily lent his aid, and at once authorised Sir Henry James to undertake the superintendence of the Sinai survey, as he had formerly done of the survey of Jerusalem, and to equip and send out an

officer and a small party of the Royal Engineers, when the necessary funds should be forthcoming. Lord Stanley, as the head of the Foreign Office, also afforded the scheme every facility in his power, and Mr. Butler, confident then of ultimate success, prepared to pay a short visit at once to Egypt, with the view of making preparatory arrangements for the arrival and progress of the surveying party, which it was proposed to despatch from this country in the coming autumn, and which he himself hoped to accompany. He had even taken his passage for Alexandria, and was actively preparing for departure, when severe illness overtook him; and on the 8th of February,—on the very day, and almost at the very hour, on which he was to have started for Egypt,—he died at his home in Kent, ere he had quite completed his forty-second year.

Mr. Butler's loss is mourned by many who valued and shared in his zeal for the cause of Biblical Geography, as well as by a large circle of personal friends, to whom he was endeared by the attributes of a true and high-minded Christian gentleman. There is something touching and even mysterious in this history of two brothers, both removed at a comparatively early age\* by death, when on the eve of carrying out the project in which both felt so keen an interest, and which both strove so hard to accomplish. It is, however, earnestly to be hoped that this useful undertaking will not be permitted to drop; and Captain Palmer, of the Royal Engineers, to whom had been entrusted the detailed work of the proposed survey, and to whom I am indebted for this sketch of Mr. Butler's career, informs me that there are many amongst Mr. Butler's friends who are most desirous to carry it to a successful termination. The Rev. George Williams, of King's College, Cambridge, and the Rev. F. W. Holland, already well known as a traveller in the Sinaitic peninsula, have both volunteered their aid and co-operation to push forward this work. It may be truly said that, whoever may henceforward be the active promoters of this enterprise, and whatever may be the measure of ultimate success which awaits it, it is one with which most assuredly the name of Butler must ever be closely and honourably connected.

Sir Charles LEMON, Bart.—By the decease of Sir Charles Lemon I have lost another old friend, who has left behind him a character which for high principles, benevolence, and friendliness, has never

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\* Captain H. J. Butler also died in his 42nd year.



been surpassed. In a word, no man of my time was ever more generally respected and beloved.

He was born in the year 1784, and dying on the 12th February of this year, was then consequently in his eighty-fourth year.

In 1810 he married Lady Charlotte Strangways, youngest daughter of the second Earl of Ilchester, by whom he had one son only. The fond parents having a presentiment that their boy might meet with his death on the water, selected Harrow School as the place of his education, because there was not, as at Eton and other places, a river near it. Yet, to their intense grief, the youth was there drowned in a pond! and the shock was so great that the affectionate mother never recovered from it.

Sir Charles Lemon was for many years the representative in Parliament of his native county, Cornwall, and was ever a consistent supporter of the old Whig principles. As a magistrate and country gentleman he seized every opportunity of promoting works of usefulness and charity, and at his hospitable mansion of Carclew his fine social qualities were heartily appreciated by all those who, like myself, have passed enjoyable and pleasant days there.

Sir Charles Lemon was much attached to Science, particularly to those branches of it which related to or improved the mining operations of his own county. In the year 1846, being President of the Royal Geological Society of Cornwall, he invited me, his guest, to attend an anniversary meeting of that body and say something which might give encouragement to the tin-miners, who were at the time in a suffering state, and many of them out of work. It was then, referring to what I had been speculating upon in our own Society and at other places in the two previous years, as to the auriferous character of the Australian rocks, when compared with those of the Ural Mountains, that I ventured to counsel these tin-miners to emigrate to Australia and dig for gold. Some of them took my advice, and in 1848 I was in possession of small specimens of gold ore sent home by them. Thereon I took more courage and warned Her Majesty's Government of the great event which was about to be fulfilled. I will only add that the so miscalled *discovery* of gold, *i. e.* the diggings on a profitable scale, were not opened out till 1851, and that my much earlier letter to the Colonial Secretary is printed in the Blue Book on Gold.

Sir Charles Lemon was elected into our Society in 1836; he was also a Fellow of the Royal and Geological Societies, and the Presidents of these bodies will, I am sure, be as ready as myself

to testify to the high worth of so excellent and accomplished a man, and such a choice specimen of a thorough English gentleman.

Mr. John CRAWFURD, F.R.S.—By the recent death of this enlightened and excellent man, on the 11th instant, I was plunged into a profound sorrow—a sorrow shared, I am sure, by everyone who knew him, and particularly by the Fellows of the Royal Geographical and Ethnological Societies, as well as the members of the Athenæum Club.

Born in the island of Islay, in 1783, he was in his 85th year when he was most unexpectedly carried off by an attack of inflammation of the lungs. For, although he had reached a ripe old age, he had preserved his habitual sound health, and had applied to the last the full vigour of his strong mind in so genial a manner, that he occupied a position among us which was unrivalled, and makes us all deeply sensible of the sad loss we have sustained.

To attempt to do justice in this short notice to the various merits of John Crawford—whether as a great traveller, an accomplished Oriental scholar, an able administrator, a sound geographer and ethnologist, and an accurate statist—is wholly beyond my power. Few men, indeed, of this century have passed away whose deeds more imperatively call for a faithful and full biography. Earnestly hoping that such a work may be undertaken by some competent person among his numerous friends and admirers, I can only briefly advert to some salient points of character in the long, distinguished, and useful career of my lamented friend.

Having studied medicine for three years at Edinburgh, he went to India in 1803, as an Assistant Surgeon in the Company's military service, and was almost immediately immersed in active duties. Thus, he served under Lord Lake, when that General invaded the dominions of Scindia, and was also present at the siege of Delhi. In the following year he accompanied Colonel Monson's force in the advance to Ougain and in its retreat before Holkar's army; and we have still happily among us a fresh and vigorous veteran Indian soldier—Colonel Sykes—who informs me that in February, 1805, he knew Crawford when he was in medical charge of twelve companies of Sepoys in the beleaguered fortress of Rampoora.

After five years of service in the North-western Provinces of India, he was transferred to Penang, where he commenced those studies of the Malay languages and people which enabled him

eventually to compose that remarkable work the 'Malay Grammar and Dictionary.' In 1811 he was selected by Lord Minto to accompany him in the great expedition which led to the conquest of Java. There, as a diplomatist, he represented the British Government for nearly six years, during which he made extensive journeys and voyages, and amassed those diversified materials in Ethnology, Natural History, and Geography, which, after his first return to England in 1817, he published in 1820 under the title of 'History of the Indian Archipelago.'

Going back to India in 1821, he was appointed by the then Governor-General, the Marquis of Hastings, to the diplomatic mission sent to Siam and Cochin China; and on this occasion he obtained the highest credit from the Indian Government. It may be affirmed, indeed, that during his Indian services all leading public men sought for his counsel and advice; and I might enumerate the names of a host of eminent authorities, including Colebroke, Mountstuart Elphinstone, and many others, who were his intimate friends and correspondents.

From 1823 to 1826, acting as Governor of Singapore, after the retirement of Sir Stamford Raffles, he became the second founder and wise administrator of that colony, which, through his sagacious arrangements with the neighbouring chiefs, was raised into the highly important position it has ever since maintained.

In addition to the highly valuable commercial and other statistics registered by our deceased Fellow, in relation to which his name stands out in gazetteers throughout the world, he never neglected any branch of natural knowledge. Thus it was that, in his voyage up the Irrawady to the capital of Ava, in 1826, he collected those fossil bones of Mastodon, large Tortoises, and Crocodilia, &c., which were described by Dr. Buckland and Mr. Clift, and which gave to the former the opportunity of generalising on the important fact, that there existed in the Indian regions formations analogous to the tertiary and superficial deposits of Europe.\* It was when these remarkable collections were the admiration of geologists, that I became better acquainted with Mr. Crawfurd; and from that day, now forty-two years ago, our intimacy strengthened with each succeeding year.

For some time, indeed, after his return from India, he was more immersed in political affairs than harmonised with my own special oc-

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\* See 'Transactions of the Geological Society,' second series, vol. ii. p. 377.

cupations. Thus, with his large and liberal views on the subject of Free Trade, he took an active and influential part in the support of his friend Mr. Joseph Hume, in breaking up the old commercial monopoly of the East India Company, and mainly helped to bring about that great fall in the price of tea, and other necessaries of life, which has proved such a blessing to the masses of the people. It is also known to me that Mr. Cobden highly estimated the efforts of Mr. Crawford in favour of Free Trade, particularly as shown in an article of the 'Westminster Review' of 1832.

He made two efforts, shortly after the passing of the Reform Bill in 1832, to obtain a seat in the House of Commons for two Scottish places—Glasgow and the Stirling burghs—but was unsuccessful. I have often rejoiced at these political failures; for, from that moment the strong mind and untiring energy of the man were devoted almost exclusively to his favourite topics of philology, ethnology, geography, and statistics; the fruits of his laborious studies first appearing in the 'Malay Grammar and Dictionary,' the preliminary Dissertation to which is a remarkable work in itself. Tracing the affinities of a vast number of the languages of the Indian Archipelago, and even in parts of the Pacific, to the Malay root, he ascribed this wide diffusion to the insular character of this vast region. His first-rate merits as a philologist have indeed been canonized in the writings of William von Humboldt in his great work 'Über die Kawi-Sprache auf der Inseln Java.' In it the illustrious Prussian expressly stated, that without the valuable contributions of Mr. Crawford, he could never have succeeded in mastering the Javanese and Kawi languages, and he expresses the very great obligations of his brother Alexander von Humboldt and himself for the highly valuable contributions of our deceased Associate. In 1856 he published his 'Descriptive Dictionary of the Indian Islands and adjacent Countries,' which was in fact the completion and extension of his original work of 1820. This book, illustrated as it is with a most interesting map of the Asiatic Archipelago, is a striking specimen of the great capacity of the author. In it we find condensed in an octavo of 459 pages a surprising amount of accurate geographical, ethnological, and statistical knowledge.

First presiding over the Ethnological Society in 1861, he continued to be the life and soul of it to the day of his death. In fact, he gave to this body quite a new impetus, and astonished even his most intimate friends by his unceasing contributions on the prodigious variety of subjects which he skilfully connected with his

favourite science. The mere enumeration of the titles of these memoirs, as given in the appended footnote—all produced in seven or eight years—is a wonderful proof of the capacity, versatile power, and energy of an author who could bring out all these works between his seventy-eighth and eighty-fifth year.\* Including his frequent contributions to reviews and weekly newspapers, particularly the 'Examiner,' Mr. Crawfurd has perhaps written more than it has been given to any one author of this century to accomplish. I may here also observe, as a striking illustration of the logical accuracy of his thoughts and the strength of his memory, that his writings on the statistics of commerce, geography, philology and ethnology scarcely ever required a correction of his pen; for they exhibit fewer erasures and alterations than are to be seen in the original manuscripts of Walter Scott, or any other author, even of works of fiction.

Personally I have to acknowledge with gratitude the contributions he made to several of my Anniversary Addresses, whenever it fell to me to allude to India or its great Archipelago, and on this very occasion I am indebted to him for the article on Burmah.

Yet, with all this incessant literary labour, he found time to read extensively, and store up in his surprising memory all the knowledge that he had ever acquired. He also found leisure to hold much social converse with many friends, both young and old; and few of the members of the Athenæum Club will now enter

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\* Out of the thirty-eight memoirs contributed by Mr. Crawfurd to the 'Journal of the Ethnological Society,' I may mention the following:—'On the Connexion between Ethnology and Physical Geography;' 'On Numerals as Evidences of the Progress of Civilisation;' 'On the Antiquity of Man from the Evidence of Language;' 'On the Commixture of the Races of Man as affecting the Progress of Civilisation;' 'On Colour as the test of the Races of Man;' 'On the Relation of the Domesticated Animals to Civilisation;' 'On Language as a test of the Races of Man;' 'On Lyell's Antiquity of Man,' and 'Huxley's Evidence on Man's Place in Nature;' 'On the Sources of Tin for Bronze Tools and Weapons of Antiquity;' 'On the supposed Infecundity of Human Hybrids or Croases;' 'On the supposed Stone, Bronze, and Iron Ages of Society;' 'On the so-called Celtic Languages in reference to the question of Races;' 'On Cannibalism in relation to Ethnology;' 'On the Physical and Mental Characteristics of the Negro;' 'On the Origin and History of Written Language;' 'On the Ancient Hindu Sacrificial Bell found in the Northern Island of New Zealand;' 'On the Invention of Writing Materials in reference to Ethnology;' 'On the Migration of Cultivated Plants in reference to Ethnology;' 'On Cæsar's Account of Britain and its Inhabitants;' 'On the History and Migration of Cultivated Plants;' 'On the Dissemination of the Arabian Race and Language;' 'On the Migration and Cultivation of Sacchariferous Plants;' 'On the Plurality of the Races of Man;' 'On the Animal and Vegetable Food of the Nations of Australia in reference to their Social Position;' 'On the Classification of the Races of Man according to the form of the Skull;' 'On the History and Migration of Cultivated Plants and on Condiments;' 'On the Antiquity of Man' (second memoir); 'On the Ethnology of Abyssinia and adjacent Countries,' read Nov. 12, 1867. Since the contribution of the last of these memoirs to the volumes of the Ethnological Society, Mr. Crawfurd has read certain others, including one on his objections to the Darwinian theory, another on coffee and other plants, and has left sixteen other manuscript papers behind him.

its great vestibule, in which he was generally to be seen in the afternoon, without mournfully regretting the absence of the cheerful countenance and friendly grasp of the hand of dear John Crawford.

Let me add that he was equally popular with the gentler sex, who could not fail to be attracted to him by his genial address and his happy and simple manner of conveying information. Well has it been said by an able writer in the 'Times'\* who commemorated his deeds, that "all the members of the Geographical and Ethnological Societies will miss the tall form of the evergreen veteran, who scarcely ever failed to take part in their discussions, and who, while stoutly maintaining his own views, showed a forbearance and courtesy which might well be imitated by all members of learned Societies."

So deeply were his feelings and sympathies bound up with our meetings, which he so often enlivened by his good humoured criticisms and wise cautions, that during his last and fatal illness, when his mind was wandering, he was frequently speaking volubly as if he were addressing our Society, with kind allusions to his associates.

As a Highlander, I am proud that Islay should have produced such a man as John Crawford; and when his remains were consigned to the grave on Monday last, it was a solace to my heart to see many true friends assembled to pay this last mark of respect to such a noble type of humanity.

Mr. Crawford was first married to Miss Robertson, who, losing her health in India, was coming home with her child when the ship was lost and all hands perished. He married secondly in 1820 the beautiful Miss Horatia Perry, daughter of Mr. James Perry. She died in 1855, leaving him one son, Oswald, now H. M. accomplished Consul at Oporto, and two daughters, Mrs. Mynors and Mrs. George Ramsay, to deplore the loss of the most affectionate of fathers.

In addition to the men who have passed away, and of whom I have treated as being distinguished in science and art or in the public service, are the following deceased Fellows:—

Mr. T. H. Alsager; Mr. Arthur Anderdon; Lieutenant J. B. Bewsher; Mr. Thomas Bigg; Mr. J. W. Church; Captain Creswell, R.N.; Mr. John J. Cowell; Mr. William Thomas Hodgetts Chambers; Dr. James French; Mr. Charles Fraser; Mr. J. L. Franklin; Mr. Nathaniel Gould; Mr. W. S. Harvey; Mr. Robinson Hudson; Mr. Andrew Henderson; Mr. John Jerdein; Mr. Charles Kean, the

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\* See 'Times,' May 13, 1868.

celebrated actor; Mr. A. O. Lloyd; Colonel Thomas McGoun; Mr. Colin J. Mackenzie; Mr. H. H. Morris; Captain Rochfort Maguire, R.N.; Mr. Duncan Macpherson; Sir Richard D. Neave, Bart.; Mr. James Price, M.D., &c.; Mr. William Reed; Mr. James Smith; Mr. R. S. Sutherland, R.N.; Mr. John Scott; Mr. William Scott; Mr. William Silver; Mr. Arthur Vardon; Mr. J. E. Worcester.

ADMIRALTY SURVEYS.\*—The Hydrographical Surveys of the Admiralty on the Coasts of the United Kingdom, in the Colonies, and in Foreign waters, have progressed during the past year favourably and successfully; and the Naval Officers employed in carrying them out have displayed their accustomed industry and ability, as will be seen by the following brief sketch of the result

*West Coast of England.*—H.M.S. *Lightning*, under Captain E. J. Bedford, with three assistants, has been employed in a re-survey of the upper portion of the Bristol Channel, from the termination of the Cardiff Survey of 1866-7 to the upper limit of King Roads, where many changes were found to have taken place in the bank-edges and shoals—so much so, as to require a re-buoyage on the part of the Trinity Corporation. This survey having been completed, the *Lightning* has been laid up, and the force on the home coasts reduced for the present to one regular surveying-vessel.

*East Coast of England.*—Staff-Commander E. K. Calver, with two assistants, in the *Porcupine*, have continued their examination of last year on the Eastern Coast with a view to the correction and revision of the Charts and Sailing Directions. The Coast and Harbours from the River Humber to the North Foreland have now been minutely examined. The entrance of Harwich Harbour, where improvements have been carried out to increase the depth, has been re-surveyed, and a new survey has been executed of the Suffolk Coast from a little below Lowestoft to Orfordness. During the progress of this latter work a discovery, interesting from its apparent connexion with the Suffolk beaches, has been made, viz., the existence of a tract of nine square miles of shingle a short distance in the offing between Dunwich and Sizewell, being of the same character as that of the beach, opaque flint, though more angular from having been subjected to less attrition: this feature may be of interest to those who have made the origin and movement of sea-beaches the subject of their investigations.

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\* Communicated by Captain Richards, R.N., F.R.S.

*Portsmouth*.—Staff-Commander D. Hall, with a steam-launch and a small party consisting of a boat's crew, has been employed in the examination of the bar and shoals at the entrance of this important harbour. The entrance as far as Spithead, and westward beyond Stokes Bay, has been very closely and carefully sounded on a scale of 24 inches to the mile; and a re-survey of the harbour itself on a scale of 30 inches to the mile has been commenced, which had become absolutely necessary in connexion with the extensive Government works being carried out, and the dredging away of the banks in contemplation.

*Channel Islands*.—Staff-Commander John Richards, with one assistant, and with such means as the vessels employed in the fishery and pilotage establishments are able to afford, is still employed in completing this intricate and very necessary survey. During the past year they have surveyed the Ecrehos and Drouilles rocks and islets, together with the Ecrevière Bank, all of which form a continuous chain of dangers, 10 miles in length by 3 miles in width, lying nearly midway between Jersey and Cape Carteret, and which are necessarily included in the Admiralty Chart of Jersey, now in course of publication, on a scale of 4 inches to the mile.

The spacious channel between this extensive line of reef and the island of Jersey has also been closely sounded, and many hidden dangers, hitherto unknown, have been discovered and placed on the Chart.

FOREIGN SURVEYS.—*Mediterranean*.—Captain P. F. Shortland, with an able staff of assistants, in H.M.S. *Hydra*, was employed in the early part of the last season in surveying the southern and eastern shores of Sicily, carrying the soundings off to depths of 2000 fathoms. Later in the year they were employed in sounding the Malta Channel; and in September, in consequence of an imperative necessity for a knowledge of the depths between Bombay and the Red Sea—in connexion with a Submarine Telegraph to India—the *Hydra* was detached from the Mediterranean for this purpose. She left Gibraltar in October, amply provided with all the necessary material, passed round the Cape of Good Hope, and reached Bombay in January; and, by the month of March, Captain Shortland having been greatly favoured by weather, most ably and successfully completed this important service, having obtained positive depths, and brought up specimens of the bottom at short intervals in a direct line from Bombay to the Kooria Moorias Isles, and thence to Aden.

The *Hydra* is now making a few additional investigations of the



bottom in the Indian Ocean, and settling some doubtful positions *en route* to England, after five years' foreign service, and will be replaced in the Mediterranean by the *Newport*, a small screw surveying-vessel, fitting out under Commander G. S. Nares.

*Strait of Magellan*.—H.M.S. *Nassau*, Captain R. C. Mayne, C.B., with several experienced assistants, has been employed in examining the approach to this strait, and its eastern portion, including the First and Second Narrows as far as Cape Negro. Great progress has been made in this work under considerable difficulties of climate and almost constant gales of wind, rendering it a harassing and often hazardous service for boat-parties. The great changes, however, which have been found to have taken place since surveys of nearly forty years ago—and the necessity of meeting the increased requirements of navigation, by this route to the Pacific, for large steam and iron-clad ships—are conclusive evidences of the usefulness of this undertaking. Among other changes the Sarmiento Bank, extending several miles off Cape Virgin, has undergone a material alteration in its character; and a pinnacle rock, with only 3 feet of water on it, and which had been undetected in former surveys, has been discovered at a distance of two miles from the cape.

*China Sea*.—Staff-Commander J. W. Reed, in command of the *Rifleman*, and a not over-strong staff of assistants, have been indefatigable in their labours among the reefs in the China Sea during the past season. No less than nine dangerous and extensive coral-reefs in the main route have been carefully examined, and added to the Chart immediately on their arrival at the Admiralty, as also the Sea-Horse Bank at the north-western end of the Palawan Passage.

The position of the doubtful "Holme's Shoal," in the fairway of that passage, has likewise been examined and found free from danger. A close and complete survey of Rhio Strait has been executed, and so far extended to the south as to include the islands of the Linga Archipelago, and the various channels leading to the Strait of Durian, as far south as the Island of Missana. The South Channel into Penang, which had undergone considerable change, has also been resurveyed.

*North China and Japan*.—Commander E. W. Brooker, in H.M.S. *Sylvia*, with a full staff of assistants, has during the past year been chiefly employed on the coasts of Formosa, of which, until now, our surveys have been of a fragmentary and imperfect character.

The *Sylvia*, in addition to the survey of the coasts and ports of Formosa, has searched for, and pronounced not to exist, Harp Island

and Alceste Rock on its southern and eastern sides, and has settled the position of Botel, Tobago Island, not hitherto correctly placed in regard to Formosa.

On the voyage to China, Commander Brooker visited the Andaman Islands and Cocos Group, for the purpose of rectifying the geographical positions of certain points reported to be considerably in error, and which he accomplished. He then carried a line of soundings along the Coast of Martaban, through the Strait of Malacca, and up the China Sea, from Saigon to Hong Kong, with a view to the requirements of submarine telegraphy between Singapore and China.

The *Sylvia* has also visited the Pratas Reef, as a preliminary step towards the lighting, by the Chinese Government, of that important position which has proved so fatal a danger to the navigation of the China Sea.

A valuable report on the lighting of the Coast of China between Hong Kong and Shanghai has also been furnished by Commander Brooker, and there is reason to believe that the Chinese Government, with the able professional aid of its English agents and advisers, are about to take up this important matter in earnest.

*The Serpent*, Commander C. Bullock, has been usefully employed on the coast of Japan, examining the anchorages on the east and west coasts of Nipon, with a view to the selection of treaty ports. Commander Bullock has surveyed the ports of Hiogo and Oösaka in the Inland Sea, and Nanao Harbour on the west coast, and examined the entrance to Kagosima Gulf and the coast about Cape Chichakoff; and has been generally engaged in correcting errors, getting soundings, and adding to our as yet partial knowledge of the coasts of that extensive country.

*West Indies*.—Staff-Commander John Parsons, with two assistants, is carrying on the survey of the British West India Isles by means of small vessels or boats hired on the spot. Owing to the inexpensive system pursued, the work necessarily progresses somewhat slowly; but in no part of the world has more elaborate or more accurate and perfect work been performed than in this survey.

A very complete Chart of the Island of Montserrat, closely sounded to the edge of the steep land which forms its base, has lately been received from Staff-Commander Parsons; and an equally careful survey of the Island of Barbadoes has been now commenced. Some interruption to the survey has lately occurred, in order to make an examination of the various channels among the Virgin

Islands to ascertain whether any serious changes had resulted from the late earthquake disturbances, which appears from the report of Staff-Commander Parsons, and other naval officers on the station, not to have been the case.

The surveys necessary to arrive at a conclusion respecting the selection of a station for the West India Mail Service, in lieu of St. Thomas, have also engaged the attention of our naval surveyors; and up to the present moment they are still occupied on this service.

It must not be omitted to mention that much valuable hydrographical information has been received from naval officers generally, both on this and other stations during the past year.

To Captain R. V. Hamilton, of H.M.S. *Sphinx*, especially, we are indebted for a close examination of the channel between the Island of Santa Cruz and the Virgin Group subsequent to the late earthquakes in that neighbourhood; upon which occasion he obtained a series of deep soundings, which were very valuable, and furnished as well an interesting paper on the subject generally.

Commander Charles Parry, of H.M.S. *Cordelia*, has also succeeded in obtaining deep soundings between Jamaica and Cuba. Information of this nature is always valuable, and especially at the present time, when it is likely to be turned to practical account by the connexion of Florida with the Southern Continent of America by means of the Telegraph Cable.

*The Gannet*, Commander W. Chimmo, in addition to her duties as a ship of war on the West India Station, has been principally occupied during the past season in continuing the survey of the Island of Trinidad and adjacent mainland, which important work will have been completed in a very perfect way by the middle of the present year. During the summer and autumn of 1867, the *Gannet* visited and explored a considerable stretch of the Labrador Coast, in the interest of the Fisheries; the limits of this coast, hitherto very inaccurately laid down, were correctly determined, and several harbours and anchorages carefully surveyed, to the great advantage of the seafaring population of Newfoundland, who annually resort to the fishing-grounds of Labrador.

*Newfoundland*.—Staff-Commander J. H. Kerr, with two assistants and a hired vessel, is steadily progressing with the coast survey of this colony.

During the summer of 1867 these officers rendered great assistance in procuring soundings and tracing out the best course for the

submarine cable between Placentia Bay at the south end of Newfoundland, and Cape Breton, in Nova Scotia; as also in ascertaining the position and assisting in the recovery of the Atlantic Cable eastward of Newfoundland. Subsequently the survey of the coast of Concepcion Bay and the examination of the dangerous rocky ground in the vicinity of Cape Freels and the off-lying islands was proceeded with.

*Bermudas.*—The examination, which was undertaken principally with the view of discovering the exact capabilities of the numerous narrow openings through the reefs of this group, and ascertaining the depth of water over the reefs generally, has been completed, and the survey discontinued.

*British Columbia.*—Mr. Pender, Navigating Lieutenant, and two assistants, have been employed in continuing the survey of the inner ship-channels between Vancouver Island and the northern boundary of British North-West America near Fort Simpson. This work, which is essential to the safe navigation of a very intricate region, has progressed very satisfactorily, and, when completed, will be of great benefit to our ships of war and to the future commerce of these colonies.

*Cape of Good Hope.*—This survey, which is being carried on principally by shore parties, aided by a ship of war when one can be spared by the officer commanding the station, is under the charge of Mr. W. E. Archdeacon, Navigating Lieutenant, and is now completed as far eastward as the Kei River, after long and laborious operations extending over many years. The whole of the coast from the Cape of Good Hope almost to the Kei River, a distance of 500 miles, is now published for the use of the seaman on a fair navigating scale, together with plans of every anchorage which is available between Simon's Bay and Natal.

*AUSTRALIA.—Victoria.*—The coast of this colony has been surveyed for some distance west of Cape Otway, with many additional soundings obtained off Ports Phillip and Western, and the survey is now being continued eastward between the latter port and Wilson Promontory. There has been some unavoidable delay in its progress, owing to the illness of Commander Wilkinson, which terminated in the death of that lamented officer in December last; by which sad event the navy has lost a most able and zealous officer, and the surveying branch of it one whose whole professional life had been conscientiously spent in its service.

*New South Wales.*—Captain Sidney and his assistants have made

their customary good progress with the survey of the shores of this colony. The coast-line between Sydney and Ulladulla, a distance of 112 miles, has been completed, together with the re-surveying of a great part of Broken Bay, and a plan of Jervis Bay, 80 miles southward of Sydney.

*South Australia.*—Commander Hutchinson and his two assistants have been employed during the past season on the coasts of Yorke Peninsula, which separates the Gulfs of St. Vincent and Spencer, and which, with the surveys of the anchorages of Ports Adelaide and Glenelg, makes up an amount of coast-line equal to about 160 miles.

*Queensland.*—Mr. Bedwell and his assistant have completed an entire re-survey of Moreton Bay, which was much required; and they have likewise completed the outer coast from Cape Moreton to Point Danger,—thus connecting the shores of the two colonies of Queensland and New South Wales.

*Red Sea.*—Consequent on the Abyssinian expedition, additions have been made to our knowledge of the coasts and reefs of the Red Sea between Aden and Annesley Bay; for, although no specially fitted surveying-vessel was available for this service, it has been ably performed by Captain D. Bradshaw, of H.M.S. *Star*, who was selected for the duty from his special qualifications.

The results of the labours of the Hydrographical Department during the past year have consisted in the engraving and publication of 56 new charts, and the revision of a vast number of original ones, and about 164,000 have been printed for the use of the naval service and the public.

Sailing Directions for the west coast of Scotland, coasts of France, Spain, and Portugal, 2 volumes of the 'China Sea Directory, Newfoundland, Labrador, the North Sea, and Australia,' have been published, as well as the Annual Tables of Tides, Lights, &c.

NEW PUBLICATIONS.—The *Society's 'Journal,'* vol. 37.—I have again to congratulate the Society on the punctual issue of the annual volume of our 'Journal' before the period of the anniversary, an admirable improvement on all antecedent practice, which is due exclusively to the zealous and untiring labours of our able Assistant-Secretary, Mr. H. W. Bates. The principal subjects contained in the present volume are:—Mr. Johnson's 'Report of his adventurous Journey across the Himalaya and the Kuen-lun to Khotan;' Dr. Mann 'On the Physical Geography and Climate of Natal,'—a truly

philosophical treatise on the subject, and founded on original observations; Colonel Tremenheere 'On the Physical Geography of the Lower Indus;' Professor Raimondi 'On a Portion of the Province of Carabaya in Southern Peru,'—an important contribution to the geography of this interesting region; Admiral Boutakoff's Memoir 'On the Delta and Mouths of the Amu Daria;' Lieutenant Bewsher 'On the Results of his Survey of a Portion of Mesopotamia, South and West of Baghdad;' Mr. Findlay 'On the last Journey of Dr. Livingstone,'—an able exposition of the geography of Central Africa, according to our present information, tending to show that Lake Tanganyika may be the ultimate source of the Nile; 'Notes on Eastern Persia and Western Beluchistan,' by Colonel Goldsmid; Kennedy's 'Report on an Expedition into Laos and Cambodia in 1866;' Dr. Haast's 'Altitude Sections across the New Zealand Alps of Canterbury Province;' and, lastly, Captain Godwin Austen 'On the Pangong Lake District of Ladakh.' With the exception of the last-named, all these memoirs are accompanied by maps, mostly founded on original material supplied by the respective authors. On the geographical value of these memoirs it is needless for me further to dilate, especially as most of them have been read and discussed at our evening meetings, copious reports of which are published in our 'Proceedings;' but I may point out the large proportion which papers on physical geography, in this as in previous volumes, bear to those of mere description, as showing the importance we attach to the purely scientific aspects of our pursuit.

With regard to the numerous works published in various countries on subjects relating to geography, it is not my purpose, as I have stated in previous years, to pass them all in review in my annual addresses. According to established custom, I limit myself to a short notice of such as have fallen under my attention. Those who desire full information on current geographical literature will do well to consult that indispensable periodical, Petermann's 'Geographische Mittheilungen,' in which, from time to time, an article appears enumerating every work which has any bearing on geography, and arranged in classified order, according to countries.

*Major's Life of Prince Henry.*—I had occasion in my last year's Address to draw the attention of the Society to a remarkable work elucidating the comparative geography of Asia, by our associate Colonel Henry Yule, entitled, 'Cathay, and the Way Thither,' by which our acquaintance with the amount of knowledge of Eastern geography

possessed by our ancestors was vastly increased. I have this year to speak of another work of a similar character, which has recently been produced by our secretary, Mr. R. H. Major, in which a large number of entirely new points in the history of geographical discovery have been successfully established. It is impossible to open this book, which bears the title of 'The Life of Prince Henry of Portugal, surnamed the Navigator, and its Results,' without observing how great an amount of labour and patient research has been devoted to its preparation. Till comparatively recently the materials for such a work were not to be found in England; but, by the careful study of authentic contemporary documents, Mr. Major has brought into prominent relief the name and life of one till now too little known, but to whom, in fact, was due the discovery, within one century, of half the world. And it is in this aspect that this work has so much interest for our Society, since Prince Henry himself was the centre and source of all that activity in geographical discovery which made that period so remarkable.

Commencing with a description of the state of geographical knowledge in Prince Henry's time, and of the vague notions which prevailed respecting those unexplored regions which were bathed by the waters of the Sea of Darkness, Mr. Major leads us on through years of costly failure to the story of those wonderful discoveries which were made under the auspices of Prince Henry himself. In this portion of the work alone we are presented with an abundance of new material in the history of geography. The discovery of the Coast of Africa, from Cape Bojador to Sierra Leone, is given from the contemporary accounts of Azurara, Cadamosto, and Diogo Gomez; the first and last of which authors were previously unknown to English literature. Another original feature in the work is the circumstantial and conclusive refutation of a variety of claims set up on behalf of Genoese, Catalans, and Frenchmen, to priority in discovery of the Coast of Guinea. With respect to the important groups of islands in the Atlantic, we now for the first time learn that the Azores and Madeira group were discovered so early as the beginning of the fifteenth century by Genoese navigators in the service of Portugal, while for the Cape Verde Islands we are supplied with the name of an entirely new original discoverer, Diogo Gomez, in lieu of his supplanter, the Genoese Antonio de Nolli. The romantic story of the later accidental discovery of Madeira by the Englishman, Machin, which led to the exploration and colonisation of the island by Prince Henry's navigators, has now been definitely cleared from doubt, while the

complete history of the colonisation of the Azores is for the first time given in English. Still these are but incidents in comparison with the great 'Results' of the life of Prince Henry, which it is the real purpose of this comprehensive work to set forth. Within the small compass of a single century from the rounding of Cape Bojador, in 1434, we find more than one-half of the world opened up to man's knowledge by an unbroken chain of discovery, which originated in the genius and the efforts of this one man, whose name is all but unknown. The coasts of Africa visited—the Cape of Good Hope rounded—the New World disclosed—the seaway to India, the Moluccas and China laid open, the globe circumnavigated—and last, not least (for here I would take occasion to say that Mr. Major has made this subject peculiarly his own), Australia discovered. "Such were the stupendous results," to use Mr. Major's words, "of a great thought and of indomitable perseverance, in spite of twelve years of costly failure and disheartening ridicule. Had that failure and that ridicule produced on Prince Henry the effect which they ordinarily produce on other men, it is impossible to say what delays would have occurred before these mighty events would have been realised; for it must be borne in mind that the ardour not only of his own sailors, but of surrounding nations, owed its impulse to this pertinacity of purpose in him."

*Keith Johnston's New Atlases*.—Among the useful and important cartographical publications brought out by our Associate Mr. A. Keith Johnston, I have to mention the 'Handy Royal Atlas,' published this year, as a reliable work, giving the most recent discoveries by our travellers in Central Africa and Asia, and, for its size and form, easy to be consulted. I have also to notice with especial satisfaction the forthcoming issue by Mr. Johnston of a series of Elementary Atlases of General, Physical, Historical, and Scriptural Geography, which, being sold at extremely low prices, will, it is hoped, diffuse very widely much useful knowledge. The same indefatigable author is also about to issue during the summer a complete series of Geographical Text-books, arranged on a new plan, and in a style calculated to attract students, at the cost of a few pence each. Each map will have an accompanying handbook, so that the attention of the pupil or student will be limited to one subject at a time. These cheap and good scientific publications coming out now, when the better instruction of the people is so much advocated, cannot fail to be highly serviceable in popularising the study of Geography.



*Chapman's Travels in South Africa.*—Among recent publications, the narrative of Mr. James Chapman's Travels in South Africa, during a period of fifteen years, merits a commendatory notice on the part of geographers and naturalists. The ground he travelled over lies between Natal on the south, and the Zambesi River on the north, and from the Limpopo on the east, to Walvisch Bay on the west. Few persons occupied in trade as Mr. Chapman was could have given us such good sketches of the outlines of the country, and so many interesting details respecting the geology and botany of the wild regions he traversed. European readers may well be astonished to learn from Mr. Chapman, among the wonders of natural history which he witnessed, that in one district he walked 7 inches deep in a body of locusts, which devoured a cornfield in two hours. Many persons must doubtless be interested in the valuable contributions in various branches of natural history, whilst some of the sketches of the gorgeous scenes at and around the great Falls of the Zambesi, as executed by Mr. Baines, are telling adjuncts. I am pleased to see that the book has been well spoken of by able reviewers, one of whom, after recommending it to all who are interested in Africa, thus writes:—"As a traveller he has been adventurous and energetic, as a narrator truthful and modest; and it must not be forgotten that to such men as Mr. Chapman the gratitude of mankind is due."\*

*Millingen's Observations in Armenia and Kurdistan.*—A work has recently appeared in Paris, and in the French language, which from its title would be supposed to be simply of historical and political interest, but which, in reality, contains a considerable amount of geographical information concerning parts of the Turkish empire of which very little is known. The work is entitled 'La Turquie sous la Règne d'Abdul-Aziz,' and contains the experiences of the author, Mr. Frederick Millingen, during three years' military service in the eastern part of Armenia, or northern Kurdistan. The numerous details gleaned by this intelligent observer concerning the tribes of Kurds in that region will prove interesting to the ethnologist; and the map attached to the volume, in which the tract of country lying between the south-eastern shores of Lake Van and the Persian frontier is delineated, recommend the work to the notice of geographers. The chief utility of the map is, that the districts peopled by the different Kurdish

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\* 'Spectator,' April 11, 1868, p. 444.

tribes, together with the names of their numerous villages, are laid down from the personal observations of the author.

*Cornelissen's Treatise on the Temperature of the Sea off the Cape of Good Hope.*—One of those memoirs on oceanic hydrography which are so important and valuable for the bearing they have on practical seamanship, as well as on the generalizations of physical geography, has recently appeared in the publications of the Royal Meteorological Institute of the Netherlands, from the pen of Captain J. E. Cornelissen, of the Dutch Navy. The conclusions arrived at by the author—after tabulating the results of nearly thirty thousand observations of the temperature of the sea, systematically made by Dutch shipmasters—are, that the warm Mozambique current spreads out towards the south of the Cape, and that the cold South polar current drives it towards the coast of Africa, the two alternately encroaching on each other's domain; and that the various positions, during the year, of these oceanic streams are explicable only by the existence of a submarine reef or bank, between  $26^{\circ}$  and  $27^{\circ}$  E. longitude and between  $37^{\circ}$  and  $38^{\circ}$  S. latitude, having a gentle slope to the south, and a steep inclination on the north and north-eastern side. Similar observations have been made by English observers; and, indeed, the memoir of Captain Cornelissen should be studied in connexion with the important paper read before our own Society by Mr. Henry Toynbee, and published in the thirty-fifth volume of our Journal; the merit of the Dutch memoir consisting in the co-ordination of a vast number of observations, made in all seasons, and recorded in the logs deposited by the intelligent seamen of that nation in the nautical department of the Dutch Government.

*Jordan's Vis Inertiae in the Ocean.*—Mr. Wm. Leighton Jordan, our Associate, has recently published a treatise on the action of *vis inertiae* in the ocean, a sequel to two former volumes on the elements as affected by the motions of the earth. In this work Mr. Jordan advances a series of propositions, carefully arranged, and based on the assumption that the waters of the ocean are acted on by the axial and orbital motion of the earth in a different degree to the solid matter of the globe; and, by his deductions, he accounts for most of the well ascertained currents of the ocean, and also infers that others yet undetected exist, by which the known circulation of the entire mass of waters is maintained. It is a subject of great difficulty, and one on which we are entirely deficient in data whereon to form a theory based on facts.

EUROPE.—*Spain*.—I am indebted to Don Francisco Coello, our able Honorary Corresponding Member at Madrid, for interesting details regarding the official surveys and the issue of Government maps in Spain, during the last year. In his communication he laments, as all men of science must do, the partial suspension of the great cadastral survey of the country, of which he was the director, and which employed a large staff of scientific men in working out, on a magnificent scale, the topography, hydrology, and geology of this imperfectly known part of Europe. Even the results of the preliminary surveys of the basins of the Douro, the Tagus, and the Guadiana, although finished in the same form as the Memoirs on the Ebro\* and Guadalquivir, which had previously attracted so much attention, have been suffered to remain unpublished. The only portion of this national work which lingers on is the survey by small parties of limited districts previously commenced, and the neighbourhoods of large towns. Since the suspension of geodetical operations, Don Francisco Coello informs me that the definitive calculations have been completed on the meridian and parallel of Madrid, and in other directions; and that the lines were being connected with the Portuguese triangulation on the one hand, and the French—at Biarritz—on the other. A line of levels had also been commenced, with a view to the accurate determination of the altitude of Madrid above the sea-level, which is still a matter of dispute, and, although this work has been stopped like the rest of the survey, many important points in the mountain-chains of the Peninsula have been accurately measured. Thus it has been finally ascertained that the Peak of Mulhacen, in the Sierra Nevada, is the highest point in Spain, being 11,423 feet high, and exceeding the Pic de Nethou, the highest point in the Spanish portion of the Pyrenees, which is only 11,168 feet. The altitudes of many other mountains, exceeding 2000 mètres (6561 feet), under the meridian and parallel of Madrid, have been also determined with similar accuracy.

In conclusion, our Associate informs me that a number of new charts of the Philippine Islands have been issued by the Hydrographical Dépôt of Madrid, and that the General Staff have published an Itinerary Map of Spain on a scale of  $\frac{1}{1,000,000}$ , in twenty sheets; copies of these maps are promised to our Society, and will be acceptable additions to our collection.

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\* See Anniversary Address, 1866, 'Journal,' vol. xxxvi., p. clxv.

*Switzerland*.—According to a report communicated by our esteemed Correspondent, Mons. J. M. Ziegler, the exact measurement of levels in Switzerland determined on as a consequence of Swiss participation in the European Geodetical Congress, and entrusted to those able astronomers M. Hirsch of Neuchatel and M. Plantamour of Geneva, has made progress during the year 1867. By these operations all elevations, previously hypsometrically determined, will be reviewed throughout Switzerland. So far the work performed by Swiss surveyors has contrasted favourably with that done in connexion with it by surrounding States, and has been complimented by the astronomer Hansen of Gotha, President of the Central Board. Probably as a consequence of the grandeur and interest of its natural phenomena, in few countries is the study of physical geography more cultivated than in Switzerland. As evidence of this, may be cited the number of maps and treatises which annually appear, relating to the different phases of this fruitful department of science. I am informed by M. Ziegler that, since the completion of the Federal Survey, the measurement of the Swiss glaciers was determined on; and that the first series of the results (the work of M. Kindig) has been published, comprising the glaciers of South-Western Valais. In connexion with this subject, and the conditions which influence the climate of their country, the Swiss Natural Science Society have offered a prize to encourage investigations concerning the warm southerly wind or *Föhn*. The same Society has a Meteorological Section, and it must be allowed that Switzerland offers many questions of interest to stimulate their inquiries.

**ARCTIC RESEARCHES**.—Having participated during many years in the efforts made by our Society to encourage Arctic exploration, it has been my pleasing duty, handed down to me by my eminent predecessor Sir John Barrow, to welcome and encourage every proposal which has been brought before us, tending to add lustre to the fame that the British nation has achieved in the delineation of the geography of a region which we have almost made our own.

For a number of years the hope was entertained that a passage between the Atlantic and Pacific Oceans, useful in commerce, might be realised; but, though the honour of effecting a transit by sea and ice was first accomplished by Franklin, who sealed his success with his life, and shortly after by McClure, and though many of their brave associates, from the days of Parry to those of McClintock,

have explored and laid down the forms of large islands constituting a large archipelago in these frozen climes, all hope of ever establishing a practicable sea-passage has vanished. For, by our researches we now know that, in any latitudes which we have searched, the Arctic Sea is beset with islands, and the intensity of the cold thereby so much increased, that the narrow passages between them are necessarily frozen, and impassable to ships.

Of late years, however, our interest has been awakened to the accomplishment of another great Arctic desideratum, or that of reaching the North Pole itself. As British geographers, we naturally supported this project, in the consideration that the nation which had already added so much to our knowledge of these regions should crown the work, by determining whether an open sea or land existed at the Pole itself. The project was warmly supported by zoologists, botanists, meteorologists, and physicists; and, fortified by the support of the British Association for the Advancement of Science, this Society urged the Government to employ a small portion of our great maritime force in settling this important question. If the most stirring eloquence could have prevailed, the Memoir of that distinguished Arctic explorer Sherard Osborn, read to us in 1865, should have induced any Board of Admiralty to countenance the effort we called for. But our rulers paused, chiefly because we, the Geographers, had not made up our minds as to whether the British efforts should be made by the way of Baffin's Bay and Smith Sound, or by Spitzbergen; our associates being divided in opinion. And even in regard to the Spitzbergen route, some believed that the expedition ought to proceed between that island and Nova Zembla, and others preferred coasting along the east and north shores of Greenland. Hence the refusal of the Admiralty to sanction any expedition in 1865, though Osborn had clearly pointed out the small amount of exploration, comparatively speaking, which remained to be accomplished in solving the desired problem.

Recently the subject—which, though dormant, has never been abandoned by us—has been revived with vigour in Germany, entirely through the energy and skill of our Medallist Dr. Petermann, who, warmly advocating the voyage by Spitzbergen, has at his own risk fitted out a Norwegian yacht of 80 tons, the *Germania*, commanded by Karl Koldewey, which sailed probably to-day from Bergen in Norway, and will proceed to lat.  $74\frac{1}{2}^{\circ}$  N., along the eastern coast of Greenland. The French, also, have been roused by the appeal of a zealous young naval officer, Lieutenant Lam-

bert, to fit out an expedition to enter the Arctic Seas by Behring Strait; and, finally, we have once more been stimulated by Sherard Osborn to go forward in the cause he has so much at heart. Whilst in his last communication he gave many strong and good reasons for preferring, as heretofore, the route by Smith Sound to any other line, he is, I know, above all desirous that we should lie no longer on our oars, but that, at the latest in the ensuing year, whichever route may be preferred, something should be done in reopening this fine school for the training of hardy and adventurous seamen.

In his last Memoir, Captain Sherard Osborn gives great credit to the views of Dr. Petermann, who has indeed justly entitled himself to our warmest acknowledgments for the sagacity and talent with which he long ago deduced the existence of those northern lands, and laid them down in his maps from the evidence of the Russian explorers, and recently again examined by way of Behring Strait. At the same time the results of the inquiries of the Swedish expedition at and around Spitzbergen are, as Osborn thinks, antagonistic to the success of any effort in that direction.

Whilst such are the preparations and hopes in European countries, a great amount of fresh knowledge has been obtained by our American kinsmen, who in their whaling-vessels have pushed their enterprise through Behring Strait, far beyond the land first sighted by Kellett, and beyond 73° N. lat. have coasted extensive high lands which lie off the coast of Siberia, from which they are, it is thought, separated by the sea first seen by Wrangell. These, indeed, are great advances since the days when Collinson (whose discoveries in another direction have never been surpassed) determined the outline of the whole northern coast of America, and Kellett first saw Herald Island.

One of these masters of American whalers—Captain Long—has communicated to the 'Pacific Commercial Advertiser of Honolulu,' a report which, in giving a lively sketch of the progress of Arctic discovery from the days of Hudson and Frobisher, has enunciated the opinion that, if ever a transit by water be made between the Eastern and Western Oceans, it will not be by lines hitherto tried, but by an enterprise directed from Behring Strait.

Looking to the fact that the Arctic Sea is bounded by North America, Greenland, Spitzbergen, Nova Zembla, and Siberia, and that it is the recipient of the enormous bodies of water poured into it by many large rivers, he infers that the surplus must be mainly

discharged either by Spitzbergen or by Smith Sound and Baffin's Bay. Now, all navigators who have endeavoured to get towards the Pole by these lines have, he says, always met with a powerful outflow of water transporting and moving out the ice southward into the Atlantic. Thus it was that Parry, having proceeded with great perseverance in sledges 292 miles northwards, and having reached lat.  $82^{\circ} 45'$ , was only 172 miles from his starting-point, so steadily had the broken ice been carrying him and his party southwards by this great channel. Considering that the same outflow of water and ice has been met with by all explorers to the north of Smith Sound, Captain Long maintains that Behring Strait stands in favourable contrast to the other openings into the region of the Polar Sea, and is the channel in which the effort should be made. He affirms, from experience of whalers since 1847, that no great body of water finds its way south through Behring Strait; and that, at least in the spring and summer, the current is always found setting to the north, owing, as he infers, to the discharge of the rivers on the North American shore and that of the Anadyr on the Asiatic coast. He suggests, therefore, that a strong vessel of from 200 to 300 tons' burthen, and provided with sufficient steam-power to get through temporary obstacles, should follow the Asiatic shore from Behring Strait as far as Cape Kekurnai or Cape Schelagskoi. From some point between those capes the course would be to the north of the Laachoo Islands, whence the course towards Spitzbergen or the Pole would be influenced by the currents proceeding from the great Siberian rivers. If the vessel were obstructed by ice to the north of these islands, the outflow current, though not so strong as immediately to the north of Spitzbergen or in Baffin's Bay, would, he thinks, eventually carry the ship through one of the channels into the Atlantic.

Another route by which the voyage might, in the opinion of Captain Long, be accomplished, is to proceed from Behring Strait to the mouth of the Lena, then directly north beyond Cape Sievero Vostoschni, and then westwards towards Spitzbergen.

The letter of this experienced whaling captain is highly entitled to the notice of all persons interested in Arctic exploration, inasmuch as he assigns strong grounds for believing that hitherto we have been toiling like Sisyphus against natural obstacles; he believes that notwithstanding a few minor difficulties on the Siberian coast, if we once get a stout but small vessel into the current caused by the Yenissei and other great Siberian streams, that she would,

if entangled in the pack, be unquestionably carried forward into the Atlantic.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in a *single season to a very high latitude, if not to the Pole itself*. He proposes to take the ice at about  $72^{\circ}$ , where there is a deep bight running towards Shannon Island, and thence he could follow the contour of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as  $78^{\circ}$ , being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is



said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

Before I dismiss the subject of Arctic researches I must state that I have recently been informed by Professor A. E. Nordenskiöld, of Stockholm, that the Swedish Government are preparing to make, during the approaching summer, an attempt to advance into the Polar Sea beyond Spitzbergen. A powerful screw-steamer, expressly built for winter navigation, has been granted for the purpose, and is to be provisioned for twelve months. Already the Swedish Government have gained honour by their encouragement of successive expeditions to Spitzbergen for the measurement of an arc of the meridian, and the scientific exploration of the islands, in which Professor Nordenskiöld took part; that success may attend the present enterprise must be the prayer of all Geographers.

BRITISH NORTH AMERICA.—In an able review of the Memoir read by Mr. Alfred Waddington, during the present session, "On the Physical Geography of British Columbia," Dr. Cheadle has recently given\* us a very suggestive forecast of the probable future of our North American Colonies, if those on the Pacific, so rich in coal and gold, be not speedily connected with those east of the Rocky Mountains and with Canada. Coming from the fellow-traveller of Lord Milton, who three years ago called public attention to the important subject of a north-west passage by land, I am happy to see that Dr. Cheadle coincides with me in assigning great praise to Mr. Waddington, for the perseverance and intelligence with which he has promoted, at great pecuniary sacrifice, the exploration of British Columbia during many years, and for having been the first to indicate the best line of route between the Leatherhead Pass of the Rocky Mountains (described by Dr. Rae, Lord Milton and Dr. Cheadle), and Bute Inlet on the Pacific. It is manifest that the

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\* 'Pall Mall Gazette,' April 15, 1868, p. 3.

present isolation of the Pacific colonies from the rich countries watered by the Saskatchewan and the Red River is greatly to be lamented, and it is evident that if British North America is to be preserved in its entirety, a strong imperial will must be exerted and considerable expenditure incurred in the construction of lines of communication between our widely-separated provinces, which otherwise will be absorbed one by one by our energetic neighbours of the United States, commencing with the most readily accessible, the Red River Settlement.

CENTRAL AMERICA.—*Isthmus of Darien*.—Our attention has been directed, during the present session, to the ever-recurring and important subject of new lines of transit and projects of ship-canals across the great American isthmus. At one of our evening meetings, our enterprising associate, Mr. John Collinson, gave us an interesting narrative of his preliminary survey (in which he was accompanied by Lieutenant S. P. Oliver) across the unknown eastern part of Nicaragua, undertaken with a view to the selection of a line for a railway across the country, to terminate at Pim's Bay on the Atlantic side, and Realejo on the Pacific. The highest point of the line surveyed was found to be only 748 feet above the level of the Atlantic, and 620 feet above that of Lake Nicaragua; and the country, except for a few miles near the lake, was covered with the dense and lofty virgin-forest, which is characteristic of the lower levels in Tropical America.

The most easterly part of the American isthmus—the Isthmus of Darien—is that which has always presented the greatest difficulties to the explorer. The terrible sufferings of the survey-parties sent out to explore the line of the Savannah River and Port Escoces, fourteen years ago, when several members of the expedition perished of hunger in the trackless forests, must still be fresh in the memory of many persons. Notwithstanding, however, the failure of all previous attempts to cross the isthmus, M. Lucien de Puydt, under the auspices of the French Government, has devoted himself during the last few years to the examination of this difficult country. In 1861 he explored the line of the River Lara and Chuquanaque, and penetrated as far as was possible by water towards the sources of the River Tuyra; and believing that he then saw the chain of the Andes in that direction broken up into isolated hills, with two passes between them, revisited the district from the eastern or Atlantic side in 1865, and succeeded in reaching one of these passes, which he declares to be not more than about 120 feet above the sea-

level. The district of M. de Puydt's later exploration is one of the least known of the Isthmus of Darien, lying along the course and near the sources of the Tanela River, which disembogues in the Gulf of Uraba. Although we may regret the insufficiency of the observations of altitudes taken by the traveller,—and he describes his exploration as only preliminary to a more perfect survey,—the Memoir communicated to us by M. de Puydt must be admitted to contain much information on the geography, ethnology, and productions of a region hitherto almost unknown.

Before quitting the subject of the Isthmus of Darien, I have to record that a most useful volume on the subject of interoceanic transit has been published by Admiral Davis, of the National Observatory, Washington, which contains an outline of nearly all the various projects for connecting the two oceans, copiously illustrated by maps.

**SOUTH AMERICA.**—Last year it was my pleasing duty to record the continuation of the important explorations of the Purus and its tributaries by our associate and medalist, Mr. Chandless, which added so much to our knowledge of South American geography. Although I have not, on the present occasion, to bring to your notice any fact of such striking interest as this, much has been done in the investigation of the other great rivers of the Amazon-basin, chiefly through the Peruvians, who have lately made strenuous efforts to explore the rivers in their eastern territory, with the view to the opening of new lines of communication. The reports of Peruvian officers engaged in these fluvial explorations have been published in the official Gazettes of Lima; but have not, as far as I am aware, been translated into English, or made known to the scientific public in Europe.

The expedition up the Ucayali and Pachitea rivers, which I noticed in my last year's Address as having succeeded in proving the navigability of these tributaries of the Amazons to within 325 miles of Lima, has been followed by a survey of the land-route between the head of the navigation and the city of Huanuco, in the inhabited parts of Peru. A brief account of this survey has been sent to our Society by our Corresponding Member, Don M. Felipe Paz Soldan, accompanied by a tracing of the map of the route, which will be interesting to English geographers, delineating the unexplored country into which our travellers Smith and Lowe found it impossible to advance in 1834. The port which is to be the future

place of embarkation at the foot of the Andes, for the voyage to Europe *viâ* the Amazons, has been named "Puerto General Prado" after the President of Peru; and is situated at the junction of the River Mayro with the Palcazo, more than 3600 miles distant from the Atlantic. The survey was executed by a Hydrographic Commission, under the direction of Admiral Tucker, a North-American naval officer, now in the Peruvian service; and all the principal points on the line have been fixed by astronomical observation. Profile sections of the route accompany the map, and we are promised a narrative of the expedition as soon as it is ready.

Another important undertaking has been the exploration of the River Javari in 1866, by a joint Frontier Commission of Peruvians and Brazilians. In all maps this tributary of the Amazons is represented as running from south to north, and it had been fixed upon in the last century as the boundary line, in this direction, between the colonial territories of Spain and Portugal; but the result of the recent exploration has been to show that the general direction of the stream is for several hundred miles south-east to north-west, or nearly parallel to the Amazons, and that it has numerous abrupt windings. A report of the survey has been sent to us by Don Manuel R. Paz Soldan, nephew of our Lima correspondent, who was the Peruvian Commissioner; but a great part of the journals and observations, as well as the instruments, were lost in a murderous affray with the wild Indians of this dangerous region,—a hundred savages armed with bows and poisoned arrows having suddenly attacked the party in a narrow part of the stream, walled-in by high forests, and killed the Brazilian Commissioner, besides wounding five others, including Señor Paz Soldan himself. The expedition had thus to turn back, leaving their large vessel in the hands of the Indians, and escaping in a small boat. The author of the Report speaks of the wide extent of fertile country watered by the Javari and other rivers, still unknown, and likely long to remain so, on account of the ferocious nature of its inhabitants.

The River Morona, an affluent of the left bank of the Upper Amazons, near the limit of navigation, was explored last year by the steamer *Napo*, under the command of Captain M. A. Vargas. The country on both sides of this little-known stream is scantily peopled by Indians, who obtain gold, for barter with white traders, with the greatest facility, by washing the sand of the beaches in the rudest manner. Captain Vargas observed the method of working, and obtained samples of the gold, which is of fine quality, and he

concludes his interesting report by expressing the opinion that the valleys of several of these northern tributaries abound in gold, the search for which will soon attract a large population.

Our indefatigable associate Professor Raimondi continues without interruption his valuable explorations of the Andean valleys of Central Peru, and has recently examined the course of the River Pulperia, an affluent of the Apurimac,—a journey undertaken with a view to ascertaining how far up the latter river was navigable. His memoir on this subject, which we have already received, like the previous one published in the last volume of our 'Journal,' abounds in interesting observations not only of the topography, but also of the physical geography and botany of this previously unknown district.

In other parts of South America there is little to record, except that Captain Burton has recently returned to his Consulate at Santos, after a journey of seven months through the interior of Brazil, and down the River San Francisco. His report of the journey may be shortly expected, and, being from the pen of so experienced and able a traveller, it cannot but contain much that will be new and interesting.

AUSTRALIA.—The chief additions to our knowledge of Australian geography have been made, as in the previous year, by small expeditions from the outskirts of the populated districts, undertaken to discover new lands suitable for settlement. In this way we are gradually becoming acquainted with the interior portions of Queensland and Western Australia. Under the enlightened encouragement of Governor Hampton, in the latter colony, much useful knowledge of the country between Nickol Bay and the Tropic of Capricorn has been obtained by parties under the leadership of Mr. T. C. Sholl, who has established the identity of the Ashburton with the Curlew River, and discovered several new streams flowing towards Exmouth Gulf.

Discoveries of some importance have been made in 1867, in the northern territory belonging to the colony of South Australia. After the failure of the Adam Bay Settlement, the enterprising Government of Adelaide despatched Captain Cadell in a steamer named the *Eagle*, to explore the coast between the mouth of the Adelaide River and the Gulf of Carpentaria, previously imperfectly surveyed by Flinders and afterwards by Stokes, with a view to the discovery of some better site for a settlement than Adam Bay. The

*Eagle* left Sydney on the 29th March, 1867, and on arriving at the Gulf of Carpentaria examined all the inlets, commencing from the west of the Queensland frontier. Proceeding northward along the western shores of the Gulf, Captain Cadell discovered, first, a moderate-sized river in lat.  $14^{\circ} 27'$ ; afterwards, in lat.  $12^{\circ} 33'$  and long.  $136^{\circ} 55'$ , another river flowing into a fine haven of some 50 square miles' area; and again, on the western side of the deep gulf in which lies Arnhem's Bay, the mouths of three large rivers dis-emboguing in a deep bay, 20 miles in length by 10 in breadth, in a part of the coast hitherto represented on charts as dry land. Two of these rivers had 5 fathoms of water on the bar. The new bay was named Buckingham Bay, in honour of the Duke of Buckingham, the present Secretary of State for the Colonies. Another fine river was discovered about 30 miles to the eastward of the Liverpool, by Mr. H. B. Bristow, the chief officer in command of a boat-party. He proceeded 60 miles up the stream, and found the depth all that distance 4 fathoms, at low water, the width being 200 yards; the entrance to the river is  $2\frac{1}{2}$  miles wide. Natives were numerous on the shores of the river; and indeed the whole coast, which is fringed with islands, was found to be thickly inhabited. As a result of this exploration, Captain Cadell gives the estuary of the Liverpool River as by far the best site for a settlement in this region.

*Central Asia and Western China.*—For some years I have, in my Anniversary Addresses, directed attention to the grand and impassable mountain region lying between the Central Asiatic countries occupied by the Russians and our great Empire of India. In confirmation of the views I have entertained, I now refer you to the able and sound views on this subject, which are contained in the article of the last number of the 'Edinburgh Review' headed "Western China." In Eastern Turkistan, and in the great province of Yunan, the authority of the Chinese has been swept away, and the insurgent Mahomedans have established independent governments. From Eastern Turkistan the insurrection has spread also over the provinces of Khansa and Shansi, and even in the Szechuen districts bordering on Thibet. So, in the expressive language of the writer, "we really have before us grounds to surmise that this remote part of the world may at present be the scene of a great Moslem revival." We learn from our Associate Colonel Yule, that, even in the 13th century, Marco Polo found in the chief

city of Yunan, the westernmost province of China, a mixed assemblage of idolaters, Saracens, and Nestorian Christians; and the recent rise and spread of the Mussulman element is graphically told by the author of the article in question. By this last revolution, indeed, all the overland trade between British Burmah and China has been stopped, and some time must elapse before any commercial intercourse can be safely established with the new rulers. The great interest of the article I refer to consists in the condensed description of the internecine conflicts between the former governors, the Chinese and the Mussulmen, who have expelled them, and subsequently of the frequent battles and disturbances of the latter among themselves, now that they are unquestioned masters of all Eastern Turkistan, including the cities of Yarkand, Kashgar, and Khotan.

The most important of the leaders of these Mussulmen is Yakooob Kooshegee of Khotan, now the ruler of all Eastern Turkistan, with whom the adventurous explorer Johnson, of the Trigonometrical Survey of India, came into communication, as recorded in our 'Proceedings.'

Although as anxious as any one to gain fresh geographical knowledge, I dissent from the views of those of my contemporaries, who, overlooking all obstacles where British *prestige* and power are to be extended, have blamed Sir John Lawrence for having discountenanced such excursions. I must record it as my opinion that the Governor-General of India has acted most wisely in abstaining from intercourse with these bellicose and unsettled Free Lances beyond the British frontier, whether they lie in Afghanistan on the west, or at Khotan and Kashgar on the north. At the same time, as President of this Society, I shall rejoice if the recommendation of the Expedition Committee of our Council be adopted, and that the able young Indian officer, Lieut. Hayward, who has already penetrated in sporting excursions to the north of the Hindoo Kush, should proceed, as an unauthorized individual, to the regions north of that mountain range, and define the flanks of the Pamir steppe, thus clearing up some of the problems in the physical geography of Central Asia.

Having during some years endeavoured to lead my associates to believe that the invasion of our Indian empire by Russia was a mere chimera and a political bugbear, so when I see a few thousand Cossacks gradually establishing order in Western Turkistan, and gradually gaining ground eastwards from the Syr Daria, I rejoice

to find that many of my countrymen no longer look with apprehension to their advances, but rather hail them as establishing settled government where all was previously chaos. In a word, the able reviewer to whom I have alluded, and who was for some time an efficient public servant in India, has thus written in regard to the grand and impassable mountains which happily separate British India from Turkistan :—"As for the security of the British empire, even the wildest of the Russophobists has not yet conceived the possibility of an invasion by the way of Karakorum." And when we consider that the Russian forces, which have now extended along the Syr Daria to Tashkend, do not exceed eight or ten thousand men in the remote provinces they have brought into order, and that they are separated from their great centre of supply by many wild and sterile countries, I trust we may hear no more of this phantom.

**BRITISH BURMAH.\***—I may now profitably call your attention to a region which has received less of the attention of geographers than it deserves, as will be at once seen in the following short statement which I obtained, a few days before his death, from my friend Mr. John Crawfurd, who was personally well acquainted with a large portion of the country. This is that part of our vast Indian dominion which in official language is called British Burmah, and on which admirable periodical reports have been made by the able men who have administered the government of this new country since the more important part of it came into our possession. These men are Sir Arthur Phayre, for many years the Chief Commissioner there, and at present his worthy successor Colonel A. Fytche. What has been accomplished in a few short years will appear from the following account of the present state of the province :—

The territory is composed of the ancient divisions of Pegu in the centre, Arracan to the north, and Tenasserim to the south, and is wholly tropical, extending from about the eleventh to the twenty-first degree of latitude, and has a computed area of 90,000 square miles, which make it some 6000 square miles larger than Great Britain. The eastern shore of the Bay of Bengal, over a vast line of 900 miles, forms its western boundary; and along this line there are, in contrast to the absence of harbours which characterises the

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\* This portion of my Address, the work of my deeply lamented friend John Crawfurd, is the last of the many proofs I had of his willing co-operation.



western shore of the same bay, four good ones, being the embouchures of as many rivers; one of which, the Irrawady, is navigable by steamers for 500 miles.

We have in British Burmah a country in almost all respects widely differing from India, inhabited by a distinct race of men, differing from Hindus in language, in religion, and in manners. India is a thickly-peopled, and in many places even an over-peopled one, while Burmah is everywhere under-peopled. There is no room in India for that immigration which our territory in Trans-Gangetic India loudly invites. In 1861-2, the population of British Burmah was 1,897,807, and in 1866-7, or in five years' time, it had increased to 2,330,453, or 23 per cent., arising for the most part from emigration from the misgoverned native provinces bordering on it. The great majority of the inhabitants are natives of the country, but we have in this population also about 100,000 Hindu and Mahomedan settlers from India, and above 10,000 settlers from China. In the last year of the Return, the numbers of immigrants amounted to no fewer than 76,869. The ratio of population to land in British Hindustan ranges from 150 to 500 to every square mile; whereas, in our Trans-Gangetic province, it is little more than 25, or one-sixth of the lowest, and one-twentieth of the highest, density of India. As a resource for emigration, then, Burmah is to India what America and Australia are to England.

The two staple products of British Burmah point at the nature and quality of the country. They are rice and teak timber; the first the main cereal everywhere of the tropics, and the last the only timber that equals, if it does not indeed excel, British oak. The export of rice, in 1865-6, amounted to 6,089,700 cwt., of the local value of 1,825,209*l.* Of this corn, British Burmah is the largest exporting country in the world—an advantage which it owes to the abundance and suitableness of its land, and the favourable nature of its climate, and more especially to the 10,000 square miles of alluvial soil which constitute the deltas of its great rivers. Before the British accession all export of rice was forbidden.

The teak forests of British Burmah are by far the largest in India, but the supplies which we obtain from the foreign states of Burmah, Siam, and other countries, and which pass through our territory for a market, are still larger than our own. In 1865-6, 14,000 logs of teak were imported from foreign countries, and 24,178 loads, of the value of 144,540*l.*, were exported chiefly to form the backing of English "iron shields."

Mr. Crawford added to his instructive commentary on British Burmah some valuable, and it seems to me well-founded, objections to the attempt to establish a railroad between Rangoon and the western Chinese province of Yunan. He showed that this province, the poorest of the empire, is almost entirely inhabited by Mahomedans who are now in insurrection; and besides this there lies a vast country between British Burmah and the Chinese frontier, which is occupied by wild, lawless, and independent tribes. Hence it is that at the present day the raw silk from China, which formerly was brought overland, now comes to Rangoon much better and cheaper after it has gone over the China Sea, through the Straits of Malacca, and up the Bay of Bengal—a voyage of some 3000 miles.

If, however, the project of a railroad from Rangoon to China is not to be thought of, the local authorities of British Burmah, supported by the commercial community, have submitted to the Supreme Government of India the project of a guaranteed railroad, which, from its national, practical, and moderate character, is well entitled to favourable consideration. It is to be wholly within British territory, and to run over the most fertile and populous portion of the province, comprising a distance of 180 miles; one terminus being the port of Rangoon, a town of 70,000 inhabitants, and the other Prome, near our northern frontier, a town with a population of 22,000.

*Tibet and Lhasa.*—We have received during the past year, through the enterprising but well-considered arrangements of Captain Montgomerie, who is now in executive charge of the Great Trigonometrical Survey of India, a most valuable accession to our knowledge of the geography of the Trans-Himalayan regions. This officer, finding it impossible to employ his English assistants, either with safety or advantage, beyond the dominions of our ally the Maharaja of Cashmire, proposed to educate intelligent natives for the purpose of extending exploration to the northward, and thus enlarging the scope of his survey. His proposal met with the approval of the Government; and, if we may judge from the success of the first two experiments that have been made, it is likely to lead to the most important results.

At our last Anniversary it was announced to the Society that one of Captain Montgomerie's native assistants, a Mahometan who had acquired a competent knowledge of the use of scientific instruments, had penetrated from the Karakorum Pass to Yarkand, determining for the first time the true astronomical position of that town, and

connecting it through a well-executed route-survey with our trigonometrical operations in Thibet. I have now to notice a still more important achievement, for which we are indebted to Captain Montgomerie's judicious encouragement of native talent, and which has attracted much attention both in India and England. The extensive plateau beyond the crests of the Himalaya, which stretches west and east from Mount Kailas and the Mansarowar Lake to Lhasa in Great Thibet, has never been visited by Moslem travellers; and although, a century and a half ago, a Catholic missionary of the name of Hippolito Desideri did traverse the entire distance in his journey from Cashmere, *viâ* Ladak to Lhasa, he has left no information of any value with regard to the geography of the country. The interval, therefore, upon this line between the Mansarowar Lake and the great monastery of Teshú-Lúmbú near Lhasa, which was visited by Warren Hastings's envoys—Mr. Bogle and Major Turner—was regarded as a sort of *terra incognita*; and was thus judged by Captain Montgomerie to be particularly deserving of his attention. He employed accordingly two brothers, intelligent young Brahmins, who had been fully instructed in the use of surveying instruments, to explore this region. They proceeded from India by way of Nepal, and, after numerous failures, one of the two succeeded in eluding the vigilance of the Thibetan officials, and obtaining access to the country. With marvellous address and no little boldness and energy, this individual—now generally known as Captain Montgomerie's Pundit—penetrated from the Nepal frontier to the city of Lhasa, and subsequently returned from that city along the banks of the Brahmaputra to the source of that river in the Mansarowar Lake; from whence he crossed the Himalayas to the plains of India, leaving his brother, whom he had rejoined on the Indian frontier, to continue the survey from the lake to Ladak.

Throughout this long tract, a distance of over 800 miles, we are now, therefore, in possession of a continuous route-survey, verified by astronomical observations, at a number of intermediate points, and rendered still more valuable by reliable information regarding the climatology and physical geography of this hitherto almost unknown region. That the Pundit, while maintaining his disguise, should have been able, amid a watchful and suspicious people, to keep upon so long a line a careful road-book with a full record of bearings and distances, and a very extensive register of observations, is certainly no ordinary feat; and reflects infinite credit, not only on the individual employed, but on Captain Montgomerie's judgment in selecting

him for the duty. The Society will further be glad to learn that the Council have awarded a Gold Watch of the value of 30*l.* to the Pundit, in commemoration of his courage, ability, and address, and to mark their sense of the value of the services which he has rendered to Geography.

·COAL AND GOLD OF SOUTH-EASTERN AFRICA.—The colony of Natal seems to be destined to rise into considerable importance, if the coal, which is there plentiful, particularly in its north-western parts, should be rendered useful by the construction of railroads to convey it from the interior to the towns of Pieter Maritzburg and Durban. I have reason to think that this coal was formed in Palæozoic times, and is of the best quality. In order to determine its extent and by what means it can be best worked and transported, I have, on being consulted, recommended Her Majesty's Government to send out a competent mining engineer to report upon the most efficient steps to be taken in order to work out this important problem; for, independently of the establishment of local manufactories which the possession of coal would bring about, the capability of supplying our steam-vessels and packets with fuel upon the east coast of Africa would be a notable advantage. I have been much interested in tracing the various positions occupied by this coal upon the map of Natal, prepared by the colonial surveyor, Dr. Sutherland, as well as on a large map drawn out by our associate Dr. Mann, who so well represents the interests of this colony in Europe.

The existence of another source of wealth in an adjacent region on the north-west, commonly known as the country of Mosilikatse, has recently thrown the colonists of Natal into a state of great excitement. In that part of the interior, to the north-west of the Transvaal Territory, hitherto chiefly noted for its ivory and ostrich feathers, gold has been discovered in considerable quantity.

Mr. Carl Mauch, to whom we are indebted for the realization of this fact, and, of whom we first heard through the newspapers of Natal and the Cape of Good Hope, has really proved himself to be an explorer of considerable merit, both as a geographer and a geologist. Having been in frequent communication with our Medalist Dr. Petermann, I gather these data from a forthcoming number of the 'Mittheilungen,' to which I have had access:—Leaving Trieste in 1863, he has been travelling in South Africa since 1865. Having traversed and examined the Transvaal Territory, of which

he constructed a map, he became acquainted with Mr. Hartley, an elephant-hunter, who, in quest of ivory, had visited all the highest lands of the region which forms the broad-backed lofty watershed between the rivers Zambesi, on the north, and Limpopo on the south. Being informed by Hartley of the existence in these high and rocky lands of the relics of ancient metalliferous excavations, Mr. Carl Mauch explored them, hammer in hand, and in two separate localities \*—the one in s. lat.  $20^{\circ} 40'$ , and on an affluent of the Limpopo, the other on an affluent of the Zambesi, about 40 miles south of Tete—he discovered rich auriferous white quartz-rocks, embayed in a variety of ancient crystalline rocks, whether hard slates (probably Silurian) or various igneous rocks, including a great predominance of granite and diorite. The loftiest part of this elevated tract being 7000 feet above the sea, and lying in s. lat.  $19^{\circ} 50'$  and e. long.  $28^{\circ} 35'$ , presents in parts great accumulations of these broken masses of granite, to which my illustrious friend the late Leopold von Buch assigned the appropriate name of "Felsen Meer," or a sea of rocks. Many travellers have too often erroneously considered these to be boulders, whilst in fact they are simply the results of decomposition *in situ*, as seen in many granitic countries.

The auriferous quartz-rock, which in places is still seen to rise a few feet above the surface, has, where rich in gold, been quarried down in open trenches to the depth of 6 feet or more. These works seem to have been abandoned simply from the influx of water, and in one spot the traveller detected the remains of smelting operations with slag and scoriæ, the relics of lead-ore being also observable.

Of the auriferous localities described by Mr. Mauch, that which lies to the north, on a tributary of the Zambesi, is the most sterile, and this fact explains why the Portuguese have never made much of it; Dr. Livingstone having only spoken of small quantities of gold-dust being washed down in the rivers to the south of Tete.

On the other hand, the existence of the rich tract on the river Thuti, or Tuti, an affluent of the Limpopo, and the proof of old works having been in operation there, greatly favours the suggestion I am about to offer that the Ophir of Solomon was probably near the mouth of that great stream. In the mean time the discoveries of Mr. Mauch have awakened the interest of many of the colonists of

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\* In the original map of Mr. Mauch, which Dr. Petermann has submitted to my inspection, a third and intermediate gold tract is laid down.

Natal, and doubtless the tract, which seems to have been neglected for so many centuries, will be soon the scene of active operations of the miner.\*

As Mr. Mauch has visited the colony of Natal, where he was warmly received by our countrymen, and has had the opportunity of regulating his astronomical instruments by comparison with those of the Observatory of Pieter Maritzburg, I anticipate that he will largely and accurately extend our acquaintance with that great backbone of South Africa. I would add that, as the Council of our Society did, by small advances of money, assist Gerhard Rohlfs in carrying out those researches in Northern Africa which have obtained for him one of our Gold Medals, so I venture to hope that they will approve my suggestion that Mr. Carl Mauch—who, unassisted by any Government, has been accomplishing such great results on the slenderest means (provided by partial subscriptions raised in Germany)—may receive at our hands such aid as will enable him to bring his labours to a successful termination.

This newly-discovered auriferous tract is, I may state, precisely in that position in which, as a geologist, I should have expected to find gold, *i. e.* in the elevated and ancient slaty quartzose rocks (probably Silurian), with granite and greenstone, which form the mountains, in s. lat. 21°, that constitute the watershed whence some streams, tributaries of the Zambesi, flow to the north, and others, tributaries of the Limpopo, to the south. From the well-known fact that some of the rivers of Africa—particularly the Niger and its affluents—contain gold-dust, we may reasonably expect that the other mountain-tracts from which they flow will eventually prove to be as auriferous as the upper region of the Limpopo in the south-east of Africa; and thus with the spread of enterprise the geological *nuclei* or back-bones of Africa may prove remunerative to searchers for the precious metal.

This discovery of gold leads us once more to consider a suggestion made to us two years ago by Mr. George Thompson, namely, that the Ophir of Solomon might, after all, have been situated in the country of the Limpopo. He supported his view

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\* Whilst I write I have received a pamphlet, entitled 'The Gold-Fields of South Africa, and the Way to reach them;' in which the author, Mr. Robert Babbs, invites his countrymen and speculators to reach these gold-fields by way of Natal. I am indebted also to Mr. John Robinson, editor of the 'Natal Mercury,' for information regarding the gold discovery, which has naturally excited great expectations in that colony. In a recent letter, he states that a pioneer party, under the guidance of Mr. Hartley, left Potchefstroom for the gold-fields on the 13th March.

by mentioning recent reports brought by some missionaries of the existence on that stream of ruins of an ancient city. The discovery of gold will, I hope, lead to the opening out to us of a large portion of the interior hitherto traversed only by an occasional elephant-hunter. I trust, indeed, that the day is not distant when some adventurous explorer will make the boating-voyage from the interior by the Limpopo River to its mouth, as suggested by my friend Mr. W. Webb, and thus escape the necessity of a land-journey which no traveller with oxen can hope to accomplish, on account of the bites of the dreadful Tsetse fly, which infests that region. By such a boat-journey we should become acquainted with the whole course of this grand stream and its embouchure in the Indian Ocean, which has remained unknown to the present time.

The Ophir of Scripture had from early times been supposed to lie somewhere on the south-east coast of Africa.\* It was this belief that led the Portuguese to send expeditions soon after the voyage of Vasco de Gama, and subsequently to colonise largely in these latitudes; the relics of churches built by the Jesuit fathers being, it is said, still to be traced. But, after all, the Portuguese were never successful in finding any great gold-field, owing probably to their chief settlements being upon the Zambesi and to their having omitted to extend their researches southwards in the interior.

The question as to the real site of the Ophir of Solomon has long been a subject of dispute. My lamented friend the late Mr. John Crawford, President of the Ethnological Society, has in his excellent work, 'The Descriptive Dictionary of the Indian Islands,' analysed with great perspicuity and much knowledge the various hypotheses which have been suggested, and has considered that Ophir cannot with any show of possibility be placed in any part of India where the great geographer Carl Ritter had supposed it to be. Quite agreeing with my eminent friend that all the commodities forming the exports from Ophir could not well have been the native products of one and the same place, and that Ophir may have been an emporium, we have yet to ascertain, by a proper survey, whether the site of such an important place of trade might not have been at or near the mouth of the great Limpopo River which flows from the above-

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\* See D'Anville's Disquisition on Ophir, 'Mem. de l'Acad. des Sciences,' t. xxx. p. 83.

mentioned gold mountains. Looking to the great objection to the hypothesis of Ophir being in India, inasmuch as the seamen of the days of Solomon could not have made such long voyages, the learned author of the article "Ophir," in Smith's 'Dictionary of the Bible,' naturally preferred Arabia as the country in which Ophir was situated, both from its proximity to the Holy Land and as being within the bounds of the earliest navigators. Although I at one time thought that Arabia might possibly have been the auriferous region in question, I abandoned that idea when I ascertained that the mineral structure of that peninsula was such as to render it most unlikely that at any time it could have yielded gold. The absence of rivers and seaports is also strongly against the Arabian hypothesis.

Knowing, as we now do, from the structure of the adjacent countries, that the traders from Tarshish, whether Tyrians or Jews, could find no gold on either shore of the Red Sea, they would naturally continue their coasting voyage along the east coast of Africa in their endeavour to find it. In doing so, we further know, both from the mineral structure of the region north of the equator and the fact that the Jub, Ozy, and other streams which traverse the Somauli country, flow from tracts of sandstone and volcanic rocks, and bring down no gold-dust, that the old navigators could meet with no success in those parallels. Neither is the country between Zanzibar and the Zambesi auriferous. It is only on reaching the latitude of 21° s. that auriferous rocks occur in the mountains of the interior, in a region from which, as before said, the waters flow to the Zambesi on the north, but chiefly to the Limpopo on the south.

I venture, therefore, to say, that of all the sites hitherto suggested, the region which feeds these streams was, according to our present knowledge, in all probability the source which supplied the ancient Ophir. I have before stated that this region, besides gold, is rich in ivory and ostrich feathers; and if Hebrew scholars see no objection to the supposition that the Biblical writers might not clearly distinguish between the feathers of the peacock and those of the ostrich, another difficulty in choosing this South African site of Ophir vanishes. I would also add that parts of this region are specially rich in ebony—so rich indeed that, according to Livingstone, great profit might be obtained by bringing home cargoes of those valuable trees from the River Rovuma. Now, may not these have been the famous almug-trees of which Solomon made



pillars for the House of the Lord and the King's House, as well as harps and psalteries for the singers?

Mr. Crawford has very successfully shown that "sandal-wood," as suggested by some writers, could not, from its diminutive size, have been the almug-tree; and knowing, as we now do, the comparatively great size of the ebony and its beauty and tenacity, I suggest that this is a good additional reason for the adoption of the site I have suggested. However this may be, I earnestly hope that ere long the Limpopo and its branches may be well examined, if only with a view of ascertaining the truth of the rumour that extensive ruins of ancient buildings lie near them.

ABYSSINIA.—At various periods since the foundation of this Society, our attention has been attracted to some part or other of this region, so diversified in physical features and so unlike other parts of the world in the character and condition of its inhabitants. At the opening of the present Session I congratulated you on having our interest in this remarkable country re-awakened by our able Secretary Mr. Clements Markham, who brought before us in a most telling manner the wonderful exploits of our precursors in bold adventure, the Portuguese, who carried out expeditions in that country during the fifteenth, sixteenth, and seventeenth centuries. I also reminded you that, a quarter of a century ago, when I presided over you, I put before you in a condensed form all the sources of information we then possessed with regard to the country; those comments being elicited by the then recent researches of our Associate Dr. Beke, which we rewarded with our highest honour, for having, more than any of the travellers who had visited Abyssinia in the preceding forty years, added to our geographical acquaintance with it. During and since that time there has, indeed, existed between our countrymen and the French an honourable rivalry. Led on by the able and zealous brothers d'Abbadie, many of our opposite neighbours, including Combes and Tamissier, and many others, have distinguished themselves as Abyssinian explorers. One of our own Fellows, Mr. Mansfield Parkyns, has also been much distinguished by his labours in this wild field, and has led us to give entire credence to the narrative of the great traveller Bruce, which, when first told, was so much discredited. In my opening Address of the Session I also told you that Her Majesty's Government approved the suggestion which

I offered to them of employing a certain number of men of science as attendants upon the military expedition about to proceed; and you also know that, whilst the greater number of the gentlemen so employed accompanied the force from India, our Secretary Mr. Clements' Markham went from England, as the Geographer of the Expedition.

Confined as the advance of the British army has been to the long and lofty mountain range which forms the eastern boundary of the Abyssinian plateau, geographers must still take much interest in that range in itself, seeing that it is the dominant and leading feature of the whole region, in being the "*divortia aquarum*" between the Nile and the Mediterranean on the one hand and the Red Sea and the Indian Ocean on the other.

Ever with the advanced guard, and stationed for some time at Senafé before the general forward movement took place, Mr. Markham has been enabled to make many good observations on latitudes and longitudes, the heights of the mountains and plateaus, and the character of the rocks. He has also given us, in two memoirs which have been read to the Society, striking descriptions of the meteorology and natural scenery, as well as of the changes of vegetation at each varying altitude, in these highly-diversified highlands. A third memoir has been received, and a fourth is promised when the description of the country up to Mágdala shall have been completed, and in this he will describe his entrance into Mágdala with the storming party, as I know by a letter he has written to me on his gallop homewards. Even on that eventful day the Geographer was at work, for he took two observations for latitude on the heights of Mágdala.

I have no hesitation in saying that, when they are put together, these memoirs of Mr. Markham will form as creditable a portion of the 'Journal' of the Society as it has ever contained; and I therefore feel satisfied that I did well in strongly recommending him to the Secretary for India as one well qualified to be the Geographer of the Abyssinian Expedition.\*

During the progress of this great enterprise, the various depart-

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\* Whilst these sheets are passing through the press, our meeting of the 8th of June has taken place, and the Fellows have heard from Mr. Markham himself—happily returned from his honourable and successful mission—the interesting account of the line of march from Antalo southwards, and the Topography of Mágdala.

ments of the public service and public institutions have been well supplied with the best and most recent geographical information of this country by the Topographical Department of the War Office, which has issued at intervals successive editions of the route-map and other maps of Abyssinia. The chief credit of this is due to the promptitude and intelligence of Colonel A. C. Cooke, under whose direct superintendence the maps, as well as the publication entitled 'Routes in Abyssinia,' and many engravings of scenery, have been compiled.

Sympathising as I do with an eloquent writer in a recent number of an able periodical\* in the astonishment he expresses at the apathy with which many of our countrymen regard this expedition, I ask with him, When has Europe marched a scientifically-organised army into an unknown intertropical region, and urged it forward as we have done, for hundreds of miles over chain after chain of Alps amid the grandest scenery? and all to punish a dark king, of whom we only know that he was an able but unscrupulous tyrant who insulted us by unjustly imprisoning our countrymen. This truly is a fine moral lesson which we have read to the world; and as, in addition, we reap good scientific data, the Abyssinian Expedition will be chronicled in the pages of history as more worthy of an admiring posterity than many a campaign in which greater political results have been obtained, after much bloodshed, but without the smallest addition to human knowledge. I may add the expression of my delight that the distinguished General who has accomplished these glorious results is a man of science, and is particularly well versed in Geography.

DEPENDENCE OF GEOGRAPHY ON GEOLOGY.—*The oldest Comparative Geography.*—Having now touched upon some of the chief advances made by Geographers during the past year, I may briefly direct your attention to those subterranean phenomena by which the present outlines of sea and land have been mainly determined, and ask you not to rest satisfied with merely exploring and describing distant and unknown countries, or in fixing latitudes and longitudes. I would incite you to increase the pleasure of your studies by endeavouring to trace, from ages long anterior to the creation of man, the various changes which the surface has undergone before the present contours of land and water were attained,

\* 'Spectator,' April 18, 1868, p. 456.

and to ascertain by what natural agencies such outlines have been successively brought about. If it be said that this is entering into purely geological questions, my answer is, that, as a weather-beaten explorer of the rocks, it is my pleasing duty to revert to my old love, and to stimulate you to ponder on the grand series of pre-historic events by which the present relations of land and sea have been realised.

Possessing no distinct evidence to show us what were the earliest conditions of the planet, whilst (according to general belief) it was passing from a molten mass into a solid spheroid, and seeing that, at the beginning of the geological record, we are as much lost in obscurity as the astronomer who peers into the remotest nebulae; the geologist explains to us, after fair search and inquiry, what were for the most part the aqueous, if not the hydrographical, conditions at the time when the oldest strata were deposited. He has so worked out the order in which the stony tablets forming the crust of the earth lie upon each other, containing within them the records of the earliest as well as of all succeeding living things, that he has at last developed the history of former life, from that beginning when only the lowest invertebrate creatures lived in the sea, and were buried in the first-formed marine sediments, through an ascending order of creations, until the human period was attained.

Leaving these records of successive creations to the palæontologist, the physical geographer may unite with the geologist in the endeavour to elucidate the changes of the surface, as due to each great perturbation which the crust of the earth has undergone. In short, the ups and downs of the geologist are the fundamental data on which our present geographical features mainly depend.

It has been ascertained that life was first breathed into the waters in the form of marine invertebrate creatures of the lowest class called Foraminifera. We have learned, indeed, that the mud and sediment of those earliest seas, in which only such animals (and probably seaweeds) lived, were subsequently transformed into those crystalline gneissic rocks which constitute the basement of the Laurentian system of North America and the fundamental gneiss of North Britain and Bohemia.

The succeeding period, as proved by fossil remains in the lower stages of the Silurian rocks, was one in which a variety of marine animals, *i.e.* of shell-fish, crustaceans, and mollusks, began to abound, though these invertebrates are wholly dissimilar in species from any known in the present era.

During all these long early periods we have scarcely any proofs of the existence of lands; and, though some terra firma must have existed to afford materials for the accumulations of the sea-beds, we have every reason to believe that there were then no lofty mountains. In other words, it is supposed that the seas then occupied enormously wide spaces, and also that a much more uniform temperature and climate prevailed in both hemispheres than at present, judging from the fact that the fossil remains found in these ancient strata have a common *facies*, though found in regions widely remote from each other.

For a very long time, then, we may infer that, in the absence of high lands, nothing approaching to the present physical outlines of the surface existed. As time rolled on, this ancient fauna was largely increased by the creation of many new marine animals; but during all the immensely long older Silurian era the seas were unoccupied by a single fish, or, in other words, by any animal having a vertebrate column or backbone. The first fishes suddenly appeared towards the close of the long Silurian epoch,\* and, judging from the structure of the deposits, this particular period was one of long-continued quiescence. And yet this earliest kind of vertebrate animal, whose bones assure us that it is the prototype of the human skeleton, is distinct from and unconnected with all the other marine animals which lived before and with it. Thus, these first fishes are as clear a manifestation of creative power as any of those other proofs which are offered to us, as we mount up through the overlying formations, and continue our inquiry until we reach the recent superficial deposits.

It was at about the period when fishes appeared that we have the first proofs of the existence of dry lands, in the remnants of some curious land-plants; and then, indeed, it is clear that the earth's outline was becoming more diversified. But still we are without evidence that any great rivers then flowed from mountains. In the mean time, however, various outbursts of igneous rocks, whether porphyries, greenstones, basalts, &c., had been penetrating the surface, and had therefore added much to the materials out of which all marine deposits might be formed; doubtless these operations considerably changed the outline, and thus began the first approaches towards the present features of the earth, and the diversified relations of land and water.

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\* See 'Siluria,' 4th Edition, p. 477.

In subsequent ages fresh accumulations were added to the crust of the globe, and, in tracing these upwards, the geologist has demonstrated that he meets successively with races of higher organisation ; so that, having passed through the successive additions of lizards and warm-blooded quadrupeds to all that pre-existed, he finds relics of the human race in the uppermost of all these accumulations, and lying above those of all other kinds of animals. During this incalculably long time the face of the globe underwent numberless changes, most of which were due either to contractions of the crust, or to the expansion of internal heat and gases, producing great folds, crumplings, downcasts, and breaks in the outer layers of the earth. In some regions the strata, raised from sea-bottoms into lands and hills, were by that action of internal heat folded over into a multitude of convolutions. Occasionally these folds were broken athwart, leaving the great solutions of their continuity which are called faults.

Now, whether by such convolutions, or by the more complex action of innumerable fractures, such deposits were affected, I maintain that they then had impressed upon them certain great outlines, which, much as they have been since modified by atmospheric and diurnal action, still constitute in many tracts the chief drainage lines of the several continents and islands which geographers have to examine. In estimating the various perturbations of terrestrial masses, whether by upheaval or depression, of which geology affords evidence from the earliest period up to historic days, my belief is, that to one or other of these movements we can in many cases trace the *origin* of those valleys, deep lakes, gorges, and river-courses, which it is the province of the geographer to describe.

In illustration of these views, I may say that there are many mountain tracts, such as the Central Highlands of Scotland, large parts of Scandinavia, and the Ural Mountains, in which there is clear evidence that rocks of very high antiquity occupied their relative positions, and had deep depressions across them, at the times when such main outlines were originally determined. I believe, that in many cases the watercourses which still flow in the valleys took their direction then, and have ever since continued to act ; necessarily deepening their beds in the highly inclined or mountainous parts, whilst encumbering the lower countries with their *débris* and silt.

Hence I infer that there are regions in which these old and pris-

tine depressions have remained to this day as the prominent features which determined, and still maintain,\* the main lines along which atmospheric action, snow, and ice, and water, would necessarily exert the greatest influence in eroding the rocks.

There are, however, many tracts, such as parts of England, wherein great masses of secondary and tertiary rocks have been successively accumulated, and have covered over the ancient rocks; and in such districts the aboriginal lines impressed upon the older rocks have been hidden. The Alps—particularly the Western Alps—afford illustrations of both these phenomena; for there we can see tracts where the old rocks exhibit the original features of elevation, fracture, depression, and convolution; whilst, in other parts, we note how such pristine features have been obscured by the subsequent accumulation of younger deposits. Again, we have in that chain the clearest proof that it underwent great upheavals by one of the very latest geological movements, at which time some of the youngest formations on its flanks were raised into the highest pinnacles of the chain, having often undergone such intense metamorphism that the latest of them have assumed the mineral aspect of the oldest rocks. Yet through all this chaotic assemblage the skilful geologist can often trace to one or other of the great movements which the masses have undergone the dominant causes which have led to the existing drainage of these mountains.

True it is that glaciers and melting snows have through long ages widened gorges and ravines, and have worn away large portions of the mountain sides, but they have not, in my opinion, really originated the great valleys in and along which the glaciers have advanced.

Looking at the surface of the globe in this aspect, the geologist is but the physical geographer of former periods, and he ascertains beyond all doubt that, when the tertiary periods were completed, and long anterior to the creation of man, the hills and valleys of all continents and islands had, to a very great extent, assumed their present outlines—such outlines having been mainly due to subterranean action, followed at intervals by powerful denudations.

Having laboured through many a year in the endeavour to establish certain well-known land, sea, and river marks, in geological

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\* This view has been ably sustained by the Duke of Argyll, as regards the Argyllshire highlands, in a masterly memoir, recently read before the Geological Society of London.

science, I have made these observations to incite all travellers never to neglect the observation of these ancient phenomena, upon which the basis of physical geography rests. By connecting them further with the various proofs of the eruption of those igneous rocks which form such a large portion of our subsoil, they will in all their excursions have an additional stimulus to look to the foundations of our science; and, if imbued with the love of nature, they may, like the illustrious Humboldt, combine such knowledge of the earth on which they tread with all the existing wonders of animal and vegetable life which characterize its various zones of altitude and climate.

LIVINGSTONE'S PROGRESS IN SOUTH AFRICA.—Glorious indeed have been the tidings which we have received since the last Anniversary, in relation to the great South African traveller. It was then my duty to recapitulate my reasons for the utter disbelief I entertained of the truth of the story of his death, so generally believed, and I added other indications to prove the falsehood of the Johanna men. I also dwelt with satisfaction and gratitude on the support which Her Majesty's Government had afforded to the Council and myself in sending out a boat expedition by the Zambesi and Shiré rivers to the Lake Nyassa, to ascertain the truth. Rejoiced indeed did I feel when that expedition returned precisely at the time calculated, bearing the joyful intelligence, that not only had Livingstone not been killed at or near to Lake Nyassa, but that, accompanied by his nine trusty negroes (six of them christianised lads from Nassick near Bombay), he had passed on for many days' march into the interior. My anticipations as to the falsehood of the Johanna men having been thus realised, I felt certain that, if his usually robust health continued, we should not be long without obtaining that intelligence from himself which has since come, and filled the country with gladness.

Few can realise the anxiety I felt until the gallant and skilful Mr. E. D. Young brought us the first happy news; for I well knew how many chances of failure hung in suspense over that expedition. The boat was constructed of thirty-eight pieces of elastic steel, which had to be put together and taken to pieces three times after it reached the mouth of the Zambesi; to be carried past the great rapids and falls of the Shiré for 40 miles on the backs of negroes; again broken up on returning, and again put together to



descend the Zambesi, where the party were to be picked up by a cruising ship of war at a time duly calculated! Pondering on all these chances, I was too well aware that, if through any accident—such as the loss or fracture of a single piece of the steel boat, the insubordination of the black crews which were to man the boats, the sickness of any one of the party—the expedition returned without results, that I should have incurred much blame, and the scheme would have been stigmatised as the Utopian Livingstone Search. Through the admirable conduct, however, of Mr. Young and his associates, the truth was ascertained; and from that moment I had not the smallest misgiving as to the future travels of my dear friend in the interior.

Not dwelling on what Livingstone has already accomplished, for his letters have recently been laid before you, we may now speculate on his future steps, and if we form a right estimation of the course he is now following out, we may not unreasonably calculate the period of his return home. At the date of his last letters,—2nd February, 1867,—the great traveller was at Bemba, lat.  $10^{\circ} 10' s$ .; and at that time all the problems respecting the outflow or inflow of the great Lake Tanganyika, about 200 miles to the north of his position, had yet to be determined. He had, indeed, to ascertain whether that vast body of fresh water, about 300 miles in length, and the central part of which only was known to Burton and Speke, was fed by waters flowing into it at its southern end, or sent off a river or rivers to the south-west. Now, this point, I have no doubt, he will have completely ascertained; for as by the last accounts brought by the Arabs he was at Ujiji, which lies in the central part of the eastern shore of Tanganyika, in the middle of October, so we know that he had eight months to settle that important question.

If it should transpire that he found no outflow to the south-west (and we know that there is nothing of the sort to the east), then the great mass of fresh water must have an outlet either to the west at a more northern parallel, or there must be an opening in the mountains at its northern extremity, by which the waters of the Tanganyika flow into those of the Albert Nyanza of Baker. If the first of these hypotheses prove true, and, the Tanganyika being found shut in on the north, a great stream should be discovered flowing from it to the west or south-west, why then my dauntless friend may follow that course of water across an entirely unknown region of Africa, and emerge on the west coast either by the settlements on

the Congo\* or by the territory of the Portuguese, to which he penetrated in his first grand travels across South Africa. In this case a very long time, perhaps eighteen months, may elapse, during which we shall be held in anxious suspense.

On the other hand, if the view of Mr. Findlay be sustained,—that a water-communication exists between Tanganyika and Albert Nyanza,—we can much more readily estimate the probable period of his return. In this event, the great physical problem of the true watershed of South Africa and the ultimate southern water-basin of the Nile will have been determined; and in touching the south end of the Lake Albert Nyanza, Livingstone will have, in fact, reached the known waters of the Nile.

If such be the case, opinions are various as to the course he would next follow: some persons believing that he would push on northwards, and, traversing Equatorial Africa, would endeavour to reach Gondokoro, and so descend the Nile to its mouth. For my own part, I have already expressed the opinion that, having once determined the great geographical problem which he went out to solve, it is more probable that he would turn to the east coast and find his way to Zanzibar, by a route to the north of that traversed by Burton and Speke. Should such have been his decision, there is nothing unreasonable in the hope of seeing him home in the autumn. If, however, he should be led, through his unrivalled intrepidity and self-confidence, to navigate the huge long sheet of water the Albert Nyanza, and thence endeavour to reach Gondokoro and descend the Nile to its mouth, I give you the following estimate of Sir Samuel Baker, as prepared at my request:—

“If Livingstone,” says Sir Samuel, “were to reach the north end of the Lake Tanganyika by the end of November, he would have fine weather until the 15th February, and might reach the south end of the Albert Nyanza by the end of December; and, if all went well and canoes were obtained, he might reach Magungo or the

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\* According to the map of Duarte Lopez, published in 1591, in Pigafetta's ‘History of Congo,’ and copied by many of the atlas makers of the sixteenth and seventeenth centuries, the Congo River flowed out of a great lake in Central Africa, corresponding pretty well in position with Lake Tanganyika. Lopez gleaned his information during his residence on the Congo from 1578 to 1587. See Mr. R. H. Major's Paper on Pigafetta's map of Africa, in our ‘Proceedings,’ vol. xi. p. 246. My attention has been recently again called to this subject of the equatorial lakes, as represented in the old atlases, by the Rev. P. H. Waddell of Glasgow, who has described to me a map of this kind given in a miniature Italian atlas of the sixteenth century.

Nile junction in one month, or by the 1st of February. Now, if the Arabs should have established a depôt since I left Magungo, they would receive him. The Arab traders quit their depôts annually in March, to deliver their ivory, &c.; and if the traveller should arrive among them before the 15th March, they would take him on to Gondokoro. All the boats that descend the Nile leave Gondokoro for Khartum at latest on the 15th April, and if the Arabs receive Livingstone before that time, they will bring him to Khartum about the end of May. The post from Khartum reaches Alexandria in about twenty-five days, and therefore if the great traveller should have to keep this line and reach Gondokoro and Khartum, we should hear from himself by the end of June, if he is to appear this year *via* the Nile. In that case he might be in England in August. On the other hand, if, having taken this line, Livingstone misses the Arabs, he will have the greatest difficulty in reaching Gondokoro; and again, if he should not attain that part till after April, there will be no boats to bring him down the Nile to Khartum before April, 1869.

"It is impossible," Sir Samuel adds, "to foresee the difficulties that may occur between the north limit of Tanganyika and the nearest Arab station; but should all go smoothly (which is seldom the case in Africa), it is possible, but not probable, that he might reach Gondokoro in April, 1868. Since I left, three years ago, the Arabs may have extended their journeys far south, and if so, they will materially assist Livingstone and save him from the annoyance and delays that we suffered in Kamrasi's country."

In anticipation of news from Livingstone himself, I have thus put his case before the Society, according as he may follow one of the three routes I have indicated; and my hearers must see that much doubt must attach to the adoption of any decided conclusion as to the period of his return to England; for, even if he should attempt to return by the Nile, we see, from Sir Samuel Baker's explanations, how many fortunate contingencies must combine to enable him to reach England soon. But whether, after determining the true watershed of South Africa, he should emerge by Zanzibar or by the mouth of the Nile, or deflecting from either of those courses, for the reason above assigned, he should reach the Congo or the Portuguese settlements on the west, Livingstone will have so vastly added to his fame, that he must unquestionably be pronounced the greatest of all African explorers. In any case, I trust that, looking to his long and devoted services, and that he has

been acting as her Majesty's Consul and accredited as such to all the Chiefs of the Interior of Africa, the Government will think it due to so illustrious a traveller, so zealous a missionary, and so faithful a servant, to grant him an adequate pension for life, as well as some suitable honour of the Crown.

**CONCLUSION.**—Reverting, Gentlemen, in conclusion, to the expressions I used in commencing the Address, on the very prosperous condition of our Society, and returning you my heartiest thanks for the kind continuance of the support you have invariably afforded me in my endeavours to do my duty, I must repeat what I have said on former occasions, that you should have selected a younger man to fill the distinguished post which I have so long occupied.

Since, however, you are pleased to keep me in office during another year, I can honestly say that I am as warmly devoted to your cause as ever; and that, notwithstanding my advancing years, I will still strive to be worthy of the confidence you continue to repose in your veteran leader.

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PAPERS READ  
BEFORE THE  
ROYAL GEOGRAPHICAL SOCIETY  
DURING THE SESSION 1867-68.

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I.—*The Portuguese Expeditions to Abyssinia in the Fifteenth, Sixteenth, and Seventeenth Centuries.* By C. R. MARKHAM, Esq., Secretary, Royal Geographical Society.

Read, November 11, 1867.

It has been the occasional practice of the Council to select papers for reading at the evening meetings which cast a glance at the course of geographical discovery in earlier times, in some particular region which happens to be engaging the special attention of the Society and the public. Thus, when the persistent labours of the Russians caused the geography of Central Asia to form a prominent feature in the proceedings of last session, the retrospect of former travels over that interesting region, which was furnished by the learned paper of Colonel Yule, proved a most opportune and acceptable supplement to the communications of modern travellers, and gave rise to leading commentaries of our President in his two last addresses. The expedition into Abyssinia, and the determination of the Government that no opportunity shall be neglected of collecting fresh information in the various branches of science in that country, will naturally draw the attention of the Society to those African highlands during the ensuing session. It has therefore been thought that we might not be unprofitably occupied for about half an hour during our first meeting in glancing over the early labours of Portuguese explorers in the empire of Prester John.

Portugal, during a century and a half, was a hero nation. She took the lead in all great enterprises, her sons made the power of the little kingdom felt on every coast from Brazil to Japan, and her poet worthily sang their famous and immortal

deeds. To Portugal all our knowledge of Abyssinia is due previous to the time of Bruce.

As soon as the aspirations of Prince Henry had been fulfilled by the discovery of the Cape by Bartholomew Dias, in the year 1487, King John II. saw the importance of collecting information in the East with reference to the possibility of turning the rich trade of the Indies into the new channel; and he was also anxious to discover the dominions of the Christian ruler, called Prester John, who had been reported by the Venetian Marco Polo to reign in the far east. Two Portuguese, named Alfonso de Payva and Pedro de Covilham, were selected for this service. After a long journey through the east, Payva died at Cairo; but Covilham, having heard that a Christian ruler reigned in the mountain of Æthiopia, and having gained no tidings of any other Christian king during all his wanderings, naturally concluded that the Æthiopian potentate was he for whom he had so long sought in vain. So, in pursuance of his instructions, and undeterred by the dangers of the journey, he penetrated into Abyssinia, and presented himself at the court of the Negûs, which was then in the southern province of Shoa, in the year 1490. He delivered the King of Portugal's letter to Prester John to the Negûs Alexander; but he was detained by this Prince and his successors, and was never allowed to leave the country. Covilham, as a young man, had distinguished himself both in the war with Spain and in Morocco, and was an officer of capacity and great courage. He married in Abyssinia, obtained influence at Court, and survived for many years; for he was still living when the Portuguese Embassy arrived in 1520. It is matter for regret that there should be no work by a man who must have acquired so intimate a knowledge of the country and people. He may be described as the theoretical discoverer of the Cape of Good Hope, for before the return of Bartholomew Dias from his great discovery, he had sent to King John a letter, stating that ships sailing down the coast of Guinea might be sure of reaching the termination of the Continent by persisting in a southward course, and when they reached the Eastern Ocean they were to enquire for the Island of the Moon (Madagascar).

In 1507 Labna Dengel (*"Virgin's incense"*), or David, ascended the throne of Æthiopia, with the title of *Wanâg Segged* (*"Precious gem"*). He was very young, and his grandmother Helena assumed the regency. Hearing of the great power of the King of Portugal from Covilham, she sent an Armenian, named Matthew, with a letter from the Negûs David to King Manuel, who was well received at Lisbon; and a return Embassy was despatched under Duarte Galvano, a distinguished but aged

diplomatist, who died on the voyage. But the advisability of opening a communication with Abyssinia was not lost sight of by the Portuguese Viceroy at Goa, and the death of Galvano only delayed the despatch of an embassy.

In April, 1520, the Portuguese Viceroy led a fleet into the Red Sea to attack the Turks, taking Matthew, the Armenian, with him. He anchored at Massowa, where he saw the *Bahar-Nâgash*, or Abyssinian Governor of the province, bordering on the sea, and some monks from the convent of Bisan in the adjacent mountains. This intercourse led the Viceroy to decide upon sending an embassy to the Negûs of Abyssinia. The leading members of the mission were Dom Rodriguez de Lima, a haughty, quick-tempered young officer; Father Francisco Alvarez, a priest, whose quaint narrative is the earliest, and not the least interesting account we possess of Abyssinia; and João Bermudez, the Secretary, a bold and intriguing man, who was much mixed up with the subsequent history of the country.

The routes by which former travellers have entered the highlands of Abyssinia from the sea-coast have now become exceedingly interesting with reference to the advance of the expeditionary force. The Portuguese Embassy of 1520 went first to the monastery of Bisan, on the seaward slope of the Taranta Mountains, and crossing that range arrived at the town of Barua or Debaroa (*Dobarwa*), on the eastern bank of the River Mareb, which was then the capital of the province ruled over by the *Bahar-Nâgash*, or Lord of the Sea. The Mareb separated this province from Tigre. Debaroa and Bisan have disappeared from modern maps; but Bruce mentions that the road by Dobarwa was better than the one he took by Dixa. The route of the Portuguese Embassy seems to be nearly the same as that by Kiaquor, which Dr. Beke describes as a gradual and easy road, well watered, and occupying two days and a half.

The Embassy did not reach the Court of the Negûs, which was then encamped on the northern frontier of Shoa, until October, taking very much the same route as that which was travelled over by Krapf in 1842. The Portuguese, after leaving Debaroa, crossed the Mareb to Axum, and went thence through the district of Angot, by Lalibela and the famous rock of Geshen, where the Abyssinian princes were imprisoned, to the court of the Negûs David, in the province of Fatigar. The embassy was detained for six years in Abyssinia, during which time Father Alvarez had an excellent opportunity of acquiring a knowledge of the country and of the manners of the people. In 1526, Don Rodriguez da Lima and his suite were dismissed with a letter to the King of Portugal, and was accompanied by a learned Abys-

sinian named Zagaza-Ab. But Bermudez, the secretary and physician, was detained by the Negûs.

The narrative of Father Alvarez forms a folio volume, which was published at Lisbon in 1540, and there is a copy in the British Museum. Ramusio gives an Italian version, and a French one was printed at Antwerp in 1558. The indefatigable Hakluyt obtained an English translation, which is one of the quaintest and most pleasant bits of reading in the 'Pilgrims' of Purchas.

Soon after the departure of the Portuguese embassy a series of formidable invasions commenced from the south. Armies of Mohammedans, inhabiting the country of Adel and Hurrur, kept pouring into Abyssinia, and, although frequently defeated, their incursions did not cease. Between 1528 and 1540 these Moors, led by the famous General Mohammed Gragh, or the left-handed, overran the whole country, until the Negûs David was obliged to seek refuge on the almost inaccessible mountain of Damo, in Tigrè, where he died in 1540. His widow, who was at Damo, assumed the regency, while his son and successor Claudius, then only eighteen, had taken refuge in a fastness of Shoa.

In this deplorable state of affairs David had resolved to seek aid from the Portuguese, and, the better to ensure their support, he embraced the Romish faith. The physician Bermudez, whom he had detained in Abyssinia, was ordained by the Abyssinian patriarch or Abûna Mark, and nominated as his successor; and was sent first to Rome for confirmation from Pope Paul III., where he arrived in 1538; and thence to Lisbon, to request military assistance for his master, the Negûs David, from the King of Portugal.

The Portuguese were invited to interfere actively in the affairs of Abyssinia; and the prospect of thus carving out an empire was assuredly most tempting. Here was a Christian people persecuted and well-nigh overwhelmed by the followers of the false prophet, crying to their co-religionists to save them. Here was the famed kingdom of Prester John waiting for Portuguese occupation; a country rich in minerals and in flocks and herds; a mountain-land within the tropics, possessing a healthful, temperate climate, and holding within its valleys the lakes and enriching affluents of the mighty Nile; a lofty region, which was believed then, as it is known now to be, if in good hands, the key to equatorial Africa. The King of Portugal did not hesitate, and Bermudez was despatched to Goa with orders to the Viceroy to send an expedition to assist the Negûs of Abyssinia.



In 1541 the Portuguese Viceroy, Don Estevan da Gama, entered the Red Sea, and anchored at Massowa, where the small expeditionary force was landed. This is the only time that a European armed force has invaded Abyssinia, and its operations possess a peculiar interest now that another European force is about to land at the same port, after a lapse of 326 years. But there is this difference in the circumstances. The Portuguese came to a friendly country, invited by its king, to assist in driving out an invader. The English are about to invade an enemy's country, to force him to liberate captives who have been treacherously seized and imprisoned. Yet the Abyssinians cannot treat their enemies worse than they treated their friends and deliverers.

The Viceroy gave the command of the expedition to his brother Dom Cristofero da Gama, a brave and enterprising officer, and a worthy son of the great discoverer of the Cape; but hasty and impetuous, and deficient in coolness and forethought. He was accompanied by the Patriarch Bermudez, and the force consisted of 450 Portuguese musketeers and 6 small field-pieces. The expedition started from Massowa on July 9th, 1541, and, marching into the interior, halted at some brackish wells till the afternoon of the next day on account of the intense heat. They continued their march for six days, suffering much from the want of water and the means of carriage; for they only had a few camels and mules which carried the artillery. At many places, where the ground was rocky, the camels became useless, and the men had to carry the burdens on their own backs. Dom Cristofero, like a true captain, was the first to take his share of this work, which, although almost intolerable to the men, was thus made to appear lighter. At the end of seven days the party arrived at so steep a mountain that it took them the whole day to reach the summit. Here the Portuguese rested, with the pleasant view of the wide and beautiful Abyssinian plains spread out before them, and refreshed by the breeze and the delicious springs that descended from the mountains. They rested a few days at a church which had been ruined by the Moors, and here they were met by the Abyssinians, who welcomed them as deliverers, and furnished them with assistance and provisions. Da Gama took the same route in ascending from the coast as had been followed by the embassy of Rodriguez da Lima, and reached Debaroa, where he united his forces with those of the Bahar-Nâgash. Here he was joined by the Queen Mother.

Mohammed Gragn, the terrible Moorish general, was in the province of Tigrè, prepared to dispute the advance of the Portuguese with 1000 horse, 5000 foot, 50 Turkish musketeers, and

some artillery. Da Gama's army consisted of 450 Portuguese musketeers, and about 12,000 Abyssinians badly armed with spears and shields. On the whole, they were fairly matched; but the dash and energy of Da Gama at first carried all before him. He took the hitherto impregnable mountain-fortress of Amba Zanet by storm, and during April, 1542, defeated Mohammed Gragn in two pitched battles and drove him into another fastness, whence he sent to implore assistance from one of the Turkish pashas on the Arabian coast. Meanwhile Da Gama crossed the great river Takkazyè, and surprised the famous hill-fortress known as the Jew's Amba, which was garrisoned by Moors and is perched in the most inaccessible part of the mountainous district of Semyen.

This brilliant career of victory was short-lived. During the winter Mohammed Gragn received reinforcements from Arabia, and on August 28th, 1543, he offered battle to the allied army. The action commenced with a cannonade which lasted for some hours. Then the Portuguese made repeated gallant charges, but were as often repulsed; and, finally the Moors advanced in force, and the rout of the allies was completed. Badly wounded and cruelly mortified by his defeat, the gallant Da Gama was with difficulty prevailed upon by the Queen Mother and the Patriarch Bermudez to accompany them in their flight. Bermudez himself relates the subsequent events. He says that on reaching a deep river Da Gama positively refused to go any further, and that they were obliged to leave him behind. There is, however, something suspicious in all this; and I am inclined to doubt whether Bermudez, who tells his own story, is quite clean-handed. It is true that Da Gama had captured a beautiful girl on the Mountain of the Jews, to whom he was much attached, and it is possible that he may have stayed behind in the hope of finding her among the fugitives. But, be this how it may, it is certain that the Portuguese general was captured by the Moors, brutally treated by the savage Mohammed Gragn, and beheaded. Thus ended the romantic career of the noble and chivalrous knight Dom Cristofero da Gama.

Only 300 Portuguese, out of the 450 who had landed at Massowa, escaped from this fatal battle. Dom Alfonso da Caldeira was chosen as their leader, and they retreated, with the Queen and the Patriarch, to the Jew's Mountain in the province of Semyen, where they were joined by the young Negus Claudius. They proved of the greatest service to the Abyssinian cause. In the following February a great battle was fought between the Abyssinians and Moors on the plains of Dembea, which was decided by the gallant conduct of the Portuguese, and in which Mohammed Gragn himself was shot by a mus-

keteeer named Pedro Leon, who thus avenged the death of his beloved commander. In a subsequent battle Claudius, with the help of his Portuguese, defeated and killed the King of Adel, whose wife was given as a reward to Arias Diaz, the Portuguese leader. The Negûs was eventually slain in a battle with the Mohammedans of Adel, led by a chief named Noor, in March, 1559, and his body-guard of 18 Portuguese were killed to a man in their gallant attempt to defend him. Yet the Portuguese were treated with the basest ingratitude. Some of them settled in Tigrè, and others in the province of Godjam. They married natives, and Dr. Beke tells us that to this day their descendants are called Francis at Karneo and in its vicinity.\*

The Jesuits who accompanied and followed Bermudez into the country fixed their head-quarters at Fremona, in Tigrè, where they erected a church and a fortified convent. These buildings were on the top of a high hill, in the centre of a large plain, on one side of which stands Adowa. Bruce visited the ruins, and describes them as consisting of stone walls 25 feet high, with towers in the flanks and angles. Here the Jesuit mission was established for many years, undergoing numerous vicissitudes of good and evil fortune, until it was finally expelled. The place was originally called Mai-goga, which Bruce interprets as the "River of Owls." The name Fremona was given to the convent in honour of Frumentius, the apostle of Abyssinia, who was consecrated the first Patriarch or Abûna by St. Athanasius in 330 A.D. The Jesuits at Fremona worked hard at the Geez and Amharic languages, studied the old Ethiopic chronicles of Axum, and collected material for the early history of Abyssinia, some of which, especially the account of the invasion of Yaman by King Caleb, is corroborated by Greek and Mohammedan writers. The Jesuits also made numerous futile attempts to fix the latitude of Fremona with an astrolabe, always being more than 30 miles out in their reckoning.

But, as missionaries, the Portuguese Jesuits in Abyssinia were eminently unsuccessful. The people preferred their own traditional form of Christianity, hated innovation, and insisted upon having a Coptic, not a Romish, Abûna. Indeed, with such a man as Bermudez success was impossible. He was proud, violent, and insolent; burnt women for witchcraft; treated the native priesthood with contempt; and rendered himself odious to all classes. At last, he went so far as to excommunicate the Negus, who ordered him to retire to a distant convent for the remainder of his life, and sent for a new Abûna from Alexandria. Bermudez with difficulty escaped to Fremona, where he was

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\* 'Journal,' 1844, vol. xiv. p. 26.

concealed for a long time, and eventually sneaked out of the country by way of Debaroa and Massowa. The ex-Patriarch reached Lisbon in safety, after a residence in Abyssinia of upwards of thirty years. His narrative was published at Lisbon in 1565. There is a copy in the British Museum, and an English version is given in the second volume of Purchas's 'Pilgrims.' This work is the best authority for the famous expedition of Cristoforo da Gama, as it is written by an eye-witness of the scenes it describes.

In 1556 Don Nunez da Barreto, accompanied by a learned Spanish priest named Andres de Oviedo, was sent out to succeed Bermudez as Patriarch of Ethiopia. He died at Goa in 1562; but Oviedo reached Massowa, and was for many years chief of the Jesuits at Fremona. But the mission was neglected and oppressed, though not actually expelled, by the successors of Claudius, and Oviedo died at Fremona, in great poverty, in the year 1577. An account of Oviedo's proceedings, and of those of his brother missionaries, is given in Purchas.

At about this time, apparently in 1572, the Turks seized upon Massowa and other ports on the coast, which they have held ever since: so that the Abyssinian title of Bahar-Nagash, or Lord of the Sea, from thenceforth became empty and vain.

In the beginning of the next century Father Francisco Paez arrived at Fremona, who was by far the ablest European that has as yet resided in Abyssinia. He added to great tact and judgment, and an extraordinary power of influencing the minds of all classes of men among whom he was thrown, an amount of ability which enabled him to succeed in nearly everything he undertook, from turning a stone arch to ruling the heart of a king; and a quickness of apprehension, which amounted to genius. This remarkable man was wrecked at Dharfur, and remained a prisoner in Hadramaut and Yaman for seven weary years. But at length he reached Fremona, and in 1604 was presented at the Court of the Negus, whose name was Socinius or Onag Segged.

The presence of such a man as Paez soon made itself felt. The Jesuit mission rose into high favour, and both the Negus and his brother Sella Christos embraced the Romish faith. This gave rise to a rebellion, headed by the Coptic Abuna Peter, who was killed in a battle fought amongst the mountains of Semyen; when the insurgents were entirely defeated. The rebel cavalry were seized with a panic, could not stop themselves, and 600 men and horses galloped over a precipice, and plunged into a frightful abyss. One of the Portuguese, named Manuel Gonzalez, who had been carried away with the flying crowd, let go his bridle as his horse was falling through the air, caught the branch

of a tree on which he spent the night, and scrambled safely out next morning. The representation of this memorable catastrophe, in the Latin folio edition of Ludolf's 'Ethiopia,' is one of the most stupendous prints that artist ever engraved.

After the battle the Negus Socinios crossed the pass of Lamalmon, which is so graphically described by Bruce, and was crowned at Axum, by the new Abûna, on March 23rd, 1609. Pæz accompanied him, and continued to reside at his court. But the Romish and Ethiopic priests nourished a deadly hatred against each other. The people of course sided with their countrymen, while the Negûs upheld the Portuguese. The Abûna and the Jesuits thundered excommunications against each other, while nobles and people petitioned the Negus against innovations.

While Pæz lived, these disputes were kept within bounds. But the most lasting memorials of his genius are to be found in the ruins of churches, palaces, and bridges, erected under his superintendence. His most famous work was the palace on the peninsula of Gorgora, at the north-western corner of the great lake of Dembea. Here he found a good quarry of white stone. He taught the workmen how to cut and lay the stones, using clay instead of mortar; and eventually he completed an edifice for the Negûs, containing a grand hall and a chamber with a staircase in the centre, leading to an upper story whence there was a magnificent view of the lake. He placed a spring-lock on this door, a precaution which on one occasion saved the life of the Negûs, when the Abuna and some nobles had conspired to kill him. Pæz also built a church at Gorgora, another very fine one supported by Ionic columns on the plain of Dembea; and he probably rebuilt the famous church of Martola Mariam in Godjam, which is described by Dr. Beke. A bridge near Gondar and another across the Abai are also probably due to Father Pæz. It is a proof of the stiffnecked savagery of the Abyssinians that, with all these models under their very noses, they should still worship in churches and live in huts of which a West Coast negro would be ashamed.

Pæz is said to have visited the source of the Abai or Blue Nile in 1618; but Bruce maintains that the account of this visit in the MS. of Pæz, quoted by Kircher, was a modern interpolation.

It was certainly through the influence of Pæz that the Negus was induced to make a public profession of the Romish faith at Foggera, near the eastern shores of the great lake of Dembea, in 1622. The good Father died soon afterwards at Gorgora, after a residence of nineteen years in Abyssinia. He left a narrative of his labours, of which there were many copies in the

Jesuit colleges; but unfortunately it is not yet in an accessible form, and awaits the attention of the Hakluyt Society. Bruce says that it forms two thick octavo volumes, and that he saw three copies in Italy. There is one in the British Museum.

In the very year that Paez died, Father Manuel d'Almeyda arrived at Massowa. His route into the interior was by the high land of Asmara and Debaroa (both which places are marked on the map of Ferret and Galinier, as well as the convent of Bisan) to Fremona; whence he proceeded to the camp of the Negus at Dancaz in Dembea. He afterwards travelled over most parts of Abyssinia, and his annual letters were published at Rome in 1629. Extracts from some of them are given by Tellez, in his 'History of Ethiopia.'

On the death of Paez, the Negûs is said to have applied to the Pope for a new Patriarch, and Father Alfonso Mendez was sent out in 1624, accompanied by several Jesuit priests, among whom was Father Geronimo Lobo. They landed at Belool or Baylur, on the coast inhabited by the Dankâli tribes, and approached the highlands of Abyssinia by a route which has only once been traversed by a European since their time. Mr. Coffin, the companion of Salt and Pierce, landed at Hanfila in 1810, and reached Chelicut by following the old route of Fathers Mendez and Lobo across the salt-desert.

The Jesuits crossed this scorching desert in the month of June, and Lobo describes their sufferings and hardships in most piteous terms; but they eventually reached the convent of Fremona in safety. Lobo was employed to search for the remains of Cristoforo da Gama, which were sent to Goa for interment. This Jesuit remained in charge of the mission at Fremona for some years, and was afterwards ordered by his superiors to Damot, and crossed the Abai by jumping from rock to rock, at a point which was afterwards called "the passage of Father Geronimo." Bruce is very angry with poor Lobo, as he also is with Paez, for having described the sources of the Abai or Blue Nile, which he considers as his own exclusive property. From Damot, Lobo was ordered to return to Tigrè, and he remained at Fremona until the expulsion of the Jesuits.

There were, at this time, as many as nineteen Jesuits in Abyssinia, with churches and convents, while the Patriarch Alfonso Mendez had unlimited influence over the Negûs. But they were universally detested by the people; as the Negûs grew old their power waned, and, when he died on September 16th, 1633, it sank for ever. His son and successor Facilidas shared the feeling of the people, and resolved to put an end to the intrusion of these foreign priests. Immediately on his accession the Patriarch Mendez was ordered to leave his Court,

and retire to the convent of Fremona. Soon afterwards he and all his Jesuits were handed over to the tender mercies of the Turks, who sent them to the Pasha of Suâkin; and, after a long imprisonment, they were at length ransomed, and allowed to sail for the Portuguese settlements of the coast of India.

The narrative of the Patriarch Mendez was published in French, at Lille, in 1633; but the original is not known to exist. That of Father Lobo is well known. It was published at Coimbra in 1659, translated into French by Le Grand in 1728, and the English version of 1735 was the first literary attempt of Dr. Samuel Johnson.

General histories of the Portuguese connexion with Abyssinia were written by the Jesuit Balthazar Tellez, and by the German Ludolf; while the work of Father Luis Ureta, published at Valencia in 1610, is more scarce and less trustworthy.

The connexion of the Portuguese with Abyssinia, which extended over a period of a century and a half, is as important to the comparative geographer as it is interesting to the student of history. The limits of this paper render it impossible to dwell at any length upon the geographical results of their explorations. I have merely endeavoured to point out the sources of information respecting this earlier period of European intercourse with Abyssinia; and to give a general idea of the routes taken and the ground covered by the Portuguese explorers. In ascending to the highlands from the shores of the Red Sea, they all, with a single exception, appear to have landed at Massowa, and reached their head-quarters near Axum, by way of the convent of Bisan, Asmara, and Debaroa. But Mendez and Lobo struck out a new route for themselves. Landing at Beilul, far to the south, they marched through the Dankâli country and the desert of salt, and reached Fremona by way of Senafè. Mr. Coffin alone, among modern travellers, has followed the enterprising fathers in this route. The old road of the Greek settlers, from Adulis to Axum, which is said to be the best of all, and the modern route of Halai and Dixà, appear to have been altogether neglected in the period of Portuguese intercourse with Abyssinia.

After reaching the highlands, the different Portuguese explorers, at one time or another, traversed the country in all directions. Alvarez, with the mission of Rodriguez da Lima, went south from Axum by the route afterwards taken by Dr. Krapf, and which would lead direct to Magdala. Da Gama and Bermudez, with their armed force, marched over Tigrè and Samen in every direction; while Paez and Almeida, Mendez and Lobo, became well acquainted with all the districts round the Dembea Lake, and with the provinces of Godjam and Damot.

Before the Jesuits were expelled from Abyssinia, the glory of Portugal had come to an end. But this Abyssinian episode is not the least interesting portion of that brilliant history of Portuguese heroism which has been sung by Camoens. "At the proudest moment of that brief and glorious period," says Schlegel, "a great national song broke forth like the dying notes of the fabled swan, a dirge for the departed hero-nation."

From the expulsion of the Portuguese in 1633 to the arrival of Bruce in 1770, Abyssinia was, with the single exception of the physician Poncet's visit in 1699, closed and unknown to Europeans. The labours of more recent explorers, since Bruce's time, have been admirably sketched up to 1842, by our President, Sir Roderick I. Murchison, in his Anniversary Address of 1844. Numerous travellers have crossed the country since then; missionaries, sportsmen, and consuls, and now there is every probability that this most interesting region will, at least for a time, be more completely opened up than has ever been the case since the time of the Portuguese.

II.—*Geographical Results of the Abyssinian Expedition.* By C. R. MARKHAM, Esq., Secretary, Royal Geographical Society.

(Read, February 24, 1868, and June 8, 1868.)

I.—COAST PLAIN ROUND MULKUTTO.

Senafé, December 31st, 1867.

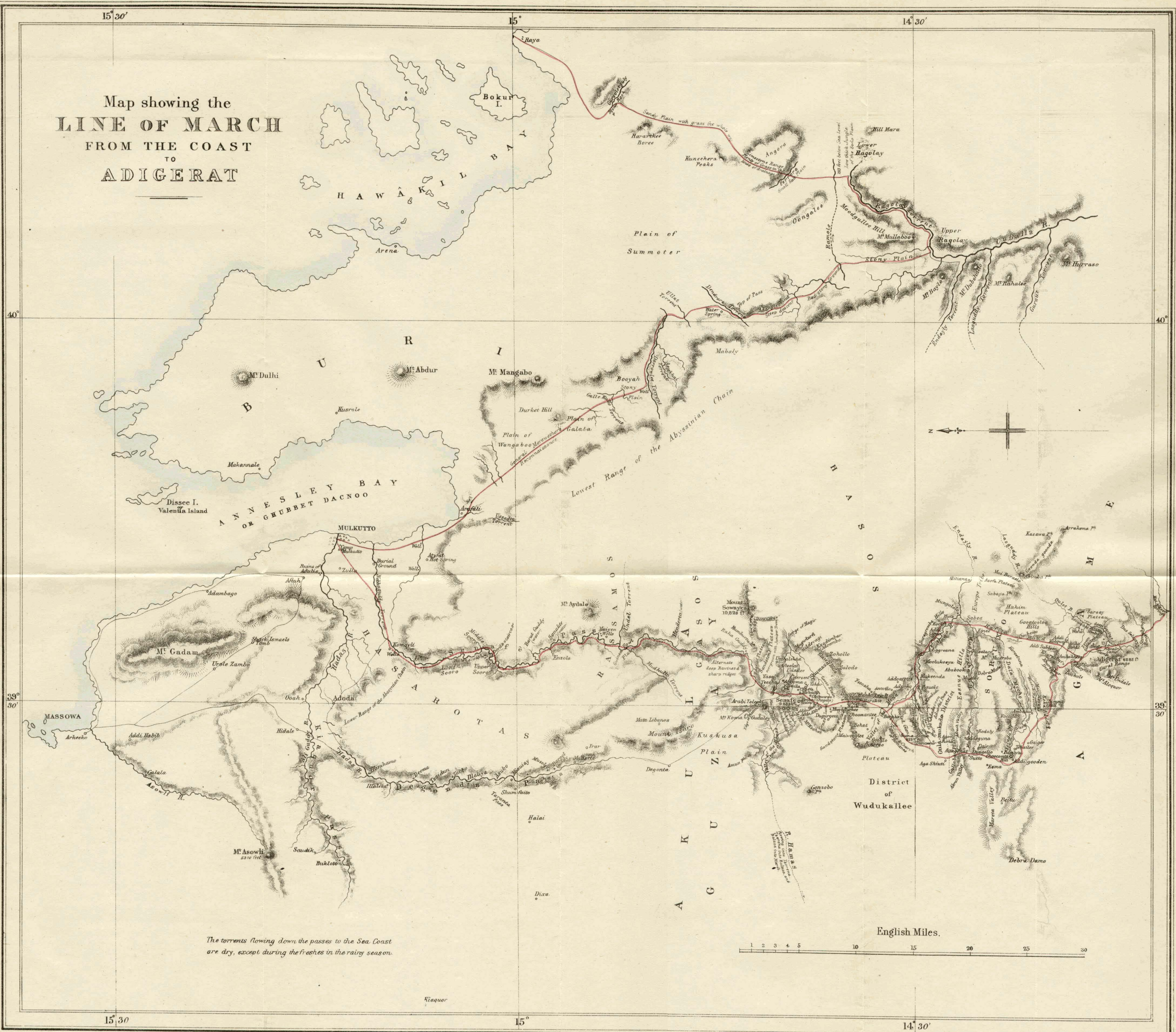
THE proceedings of the reconnoitring party under Colonel (now Brigadier-General) Merewether, Colonel Phayre (Quartermaster-General), and Colonel Wilkins, R.E., have extended over the months of October, November, and December, and the arrival of the Commander-in-Chief may be considered to have brought their preliminary labours to an end. This then is an opportune time for taking stock of the geographical results of the first three months of the Abyssinian expedition.

The reconnoitring party have explored the sea-coast from Mulkutto to Hawâkil Bay, examined and surveyed two passes up the mountains to the Abyssinian table-land—indeed, they may be said to have discovered that leading to Senafé—and reconnoitred about 50 miles of the table-land itself. My own work has hitherto been confined to the plain round Mulkutto, the pass up to the Abyssinian plateau, and the neighbourhood of Senafé.

The point of disembarkation in Annesley Bay is a few yards south of the place where the dry bed of the Hadas reaches the sea; and it is the nearest point on the coast to the foot of the



# Map showing the LINE OF MARCH FROM THE COAST TO ADIGERAT

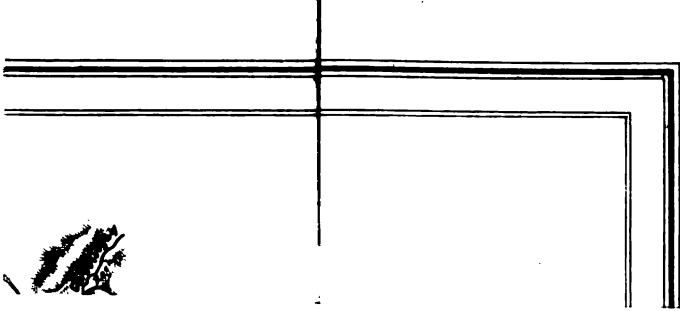


The torrents flowing down the passes to the Sea Coast are dry, except during the freshes in the rainy season.

English Miles.  
1 2 3 4 5 10 15 20 25 30

Kiaquor







mountains—the distance being about 10 miles. The site of the encampment is called Mulkutto, from a well of that name, about a mile from the shore. I found the latitude by meridian altitudes of *Capella* and *Sirius* to be  $15^{\circ} 15' 51''$ , N.; the longitude by a chronometer observation of the Navigating Lieutenant of H.M.S. *Satellite*,  $39^{\circ} 46' 15''$ , E.

The sea is very shallow for some distance from the shore, and the spring tides rise so as to cover a considerable area of the low land which, near the beach, has a slope of about 1 in 400. The ordinary rise and fall of the tide is 4 feet 6 inches.

The plain looks green from the anchorage, and when it is clear there is a magnificent view of the Abyssinian Alps, the passes clearing them laterally from north to south, so that the ridges appear to rise one above the other in a succession of waves. But on landing all illusion to which the green appearance of the land may have given rise is at once dissipated. A sandy plain, overlying clay, extends from the sea shore to the mountains, which is intersected by dry beds of torrents, and overgrown with such plants as salicornia, acacia, and calotropis. There are also tufts of coarse grass in patches.

The shores of Annesley Bay, or more properly Ghubbet Dacnoo, were, as is well known, the point whence the Greeks, in the days of the Ptolemies, carried on a thriving trade with Axum, by way of Degonta; while the Portuguese and modern travellers have recently taken the route by Massowa. The ancient Greek city of Adulis, the emporium of this trade, was close to the shore; but the ruins are now at a distance of 4 miles on the left bank of the Hadas. On a few mounds concealed by salicornia bushes, there are broken pieces of fluted columns, capitals, and other fragments of a very dark-coloured volcanic stone. But a great wealth of antiquarian treasure may be concealed under the mounds, and Dr. Lumsdaine, after making a very slight excavation, found the bronze balance and chain of a pair of scales; an appropriate first discovery in the ruins of a great commercial city. The modern village of Zulla is at a little distance on the right bank of the Hadas.

The Shohos, who inhabit this plain, are a black race, with rather woolly hair, and small boned; but with regular, and in most instances even handsome features. They wear a cotton cloth round the middle, and a cloak of the same material, the head and feet bare, and are always armed with a curved sword, worn on the right side, spear, club, and leathern shield. They cultivate a little *jowarree*, and have cattle of a very diminutive breed, asses, goats, and sheep. Their huts are scattered over the plain; while their burial places are extensive, and appear to be used by the people for a considerable distance around

them—there being only two between the coast and the entrance to the Senafé Pass—one of them close to the ruins of Adulis. The mode of sepulture is peculiar. The graves are marked by oblong heaps of stones, with upright slabs at each end. A hole is dug about 6 feet deep, at the bottom of which a small cave is excavated for the reception of the body. The tomb is then closed with stones, and the hole leading to it is filled up.

The plain round Mulkutto abounds in game,—antelopes, gazelles (Beni Israel), hares, bustards, and spur fowl; and during the rains the game is said to be still more plentiful. The coast rains usually commence in December, but there is no great fall; and this year, beyond one drizzling morning, on the 15th, there has been no rain up to the end of the month. At Mulkutto the thermometer ranges, in the day time, from 84° to 90°, from December 12th to 18th.

## II.—MULKUTTO TO HAWÁKIL BAY.

Colonel Merewether and the reconnoitring party left Mulkutto for Hawákil Bay on the 21st of October, and returned on the 30th. The road leads for the first 15 miles along the shore of Annesley Bay; and at the ninth mile, where the hills come close to the beach, are the hot salt springs of Atofeh. Thence to Arafali, at the head of Annesley Bay, the road is over a narrow plain, less than a mile broad, crossing small beds of torrents. Arafali is a village consisting of a few grass huts belonging to the Rassamo tribe, who are engaged in the salt trade from a small lake on the Buré Peninsula. There is an outpost of 100 Egyptian troops from Massowa, in an entrenched position, near the village. Good water is found by digging, and there are several wells. Close to the sea there is an extinct volcano with a double crater, 100 feet deep and 300 across; and scoria and pumice are scattered over the plain. From Arafali onwards volcanic action is apparent in every direction.

From Arafali to Booeah (the next halting-place) the distance was found to be 21 miles, thence to Mabileh, 25, and thence to Ramote 10. After leaving Arafali the way leads over a plain called Wongurboo for 3½ miles, where ostriches and antelopes were seen. Another plain follows, 5 miles in extent, called Gallatee, which is intersected by many dry beds of torrents, and overgrown with tamarisk and acacia. After crossing the Gallatee plain the road leads for 3 miles along the bed of a torrent, and then up a rugged path to a plateau called Dhan, covered with loose stones. A descent of 200 feet brought them to the Dharowlee River bed, where there was a well of very fair water, and to the eastward they could see a high hill called Alut,

which was said by the natives to be an active volcano, and to be actually smoking on the other side.

From Ramote the way leads over irregular stony ground, with high hills on either side, to the low land through which the river Ragolay flows, in an alluvial plain covered with salicornia bushes and coarse tufts of grass. The Ragolay was found to be at this point a clear running stream of excellent water. Here they saw traces of wild elephants. From this point the party followed the downward course of the Ragolay, crossing the river forty-eight times, to a place called Lower Ragolay, a distance of 14 miles. Lower Ragolay was found to be 193 feet below the level of the sea.

The Ragolay ravine belongs to the Belessua branch of the Afar tribe; and at Lower Ragolay the chiefs came in to pay their respects to Colonel Merewether. The people were very friendly, but the Chiefs explained that they had little control over them, and that it was necessary for a man to have murdered or mutilated some one before he could obtain the hand of a woman of the tribe. Strict orders were, therefore, issued against straggling.

After leaving Lower Ragolay the party came to the extreme northern limit of the great salt plain, which extended to the south as far as the eye could reach. The ground was white with incrustations of salt.

From Ragolay, their southern limit, the party was returning north-east towards Hawakil Bay; 30 miles to wells at Gairse Loyola (195 feet above the sea), and 19 more to Rasa, a village on the shores of the bay, opposite the island of Boka. From Rasa they returned to Annesley Bay in a steamer.

The temperature during the journey ranged from 101° to 110° Fahr.

The whole of this region has been under the influence of volcanic action, the evidence of which was observed at every turn. But the most valuable discovery that was made was the nature of the Ragolay River system. It was ascertained that the eastern drainage of the whole of the Abyssinian watershed from Senafè to Atsbi (called on the maps Atebidera) consisted of tributaries of the Ragolay River. These two places are about 70 geographical miles from each other. The River Mena (called Mai Muna on the maps) receives the drainage of Senafè and other plains, and forms the Endayly river, which falls into the Ragolay. Further south the river, called Ouret on the maps, receiving streams from the beautiful vale of Omfeito, and from other valleys nearly to Atigerat, flows past the mountain of Gondagonda, and forms the River Lasguddy, another tributary of the Ragolay. Still further south, between Atigerat and

Atsbi, two other rivers—the Gursuf and Gabala—receive the drainage of the eastern slopes of the Abyssinian Alps, and likewise go to swell the Ragolay.

Thus the Ragolay is an important river-system; and at the point where the reconnoitring party reached its banks it was a perennial running stream, in spite of thirsty sand and a scorching sun. Afterwards, in flowing towards the sea, it descends into a depression 193 feet below the sea-level, which was probably caused by some violent volcanic action; and its waters are finally dissipated by evaporation under the intense heat of a scorching sun, and by absorption in the sand.

To the southward of Atsbi the streams flowing to the east appear to be lost in the great salt plain, which may be looked upon as occupying the place of a vast lake without an outlet. Such a lake would, under similar circumstances, no doubt exist in a less burning climate; but here the intense heat of the sun gives rise to such rapid evaporation that no moisture remains, except a swamp here and there, and the ground is left with an incrustation of salt.

Opportunities will be taken, during the march of the field force along the watershed from Senafè to Atsbi, of completing the examination of the tributaries of the Ragolay to the eastward; and possibly, if any of the ravines through which they flow afford tolerable roads, it may be deemed advisable to open another line of communication by the Ragolay to the sea at Hawâkil Bay.

### III.—THE TEKONDA PASS.

The most important duty of the reconnoitring party, under Colonel Merewether, was to discover the best approach from the coast to the Abyssinian table-land; and the first that was examined was the gorge through which the River Hadas flows, called the Tekonda Pass, from the village at its summit. The gorge of the River Alliguddy, which unites with the Hadas in the plain, is said to form an excellent pass, but it emerges on the table-land too far to the north; the Alliguddy flowing west and east, while the Hadas comes from the south.

### IV.—THE SENAFÈ PASS.

The Senafè Pass was first discovered and examined by Colonel Merewether and the reconnoitring party early in November; and they finally led the advanced brigade up it, and encamped at Senafè, on the Abyssinian table-land, between the 1st and 6th of December. I went up the pass with Sir Charles Staveley and his Staff between the 20th and 22nd of December.

Komayli, at the entrance of the Senafé Pass, is 10 miles 6 furlongs s.,  $76^{\circ}$  w., from the camp at Mulkutto. Here the dry bed of the Nebhaguddy torrent, which flows down the pass, debouches on the plain, and the drainage-line passes on towards the sea, some miles to the southward of the bed of the Hadas. Komayli is 433 feet above the level of the sea, and here there are abundant supplies of good water from wells.

The road enters the pass immediately on leaving Komayli, and winds up the dry bed of the Nebhaguddy to Lower Sooroo, a distance of 8 miles. In several places the alluvial deposit brought down by the torrent was from 10 to even 20 feet thick. The pass winds very much, and is narrow, while the gneiss mountains rise up perpendicularly on either side. In this part the vegetation is like that of the coast plain — acacias, with a few calotropis trees. At the end of 8 miles the narrow part of the pass is reached, at a place called Lower Sooroo, where the running water which flows from Upper Sooroo, a distance of 4 miles, is lost. The volcanic action which has disturbed the whole of this region, is very distinctly visible in this pass. At Lower Sooroo the gneiss cliffs are perpendicular on the western side; and in one place a vertical crack, some 5 feet in width, is filled in with a black volcanic rock. The eye is caught by it at once, and it looks like a broad black mark painted on the face of the cliff, from the summit to the base. At Lower Sooroo the road turns sharp to the right, and enters a very narrow pass at Middle Sooroo, not more than 50 to 100 feet across, with cliffs on either side rising to a height of upwards of a thousand feet, while the pass is blocked up by gigantic boulders of gneiss, heaped together in wild confusion for a distance of 250 yards. The scenery here is magnificent. At Upper Sooroo, which is 12 miles and 2 furlongs from Komayli, the pass opens again, and the water is excellent and plentiful. The total length of the running stream, from its source to where it disappears at Lower Sooroo, is 4 miles.

I found the boiling point at Upper Sooroo to be  $207.50^{\circ}$ , and the aneroid showed 27.61 inches, which gives an elevation above the sea of about 2520 feet. The latitude by meridian altitude of *Capella* was  $15^{\circ} 1' 52''$  N.

We left Upper Sooroo in the night, and got over the first 10 miles before dawn; but I was informed that, at a distance of 8 miles, there was water up a ravine called Barutguddy (2640 feet above the sea), and again at another place called Sonakte, 2 miles further on (3234 feet above the sea). Between Upper Sooroo and Barutguddy there are two tributary torrents on the right hand side of the pass, and on the same side, a little beyond



Sonakte, the bed of the Mudhullo torrent forms a difficult communication between the Senafé and Tekonda passes.

Near Sonakte the gneiss ceases, and a dark, schistose, metamorphic rock, with strata thrown up at angles of upwards of  $70^{\circ}$ , takes its place, apparently overlying it. It was observable that, whenever there was running water, the strata were nearly horizontal and but slightly tilted, while the waterless tracts were met with where the strata were tilted at great angles. At a distance of 12 miles 5 furlongs from Upper Sooroo, at a place called Maiyen, a well has been dug, and a mile further on the pass opens out, and there is a plain which the reconnoitring party named after a bevy of guinea-fowl they put up there. Here the first *kol-quall*, or candelabra-trees (*Euphorbia*), which are described in such enthusiastic terms by Bruce, are met with. Their upright branches, clustering close together, of a bright *Araucaria* green, certainly have a very fine effect amongst the brushwood. There are also large beds of aloes on the plain. To the right a view of the plateau of Abyssinia, with scarped cliffs, apparently only distant about 4 miles, is obtained through an opening in the cliffs.

Further on the scenery in the pass becomes very fine, the cliffs higher, with peaked mountains towering up behind them, and the vegetation richer and more varied. The strata of the schistose rocks are here not only tilted at great angles, but crumpled into irregular waves, and where there are veins of quartz, the two kinds of rock are torn away, leaving gaping cracks and fissures. Very fine trees of the fig tribe, peepal, banyan, and sycamore figs grow in this part of the gorge, with the feathery tamaric, tamarinds, jujub-trees, and an undergrowth of mimosa, lobelia, and solanum. The pass winds in and out amongst the mountains, and at one lovely spot the cliffs approach within 40 feet, while the foliage of 4 or 5 venerable banyan-trees overshadows the road. In some places there was a perfect plague of locusts, which rose from the ground in myriads as we approached, their innumerable wings making a loud crackling noise. Monkeys are numerous in the pass, and the carcasses of many dead mules have attracted a host of obscene vultures.

The distance from Maiyen wells to the next water at Raha-guddy is 16 miles, 3 furlongs; but there is a little water after rains at a place called Henderta, only 11 miles from Maiyen. The whole distance from Upper Sooroo to Raha-guddy is an excellent natural road with an easy gradient, but at Raha-guddy it again narrows, and some labour is required to make it passable for wheeled traffic.

At Raha-guddy, where there is a good supply of running

water, the flora becomes more alpine. There is turf by the road side, tall, handsome, juniper pines, wild olives, several mimosæ, peepul, banyan, and sycamore, figs, kol-qualls, jujub-trees, an evergreen bush with a sweetly scented flower (*Myrsine Africana*), lobelia, solanum, and wild thyme, while a graceful clematis climbs over the trees. I climbed to the top of a hill above Raha-guddy, with Sir Charles Staveley, and obtained a splendid view. To the south and west is the edge of the Abyssinian table-land, running in almost a straight line, with scarped sides of white sandstone. The mountain ridges or spurs, between which the passes wind, appear to run off from the table-land at right angles, but afterwards turning to the north, and throwing up peaks here and there. They then wind away in a northerly direction, but very tortuously, with deep ravines between them. It appeared, from our point of view, as if there was a deep natural trench between these mountain spurs and the ascent of the table-land.

I found the boiling point at Raha-guddy to be 200·80, and the aneroid showed 23·84, which makes the elevation above the sea about 6300 feet. The latitude by meridian altitude of \**Capella* 14° 45' 52" N. Temperature at 11 P.M. 59° Fahr.

Senafé, on the Abyssinian table-land, is 8 miles from Raha-guddy, 5 to the foot of the ascent, 1½ the ascent, and 1½ across the plateau. The length of the gorge, from Komayli to the foot of the ascent to Senafé, is thus nearly 46 miles. The ascent up the sloping rocky side of a hill is by no means difficult; and the plateau of Abyssinia is thus reached. I have been in the Alps and Pyrenees, have walked or ridden up nearly every pass in the Western Ghauts of India from Bombay to Cape Comorin, and know most of the passes in the Peruvian Andes, and I confidently affirm that in none of these ranges is there any natural opening which is so easily accessible as that from Komayli to the highlands of Abyssinia. One peculiar feature in these Abyssinian mountains is that the passes leading through them have easier gradients, and are altogether more readily surmounted than those of almost any other mountain range in the world.\*

The reconnoitring party have gone over the ground, on the table-land, between Senafé and Tekonda, a distance of about 9 miles, and have thus connected their surveys of the two passes. Parties of sappers, and a Belooch regiment, are at work on the narrow parts of the Senafé Pass, at middle Sooroo and Raha-guddy, and very soon there will be a good road throughout. The line separating the region of mountain and coast rains is at

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\* The Bolan Pass is perhaps as easy.

or near Upper Sooroo. Above that line the heavy rains of the Abyssinian highlands begin to fall in June, and it is apprehended that the swollen torrent will then render the gorge impassable. But the area of drainage appears to me to be too small to justify this apprehension, while the growth of trees in the torrent bed seems to indicate that such floods are at least not of annual occurrence. The Senafé Pass is flanked by the Tekonda Pass on one side, and by another ravine on the other, so that the side drainage is confined to the rain-fall on the almost perpendicular sides of the flanking hills. Nor is there a larger area of drainage from the plateau, as the streams at Senafé and its vicinity go to swell the Ragolay system. If floods occur at all they must be merely the rush of surface drainage over a comparatively small area, after some exceptionally heavy fall, and must be sudden and of very short duration—the water rushing rapidly down the gorge. However all this remains to be proved.

#### V.—SENAFÉ.

The camp at Senafé is pitched on a plain surrounded on every side but the south-west by an amphitheatre of sandstone hills and rocks. This sandstone seems to overlie the metamorphic rocks in the pass, and I am informed that all the table hills towards the south and west are of the same formation.

I found the boiling point at Senafé to be  $198^{\circ}00'$ , and the aneroid showed 22.56 inches, giving the elevation above the sea at 8332 feet. The latitude by meridian altitudes of the Sun, and \**Capella*  $41^{\circ} 14' 52''$  N., and the longitude by D. R.  $39^{\circ} 31'$  E. All the longitudes will be accurately fixed as soon as the electric telegraph is brought up to Senafé.\* At this time of year the sky is usually cloudless, except at dawn when the fleecy mists roll up the passes; and the sun is hot during the day, the temperature ranging from  $68^{\circ}$  to  $78^{\circ}$ ; but the bright starry nights are cold, the minimum descending as low as  $45^{\circ}$ .

The plain is covered with grass or stubble barley fields, and dotted with stunted juniper pine, with thyme, and other bushes. The head of the pass is a mile and a half over the plain, a few points to the eastward of north, and nearly due north is the lofty scarped hill called Arabi Teleeki. I climbed to the summit to get a round of angles, and found the boiling point to be  $196^{\circ}05'$ , the aneroid showing 21.60 inches, which gives an elevation of 8561 feet above the sea, and 1097 above the camp. A ridge covered with flowering bushes, the pretty *Myrsine* being

\* Unfortunately there was not time to fix the longitudes by telegraph, and it was not done.

most common, extends from Arabi Teleeki until it bears n.w. by w. from the camp, where there is an opening—the beetling cliffs of the Adana rock rising up on the other side. Here, at a spot where wild thyme and *Myrsine* bushes cluster round mighty boulders of rock, with intervals of soft turf, there is a wide view over the valley of the Hames to the north-west, with flat-topped mountains rising one above the other, in the far distance.

The village of Senafé is at the foot of the grand mass of sandstone rock about half a mile north-west of the camp, called Amba-Adana. It consists of about a dozen houses built of rough stones and mud, with flat roofs—branches being placed in rows across the beams, and covered with mud. Broken jars plastered into the roof, serve as chimneys. The outer door, very roughly formed, with wooden posts and lintel, leads into a large outer hall, the roof of which is formed of timber pillars. This serves as a stable for cattle and goats, while a mud platform, along one side, is the sleeping place for servants and guests. Doors lead from this hall into two much smaller chambers, occupied by the family. The population of Senafé is about 240. The inhabitants are all Mohammedans; an upright people with good features, but with very black complexions and woolly hair done in plaits. The women are filthily dirty, wearing a leathern petticoat and mantle, and necklaces of beads. The dress of the men differs from that of the Shohos in having cotton drawers—their arms are the same.

Senafé is the last Mohammedan village, all beyond in this province of Shamazano are Christian.

## VI.—THE REGION AROUND SENAFÉ.

Camp, Senafé, January 22nd, 1868.

The long detention of the Abyssinian expedition at Senafé has afforded occasion for a more detailed examination of the immediate neighbourhood of the British camp there than is usually possible for a traveller in passing through a new country. The region thus thrown open to geographical research comprises the southern portion of the great Tigrè province of Akula-Guzay. I propose to submit a sketch of the physical geography of this region, which is specially interesting from its containing the base of operations of the British force, on the Abyssinian plateau.

The southern half of Akula-Guzay (comprising the districts of Shumazano, Wudukalee, Tserena, and Gula Mukado) consists of plateau at a general elevation of 8000 feet above the sea, with occasional peaks and ridges rising to a height of 9000 feet and upwards; of wide valleys surrounded by these plateaux at a

height of 7000 feet; and of deep ravines and river basins elevated from 6000 to 4500 feet above the sea.

The plateaux stretch from north to south along the main line of the Abyssinian alps, and form their summit ridge; and they also extend over a considerable area to the westward, dividing the valleys from each other. In describing the passes leading from the plateaux to the sea-coast, I mentioned that the lower rocks were gneiss; above which came a mica schist, with veins of quartz, tilted at an angle of at least 70°; and that the schistose rock was overlaid unconformably by a deposit of sandstone. The plateaux, which I am now endeavouring to describe, are composed of sandstone overlying the same tilted strata as are visible in the pass; and they present a very remarkable appearance when viewed from the valleys which they enclose. Their summits form a perfectly straight level line, and their sides, from the top to a depth of 50 to 100 feet, are scarped sandstone cliffs, but below these cliffs the schist rocks, more or less disintegrated at the surface, form hill sides which slope down more gradually to the valleys. Several flat-topped peaks rise from the plateaux, the most remarkable of which are Arabi Teleeki (two miles north of the camp at Senafé), which I found to be 9600 feet above the sea; Gonzobo, some miles to the westward of Senafé, and Sowayra about 7½ miles to the eastward. I was unable to effect the ascent of Gonzobo owing to the disturbed state of the country in that direction; but I made a successful expedition to the summit of Mount Sowayra, under the guidance of a chief of the Gaso Shohos. Sowayra consists of a range of lofty sandstone cliffs on the verge of the plateau overlooking the Senafé Pass, and from one point we could see the tents of the Belooch regiment at Raha-guddy in the pass below. We had to select the loftiest part of the ridge for ascent, and, after a hard climb over projecting rocks and along narrow shelves, we reached the summit. Here I found two small rocky table-lands, divided by a slight depression, and I proceeded to observe the altitude on each, with the following results:—

Mount Sowayra. No. 1:—

|               |    |    |    |    |    |               |
|---------------|----|----|----|----|----|---------------|
| Boiling point | .. | .. | .. | .. | .. | 195·05°       |
| Aneroid       | .. | .. | .. | .. | .. | 20·86 inches. |
| Height        | .. | .. | .. | .. | .. | 10,328 feet.  |

Mount Sowayra. No. 2:—

|               |    |    |    |    |    |               |
|---------------|----|----|----|----|----|---------------|
| Boiling point | .. | .. | .. | .. | .. | 195°          |
| Aneroid       | .. | .. | .. | .. | .. | 20·80 inches. |
| Height        | .. | .. | .. | .. | .. | 10,350 feet.  |

The sandstone of Mount Sowayra is much stained with iron, and near the summit I came upon some thin flakes of lime.

The plateau, from which Sowayra rises, is intersected by deep wild glens overgrown with juniper; the drainage flowing to the Shumazano valley and away from the Senafé Pass. But, in January, the torrent beds are all dry, and only in one place did we find a few pools of stagnant water.

The second great feature in this region is the valleys which are surrounded by the loftier plateaux. The chief of these is that of Shumazano, 7000 feet above the sea, and about 5 miles long by 4; at the north-east corner of which is the British camp, pitched under the grand sandstone peaks and precipices of Senafé.\* The edges of the tilted strata of the schist rock, at an angle of  $70^\circ$  from north-west to south-east, crop out in every direction over the valley with veins of quartz. The shallow soil is composed of the disintegrated rock, and is covered with stones and pebbles of white quartz. Here and there the rock rises up and forms isolated conical hills, upon which the villages are built; but wherever these hills rise above a certain height, as in the case of the lofty peak of Saim at the western end of the valley, the summits are capped with sandstone. This upper sandstone deposit has thus been washed away in the valleys, until the schist which underlies it is exposed, while it remains to cover the plateaux and cap the isolated peaks which rise from the valleys. The schist is first met with in the Senafé Pass, at an elevation of 3000 feet, and it is overlaid by the sandstone at about 7000 feet, so that the perpendicular depth of this formation must be about 4000 feet. Considering the angle at which the schistose strata are tilted, and the ease with which water can penetrate down them, owing partly to the frequently recurring veins of quartz, I should be inclined to think that no water would be found except at enormous depths below the surface. Thus the whole distance from Raraguddy to Maiyen well (in the Senafé Pass) is devoid of water, while at the latter place, and at Upper Sooroo, in the neighbourhood of which points the schist rock rests upon the gneiss, fresh water appears again. The Shumazano valley is watered by surface drainage. The population of the 16 villages in this valley, including Senafé, is about 5000 souls;

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\* Dr. Beke states that there was a Greek station at Senafé, but I have searched and inquired in vain for any ruins. The name bears out the tradition of the inhabitants of the village, that it was founded by people coming from Sana, in Yemen, 400 years ago. When General Merewether, and the reconnoitring party, ascended the high plateau near Tekonda, called Koheito, they found ruined walls and columns on Mount Tsaro, the highest part. This, it seems probable, and not Senafé, was the position of the Greek dépôt, on the verge of the Abyssinian plateau. The way to it, from Adulis, was probably by the Senafé Pass, as far as the Mudhullo Torrent, and then by that torrent bed, which leads direct to Tsaro, and on to Tekonda and Axum.

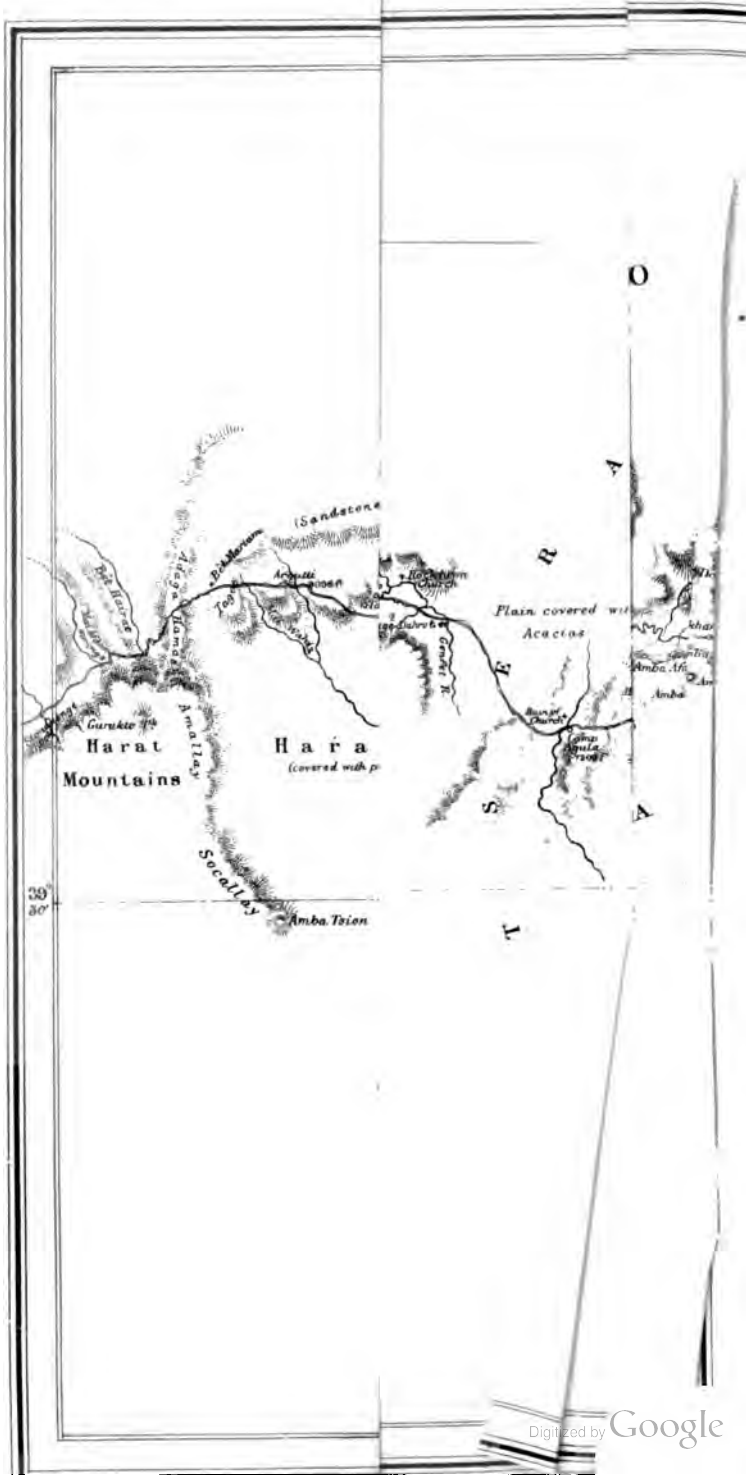
and the extent to which their resources are being drawn upon by the English Commissariat may be imagined when, from January 1st to 15th, 60,000 lbs. of barley and 200,000 lbs. of grass have been purchased. It is true that some of this comes from the neighbouring valley of Mai Mena. The Mai Mena, in its general features, resembles the Shumazano valley—except that, on its western side, there are long, deep, and very picturesque gorges with perennial streams of delicious water forming deep pools amongst the giant boulders of sandstone. This difference may be caused by the increasing rainfall in the rainy season as we advance westward.

The third great feature in the region, the geography of which I am describing, is the deep ravines and river beds, which carry off the drainage on the one hand to the River Mareb and on the other to the coast of the Red Sea. The valley of the Mena was explored for some distance by Captain Pottinger of the Quartermaster General's Department, in the beginning of the present month. He ascertained that the Mena flowed into the Endayly, a principal affluent of the Ragolay, but the complete exploration of this river system was prevented by his small party being stopped by a truculent tribe of Shohos (the Hazo). The Hagir gorge conducts the drainage of the Shumazano valley and surrounding plateaux to the Ragolay, while the steep northern slopes drain into the Senafé Pass. But the deepest and grandest gorge is that of the Hamas, in the Mareb River system, immediately to the westward of Senafé. The Senafé rocks rise from the plain on their eastern sides, but to the westward they tower over a rapid declivity which descends to the Hamas gorge. This declivity is entirely of schistose rock, the Senafé cliffs above alone being of sandstone. But it is cut up by deep watercourses which are filled with gigantic masses of sandstone hurled from the cliffs above. These boulders form deep caves, the lurking places of panthers and hyænas. I know not whether to give the palm to the view looking down from the Senafé cliffs over the Hamas gorge, with the wild masses of mountains beyond, bounded by the dim outline of the peaks near Adowa; or to the view upwards from the gorge, with the fantastic peaks and dizzy precipices, and the crowds of lordly eagles and more humble kites wheeling in circles above them. I found the elevation of the Hamas gorge, just at the foot of the declivity, to be 5850 feet above the sea, or 1600 below Senafé. There is no water in the Hamas at this season, but, in the rainy season, it drains into the Tserena, a tributary of the Bellesa, which is an affluent of the Mareb.

One of the most interesting points for observation in this alpine region is the character of the vegetation with reference to







zones of elevation, from the Hamas gorge at about 6000 to the top of Sowayra at 10,300 feet—a perpendicular height of more than 4000 feet. On the summit and slopes of Sowayra the *flora* is of a thoroughly temperate, and even English character. The only tree is the juniper, while the most common plants are lavender, wild thyme, dog rose, violets, cowslips, and compositæ. The sandstone plateaux have the same *flora*, but on the lower slopes of the hills bounding the valleys it is enriched by many trees and shrubs of a warmer clime. Italian here mingles with English vegetation. In the lovely gorge of Baraka, on the western side of the Mai Mena valley, which is rendered sacred by the shrine and church of the Abyssinian saint Romanos and his fellow martyrs, masses of maiden hair fern droop over the clear pools of water, and the undergrowth consists of a *Myrsine*, a large lobelia, and solanum. At this elevation the vegetation akin to that of the Bombay ghauts commences. Huge and venerable *dahro* trees (the representative of the Indian banyan) grow near the villages, and afford shelter for flocks of pigeons; and tamarinds, mimosæ, jujub, and oleander trees appear in the ravines. But the English types, so plentiful round Mount Sowayra, do not descend lower than Raha-guddy—6000 feet above the sea—and they disappear altogether in the Hamas gorge, where there is nothing but acacias and mimosæ. Thus the temperate flora may be said to extend over a zone from 10,000 to 6000 feet above the sea, the sub-tropical from 6000 to 3000, and the dry tropical coast vegetation from 3000 to the sea. The open elevated valleys are, as a rule, bare of trees, the dahros and acacias only occurring in sheltered places near the villages, although the loftier plateaux are pretty thickly covered with low juniper trees overgrown with clematis.

A series of meteorological observations carried on during only one month can give no idea of the climate; but it appears that the cold nights and warm cloudless days of the dry season are succeeded, from May to September, by rains more or less heavy, which convert the dry pastures into swamps, and fill the water-courses with torrents. The water, however, for the most part, rushes rapidly off in surface drainage. The prevailing wind, in December and January, at Senafé, is easterly.

## VII.—SENAFÉ TO ANTÂLO.

Camp at Buva, near Antâlo, February 24th, 1868.

The country between Senafé and Antâlo forms the watershed of the river flowing off to the Red Sea coast, on the one hand, and of the feeders of the Mareb and the Nile on the other. The



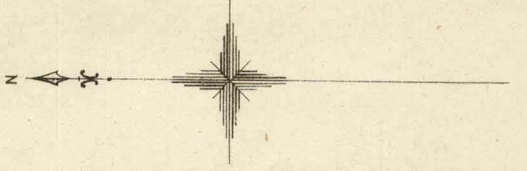
14°

13° 30'

13°

12° 30'

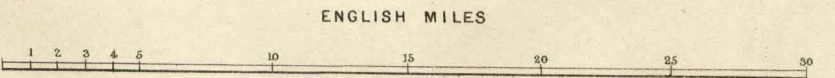
12°



A Z E B O G A L L A C O U N T R Y



LINE OF MARCH  
FROM  
ADIGERAT  
TO THE  
RIVER TAKKAZYÈ



14°

13° 30'

13°

12° 30'

12°



distance between the two places by the road is 120 miles—the route taken by the British army being as follows:—

|                                                               | Distance.* |      |        | Corrected Course. |
|---------------------------------------------------------------|------------|------|--------|-------------------|
|                                                               | Miles.     | Fur. | Yards. | °                 |
| <b>Akula Guzay—</b>                                           |            |      |        |                   |
| Senafé to Barakit .. .. .                                     | 7          | 3    | 115    | S. 11 W.          |
| ,, Goona-goona .. .. .                                        | 5          | 0    | 0      | S. 24 W.          |
| <b>Agamé—</b>                                                 |            |      |        |                   |
| Senafé to Mai-musrab .. .. .                                  | 7          | 3    | 96     | S. 41 W.          |
| ,, Focada .. .. .                                             | 6          | 0    | 139    | S. 13 W.          |
| ,, Khursabur .. .. .                                          | 5          | 2    | 173    | S. 31 E.          |
| ,, Adigerat .. .. .                                           | 5          | 3    | 81     | S. 8 E.           |
| <b>Haramât—</b>                                               |            |      |        |                   |
| Adigerat to Mai Wahiz .. .. .                                 | 12         | 0    | 0      | S. 24 E.          |
| ,, Adabagi .. .. .                                            | 14         | 4    | 0      | S. 9½ W.          |
| <b>Tsera—</b>                                                 |            |      |        |                   |
| Adabagi to Dongolo .. .. .                                    | 9          | 2    | 0      | S. 11 W.          |
| ,, Agula .. .. .                                              | 8          | 0    | 0      | S. 24½ W.         |
| ,, Mai Makdan .. .. .                                         | 7          | 2    | 0      | S. 27 W.          |
| <b>Enderta—</b>                                               |            |      |        |                   |
| Mai-Makdan to Dolo .. .. .                                    | 6          | 4    | 0      | S. 25 W.          |
| ,, Haik-hallat .. .. .                                        | 8          | 2    | 0      | S. 24½ W.         |
| ,, Afgul .. .. .                                              | 4          | 0    | 0      | S. 62 W.          |
| ,, Antálo (camp on Buya River,<br>4 miles S. of town) .. .. . | 7          | 0    | 0      | S. 21½ W.         |
|                                                               | 113        | 1    | 604    |                   |

In my previous paper I described the region round Senafé, including the valley of the Upper Mena, and the romantic glen of Baraka. On the southern side of the Mena a lofty chain of mountains rises up very abruptly, and forms the water-shed. The road ascends to the wide plain of Gullaba, on their western flank, from a beautiful little valley enclosed between precipitous cliffs, where a bright stream falls from a height of 150 feet into a copse of scented shrubs, irrigates an expanse of barley cultivation at the village of Goona-goona, and empties itself into the Mena. At this point the schistose rocks entirely disappear from the surface, and nothing but sandstone is seen as far as Adigerat.

At Goona-goona (2 P.M.):—

|                          |               |
|--------------------------|---------------|
| Boiling point .. .. .    | 198·8°        |
| Aneroid .. .. .          | 22·74 inches. |
| Temperature .. .. .      | 79°           |
| Height above sea .. .. . | 8227 feet.    |

From the plain of Gullaba there is a fine view of the Adowa

\* Straight, from point to point.

mountains to the westward, and of the well-defined peaks round Senafé to the north. The plain is covered with long tufts of grass and *myrsine* bushes, and abounds in game, hares, spur-fowl, and quail. At the southern end of the plain there is a depression forming a narrow ridge, which is the exact water-shed of the country, the drainage on one side going to the Mareb, and on the other to the Ragolay, within a few feet of each other. The eastern streams still flow to the Mena; and, looking down the valley of Mai Musrub, the deep gorge of the Wudharsha stream could be seen beyond, with the overhanging cliffs which bound it overlapping each other far away into the eastern distance. High above all towers the flat-topped *amba* of Debra Matso, the stronghold of the Sabagadis family. A few miles further on the high scarped mountain of Focada intersects the plateau, and the road is taken round its western end, on the very edge of the cliffs, whence there is a most remarkable view, which at one glance furnishes a good idea of the physical features of this part of Abyssinia.

The spectator, standing at the foot of the Focada mountain, and looking to the westward, has before him, at his own level, an apparently interminable plateau with peaks and hills, such as that of Focada, rising out of it. But the plateau is also deeply cut into by valleys of considerable width and great depth. From his very feet the hills descend, first as perpendicular cliffs, and then with sloping sides overgrown with trees; and far below there is the fertile valley of Mareta, with its villages and green crops. But the most remarkable feature of the landscape remains to be described. Just as peaks rise from the surface of the plateau, so hills rise up out of the valleys, with sides exactly like those descending from the plateau, and with flat-topped summits corresponding exactly with the plateau-level. One of these *valley* hills is the famous *amba* of Debra Damo, famous in the history of the Portuguese expedition of Cristoforo da Gama. The general effect is most striking; it gives the idea of a dead level plain which had been cut into by floods forming ravines and valleys, but leaving portions of the plateau in their midst as islands, just as navvies leave earth pillars to measure the depth of their excavations.

After rounding the Focada mountain the road crosses a grassy plain, and begins to skirt the eastern side of the watershed. Here an important knot of mountains begins to rise from the plateau, which ends in an abrupt wall about 20 miles further south. It is called the Harat range, and is one of the chief mountain roots (stock-gebirge) of Tigre; as its western half forms the dividing point of the waters flowing to the Mareb on

the north, and the Nile on the south. I have only seen its eastern and southern sides.

Just beyond Focada, and at the commencement of the Harat hills a little stream, called Kai Korkos, pours over a cliff into a thickly wooded ravine, the view from the top extending far away over hills and valleys to the eastward. Four miles further on is the steep descent of Khursabur, and another five miles in an easterly direction completes the march to Adigerat.\* The Harat hills increase in elevation to the southward—and Adigerat, a ruined and half deserted town, with a large church and ruined palace to tell the tale of former prosperity—nestles at the foot of the Aloquor and Undale peaks, which are upwards of 11,000 feet above the sea.

The Khursabur ridge, an eastern spur of the Harat, separates the eastern drainage, the streams to the north of it being tributaries of the Mena, while to the south the water converges to form the Ouret. The Mena is a tributary of the Endayly, and the Ouret of the Lasguddy, both main tributaries of the Ragolay. The fertile plain of Adigerat is, strictly speaking, a wide terrace at the foot of the lofty Harat mountains, whence deep ravines lead off the drainage to the Ouret valley. At the same time there are abrupt scarped ridges of sandstone on its eastern side, which are cut through at intervals to allow the escape of the Harat drainage. I made the following observations at Adigerat (6 P.M.):—

|                                                 |         |                |
|-------------------------------------------------|---------|----------------|
| Boiling point                                   | .. .. . | 197°9'         |
| Aneroid                                         | .. .. . | 22·27 inches.  |
| Temperature                                     | .. .. . | 61°            |
| Height above the sea                            | .. .. . | 8585 feet.     |
| Latitude by meridian altitude of ☉              | .. .. . | 14° 16' 26" n. |
| Variation and deviation by azimuth observations |         | 9° 11' w.      |
| Longitude by D. R. (distances chained)          | .. .. . | 39° 35' 30" e. |

The vegetation of Adigerat is much the same as at Senafé, but water is more abundant, and where the springs issue from the hills there are wooded glens containing many tall trees, most of them belonging to the fig tribe. The *kol-qualls* attain to a great height, there are thickets of jessamine and dog-roses, and the plain is covered with an aloe having a bright orange flower, the same, M. Munzinger informs me, as is known in medicine by the name of the Socotrine aloe.

To the eastward of the Adigerat plain the ground is broken up into profound ravines sloping off to the eastward, with their scarped sides sometimes forming magnificent cliffs, and ter-

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\* The capital of the province of Agamé, and once the favourite residence of Sabagadis, who was ruler of Tigrè from 1813 to 1831.

minating in *ambas*, or natural fortresses—a country well adapted for the wild lives led by the turbulent and usually outlawed musketeers of Agamé. In the Ouret ravine the rock underlying the sandstone crops out, and appears to be a coarse granite, with veins of quartz. The sandstone is very full of iron, and, for the purpose of testing the deviation of the compass, I took a careful bearing of a tent in camp from the top of an *amba* called Sebanbat-falasso, and another from the tent to the *amba*. The difference between the two bearings was 3°. From the above *amba* there is a distant view of the lofty peak of Goonda-goonda to the eastward, round which the Lasguddy river is said to flow, and beyond it the mountains rapidly slope away into the coast country of the Shohos.

There is a very curious formation a few miles south of Adigerat, which is worthy of mention. A conical hill rises out of the plain, and on the summit there is a mass of very coarse-grained sandstone, forming two rough columns and a lintel. The doorway thus formed is perfect; at a distance it might easily be mistaken for the work of man, but on a nearer approach its massive proportions, and the fact that the door-posts are a part of the hill itself, show that nature alone could have been the workman.

At the southern end of the plain of Adigerat, four miles south of the town, a ridge jutting out from the Harat range separates it from a ravine converging to the Ouret, there is yet another ravine belonging to the eastern drainage system, and then a steep rocky ascent leads to the summit of a ridge at the extreme south-east angle of the Harat mountains, which forms the dividing line between the Nile and the Ragolay. High above, on the right, rise the beetling cliffs of the Harat, but away to the south-west, as far as the eye can reach, is the rich plain of Haramât, traversed by springs which go to swell the Atbara, the main fertilizing tributary of the Nile.

As the sun was setting we descended the opposite or southern side of the ridge, passed through the gloomy grove of kol-qualls surrounding the ruined church of St. Mary's; and, when our horses' feet sunk in some black mud by the side of a thicket of dog-roses and jessamines, we realized the fact that at last we were in the basin of the Nile. That swampy ground was the source of the Mai Wahiz ("running water"), a feeder of the Geba, which is one of the main tributaries of the Takkazyè. We had reason to remember our first night in the Nile basin, for the baggage mules were benighted, and we passed the night, a very cold one, round a camp fire, without tents or beds.

Our camp was at Argutti,\* four miles south of the ridge

\* Argutti is a very fine tree (*Celastrus Senegalensis*), but there are none at this place. *Lucus* a non lucendo.

(which is called *Adaga-Hamas*, because a market is held there every Thursday); and at daylight, on the morning of February 13th, I took the following observations:—

Argutti (6.13 A.M.):—

|                                      |         |               |
|--------------------------------------|---------|---------------|
| Boiling point                        | .. .. . | 196.9°        |
| Aneroid                              | .. .. . | 21.86 inches. |
| Temperature                          | .. .. . | 43°           |
| Height above the sea                 | .. .. . | 0936 feet.    |
| Deviation and variation by amplitude |         | 8° 21' w.     |

The important mountain-knot of Harat ends abruptly at a point about 8 miles south of Adigerat, and from Argutti, which is about 4 miles south of that point, they appear like a mighty wall rising suddenly from the plain of Haramât—bold sandstone cliffs, with flat tops, surmounted here and there by truncated cones, and the higher peaks, such as Aloquor and Undale (over Adigerat), in the interior of the mountain-knot, rising above them. The most conspicuous of these lofty flat-topped cones is the famous Amba Tsion, the great fortress of Haramât, forming the extreme south-west angle of the Harat Range, and bearing N. 88° W. from Argutti. For many and many a mile to the southward it forms a noble landmark.

The plain of Haramât is bounded on the north by the Harat Range. On the east there is a line of sandstone flat-topped hills, extending for some miles to the southward, and sinking into the plain in a succession of wide terraces, broken by steep ravines which are well wooded, with rich pasture and arable land at their bases. Here most of the villages are built, and it is observable that at this point the houses cease to be square and flat-roofed, as in Shumazano, and are circular, with pointed thatched roofs—losing the Arab and having more of the African character.

At the southern end of the plain of Haramât, which is rich in cattle and grain, there are a series of undulating hills, with valleys between. That of Adabagi ("*Sheep Village*") is 14 miles south of Argutti:—

Adabagi (1 P.M.):—

|                  |         |               |
|------------------|---------|---------------|
| Boiling point    | .. .. . | 197.75°       |
| Aneroid          | .. .. . | 22.14 inches. |
| Temperature      | .. .. . | 72°           |
| Height above sea | .. .. . | 8781 feet.    |

About two miles beyond Adabagi there is a long and steep descent to Dongolo and the valley of the Genfel, and here the slate-rock again appears, which I had not seen since leaving the Shumazano district, where it underlies the sandstone, and appears in all directions on the surface of the plain. At this point the character of the country entirely changes, so that the



country between Senafé and Antálo is divided into two distinct regions at the descent of Dongolo, one upwards of 8000 feet above the sea, with the vegetation of the temperate zone; the other little over 7000 feet above the sea, with the dry semi-tropical flora of the upper Bombay Ghauts, but much poorer and scantier. In both the plains are bare of trees, and the vegetation only becomes rich in the sheltered glens; in both the mountain-peaks and plateaux rise high above the average level, and many plants are, of course, common to both.

The scenery on the Dongolo descent and in the Genfel valley is exceedingly beautiful. On the right there is a glorious mass of reddish sandstone cliff, and the lower hills are covered with that mimosa with the crimson pod which glistens under the rays of the sun (common also at Raha-guddy, in the Senafé Pass), with myrsine, and the *Cassia Arereh*, now leafless and covered with bright yellow flowers. A broad running stream flows through the valley, bordered by a kind of asclepiad with milky juice, leaves like an oleander, and milk-white woolly flowers. Here and there venerable dahro trees afford a grateful shade, under their wide-spreading branches. The road crosses the Genfel River, a tributary of the Geba, and enters upon a vast plain covered with stunted acacias, which, if it were not for a fragrant labiate plant interspersed among them, would remind one of the country round Mulkutto. This lower region abounds in camels of a strong active breed. The road to Atsbi, the great salt-market, branches off just beyond Adabagi, and the camels, brought up with salt by the Taltals, are driven to the westward to feed upon the acacias, many finding their way into the possession of the natives, between Dongolo and Antalo. The Mohammedans especially, of whom there are not a few, and who are all traders, are great owners of camels.

Agula is in a valley, 7 miles south of Dongolo, running east and west, with a fine stream of water flowing through it—also a tributary of the Geba. The hills on either side, unlike all those to the northward, are low and round, and are composed of limestone full of fossil-shells and encrinites. From the hills to the westward there is a fine view of this valley, with the winding course of the brook marked by a bright green belt:—

At Agula (5 P.M.):—

|                          |         |               |
|--------------------------|---------|---------------|
| Boiling point            | .. .. . | 200·1°        |
| Aneroid .. .. .          | .. .. . | 23·39 inches. |
| Temperature .. .. .      | .. .. . | 75°           |
| Height above sea .. .. . | .. .. . | 7209 feet.    |
| Var., &c., by Azimuth    | .. .. . | 12° w.        |

Lat. mer. alt. \* Sirius obtained, but not very satisfactory, as the sky was cloudy.

The road from Agula to Dolo, a distance of 15 miles to the southward, is over three ranges of limestone hills, from 500 to 800 feet high, with intervening valleys. From the last ascent there is a magnificent view down the wide gorge to the westward, with a series of distinctly-marked terrace-lines round the hills. At the summit I obtained a bearing of the Aloquor Peak, towering above the southern front of the Harat Range in the blue northern distance. This peak is immediately above Adigerat. At the same time I got another bearing of Amba Aradom, a hill just over Antâlo, to the south. The Dolo ravine, running from east to west, opens upon the plain of Gembela, which appeared to be covered with green crops, rich pasture, and villages :—

At Dolo Camp (8 A.M.):—

|                          |            |
|--------------------------|------------|
| Boiling point .. .. .    | 199.6°     |
| Aneroid .. .. .          | 23 inches. |
| Temperature .. .. .      | 59°        |
| Height above sea .. .. . | 7585 feet. |

From Dolo there is a good road over a grassy plain for 9 miles, to a place called Haik-hallat, which is separated from the vast plain to the south of Antâlo by a chain of hills, of which Amba Aradom, the hill immediately above Antâlo, forms the nucleus. The drainage of the Haik-hallat Plain flows down the valley to the westward, and irrigates the fields and gardens of Chelicut. This town is far and away the most pleasant and picturesque that we have yet seen in Abyssinia. It is in a valley on the northern side of the Amba Aradom Mountains. The valley is abundantly watered, and numerous channels are led away to irrigate the fields. Chelicut was founded by Râs Walda Selassyè, the friend of the Englishmen Salt and Pierce. Its church, dedicated to the Trinity, is surrounded by superb juniper trees of great height; two glorious *dahros*, where the elders of the town arbitrate, spread a wide shade over a strip of soft turf, bordered by a running stream, and all the houses are surrounded by gardens of Chile pepper and groves of trees. There are several plantain-trees in the town, and one peach-tree.

Chelicut is a few miles north-east of Antâlo, on the opposite side of the hills :—

Chelicut (11.30 A.M.):—

|                          |               |
|--------------------------|---------------|
| Boiling point .. .. .    | 200.2°        |
| Aneroid .. .. .          | 23.26 inches. |
| Thermometer .. .. .      | 69°           |
| Height above sea .. .. . | 7275 feet.    |

Antâlo is the ruins of a large town on a high plateau, just under the southern face of the rocky peak, called Amba Aradom.\*

\* I found the height of Amba Aradom to be 10,240 feet.

The circular huts of stone and mud are mostly unroofed and deserted, and the great palace of Ras Walda Selassyè is an utter ruin; but there are still eight churches round the place, with their pleasant groves of trees:—

Antâlo\* (1 P.M.):—

|                          |               |
|--------------------------|---------------|
| Boiling point.. .. .     | 198·2°        |
| Aneroid.. .. .           | 22·80 inches. |
| Thermometer .. .. .      | 76°           |
| Height above sea .. .. . | 8432 feet.    |

From the foot, of these heights, on which Antâlo is built, an enormous undulating plain stretches away to the southward, covered with long grass and large stones. It is bounded on the south by a plateau, beyond which there is the fine range of the Wadjerât Mountains, and in that direction is the road onwards to Lake Ashangi. A river, called the Buya, with its tributary streams, waters this dreary plain; and the camp† has been formed on a stony knoll, about 200 yards from the stream and 8 miles from the town of Antâlo:—

At Buya Camp (5 P.M.):—

|                          |               |
|--------------------------|---------------|
| Boiling point.. .. .     | 200·2         |
| Aneroid .. .. .          | 23·20 inches. |
| Temperature .. .. .      | 74°           |
| Height above sea .. .. . | 7261 feet.    |

Nearly on a level with Chelicut.

|                                    |               |
|------------------------------------|---------------|
| Variation, &c., (by Azimuth) .. .. | 9° 8' w.      |
| Latitude (mer. alt. ☉) .. .. .     | 13° 14' 2" N. |

The climate of the region between Senafé and Antâlo is, at this season of the year, the most delightful in the world. The heat of the sun, which is never oppressive, is tempered by light clouds and fresh breezes, and the nights are deliciously cool. On the plain south of Antâlo there is generally a strong wind from the eastward, commencing about noon and dying away at sunset. Meanwhile heavy clouds, with thunder and lightning, gather about the mountains, where it often rains, and twice we have had heavy night-showers over the camp.

In conclusion, it will be well to make a few observations respecting the resources of the country on the line of march. Of butcher's meat and ghee there is an ample supply everywhere. The supplies of grain vary in amount at the different points on the march; but the commissariat officers have never failed to obtain large quantities at every market where time has been

\* Taken in Ras Walda Selassyè's *adrash*, or reception hall.

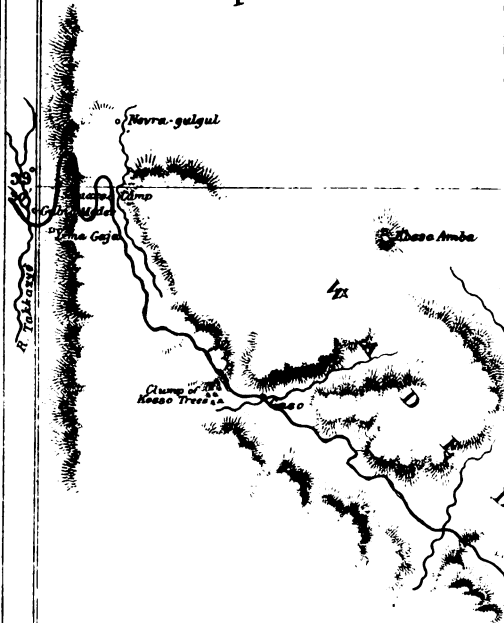
† Called Buya Camp. The river flows away to the westward in the direction of the Salowa Province, and eventually to the Takkazyè. All this part of the War-Office map is very incorrect. Very few of the names on it are recognizable by the natives.

given to allow the people in the neighbourhood to become aware of our wants, and of the prices paid. Salt is, of course, to be obtained in any quantity from Atsbi, and throughout the country grass is abundant. These are the only absolute necessities for a march on Mágdala, and of these the grain alone is insufficient in quantity for a force of 2000 men. All the people between Senafé and Antálo came forward eagerly to carry bags of flour and grain for the English. From Senafé they agreed to carry bags (weighing 60 lbs.) on their bullocks, to be paid one and a half dollar for each, on delivery at Adigerat. At the latter place they entered still more readily into the agreement, brought all available means of transport to bear—bullocks, donkeys, wives and daughters—and in two days delivered upwards of 63,000 lbs. at Agula. The Muhammedans of Agula were equally ready with their camels and donkeys, and similar arrangements will be made onwards from Antálo. Great numbers of strong little mules are to be purchased along the line of march. The road at this season, is excellent nearly the whole way, and the few places which presented any difficulty for laden baggage animals and the mules carrying the Armstrong battery were made practicable in a couple of days by a small pioneer force one march ahead.

The region which I have thus briefly endeavoured to describe is one which contains many of the sources of the Atbara, the chief fertilising tributary of the Nile, as well as those of the Mareb, and its most marked features are the great mountain-knot of Harat, parting the drainage of the Nile and Mareb, and the sudden depression at Dongolo, which separates it into two distinct divisions as regards climate and vegetation. It is also interesting as containing all the sources of the Ragolay system of rivers on the Red Sea side of the Abyssinian Alps. In my first paper I gave some account of Colonel Merewether's expedition from Mulkutto, the results of which were the exploration of the Ragolay Valley on the coast, until the river was lost in a depression far below the sea level, and the collection of valuable information respecting its affluents. I now beg to draw attention to the labours of M. Munzinger (our Consular Agent at Massowa, at present accompanying this force,) in the same direction. Last autumn he landed at Hanfila, crossed the great salt plain to Ala, within a short distance of Atsbi (Atebidera), then marched northwards, discovered the River Ragolay, and went on by land to Zulla. The difficulties and hardships he encountered in these fearful marches would have daunted most men, whilst his Report adds much to our knowledge of this previously unknown but most remarkable region. M. Munzinger has also collected and made available a large quantity of data for cor-

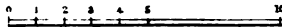


Y A D J O



**WADELA AND DALA  
PLATEAUX  
AND  
MÁGDALA.**

English Miles.



rectly mapping Bogos, Sarawe, and indeed all the northern frontier lands of Abyssinia. His invaluable services to this expedition will doubtless be rewarded by the Government; but as a contributor to geographical knowledge, and as an explorer, I venture to submit that M. Munzinger fully deserves the honour of election as an Honorary Corresponding Member of the Royal Geographical Society.

#### VIII.—THE REGION BETWEEN ANTÂLO AND THE BESHILLO, AND THE TOPOGRAPHY OF MÁGDALA.

May, 1868.

The country between Antâlo and Mágdala is a mountainous region entirely composed of volcanic rocks, but it is divided into two very distinct parts by the river Takkazyè. That to the north is an elevated ridge, crossed by several lofty ranges of mountains. That to the south is a plateau of still greater height cut by ravines of enormous depth. The former contains the sources of the Tellare, a chief affluent of the Takkazyè, and those of the Takkazyè itself. The latter is drained by the principal affluents of the Blue Nile. The volcanic region commences beyond the valley of Musgi, immediately to the southward of the plain of Antâlo. From Senafé to Antâlo the rocks are almost all aqueous or metamorphic, with a few trachytic and basaltic boulders on the surface; to the southward of Antâlo there is a complete change, and this change is not confined to the geological features of the country. The scenery becomes grander, the vegetation more varied and more abundant, and the supply of water more plentiful.

The magnetic courses and distances (chained) of the stations between Antâlo and Mágdala are given in the Table overleaf.

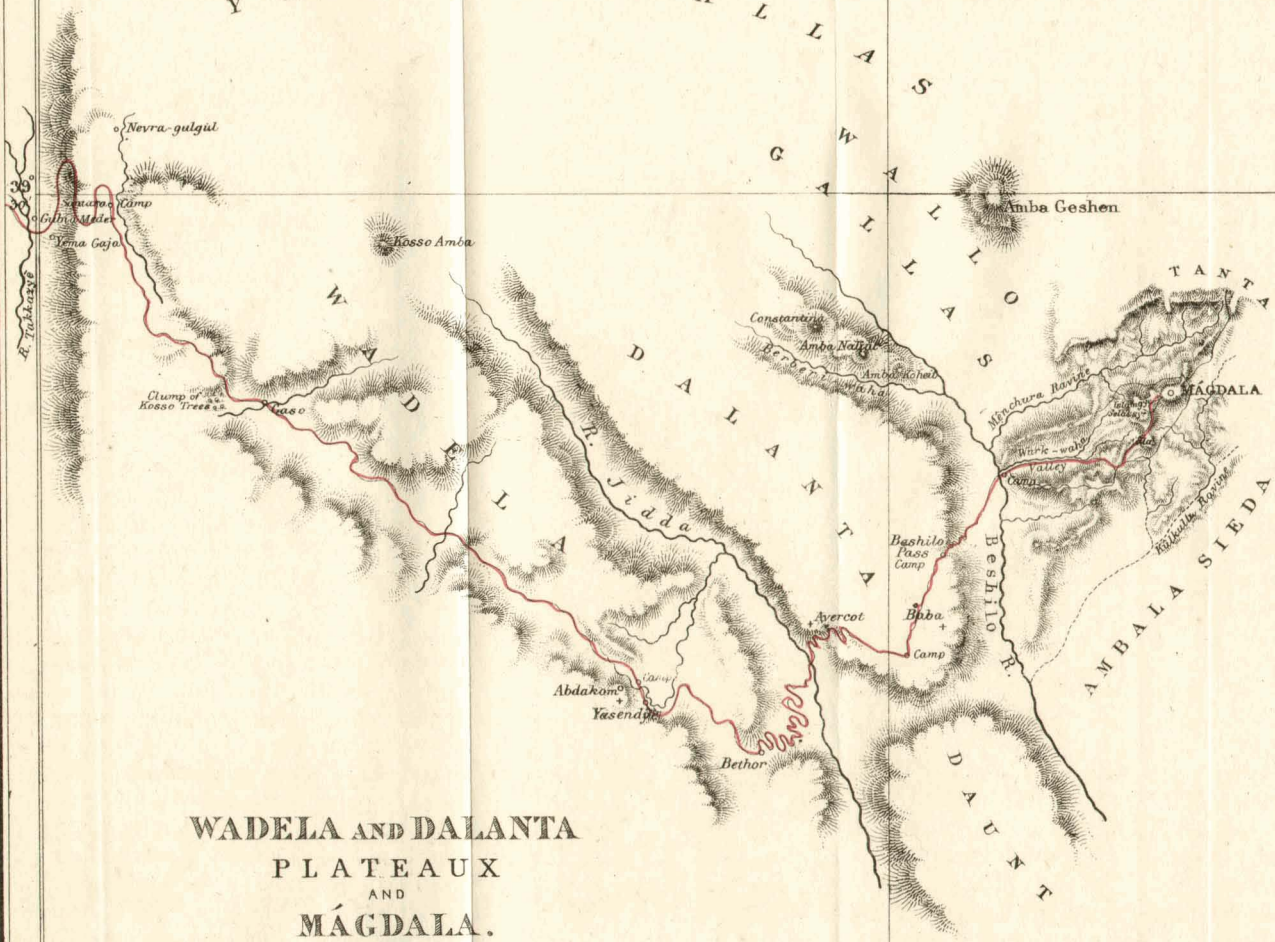
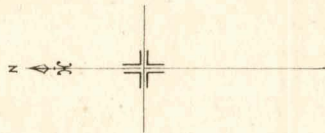
The plain of Antâlo is bounded on the south by the deep valley of the Musgi, beyond which is the mountain range of Wadjerât, towering up into peaks, such as Alaji, which attain a height of 10,000 feet above the sea. The peculiar feature of the whole region, which I shall endeavour to describe, is that, while the backbone of the mountain system runs north and south, with drainage to the east and west, it is crossed by ranges of great elevation running across it in the direction of the drainage and dividing it into sections. Thus the Wadjerât mountains rise up as a great southern barrier separating the dreary plains round Antâlo from the rich valleys of the volcanic formation.

On the other side of the Wadjerât mountains is the valley of Atala. There are two ravines running up through the northern faces of this transverse range, and leading south to Atala. One well to the south-east is called Gurub-dekdek, and the road up

11° 30'

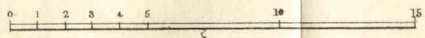
39° 30'

Y A D J O W G A L L A S



**WADELA AND DALANTA  
PLATEAUX  
AND  
MÁGDALA.**

English Miles.



11° 30'



MAGNETIC COURSES AND DISTANCES OF STATIONS BETWEEN ANTÂLO AND  
MÁGDALA.

| Buya Camp (Antâlo) to—                 | Course<br>(Magnetic.) | Distance (Chained.) |      |        |
|----------------------------------------|-----------------------|---------------------|------|--------|
|                                        |                       | Miles.              | Fur. | Yards. |
|                                        | o                     |                     |      |        |
| 1. Musgi .. .. .                       | S. 5½ E.              | 7                   | 3    | 110    |
| 2. Amba Alaji .. .. .                  | S. 11 E.              | 12                  | 2    | 42     |
| 3. Atala .. .. .                       | S. 13½ W.             | 3                   | 2    | 132    |
| 4. Ayba .. .. .                        | S. 10½ W.             | 2                   | 5    | 0      |
| 5. Amba Ferrah .. .. .                 | S. 13½ W.             | 2                   | 6    | 80     |
| 6. Belágo .. .. .                      | S. 4 W.               | 2                   | 2    | 0      |
| 7. Makhan .. .. .                      | S. 1½ E.              | 5                   | 1    | 50     |
| 8. Haya .. .. .                        | S. 5½ E.              | 4                   | 3    | 0      |
| 9. Top of Ashangi Pass .. .. .         | S. 25½ W.             | 2                   | 2    | 50     |
| 10. Ayni Mai .. .. .                   | S. 52 W.              | 2                   | 7    | 80     |
| 11. Border of Ashangi Lake .. .. .     | S. 26 W.              | 4                   | 1    | 90     |
| 12. Mes-agita .. .. .                  | S. 2½ E.              | 2                   | 7    | 60     |
| 13. Womberat Plateau .. .. .           | S. 21 W.              | 3                   | 4    | 50     |
| 14. Lát .. .. .                        | S. 60 W.              | 3                   | 4    | 88     |
| 15. Dafat Pass .. .. .                 | S. 56½ W.             | 3                   | 3    | 132    |
| 16. Asan-galla .. .. .                 | S. 11 W.              | 4                   | 4    | 40     |
| 17. Ayo .. .. .                        | S. 23½ W.             | 6                   | 0    | 0      |
| 18. Dildi and Mezgar Amba .. .. .      | S. 22½ W.             | 5                   | 7    | 0      |
| 19. Camp on the Tellarè .. .. .        | S.                    | 1                   | 0    | 0      |
| 20. Wondaj Pass .. .. .                | S. 17 W.              | 5                   | 7    | 80     |
| 21. Takkaryè .. .. .                   | S. 23 W.              | 10                  | 1    | 154    |
| 22. Gubia-meder .. .. .                | S. 19 E.              | 0                   | 6    | 132    |
| 23. Top of Santara Pass .. .. .        | S. 20½ E.             | 2                   | 0    | 100    |
| 24. Santara .. .. .                    | S.                    | 1                   | 1    | 170    |
| 25. Gaso .. .. .                       | S. 64 W.              | 9                   | 1    | 180    |
| 26. Abdakom .. .. .                    | S. 59 W.              | 15                  | 4    | 0      |
| 27. Yasendyè .. .. .                   | S. 34 W.              | 2                   | 3    | 132    |
| 28. Bêt-hor .. .. .                    | S. 68½ W.             | 5                   | 5    | 150    |
| 29. Bed of Jitta River .. .. .         | S. 46½ W.             | 4                   | 1    | 150    |
| 30. Tekrena Water (on Dalanta) .. .. . | S. 1 E.               | 3                   | 4    | 130    |
| 31. Head of Beshilo Pass .. .. .       | S. 58 E.              | 3                   | 5    | 170    |
| 32. Mágdala .. .. .                    | S. 25½ E.             | 12                  | 4    | 0      |
|                                        |                       | 147                 | 3    | 202    |

it leads by a place called Mesno to Atala. The other runs straight or nearly due south, and was the one selected for the march of the English troops. It is called Bêt Mayra, and forms a very beautiful gorge. A noisy stream flows down the gorge to join the Musgi, and irrigates a succession of barley crops grown on carefully-levelled terraces, which rise one above the other up the ravine. Above them the gorge is full of fine trees—tall acacias, myrsine, figs of various species, and a very pretty *crotalaria*. The road often crosses the stream, and at some points passes along a ridge above it, with the tops of the trees rising from the bottom just to a level with the traveller's eye. At one place the mountain sides recede, there is a stretch of

velvety turf, and the brook is overshadowed by wide-spreading willow-trees. This is the halting-place of Meshek; and here the steep ascent to the saddle of Alaji commences, with the lofty peak called Amba Alaji on the right and the cone-shaped mountain top of Yumasa on the left. The sides of the mountain are well clothed with juniper and rose-trees, and there is a gigantic thistle 12 to 14 feet high. We found the saddle, by a comparison of aneroid and barometer observations, to be 9700 feet above the sea. The Amba rises up on the right some 800 feet higher, ending in a steep grassy peak, with scarped precipices just below. Here, on a rocky shelf, there are five or six houses with thatched roofs, almost overhanging the pass, the impregnable abode of the chief of Wadjerât. The descent into the Atala valley is not so long, and there are terraces at intervals, but the crest of the pass is 2800 feet above the camping-ground at Atala.

The Atala valley is narrow, running south-east to north-west, with a plentiful stream flowing through it, in the direction of the low land of Bora to the westward, to join the Takkazyè. The range to the south derives its name from a high peak called Bota, and separates the valley of Atala from that of Ayba. Beyond the Ayba valley there is another transverse range—that of Ferrah, also named after a mountain mass rising up on the right of the road. This Amba-Ferrah is a succession of grand precipices—a glorious mass of rock, not terminating in a peak like Alaji, but in angular walls of rock, with bright green steeps and ledges intersecting them. It rises up immediately on the right of the pass, which winds up the shelving hills down which a bright stream flows into the Ayba valley. The hills are covered with juniper bushes, and the hollows are golden with a pretty St.-John's-wort, which here first makes its appearance. On this pass, too, the *kosoo* tree was first seen. Large boulders covered with moss are scattered over the grass, and here and there thickets of wild roses scent the air, growing with a bright purple indigo and a *crotalaria*. The gigantic thistle rises above all, and on the higher slopes there is a heath with a white flower. A long descent, broken by two broad terraces, leads down from the saddle of Ferrah into the valley of Dobâ. The first terrace is called Belâgo, and is covered with irrigated barley crops; the drainage being westward to the Bora low land. The height of the Ferrah pass above the Dobâ valley is upwards of 2000 feet.

From the Ferrah-Amba there is a range of mountains running north and south, and forming a distinctly-marked watershed, as far as Ashangi; the Dobâ and Makhan valleys, through which the road passes, being on their eastern sides, and the drainage

of these valleys being to the east. There are five conspicuous peaks on this longitudinal range, commencing from Ferrah, namely, the Ferrah-Amba itself, Afaji, Tsaheti, Bokero, and Sarenga. There are deep cracks round the base of Afaji, which are said to have been caused by the earthquakes in 1864, and the natives assert that these earthquakes also caused great changes in the water system of the Dobâ valley, some springs drying up and others appearing. The mountain sides which slope down from Belâgo to Dobâ are covered with trees and flowering bushes, and the scenery becomes very beautiful. The valley is covered with coppices and open grass-fields, and near its centre a conical hill rises up, crowned by the fenced village of Ajiera. Along the foot of the western mountains the ground is cut deep by well-wooded ravines. The ridges and hollows are covered with juniper-trees, above which rise, here and there, the tall stems and spreading branches of the umbrella-shaped acacia. A low saddle leads from the Dobâ into the equally well-wooded vale of Makhan. Here clumps of tall junipers are scattered over the grassy glades and knolls, and in the bottoms, near the brook which flows off to the eastward, there are thickets of *khadoo*, fig, brambles, wild roses, jasmine, and clematis. The round hills, dividing the two valleys to the east, are crowned with villages of circular huts, fenced round with thick hedges of kol-quall.

The lower country to the eastward of this alpine region, from Antâlo to the Takkazyè, is occupied by lawless tribes of Mohammedan Azebo Gallas. From the summits of all the passes, looking to the eastward, we could see the same broad valley, apparently extending north and south, for upwards of 200 miles, and receiving all the eastern drainage from the Abyssinian alps. Beyond it, in the far eastern distance, were ranges of mountains rising one above the other; and the valley itself appeared to be covered with jungle, and to have a river running through it. In this country, still entirely unknown to Europeans, dwell those incorrigible robbers and murderers, the Azebo Gallas, who profess Mohammedanism, and make incessant raids on the Christian inhabitants of the highlands. Hence the thick kol-quall fences round all the villages, which are usually perched on isolated hills.

The mountainous country between Makhan and the basin of Lake Ashangi, about 14 miles across, is well wooded, the hillsides being covered with junipers as tall as Scotch firs, flowering St.-John's-wort growing as trees, and a heath with a white flower, in the form of a bush, sometimes 30 to 40 feet high. The drainage is still to the eastward, and lofty peaks shut out the view to the west. The view from the southern edge of this

highland is magnificent. Far below lies the bright blue lake of Ashangi, bordered by a richly cultivated plain, and surrounded by mountains on every side. To the westward this mountain barrier is very high, but to the east the hills are comparatively low, and appear to slope away rapidly, on their eastern sides, to the valley of the Gallas, which is at a much lower elevation. Thus the landscape presents the curious effect of an Alpine lake surrounded by mountains and without an outlet, lying on the edge of a vast extent of country at a much lower elevation.

The basin of Lake Ashangi is a flat plain with the sheet of water occupying its southern half. On the north side there is rich pasture for cattle, and much wheat and barley cultivation; the fields being artificially levelled in terraces, and extending in steps far up the skirts of the hills. The villages are perched up on the tops of conical hills or high on the sides of the western mountains, and at sunset the cattle and labourers may be seen winding their way up the steep paths in all directions. Round the north end of the lake there are deep fissures full of soft mud and quicksands, which are excessively dangerous. These fissures are said by the people to have been formed by the earthquake of 1854.

The lake of Ashangi is 4 miles long by about 3 broad, and about 8000 feet above the level of the sea. I found the latitude by meridian altitude of \**Dubhe* to be  $12^{\circ} 36' 40''$  N. It furnishes one of the very rare examples of a freshwater lake without any apparent outlet, the water probably escaping at some point on the eastern side by percolation. The surrounding mountains are all volcanic.

On the western side there is only a strip of land about 200 yards wide between the mountains and the shores of the lake, and at one point a promontory descends abruptly into the water, with a broad sheet of waving corn extending along its northern base. Myriads of geese, ducks, cootes, and curlew frequent the lake or wade amongst the reeds in the treacherous mud on its shores. At the south end there is a break in the mountains, and a gradual ascent leads to the plain of Wofela. To the south the mountains forming the high table-land of Womberat rise abruptly from the Wofela plain, and the jagged volcanic peaks to the westward are a continuation of the range which bounds the Ashangi basin. At the south-west angle of the plain, where this range approaches the Womberat mountains, there is a gap, or rather low saddle, clothed with tall juniper trees, forming a shady grove; on the other side of which a long valley runs westward, having mountains on either side, deeply scored with torrent-beds. A lofty mountain peak rises

over the valley some miles down, and I got a view of a very rugged country far to the westward, at a lower elevation, probably part of the Wag province.

The road leads up a wild gorge to the Womberat plateau, and then by a long descent to the Valley of Lât. This highland sends its drainage to the Galla country, passing round to the eastern side of Lât; so that from Lât onwards to the Takkazyè, all the streams again become fountains of the Nile. From Womberat there are distant views of the Galla country to the eastward, while far away to the s.s.e. is the mysterious plain of Zobul, concerning which there are many traditions. It is said that, in ages long gone by, there was a Christian kingdom in Zobul, that old churches are still standing there, that the bells are heard ringing from afar, but that no man dares to approach them, because spirits guard those holy places.

Lât is a narrow valley, fertile and well watered, whose river pours over a precipice and joins a tributary of the Tellarè flowing away to swell the Takkazyè. South of the Lât Valley the Dafat mountain range crosses the line of the watershed, and about 16 miles further south (as the crow flies) is the still loftier parallel range of Abuya-meder, which forms the northern boundary of the valley of the Takkazyè. The intervening country, being a portion of the Lasta Province, is very mountainous, and contains the sources of the River Tellarè, one of the principal affluents of the Takkazyè.

The Dafat mountains are covered with compositæ, labiate shrubs, white heather, roses, jassmine, clematis, juniper, and St.-John's-wort. The St.-John's-wort (*hypericum*) grows as a large tree, the trunk of one of them being 18 inches in diameter, and they are one mass of bright orange flowers. The Dafat Pass was 9820 feet above the sea.

This part of the Lasta district is broken up into a succession of mountain spurs and deep ravines; but it is well watered and fertile, and there are no scarped cliffs or perpendicular gorges, so that the difficulties of the road are insignificant. The scenery is very fine, and there is much cultivation in terraces up the mountain sides. At the foot of the long ascent of the Abuya-meder mountains, by the Wondaj Pass, flows the River Tellarè through a rocky gorge, and the clear water dashes noisily over huge boulders. Here the camp of Dildi was formed, on the north side of the river, with the peak of Gubarji towering over the nearer mountains to the south-east, and the lofty slopes of Abuya-meder brilliantly green with barley crops to the south-west. The country is well wooded, and a rippling stream flows down every valley. The Tellarè, at this point, which is within 4 or 5 miles of its source, is never more than

10 feet across at this season, but it is evidently a mighty torrent in the rains. The whole bed, covered with large water-worn boulders, averages a width of 20 yards, and in places the rushing water washes a wall of alluvial soil, with large round stones embedded in it, which is from 4 to 6 feet thick.

The ascent up the Abuya-meder mountains, from Dildi on the banks of the Tellarè, to the summit of the Wandaj Pass, is 7 miles long; Dildi being 7400 and Wandaj 10,500 feet above the level of the sea. Thus Wandaj is the highest point on the road between Senafé and Mágdala. The sides of the Abuya-meder mountains, though very steep, are cultivated, and many villages are within sight from the road. Small rills and brooks irrigate the land, flowing over banks of soft turf and white clover, or dropping down cliffs of black rock shaded by juniper, with masses of orange aloë flowers raising their long spikes above the bushes below. From the summit of the pass there is a glorious view of the Dafat range to the north, with a sea of mountain peaks intervening; of the great Azebo Galla Valley to the east, and of the Takkazyè Valley—with the straight line of the Wadela plateau—to the south.

The Abuya-meder Mountains separate the valleys of the Tellarè and Takkazyè, the source of the former river being on their northern, and that of the latter on their southern face. The streams flowing down the deep ravines to the south unite and form the Takkazyè. The most distant source is some 10 miles away due east in Angot; but the 'Ayn Takkazyè, the fountain of tradition, is close at hand, at the foot of a peak called 'Ayn Kirkum, and this stream has the honour of being considered the source of the great fertilising tributary of the Nile, because Menilek, son of the Queen of Sheba, is said to have struck a rock there, and caused the water to well forth. Old Tellez correctly describes the 'Ayn Takkazyè ravine as a place where three several springs gush out violently within a stone's throw of one another. They are shaded by a grove of kosso and juniper trees, surrounding a Christian church. The next ravine, on the southern slope of the Abuya-meder range to the westward, is called Marora; and then comes that which runs south from the Wandaj Pass, known as the Briganut-wanz.\* Still going westward, and divided by a mountain spur from the former, is the Sohona-wuns, commencing at the foot of a lofty peak called Zugagisi. The Rigach-wanz joins the Sohona, and still further west is the Mal-wanz, passing between Lalibela, the capital of Lasta, and Sagubnaf, where the camp of Gobazyè was long pitched. The streams flowing down these ravines

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\* Wanz is Amharic for a ravine.

unite to form the River Takkazyè, which flows from east to west in a deep valley. All the ravines are bright green with irrigated wheat and barley crops, while here and there a village is perched upon the overhanging hills, with a clump of trees concealing a church close by.

South of the Takkazyè the nature of the country entirely changes. Hitherto we had passed over a broken mountainous region, where lofty ridges alternated with deep ravines. But from the Wandaj Pass, looking across the Takkazyè Valley, we got the first view of the Wadela plateau, a mighty wall, 2600 feet high, rising abruptly from the valley, and ending in a level summit at an elevation nearly equal to that of the Wandaj Pass itself.

I found the bed of the Takkazyè to be about 8000, and the summit of the pass up to the Wadela plateau 10,400 feet above the sea, by observations of the boiling point and aneroid. At this season it is but a small stream, easily crossed dry-shod, by jumping from stone to stone; but the extent of the river-bed showed what it was during the rainy season, even at this short distance from its source.

The plateau of Wadela is bounded on the north by the valley of the Takkazyè, on the south-east by the Jitta, and on the north-west by the Tchetchéo, the two latter rivers falling into the Beshilo; and its average level is some 2000 feet above them. The north-eastern half is composed of trachyte, with beds of black tourmaline and amygdaloidal trap, and consists of a succession of rolling hills and valleys, with occasional ridges of scarped rock; streams flowing to the Jitta, and swampy pools in the low ground. With the exception of clumps of kosso and other trees round the churches, Wadela is without either trees or shrubs, the hills being covered with grass and small wild herbs, the most common of which is a bright yellow composita. The scenery is wild and desolate, not unlike that of the interior of the Orkney Islands. The south-western half of Wadela is composed of columnar basalt, and is more level and fertile. Extensive tracts are under wheat and barley cultivation, and there are large flocks of sheep and goats and herds of cattle, besides horses and asses. The people weave woollen and cotton cloths, the wool being raised on the plateau, and the cotton imported from the Yadjow Galla country to the eastward.

The north-eastern part of Wadela is about 10,400 feet above the sea, but towards the Jitta ravine it is not more than 9100. The English troops, after crossing the Takkazyè and reaching the plateau of Wadela, instead of marching direct on Mágdala by Kosso Amba, turned off in a south-west direction in order to reach the great road made by King Theodore across the Jitta

ravine, from the Wadela to the Talanta plateau. A large part of the length of Wadela was thus traversed, from Santara, near the point where the Takkazyè was crossed, to Bêt-hor at the edge of the descent to the Jitta, a distance of 34 miles. The first stage, from Santara to Gaso, is 9 miles, and at Gaso the trachyte formation ends, and the basalt commences. From Gaso to Abdakom, the next stage, is a distance of 15 miles over a well watered grassy country, with much corn cultivation and many villages. From Abdakom to Yasendyè\* is  $2\frac{1}{2}$  miles, and from Yasendyè to Bêt-hor  $5\frac{1}{2}$  miles.

The Jitta River separates the Wadela plateau from that of Dalanta. The height of these table-lands above the level of the sea, along the line where the Jitta divides them, is the same—about 9200 feet—and it is evident that they were once a single mass of columnar basalt. But, in the course of ages, the Jitta has cut its way down for a depth of 3500 feet, carrying millions and millions of tons of earth and rock away, to fertilise the delta of the Nile, and forming a ravine of extraordinary size, which, had it not been for King Theodore's marvellous road, would have been the most formidable obstacle on the line of march from the coast to Mágdala. I found the height of the plateaux to be 9200 feet, and the bed of the Jitta 5720 feet above the sea, so that the depth of the ravine is 3480 feet. The northern side of the gorge has a scarped wall of basalt at its summit, with beds of white clay intruding, in patches, and numerous lumps of a prase opal. The sides of the ravine have a parched arid look, the only vegetation being kol-qualls and acacias. There are terraces of broken ground about half-way up, on either side, corresponding with each other as regards height above the river-bed, and showing, beyond doubt, that this deep gorge has been formed by the gradual action of water, over a long course of ages. The descent of 3480 feet, by Theodore's trace, is performed along a distance of 4 miles and 6 furlongs, the width of the river-bed is 200 yards, and the ascent to the Dalanta plateau is 3 miles and 2 furlongs in length. The bed of the river is covered with large water-worn stones, but, in the dry season, the water is only in pools communicating by percolation. Some fine *dahro* trees grow at the edge of the river-bed.

The Dalanta plateau is a mass of columnar basalt between the rivers Jitta and Beshilo, with its surface upwards of 9000 feet above the level of the sea. To the south-west it is bounded by a gorge or depression, which separates it from the Dâunt plateau, the latter extending to the point where the two rivers

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\* Yasendyè means literally "of the wheat"—the wheat district.



unite. The southern part of Dalanta is about 5 miles across, but it becomes broader to the north-east, the distance between the rivers increasing as their sources are approached. Talanta is a flat plain, quite treeless, except the clumps round a few churches, and with a rich black soil several feet thick, save where the streams have worn it away and laid bare the pentagon-shaped tops of the basalt columns. From most points of view the scarped sides of the Dâunt plateau and of the Jitta and Beshilo ravines are just visible at the edges of the plain. The flora, at this high elevation, is very English, consisting of dog-roses, nettle, yellow and purple compositæ, clover, and plantain. From the edge of the plateau, looking s. 30° E. over the Beshilo ravine, there is a view of the heights forming the Mâgdala system, and of what at first sight appears to be a confused mass of brown, forbidding mountains, piled one over the other, from the banks of the Beshilo; but on a closer inspection it all becomes clear. The ravine of the Beshilo is even deeper than that of the Jitta, the bed of the river being only 5638 feet above the sea, and the river itself was up to the horses' girths, being far the largest volume of water that has been met with in any stream on the line of march. The length of the descent is 4 miles 4 furlongs, and the width of the river bed 113 yards. Near the top the sides are perpendicular, and at the base of the cliffs the huge boulders of columnar basalt which had broken off, were exactly like bundles of tree-stems. Beds of clay were here and there intruded in the basalt. The vegetation of the Beshilo gorge consists of kol-qualls, a celastrus, a myrtacea, and some fine umbrella-shaped acacias; but the dark-coloured rock and brown dried-up grass give a sombre effect to the scene, which is scarcely relieved by the scattered trees. Two miles to the east of the point where King Theodore's road begins to descend the Beshilo ravine, the uniformity of the basalt wall, which forms the side of Dalanta, is broken by a ravine containing a little stream called the Berberi-waha ("Pepper-water"), which falls into the Beshilo. The narrow ridge thus separated from the Dalanta plateau by the ravine of the Berberi-waha on one side, and by that of the Beshilo on the other, consists of three peaks, forming *ambas*, or natural fortresses, called Amba Koheit, Amba Nebiet, and Constantina: two held by the Christian chief of Dalanta, and one by the Mahomedan Wollo Gallas, whose territory lies to the eastward of the Beshilo. With this exception, the north-west side of the Beshilo ravine consists of a mighty basalt wall, 3500 feet high, broken by one or two irregular terraces. But on the south-east the original basaltic wall is now cut deeply by ravines and gorges, which leave isolated peaks and plateaux between them; and a detailed

description of this region will comprise an account of the topography of Mágdala and its vicinity.

The lofty plateaux of Tanta and Ambala-sieda, on the east side of the Beshilo, which correspond with that of Dalanta on the west side, recede for a distance of 9 miles in some places, the intervening country being broken up by ravines and gorges. Two of these ravines, of immense depth, are divided from each other at their heads by a series of ridges and terraces called Thaddat, Korakor, and Sangallat, which form a sort of irregular rocky isthmus, uniting the table-land of Tanta with Mágdala. The ravine to the east is called the Valley of Mênchura, and enters the Beshilo valley between scarped cliffs. That to the west is the Valley of Kûlkula, and is of much greater length, entering the Beshilo ravine at a very acute angle far to the westward. The Mágdala system, or knot of mountains, rises up between the Mênchura and Kûlkula ravines; the sides to the east and west being steep and precipitous, and nearly 3000 feet high. Mágdala itself is a mass of columnar basalt, with scarped perpendicular sides, and with a plateau on the top about 2 miles long by half a mile across. It is 9050 feet above the level of the sea, and thus a few feet lower than the Talanta plateau. At its south-east end there is a lower terrace, which is approached from Tanta by a pass, called the Kaffir-bir, where there was a fortified gate. At the northern end was the gate called the Koket-bir, whence a steep descent of nearly 500 feet leads down to the saddle of Islamgyè. The Mágdala system consists of the plateau of Mágdala itself, the peak of Selassyè, and the plateau of Fâla; the three heights being connected by saddles at lower elevations. Between Mágdala and Selassyè is the saddle of Islamgyè, 6 furlongs in length: a flat plain, on which the camp of King Teodoros was pitched, with perpendicular cliffs on either side, whence the mountain-sides slope rapidly down to the Mênchura and Kûlkula valleys. Selassyè is a mountain terminating in a sharp peak, or rather short ridge, 9200 feet above the sea. It is composed of trachyte of a light colour, and is named after a church dedicated to the Trinity (Selassyè), with a clump of tall trees round it on the outer slope. Selassyè and Fâla are connected by a saddle some hundred feet below the level of Islamgyè, which is approached from it by a rocky zigzag path; and Fâla, like Mágdala, is a flat-topped mass of basalt. But these three heights of Mágdala, Selassyè, and Fâla are not in a line; they form an angle of which Selassyè is the apex, and Mágdala and Fâla the two legs. The leg from Selassyè, along Islamgyè, to the end of Mágdala, has the deep ravines of Mênchura and Kûlkula, one on either side; while that from Selassyè to Fâla faces the broken

country towards the Beshilo. Thus, in approaching from the Beshilo, Selassyè, Fâla (and the saddle connecting them), alone are visible; while Mágdala and the Islamgyè saddle are concealed by the higher ground of Selassyè and its encircling ridges. On the plateau of Mágdala itself there is no water; but there are several wells on Islamgyè, one in the rear of Fâla, and another, called Shamba-koch, in the Kûlkula ravine.

The portion of the Mágdala system which is visible from the Talanta plateau, and which faces to the north and west, is the mountain-side which is crowned by the Selassyè peak at one end, and the Fâla plateau at the other. At the foot of Fâla is the small plain of Arogyè, 1 mile and 3 furlongs across, with a gradual slope of 440 feet, and 1140 feet below the Fâla plateau. There is a spring, furnishing a limited supply of water, on Arogyè, which is dotted with thickets of myrsine, crotolaria, kol-qualls, and the large labiate bush called *tehendog*. A ravine, with the sides clothed with bushes, running down from the Fâla saddle, and uniting with another defile which bounds Arogyè to the north-west, forms the head of the Valley of Wark-waha ("Golden Water"). Other ravines, from east and west, converge upon it. The Wark-waha, at this season a waterless valley, runs down to the Beshilo, and joins that gorge between the Kûlkula and the Mênchura; the distance from the Beshilo river, up the Wark-waha, to the head of the defile opening on the Arogyè plain being 4 miles and 3 furlongs. Beyond (north-west of) Arogyè, and across the defile, there is a steep ascent of 460 feet to the loftier height of Aficho, where the British camp was pitched at an elevation of 7900 feet above the level of the sea. Towards the Beshilo the Aficho heights sink into those of Gûmbaji, which descend abruptly to the Beshilo ravine and form its southern wall. Ravines run off from the Aficho and Gûmbaji highlands to the Kûlkula on one side, and the Wark-waha valley on the other. To the eastward, the high broken country between the Wark-waha and Mênchura valleys, and extending from the foot of Selassyè to the Beshilo, is called Neft.

I found the latitude of Aficho, by meridian altitude of the star *Dubhe*, to be  $11^{\circ} 22' 7''$  N.

It will be seen from this description that the Mágdala district, with reference to the Dalanta plateau, is not, properly speaking, a mountainous region, but that it is simply a portion of the great basaltic mass which has been cut up and furrowed by the action of water during many ages. Mágdala and Fâla are isolated bits of the original plateau, and are at nearly the same height above the sea as the table-lands of Tanta and Dalanta, of which they appear once to have formed a part. The lofty range

of mountains in the Worro-Haimanot country, visible far to the eastward, seem to account for the cutting up of the country between Tanta and the Beshilo; while the deep drains formed by the rivers to the east and west have protected the plateaux of Dalanta and Wadela from further denudation. The scenery of this wild country, where the forces of nature appear to have been at work gradually, but with such tremendous effect, is most striking. Looking from the heights of Mágdala, the lofty ridges and profound ravines would appear very grand in their apparently wild confusion, were it not that the view is always bounded by the straight basaltic wall of Dalanta, which rises above them all, and has the effect of dwarfing everything below it. The drainage of Mágdala and Tanta, and of the Wadela, Talanta, and Dâunt plateaux, unite to form the Beshilo, which is one of the principal affluents of the Blue Nile.

The climate of the region between Antâlo and Mágdala was, during the time that I was in it—from March 12th to April 28th—healthy and agreeable: the hot sun being tempered by cool winds during the day, and the nights being cold. From March 12th to 24th there was not a drop of rain; but in the evening of the latter day a heavy thunder-storm broke over the camp at Dildi, with rain lasting from 6 to 9 P.M. On the 25th there was a shower in the evening; and on the 26th, towards evening and during part of the night, there were storms of hail and rain, with thunder, on the Wandaj pass. The Wadela plateau was excessively cold, with ice forming in the night, and the grass being covered with hoar-frost in the mornings. The minimum registered was 17° Fahr. The difference in temperature between the Wadela and Dalanta plateaux was very observable, the latter being much warmer. This may probably be accounted for by the deep warm ravines of the Jitta and Beshilo, which flank Dalanta on either side, while the Wadela plateau only has the Jitta ravine on one side, while it is much nearer to the cold rain-belt of the Abuya-meder mountains. From the 3rd to the 15th of April there were thunderstorms every day, with heavy rain, generally but not always commencing at about four in the afternoon, and lasting until two or three hours after sunset. On the 6th, a fearful storm of hail, thunder, and lightning burst over the Dalanta plateau, with hailstones of enormous size. After the 15th these rains ceased, and there was fine weather for nearly a month, although occasional local thunder-showers occurred further north, round Adigerat and Senafé. These rains never began until late in the afternoon, and, if the marches had been properly arranged, the troops need never have felt any inconvenience or discomfort from them. From the middle of March to the middle of April it rained on eighteen

days out of the thirty, the rain always coming with wind from the east; but this wet weather in the early spring has nothing to do with the true rainy season, which commences in the middle of June. While on the subject of meteorology, I must not forget to mention a curious phenomenon which occurred on the 13th of April, the day of the capture of Mágdala. Early in the forenoon a dark-brown circle appeared round the sun, like a blister, about  $15^\circ$  in radius; light clouds passed and repassed over it, but it did not disappear until the usual rain-storm came up from the eastward late in the afternoon. Walda Gâbir, the King's valet, informed me that Theodore saw it when he came out of his tent that morning, and that he remarked that it was an omen of bloodshed.

The region which I traversed, with the expeditionary field force, from the sea-coast to Mágdala—a distance of more than 300 miles—is one of considerable geographical interest; and the operations of the expedition have added much to our knowledge. On the coast the great system of eastern drainage comprised in the Ragolay and its tributaries has been discovered; and old Father Lobo's story of one of the pleasantest rivers in the world, with sweet herbs growing along its banks, flowing through a country which had always hitherto been believed to consist of a salt desert, has thus been explained. The remarkable passes from the coast to the highlands of Abyssinia have been thoroughly explored; the mountain chains forming the watershed of a vast region have been examined; and the numerous sources of the great fertilising tributaries of the Nile have been accurately surveyed. Besides the observations which I have taken, that most zealous and indefatigable of Quarter-master-Generals, Colonel Phayre, has completed a rough, but at the same time a most useful survey of the whole country that has been traversed. Dr. Cooke, in spite of severe illness, which would have disabled a less zealous inquirer, has done much valuable meteorological work; and the officers of the Indian Trigonometrical Survey have completed the mapping of the eastern portion of the Abyssinian highlands. The Trigonometrical Survey staff consists of Lieutenants Carter, Dummler, and Holdich, all of the Royal Engineers, with assistants, and provided with five chronometers, an 8-inch transit theodolite, and three  $6\frac{1}{2}$ -inch theodolites. They have measured bases at Komayli, Senafé, Antâlo, and Ashangi; have made a survey extending for 15 miles on either side of the road, with more distant points intersected, as far as Ashangi; and Lieutenant Carter has carried on a route-survey as far as Mágdala with theodolite and plane table. They have taken vertical angles throughout for a section of the country; have made numerous astronomical

observations for latitude and longitude at each station; and from Antâlo to the coast the longitudes will be still more accurately fixed by means of the electric telegraph.

But, important as the geographical results of the Abyssinian expedition have been, *our* science is not the only one that will be enriched by it. Mr. Blandford, who, from his intimate knowledge of the analogous formations in the Deccan, was peculiarly well qualified for the work, has found the geology of this part of Abyssinia to be exceedingly interesting: so interesting, indeed, that he resolved to be amongst the last to quit Abyssinian soil. Mr. Blandford has also added to our knowledge of the zoology of the country, has made a large collection, and has ascertained the existence of four distinct zones into which the fauna is divided: one on the coast, the second in the Senafé pass, the third on the highlands, and a fourth on the lofty basaltic plateaux. Mr. Jesse, who was sent out by the Zoological Society, and several officers, have also made large collections of skins, both of birds and mammals. The botany, though very interesting, had already been thoroughly worked up by M. Schimper, the Nestor of King Theodore's captives. The country on the line of march also presents many points of antiquarian interest. The ruins of the Greek emporium at Adulis, on the coast, and of Koheito, at the head of the Degonta pass, offer a field of research of no common interest to the archæologist, as throwing light on the ancient intercourse between the Axumite kingdom and the Egypt of the Ptolemies. The cave church at Dongolo, the curious ruin at Agula, and the famous caverns of Lalibela, illustrate the later period, when one of the most ancient Christian churches was established in Abyssinia. Nor can it be said that nothing of antiquarian value was to be obtained worth taking away, when several thousand manuscript parchment folios were found in the library of King Theodore, and a golden chalice belonging to Seltan Segged, a king who flourished in the sixteenth century, was amongst the plunder of Mâgdala.

The main objects of the Abyssinian expedition have been gained, and this is not the place either to discuss their importance, or the question whether other more lasting results might or ought to have been secured by its means. The men of science who accompanied the expedition have not returned empty-handed, and there are few regions on the globe where so much could be found to repay inquiry.

III.—*Sketch of a Journey from Canton to Hankow.* By ALBERT S. BICKMORE, M.A.

Read, December 9, 1868.

ON the 7th of August, 1866, I left Canton with Mr. C. L. Weed, photographer at Hong Kong, and Rev. Mr. Nevin, of Canton, on a journey into the interior of China.

Our course, at first, was westward for about 60 miles to the head of the great delta of the Sikiang, whose low, fertile fields spread out widely along the river-banks and support a most dense population.

Along the borders of these low lands rise serrated mountains—some peaks attaining an elevation of 1500 to 2000 feet, their sharp ridges and projecting spurs coming out in strong relief, on account of the scanty vegetation on their sides. This nakedness is a universal characteristic of the mountain scenery in China, but it is not the fault of the soil or the climate, for wherever the little pines are allowed to rise they show a vigorous growth. With proper care and labour the thousand hill-sides in China might yield an abundance of timber, and the miserable mud houses of the poorer classes be replaced by neat structures of wood. But in regard to the low lands, it seems scarcely possible that they could be made to yield more than already raised—two full crops being obtained in nearly every part of the empire.

The continued fertility of these lands is due, no doubt, chiefly to two causes; first, the Chinese are very careful to save everything that can possibly serve for manure, in some places even to the hair they shave from their heads; and, secondly, these low lands are all, or very nearly all, subject to floods, at least once a year, and a deposit of fine mud is thus spread out over them, just as in the valley of the Nile.

Following up the Sikiang through a deep pass in the first mountain range we came to the city of Shauking, where the Viceroy of Kwangtung and Kwangsi resided when the Portuguese first appeared off the coast. About two miles behind it rise the "Marble Rocks" or "Seven Stars," like dark, sharp needles out of the low, green plain. Mr. Nevin and I measured their height with an aneroid barometer, and found them to range from 150 to 300 feet above the plain, though they had been usually estimated at twice that height.

The rock is a highly crystalline limestone of a dark blue colour on the weathered surfaces and of a rusty iron tinge where large fragments have been lately detached; the whole traversed in every direction with milk-white veins and completely fissured

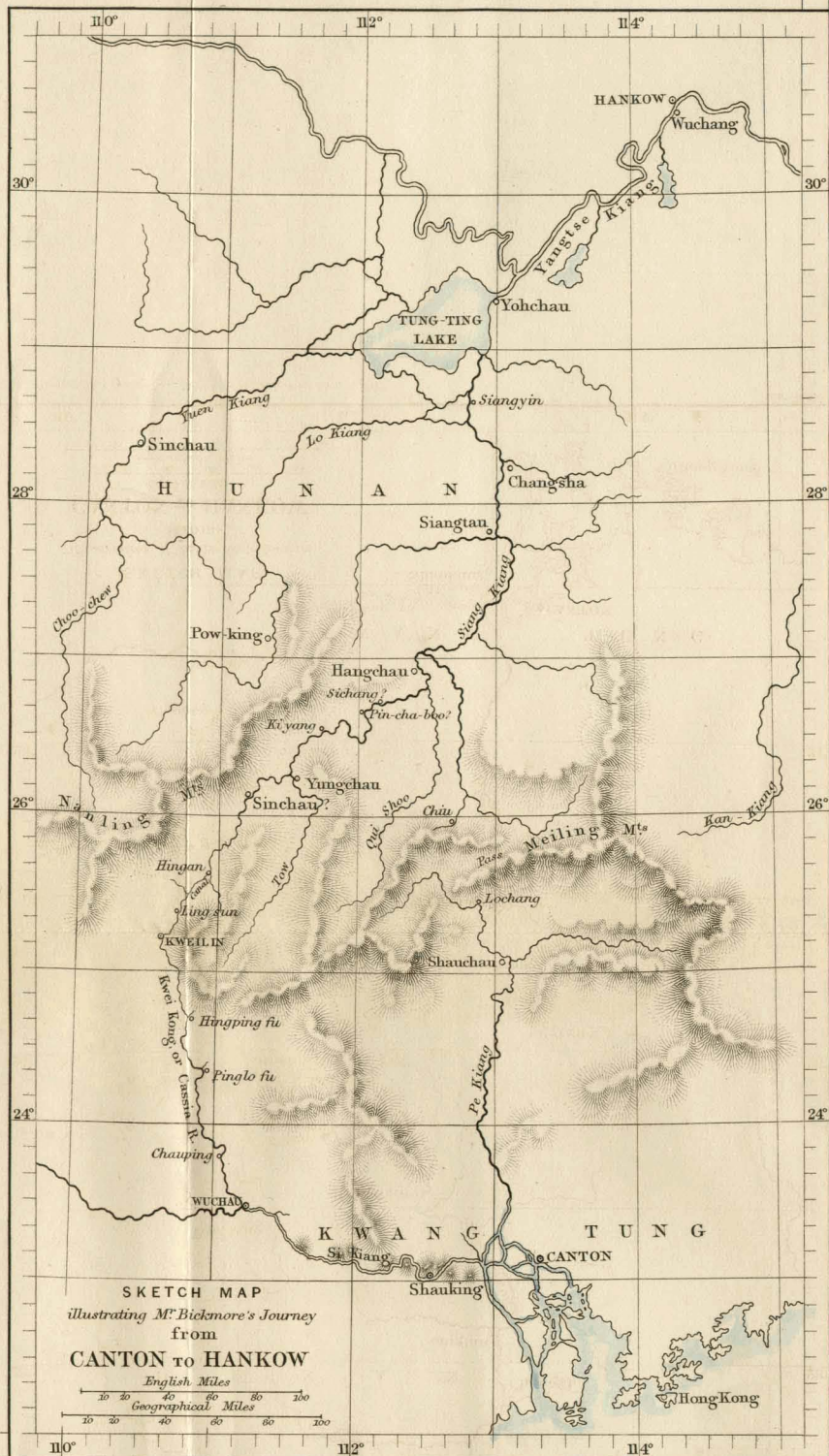
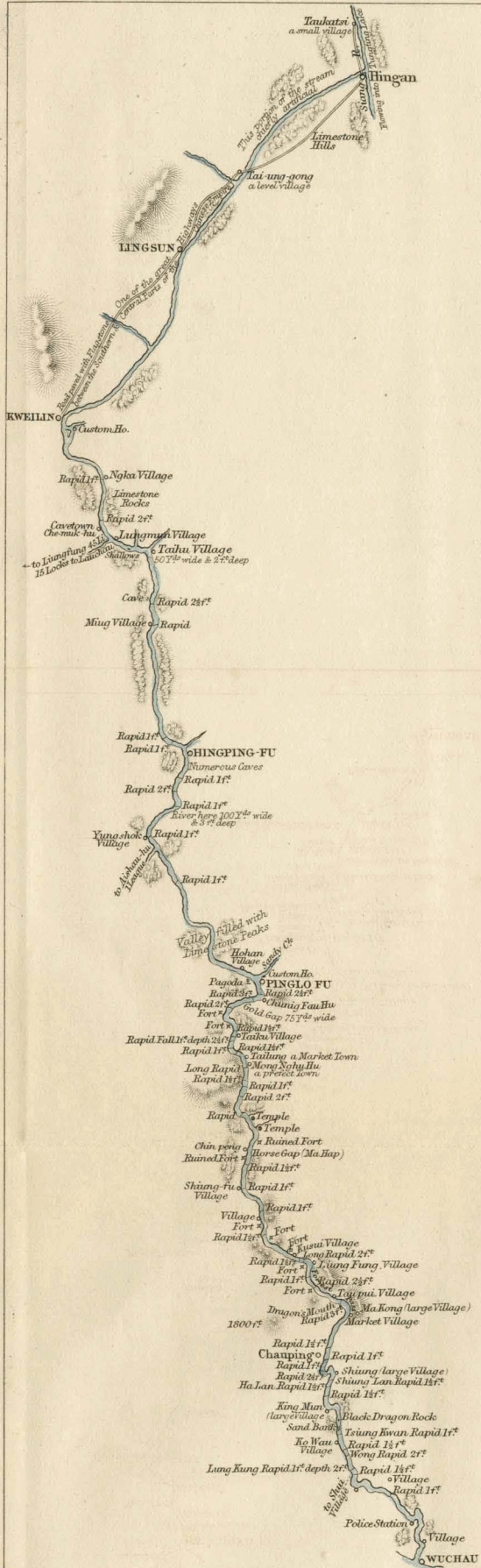


# THE RIVER KONG OR CASSIA

Reduced from the large Map

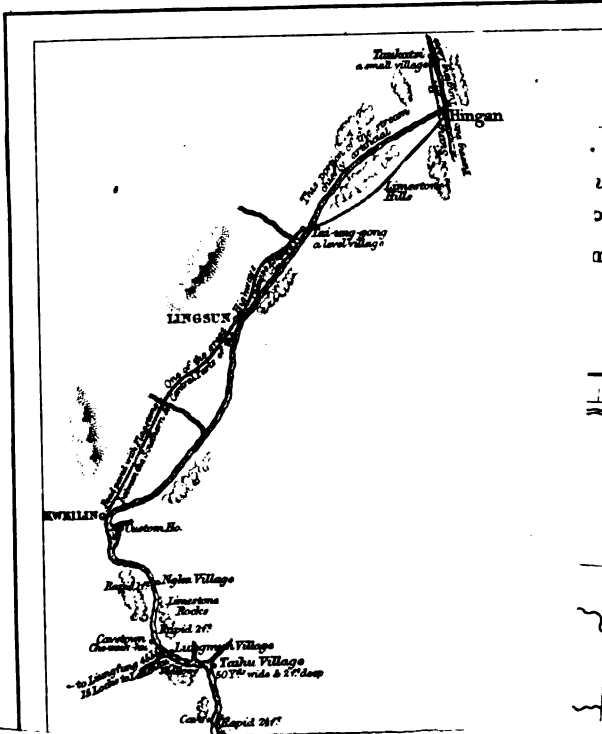
by

Albert S. Bickmore Esq<sup>r</sup>e M.A.

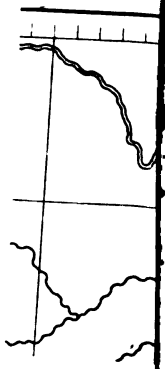








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by joints and seams. Over their whole surface they are extremely rough and jagged, and furrowed into perpendicular grooves, worn by the small streams that pour down their sides in every slight shower. They form as striking objects in the level plain as the "Little Orphan" does in the waters of the Yangtse, and, like it, have groups of little temples in the natural niches in their sides. Larger temples are ranged at their feet; and one which we entered contained in the principal hall three great images of bronze, 6 or 7 feet high. In another room I noticed an idol with six arms. The whole building was going rapidly to decay, and it was only after much searching that we succeeded in finding two poor monks preparing a scanty meal in the refectory—the last place they were willing to desert in the whole temple.

Climbing up a steep, narrow stairway, that rises diagonally across the face of the precipice, we reached a second temple perched high in a little nook. Along a part of this stairway a rude, heavy chain was fastened to the mountain side, that the timid and weary might help themselves onward to the temples above; and many must have been the pilgrims that ascended this difficult way, if we are to judge from the depth of the places their feet have worn in the solid rock. The entrance to the temple was through a crazy gateway or portal of loosened bricks, which threatened to fall and immolate to its heathen god the first person who should set foot within it. This temple, we were informed, was built some 200 years ago when Shauking was a great and flourishing city, but now the poor priests can scarcely beg enough from the people to supply their immediate necessities, and their once splendid temples are rapidly becoming merely heaps of ruins. Here, as is frequently found in masses of limestone, are several caves. We entered one of a bell shape. Its floor was mostly covered with water, and a bridge led us to a platform at the farther end. As we were crossing this Stygian stream we were saluted with a fierce barking, and indeed we did seem to be approaching the regions over which Cerberus presides, but no other charm was necessary for us to safely pass these canine guardians than a show of our canes. Many tablets have been cut in the rock, and along a stairway that led us to a picturesque temple, where the cave opens to the sky on the opposite side.

During these excursions in the vicinity of Shauking both of my companions became quite ill from the excessive heat, the thermometer in the shade at noon rising to 98° Fahr., and at my urgent solicitation they concluded to return and let me continue on alone.

On the second day, from Shaiking, I came to the "Cock's Comb Rock," a huge wall or dyke of black crystalline marble, with a crest so jagged that the name the Chinese have given it accurately describes it. North-west from this, in a small plain, is a conical hill also of limestone. Its whole interior has been washed, and forms a much grander cave than the one we had previously visited in one of the "Seven Stars." All these rocks have the same mineralogical characters, and probably belong to the same geological period.

Crossing the river from Cock's Comb Rock we came to a small village, and anchored for the night astern a small gunboat. On consulting my chart I found "a favourite resort for robbers" written around the next bend, about half-a-mile up the stream; but I believed we must be safe with a gunboat so near, and taking care that my revolver was in prime order, and that a heavy sword was within my grasp, I laid down determined to sleep despite a continual din of tam-tams, and the most extravagant crying, and shrieking, and groaning of some women who were bewailing the death of some relative or friend. Late in the night the watch on the gunboat began calling out loudly; then my boy, who was interpreter and only companion, joined in the shouting; and though the stranger boat had approached so near that I could hear the splashing of their oars, yet there was no reply. The next instant the gunner fired his cannon, and at once they replied in the meekest tones. Our would-be robbers had that time mistaken their prey. This is but an illustration of the noises and alarms that occurred frequently all the way to Hankow.

As we slowly ascended the river by dint of poling, tracking, and sailing, I had good opportunities to collect specimens of the rocks and ascertain the dip and strike of the strata. In a week I reached Wuchau, the last missionary outpost in this direction. There I met the Rev. Mr. Graves, of Canton, and induced him to go with me up the River Kweikong, or Cassia River, to Kweilin, the capital of the province of Kwangsi.

It is so dangerous ascending this river, on account of robbers, that boats only leave Wuchau when several are ready to go, and can keep together and afford each other mutual assistance in case of an attack. As an additional protection, the Mandarin offered to send a small gunboat along with us; but only one policeman made his appearance, and he carried no arms—a fair illustration of the way Chinese officials keep their promises.

The boats on this river are quite different from those seen at Canton. They have flat bottoms, and curve up high at the

bow and stern, that the helmsman and a man on the highest part forward may see some distance ahead and escape the rocks when they come down with the rapid current.

The principal article carried up this river in these boats is salt, and, as the Government monopolises the manufacture of this necessary article, and taxes and retaxes it at the most exorbitant rates, the boatmen improve every possible opportunity to smuggle it from place to place into the interior. We therefore made a special agreement that not a particle should be brought on board, and were not a little astounded soon afterwards to find the captain trying to hide some among our baggage. We very plainly informed him if it was left there it would go overboard, and finally, as near as I could ascertain, he bought a permit for a part and smuggled through the rest.

This smuggling and cheating the Government is so common that I was repeatedly assured that the Mandarin boats, which are not liable to be searched, from the fact that they carry officials, never go up or down this river without improving every such opportunity to evade the Custom dues. Every day or two we came to a small house with two poles in front bearing large triangular flags; and there we were obliged to stop and allow the boat to be searched by fierce-looking fellows, each armed with a long stick pointed with iron. The privilege of collecting taxes at every place in the interior being given in reality to the highest bidder, he has no scruples to reimburse himself and leave a good surplus. In this way the people are "squeezed" until their discontent ripens into open rebellion. When an official is appointed over a city, or district, or province, he receives no instructions how he must act, except to govern successfully; and to govern with success in China, means to extort the last cash possible from the people and yet not press them into open revolt. At Wuchau I was credibly informed that between that city and Canton, a distance of 200 miles, there were no less than *ten* places where duties are levied. With such strictures in the great arteries of her trade all rapid progress in China is beyond hope.

Ascending this river is little else than dragging a boat up one continued series of rapids, and though ours drew but 5 or 6 inches, it seemed sometimes that the boatmen would not be able to get her along any farther. This shows how shallow the water is at that season of the year, and also the unfortunate fact that steamers can never be used on the river. The boatmen at Wuchau reckon on fourteen days to reach Kweilin and four to return.

For the first 100 miles we passed only small scattered villages,

each having on the top of the highest hill near it a fort where they keep their extra rice and clothing; for every village pillages every other village, and all that pass, whenever they dare. These fortified hill-tops reminded us of the pictures of the middle ages, given us by historians; but these people are subject to even less law and order than those of those early times, for here each man seems grasping for himself, and there they did acknowledge an allegiance to some lord and obeyed his commands.

As an illustration of the complete state of anarchy that obtains throughout this whole region, I may state that on our third day from Wuchau we met a large Mandarin boat that had been robbed of everything the first night after leaving Kweilin—the *officials* even not being able to escape the hands of these desperate thieves.

As we passed on from place to place, the Mandarins were all very kind to us, but kept asking how we could dare to come away there so far into the interior, that only one foreigner had ever been before, and who, as they said, though he escaped alive through Kwangsi, was murdered by the people of Hunan. They referred to an eccentric genius who did reach Hankow, but was stripped even of his clothing.

Beyond the city of Chauping the country becomes somewhat more cultivated, yet it is sparsely peopled, and there is no need that a single man should leave China in order to find a plenty of good land to cultivate.

The river here flows through deep passes; and we entered one, called the Forest Pass, as the bright day was darkening into twilight. The rock was a hard, silicious grit, and sharp peaks rose up to a height of 1600 or 1700 feet. Like the famous Shauking Pass, this is also a cleft in a mountain range, but while that is about 600 yards wide this is only from 50 to 150; and as we sailed along under these high overhanging precipices the scenic effect was far grander than anything else I enjoyed in China. As night overtook us while yet in the deep pass, we moored our boat to some huge rocks by the steep bank, and then climbed to the edge of a neighbouring ridge and waited to see the full moon, whose soft light was just brightening the eastern sky. And when her silver disk rose over the high jagged peaks, and threw their long, pointed shadows down the steep-sided pass, we had before us such a view as a lover of crayon sketches might well roam the whole world over to enjoy.

As we approached Pinglo, a city of the first rank, a high range of needle-shaped peaks stretched across the river from the east to the west. They were composed of the same dark-blue, highly crystalline limestone, traversed with white veins, that

had been previously noticed in the "Seven Stars" at Shaiking, and at "Cock's Comb Rock" on the Sikiang. Here a pass gave a section showing this limestone apparently resting on the grits and slates previously mentioned. In the shady places were large quantities of a beautiful blue convolvulus in full bloom, of the same species as specimens Mr. Graves had frequently found in the limestone caves near Shaiking.

Our daily routine was to walk in the forenoon until the sun got high, and again in the afternoon, until the boat reached a safe anchorage; Mr. Graves gathering plants and sketching a map of the river, and the writer collecting specimens of the rocks, ascertaining the dip of the strata and the direction of the elevations—details too numerous to be given in this paper.

On the evening after leaving Pinglo we were following the river-bank as it bent round a high bluff, when we suddenly found ourselves on the edge of a valley some ten miles broad, and extending to the right and left farther than we could see. In every direction it was perfectly *bristling* with sharp peaks of limestone. The strata of this limestone were nearly horizontal, and once the whole valley was filled with solid rock, which in the course of ages has been worn by running streams into deep channels, that have kept widening until only sharp peaks are left.

From a single position on the low river-bank I counted 192 separate peaks. The highest rose, I judge, to a height of 1200 feet above the plain, but even this did not represent the whole depth of the deposit. On the low land they were cultivating rice, indigo, peanuts, sugarcane, millet, and cotton, and their light-green colours contrasted sharply with the dark rocks rising abruptly from the level plain, and made the whole view the most peculiar and most picturesque seen on the journey. Similar views are given in Sir Roderick Murchison's 'Russia and the Ural Mountains,' and in 'Atkinson's Travels,' of the scenery among the contorted and fractured Devonian limestones on the banks of the Tchussovaya, on the western flanks of the Ural; and it is probably to this same Devonian period that these limestones and those previously mentioned belong.

On passing out of this marble region a section was found a little above the market-place, Hingping, where the limestone was seen resting—conformably, as near as I could judge—on the grits that at Kokhan had been found, in turn, resting on granite.

Nearer Kweilin the country is more open, and better cultivated, and large water-wheels, 20 or 30 feet in diameter, are frequently seen along the river-banks, wherever the rapids are strong enough to keep them moving. Pieces of bamboo are

fastened diagonally to the rim, and bring up the water, pouring it into a trough as they reach the highest point, and begin to descend on the revolving wheel.

A small pagoda perched on the top of a ragged rock, and a high hill through which had been chiseled a huge hole, were pointed out by our boatmen as indications that we were nearing the capital of the province of Kwangsi.

Instead of being situated on the west side of a considerable lake, as represented on the latest maps, we found it on the west side of the river, which in the rainy season probably overflows its low banks, and thus gives rise to the mistake.

The walls of the city are of blocks of limestone, neatly cut, and above a parapet of bricks.

We carefully closed our boat, to prevent any one from seeing us, and in the evening rowed up to the city. I at once despatched my boy to the Yamun, to show my pass from the Viceroy at Canton, and ask for chairs, and policemen to protect me to the next city; for Mr. Graves was then to return, and I must make my way as best I could for 800 miles farther, unable to speak six words of the language myself, and with no other interpreter or companion than a boy from Canton.

All arrangements could not be made till the next day; meanwhile we kept out of sight, but in some way they found we had come, and early the next morning all the streets, house-tops, and boats near us were packed with people, anxious to get a sight at the foreigners. At first we tried to avoid them by moving from place to place, darting hither and thither like a bird trying to escape from a hawk; but we met a crowd everywhere, and concluded the best way was to go out on the front part of the boat, and exhibit ourselves by turns to the curious public. When one throng had satiated their curiosity they generally left us, but they were immediately replaced by one still larger, until it seemed as if all the Chinamen south of the Great Wall had come out to gaze at us. In the midst of this tumult my boy arrived from the Yamun, and stated all was ready, and the Mandarin said that if I was going to Hankow, I should depart at once, for the whole city had been set into a perfect *furor* by a proclamation from the gentry, and he feared we should be attacked by so many he might not be able to defend us—a statement we well knew was only too true.

Mr. Graves kindly translated the proclamation for me as follows:—

*“It has already been determined by common consent that if any one has anything to do with the IMPs, or rents them a house or any other dwelling-place, his house and his family-dwelling shall*



*be immediately burnt to the ground, and his whole family, male and female, old and young, shall be at once put to death.*

“BY ORDER OF THE WHOLE PROVINCIAL CITY.”

But despite this formidable threat, I determined to continue to push my way through to Hankow, or perish in the attempt.

A great crowd gathered on the shore where I landed, and the boys hooted and shouted, but I could not understand what they said, and only hurried on my chair coolies through the suburbs, which were everywhere perfectly thronged. Two or three times I feared they would block up the street before me, and thus stop me completely, but they seemed to have a suspicious respect for “the barbarian,” and allowed me to pass. When we came to the chief gate, and were entering the city, some officials stopped my chair, and drew me into their office from the press of the crowd, while they were telling my coolies to take me round the city, and not through it. And to increase this dangerous delay, one of my chair coolies ran away, and it was a long time before another could be found; but I finally continued on between the city wall and the river, until we came to a high rock, round which we were ferried in a boat, and once more I was freed from my tormentors. It was certainly with no small delight that I walked, and was thus able to hurry on my chair-bearers, and with all possible haste quit this city of destruction. Night, however, overtook us when we were only five miles away, and the two policemen guarding us selected an inn in a little village, where we took lodgings for the night.

After such a tempest it was so pleasant to be allowed to rest a few moments in peace, and I considered myself so safe from any harm that I was tempted to wander out a little way into a neighbouring field, to note by the aid of an azimuth compass the direction of the valley we were to travel in on the morrow, and the form of the mountains on either side.

While I was absorbed in the beautiful view before me, a man passed by and glanced suspiciously at the open compass, so I shut it up and went back to rest. But a presentiment that all my troubles were not passed kept me awake till late in the evening, when suddenly the whole village began to resound with a heavy beating of gongs, and immediately came a great rabble bearing torches, and shouting out, “*Kill him! kill him!! kill the white devil!!!*” I plainly saw—mean cowards that they were—that they had come to rob me and then kill me, and I feared the worst; but my two policemen were faithful, for they knew they would be sure to lose their heads if I came to any harm, and it should be reported to Peking. They therefore showed the ringleader my pass from his own mandarin, and assured

them all that if they injured me in the least the mandarin would behead them to a man, and destroy every house in the place; and, after much loud and angry disputing, they offered to leave me, on condition that I should go on at the earliest dawn. The only crime alleged against me was that one of their number had seen me with a mysterious instrument observing the mountains and valleys, and that they were all satisfied I had come to carry away the hidden treasures they are confident their land possessed. All through this region, and indeed I may say all over China, whenever they saw me breaking the rocks, they at once concluded I must be searching for gold, or silver, or precious gems. Another popular notion is that a foreigner who has blue eyes certainly has the clairvoyant power of seeing straight through any quantity of solid rock.

*Sept. 3rd.*—At daylight we started up the valley to the north-east, the general direction of the Kweikong above Kweilin. The road, or, more properly, path, was only 3 or 4 feet wide, and paved with blocks of limestone or cobble-stone from the neighbouring river. Great numbers of coolies were passing to and fro, this being one of the four great highways between the southern part of the empire and the valley of the Yangtse. The others are (1) that from the province of Kwantung, over the Great Meiling Pass, into the province of Kiangsi, and down the Kan River to the Poyang Lake; (2), another also up the Pehkiang, or North River, to Shauchau, and in a north-west direction, up a small stream to Lo-chang, and over the Lesser Meiling Pass to Ching, and down a small river to Hangchau in Hunan; and (3), one from Yunnan, the capital of the province of that name, to Kweiyang, the capital of Kweichau, and thence down the Wu to the Yangtse.

At 10 A.M., the road came to a small tributary of the Kweikong, coming in from a range of high mountains on the north-west. On each side of this stream there had once been a large flight of marble steps, nicely cut, and carefully laid up; but now they are all falling apart, and the whole work going to decay, the amount of travel at present not being sufficient even to keep them in repair; and such was the condition of all the public works throughout that region.

Crossing to the opposite bank, we came to a small square tower, and near it were two iron pillars, surmounted by a large ornamental cap. Around each was an iron ring, to which were attached a series of huge chains, large enough for a sea junk. The people said they were to fasten robbers to—perhaps the Miautse, who live in the neighbouring mountains to the north and north-west, and are said to come down frequently and plunder the smaller villages in the neighbourhood.

But notwithstanding this great show of absolute power, these Miautse have to this day maintained an uninterrupted independence,—a proof of the weakness of the Chinese Government in every dynasty.

At 2 P.M., stopped to lunch at a little inn. The policemen insisted on my going into a small room, and remaining there out of sight till we were ready to start again; and after that, all the way to Hankow, I was so closely attended and so strictly guarded, that I found myself really a prisoner. I could not make long detours to the right or left as we passed objects of much interest; yet I can scarcely complain, for such measures were undoubtedly necessary for my safety. My compass I carried under my vest, and I looked at it only when we were at some distance from any village, and the road was clear of coolies, yet even my boy thought it was his duty to frequently remind me of the trouble it had just caused us; and besides, when I used it often, my policemen, with whom it was absolutely necessary for me to keep on good terms, plainly manifested a suspicion that I was a spy. Yet, as we followed along near the Kweikong, and crossed two of its tributaries, and the main stream itself, I was able to complete Mr. Graves' map across the watershed with considerable accuracy, and thus solve one of the queries I proposed to myself on leaving Canton, namely—Is there a water communication between the valley of the Siang and that of the Yangtse?

2 P.M.—Came to Ling-sun, a hien city, 60 li (20 miles) from Kweilin.

A sickening sensation closely akin to fear came over me as I entered its gate and thought how I had been treated at the last city; but the officials at the Yamun seemed to regard me with pity rather than hate, and I tried to return their kindness by pronouncing as well as I could the names of the chief places along my route, and marking out a rude map on the wall, and thus giving them some idea of where I had come from and where I wanted to go. But the policemen feared a mob might gather again, and led me away to a dirty inn, where every room was full but one, and on one of the two beds in that an old opium-smoker lay stretched out, nearly stupified with his favourite drug. The room was properly more of a dungeon than a guest chamber. A single piece of glass in the roof, which was little higher than our heads, admitted all the light we were suffered to enjoy. But my companion, at least, seemed blissfully indifferent to the inconveniences of our prison, and no doubt was imagining himself floating on clouds in the high air, or in some richly gilded barge gliding down Lethe's stream, whose waters he had certainly drunk to satiety. Several small boys climbed

up the partitions to peep over and steal a view at the odd personage inside, but I had become accustomed to such rudeness.

After three hours more we continued on, and passed out at the eastern gate. The whole city is one heap of ruins, and there are scarcely enough houses left to line the single main street, so complete is the destruction made by the Taipings. In fact, all the way from Shauking I had come almost exactly in the track of those rebels, and their hordes were composed of just such murderers and robbers as I found there. Their leader was undoubtedly stimulated to his undertaking by chagrin at not being able to pass the government examination; and it would be strange if a man whose prime motive was to take revenge on his government should care much about elevating his countrymen. It is true he and his confederates were friendly to foreigners, and invited them to take part with them in trying to drive out the Manchus; but I believe it was only because they were weak and needed assistance, and that, if they had once gained the supreme authority, they would have been as hostile to foreigners as the present dynasty, and a proof of this is the reserved manner of their chief as soon as he had taken Nanking, and believed the whole empire within his grasp. This territory where the "Great Peace," rebellion started, and the territory, too, that they held the longest, is the most despoiled, the most dangerous, and the most unpromising of any I have seen in China, and it has been my privilege to travel over a very large part of the empire. Revolution after revolution has swept back and forth over the whole length and breadth of China, until her soil has reddened in every part with the blood of tens, nay hundreds of millions of her people, and yet she remains just where she was two thousand years ago, simply because all these movements have been originated by men like the Taipings, whose only aim was to obtain the throne, or to plunder, or to avenge personal wrongs, and not by men who were filled with a lofty ambition to benefit their native land, and who were willing and desirous, if need be, to sacrifice their lives and all they possessed for the attainment of such a noble end.

The plain surrounding Ling-sun appeared very fertile, and was perfectly dotted with large stacks of rice, which the farmers were just gathering.

A walk of 35 li brought us to Tai-ung-gong, a small village on the Kweikong or Cassia River, for the water still flows slowly towards Kweilin. Before we reached it we crossed a small stream flowing into the Kweikong from the north. There we saw many rafts of bamboos to be floated down to

Kweilin and Wuchau. In its bed I noticed pebbles of granite and porphyry, but all the rocks seen *in situ* were the common silicious grits. The valley here is nearly filled with small hills, but in this place only. Among them I gathered a beautiful blue-bell, much like that found on our hill sides in New England. A kind of blackberry that grew in the old ruins by the road side was just ripening, and the opening of the asters also heralded the coming of autumn, as at home.

I had chosen just the right time for this journey, for there is much less danger of being robbed and murdered when it is harvest time, and the people are not suffering from want of food.

The next day we travelled 55 li to the district city, Hingan. The water here flows to the north, and the watershed is a few li to the south-west, but a canal connects the Kweikong and the Siang, which has been made in the following manner. The east and west chain of mountains, in some parts called the Meiling Range, and in others the Nanling Range, is here composed of separate ranges, which, instead of extending east and west, run parallel to each other in a direction N. 60° E. and S. 60° W.

The Kweikong takes its rise near the northern end of one valley, while the source of the Siang is at the southern end of the adjoining valley, and for some distance these streams have their channels nearly parallel to each other while they flow in *opposite* directions. It was only necessary to make a canal between the two, at right angles to their courses, and the communication was complete. This was done near the source of the Kweikong, for previously only a very slight elevation prevented the water at that place from flowing into the Siang.

But this canal can only be used during the rainy season, and then not for boats drawing more than 2 feet. The water is kept in the canals by building dams across them wherever a rapid would occur, and allowing the water to escape only through a small gap deep enough for a single boat to pass over. If there were large reservoirs along this part of the canal to receive the surplus water during the wet season, and pour it out during the dry season, boats could pass to and from Kweilin and Sinchau throughout the year. But the chief difficulty is not near the watershed, which is really on a plateau, but in the many strong and dangerous rapids that occur all the way down the Cassia River from Kweilin to Wuchau on the one side, and from Hingan down the Siang to Yunchau on the other. To improve the navigation of these rivers to a satisfactory degree would, I believe, prove nearly as costly as building a railroad,

without offering only a part of the great advantages of the latter for the future development of the adjacent country.

Hingan we found in the same ominous condition as Ling-sun. For the whole distance the stream was so low, that we were continually thumping, bumping, and grating over the rocks and coarse shingle, especially in the gaps in the dams. These dams occurred every one or two li. They are made with a gap for the boats by one bank, and by the other a sluice-way, where as many as ten huge water-wheels were sometimes seen one behind the other. It seemed that there were many more rapids in the 14 leagues from Taukatse to Sinchau, than in 16 leagues from Kweilin toward Wuchau on the other side of the watershed.

Through the province of Kwangsi one or two policemen attended us from one city to the next, carrying a large letter from their Mandarin, informing the people we were travelling with the permission of the Government, and requesting them not to trouble or annoy us in any way. When we reached the city before us, this paper was signed by the Mandarin and returned to the policemen, as a proof they had fully performed their duty and were free from any farther responsibility. But in Hunan I was always accompanied by one civil Mandarin and one policeman, and for most of the way by a military Mandarin, and from two to four soldiers besides—a guard no larger than the sequel proved I needed. So far as my experience extended, these people certainly sustained their unenviable reputation of being the most lawless and the most openly hostile to foreigners of those of any province in the empire.

Sinchau is the chief city in this region, and appeared nearly as large as Wuchau, yet it is not seen even on the best maps. Again, all this area for 100 li farther down the Siang is in the province of Kwangsi, and not in the province of Hunan, as the maps represent it.

At this city my boy and boatmen purchased some fossil *brachiopoda* in the market, and on enquiring carefully I found they came from the foot of a waterfall some 93 li distant among the hills, and were gathered by the boys and brought to market to sell as curiosities. They call them "hawks" from the curved part near the hinge. A Mandarin afterwards fully confirmed this account of them. They are probably of the Devonian period, and undoubtedly came from the limestones already mentioned as resting on grits and slates, which again rest on granite.

At the boundary of the province dark shales appeared for the first time, and probably belong to the coal rocks.

All the way from Shauking to this point the whole country,

along the route, we had come, is one uninterrupted mass of hills. Here the valley of the Siang begins to widen.

In eight days from Sinchau we reached Kiyang which is situated on the river-bank, and not some distance back of it, as given on the maps.

Below this city the whole country becomes thickly populated and well cultivated, and the temples outside the cities which were all destroyed by the Taipings appeared everywhere newly built, and contrasting favourably with the ominous condition of such buildings in every other part of the empire, and indicating the high prosperity of the people by whose contributions they are built. They are so numerous, and form such a prominent feature in every scene along the Siang, that Hunan may properly be styled the province of temples, and the stronghold of Buddhism.

Eight or ten li below Kiyang, in one place on the right bank, limestone strata were seen resting unconformably on other limestone strata, as if the upper layers belong to a different formation. The lower limestone had the jointed and fissured appearance of that previously seen resting on the grits and slates. 84 li below Kiyang, at the village of Pin-cha-boo, we passed a hill of limestone, interstratified with coal. They were quarrying the limestone, and using the coal obtained at the same time, to burn it to lime. Dip of these strata  $40^{\circ}$  to the north, and a little farther in that direction came red sandstone, with similar dip of  $15^{\circ}$  to  $20^{\circ}$ .

*September 16th.* Stopped for the night at a little village 165 li above Hangchau. As we arrived after dark no one saw me, and I was left unmolested. All the evening there was even more loud talking and disputing than I had been accustomed to hear, and the whole village appeared to have indulged rather freely in samshoo.

Before we pushed off to anchor, as usual, in the stream, my servant asked the Mandarin if he would like to take a walk along the front street, but he only shook his head in an ominous manner, and replied "they are all ruffians there." About 10 o'clock very loud and excited talking and disputing began on the bank near us, and soon one of the number commenced screaming and groaning, as if he had received his death wound. Immediately his murderers brought him down the bank, put him into a small boat, and paddled by us out into the stream, their victim all the time groaning more and more feebly, and evidently dying. My servant, who had been carefully watching and listening, said these men had first robbed him, and when he cried for help they had stabbed him, and they

were just then finishing their work by sinking him in the river. I found we had thus run directly into a nest of the assassins that prowl through the country, but I trusted no one had seen me, for that was my only chance of escaping the same fate. There was nothing I could do but keep perfectly quiet, so as not to attract their attention, and have the boat start as soon as it should be light enough for us to avoid the rocks in the rapids. I opened the lid of my revolver box, and determined when the event came to sell my life as dearly as I could; but after listening for many long, lonely hours, I finally fell asleep, and when I awoke again we were quietly floating down the rapid stream, and this village of robbers was far out of sight behind us.

We soon passed Sichang 145 li above Hangchau. This is the principal coal mine on the Siang, and some fifty boats were then loading for places down that river and along the Yangtse. Here a fine section was obtained, showing that the coal-beds rest on limestone, which is also the case in Szchuen, near Peking, and probably in every part of the empire where both occur.

As we were but six miles from the village where the murder just described had occurred, the civil Mandarin sent to protect me, declared he would not allow me to land and examine the mines for a moment, and I could therefore only note what was to be seen from the river as we passed. "The mines" that thus came in view were nothing more than deep pits in the sides of the hills, and consequently only "surface coals" are obtained. It is probably to be expected that better coal would occur below the water-level, but as soon as they come to water they are obliged to give up working a mine for want of proper pumping apparatus. The best coal in China therefore remains to be taken out. The engineers in the steamers on the Yangtse assure me it has improved very decidedly in quality since the first was brought to them; but I doubt whether it will ever equal the best coals of England or America.

Hangchau is the great depôt for coal in Hunan, and the military Mandarin who accompanied me from that city to Changshá, the capital of the province, stated that coal is also mined at Kweiyang and Saiyang (see Dr. Williams' map of China), and at Siuhwa, on Tsz' Kiang. It probably occurs, therefore, everywhere beneath the red sandstone that covers the wide plains in this province, but it is only mined where it outcrops on the borders of those plains.

From this village of Sichang, in Hunan, to Moukden, north of the Gulf of Liautung, there is a continued series of coal-



mines on the flanks of the elevations that form the western border of the Great Plain, and the wide distribution of such a mineral promises well for the future development of China.

The most important place for trade in Hunan is Siangtau, 90 li south of Changsha. All the boats that come down the numerous branches of the Siang make this the point of rendezvous, and there is water enough for small steamers from Hankow unless a shallow occurs where this river empties into the Tungting Lake. That place I passed by night, and had no opportunity of examining.

At Siangyin we found there was such a great flood in the valley of the Yangtse that we were already on the border of the lake, though, according to the map, it ought to have been dry land for 20 miles farther.

When we reached the lake a heavy northerly wind had been blowing for six or seven days, and few or no boats had crossed it during that time. A southerly breeze then set in, and all the boats that had been harbouring in the many creeks and bays came out on to the lake; and at sunrise I enjoyed a view only to be seen in this land whose population is numbered by the hundred million. As far as the eye could see before us and behind us and for several miles on either side the surface of the lake was perfectly feathered with white sails, some in sunshine, some in shadow, and some in the dim distance apparently gliding on a thin film of air over the water. Twice I counted nearly 440 boats in sight at one time, and with the aid of my field glass fully 100 more could be distinguished. Many were loaded with tea, many with coal, and many were just swimming along under huge deck loads of round timber. This shows the amount of carrying trade between Siangtau with Changsha, and Yohchau, and Hankow, and other cities down the Yangtse. It also indicates that Siangtau is the most important city up the Yangtse that is not yet open to foreign trade.

This lake is very shallow along its eastern side and probably over its whole area, and its basin is merely the lowest part in the great depression that forms the valley of the Siang. It is rapidly filling up with the sediment brought down the Siang and the Yangtse.

The Poyang Lake is of the same character. It has been noticed that each has near it a group of high mountains. This is only another way of stating that where there has been an unusual elevation there has been a corresponding depression near it.

Below Yohchau a number of lakes occur, which Père Huc describes as abounding in floating islands, where the people are obliged to live because the surrounding country is so over-popu-

lated; but I saw none, and others who had been to and fro over most of this area assured me they had never seen anything of the kind.

*Oct. 5th.*—After 60 days of continued travelling I reached Hankow, the distance by the route I had chosen being about 1200 miles.

For 35 days I had lived like a common coolie, as I had only one man to carry my own and my servant's clothing during the land journey, and what food we should want for two or three days, for we expected to be able to get nothing to eat near Kweilin after the gentry had published such a proclamation. Frequently, for nearly half a day at a time, while we were waiting for the mandarins at the cities, I had to lie among the cargo with a straw mat over me, fearfully cramped, yet not able to stir, that I might thus escape a repetition of what had occurred at Kweilin. The mandarins never seemed contented until they had packed me away in that fashion. Yet they were always very kind, and for some distance they came to call on me and be satisfied that a foreigner had really come up into their country. At Yohchau the Mandarin would not believe I had come from Canton, and even had the impoliteness to say it was much more probable I had come up the Yangtse from Shanghai or Hankow, until he had seen the seal of the Viceroy of Kwangtung and Kwangsi.

Besides learning something of the physical geography of this unknown part of the empire, this journey was undertaken with the hope of being able to trace the succession of the geological formations of that region. In a country where there are no railroads or great excavations, perhaps the channels of the rivers afford one of the best opportunities for this purpose; and as the water was everywhere very low, it was only necessary to float along in a boat near the banks and the strata could be examined and followed continuously for miles. Sections were pencilled at the most interesting points, and they show the succession in the territory through which we came to be—*first* and *lowest*, granite; on which rests, *secondly*, a thick formation of *grits* and *slates*. On these rest, *thirdly*, *old limestones*, probably of the Devonian period; and these are covered, *fourthly*, by another series of *limestone strata* of the same age as the *coal rocks*; and *fifthly*, these later limestones and coal beds are covered in turn by *red sandstone*.

The route taken from Canton to Hankow is the one proposed for a railroad between those cities on account of the large trade between Canton and Wuchau; but I suggest that possibly a more desirable route may be from Canton up the North River to Shauchau, and thence along a small stream in a north-

westerly direction to Loucheung, and over the "Lesser Meiling Pass" to Ching and down a branch of the Siang to Hangchau, provided this pass is not so high as to make deep cuttings or tunnelling necessary. All such difficulty would certainly be avoided by extending the line as proposed southerly from Hangchau to Kweilin and Wuchau; and in proof of this I may state that if I had left Canton in the rainy season I could have gone by this route all the way round to Shanghai in *one and the same* boat. The season in which I came was not only a "dry season," but admitted by all to be a *remarkably* dry season; and yet if the gentry of Kweilin had not prevented me from getting a boat at that city, I could then have continued on to Ling-sun, and when I reached Tai-ung-gong, only 35 li (11 miles) further, I found some boatmen pushing their boats along to Hingan, but not as fast as I could go by land. From Hankow to Canton, *viâ* Kweilin, there is no physical feature whatever that will render the construction of a railroad a work of any greater difficulty than in any very hilly country; but there is very little trade between Hangchau and Kweilin, and Kweilin and Wuchau, while there appears to be very considerable trade between Hangchau and the province of Kwangtung by the route I suggest. This way over the Lesser Meiling Pass was the one in which all the teas from the province of Hunan and Kweichau were transported to Canton when that was the only open port; and when I was at Hangchau the mandarins and boatmen all agreed that all their trade at present with the province of Kwangtung was carried in this old channel, which, as they said, would have taken me but half as long as the one I had preferred that I might see a new part of the empire. They also affirmed that there was no water communication between the source of the branch of the Siang near Ching and the source of the branch of the North River at Loucheung on the southern side of the watershed.

While there are immense quantities of goods to be transported in every direction, and such natural facilities for building a railroad, great obstacles to such a work will be found in the bitter hostility of the people to all foreigners, and in their superstitious fears—"Fringshui"—that any high building or excavation "will affect the winds and rain," and deluge their crops with floods or parch them with heat. The prevalence of this belief among the Chinese, and the extent to which it influences their actions, is most surprising. All over the empire deserted quarries of limestone and sandstone are seen, and lead and other mines, except coal, are generally not worked. On inquiring the cause of this, the invariable reply is, "It has been closed by order of the Emperor;" but in pressing the matter further, I have found, in every case except one, that this imperial edict

was made in this way:—When a man commences an excavation, the surrounding community draw up a petition that this man should not be allowed to ruin their crops. It is then handed to the emperor, who, not daring to oppose the will of the majority, in a condescending manner orders the petition to be granted, and thus, while he plays the part of the absolute monarch, he is really a supple slave. And this shows how much protection a railroad company or a telegraph company ought to expect, and how much they would certainly find in the present Government. Again, the great numbers who are now dependent on the carrying trade for a livelihood would be likely to interfere with any such work, and perhaps destroy it altogether when they found it taking away their only means of supporting themselves. The argument that such people would find plenty of employment in building the road and taking care of it is partly met, at least, by the fact that the Chinese are slow to change their habits, and the boat people generally dislike to live on the land, much less to work on it.

We therefore come to the conclusion that there is no encouragement for either foreign or native capitalists to attempt to build a railroad in that land until the Government will not only freely give permission for such a work, but also *can* and *will* guarantee to protect the road, or fully make up any damage the people may do to it. When this happy day for China arrives, it is as certain that railroads there will pay as that merchants now find it profitable to run steamers on the Yangtse and Canton rivers and along the sea coast.

Besides the water communication between the valley of the Sikiang and the Yangtse described above, it has been supposed that another might be found by following up the Sikiang directly west through the whole province of Kwangsi to Sz'ching, thence north-westerly to Hingi and Ngaungau in Kweichau, and thence northerly to some branch of the Wu River near Kweihwa or Ngaushun, and so down to the Yangtse. At first I proposed taking this route, but decided on the one chosen on account of its being that proposed for a railroad, and because it was nearer the seaboard and therefore more immediately interesting.

The topography of Hunan and the eastern part of Kwangsi being now quite well known, it remains for some one to take this second route, and give us definite information concerning the geography and geology of the western part of Kwangsi and the province of Kweichau. Such a journey will also greatly add to our present knowledge of the wide ramifications of the rivers and canals in China, the completeness of her internal water-communications being the next wonder to the immense numbers of her population.



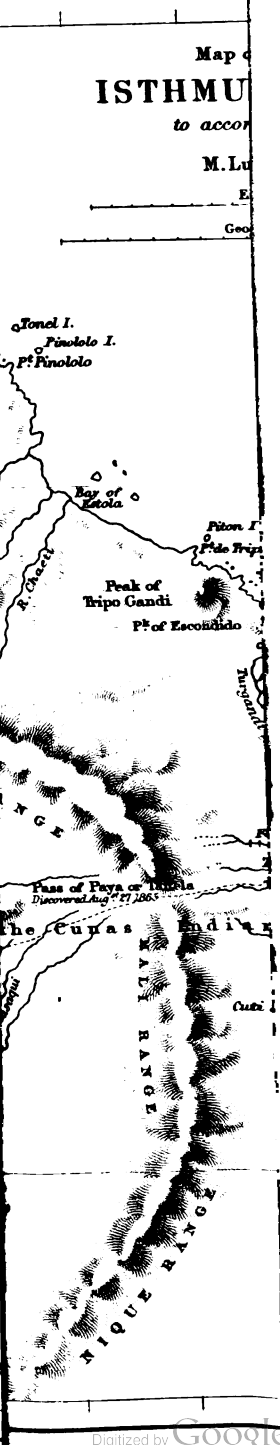
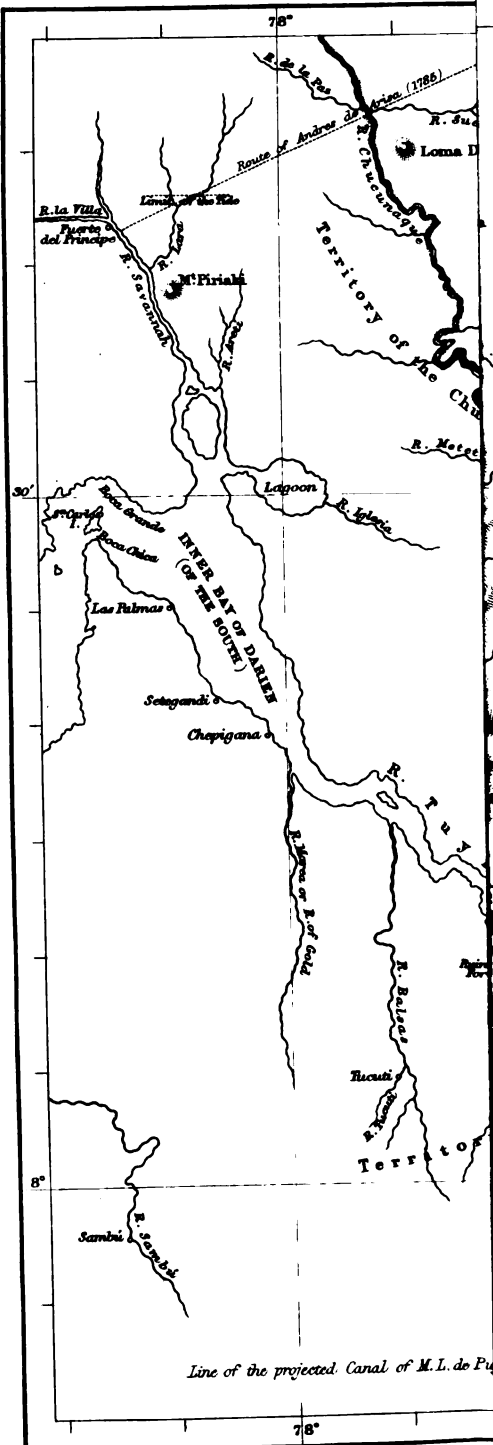
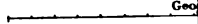
# Map of Isthmus

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IV.—*Account of Scientific Explorations in the Isthmus of Darien in the years 1861 and 1865.* By M. LUCIEN DE PUYDT.

Read, January 13, 1868.

THERE is a portion of South America but little known even to the scientific world, yet admirably situated between the Equator and the Tropic of Cancer, bathed by two oceans, teeming in minerals and rich varieties of the animal and vegetable kingdoms, and endowed by nature with convenient ports and roadsteads, as well as with important rivers and spacious lakes. This portion is the American Isthmus—that immense neck of land which separates the two Americas, bordering Mexico on the north, and the United States of Colombia on the south, and comprising the five republics of Central America.

This paucity of knowledge, however, is not to be attributed to want of enterprise with reference to that comparatively vast territory; for ever since the commencement of the sixteenth century its soil has been trodden alternately by illustrious navigators, celebrated captains, bold and reckless adventurers, unassuming colonists, and ambitious conquerors, as well as by intrepid scientific explorers, more or less influenced by the desire of opening out fresh prospects for the progress of humanity; but, unfortunately, national rivalry, petty jealousies, and more especially the indifference or incredulity of the uneducated masses of society, have paralysed the efforts of the hardy pioneers of civilisation.

The history of the discoveries and explorations in that part, from 1501 to a more modern period, is too well known to the learned world to need any circumstantial account from me; but it may be merely observed that to the nineteenth century almost exclusively belongs the honour of sending forth expeditions thereto, with a view to general civilisation; whereas at anterior periods the chief incentives to those perilous undertakings were traceable to the love of conquest, the thirst of gold, and the hope of pillage. All honour, then, to the nations of our own times! All honour to France, England, the United States of North America, and Holland, not forgetting certain other countries; each having laboured to prepare the "highway" of future times, and with the aid of science to penetrate—what the first Spanish conquerors emphatically called—"the secret of the strait."

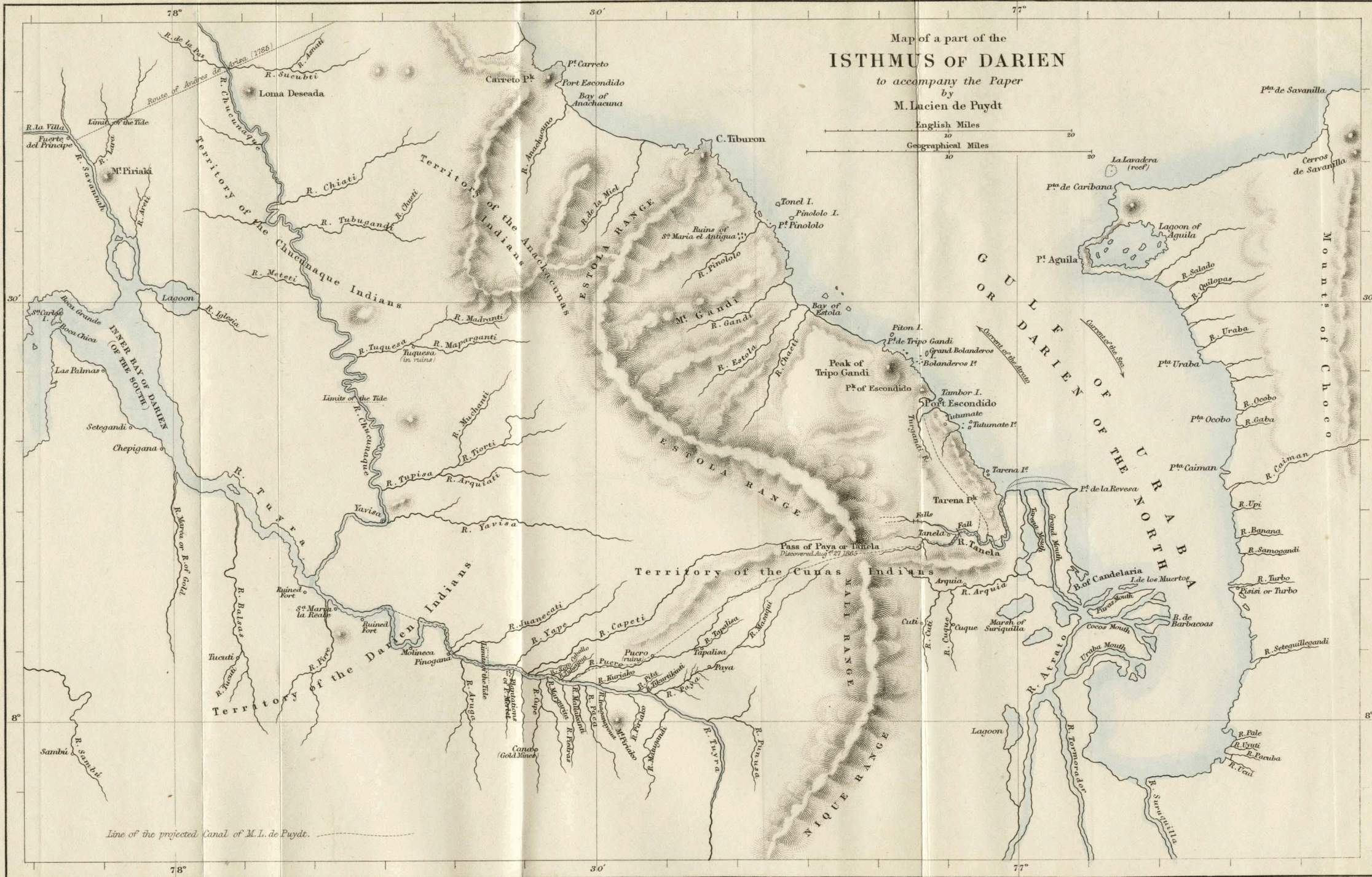
At the southernmost portion of the American Isthmus stretches forth a narrow neck of land, generally known as the Isthmus of Panama, but more properly divisible into two distinct sections: one under the above name, and the other under that of Darien.



Map of a part of the  
**ISTHMUS OF DARIEN**

to accompany the Paper  
by  
M. LACIE DE PUYDT

English Miles  
10 20  
Geographical Miles  
10 20



Line of the projected Canal of M. L. de Puydt.



The latter, to which I propose to devote more especial attention, is intersected by large rivers, the principal one being the Tuyra, which flows into the Gulf San Miguel (St. Michael) on the Pacific, and its more important tributaries the Congo, the Savannah, the Chucunaque, and others.\*

I traversed and explored the territory of Darien on two different occasions (in 1861 and 1865), with the view of determining the least elevated passage over the *Cordillera*, or mountain-chain, which borders it on the Atlantic side, as well as of tracing the most practical course for a large ship-canal, destined to unite the two oceans, either direct from sea to sea, or by turning to account the various water-ways of the two declivities.

I have now the honour of laying before the Royal Geographical Society, whilst soliciting the indulgence of its distinguished members, the scientific observations which, more especially in a geographical point of view, I had the opportunity of making in the above-named corner of the earth; one so little known even in our own day, and yet the one which William Paterson in a spirit of prophecy termed the "Key of the World."

Towards the commencement of the year 1861 I penetrated into the Isthmus of Darien, ascending the Tuyra, with the intention of examining the routes followed by Captain Prevost, of the British Navy, and Lieutenant Strain, of the United States, as well as the one mentioned by Dr. Cullen, and found practicable by Messrs. Gisborne and Forde. All these explorers were under the necessity of following, or crossing at times, the highway of communication which was opened in 1785 by Don Andres de Arisa, viz., from *Puerto Escoces* ("Scotch Port"), on the Atlantic, to *Puerto del Principe*, on the right bank of the *Savannah*. That route was completely finished when Don Manuel de Milla Santa Ella visited it in 1788.†

I had purchased at Panama a small schooner, called the *Mercedita*, in which, at the head of twenty-seven men, I ascended the Savannah as far as the mouth of the River Lara, where I pitched my first camp, that being the very spot where Captain Prevost's companions so miserably perished. By means of

\* As a geographical division, the Isthmus of Darien should be bounded on the south by  $7^{\circ} 56'$  n. lat., from the extremity of the Bay of Candelaria to Point Garatchine; but the orohydrographical division is better defined by the limit  $6^{\circ} 50'$ , as the Nique chain continues from the Gulf of Uraba to the Bay of *Aguacate*, thereby forming the grand division between the two important basins of the *Atrato* and the *Tuyra*.

† In 1865 I found and copied at the Bogota Library, the MS. of Don Andres de Arisa, to which there was a map of Darien attached, and which bore the title of 'Comentarios sobre la rica y fertilisima Provincia del Darien—Santa Maria la Antigua del Darien,' April 5, 1774. The information acquired by this writer gave rise to the road in question.

canoes I easily reached a point in the Rio Lara, where the strong tide of the Pacific is still perceptible, and, after a long passage through virgin forests, I arrived somewhat higher up than the confluence of the *Rio de la Paz* and the *Chucunaque*. It was there I became thoroughly impressed with the conviction of the impossibility of laying down a canal between the Bay of Caledonia and the River Savannah, unless by means of numerous sluices, which, however, could only be fed by the upper waters during the rainy season. The mountain, named "Loma de-seada," once passed, the country became gradually more elevated towards the Atlantic, as far as the lofty chain of the Cordilleras of San Blas, which borders the above-named bay.

It was evident that the information given by Dr. Cullen was completely incorrect, and that he had not traversed the interior of the country. In fact, I fully ascertained that such was the case when I reached the hospitable dwelling of Messrs. Nelson and Ossack in the village of Chepigana, on the left bank of the Tuyra, that being the house in which Dr. Cullen states he lived, and from which, as he alleges, he set out on that hunting expedition which conducted him, through level savannahs, to the shores of the Atlantic. I was assured by Messrs. Nelson and Ossack that they had never seen nor heard of Dr. Cullen except at Panama.

One point remained to be determined, viz., how far we should admit of the alleged height of 152 mètres, which served as the basis of a number of plans for constructing a canal, and which it was stated was the height of a gorge at the sources of the Rio Sasardi, near the Bay of Caledonia. That height, it was affirmed, had been carefully measured by Colonel Augustin Codazzi, of the New Grenada Engineers; but all my inquiries on the subject when I returned to Europe proved of no avail, and it was only on my second visit to Bogota in 1866, that I discovered, amongst the numerous maps and documents of the Observatory, a large MS. map of the Isthmus of Panama, drawn up by the above-named Colonel. The following is an extract:—

|                                               | Mètres. |
|-----------------------------------------------|---------|
| Sources of the Aglasinique (Atlantic) .. .. . | 591     |
| Road do. do. .. .. .                          | 274     |
| Small chain of the Rio Sasardi .. .. .        | 300     |
| Road of Sasardi (village) .. .. .             | 152     |
| Road of Sucubti (village) .. .. .             | 274     |

It is clear, therefore, that there has been a regrettable confusion with reference to the 152 mètres in question, which were given as the height of the least elevated pass in this mountain-chain, whereas by the word "road" ("*camino*" in Spanish), Codazzi only intended to indicate the height (above the level

of the sea) of the routes *half-way or so up the hills, and following the windings of the declivities leading from one village to another.*

All this was fully confirmed by fresh proofs; for one of my countrymen, who is settled in Colombia, made me a present of a map entirely in the handwriting of Colonel Codazzi, and signed by him, under date March 31, 1854; and in that map, which has special reference to the explorations of Captain Prevost and Messrs. Strain, Gisborne, and St. John, the heights are thus given in *English feet* :—

|                                                                                                                       | Feet. |
|-----------------------------------------------------------------------------------------------------------------------|-------|
| Between the sources of the Asnati (a minor tributary of the Chucunaque, Pacific) and those of the Aglasinique .. ..   | 1340  |
| Small chain of Sasardi .. ..                                                                                          | 1940  |
| Between the sources of the Aglatomate (Atlantic) and those of the Sucubti (a tributary of the Chucunaque, Pacific) .. | 1010  |
| Road of Sasardi (village) .. ..                                                                                       | 1275  |
|                                                                                                                       | 500   |

The observations I had made with reference to that proposed line of canalisation—which up to that time was regarded with so much favour—were consequently confirmed; and thenceforth, ceasing my investigations in that direction, I considered that the vast valley, traversed by the immense River Tuyra, which is so far up a tidal one, might afford in its eastern portion the means of easy communication with the small valleys which are bathed by the rivers that flow into the Atlantic, on the western side of the Gulf of Uraba. Thereupon I ascended that river, penetrating into the streams which feed it in its upper course; such as the Capeti, the Pucro, and the Paya; and after numerous difficulties and trials—which, however, were happily vanquished—I came to the conclusion that, *on that side alone*, the elevation of the Cordillera was sufficiently low, or else the rents in the mountain-chain sufficiently deep, for the construction of a navigable water-way suitable for all kinds of vessels of whatever tonnage.

I was sufficiently familiar with the orography of the Isthmus of Darien to remark not only the diminished elevation of the mountain chains, in proportion as they approached the Choco or the mouths of the Atrato, but also their frequent divisions into nearly isolated peaks or mamelons. Moreover, the double and broad cordillera in the Isthmus of Panama, parallel to the coast of San Blas, became a simple one, forming only one continuous but still thick line, after leaving the sources of the Chucunaque. Then descending towards the south-west on leaving Cape *Tiburón*, that chain narrows and falls, forming the *Sierra or ridge of Nique*, subdivided on the north, under the name of *Sierra de Estola*, and on the south, under that of *Sierra de Mali*. Subsequently one meets still with some isolated peaks,

but the previously mentioned continuous chain is replaced by mound-like formations, in the midst of which flow the waters of the Atrato and of other less important rivers.

I shall return hereafter to the topography proper of the extremity of the Gulf of Uraba.

In this quarter I continued until the month of June, 1861, zealously persevering in my researches and investigations, meeting with an hospitable reception in all the villages, contiguous to the Tuyra—such as Las Palmas, Chepigana, Santa Maria la Reale, Molineca, and Pinogana—and living on a friendly footing with the Paya Indians, one of whom, who spoke Spanish, acted as my interpreter during the greater portion of my wanderings. So far, then, I was in a favourable position for prosecuting my design, but the majority of the men in my service were sorely fatigued with the rough life of the woods, to which may be added the discomfort of the heavy rains which prevail in this latitude, when the sun enters the Tropic of Cancer.

I was then obliged to terminate the expedition for the time being, and to return to Europe, in order to submit to scientific men the results of my first researches, as well as the deductions I felt justified in making, with reference to the junction of the two oceans, by a maritime canal.

Four years were in that way devoted to various kinds of labour. I consulted all the authors who had written on the subject, analysed the works of eminent engineers of various nations, and closely examined every production bearing on the American Isthmus, from the plan of canalisation by the *Coatzacoalcos* in the Tehuantepec, up to the one carried into execution, at the *Raspadura*, by the parish priest of *Novita* (Choco). Thus assisted by the scientific attainments of my courageous predecessors, I resolved to explore the Darien anew—but this time on the Atlantic side, and in that way to penetrate to the boundary of my former travels in 1861.

Meanwhile "The Colombian Canal International Company" had been formed in Paris, under the auspices, and with the co-operation of a number of eminent, learned, and honourable gentlemen. It will be sufficient to make mention here of the two engineers who, so soon as a definitive plan shall have been determined on, will give their valuable aid to the work, viz., Mougel Bey, who drew up the Suez Canal plan, and Mr. Maclean, President of the Society of Civil Engineers, London.

I set off again in December, 1864, and organised my expedition at Carthagena, procuring the assistance of fourteen choice men. And here I may be allowed, were it only in grateful recognition of services rendered, to make mention of three of

the number, countrymen of my own, who afforded me many proofs of devoted zeal, gallantly braved fatigue and fever and encountered all the risks of the expedition, which was solely based on my own researches and statements, and one in which my only guides, in a country unknown even to its nearest neighbours, were my maps and my compass: the three companions in question were Mougel Bey, junior, engineer, and Messrs. Truchon and Decurey, inhabitants of Carthagena, who were induced by the grandeur of the undertaking to share my hazards and perils.

Having made a journey to Bogota, I was not able to commence my new explorations before the 28th of June, 1865; on which day I set sail from Carthagena in an old *balandra*, called the *Esperanza*, a sort of one-masted decked barge of 30 tons, without any keel—the only craft I could procure in that port. Coasting along by Morosquillo and the Sinù, but only in the day-time, on account of the defective condition of my vessel,—to say nothing of the dry or moist whirlwinds which blew almost every night from the south—I doubled Point Caribana (where I was nearly wrecked on the Lavadera Rock) as well as Point Aguila, and entered the Gulf of Uraba.

On the 7th of July I arrived at *Pisisi*—a small village situate at the mouth and on the left bank of the river Turbo. As the part of the country I proposed reaching was comparatively so near, I had indulged in the hope of being able to procure some intelligence respecting it, from the inhabitants of the place just named, particularly from Mr. Charles Dean, a British subject, who kindly received me; but, although the point at which I wished to touch was only some 19 or 20 miles distant by water, I could not, unfortunately, obtain the desired information. On the contrary, every one vied in dissuading me from the attempt to penetrate into a district inhabited by “Indios bravos,” under the leadership of a treacherous cacique, well known for his enmity to all foreigners. I was told that none but Indians of the same race could ascend their rivers, much less enter their villages, without running the risk of being put to death. Moreover—and this was of importance—every one affirmed that the river I was in quest of, in that direction, viz., the Tanela, did not even exist, and that the only “river” known under that name was one of the thirteen mouths of the Atrato—the Boca de Tarena. Nevertheless, I relied so much on my former researches respecting the Isthmus of Darien, that I persisted in my project, and ordered the owner of the craft to obey my instructions and proceed on the appointed course, without any further observations.

I left *Pisisi* on the 10th of July, at 7 A.M., under a stiff breeze

doubled Point Revesa, passed at some distance the Atrato, crossing two of its mouths (the Boca Grande and the Boca Tarena)—which were so much blocked up by the alluvia of the rivers that there was not sufficient water for the Indian canoes; and at 1 P.M., cast anchor in the western extremity of the Gulf of Uraba, some 2 miles from the coast, and in 6-fathom water.

At that short distance, and in a s.s.w. direction—the one in which I expected to discover the mouth of the Tanela—the coast, viewed through a spy-glass, presented but one continuous net-work of mangroves, sheltered behind a bar which was exposed to all the fury of the waves. To the west arose a chain of small mountains, sloping down to the sea and terminating, to the south, in the Peak of Tarena, and, to the north, in the Peak of Gandi. To the north, the islands of Tarena, Tutumate, and Tambor, were embosomed on the sea—the last-named one being lost in the horizon, above Puerto Escondido. Opposite the Tutumate Isles, and on the brink of the shore, are four fishermen's huts, which form the so-called village of Tutumate. I ordered the largest of my three canoes to be launched, and, accompanied by M. Mougél, junior, M. Truchon, and four rowers, all well armed, made right ahead for the bar, which we succeeded in passing over in safety, and found ourselves, all at once, in a small tranquil creek, at the extremity of which we perceived the mouth of the Tanela, some 20 mètres wide, and so well-concealed as to be completely invisible from outside the bar; continuing my reconnoitring, I entered the river to the extent of 5 or 6 miles, in order to note its various aspects.

The Tanela is 3 fathoms deep at its outlet, and  $1\frac{1}{2}$  some 6 miles up—that distance being the furthest extent of the exploration on the 10th of July; at which time, however, the river was not supplied with its average volume of water. For the space of about 3 miles, it takes a s.s.e. inland course, exhibiting in its axis the Peak of Tarena; it then inclines more and more towards the south, the s.s.w. and the south-west until it resumes its general direction, viz., w.s.w., which—with the exception of numerous bends—it maintains up to the point of junction of two branches, one of which descends from the Sierra de Estola in a more northerly course, whilst the other rises between the counter-forts of the Sierra de Mali, in a more southern one.

Contrary to the delineation on the maps, the Tanela has but one outlet into the sea; but it is evident, from the appearance of the spot, that there were formerly two, if not more. At some remote period it must have debouched direct into the gulf, whilst following its general direction from w.s.w. to e.n.e.; and at that epoch the River Atrato had only one vast estuary, situate

at the extremity of the Bay of Candelaria, at the base of the counter-forts of the Choco Mountains, and at the rear of the present mouth of the Suriquilla. The immense alluvial deposits of the Atrato have, by degrees, filled up the entire extremity of the gulf, covering it with flat shores, which produce only mangroves, and which, as now seen, are intersected by numerous canals, more or less navigable.

The Suriquilla, Tigre, Arquia, and other lagoons or marshes have likewise sprung up from those alluvial formations. To the like cause must be attributed the impediments to the direct course of the Tanela—obstacles which compelled it to deflect more and more towards the north, and to assume its present direction, whilst forming two or more mouths. The extension of the sandbanks has, however, effaced all traces of the more eastern mouth, so that only one now remains. That theory is confirmed by ocular inspection. In effect, on ascending the Tanela some 3 miles, one finds it flowing through an entirely flat, muddy, and slimy country (covered with mangroves), and maintaining an uninterrupted connection with the banks of the Atrato. It is only after the Tanela takes a westerly course that its bed becomes sandy, pebbly, and stony: the river is then in its ancient bed.

Before penetrating further into the country and advancing towards the Cordillera, I was desirous of reconnoitring the river as high up as possible, and, above all, of sounding the disposition of the Indians of Tanela, who had been described as so hostile. I wished also to determine the exact site of that village. Accordingly, on the 11th of July, accompanied by Messrs. Mougél and Truchon, as well as by a young native of Pisisi, whom Mr. Charles Dean had given me as an interpreter, I reascended the Tanela, and found that, higher up than the point I had attained the preceding day, the river still maintained an average breadth of 20 mètres, covered with water; but not unfrequently its bed was 100 mètres or more across, and was formed of rocks and fragments of trachytes, dolomites, gneiss, and porphyry, dry to view.

I drew near a *rancho*; but although it was uninhabited, I found under it two slightly-made boats, called *cayucos*, and perceived also another untenanted *rancho*, surrounded with banana-trees.

On the 12th inst., after having come in sight of other *ranchos* and plantations of bananas, cocoas, and the *Dioscorea radix*, I arrived, about half-past 4 P.M., at the confluence of the two branches already mentioned. From the sea up to this spot, I counted 17 rapids or "leaps," but of little incline or height. These were easily passed over, with the aid of cordage or a pole,

although I must not forget to mention that my canoe was heavily laden—containing not only nine men, but provisions, ammunition, bedding, and other articles. At the junction in question is a rapid with an incline of about 1·50 metre, and somewhat more difficult to cross. It may be observed that the number of rapids here set down is not given as the absolute one; for a few inches more or less of water cause them to disappear and re-appear, particularly up the windings of the river—the pebbles being washed down by the currents and storm-floods.

I left the smaller and far less important branch on the left and entered the northern one, whereon I considered it more probable the village of Tanela would be found. Its Indian inhabitants, I felt assured, were skilful navigators, as the construction of their cayucos was perfect in their way. At the mouth of the river I saw five or six of these admirably-shaped canoes, cut out of single trunks of trees, the natives making use of them even for turtle-fishing out at sea.

A little above the junction of the two streams I came on a magnificent and spacious *ranch*o, entirely of bamboo (*Bambusa arundinacea*), and of excellent construction. The roof was formed of palm-leaves, artistically juxtaposed and interwoven, and the dwelling itself was surrounded by plantations of banana and coco-nut trees, as well as by flowers of various kinds. Up to that time I had not encountered a single human being; but, on the other hand, I had at various times discovered unmistakable traces of the presence of man, near the abandoned *ranch*os—for example, ashes still warm, fruit recently cut, footsteps, &c. I may here add that I had given the strictest orders to respect property and not to take anything whatever belonging to the Indians.

After resting and sleeping tranquilly in the *ranch*o, we continued on our way. Our measures of precaution were found unnecessary, and that night also was passed in complete security.

On the 13th it was impossible to leave at an early hour, for the northern branch of the river had become so swollen during the storm, which broke out in the course of the night, that the navigation was impeded. It may be stated here that, up to the village of Tanela, I counted eight rapids, all of greater extent than those previously met with, on the lower course. It was evident that this northern branch took its source in a much more mountainous district, one, moreover, with a vaster plateau. As for the southern branch, it was not affected by the storm, but remained unchanged in appearance.

It was not before a quarter past 5 P.M. that we perceived the village of Tanela to our left, on the right bank of the river, the inhabitants being assembled on the margin. Soon afterwards



a light mahogany canoe, with three men, pushed off towards us. One of them was Nusalileli, the cacique of Tanela, who gave us a very kind reception, and insisted upon our sleeping in the village. Accordingly we proceeded there, and were most hospitably entertained; but I was unable to obtain any information respecting the interior of the country, the frequented roads, or the position of certain points. The fact was that, despite the perfectly good understanding between us, the Indian was of too distrustful a character to furnish me with the details I so much desired to procure.

The 14th, at half-past 6, I took my leave of the Indians of Tanela, who treated us with every mark of friendship, refusing our offer of remuneration for their hospitality. It is true that, with reference to my proposed exploration, I was not any better informed than previously to this visit; but of one thing I became certain, that, by acting with great prudence, I should have nothing to fear from these natives, whilst fully conscious that I could expect no assistance on their part.

At a quarter past 3, the same day, I again reached the sea, after an easy descent of eight hours and a half, exclusive of some short stoppages for meals.

My plan was now fully determined on, viz., to land the provisions and all the *matériel*; to reascend the Tanela, as far as the confluence of the two branches; to erect a *rancho* near that spot, as a basis of operations, and thence open a route through the virgin forest, compass in hand, and following the direction of the southern branch, which I considered would lead me to the slopes on the Pacific side by one of the transversal gorges or valleys of the Cordillera.

The execution of this plan was at once commenced; but unfortunately the large canoe, with M. Truchon and six men, was upset whilst crossing the bar, and a whirlwind which rose at the same time compelled me to weigh anchor and take moorings on the opposite coast of Caiman. This untoward event, which, however, did not involve any loss of life, necessitated the division of the expeditionary party into three companies. I landed Messrs. Mougél and Decurey, with four men, and then sailed for Pisisi, where I found M. Truchon and his crew all safe, but wholly destitute, as everything on board of the canoe had been lost. Finally, after many fatigues and contrarieties, I anchored on the 23rd at the same spot, opposite the Tanela, and on the next day we all landed, with our stores.

Being under the apprehension that the ten men in my service, eight of whom were negroes or mulattos, would make an attempt to return so soon as they came in view of the Indians, of whom they stand in dread, I took every precaution against their escape;

and accordingly, immediately on our landing, I signalled the owner of our craft to hoist sail, move off to a distance from shore, and proceed towards Pisisi, it being understood between him and me that he was not to return before September. My men were in consternation at his departure; but nought remained for them but to march forward and do their duty.

Whilst I was making all necessary scientific observations, during my upward course on the Tanela, M. Truchon preceded me on the voyage and had a *rancho* constructed on the right bank, about 150 mètres lower down than the confluence of the two branches of the river, below the Grand Rapid. The Tanela Indians kindly assisted him in the construction. We were on an excellent footing with them; and here I may state, once for all, that we continued so during the entire exploration.

On the 3rd of August all our preparations for a settlement were terminated, and we were enabled to commence our labours for opening the line. The same day nineteen tattooed and armed Indians, of the villages of Cuti and Arquia, paid us a visit, and endeavoured by all kinds of mendacious statements, as well as by a description of the various perils that awaited us, to dissuade us from proceeding any further up the country. I told them, however, in a conciliatory but firm manner, that I had fully made up my mind on the subject, so that all their efforts proved unavailing, and thereupon they withdrew.

The next day I had a road cleared in a westerly direction, making allowance for the magnetic deviation of the spot ( $8^{\circ}$  E.). On the 5th I traced the site of a new *rancho*, which was not definitively occupied before the 17th, as the branch of the Tanela, which we followed up, had not sufficient depth of water to float the canoes when laden, so that all the materials had to be carried on men's backs.

On the 10th I received a visit from Pascual, the chief cacique of the Indian confederation of the *Caribbees-Cunas*, and whose residence is at Arquia. He was accompanied by thirty-three men, armed as for war, and tattooed with the reddish-yellow juice of the arnotto plant. He also advised me not to push my researches further; in fact, every word of his partook of falsehood and duplicity, and it was only after an interview of three hours that he became convinced I would only yield to force, and accepted the hospitality of my *rancho* in Indian fashion, that is to say, by drinking with me the *chicha*, a beverage made from Indian corn. He then left, but returned to take his leave of me before proceeding on his way back to Arquia. This second time he was accompanied by forty men, but in more pacific guise. Although still as distrustful as before, and still as much disposed to mislead

me with respect to any information regarding the country, he made some protestations of friendship before his departure.

During all this time the labours of exploration continued unabated, but some of my workmen had an attack of fever, produced by over-fatigue. M. Mougel, junior, having imprudently exposed himself, fell seriously ill, and became so weak that he was unable to render me those professional services on which I had relied for establishing, by positive data, the result of my exploration. M. Truchon himself, despite all the energy of his character, was compelled to seek repose for a time in order to recruit his strength, exhausted as it was by his too great ardour in the cause.

On the 21st of August I quitted the line which had been opened out in the westerly direction, but which, however, was actively prosecuted in my absence, and proceeded towards the N.N.W., in order to ascertain the exact nature of the upper course of the northern branch, which flows, as already stated, in front of Tanela. After crossing several small mountain chains, separated by valleys radiating around a central summit, I reached the bank of the river and found that my conjectures were correct.

Of a far larger volume of water than the southern branch, the northern one was rapid in its course, confined by steep banks, obstructed by large blocks of rock, which were at times dislodged by the force of the current, and characterised here and there by falls or leaps of 2, 3, or 4 mètres. As the waters were so much swollen by a storm that I was compelled, with the two men who accompanied me, to pass the night on the bank, I concluded that the river received the torrents of rain-water which descended from the broad and elevated table-lands of the Sierra de Estola, where it takes its rise. Very different, as already observed, was the case with regard to the southern branch, for on one occasion there was scarcely a rise of a few centimètres, after the rain had fallen in torrents during fourteen consecutive hours.

On the 23rd and 24th of August I reconnoitred the course of the southern branch as far as the slopes of the Mali, and through some open vistas along the course of the river. I was enabled, by climbing up trees or neighbouring hills, to see with my own eyes that the two summits of the Mali and the Estola sank down, as it were, to an abrupt and rapid declivity, leaving a breach between them in the shape of a V, beyond which nothing further was discernible on the horizon. Nearly or quite up to my knees in water during several days—sometimes, however, hardly up to the ankle—I examined all the approaches and all the sinuosities of the ground, and felt sure that I was on the right way—the great desideratum.

I rectified the curves of the road which had been opened, and on the 25th of August M. Decurey and myself took an affectionate leave of our friends, appointing the end of the month for our return, and arranging that, in case of any untoward event, M. Truchon should take the command of the expedition and endeavour to bring back the remainder in safety. We two then proceeded on our explorations, accompanied by five devoted men, who carried our hammocks as well as provisions for five days.

Thus we set off into the unknown wilds, certain to meet with fresh difficulties, perhaps to perish. At best, we might be compelled to return by the Pacific slope, either by Paya, if we descended the river of that name, or by Tapalisa, if we followed the Pucro, or else by the Capeti and the Tuyra, for all three rivers have their sources in the same neighbourhood and in proximity to the Mali and Estola sierras. Nothing, however, of all this happened, and, as will be seen, it pleased Providence to restore us safely to the friends we had left behind.

I caused a small *rancho* to be erected at the foot of the Mali, and on the morning of the 27th doubled a buttress of the latter, whilst following a s.s.w. direction; then turning w. by  $\frac{1}{4}$  n. I reached its summit, some 400 mètres above the level of the plain. On the Pacific side the descent is almost perpendicular, and consequently dangerous, the sierra forming, as it were, a wall, from the top of which one perceives immense wooded savannahs, watered by the Tuyra and its tributaries. From out that ocean of verdure emerge the peaks and summits of the hilly chain which follows the course of the Chucunaque, and which, in undulating forms, die away in the distance, enveloped in a blueish tint, and taking a direction from north to south and from N.N.W. to S.S.E.

It was clear, therefore, that we had reached the last limit of the chain which separates the two slopes on that point; but the question still remained whether, at the base of this same peak of the Mali, we should find the Tanela unchanged in respect of its incline and current. A branch of that chain advanced towards the west and plunged almost perpendicularly in the direction of the gorge; but the eye was limited in its range by a luxuriant and gigantic vegetation, nor—for the same reason—could the ear catch the least sound announcing a water-course, even if there were any falls.

Creeping on all fours, sometimes sliding on our backs, at others with our faces to the earth, and here and there lost for a while amidst the ferns and tufted plants, we happily accomplished our perilous descent, with a grateful sense of Providential preservation.

At one end of a little savannah I came again on the Tanela.

but found its volume of water considerably diminished. It was taking a zigzag course between the slopes of the two sierras in alternately a west and south direction, so that the direction given to the passage in the Cordillera was south-west. In this latter direction I continued, accompanied by M. Decurey, sometimes in the water, at others half-way up the declivities; the result being that, in a short time, we were again presented with the same spectacle we had witnessed from the summit of the Mali. The view was an unbounded one, the already-mentioned plains of the Darien stretching out to a remote distance, without any impediment. The Tanela itself had dwindled down to a small stream, fed here and there, on the right and left, by some descending brooks, furtively making their way under the grasses, the mosses, and the stones.

It was evident that we had attained the culminating point—the very threshold of the division of the two slopes, and, at the same time, the spot where the Nique chain was at its lowest point of depression. I thereupon drew up a circumstantial account of this latter exploration, as was the case with regard to the other operations, and we returned to our *rancho*. I considered it, however, advisable to make our way back along the course of the Tanela, so that I might be certain, once for all, that the deviations we had made, in order to ascend the Mali, had not removed us from the route I was in quest of.

On the evening of the 28th we had the pleasure of rejoining our friends; and we all indulged in a holiday in commemoration of this felicitous termination of a difficult enterprise, which so many persons, including not a few who were competent to form an opinion, had deemed impracticable. From that date up to the 3rd of September, when we left for Carthagena, nothing worthy of note occurred.

It may, however, be stated here that, on descending the Tanela, I made a series of observations on the speed of its current at all points of its course. I am aware that those observations cannot possibly lead to any positive deductions with regard to the facility of constructing a maritime canal through the Isthmus, or dispense with the necessity of a survey; but such as they are they were submitted to an engineer, who based his calculations thereon, as follows:—The height of the “threshold of division,” or level summit resulting from the incline of the Tanela, as calculated by the speed of its waters, is found to be 30 mètres, 79 centimètres—this same threshold not being more than five miles in length.

From the insufficiency, however, of the details furnished, I have grounds not only for thinking that the above figures are below the standard, but for expressing the opinion that the

height above the level of the sea is from 40 to 45 mètres. This, then, would be the most depressed point of the Cordillera, *at the practicable site for opening a canal, with easy issues into the two oceans.*

With regard to the employment of a barometer as a substitute for levelling, I am convinced, by my own experience, that it would only lead one into a labyrinth of errors. The heights to be measured are, comparatively, so low, the climate so moist, the electric tension so strong, and the variations of atmospheric pressure so abrupt, that, independently of the absence of special experimental tables of correction for those regions, as well as through some other causes, the use of the barometer would be a matter of very great difficulty, without any but exceedingly doubtful results. In fact Mr. Guyot, Professor of Physical Geography at New Jersey (United States), was obliged, as he himself told me, to dispense with that mode of measuring heights, whilst making observations in intertropical climates, more particularly with respect to the lesser altitudes.

I have now to state that, as I was charged with a scientific mission by the Minister of Public Instruction, I collected, during my journey, as many facts as possible, likely to bear on the subject of such a mission. I may add also that, during my exploration of the eastern coast of Darien, I sent one of the companions of my journey of 1861 to complete the observations previously made, in order that it might be seen whether the results were in accordance with those already obtained.

I shall now treat of the Isthmus of Darien in a point of view which may, possibly, be deemed the most interesting for the Royal Geographical Society, and shall group together the facts arrived at during my two explorations.

I have already pointed out the limits of Darien, and described the large river which crosses it nearly from east to west, after a lengthy course from south-west to north-east. The tide of the Pacific finds its way very high up the Tuyra and its tributary streams, and is perceptible three miles above Pinogana, fifteen above Yavisa on the Chucunaque, and six above the mouth of the Rio Lara which falls into the Savannah. The Tuyra is of considerable depth, particularly as far up as Santa Maria La Reale, and its feeders are both numerous and important on both banks; but as existing maps are very incomplete as to those points, more especially beyond Pinogana, I shall endeavour to supplement them by means of the notes taken during my journeys. From Pinogana to Paya, its tributaries are:—

1st. The Arusa or Aruja, on the left bank.

2nd. The Yape, on the right bank. Above the latter river, the Tuyra is still from 90 to 100 mètres broad, and from 3 to 3·50 in depth, in an average volume of water.

3rd. The Capeti, on the right bank, 20 to 25 mètres at the mouth: this is the route followed by the Spaniards in their contests with the Darien Indians. It flows between the Yape and the Pucro, parallel to those two rivers and its sources, like the Pucro and the Paya are in the open gorge between the Sierras of Estola and Mali.

4th. The Cupe, on the left bank. Beyond this river the Tuyra is only 30 mètres broad.

5th. The Margarita, on the left bank, a small rivulet.

6th. The Soto Caballo, on the right bank, small.

7th. The Tuluagua, on the right bank.

8th. A nameless stream, on the left bank.

9th. The Piedro or Rio de Piedras, on the left bank.

10th. The Pucro, on the right bank, 30 to 35 mètres at its mouth. The village of the like name no longer exists. This river formerly afforded the means of communication—as is the case now with regard to the Capeti and Paya respectively—between the two slopes of the great mountain chain.

11th. The Mallakanti, on the left bank.

12th. The Paka, on the left bank.

13th. The Kuriako, on the right bank.

14th. The Inaganayua, on the left bank.

15th. The Piriako, on the left bank.

16th. The Pita, on the right bank.

17th. The Tikurtikinti, on the right bank.

18th. The Paya, on the right bank.

Up to the village of Paya, which is on its right bank, this last-named river receives not less than twenty-two tributaries, all the names of which I have obtained—the principal, however, being the Abchueldotogo, the Muyaco, the Abchueltumati, the Espinoso, the Paluti, the Biagual, the Palludi, and the Muchagambi. Opposite the village the Paya is still 30 mètres broad.

I have already spoken of the chain of the Cordilleras bordering on the Atlantic. This chain, after leaving Cape Tiburon, diminishes both in breadth and height, and becomes broken up into various masses of greater or less importance. It is in that respect that the maps are completely in error, local observation having set aside the assertion—based on an existing fact, but not sufficiently explained—that *three small consecutive chains and parallel mountains separate the Western Savannahs from the eastern shore of the Isthmus, and are connected by lateral valleys.*

This is true—but what is the relative situation of those minor chains? Do they present, as asserted, that insurmountable obstacle which has been made the basis of so much opposition to the proposed canalization by the lower Darien?

To those questions I offer the following replies:—

Taking Cape Tiburon as its starting-point, the Cordillera is divided into three chains, the highest of which is the Sierra de Estola, that is to say, the most westerly one. This chain continues in an uninterrupted line, gives rise to some streamlets, slopes down abruptly and profoundly in the vicinity of the sources of the Tanela (Atlantic) and of the Capeti, Pucro, Paya, and Masagui (Pacific), and then rises again under the name of Sierra de Mali, thus extending the grand Nique chain as far as the Bay of Aguacate, on the Pacific.

The second chain diverges from Point Miel (Cape Tiburon), follows the coast, which it often borders perpendicularly, opens out and divides into mamelons, so as to afford passages for some insignificant brooks, slopes down to a considerable depth, thereby forming the fine port known as Puerto Escondido,\* and then abruptly terminates in the Peak of Tarena, which is partly surrounded by the Tanela.

The third of the above-mentioned chains leaves Cape Tiburon Point, plunges into the sea, which it coasts, and only emerges from the waves to exhibit the summits called, respectively, the Tonel, Piton, Bolanderos, Tambor, Tutumate, and Tarena isles; three of which (the Bolanderos and the last-named two) are composed of petty groups of conic islets, of small extent, with perpendicular partitions or side-walls, around which are safe anchorages, from 20 to 40 fathoms in depth. I have anchored in, respectively, 9 and 13 fathoms water, *within a stone's throw* of one of the Tumate, and also one of the Tarena islets.

Of these three minor chains, the Estola is the highest, one of its summits (Peak Gandi) being 700 mètres, and another (Peak Estola) 500, above the level of the sea; next comes the second small chain which borders the coast, and is only of the average height of 120 mètres; and last of all, the *sub-marine* one, rising out of the waters some 30, 40, or 50 mètres.

These chains are intersected by parallel valleys. The first one, between the Sierra de Estola and the coast chain, is but of inconsiderable altitude above the level of the sea, and is bathed by a small river which rises on the declivity of the Peak of Tarena, and flows into the Puerto Escondido; and the second

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\* This port must not be confounded with a similarly named one, to the south of Point Careto, towards 8° 45' N. latitude.



one, between the coast and the isles, is easily discoverable in depths of 10, 20, and even 30 fathoms of water. The Puerto Escondido is, throughout its extent, from 15 to 44 fathoms in depth, with a slimy and pebbly bottom.

It is unnecessary to point out to those whom I have now the honour of addressing the deductions to be drawn from this orographic and hydrographical nature of things, with reference to the facility of laying down a canal in this direction. I may be allowed merely to add here—in order to avoid the necessity of reverting to the Gulf of Uraba—that, in consequence of several accidental occurrences during my explorations, I felt bound to traverse it several times, in various directions, more particularly on the following lines:—From Pisisi to the Tarena Isles; from the Tarena Isles to Point Caiman; from Point Caiman to the Tutumates; from Puerto Escondido to the anchorage opposite the Tanela; and from Point Aguila to Pisisi; and I invariably found a minimum depth of 10 fathoms up to within two miles of the eastern coast of the Gulf and of the line of the northern mouths of the Atrato, and of more than 20 to 45 on all the other points.

I had no means at hand for taking deeper soundings.

The climate of the Isthmus is, in general, healthy. As the country, which is but of limited breadth, is situate between two oceans and furrowed by numerous broad water-courses, with mountains either of no great altitude or else isolated, the breezes from the opposite shores have sufficient scope for dispersing any miasma that might arise from that decay and fermentation of vegetable matter, which are chiefly observable after the rainy season.

On the western course, in the plains on the Darien side, the rainy season, properly so called, commences towards the 1st of June and terminates about the middle of September; the dry season lasts from the 15th of November to the 1st of April—the intermediate periods constituting two mixed, variable seasons, alternating between fine weather and intermittent rains.

On the Uraba Gulf side, that is to say, on the Atlantic slope, the rainy season is of later arrival and shorter duration—the variable seasons, as well as the dry one, extending over a longer period.

Storms are of frequent occurrence throughout the Isthmus, particularly in the rainy season, and they rage with a fury unknown to our latitudes, bursting forth with scarcely any warning, and abating with the like rapidity.

The lowlands contiguous to the coasts, and more particularly such as are of slimy alluvium formation, are unhealthy and

uninhabitable, both on account of their humidity and the presence of myriads of mosquitos and sand-flies, which would render a residence insupportable. Very different, however, is the case some little distance inland—the nature of the soil and the excellence of the water rendering the interior of the country very salubrious.

During my two explorations I always found that the cases of fever—intermittent, but never miasmatic or marsh fever—which broke out amongst the men who accompanied me, were traceable to imprudences of one kind or the other, such as over-bathing, too prolonged exposure to the sun, the absence of woollen clothes on the upper parts of the body, or some excess in fatigue or drink.

The soil of the Isthmus is distinguished by those peculiarities which belong to lands of upheaval, and which appertain almost exclusively to that period of transition which originated—what were formerly called—the primitive formations; as for secondary strata, very few are discernible. Generally covered with a layer of *humus*, not unfrequently of considerable thickness, the sub-soil is composed of granitic, porphyritic and trachytic rocks; of dolerites, quartz-like gneiss, pegmatites and siliceo-aluminous earths. The most prevalent rock on the Pacific side is argillaceous schist, which is always more or less decomposed, and often found in a state of transition to pure clay. Something similar may be said with regard to the pegmatites, which are so far altered as to pass into Kaolin or porcelain clay.

I consider that the Isthmus of Darien was the point whereon the nucleus of vibration of that vast upheaval was established, which elevated from the depths of the earth the immense chains of the Cordilleras to the north, and of the Andes to the south; and if that hypothesis be correct, the inconsiderable altitude of the mountains on that point would be attributable to the quasi-immobility of the nucleus itself.

At some subsequent period must have occurred another local phenomenon, caused, no doubt, by the shock of a violent current extending from the west to the east, breaking and dis severing the already formed Cordillera, and scattering some of its remnants into the depths of the Gulf of Uraba, or massing them on its shores.

Evidence of all this may be easily deduced from the present appearance of the district between the Cordillera and the Gulf, no true regular rocky foundation or couche, nor any rocks superposed in straight or inclined layers being discoverable in any part. Nought, in fact, is to be seen but a *conglomeration*

of blocks of all kinds of shapes worn away by attrition, rounded off here and there, and scattered pell-mell either on the surface of the soil or in the soil itself. These enormous blocks, which are principally met with near the sierras, were formerly embedded in the earth; but at present they are held captive, as it were, between the roots of some patriarchal trees, and kept fixed in the soil by the vigour of such vegetation. The water-courses, rains, and storms have laid bare those blocks, by carrying off the lighter remains which surrounded them, so that they are now visible on the spots where they were formerly hurled by one of those convulsions of our globe. It will be seen, therefore, that those blocks are, so to say, erratic—rolled-down fragments, belonging to ancient alluvia, and not to be confounded with similar specimens of more modern formations. These special characteristics were discovered by exploring the bed of the Tanela, particularly in its upper course.

I may here refer to my mineralogical collection, in order to show how rich, in that respect, is the subsoil of the Isthmus. I shall, in the first place, make mention of coal (which to my own knowledge exists on two points), and of cinnabar and quicksilver in the Estola Sierra, as well as of silver, oxydised tin, &c.; and express the belief that, judging by the similarity of the soil in some places to that of the famous mines of Muzo (Colombia), which I have visited, emeralds are very likely to be found in the Isthmus. As for gold, it is on record that the Spaniards greatly enriched themselves by working mines of that precious metal in the Darien, and I am enabled to state positively that almost all the rivers—particularly on the Pacific slope—waft down either gold-sands or gold agglomerations of larger or smaller size.

It would be impossible to avoid repetition in treating of the hitherto unknown natural vegetable wealth of the Darien soil, all that is wanting being labour and means of transport.

Certain trees, such as the Mora, the Mahogany, the Ceiba, &c., attain to gigantic proportions, both as to length and diameter. I have seen a canoe, of 25 tons, which was entirely scooped out of the trunk of one tree. Amongst the trees serviceable for building purposes may be also mentioned the Gayac, the Ironwood, the Cabbage, the Ebony, the Red Mangrove (*Rhizophora Mangle*), the Nispero (*Mespilus vulgaris*), the Espave, the Bongo, the Corotu, the Red and White Cedars, &c., for the most part incorruptible in water, and impervious to insects. The two slopes produce also immense quantities of the Hevea, which yields caoutchouc, the Tagua or Vegetable-ivory tree, the Corozo Palm, which furnishes an excellent oil for commercial purposes.

the *Copaifera officinalis*, from which the Balsam of Copaiba flows, the Myroxylon, whence the Balm of Tolu is derived, and other valuable trees.

Amongst the productions used for tinctures, I may cite the Pernambuco, the Logwood-tree (*Hæmatoxylon campechianum*), the Arnotto, the Sumach, the Phytolacca, &c.; and, amongst those employed by cabinet makers, the Mahogany, the *Bois de Perdre* (Partridge wood), and various others.

Were the Isthmus more populous, or inhabited by a less sluggish race, the naturally fertile land along its shores and rivers would be rendered highly productive. In fact, the soil is fecund in the extreme, and the few plants which are known to commerce, and which I found growing wild, or in some widely apart plantations, were wonderfully developed. The soil is peculiarly suitable for the cotton-tree, more especially the variety known as Long-silk Georgian, as well as for cacao and coffee trees, sugar-canes, ricinus, tobacco, indigo, vanilla, sarsaparilla, rice, potatoes, maize, &c.

I shall pass over the medicinal productions, as well as those innumerable flowers which charm as much by the magnificence of their forms and the brilliancy of their colours, as by their delicious perfumes. Amongst the former, however, may be just mentioned—1st. the Cedron, the fruit of which contains a kernal of unequal bitterness, which proves to be a sovereign remedy in fevers that have resisted quinine and anti-toxica; it is also of great efficiency in cases of bites by venomous serpents; and, 2nd, the Guaco or Huaco, which, together with the plants called “*Yerbas de ligatura*,” is also successfully employed in similar cases, whether arising from poisonous reptiles or insects.

Throughout the entire Isthmus, no horse, ox, cow, or goat is to be met with,—the only domestic animals possessed by the inhabitants of the two slopes being dogs, pigs, cocks, and hens.

Amongst the wild animals affording food for man, may be enumerated the tapir, the wild-boar, the wild pig, two kinds of peccaries, the roebuck, the agouti, the paca, and the black howling-ape, the latter being considered a delicacy by the inhabitants; amongst the birds, the hocco, the penelope, the pheasant, the partridge, the pigeon, various kinds of ducks, the wood-hen, snipe, &c.; amongst reptiles, the sea and land tortoise, and the iguane, the flesh of the latter being delicate and succulent; and, finally, amongst the fish and mollusca, the bage, the sabalo, the corvina, the dab or flounder, the dorado, sea and mangrove oysters, Venus shell-fish, tellinea, donacea, and other shell-fish.

The forests are the resorts of numerous carnivorous animals, such as the jaguar, the puma, tiger-cat (with another species called the *Ocelot*), and other quadrupeds of the mammalia class; the racoon, the large and small ant-eater, the armadillo, the sloth, and a host of monkeys of the Sapajou tribe, inhabiting the interior of the woods, and filling them, night and day, with their cries and yells. The carnivorous species find abundant and easy prey amongst the peccaries and wild pigs which swarm on the Isthmus, but which, so far from being dangerous to man, rapidly flee at his approach. The same may be said of the numerous species of serpents with fangs, which at sunrise betake themselves to humid thickets, where they remain all day, only quitting their retreats during the night. The most common are the rattle-snake, the bejuco, the bejuquillo, the mapana, the trigonocephalus, "Lance-iron," and the long adder; and amongst the non-poisonous kinds, the *boa-constrictor* and the *boa canina* (Gallicè: "*boa chasseur*").

The *alligator sclerops* abounds in the slimy water-ways, particularly on the Pacific slope, as well as in the River Tuyra, and iguanas, lizards, "dragons," basilisks, and chameleons are found perching on the trees. The existence in America of the last-named little animal was long denied; but I once held a female chameleon in my hand, and for some time observed her whilst bearing her young one on her back, keeping it up by intertwining their two tails. Unfortunately being suddenly overtaken by the waters, after a violent storm, I was obliged to abandon this curious specimen of natural history, in order to save my life.

The forests and the savannahs teem with myriads of birds and butterflies, of brilliant and variegated colours. Every moment bands of aras, guacamayas, and other parrots, are seen on the wing, toucans, blue and white herons, tabirs—the deadly foes of reptiles—agaimes (the guardians of the poultry-yard), colibris, bird-flies, tangaras, and kingfishers, spring emulously from tree to tree or from flower to flower, whilst the white or black pelicans are seen catching fish in the slime of the lagoons.

A curious fish is found in the River Tuyra, viz., the "runcador," first mentioned by Herrera, in his 'History of the West Indies.' It is endowed with voice, which resembles the roaring from afar of a young bull, and which causes a vibration of the waters. I was greatly surprised on hearing it, for the first time, whilst descending the river.

It now only remains to cast a rapid glance at the present inhabitants of the Darien, who are but little known, and respecting whom so much incorrect information has been given

in various small publications. I shall premise by a brief retrospect at the former state of that fine country, to which, on account of its great natural wealth, the Spaniards gave, at the commencement of the sixteenth century, under the governorship of Diego de Nicuesa, the title of "Golden Castille."

It was in 1501 that Rodrigo Bastidas, of Seville, whilst following up the discoveries made on the Colombian continent by Olonzo de Ojeda, proceeded along the coasts of Gaira, Magdalena, and Carthagena, penetrated into the gulfs of Sinu and Uraba, and doubled Cape Tiburon as far as Port del Retrete—the furthest point reached by the army that followed Christopher Columbus, who himself descended from Cape Gracias á Dios in a westerly direction. Bastidas was accompanied by Juan de la Cosa,—a celebrated and skilful mariner, who acted as pilot.

Notwithstanding the resistance of the Cacique Cemaco, the towns of San Sebastian and Santa Maria el Antigua were founded by Enciso, and that of Agla by Vasco Nuñez de Balboa, who had to carry on a contest with the Cacique Tumaco.\* It was during the expedition which this great captain (who perished so deplorably) made in the direction of the Atrato, that he discovered the vast ocean to which, in 1516, after having crossed the Isthmus, he gave the name of "Pacifico."

The chief object of his first expedition was to seize on the immense treasures in the Temple of Dobaiba, and on the temple itself, which, it was said, was covered with gold and incrustated with pearls and precious stones. Even to this day there exists a tradition respecting Dobaiba, but as yet there has been no possibility of obtaining any positive information regarding that wondrous edifice.

At the time of the conquest of Darien, the country was covered with numerous and well-peopled villages. The inhabitants belonged to the Carribbee race, divided into tribes, the principal being the Mandinghese, Chucunaquese, Dariens, Cunas, Anachacunas, &c. On the eastern shore of the Gulf of Uraba dwelt the immense but now nearly exterminated tribe of the Caimans,—only a few remnants of the persecutions of the Spaniards having taken refuge in the Choco Mountains, where they are still found.

The conquerors had but one object in view, and but one incentive, viz., by all possible means to get hold of the entire wealth of the country. Everything disappeared beneath the footsteps of the invaders, and in a short time Spain was under

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\* Some authors attribute to Gabriel de Rojas the foundation of Agla, the ruins of which are still visible at the extremity of the Bay of Caledonia.

the necessity of having recourse to colonisation and the infamous system of slavery, in order to repeople a territory where she had left nought but ruins.

Matters, in a certain sense, progressed very rapidly. The search after gold was ardently resumed, particularly at Cana, and on the rivers Merea and Cuque. In fact, Don Juan de Ulloa states that, in 1716, there were not less than thirty or forty flourishing cities, towns, and villages on the soil of that fine colony.

By the year 1790 all that prosperity had ceased. Thirty shafts that had been sunk for working the gold-mines were closed up; the surviving Indians, in alliance with adventurers of all nations, had forced the Spaniards to sign the treaty of peace of Ascension Isle (June 9, 1787), and to demolish the forts they had erected, as well as to withdraw their military posts. Even the route opened by Don Andres de Arisa very soon disappeared amidst the luxuriant vegetation of the Inter-tropics. In fine, the only vestiges at present of Spanish domination are the ruins of a few forts; for example, at Escuchadero, on the left bank of the Tuyra, opposite the mouth of the Chucunaque, and at Santa Maria la Reale and Agla.

The Dariens, as well as the Anachacunas, have either totally disappeared or been absorbed in other tribes; the remnants of the Chucunaquese who in 1861 dwelt on the banks of the river which bears their name, and who hovered about my *rancho*, have gone up towards the north; the Mandinghese occupy the coast as far as the Bay of Caledonia, and the Cunas have established themselves on the shores of the Gulf of Uraba, near the outlets of the Atrato. It must be, however, stated that, in the interior of the country, more particularly to the south of the River Tuyra, there are still some small Indian villages belonging, I think, to the tribe of the Dariens, such as Sambu, Tucuti, &c.

I set down the entire population of the Isthmus of Darien at 5000 souls, at least, inclusive of the Indians of whom I have just spoken, as well as of the negroes and mulattos who inhabit the villages of Yaviza, Las Palmas, Chepigana, Santa Maria, Molineca, Pinogana, and some isolated huts on the banks or in the vicinity of the Tuyra—in all which places there is not a *single Indian*. In fact, all their inhabitants are either pure or mixed blacks, scarcely two or three *Mestizos* (issue of whites and Indians), or *Zambos* (issue of Indians and negroes) being met with.

I lay some stress on this point, because every traveller is heard speaking of the "Indians" of the Tuyra villages, whereas only Spanish is spoken therein, the Cuna and Darien dialects being totally unknown.

A small trade is carried on by all those villages with Panama,

by means of some Europeans, or of a few natives, owners of large canoes which, although without keels, traverse the Gulf of San Miguel and that of Panama, creeping along the coast, and only navigating by day. The principal articles of commerce are: caoutchouc (which the inhabitants commenced exporting some four years ago), tagua or vegetable ivory, bananas, pine-apples, timber, either square or sawn into planks, dried meat called *tasajo*, and small quantities of some other objects, such as vanilla, balsam of Tolu, and sarsaparilla. These articles they exchange with middle-men, who not unfrequently have beforehand, and, at enormous prices, sold to the producers such goods as cottons, handkerchiefs, jewellery, firearms, powder, household utensils, *aguardiente* or brandy, and *anisado*—produced by distilling the juice of the sugar-canes with various plants.

In consequence of these advances in kind and sometimes in money, on the part of the middle-men, nearly all the inhabitants of these parts incur considerable debts, in payment of which they have to collect the goods required from them, under penalty of imprisonment and the *cepo* (or stocks)—that is to say, a very heavy piece of wood enclosing the foot of the defaulter, just above the ankle. The inconceivable idleness of these people prevents them from emancipating themselves from these pecuniary burdens, by transacting their own business without agents; and their tendency to drunkenness and debauchery causes them to submit, without a murmur, to their fate, for the sake of momentary gratifications.

Their dwellings are, in general, uncleanly and void of the most necessary domestic objects. They are constructed with trunks of trees, connected by bamboos, which are planted in the earth or placed cross-wise, and the roof is covered with leaves of the macaw-tree. Amidst these villages, and on the humid ground, are seen, pell-mell, pigs, dogs, poultry, and naked children. As for the men and women, they exhibit a certain degree of luxury and are often somewhat coquettish in dress, particularly on holidays and at evening dances, as I was enabled to observe on the occasion of two *balls* given to me at Santa Maria, in the house of an inhabitant named Candelario.

Hunting and fishing afford abundance of food, and in addition the inhabitants have rice (which constitutes their principal nourishment), potatoes, ignames, and fruit of various kinds. Their arms are the gun and the machete (a sort of sabre), but they are wholly unacquainted with the use of the bow and arrow. Their boats, which are wholly made out of the trunks of trees, are not so elegant in form or so neatly finished off as those of the Indians on the Atlantic slope, but they are paddled with sufficient skill.

Their language is *exclusively* Spanish. So far, however, as



the inhabitants of the village of Pinogana are concerned, the foregoing observations with reference to the part of the Isthmus in question are susceptible of some modifications, for their manners and habits are somewhat influenced by the proximity of the Indian villages of Paya and Tapalisa, situate on the same slope, and by their frequent intercourse with the Cunas. In fact, the houses are better constructed and cleaner, some having even a rather elegant appearance. The men display a little more activity, and the visitor perceives, to some slight extent, that he is on the verge of another state of society.

To conclude the remarks regarding the Pacific slope, I may state that Catholicism is the religion of the country, but only nominally. There is—or, at least, there ought to be—a parish priest at Yavisa, the chief place of the province of Darien; there is one at Chepigana or at Santa Maria, in the bishopric of Panama; but unfortunately these clergymen show the worst of examples to their flock, as I found to be the case in 1861, and thus contribute not a little to the general immorality. In fact, there are still entire families who know nothing of the religious ceremony of marriage or of baptism.

Let us now pass beyond the Cordillera, and enter into the territory of the Carribbees-Cunas. The political organisation of the Indians is recognised by the Republic of the United States of Colombia, and the Governor of Quibdo, province of Choco, has authorised, under the name of “Confederation of the Indians of the San Blas Coast,” the union, under a Cacique or Great Captain, of the various tribes and villages which are scattered along the coast, from San Blas Point to the extremity of the Gulf of Uraba and as far as the mouths of the Atrato.

The Indians are completely ignorant of the form of government of the territory on which they are living, and “Bolivar” is the only name that has remained in the memory of their elders, whilst the sole reminiscence of their subjection of old is their traditional hatred of the Spaniards.

The Colombian Government declares and states in writing that it tolerates the Indians, whilst the latter call themselves the *masters of the soil*. The authority of the Cacique is absolute, and neither he nor his people are subject to any tax, impost, or military service. When affairs of general importance are to be discussed, he convenes a council of village caciques, each of whom presides over a local council, convoked for local matters.

The Indians in general of the coast of San Blas, and as far as Cape Tiburon, refused to submit to any yoke; and Sasardi, Morti, and some other localities remained independent. Only six villages, inhabited solely by Dariens and Cunas, have united under the authority of the Cacique Pascual, now in his 90th

year, but who is still in the vigour of health. He is a cunning and courageous man, who formerly served under Bolivar, in the War of Independence. The following are the names of those six villages:—Arquia, the chief place of the Indian Confederation, and the residence of the Great Cacique; Cuti and Cuque,—all three being situate on the rivers of the same names, and which are tributaries or sub-tributaries of the Atrato; Tanela, Paya, and Tapalisa, also constructed on the banks of similarly named streams—the Tapalisa being a feeder to the Pucro, which forms a junction with the Tuyra. The four villages first named are on the eastern, and the two others on the western slope of the Cordillera; all six being connected by easy and direct roads, which I have very frequently traversed during my explorations. I am not exactly acquainted with the number of their inhabitants; but I know that Pascual is at the head of some 400 or 500 warriors. I can only speak positively of Paya and Tanela; but, from the exact nature of the details furnished me, I believe that the following particulars will, with some slight variations, apply also to the other villages, and it will be remembered that, in my two interviews with the above-named cacique, he was accompanied by men from the six localities.

The villages of the Cunas are well situate, being built on the banks of rivers; and the houses are spacious, elegant, and constructed with admirable skill and attention to details. Many of them have an open bamboo flooring, 2 mètres from the ground, and are thus preserved from the humidity of the soil and the effects of the rain; the pillars, supporting the entire construction, are made of bamboos of 25 to 30 centimètres diameter, or of hard and carefully prepared timber. Covered with palm or macaw leaves, they thoroughly withstand the inclemencies of the weather, and are sometimes built on so extensive a scale, that they contain not less than fifty, sixty, or even eighty hammocks. The firearms, and fishing and hunting implements, which are placed in recesses in the shape of lofts, are very carefully made and always kept ready for use.

The Cunas are of middling but robust stature, with large shoulders, narrow waists, well-turned arms and ankles, and small feet. Their skin borders on a clear brownish red—the young women and children being of a somewhat more subdued hue. Their hair—which is black, smooth, and very abundant—is worn long, except at Tanela, where the married women cut it short; thus presenting a striking contrast with the long hair of the men, which is sometimes left floating about their shoulders, and at other times twisted round the head, and raised over one ear, in a species of top-knot, fastened by a long triangular comb, made of the core of the palm-tree, and ornamented with original

designs, executed with bark and vegetable fibres. The men have no beards.

Contrary to the disposition of the inhabitants of the banks of the Tuyra, of whom I have already spoken, the Indians here referred to are sober, patient, industrious, faithful, courageous, and very gentle towards any one who has gained their confidence. Strange to say, they refrain from brandy, rum, *anisado*, wine, and, in fact, every fermented liquor, except *chicha*, which they themselves make from maize-seed and the juice of the sugar-cane. And here I may state, but with no slight repugnance, that this *chicha* is made in the following manner:—Some old women, squatting around an empty gourd, munch and chew the maize-seed, and then expectorate it into that receptacle until the latter is filled; the product is then left to ferment, and it serves as the chief ingredient of the *chicha*. This I saw done, and I was obliged to partake of the beverage!

Theft is altogether unknown amongst the Cunas. Their curiosity, which often partakes of the infantine, leads them to examine very minutely any object they may see for the first time; they will cautiously touch it, inquire for what purpose it is employed, and then put it back in its place; but all this without any excitement or indiscretion. The *ranchos* I had constructed were often left untended, and completely abandoned to the good faith of the Indians, and we never missed the slightest article either of provisions or ammunition.

It must not be thought, however, that it is unnecessary to act with great prudence in their regard, for the Cunas are exceedingly distrustful, and the surest way of gaining no information from them is to ask for it, particularly with any air of eagerness. Although I was on very intimate terms with Nusalileli, the Cacique of Tanela, and acquainted with certain Indian rallying or "association" signs, which enabled me to place myself more promptly on a good footing with them, he never fully opened his mind to me on certain points, or with reference to certain questions.

They are, however, a hospitable race; and although idolaters, believing in the supernatural potency of the grotesque fetishes suspended in their houses, bowing reverentially to grossly formed figures, and holding certain trees as sacred, they, nevertheless, acknowledge a Supreme Celestial Power, whence the Good and the Beautiful emanate. It was with an air of profound reverence that Nusalileli raised his eyes towards heaven, on refusing the presents I offered in return for his hospitality, and exclaiming, "The great God on high commands his children to receive kindly the guests he sends to them."

Despite these good traits in their character, they are terrible

enemies; when summoned to arms, shrinking from no danger, and, from their agility, skill in handling weapons, and thorough knowledge of the thousand artifices of forest warfare, capable of resolutely opposing any attempt on their independence, or any violation of their customs and manners.

Certain crimes—or offences deemed such by their laws—are punishable with death; for example, that penalty was inflicted on a man who had aided in the accouchement of a woman, whose life was in imminent danger; on another occasion, a female, who had become insane, was hung from a tree and burned; and the Indian who acted as my interpreter in 1861 would have been put to death for having wished to serve me in the like capacity in 1865 without the authorisation of the Cacique, had not my ulterior relations with Pascual procured his pardon.

The Cunas wear drawers extending to the knee, and leaving the upper part of the body uncovered; but some have a species of short, loose smock-frock, or else a shirt of European shape. The head is generally bare, but at times enveloped in a narrow girth called in their language a “counter-poison,” about two centimètres in width and two or three mètres in length. It is made of the fibres or barks of certain plants, with which they alone are acquainted. When bitten in the forests by a serpent or a scorpion, or any other venomous animal—for example, a mygale—the Indian fastens a ligature around the wound, with the band or fillet in question, and pursues his journey without losing his strength or feeling the effects of the poison, though he may have to walk some three or four hours before reaching his village. On arriving there, he receives the necessary attendance, and, generally speaking, the wound is promptly and radically cured. It is, however, quite certain that the poison of the Bejuquillo and the Coral serpent is so active that the ordinary ligature is often found ineffective, when no other succour is at hand; and the patient dies in less than a couple of hours, amidst frightful sufferings, swollen, tumefied, and covered with sanguineous spots. On the other hand, whilst I was at the emerald mines of Muzo, I witnessed some extraordinary and almost incredible cures, effected by the use of those herbal ligatures—*Yerbas de ligatura*.

The women wear short-sleeved chemises, descending to the knees, and such ornaments as necklaces composed of the teeth of animals (tigers or caimans), or of coloured seeds. At Tanela I saw many with broad gold or silver rings through the nasal partition, and hanging down as far as the chin. Some of the Indian women are pretty, and all admirably well formed. Both male and female always go bare-footed. It may be stated here that on high holidays the Cunas wear drawers or large girdles

made of the plumage of birds, as well as a sort of cap covered with plumage and surmounted by long red, blue, green or yellow feathers, plucked from the tails of the aras. I have in my possession one of these head-dresses, which came from Paya, and which is about 62 centimètres in height.

The weapons most in use are bows and arrows of various kinds, suitable for hunting or fishing, and adapted to each species of prey. They also employ the lance, and all carry a heavy *machete*, a species of carefully-polished sword-knife, having a short, obtuse and broad blade, with a strong haft. This weapon serves for a hatchet, a tomahawk, and a sabre. The arrows are formed of thin and light, but solid reeds, hardened at the fire and bearded, and with palm-wood points. The lances are either of cut flint or of iron. Moreover, almost every Indian possesses a gun, and displays remarkable dexterity in its use as well as in that of his bow and arrows, but they are all very saving of their powder and ammunition, reserving their fire-arms for grand occasions. When the Cacique Pascual came to my *ranchito*, on the 10th of August, 1865, with his sons—for such the term he bestows on those subject to his authority—they were all armed with the *machete*, which they call the *pulla*, and some of them had guns, whilst the others carried bows and arrows and lances.

I have never remarked that their arrows were poisoned, nor did those they gave me bear any marks of ever having been tampered with in that way. This forbearance on their part is certainly not attributable to any ignorance of the vegetable poisons and antidotes of their country.

On grand occasions they tatoo their faces and busts with rocon. The tatooing of the Confederation of the Cunas consists of a transversal streak from one cheek-bone to the other, and across the nose, and of other lines descending perpendicularly on the cheeks as far as the corners of the mouth, and intersected by small horizontal streaks. The number and position of the lines serve to distinguish the inhabitants of the respective villages.

Polygamy is allowed amongst the Cunas, and they may have as many wives as they have respectively plantations to superintend. One of the wives devotes special attention to household affairs, cooking and attendance to the children; another to the bananas and maize; a third to the cultivation of the cocoa-tree, &c., &c. Pascual himself has four wives, but I believe he is the only one with so many.

The sole occupations of the men are hunting, fishing, making arms, and constructing *cayucos* (canoes) and houses. The other labours are performed by the women with patience and resig-

nation, but not to the exclusion of pleasure or gaiety, as may be seen in the nightly dances.

I have already stated that the Cunas, like all the Caribbean race, are skilful navigators. In fact, they venture in their light canoes, under a heavy sail, into the Gulf of Uraba, for tortoise-fishing, and with the view of exchanging their products either with the Indians of San Blas or with the canoe-men who ascend the Atrato. The Cunas traffic in cacao, tapir-flesh, venison, dried pork (*tasajo*), and lard, contained in pig-guts, receiving in exchange fire-arms, powder, shot, and various domestic utensils—nearly all these objects being of English manufacture when they arrive by the Atrato, and American when sent from San Blas or the neighbouring coasts.

It has been already stated that there is not a single Indian in the villages on the Tuyra, and it may be added here that the six villages of the Cunas do not contain a single inhabitant of white, black, or mulatto breed.

Pascual, who was formerly a slave amongst the Spaniards, is the only one who speaks fluently and understands well the Spanish language. A few others are acquainted with several words, but I only met with one individual who could utter a little English, and his pronunciation was horribly bad.

The language of the Cunas is soft and sonorous. The syllables are composed of one or two vowels, or of one or two consonants, as in *ulu* (canoe), *tumati* (great), *ambé* (ten), *chipugua* (white), *chule* (not, nothing), and *huishi* (thou knowest, dost thou know?) The accentuation of certain words is marked by a guttural articulation. Their power of computation does not exceed number 20.

I trust the day is not far distant when this rich and interesting country will be better known, and when the investigations of science will elicit new facts and lead to fresh discoveries. Once the Isthmus is opened, by means of a maritime canal, to the navigation of the world, with the flags of every commercial nation floating in unison, and with swift steamers cleaving the waters of the Tuyra, the Darien—that “key of the world,” as Paterson calls it, that “threshold of the gate of communication between the two oceans,” as the illustrious Humboldt describes it—will become the converging point for the commercial and industrial enterprise of the various peoples of the earth.

## APPENDIX I.

## VOCABULARY AND PHRASES OF THE CUNA LANGUAGE (ISTHMUS OF DARIEN).

| ENGLISH.                                                         | CUNA<br>(pronounced as in Spanish).                     |
|------------------------------------------------------------------|---------------------------------------------------------|
| Monkey (generic term) .. .. .                                    | Chúlo.                                                  |
| Stag .. .. .                                                     | Cogié.                                                  |
| Cat (generic term of different sorts of<br><i>Cats</i> ).        | Miu.                                                    |
| Dog .. .. .                                                      | Acho.                                                   |
| Curassow Birds ( <i>Crax alector</i> ; <i>Ourax<br/>pauci</i> ). | Shigli.                                                 |
| Peccari ( <i>Dicotyles</i> ) .. .. .                             | Yánu.                                                   |
| To go hunting for Peccari .. .. .                                | Yánu máque nae.                                         |
| Paca .. .. .                                                     | Chúla.                                                  |
| Agouti .. .. .                                                   | Ucho.                                                   |
| Penelope, Meleagris (Birds, gallinaceous)                        | Guama.                                                  |
| Poultry, Fowl, Hen .. .. .                                       | Cálin.                                                  |
| Turtle (of Sea), Tortoise-shell .. .. .                          | Yauca.                                                  |
| Sabalo (Fish) .. .. .                                            | Mila.                                                   |
| To go fishing Sabalo .. .. .                                     | Mila máque nae.                                         |
| There was no fish on the coast .. .. .                           | Tel (?) mala mila nica.                                 |
| To catch (in the meaning of hunting<br>or fishing).              | Máque.                                                  |
| Cow; Heifer .. .. .                                              | Moli; Moli totogua.                                     |
| Goad or whip the ox with the work-<br>men (Imperative).          | Moli totogua eti machigua pe taque<br>nae or Shé taque. |
| Father .. .. .                                                   | Tata.                                                   |
| Mother .. .. .                                                   | Nana.                                                   |
| Nusalileli's Mother .. .. .                                      | Nusalileli nana.                                        |
| Brother .. .. .                                                  | Urpa.                                                   |
| Sister .. .. .                                                   | Orne.                                                   |
| Son .. .. .                                                      | Hilú.                                                   |
| Daughter; young girl .. .. .                                     | Púnagua.                                                |
| A young boy, a youth .. .. .                                     | Machigua.                                               |
| A little boy or girl, a child .. .. .                            | Nuchuguagua.                                            |
| A Man .. .. .                                                    | Tule.                                                   |
| Men, individuals .. .. .                                         | Tule.                                                   |
| How many men or inhabitants are there<br>in Turbo?               | Picua tule Turbo pe taquesa?                            |
| A Negress; a black man .. .. .                                   | Tule rati.                                              |
| Workmen .. .. .                                                  | Machigua.                                               |
| A good, or clever seaman .. .. .                                 | Mía Cántiqui.                                           |
| The head .. .. .                                                 | Ságala.                                                 |
| The belly .. .. .                                                | Sábala.                                                 |
| To work .. .. .                                                  | Sátu.                                                   |
| To make water .. .. .                                            | Guinae.                                                 |
| Fathom .. .. .                                                   | Táli.                                                   |
| Vara (Spanish measure; 80 centimètres)                           | Barra.                                                  |
| Water, river, rivulet .. .. .                                    | Ti.                                                     |
| Cayuco, canoc, small boat, pirogue .. .. .                       | U'lu.                                                   |
| Can you sew a sail? .. .. .                                      | Ulmola maqueti pe huishi?                               |

VOCABULARY, ETC., OF THE CUNA LANGUAGE—*continued.*

| ENGLISH.                                                          | CUNA<br>(pronounced as in Spanish).  |
|-------------------------------------------------------------------|--------------------------------------|
| Have you seen a canoe on the coast? ..                            | Opo úlu pe taquesa?                  |
| Is there water in the river? .. ..                                | Turbi (?) ti nuali?                  |
| Look to the canoes! .. .. ..                                      | U'lu taque!                          |
| How many are they? (the canoes) ..                                | U'lu picua mai?                      |
| Are they all lashed? .. .. ..                                     | Pela etine?                          |
| They are all lashed; or yes .. .. ..                              | Etine pela or ée.                    |
| Are they leaky? .. .. ..                                          | Ti nica?                             |
| Do you know how to build a canoe or boat?                         | U'lu shapeti shique pe huishi?       |
| A paddle, an oar .. .. ..                                         | Camé.                                |
| Take care of the paddles .. .. ..                                 | Camé pe hue taque.                   |
| Embark! .. .. ..                                                  | Opo úlu pe nae!                      |
| Champan (great canoe covered with a tent of leaves and branches). | U'lu chuigua.                        |
| Broken, parted .. .. ..                                           | Piscali.                             |
| White .. .. ..                                                    | Chipugua.                            |
| Blue (dark) .. .. ..                                              | Rati pi.                             |
| Blue (clear) .. .. ..                                             | Mola rati.                           |
| Yellow .. .. ..                                                   | Cortiqui.                            |
| Black .. .. ..                                                    | Rati.                                |
| Red .. .. ..                                                      | Quñiti.                              |
| Fat, big, voluminous .. .. ..                                     | Shomété.                             |
| Thin, lean .. .. ..                                               | Tátragua.                            |
| Tall, high .. .. ..                                               | Tumati.                              |
| Little, short .. .. ..                                            | Totagua.                             |
| New, fresh .. .. ..                                               | Pini.                                |
| Old, worn out .. .. ..                                            | Chérete.                             |
| Neat, pretty .. .. ..                                             | Naper tag legue.                     |
| Savoury, pleasing to the taste .. ..                              | Nugue tag legue.                     |
| A bad, a wicked man .. .. ..                                      | U'r rue tule.                        |
| Very bad, very wicked .. .. ..                                    | Urrué toga.                          |
| Idle, coward, weak .. .. ..                                       | Húie.                                |
| José is very idle, cowardly, or weak ..                           | Jose húie toga.                      |
| Do not send Lazaro, because he is too idle.                       | Lazaro nate húie toga nonigui chule. |
| Ill, evil .. .. ..                                                | Chuli.                               |
| My, mine .. .. ..                                                 | Ann cati.                            |
| Your, yours .. .. ..                                              | Pe cati.                             |
| I, me .. .. ..                                                    | Ann.                                 |
| You, thou, thee .. .. ..                                          | Pe.                                  |
| Day .. .. ..                                                      | Yppa.                                |
| Night .. .. ..                                                    | Negchichi.                           |
| Morning .. .. ..                                                  | Huacuterga.                          |
| Noon, the middle of the day .. ..                                 | Tata yorcua.                         |
| Evening .. .. ..                                                  | Sheto.                               |
| To-day .. .. ..                                                   | Emis.                                |
| To-morrow .. .. ..                                                | Pana.                                |
| Banana .. .. ..                                                   | Machi.                               |
| Banana (ripe fruit) .. .. ..                                      | Mátun.                               |
| Banana tree .. .. ..                                              | Machi cana.                          |
| Are the banana trees good? .. ..                                  | Machi cana no eti?                   |



VOCABULARY, ETC., OF THE CUNA LANGUAGE—*continued.*

| ENGLISH.                                                                           | CUNA<br>(pronounced as in Spanish).                         |
|------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Give bananas to the cow .. .. .                                                    | Moli machi cune pe shunate.                                 |
| Carry this ripe banana to our friend Icuacunapaleli (name of an Indian of Tanela). | Ai Icuacunapaleli mátnun shunate.                           |
| Go with the workmen (the boys) to clean, to weed banana trees.                     | Machigua túle pe nate machi emie.                           |
| Cacao .. .. .                                                                      | Chiagua.                                                    |
| Cacao tree .. .. .                                                                 | Chiagua cana.                                               |
| Have the cacao trees fruit? are they bearing cacao?                                | Chiagua cana chiagua nica? or chiagua cana chiagua taquesa? |
| Calebash (fruit of the <i>Crescentia Cujete</i> )                                  | Púgulo.                                                     |
| Coco nut; coco tree .. .. .                                                        | Ocobo; ocobo cana.                                          |
| Indian corn, maize .. .. .                                                         | O'pa.                                                       |
| Give maize to the poultry .. .. .                                                  | Pe cálin ópa cune.                                          |
| Will you have some bread? .. .. .                                                  | Matu pe tegui?                                              |
| Rice .. .. .                                                                       | Aro (from the Spanish <i>arroz</i> ).                       |
| Sarsaparilla (plant) ( <i>Smilax sarsaparilla</i> )                                | Súquia.                                                     |
| Water .. .. .                                                                      | Tí.                                                         |
| To drink .. .. .                                                                   | Cope.                                                       |
| Can you drink milk? .. .. .                                                        | Moli núu pe cope huishi?                                    |
| Milk .. .. .                                                                       | Moli núu.                                                   |
| Flesh .. .. .                                                                      | Sána.                                                       |
| Do you eat meat? .. .. .                                                           | Sána cune pe huishi?                                        |
| Catch a hen .. .. .                                                                | Cálin pe maque, or cálin pe cae.                            |
| Broth .. .. .                                                                      | Lisa.                                                       |
| Meat, food .. .. .                                                                 | Náala.                                                      |
| To eat (verb) .. .. .                                                              | Cune.                                                       |
| What have they given you to eat? ..                                                | Tule pe mas cuna?                                           |
| What have you eaten? .. .. .                                                       | Ypi pe cune?                                                |
| India-rubber .. .. .                                                               | Cúnu.                                                       |
| Tobacco, cigar .. .. .                                                             | Huála.                                                      |
| Bring tobacco .. .. .                                                              | Huála pe she.                                               |
| Go to the house of X . . . to buy tobacco                                          | X . . . neca huála pe nae puque.                            |
| Forest or wood .. .. .                                                             | Chápul.                                                     |
| Are you going to the forest? .. .. .                                               | Chápul pe nae?                                              |
| House, habitation (rancho, Spanish) ..                                             | Neca.                                                       |
| Go to Olocunalileli's house (name of an Indian of Arquia).                         | Olocunalileli neca pe nae.                                  |
| To-day you depart from my house, you bad, wicked boy.                              | Penate emis, neca angate ani urrué toga.                    |
| Room (interior division of a house) ..                                             | Cape neca.                                                  |
| Door .. .. .                                                                       | Guanabcaca.                                                 |
| Assist John in cleaning the patio (interior yard of a house). .. .. .              | John purgana emie.                                          |
| Assist Pedro in enclosing the poultry-yard.                                        | Pedro chuara etine.                                         |
| Clothes, vestment, linen .. .. .                                                   | Mola.                                                       |
| Put on your new clothes .. .. .                                                    | Mola pini cae.                                              |
| Pull off your old vestment .. .. .                                                 | Mola cherete chica.                                         |
| Give your dirty linen to be washed ..                                              | Pe mola she puna mola emique.                               |
| Breeches, pantaloons .. .. .                                                       | Carson (perversion of the Spanish word <i>Calzon</i> ).     |

VOCABULARY, ETC., OF THE CUNA LANGUAGE—*continued.*

| ENGLISH.                                            | CUNA<br>(pronounced as in Spanish).    |
|-----------------------------------------------------|----------------------------------------|
| Shirt .. .. .                                       | Yuvaleti, yocala.                      |
| Bring the blanket .. .. .                           | Mol guaguachichiti pe she.             |
| Neckcloth, cravat, a piece of cloth round the neck. | Mol tucalchichigua.                    |
| A piece of cloth round the head .. ..               | Ságala mola.                           |
| Ribbon with stripes .. .. .                         | Mol ileleti.                           |
| Gun .. .. .                                         | Quinqui shique.                        |
| Take away your gun .. .. .                          | Quinqui shique pe shunate.             |
| Do you know how to shoot (with a gun)?              | Quinqui ócole pe huishi?               |
| To shoot (with a gun) .. .. .                       | O'cole.                                |
| Gunpowder .. .. .                                   | Quincuve.                              |
| Ammunition .. .. .                                  | Quincua.                               |
| Prime (of a gun) .. .. .                            | Quincurquina.                          |
| Axe .. .. .                                         | Acán, acána.                           |
| Where is the axe? .. .. .                           | Acána pia mai?                         |
| To cut, to open, to break .. .. .                   | Shique.                                |
| Take the axe, and go with Juan to cut fire-wood.    | Acán shique, Juan, pe nate she shique. |
| Knife .. .. .                                       | Estín.                                 |
| Large knife, hanger (Spanish, Navaja)               | Estín capegua.                         |
| Scissors .. .. .                                    | Tisla.                                 |
| Cauldron, large boiling-pot .. .. .                 | Esméte.                                |
| Needle .. .. .                                      | Ico, yco.                              |
| Thread .. .. .                                      | Nérpa túpa.                            |
| Seat, chair, bench .. .. .                          | Cána.                                  |
| To sit down, to sit .. .. .                         | Chicue.                                |
| Trunk, box .. .. .                                  | Ulúgua.                                |
| Dish, plate .. .. .                                 | Náala.                                 |
| Porringer .. .. .                                   | Múrrucua.                              |
| Calabash .. .. .                                    | Nóga.                                  |
| Keep, take care of the calabash in your room.       | Cape néca nóga shunate.                |
| Wash this porringer, this vessel .. ..              | Múrrucua urtalegua cae emigue.         |
| Wash this dish .. .. .                              | Náala urtalegua cae emigue.            |
| Tube, pipe, a stalk of a pipe .. .. .               | Pipa.                                  |
| Bring a sack, a bag .. .. .                         | Saco (Spanish) cuena pe she.           |
| Much, very much .. .. .                             | Toga.                                  |
| Few, a few, very few .. .. .                        | Pipigua.                               |
| Enough .. .. .                                      | Togue.                                 |
| Soon, instantly .. .. .                             | Yóo.                                   |
| Quickly, fast .. .. .                               | Ucurmate.                              |
| Yes .. .. .                                         | Ée (nasal).                            |
| No, nothing, not .. .. .                            | Chúle.                                 |
| Who? What? Whom? .. .. .                            | Ipi, ypi.                              |
| Have you banana? .. .. .                            | Machi nica?                            |
| Have you seen? .. .. .                              | Pe taquesa?                            |
| Where is he? Where is it? .. .. .                   | Pia mai?                               |
| To shut .. .. .                                     | Yaetique.                              |
| Shut the door .. .. .                               | Guanabcaca yaetique.                   |
| What is it? What is there? .. .. .                  | Ipi gua?                               |
| To put out, to pull off .. .. .                     | Chica.                                 |

VOCABULARY, ETC., OF THE CUNA LANGUAGE—*continued.*

| ENGLISH.                                                                                                      | CUNA<br>(pronounced as in Spanish).              |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| To take .. .. .                                                                                               | Cae.                                             |
| To see, to perceive .. .. .                                                                                   | Taque.                                           |
| Or, either .. .. .                                                                                            | E'.                                              |
| Are you well? How do you do? .. .. .                                                                          | Nuhueti?                                         |
| I am well .. .. .                                                                                             | Nuhueti (understood, A'nn).                      |
| And you too, are you well? How are you?                                                                       | Pe nuhue moga?                                   |
| I am well too .. .. .                                                                                         | Ann nuhue moga.                                  |
| To have, to possess .. .. .                                                                                   | Nica.                                            |
| What have you? What do you possess?                                                                           | Ypi pe nica?                                     |
| Have you seen Pascual? (Name of the Grand Cacique of the Confederation of the six villages of Indians—Cunas). | Pascual pe taquesa?                              |
| Have you seen him? or Have you seen them? You have seen him or them.                                          | Pe taquesa.                                      |
| I have seen him or them .. .. .                                                                               | Ann taquesa.                                     |
| To tell .. .. .                                                                                               | Shogue.                                          |
| Tell, tell him, tell them .. .. .                                                                             | Pe shogue.                                       |
| Tell him to come .. .. .                                                                                      | Tanigui pe shogue, or nene pe shogue.            |
| What does he say? What do you say?                                                                            | Ygui shogue? Ypi shogue?                         |
| Say to Olanquileli. (Name of an Indian of Tanela.)                                                            | Olanquileli pe shogue.                           |
| To know .. .. .                                                                                               | Huishi.                                          |
| Do you know it, or that? .. .. .                                                                              | Yti pe huishi?                                   |
| I know, I know it .. .. .                                                                                     | A'nn huishi.                                     |
| I do not know .. .. .                                                                                         | Ann huish chúle (elision in the verb).           |
| I know no more, or nothing more .. .. .                                                                       | Yguesa.                                          |
| To will; I will .. .. .                                                                                       | Tegui; Ann tegui.                                |
| I order you, I enjoin you to tell the Capitan Pascual, &c.                                                    | Capitan Pascual ani carta shogue pe ishe ga, &c. |
| I will not? (It does not please me.) .. .. .                                                                  | Ann tegui chule.                                 |
| Will you? Does it please you? .. .. .                                                                         | Pe tegui?                                        |
| To go, to set out .. .. .                                                                                     | Nae.                                             |
| Go (imperative) .. .. .                                                                                       | Pe nae.                                          |
| When do you depart? .. .. .                                                                                   | Yucu, or Sann pe nae?                            |
| When shall you return? .. .. .                                                                                | Yucu, or Sann pe ninigui?                        |
| To return .. .. .                                                                                             | Ninigui.                                         |
| To take, to take away, to carry away .. .. .                                                                  | Shúna.                                           |
| Take that away .. .. .                                                                                        | Pe shúna.                                        |
| Bring what they have given to you .. .. .                                                                     | Túle tegui pe she.                               |
| Do not sit down here .. .. .                                                                                  | Yti bali chicúe chúle.                           |
| It is ended; there is none, there is no more.                                                                 | Perquisa.                                        |
| Silver (the <i>metal</i> , not <i>money</i> ) .. .. .                                                         | Mánia.                                           |
| Who has given you the silver? .. .. .                                                                         | Penki mánia toga ipi noga?                       |
| Whence have you obtained that silver?                                                                         | Mánia toga pe ulugua togua cate?                 |
| To whom have you given the silver? .. .. .                                                                    | Ique noga chichigua penqui mánia?                |
| Give me the silver immediately! .. .. .                                                                       | Emiscua mánia angati pea sobandó teque!          |

VOCABULARY, ETC., OF THE CUNA LANGUAGE—*continued.*

| ENGLISH.                               | CUNA<br>(pronounced as in Spanish).  |
|----------------------------------------|--------------------------------------|
| Gold .. .. .                           | O'lo.                                |
| Pain, sorrow .. .. .                   | Nún maque.                           |
| What ails you? .. .. .                 | Ipi pe nun maque?                    |
| Are you sick? .. .. .                  | U'a cai pe nica?                     |
| Medicine, remedy .. .. .               | Yua sae.                             |
| Fire .. .. .                           | Sho.                                 |
| Bring me some fire, or a light .. .. . | Sho she taque, or Sho taque pe she.  |
| Bring nearer the fire-brands .. .. .   | Sho pe taque nae, or Sho pe maqueti. |
| A lie .. .. .                          | Cacanchi.                            |
| The truth .. .. .                      | Napriagua.                           |

NUMERALS.

|            |                |                                    |
|------------|----------------|------------------------------------|
| 1. Kuasak. | 8. Pavaga.     | 15. Kakatal.                       |
| 2. Pagua.  | 9. Pakevake.   | 16. Kakanerkua.                    |
| 3. Pa.     | 10. Ambé.      | 17. Kakakúgulé.                    |
| 4. Pake.   | 11. Kuisak.    | 18. Kakapava.                      |
| 5. Atal.   | 12. Kakapagua. | 19. Kakapakeva.                    |
| 6. Nerkua. | 13. Kakapa.    | 20. Ambetulevua, or<br>Ambetuleúa. |
| 7. Kúgule. | 14. Kakapake.  |                                    |

APPENDIX II.

SUPPLEMENTARY NOTE RELATING TO THE FIRST EXPLORATION OF THE ISTHMUS OF DARIEN, IN 1861. BY M. LUCIEN DE PUYDT.

A FEW further details regarding my expedition of 1861 are necessary, especially as erroneous statements have been published, without my consent, regarding it.

I was commissioned in 1861 to undertake a scientific exploration to Darien, by a French company, founded by M. Paul Roger. This society collapsed in 1862, and M. Roger died in June, 1867.

Messrs. Mellet (Engineer of Ponts et Chaussées) and Gustave de Champeville (Civil Engineer) were to accompany me. These, with five other persons (who, I may say in passing, were utterly useless), composed my staff. At the last moment M. Mellet broke his engagement, and I left on the 17th February, 1861, with my six other companions.

Whilst making arrangements for the expedition at Panamá, M. Roger forwarded to me, by the packet of the 2nd March, M. Hilarion Bourdiol, formerly student at one of the schools of Arts et Métiers. This gentleman had, according to instructions received from M. Roger, assumed the title of engineer in chief, and was to have under him M. de Champeville, but still subject to my immediate control. Although fitted by his youth, health, and courage, for the undertaking, he had not the special education fitting him for an engineer, nor had he other scientific acquirements.

On the 21st of April, 1861, the expedition, composed of 27 persons, em-

barked on board a vessel of 30 tons, which I had purchased, and, piloted by Captain Negro, we visited many villages on the borders of the river Tuyra, and disembarked on the left bank of the Savana, immediately below the junction of the Rio Lara.

On the 22nd, I fixed with Messrs. Bourdiol and de Champeville the direction they should follow to reach the right bank of the Chucunaque, *below* the River Paz, which is one of its affluents on the right. The angle determined on was  $57^{\circ}$  E.; but in taking into account the magnetic variation of the place ( $8^{\circ}$ ), the route to cross the forest would become altered to an angle of  $49^{\circ}$  E.

Obliged to attend single-handed to the multitudinous details of the expedition, and being myself occupied in scientific studies, it was impossible for me to see to every detail, and numerous mistakes were committed, either in the determination of the various angles of the line or in the heights, during a route of 18,550 mètres (20,288 yards, or  $11\frac{1}{2}$  miles). It followed that the note-book of M. Bourdiol gave for result an angle of  $51^{\circ}$  instead of  $49^{\circ}$ , and nevertheless the route followed made an angle of  $46^{\circ}$ . It happened, in consequence of this error, that he arrived on the banks of the Rio de la Paz, *above* its confluence with the Chucunaque, and not on the right bank of the Chucunaque, below the point where it receives the Rio de la Paz, which should have been the case had the angle of  $49^{\circ}$  been kept to.

I again turned to the River Tuyra, the object which I had chiefly in view. The direction of this vast stream running from east to west, the elbow which it forms at a little distance from the Gulf of Uraba, on the Atlantic side, and the direction of three of its affluents, the Capeti, the Pucro, and the Paya, whose sources, near to each other, lie in the lowest part of the Cordillera of Nique (Sierra de Mali and de Estola), the accounts of the inhabitants of the isthmus, the writings of Paterson and other explorers, led me to believe that the only passage for an oceanic canal, without locks or with few only, ought to be found in this direction.

The northern line to Caledonian Bay, by the Savannah River, was found to be quite impracticable by our expedition, and the want of success of my predecessors was made intelligible.

I re-ascended the Tuyra, visited its upper affluents of the right bank, and, after finding my favourable opinion justified by the aspect of the localities, and gathering valuable information, I left to rejoin the expedition up the Lara. On approaching the place, one of my people met me with the following letter from M. Bourdiol :—

“*Rancho No. 6, May 31st, 1861.*”

“We arrived here yesterday evening, in spite of the bad weather, and with the water up to our breasts, at the junction of the Rio de la Paz and of the Chucunaque. As it is now necessary to agree on what remains to be done, I beg you to rejoin us at this rancho, that we may consider the matter.

“*BOURDIOL.*”

“*M. DE PUYDT,*

“*Chef de l'Expédition du Darien.*”

I was very doubtful on the subject of this letter, this being the third time that M. Bourdiol had announced to me the discovery of the Chucunaque, and it might not be the last; for the expedition had never attained the banks of the Chucunaque, being still on the left bank of the La Paz, and yet M. Bourdiol persevered in the mistake. Thus, on the 30th of May, M. Bourdiol was doubly and completely misled. He had lost himself in the midst of inundated grounds and narrow valleys, and did not know how to extricate himself.

I resumed the command of the labourers, turned to the right, and continued opening the road. It was not until June the 2nd, at 3 in the afternoon, after

two days of toilsome forced marches, that I arrived on the right bank of the Rio de la Paz.

My Indian interpreter, Pedro Juan, of the village of Paya, recognised the stream to be this affluent of the Chucunaque, and not the Chucunaque itself, which he had often ascended and descended.

Enquiries made above and below added nothing to our knowledge, of any use; and I caused the date and the names of myself and two engineers to be cut upon a large tree; and having drawn up a report, I gave orders to return to the Savannah, where our vessel (the *Mercedita*) was anchored.

On the 2nd June, one of the party, Thomas Fellow, an intelligent Englishman, climbed a lofty tree, and, guided by the compass, saw to the east the Loma Descada Hill, situated in the delta formed by the meeting of the Sucubti and the Chucunaque, the course of this latter river being indicated by the tall trees which border its banks and the ground rising by degrees towards its boundary at about 18 miles' distance to the north-east, the chain of the Cordilleras of Caledonia Bay showing a bluish continuous line on the horizon.

I returned to France, where I devoted much time and attention to the preparation of another expedition for 1865, bringing to bear upon the study in hand the great experience acquired in 1861; my intention in this new undertaking being to discover some lower passage in the Cordillera between the source of the Tanela to the east and that of the Paya, of the Capeti, of the Pucro, and of the Tapaliza, to the west of the mountains.

Whatever may have been said, written, or published by M. Bourdiol, or by others, in France or abroad, respecting the expedition to Darien in 1861, I regard it as a strict duty to conceal nothing of the results, favourable or unfavourable. Science neither admits romance nor *equivoque*, still less untruth. I believe the results of my journey have been to expose the erroneous assertions of Messrs. Cullen, Gisborn, Airiau, Roger, Bourdiol, and others, on the supposed extraordinary facility of the passage from the one ocean to the other by the line of the Savannah and Caledonia Bay. This line of communication between the seas ought to be completely abandoned, as it offers no mode of establishing the only inter-oceanic canal that modern science would admit of, that is, suitable for navigation for large ships, and with two to four locks at most.

I have obtained fresh knowledge of the orography and hydrography of the eastern portion of the Lower Darien, in the neighbourhood of Choco, relating to the opening of such a canal to unite the Gulf of Uraba with the deep waters of the River Tuyra, where it bends into the Gulf of San Miguel.

Besides this, our expedition has made scientific observations of various kinds, in geography, natural history in its different branches, ethnology, geology, hydrography of the interior and of the coast, orography, and so forth, most of which have not yet been published, but having an important bearing on the future canal.

M. Bourdiol was never in command of a Darien expedition, and his published accounts are borrowed from the works of his predecessors and contemporaries, or are only the fruit of his own imagination. He was occupied only during 43 days in levelling and surveying, under my direction, from the Lara to the La Paz, a distance of 11½ miles. M. Felix Belly is therefore mistaken\* in saying that the exploration of M. Bourdiol lasted three years. Rear-Admiral Davis, of the United States Navy, has fallen into a similar error in his 'Report on Inter-oceanic Canals and Railways,' in speaking of M. Airiau and of M. A. Anthoine de Gogorza, neither of whom ever set foot upon the land of Darien, and also in speaking of M. Bourdiol as the leader of an expedition. Admiral Davis makes a mistake also in dates. It was in 1861, and not in 1864, that

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\* In his work 'À travers l'Amérique Centrale, le Nicaragua, et le Canal Inter-océanique, par Felix Belly.'

M. Bourdiol was attached to the expedition which I commanded. The expedition never had any fears of wild Indians, for the simple reason that no such Indians were found between the Gulf of San Miguel and the Chucunaque; the inhabitants of the villages are all, without exception, blacks, mulattoes, quadroons, or whites. Of these my crew was composed. The expedition of 1861 was daily supplied with provisions by the abundance of game, and the region affords an inexhaustible supply; so that, beyond the rains and the fatigue attending such journeys, there really was no cause for complaint on the score of want of food, as we even had a surplus. Intermittent fever alone was the cause of anxiety on the score of health; with this exception, the condition of the expedition was excellent.

I may add that I have now before me the note-books of M. Bourdiol, containing all the observations of heights by levelling; and the result does not give more than from 52 to 55 feet of elevation, where Moritz Wagner had found 138 feet in the same place. M. Bourdiol, in his chimerical project for a canal, conceived in Paris in 1862, had laid down 144 feet—a figure not resulting from his labours, but from the data of the eminent Bavarian geographer.

In concluding this statement, I may state that in 1861 I forwarded to M. Roger, on my return to Paris, a complete record of my observations on all the scientific points of the expedition which occupied me in Darien. This record has become, I cannot tell for what reason, the property of M. Bourdiol; and I was much surprised, during my absence from Europe in my second expedition of 1864-5, to find that M. Bourdiol had laid before the Geographical Society of Paris my lawful property, and secured for himself the credit of work to which I had the sole claim.

### APPENDIX III.

#### NOTE ON DON ANDRES DE ARÍZA'S MAP OF SOUTH DARIEN (1774).

In May, 1868, I discovered in the Public Library at Bogota (Columbia) a MS. with the following title:—

'Comentarios sobre la rica i fertilisima Provincia de el Darien, en fecha i dirijidos de Santa Maria la Antigua de el Darien, el 5 de Abril, 1774, por el Sr. Don Andrés de Aríza a el Exñio. Virrei.'\*

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"Capitulo: De Tall de la Provincia de Sa. Maria la Antigua de Darien, arreglado al Mapa que le dirigió al Exñio. Sr. Virrei en fecha del 5 de Abril, 1774."

The map in question had been torn out of the MS., and, despite all my efforts, I could not at the time discover where it had been taken to.

During my second visit, however, to Bogota, in 1866, I saw it accidentally in the hands of a person who refused my offer of purchase, but allowed me to take a copy—the one which, in strict conformity with the original, I now present to the Royal Geographical Society of London.‡

Briefly, the more interesting and important portions of the contents are the following:—

*Villages.*—Santa Cruz de Cana, which, in the year 1712, was set fire to,

\* Manuel de Guirrioz, Viceroy from 1772 to 1775.

† Monogram of Andres de Aríza.

‡ Now in the Map Collection of the Society.

amidst the slaughter of the inhabitants, by 80 Frenchmen and 300 of the Gulf Indians, under the command of Charles Tibou :—

|                                                                           |     |
|---------------------------------------------------------------------------|-----|
| Yavisa, a fortified village, on the Chucunnaque; number of inhabitants..  | 170 |
| Santa Maria la Reale; fortified, and situate at the mouth of the Pirré .. | 180 |
| Cana, fortified; on the river of the like name .. .. .                    | 26  |
| Chepigana, fortified .. .. .                                              | ..  |
| Tichiche .. .. .                                                          | ..  |
| Pinogana .. .. .                                                          | 117 |
| Molineca .. .. .                                                          | 180 |
| Tucuti .. .. .                                                            | 110 |
| La Marea, on the river Tayecua; much gold .. .. .                         | 168 |
|                                                                           | ..  |

*Indian Villages.*—Congo, Balsas, Acanti, Paya, Yavisa, Sambú, Pirré, Matu-maganti, Tapunaca, and Tupisa.

*Gold Mines in the Province.*—Troncoso, Sábalos, Tayecua, Nusaganti, Arquiatí, Nususunaquí, Acuasiscuati, Bagre, Marea, Balsas, Cana or Espíritu Santo, Rio de Playon, Sucubti, Cuque (mouths of the Atrato), and Mali, situate on an arm of the Pucro.

*Rivers.*—The Chucunnaque, which opens out a communication with the north, by means of the Rivers Tupisa and Gandi, as well as of the Turganti and the Chueti.

The Tuyra, a very considerable and broad river, easily navigable up to the mouth of the Pucro. It takes its rise from the Chocó, near the source of the Atrato; it is a tidal river up to a little distance above Pinogana.

Amongst its tributaries are two rivers affording easy access to the Northern Sea. One is the so-called Rio Pucro, the sources of which are near the Rio Tarena, not far from the marshes of Zaraqulla, Týglas, &c. The passage is made in six days, in canoes. The other is the Paya, affording greater facilities for the journey, its volume of water being more considerable.

The Mali Sierra, which has to be passed on either of the two routes, is the only point by which the Gulf of Uraba, its environs, &c., can be reached.

As an addendum to this notice, I may remark that my two explorations of the Darien, respectively in 1861 and 1865, and more especially in the latter year, resulted in the discovery, on the 27th of August, 1865, of a very low or sunken passage in the Mali Cordillera, between the sources of the Tanela (Tarena) on the Atlantic slope, and those of the Pucro, of its tributary the Tapalisa, of the Paya and of the Capeti, on the Pacific side. This is the point of which such precise mention is made in Don Andres de Aríza's report.

#### APPENDIX IV.

NOTE ON THE MAP OF DARIEN, BY THE COLOMBIAN ENGINEER, M. AGUSTIN CODAZZI, dated the 31st March, 1854.

THIS map, which was drawn up expressly to illustrate the routes taken by Messrs. Prévost, Gisborne, and Strain, completely differs—singularly enough—from M. Codazzi's other maps of the Isthmuses of Panamá, Darien, and Choco, and also, amongst others, from the one published by Dr. Kiepert of Berlin.

All the points on this map\* are placed 30, 31, 32, and 33 minutes more to the south than their real situations, and—what is still more singular—the left part of the map, which is devoted to Mr. Gisborne's plan of canalization, presents the same differences in latitude with respect to the right side, of

\* A copy of which, presented by M. de Puydt, is now in the Map Collection of the Society.



which it is merely a detail. It is the latter side which (in that respect only) is in accordance with the other maps of Codazzi.

In M. Moritz Wagner's excellent map of Darien, as well as in Dr. Kiepert's, the sources of the Chucunaque are placed—and correctly so—not far from those of the Bayano or Chepo, and on the slope of the Pico Pitgandi—which is at an elevation of 400 mètres, or about 1300 English feet. M. Codazzi, on the right side of his map, makes the Chucunaque extend its course far too much to the north-west; whilst, on the left side, he brings that course to an abrupt termination, and places the sources of the river under  $77^{\circ} 50'$  w. longitude (from Greenwich), instead of under  $78^{\circ} 12'$ , more or less. In like manner, the sources of the Bayano are represented by him to be so far east as  $78^{\circ}$ ; moreover he alters the course of the Aglasiniqué—describing it as traversing the Cordillera under the novel name of Rio Caledonia—and introduces certain changes into the entire mass of the Cordilleras, being thus in complete contradiction with himself, on one and the same sheet of paper.

The publication of this map would be merely a matter of curiosity, as but little credence is to be attached to such a production; at the same time, however, the publication would serve as a warning to avoid making use of it with regard to the history of Darien. This map may be taken as evident proof of a pre-conceived and pre-arranged plan, on the part of M. Codazzi, to uphold the statements of Mr. Gisborne, and—what is more to be regretted—to set forth the possibility of making a certain wonderful canal, without sluices, straight as an arrow, and passing through wholly flat savannas, from one ocean to the other. This is the canal of which bird's-eye views were published by Dr. Cullen, and, after him, by the pretentious Mr. Airiau.

All these localities were visited by me in 1861, during the expedition, of which a narrative has been presented to the Society. I had previously discovered that rising ground, 240 feet above the level of the sea, separated the valley of the Savannah from that of the Chucunaque. I also found an elevation of 144 feet above the level of the Rio de la Paz, some two miles from its mouth in the Chucunaque, and yet this is the elevation which, according to Mr. Airiau, was to be traversed by a canal without sluices, and on a level bed! Moreover, to the north-east and east arose before me the chain of the Cordilleras, which give rise to the Rivers Morti, Sucubti, Asnati, and Napsarti, tributaries and sub-tributaries of the Chucunaque, on its left bank.

This part of Darien inspired M. Bourdiol (the young surveyor who was under my orders in 1861) with another singular project, to which he gave publicity, viz., a canal with fourteen sluices, a tunnel through the Cordilleras, feeding-canals, &c. It is true he knew nothing more of the nature of the ground than was communicated to him by one of my labourers, who, perched upon a tree, caught sight of the locality in question, some 18 or 20 miles distant. We were at the time (June 2, 1861) on the right bank of the Rio de la Paz; yet M. Bourdiol did not hesitate to draw up a map of Darien, which differed *in toto* not only from those of Codazzi, Kiepert, and Wagner, but—what no one will be astonished to hear—from all other maps in existence.

The original of the present map is now in my possession. It was given to me, in Colombia, by a friend of the late Colonel Agustin Codazzi, of the Colombian Engineer Corps.

No other copy, I believe, exists; so that, even on that score alone, the map in question may be considered to be interesting in a geographical point of view; whilst it would be of service in any discussions relative to the construction of an inter-oceanic canal through the Isthmus of Darien.

V.—*Report of the Livingstone Search Expedition.* By E. D. YOUNG, Esq., Leader of the Expedition.

Read, January 27, 1868.

To Sir Roderick Murchison, Bart, K.C.B., &c.

SIR,—I have the honour to lay before you a brief outline of the proceedings of the Expedition under my command, sent out to Africa by the Royal Geographical Society for the purpose of ascertaining the truth or falsehood of the reported death of Dr. Livingstone. I am happy to inform you that our efforts have been crowned with success, and I have satisfactory evidence that Dr. Livingstone was not murdered by the Mizitu, nor by any other tribe, at the place named by the Johanna men, but had gone on in safety far beyond. I have also satisfactory evidence that the Johanna men deserted shortly after leaving Marenga, returning by the same route as they had gone.

But I must first begin the narrative from the time of our landing at the mouth of the Zambesi. Immediately on landing I succeeded in getting a negro crew to take the boats up as far as Shupanga, where I arrived on the 2nd of August. I at once engaged a fresh crew to go on to Chibisa, and the next day started for Senna. Arrived there on the 6th; found the Portuguese authorities very obliging; made what arrangements were thought necessary, and proceeded on the next day. I learned from the Portuguese that the Mizitu were in full force on the Shiré, and were threatening Chibisa, so I arranged with the authorities at Senna to send on to me at Chibisa (should I require them) 100 men, fearing, as the Mizitu were there, I should not be able to get the Makololo to accompany me.

We arrived at Chibisa on the 17th, and found that the reports about the Mizitu having been there were quite true, and that they had been down in force to the left bank, robbing and burning the houses, murdering some of the people they caught, and taking others prisoners. The Makololo put off in canoes from the opposite bank and shot three of them. Of course I was quite unprepared to meet the Mizitu in this part of the country.

The Makololo, as well as the people who were of the old mission party, received us gladly. I requested the Makololo to attend the next morning, which they did, when I acquainted them with the object of my mission. They agreed to accompany me on certain conditions, which I agreed to. One was that I should leave some ammunition behind with those that remained, so that should the Mizitu attempt to cross the river

below the Cataracts they would be well able to encounter them. After arrangements had been completed, we started on the 19th for the Cataracts; arrived the same day, and at once began taking the boat to pieces. Hitherto all had gone on well, but no sooner had we got the boat to pieces, and everything was ready for the journey overland, than fresh reports about the Mizitu reached the Makololo, which very much daunted them, and had also a tendency to lower our spirits, for without their help we could do nothing, as it was not only their help that we required, but also that of their people, they being the chiefs of the country round about. After a good deal of persuasion the whole affair was settled to our satisfaction, and on the evening of the 23rd the Makololo appeared in force with about 150 men.

We started next morning with the boat, provisions, luggage, &c., making in all 180 loads. The men worked well, and we arrived with everything in good order at Pomfunda, above the Cataracts, in four and a half days. The heat during the journey was excessive, even for Africa. We at once commenced rebuilding the boat, and everything appeared to be going on well when fresh reports reached us about the Mizitu. We were visited by some of the Ajawa chiefs who had been driven out of their own country, and were obliged to cross the river to save themselves from being murdered. There was an encampment, close by the place where we were building the boat, of about 200 Ajawa, the sole survivors of the once powerful people under the chief Joey.

Every day fresh reports reached us, and the Makololo wanted to return home, which of course I could not consent to. At this place we first heard from a native of a white man having passed through Maponda at the south end of Lake Nyassa. He stated that he had seen him, and gave a description of his dress, &c.

Launched the boat on the 30th, and started up the river next morning. The Makololo not working well, and making every excuse, not being well, &c., thinking perhaps we would turn back. They stated that the risk was too great, that there was little chance of our ever returning, but as they had gone so far they would go on and die with us; of course all was agreed to. As we proceeded on we found vast numbers of Ajawas and Machinkas on the left bank, living in temporary huts, who had retreated before the overwhelming numbers of Mizitu. Reached the small lake Pamalombe on the evening of the 5th of September.

During our passage up the river heard several reports that a white man a twelvemonth before had stopped at Maponda for

some time, having crossed from the opposite side, and that after resting there some time he had gone on in a westerly direction. I now felt almost convinced that it must have been Livingstone, but I almost feared to stop there, for I felt certain had the Makololo been satisfied that it was him they would have gone no further; for my agreement with them was, that as soon as we had satisfactory evidence that the Doctor had gone on in safety, or that he had been killed in the way described by the Johanna men, I would return with them immediately. But now, as it appeared that he had passed over the south end of Nyassa instead of the north, I wanted to find out where he had first struck the lake. The Makololo stated that they were certain that if a white man had been killed, or had died within a month's journey of where we were, we should certainly have heard of it before we got thus far.

The next morning crossed the Pamalombe, but could not find a passage into Maponda, owing to the quantity of rushes and grass, and it blowing very hard at the time we made for the river. Here again we met great numbers of natives, who appeared very hostile. They lined the banks with their guns, and demanded that we should come into them. The Makololo appeared very much afraid, so I laid the boat to, to await the approach of two armed canoes that had shoved off from the shore. I soon made matters right with them, and shortly afterwards entered Lake Nyassa, and slept the first night on the Rock Boasuum.

Started the next morning with a fine breeze for the east side of the lake, steering as near as possible for the Arab crossing-place, as laid down by Livingstone. We had not run more than two hours before a heavy gale began to blow, and for three hours we had to run along the coast to try and find shelter, but the rocks and breakers met us at every hand. This proved the finishing stroke to the Makololos' courage, who all laid down at the bottom of the boat to die, and although the boat was constantly shipping heavy seas, they refused to bale out the water. The steel boat behaved well, but was far too deep for the stormy Lake Nyassa. At length, after three hours' weary watching, we succeeded in finding a sheltered spot where we stopped to dry our clothes. Only one native appeared at this place, who when he saw us first was much frightened; but as soon as we stated we were English he willingly came towards us. He told us an Englishman had passed through his village a year ago, and that he had come from the Arab settlement, and had gone south to Maponda. Started again for the former place, but found the distance too great to reach before

dark ; put into a small sandy bay, where we found some natives fishing.

I must here remark that at any place, on first visiting it, no one was allowed by me to get out of the boat, except myself, Mr. Faulkner, and the interpreter. I soon got into conversation with these men, when they spoke of a white man who had been there, without being asked. They stated that he had first made that place coming from Makata, had stopped nine or ten days to rest, and then went north to the Arab settlement to try and get them to carry him and his party across the lake, but after waiting there some time he returned, making his way south for Makata. They described his dress, what luggage he had, imitated him taking sights, and sleeping under a mosquito curtain, and stated that he had a dog with him named Chetane. They said the head-man of the carriers was named Moosa ; two of the boys spoke the Ajawa and Mananja language, and were named Juma and Wako. They told us what barter goods he traded with ; on being shown an album with numbers of likenesses, they at once recognised the one of Livingstone. That there were nine of Moosa's countrymen with him, who did not speak either the Ajawa or Mananja language. He did not buy slaves or ivory ; he had come to see the country. Besides numerous other things that left no doubt on my mind that it was Livingstone.

Next day we arrived at the Arab settlement, where we were received kindly, and found all that I had heard before was quite correct. Livingstone waited at this place nine or ten days for the Arab boat, which did not arrive, so he started south again, and they traced him as far as Maponda. I visited the house Livingstone lived in during his stay, and I purchased a few articles (all English make) that he had traded with, such as small round looking-glasses, a knife, razor, iron spoons, &c. Of course most of the calicoes, &c., were already worn out, but the chief still possessed an Indian manufactured scarf that Livingstone had presented to him on leaving. I sent two of the most trustworthy Makololo with my ever faithful interpreter (whom I brought from the Cape) on the road to Makata to see if that was the road he had come, while we again went south, making short marches inland, to try and find the route the Johanna men took in going back, as they had not visited this place or the last. We obtained other trifling articles in the shape of barter goods, and while waiting for the return of the Makololo obtained from a chief further south an English Common Prayer Book, which he stated had been left behind by the Englishman in the house he had slept at.

On the 13th the searching party returned, having gone two days' march on the road to Makata. Livingstone had come that way. They brought back some glasses, fish-hooks, &c., that he had traded with. They would have gone further, but were ill-treated by some of the natives and driven back: their reason for so doing, they said, was that the Englishman had brought fighting into the country, for the Mizitu had been killing their people ever since he left.

*Sept. 14th.*—Started for the opposite side of the lake; made for Chinsamba's. Although we started with little or no wind, it again blew a gale before we reached the opposite shore. We found that Chinsamba had been killed some time since, and nothing remained of his village. Skeletons now met our eyes in great numbers, whenever we landed along this side. Saw several natives the first day, both Ajawas and Mananja; and those who had not seen the white man further south had heard of him, but not in a single instance was he spoken of as being dead. I wished to learn, by coming over this side, in what direction he had gone after leaving Maconda. We had not crossed long when we saw a man who had helped to carry the Englishman's luggage for two days; he described him as before. This man had been living inland some distance, but had been driven out by the Ajawa. He pointed in a north-westerly direction, and stated it was five days' journey off, which, of course, would be very much more from Marenga.

Our progress south was slow, owing to the heavy gales of wind. On our way we met several who had seen the Englishman, and more than one had helped to carry his luggage from village to village, and there was not in all their reports the slightest variation. They were not all from the same place, but they all maintained that he had gone on in a north-westerly direction towards the Loangwa. These natives were full of complaints about their neighbours, and would only have been too ready to inform against each other if Livingstone had come to an untimely end at either of their hands, and they all maintained that the Mizitu had never been in that part of the country.

*Sept. 19th.*—Reached Marenga. Seeing the boat approach the shore they lined the beach with their guns, &c.; but, as soon as we told them we were English, they laid their arms down and welcomed us. I at once asked to see Marenga, when I was conducted up to his house by one of his wives. Marenga rushed towards me, and, seizing me by the hand, shook it heartily, saying, "Where have you come from, and where is your brother that was here last year?" and as soon as I told him I had come to follow him, he began and told me all he

knew of him. He said he had come there from Maponda, had stopped there two days; he was very kind to him, making him presents, &c., and he in return gave him what food he required: Livingstone gave him medicine, which was done up in doses; the papers he used formed part of a 'Nautical Almanack' for the year 1866. He lent Livingstone four canoes to take himself and luggage across the marsh, while the Johanna men carried the remainder round. He had seen him before; he said he saw him when he was up here with a boat a long time ago. He traced him a month's journey off, giving the names of the places in the same order as I had previously heard. He was quite willing to give me any guides to go to Maksudro, or where it once was; but he stated, as I had previously heard, that Maksudro had been driven out and killed by the Ajawa and his people almost annihilated: as also had C66mo, two days' journey beyond. Marenga stated that the Johanna men returned after being absent two days. They gave as their reason for returning that they had merely agreed with Livingstone to take his goods as far only as they liked. The headman stated that he had been in that direction before with him and had met the Mizitu, and that they were going no further. To prove their independence they passed themselves off as Arabs. Marenga gave them food, and they slept there one night and then set out for Maponda.

Marenga is a Babisa, and rules over a populous district; he made us a present of a bullock and as much native food for our crew as we required, and he invited us to remain a long time. He has a great number of wives—I and Mr. Faulkner being introduced to forty, who were all sitting round him.

Having satisfied myself thus far, I asked him if he thought it possible that Livingstone could have died a month's journey off, and he not know it? He at once said No, and had he died three months off he should have heard of it; but as soon as I told him I had heard that the Mizitu had killed him not far distant, he laughed, and said he told me he was going the way to avoid them, and that the Mizitu had never been in that part of the country described by the Johanna men.

Marenga then sent for a man who had gone five days' journey with him, and when he returned the Johanna men had gone back. I had previously heard the same account from the same man.

The Makololo now got very impatient to return home, and nothing was talked of day or night but the Mizitu. They stated that they had fulfilled their engagement, but I very much wished to try and get to the north end of the lake. But they would not listen to it. No inducement I could offer

would persuade them to go; so there was no alternative but to go round to Maponda, get what information I could, and return.

Marenga was full of complaints about his neighbours, and what he wished for more than anything else was medicine for his guns, so that if the Ajawas came to fight him his shot would kill some one every time they were fired. We, being satisfied that Livingstone had gone on in safety, started on the 20th for Maponda, calling at the several places along the coast to gain what information I could; but all I obtained only went to confirm what I had previously heard.

Arrived at Maponda on the 25th. The chief himself was not at home, having gone on a trading expedition, leaving his mother to act during his absence. Immediately on arrival I sent a messenger to acquaint her of our arrival and my wish to see her. She soon came, with a train of followers, bringing us presents of native food and beer. She stated that an Englishman had been there a year before, had stopped three weeks to rest his party, and then left for Marenga, stopped there a day or two, and then left to go to the Loangwa, calling at Maksura, C66mo, &c. One of the boys was left behind here, being unable to travel, having very bad feet and legs, but had now quite recovered and had gone with Maponda. She stated that the Englishman had left a paper with him, but that he had taken it with him on the journey. She brought some books belonging to him, one of which had his name on ("Wakitane, from Dr. Wilson, Dec., 1864," &c.), which she allowed me to take. The Johanna men returned this way, stopped one day, and proceeded on. She swore, in the presence of us all, that Maponda did not take away their guns, neither did any of the party die there. She stated that the Englishman was great friends with her son, and that if any one had molested him (even Marenga, as strong as he was) he would have gone to war with him. The old lady laughed at the idea of Livingstone having been killed by the Mizitu. Mr. Faulkner questioned her regarding the havildar. She gave a description of a man with straight black hair, with the top of his head shaved, &c. Mr. Faulkner states it answers the description of the Indian very well. Marenga also told us the same, and I felt convinced had he died there we should have heard it from some of the numbers I questioned on the subject.

The Makololo now told me that if I intended going into the lake again, they were not going with me; and, being entirely dependent on these men, there was no alternative but to return and to get their aid in carrying the boat back. So, having got all the news I could at Maponda, I decided on going to Makata;



but although I offered a large amount for a guide, no one would attempt to cross the river. They stated that Makata had taken to the mountains for fear of the Mizitu, and they were afraid of being cut off.

Started for the Cataracts on the 27th. Found the same state of things along the river as on coming up. Arrived at the Cataracts on the 2nd of October, and commenced taking the boat to pieces. Meanwhile we heard from Chibisa that the road was clear, and that the Mizitu had made Chore, not far from the lower Shiré, their head-quarters.

*Oct. 8th.*—Started for Chibisa with the boat, luggage, &c.; where we arrived on the 12th. We found the boats safe, and the men left with them in very fair health. Again built the steel boat, and while there repaired the graves of the late missionaries who died there.

*22nd.*—Started from Chibisa.

*26th.*—Arrived at the Ruo, stopped and repaired the grave of the late Bishop Mackenzie. Arrived at the Kongone on the 11th of November, but on our way down we visited Senna.

H.M.S. *Racoon* arrived on the 2nd of December.

Arrived at the Cape on the evening of the 17th.

Embarked on board the mail-steamer on the 19th.

In conclusion, I must again state that this is but a brief outline of our proceedings. I should have liked to have done more by going to the north end of the lake, but was prevented by circumstances unforeseen when I left England; for, had the Mizitu not threatened Chibisi, I should have had little difficulty in getting the Makololo to accompany me. Under the circumstances, I hope that what has been done will meet with your approval, as well as that of the Royal Geographical Society.

I have the honour to be, Sir, your very obedient servant,

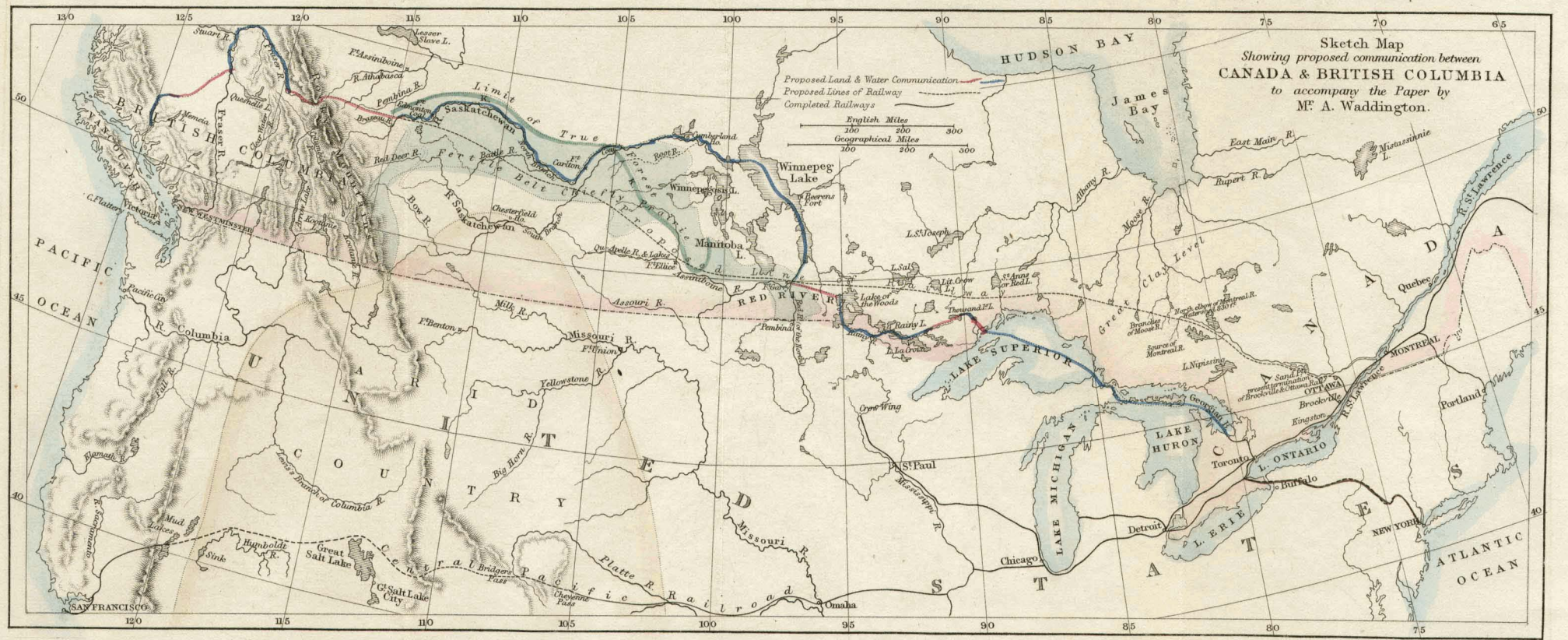
E. D. YOUNG.

VI.—*On the Geography and Mountain Passes of British Columbia in Connection with an Overland Route.* By A. WADDINGTON, Esq.

*Read, March 9, 1868.*

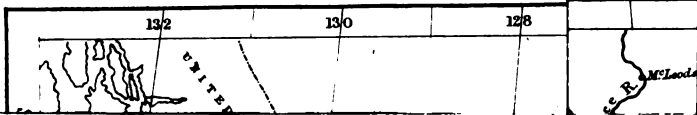
THE possibility of opening a direct and available communication between the Canadas and the Pacific, through British North America and the Rocky Mountains, has been for many years a subject of discussion, and even of doubt. True, the portion west











of Lake Superior was thoroughly explored for this purpose as far as the Red River Settlement and the lower end of the Great Saskatchewan in 1857-8, at the expense and by order of the Canadian Government, and the explorations of Palliser, Hector, Blakiston, Sullivan, and others, have made us acquainted with the main features of the Saskatchewan territory, and, to a certain extent, with some of the passes through the Rocky Mountains. But the difficulties of connecting an overland railway with the Pacific through British Columbia were not generally known, nor have the geographical features of the country west of the Rocky Mountains ever been laid before the public.

The chief object of the present paper is, therefore, to collect and embody what I have learnt respecting them, so as to supply this deficiency, and furnish such details as were still wanting. The writer has spent over five years in studying them, and has laid out considerable sums in equipping and sending out exploring parties in all directions under reliable engineers, or conducted by himself; and the result has been the discovery, after much uncertainty and expense, of a feasible route for a railroad through the Cascade Range, followed by the survey, and partial opening of 222 miles of road, through an entirely unknown country, from the coast to the mouth of Quesnelle River, and which must necessarily form the first link in any future overland route. From this point (whence a road leads to the Cariboo Gold-mines in the neighbourhood) the Upper Fraser is navigable for steam-boats for 280 miles farther up to the "Leather," or "Yellow Head Pass," through the Rocky Mountains, and shortly after their watershed forms the limit of the colony.

The colony of British Columbia is to a great extent occupied by two ranges of mountains, running N.N.W., but gradually diverging from each other towards the north, where they enclose a vast plain, of which more will be said hereafter. That on the east side bears the name of the Rocky Mountains, and the other that of the Cascade or Coast Range. They have one feature in common, which is that their eastern edge rises in both cases abruptly from an elevated plain; and in the Rocky Mountains the highest crest or ridge is also on that side; whereas the descent on the western slope, though greater, is extended over a wider distance, and therefore in general more moderate.

The MAIN crest of the Rocky Mountains, several of the peaks of which rise to a height of 16,000 feet, forms the eastern limit of the colony, and runs from its south-east corner at the boundary line in a N.N.W. direction to beyond the northern limit of the colony, in Lat. 60°. I say the main crest, because what generally bears the name of the Rocky Mountains is composed

in British Columbia of three distinct ranges, divided from each other by rivers and deep depressions, and having each its own crest or ridge. Of these the two western ones, though less elevated, are chiefly composed of metamorphic rocks, and therefore, generally speaking, more distorted and abrupt than the rounded and granitic peaks and domes of the main crest. The whole forms a triple fence as it were to the colony, or one vast sea of mountains, averaging from 150 to 160 miles wide.

The Middle range, which, as before said, is somewhat lower than the main one, and which takes the names of the Purcell, Selkirk, and Malton ranges successively, is separated from the main ridge by the Kootanie River, the Upper Columbia, the Canoe River, and the Upper Fraser; and presents one uninterrupted line of mountains, some of them 12,000 feet high, for 240 miles, from the Boundary-line to the great bend of the Columbia, in  $52^{\circ}$  N. Lat. The Columbia River here runs towards the north, and, after separating the above middle or Selkirk Range from the Rocky Mountains proper, cuts through it at the Big Bend, and, turning south, again separates it in its downward course from the third or more westerly range. But the travellers who have discovered the different passes (such as they are in this latitude) through the Rocky Mountains, were unable to push their explorations further than this eastern or upper portion of the Columbia, excepting near the boundary-line; so that neither the middle range nor the western one, which were perhaps supposed, as being less elevated, to present less difficulties, had been hitherto examined. In consequence, however, of the gold discoveries at Kootanie and the Big Bend, or in connection with them, they were carefully explored last year; but no practicable pass could be discovered through the Selkirk Range, which thus presents an impenetrable barrier for a railroad in that direction.

The Third, or more westerly range, is the least elevated of the three, though still ranging from 4000 to 8000 feet high. South of Fort Shepherd and the Boundary Line, where it forms eleven sharp ridges running north and south, it bears the name of the Kulspelm Mountains, and further north of the Snowy Mountains or Gold Range. The Bald Mountains in Cariboo, 6000 to 8000 feet high, are also a continuation of this range, which, after crossing the Fraser below Fort George, lowers towards the north, and takes the name of the Peak Mountains. The only good pass from the Columbia through this third range is to the south end of Souswap Lake, and was discovered last year by Mr. Moberly, the Government Engineer at Eagle Creek, in Lat.  $50^{\circ} 56'$ . An important feature in both the middle and western ranges just described is their gradual depression north of

Cariboo, to where the Upper Fraser, after separating the middle range from the Rocky Mountains to the east, abandons its north-westerly course, and makes a circular sweep through the depression from east to west, and then south to below Fort George. This depression forms a large tract of level flat country, on each, but more particularly on the south, side of the Fraser; and as the country and climate are both well adapted for settlements offers every inducement and facility (if, indeed, it be not the only pass) for a future railroad through these two ranges of the Rocky Mountains.

The CASCADE RANGE forms the Coast-line of the colony, which it follows from near the mouth of the Fraser into the Russian (now American) territory. Its average width is about 110 miles, and it may also be considered as a sea of mountains, some of which attain, if they do not exceed, a height of 10,000 feet. Its crest, starting from Mount Baker, a few miles south of the Boundary Line, passes a little north of the head of Jervis Inlet, some 25 miles north of the head of Bute Inlet, 22 miles east of the head of North Bentinck Arm, and crosses Gardener's Channel about 20 miles west of its head. From Mount Baker the Cascade Range throws out a spur east and north in the direction of the Great Okanāgan Lake and Fort Kamloops, so as nearly to join the Gold Range; and it entirely envelopes the Fraser from a little above Harrison River (55 miles above New Westminster), up to its junction with the Thompson at Lytton, and even a few miles beyond, on both rivers. But the most rugged portion in this direction lies between Yale and Lytton, where mountain succeeds mountain, and where those along the river present the most formidable aspect; bluff after bluff of solid perpendicular granite, intermingled with steep slides of rolling rock, washed by a deep impetuous stream and 1500 to 2000 feet high. In short, not only has this portion of the Fraser valley been declared utterly impracticable for a railroad by Major Pope and other competent authorities, but it is so fenced in with mountains, that there could be no reasonable way of getting at it with a railroad if it were. It is over these mountains that the present waggon-road passes at an elevation, in one place for nearly 40 miles, of 3600 feet above the sea: the only road to the Cariboo mines and the north of the colony, and, considering circumstances, a lasting monument of Sir James Douglas's energetic and provident administration. Unfortunately the difficulties (as may be seen in Milton and Cheadle's 'North-West Passage,' p. 356, where there is a good sketch of one of them) were Alpine. Many places are most dangerous, the endless ascents and descents fatiguing and laborious in the extreme; and as the sharp turn-

ings, besides many other portions, have had to be built up on cribs or cross timbers, which will very soon rot, the repairs will form a heavy charge on the Colony.

So that, supposing the difficulties of the Rocky Mountains to be got over, the Cascade Range still intercepts all communication by railroad between the eastern parts of the Colony and New Westminster. To say nothing of the utter worthlessness of the country to be traversed, amounting to 450 miles out of the 600 from its eastern limit by Howse Pass. Add to this that the navigation across the Gulf of Georgia, and at the entrance to the Fraser, by a narrow intricate channel, through shifting sands, full five miles long, is both difficult and dangerous, and that the river itself is frequently frozen up in winter for long periods, and it will be evident to every impartial mind that New Westminster, with its 700 or 800 inhabitants, can never become the terminus of an overland railway to connect with Victoria and the ocean.

Further north along the coast there are numerous inlets which penetrate into the Cascade range, but the greater part terminate abruptly, like the fiords in Norway, or are too distant; or like Gardener's Channel, Dean's Canal, or the Skeena, are too far to the north-west to be available for any present communication with the mines or the interior. There are, however, two exceptions: the North Bentinck Arm, by Milbank Sound, in lat.  $52^{\circ} 13'$ , and Bute Inlet, opposite Vancouver Island, with a safe and easy inland communication by steam to Victoria, distant 185 nautical miles. Both these inlets terminate in a valley of some extent; and as attempts have been made to open both of them, it becomes necessary to explain why the writer gave a decided preference to Bute Inlet for a waggon-road, and *à fortiori* for a railroad, over Bentinck Arm or any other line.

*Superiority of the Bute Inlet Route.*—The advantages of the Bute Inlet route consist in its central position, fine town-site and harbour, or rather its two harbours, accessible at all seasons of the year, its easy and safe connection with Victoria and the ocean, and the proximity of the coal mines at Nanaimo. The port of New Westminster, on the contrary, is difficult of access, in consequence of its constantly-shifting sandbanks, and closed, as aforesaid, by ice during 2 and even occasionally 3 and  $3\frac{1}{2}$  months in the winter.

The harbour at Bella Coola, on the Bentinck Arm Trail (the only other feasible route to the mines), is situated 435 miles further to the north, and has been pronounced to be totally unworthy, presenting no shelter, no good anchorage, no good landing-place, but a vast mud flat, with a mile of swamp, intersected by a shallow river, barely navigable for canoes. Or to



quote the words of Lieutenant Palmer, of the Royal Engineers, in his official report on the Bentinck Arm Trail, "A large flat shoal, extending across the head of the Arm, composed of black fetid mud, supporting a rank vegetation, bare at low spring tides for about 700 yards from high water mark, and covered at high tide with from 1 to 8 feet of water, and at a distance of 800 yards from shore terminating abruptly in a steep shelving bank, on which soundings rapidly increase to 40 and soon 70 fathoms." The whole is, moreover, subject to violent winds and powerful tides.

On the Bute Inlet route the snow, owing to its more moderate elevation, and its more southern latitude and aspect, melts fully 3 weeks sooner than on the Bentinck Arm Trail; and the road is dry, entirely exempt from snow slides, and level the whole way through: unlike the endless mountains on the Fraser route, or the steep unavoidable ascent from the sea, and numerous swamps by that of Bentinck Arm. The Bute Inlet Trail *cuts through* the Cascade Mountains by a deep valley studded with rich bottoms, affording plentiful pasture and rising imperceptibly for 80 miles, when it nearly attains its greatest height (2500 feet), from which point forward in the plain it was free from snow for 25 miles in February, 1862. The Bentinck Arm Trail, on the contrary, is obliged to *climb over* the range, owing to the valley, when 35 miles from the inlet, turning abruptly to the s.s.e., and running longitudinally with the range, instead of cutting through it; so that the trail on leaving it attains in a very few miles from that point a height of 3840 feet, as will be better shown by the following table, compiled from Lieut. Palmer's report:—

|                                                                                                       | GRADIENTS. |           |        |       |           |
|-------------------------------------------------------------------------------------------------------|------------|-----------|--------|-------|-----------|
|                                                                                                       | Miles.     | Per Mile. | One in | Rise. | Altitude. |
|                                                                                                       |            | Feet.     | Feet.  | Feet. | Feet.     |
| From the inlet to Shtooiht, at the turn of the valley .. .. .                                         | 35         | ..        | ..     | ..    | Say 500   |
| Thence to Cokelin, "by a narrow gorge, hemmed in by steep and continuous cliffs" .. .. .              | 14         | 43·6      | 121·1  | 610   | 1110      |
| From Cokelin to the Great Slide ..                                                                    | 5          | 356·0     | 14·8   | 1780  | 2890      |
| From the Great Slide to the Precipice                                                                 | 11         | 86·3      | 61·2   | 950   | 3840      |
| Or, supposing it possible to equalise these grades (a thing next to impracticable), we should have .. | 30         | 111·3     | 47·4   | 3340  | ..        |

"After which the trail continues to rise gradually, the soil becoming shallow and meagre, the vegetation thinner and inferior, for 60 miles more, till it crosses the summit range at an altitude of 4360 feet."—(Lieut. Palmer's report.) And it then only enters

on good soil some 20 miles before crossing the Bute Inlet Trail at Benchee Lake ; whereas, along the latter line, the bunch grass peculiar to the country flourishes over thousands of acres.

Finally, the distance from Bute Inlet to the mouth of Quesnelle River is fully 25 miles less than by the Bentinck Arm Trail, and not much more than half that from New Westminster (222 against 393), besides having no portages or mountains ; thus presenting an open communication during the whole winter which exists on neither of the other routes ; and a diminution of nearly one half in the time and cost of conveyance, as compared with that by the Fraser. Lieut. Palmer, in his report, admits "the geographical advantages of the Bute Inlet route over the others."

Another item in favour of the Bute Inlet route is its great strategical security in case of any difficulties with our American neighbours. The Fraser River, from Fort Hope downwards, runs for 80 miles parallel to the boundary line, and at a distance varying from 6 to 12 miles from that frontier, whilst the only road from New Westminster to Hope and the interior has been constructed between them ; so that a detachment of a few hundred men could at almost any point intercept all communication, and literally starve out the whole colony. The Bute Inlet route, on the contrary, would be perfectly safe, and its approaches impregnable.

*General Features of the Ground over which the Railroad would pass from Bute Inlet to the Mouth of Quesnelle River.*—The valley of the Homathco River, which falls into Bute Inlet, presents a deep cut or fissure through the Cascade Mountains, varying from 3 miles to less than a quarter of a mile in width, is 84 miles in length, and rises imperceptibly to a height of 2400 feet or more above the sea, at the point where it enters on the plain beyond the mountains. For the first 31 miles, up to the *canyon*, or defile, the bed of the valley is composed of diluvial soil, consisting of a sandy clay or loam, and forming a hard dry bottom. The canyon itself is exactly  $1\frac{1}{2}$  mile in length. Beyond the canyon the valley again forms and opens for about 6 miles, the soil partaking of the nature of the rocks from which it is derived, and becoming more gravelly, and of a reddish cast. The river after this is again confined to a narrow bed, but the country is more open, and the road passes for 6 other miles near the river along the foot of the mountains, until the valley once more opens and recovers its flat level aspect, which it maintains up to the plain.

The mountainous region thus traversed is composed, for the first 40 miles, up to the neighbourhood of Tiedeman's Glacier, of brittle quartzose granite, hard to drill, but yielding easily to

the blast. The rock then becomes more feldspathic, and contains more hornblende, the former element decomposing into a reddish-white, greasy clay. This continues until a short distance below the First Lake, where the granite ceases, and is replaced for six or eight miles by a clay-slate of variegated colours, bearing the marks of igneous action. This slaty zone is supposed to be auriferous, and is in all probability a continuation of the Bridge River diggings. It is followed by beds of stratified granite, of apparently more modern origin, and which are intersected here and there for a short distance by veins of augitic rock, varying from 6 inches to 2 feet in thickness. The valley now opens more and more, till at a distance of 84 miles from the inlet the mountains cease abruptly, and the road enters on the plain beyond.

The rise in the valley, though apparently uniform, presents considerable variations. Thus, the *canyon* presents a rise in 30½ miles of only 860 feet above the sea. The river then becomes much more rapid, and gives for the next 13 miles an ascent probably of 780 feet, after which for 40 miles and up to Fifth Lake, the rise diminishes to 630 feet, beyond which there is a sharp ascent for a couple of miles more of, say, 150 feet, when the summit, or watershed, is attained.

We shall thus have the following gradients :—

|      | Feet. |    |     | Feet. |   |       |                         |
|------|-------|----|-----|-------|---|-------|-------------------------|
| Rise | 865   | in | 30½ | miles | = | 28·36 | per mile, or 1 in 186·2 |
| "    | 780   | "  | 13  | "     | = | 60·00 | " " 1 " 88·0            |
| "    | 630   | "  | 40  | "     | = | 15·75 | " " 1 " 335·2           |
| "    | 150   | "  | 2   | "     | = | 75·00 | " " 1 " 70·4            |

Total .. 2425

The above figures must of course be considered as only approximate.

The plain consists of a deep sedimentary soil, watered by numerous lakes and small streams, and varied by occasional elevations formed of sandstone belonging probably to the lower series of the chalk formation, and apparently owing their upheaval to plutonic action, which has hardened or calcined the rock. They form here and there conical elevations, varying from 500 to 800 feet in height. Such, for instance, are Mount Palmer, to the north of Benchee Lake, and several others that figure on my map. These elevations, and the low spurs or ranges of hills that accompany them, necessitate but few deviations from the straight line, and the plain in general offers every facility for the establishment of a railroad. Towards the mouth of the Quesnelle there is a gradual descent for some miles, but unattended by any difficulty; and at the terminus on the banks of the Fraser there exists a rich plateau of cultivatable soil.

*Agricultural Resources on the Line.*—The valley above described is in general heavily timbered, but studded, as aforesaid, with rich bottoms, capable of producing any kind of crops, and offering open spots for small farms. The plain itself (the only one in British Columbia of any extent) has been admired by all who have seen it, on account of its vast pasturages and park-like scenery. Its width, where it is crossed by the Bute Inlet trail, is about 120 miles, and it stretches from the neighbourhood of Lake Kamloops and the south-west end of the Great Quesnelle Lake across the Fraser, in a N.W. direction more than 300 miles to the Skeena, beyond which river it has not been explored. It contains millions of acres of good ground, and some of the best along the proposed route, where large tracts of land are sure to be taken up as soon as the first communications are established. Some objections have been made to its elevation, which averages about 2500 feet above the sea in the southern part, though gradually lowering towards the Skeena, where the climate in consequence becomes considerably milder. But this makes it none the less valuable for grazing purposes, which will be by far the most profitable branch of farming in the country when there are means of conveyance. At present, the cattle consumed in Cariboo are driven overland some 500 or 600 miles from Washington territory.

Cereals can also be cultivated with success, as is fully proved by the following list, showing some of the crops which were raised last season on the Fraser route, together with the corresponding latitudes and altitudes:—

|                | Lat. N. | Altitude. |                                                      |
|----------------|---------|-----------|------------------------------------------------------|
| Deep Creek ..  | 52°17'  | 2255      | 100 acres of oats.                                   |
| William's Lake | 52°12'  | 2135      | 200 „ oats, barley and wheat.                        |
| Cut off Valley | 51°10'  | 2973      | 200 „ oats, barley, potatoes,<br>and a little wheat. |
| Mt. Cornwall   | 51°00'  | 1508      | 70 „ oats, barley, and 300<br>bushels of wheat.      |

But the above localities are all to the east of the Fraser, and it must be borne in mind that as the isothermal lines approach the Pacific they extend diagonally towards the north, in the proportion of about 1° of latitude to 2° of longitude. Thus at Benchee Lake, on the Chilcoaten Plain, in the same latitude as William's Lake, and rather more elevated, but 2° more to the west, and therefore very probably identical in climate, I saw in the autumn of 1863 a small crop of oats, barley, and turnips, which Mr. Manning had raised on trial, and which had perfectly succeeded; whilst some potatoes, which had been placed in an exposed situation to the south, had been frost-bitten. The Indian horses pass the winter out of doors, without fodder or stabling—the best proof that the winters are not very severe.

The superiority of the Bute Inlet route (the only one which opens a communication available for a railroad with this magnificent plain) being thus proved, it remains to say a few words on the different passes which have been explored through the Rocky Mountains, on British territory, leaving out the Athabasca Pass by Peace River, in lat. 56° 28', as being too far north for present purposes:—

| NAMES OF THE PASSES.                                                                                                      | RIDGE OR DIVIDE. |            |           |
|---------------------------------------------------------------------------------------------------------------------------|------------------|------------|-----------|
|                                                                                                                           | Latitude.        | Longitude. | Altitude. |
|                                                                                                                           | Degrees.         | Degrees.   | Feet.     |
| 1. Yellow Head Pass, from the Athabasca to the Upper Fraser (Rae) .. .. .                                                 | 52·54            | 118·33     | 3760      |
| 2. Howse Pass, from Deer River, by Blaeberry River to the Upper Columbia .. .. .                                          | 51·57            | 117·07     | 6347      |
| 3. Kicking Horse Pass, by Bow River and Kicking Horse River, to the Upper Columbia (Sullivan) .. .. .                     | 51·16            | 116·32     | 5420      |
| 4. Vermillion Pass, from the South Saskatchewan, by Fort Bow (4100 feet), to the Kootanie (Hector) .. .. .                | 51·06            | 116·15     | 4947      |
| 5. Kananaskis Pass, from Fort Bow, by Pamsay River, to the Kootanie (with a short tunnel 4600 feet) (Palliser) .. .. .    | 50·45            | 115·31     | 5985      |
| 6. Crow's Nest Pass, by Crow River to the Kootanie .. .. .                                                                | 49·38            | 114·48     | ..        |
| 7. British Kootanie Pass, by Railway River to the Kootanie (Blakiston) .. .. .                                            | 49·27            | 114·57     | 5960      |
| 8. Red Stone Creek, or Boundary Pass, from Waterton River to the Kootanie (partly on American ground) (Blakiston) .. .. . | 49·06            | 114·14     | 6030      |

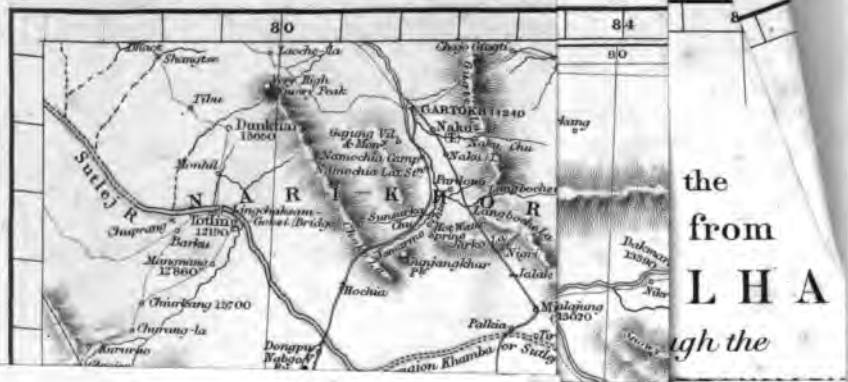
With the exception of the Yellow Head Pass in the above table, which is comparatively straight and short, and the three last, which are tolerably so, but too near the Boundary line to be available; the four others describe the most circuitous routes, among a labyrinth of glaciers, and mountains covered with perpetual snow. Besides which, the approach to them over the plain by the South Saskatchewan is for nearly 100 miles through an arid, sandy, treeless district, forming the northern limit of the great American Desert; instead of the rich fertile belt drained by the north branch, which is also the more considerable one of the two. And it is in the very latitude of this belt that the great barrier of the Rocky Mountains is cleft asunder, so that the road runs along this fertile zone in a direct line up to the lowest and easiest Pass, as to a natural gateway leading to the Pacific. But we have already seen that all the southern passes (and Captain Palliser wished it to be distinctly understood that he considered these as far from being the best that could be discovered) are intercepted further west by the Selkirk range, which presents an impenetrable barrier, and

renders them so far next to useless. When, therefore, we consider their relative altitude, their necessarily precipitous nature, and the great depth of snow (27 feet or more), under which they lie buried during eight months of the year, there can be no hesitation (and such, indeed, is now the general opinion) in regarding the Yellow Head Pass through the Rocky Mountains, with its easy gradients and low elevation, as the only feasible one for a railroad. But the same has been shown with respect to the Upper Fraser, and the Bute Inlet valley, through the Cascade range. It is therefore clearly demonstrated that these passes, which connect naturally with each other, offer the best and, indeed, the only really practicable line for a railway to the Pacific through British Columbia.

I shall conclude with a few lines on the urgency of a direct communication between the Canadas and the Pacific through British territory—a fact which is becoming every day more and more evident. In a political point of view, and as a natural consequence of the late confederation, it would contribute essentially to its prosperity; for so long as there is no Overland route, any communication with British Columbia must remain a myth and the Red River Settlement continue isolated, instead of becoming a valuable annex to the Union. At present England has no other communication with the Pacific but by New York and San Francisco: and in case of war with the United States the only possible postal line would be through her own territory across the Rocky Mountains; whereas by opening an overland communication immediately, a mail service would be established forthwith, not only to British Columbia and Vancouver Island, but before long to Australia and Asia. In the United States the Central Pacific Railroad passes over what is commonly called the great American Desert, a vast tract of country destitute of wood and water, dry, barren, and unfit for the habitation of man; yet in spite of this drawback, and though San Francisco possesses no coal for steamboat purposes, it is progressing rapidly, and the time is not far distant when it will be opened. Passengers, mails, and the lighter, costlier kinds of goods will pass over it; it is calculated to divert a great part of the trade of China and Japan from the Old to the New World, and if we do not wake up we shall bitterly regret the lost opportunity, and an important traffic, which might so easily pass over our own territory, and which, from our position, ought naturally to belong to us.

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**VOL. XXXVIII.**



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VII.—*Report of a Route-Survey made by PUNDIT \*—, from Nepal to Lhasa, and thence through the Upper Valley of the Brahmaputra to its Source.* By Captain T. G. MONTGOMERIE, R.E., of the Great Trigonometrical Survey, in charge of the Trans-Himalayan Survey Parties.

*Read, March 23, 1868.*

EXPLORATION beyond the frontiers of British India has, for many years, made but little comparative progress, and (as far as Europeans have been concerned) has been confined to points not many marches beyond the border.

A European, even if disguised, attracts attention when travelling among Asiatics, and his presence, if detected, is now-a-days often apt to lead to outrage. The difficulty of redressing such outrages, and various other causes, has, for the present, all but put a stop to exploration by Europeans. On the other hand, Asiatics, the subjects of the British Government, are known to travel freely without molestation in countries far beyond the British frontier; they constantly pass to and fro between India and Central Asia, and also between India and Tibet, for trading and other purposes, without exciting any suspicion.

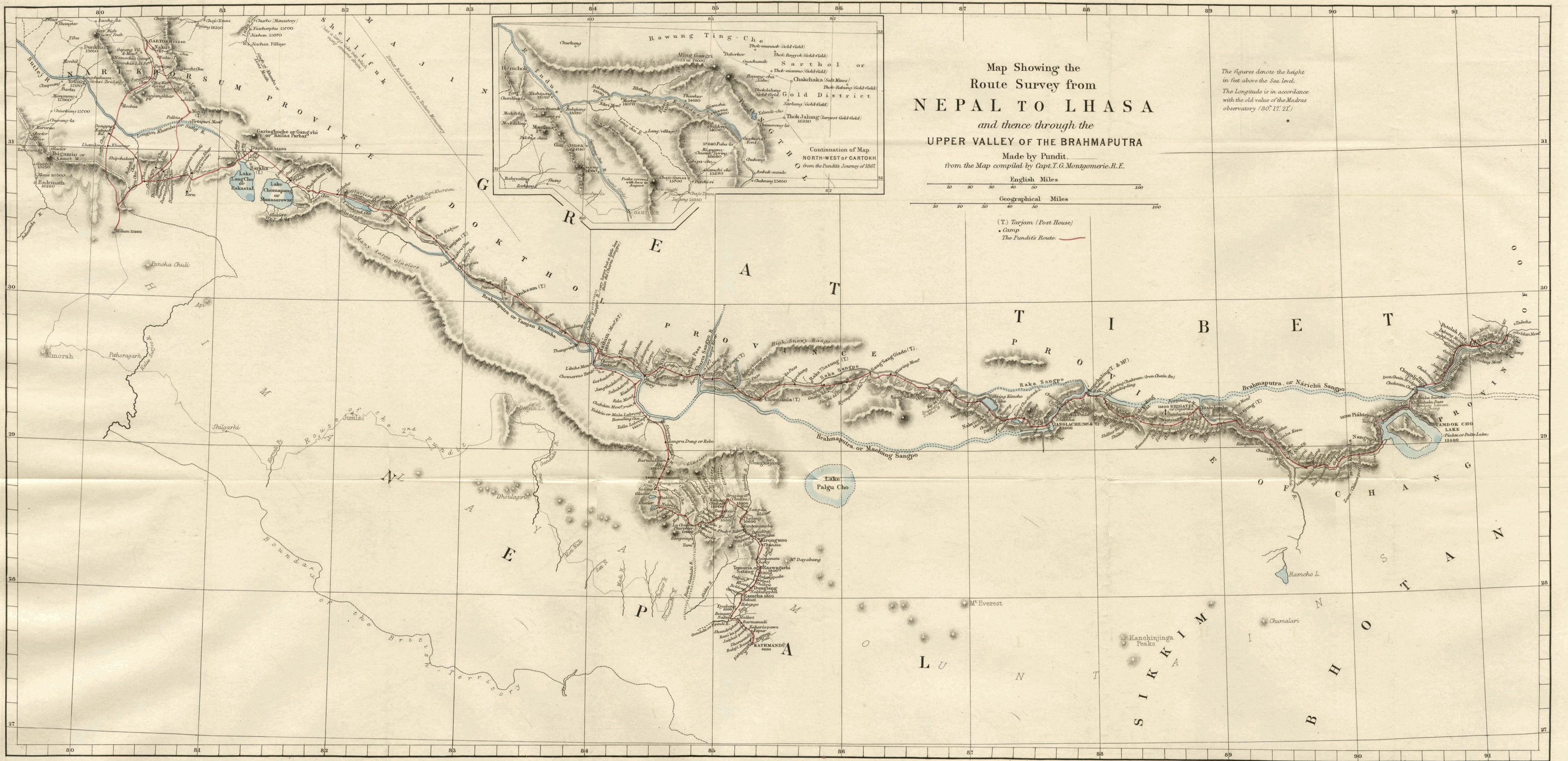
In 1861 it was consequently proposed to take advantage of this facility possessed by Asiatics, and to employ them on explorations beyond the frontier. The government of India approved of the project, and agreed to support it liberally.

With a view to carry out the above, Colonel Walker, the superintendent of the Great Trigonometrical Survey, engaged two Pundits, British subjects, from one of the upper valleys of the Himalayas. These men were recommended by Major Smyth, of the Educational Department, as likely to have great facility in travelling through various parts of Tibet, their countrymen having always been granted by the Chinese authorities the privilege of travelling and trading in Nari-Khorsum, the upper basin of the Sutlej. Such promising recruits having been secured, they were at once sent to the head-quarters of the Great Trigonometrical Survey, in order to be trained for Trans-Himalayan exploration.

On Colonel Walker's departure for England, these Pundits were put under Captain Montgomerie, who completed their training. They were found to be very intelligent, and rapidly learnt the use of the sextant, compass, &c., and before long recognized all the larger stars without any difficulty. Their

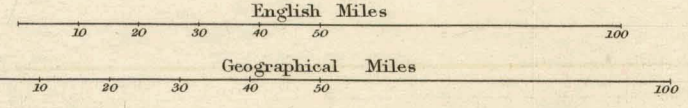
\* The two Pundits being still employed on explorations, their names are, for obvious reasons, omitted.





Map Showing the  
Route Survey from  
**NEPAL TO LHASA**  
and thence through the  
**UPPER VALLEY OF THE BRAHMAPUTRA**  
Made by Pundit  
from the Map compiled by Capt. T. G. Montgomerie, R.E.

The figures denote the height  
in feet above the Sea level.  
The Longitude is in accordance  
with the old value of the Madras  
observatory (80° 17' 21").



(T) Tarjam (Post House)  
• Camp  
The Pundit's Route.



work, from actual practice, having been found to be satisfactory, Captain Montgomerie directed them to make a route-survey from the Mansarowar lake to Lhasa, along the great road that was known to exist between Gartokh and Lhasa. From Lhasa they were directed to return by a more northerly route to Mansarowar. The route to Lhasa was selected by Captain Montgomerie, because it was known, from native information, to be practicable as far as the road itself was concerned. If explored it was likely to define the whole course of the great river known to flow from near the Mansarowar lake to beyond Lhasa. Hitherto the sole point on the upper course of this great river, the position of which was known with any certainty, was a point near Teshooloomboo, or Shigátze, as determined by Captain Turner in 1783. The position of Lhasa, the capital of Great Tibet, was, moreover, only a matter of guess, the most probable determination having been derived from native information as to the marches between Turner's Teshooloomboo and Lhasa. In fact the route from the Mansarowar lake to Lhasa, an estimated distance of 7 or 800 miles, was alone a capital field for exploration.

An attempt was made by the Pundits to advance direct from Kumaon, *viâ* Mansarowar to Lhasa, but they did not find it practicable. Whilst in Kumaon they came across some British subjects, Bhotiyas, who had been robbed whilst trading in the Chinese territories, near Gartokh. These Bhotiyas thought that, if the matter was properly represented, they might get redress from the Lhasa Government, and hearing that the Pundits were going to Lhasa, asked them to be their agents (*vakeels*), in order to recover what they could. The Pundits consented, and one of them returned to Captain Montgomerie for fresh instructions. The attempt by the Mansarowar lake having failed, it appeared to Captain Montgomerie that the best chance of reaching Lhasa would be through Nepal, as the Nepalese Government has always maintained relations of some kind with the Government of Lhasa. Traders from Nepal, moreover, were known to visit Lhasa, and Lhasa traders to visit Nepal.

Captain Montgomerie thought that the wish to recover money for the Bhotiyas of Kumaon would afford a plausible excuse for the Pundit's journey to Lhasa, an excuse the Nepalese would thoroughly understand, and he trusted the frequent intercourse with Lhasa would eventually afford the Pundits a good opportunity of travelling to that place in company with traders or others.

The Pundits were consequently ordered to go to Kathmandû, and from thence to try and make their way to the great road

between the Mansarowar and Lhasa. Their instrumental equipment consisted of two large sextants,\* two box sextants, prismatic and pocket compasses, thermometers for observing temperature of air and of boiling water, pocket chronometer, and common watch, with apparatus, the latter reduced as much as possible.

The Pundits started from Dehra, reached Moradabad on the 12th January, and Bareilly on the 23rd January, 1865. At Bareilly they took latitude observations, and commenced their route-survey. They crossed the Nepalese frontier at Nepalgunj, Jung Bahadur's new town, and from thence went by the Cheesaghurri road to Kathmandû, reaching the latter place on the 7th March, 1865.

In Kathmandû they made inquiries on all sides as to the best route to Lhasa; they found that the direct one by Kûti (or Nilum), across the Dingri plain (or Tingri Maidan, as it is called), was likely to be very difficult, if not impassable, owing to the snow at that early season (March, April). They consequently determined to try the route by Kirong, a small town in the Lhasa territory, as that route was said to be passable earlier than the Kûti route. Having made their arrangements, the Pundits started full of hope on the 20th March, 1865, accompanied by four men, whom they had hired as servants.

On the 26th they reached Medangpodo village, and here they changed their mode of dress to one better known to the people of Lhasa. They also gave out that they were Bisahiris,† and were going to buy horses, at the same time to do homage at the Lhasa shrine. The character of Bisahiris was assumed, because they knew that those people had from time immemorial been privileged to travel in the Lhasa territory without question. On the 28th March they reached the neighbourhood of Kirong, but, much to their disappointment, they were stopped by the Chinese officials, who questioned them as to the object of their journey, and searched their baggage. Fortunately the instruments (which had been ingeniously secreted in a false compartment of a box) escaped detection; but still, though nothing suspicious was seen, the plausible reasons given for the journey did not satisfy the jealousy of the Chinese authorities. In spite of everything urged, they were not allowed to pass until a reference had been made to the Kirong governor. The Kirong governor seems at once to have noted the weak points of their story, and having pointed them out with inexorable

\* Only one large sextant was taken to Lhasa.

† From the British valley of that name north-east of Simla.

logic, declined to let them pass on any consideration; they were therefore reluctantly forced to retrace their steps to Shabrû. At Shabrû the wily Pundit managed to persuade a high official that they were no impostors, and induced him, moreover, to certify that in a letter to the Kirong governor. Armed with this letter they returned towards Kirong with hopes of better luck, and no doubt, under ordinary circumstances, would have succeeded; but on the road they fortunately discovered that the Kirong governor was an individual who had known the Pundit's brother personally when he was chief of Taglakote near Mansarowar; his brother had in fact been frequently in close and friendly relations with him. This at once put a stop to all hopes of his advancing by the Kirong route, as the governor well knew he was no Bisahiri. The other Pundit thought of proceeding by himself, but, being able to devise no feasible method, he gave up the idea, and the party consequently marched back, reaching Kathmandû on the 10th April. Here they made fresh inquiries as to some more promising way of getting to Lhasa. At last they heard of two opportunities, the first by accompanying the camp of a new agent (vakeel) that Jung Bahadur was about to send to Lhasa, and the second by accompanying a Bhot merchant. In order to increase their chances of success, they decided that one should go with the Nepal agent, and the other with the merchant. The vakeel at first agreed to take one of them with him, but ultimately refused.

Failing with the vakeel, it was impossible for the Pundit, who was known to the Kirong governor, to go with the Bhot merchant, as he intended to take the Kirong route; he consequently decided to try a more circuitous route by Muktinâth, but in this he failed, owing, according to his own account, to loss of health and the unsafe state of the roads, but, no doubt, in a great measure due to his own want of determination. After a long journey through the upper parts of the Nepal territory, he returned to British territory. The account of his proceedings is referred to separately. The other Pundit, at first, was not much more successful with the merchant than his brother had been with the vakeel. The merchant, Dawa Nangal, promised to take the Pundit to Lhasa, and on the strength of that proceeded to borrow money from him. The merchant, however, put off starting from day to day, and eventually the Pundit had to start with one of the merchant's servants, the merchant himself promising to follow in a few days. The Pundit assumed the dress of a Ladâki, and, to complete his disguise, added a pig-tail to his head. This change was made, because he was afraid that the Kirong

officials, who stopped him the first time, might recognize him again.

Starting on the 3rd June with one servant and Dawa Nangal's man, he reached Shabrû on the 20th of June, having been delayed six days by a bad attack of fever. At Shabrû he was kindly received by Dawa Nangal's family, but Dawa Nangal himself never made his appearance, and it became evident that he did not intend to keep his promise. In his perplexity the Pundit appealed to Dawa Nangal's uncle, and told him how he had been treated. The uncle, a man of some authority, said he sympathized with him, and gave him a pass to Kirong, and a letter to Dawa Nangal's brother, who had just returned to Kirong from Lhasa. In the letter he mentioned that the Pundit's claim against Dawa Nangal was just, and, in consequence, requested him to arrange for the Pundit's journey to Lhasa, and, if necessary, to stand security for him.

Starting on the 6th July with one of the uncle's servants, the Pundit managed to make his way into Kirong. Here he found Dawa Nangal's brother, by name Chûng Chû. Chûng Chû, on hearing the state of the case, promised to assist the Pundit on to Lhasa, but refused to pay his brother's debt. Chûng Chû proved himself a better man than his brother, for, though permission to travel by the direct route was refused, he ultimately succeeded in getting the Pundit permission to travel onwards; by this means he reached Tadûm monastery, a well-known halting-place on the great road between Lhasa and Gartokh. Starting on the 13th August from Kirong, he reached Lue on the 23rd. From Kathmandû up to this point vegetation and jungle had been abundant, but, beyond, the mountains were throughout bare, and all but barren.

On the 24th August the Pundit joined a large trading party, travelling *viâ* Tadûm to Mansarowar, and was allowed to accompany them. On the 30th he reached Talla Labrong, and there first caught sight of the great river\* that flows towards Lhasa. His first acquaintance with this river was calculated to inspire him with respect for it, as three men were drowned in front of him by the swamping of a ferry boat. Alarmed by this occurrence the party marched a short distance farther up the river to a better ferry, by which they crossed in safety to the Tadûm monastery on the 6th of September. At Tadûm the Pundit feigned sickness, as a reason for not going on to Mansarowar, and he was accordingly left behind. Continuing to feign illness, he at last found an admirable opportunity of going to Lhasa, viz., by accompanying a Ladâk

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\* The Brahmaputra.

merchant in the employ of the Kashmir Maharaja, who was that year going to Lhasa, and was to pass through Tadúm. On the 2nd of October the merchant's head man, Chiring Nirpal, arrived, and on hearing the Pundit's story at once consented to take him on to Lhasa. Starting on the next morning with the Ladáki camp, he marched eastwards along the great road, reaching the town of Sarkajong on the 8th October. So far everything had gone smoothly, but here the inquiries made by the authorities rather alarmed the Pundit, and as his funds, owing to the great delays, had begun to run short, the two combined made him very uneasy. However, he manfully resolved to continue his journey. He became a great favourite with Chiring Nirpal and the whole of the Ladáki camp. On the 19th October they reached Ralang. From Tadúm to this point no cultivation was seen, but here there was a little, and a few willow trees, and onwards to Lhasa cultivation was met with nearly every day.

On the 22nd October the party reached the town of Jan-glache, with a fort and fine monastery on the Nárichú,\* the great river first met with near Talla Labrong. From this point people and goods are frequently transported by boats to Shigátze, 5 days march (85 miles) lower down the river. Most of the Pundit's companions went by boat, but he having to survey, count paces, &c., went by land. On the 29th October they reached Digarcha, or Shigátze, a large town on the Penan-angchú River near its junction with the great Nárichú River. At Shigátze Chirung Nirpal had to wait for his master, the head merchant, called Lopchak. The Pundit consequently remained in that town till the 22nd of December. The Lopchak, who arrived on the 16th November, saw no objection to the Pundit continuing with the party, and, moreover, promised to assist him at Lhasa. Whilst at Shigátze the Pundit and his companions remained in a large sort of caravanserai called Kunkhang. The only incident during their long stay there was a visit that he and the Ladákis paid to the great Tashilumbo monastery. This monastery lies about half-a-mile south-west of the city, and is the same as that visited and fully described by Turner. The Pundit would rather not have paid the Lama a visit, but he thought it imprudent to refuse, and therefore joined the Ladákis, who were going to pay their respects to him. The Pundit confesses that, though personally a follower of Brahma, the proposed visit rather frightened him, as, according to the religion of his ancestors, who were Budhists, the Lama ought to know the secrets of all hearts. However,

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\* The Brahmaputra River.

putting a bold face on the matter, he went, and was much relieved to find that the Lama, a boy of 11, only asked him three simple questions, and was, according to the Pundit, nothing more than an ordinary child, and did not evince any extra intelligence. At Shigátze the Pundit took to teaching Nepalese shopkeepers the Hindee method of calculation, and thereby earned a few rupees.

The great road, which had hitherto been more or less close to the great Nárichú River, from Shagátze goes considerably south of that river. On the 25th December they reached the large town of Gyangze, on the Penanangchú River, which was then frozen hard enough to bear men. Crossing the lofty Kharola mountains they arrived on the 31st December at Nang-ganche-jong, a village on the Yamdokcho Lake, with the usual fort on a small hill. For two days the Pundit coasted along the Great Yamdokcho Lake.\* On the second day he nearly fell a prey to a band of robbers, but, being on horseback,† he managed to escape, and on the 2nd January reached Demálang, a village at the northern angle of the lake. From Demálang the lake was seen to stretch some 20 miles to the south-east. The Pundit estimated the circumference of the lake to be 45 miles, but, as far as he saw, it was only 2 to 3 miles in width. He was informed that the lake encircled a large island, which rises into low rounded hills 2000 or 3000 feet above the surface of the lake. These hills were covered with grass up to the top. Between the hills and the margin of the lake several villages and a white monastery were visible on the island. The villagers keep up their communication with the mainland by means of boats. The Pundit was told that the lake had no outlet, but as he says its water was perfectly fresh, that is probably a mistake; if so, the Pundit thinks the outlet may be on the eastern side, where the mountains appeared to be not quite so high as those on the other sides. The evidence as to the lake encircling a very large island is unanimous. Almost all former maps, whether derived from the Chinese maps made by the Lamas, or from native information collected in Hindustan, agree in giving the island a very large area, as compared with the lake in which it stands. This is, however, a very curious topographical feature, and as no similar case is known to exist elsewhere, it might perhaps be rash to take it for granted until some reliable person has actually made the circuit of the lake. Meantime the Pundit's survey goes a considerable way to confirm the

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\* The margin of the lake was frozen.

† With reference to this, the Pundit on being questioned said that the paces of this portion, and of one or two other parts, were counted on his return journey.



received theory. The lake, from the Pundit's observations, appears to be about 13,500 feet above the sea; it contains quantities of fish. The water was very clear, and said to be very deep.

The island in the centre must rise to 16,000 feet above the sea, an altitude at which coarse grass is found in most parts of Tibet.

From the basin of the Yamdokcho Lake the party crossed over the Khambala mountains by a high pass, reaching the great Nárichú (the Brahmaputra) at Khambabarche; from thence they descended the river in boats to Chusul village. Near Chusul they again left the great river, and ascending its tributary, the Kichu Sangpo or Lhasa River, in a north-easterly direction reached Lhasa on the 10th of January, 1866.

The Pundit took up his abode in a sort of caravanserai with a very long name, belonging to the Tashilumbo monastery; he hired two rooms that he thought well suited for taking observations of stars, &c., without being noticed. Here he remained till the 21st of April, 1866. On one occasion he paid a visit to the Goldan monastery, two marches up the great road to China, which runs from Lhasa in a north-easterly direction. He also attempted to go down the Brahmaputra, but was told that it was impossible without a well-armed party of a dozen at least. His funds being low, he was obliged to give up the idea, and indeed, judging from all accounts, doubted if he could have done it with funds. The Pundit's account of the city of Lhasa agrees, in the main, with what has been written in Messrs. Huc and Gabet's book as to that extraordinary capital, which the Pundit found to be about 11,400 feet above the sea. He particularly dwells upon the great number, size, and magnificence of the various monasteries, and the vast number of monks, &c., serving in them.

He had an interview with the Grand Lama, whom he describes as a fair and handsome boy of thirteen years of age. The Lama was seated on a throne 6 feet high, and on a lower throne to his right was seated his chief minister, the Gyalbo\* or Potolah Raja, as he is called by the Newár people. The Gyalbo is evidently the actual ruler of Lhasa, under the Chinese ambán or resident, the Grand Lama being a puppet in the hands of the Gyalbos.

It is curious that the few times these Great Lamas have been seen by reliable people, they have been always found to be small boys, or fair, effeminate-looking young men. Moorcroft remarks on the emasculated appearance given to them in all

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\* Or Gyalpo.

the pictures of them that he saw during his journey to Gartokh, and the same may be remarked on the pictures of Lamas in the monasteries of Ladak. M. Huc says that the Delai Lama at Lhasa, during their visit in 1846, was nine years of age, and had been Grand Lama for only six years, so that he must have transmigrated once, at any rate, between that time and the Pundit's visit in 1866, possibly oftener, as M. Huc says that, during the time one Nomekhan or Gyalbo was in office, "three successive Delai Lamas had died very soon after reaching the age of majority." Turner found the Grand Tashilumbo Lama quite a child in 1783. From the above it would appear that the poor Lamas are made to go through their transigrations very rapidly, the intervals being probably in inverse proportion to the amount of trouble they give to the Gyalbo. If the Pundit is right in saying that the Lamas are only allowed to transmigrate thirteen times, and the present Delai Lama is in his thirteenth body, some changes may be expected before very long in the Lhasa Government. The Pundit gives a very curious account of the festival observed at Lhasa on and after their new year's day.

Having been so long away, the Pundit's funds had arrived at a very low ebb, and he was obliged to make his livelihood by teaching Nepalese merchants the Hindee method of accounts. By this means he got a little more money, but the merchants, not being quite so liberal as those of Shigátze, chiefly remunerated him by small presents of butter and food, on which he managed to subsist. During his stay in Lhasa the Pundit seems to have been unmolested, and his account of himself was only once called in question. On that occasion two Mahomedans of Kashmiri descent managed to penetrate his disguise, and made him confess his secret. However they kept it faithfully, and assisted the poor Pundit with a small loan, on the security of his watch. On another occasion the Pundit was surprised to see the Kirong governor in the streets of Lhasa. This was the same official that had made so much difficulty about letting him pass Kirong; and as the Pundit had (through Chúngh Chú) agreed to forfeit his life if, after passing Kirong, he went to Lhasa, his alarm may easily be imagined. Just about the same time the Pundit saw the summary way in which treachery was dealt with in Lhasa: A Chinaman, who had raised a quarrel between two monasteries, was taken out and beheaded without the slightest compunction. All these things combined alarmed the Pundit so much that he changed his residence, and from that time seldom appeared in public.

Early in April the Pundit heard that his Ladáki friends were about to return to Ládak with the tea, &c., that they had pur-

chased. He forthwith waited on the Lopchak, and was, much to his delight, not only allowed to return with him, but was told that he would be well cared for, and his expenses paid *en route*, and that they need not be repaid till he reached Mansarowar. The Pundit, in fact, was a favourite with all who came in contact with him.

On the 21st April he left Lhasa with the Ladáki party, and marching back by the great road as before, reached Tádúm monastery on the 1st of June.

From Tádúm he followed the great road to Mansarowar, passing over a very elevated tract of country from 14,000 to 16,000 feet above the sea, inhabited solely by nomadic people, who possess large flocks and herds of sheep, goats, and yaks. On the road his servant fell ill, but his Ladáki companions assisted him in his work, and he was able to carry it on. Crossing the Mariam-La mountains, the watershed between the Brahmaputra and the Sutlej, he reached Darchan, between the Mansarowar and the Rakas Tâl, on the 17th of June. Here he met a trader from British territory who knew him, and at once enabled him to pay all his debts, except the loan on his watch, which was in the hands of one of the Ladákis. He asked his friends to leave the watch at Gartokh till he redeemed it.

At Darchan the Pundit and his Ladáki companions parted with mutual regret, the Ladákis going north towards Gartokh, and the Pundit marching towards the nearest pass to the British territory, accompanied by two sons of the man who had paid his debts.

The Pundit's servant, a faithful man from Záskar in Ladák, who had stuck to him throughout the journey, being ill, remained behind. He answered as a sort of security for the Pundit, who promised to send for him, and at the same time to pay all the money that had been advanced. Leaving Darchan on the 20th June, the Pundit reached Thájung on the 23rd, and here he was much astonished to find even the low hills covered with snow in a way he had never seen before. The fact being that he was approaching the outer Himalayan chain, and the ground he was on (though lower than much of the country he had crossed earlier in the season) was close enough to the outer range to get the full benefit of the moisture from the Hindustan side. The snow rendered the route he meant to take impracticable, and he had to make a great detour. After an adventure with the Bhotiyas, from whom he escaped with difficulty, he finally crossed the Himalayan range on the 26th June, and thence descended into British territory after an absence of eighteen months. As soon after his arrival as possible, the Pundit sent back two men to Darchan, with money

to pay his debts, and directions to bring back his servant. This was done, and the servant arrived all safe, and in good health.

The Pundit met his brother, who failing to make his way to Lhasa, had returned by a lower road through the Nepalese territory. This brother had been told to penetrate into Tibet, and, if possible, to assist the Pundit. The snow had however prevented him from starting. He was now, at the Pundit's request, sent to Gartokh to redeem the watch, and to carry on a route-survey to that place. The Pundit handed over his sextant, and told him to connect his route with the point where the Bhotiyas had made the Pundit leave off. The brother succeeded in reaching Gartokh, redeemed the watch, and after making a route-survey from the British territories to Gartokh and back, he rejoined the Pundit, and they both reached the Head-Quarters of the Survey on the 27th of October, 1866.

During the regular survey of Ladák, Captain Montgomerie had noticed that the Tibetans always made use of the rosary and prayer-wheel,\* he consequently recommended the Pundit to carry both with him, partly because the character of a Buddhist was the most appropriate to assume in Tibet, but still more, because it was thought that these ritualistic instruments would (with a little adaptation) form very useful adjuncts in carrying on the route-survey.

It was necessary that the Pundit should be able to take his compass bearings unobserved, and also that, when counting his paces, he should not be interrupted by having to answer questions. The Pundit found the best way of effecting those objects was to march separate with his servant either behind or in front of the rest of the camp. It was of course not always possible to effect this, nor could strangers be altogether avoided. Whenever people did come up to the Pundit, the sight of his prayer-wheel was generally sufficient to prevent them from addressing him. When he saw any one approaching, he at once began to whirl his prayer-wheel round, and as all good Buddhists whilst doing that are supposed to be absorbed in religious contemplation, he was very seldom interrupted.

The prayer-wheel consists of a hollow cylindrical copper box, which revolves round a spindle, one end of which forms the handle. The cylinder is turned by means of a piece of copper attached by a string. A slight twist of the hand makes the cylinder revolve, and each revolution represents one repetition of the prayer, which is written on a scroll kept inside the cylinder.† The prayer-wheels are of all sizes, from that of a

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\* The *mani-chuskor*, or prayer-wheel.

† This prayer is sometimes engraved on the exterior of the wheel.

large barrel downwards; but those carried in the hand are generally 4 or 6 inches in height by about 3 inches in diameter, with a handle projecting about 4 inches below the bottom of the cylinder. The one used by the Pundit was an ordinary hand one, but instead of carrying a paper scroll with the usual Buddhist prayer "Om mani padmi hom," the cylinder had inside it long slips of paper, for the purpose of recording the bearings and number of paces, &c. The top of the cylinder was made loose enough to allow the paper to be taken out when required.

The rosary, which ought to have 108 beads, was made of 100 beads, every tenth bead being much larger than the others. The small beads were made of a red composition to imitate coral, the large ones of the dark corrugated seed of the udrâs. The rosary was carried in the left sleeve; at every hundredth pace a bead was dropped, and each large bead dropped, consequently, represented 1000 paces. With his prayer-wheel\* and rosary the Pundit always managed in one way or another to take his bearings and to count his paces.

The latitude observations were a greater difficulty than the route-survey. The Pundit required to observe unseen by any one except his servant; however, with his assistance, and by means of various pretences, the Pundit did manage to observe at thirty-one different places. His observations for latitude were all taken with a large sextant, by Elliot, of 6-inch radius, reading to ten seconds. The Pundit was supplied with a dark glass artificial horizon, but Captain Montgomerie finding that it was far from satisfactory, ordered the Pundit not to use it, unless he found it impossible to use quicksilver. A shallow wooden trough with a spout was made for the quicksilver, but as anything in the shape of a glass cover could not be carried, the Pundit was directed to protect his quicksilver from the wind as he best could, by sinking it in the ground, &c. The Pundit had invested in a wooden bowl,† such as is carried at the waist by all Bhotiyas. This bowl is used by the Bhotiyas for drinking purposes; in it they put their water, tea, broth, and spirits, and in it they make their stirabout with dry flour and water, when they see no chance of getting anything better. The Pundit, in addition, found this bowl answer capitally for

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\* The Pundit found this prayer-wheel free of all examination by custom-house or other officials. In order to take full advantage of this immunity, several copper prayer-wheels have been made up in the G. T. S. workshop, fitted for compasses, &c.; these will be described hereafter.

† The Tibetans are very curious as to these drinking bowls or cups; they are made by hollowing out a piece of hard wood, those made from knots of trees being more especially valued. A good bowl is often bound with silver. The wood from which they are made does not grow in Tibet, and the cups consequently sell for large amounts.

his quicksilver, as its deep sides prevented the wind from acting readily on the surface. Quicksilver is a difficult thing to carry, but the Pundit managed to carry his safely nearly all the way to Lhasa, by putting some into a cocoa-nut, and by carrying a reserve in cowrie shells closed with wax. At Piáhtejong however the whole of his quicksilver escaped by some accident; fortunately he was not far from Lhasa, where he was able to purchase more. The whole of his altitudes were taken with the quicksilver.

Reading the sextant at night without exciting remark was by no means easy. At first a common bull's-eye lantern answered capially, but it was seen and admired by some of the curious officials at the Tadúm monastery, and the Pundit, who said he had brought it for sale, was forced to part with it, in order to avoid suspicion. From Tadúm onwards a common oil wick was the only thing to be got. The wind often prevented the use of it, and, as it was difficult to hide, the Pundit was at some of the smaller places obliged to take his night observation, and then put his instrument carefully by, and not read it till the next morning; but at most places, including all the more important ones, he was able to read his instrument immediately after taking his observations.

The results of the expedition delivered at the Head-Quarters consist of—

*1st.*—A great number of meridian altitudes of the sun and stars, taken for latitude at thirty-one different points, including a number of observations at Lhasa, Tashilumbo, and other important places.

*2nd.*—An elaborate route-survey, extending over 1200 miles, defining the road from Kathmandú to Tadúm, and the whole of the Great Tibetan road from Lhasa to Gartokh, fixing generally the whole course of the great Brahmaputra River from its source near Mansarowar to the point where it is joined by the stream on which Lhasa stands.

*3rd.*—Observations of the temperature of the air and boiling water, by which the height of thirty-three points have been determined, also a still greater number of observations of temperature, taken at Shigátze, Lhasa, &c., giving some idea of the climate of those places.

*4th.*—Notes as to what was seen, and as to the information gathered during the expedition.

The latitude observations were taken with a large sextant of 6-inch radius, and have been reduced in the Great Trigonometrical Survey Computing Office. There is no doubt but that the Pundit is a most excellent and trustworthy observer. In order to see this, it is only necessary to look at the accompany-

ing list, *vide* Appendix. At any one point the results deduced from a variety of stars differ *inter se* so very little, that it is not too much to say that the mean must be true within a limit of a minute.

The merits of the route-survey are more difficult to decide upon, but the means of testing the work are not wanting. The bearings from point to point were observed with a compass, and the number of paces between were counted. From the bearings and number of paces there was no difficulty in computing the latitude and departure in paces, or the number of paces that the route had advanced in latitude, and also in longitude. In order to determine the value of the pace, there was first the latitudes derived from the astronomical observations determined during the route-survey, and second the latitudes and longitudes of Kathmandû, of the Mansarowar Lake, of places in Kumaon, and, lastly, the longitudes which Turner determined by his route-survey running nearly due north from the Chumulâri Peak. Turner's route forms a most important check upon the Pundit's work, and prevents any accumulation of error which might occur in a route-survey carried over such a great space as 9 degrees of longitude. As far as the longitudes are concerned, that of Kathmandû, which has hitherto been accepted as approximately correct, was not found to be quite in accordance with the data forthcoming. It was consequently necessary to re-determine the longitude.

Colonel Crawford's Trigonometrical Survey and map undoubtedly still supply the most reliable data available as to the position of Kathmandû, though his observations were made as far back as the year 1802.

No member of the Great Trigonometrical Survey of India has hitherto been allowed to use a surveying instrument in Nepal, but, by means of stations in British territory, a number of peaks have been accurately determined to the north of the Nepal valley. Several of these peaks have fortunately proved to be identical with those determined by Crawford.

Crawford's Mount Daibun, or L, corresponding with G. T. S. No. XXV.

" D " " XXI.

" C " " XX.

" B " " XVIII.

Now, on page 264 of London edition of vol. xii. of the 'Asiatic Researches,' Crawford's distance of

Mount Daibun (or XXV. G. T. S.) from Kathmandû is given as 35½ geo. miles,

|          |                |   |   |    |   |
|----------|----------------|---|---|----|---|
| Do. of D | (or XXI. " )   | " | " | 48 | " |
| " C      | (or XX. " )    | " | " | 59 | " |
| " B      | (or XVIII. " ) | " | " | 68 | " |

Taking the Great Trigonometrical Survey positions of the above points, we find that the distances given above intersect in

points varying in longitude from  $85^{\circ} 16\frac{1}{2}'$  to  $85^{\circ} 19'$ , and varying in latitude from  $27^{\circ} 42'$  to  $27^{\circ} 43'$ . According to Crawford's map\* the Daibun peak lies  $25^{\circ}$  E. of north from Kathmandû; that bearing with the distance given above, viz.,  $35\frac{7}{8}$  geographical miles, would put Kathmandû in latitude  $27^{\circ} 43'$ , longitude  $85^{\circ} 16\frac{1}{2}'$ . Crawford's latitude of Kathmandû by astronomical observations† is  $27^{\circ} 42'$ . From the above it has been concluded that Kathmandû is in N. lat.  $27^{\circ} 42\frac{1}{2}'$ , and E. long.  $85^{\circ} 17' 45''$ .

It is greatly to be regretted that the Messrs. Schlagintweit did not finally determine the longitude of Kathmandû in 1857, when they received permission to use their instruments in the Nepal valley. The longitude might have been determined with indisputable accuracy by the simple expedient of observing the azimuth of one or more of the Great Trigonometrical Survey peaks north of Kathmandû. The Messrs. Schlagintweit state that they saw these peaks, and recognised them as those fixed by the Great Trigonometrical Survey; it is consequently all the more difficult to imagine why this great opportunity was lost. Their longitude of Kathmandû was determined by a chronometer, but as the time depends upon a single day's set of altitudes taken too near to the meridian, it cannot be accepted as conclusive, but, as far as their observations can be relied on, they tend to confirm the longitude‡ adopted above, viz.,  $85^{\circ} 17' 45''$ .

The longitudes of the points in Kumaon have been derived from the Stracheys' map§, and are known from the adjacent Great Trigonometrical Survey peaks to be correct within a very small limit. The longitude of Gyangze-jong (or Jhansû-jong) has been taken from Turner's survey of the road from Bhootan to Tibet, made in 1783. Turner's longitude of the Chumulárlí peak is  $89^{\circ} 18'$ , the Great Trigonometrical Survey longitude being  $89^{\circ} 18' 43''$ . This coincidence no doubt is fortuitous, as there is an error of  $11'$  in the longitude of the origin of his survey; however it may have happened, Turner's longitudes up to Chumulárlí seem to be correct, for Captain Godwin-Austen, whilst surveying in Bhootan, ascertained that the village of Phárlí, close to the Chumulárlí, is very nearly in the longitude ascribed to it by Turner. Turner moreover puts Tassísudon in longitude  $89^{\circ} 41'$ , and Captain Austen in  $89^{\circ} 40'$ .

It may consequently be assumed that the longitude of

\* A MS. map in the G. T. Survey Office.

† See p. 255, vol. xii., 'Asiatic Researches,' London edit.

‡ The Schlagintweit's longitude of Kathmandû, in terms of the G. T. Survey, is  $85^{\circ} 15' 34''$ .

§ Compiled in the Surveyor General's Office, Calcutta, April, 1850.



Turner's route near the Chumulári peak is nearly correct. From the neighbourhood of the Chumulári to Jhansú-jong, Turner's route runs nearly due north, and therefore any error in his estimate of distances would have a very small effect on the longitude. This is fortunate, as it is not known how Turner measured his distances, though he specially states that he took bearings with a compass. The distance between Chumulári and Jhansú-jong is only about 80 miles, and as the bearing is so northerly (viz.,  $20^{\circ}$  E. of N.), it may be concluded that any error in the distance has had but small effect on the longitude. The longitude of Gyangze has therefore been assumed from Turner to be  $89^{\circ} 31'$ . Turner observed the latitude at Tashilumbo (Shigátze), and made it  $29^{\circ} 4' 20''$ , the Pundit makes it  $29^{\circ} 16' 32''$ . Turner's latitude of Chumulári is  $28^{\circ} 5'$ , the Great Trigonometrical Survey latitude is  $27^{\circ} 50'$ . Turner very possibly was not accustomed to take latitudes, and as the Surveyor (Lieutenant S. Davis) sent with him was not allowed to go beyond Tassisudon, it is not to be wondered that there are differences in his latitudes. The comparison of several latitudes now well-known, tend to show that the semi-diameter of the sun may have been omitted by Turner, as his observations were to the sun only.

The Pundit's observations at Shigátze extend over many days, and include thirteen observations to the sun and a variety of southern stars, as well as to the pole star. The latitudes derived from these observations agree capitally *inter se*. The Pundit was thoroughly practised in the method of taking latitudes, and as his determinations of many well-known points, such as Bareilly, Moradabad, &c., have proved to be correct with only a pair of observations, there can be no doubt about accepting his latitude of Shigátze, where he took so many. The Pundit followed the same river as Turner for 50 miles between Gyangze and Shigátze. They agree in making the bearing between those places  $62^{\circ}$  west of north. The bends of the river as given by them agree in a general way, but the distance by Turner is 39 miles, and by the Pundit 46 miles. As the former appears to have only estimated his distances by guess, while the latter paced them carefully, the result by the Pundit has been adopted as the most correct.

In a route-survey, where bearings, distances, and latitudes only are available, it is obvious that a route running meridionally is the most easily checked. Unfortunately in this route-survey the only part that runs very favourably is that from Kathmandú to Tadúm, where there is a difference of latitude of  $118'$  to a difference of longitude of only  $75'$ . The length of the pace derived from the difference of latitude is 2.6074 feet,

or 31 inches. The remainder of the route from the Mansarowar to Gyangze runs so nearly east and west that the differences of latitudes between the various points are too small to give a reliable value for the pace, but, as far as they go, these differences indicate a longer pace than that derived from Kathmandû to Tadûm. The direction of the route not being favourable for determining the pace from the latitudes, recourse has been had to the known differences of longitude between Kumaon, Kathmandû, and Gyangze, derived as above. The difference of longitude between Kathmandû and Kumaon makes the length of the Pundit's 2.53 feet, or 30 inches. The difference between Kathmandû and Gyangze makes the length of the Pundit's pace to be 2.75 feet, or 33 inches.

The route between Kathmandû and Kumaon taken by the Pundit is the worst part of the whole of his route. It crosses the Himalayas twice, and also several high passes, and the road on the Cis-Himalayan side is particularly rough and rocky, with great ascents and descents. It was consequently to be expected that his pace would be somewhat shorter than on the route between Tadûm and Gyangze, which runs the whole distance by the easiest slopes possible, without crossing a single steep pass. The Pundit's pace, as derived from his own difference of latitude between Kathmandû and Tadûm, is 2.61 feet, or 31 inches. If this pace were adopted between Kathmandû and Kumaon, the difference of longitude between the two would be only 13' larger than the assumed difference, or in 320' (5° 20') only a discrepancy at the rate of 4 per cent. If this same pace were used between Tadûm and Gyangze the difference of longitude would be 17' less than the assumed difference, viz., 328' (5° 28'), or a discrepancy at the rate of only 5 per cent.

The two lengths of the pace, derived from the difference of longitude, agreeing so closely with that derived from the Pundit's difference of latitude between Nepal and Tadûm, the one being slightly shorter in the roughest ground, and the other slightly longer in the easiest ground, it seems reasonable to conclude that the lengths of pace derived from the longitudes are quite in accordance with all that is known of the route. The Pundit was practised to walk 2000 paces in a mile, or say a pace of 31½ inches, and he has certainly adhered very closely to it. From Gyangze to Lhasa the road is very similar to that between Tadûm and Gyangze, and the same value of pace, viz., 2.74\* has been used. This gives a difference of longitude of

\* The direction of the road between Piahtejong and Lhasa is rather more favourable for making use of the Pundit's latitudes. If used they would give a pace of 2.86 feet, a proof that the pace was longer than between Tadûm and Kathmandû. This pace would put Lhasa in longitude 91° 3' 36".

1° 28' 7". The Pundit's latitude of Lhasa is derived from twenty separate observations to the sun and stars. It is probably within half a minute of the correct value. From the above it is concluded that Lhasa is in north latitude 29° 39' 17", and east longitude 90° 59' 43".

Between the Mansarowar lake and Lhasa the Pundit travelled by the great road called the Jong-lam\* (or Whor-lam), by means of which the Chinese officials keep up their communications for 800 miles along the top of the Himalayan range from Lhasa, north of Assam, to Gartokh, north-east of Simla. A separate memorandum is given hereafter as to the stages, &c., on this extraordinary road. Starting from Gartokh on the Indus, at 15,500 feet above the sea, the road crosses the Kailas range by a very high pass, descends to about 15,000 feet in Narí Khorsum, the upper basin of the Sutlej, and then coasting along the Rakas Tál, the Mansarowar, and another long lake, rises gradually to the Mariham-la pass, the watershed between the Sutlej and Brahmaputra, 15,500 feet above the sea. From the Mariham-la the road descends gradually, following close to the north of the main source of the Brahmaputra, and within sight of the gigantic glaciers, which give rise to that great river. At about 50 miles from its source the road is for the first time actually on the river, but from that point to Tadúm it adheres very closely to the left bank. Just before reaching Tadúm the road crosses a great tributary, little inferior to the main river itself. The Tadúm monastery is about 14,200 feet above the sea.

From Tadúm, the road follows down the Brahmaputra, sometimes close to it, sometimes several miles from it, but at 80 miles east of Tadúm the road leaves the river, and crossing some higher ground, descends into the valley of the Raka Sangpo river, which is a great tributary of the Brahmaputra; leaving the Rakas valley, the road crosses over the mountains, and again reaches the Brahmaputra at about 180 miles below Tadúm. About 10 miles lower the road changes from the left bank to the right bank, travellers having to cross the great river by ferry-boats near the town of Janglache. Below Janglache, the road follows the river closely to a little below its junction with the Raka Sangpo. From that point the road runs some 10 miles south of the river, crossing the mountains to the large town of Shigátze, 11,800 feet above the sea. From Shigátze the road runs considerably south of the river, it ascends the Penanangchú river, and crossing the Kharola pass, 17,000 feet above the sea, descends into the basin of the Yamdokcho lake.

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\* Lam means road in the Tibetan language.

For two long stages the road runs along this great lake, which is 13,700 feet above the sea, then rising sharply, crosses the lofty Khamba-la pass, and descends to the Brahmaputra again, now only 11,400 feet above the sea. Following the great river for one stage more, the road (which has hitherto been running from west to east) here leaves the Brahmaputra, and ascends its tributary, the Kichu Sangpo, in a north-easterly direction for three stages more to Lhasa, which is 11,700 feet above the sea. The total distance is about 800 miles from Gartokh to Lhasa.

This long line of road is generally well-defined, though it is not a made road, in the European sense of the word. The natural slopes over which the road is carried are however wonderfully easy. The Tibetans have, as a rule, simply had to clear away the loose stones, and only in three or four places, for a few miles, has anything in the way of making a road been necessary.

In many parts there appears to have been considerable danger of losing the road in the open stretches of the table-land, the whole surface looking very much like a road; but this danger is guarded against by the frequent erection of piles of stones, surmounted with flags on sticks, &c. These piles, called lapcha by the Tibetans, were found exceedingly handy for the survey; the quick eye of the Pundit generally caught the forward pile, and even if he did not, he was sure to see the one behind, and in this way generally secured a capital object on which to take his compass bearings. The Tibetans look upon these piles partly as guide posts, and partly as objects of veneration; travellers generally contribute a stone to them as they pass, or if very devout and generous, add a piece of rag; consequently, on a well-used road, these piles grow to a great size, and form conspicuous objects in the landscape. Over the table-land the road is broad and wide enough to allow several travellers to go abreast; in the rougher portions the road generally consists of two or three narrow paths, the width worn by horses, yaks, men, &c., following one another. In two or three places these dwindle down to a single track, but are always passable by a horseman, and, indeed, only in one place, near Puncholing, is there any difficulty about laden animals. A man on horseback need never dismount between Lhasa and Gartokh, except to cross the rivers.

The road is, in fact, a wonderfully well-maintained one, considering the very elevated and desolate mountains over which it is carried. Between Lhasa and Gartokh there are 22 staging places, called Tarjums, where the baggage animals are changed. These Tarjums are from 20 to 70 miles apart; at each, shelter

is to be had, and efficient arrangements are organised for forwarding officials and messengers. The Tarjums generally consist of a house, or houses, made with sun-dried bricks. The larger Tarjums are capable of holding 150 to 200 men at a time, but some of the smaller can only hold a dozen people; in the latter case, further accommodation is provided by tents. At six Tarjums tents only are forthcoming. Each Tarjum is in charge of an official, called Tarjumpá, who is obliged to have horses, yaks, and coolies in attendance whenever notice is received of the approach of a Lhasa official. From ten to fifteen horses, and as many men, are always in attendance night and day. Horses and beasts of burden (yaks in the higher ground, donkeys in the lower) are forthcoming in great numbers when required; they are supplied by the nomadic tribes, whose camps are pitched near the halting houses.

Though the iron rule of the Lhasa authorities keeps this high road in order, the difficulties and hardships of the Pundit's march along it cannot be fully realized, without bearing in mind the great elevation at which the road is carried. Between the Mansarowar lake and the Tadúm monastery the average height of the road above the sea must be over 15,000 feet, or about the height of Mont Blanc. Between Tadúm and Lhasa its average height is 13,500 feet; and only for one stage does the road descend so low as 11,000 feet, whilst on several passes it rises to more than 16,000 feet above the sea. Ordinary travellers with laden animals make two to five marches between the staging-houses, and only special messengers go from one staging-house to another without halting. Between the staging-houses the Pundit had to sleep in a rude tent that freely admitted the biting Tibetan wind, and on some occasions he had to sleep in the open air.

Bearing in mind that the greater part of this march was made in mid-winter, it will be allowed that the Pundit has performed a feat of which a native of Hindustan, or of any other country, may well be proud. Notwithstanding the desolate track they crossed, the camp was not altogether without creature comforts. The yaks and donkeys carried a good supply of ordinary necessaries, such as grain, barley-meal, tea, butter, &c., and sheep and goats were generally procurable at the halting places. A never failing supply of fuel, though not of the pleasanter kind, was generally forthcoming from the argols or dried dung of the baggage animals, each camp being supposed to leave behind at least as many argols as it burns. At most of the halting places there is generally a very large accumulation.

Between the Mansarowar and Sarkájong nothing in the shape of spirits was to be had, but to the eastward of the latter

place a liquor made from barley could generally be got in every village. This liquor, called chung, varies in strength, according to the season of the year, being in summer something like sour beer, and in the winter approximating closely in taste and strength to the strongest of smoked whiskey. The good-natured Tibetans are constantly brewing chung, and they never begrudge anyone a drink. Thirsty travellers, on reaching a village, soon find out where a fresh brew has been made; their drinking cups are always handy in their belts, and they seldom fail to get them filled at least once. The Pundit stoutly denied that this custom tended to drunkenness among his Tibetan friends; and it must be allowed that in Ladák, where the same custom prevails, the people never appeared to be much the worse for it; guides had however to be rather closely watched, if the march took them through many villages, as they seldom failed to pull out their cup at each one.

A good deal of fruit is said to be produced on the banks of the Brahmaputra, between Shigátze and Chushul. The Pundit only saw it in a dried state.

When marching along the great road, the Pundit and his companions rose very early; before starting they sometimes made a brew\* of tea, and another brew was always made about the middle of the march, or a mess of stirabout (suttoo)† was made in their cups, with barley-meal and water. On arriving at the end of a march they generally had some more tea at once, to stave off the cravings of hunger, until something more substantial was got ready, in the shape of cakes and meat, if the latter was available. Their marches generally occupied them from dawn till 2 or 3 P.M., but sometimes they did not reach their camping ground till quite late in the evening. On the march they were often passed and met by special messengers, riding along as hard as they could go. The Pundit said these men always looked haggard and worn. They have to ride the whole distance continuously, without stopping either by night or day, except to eat food and change horses. In order to make sure that they never take off their clothes, the breast fastening of their over-coat is sealed, and no one is allowed to break the seal, except the official to whom the messenger is sent. The Pundit says he saw several of the messengers arrive at the end of their 800 miles ride. Their faces were cracked, their eyes blood-shot and sunken, and their bodies eaten by lice

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\* The Tibetans stew their tea with water, meal, and butter; the tea-leaves are always eaten.

† A Tibetan always carries meal with him, and makes suttoo whenever he feels hungry.

into large raws, the latter they attributed to not being allowed to take off their clothes.

It is difficult to imagine why the Lhasa authorities are so very particular as to the rapid transmission of official messages, but it seems to be a principle that is acted upon throughout the Chinese empire, as one of the means of government. Ordinary letters have a feather attached to them, and this simple addition is sufficient to carry a letter from Lhasa to Gartokh, 800 miles, in little over thirty days. A messenger arriving at a village with such a letter is at once relieved by another, who takes it on to the next village. This system was frequently made use of by the Surveyors in Ladák and Little Tibet, and it generally answered well.

If any very special message is in preparation, and if time permits, an ordinary messenger is sent ahead to give notice. Food is then kept ready, and the special messenger only remains at each staging-house long enough to eat his food, and then starts again on a fresh horse. He rides on day and night, as fast as the horses can carry him. The road throughout can be ridden over at night; if there is no moon the bright starlight\* of Tibet gives sufficient light. Tibet is rarely troubled by dark nights; but, in case it should be cloudy, or that a horse should break down, two mounted men always accompany the messenger. These men are changed at every stage, and are thoroughly acquainted with their own piece of road. Each of these two men has, at least, two spare horses attached behind the horse he is mounted. If any horse gets tired it is changed at once, and left on the road, to be picked up on the return of the men to their own homes. By this means the messenger makes great progress where the road is good, and is never stopped altogether, even in the rougher portion. A special messenger does the 800 miles in twenty-two days on the average, occasionally in two or three days less, but only on very urgent occasions. The Pundit made fifty-one marches between Lhasa and the Mansarowar Lake, and his brother makes out the remaining distance to Gartokh seven marches more, or, in all, fifty-eight marches. The Pundit found very few of the marches short, while a great many were very long and tedious.

Little idea of the general aspect of the country which the road traversed could be given by the Pundit.

From the Mansarowar Lake to Tadúm (140 miles) glaciers seem always to have been visible to the south, but nothing very

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\* The starlight in Tibet, as in all very elevated regions, is particularly bright.

high was seen to the north; for the next 70 miles the mountains north and south seem to have been lower, but further eastward a very high snowy range was visible to the north,\* running for 120 miles parallel to the Raka Sangpo River. From Janglache to Gyangze the Pundit seems to have seen nothing high, but he notices a very large glacier between the Penanang valley and the Yamdokcho Lake.

From the lofty Khamba-la Pass the Pundit got a capital view. Looking south he could see over the island in the Yamdokcho Lake, and made out a very high range to the south of the lake; the mountains to the east of the lake did not appear to be quite so high. Looking north the Pundit had a clear view over the Brahmaputra, but all the mountains in that direction were, comparatively speaking, low, and in no way remarkable.

About Lhasa no very high mountains were seen, and those visible appeared to be all about the same altitude. Hardly any snow was visible from the city, even in winter. From the Mansarowar to Ralung, 400 miles, there were no villages, and no cultivation of any kind. The mountains had a very desolate appearance, but still numerous large camps of black tents, and thousands of sheep, goats, and yaks were seen. The fact being that the mountain sides, though looking so arid and brown, do produce a very nourishing coarse grass.

To the eastward of Ralung, cultivation and trees were seen every day near the villages. Near the Yamdokcho Lake the lower mountains seem to have had a better covering of grass. The Pundit mentions the island in the Yamdokcho as being very well grassed up to the summit, which must be 16,000 or 17,000 feet above the sea. This extra amount of grass may be due to a larger fall of rain, as the Pundit was informed that the rains were heavy during July and August.

As a rule, the Pundit's view from the road does not seem to have been very extensive, for although the mountains on either side were comparatively low, they generally hid the distant ranges.

The only geological fact elicited is that the low range to the east of the Lhasa River was composed of sandstone. According to the Pundit, this sandstone was very like that of the Siwálík range at the southern foot of the Himalayas.

The probability of this is perhaps increased by the fact that fossil bones are plentiful in the Lhasa district. They are supposed to possess great healing properties when applied to wounds,

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\* With a very high peak at its western extremity, called Harkiang. A very high peak was also noticed to the south between the Raka and Brahmaputra valleys.



&c., in a powdered state. The Pundit saw quantities of fossils exposed for sale in the Lhasa bazaar. The people there call them *Dúg-rúpa*, or lightning bones. One fossil particularly struck the Pundit; it consisted of a skull which was about  $2\frac{1}{2}$  feet long, and  $1\frac{1}{2}$  feet broad. The jaws were elongated, but the points had been broken off. The mountains crossed were generally rounded with easy slopes. The roundness of those on the Yamdokcho Island seems to have been very remarkable; this general roundness and easiness of slope probably points to former glacier or ice action.

Besides the Yamdokcho, a good many smaller lakes were seen, and two much larger ones were heard of. Those seen by the Pundit were all at about 14,000 feet above the sea. There are hardly any lakes in the lower Himalayas; the few that exist being all at, or below, 6,000 feet, but from about 14,000 to 15,000 feet lakes and tarns are particularly numerous.\* This may be another evidence of former ice action.

Whilst the Pundit was at Shigátze and Lhasa, he took a series of thermometer observations to determine the temperature of the air. During November, at Shigátze, the thermometer always fell during the night below the freezing point, even inside a house. The lowest temperature recorded was  $25^{\circ}$ , and during the day the temperature hardly ever rose to  $50^{\circ}$ . At Lhasa, in February, the thermometer generally fell below  $32^{\circ}$  during the night, and the lowest observed temperature was  $\dagger 26^{\circ}$ ; during the day it seldom rose to  $45^{\circ}$ . During the whole time the Pundit was in the Lhasa territory, from September to the end of June, it never rained, and snow only fell once whilst he was on the march, and twice whilst in Lhasa.

The snow-fall at Shigátze was said to be never more than 12 inches; but the cold in the open air must have been intense, as the water of running streams freezes if the current is not very strong. A good deal of rain falls during July and August about Shigátze, and there is said to be a little lightning and thunder, but the Pundit does not recollect seeing the one or hearing the other whilst he was in the Lhasa territory. The wind throughout Tibet is generally very strong on the tablelands, but at Shigátze and Lhasa it does not seem to have been in any way remarkable. The sky during the winter seems to have been generally clear.

The Pundit's heights were all determined thermometrically, that is, by observing the temperature of boiling water. The

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\* There are no lakes known in the Himalayas higher than 16,000 feet, but possibly one of those heard of by the Pundit may turn out to be a little higher.

† Inside a house.

height of Kathmandû, thus determined, agrees very closely with that deduced from other sources; the thermometer used there, and at Muktinâth, returned in safety, and was afterwards boiled at a trigonometrical station. It was found to agree with the observations taken before the Pundit went to Kathmandû. This thermometer was handed over to the Pundit's brother.

The Pundit took another thermometer with him to Lhasa, and, with it, all his higher points were determined. This latter was unfortunately broken near the end of the Pundit's march. There has, consequently, been no means of finding out whether it had altered in any way during the journey, nor any opportunity of testing it at known altitudes. If it had come back safely, there would have been no difficulty in having it boiled at trigonometrical stations of all heights, up to the highest visited by the Pundit. This thermometer was boiled at Almorah before the Pundit started, and with that observation as a zero, the heights of Lhasa, &c., have been computed out.

The height of Darchan, a little above the Mansarowar Lake, computed out in this way, is found to be 14,489 feet above the sea. The Mansarowar Lake, as derived from Captain H. Strachey's thermometrical observations, is 14,877\* feet, or taking a mean between his height of the Mansarowar and Rakas Tâl lakes it is about 15,000 feet. A result 400 or 500 feet higher than the Pundit's height. It may consequently be concluded that the Pundit's heights are not in excess.

With reference to the spelling of the name of the capital of Tibet, Lhasa has been adopted, as that agrees best with the Pundit's pronunciation of the word. He says the word means God's abode, from Lha, a God, and Sa, a place.

It may be remarked that more bearings to distant peaks would have been a great addition to the Pundit's route-survey, but the recognising of distant peaks from different points of view is a difficult matter, and only to be accomplished after much practice. The Pundit's next survey will, no doubt, be much improved in this respect. On the whole, the work now reported on has been well done, and the results are highly creditable to the Pundit.

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\* Mansarowar, 175 feet above lake, air 46° boiling point 186°0  
 Rakas Tâl, " " " " " " 54° " " " " 186°0  
 Petoragurh, 5,590 above sea, " " " " " " 64° " " " " 202°5

*Extracts from a Diary kept by Pundit —, during his Journey from Nepal to Lhasa, and from Lhasa through the Upper Valley of the Brahmaputra to the Source of that River near the Mansarowar Lake.*

Having made our preliminary arrangements, I started from Nepal on the 20th March, 1865, accompanied by my brother and four private servants. We arrived at night-fall at Azidpur village, on the Lhásá road.

*March 21st.*—Crossed over the Nilkánt hills, and arrived at Sündriphedi.

*22nd.*—After travelling all day, I arrived in the evening on the bank of the Bitráwāti stream.

*23rd.*—I arrived at Ramchá village, and took observations for latitude, and thermometrical observations.

*24th.*—Arrived at Náklang halting-place.

*25th.*—Arrived at Shábroy village, situated near the junction of the streams Gandak and Lendichû, and took observations for latitude. This is a customs' post, where all goods are taxed, and travellers have to pay a toll of 4 annas each; we paid Rs. 1-8 for our party.

*26th.*—Arrived at Medongpodo village, where we altered our mode of dress, adopting a mode familiar to the inhabitants of Lhásá, in order to preclude any suspicion as to the object of our visit.

*27th.*—Arrived about noon at Temuriá Bhansár (a Nepalese thannah and customs' post), where the officials forced us to undergo a strict examination. Our boxes and baggage were closely searched, but they failed to discover our instruments, which were hid in a secret compartment of a box; they, however, compelled us to pay a toll of Rs. 4, after examining our purwanahs. We then proceeded on our way, and by night-fall arrived at Raswágarhi, a fort built by Jung Bahadoor in 1855, during a war between him and the Lhásá rajah. This fort is situated near the junction of the Gandak and Lendichû streams, the latter forming the boundary between the Nepal and Lhásá territories. A stone bears a Chinese inscription mentioning this fact. I here took observations for latitude, and thermometrical observations.

*28th.*—I arrived at noon on the left bank of the Gandak at Pemánésá halting-place, near a thannah of the Kirong district. We were here stopped, and interrogated as to who we were, and as to the object of our visit. Our answer was that we were Bisahiris,\* and the object of our visit was to purchase horses,

\* Inhabitants of the country north-east of Simla, who possess the privilege of travelling through the Lhasa territory without question.

and also to pay our homage at the shrine of the Lhásá divinity. On hearing this, they told us that we must be detained till the Kirong governor gave us his sanction to pass; and, acting up to their decision, they sent word to Kirong, meanwhile searching our boxes, &c.; but the same good fortune attending us, they failed to discover the secret recesses where our instruments were hidden; they, however, made us pay a toll of Rs. 5 for myself and party. After detaining us the whole of the next day, the 29th, and a portion of the 30th, the expected answer from the Kirong governor arrived, and was read to us. It stated that we were forbidden to continue our route by Kirong, because this was not the ordinary route from Káthmándû to Lhásá, the proper route being *viâ* Nflam or Kúti, and, had we been Bisahiris, the route we should have taken was *viâ* Mansarowar, and not this. Seeing such a decided prohibition set against our continuing our onward march by Kirong, I demanded back the toll which had been imposed on us, but a portion only of the Rs. 5 was returned. With heavy hearts and gloomy forebodings as to the ultimate success of our enterprise, we made a detour to Ráswágárho.

31st.—We left Ráswágárho fort early this morning, and arrived at night-fall at Shábro. Here I was again questioned why I had returned, when I had told them on leaving the place on the first occasion that I was going on to Lhásá. I told them how it was that, after travelling up to Pemánesá unmolested, our further march was prohibited by the police at that thannah. They suggested to me that if I laid my complaint before another official, who lived some miles away, and who was in favour with the Potolah rajah (the Lhásá Lama's diwan), I might perhaps get a passport to Lhásá through his intercession.

Acting up to this suggestion, I proceeded early the following morning to visit this official, and told him all that I had mentioned to the police at Pemánesá, and also exhibited to him the passports that I had in my possession. He listened to me with great attention, and evidently believed my statements. After a long pause he wrote a letter to the Kirong governor (Jongpon), stating that I was no impostor, but that my real object in wishing to visit Lhásá was for the purpose of purchasing horses, to visit the shrine of the Lhásá divinity, and to recover certain sums of money due to me by some of the Lhásá residents. I succeeded completely in imposing upon this official, and elicited from him a promise that no one should now impede me. After making him a present of a few trifles, such as a pair of spectacles, a box of matches, &c., I withdrew to Shábro village, intending to start the following morning towards Kirong, armed with the letter.

*April 2nd.*—Starting early from Shábros, we arrived at noon at a serai called Dongkhang ; here we were accidentally informed by some travellers that the Kirong governor (Jongpon) was the individual who had in previous years been the governor of Purang Taglá Kote, and the chief official at one time of Gartokh. This deprived us of all hope of being able to proceed onwards, for this chief of Kirong was personally well acquainted with my brother, and had we proceeded, even with such influential support as the letter mentioned above was likely to give, yet the recognition of my brother by the Kirong governor (which was certain to happen) would have prevented him from having any confidence in us, and would thus have thwarted our enterprise at the outset. My brother had very frequently (only a few years previous) been brought in close and friendly contact with the governor, and he well knew that we were no Bisahiris. I then planned that my brother and three servants should return and stay at Nepal, till such time as the melting of the snow would render the road to Lhásá, *viá* Nílám or Kúti, practicable for travellers, while I, with one servant, should proceed by Kirong ; but, after mature consideration, we abandoned this plan, because, with but one servant, I might have fallen an easy prey to thieves. Accordingly, we retraced our steps, and on the 7th April arrived at Khinchat bazar, situated on the bank of Tirsuli river. Here, thinking that our number (six) might create suspicion, I discharged two of our servants, who knew but little of the Tibetan language. I made over to them the papers and work already finished, with instructions to deposit them in a safe place till my return. We ourselves marching back, arrived at the Batar bazar by nightfall. Resuming our march the next morning, we arrived at Káthmándû on April 10th, 1865.

I was already acquainted with a resident of Káthmándû, and with his aid I took up my residence there, waiting till such time as the melting of the snow might render the road to Lhásá, *viá* Nílám or Kúti, practicable to travellers. Meanwhile, I made the acquaintance of all who I thought might enable me to compass my object, collecting as much information as to the road to Lhásá, the state of the country, &c., as I could, without creating suspicion. My friend promised to accompany me to Lhásá as my servant, on a pay of 25 rupees per month. I thought he would be useful, as he had travelled the road, and was well known all along it, but when the time came he failed me.

Another resident of Káthmándû told me that it was fruitless to imagine that I could ever reach Lhásá, for although I had tried only one of the two roads, *i.e.*, the one by Kirong, and had to return, yet there was less chance of success in reaching my

destination by the other, viz., by Nílám or Kúti, for the authorities on this road were much stricter than those I had met with on the Kirong road. He informed me that if I was not personally known to the (Jongpong) chief official at Nílám, he would on no account give me permission to travel to Lháśá, as he was forced to give security for the good conduct of those he passes. With the best intentions, he advised me to give up all thought of seeing Lháśá, telling me that even if I should be fortunate enough to pass through Nílám, yet a higher and stricter official, residing at Dhangri Ghangá\* (Tingri Maidan), would require better and stronger reasons before allowing me to go to Lháśá. Suffering from anxiety, and losing nearly all hope of ever accomplishing my design, I determined to overcome my despondence, and make one effort more. With this view I daily went about the city questioning all who were going to Lháśá, but none would allow me to accompany them. At last I met with an apparently rich man on the eve of travelling to Lháśá, and did all I could in my power to gain his confidence. When I thought I had partially succeeded, I asked him if he would allow me to accompany him, and he said he would have no objection. I then made him take an oath not to desert me on the road. I advised him not to travel by Kirong. He, however, told me that he was well known by the authorities on the Kirong road, and that his house was not far from Kirong, so that there was no cause of fear. Thinking that this man, Dawá Nangal, was really as honest and honourable as he appeared to be, I lent him Rs. 100, a sum which he promised faithfully to return on our arrival at Lháśá. At that time I heard that Jung Bahadoor intended to send another vakeel to Lháśá, in place of the one already there, and I was told that this would be the best opportunity afforded of getting to Lháśá. We then decided that my brother, who was likely to be recognised by the Kirong official, had better accompany this vakeel, who was about to proceed by the Nílám road, while I was to travel by the Kirong road with the Bhotiya, Dawá Nangal. Thinking that, if I was unfortunate enough not to reach Lháśá, my brother might be more successful, and *vice versa*.

We consequently divided the money in my possession, and I made over a few of the instruments to him, retaining the better servant of the two for myself. I then removed to the dwelling of Dawá Nangal, and, preparatory to starting, altered my dress to one adopted by the Ladákis, and added a tail of hair to the

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\* The Ghoorkhas suffered their first defeat at the hands of the Tibetans on the Tingri Maidan in 1792. Kúti and several other frontier posts of Nepal were taken from the Ghoorkhas in consequence, and the Lháśá boundary was carried considerably to the south.

back of my head. All my arrangements being completed, I requested Dawá Nangal to delay no longer. Whereupon he advised me to start, in the company of one of his men, and promised to join me, either on the road, or at Shábro village, as work was likely to detain him for four or five days at Káthmándû. We started from Káthmándû on the night of the 3rd June, 1865, and arrived, after travelling for 4 miles, at a village named Dharamtalli.

Resuming our march the following morning, we arrived at Basuata Páwá. On the 5th we arrived at Sundriphedi. On the 6th we halted at Tirsuli bridge. On the 7th arrived on the bank of the Bitrawati stream. On the 8th at Dhebung Páwá. On the 9th we continued our stay at Dhebung Páwá, in consequence of rain. On the 10th we arrived at Bekuti village. On the 11th we halted. From this village, all the way to Raswágarhi, the inhabitants of the country are Bhotiyas. On the 12th we arrived at Garrang village. 13th, at Dañglang, where I fell ill with fever, and continued there in that state for 6 days. On the 20th, after my recovery, we marched to Shábro village. Here the servant of Dawá Nangal, who accompanied me thus far, mentioned to Dawá Nangal's family that I was a friend of Dawá's, and that it was the request of the latter that they should show me kindness. I was hospitably received and lodged, but after some days I began to feel uneasy at Dawá Nangal's long delay. I mentioned my anxiety to his family, and, in compliance with my request, they sent a messenger, asking the cause of the delay. Dawá's answer was that press of work would keep him still longer at Káthmándû, but that he might be expected at Shábro within 10 or 12 days. I now concluded that Dawá intended to play me some trick, and this suspicion gave me great anxiety, and induced me to visit Dawá's uncle; he was the chief person of Shábro village, and possessed great influence. I asked his advice as to what was to be done in my perplexity, for to return to Káthmándû was not my intention, and to proceed onward to Lháśá was not in my power, in consequence of the prohibition of the road officials. He said he felt for me, and would give me a passport to Kirong, as also a letter to Dawá Nangal's brother, who had just returned from Lháśá to Kirong, and who being a just and good man, would return me the money lent to his brother, and also arrange for my safe journey to Lháśá. Acting up to his promise, he gave me a passport to Kirong, and the letter to Dawá's brother. He stated in his letter that I was an honest man, going to Lháśa on commission for the purchase of horses, and that my claim of Rs. 100 against his brother was just, also mentioning that he would stand security for my good conduct to Lháśá, and requesting him to

arrange for my journey to that place, and if the Kirong officials required it, even to stand security for me.

Starting on the 6th July, accompanied by a relative of the Shábros official, I reach Temuria. On the 7th I arrived at Pemanésá, where, as on the first occasion, the officials attempted to stop me, but the person who accompanied me from Shábros opened the way, and in the evening of this same day we arrived at Kirong.

Kirong is a small town, possessing from 15 to 20 shops (some kept by Nepalese and some by Bhotiyas, who sell a variety of articles). Kirong has a fort and a good-sized temple. Its population is estimated at from 3000 to 4000 souls. Rice is imported, and salt exported. Three crops are raised annually. Wheat and barley are sown in October, and ripen in June. Another description of barley, called Ne, is sown in July, and ripens in October, and two other grains (called in these parts Phápar and Sarso) are sown in May, and ripen in September. A number of edible herbs are cultivated. On arriving at Kirong I lost no time in seeing Dawá Nangal's brother, by name Chûng Chû, and after offering a few trifling presents, explained my business with him. He promised me that all in his power would be done to enable me to travel onwards to Lhásá, but, as regarded the money, he could not refund it, as his brother was a bad man, and it was not his intention to pay his debts. For four days after this interview, the chief official (Jongpong) was busy, and could not attend to my affairs; but on the fifth day I obtained a hearing from him, and urged my request to be permitted to travel on. He told me, with all my strong recommendations, he would not wait a moment longer to grant me leave to travel, had there not been a higher official than him at Dhingri Ghangá who might object, but that he would send word to the chief official at that place (8 days' journey distant), and if he granted my request, no further obstacle would present itself to my travelling to Lhásá. He also mentioned that the only thing he found not right was, that no Bisahiri travelled by this road at this time of the year, and this might be one of the reasons which might induce the chief official at Dhingri Ghangá to negative my request. A messenger was sent bearing a letter from the Kirong to the Dhingri Ghangá official; and after 15 or 16 days, on the 26th July, the answer was received. The Kirong official was ordered to send me back to Nepal, and on no account to allow me to travel on towards Lhásá, for had I been going to Lhásá for horses I would not have taken this route, and, had I been a Bisahiri, the route to Lhásá I should have adopted was by Mansárowar, and not this. On hearing the decision of the Dhingri Ghangá chief, I implored the Kirong chief to permit me



to travel to Pati Nubri, to see my countrymen, *viâ* Lá-Jok Tumbá mountain and Kadáng-Châm, but he hesitated, and said that should he permit me to go there, and should I thence proceed on to Lhásá, and the news of my arrival at the latter place reach the ears of the Dhingri Ghangá chief, then he would forfeit his all, and perhaps be murdered, for disobeying orders; he, however, sent a man with a letter, urging this fresh request of mine, to the Dhingri Ghangá chief. The messenger was despatched on the 29th of July, and returned on August 10th, bearing the order from the Dhingri Ghangá chief to make me give security for my good conduct, before I was permitted to travel to Pati Nubri. On learning this, I returned to Shábri village, and with a great deal of persuasion and many entreaties induced the chief of the village, Chûng Chû, to enter into security for me. The wording and sense of the security was, that should I, on being permitted to travel to Pati Nubri, break through my promise not to visit Lhásá within this year, then he, Chûng Chû, would submit to the heaviest penalty which the Potolah rajah might think fit to impose on him. Chûng Chû, after doing this much for me, made me give him a declaration to the effect that, should I be found in Lhásá within this year, then it would be at the penalty of the loss of my life. This declaration was written out by the Kirong official, and I subscribed my name and seal to the document. This did not appear entirely to allay the suspicion of the Kirong official, and to guard against any wrong-doing on my part, he directed that I should be accompanied by his men from stage to stage, and they were ordered to bring back a letter from me on my arrival at Pati Nubri.

*August 13th.*—I left Kirong, and arrived at Rákmá village. *14th.*—Arrived at Thotang village, and halted there the following day. *16th.*—Arrived at Nûn village. *17th.*—Crossed Lá-Jok Tumbá, and arrived at Kolûng Chuksá. *18th.*—Arrived at Joñka-hil village. *19th.*—Arrived at Chartan-Phuk-khar village. *20th.*—Arrived half-way up Lá-Chumu-phur-phur mountain. *21st.*—Arrived at a halting-place; the road to this place from the last was very bad. Tradition has it that a priest rose to heaven on wings from the top of this mountain; hence its name. *22nd.*—Arrived at Namdûl village, where I met Châmik Dûrji, the brother of the man who I said lived at Pati Nubri, and to whom I told the Kirong chief I intended going. *23rd.*—At Lue village.

*24th.*—At Bâbuk village, where I saw Thele, from whom the messengers carried back the letter, as ordered by the Kirong official. At this place a plant called Nirbisi, or Jadwar, grows wild very abundantly; its root is held in very great esteem

throughout India, as possessing great healing power when applied to cuts, scars, bites of venomous serpents and insects. Bábuk is a large mart for the exchange of goods; Bhotiyas from all parts frequent it. Salt, wool, felt, and borax are brought here from Tibet, prior to being carried into Nepal and adjacent territories, while tobacco, rice, grain, cloth, copper-plates, &c., are brought from Nepal, prior to being carried into Tibet, to Tadúm, Nikú, Hápchän, Labrang, and all other large places. From Káth-mándû to Lue village jungle and forest was generally abundant, but at this place there was none visible, and hence to Lhasá the mountain sides were very bare and rocky. I learnt that on the 25th August, Báro Thele Durcha, with a large party, and a great number of yaks (about 200) laden with goods, intended to start from this place towards Tadúm. Having told these people that I was a Bisahiri (a countryman of theirs), I was held in great favour with all, and consequently received no opposition to my wish to accompany them: we accordingly started, and arrived in the evening at Galá Sátang camp.

26th.—We crossed the Galá mountain, which forms the boundary between the Lhasá and Gurkha territories, where I took thermometrical observations, and after passing Sang-jomba village, we arrived by evening at Somnath camp.

27th.—Crossed Gñolá mountain, and arrived at Báro Dhuksum camp. 28th.—Halted at Báro Dhuksum. 29th.—Arrived at Zángra grazing-ground, at that time covered with herds tended by men. 30th.—Arrived at Talla Labrang. 31st.—Halted at Talla Labrang.

September 1st.—Arrived at Yákáú. 2nd.—Arrived on right bank of Brahmaputra River, at Relá monastery. 3rd.—Arrived at Muna Ghát on bank of river, where boats formed of a framework of wood, covered with leather, convey people and goods across; on this occasion the boat was lost, with three people, in my presence, and so I returned to Káu. 4th.—Arrived at Jangtha grazing-ground. 5th.—Arrived on right bank of Brahmaputra at Likche monastery, situated on a low hill. 6th.—Crossed the river by ferry at Likche, and arrived at Tadúm monastery.

I was frequently asked who I was by the inhabitants, and I always said that I was a Bisahiri merchant, called Khúmû in these parts, and had purchased a quantity of Nirbisi\* root at Pati Nubri and Muktináth, which I had sent on to Mansarowar by another route, and had come here merely to worship. The inhabitants told me that the road from hence to Lhasá was infested by thieves and dacoits, and that a journey by a small party was attended with great danger.

\* Zedoary, a spicy plant, somewhat like ginger in its leaves, but of a sweet scent.

The Maharajah of Kashmir sends a merchant with a great quantity of goods to Lhasá once in two years. Hearing that he was to be sent this year, it occurred to me that I had better try to accompany his party. The merchant sent is called Lopchak, and, by the orders of the Lhasá rajah, is shown great attention, and treated with great distinction, as he passes along the road. The rajah of Lhasá sends a merchant, called Jang Chongpon, into Ladák once a year.

On the 8th of September, a traveller came into Tadúm from Gartokh, and on questioning him I was delighted to hear that the merchant (Lopchak) would be here within thirty days. I accordingly rented a house, and made up my mind to wait, and to avoid suspicion pretended that illness prevented me from joining the party on their way to Mansarowar. Grain and food generally, being imported, are very dear. Grain is not raised at all at this place. Tadúm possesses a large monastery, surrounded by 8 or 9 post-houses (Tarjams). At this place there are very extensive plains, stretching to the east 7 miles, and in width about 4, to the west 15 miles, by about 15 in breadth.

*October 2nd.*—The merchant's head man, named Chiring Nurpal, accompanied by about 12 men and 70 laden yaks, came into Tadúm this day. On his arrival I sent for him, and made friends with him. I told him what I had already told all at this place, and asked him to let me accompany him to Lhasá, as the season had advanced, and to return to Mansarowar was nearly impossible. He, without hesitation, acceded to my request, and so we started the following day. *3rd.*—Arrived at Thuku camp.

*4th.*—Arrived at Siri Kárpo camp. *5th.*—Arrived at Niku Tarjam, where Chiring Nurpal dismissed the coolies from Tadúm, and engaged fresh men. *6th.*—Arrived at Jagúng camp. *7th.*—After crossing a large river called Chartá Súngpo, we arrived at Jalúng camp.

*8th.*—Marching along the bank of the Cháká Chû River, we arrived at Sarká-jong town. This place is presided over by two officials (Jongpons), residing at Sar-jong and Nub-jong, who questioned Chiring Nurpal as to who I and my servants were. He told them that we were his countrymen and servants. Nothing more was said by them on hearing this, but I was very much troubled in mind, thinking that, should I be discovered at Lhasá, I would to a certainty forfeit my life; and another subject was a source of great uneasiness to me, viz., that I was fast exhausting my funds. I, however, determined to accomplish my design of seeing Lhasá. I continued my route-survey, and took observations for latitude at favourable moments, wherever I could. Grain is not raised at Sarká-jong, but is brought here

all the way from Kirong and Jonká-jong. Chiring Nurpal was very kind to me, and I, in return, told him that when we got back to Mansarowar, he need only ask me for whatever he wished to have it granted. Coolies were changed at Sarká-jong. 9th. —Arrived at Nágáling camp. 10th.—Arrived at Chomúkulá Tarjam; coolies and yaks were changed. Halted on 11th. 12th. —Arrived at Tarchunk camp. 13th.—Arrived at Nangbá Yako camp. 14th.—Arrived at Rúin camp. 15th.—Arrived at Sang-Sang Gyádo Tarjam, a mud house, where coolies and yaks were changed. 16th.—Arrived at Ge camp. 17th.—Arrived at Sang-Sang Kau Tarjam, a mud house; there is, besides the above, one other house of mud, belonging to a jemadar; coolies and yaks were changed. 18th.—Arrived at Kúkap camp. 19th. —Arrived at Rálung camp. Cultivation is seen from this place onwards, and willow trees make their appearance here also. From Tadúm to this place there are no signs of cultivation, and the population is very scanty.

20th.—Arrived at Nábring Kháká Tarjam, to the north-west of which place lies a lake 8 miles long and 3 miles in breadth. On the bank of the lake, and north-east of this village, is situated Nábring village, ruled by a Jongpon (an official). The yaks between Nábring and Lhása are very small, and the goods (which from Tadúm had been carried on large yaks) were at Nábring transferred to asses.

21st.—After passing a small lake called Láng-cho-Gonok, we arrived at Barkhá village. The water of this lake is very salt, and is reported to be 162 feet in depth. The length of this lake is 4 miles, and breadth 2 miles.

22nd.—After crossing the Brahmaputra by ferry, we arrived at Jangláche town, which has a very fine monastery, and a strongly built fort, situated on the top of a small hill. They call a fort in these parts khar.

A number of shops are kept by Nepalese. I was informed that the Kirong and Dhingri Ghangá road passes through this place. We halted here on the 23rd, when we were joined by a second portion of the Ladák merchant's men and yaks (105) conveying goods.

24th.—Continued our stay at Jangláche town. From this town to Shigátze city goods and men are frequently transported by boats covered with leather, the river being wide and navigable; but we preferred going overland, and so continued our journey.

25th.—Arrived at Táshiling village. 26th.—Arrived at Phuncholing village, which is ruled by a Jongpon. There is a very well-built monastery in this village. At this village the

river is spanned by a bridge, formed of iron chain and rope, called chakoam.

27th.—Arrived at Jilong village. 28th.—Arrived at Chakri village.

29th.—Arrived at Digarcha, or Shigátze, city. We took up our quarters at a serai (called Kunkhang in these parts), built by the government. At north-west end of the city, on a low hill, stands a strong fort, called Gang Már Jong, which, as tradition has it, was built by a Deo. To the south-west of the city stands a very well-built monastery, called Tashilumbo, surrounded by a wall about one mile in circumference. Numerous houses and temples rise within this enclosure; four of the larger temples among these are superior to the rest, and have gilded spires.

The idols in these temples are studded with precious stones, gold, and silver. There are 3300 priests in this monastery, the chief being the Great Láma, called Panjan Ringbo-Che, considered throughout Tibet as an incarnation of the Deity, who can read the thoughts of men, and who is supposed never to die.

We formed a small party and on the 1st of November went to do homage to Panjan Ringbo-Che, and were conducted into the presence of a boy eleven years old, seated on a high throne covered with rich silks. He was surrounded by a number of priests, standing in reverential attitudes, and bearing the insignia of their calling. We uncovered our heads and made a low obeisance, and then presented an offering of pieces of silk. Panjan Ringbo-Che then placed his hands on each of our heads and beckoned to his priest to have us seated. Up to this time he had preserved a profound silence, but, on seeing that we were seated, put us only three questions (as he is wont to do to every worshipper), viz., "Is your king well?" "Is your country prospering?" and "Are you in good health?" The priest then placed a small strip of silk round each of our necks, and from a silver kettle poured a little tea into our cups, and then dismissed us.

The city of Digarcha is three-quarters of a mile in length and half a mile in breadth. North-east of the city, distant three-quarters of a mile, situated on the left bank of the Penánangchú stream stands a monastery, called Kongkaling, in the centre of a garden. A market (bazar) is daily held on the space called Thom, between the city and the Tashilumbo monastery, where every saleable article is exposed throughout the day, the vendors retiring to their homes in the evening.

The population of the city is estimated at 9000 souls, exclusive of the 3300 priests. The earth here is rich and yields fine crops of grain. The city is ruled by two Depons, one residing at

Khárák village, and the other at Rimu village; but two Jongpons (inferior officers) are obliged to take up quarters in the city.

A force, consisting of 100 Chinese and 400 Bhotiya soldiers, is quartered here. To the south of the city, and distant about 15 miles, is situated a hill called Mao-mi, where gold is said to be found; but a strict order prohibits the people from working it.

*November 16th.*—The Kashmir Maharajah's merchant,\* for whom we were waiting, came in on this day, and I waited on him with a few presents, requesting to be permitted to accompany his men, as I had done from Tadúm. I told him the story of my illness, and how it was that I came with his servants. He saw no objection to my continuing with his men, and promised to assist me at Lhá-sá. I took star observations for latitude at this place as often as I could.

*28th.*—The Nepalese agent (vakeel) at Lhá-sá, who was recalled by Jung Bahadoor, arrived at Digarchá city on this day, and I was sorry not to discover my brother among his followers.

*December 22nd.*—Left Digarchá city and marched to Giáng village. *23rd.*—Arrived at Penájong town, governed by a Jongpon, who resides in the fort. *24th.*—Arrived at Tákche village. *25th.*—We arrived at Gyangze city, which is about the size of Digarchá, and has a fort on a low hill in the heart of the city, and also a large gilded temple. The city is ruled by a Depon, assisted by two Jongpons.

A force, consisting of 50 Chinese and 200 Bhotiya soldiers, is quartered here. The boundary between the Lhá-sá and Loh (Bhootan) territories is three days' journey from Gyangze. Rice and tobacco are imported from Bhootan, while wheat, flour, barley, oil, radish, peas, ghee, produced in the place, are sold very cheap. Very fine crops are raised here, although it appeared to me to be higher above the sea level than either Digarchá or Lhá-sá. The following are the names of three different descriptions of woollen cloth manufactured in this city, for which it is famous, viz., gethá, nambu, chuktu, purik nambu, this last being very superior. It is also the seat of the manufacture of a kind of small bell, called yá-rká, with which they adorn their horses. To the south-west, north-west, and south-east of the city are plains stretching from 6 to 10 miles, through which the Penánangchú stream flows. At this time of the year the river becomes frozen, and men pass over on foot. We started from hence on the 28th. *28th.*—Arrived at Gobzi village. *29th.*—Arrived at Rálung village. *30th.*—After crossing Kharolá Mountain we arrived at Zará halting place. *31st.*—Arrived at Nan-

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\* Officially called Lopchak, his own name in this case being Chyanggonboo.

ganche-jong, a village on the Yamdokcho Lake, with a fort on a small hill.

*January 1st, 1866.*—Arrived at Piáhtejong, on the bank of the Yamdokcho Lake. Its small fort is situated so close to the lake that the water washes its walls.

*2nd.*—Marching along the bank of Yamdokcho Lake we came upon a band of robbers. One of them took hold of my horse's bridle and told me to dismount. Through fear, I was on the point of resigning my horse to him, when a Mahommedan who accompanied me raised his whip; whereupon the robber drew a long sabre and rushed on the Mahommedan. Taking advantage of this favourable moment I whipped my own horse forward, and as the robbers could not catch us they fired on us, but without effect, and we arrived at Demálung village all safe.

The Yamdokcho Lake from this point stretches to south-east about 20 miles, and then turns west. The breadth of this lake varies from 2 to 3 miles, and it is said to be very deep. In the centre of the lake stands a hill, at the foot of which are situated a number of villages. The circumference of the lake is about 45 miles; it is crossed in wicker boats covered with leather. We halted at Demálung this day, the 3rd, to procure yaks and coolies.

*4th.*—After crossing Khambálá Mountain we arrived at Khambá-Bárcchi village, situated on the right bank of the Brahmaputra River, and taking boat from hence we were rowed down the stream to Chusul village, passing Chaksam Chori village, which is situated on the right bank of the river, at foot of hill, and alongside an old bridge (formed of iron chain and rope), which, owing to its insecurity, is seldom or never used, the ferries being preferable.

The Khambálá mountain forms the boundary between the two districts Oo and Chang, from Khambálá west to Kálá Mountain being the Chang, and from Khambálá east to Chari being the Oo district. Chusul Jong is ruled by a Jongpon. On the bank of the river, situated on a low hill, stands a fort. We stayed here three days.

*8th.*—Arrived at Chábonang village.

*9th.*—Marching along the right bank of the Kichu Sangpo River we arrived at Netang village. The Kichu Sangpo River comes from the direction of Lhásá, and falls into the Brahmaputra at Chusul village. The Brahmaputra from thence flows east.

*10th.*—We arrived this day at Lhásá, and soon after my arrival I engaged two rooms in a building, called Dhiki Rabdan Tashilumbo-gi-Khan Sumbá. One of the rooms was well adapted for taking my star observations from within. I had been here

some ten days when the Lopchak's men, my late companions, told me they were going to visit the Goldan monastery, and asked me to go with them. I accordingly left Lhásá in their company on the 21st, and arrived at Sára monastery, distant some 3 miles only from Lhásá, at the foot of the Tatiphá Mountain. The circumference of this mountain is little more than 1 mile. Numerous temples, with gilded spires, and of all sizes, are seen in the inclosure. The idols within are studded with gold, silver, and precious stones. They differ in size and hideousness, some having horns, but the limbs and lower portion of the figures are generally those of men. I was informed that there were 5500 priests in this monastery.

22nd.—Starting this morning from Sára, we arrived late in the evening at Dák Yárpá monastery, situated half way up a hill. Many temples are to be seen here also, although the number of priests is not more than a dozen.

23rd.—Arrived at Bumtod.

24th.—After crossing the Kichu stream we arrived at Goldan monastery, situated on the summit of a low hill. The circumference of this monastery is about three-quarters of a mile. There are numerous well-built temples, with idols much the same as those at Sára. It is reported to be a very wealthy monastery, and is occupied by 3300 priests.

25th.—Returning to Lhásá we arrived at Nángrá village.

26th.—Reached Lhásá. It was my wish now to follow the course of the Brahmaputra River, but I was informed that, unless I went with a well-armed party of at least a dozen, it would be dangerous to proceed.

The city of Lhásá is circular, with a circumference of  $2\frac{1}{2}$  miles. In the centre of the city stands a very large temple, called by three different names, viz., Máchindránáth, Jo, and Phokpochen-grá. The idols in it are richly inlaid with gold and precious stones. This temple is surrounded by bazars and shops, kept by Lhásá, Kashmiri, Ladáki, Azimabad, and Nepalese merchants, a number of whom are Mahommedans. Chinese tradesmen are numerous here also.

The city stands in a tolerably level plain surrounded by mountains, the level or open ground extending about 6 miles on the east, 7 on the west, 4 on the south, and 3 on the north. At the northern end of the city there are two monasteries, called Mûrû and Rámoche. At the north-west corner stands the Chumuling monastery; at the west end the Tankyáling monastery. The monastery called Kontyaling is about 1 mile west of the city, at the foot of a low isolated hill called Chápochi, which has a house on its summit. About three-quarters of a mile west of the Rámoche monastery there is, on a low hill, a large and strong



fort called Potalá, which is the residence of the Lámá Gúrú, who is also called Gewáring-bo-che, his head minister being generally called Rajah. The fort is  $1\frac{1}{2}$  mile in circumference and 300 feet above the surrounding level; steps lead up to the fort on every side. The village Jol lies under the fort. Four miles west of the city stands the Debang monastery, at the foot of a hill; it is occupied by 7700 priests, who are held in great veneration by all classes of the Lhása people. South of the city and distant 3 miles (beyond the Kichu Sangpo River), is situated the Chochuling monastery. I accompanied the Ladák merchant, called Lopchak, on the 7th of February, to pay homage to the Gewáring-bo-che (the Great Lámá of Tibet) in the fort, ascending by the southern steps. A priest came out to receive us, and we were conducted into the presence of the Gewáring-bo-che, a fair and handsome boy of about thirteen years, seated on a throne 6 feet high, attended by two of the highest priests, each holding a bundle of peacock feathers. To the right of this boy, and seated on a throne 3 feet high, was the Rajah Gyálbo-Khuro-Gyágo, his minister. Numbers of priests in reverential attitudes were standing at a respectful distance from them. We were ordered to be seated, and after making offerings of silks, sweets, and money, the Lámá Gúrú put us three questions, placing his hand on each of our heads: "Is your king well?" "Does your country prosper?" and "Are you in good health?" We were then served with tea, which some drank and others poured on their heads, and after having a strip of silk, with a knot in it, placed by the priests round each of our necks, we were dismissed, but many were invited to inspect the curiosities that were to be seen in the fort. The walls and ceilings of all the chief houses in the fort, and all the temples that contained images of gold, were covered with rich silks.

The Lámá Gúrú is the chief of all Tibet, but he does not interfere with state business. He is looked upon as the guardian divinity, and is supposed never to die, but transmigrates into anybody he pleases. The dead body from which the Lámá Gúrú's soul has departed is placed in a gold coffin studded with the finest gems, and kept in the temple with the greatest care. The belief of the people is that the soul of one Lámá Gúrú is privileged to transmigrate thirteen times. The present Lámá Gúrú is now in his thirteenth transmigration. Churtans are placed over the coffins containing the Lámás' bodies, and it is said that these dead bodies diminish in size, while the hair and nails grow.

The rajah, or gyalbo, is next to the Lámá Gúrú in rank; below him there are four ministers, called kaskak, who conduct all state business, under his orders. The Chinese vakeel at

Lhásá, who is called ambán, has the power of reporting against either the rajah or the four ministers to the King of China, and, if necessary, can have them removed from office.

The general belief of all the Tibetans is, that no sooner is the Lámá Gûrû born than he speaks, and all withered plants and trees about his birthplace at once begin to bear green leaves. The moment news gets to the Lhásá court of such an occurrence, then the four ministers repair to the house in order to ascertain the truth by the following method:—Articles of all descriptions are placed before the child, and he is requested to tell which belonged to the late Lámá Gûrû, and which did not. Should he be able to select from the articles put before him such of those that belonged to the Lámá Gûrû, then he is pronounced to be no impostor, and is forthwith carried away to the fort of Potoláh and placed upon the throne as Lámá Gûrû.

The Mahommedans of Lhásá gave me the following account as to the selection of the future Lámá Gûrû:—From the day of the death of a Lámá Gûrû all male births are recorded by the Lámás about the city, and the ministers are secretly informed of them. Names are given to the children, and on the thirtieth day after the decease of a Lámá Gûrû slips of paper, each bearing the name of a child born within the month, are placed in a vessel; the chief of the four ministers then draws out one of the slips with a pair of pincers, and which ever child's name that bears, he is pronounced to be the future Lámá Gûrû. He is then taught all that is required of him by the priests, and when they think he has come to years of discretion, the previously narrated ceremony of the choosing of articles is conducted. The people of Lhásá are kept in the dark as to this method of adopting a Lámá Gûrû. The Lhásá people are, by strangers, supposed to adopt a Lámá Gûrû, in order to prevent the government of the country from falling entirely into the hands of the Chinese.

Of all the monasteries in these parts, the largest, apparently, are Sára, Debang, Goldan, &c., and occupied likewise by the largest number of priests; but in former days the monasteries held in greatest esteem were Kontyaling, Tankyáling, Chumuling, and Chochuling; and on the death of the Potoláh rajah the successor was chosen from one of these four monasteries, while now he is chosen from the Debang monastery only. The reason that the Potoláh rajah is not selected from one of the four monasteries, but only from Debang, is because, not very long ago, Sátá Safáde, allied with the Debang priests (7700), and also with the people, and aided by the Chinese vakeel, managed to remove the then reigning rajah, Gyalbo Riting, from the throne and drove him to Pekin, where he died shortly

after. Sátá Safáde then assumed the position of rajah, and ever since the recognised heir to the Potoláh throne has been the head Lámá of the Debang monastery.

Three days' journey (36 miles) east of Lhásá, situated on the left bank of the Brahmaputra River, stands a monastery called Sáme, the seat of the Jam Rajah, who is believed to possess the power and authority to punish or reward the souls of departed men. The state treasury of Lhásá is also at this place, Sáme, and, on the occasion of war, the four ministers repair thither, and, after a little ceremony, receive the amount they solicit, with an injunction to return the same within a certain period. Within 40 miles east of Sáme monastery, and on the right bank of the Brahmaputra, is situated Chotang city, rivalling in size the city of Digarcha. The Brahmaputra River flows from hence in an easterly direction for a distance of 120 miles, and then flows due south.

I observed that there was but little order and justice to be seen in Lhásá.

The new year of this people commences with the new moon, appearing on or about the 15th of February; they call it Lohsar. On New Year's eve an order from the court goes round to have every house in the city cleaned; the houses are swept and white-washed and the streets are cleaned. On the day following each household displays as many flags, &c., from the housetop as it can afford. Throughout the day and night singing, dancing, and drinking are kept up. On the second day of their new year all the people of the city assemble before the Potoláh fort to witness the following feat, performed generally by two men:— A strong rope is fastened from the fort walls to strong rivets in the ground, 100 yards distant from the base of the fort. The two unfortunate men then have to slide down this rope, which very often proves fatal to them; should they, however, survive, they are rewarded by the court. The Lámá Gûrû is always a witness of the performance from the fort.

From the commencement of the new year, whoever pays the highest sum is considered the judge of the rajah's court, and for twenty-three days he exercises his authority in the most arbitrary manner possible, for his own benefit, as all fines, &c., are his by the purchase. The purchaser of such authority must be one of the 7700 priests attached to the Debang monastery; the successful priest is called Jalno, and announces the fact through the streets of Lhásá in person, bearing a silver stick.

The priests attached to all the temples and monasteries in the neighbourhood assemble in the fort, and offer homage. This assembling of the priests is called Molun Chumbo, and the

holidays go by the same name. The Jalno's men are now seen to go about the streets and places, in order to discover any conduct in the inhabitants that may be found fault with. Every house is taxed in Lhásá at this period, and the slightest fault is punished with the greatest severity by fines. This severity of the Jalno drives all the working classes out of the city, till the twenty-three days are over. The profit gained by the Jalno is about ten times the purchase-money. During the twenty-three days all the priests of the neighbourhood congregate at the Má-chindránáth temple, and perform religious ceremonies. On the fifteenth day of the new year all the priests, assembling about Máchindránáth temple, display hundreds of idols in form of men, animals, trees, &c., and throughout the night burn torches, which illuminate the city to a great distance. The day on which the authority of the Jalno ceases the rajah's troops parade through the streets, and proclaim that the power of the rajah has again been assumed by him. Twenty-four days after the Jalno ceases to have authority, he again assumes it, and acts in the same arbitrary manner as on the first occasion for ten days, after which authority is once more assumed by the rajah. These ten days are called Chokchut Molam.

On the first day the Lámás all assemble, as before, at Má-chindránáth temple, and, after a religious ceremony, invoke the assistance of their deities to prevent sickness, &c., among the people, and, as a peace-offering, sacrifice one man. The man is not killed purposely, but the ceremony he undergoes often proves fatal. Grain is thrown against his head, and his face is painted half white, half black.

On the tenth day of this vacation, all the troops quartered at Lhásá march to the temple, and form line before it. The victim, who has his face painted, is then brought forth from the temple, and receives small donations from all the populace assembled. He then throws the dice with the Jalno, and if the latter loses it is said to forebode great evil, and if not, and the Jalno wins, then it is believed that the victim, who is to bear the sins of all the inhabitants of Lhásá, has been permitted by the gods to do so. He is then marched to the walls of the city, followed by the whole populace and troops, hooting and shouting, and discharging volleys after him. When he is driven outside the city, then people return, and the victim is carried to the Sáme monastery. Should he die shortly after this the people say it is an auspicious sign, and if not, he is kept a prisoner at Sáme monastery for the term of a whole year, after which he is released, and is allowed to return to Lhásá.

The day following the banishment of the man to Sáme, all

the state jewels, gold and silver plate, &c., are brought out from the fort, and carried through the streets of Lháśá, protected by the troops armed, and followed by thousands of spectators. Towards evening everything is taken back to the fort, and kept as before. The day following, immense images of the gods (formed of variegated paper, on wooden frame-work) are dragged by men through the city, protected by armed troops. About noon the whole populace, great and small, assemble on the plain north of the city, and publicly carouse, race, and practise with the gun at targets. I was informed that the Molam Chambo and Chokchut Molam vacations, with all the religious ceremonies and observances, were instituted from time immemorial, but that the business of putting to the highest bid the powers of sole and chief magistrate dates from the tenth transmigration of the soul of the present Lámá Gârú.

One crop only is raised here in the year. Seed is sown in April, and the crop cut in September. The grains raised are Sua, Ne, Do, Doo Sanma, Youkar (barley, another description of barley, wheat, another kind of wheat, peas, and mustard). Radish, carrots, onions, potatoes, beans, garlic, and various other edibles are cultivated. There are two kinds of trees, called Changma and Jawar, but they are not indigenous, and are only to be seen in gardens. There is no jungle hereabouts, and, excepting one thorny bush called Sia, the hills are absolutely barren.

A very few of the rich men's houses are built of brick and stone, all others are of mud. Some few are built of sun-dried bricks. The manufactures of Lháśá are woollen cloths, felt, &c. The cattle of Lháśá are cows, sheep, goats, yaks, horses, asses, &c.; pigs and dogs are also reared, the latter being a very big animal; there are quantities of domestic cats, mostly black, and a few white and red. Fowls, pigeons, kites, crows, ducks, and pheasants, together with a variety of small birds, are very numerous. Snakes, reptiles, scorpions, &c., are not known.

The water supply of Lháśá is from wells, and a tax of two annas on every house is imposed monthly on the inhabitants for the use of the wells.

During the month of December merchants from all parts bring their merchandise here (from China, Tartary, Darchando, Chando, Kham, Tawang, Bhotan, Sikkim, Nepal, Darjiling, Azimabad, and Ladák). From China, silks of all varieties, carpets, and chinaware. From Jiling, in Tartary, is brought gold-lace, silk, precious gems, carpets of a superior manufacture, horse-saddles, and a very large kind of Dumba sheep, also valuable horses. From Darchando immense quantities of tea

(Darchando is said to be situated north-east of Lhásá, and to be distant two months' journey). From Chando city, in the Kham territory, an enormous quantity of the musk perfume is brought, which eventually finds its way to Europe, through Nepal. Rice, and other grain that is foreign to Lhásá, is brought from Tawang, in Bhotan. From Sikkim, rice and tobacco; and from Nepal, Darjiling, and Azimabad, broad-cloth, silks, satins, saddles, precious stones, coral, pearls, sugar, spices, and a variety of Indian commodities. Charas and saffron (késar) come from Ladák and Kashmir. The merchants who come in December leave in March, before the setting in of the rains render the rivers impassable. The inhabitants use ornaments of coral, pearls, and precious stones, and occasionally of gold and silver, which are more especially worn by women on their heads. Coats lined with the skins of sheep are generally worn.

During the month of December, at nights and early in the mornings, the mercury in the thermometer sank below 32°, and during the days never rose over 40° to 45°. The river Kichu was frozen at that time of the year and water kept in the warmest parts of a house froze, and burst the vessels holding it.

The chief divinity worshipped in this part is Budh.

The food of the inhabitants consists chiefly of salted butter, tea, mutton, beef, pork, and fowls. Rice is not much eaten, owing to its high price, and because it is considered a fruitful source of disease. Other edibles, such as wheat, barley, and kitchen produce, &c., are cheap.

The current coin of the country is a silver piece called Naktang, two and a half of which pieces being the equivalent of one rupee. The silver pieces are cut into either halves, or into three pieces, the half pieces are called Chikyah, and one-third of the Naktang is called Karma, and two-thirds of the Naktang piece called Shokang or Miscal. There is also a large lump of silver, bearing the seal of the Chinese Emperor, the value of which is equal to 333 Naktangs, called Dojah or Kuras.

To the north-east of Lhásá, distant about one month's journey, there is a country called Kham or Nyahrong. Thousands of the inhabitants of this country annually pay Lhásá a visit, some under the plea of wishing to worship, while others come with the ostensible reason of trading, but all really come with the object of robbing and stealing whatever they can. These people are held in terror by all the peaceable inhabitants of the Lhásá territory, who have named them Golok Khamba. Highway robbery and murder are perpetrated by them without compunction. They appear to be exempt from the wrath or

punishment of the Lhásá chiefs. The Lhásá government never takes notice of any complaints brought against this marauding tribe, and the reason I heard for this silence was that the Lhásá vakeel with government merchandize, on his annual journey to Pekin, has to pass through the territory appertaining to this tribe, and to insure a safe journey for these the government connives at the mischief done by them in the Lhásá territory. Another reason I heard was, that in case of a war, this Khamba tribe would render good service.

North of Lhásá, and four miles distant, is situated a long hill, stretching from east to west, reported to contain immense quantities of silver; but a government order prohibits any one from working the metal. The government itself refuses to work the metal, for the general belief is that the country will be impoverished, and the men will degenerate, should the metal be worked.

A Chinaman, not many years ago, worked a large quantity of silver here, but intimation was given to the government of the fact, and the man was seized, and sent to Pekin, where his hands were cut off. The name given to this hill is Toti-phu. On the summit of this hill is a spring, and a large flat slab of stone called Darga, the seat of the Mahomedan Pír. Another large slab of stone close to this is called Ja Nawaj; it bears the impression of a large hand, said to be the hand of a Mahomedan Pír, who lived here in former days. The Mahomedans of Lhásá resort to this place to worship. It is also reported and believed that gold exists in the Toti-phu hill, and near the monasteries Debang and Ramoche, but it is not worked. Gold is, however, worked to a very slight extent near the monasteries by the priests, but should they, in their search, discover a nugget of large size it is immediately replaced in the earth, under the impression that the large nuggets have life, and germinate in time, producing the small lumps, which they are privileged to search for.

To the north-east of Lhásá, and one and a half month's journey from it, at Sarka or Thok, gold is extracted in large quantities, there being no prohibition as to working it. This gold is carried to Lhásá, Gartokh, and Digarcha. In this country no grain is raised near Sarka, the gold-diggers barter the metal for grain, &c., brought by merchants.

The strength of the standing force in Lhásá is 1000 Bhotiya and 500 Chinese soldiers, armed with long flint guns, and of late seven small pieces of ordnance have been introduced. During the war between the Goorkhas and the Lhásá government, in 1854, an order was given for a census of the inhabit-

ants, and, exclusive of the military and priests, Lhásá was found to contain 9000 women and 6000 men. The reason of this preponderance of females over the males is easily accounted for in consequence of the large number of males who become priests, who are compelled to vow celibacy.

The Nepalese residents of Lhásá, though believing in the same divinity, Budh, as the Lhásá people, yet differ from them in many minor points. Another reason of the scanty population of Lhásá is traced to the custom of one family, consisting say of four or five males, who cohabit with one woman.

Regarding the disposal of their dead, the Lhásá people of the poorer classes bind the corpses tightly with rope, and place them erect against the inner walls of their houses for two or three days, while the richer and well-to-do classes detain the corpses in their houses for a length of fourteen days; after which time priests are invited, who pretend to read from their ritual the manner in which these corpses are predestined to be disposed of. Sometimes their decision is to cut the corpse into pieces, and scatter the fragments to the birds and beasts of prey, and sometimes to bury them. The reason assigned by them for detaining the bodies springs from the belief that they may become demons if disposed of without the blessings of the priests.

The inhabitants of Lhásá report that the ready cash possessed by the government of Lhásá, and deposited in the Potoláh fort, equals, if not exceeds, the wealth of the whole world; but I was of a contrary opinion, as I learnt that, during the war between Lhásá and the Goorkhas in 1854, the Lhásá government had to bring two lacs of rupees from Sáme monastery, to conduct the war.

Having made such a long stay in Lhásá, I had completely exhausted my funds, and was driven to teach some Nepalese merchants a little Hindée calculation for my support, since I could get no credit in the place, and no opportunity to return to Nepal offered itself. I was one day questioned as to who I was by two Mahomedan merchants of Lhásá, who appeared to be of a better class than the generality of the people. I told them (as I had told every one who asked me the same question) that I was a Bisahiri, but they contradicted me familiarly, and said that I, they were convinced, was no Bisahiri, and at last they forced me to confess the truth, but solemnly swore to secrecy. By this confession of mine I was enabled to borrow of them a sum of money, on pledging my watch, and after borrowing another small sum, I made up my mind to start from Lhásá by the first opportunity that presented itself.



I was at about this time very much alarmed by seeing the Kirong Jongpon in the streets of Lháśá one day; and I was still more alarmed on seeing the summary manner in which treachery in these parts was dealt with, in the person of a Chinaman, who had seditiously raised a quarrel between the priests of the Sara and Debang monasteries. He was (on the receipt of an order from Pekin to kill him) brought out before the whole of the people, and beheaded with very little hesitation. Owing to my alarm, I changed my residence, and seldom appeared in public again.

At this time I learnt that the Ladák merchant, with whose servants I had travelled hither, was sending his party back to Ladák with large quantities of tea, &c., that he had purchased. Hearing this, I went to see him, and after making a few presents, preferred my request to be allowed to return to my own country along with his party. He assented, and ordered that I should be well provided for, giving his servants injunction to receive from me all that I might owe him on our arrival at Mansarowar.

*April 21st.*—Left Lháśá early this morning, and arrived at eve at Netang village. *22nd.*—Arrived at Chusul. *23rd.*—Arrived at Kamba Barchi village. *24th.*—Crossed Khambálá mountain, and arrived at Piate Jong village. *25th.*—Arrived at Nanganche village. *26th.*—Crossed Kharola mountain, and arrived at Ralung village. *27th.*—Arrived at Gyangze city; halted here the 28th. *29th.*—Arrived at Takche village. *30th.*—Arrived at Pena Jong village.

*May 1st.*—Arrived at Shigátze city; made a stay of six days here, while collecting provisions for the road. *8th.*—Left Digarcha in the morning, and arrived at Natang village. *9th.*—Arrived at Sabgeding village. *10th.*—Arrived at Silka village. *11th.*—Arrived at Tamcheding village. *12th.*—Arrived at Phuncholing village. *13th.*—Arrived at Chakdong village. *14th.*—Arrived at Jangláche town; halted here one day, seeking provisions for the road as far as Mansarowar. *16th.*—Crossed the Brahmaputra river, and arrived at Singilung village. *17th.*—Arrived at Lharcha village. *18th.*—Arrived at Gnabring Thaka Tarjam. *19th.*—Arrived at foot of Rigu Tapjang monastery, situated on a hill. *20th.*—Arrived at Sang-Sang-Kao Tarjam; halted here one day. *22nd.*—Arrived at Ge camp. *23rd.*—Arrived at Sang-Sang-Giado Tarjam. *24th.*—Arrived at Gñangba-Yako camp. *25th.*—Arrived at Rakha Thazang Tarjam. *26th.*—Arrived at Chomukula Tarjam. *27th.*—Arrived at camp near Gyacho Jheel. *28th.*—Arrived at Sarka Jong. *29th.*—Arrived at Tagung camp. *30th.*—Ar-

rived at Srikarpo camp, after passing Niku Tarjam. 31st.—Arrived at Thuku camp.

*June 1st.*—Arrived at Tadúm monastery. *2nd.*—Left Tadúm, and after crossing Chachu stream, arrived at Birmalung camp, on the left bank of the Brahmaputra. The Brahmaputra river is called by the people in these parts by three names, Tamjan Khamba, Machang, and Gnarichu Sangpo. *3rd.*—Arrived at Tulu camp. *4th.*—Arrived at Dhuksum Tarjam; sheep, goats, yaks, and horses are seen in large numbers here; salt, which is got from Chaba, is bartered here for grain, brought from Muktinath and Jumla, this place producing no grain. *5th.*—Arrived at Demar camp. *6th.*—Arrived at Lahro camp. *7th.*—Arrived at Thamzang Tarjam; sheep, goats, yaks, &c., are seen here in large numbers, and salt is bartered for grain brought from Jumla; halted here one day. *9th.*—Arrived at Tha Khabjor; my servant here fell ill, and I was compelled to ask the assistance of my Ladáki companions for the prosecution of my work. *10th.*—Arrived at Gyamzar camp; halted here one day. *12th.*—Crossed Mariam La mountain, and arrived at Ugro Tarjam, situated near Gunk Yud-cho lake; this lake is about 10 miles in length and 2 miles in breadth. *13th.*—Arrived at Nukche camp. *14th.*—Arrived at Thokchan Tarjam, on the right bank of Some Chu stream; halted here one day. *16th.*—Arrived at Sarnia Unia camp, distant half a mile from bank of Mansarowar lake. *17th.*—Left Sarnia Unia camp this morning, and travelling fast arrived at Darchan, a large village. Here I met Supia Shopol, an inhabitant of the Kumaon district, through whose assistance I was enabled to discharge my debts, which had been accumulating since I left Lhása. The party whom I had accompanied hither went on to Gartokh, while I, in company with two of Supia's sons, started for Kumaon. I left my servant, who was ailing, at Darchan, as a security for the fulfilment of my promise to return and pay Supia all he had lent me. The watch I, however, could not redeem, but told the men who had possession of it to leave it at Gartokh, and that I would send the money to redeem it. *20th.*—Left Darchan this morning, and arrived at a camp, name not ascertained. *21st.*—Arrived at Gyanima camp. During the rains Darchan and this place are resorted to by many traders, who come here to dispose of their merchandize. *22nd.*—Arrived on the right bank of Chu Nago stream. *23rd.*—Arrived at Thazang camp, and was surprised to see the low hills in the vicinity covered with snow, in a way I had never seen before. The road over Kongribingri mountain was covered with snow, and rendered quite imprac-

licable, this caused me to journey on to Niti, but even this road was so much covered with snow, that, on crossing over a hill, I accidentally slipped, and the thermometer I was carrying fell and broke. I left Thazang this same day, and arrived at Ship camp. 24th.—Arrived at Nukchang camp, on bank of Sákchu stream. 25th.—The Sákchu stream was not fordable, so I travelled alongside it till we arrived at Dongpu village; there I was asked who I was; I answered that I was a Bhotiya, like themselves; but they refused to let me pass unless I showed them my authority for travelling thither. They told me if I had come from Tagla-Kote, as I said, to produce the passport of the Jongpon residing there. I told them I was on my way to Niti, but this did not satisfy them; and so they told me I must be detained till they had reported, and got back word from the Daba Jongpon. I was told that whenever the passes were opened news of the fact was sent officially to every village, and that none of the passes were yet open, hence their suspicion of me. On seeing their determination to stop my further progress, I told them that I had a passport from the Jongpon of Tagla-Kote, but had forgotten, and left it at Darchan, and, if they would not let me pass on, I would return to Darchan. They then informed me that they would allow me to return to Darchan, but could, on no account, let me pass for Niti, and with this, I returned three miles by the Darchan road, and struck out by a jungle-path over hills, &c., and arrived at night at Lamlung camp. From Dongpu to this place I was unable to continue my route-survey.

26th.—Arrived at Laphthal camp. Here I saw four Bhotiya soldiers, who were sent here to stop the progress of Major Brereton. They questioned me as to who I was, where I had come from, and whither I was going; my answer to them was that I had come from Niti, knowing this would not excite suspicion. This village is on the extreme border of the Lhasá territory. 27th.—Arrived at Khingur camp, where I met Major Brereton's camp. I halted here a portion of the next day, and was very kindly treated by Major Brereton. 28th.—Arrived at Topi Dhunga camp, where I left my servants, in consequence of one of them having been taken suddenly ill. 29th.—Crossed Utdhura or Untadhura pass, and thence made my way, through Kumaon and Gurhwal, to Masuri. My servant Chumbal, whom I had left at Darchan, rejoined me on the road, having quite recovered from his illness.

My brother, who had returned to the British territory some time before me, had been instructed to cross the passes, in order to assist me. I gave him my sextant, and told him to carry a

route-survey back to Dongpu (where I was forced to leave off), and thence to carry on the route-survey to Gartokh, in order to fix that place, and at the same time to redeem my watch, which the Ladákis had left there for me. My brother was successful in both these objects.

## OBSERVATIONS FOR LATITUDE TAKEN IN NEPAL, TIBET, &amp;C.,

| No. of Observations. | Astronomical Date. | Watch Time. | STATION.                                                                                                 | Object on Meridian.            | Upper or Lower Transit. |
|----------------------|--------------------|-------------|----------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------|
|                      | 1865.              | H. M. S.    |                                                                                                          |                                |                         |
| 1                    | Jan. 13..          | 10 5 0      | Morśádábád city, Atái mohalla, on the house of Janki.                                                    | $\alpha$ C. Maj. (Sirius)      | Upper                   |
| 2                    | „ 13..             | 11 40 0     | Ditto                                                                                                    | $\alpha$ C. Mino. (Procyon)    | ..                      |
| 3                    | „ 23..             | 8 32 50     | Bareilly city, on the western part in serai.                                                             | $\beta$ Orionis. (Rigel)       | ..                      |
| 4                    | „ 23..             | 16 34 50    | Ditto                                                                                                    | Polaris.                       | Lower                   |
| 5                    | „ 24..             | 10 48 52    | Ditto                                                                                                    | $\alpha$ C. Mino. (Procyon)    | Upper                   |
| 6                    | „ 28..             | 8 2 3       | Sháhjahánpur city, on the eastern part, in a garden.                                                     | $\beta$ Orionis. (Rigel)       | Upper                   |
| 7                    | „ 28..             | 9 35 5      | Ditto                                                                                                    | $\alpha$ C. Maj. (Sirius)      | ..                      |
| 8                    | March 7..          | 13 18 0     | Khatmandú city, on left bank of Bishnomati nadi, near lower bridge, in serai.                            | Polaris.                       | Lower                   |
| 9                    | „ 18..             | 12 51 0     | Ditto                                                                                                    | ..                             | ..                      |
| 10                   | „ 23..             | 6 32 32     | Ramchá village, on the road.                                                                             | $\alpha$ C. Mino. (Procyon)    | Upper                   |
| 11                   | „ 23..             | 8 17 42     | Ditto                                                                                                    | $\alpha$ Hydræ.                | ..                      |
| 12                   | „ 25..             | 8 10 12     | Shabrú, outside the village, on the bank of a small nadi.                                                | ..                             | ..                      |
| 13                   | „ 27..             | 6 9 38      | Raswágarhí, on the right bank of the Lendíchú, on the boundary line between Nepal and Tibet territories. | $\alpha$ C. Mino. (Procyon)    | ..                      |
| 14                   | „ 27..             | 8 0 31      | Ditto                                                                                                    | $\alpha$ Hydræ.                | ..                      |
|                      | July 30..          | 14 0 0      | Kiroñg city, on Chang-chú's house.                                                                       | $\alpha$ Pis. Aus. (Fomalhaut) | ..                      |
| 15                   | „ 31..             | 8 20 0      | Ditto                                                                                                    | Jupiter.                       | ..                      |
| 16                   | Aug. 31..          | 12 45 0     | Tallá Lhábrong, near Doñg.                                                                               | $\alpha$ Pis. Aus. (Fomalhaut) | ..                      |
| 17                   | „ 31..             | 15 10 30    | Ditto                                                                                                    | Polaris.                       | ..                      |

WITH AN ELLIOTT 6-INCH RADIUS SEXTANT, NO. 44.

| Double Altitude. | Single. | Index Error. | Deduced Latitudes. | Mean Latitudes. | REMARKS.                                                                                                                                                                                                                                                                                                                              |
|------------------|---------|--------------|--------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 89 18 0          | ..      | + 30"        | 28 49 27           | 28 50 18        | This latitude station is about 1½' s. of the kutcherry and 1' 20" E. of the said kutcherry, and according to G. T. Survey the kutcherry is in lat. 28° 51' 1", long. 78° 48' 36".                                                                                                                                                     |
| 133 25 50        | ..      | ..           | 28 51 8            |                 |                                                                                                                                                                                                                                                                                                                                       |
| 106 32 0         | ..      | ..           | 28 22 26           | 28 22 3         | This latitude station is about 20" s. of Bahadur Singh's house, and nearly in the same longitude. By G. T. Survey, Bahadur Singh's house is in lat. 28° 22' 9", long. 79° 26' 38".                                                                                                                                                    |
| 53 57 10         | ..      | ..           | 28 21 17           |                 |                                                                                                                                                                                                                                                                                                                                       |
| 134 23 30        | ..      | ..           | 28 22 16           |                 |                                                                                                                                                                                                                                                                                                                                       |
| 107 34 10        | ..      | ..           | 27 51 29           | 27 51 33        | This point is much the same as the G. T. Survey point in latitude, and about 1' E. of the said G. T. Survey point. The G. T. Survey point in Sháhjahánpur being lat. 27° 52' 55", long. 79° 57' 16", but the point itself cannot be exactly identified. The latitude given by the Pundit agrees with some of the G. T. Survey values. |
| 91 13 30         | ..      | ..           | 27 51 37           |                 |                                                                                                                                                                                                                                                                                                                                       |
| 52 36 30         | ..      | ..           | 27 41 11           | 27 41 28        | This point is rather more than a mile s. of the British Residency.                                                                                                                                                                                                                                                                    |
| 52 37 30         | ..      | ..           | 27 41 44           |                 |                                                                                                                                                                                                                                                                                                                                       |
| 135 5 50         | ..      | ..           | 28 1 1             | 28 1 33         |                                                                                                                                                                                                                                                                                                                                       |
| 107 46 50        | ..      | ..           | 28 2 4             |                 |                                                                                                                                                                                                                                                                                                                                       |
| 107 32 10        | ..      | ..           | 28 9 24            | 28 9 24         |                                                                                                                                                                                                                                                                                                                                       |
| 134 34 40        | ..      | ..           | 28 16 36           | 28 16 32        |                                                                                                                                                                                                                                                                                                                                       |
| 107 18 0         | ..      | ..           | 28 16 28           |                 |                                                                                                                                                                                                                                                                                                                                       |
| 62 2 80          | ..      | ..           | 28 27 5            |                 |                                                                                                                                                                                                                                                                                                                                       |
| 87 44 10         | ..      | ..           |                    | 29 13 21        |                                                                                                                                                                                                                                                                                                                                       |
| 60 53 30         | ..      | ..           | 29 14 8            |                 |                                                                                                                                                                                                                                                                                                                                       |
| 61 15 40         | ..      | ..           | 29 12 34           |                 |                                                                                                                                                                                                                                                                                                                                       |

## OBSERVATIONS FOR LATITUDE TAKEN IN NEPAL, TIBET, &amp;c.,

| No. of Observations. | Astronomical Date. | Watch Time.        | STATION.                                                                                             | Object on Meridian.        | Upper or Lower Transit. |
|----------------------|--------------------|--------------------|------------------------------------------------------------------------------------------------------|----------------------------|-------------------------|
| 18                   | 1865.<br>Sept. 9.. | H. M. S.<br>0 41 0 | Tadungunpá, near the monastery.                                                                      | Sun.<br>(Upper limb)       | Upper                   |
| 19                   | „ 11..             | 0 48 30            | Ditto                                                                                                | ..                         | ..                      |
| 20                   | „ 13..             | 11 44 0            | Ditto                                                                                                | a Pis. Aus.<br>(Fomalhaut) | ..                      |
| 21                   | „ 21..             | 0 15 0             | Ditto                                                                                                | Sun.                       | ..                      |
| 22                   | „ 21..             | 13 30 0            | Ditto                                                                                                | Polaris.                   | ..                      |
| 23                   | „ 22..             | 13 20 0            | Ditto                                                                                                | ..                         | ..                      |
| 24                   | „ 24..             | 0 0 0              | Ditto                                                                                                | Sun.                       | ..                      |
| 25                   | „ 25..             | 0 0 0              | Ditto                                                                                                | Sun.                       | ..                      |
| 26                   | „ 27..             | 16 36 0            | Ditto                                                                                                | β Orionis.<br>(Rigel)      | ..                      |
| 27                   | „ 29..             | 12 35 0            | Ditto                                                                                                | Polaris.                   | ..                      |
| 28                   | „ 30..             | 23 40 0            | Ditto                                                                                                | Sun.                       | ..                      |
| 29                   | Oct. 2..           | 23 41 0            | Ditto                                                                                                | ..                         | ..                      |
| 30                   | „ 10..             | 11 0 0             | Chomákúla Tarjum, Post Office.                                                                       | Polaris.                   | ..                      |
| 31                   | „ 15..             | 9 10 0             | Sang-sang-giádo Tarjum.                                                                              | a Pis. Aus.<br>(Fomalhaut) | ..                      |
| 32                   | „ 17..             | 15 45 0            | Sang-Sang-Kau Tarjum.                                                                                | β Orionis.<br>(Rigel)      | ..                      |
| 33                   | „ 19..             | 11 15 0            | Balung village, in the house of Gáñbo.                                                               | Polaris.                   | ..                      |
| 34                   | „ 20..             | 15 40 0            | Nabring-Khá-Khá Tarjum.                                                                              | β Orionis.<br>(Rigel)      | ..                      |
| 35                   | „ 22..             | 9 20 0             | Janglache city, in the Giá Khang (building for the accommodation of Chinese officials).              | a Pis. Aus.<br>(Fomalhaut) | ..                      |
| 36                   | „ 25..             | 15 44 0            | Tashlingh village, in the house of Gáñbo.                                                            | β Orionis.<br>(Rigel)      | ..                      |
| 37                   | „ 27..             | 11 55 0            | Jilungh village, in the Giá Khang                                                                    | Polaris.                   | ..                      |
| 38                   | „ 29..             | 15 50 0            | Shigátze, or Digarcha, city, in the Kun Khang (building for the accommodation of Chinese Officials). | β Orionis.<br>(Rigel)      | ..                      |
| 39                   | „ 31..             | 17 25 30           | Ditto                                                                                                | a C. Maj.<br>(Sirius)      | ..                      |
| 40                   | Nov. 3..           | 15 5 0             | Ditto                                                                                                | β Orionis.<br>(Rigel)      | ..                      |
| 41                   | „ 4..              | 0 24 0             | Ditto                                                                                                | Sun.                       | ..                      |
| 42                   | „ 5..              | 0 30 0             | Ditto                                                                                                | ..                         | ..                      |
| 43                   | „ 11..             | 11 10 0            | Ditto                                                                                                | Polaris.                   | ..                      |

WITH AN ELLIOTT 6-INCH RADIUS SEXTANT, No. 44—continued.

| Double Altitude. | Single. | Index Error. | Deduced Latitudes. | Mean Latitudes. | REMARKS.                                          |
|------------------|---------|--------------|--------------------|-----------------|---------------------------------------------------|
| 131 50 10        | ..      | + 30"        | 29 39 30           | 0 ' "           | Watch moved back 48m. 30s. after the observation. |
| 130 17 40        | ..      | ..           | 29 40 15           | ..              |                                                   |
| 60 3 0           | ..      | ..           | 29 39 26           |                 |                                                   |
| 122 35 20        | ..      | ..           | 29 39 56           |                 |                                                   |
| 62 7 20          | ..      | ..           | 29 38 29           |                 |                                                   |
| 62 7 10          | ..      | ..           | 29 38 25           | 29 39 21        | Watch was all right.                              |
| 120 16 0         | ..      | ..           | 29 39 26           |                 |                                                   |
| 119 29 10        | ..      | ..           | 29 39 27           |                 |                                                   |
| 103 58 30        | ..      | ..           | 29 39 25           |                 |                                                   |
| 62 8 0           | ..      | ..           | 29 38 52           |                 |                                                   |
| 115 35 10        | ..      | ..           | 29 39 31           |                 |                                                   |
| 114 2 10         | ..      | ..           | 29 39 28           |                 |                                                   |
| 61 32 40         | ..      | ..           | 29 21 17           | 29 21 17        |                                                   |
| 60 19 40         | ..      | ..           | 29 30 59           | 29 30 59        |                                                   |
| 104 26 0         | ..      | ..           | 29 25 39           | 29 25 39        |                                                   |
| 61 28 20         | ..      | ..           | 29 19 10           | 29 19 10        |                                                   |
| 104 45 30        | ..      | ..           | 29 15 55           | 29 15 55        |                                                   |
| 61 3 30          | ..      | ..           | 29 8 59            | 29 8 59         |                                                   |
| 104 36 10        | ..      | ..           | 29 20 34           | 29 20 34        |                                                   |
| 61 14 40         | ..      | ..           | 29 12 20           | 29 12 20        |                                                   |
| 104 45 20        | ..      | ..           | 29 16 1            |                 |                                                   |
| 88 23 40         | ..      | ..           | 29 16 32           |                 |                                                   |
| 104 44 10        | ..      | ..           | 16 36              |                 |                                                   |
| 91 11 30         | ..      | ..           | 16 40              |                 |                                                   |
| 90 34 30         | ..      | ..           | 16 49              |                 |                                                   |
| 61 2 40          | ..      | ..           | 16 20              | 29 16 32        | Watch was 35 m. fast.                             |



## OBSERVATIONS FOR LATITUDE TAKEN IN NEPAL, TIBET, &amp;c.,

| No. of Observations. | Astronomical Date. | Watch Time. | STATION.                                                                                                                                                           | Object on Meridian.       | Upper or Lower Transit. |
|----------------------|--------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------|
|                      | 1865.              | H. M. S.    |                                                                                                                                                                    |                           |                         |
| 44                   | Nov. 14..          | 0 0 0       | Shigátze, or Digarcha, city, in the Kun Khang (building for the accommodation of Chinese officials.)                                                               | Sun.                      | Upper                   |
| 45                   | „ 14..             | 13 46 0     | Ditto                                                                                                                                                              | $\beta$ Orionis. (Rigel)  | ..                      |
| 46                   | „ 16..             | 10 0 0      | Ditto                                                                                                                                                              | Polaris.                  | ..                      |
| 47                   | „ 17..             | 0 5 0       | Ditto                                                                                                                                                              | Sun.                      | ..                      |
| 48                   | „ 17..             | 9 48 0      | Ditto                                                                                                                                                              | Polaris.                  | ..                      |
| 49                   | „ 18..             | 9 40 0      | Ditto                                                                                                                                                              | ..                        | ..                      |
| 50                   | „ 21..             | 15 0 0      | Ditto                                                                                                                                                              | $\alpha$ C. Maj. (Sirius) | ..                      |
| 51                   | Dec. 23..          | 12 30 0     | Penájong, in the Giá Khang.                                                                                                                                        | ..                        | ..                      |
| 52                   | „ 27..             | 12 25 0     | Gyañgze city, near the fort, in the Kon Khan.                                                                                                                      | ..                        | ..                      |
| 53                   | „ 29..             | 10 45 0     | Gobjí village, in the Kun Khang.                                                                                                                                   | $\beta$ Orionis. (Rigel)  | ..                      |
|                      | 1866.              |             |                                                                                                                                                                    |                           |                         |
| 54                   | Jan. 1..           | 10 35 0     | Pyatejong village, near the fort, on the bank of a small lake named Yamdok-cho.                                                                                    | ..                        | ..                      |
| 55                   | „ 12..             | 17 30 0     | Lháśá city, near the temple of Jû or Machandranáth, in Dhiki Rabdan Tashilumbo-gí-Kháng-Sombá, (new house called Dhíkí Rabdan, the property of Tashilumbo temple). | Polaris.                  | Lower                   |
| 56                   | „ 13..             | 17 20 0     | Ditto                                                                                                                                                              | ..                        | ..                      |
| 57                   | „ 14..             | 9 27 0      | Ditto                                                                                                                                                              | $\beta$ Orionis. (Rigel)  | Upper                   |
| 58                   | „ 15..             | 9 25 0      | Ditto                                                                                                                                                              | ..                        | ..                      |
| 59                   | „ 16..             | 9 20 0      | Ditto                                                                                                                                                              | ..                        | ..                      |
| 60                   | „ 17..             | 0 12 0      | Ditto                                                                                                                                                              | Sun.                      | ..                      |
| 61                   | „ 17..             | 9 25 0      | Ditto                                                                                                                                                              | $\beta$ Orionis. (Rigel)  | ..                      |
| 62                   | „ 19..             | 9 15 0      | Ditto                                                                                                                                                              | ..                        | ..                      |
| 63                   | „ 20..             | 0 10 0      | Ditto                                                                                                                                                              | Sun.                      | ..                      |
| 64                   | „ 26..             | 16 55 0     | Ditto                                                                                                                                                              | Polaris.                  | Lower                   |
| 65                   | „ 27..             | 0 8 0       | Ditto                                                                                                                                                              | Sun.                      | Upper                   |
| 66                   | „ 28..             | 0 8 0       | Ditto                                                                                                                                                              | ..                        | ..                      |
| 67                   | „ 29..             | 0 5 0       | Ditto                                                                                                                                                              | ..                        | ..                      |

WITH AN ELLIOTT 6-INCH RADIUS SEXTANT, No. 44—continued.

| Double Altitude. | Single. | Index Error. | Deduced Latitudes. | Mean Latitudes. | REMARKS.                                                                                        |
|------------------|---------|--------------|--------------------|-----------------|-------------------------------------------------------------------------------------------------|
| 85 28 30         | ..      | + 30"        | 16 60              | 0 .. "          | Observation doubtful. Watch stopped on 13th, and was regulated and made to run on 14th, 12 P.M. |
| 104 44 10        | ..      | ..           | 16 34              |                 |                                                                                                 |
| 61 22 40         | ..      | ..           | 16 22              | ..              | Observation taken very correctly.                                                               |
| 83 58 0          | ..      | ..           | 16 49              |                 |                                                                                                 |
| 61 22 30         | ..      | ..           | 16 17              | ..              | Watch kept correct time.                                                                        |
| 61 22 40         | ..      | ..           | 16 22              |                 |                                                                                                 |
| 88 23 30         | ..      | ..           | 16 33              |                 |                                                                                                 |
| 88 35 10         | ..      | ..           | 29 10 37           | 29 10 37        |                                                                                                 |
| 89 5 0           | ..      | ..           | 28 55 37           | 28 55 37        |                                                                                                 |
| 105 36 30        | ..      | ..           | 28 50 17           | 28 50 17        |                                                                                                 |
| 105 4 50         | ..      | ..           | 29 6 4             | 29 6 4          |                                                                                                 |
| 56 31 30         | ..      | ..           | 29 38 44           |                 |                                                                                                 |
| 56 31 20         | ..      | ..           | 29 38 39           |                 |                                                                                                 |
| 103 59 10        | ..      | ..           | 38 55              |                 |                                                                                                 |
| 103 58 30        | ..      | ..           | 39 14              |                 |                                                                                                 |
| 103 59 0         | ..      | ..           | 29 38 59           |                 |                                                                                                 |
| 79 41 50         | ..      | ..           | 39 21              | ..              | Observation taken very correctly.                                                               |
| 103 58 40        | ..      | ..           | 39 9               | ..              | Ditto.                                                                                          |
| 103 58 30        | ..      | ..           | 39 14              | ..              | Ditto.                                                                                          |
| 80 56 0          | ..      | ..           | 39 23              | ..              | Observation taken correctly.                                                                    |
| 56 32 10         | ..      | ..           | 39 4               |                 |                                                                                                 |
| 84 15 10         | ..      | ..           | 39 21              | 29 39 17        | Ditto.                                                                                          |
| 84 46 40         | ..      | ..           | 39 10              | ..              | Altitude doubtful.                                                                              |
| 85 18 0          | ..      | ..           | 39 27              | ..              | No doubt, and taken correctly.                                                                  |

## OBSERVATIONS FOR LATITUDE TAKEN IN NEPAL, TIBET, &amp;C.,

| No. of Observations. | Astronomical Date. | Watch Time. | STATION.                                                                                                                                                           | Object on Meridian.                     | Upper or Lower Transit. |
|----------------------|--------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------|
|                      | 1866.              | H. M. S.    |                                                                                                                                                                    |                                         |                         |
| 68                   | Jan. 31..          | 0 10 0      | Lhasá city, near the temple of Jû or Machandranáth, in Dhiki Rabdan Tashilumbo-gi-Kháng-Sombá, (new house called Dhiki Rabdan, the property of Tashilumbo temple). | Sun.                                    | Upper                   |
| 69                   | Feb. 6..           | 8 30 0      | Ditto                                                                                                                                                              | $\beta$ Orionis. ( <i>Rigel</i> )       | ..                      |
| 70                   | „ 9..              | 0 0 0       | Ditto                                                                                                                                                              | Sun.                                    | ..                      |
| 71                   | „ 10..             | 0 0 0       | Ditto                                                                                                                                                              | ..                                      | ..                      |
| 72                   | „ 13..             | 9 0 0       | Ditto                                                                                                                                                              | $\alpha$ C. Maj. ( <i>Sirius</i> )      | ..                      |
| 73                   | „ 26..             | 8 10 0      | Ditto                                                                                                                                                              | ..                                      | ..                      |
| 74                   | March 3..          | 8 0 0       | Ditto                                                                                                                                                              | ..                                      | ..                      |
| 75                   | June 17..          | 10 0 0      | Darchan village, at the base of the Kailas Peak, on Dung Khang (serai).                                                                                            | $\alpha$ Scorpii. ( <i>Antares</i> )    | ..                      |
| 76                   | „ 21..             | 7 15 0      | Gyánimá Mandí .. .. .                                                                                                                                              | Polaris.                                | Lower                   |
| 77                   | Sept. 23..         | 11 0 0      | Sankú Dhurá .. .. .                                                                                                                                                | $\alpha$ Pis. Aus. ( <i>Fomalhaut</i> ) | Upper                   |
| 78                   | „ 24..             | 0 0 0       | Ditto                                                                                                                                                              | Sun.                                    | ..                      |
| 79                   | „ 30..             | 17 45 0     | Kap kot village, near a bungalow                                                                                                                                   | $\beta$ Orionis. ( <i>Rigel</i> )       | ..                      |
| 80                   | Oct. 1..           | 10 0 0      | Bágéshwar, near the bridge .. ..                                                                                                                                   | $\alpha$ Pis. Aus. ( <i>Fomalhaut</i> ) | ..                      |
| 81                   | „ 4..              | 10 0 0      | Almorah city, near the walls of Narain Tewari and the temple, in serai.                                                                                            | $\alpha$ Pis. Aus. ( <i>Fomalhaut</i> ) | ..                      |
| 82                   | „ 5..              | ..          | Ditto                                                                                                                                                              | ..                                      | ..                      |
| 83                   | „ 9..              | 0 0 0       | Bogoálipokhar, in the school ..                                                                                                                                    | Sun.                                    | ..                      |
| 84                   | „ 9..              | 10 0 0      | Ditto                                                                                                                                                              | $\alpha$ Pis. Aus. ( <i>Fomalhaut</i> ) | ..                      |
| 85                   | „ 10..             | 9 45 0      | Doráhát .. .. .                                                                                                                                                    | ..                                      | ..                      |
| 86                   | „ 13..             | 9 30 0      | Thángáon .. .. .                                                                                                                                                   | ..                                      | ..                      |
| 87                   | „ 14..             | ..          | Kanúrgáon, near the bungalow ..                                                                                                                                    | ..                                      | ..                      |
| 88                   | „ 15..             | 9 0 0       | Chiphalghát village, near the bungalow.                                                                                                                            | ..                                      | ..                      |
| 89                   | „ 16..             | ..          | Paori village, in the yard of Lachman Sing, patwarí.                                                                                                               | ..                                      | ..                      |

WITH AN ELLIOTT 6-INCH RADIUS SEXTANT, No. 44—continued.

| Double Altitude. |    |    | Single. | Index Error. | Deduced Latitudes. |    |    | Mean Latitudes. |    |    | REMARKS.                                                       |
|------------------|----|----|---------|--------------|--------------------|----|----|-----------------|----|----|----------------------------------------------------------------|
| °                | '  | "  |         |              | °                  | '  | "  | °               | '  | "  |                                                                |
| 86               | 23 | 20 | ..      | + 30"        | 39                 | 35 |    | ..              |    |    | Seen on meridian, but doubtful.                                |
| 103              | 85 | 30 | ..      | ..           | 39                 | 12 |    | ..              |    |    | Watch stopped, time was taken by supposition.                  |
| 91               | 47 | 50 | ..      | ..           | 39                 | 29 |    | ..              |    |    | Watch was set at 12 o'clock noon, observation taken correctly. |
| 92               | 26 | 20 | ..      | ..           | 39                 | 34 |    | ..              |    |    | Observation taken correctly.                                   |
| 87               | 36 | 20 | ..      | ..           | 39                 | 51 |    |                 |    |    |                                                                |
| 87               | 36 | 30 | ..      | ..           | 39                 | 44 |    |                 |    |    |                                                                |
| 87               | 36 | 30 | ..      | ..           | 39                 | 43 |    | ..              |    |    | No watch, time taken by supposition.                           |
| 65               | 44 | 30 | ..      | ..           | 31                 | 0  | 28 | 31              | 0  | 28 | Ditto.                                                         |
| 58               | 51 | 0  | ..      | ..           | 30                 | 49 | 14 | 30              | 49 | 14 | Ditto.                                                         |
| 59               | 20 | 50 | ..      | - 7' 10"     | 30                 | 4  | 56 | 30              | 5  | 19 | Ditto.                                                         |
| 119              | 42 | 20 | ..      | ..           | 30                 | 5  | 41 | ..              |    |    | Ditto.                                                         |
| 103              | 31 | 10 | ..      | ..           | 29                 | 57 | 11 | 29              | 57 | 11 | Ditto.                                                         |
| 59               | 48 | 40 | ..      | ..           | 29                 | 51 | 8  | ..              |    |    | Ditto.                                                         |
| 60               | 15 | 40 | ..      | ..           | 29                 | 37 | 32 | ..              |    |    | Ditto.                                                         |
| ..               | .. | .. | ..      | ..           | 29                 | 37 | 32 | 29              | 37 | 32 | Ditto.                                                         |
| 108              | 46 | 50 | ..      | ..           | 29                 | 44 | 54 | ..              |    |    | Ditto.                                                         |
| 61               | 1  | 50 | ..      | ..           | 29                 | 14 | 28 | ..              |    |    | Ditto.                                                         |
| 59               | 56 | 0  | ..      | ..           | 29                 | 47 | 21 | 29              | 47 | 21 | Ditto.                                                         |
| 59               | 31 | 20 | ..      | ..           | 29                 | 59 | 43 | 29              | 59 | 43 | Ditto.                                                         |
| 59               | 27 | 40 | ..      | ..           | 30                 | 1  | 29 | 30              | 1  | 29 | Ditto.                                                         |
| 59               | 15 | 10 | ..      | ..           | 30                 | 7  | 53 | 30              | 7  | 53 | Ditto.                                                         |
| 59               | 11 | 40 | ..      | ..           | 30                 | 9  | 31 | 30              | 9  | 31 | Ditto.                                                         |

## OBSERVATIONS FOR LATITUDE TAKEN IN NEPAL, TIBET, &amp;C.,

| No. of Observations. | Astronomical Date. | Watch Time. |    |    | STATION.                                         | Object on Meridian.               | Upper or Lower Transit. |
|----------------------|--------------------|-------------|----|----|--------------------------------------------------|-----------------------------------|-------------------------|
|                      |                    | H.          | M. | S. |                                                  |                                   |                         |
| 90                   | 1866.<br>Oct. 17.. | 0           | 0  | 0  | Sri-nagar city .. .. .                           | Sun.                              | Upper                   |
| 91                   | .. 17..            | 11          | 0  | 0  | Ditto                                            | Polaris.                          | ..                      |
| 92                   | .. 18..            | 8           | 45 | 0  | Ditto                                            | $\alpha$ Pis. Aus.<br>(Fomalhaut) | ..                      |
| 93                   | .. 19..            | 0           | 0  | 0  | Ditto                                            | Sun.                              | ..                      |
| 94                   | .. 23..            | 8           | 45 | 0  | Jolingh village, in the yard of Kalmu, zamindar. | $\alpha$ Pis. Aus.<br>(Fomalhaut) | ..                      |
| 95                   | .. 25..            | 8           | 45 | 0  | Dhanolti, near the bungalow ..                   | ..                                | ..                      |
| 96                   | Sept. 5..          | 11          | 0  | 0  | Gartokh, on parade ground ..                     | ..                                | ..                      |
| 97                   | .. 6..             | ..          | .. | .. | Namáchia .. .. .                                 | ..                                | ..                      |
| 98                   | .. 10..            | ..          | .. | .. | Dongpú village, in the house of Chikpúá Darkia.  | ..                                | ..                      |
| 99                   | .. 11..            | ..          | .. | .. | Nagbo village .. .. .                            | ..                                | ..                      |

WITH AN ELLIOTT 6-INCH RADIUS SEXTANT, No. 44—continued.

| Double Altitude. | Single. | Index Error. | Deduced Latitudes. | Mean Latitudes. | REMARKS.                             |
|------------------|---------|--------------|--------------------|-----------------|--------------------------------------|
| 101 49 30        | ..      | - 7' 10"     | 30 13 52           | 0 .. "          | No watch, time taken by supposition. |
| 63 21 40         | ..      | ..           | 11 51              | ..              |                                      |
| 59 4 20          | ..      | ..           | 13 17              | 30 13 10        | Ditto.                               |
| 100 22 30        | ..      | ..           | 13 38              | ..              | Ditto.                               |
| 58 41 30         | ..      | ..           | 30 24 38           | 30 24 38        | Ditto.                               |
| 58 39 0          | ..      | ..           | 30 25 49           | 30 25 49        | Ditto.                               |
| 55 57 10         | ..      | -2' 30"      | 31 44 14           | 31 44 14        | Ditto.                               |
| 56 11 30         | ..      | ..           | 31 37 5            | 31 37 5         | Ditto.                               |
| 57 9 10          | ..      | ..           | 31 8 12            | 31 8 12         | Ditto.                               |
| 57 11 0          | ..      | ..           | 31 7 17            | 31 7 17         | Ditto.                               |

## OBSERVATIONS OF THE BOILING

| No. of Station. | Astronomical Date.                     | Watch Time.     | STATION.                                                                                      |
|-----------------|----------------------------------------|-----------------|-----------------------------------------------------------------------------------------------|
|                 | 1867.                                  | H. M.           |                                                                                               |
|                 | June 3 ..                              | 3 0             | Mussoorie G. T. S. Office .. .. .                                                             |
|                 | 1865.                                  |                 |                                                                                               |
|                 | April { <sup>14</sup> <sub>18</sub> .. | 0 35)<br>20 28) | Almorah .. .. .                                                                               |
| 1               | Mar. 10 ..                             | 0 45            | Khatmandú city, on the left bank of Bish-nomati river near lower bridge, in serai.            |
| 2               | .. 16 ..                               | 20 18           | Ditto .. .. .                                                                                 |
| 3               | .. 23 ..                               | 18 7            | Ramcha village, on the road .. .. .                                                           |
| 4               | .. 27 ..                               | 16 58           | Raswágarhí, on the right bank of Lendíchú nadi, on the boundary line between Nepal and Tibet. |
| 5               | April 5 ..                             | 22 24           | Deobung, on the serai .. .. .                                                                 |
| 6               | July 21 ..                             | 20 41           | Kiroñg town, on Chang Chu's house .. ..                                                       |
| 7               | .. 31 ..                               | 1 50            | Ditto .. .. .                                                                                 |
| 8               | Aug. 14 ..                             | 1 49            | Thotang village .. .. .                                                                       |
| 9               | .. 16 ..                               | 23 35           | Lajúk Thumbá, top of pass .. .. .                                                             |
| 10              | .. 17 ..                               | 19 53           | Kolung chúksá .. .. .                                                                         |
| 11              | .. 19 ..                               | 6 55            | Junka village .. .. .                                                                         |
| 12              | .. 20 ..                               | 22 57           | Lachúmúphúrphúr, top of pass .. .. .                                                          |
| 13              | .. 25 ..                               | 22 29           | Gyálá, hill top .. .. .                                                                       |
| 14              | .. 26 ..                               | 5 18            | Súmnath .. .. .                                                                               |
| 15              | .. 27 ..                               | 0 17            | Gno-lá, crest of pass .. .. .                                                                 |
| 16              | .. 31 ..                               | 4 58            | Tallalabrong, near Dong .. .. .                                                               |
| 17              | Sept. 7 ..                             | 22 0            | Tadumgunpá, near the temple .. .. .                                                           |
| 18              | .. 25 ..                               | 21 46           | Ditto .. .. .                                                                                 |
| 19              | .. 26 ..                               | 4 0             | Ditto .. .. .                                                                                 |
| 20              | Oct. 25 ..                             | 6 30            | Tashiling village, in the house of Ganbo ..                                                   |

POINT IN NEPAL, TIBET, &C.

| THERMOMETER. |                | THERMOMETER. |         | Deduced height above Sea. | REMARKS.                                                                                                                                            |
|--------------|----------------|--------------|---------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| No.          | Boiling Point. | No.          | In Air. |                           |                                                                                                                                                     |
| 22           | 201·18         | ..           | 81·0    | ..                        | Height determined trigonometrically 6923·2.                                                                                                         |
| 7            | 203·25         | ..           | 64·0    | ..                        | { Height determined trigonometrically 5400·0.                                                                                                       |
| 22           | 206·00         | 10           | 67·50   | 4,044·5                   |                                                                                                                                                     |
| ..           | 206·25         | ..           | 54·75   | ..                        | Clear sky; gentle south wind blowing. This point is about 200 feet below the Residency, which, according to these observations, would be 4244 feet. |
| ..           | 203·00         | ..           | 53·00   | 5,874·9                   | Clear sky; no wind blowing.                                                                                                                         |
| ..           | 202·95         | ..           | 55·50   | 5,901·0                   | Gentle east wind blowing.                                                                                                                           |
| ..           | 207·70         | ..           | 70·00   | 3,144·0                   | N.E. wind blowing; sky somewhat cloudy.                                                                                                             |
| 7            | 196·80         | 6            | 64·50   | 9,074·6                   | South wind blowing; sky cloudy near the horizon only.                                                                                               |
| ..           | 197·00         | ..           | 71·50   | ..                        | S.E. wind blowing; sky cloudy on all sides.                                                                                                         |
| ..           | 194·20         | ..           | 58·50   | 10,619·1                  | South wind blowing; sky cloudy near the horizon; bright sunshine.                                                                                   |
| ..           | 186·00         | ..           | 47·50   | 15,391·8                  | Strong S. wind blowing; rain falling.                                                                                                               |
| ..           | 191·80         | ..           | 51·25   | 11,984·4                  | Strong W. wind blowing; slight rain falling.                                                                                                        |
| ..           | 195·20         | ..           | 60·00   | 10,035·6                  | No wind; cloudy sky.                                                                                                                                |
| ..           | 192·60         | ..           | 63·25   | 11,590·3                  | Ditto.                                                                                                                                              |
| ..           | 183·80         | ..           | 45·00   | 16,679·3                  | South wind; bright sunshine.                                                                                                                        |
| ..           | 188·40         | ..           | 57·75   | 14,043·2                  | Gentle west wind; cloudy sky.                                                                                                                       |
| ..           | 184·00         | ..           | 51·25   | 16,622·9                  | Ditto.                                                                                                                                              |
| ..           | 187·40         | ..           | 55·00   | 14,617·0                  | Slight N.W. wind; clear.                                                                                                                            |
| ..           | 188·00         | ..           | 48·75   | 14,187·4                  | No wind; rather cloudy sky.                                                                                                                         |
| ..           | 188·10         | ..           | 47·50   | ..                        | Gentle north wind; clear sky.                                                                                                                       |
| ..           | 188·00         | ..           | 52·00   | ..                        | No wind; clear sky.                                                                                                                                 |
| ..           | 188·80         | ..           | 53·50   | 13,774·1                  | Ditto.                                                                                                                                              |
|              |                |              |         |                           | North wind; clear sky.                                                                                                                              |



## OBSERVATIONS OF THE BOILING

| No. of Station. | Astronomical Date. | Watch Time. | STATION.                                                                                       |
|-----------------|--------------------|-------------|------------------------------------------------------------------------------------------------|
|                 | 1865.              | H. M.       |                                                                                                |
| 21              | Nov. 3 ..          | 19 26       | Shigátze, or Digarcha, city, in the Kon Khan (building for the accommodation of the public).   |
| 22              | „ 14 ..            | 4 0         | Ditto .. .. .                                                                                  |
| 23              | „ „ ..             | 10 0        | Ditto .. .. .                                                                                  |
| 24              | „ „ ..             | 16 0        | Ditto .. .. .                                                                                  |
| 25              | „ „ ..             | 22 0        | Ditto .. .. .                                                                                  |
| 26              | Dec. 28 ..         | 20 0        | Gobji village, Kon Khan .. .. .                                                                |
|                 | 1866.              |             |                                                                                                |
| 27              | Jan. 12 ..         | 4 0         | Lhásá city, near the temple of Jû or Machandranáth, in Dhiki-Rabdan-Tashilumbo-gi-Khang-somba. |
| 28              | Feb. 9 ..          | 1 0         | Lhásá city, near temple of Jhû or Machindranáth, in Dhiki-Rabdan-Tashilumbo-gi-Khang-Sumba.    |
| 29              | „ 9 ..             | 4 0         | Ditto .. .. .                                                                                  |
| 30              | „ 9 ..             | 10 0        | Ditto .. .. .                                                                                  |
| 31              | „ 9 ..             | 16 0        | Ditto .. .. .                                                                                  |
| 32              | „ 9 ..             | 22 0        | Ditto .. .. .                                                                                  |
| 33              | April 22 ..        | 7 0         | Chúshúl jong, on left bank of the Brahmaputra river.                                           |
| 34              | „ 24 ..            | ..          | Piáhte jong village, near the fort, on the bank of a lake named Yamdok-cho.                    |
| 35              | „ 26 ..            | 1 30        | Kháro-lá, crest of pass .. .. .                                                                |
| 36              | „ 26 ..            | 5 30        | Ralung village, Giakhung .. .. .                                                               |
| 37              | „ 27 ..            | 20 30       | Giangze city, near the fort Kun Khang ..                                                       |
| 38              | May 9 ..           | 23 30       | Silkar village, in house of Ganbo .. ..                                                        |
| 39              | „ 14 ..            | 3 30        | Jangláche city, in Giakhung (building for the accommodation of Chinese officials).             |
| 40              | „ 17 ..            | 22 30       | Nabring Khá Khá Tarjum .. .. .                                                                 |
| 41              | „ 20 ..            | 1 0         | Sang-sang Kau Tarjum .. .. .                                                                   |
| 42              | June 11 ..         | 20 0        | Mariam-lá, crest of pass, on the boundary-line between Nari-Khorsum and Dokhtal.               |
| 43              | „ 17 ..            | 6 0         | Darchan village, at base of the Kailás mountain, on Dung Khang (serai).                        |
| 44              | „ 21 ..            | 6 30        | Gianima-mandi .. .. .                                                                          |

POINT IN NEPAL, TIBET, &c.—continued.

| THERMOMETER. |                | THERMOMETER. |         | Deducted height above Sea. | REMARKS.                                                                                |
|--------------|----------------|--------------|---------|----------------------------|-----------------------------------------------------------------------------------------|
| No.          | Boiling Point. | No.          | In Air. |                            |                                                                                         |
| ..           | 192·00         | ..           | 38·25   | ..                         | North wind; clear sky.                                                                  |
| ..           | 191·95         | ..           | 49·75   | ..                         | West wind; clear sky.                                                                   |
| ..           | 192·00         | ..           | 47·25   | 11,822·4                   | Slight north wind; clear sky.                                                           |
| ..           | 192·00         | ..           | 32·50   | ..                         | Ditto.                                                                                  |
| ..           | 191·90         | ..           | 36·50   | ..                         | No wind; clear sky.                                                                     |
| ..           | 188·60         | ..           | 40·00   | 13,779·8                   | South-east wind; clear sky.                                                             |
| ..           | 192·20         | ..           | 36·25   | ..                         | No wind; sky very cloudy.                                                               |
| 7            | 191·90         | 6            | 43·50   | ..                         | West wind; clouds here and there in the sky.                                            |
| ..           | 192·10         | ..           | 40·50   | ..                         | Ditto; cloudy sky.                                                                      |
| ..           | 192·20         | ..           | 33·50   | ..                         | Gentle south-west wind; sky cloudy near horizon only.                                   |
| ..           | 192·20         | ..           | 32·50   | ..                         | Very faint west wind; clear sky.                                                        |
| ..           | 192·20         | ..           | 32·00   | 11,699·1                   | No wind; clear sky.                                                                     |
| ..           | 192·90         | ..           | 50·00   | 11,334·3                   | From this time date time taken by supposition. East wind blowing violently; cloudy sky. |
| ..           | 188·80         | ..           | 40·00   | 13,663·1                   | Light north-east wind; clear sky.                                                       |
| ..           | 183·80         | ..           | 48·00   | 16,711·7                   | Gentle west wind; clear sky.                                                            |
| ..           | 188·20         | ..           | 38·00   | 13,996·6                   | Strong south wind; cloudy sky.                                                          |
| ..           | 190·30         | ..           | 55·00   | 12,895·2                   | Gentle east wind; sky somewhat cloudy near the horizon.                                 |
| ..           | 190·40         | ..           | 52·00   | ..                         | North wind blowing strongly; clear sky.                                                 |
| ..           | 189·40         | ..           | 74·00   | 13,579·8                   | West wind; clear sky.                                                                   |
| ..           | 189·30         | ..           | 54·50   | 13,486·1                   | North wind; clear sky.                                                                  |
| ..           | 188·20         | ..           | 61·50   | 14,203·1                   | Strong north wind; sky cloudy.                                                          |
| ..           | 185·80         | ..           | 43·00   | 15,462·3                   | Gentle east wind; clear sky.                                                            |
| ..           | 187·60         | ..           | 53·50   | 14,489·0                   | North-east wind; clear sky.                                                             |
| ..           | 188·60         | ..           | 49·75   | 13,860·2                   | South wind blowing violently; clear sky.                                                |

## OBSERVATIONS OF THE BOILING

| No. of Station. | Astronomical Date. | Watch Time. | STATION.                                     |
|-----------------|--------------------|-------------|----------------------------------------------|
|                 | 1865.              | H. M.       |                                              |
| 1               | July 22 ..         | 9 0         | Trisúli hathi .. .. .                        |
| 2               | Aug. 5 ..          | Noon        | Muktináth, at Rani-ka-páwá .. .. .           |
| 3               | „ 7 ..             | 3 0         | Denjiá-lá.. .. .                             |
| 4               | Sept. 15 ..        | 6 0         | Jumla, at Tattapani village .. .. .          |
| 5               | Oct. 2 ..          | 6 0         | Bharat village .. .. .                       |
| 6               | „ 5 ..             | 6 0         | Ditto .. .. .                                |
| 7               | „ 5 ..             | 2 0         | Ditto .. .. .                                |
| 8               | „ 8 ..             | 7 0         | Bank of Karnáli river .. .. .                |
| 9               | „ 15 ..            | 6 0         | Shilgarhi, at Painkhán .. .. .               |
| 10              | „ 16 ..            | 6 0         | Ditto .. .. .                                |
| 11              | „ 20 ..            | 7 0         | Seti-ghát, on bank of the Seti river .. .. . |
| 12              | „ 24 ..            | 2 0         | Ganghushia .. .. .                           |
| 13              | „ 29 ..            | 6 0         | Jhulghát, on bank of the Káli river .. .. .  |
| 14              | „ 29 ..            | 1 0         | Ditto .. .. .                                |
| 15              | „ 29 ..            | 6 0         | Ditto .. .. .                                |
| 16              | Nov. 11 ..         | 6 30        | Petoragarh, near bangla of khazanchi .. .. . |
| 17              | „ 13 ..            | 7 0         | Ditto .. .. .                                |
| 18              | „ 15 ..            | 7 0         | Ditto .. .. .                                |
| 19              | „ 20 ..            | 6 0         | Ditto .. .. .                                |
| 20              | „ 28 ..            | 1 30        | Bank of Sarjú river, near bridge .. .. .     |
| 21              | „ 29 ..            | 0 30        | Burjageshur, at temple on the hill .. .. .   |

POINT IN NEPAL, TIBET, &c.—continued.

| THERMOMETER. |                   | THERMOMETER. |         | Deducted<br>Height above<br>Sea. | REMARKS. |
|--------------|-------------------|--------------|---------|----------------------------------|----------|
| No.          | Boiling<br>Point. | No.          | In Air. |                                  |          |
| 22           | 210° 0            | 10           | 84° 25  | 1,760·6                          |          |
| ,,           | 190° 80           | ,,           | 61° 25  | 13,086·0                         |          |
| ,,           | 183° 80           | ,,           | 55° 0   | 17,310·9                         |          |
| ,,           | 199° 80           | ,,           | 69° 0   | 7,784·1                          |          |
| ,,           | 202° 50           | ,,           | 59° 0   | 6,158·2                          |          |
| ,,           | 202° 50           | ,,           | 57° 50  | 6,158·9                          |          |
| ,,           | 202° 50           | ,,           | 75° 50  | 6,145·4                          |          |
| ,,           | 209° 25           | ,,           | 64° 50  | 2,280·5                          |          |
| ,,           | 204° 50           | ,,           | 75° 50  | 4,978·2                          |          |
| ,,           | 204° 50           | ,,           | 65° 25  | 4,999·5                          |          |
| ,,           | 211° 0            | ,,           | 60° 0   | 1,311·5                          |          |
| ,,           | 200° 20           | ,,           | 56° 25  | 7,491·3                          |          |
| ,,           | 210° 40           | ,,           | 50° 75  | 1,694·6                          |          |
| ,,           | 210° 40           | ,,           | 64° 75  | 1,626·2                          |          |
| 22           | 210° 40           | 10           | 59° 50  | 1,650·6                          |          |
| ,,           | 203° 40           | ,,           | 46° 25  | 5,642·9                          |          |
| ,,           | 203° 40           | ,,           | 46° 75  | ..                               |          |
| ,,           | 203° 40           | ,,           | 47° 75  | ..                               |          |
| ,,           | 203° 50           | ,,           | 44° 25  | ..                               |          |
| ,,           | 208° 50           | ,,           | 60° 0   | 2,727·4                          |          |
| ,,           | 200° 40           | ,,           | 55° 75  | 7,374·7                          |          |

## OBSERVATIONS OF THE TEMPERATURE OF THE AIR AT SHIGÁTZE, OR DIGARCHA, A LARGE TOWN IN GREAT TIBET, 11,800 FEET ABOVE THE SEA.

| DATE.      | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                               |
|------------|-------|-----------------------|-------------------|----------------------------------------|
| 1865.      |       |                       |                   |                                        |
| Nov. 14 .. | 1     | 6                     | 41·50             | Very slight wind from S.W.; clear sky. |
| .. 14 ..   | 2     | ..                    | 43·25             | Wind lulled. ditto.                    |
| .. 14 ..   | 3     | ..                    | 44·25             | Slight wind from W.; ditto.            |
| .. 14 ..   | 4     | ..                    | 49·75             | Ditto W.; ditto.                       |
| .. 14 ..   | 5     | ..                    | 49·50             | Ditto W.; ditto.                       |
| .. 14 ..   | 6     | ..                    | 50·0              | Ditto W.; ditto.                       |
| .. 14 ..   | 7     | ..                    | 50·50             | Ditto W.; ditto.                       |
| .. 14 ..   | 8     | ..                    | 49·0              | Strong wind from W.; ditto.            |
| .. 14 ..   | 9     | ..                    | 48·0              | Ditto W.; ditto.                       |
| .. 14 ..   | 10    | ..                    | 47·25             | Slight wind from N.; ditto.            |
| .. 14 ..   | 11    | ..                    | 44·50             | Ditto S.E.; ditto.                     |
| .. 14 ..   | 12    | ..                    | 43·0              | Ditto S.E.; ditto.                     |
| .. 14 ..   | 13    | ..                    | 40·25             | Ditto S.; ditto.                       |
| .. 14 ..   | 14    | ..                    | 38·0              | Ditto E.; ditto.                       |
| .. 14 ..   | 15    | ..                    | 34·25             | Ditto W.; ditto.                       |
| .. 14 ..   | 16    | ..                    | 32·50             | Ditto N.; ditto.                       |
| .. 14 ..   | 17    | ..                    | 31·75             | Very slight wind from N.E.; ditto.     |
| .. 14 ..   | 18    | ..                    | 30·25             | Ditto N.E.; ditto.                     |
| .. 14 ..   | 19    | ..                    | 33·50             | Ditto N.E.; ditto.                     |
| .. 14 ..   | 20    | ..                    | 34·50             | Ditto N.E.; ditto.                     |
| .. 14 ..   | 21    | ..                    | 34·25             | Wind lulled. ditto.                    |
| .. 14 ..   | 22    | ..                    | 36·50             | Ditto ditto.                           |
| .. 14 ..   | 23    | ..                    | 38·75             | Ditto ditto.                           |
| .. 14 ..   | 24    | ..                    | 41·0              | Ditto ditto.                           |
| .. 15 ..   | 1     | ..                    | 43·50             | Ditto ditto.                           |
| .. 15 ..   | 2     | ..                    | 45·25             | Ditto ditto.                           |
| .. 15 ..   | 3     | ..                    | 45·75             | Ditto ditto.                           |
| .. 15 ..   | 4     | ..                    | 46·25             | Ditto ditto.                           |
| .. 15 ..   | 5     | ..                    | 44·50             | Ditto ditto.                           |
| .. 15 ..   | 6     | ..                    | 43·50             | Ditto ditto.                           |
| .. 15 ..   | 7     | ..                    | 47·0              | Ditto ditto.                           |
| .. 15 ..   | 8     | ..                    | 45·50             | Ditto ditto.                           |
| .. 15 ..   | 19    | ..                    | 32·25             | Ditto ditto.                           |
| .. 15 ..   | 20    | ..                    | 32·50             | Ditto ditto.                           |
| .. 15 ..   | 21    | ..                    | 32·50             | Ditto ditto.                           |
| .. 15 ..   | 22    | ..                    | 33·50             | Ditto ditto.                           |
| .. 15 ..   | 23    | ..                    | 34·75             | Ditto ditto.                           |
| .. 15 ..   | 24    | ..                    | 36·0              | Ditto ditto.                           |
| .. 16 ..   | 1     | ..                    | 38·75             | Wind slight from N.E.; ditto.          |
| .. 16 ..   | 2     | ..                    | 39·25             | Wind lulled. ditto.                    |
| .. 16 ..   | 3     | ..                    | 41·50             | Ditto ditto.                           |
| .. 16 ..   | 4     | ..                    | 42·50             | Ditto ditto.                           |
| .. 16 ..   | 5     | ..                    | 41·25             | Ditto ditto.                           |
| .. 16 ..   | 6     | ..                    | 42·25             | Wind slight from N.; ditto.            |
| .. 16 ..   | 7     | ..                    | 44·25             | Wind lulled. ditto.                    |
| .. 16 ..   | 8     | ..                    | 41·25             | Wind slight from W.; ditto.            |
| .. 16 ..   | 9     | ..                    | 39·25             | Ditto S.; ditto.                       |
| .. 16 ..   | 10    | ..                    | 39·0              | Ditto S.; ditto.                       |
| .. 16 ..   | 19    | ..                    | 30·75             | Ditto S.; ditto.                       |

OBSERVATIONS OF TEMPERATURE OF AIR AT SHIGATZE, &c.—continued.

| DATE.      | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                                              |
|------------|-------|-----------------------|-------------------|-------------------------------------------------------|
| 1865.      |       |                       |                   |                                                       |
| Nov. 16 .. | 20    | 6                     | 30·75             | Wind slight from S.; clear sky.                       |
| „ 16 ..    | 21    | ..                    | 30·75             | Ditto S.; ditto.                                      |
| „ 16 ..    | 22    | ..                    | 32·75             | Ditto S.; ditto.                                      |
| „ 16 ..    | 23    | ..                    | 35· 0             | Wind lulled. ditto.                                   |
| „ 16 ..    | 24    | ..                    | 37·50             | Ditto ditto.                                          |
| „ 17 ..    | 1     | ..                    | 39·50             | Slight wind from S.; ditto.                           |
| „ 17 ..    | 2     | ..                    | 42·75             | Wind lulled ditto.                                    |
| „ 17 ..    | 3     | ..                    | 43·50             | Slight wind from W.; ditto.                           |
| „ 17 ..    | 4     | ..                    | 49·50             | Hurricane from W.; ditto.                             |
| „ 17 ..    | 5     | ..                    | 46·75             | Ditto W.; ditto.                                      |
| „ 17 ..    | 6     | ..                    | 47· 0             | Very slight wind from W.; ditto.                      |
| „ 17 ..    | 7     | ..                    | 48· 0             | Strong wind from W.; ditto.                           |
| „ 17 ..    | 8     | ..                    | 46·50             | Ditto W.; ditto.                                      |
| „ 17 ..    | 9     | ..                    | 45· 0             | Slight wind from N.W.; ditto.                         |
| „ 17 ..    | 10    | ..                    | 43·25             | Strong wind from S.; ditto.                           |
| „ 17 ..    | 19    | ..                    | 29·25             | Slight wind from W.; ditto.                           |
| „ 17 ..    | 20    | ..                    | 32·50             | Ditto E.; ditto.                                      |
| „ 17 ..    | 21    | ..                    | 33·25             | Ditto E.; ditto.                                      |
| „ 17 ..    | 22    | ..                    | 34·25             | Ditto S.E.; ditto.                                    |
| „ 17 ..    | 23    | ..                    | 39·50             | Strong wind from S.; ditto.                           |
| „ 17 ..    | 24    | ..                    | 40·25             | Ditto S.; ditto.                                      |
| „ 18 ..    | 1     | ..                    | 43· 0             | Ditto S.W.; ditto.                                    |
| „ 18 ..    | 2     | ..                    | 45· 0             | Ditto S.W.; ditto.                                    |
| „ 18 ..    | 3     | ..                    | 44·25             | Slight wind from W.; ditto.                           |
| „ 18 ..    | 4     | ..                    | 44·50             | Ditto W.; ditto.                                      |
| „ 18 ..    | 5     | ..                    | 43·25             | Ditto W.; ditto.                                      |
| „ 18 ..    | 6     | ..                    | 41·50             | Ditto W.; ditto.                                      |
| „ 18 ..    | 7     | ..                    | 42·25             | Ditto W.; ditto.                                      |
| „ 18 ..    | 8     | ..                    | 41· 0             | Ditto W.; ditto.                                      |
| „ 18 ..    | 9     | ..                    | 37·25             | Ditto N.; ditto.                                      |
| „ 18 ..    | 10    | ..                    | 36·75             | Ditto N.; ditto.                                      |
| „ 18 ..    | 19    | ..                    | 24·25             | Ditto N.W.; ditto.                                    |
| „ 18 ..    | 20    | ..                    | 26· 0             | Ditto N.W.; ditto.                                    |
| „ 18 ..    | 21    | ..                    | 27· 0             | Ditto S.; ditto.                                      |
| „ 18 ..    | 22    | ..                    | 28·50             | Ditto S.; ditto.                                      |
| „ 18 ..    | 23    | ..                    | 30· 0             | Ditto S.; ditto.                                      |
| „ 18 ..    | 24    | ..                    | 31·75             | Ditto S.; ditto.                                      |
| „ 19 ..    | 1     | ..                    | 34·25             | Ditto S.; ditto.                                      |
| „ 19 ..    | 2     | ..                    | 36·50             | Wind lulled. ditto.                                   |
| „ 19 ..    | 3     | ..                    | 35·75             | Slight wind from W.; ditto.                           |
| „ 19 ..    | 4     | ..                    | 36·50             | Wind lulled. ditto.                                   |
| „ 19 ..    | 5     | ..                    | 36· 0             | Slight wind from W.; ditto.                           |
| „ 19 ..    | 6     | ..                    | 36·25             | Ditto W.; ditto.                                      |
| „ 19 ..    | 7     | ..                    | 42· 0             | Ditto W.; ditto.                                      |
| „ 19 ..    | 8     | ..                    | 40· 0             | Ditto W.; ditto.                                      |
| „ 19 ..    | 9     | ..                    | 37· 0             | Ditto W.; ditto.                                      |
| „ 19 ..    | 10    | ..                    | 36·50             | Ditto W.; ditto.                                      |
| „ 19 ..    | 19    | ..                    | 24·75             | Ditto N.; fleecy clouds.                              |
| „ 19 ..    | 20    | ..                    | 26·50             | Ditto E.; ditto.                                      |
| „ 19 ..    | 21    | ..                    | 26· 0             | Strong wind from N.; ditto.                           |
| „ 19 ..    | 22    | ..                    | 28·25             | { Slight wind from N.; light clouds<br>only to south. |
| „ 19 ..    | 23    | ..                    | 29·50             | Very slight wind from N.; clear sky.                  |

OBSERVATIONS OF TEMPERATURE OF AIR AT SHIGATZE, &c.—*continued.*

| DATE.      | Hour. | No. Thermometer. | Thermometer. | REMARKS.                                                |
|------------|-------|------------------|--------------|---------------------------------------------------------|
| 1865.      |       |                  |              |                                                         |
| Nov. 19 .. | 24    | 6                | 32·50        | Very slight wind from N.; sky clear.                    |
| „ 20 ..    | 1     | ..               | 33·75        | Ditto W.; ditto.                                        |
| „ 20 ..    | 2     | ..               | 35· 0        | Slight wind from W.; ditto.                             |
| „ 20 ..    | 3     | ..               | 36·50        | Wind lulled. light clouds.                              |
| „ 20 ..    | 4     | ..               | 36·50        | Slight wind from W.; ditto.                             |
| „ 20 ..    | 5     | ..               | 36· 0        | { Wind lulled. rather heavy clouds<br>all over.         |
| „ 20 ..    | 6     | ..               | 35·50        | Ditto ditto.                                            |
| „ 20 ..    | 7     | ..               | 39·50        | Slight wind from W.; sky clear.                         |
| „ 20 ..    | 8     | ..               | 37·75        | Ditto N.W.; clouds to E.                                |
| „ 20 ..    | 9     | ..               | 40· 0        | Very heavy wind from W.; sky clear.                     |
| „ 20 ..    | 10    | ..               | 39·25        | Strong wind from W.; sky cloudy to W.                   |
| „ 20 ..    | 19    | ..               | 30· 0        | Ditto N.W.; sky very clear.                             |
| „ 20 ..    | 20    | ..               | 30· 0        | Ditto N.W.; ditto.                                      |
| „ 20 ..    | 21    | ..               | 32·50        | Ditto N.W.; ditto.                                      |
| „ 20 ..    | 22    | ..               | 34·50        | Slight wind from W.; ditto.                             |
| „ 20 ..    | 23    | ..               | 35·75        | { Ditto W.; here and there<br>light clouds.             |
| „ 20 ..    | 24    | ..               | 38· 0        | { Strong wind from N.; sky obscured by<br>light clouds. |

## OBSERVATIONS OF THE TEMPERATURE OF THE AIR AT LHASA, THE CAPITAL OF GREAT TIBET, 11,700 FEET ABOVE THE SEA.

| DATE.     | Hour. | No. Thermometer. | Thermometer. | REMARKS.                                         |
|-----------|-------|------------------|--------------|--------------------------------------------------|
| 1866.     |       |                  |              |                                                  |
| Feb. 9 .. | 1     | 6                | 43·50        | { Strong wind from W.; here and there<br>clouds. |
| „ 9 ..    | 2     | ..               | 41·75        | Strong wind from W.; ditto.                      |
| „ 9 ..    | 3     | ..               | 40·50        | Ditto W.; ditto.                                 |
| „ 9 ..    | 4     | ..               | 40·50        | Slight wind from W.; clouds all over.            |
| „ 9 ..    | 5     | ..               | 39·25        | Ditto S.; ditto.                                 |
| „ 9 ..    | 6     | ..               | 38·50        | Ditto S.; ditto.                                 |
| „ 9 ..    | 7     | ..               | 36· 0        | { Ditto N.; clouds near ho-<br>rizon.            |
| „ 9 ..    | 8     | ..               | 35· 0        | Slight wind from E.; ditto.                      |
| „ 9 ..    | 9     | ..               | 34·50        | Ditto S.; ditto.                                 |
| „ 9 ..    | 10    | ..               | 33·50        | Ditto S.W.; ditto.                               |
| „ 9 ..    | 11    | ..               | 36· 0        | Ditto W.; sky clear.                             |
| „ 9 ..    | 12    | ..               | 36·50        | Ditto W.; ditto.                                 |
| „ 9 ..    | 13    | ..               | 34· 0        | Strong wind from W.; ditto.                      |
| „ 9 ..    | 14    | ..               | 33·75        | Ditto W.; ditto.                                 |
| „ 9 ..    | 15    | ..               | 33·25        | Ditto W.; ditto.                                 |
| „ 9 ..    | 16    | ..               | 32·50        | Slight wind from W.; ditto.                      |
| „ 9 ..    | 17    | ..               | 30·50        | Ditto E.; ditto.                                 |
| „ 9 ..    | 18    | ..               | 28·75        | Ditto E.; ditto.                                 |

OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &c.—continued.

| DATE.     | Hour. | No. Thermometer. | Thermometer. | REMARKS.                                                                                      |
|-----------|-------|------------------|--------------|-----------------------------------------------------------------------------------------------|
| 1866.     |       |                  |              |                                                                                               |
| Feb. 9 .. | 19    | 6                | 29° 0        | Slight wind from E.; sky clear.                                                               |
| .. 9 ..   | 20    | ..               | 29° 75       | Ditto S.; ditto.                                                                              |
| .. 9 ..   | 21    | ..               | 30° 0        | Wind lulled. .. ditto.                                                                        |
| .. 9 ..   | 22    | ..               | 32° 0        | Ditto S.; ditto.                                                                              |
| .. 9 ..   | 23    | ..               | 33° 25       | Slight wind from W.; ditto.                                                                   |
| .. 9 ..   | 24    | ..               | 35° 0        | { Ditto N.W.; light fleecy clouds all over.                                                   |
| .. 10 ..  | 1     | ..               | 37° 50       | { Very strong wind from W.; light clouds all over.                                            |
| .. 10 ..  | 2     | ..               | 39° 50       | Very strong wind from W.; ditto.                                                              |
| .. 10 ..  | 3     | ..               | 39° 00       | Ditto W.; ditto.                                                                              |
| .. 10 ..  | 4     | ..               | 39° 0        | Very slight wind from N.; clouds all over.                                                    |
| .. 10 ..  | 5     | ..               | 37° 50       | Very slight wind from N.; ditto.                                                              |
| .. 10 ..  | 6     | ..               | 38° 0        | Ditto N.; ditto.                                                                              |
| .. 10 ..  | 7     | ..               | 37° 0        | { Ditto S.; clouds near horizon.                                                              |
| .. 10 ..  | 8     | ..               | 37° 0        | Wind lulled .. very cloudy.                                                                   |
| .. 10 ..  | 9     | ..               | 37° 0        | Ditto .. ditto.                                                                               |
| .. 10 ..  | 10    | ..               | 37° 75       | Slight wind from N. ditto.                                                                    |
| .. 10 ..  | 19    | ..               | 34° 0        | Ditto S.; ditto.                                                                              |
| .. 10 ..  | 20    | ..               | 34° 0        | Ditto E.; ditto.                                                                              |
| .. 10 ..  | 21    | ..               | 35° 50       | Ditto E.; ditto.                                                                              |
| .. 10 ..  | 22    | ..               | 38° 0        | Ditto E.; ditto.                                                                              |
| .. 10 ..  | 23    | ..               | 37° 50       | Ditto E.; ditto.                                                                              |
| .. 10 ..  | 24    | ..               | 38° 50       | Ditto E.; ditto.                                                                              |
| .. 11 ..  | 1     | ..               | 40° 50       | { Strong wind from W.; very cloudy all over.                                                  |
| .. 11 ..  | 2     | ..               | 42° 0        | Hurricane from W.; ditto.                                                                     |
| .. 11 ..  | 3     | ..               | 44° 25       | Ditto W.; ditto.                                                                              |
| .. 11 ..  | 4     | ..               | 43° 0        | Ditto S.; ditto.                                                                              |
| .. 11 ..  | 5     | ..               | 42° 0        | Ditto S.; ditto.                                                                              |
| .. 11 ..  | 6     | ..               | 40° 50       | { Slight wind from W.; at this hour it snowed on all the hills around, and slightly in Lhasá. |
| .. 11 ..  | 7     | ..               | 40° 25       | Slight wind from W.;                                                                          |
| .. 11 ..  | 8     | ..               | 39° 75       | Ditto W.;                                                                                     |
| .. 11 ..  | 9     | ..               | 40° 0        | Ditto W.;                                                                                     |
| .. 11 ..  | 10    | ..               | 40° 25       | Ditto W.;                                                                                     |
| .. 11 ..  | 19    | ..               | 38° 0        | Ditto W.;                                                                                     |
| .. 11 ..  | 20    | ..               | 39° 0        | Ditto W.;                                                                                     |
| .. 11 ..  | 21    | ..               | 38° 0        | { Ditto W.; snowed rather more in Lhasá, but did not collect on the ground.                   |
| .. 11 ..  | 22    | ..               | 37° 0        | Slight wind from W.; ditto.                                                                   |
| .. 11 ..  | 23    | ..               | 37° 50       | { Ditto E.; cloudy towards horizon only, zenith clear.                                        |
| .. 11 ..  | 24    | ..               | 39° 50       | Slight wind from E.; ditto.                                                                   |
| .. 12 ..  | 1     | ..               | 40° 0        | { Very strong wind from W.; sky obscured by clouds.                                           |
| .. 12 ..  | 2     | ..               | 40° 0        | Very strong wind from S.; cloudy.                                                             |
| .. 12 ..  | 3     | ..               | 40° 0        | Ditto E.; ditto.                                                                              |
| .. 12 ..  | 4     | ..               | 40° 0        | Ditto S.; ditto.                                                                              |



## OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &amp;c.—continued.

| DATE.   | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS. |                                                                                                                      |
|---------|-------|-----------------------|-------------------|----------|----------------------------------------------------------------------------------------------------------------------|
| 1866.   |       |                       |                   |          |                                                                                                                      |
| Feb. 12 | ..    | 5                     | 6                 | 39° 50   | Very strong wind from S.; cloudy.                                                                                    |
| ..      | ..    | 12                    | ..                | 39° 50   | Ditto S.; ditto.                                                                                                     |
| ..      | ..    | 12                    | ..                | 37° 75   | Slight wind from S.; snowed slightly.                                                                                |
| ..      | ..    | 12                    | ..                | 35° 0    | Ditto W.; ditto.                                                                                                     |
| ..      | ..    | 12                    | ..                | 34° 50   | Ditto W.; ditto.                                                                                                     |
| ..      | ..    | 12                    | ..                | 35° 50   | Ditto W.; ditto.                                                                                                     |
| ..      | ..    | 12                    | ..                | 29° 75   | Ditto N.; horizon cloudy;<br>awoke, and saw $\frac{1}{2}$ inch of snow on the<br>ground, which had fallen overnight. |
| ..      | ..    | 12                    | ..                | 32° 0    | Slight wind from N.;                                                                                                 |
| ..      | ..    | 12                    | ..                | 33° 0    | Wind lulled; cloudy, towards horizon<br>sunny.                                                                       |
| ..      | ..    | 12                    | ..                | 33° 50   | Wind lulled; ditto.                                                                                                  |
| ..      | ..    | 12                    | ..                | 35° 0    | Ditto ditto.                                                                                                         |
| ..      | ..    | 12                    | ..                | 36° 50   | (Slight wind from W.; sky completely<br>obscured by clouds.                                                          |
| ..      | ..    | 13                    | ..                | 37° 0    | Slight wind from N.W.; sky very cloudy.                                                                              |
| ..      | ..    | 13                    | ..                | 35° 0    | Hurricane N.; ditto.                                                                                                 |
| ..      | ..    | 13                    | ..                | 34° 75   | Hurricane N.; ditto.                                                                                                 |
| ..      | ..    | 13                    | ..                | 33° 50   | Ditto N.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 33° 50   | Ditto N.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 33° 50   | (Slight wind from N.; sky clear over-<br>head only.                                                                  |
| ..      | ..    | 13                    | ..                | 33° 0    | Slight wind from W.; sky clear.                                                                                      |
| ..      | ..    | 13                    | ..                | 32° 50   | Ditto N.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 32° 0    | Ditto N.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 31° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 26° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 26° 75   | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 28° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 30° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 13                    | ..                | 31° 0    | Very slight wind from E.; ditto.                                                                                     |
| ..      | ..    | 13                    | ..                | 33° 0    | Noon, Ditto E.; ditto.                                                                                               |
| ..      | ..    | 14                    | ..                | 34° 75   | (Very slight wind from N.; here and<br>there clouds.                                                                 |
| ..      | ..    | 14                    | ..                | 36° 50   | Very slight wind from N.; ditto.                                                                                     |
| ..      | ..    | 14                    | ..                | 36° 50   | Ditto N.; ditto.                                                                                                     |
| ..      | ..    | 14                    | ..                | 37° 50   | Ditto N.E.; sky very cloudy.                                                                                         |
| ..      | ..    | 14                    | ..                | 37° 50   | Ditto N.E.; ditto.                                                                                                   |
| ..      | ..    | 14                    | ..                | 35° 50   | Wind lulled. thin clouds all over.                                                                                   |
| ..      | ..    | 14                    | ..                | 36° 75   | Very slight wind from W.; ditto.                                                                                     |
| ..      | ..    | 14                    | ..                | 36° 0    | Wind lulled. sky clear.                                                                                              |
| ..      | ..    | 14                    | ..                | 35° 0    | Ditto ditto.                                                                                                         |
| ..      | ..    | 14                    | ..                | 33° 75   | Ditto ditto.                                                                                                         |
| ..      | ..    | 14                    | ..                | 27° 0    | 7 A.M., wind slight from E.; ditto.                                                                                  |
| ..      | ..    | 14                    | ..                | 28° 50   | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 14                    | ..                | 30° 50   | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 14                    | ..                | 32° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 14                    | ..                | 33° 0    | Ditto E.; ditto.                                                                                                     |
| ..      | ..    | 14                    | ..                | 35° 0    | Wind lulled. ditto.                                                                                                  |
| ..      | ..    | 15                    | ..                | 37° 0    | (Very slight wind from N.W.; white<br>clouds towards horizon.                                                        |
| ..      | ..    | 15                    | ..                | 38° 75   | Very slight wind from N.W.; ditto.                                                                                   |

OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &c.—continued.

| DATE.      | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                                                        |
|------------|-------|-----------------------|-------------------|-----------------------------------------------------------------|
| 1866.      |       |                       |                   |                                                                 |
| Feb. 15 .. | 3     | 6                     | 43·50             | { Very slight wind from N.W.; white clouds towards horizon.     |
| .. 15 ..   | 4     | ..                    | 43·50             | Ditto N.W.; ditto.                                              |
| .. 15 ..   | 5     | ..                    | 43·75             | { Strong wind from W.; here and there only clouds.              |
| .. 15 ..   | 6     | ..                    | 40·50             | Wind lulled. sky clear.                                         |
| .. 15 ..   | 7     | ..                    | 39·75             | Ditto ditto.                                                    |
| .. 15 ..   | 8     | ..                    | 39·0              | Ditto ditto.                                                    |
| .. 15 ..   | 9     | ..                    | 37·75             | Ditto ditto.                                                    |
| .. 15 ..   | 10    | ..                    | 37·0              | Ditto ditto.                                                    |
| .. 15 ..   | 19    | ..                    | 29·50             | 7 A.M., strong wind from E.; ditto.                             |
| .. 15 ..   | 20    | ..                    | 32·0              | Ditto E.; ditto.                                                |
| .. 15 ..   | 21    | ..                    | 33·50             | Ditto E.; ditto.                                                |
| .. 15 ..   | 22    | ..                    | 35·25             | Wind lulled. ditto.                                             |
| .. 15 ..   | 23    | ..                    | 37·0              | Ditto ditto.                                                    |
| .. 15 ..   | 24    | ..                    | 40·0              | Ditto ditto.                                                    |
| .. 16 ..   | 1     | ..                    | 40·25             | Ditto ditto.                                                    |
| .. 16 ..   | 2     | ..                    | 41·0              | Ditto ditto.                                                    |
| .. 16 ..   | 3     | ..                    | 41·0              | Strong wind from W.; clouds to N.                               |
| .. 16 ..   | 4     | ..                    | 43·0              | Ditto W.; ditto.                                                |
| .. 16 ..   | 5     | ..                    | 44·0              | Ditto W.; ditto.                                                |
| .. 16 ..   | 6     | ..                    | 40·50             | Wind lulled. sky clear.                                         |
| .. 16 ..   | 7     | ..                    | 40·50             | Slight wind from E.; ditto.                                     |
| .. 16 ..   | 8     | ..                    | 40·0              | Ditto E.; ditto.                                                |
| .. 16 ..   | 9     | ..                    | 38·0              | Ditto E.; ditto.                                                |
| .. 16 ..   | 10    | ..                    | 37·0              | Ditto E.; ditto.                                                |
| .. 16 ..   | 19    | ..                    | 31·0              | 7 A.M., Ditto E.; ditto.                                        |
| .. 16 ..   | 20    | ..                    | 31·50             | Ditto E.; ditto.                                                |
| .. 16 ..   | 21    | ..                    | 33·0              | Ditto E.; ditto.                                                |
| .. 16 ..   | 22    | ..                    | 35·0              | Wind lulled. ditto.                                             |
| .. 16 ..   | 23    | ..                    | 36·25             | Slight wind from W.; ditto.                                     |
| .. 16 ..   | 24    | ..                    | 37·50             | { Strong wind from S.; here and there white clouds; bright sun. |
| .. 17 ..   | 1     | ..                    | 39·75             | { Slight wind from W.; here and there light clouds.             |
| .. 17 ..   | 2     | ..                    | 39·75             | Slight wind from W.; ditto.                                     |
| .. 17 ..   | 3     | ..                    | 40·0              | Ditto W.; ditto.                                                |
| .. 17 ..   | 4     | ..                    | 40·50             | Ditto W.; ditto.                                                |
| .. 17 ..   | 5     | ..                    | 40·50             | { Very slight wind from W.; a few cirrus clouds.                |
| .. 17 ..   | 6     | ..                    | 39·75             | Ditto W.; ditto.                                                |
| .. 17 ..   | 7     | ..                    | 39·50             | Very strong wind from S.; sky clear.                            |
| .. 17 ..   | 8     | ..                    | 38·50             | Wind lulled. ditto.                                             |
| .. 17 ..   | 9     | ..                    | 36·75             | Ditto ditto.                                                    |
| .. 17 ..   | 10    | ..                    | 36·0              | Ditto ditto.                                                    |
| .. 17 ..   | 19    | ..                    | 32·0              | { Very slight wind from E.; heavy dark clouds.                  |
| .. 17 ..   | 20    | ..                    | 32·50             | Very slight wind from E.; ditto.                                |
| .. 17 ..   | 21    | ..                    | 34·50             | Ditto E.; ditto.                                                |
| .. 17 ..   | 22    | ..                    | 35·50             | Wind lulled. ditto.                                             |
| .. 17 ..   | 23    | ..                    | 36·50             | { Slight wind from E.; here and there clouds.                   |
| .. 17 ..   | 24    | ..                    | 37·50             | Slight wind from W.; ditto.                                     |

OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &c.—*continued.*

| DATE    | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                                                    |
|---------|-------|-----------------------|-------------------|-------------------------------------------------------------|
| 1866.   |       |                       |                   |                                                             |
| Feb. 18 | 1     | 6                     | 39·75             | {Slight wind from W.; here and there clouds.                |
| „ 18    | 2     | ..                    | 40·0              | {Slight wind from W.; light clouds obscuring sky.           |
| „ 18    | 3     | ..                    | 40·50             | Slight wind from W.; ditto.                                 |
| „ 18    | 4     | ..                    | 40·50             | Ditto W.; ditto.                                            |
| „ 18    | 5     | ..                    | 40·0              | Ditto W.; ditto.                                            |
| „ 18    | 6     | ..                    | 40·0              | {Slight wind from W.; clouds to north of horizon.           |
| „ 18    | 7     | ..                    | 39·75             | Slight wind from W.; ditto.                                 |
| „ 18    | 8     | ..                    | 39·50             | Ditto W.; ditto.                                            |
| „ 18    | 9     | ..                    | 39·50             | Ditto W.; ditto.                                            |
| „ 18    | 10    | ..                    | 39·0              | {Slight wind from W.; light clouds obscuring sky.           |
| „ 18    | 19    | ..                    | 34·50             | Slight wind from W.; sky clear.                             |
| „ 18    | 20    | ..                    | 34·75             | Ditto W.; ditto.                                            |
| „ 18    | 21    | ..                    | 35·50             | Ditto W.; ditto.                                            |
| „ 18    | 22    | ..                    | 37·0              | Ditto W.; ditto.                                            |
| „ 18    | 23    | ..                    | 37·75             | {Slight wind from N.W.; here and there white clouds.        |
| „ 18    | 24    | ..                    | 39·50             | {Slight wind from N.; white and light clouds obscuring sky. |
| „ 19    | 1     | ..                    | 41·25             | {Strong wind from W.; here and there light clouds.          |
| „ 19    | 2     | ..                    | 42·0              | Strong wind from W.; ditto.                                 |
| „ 19    | 3     | ..                    | 42·0              | Slight wind from N.W.; ditto.                               |
| „ 19    | 4     | ..                    | 41·0              |                                                             |
| „ 19    | 5     | ..                    | 41·0              | {Very slight wind from W.; heavy clouds obscuring sky.      |
| „ 19    | 6     | ..                    | 41·0              | Very slight wind from W.; ditto.                            |
| „ 19    | 7     | ..                    | 42·0              | Strong wind from S.; clouds to north.                       |
| „ 19    | 8     | ..                    | 41·50             | Ditto S.; ditto.                                            |
| „ 19    | 9     | ..                    | 40·25             | Slight wind from S.; ditto.                                 |
| „ 19    | 10    | ..                    | 40·0              | Ditto W.; ditto.                                            |
| „ 19    | 19    | ..                    | 33·0              | Ditto E.; sky clear.                                        |
| „ 19    | 20    | ..                    | 33·25             | Wind lulled. ditto.                                         |
| „ 19    | 21    | ..                    | 35·0              | Slight wind from W.; ditto.                                 |
| „ 19    | 22    | ..                    | 35·50             | {Slight wind from N.; here and there clouds, sun shining.   |
| „ 19    | 23    | ..                    | 37·25             | Slight wind from W.; ditto.                                 |
| „ 19    | 24    | ..                    | 38·75             | Noon, Ditto W.; ditto.                                      |
| „ 20    | 1     | ..                    | 39·50             | {Noon, ditto from W.; here and there fleecy clouds.         |
| „ 20    | 2     | ..                    | 40·75             | Noon, ditto from W.; ditto.                                 |
| „ 20    | 3     | ..                    | 41·0              | Ditto W.; ditto.                                            |
| „ 20    | 4     | ..                    | 41·50             | Strong wind from W.; ditto.                                 |
| „ 20    | 5     | ..                    | 40·50             | Ditto W.; ditto.                                            |
| „ 20    | 6     | ..                    | 39·50             | Very strong wind from N.; ditto.                            |
| „ 20    | 7     | ..                    | 38·0              | Ditto N.; ditto.                                            |
| „ 20    | 8     | ..                    | 37·0              | Ditto N.; ditto.                                            |
| „ 20    | 9     | ..                    | 36·0              | Wind rather strong from N.; ditto.                          |
| „ 20    | 10    | ..                    | 35·50             | Ditto N.; ditto.                                            |
| „ 20    | 19    | ..                    | 30·0              | Slight wind from E.; sky clear.                             |

OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &c.—continued.

| DATE       | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                                           |
|------------|-------|-----------------------|-------------------|----------------------------------------------------|
| 1866.      |       |                       |                   |                                                    |
| Feb. 20 .. | 20    | 6                     | 31.50             | Slight wind from E.; sky clear.                    |
| „ 20 ..    | 21    | ..                    | 33.0              | Ditto E.; ditto.                                   |
| „ 20 ..    | 22    | ..                    | 34.0              | Wind lulled. ditto.                                |
| „ 20 ..    | 23    | ..                    | 35.0              | Ditto ditto.                                       |
| „ 20 ..    | 24    | ..                    | 36.50             | Very gentle wind from W.; ditto.                   |
| „ 21 ..    | 1     | ..                    | 38.0              | Very slight wind from W.; ditto.                   |
| „ 21 ..    | 2     | ..                    | 39.0              | Ditto N.; ditto.                                   |
| „ 21 ..    | 3     | ..                    | 39.50             | Ditto N.; ditto.                                   |
| „ 21 ..    | 4     | ..                    | 41.0              | { Very slight wind from N.; here and there clouds. |
| „ 21 ..    | 5     | ..                    | 40.25             | Very slight wind from N.; ditto.                   |
| „ 21 ..    | 6     | ..                    | 39.25             | Ditto E.; sky clear.                               |
| „ 21 ..    | 7     | ..                    | 39.0              | Ditto E.; ditto.                                   |
| „ 21 ..    | 8     | ..                    | 38.0              | Ditto E.; ditto.                                   |
| „ 21 ..    | 9     | ..                    | 36.75             | Ditto W.; ditto.                                   |
| „ 21 ..    | 10    | ..                    | 36.26             | Ditto W.; ditto.                                   |
| „ 21 ..    | 19    | ..                    | 36.50             | 7 A.M., ditto S.; ditto.                           |
| „ 21 ..    | 20    | ..                    | 37.0              | Ditto S.; ditto.                                   |
| „ 21 ..    | 21    | ..                    | 39.50             | Wind lulled. ditto.                                |
| „ 21 ..    | 22    | ..                    | 42.0              | Very strong wind from W.; ditto.                   |
| „ 21 ..    | 23    | ..                    | 43.0              | Ditto W.; ditto.                                   |
| „ 21 ..    | 24    | ..                    | 43.0              | Ditto W.; ditto.                                   |
| „ 22 ..    | 1     | ..                    | 45.50             | Ditto W.; ditto.                                   |
| „ 22 ..    | 2     | ..                    | 45.75             | Ditto W.; ditto.                                   |
| „ 22 ..    | 3     | ..                    | 45.0              | Ditto W.; ditto.                                   |
| „ 22 ..    | 4     | ..                    | 44.75             | { Slight wind from W.; light clouds obscuring sky. |
| „ 22 ..    | 5     | ..                    | 44.75             | Slight wind from W.; ditto.                        |
| „ 22 ..    | 6     | ..                    | 43.0              | Ditto N.; ditto.                                   |
| „ 22 ..    | 7     | ..                    | 42.50             | Ditto N.; ditto.                                   |
| „ 22 ..    | 8     | ..                    | 40.50             | Ditto N.; ditto.                                   |
| „ 22 ..    | 9     | ..                    | 40.50             | Ditto N.; ditto.                                   |
| „ 22 ..    | 10    | ..                    | 37.50             | Ditto N.; ditto.                                   |
| „ 22 ..    | 19    | ..                    | 32.0              | 7 A.M. Ditto E.; sky clear.                        |
| „ 22 ..    | 20    | ..                    | 32.50             | Ditto E.; ditto.                                   |
| „ 22 ..    | 21    | ..                    | 34.50             | Ditto E.; ditto.                                   |
| „ 22 ..    | 22    | ..                    | 36.0              | Ditto E.; ditto.                                   |
| „ 22 ..    | 23    | ..                    | 37.0              | Wind lulled. ditto.                                |
| „ 22 ..    | 24    | ..                    | 40.0              | Ditto ditto.                                       |
| „ 23 ..    | 19    | ..                    | 36.0              | Slight wind from E.; ditto.                        |
| „ 24 ..    | 6     | ..                    | 45.75             | { Ditto W.; heavy clouds obscuring sky.            |
| „ 24 ..    | 19    | ..                    | 35.0              | Slight wind from W.; sky clear.                    |
| „ 25 ..    | 6     | ..                    | 45.75             | Wind lulled heavy clouds all over.                 |
| „ 25 ..    | 19    | ..                    | 33.50             | Slight wind from E.; sky clear.                    |
| „ 26 ..    | 6     | ..                    | 45.75             | Ditto W.; clouds obscuring sky.                    |
| „ 26 ..    | 19    | ..                    | 33.50             | Strong wind from E.; sky clear.                    |
| „ 27 ..    | 6     | ..                    | 45.75             | Wind lulled clouds obscuring sky.                  |
| „ 27 ..    | 19    | ..                    | 34.0              | Slight wind from E.; sky clear.                    |
| „ 28 ..    | 6     | ..                    | 45.50             | Very slight wind from W.; clouds all over.         |
| „ 28 ..    | 19    | ..                    | 33.50             | Ditto E.; here and there clouds.                   |
| Mar. 1 ..  | 6     | ..                    | 43.50             | Ditto E.; clouds all over.                         |
| „ 1 ..     | 19    | ..                    | 35.50             | Ditto E.; sky clear.                               |

OBSERVATIONS OF TEMPERATURE OF AIR AT LHASA, &c.—*continued.*

| DATE.     | Hour. | No. Ther-<br>mometer. | Ther-<br>mometer. | REMARKS.                                      |
|-----------|-------|-----------------------|-------------------|-----------------------------------------------|
| 1866.     |       |                       |                   |                                               |
| Mar. 2 .. | 6     | 6                     | 43·50             | Very slight wind from E.; clouds all over.    |
| „ 2 ..    | 19    | ..                    | 36·25             | Ditto E.; sky clear.                          |
| „ 3 ..    | 6     | ..                    | 47·25             | Ditto W.; clouds near horizon.                |
| „ 3 ..    | 19    | ..                    | 36·50             | Ditto E.; sky clear.                          |
| „ 4 ..    | 6     | ..                    | 48·25             | { Slight wind from N.W.; clouds near horizon. |
| „ 4 ..    | 19    | ..                    | 37· 0             | Slight wind from E.; sky clear.               |
| „ 5 ..    | 6     | ..                    | 48·50             | Ditto W.; here and there clouds.              |
| „ 5 ..    | 19    | ..                    | 37·50             | Ditto E.; ditto.                              |
| „ 6 ..    | 6     | ..                    | 50· 0             | Ditto W.; ditto.                              |
| „ 6 ..    | 19    | ..                    | 42· 0             | Ditto E.; sky clear.                          |
| „ 7 ..    | 6     | ..                    | 49·75             | Ditto N.; cloudy.                             |
| „ 7 ..    | 19    | ..                    | 41·50             | Ditto E.; sky clear.                          |
| „ 8 ..    | 6     | ..                    | 48·75             | Wind lulled cloudy.                           |
| „ 8 ..    | 19    | ..                    | 38·50             | { Slight wind from E.; here and there clouds. |
| „ 9 ..    | 6     | ..                    | 48·50             | Wind lulled clouds near horizon.              |
| „ 9 ..    | 19    | ..                    | 44·75             | Slight wind from W.; cloudy.                  |

*Remarks as to the Weather, &c., in the Lhasá Territory.*

During my stay at Lhasá, Shigátze, and in the Lhasá territory, I do not recollect either having seen lightning or heard thunder, and on making inquiries I was informed that during the winter season there is neither one nor the other, though there is a little during the rains. Lightning is never known to kill the inhabitants, or to strike houses, &c. The rains (during the season) are very heavy at Shigátze, especially during the months of July and August. The snow fall at Shigátze, and on the country around, never exceeds 1 foot, although the water of running streams freezes if the current is not very rapid. During my journey in Tibet, from October to June, it never rained, and on only a single occasion did I observe a fall of snow of about 3 inches, when on my way to Penajong from the Takche village.

The inhabitants regard snow as an evil, and attribute the slight fall during the winter to the goodness of their chief divinities and head Lamas. Should the fall ever exceed a foot, it is looked on as an evil sign, expressing the displeasure of their gods, and to propitiate them large sums of money are expended on the priests, &c. They call snow “khá,” after the word khá, meaning nothing.

I was informed that earthquakes are unknown in the Lhasá

territory proper, though slight earthquakes are said to occur in Nari Khorsum.

Strong and high winds are very prevalent throughout the Lhásá territory.

No rain fell during my three months' residence at Lhásá. Snow fell twice in the city, but only to the amount of about three inches on each occasion. The fall on the surrounding hills was somewhat heavier.

High winds were prevalent during March and April.

NOTE.—The thermometer observations at Shigátze were taken in a small room off the large one the Pundit had hired for himself in the Kunkung, or serai. There were forty to fifty people in the serai, mostly his Ladáki friends. The small room was entirely open upon one side, the thermometer hanging in the middle; the open side looked to the south.

The walls of the room were of sun-dried bricks, and the roof of wood covered with earth, so that the sun's heat did not penetrate.

At Lhásá the thermometer observations were taken in a house with a roof and walls quite as thick as those in the serai at Shigátze.

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*Memorandum on the Great Tibetan Road from Lhásá to Gartokh.*

The great Tibetan road between Lhásá and Gartokh is divided into twenty-two stages, of from 20 to 60 miles in length, varying according to the nature of the country.

At the end of each of these places there is a halting-place, called a Tarjum, where shelter is provided for all Tibetan officials travelling along the road.

These halting-places, or Tarjums, generally consist of one large house, or of several small houses, with a number of tents, sufficient together to supply shelter to at least 200 men, with their baggage and merchandise. The houses have generally walls of sun-dried bricks, and a wooden roof covered with earth.

The Tibetan officials get a change of cattle at each Tarjum. The Tarjums are in charge of a man called Tarjumpá, or Jalno. He is bound to have coolies, horses, yaks, and donkeys in attendance, whenever he receives notice of the approach of a Lhásá official. The Tarjumpás are supported by the State, and they give the orders to the heads \* of camps and villages near these Tarjums as to supplying cattle, &c.

From ten to fifteen men, and as many horses, are always in attendance at the Tarjums.

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\* The heads of villages are called Gámbos.

The horses that are kept in constant readiness form what is called a Taol.

A high official, called Shipchat, is sent every third year from Lhásá to Gartokh, in order to see how matters have been carried on.

The Shipchat, and all high officials, receive every attention on the road, and, when travelling on the public service, they and their retinue are supplied with horses, baggage animals, food, and fuel free of all charge. Their goods sometimes take as many as a thousand yaks, besides men, &c.

A caravan of yaks, &c., is called a Dûe. The supply of cattle, &c., forms a kind of tax on the inhabitants, called Changshul and Thoptang.

Although the nomadic tribes and villages receive nothing for the above, they are nevertheless held strictly responsible for the safe transit of all goods, and are made to pay twice the value of anything lost or damaged.

The higher officials generally trade on their own account, and this adds very much to the tax upon the inhabitants, who, in addition, are often forced to buy the goods at very much over their proper value.

The inhabitants appear to have no remedy, as the Shipchat, or inspector of the road, seems to trade just as much as the other officials.

A LIST OF THE TWENTY-TWO TARJUMS, OR HALTING-PLACES, BETWEEN GARTOKH AND LHASA, WITH THE DISTANCES BETWEEN EACH.

| No. | Names of Tarjums, or Halting-places, where cattle are changed. | Estimated distance in miles. | REMARKS.                                                                                                                                                                    |
|-----|----------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <b>Gartokh to</b>                                              |                              |                                                                                                                                                                             |
| 1   | Naku Tarjum .. ..                                              | 6                            | No houses, only tents.                                                                                                                                                      |
| 2   | Mesir Tarjum .. ..                                             | 37                           | The Tarjum consists of a house and tents.                                                                                                                                   |
| 3   | Barkha Tarjum .. ..                                            | 40                           | The Tarjum consists of a house and tents, and is situated in a very cold place near the Mansarowar Lake.                                                                    |
| 4   | Thokchan Tarjum ..                                             | 34                           | On right bank of Some stream, only tents, no houses.                                                                                                                        |
| 5   | Tamjan Tarjum .. ..                                            | 77                           | On left bank of Brahmaputra river, only tents, no houses.                                                                                                                   |
| 6   | Dúksúm Tarjum .. ..                                            | 41                           | Only tents, no house.                                                                                                                                                       |
| 7   | Tadam Tarjum .. ..                                             | 52                           | Four or five small houses about the monastery form the Tarjum.                                                                                                              |
| 8   | Niku Tarjum .. ..                                              | 31                           | On the bank of the Minchu stream. Tents only, no house.                                                                                                                     |
| 9   | Sarká Jong Tarjum ..                                           | 29                           | Sarka is a large village containing numerous houses built of sun-dried bricks. It is ruled by a Jongpon. The Tarjum is a house built with sun-dried bricks.                 |
| 10  | Chomokula Tarjum ..                                            | 26                           | Only tents.                                                                                                                                                                 |
| 11  | Raka Thasang Tarjum ..                                         | 23                           | Only tents, a very cold place.                                                                                                                                              |
| 12  | Sang Sang Giado Tarjum                                         | 27                           | The Tarjum is built of sun-dried bricks.                                                                                                                                    |
| 13  | Sang Sang Kau Tarjum                                           | 34                           | The Tarjum is of a good size, and built of sun-dried bricks. There are many tents, but only two houses besides the Tarjum.                                                  |
| 14  | Nabring Khaka Tarjum                                           | 31                           | This is the first place east of Gartokh where the people were seen to cultivate the ground; from hence on to Lhasa the villagers cultivate. The Tarjum consists of a house. |
| 15  | Jang Lache Tarjum ..                                           | 33                           | A house in town of same name. Travelers from Lhasa provide themselves with provisions at this place for the entire journey to Gartokh.                                      |
| 16  | Phuncholing Tarjum ..                                          | 26                           | The Tarjum is a house in the large village of the same name.                                                                                                                |



## A LIST OF THE TWENTY-TWO TARJUMS, OR HALTING-PLACES, BETWEEN GARTOKH AND LHASA, &amp;c.—continued.

| No.               | Names of Tarjums, or Halting-places, where cattle are changed. | Estimated distance in miles. | REMARKS.                                                                           |
|-------------------|----------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------|
| <b>Gartokh to</b> |                                                                |                              |                                                                                    |
| 17                | Shigatze Tarjum .. ..                                          | 61                           | The Tarjum is a large building in the city.                                        |
| 18                | Pena Jong Tarjum .. ..                                         | 19                           | The Tarjum is a house in the town.                                                 |
| 19                | Gyangze Tarjum .. ..                                           | 29                           | The Tarjum is a house in the city.                                                 |
| 20                | Nanganche Jong Tarjum                                          | 57                           | The Tarjum is a house built of sun-dried bricks.                                   |
| 21                | Pyahtejong Tarjum .. ..                                        | 18                           | On border of the Lake Yamdok cho. The Tarjum is a house built of sun-dried bricks. |
| 22                | Chushul Tarjum .. ..                                           | 25                           | On right bank of Brahmaputra river. House same as last.                            |
|                   | Lhasa .. .. .                                                  | 34                           |                                                                                    |
|                   | Total miles .. ..                                              | 790                          |                                                                                    |

## LIST OF ORDINARY MARCHES BETWEEN GARTOKH AND LHASA.

| No. of Tarjum. | Names of the Daily Halting-places for Ordinary Marches. | Estimated number of Miles from Stage to Stage. | Under the authority of whom. | REMARKS.                                |
|----------------|---------------------------------------------------------|------------------------------------------------|------------------------------|-----------------------------------------|
|                | Gartokh .. .. .                                         | ..                                             | Chief Garpon of Gartokh.     | Two Garpons and a Shipchat reside here. |
| 1              | Naku Tarjum .. .. .                                     | 6                                              | Ditto.                       |                                         |
|                | Langbochia .. .. .                                      | 10                                             | Ditto.                       | No accommodation for travellers here.   |
|                | Nigri camp .. .. .                                      | 12                                             | Ditto.                       | Tents.                                  |
| 2              | Mesir Tarjum .. .. .                                    | 15                                             | Ditto.                       |                                         |
|                | Dokpachu .. .. .                                        | 5                                              | Ditto.                       | No accommodation for travellers here.   |
|                | Ramothal .. .. .                                        | 20                                             | Jongpon of Barkha.           | Ditto.                                  |

LIST OF ORDINARY MARCHES BETWEEN GARTOKH AND LHASA—*continued.*

| No. of Tarjum. | Names of the Daily Halting-places for Ordinary Marches. | Estimated number of Miles from Stage to Stage. | Under the authority of whom. | REMARKS.                              |
|----------------|---------------------------------------------------------|------------------------------------------------|------------------------------|---------------------------------------|
| 3              | Barkha Tarjum .. .. .                                   | 15                                             | Jongpon of Barkha.           | The Jongpon resides here.             |
|                | Langbona camp .. .. .                                   | 9                                              | Ditto.                       | Near a monastery.                     |
|                | Sariniah Uniah camp ..                                  | 15                                             | Ditto.                       | Tents. This is a large camp.          |
| 4              | Thokchan Tarjum .. .. .                                 | 10                                             | Purang Jongpon.              |                                       |
|                | Nokche .. .. .                                          | 17                                             | Ditto.                       | No accommodation here.                |
|                | Ugro (old tarjum in ruins)                              | 14                                             | Ditto.                       | Ditto.                                |
|                | Giamzar camp .. .. .                                    | 23                                             | Dhuksum Jongpon.             | The Jongpon is called Bongpua-Chigap. |
|                | Thakhabjor .. .. .                                      | 15                                             | Ditto.                       | No accommodation here.                |
| 5              | Tamjan Tarjum .. .. .                                   | 8                                              | Ditto.                       |                                       |
|                | Laro .. .. .                                            | 6                                              | Ditto.                       | No accommodation here.                |
|                | Demár camp .. .. .                                      | 23                                             | Ditto.                       | Tents.                                |
| 6              | Dúksúm Tarjum .. .. .                                   | 12                                             | Ditto.                       | The Jongpon of Dhúksúm resides here.  |
|                | Totu camp .. .. .                                       | 20                                             | Ditto.                       |                                       |
|                | Barhmalung .. .. .                                      | 14                                             | Ditto.                       | No accommodation here.                |
| 7              | Tadum Tarjum .. .. .                                    | 18                                             | Jongpon of Sarka.            |                                       |
|                | Thuku camp .. .. .                                      | 9                                              | Ditto.                       | Tents.                                |
|                | Shrikarpo camp .. .. .                                  | 16                                             | Ditto.                       | Tents.                                |
| 8              | Niku Tarjum .. .. .                                     | 6                                              | Ditto.                       |                                       |
|                | Jagúng .. .. .                                          | 10                                             | Ditto.                       | No accommodation here.                |
|                | Jhalung .. .. .                                         | 16                                             | Ditto.                       |                                       |
| 9              | Sarkajong Tarjum .. .. .                                | 3                                              | Ditto.                       | The Jongpon resides here.             |
|                | Upahi village .. .. .                                   | 18                                             | Ditto.                       | Mud houses.                           |
| 10             | Chomokula Tarjum .. .. .                                | 8                                              | Ditto.                       |                                       |
| 11             | Raka Thazang Tarjum ..                                  | 23                                             | Ditto.                       |                                       |
|                | Gñang-biako .. .. .                                     | 6                                              | Ditto.                       |                                       |
| 12             | Sang Sang Giado Tarjum ..                               | 21                                             | Ditto.                       |                                       |
|                | Ge .. .. .                                              | 15                                             | Ditto.                       |                                       |
| 13             | Sang Sang Kau Tarjum ..                                 | 19                                             | Jongpon of Sarka.            | Camp.                                 |
|                | Kukap camp .. .. .                                      | 11                                             | Nabring Jongpon.             |                                       |
|                | Ralung village .. .. .                                  | 14                                             | Ditto.                       |                                       |
| 14             | Nabring Khaka Tarjum ..                                 | 6                                              | Ditto.                       |                                       |

LIST OF ORDINARY MARCHES BETWEEN GARTOKH AND LHASA—*continued.*

| No. of Tarjum. | Names of the Daily Halting-places for Ordinary Marches. | Estimated number of Miles from Stage to Stage. | Under the authority of whom. | REMARKS.                                        |
|----------------|---------------------------------------------------------|------------------------------------------------|------------------------------|-------------------------------------------------|
|                | Larcha Nil village .. ..                                | 11                                             | Nabring Jongpon.             |                                                 |
|                | Singilung village .. ..                                 | 11                                             | Jang Lache Jongpon.          |                                                 |
| 15             | Jang Lache Tarjum .. ..                                 | 11                                             | Ditto.                       | The Jongpon resides here.                       |
|                | Chakdong village .. ..                                  | 11                                             | Ditto.                       |                                                 |
| 16             | Phuncholing Tarjum .. ..                                | 15                                             | Phuncholing Jongpon.         | A very large village. The Jongpon resides here. |
|                | Chamcheding village .. ..                               | 10                                             | Ditto.                       |                                                 |
|                | Shilkar village .. .. .                                 | 14                                             | Jongpon of Shigatze.         |                                                 |
|                | Chakri village .. .. .                                  | 22                                             | Ditto.                       |                                                 |
| 17             | Shigatze Tarjum .. ..                                   | 15                                             | Ditto.                       | The Jongpon resides here.                       |
| 18             | Penajong Tarjum .. ..                                   | 19                                             | Jongpon of Penajong.         | The Jongpon resides here.                       |
|                | Thakcka village .. ..                                   | 15                                             | Ditto.                       |                                                 |
| 19             | Gyangze Tarjum .. ..                                    | 14                                             | Jongpon of Gyangze.          | The Jongpon resides here.                       |
|                | Gobzi village .. .. .                                   | 16                                             | Ditto.                       |                                                 |
|                | Ralung village .. .. .                                  | 13                                             | Ditto.                       |                                                 |
|                | Zara village .. .. .                                    | 14                                             | Nanganche Jongpon.           | A Chinese post-stage.                           |
| 20             | Nanganchejong Tarjum ..                                 | 14                                             | Ditto.                       | The Jongpon resides here.                       |
| 21             | Pyahtejong Tarjum .. ..                                 | 18                                             | Jongpon of Pyahte.           | The Jongpon resides here.                       |
|                | Demalang village .. ..                                  | 12                                             | Ditto.                       |                                                 |
| 22             | Chûshûl Tarjum, .. ..                                   | 13                                             | Jongpon of Chûshûl.          | The Jongpon resides here.                       |
|                | Netang village .. .. .                                  | 18                                             | Jongpon of Lhásá.            |                                                 |
|                | Lhásá city .. .. .                                      | 16                                             |                              |                                                 |
|                | Total miles .. .. .                                     | 790                                            |                              |                                                 |

NOTE.—The tents in Tibet are made from the coarser hair of the yak, and are generally of a black colour.

*Memorandum on 600 miles of the Brahmaputra River, from its source near the Mansarowar Lake, in latitude  $30\frac{1}{2}^{\circ}$ , and longitude  $82^{\circ}$ , to the junction of the Lhasa River, in latitude  $29^{\circ} 22'$  and longitude  $90^{\circ} 40'$ .*

Mussoorie, 30th July, 1867.

When sending the Pundits to explore the country from Mansarowar to Lhasa, they were directed to make every inquiry as to the great river which was known to flow from near the Mansarowar Lake to Lhasa. Care was taken not to give the river any name, it was simply called the great river, and the explorers were told to find out its name.

The Pundit on his return said that the river is called by the Nari and Ladak people the Tamjan Khamba (the horse's mouth), from its source to the junction of the Charta Sangpo, from the latter to Janglache it is called Machang Sangpo by the Dokthal people, and from Janglache to Lhasa it is called the Narichu Sangpo by the Lhasa people, the latter name being given to it because the river runs from near Nari, the country about Mansarowar, &c.

The Nepalese, the Newars from Nepal, and the Kashmiri Mahomedans, who were in Lhasa, all told the Pundit that this great river was the Brahmaputra. All the Lhasa people who were questioned, were unanimous in saying that, after going east for a considerable distance, it flowed down into Hindostan.

For this reason, and others to be given hereafter, the river throughout this paper will be referred to as the Brahmaputra.

The river Brahmaputra was ascertained to rise in about north latitude  $30\frac{1}{2}^{\circ}$ , and east longitude  $82^{\circ}$ .

The great road along which the route-survey was carried does not follow the course of the river for the first 50 miles, but the road was probably never much more than 10 miles north of the river.

The general direction of the river's course during the first 50 miles was, however, quite unmistakable, owing to the gigantic range visible to the south of it, the large glaciers which filled every ravine of that range evidently forming the sources of the river.

The Tamjan Tarjum, in latitude  $30^{\circ} 21'$ , longitude  $82^{\circ} 51'$ , was the first point of the road actually on the river. The staging-house is called Tamjan, from the Tibetan name of the river, which is Tamjan Khamba (horse's mouth). From Tamjan there was a good view up the river for a considerable distance. The Tibetans all agreed in saying that it was the main branch of the river.

At Tamjan, on the 7th of June, the river was much swollen, its current rapid, and water turbid. About 40 miles south-east of Tamjan, the first large tributary (the Chu-Nago) falls in from the north, intermediately only two small tributaries were noticed. From the junction of the Chu-Nago the great river flows south-east, and about 50 miles lower down received a still larger river, called the Chachu Sangpo, coming from the north; this tributary was about 200 paces wide, and not very much inferior to the Brahmaputra itself. The junction is near the Tadum monastery, a well-known halting-place on the great road.

From the junction with the Chachu the river runs 4 to 5 miles due south, and then continues as before in a south-easterly direction for nearly 30 miles, below which it makes a great bend, and flowing southward for 25 miles, receives a large tributary from the south called the Shorta Sangpo, and then flowing north-east for 25 miles more, receives another great tributary from the north called the Charta Sangpo. The Charta Sangpo was, in October, about 250 paces in width, and its tributary, the Chaka Chu, which joins it a few miles below the point where the road crosses, was 150 paces in width. The combined stream forms one of the largest tributaries, if not the largest, that was seen to join the Brahmaputra. In May the Charta Sangpo and its tributary were very slightly swollen; ice was still clinging to their edges.

From the junction of the Charta Sangpo the great river was observed to flow for about 40 miles in a direction a little south of east. At this last point, near Upshi, the main road separated from the river, and the latter was not seen again till it had reached a point 100 miles further east, above the village of Napsi. Of this 100 miles of the river's course nothing positive is known; according to the natives of the country, it had no good road along it. The Pundit conjectured that the river flows (somewhat as shown in the map by dotted lines) south of a great peak which he observed from the road.

From Nupsi the river flows east by north for 25 miles, and then turning short to the north, flows past the large town of Janglache, taking thence a north-east course for 25 miles more, where it is joined by a very large river, called the Raka Sangpo. The course of this tributary was followed by the Pundit from the Gurla Pass, near Upshi, where the great road leaves the Brahmaputra, to a place called Ralung on the Nabring Lake. At this place it was a large river, but when seen again lower down, at its junction with the Brahmaputra, the Raka Sangpo had become very much larger, having evidently received a large addition by one or more tributaries from the north. Just

above the junction it was estimated to be about 200 paces in width. From Janglache some of the Pundit's companions took boat, and were paddled down the great river to Shigatze, a distance of 85 miles below Janglache, and 60 miles below the junction of the Raka Sangpo. The Pundit continued his march by land to Shigatze, crossing a good-sized tributary from the south. The great river was seen occasionally, and was evidently never so much as 10 miles from the road. His companions who went by boat said the stream was smooth, and the course direct. From Shigatze the great river is again visible at the point where it receives the Penanangchu River from the south. The Penanangchu was about 150 paces wide in December. From Shigatze to Khambabarche the river was not seen for about 100 miles, the main-road diverging considerably to the south of the river. The Tibetans said that this portion was too rapid for boats. At Kambabarche the river, when again seen, was flowing in a broad deep stream. The stream flowed so easily that every one of the party went by boat from Khambabarche to Chushul, a distance of about 10 miles.

From Chushul the Pundit could see the river flowing eastward for 20 or 30 miles, and was informed that it continued to flow in that direction for a great distance.

A mile or two below Chushul the Lhasa River, called the Kichu Sangpo, joins the great river. The Kichu is navigable for small boats for about 30 miles, and in January was about 250 paces wide.

During the first week of June, at about 140 miles from its source, the water of the main branch of the Brahmaputra was very dirty and very cold, again at the end of August, a little lower down the water was of a dirty whitish colour, and very cold.

At Chushul, 585 miles from its source, the water of the Brahmaputra was in January very clear, and again in April at the same point the water was only slightly less clear, though the river had swollen. As to the tributaries, the water of the Charta Sangpo and the Chaka Chu rivers was very clear in October, and in May, after the river had swollen, the water was still only slightly less clear.

The water of the Raka Sangpo River was very clear and cold in October, and in May it was slightly dirty.

The water of the Penanangchu was very clear in December, but dirty in April.

The Kichu Sangpo (or Lassa River) was clear in January, and again at the end of April it was still clear.

Streams from glaciers are always noted for having exceedingly dirty water, from the action of the glaciers on the rocks and

earth in contact with them. Those who have travelled in glacier regions are hardly ever mistaken in deciding as to whether a stream comes from a glacier or not.

The Pundit had been acquainted with glaciers all his life. His evidence as to the water, given above, would tend to show that the main branch of the river rose among glaciers, and he says that he saw the glaciers; again, the Shorta Sangpo, from his own observation, was known to rise among glaciers, and so also does the Penanangchu; so that the two southern tributaries would also appear to rise among glaciers, but none of the four northern tributaries appear to rise among glaciers, or, at any rate, if they do, the glaciers must be very remote or very small, as their streams were clear, even in April and May, after the rivers had begun to rise. Summing up, it appears that at Likche, near Tadam, just below the junction of the first great tributary, the Brahmaputra was in September estimated to be at least one-half wider than the Ganges at Hurdwar in December.

Between Likche and Chushul, a distance of about 450 miles, the great river is known to receive, 1st. A large tributary, called Shorta Sangpo; 2nd. A very large tributary, called the Charta Sangpo, estimated to be 250 paces wide in October; 3rd. The Chaka Chu tributary of the Charta Sangpo, estimated to be 150 paces wide in October; 4th. A very large tributary, called the Raka Sangpo, estimated to be 200 paces wide in October; 5th. A large tributary, called Penanangchu, estimated to be 150 paces wide in December; 6th. A very large tributary, the Kichu Sangpo, or Lhasa River, estimated to be 250 paces wide in January.

The main river below Tadam is never fordable, even at the broadest part, and each one of the six great tributaries, by which it is subsequently joined, are represented as being rapid, deep streams, that are not fordable during summer, and only one or two can be crossed with difficulty on large horses and yaks when the rivers are low, at other times they are invariably crossed by means of boats.

Supposing the Pundit's estimates given above to be correct, a very fair idea may be formed as to the size of the combined stream near Chushul.

The Pundit is an accurate observer, accustomed to pacing, and to estimating distances in paces, and as far as can be tested by his ideas of the Ganges, and other known streams, he is not given to exaggeration.

His estimate of one of the tributaries, viz., the Penanangchu, can be tested by direct European evidence, as Captain Turner's route along that stream coincided with the Pundit's route for about fifty miles.

Turner says that the Penanangchu stream near its source formed no inconsiderable river in September. Lower down he crossed the river by a rude bridge. At Tehukha he forded the river close to Gyanze (Jhansu Jung), above the point where it is joined by a very large tributary from the east, which the Pundit considered the main stream. He again crossed it near that town, and 16 miles lower down, he says, the river ran in a smooth stream, but was no longer fordable; he noticed a boat placed on its end in one of the villages.

At Painom, 10 miles lower, Turner found, "over the broadest part of the river, a long bridge upon nine piers of very rude structure, slight beams of timber were laid from pier to pier."

The Pundit seems to have crossed at this very spot on the 23rd December; he notices that the river was bridged.

In all Tibetan bridges that I have seen the piers are very broad as compared with the spans, and it would be a moderate estimate to take nine piers of 12 feet each, and ten spans at 25 feet, in all 358 feet, as the breadth of the river at this point. The Pundit puts it down at 150 paces, which gives 375 feet. The Pundit says that the river had a rapid current. The above shows that, as far as the size of this particular tributary is concerned, the Pundit is remarkably accurate, and at any rate has exaggerated very little.

As far as the Brahmaputra itself is concerned, Turner saw it from the rock above Teshooloomboo, some two or three miles from the river.

Near Shigatze, he states that "the Brahmaputra flows in a wide extended bed, and as though the soil gave it an unwilling passage, it has forced itself through many channels, and formed a multitude of islands in its way. But though its bed appears so wide extended from hence, I was told that its principal channel is narrow, deep, and never fordable."

An account which would agree very fairly with the Pundit's description of what he saw from the same point, and also with the Pundit's more detailed description of the river at Chaksamchori, 100 miles further down, where the deepest part was spanned by a very fragile chain-bridge. I hoped that this bridge, which I had heard of, would have given conclusive evidence as to the size of the Brahmaputra near Lhasa. The Pundit was requested to note its breadth in paces; unfortunately, he found that the bridge only spanned the deepest portion, and that, in addition, a great deal of water had to be crossed beyond the bridge. The bridge itself, moreover, was in such a rickety condition that the Pundit was afraid to cross it, the people of the country themselves invariably preferring boats.



Consequently only a rough guess could be made as to the breadth of the river.

The Pundit could only say that the river was very much larger than the Ganges or the Indus, or any other river he had seen. The depth of the stream impressed him very much. He inferred that it was very deep, because, though the water was very clear, and the surface smooth, the bottom was nowhere visible.

The breadth of the stream had not impressed the Pundit so much as the depth, he did not think the breadth at Chuksamchori much more than half greater than the Ganges, and he made the same estimate of it at Janglache, 200 miles higher up, where the volume of the river must have been much less.

After receiving so many large tributaries, it may be a matter of wonder that the river was not broader, but that it should not be so is quite in accordance with what is known of the upper course of the River Indus, which rises not far from the Mansarowar Lake, and flows through the same style of country as the Brahmaputra. The Indus receives the Zanskar, a river nearly as large as itself, at Snimmo below Leh, and yet the increase in the breadth of the main stream is hardly perceptible to an ordinary observer. The same thing happens at its junction with the Dras River, and, again, it is still more remarkable at the point where the Shayok River joins the Indus, both great streams with but little difference in volume, yet the combined stream appeared to me almost narrower than either of them separately. The increased volume of water having simply made the stream deeper.

The Indus at Attok has run a course of about 700 miles, during which it has received the following six tributaries, viz., the Zanskar, Dras, Saaroo, Shayok, Gilgit, and Caubul rivers; and, judging from my knowledge of these rivers, I should say they were not equal to the six tributaries of the Brahmaputra above Lhasa, as described by the Pundit. But supposing that they are equal, and that the size of rivers are somewhat in proportion to their length of course, *i.e.*, that they would drain the same area, I conclude that the Brahmaputra below the junction of the Lhasa River is at least equal to the Indus at Attok. The latter probably drains a country which receives very much less moisture than the Lhasa territory, but during the dry season it discharges about 24,000 \* cubic feet per second.

As compared with the Indus, the Pundit's account shows that

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\* 32,000 cubic feet according to Dr. Lord's measurement.

16,000

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Colonel Cunningham's estimate.

the Brahmaputra is a very much larger river. The Indus has a wooden bridge over it near Leh, 250 miles from its source, consisting of one span of about 70 feet, and a smaller of 20 or 30 feet, and it is again spanned at Kulsī, 50 miles lower, by a wooden bridge of one span of 80 feet, though the river immediately receives the Zanskar, which is nearly as large as the main stream under Leh. Lower, between Kulsī and Skardo, there is another wooden, and several rope or twig suspension-bridges; but boats are not used for ferries anywhere above Skardo, 400 miles from the source, and no portion of the river whilst in the mountains is navigable.

There is not a single wooden bridge over the Brahmaputra, and no twig, rope, or cane bridges. Iron suspension-bridges have been made at Janglache, and in two or three other places, but the river appears to have been too large for the Tibetan workmanship, even in that material. According to the Pundit's account they are all dangerous to use, the people of the country preferring boats.

The above, added to the facts that the river was not fordable at 140 miles from its source, or at any point lower down, even at the broadest parts, that ferry-boats were used on the six great tributaries, as well as on the main stream, and that the main stream itself was navigable continuously for over 80 miles in one place, and again for 10 miles in another, are in themselves sufficient to prove that the river at the lowest point was a gigantic stream. The Tibetans all spoke of the Brahmaputra as a very great river. They call all very large rivers Sangpo, and as that term is applied to four of the tributaries enumerated above, it is to be supposed that the conjoint stream is, in their estimation, a very large one indeed.

The navigation at 13,500 feet above the sea, rude though it may be, is an extraordinary fact; navigation of any kind at such an altitude being quite unknown in any part of either the old world or of the new. If the Pundit had any doubt as to the great volume of the river, it was completely removed by a squall which suddenly swept across the broad expanse of water; the wind raising such large waves that the small fleet of boats carrying the Pundit and his companions only escaped swamping by taking to the nearest shore.

Any comparative estimate by eye of such a great river is of course very deceptive, but, as has already been shown in the case of the Penanangchu, a tolerable estimate may be made in that way of a moderate-sized river.

Assuming that the Pundit's other estimates of the main stream and its tributaries were as accurate as that of the Pena-

nangchu, it would follow that in the dry season (December and January) the resulting stream was composed of the stream near Tadum, which was at least one and a-half times as large as the Ganges in September (or say only the same size in December), and of six other streams, each of which on the average was probably larger than the Ganges, or, say in all, of a discharge of water equal to seven times that of the Ganges at Hurdwar in December.

The Ganges at Hurdwar was selected for comparison, as it was well-known to the Pundit, and had lately been recrossed by him. Its discharge may be taken at about 5000 \* cubic feet per second in December. Consequently a moderate estimate of the great river's discharge just below the junction of the Lhasa River would be ( $7 \times 5,000$ ), 35,000 cubic feet per second even in the dry season of December and January, without allowing anything for minor tributaries, or for any large ones that were not seen by the Pundit.

The point for which this estimate is made is near Chushul, in latitude  $29^{\circ} 22'$ , longitude  $90^{\circ} 40'$ , between it and the highest point of the Brahmaputra, visited by Wilcox, viz., that in latitude  $28^{\circ} 10'$ , longitude  $95^{\circ} 10'$ , we have no direct evidence † as to the river and the tributaries it may receive. The length of course between these two points would probably be about 350 miles. In such a distance it must be allowed that the great river would receive a large increase of water. Consequently it appears to be very probable that the river, which at the upper end of the 350 miles had an estimate discharge of 35,000 cubic feet in December, would at the lower end have fully 50,000 cubic feet, the amount ascribed to it by Wilcox in March, when the river had begun to swell. Wilcox found the river at the point referred to 100 yards in width, with every sign of great depth.

No branch of the Brahmaputra west of that referred to by Wilcox, viz., the Dihong, is large enough to account for the discharge of water noted below Lhasa. The largest, viz., the Subanshiri, in the dry season having a discharge of only 15,000 cubic feet; and as Wilcox has very clearly put it, if the great river that flows to the south of Lhasa is not the same as the Dihong, it is impossible to see how a sufficient area can be left to provide the water of the latter.

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\* More correctly 5500 cubic feet.

† According to the information collected by the Pundit, near the junction of the Lhasa tributary the river appears to have an easterly course for about 200 miles from Chusul, or say to about longitude  $94^{\circ}$ , and then flows in a more southerly direction.



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I consequently conclude that the great river south of Lhasa forms the upper part of the Brahmaputra, and is identical with, and forms the Dihong, or main branch of the said river.

The great river flows from Mansarowar, in a south-easterly direction for about 170 miles, and thence adheres very closely to a due east course for at least 500 miles more, being at the end of that distance in exactly the same latitude as at the beginning. The river is nowhere fordable from its source to near Lhasa, and at 600 miles from its source it would appear to discharge about 35,000 cubic feet per second in December and January, as far as can be determined from description and comparison with other rivers. Positive proof, as to whether this river is or is not the upper course of the Brahmaputra, can of course only be afforded by tracing the river from Lhasa downwards.

Every endeavour will be made to supply this missing link, meantime this last exploration tends to show that Turner and Wilcox were right in concluding that the great river which flows through the Lhasa territory is the upper course of the main stream of the Brahmaputra, the largest river in India.

T. G. MONTGOMERIE, CAPTAIN R.E.

VIII.—*A Journey from Norton Sound, Bering Sea, to Fort Youkon (Junction of Porcupine and Youkon Rivers).* By FREDERICK WHYMPER, Esq.

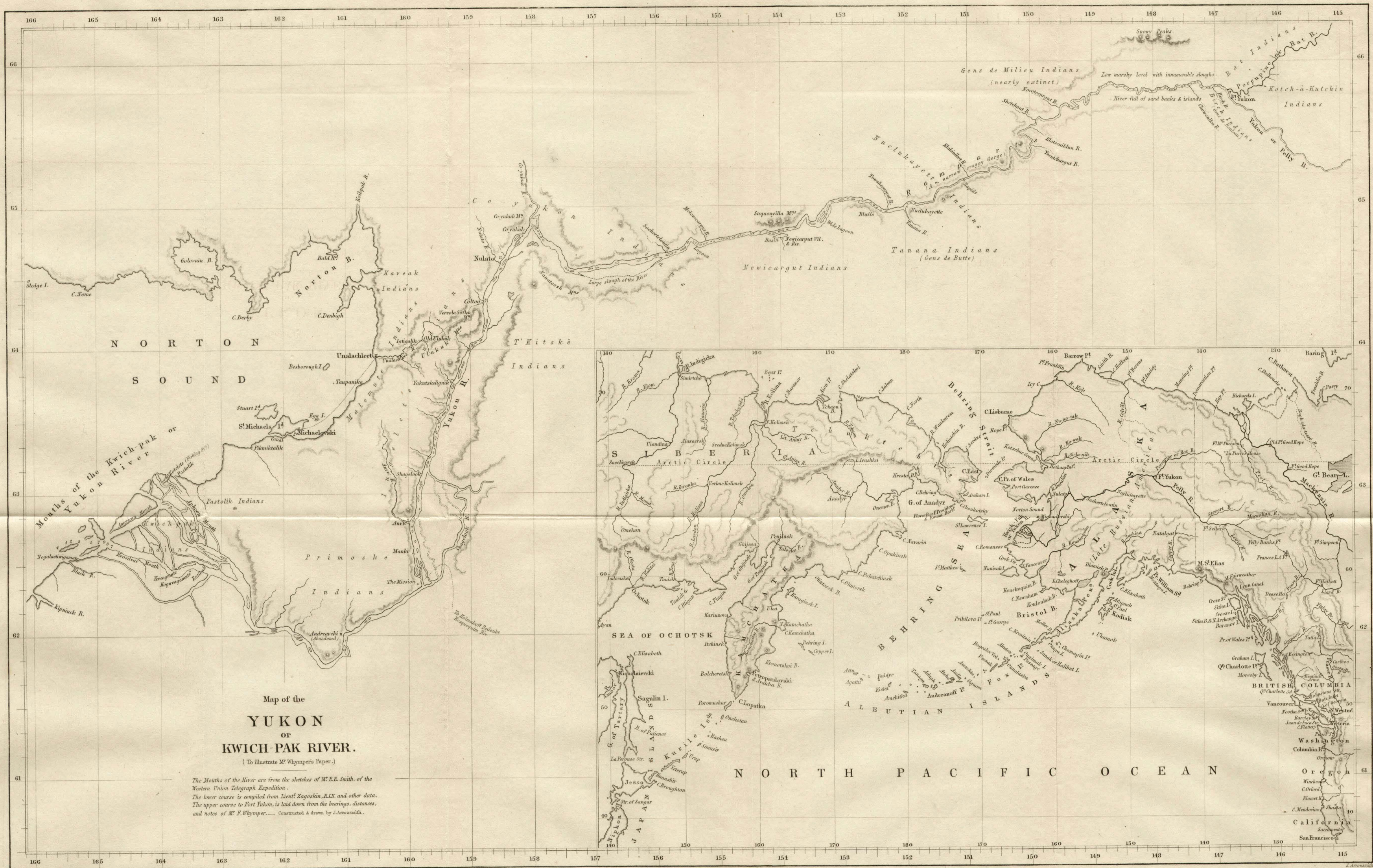
Read, April 27, 1868.

THE journey of which my present paper treats was made in the service of the Western Union Telegraph Expedition, often known as the "Russo-American" or "Collins' Overland Telegraph." This enterprise, in which the Company is said to have spent 3,000,000 dollars (in gold), was, in 1867, abandoned, solely owing to the success of the Atlantic Cable, and not from any difficulties in the way of the undertaking itself.

Our expedition was largely Arctic in its character, and affords perhaps the latest confirmation of the possibility of men enduring extreme temperatures and working hard at the same time. During the winters of 1855-6 and 1866-7 we had stations at the head of the Ochotsk Sea and at the Anadyr River, Eastern Siberia, at Plover Bay and Port Clarence, on either side of Bering Straits, two in Norton Sound, and one on the Great Youkon River, besides numerous parties in somewhat lower latitudes.

Our men were engaged both exploring and building telegraphs at temperatures frequently below the freezing point of





Map of the  
**YUKON**  
 OR  
**KWICH-PAK RIVER.**  
 (To illustrate Mr. Whympers Paper.)

The Mouths of the River are from the sketches of Mr. E.E. Smith, of the Western Union Telegraph Expedition.  
 The lower course is compiled from Lieut. Zagoskin, R.N., and other data.  
 The upper course of Fort Yukon, is laid down from the bearings, distances, and notes of Mr. F. Whympers. — Constructed & drawn by J. Arrowsmith.



mercury. Minus 58° Fah. was our lowest recorded temperature in Russian America. Now, in such a climate, this work was no joke. The simple process of digging a hole to receive the telegraph pole became a difficult operation when the ground was a frozen rock with 5 feet of snow on the top of it, and where the pick and crow-bar were of more use than the spade or shovel. The axe-man, too, getting out poles and logs, found his axe ever losing its edge or cracking into pieces. All this was in addition to transporting *matériel* and provisions. Yet our men persevered, and succeeded in putting up at least one-fourth of the whole line, and I can sympathise with the feeling that prompted some of them at Unalachleet, Norton Sound, on hearing of the withdrawal of our forces and the abandonment of the work, to hang black cloth on the telegraph poles and put them into mourning!

The Youkon is by no means a familiar river to us, yet it certainly deserves to rank among the great streams of America. Its name is of Indian derivation. "Youkona" is the term used by three-fourths of the natives on its banks. But, near the mouths, other tribes call it the Kwich-pak (pron. Kwif-päk) and the Russians on their first entry into the country adopted their name. Both terms signify "big river."

Its course is very worthy of notice, being a reproduction, as it were, of the outline of the lower coast of Russian America from the peninsula of Aliaska to the Stekina River.

The first Russian travellers on it were *employés* of the Fur Company. Glazoonav in 1835, Malakoff in 1838, and Derabin in 1839, went from Norton Sound to the Youkon; the latter, in 1842, commenced the erection of the Post at Nulato, which long bore his name. The same year Lieut. Zagoskin, of the Russian Imperial Navy, arrived at St. Michael's, Norton Sound, on a mission in the interests of the Russian-American Fur Company. His principal journey, made under great disadvantages, was so far successful that he reached a point on the Youkon some 120 miles above Nulato, and he then descended the river to its mouths. His work, published in Russian, was translated into English for our expedition, but was never printed.

In 1850-1, members of Captain, now Admiral, Collinson's Expedition, went through from Norton Sound to the Youkon, and one brave Englishman, Lieut. Barnard, met his death at the hands of the Co-Youkon Indians. His grave, near the Russian post of Nulato, where I spent a part of last winter, is in good preservation. At Unalachleet, Norton Sound, Captain Bedford Pim is very kindly remembered by both Russians and natives.



In 1865, at the commencement of our enterprise, the services of Major Kennicott were secured by the Directors of our Company to lead a party on the Youkon. This gentleman, an enthusiastic collector, had spent several years previously in the Hudson's Bay territory, in the interests of the Smithsonian Institute at Washington. He was landed at St. Michael's, in September, 1865, with a party, and commenced the work with great energy, but he died at Nulato before he had made the trip nearest his heart—the journey to Fort Youkon from the Pacific side. He had previously been there from the Atlantic States. Two of his party, Messrs. Ketchum and Labarge, were the first to make this trip in 1866, and subsequent to his death.

While this was going on I made two lengthened voyages in the North Pacific, visiting most of the stations before mentioned, with the addition of those of Sitka and Petropaulovski. On the 30th September, 1866, I went ashore to the post at St. Michael's, with liberty to attach myself to any of our parties, and travel where I deemed best, with due regard to the Company's interests, and I immediately determined to join the Youkon division. I found my friends of the previous year, although rough-looking specimens enough, generally in good health, with a fair knowledge of the country, and the means of travelling in it.

#### ST. MICHAEL'S (Norton Sound).

|       |      |     |        |             |
|-------|------|-----|--------|-------------|
| Lat.  | 63°  | 28' | 45" N. | } Zagoskin. |
| Long. | 161° | 44' | 61" W. |             |

Redoubt St. Michael's, or Michaelovski, deserves some brief notice. It is not merely the principal station in North-West Russian America, but is likely to become a military post in the hands of its new owners. It was long the head-quarters of the Fur Company for this district of their territory.

St. Michael's is situated on the island of the same name, was founded in 1833 by Michael Tebenkoff, and is built on the model of a Hudson's Bay Company's fort, with enclosure of pickets and with bastions flanking it. Inside you find magazines, bath-house, *caserne*, and the houses of the *employés*. These latter, with their yellow walls and red roofs, give it a somewhat gay appearance.

Outside the post, besides other buildings, there is a small chapel, in which on Sabbaths and "Prasniks," or holidays of the Church, a service is performed. A priest of the Greek Church, resident at the "Mission" on the Lower Youkon, comes down occasionally to baptize the natives. The Greek Church practices, I may observe, *total immersion*, and when an infant is christened it is dipped bodily. In the case of Indians, they are

baptized in the sea at this fort, and rumour says that some of them have been so christianised many years in succession, in order that they may obtain small gilt crosses and other presents given them at such times.

The Island of St. Michael's is covered with moss and berries, resting sometimes on a bed of clay, but more commonly on a porous lava rock. This formation apparently extends to the Youkon. The Indians have a tradition that the island was upheaved from the sea, an occurrence at least possible. A large rock in the chain of the Aleutian Islands, known by the Russians as the Bogoslov Volcano, rose from the sea in 1796. Zagoskin says that the spot where the fort now stands has been covered by the sea within the memory of the Indians living at the date of his visit, 1842-3.

The ice in Norton Sound forms in October, but is frequently broken up and carried to sea till late in winter. On Christmas Eve some of our men arrived at St. Michael's from Unalachleet, having travelled on the ice sometimes at a distance of a mile or two from the coast. They, as usual, were invited in at once by the Russians to "Chi-peat," or drink tea. This over, they sallied outside the fort to smoke their pipes and look after the dogs, &c. What must have been their surprise to find that all the ice, as far as the eye could reach, that they had so recently travelled over, had broken up and gone on a cruise. Had they been half-an-hour later they would have gone with it, and would have been floating about Bering Sea on a field of ice. Norton Sound was not clear of ice till the third week of June last year.

On the coast, although the thermometer usually stands rather higher than in the interior, the cold is well known to be more felt. Nearly all the cases of frost-bite among our men occurred whilst travelling in, and north of Norton Sound. Again, whilst "clear ice," *i.e.*, ice free from a covering of snow, is scarce on the rivers, except very early in winter, it is common enough on the coast. When your sledge arrives at such ice the dogs will often start off at a great rate, although but a few minutes before they may have been proceeding with difficulty. At such a time it is usual to jump on and take a ride, and you have to look sharp to do it. Now, if there is much wind at such a time, however warm you may be from previous exercise, you may chill very readily. Under exactly such circumstances as this the Russians at St. Michael's were once horrified at the arrival of a sledge with an Indian on it, sitting erect, but perfectly dead. Unable to stop his dogs, the poor fellow had jumped on his sledge, and had probably frozen to death in a few minutes. Such incidents are rare, but it is common enough to find Indians

with faces much disfigured, and having lost part of their ears or noses. It has been the universal testimony of Arctic travellers that the most extreme temperatures without wind are infinitely less felt than more moderate temperatures *with* it, and it is a fact that usually the very low temperatures occur in calm, clear weather.

In Norton Sound a small steamer had been left for our use. On the 2nd October she made her first, and, as it proved, her last trip, for the season, from St. Michael's to Unalachleet, with a number of us on board. We found the Unalachleet River completely frozen up, and ice forming on the coast. On the 7th October she was beached for the winter.

The post at Unalachleet, founded in 1840, is, on the authority of Zagoskin, lat.  $63^{\circ} 53' 33''$  N., long.  $160^{\circ} 30' 16''$  W. It is the most northern Russian settlement on the coast, and is at the mouth of the river of the same name on the north bank. It is partially surrounded by the usual picket fence, but is on a smaller and meaner scale than St. Michael's. The "Bidarshik," or head man, has but one room for himself and family. The caserne is occupied by several men with families, and by an immense number of cockroaches, apparently with families also. A large "pitchka," or oven, occupies an important position in this establishment, as in all the Russian settlements. The windows do not, as at St. Michael's, aspire to the dignity of glass, but are of the gut of fur-seal, white and translucent, if not transparent.

In this neighbourhood we had during the winter and spring of 1866-7 a party of 36 men, and large sections of the line were built in the country lying between it and Port Clarence. Besides occupying every available bastion and corner of the station, our men were domiciled in two rude houses built of logs and earth, which were constructed during my stay.

To the north-west of the post there is a large village of Malemukes and Kaveaks, a race of tall and stout Indians. In other respects they much resemble the Esquimaux.

The males very generally shave the crown of the head, and often wear the "totook," two pieces of bone run through holes in the face on either side of the mouth. The women are tattooed on the chin, and wear ornaments of beads from their hair, and leaden or iron bracelets. All wear rein-deer clothing, and boots with soles of "maclock" or sealskin, with the hair removed. A great trade is carried on by these people with the Tchuktchis of the Siberian coast for *tame* rein-deer skins. Although the Tchuktchis have, as is well known, immense herds of domesticated rein-deer (some of which I have seen at the

Anadyr and elsewhere), *the animal is never met with in Russian America but in a wild state.*

In this, as in other villages, there is a large building specially set apart for gatherings of the people. It is, in fact, their town hall. I witnessed several of their public dances, in some of which they burlesque the motions of birds and quadrupeds.

To one dance we were specially invited. Arrived at the door-way, we found a narrow subterraneous passage, 2½ feet high, crawling through which you at last reach the room itself, partly underground, and dimly lighted by blubber-lamps.

The Indians to be concerned, chiefly young men, were dressing. All were nude to the waist, and wore deer-skin or cotton pantaloons, with the tails of wolves or dogs hanging from their belts behind, feathers and cheap handkerchiefs round their heads. The elders sat on a bench or shelf running round the entire building, and looked on approvingly, whilst they *consumed their own smoke*—as is the manner of the Tchuktchis—by swallowing all they made, and getting partially intoxicated thereby. Their pipe-bowls are on the smallest scale, and they even dilute their tobacco by mixing willow-shavings “fine cut” with it. Meantime the women were bringing in contributions of berries and fish in large “contogs,” or wooden vessels, varying in shape from a deep dish to an oblong soup-tureen.

The performance commenced by the actors therein ranging themselves in a square and raising these dishes of provisions to the four cardinal points successively and once to the skies with a sudden noise, like “swish!” or the flight of a rocket. May-be it meant an offering to the seasons and to the great spirit. Then came the feast, and that over, a monotonous chorus with an accompaniment of gongs was started. The words of the song commenced “*Yung-i-ya i-ya-i-ya,*” and continued throughout “*yung-i-ya.*” Then a boy sprung on the floor; he was speedily joined by a second, then a third, till a circle of 20 was formed. Now they appeared violently attracted together, and now as much repelled; now they were horrified at one another's conduct, and held their arms in warning gestures; and again all were friends, and made pantomime of their happiness. In this performance there was nearly as much done by arms and bodies as with the feet. When there was a lull in the entertainment, small presents were brought round to all the strangers; mine was a pair of boot-soles of seal-skin.

So decided an odour at length pervaded the ball-room, that we one by one left the festive scene. The Indians kept it up for hours afterwards.

Although there is much that is interesting in connection with

this people, I must proceed to speak of our journey to the Youkon, mainly by a land-route, and one made constantly during winter by our men. The distance from St. Michael's is by this way but 225 miles, against nearly 700 by the mouths of the Kwich-pak or Youkon.

We left Unalachleet on the 27th of October, and followed the course of the river of the same name for 25 miles, and then for the most part a valley direct to the Youkon. The snow was so deep and soft that the journey took us 11 days, although it was subsequently made in 4 or 5. Our light birch sledges (with bone runners) had five dogs a-piece when we started, and were heavily laden. I say "when we started," for our dogs infinitely preferred the luxuries and ease of an Indian village to our service, and deserted whenever they got a chance. "Ukalee," a small salmon dried, is the regular dog-feed of the country, whilst a soup is sometimes fabricated at the Russian forts. Contrary to Dr. Kane's experience, we found our dogs *would* eat beans properly softened, and even rice and bran, when mixed with a due proportion of oil, blubber, or fish.

We were surprised at finding this a well-wooded country. Spruce, birch, and willow are abundant within a short distance of the sea-coast. In camping, we could almost always, after clearing a space in the snow, lay down a bed of fir-brush for our blankets and hides to rest on. This with the certainty of a good log-fire, made any temperature endurable. Tents were rarely used at this time, but sometimes erected a semicircular screen of cotton-drill or canvas around our camp to shelter us from our only enemy—the wind. Our first care was always to put up everything eatable out of the reach of our dogs; and as they do not object to old boots, skin clothing, and will frequently eat their own harness, it was a somewhat difficult task.

At a distance of 25 miles from Unalachleet we came into the country of the Ingelete Indians, who speak a dialect entirely differing from the coast Indians, and one, as we found, more allied to the Co-Youkon. At their villages of Igtigalik and old Ulukuk we spent some time. Their winter dwellings are underground, the roof only raised above the surface, and to get into them you have to crawl through a narrow passage a little over 2 feet in height. A square hole in the roof to let out the smoke of the fire below, and the narrow entrance-hole are the only openings, and when the fire gets low both are covered by skins, thus effectually keeping in all warmth, with a good deal of smoke and carbonic acid gas. The dogs, scrambling over the roofs, will sometimes tumble through the large smoke-hole on to the fire below, scattering cooking arrangements to the wind, and themselves retreating with great alacrity.

The second Ingelete village is prettily situated by a stream, with rapids and fish-traps, and is the paradise of the neighbourhood in regard to salmon-trout and rein-deer meat.

Our course after leaving this happy spot followed more or less the Ulukuk range of mountains. They are a conspicuous landmark in this country, but do not, I think, exceed 3000 feet in height. Our course to the Youkon was in general terms north-east.

The snow was so soft that, without snow-shoes, we sank in  $2\frac{1}{2}$  feet, and we accordingly wore them. In order to make a track for our dogs, we, with our Indians, often walked on a-head, returned, and again started forward, thus going over the ground three times. At snow-banks all hands had enough to do, in assisting the dogs to struggle up with their heavily-laden sledges.

Near the Youkon are many warm springs, said never to freeze. One of them, I examined, and found innumerable bubbles rising to the surface—the water showing a temperature of  $33^{\circ}$  Fah., the air at the time being  $23^{\circ}$  colder.

On the 11th of November, from a slight eminence, we saw a faint streak of blue over the woods; travelled hard to reach it, and at sun-down broke from the thicket, shot down a steep bank, and stood on the borders of an immense field of snow—the mighty Youkon! Hardly a patch of ice was to be seen; though huge hummucks in places had been forced on the surface, all was covered by a wintry mantle; the river in but a few isolated streaks, still open and running swiftly. From bank to bank was not less than a mile, and several islands were visible in either direction.

Within a short distance of the termination of the portage (or "peronose," as it is called by the Russians) that we had just travelled over, we found the Indian village of Coltog, where we again stopped. In our intercourse with these people, as with most other tribes, we found that the best goods for trading purposes were useful rather than ornamental ones. Axes, knives, flints, powder and balls, were all much inquired for, whilst rubbish was at a discount. Even beads were required to be of a substantial nature, not easily broken. Our business with them was principally, of course, in purchasing supplies or in paying for services rendered.

The course of the Youkon from Coltog upwards is for 65 miles very little east of north, till at the Co-Youkuk "Sofka," or mountain, the great bend to the east occurs.

We found sledge travelling on the great river comparatively easy, and we arrived at Nulato on the 15th November to find fair quarters assigned to us, and a hearty Russian welcome from the men at the Fort.

— 6° Fah. was our lowest cold on this trip: later in the same month we had it down to — 36°. In December our coldest day occurred — 58°. January proved our coldest month, ranging from + 10° to — 49°.

The Post at Nulato resembles the others, and differs only in having two watch towers. Zagoskin makes its lat. 64°, 42', 11" N.; long. 157°, 58', 18" W. It is the most interior and northern fort of the R. A. Fur Company, and is on the north-west bank of the river—on a level and comparatively open space bounded by two streams.

Indians come hither from distances of 200 and 300 miles to barter their furs. The tariff last year was about 7½*d.* in trade for one marten skin—and they have obtained as many as 5000 in one year—besides other furs, beaver, white, red, and more rarely black and silver-grey foxes. Free traders, doubtless now the country is open to them, will play great havoc. Soon the record too of the interior, as of the coast trade already, will be—to use the words of a well-known traveller—"White men, whiskey, guns, powder and ball, small-pox, debauchery, extermination."

Our quarters were warmed by an immense oven, and usually we could keep up sufficient heat. The floor, however, was sometimes intensely cold; I have tested it and found the temperature + 4°, or 28° below freezing! I remember once hanging up some damp cloth; near the roof it steamed, within a foot of the floor it was frozen hard with long icicles hanging therefrom.

Our supplies from the resources of the country were very variable. At one time we luxuriated on Arctic grouse, or deer meat, and at others we were reduced to tea and bread.

I had before seen Indians fishing through the ice, but was not prepared to see it done on a large scale, as on the Youkon. Early in the season large stakes were driven down through the ice to the bottom of the river. To these were affixed traps, consisting simply of a wicker funnel leading into a long basket, not unlike the eel-pots to be seen on the Thames—at Reading—and elsewhere. They are, however, of a larger size.

Oblong holes above them were kept open through the ice by frequent breaking, and sometimes a great haul of fish was the result, when the traps were raised.

The true Nulato Indians do not now number over 5 or 6 souls. At the period that our countryman, Lieut. Barnard, met his death, the Co-Youkons wreaked their vengeance on the Nulatos by surrounding their underground dwellings, stopping up the smoke and entrance holes, and raising great fires over

them. All were either suffocated or shot. The Co-Youkons never gave us any trouble, but are wilder Indians than those of the coast. Their true dress is a double-tailed coat, one tail in front and one behind. In various modifications this fashion extends to Fort Youkon and beyond. The women wear an ornament made of shells and running through the cartilage between the nostrils. Curiously, higher up the river, it is the men exclusively who adopt the same ornament.

The tribes here mourn for the dead one year, and the women during that time often gather together, talking and crying over the deceased. At the expiration of that term they hold a feast, or "wake," and the mourning is over. Their graves are simply oblong boxes raised on posts, sometimes decorated with strips of skin hanging over them, sometimes with the possessions of the deceased (as a baidarre, or a birch-bark canoe with paddles) on the top of the box. Smaller belongings are put inside the box with the corpse. I cannot describe it better than by calling it a 4-post coffin!

They have certain superstitions with regard to the bones of animals, which they will neither throw on the fire or to the dogs, but save them in their houses or caches. When they saw us careless in such matters they said it would prevent them from catching or shooting successfully. Also they will not throw away their hair or nails just cut short, but save them, sometimes hanging them in packages to the trees.

As the rivers are unnavigable from late in September to late in May inclusive, the winter might be said to be 8 months in length, but still warm weather commences comparatively early. On the 10th April I found the willows budding; on the 28th the first goose from the south arrived; on the 12th May mosquitoes made their appearance, and the next day swallows were flitting round the Fort.

The break up of the great river was an interesting sight, the smaller streams and tributaries opening first, and running out on the surface of the ice. It was on the 19th May that the Youkon made its first great move, and for several days afterwards a constant stream of broken ice travelled past our station at about 6 miles an hour—now surging into mountains as it met with some obstruction, now grinding and crashing on its way, and carrying all before it. Whole trees and banks were swept away remorselessly before its victorious march, and the river rose 14 feet above its winter level.

On the 26th May we started up river, the Russian trader and employés bearing us company as far as Nuclukayette. My only companion was Mr. Dall, a collector for the Smithsonian Institute. Our crew was Indian, our craft a "baidarre" or



skin boat. The river was still full of drift wood and ice, and we found navigation somewhat difficult. One man always, at this time, stood in the bows of our canoe, with a pole shod with iron, to push away the floating logs or angular pieces of ice, lest a collision should ensue, and we with our frail bark come to grief. We had frequently to cross and recross the stream to get into quieter water, and at such times exerted ourselves specially, so that we might not lose by the operation. As it was we usually drifted down half-a-mile or so. The current certainly averaged 6 knots an hour at this time, and at angles of the river, and partial rapids, a much greater speed.

How shall I in few words describe this immense stream? one that our men were wont to compare with the Mississippi! At Nulato, 600 miles above its mouth, it is from bank to bank one mile and a quarter. In other places it opens out into lagoons, 4 to 5 miles in width, studded with innumerable islands. Our explorers have travelled down it 1800 miles. Its tributaries would be large rivers in Europe. The Co-Youkuk, Meloze-cargut, Newicargut, Tanana, and Porcupine Rivers, with many others, are all considerable streams, and I can understand the proud boast—uttered by a native of its banks and translated for our benefit—"We are not savages, we are Youkon Indians!"

On the 27th May we passed the Indian village and river of Co-Youkuk. Here a large mountain terminates on the river in a steep sandstone bluff, perpendicular strata taking the place of the more usual horizontal formation. The islands of the river were all more or less submerged, and we floated over some of the lesser tree-tops. We were accompanied by a fleet of birch-bark canoes, their owners all bound for the annual trading meetings at Newicargut and Nuclukayette. These canoes are well constructed on a light frame of birch, and vary in length from 8 to 14 feet; some being intended for but one, and others for two or more persons. They commonly use a single paddle. The seams of the canoe are sewn with the finer roots of spruce fir, and are rendered tolerably water-tight by rubbing in the gum of the same tree. When they are found to leak the Indian goes ashore, lights a small fire, turns his canoe over, and works in the gum in a heated state. Every canoe carries a wooden vessel, or more rarely iron pot, containing smouldering sticks and embers. This is done for a double reason, to enable them to start a fire readily, and at the same time with the smoke to keep off the mosquitoes, the pest of early summer. From "Sachertelontin," an Indian fishing village about 100 miles above Nulato, I kept a constant running survey (of bearings and distances only). Our only authority—the Map of Zagoskin—terminates near this point, and I have therefore

attempted to lay down the continuation of the river to its junction with the Porcupine, on a sketch-map. With many windings the general direction is N.E. magnetic, and so little does it really vary from this that my notes contain little else but points ranging from N. to E.

On the 2nd of June we passed the Melozecargut River (north bank), and later in the day the Suquonyilla Mountains—snow lying in patches on them; but they are of inconsiderable altitude.

The night of the 3rd and 4th June, on the south-east side of the river, we found an opening leading to a kind of fresh-water bay, into which the Newicargut River empties. At its mouth we met about 150 Indians, nearly all wearing the double-tailed coat, much-ornamented fire-bags, and knife-belts. The Russians and ourselves saluted the village with a miscellaneous discharge from revolvers, carbines, and shot-guns, as is the delight of the Indians hereabouts, and they returned it with great zeal. Whilst the Russians traded for furs we laid in a whole canoe load of dried meat and pemmican. In the evening of the 4th "Larrione," a Co-Youkon, "made medicine" over a sick man. A group of Indians encircled the invalid; in their midst burnt a dim fire. A monotonous chorus in an undertone was kept up whilst Larrione went through an elaborate performance, some details of which are absolutely revolting and cannot be mentioned. Now he appeared to draw the evil spirit from the sick man, and wrestling with it throw it on the fire, and then repelled, ran wildly from it with mock terror and affright. Now it had possession of him, and he gesticulated, groaned, and frothed at the mouth—the whole accompanied by a recitative, wild enough, but artistically managed in connection with the chorus. The whole affair was not unlike a weird scene in a sensation drama, taking into consideration the accessories, the over-hanging trees, the twilight, the dim fire.

At last the performance assumed a gayer tinge, the chorus grew louder and livelier—the man was supposed to be dispossessed, and he hobbled from the scene.

Above Newicargut the river opens out into a wide lagoon with large islands, and running due north (magnetic).

On the 8th June, after passing the mouth of the Towshécargut River (entering from the north-west), we arrived at Nuclukayette, at the junction of the Tanana with the Youkon, the furthest point ever reached by the Russian traders, and approximately 240 miles above Nulato. Hither come, for trading purposes, Indians from all quarters; on some occasions their gatherings have numbered 600. Within two or three years the Hudson's Bay Company's men have also come down from Fort Youkon.

The Indians from the Tanana had not arrived, but we met a number subsequently. I believe them to be the most unsophisticated natives to be met with at the present day. Painted faces, large feathers in their unkempt hair, a patch of red clay at the back of their heads covered with small feathers, a long ornament through the nose, double-tailed buckskin coats and pantaloons, much adorned with fringes and beads, and much-worked firebags and belts. They reminded me of the ideal North-American Indian that I had read of, but had hitherto never seen.

On landing at this village a ceremony had to be gone through. The Indians already there advanced whooping, yelling, and brandishing their guns till they reached us, then discharged them in the air. We, with the Indians just arrived, returned the compliment, and then the chief, whose acquaintance we had made during winter, came forward and welcomed us.

This village was almost bare of provisions; but they kept up dancing and singing vigorously, knowing the season for moose-hunting was at hand.

From this point we travelled exclusively by night; the days were too hot, sometimes  $78^{\circ}$  in the shade. But at that time night was no night, sun-set blended into sun-rise: our shortest night (when nearing Fort Youkon) was but 45 minutes in duration.

Immediately above Nuclukayette the river narrows, and is more or less shut in by mountains with craggy bluffs and heights for 200 miles. About a day's journey above the village we came to the only "Rapids," at all deserving the name, to be met with for 1200 miles from the river's mouths. Here a bar of sunken rocks makes the water boil and surge; but there is a clean channel and no fall, and we got through with very little trouble, part of the time "tracking" from the rocks on the banks.

The heights surrounding this gorge are known at Fort Youkon as the "Ramparts." When we passed the river had fallen 10 feet, and we could track or tow from the banks very frequently.

This part of the river abounds with moose; both Indians and ourselves shot several. The mosquitoes are the principal cause of the moose leaving the woods and taking to the river, and when in the water they are very clumsy. Natives do not always waste powder and ball over them. I have seen an Indian approach one carefully in his birch-bark canoe and kill it by repeated stabs from a knife.

Above the "Ramparts" the river again is shut in by their banks, generally wooded, often

strong currents having undermined them. It is no uncommon thing to find a tree with its roots dangling in the air, and only supported by a little earth and moss. These constantly fall in, and there is no doubt that great changes, both with regard to the formation as well as the destruction of islands, are constantly going on. On sand-bars and at the mouths of streams immense piles of drift-wood are common, and we frequently camped near them. The channels of the river evidently change: we passed passages or "sloughs" completely dried up that had been of old unmistakably water-courses.

On the Youkon the berries are innumerable; wild rhubarb attains a fair growth. I have seen, but more rarely, wild currant and gooseberry bushes. The wild rose is everywhere abundant.

Many rivers and streams enter the Youkon between Nukulayette and Youkon; but they are generally small, excepting only the Porcupine. This part of the river is not peopled, though the Indians from a distance frequently hunt there. The "Gens de Milieu," a tribe formerly there, died off some years ago from scarlet fever. We passed some of their untenanted houses. While, however, at Fort Youkon I heard that a tribe from the Porcupine River were coming to occupy this deserted ground.

On the 23rd June (29 days from Nulato, 26 days' travelling time) we reached Fort Youkon, to find but three of the company's men to a large crowd of Indians, all awaiting the return of the commander (from La Pierre's house on the Rat or Porcupine River).

We shook hands with everybody, including a large proportion of the Indians, and were soon installed in a room of the fort. A few days later the commander, Mr. Mac Dougall, returned with his season's supplies, and with him the Rev. Mr. MacDonald, a missionary of the Church of England, stationed there. Both welcomed us warmly, and we spent over a week in their pleasant society.

Fort Youkon was founded in 1847. The present fort, commenced in 1864 and unfinished last year, is at a distance of about three-fourths of a mile from the old post. It is situated about half a mile above the junction of the Porcupine River, on the north bank of the Youkon, is approximately in lat. 66° N., and is well known to be within the boundary of Russian America. It may be fairly considered as the most remote of the Hudson's Bay Company's posts. Their supplies of trading goods are brought through all the Hudson's Bay territory, and consequently provisions are hardly brought at all. Moose-meat, fresh and dried, is their staple diet.

The Kotch ā kutchin (or lowland nation) is the tribe living at Fort Youkon and neighbourhood. My lamented friend, Major:

Kennicott, when here on his visit from the Atlantic States, made a very careful vocabulary of their dialect.

These Indians dwell partly on the Youkon, partly on the Porcupine, and are divided under two chiefs. Compared with the natives of the lower river they are well provided with necessaries. They wear every variety of dress, from mock uniforms, or ordinary clothing imported by the Company, to moose and rein-deer clothing of every shape and style. Here, too, we get into the buckskin and mocassin country. The principal tribes also visiting this station for barter are the Tananas (or "Gens de bulte"), An-Kutchins ("Gens de foux"), and Tatanchok-Kutchins ("Gens de bois").

The Fort Youkon snow-shoes are pointed at either end, the foremost turning up. Their sledge is undoubtedly the simplest in the world, being nothing more than a wide plank. One end is softened by steam till it can be turned up, forming a kind of prow, and this is kept in its place by thongs. A few cross-pieces on the plank, and the lashings, complete the sledge. The prow is generally covered with hide.

On the 29th June Ketchum and Labarge, who had been 600 miles further on the Pelly or Youkon, returned. They had reached Fort Selkirk (Mr. Campbell's Fort, as they called it at Fort Youkon), and brought a fragment of its remains. It has been for some time abandoned. They found the Indians peaceable and supplies good. This part of the river, according to their observations, agreed in its general course with that laid down for so long a time on our maps. I may remark that the river between Fort Youkon and Nulato is less known than those portions nearer its source, or near its mouths. Doubtless the Hudson's Bay Company could tell us much of the Youkon *above* their fort.

The Porcupine or Rat River, emptying into the Youkon below the fort, is undoubtedly the river mentioned in 'Mackenzie's Voyages.' He was—when on the great stream that now bears his name—told of a river, in comparison of which he says "that on whose banks we then were was but a small stream; that the natives were very large and very wicked, and kill common men with their eyes;" that they were "adorned with wings," and that they could eat "a large beaver at a single meal." It was also described as falling into a great lake or sea. Now the Porcupine, with its virtual continuation, the Youkon, answers perfectly to this; but I need hardly say the people dwelling there are comparatively common-place after this description.

On the 8th of July, having obtained two extra birch-bark canoes, we started down. Ketchum, Labarge, Dall, and myself, with four Indians, formed our party. Our canoes, lashed together,

floated down the current, without much exertion on our part, at the rate of 100 miles to 24 hours. We slept and took our meals on board, travelling steadily day and night, and simply going ashore about twice a day to boil the water for our tea, &c.

Arrived at Nulato, we stopped two days, and then resumed our trip in one large baidarre obtained from the Russians. At every Indian village, and there are many, we found them engaged in taking salmon in weirs, in hand nets, or by spearing. This fish, of at least two varieties, is very abundant; the larger kind extremely rich and oily, and measuring sometimes  $4\frac{1}{2}$  feet and over. I have seen the sides of boots made of the tough skin. Everywhere they were also drying meat and fish for winter use, and living either in small tents, or in open booths.

The largest village on the lower river is "Anric," at the mouth of a stream of the same name. Here we saw well fashioned native jars and pots of clay, used for cooking purposes. The Indians of this part of the river, though apparently well fed, are miserably clothed, and worse provided than those of the upper portion. Needles and tobacco will buy anything they have. We purchased 30 or 40 lbs. salmon for 5 or less needles!

The Russians had two establishments on the lower river, the "Mission" (Missie) and Andreavski, recently abandoned.

At the Mission, a priest of the Greek Church resides: there is an Indian village, three log houses belonging to the Fur Company, and a small chapel, with the residence of the priest. We arrived there on the morning of the 20th July to find most of the Russians absent. Those remaining had soon, with true Russian hospitality, the brazen "samovar" on the table, and a fragrant cup of tea for us. They had experienced a shock of earthquake the night before; we had felt the same on the water, as though our canoe had received a sudden jar.

The cliffs abutting on the river immediately by the station, are of rock riddled with holes, and resembling those of St. Michaels, except that they are of a more crumbling nature.

Passing over our visit to Andreavski—the deserted—where we found one poor Russian in charge, who was very glad to see us, I must pass on to the country near and immediately by the mouths of the great river.

Long sketches of low country extend in all directions, with islands, sand banks, and passages innumerable. It is generally wooded, though occasionally bare hills are seen. The current is here more sluggish; yet averages 3 knots an hour, and in spring certainly 5 or 6. A steamer of good power, and capable of going at least 10 knots, built with flat bottom, and stern wheel in the American manner, could proceed 1800 miles on

the Youkon, and sap the entire trade thereon. Such an experiment has been proposed in San Francisco.

We came out to the sea by the most northern or "Aphoon" Mouth, that travelled annually by the Russians to and from St. Michaels. This is the most narrow outlet, and is known by willows and larger trees on its banks, whilst those of the larger mouths are bare.

Mr. E. Everett Smith, a member of our expedition and a sailor by profession, was sent to the mouths exclusively to take soundings, it having been the intention of the Telegraph Company, to put a steamer on the river.

He found that whilst the "Koosilvac" mouth gave soundings of from  $2\frac{1}{2}$  to 9 fathoms, a vessel of the class proposed could only enter it by going first some way out to sea. The intermediate mouths were too shallow, and he came to the conclusion that the "Aphoon" mouth, so long used by the Russians, was the only available one. His sketch map (which I have incorporated with my own) shows innumerable passages running between the mouths. He found them blocked with ice till the 1st June. Generally the water outside is extremely shoal, and the Indians drive the "balouga" or white grampus into shallow water, and there spear them. On Indian authority it is said, that whales from Bering Sea go into the mouths to calve.

Mr. Smith found the water fresh, 10 miles outside, at sea.

The geese and ducks are there extremely abundant in spring. Some breed there; a large number leave later for the Arctic. Mr. Smith in three days shot 104. Eggs were so abundant, that 10 could be bought for a needle!

Immediately at the Aphoon Mouth is the Indian village of Pastolik. Here we got a larger baidarre, and left for St. Michaels, arriving there on the 25th July, but  $15\frac{1}{2}$  days from Fort Youkon, a distance of 1260 miles.

A month later we sailed for Plover Bay, E. Siberia, meeting those who had wintered there, with the parties both from the Anadyr and Port Clarence, numbering in all 120 men. Shortly afterwards on the arrival of the *Nightingale*, our largest vessel, we set sail for San Francisco.

My companion, Mr. Dall, was an indefatigable collector, and the results of his work, in the hands of the Smithsonian Institute, must eventually add much to our knowledge of the productions and natural history of Russian America.

In conclusion, let me pay a high tribute to the American gentlemen, with whom I was associated. I count some of the pleasantest moments of my life in the time spent with them, and every member of our expedition remembers Colonel Bulkeley, our leader, with the sincerest respect and genuine affection.

NOTE.—In ‘Silliman’s Journal’ for January, 1868, Mr. Dall has published a few notes on the geology of the Youkon country, which may perhaps be of interest in connection with the above. Speaking first of the cliffs known as the “Ramparts,” he says they “were entirely composed of Azoic rocks, of which a silvery-greenish rock of talcose appearance, but very hard, predominates. Quartz, in seams, slates and quartzite rocks, are abundant; and a rock resembling granite, but with a superfluity of feldspar, and no mica, rarely. The slates generally have a north-westerly dip. True granite appears only once, near the termination of the Ramparts, and forms a ledge extending across the river, and making a rapid—not, however, a dangerous one.”

Further on he says, “From the end of the Ramparts to Coyoukuk river (250 miles), the right bank presents in their order: conglomerate, quartzite, bluffs of yellow gravel, blue talcose slate, conglomerate hard blue slates and quartzose rocks, blue sandstones, and a soft green rock (Plutonic) with light stellate spots in it. Granite is very rare, and mica also. I have found fine specimens of obsidian on the beach and just above the Ramparts pebbles of Niagara limestone with its characteristic fossils. From the bend we find the following strata: blue sandstone (unfossiliferous), brown sandstone in beds at least 500 feet thick, containing vegetable remains, in some layers and rarely, casts of mollusca, all as far as I have collected, Lamellibranchs. Thirty miles below the bend is a small contorted seam of coal, between two thin layers of shale, containing very poor vegetable remains, and underlaid by the brown sandstone, which also overlies the blue sandstone; which, in its turn, I think covers the blue slates. The coal seam is very limited, being on the extreme point of a bluff, and the greater part of it has been denuded. The fossils are very poor, vegetable, and resemble Fuci. The coal is of good quality, bituminous, non-caking, and leaves a gray ash. The seam is 16 inches wide. The sandstones continue down the river some 45 miles, more generally with a north-west dip, and always in gentle undulation, sometimes continuous for miles, and often broken short off. Below, the rocks for 300 miles are slates and eruptive rocks of a pink colour, sometimes containing spathose minerals. The formation changes at the Russian mission, from hard blue slate to a volcanic rock, full of almond-shaped cavities, which are empty; but certain parts of the rock are quite solid. It is black, and contains minute crystals (of? olivine).

[It is roughly columnar on Stuart’s Island, Norton Sound, in five-sided columns, on the beach.]

“From this to the sea the banks are mostly low, but when they approach the river they are invariably blue hard slaty sandstone or sandy slate, the rock passing from one into the other imperceptibly. This formation extends to St. Michael’s, nearly where the fore-mentioned volcanic rock takes its place, and continues up the shore of Norton Sound some 30 miles, when it is replaced by the hard slates and sandstone, and I have followed them up for 30 miles more to Unalachleet river. Here you cross in winter to the Youkon, 200 miles of portage.

“The entire country is sprinkled over with remains of Pliocene animals, ? Elephas, Ovibos, moschatus, &c. Beds of marl exist near Fort Youkon, consisting of shells (fresh-water), still found living in the vicinity. The Kotto river, emptying into the Youkon above Fort Youkon, is held in superstitious dread by the Indians, on account of the immense number of fossil bones existing there.

“The Inglutalic river, emptying into Norton Sound, has a somewhat similar reputation.

“I have carefully examined the country over which I have passed for glacial indications, and have not found any effects attributable to such agencies.

“My own opinion, from what I have seen of the West coast, though yet unproved, is that the glacier-field never extended in these regions to the west-



ward of the Rocky Mountains, although small single glaciers have and still do exist between spurs of the mountains which approach the coast. No boulders, such as are common in New England, no scratches or other marks of ice action have been observed by any of our party, though carefully looked for."

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IX. — *On the Peninsula of Sinai.* By the Rev. F. W. HOLLAND, M.A., F.R.G.S.

*Read, May 11, 1868.*

Two years ago I had the honour of communicating to the Royal Geographical Society a paper containing an account of a few months' wanderings in the Peninsula of Sinai. The experience gained during a former visit, in 1861, had enabled me to adopt a more independent mode of travelling than is usually followed in that country; and dispensing with the services of a dragoman, I traversed on foot a considerable portion of the peninsula, and visited many spots that had probably never been trodden by European feet since the time of its monastic occupation.

I returned to England, however, impressed with the need of further exploration in so interesting a country. The best maps I had found in many parts extremely incorrect; large districts still remained unvisited, and I felt convinced that a more careful examination of the natural features of the country could not fail to throw additional light upon some of the difficulties connected with the history of the Exodus, and might also lead to the discovery of some interesting relics of antiquity. When, therefore, in September last an opportunity was afforded me of revisiting for a third time the Peninsula of Sinai, I readily availed myself of it; and although I felt strongly my own inability to do justice to the work of exploration, since nobody else had at that time appeared in the field, I determined to go and do the best I could, hoping that at all events I might be of some service as a pioneer. I arrived at Suez on the 8th of October; and as the Directors of "the Peninsula and Oriental Company" had kindly granted me permission to obtain provisions there from their stores, and I had determined again to render myself as independent as possible by travelling on foot, taking with me this time neither companions nor servants, my arrangements were soon completed; and on the 10th of October I started for the desert, with four camels laden with provisions for four months, a small tent, and other necessaries for the journey. My plan was to make the monastery or convent, as it is generally called, which stands at the foot of Mount Sinai

(Jebel Mûsa), my first point, to establish there my depôt of provisions, and to make it my head-quarters, while I was examining the surrounding country.

I took, however, a somewhat longer route thither than that *usually* taken, in order that I might follow out what I *then* supposed to be the most probable route of the Israelites. Crossing the head of the Gulf of Suez, and passing by "the Wells of Moses," I kept along the coast until I reached, on the 3rd day, the mouth of Wady Ghurundel. This coast-road is a far more interesting road than the one generally followed by travellers, which lies some 6 or 7 miles inland, along a hard stony plain. For this plain (which is about 15 miles broad, and is bounded on the east by the long range of Jebel Er-Rahar) slopes gently down towards the coast, and its drainage being intercepted by hillocks of sand blown from the shore, has formed a long tract of alluvial deposit, which bears a considerable amount of vegetation.

About 30 miles south of Ayoun Mûsa lies the Well of Abou Szoueyra, a mere water-hole, about 8 feet deep, dug in the bed of a dry watercourse. The water is slightly brackish, like that of Ayoun Mûsa, but quite drinkable. South of this point the plain rapidly contracts, irregular spurs of limestone being thrust down to within half a mile of the shore, but on nearing the mouth of W. Ghurûndel the mountains again recede, and a plain is formed which stretches down to Jebel Hummâm Faroun, *the mountain of the baths of Pharaoh*. This mountain cuts off further progress along the coast; it derives its name from a number of hot sulphurous springs, which issue from the sand at its base, just below high-water mark. The temperature of the water I found to be 160°. The baths are frequented by the Arabs for medicinal purposes; and a course of forty days' bathing, the sacrifice of a sheep, and a special diet of flour mixed with oil, and certain medicinal herbs, is regarded by many of them as an almost certain cure for rheumatism and ague. The heat of the springs, and the sulphurous smell which they emit, the Arabs suppose to be caused by the troubled spirit of Pharaoh, whose body they say lies buried beneath in the sand; for here is the traditional spot of the drowning of the Egyptian host and the passage of the Israelites through the Red Sea. After visiting J. Hummâm, I retraced my steps to W. Ghurûndel. The lower portion of this wady is one of the most fertile in the whole of the peninsula. It is nearly 300 yards broad in many places, and thickets of tamarisks, palms, and beds of bulrushes and reeds abound, and wild ducks, with many kinds of smaller birds, frequent the pools, formed here and there by a clear stream of running water, which never fails. A

few tents of the Terabein Arabs are generally pitched here, the whole of the rest of the country south of the Tyh Range is occupied by the Tówarah. After keeping up W. Ghurúndel for a few miles, I again struck southwards across the irregular limestone plateau which forms the head of W. Usseit and W. Thâl, and passing round the back of the Hummâm Range, I descended again to the sea by W. Taiyibeh, and kept along the coast down the plain of El Mûrkha (now generally accepted as "the Wilderness of Sin"), until I reached the mouth of W. Feiran.

Although in the contract which I had made with my Arabs it was distinctly stated that this should be our route, I had some difficulty in inducing them to follow it, owing to the scarcity of water. They usually take the road up W. Shellûh, and when we reached the point where that road branches off, they came to a standstill, and refused to proceed. Finding argument useless, I adopted the plan of going on alone, knowing that they dared not leave me to die, since my sheikh had made himself responsible for my life; and when they saw me disappearing in the distance, they all, as I had expected, followed me. On reaching the bottom of W. Feiran, the stock of water which we had brought from Ghurúndel was exhausted, and when night came on we found that we were still 20 miles from the nearest well. The heat of the sun during the day at that time of the year (October 16th) was very great. At 8 A.M. that morning my thermometer stood at 84° in the shade, at 12 at 93° in the shade, and in the sun about 135°. Had we waited for daylight we should have suffered terribly from the heat without water, so we lay down to rest for a few hours until the moon rose, and then we pushed on to the wells of El Hessne, which we reached at dawn.

Being anxious to deposit my stores at the convent as soon as possible, I kept straight up Wady Feiran and Wady Es-Sheikh, which form the main road to Jebel Mûsa, only diverging slightly on one occasion to visit the tents belonging to my Arabs. These formed a fair specimen of an Arab encampment in Sinai. There were ten tents pitched in a straight line, so that the occupants of one could not see inside their neighbour's tent. The scantiness of the pasturage does not allow of the Tówarah Arabs pitching many tents in one spot; the largest encampment I saw only consisted of fourteen tents; but there is no occasion for them to congregate in large numbers, since their territory being bounded by the sea on the east and west, and by the Tyh Range on the north, they are never in fear of incursions by other tribes, and they are themselves a very peaceable and quiet people. The material for the tents, consisting of a coarse, dark

goat's-hair cloth, sometimes relieved by a white stripe of cotton, which they obtain from Cairo, is woven by themselves; sometimes by the men, but more often by the women. One long piece forms the back and sides of the tent, another the top, and the two are fastened together with wooden pins. The tent is supported by forked poles, which are secured by ropes, which the men make very cleverly and quickly from palm-leaf fibre, and it is divided into two compartments by a hanging in the centre. The left-hand compartment is occupied by the women and children, and contains their scanty store of corn and dates, water-skins, a small hand-mill, and in the lambing season a small stone enclosure, in which the kids are kept. The men, when at home, live a lazy, idle life, congregating together in each other's tents, or under some neighbouring rock, and passing the day in drinking coffee and telling stories. The women have all the hard work to do. The corn has to be ground daily for the evening and morning meal. They take entire charge of the goats, of which there are on an average from ten to twenty, sometimes thirty to each tent. They collect the firewood, fetch the water, and gather herbs from the mountains for the kids. The water has often to be brought from a distance of 3 or 4 miles; and donkeys, which thrive wonderfully in the desert, are generally employed to carry the water-skins. The goats from all the tents are collected together every morning, and driven off to the huts under the charge of two or three girls; it is a pretty sight in the evening to see them drive home, and finding their way to their own tents, where they are tied up for the night to a cord outside. When the store of corn runs short the men burn a little charcoal, using generally for this purpose the wood of the broom or "retem," and loading their camels with it, start for Suez or Cairo, where they exchange it for corn. The only other articles of commerce which the Peninsula of Sinai affords appear to be mill-stones, rushes for making mats, manna, gum Arabic, butter and dates, and a few sheep and goats, but articles of food are too precious to the Arabs themselves to be often exported. The manna and gum Arabic appear to be found in very small quantities. The latter exudes from the boughs of the Mimosa, or shittim-tree, after the young shoots have been lopped off in spring to feed the goats.

Both men and women are wretchedly clothed, and the children often have literally no clothing at all, or only a goatskin hung over their shoulders, and turned whichever way the wind blows. The women all have their faces veiled, and wear their hair twisted or plaited into a knot over their forehead. On the top of this knot is often placed a red bead. Many of the girls wear a curious head-dress, made generally of a strip of red cloth,

with pieces of mother-of-pearl, about 5 inches long and 1 inch broad, sewed upon it. Their chins are tattooed, their eyes are dark and bright, and their hair black. Upon the women's veils are sewed coins, buttons, and any bright bits of metal they can pick up; they wear a mass of glass beads round their necks, and numerous bracelets, the favourite pattern being a plaited leather ring studded with silver nails. The men all have their heads shaved, and they wear sandals, sometimes made of camel's hide, sometimes of the thick skin of a fish, which they obtain from Tor, or the Gulf of Akaba.

But to return to myself—I arrived at the convent on the 19th of October; and dismissing my Arabs, took up my quarters with the 26 Greek monks who live there. I was unable to speak modern Greek, and their pronunciation of Arabic was so peculiar that it was some days before I could understand a word that they said to me. I succeeded, however, in making *them* understand that I had come to live for a time with them, and I was received most hospitably.

I at once set to work to explore the surrounding mountains and wadies, and to fix the names of the various localities. My life at this time was a somewhat curious one. I occupied a little room at the top of the convent. At sunrise, about six o'clock, I was awoke every morning by the clanging of the pieces of iron and wooden boards used as bells to call the monks to service. Going to the pilgrims' kitchen, where the monks always had wood and water placed for me, I lighted a fire, and while my kettle was boiling, returned to dress, and clean out my room. After breakfast I prepared for my day's excursion, and as I went out I often met one of the monks, who asked me where I was going, and told me that I must take a guide with me from the convent. This I always flatly refused to do, for I found that the monks and their Arab servants seldom stirred beyond their garden, and knew little or nothing of the country. The doorkeeper unlocked the three massive iron doors for me, and then making my way through the garden, I let myself down from a little gate in the wall by a rope. If intending to ascend an unknown mountain I generally picked up an Arab on my way, an ibex hunter if possible, since they know the mountains best; but I did not take the same one on different days, in order that I might check the mistakes or misrepresentations made by one by the information obtained from another. At sunset I made my way back to the convent, again lighted my fire, and cooked my dinner. In the evening occasionally I had a visit from some of the monks. A few of them are intelligent men, but most of them are wretched specimens of humanity,

dirty, lazy, and uneducated. They are strict vegetarians, and consequently their cats patronized me to a great extent, and I several times lost some of my specimens of natural history.

By the 7th of November I had explored most of the surrounding country within a day's walk of the convent. I then began to make more distant excursions, taking with me an Arab to carry my blanket and bag of provisions, and sleeping out sometimes for three or four nights. I very seldom carried water with me, for even in November, the *end* of the long dry season, I generally found in the neighbourhood of Jebel Mûsa two or three springs on every important mountain. Water is not nearly so scarce in the granitic district as most travellers have supposed. There is also a far larger amount of vegetation than usually described. The basins on the summits of the mountains generally afford good pasturage, and even the mountain sides, which look so barren from the wadies below, are often covered with numerous plants, on which the goats delight to feed. Many of the smaller wadies, too, are astonishingly fertile, and in former days, when fairly cultivated by the monks, must have yielded abundance of fruit, vegetables, and even corn, for I found traces in several spots of terraced plots evidently laid out for growing corn. I can readily believe that at one time 6000 or 7000 monks and hermits lived, as we are told, in those mountains, and were enabled in great measure, perhaps altogether, to support themselves by the cultivation of the soil.

The gardens and olive groves of W. Leja are well known. Those in the basin of Jebel Fureia, in Wady Tinia and Wady Zouartin, on the west of Jebel Tinia, in Wady Ilâk on the east, and in many other wadies in the mountains between Tor and Jebel Mûsa, are not so well known, and are far more productive. In W. Ilâk alone, in addition to a fine grove of olives near the ruins of an old monastery, there is for *three miles* a constant succession of gardens, each garden having in it two good wells, which never fail, and producing olives, pears, apples, vines, figs, palms, nebk, carroub, apricot, mulberry, pomegranate, and poplar trees; while above and below these gardens runs a stream of water which affords here and there a pool large and deep enough to swim in.

The object of the first of my longer excursions from the convent was the ascent of J. Um Shaumer, for I was anxious to obtain bearings from its summit, and also to measure its height more accurately than I had been able to do in 1865. I again found little difficulty in the ascent, the last few hundred yards alone being very precipitous, and with bare feet I easily surmounted that. With hypsometer and two aneroids I quite

settled the disputed point as to which was the highest, J. Um Shaumer or J. Katharine, and confirmed my former opinion that the latter is the highest by 30 feet.

The Arabs have a curious tradition connected with this mountain, viz., that an ibex hunter, having made his way to the summit, saw there a most beautiful Arab girl. Startled at the apparition he hastened down; but next day, having come to the conclusion that it would have been wiser to have claimed the girl as his bride, he returned in search of her, but found the path rendered impassable by a huge stone which had been placed across it; and ever since that time frequent reports of guns have been heard to issue from its summit. These reports are said to be heard even as far as the convent; and the mountain is a great object of superstition and mystery amongst the Arabs. I trace the origin of this tradition to a very remarkable rock on the north of the mountain, near its summit, which bears the exact likeness to a woman's face, and I found that this rock, and not one lower down, as usually supposed, bears the name of "Hadjar el Bint," "the Maiden's Rock." I myself have on several occasions heard the reports said to issue from the mountain, and have not the slightest doubt that they are caused merely by the falling of rocks.

On my return from J. Um Shaumer I visited a mountain called Jebel Hadēd, "the Iron Mountain." Veins of specular iron ore crop out near its base in several spots, but I could find no traces of their having been worked. The fallen *débris* however from the mountain above was so great that workings may exist hidden beneath it.

In the neighbourhood of this mountain my attention was first drawn to some remarkable ruins of buildings and tombs, which I afterwards found occurred in large numbers throughout the whole of the southern portion of the peninsula, and which I have come to the conclusion are probably Amalekite ruins.

Along the banks of a dry watercourse near J. Hadēd I discovered the ruins of nearly 40 of these buildings within the space of less than a mile; some few of them stood in groups, others stood alone at a short distance from each other. I afterwards returned and examined them more carefully, and opened several of them. There were two kinds of ruins, apparently of the same date. The first, which were probably used as store-houses, were built in the shape of a dome, about 5 feet high and 5 or 6 feet in diameter in the interior; the walls were often as much as 4 feet thick, and a large flat stone formed the highest portion of the roof, which appeared to have been covered with loose shingle. They had no windows, and one door, generally placed on the south or west, about 3 feet high and  $1\frac{1}{2}$  broad.

The stones used in the building were often of great size, but they were never dressed, and of course the size depended much on the character of the surrounding rocks. No mortar was used in their construction. I found in one a few small bones, a sheep's tooth, and a bit of crystal; but I searched in vain for further traces of their builders. The Arabs call these buildings "nalous," "mosquitoes," and say that they were built by European gentlemen many years ago (*i.e.* by the monks of old) as sleeping places, in consequence of the number of mosquitoes; and on my remarking that there were now very few mosquitoes, they at once replied that there was formerly *more rain*, and consequently more mosquitoes. This tradition is evidently absurd, but at the same time interesting as embodying the belief that the rainfall was formerly larger than at present.

The other kind of ruins, which are generally found in close proximity to the former, often in separate groups, consist of massively built circles of stones of about 14 to 15 feet in diameter, and about 3 feet high, but without any roof. These were evidently tombs, for I found human bones in all that I opened; and in one I found two skeletons lying side by side, one of them on a bed of flat stones. The rings of stones were apparently half filled with earth, the bodies were then laid in them, and they were filled up with earth; and heavy stones were then placed at the top to prevent the wild beasts disturbing the bodies; such probably was the mode of burial. Some, however, of these rings of stones were of far larger size. I found some of 15 to 30 yards diameter, some of which contained a smaller ring in their centre; and near the mouth of Nukb Hawy I discovered one no less than 125 yards in diameter.

The shape of these buildings and tombs at once distinguishes them from the ruins of monastic times, which are very numerous; the latter, as a rule, are always *square built*; these always *round*. The character of the two buildings also differs much. The *round* houses and tombs are far more massively and rudely built than the *monastic* ruins. In the latter mortar was generally used; in the former never. The most remarkable groups of these ruins which I discovered, were situated in W. Hadēed, W. Nusb, near Dahab on the coast of the gulf of Akaba, on a plateau south of J. Théllal, and in a little wady between the head of W. Hebrân and W. Solaf; at which latter spot I found upwards of 100 ruined houses and tombs. They extend, however, as I have said, over a large portion of the Peninsula.

Their extent and massive workmanship proves, I think, that they must have been built by a large and powerful people. They are evidently of earlier date than the monastic occupation of Sinai; earlier than the time of the writers of the Sinaitic



inscriptions, for I found upon and within them a few of those mysterious inscriptions, evidently made after they had fallen into ruins, and lay in exactly the same condition as at present.

The *only* large and powerful nation of whose existence we have any record in Sinai is that of the *Amalekites*; and these ruins in the character of their workmanship, their position, and extent, agree well with what we should expect to find of the buildings of such a people. Such then, I believe them to be, and if I am right in doing so, they go far to prove this interesting fact, that the Amalekites were to some extent an *agricultural* as well as *pastoral* people, for in two or three spots I found evident traces of gardens in connexion with these ruins.

On November 12th I started on an excursion to J. Eth Thebt, a mountain situate about 30 miles south of Jebel Mûsa, which had never before, I believe, been visited by Europeans, and which was reported by the Arabs to be the highest mountain in the Peninsula. I took with me two Arabs and a camel, as I expected to be absent for some days. I had as yet had no rain or snow, but every week it was becoming colder, and the Arabs were beginning gradually to work their way down into the lower wadies. In the depth of winter the higher ground round Jebel Mûsa is almost entirely deserted by them, for they cannot stand the cold. On the night of November 13th, near the head of W. Sebaizeh, at an elevation of about 5000 feet above the sea level, I had 15° of frost, and the water in my gerba was in the morning a solid mass of ice.

I was surprised even in the neighbourhood of J. Eth Thebt to find the ruins of monastic establishments and gardens. The monks of old must have known every spring in the country, and I scarcely found one that had not a garden and house near it. The ascent of the mountain was somewhat difficult and dangerous, owing to the loose *débris* of its porphyritic rocks and numerous precipices. I was four hours in reaching the summit, but was rewarded by a good view of the southern portion of the Peninsula, which does not consist of a long straight ridge of mountains as usually represented in maps, but is almost as grand in its confusion and irregularity as the more northern portion. J. Eth Thebt forms a centre, from which several important wadies run to the gulf on either side. On leaving it I traced eastward to its junction with W. Kyd, the great trunk wady, called in its upper portion Esméd, lower down W. Gerât. I returned northwards by W. Kyd, famous for its palm-groves and stream of running water. At the head of this wady stands J. Mazroud, one of the most conspicuous mountains in the Peninsula. This I also ascended, and found on its summit traces of

an ancient excavation, but for what purpose it had been made I could not discover.

Hearing that ancient workings existed at a spot called Senned, I next directed my steps there. I found, much to my surprise, that it lay only about 8 miles to the north-east of J. Mûsa. In Palmer's map it is placed upwards of 30 miles distant. I followed down to W. Es Sheikh, almost to the Sheikh's tomb, and then striking eastward, came quite unexpectedly upon a large plain, after about an hour's walk. This was the plain of Senned. It is so hidden by the mountains which enclose it that its existence has, I believe, up to this time been unknown to travellers. I myself had been living at the convent upwards of a month, and had ascended most of the highest mountains round, without ever having discovered it. It cannot be less than 6 or 7 miles long, and is nearly 4 miles broad. It is bounded on the south by the fine range of Jebel Um Alowee, so called from the central mountain of the range, which rises precipitously from the plain. The plain slopes gently northwards from this range, and presents a smooth expanse of gravel, studded here and there with round-headed knolls of coarse syenite. On the south and west it is quite shut in by mountains; it is more open on the east, and from it on the north flow several broad wadies, which gradually sweep round to the Gulf of Akaba. My Arab pointed out the position of six springs on different sides of this plain, but they are all of them, I believe, with one single exception small. Following the road to Dahab, which skirts the northern side of the plain, after walking nearly 3 miles, my Arab drew my attention to some small blue stones, which evidently contained copper ore; on comparing them with the surrounding rocks, I found that they must have been brought from some other spot. Thinking that they might have been washed down by the rains, I searched higher up the slope, and succeeded in tracing them up to a spot, where, in addition to these blue stones, lay a number of small pieces of iron ore and slag. At first I could discover no other traces of furnaces, but on turning up the sand with my pickaxe, I found in many places, a few inches below the surface, remains of fires, and broken pieces of crucibles. Here then was a smelting-place, probably for both iron and copper; and, no doubt, the ore was brought here for the sake of the excellent fuel afforded by the roots of a low bush called "ajerum," which abounds near that spot. Night coming on I slept under a rock close by, and early the next morning went on to examine the ancient workings that my Arab had described to me. Following down a wady called Hushthobbak for a few miles, we came to a projecting mass of

rock in the centre of the valley, which contained traces of both copper and iron ore, for which excavations had evidently been made. We next turned eastward across the mountains, and soon came to the *débris* of ancient workings, which covered the whole mountain side. Ascending to the top we found a view running south-east by north-west, across mountains and wadies, which had been almost continuously worked for the distance of nearly 2 miles. We struck upon it at the north-west end, and followed it up. In several places the hard granite rock had been cut away to a depth of 30 feet or more, the *débris* consisting often of massive blocks, having been rolled down the mountain side. I could find no traces of chisel marks, no flints, or stone hammers, nothing to show how or when these extensive excavations had been made. The surface of rock in many places was a beautiful turquoise-blue. There appeared here to be no traces of iron, only copper. The vein in which the copper occurs varies from 1 to 6 feet in breadth, and consists of a fine grained syenite lying between the coarser white syenite and a thick vein of porphyry. I afterwards found a very similar vein, also apparently containing copper, in Wada Baba. And on the coast of the Gulf of Akaba, north of Sherue, I again found traces of smelting furnaces, and similar pieces of slag and ore, probably brought from the neighbouring mountains. I was led to the discovery of this latter smelting-place, by finding at some little distance off flakes of worked flints. Unable to account for finding several near each other in so barren a spot, I followed up the watercourse in which they lay, and it led me to the top of a low hill, where I found the traces of furnaces.

On November 28th I removed to J. Serbal, and pitched my tent in the upper part of W. Er Rym, near the ruins of a village, which appeared to me to be of the monastic period, but to have been built partly upon the ruins of the older *round* buildings. I had intended to have stayed here several days, for the purpose of exploring the mountain; but the water of the well, on which I depended for my supply, was so putrid, owing to the decaying leaves which fell from a wild fig-tree overhanging it, that I was unable to do so. I spent, however, two nights there, and succeeded in visiting the two ruined monastic establishments of W. Sigyllye, and also in ascending the southern peak of J. Serbal. The ruins of Sigyllye, which I believe no other travellers have visited, I described in my former paper, and I then mentioned the very remarkable roads, which are found around the whole mountain, but especially in this neighbourhood. Their authorship had puzzled me; but, on further examination, I came to the conclusion that they do not date further back than the monastic period.

On moving from W. Er Rym, I sent my camel on by W. Feiran to the bottom of W. Aleyat, while I myself made an excursion round the west of J. Serbal, and then rejoined it. For some days a storm appeared to have been gathering, and on the 3rd of December the clouds looked so threatening and the wind was so high that I did not venture far from my tent, which was pitched on the east side of W. Feiran, nearly opposite the mouth of W. Aleyat, which flows down from the central peaks of Serbal. At half-past four a few heavy drops of rain began to fall, but not sufficient to disperse the knot of Arabs who were sitting round my fire. At five, however, a tremendous thunder-storm burst upon us, the Arabs quickly dispersed to their tents, and I had to gather all my goods together and take them and my two Arabs under the cover of my little tent. I never saw such rain, and the roar of the thunder echoing from peak to peak and the howling of the wind was quite deafening. It soon grew dark, but the lightning was so incessant that we could see everything around us. In a quarter of an hour every ravine and gully in the mountains was pouring down a foaming stream, and as my tent was not pitched on very high ground, we kept an anxious look out for the flood, which we saw must ensue. The roaring of a torrent down a narrow gorge behind us showed that the waters were quickly gathering. Soon a white line of foam appeared down the wady before us, and quickly grew in size till it formed a mighty stream. Its course lay on the further side of the valley, and I was tempted to cross over to some high ground in the middle to watch its progress, for enveloped in a waterproof sheet I had left the tent to witness the effects of the storm. Fortunately I did not do so, for in a few minutes the stream rose so rapidly that I must have been cut off by it had I ventured to cross over. I went back to my tent and packed up all my things ready for a hasty retreat, if necessary, and then returned to watch the torrent. It was still rising steadily, but soon so sudden an increase took place that I had barely time to rush back to the tent, and with the Arabs help carry my things to a wall, about 15 yards distant, before the water was upon us. When I took the last load the water was nearly ankle deep. I ran to the wall and back, and it was nearly up to my knees; with a desperate effort I seized the tent and dragged it to the wall, but narrowly escaped being washed away in doing so. We were congratulating ourselves on having saved everything, when down came another sudden rush of water, and we had barely time to carry the things to higher ground; we saved all, however, except my boots, which were washed away. It was now only a few minutes past six. It had left off raining, the flood began to subside, and, with the help of a little dry straw from the middle of the camel's saddle,

we managed to light a fire. We had just got a good blaze, and were sitting round it drying ourselves, when suddenly a tremendous wave leaped over the wall of the garden in which we had placed ourselves and carried away our fire, a second wave demolished the wall, and our things were in greater danger than ever; but again we succeeded in saving everything, and this time carried them high up the mountain side. Our poor camel, which was tied to a tree, struggled and roared piteously as he felt the water rising; but we released him before he was in any real danger. After seeing everything safe, I went to a commanding position to watch the flood. The lightning had ceased, but the moon began to shine out brightly. It was a grand but awful sight. It seemed almost impossible to believe that scarcely more than an hour's rain could turn a dry desert wady, upwards of 300 yards broad, into a foaming torrent from 8 to 10 feet deep. Yet there it was, roaring and tearing down, bearing with it tangled masses of tamarisks, hundreds of beautiful palm-trees, scores of sheep and goats, camels and donkeys, and still worse, men, women, and children. A few miles above the spot where I stood a whole encampment was swept away. I saw some of them swept past me in the pale moonlight: nearly thirty people were known to have perished, but two bodies only were found; the rest were buried in the *débris*, or carried down to the sea. The roar of the torrent as it swept past me was tremendous; the boulders ground along beneath the water with the noise as of a hundred mills at work, and every now and then the very ground on which I stood shook again, as some huge rock charged down against it from W. Aleyat. When I returned to my tent at half-past nine the waters were rapidly subsiding, and it was evident that the flood had spent its force. In the morning a gently flowing stream, but a few yards broad and a few inches deep, was all that remained of the flood. But the whole bed of the wady was changed; where yesterday a bank had stood covered with trees was now a deep muddy watercourse. In other spots huge banks of sand and stones had taken the place of hollows. The scene recalled forcibly to my mind the remembrance of a visit to Sheffield after the terrible disaster caused there a few years ago by the bursting of a reservoir. The Arabs were astir at an early hour, inquiring for missing friends and searching for lost property. None remembered such a storm before, and all had some tale to tell of hair-breadth escapes, or loss of property. Nearly a thousand palm-trees had been swept away in W. Feiran: this in itself was a terrible loss to the poor Arabs, who depend so much on dates for food. But I was much struck by the quiet way in which the men heard of their losses. Not a murmur was uttered; "All comes from God," was the one

expression in the mouth of all. One poor fellow, whom I knew well, hurried back from a distance when he saw the storm gathering, to find his wife, six children, his tent, and all his worldly possessions swept away; yet he, too, seemed to find comfort in this thought. A casual observer would have said that they were lacking in affection; but living amongst them as I then was, I saw that this was not the case: whatever other Bedouins may do, the Tówarah Arabs love their wives and children dearly. The *women*, however, unlike the men, are noisily demonstrative in their grief. I had accepted an invitation from one of the sheikhs, and was staying at his tents two days after the flood, when the news of the loss of some relations was first made known to the women of the encampment. Dreading the scene that would follow the announcement, the men appeared up to that time to have withheld the news. The first woman who heard it uttered a loud shriek and rushed out of her tent: the cry was immediately taken up by all the women, and clapping their hands, tearing their hair, and crying aloud, they all rushed out into the desert, running some one way, some another, pursued by the men who led them back, now coaxing, now threatening, now dragging them along by main force; but no sooner were they brought back than out they rushed again, until having apparently satisfied themselves that they had done their part, they dropped back by degrees to their tents, though some of the nearest relations went to visit the scene of the disaster. It will be many years before W. Feiran recovers from the effects of this flood, for many miles every herb in the bed of the wady was swept away, the wells were filled up, the gardens destroyed, and where a few days before I had passed through a thick wood of tamarisks, nearly two miles in length, I now found a barren waste of sand, without a vestige of a tree.

On my return to the convent I prepared for another excursion to the south of the Peninsula. I first traced down the great trunk wady Nusb from its source near Um Shaumer to its mouth near Dahab, fixing the position and name of every branch wady which joined it. After visiting Dahab, where I found no traces of buildings, except a few round tombs, I turned inland again, and striking southwards by J. Um Shôke and J. Terrâny, I followed down W. Melhadje to its junction with W. Kyd, and so on to the sea. I next visited Sheren and Ras Mohammed, and returned by the seaport of Tor, following an inland road between the two latter places, which appears to be almost unknown; but unfortunately I was suffering at this time from want of food and water, and had to push on too fast to be able to explore this part of the country as fully as I wished.

I afterwards spent some time in the sandstone district exploring

the mines of Serabit-el-Kadim, Nusb, and Mughâra. The mines of Serabit-el-Kadim are very extensive, far more so than I had anticipated, extending over an area of some miles. With the exception of a few workings for kohl, not previously noticed I believe, they are all turquoise mines. In wady Nusb there are mines apparently for turquoise, hæmatite iron, kohl, and lead, and the remains of a large smelting-ground. The slag from the furnaces forms a low mound, about 200 yards long and 100 yards broad. This slag apparently consists principally of iron, but slight indications of copper are found with it. The kohl mines in this district and in W. Baba to the north-west are very extensive, and many more mines of this kind exist, I believe, in other parts of the sandstone district. The mines of W. Mughâra are entirely turquoise mines: some of them are still worked by the Arabs. Both at Serâbit-el-Kadim and W. Mughâra numerous flint-instruments are found, and occasionally the same hammers that were used by the miners. The Egyptian tablets prove, I believe, that some of these mines were worked before the time of the Exodus. There are a good many Sinaitic inscriptions in W. Nusb; but I found none in any way connected with the mines.

My last excursion was, in a Biblical point of view, the most interesting of all. I first visited Ain Huthera, which has been identified as Hazeroth, the third station of the Israelites after leaving Mount Sinai. It lies a few miles north of the road to Akaba, and is seldom actually visited by travellers. Its situation is such as, in my opinion, to preclude all idea of its having been one of the stations of the Israelites, for it lies in a complete cul-de-sac, near the head of a deep ravine confined by high precipitous cliffs, and can be approached only from the west by a steep narrow path utterly unsuitable for the passage of an Israelite host. I followed down this wady to its junction with W. El Ain, not far from the Gulf of Akaba, and I then turned up this latter wady. This, too, has been laid down by many as the route of the Israelites, but its complicated windings and narrowness appear to me utterly to overthrow such an opinion.

Following Wady el Ain almost up to its head, I crossed a low pass of sandstone to the upper springs of El Ain, a charming basin at the bottom of W. Telleger, containing abundance of water and thick beds of bulrushes and reeds, the latter frequently upwards of 20 feet in height. The sandstone at the pass was remarkable, consisting in great measure of a conglomeration of white nodules varying from the size of a pea to that of a large cannon-ball; in one spot the sandstone was of a dark red colour, the colouring matter being curiously

confined to the exterior of the rocks. I observed numerous ruins of round buildings in the neighbourhood of these wells. Still bearing westwards, I followed the course of W. Telleger, a broad valley about 35 miles long, inclosed by the white sandstone and limestone ranges of J. Thellal on the north, and J. Huthera on the south. At the head of this wady were extensive sand-drifts, but their monotony was relieved by the hundreds of white and purple crocusses that grew upon them. Here for a few miles I wound in and out between low sandstone-hills, and at length reached an extensive sandstone plateau, affording an unusually large amount of pasturage, with splendid views of the southern granite mountains and J. Serbal. I had intended to make my way direct to J. Odjmeh, but on questioning an Arab whom I met as to the road he had followed, he mentioned having slept the night before at a place called el Huther; since Ain Huthera was evidently not Hazeroth, this I thought might possibly turn out to be it, and accordingly I directed my steps towards it. My direction lay across the plateau upon which I had entered on leaving W. Telleger. Porphyry by degrees took the place of the sandstone, but the plateau still retained its fertile character. This fertility is chiefly caused by the rain lodging in the hollows of the rocks, and thus giving life to the thin stratum of sand which has drifted over them. This plateau, which is 12 or 15 miles in length and 7 or 8 in breadth, goes by the name of Leranûk. On the western edge, near the head of a wady bearing its name, is situated El Huther. Here lie some old gardens with seven wells, besides several water-holes. On a hill overhanging these gardens, I found the ruins of ancient buildings, consisting of round houses very similar to those which I have before mentioned, and higher up on the plateau numerous groups of similar ruins are seen. Might not these be the "inclosures" of the Amalekites which gave the spot the name of Hazeroth? From El Huther I went on to J. Odjmeh, descending to the lower plain which has wrongly been called "Debbet er Ramleh," and passing up W. Sik to the basin of Um Râyther, which may perhaps be identified with "Rithmah." J. Odjmeh has lately been brought forward as a probable Mount Sinai. The authors of this theory have, however, utterly mistaken its position and character: which in no way answer to the Sinai of the Bible. The name J. Odjmeh is not given to any one mountain, but to a long limestone range which lies above the range of J. Tih, and supports the plateau to the north, which is drained by the Wady El Arish.

The Tih range, which sweeps across the whole breadth of the peninsula, is not entirely a limestone range as usually described; two-thirds of its height is composed of a white sandstone, upon



which lies a thick stratum of sandstone. This at least is the character of the most southerly portion of the range, which supports a broken plateau a few miles broad, drained by wadies running down to the south. The real plateau of the Tih, the drainage of which runs to the Mediterranean, lies to the north of the Odjmeb range.

After leaving J. Odjmeb I retraced my steps to El Huther by a slightly different road, and then struck southwards following the direct road to W. Es Sheikh. This led me first across the lower portion of the Zerenēšk plateau, and then along a succession of wadies so broad and level as almost to deserve the name of plains, until I reached the narrow gorge of the Mokad Mûsa. From the head of W. Hibran on the west there stretches north-eastwards across the peninsula a long unbroken wall of granite, at first upwards of 1500 feet in height, but gradually lowering as the higher ground in the centre of the peninsula is reached.

Along the whole of this length two roads only are found which lead southwards—one up the Nukb Hawy, the other by W. Es Sheikh. If Jebel Mûsa be the true Mount Sinai, the children of Israel must have taken the *latter* road, the former being so difficult a pass as to be out of the question. And at this point, about 10 miles from Mount Sinai, would be the natural place to fix Rephidim. At this very spot the Arabs point out to you the “Mokad Nebi Mûsa,” *i.e.* “the Seat of the Prophet Moses.” This tradition is apparently of *Arab*, and not *monastic*, origin; and it is rendered more striking perhaps by the inability of the Arabs to explain why the seat of Moses should be remembered; they apparently know nothing of the battle of Rephidim.

The Bible tells us but little about Rephidim, but that little tends fully to bear out the truth of this Arab tradition.

In the first place, the Amalekites appear to have chosen some spot where they collected their forces, and awaited the approach of the Israelites, and it was evidently so selected as to leave their enemies without water, while they were well supplied.

At the gorge of the Mokad Mûsa the W. Es Sheikh cuts through the wall of granite forming a tolerably level passage about 400 yards long, and from 50 to 80 yards broad; on either side, east and west, the range continues impassable. North and south of this pass are plains of considerable extent, forming admirable camping-ground for the two armies.

The southern plain, which would be that occupied by the Amalekites, having several copious springs close at hand; the

northern plain, where the Israelites would be forced to encamp, being totally destitute of water.

The Amalekites, like their Arab successors, would probably throw a barricade of rocks across the pass, and station themselves behind it. When this was forced, the battle would extend to the upper portion of the pass, and also to the plain above. The rock pointed out by the Arabs as the Seat of Moses is merely a fallen detached rock of no great size, but immediately above it stands a low rocky peak, which, while completely out of arrow-shot from the surrounding heights, commands in a striking manner a view of the pass beneath and the plains on either side. This probably was the hill on which Moses took his stand attended by Aaron and Hur, and from its northern base may have flowed the waters which miraculously supplied the children of Israel.

No spot could possibly be selected more suitable for the circumstances related of the battle; as the Israelites marched onwards the outstanding encampments of the Amalekites would naturally fall back to their mountain fastnesses. To oppose so numerous a host they would establish themselves in the strongest possible position, which a glance at the country shows at once to be the pass of Mokad Mûsa. By manning this pass they could hold their enemies in check, and prevent them by the narrowness of the gorge from bringing their full forces into action, and they would also be able to send down from the Nukb Hawy pass small bodies of men to harass their rear, and "smite the hindmost of them when they were faint and weary," and distressed through want of water.

On my return to Suez, I paid another visit to J. Serbal, again crossing over by the head of W. Erkym, and passing round the western side of the mountain until I reached the central peak, which I ascended by the usual path, though not without some little difficulty, as the rocks were covered with a sheet of ice caused by the melting of the snow which had fallen a few days before (on Feb. 2nd), and still lay deeply in the crevasses.

In my former paper I mentioned finding a number of inscriptions near the summit, including some apparently *painted* under an overhanging rock with white paint. I again examined the latter, and confirmed my opinion as to the paint. This perhaps tends to connect them with the ruins of a building on a rocky platform close at hand, in which paint may have been used. One can hardly suppose that it would be carried to the summit of the mountain for the mere purpose of painting inscriptions when the usual plan was to engrave them upon the rocks.

From J. Serbal I journeyed to W. Mokatteb, and up W. Mugeraffe to Serabit-el-Kadim, which I visited in a steady down-pour of rain, which lasted for five hours. Those who know the dry barren nature of this district will scarcely be able to realise its aspect under such circumstances; with pools of water standing on the flat hill-tops, and the roar of cascades ringing in one's ears on every side. From Serabit-el-Kadim I struck north to the large broken plain which lies at the foot of Jebel Tih. The late rains had caused numerous flowers and herbs to spring up, and there was abundance of water standing in the basins formed by the depressions in the sandstone rocks. A large number of Arabs were encamped there with their flocks for the sake of the pasturage.

Skirting the edge of the Debbet-er-Ramleh, the belt of sand which lies between W. Nusb and J. Sarbont-el-Gemel, I descended W. Hommar to the head of W. Taiyebeh, and again crossing the plateau at the head of W. Usseit I reached Wady Ghuründel, and taking thence the upper road by Ain Howara, along the sea plain, I arrived at Suez on the 11th of February, having been wandering in the desert exactly four months.

The account that I have given of the country has necessarily been brief and incomplete. It is difficult to describe accurately a very mountainous country of a desert character without rendering one's description tedious by a string of uninteresting names of mountains and wadies. I have preferred, therefore, to leave my map to explain the nature of the drainage of the country, and the position of the principal mountains. The heights of the mountains which I ascended will be given hereafter.

The country is of course chiefly interesting to us on account of its connexion with the history of the Exodus. I will therefore sum up briefly the opinion which I have formed from my own observations respecting the much-disputed route of the children of Israel.

After crossing the Red Sea somewhere in the neighbourhood of Suez, I think that they took the lower road down the plain along the coast as far as Ain Szouweira, which may possibly mark the locality of Marah. They then turned inland to Elim, which I would place at Ain Howara. Their next encampment was by *the sea*, possibly near the mouth of W. Ghuründel, which the abundance of water would render a fitting spot for an encampment before a severe forced march across the barren plateau of Usseit. The Wilderness of Sin I would identify with the plain of Es Seyh, which lies beneath the Tih range. It is rather a succession of large basins than one plain, and after rain its fertility is great, and its water-supply abundant.

If the Israelites took this northern route I do not think that

they could possibly have descended to the *plain on the coast* south of J. Hummâm, down the narrow winding wady Taiyebbeh, afterwards to reascend it to W. Hommar. The barren and waterless character of the desert plains of Merkha, which have generally been identified with the Plain of Sin, and the narrow, winding, confined character of W. Feiran, which affords the only road thence to Jebel Mûsa, lead me to abandon the idea of this having been their route. Dophkah I would place in the neighbourhood of W. Keneh, near Lib-el-cheir. Alush, at W. El Ash, a broad wady uniting with W. Berah not far from W. Es Sheikh, up which latter wady I would then lead the Israelites to the Rephidim, which I have described, and so on to Jebel Mûsa, Mount Sinai.

The character of the mountains of J. Serbal and J. Odjmeh forbids, in my opinion, any likelihood of their being Mount Sinai. In the neighbourhood of the former there is *no plain*, in the latter range there is *no one distinct mountain*. One mountain only, it appears to me, can enter into competition with J. Mûsa, viz., the hitherto unknown mountain of J. Um Alowee, "the Mother of Heights," a name which might possibly be a corruption of J. Elohêm, "the Mount of God." The name of the plain "Senned," which lies beneath this mountain, is not very far removed from Sinai, but the final *d* seems to forbid the connecting together of these names. The copper-mines opposite were probably Egyptian; if so, the mountain and plain would have been well known by name to King Pharaoh.

The tradition connected with the name Jebel Mûsa, and especially the better supply of water, are in favour of that mountain. But the plain of Senned affords a better camping ground, containing about *thirty* square miles, whereas the plain of Er Rahar, at the foot of Jebel Mûsa, with its lateral wadies, contains at the most barely *six* square miles. There is little, I think, to choose between the peak of Ras Sufsâfeh and J. Um Alowee. Both rise almost precipitously from the plains beneath them, and are of nearly equal height; at the foot of both bounds might easily be placed to prevent man or beast approaching them.

If, however, I have discovered a new rival to Jebel Mûsa, it has at least this advantage over others, viz., that the road to the two is identically the same up to the last five or six miles, and so, whichever mountain the preference may be given to, our observations with regard to the route of the Israelites to Mount Sinai are equally valid.

With regard to their route *from* Mount Sinai to the Tih plateau, the shortest and most open road leads almost due north across a succession of broad wadies or plains to El Huther,

which may probably be identified with Hazeroth, and thence by passes either on the east or west of J. Thellal to the basin of Um Rayther, which perhaps represents Rithmeh. From this point there are several roads north over the ridge of J. Odjmeh to the elevated plateau which slopes northwards to the Mediterranean.

I cannot conclude my paper without a protest against the theory that the Sinaitic inscriptions are the work of the children of Israel. I have carefully examined the locality and character of those inscriptions, and copied some hundreds of them, and I have found not *one single point* in favour of such a theory, and many facts in contradiction of it. The strongest of them all being the existence of a *bilingual inscription*, viz., *Greek and Sinaitic*, which is undoubtedly the work of *one hand*. Strangely enough this inscription happens to be the very one in which Mr. Forster discovered the names of Rephidim, Moses, Aaron, and Hur.

Who the authors of the inscriptions were still remains a matter of doubt. But I discovered by chance, during my late travels, one interesting point connected with them, viz., that they were almost all *engraved with stones*. I happened one day to find some pointed stones left on a ledge beneath some drawings of animals that had been made during the last few years, closely resembling the more ancient ones. That was in the *sandstone* district; but I afterwards tried experiments in various parts of the peninsula, and found that with the rocks which I picked up I could with ease make inscriptions either on the sandstone, limestone, or granite rocks, which most closely resembled the true Sinaitic inscriptions.

It is not to the Sinaitic inscriptions, but to the natural features of the country, the rocks themselves, and the mountains and wadies, that we must look for further knowledge to confirm and illustrate the Bible History. The country still remains but little known. None of it has as yet been carefully surveyed; but my own observations enable me to state with confidence my belief that further research will tend to confirm the truth of the sacred records, and to cut away the ground on which infidelity bases its arguments. I do believe, in fact, that an accurate survey of the peninsula of Sinai will tend to establish the route taken by the Israelites with such a degree of probability as almost to amount to certainty.

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X.—A Visit to the North-East Coast of Labrador, during the Autumn of 1867, by H.M.S. 'Gannet,' Commander W. CHIMMO, R.N.

Read, May 11, 1868.

THE object of our voyage to this little known part of the world, so seldom visited, was to search for new fishing-grounds, and to find harbours of refuge for the Newfoundland fishermen; the cod fish and their food (the herring and other fish) having of late years become insufficient to remunerate them, or even to realise a fair cargo.

The Chamber of Commerce of Newfoundland having urged the Governor to represent to the Secretary of State for the Colonies the benefit that would arise from a survey being made of North-East Labrador, and the advantage it would be to the community in the prosecution of the fisheries, as it was a service scarcely within the power of the Local Government to accomplish, and that such friendly action on the part of Her Majesty's Government in the matter would tend to create a cordiality of feeling among the mercantile community, which would produce very useful effects in dealing with questions connected with the fisheries, which are likely soon to be agitated. The Secretary of State was induced to request that the Admiralty would send a vessel of war to the Labrador coast during the season of 1867 for that purpose, and their Lordships accordingly gave directions to the Naval Commander-in-Chief on the North American station that a vessel should be sent.

It was, however, considered by the Board of Admiralty and their Lordships' hydrographer that it would not be feasible to make an elaborate survey of 500 miles of coast at present, which would reach over many years, and, indeed, that it was the province of the fishermen to search for their own grounds. It was, nevertheless, decided that the *Gannet* should proceed on this service, and after refitting and preparing for the cold and boisterous weather, as well as the intricate and dangerous navigation of the bleak and barren Labrador, she sailed on the last day of July, 1867.

*July 31st.*—We turned our backs towards Halifax, and after the signal was answered "permission to-part company," steamed out with full steam and all sail.

The morning was beautiful; the barometers had risen to 30°.40ths, and the weather had to all appearance changed from south-east, and south-west gales, heavy rains and fogs, which had lasted for thirteen days; indeed such a continuance of boisterous and wet weather had not been felt (during the





Chart of the  
**NORTH-EAST COAST**  
 of  
**LABRADOR**

to accompany the Paper by  
 Commander W. Chimmo.









summer months) for many years; heavy thunder-storms, with lightning and rain, also passed over Halifax. Now, with the first of the new moon, we hoped for better.

It was at first intended that I should call at St. John's Newfoundland, for pilots, but from all I could learn from old and experienced persons, who had passed their life-time in South Labrador, there were no pilots there who knew anything of North-East Labrador. Their knowledge was within the Gulf of St. Lawrence only, and to Cape Charles, beyond and north of this no person knew anything, except of north gales, icebergs, and arctic currents, or, as Falconer says, "Bleak coasts of savage Labrador." Calling at Sydney would save me 280 miles.

The passage up the east coast of Nova Scotia was pleasant, but the heavy swell had not yet subsided, which the late unusual weather had caused. The small rock marked on some of the charts, 20 miles E.S.E. of Devil Island Light, Halifax harbour, does not exist. We passed over its position. Brig Rock, and the new light-house on Egg Island were passed at noon.

*Aug. 1st.*—A calm and lovely night was passed through many small vessels, whales sporting, and at 10 A.M., on the 1st of August, rounded Scutari Light, and shortly after Fern Island. Many vessels could be seen struggling under all their canvas for Quebec and the St. Lawrence, taking advantage of a light south wind, and a charming clear day.

We entered Sydney harbour at 3 P.M. Several pilot-boats were very anxious, by holding up a flag, that their services should be called into request, but as Sydney harbour looked so clear of dangers, and so free for any vessel, we thought we would not trouble them. Their little whale-boats looked very snug. In Morien or Cow Bay, on the north-east side of Cape Breton Island, a considerable town, with here and there a church spire, has sprung up since the chart of 1859 was published. Several large vessels were at anchor in the bay.

A wreck of some ill-fated vessel lay on the beach in Schooner Cove, and another in Indian Bay with masts gone. At Bridgeport there were a number of vessels loading with coals, and, indeed, along the whole of this coast there were evident symptoms that the mines were at work, giving life and employment to many hundreds of persons.

We arrived in the beautiful harbour of Sydney at 3 P.M. The *Alma Jane*, our coal vessel (which should have been in Labrador), anchoring at the same time. She had been in fog and calm off Scutari Lighthouse for several days, and had only now arrived. We ran under the coal-shute, and received our coal, taking as much as we could stow. I walked through Sydney to get clear of the coal-dust. The *Victoria*, the Prince of

Wales, the New Dominion, the Cape Breton Hotel, had inviting signs over their door-ways. The boarding-houses were numerous. A patent slip, capable of taking up a vessel of 800 tons, and two smaller ones, a Post-office (which was also a hospital for old and worn out parasols), kept by a very obliging but loquacious Scotchman, who would show me all the various postage-stamps of Nova Scotia, and which he declared "were the most beautiful in the world." Sydney was evidently progressing, and fast too. Coal was in abundance at 10s. per ton, and many small vessels were filling up.

The *Red-buoy* on the sand spit was gone; it was useful for rounding it. Some warping-buoys would be convenient off the coal-pier. I think Sydney harbour is worthy of many improvements. We were fortunate in getting many bullocks and sheep to take on our voyage with us.

At 7 P.M. we started again on our voyage north, anxious not to lose a moment of the south-east breeze, that was then blowing; and we steered for St. Paul's Island. I was anxious to see it and make a sketch of it; but at four in the morning, just as we had made the light, fog, mist and a south-east wind came on, obscuring everything! Barometers fell two-tenths, and we had a brisk south-east wind.

2nd.—The current between Sydney and St. Paul's was south-easterly, one mile per hour. At noon we saw the high land of Cape Auguille bearing south-east about 10 or 11 miles; but here a dense fog came on, and we anxiously looked for Cape St. George, but we could scarcely see the jib. Rounded to and sounded at 3.30 in 78 fathoms, sand. This showed we were not dangerously near the Cape, but we hauled out two points. Ran anxiously under sail and steam in a dense fog during the night, at the rate of 7 and 8 knots. Time was too short and valuable to stop or to go easy, and as I knew that large vessels did not frequent our track, and that we were too far out in deep water for fishing-boats, I trusted to good fortune to take us along.

3rd.—At daylight the high land about Portland Creek was visible E.S.E. about 15 miles; patches of snow here and there on the mountains. We hauled in for the land. The weather was wet, dark, and gloomy. At ten the progress of the vessel was well-nigh stopped by an alarm of "Fire." Some mats at the back of the boilers, together with some soot which had been swept from the tubes, took fire. The fire-bell was rung, sail shortened, and the vessel stopped. In a few minutes it was put out, and danger was over.

In the mean time the barometers had fallen three-tenths suddenly, and the wind shifted to north-east, with a downfall of

rain, sufficient to put out any fire without the aid of engines or fire-buckets. Furling all sail, and stood in easy for what we supposed "Rich Point." This was a gale severely felt all over Nova Scotia; at Halifax it blew with terrific violence; some of the vessels secured to the dockyard tore their bits out and did other damage. At Sydney, where we had just left, great damage was done to the shipping and wharves. Barometers again rose as suddenly as they fell; and, with a violent burst of wind from the north-west and north, cleared away everything to a bright sunshine and clear evening, showing us St. John's Island and Harbour, which we would have gone into had not the wind been blowing directly on the land. We therefore stood off for the night under try-sails. The aurora burst forth brilliantly in an arch from north-east to north-west, and lit up the heavens, which, together with the stars, left us very little darkness during the night.

It moderated so much about 10 P.M. that I proceeded half speed on our course for "Amour Lighthouse," and we passed it at 4 A.M.

4th.—It was a lovely morning, calm, and everything bright. Small icebergs soon began to show themselves in-shore aground, and appearing like small vessels with very white sails. Forteau Bay was crowded with small fishing-vessels, also Black Bay and Ains-à-Loup.

Off Wreck Bay the icebergs commenced in all fantastic forms and shapes. The first seen was 80 feet high, perfectly white, with a streak of ultramarine here and there, aground. Around it were whales, ducks, Arctic puffin, divers and tern of nearly every description. It was certainly a grand sight.

At 10 passed Château Bay, with a few vessels, having their colours flying; several bergs aground off it, and between it and Belle Island a fleet of small vessels, and a steamer distorted in the most irregular manner by mirage. The steamer was going south-west. Here we had a view of and passed close to several grand bergs. They were grand indeed, towering far above the mastheads of the Gannet, here and there splitting and falling with a roar equal to that of a cannon. I had never seen, although in and about Behring's Straits for six years, so grand an ice sight. All there is field and wall ice, no bergs, such as we viewed to day aground in 20, 40, and 60 fathoms.

Cape Château, off the Bay, is so called from the remarkable resemblance which it bears to an old castle. Its turrets, arches, loopholes, and keeps, are singularly represented by a series of basaltic columns. Time would not permit a drawing to be made. It presented as attractive a scene as the noted cave of

Fingal, or the celebrated Giant's Causeway. Off Peter's Island we unexpectedly got 10 fathoms, and I hauled out.

A day or two afterwards one of the men said that he saw a rock under the ship's bottom (from the forecastle) at the time of getting 10 fathoms, but said nothing of it at the time. If it was so the vessel had a narrow escape, but I have some doubt of the truth of the report.

A berg off this bay was perhaps the most attractive we had seen. The temperature of the water on passing it was  $35^{\circ}$ ,  $13^{\circ}$  less than we had a few minutes before at half a mile distant. It was 180 feet high, and at its base were two remarkable small bergs like hay-stacks. Some of the bergs were covered with birds of the diver and tern species, fishing as if from a rock. On passing a berg, the cool wind which came off it made one shiver again. A sun halo was measured of  $46^{\circ}$  diameter, showing that rain or fog was at no great distance.

One berg we passed, which had recently split in two, and now formed two wedge-like pieces, very striking, about 80 or 90 feet high. It was at once evident what a very dangerous place for navigation the Straits of Belleisle must be, in darkness or in fog, with these numerous dangers, some fixed, some drifting. To strike against one would be more fatal than running against an island; there you might possibly get a landing; on an iceberg, never!

In the afternoon, favoured by smooth water, we got out of the Straits; and after rounding the Battle Islands, and winding our way through many icebergs, entered St. Lewis' Inlet, bidding adieu to the last lighthouse we should for some time see, that of Belleisle; passed the dangerous reefs called the "Ribs," which were breaking heavily, and steered up the inlet for Fox Harbour. An iceberg had grounded directly in front of the entrance, and made the navigation very difficult, causing us to get into 3 fathoms on the east point, and we narrowly escaped grounding; anchored in the centre of the bay in 6 fathoms, finding not one vessel, where I had expected hundreds; and this was our first anchorage on the east coast of Labrador.

"Fox" is a very small but snug harbour; only three or four vessels could ride at single anchor in it. Three or four families live on shore all the year round. Some have been here for many years, and gain a livelihood by fishing for salmon (in the next arm), which they send over to Battle Harbour when cured. "There," they said, "pilots can be had, and all information obtained about fishing and the coast of Labrador."

The anchor was scarcely down when the prognostications of the sun halo were fully verified. The rain came down in

torrents, and we really congratulated ourselves at being safely at anchor after four days of toil and real anxiety, particularly on the west coast of Newfoundland, so dangerous and so little known. This very unusual and changeable weather was to be expected from the remarkable oscillations of the barometer. On the first it stood at 30.50, and rose to 30.60 suddenly. On the 2nd it fell .3, in a heavy fall of rain. On the 3rd it fell very suddenly to 29.67, and rose again as quickly to 30.50, and even up to 30.67 on the 4th, when it again fell three-tenths, and heavy rain from south-west was the result. These ranges of one inch were naturally attended with sudden changes of weather.

5th.—A fine north-west wind, ice breaking up. The berg which was aground at the entrance shifted its position to 8 fathoms. Sounded in the boats across the entrance in brash ice, 3 to 5 fathoms. The ice this season has very much injured the salmon-nets, and rendered the catch very small.

Weighed at 7.45, and sounded across to Battle Harbour, a few soundings being much required in Lewis Sound. In running into the anchorage of 11 fathoms struck 3 fathoms off, a point not marked, and nearly grounded; backed out at once, full speed, and then steered in again; but finding no less water than 12 fathoms without actually touching the rocks, backed out and lay off and on. Here the agent (Mr. Bendle), for Slade and Co., came on board. He says that all the fishing-vessels are at Webeck, C. Harrison; and, to use the usual term, "do what they like with the fish." The salt was all expended, or, as they term it, "wet," and vessels were now "turning up" hourly; that is, coming from the north, loaded. The agent sent, at my request, for two of the most intelligent and experienced fishermen, and an Esquimaux from Indian Island; they said fish was abundant, as much as they wished for; all the fishing was "shore fishing," no such thing as "bank fishing." The fishermen knew the grounds and the harbour too, but vessels could not be got to bring the fish south; they could not ensure them, as "Lloyds" were aware of the dangers of the navigation; but when charts were made of the coast and harbours, then vessels would come there. They had no pilots at Battle Harbour who could be of any use to me; at Occasional Harbour I would probably get one.

There were about 300 persons at Battle Harbour prosecuting the fishery, but this season they only got "half cargoes." The ice had been unusually thick this season, and made the fish "lazy!"

We amused ourselves for a few minutes firing shot and shell at a berg with the 100-pounder and Armstrongs, but they had

no more effect than firing at a mountain, although we picked out a berg about 70 feet high, standing like a wedge out of the water. The coast was very interesting, though bare, passing "Petty Harbour," Alexis, and Gilbert Rivers.

The north wind having died away, fog threatened to seaward, and we had to use all our steam and sail to reach an anchorage. However, a light wind coming off the land kept it away. The mirage distorted the land into the most inconceivable shapes. I took a sketch of the entrance to Occasional Harbour, but in a minute or two I did not know it. I could hardly recognise the "Twins" going into the harbour. One was an island, the other a flat rock, as unlike twins as one can possibly conceive.

We anchored in Occasional Harbour after much difficulty in finding less water than 15 fathoms. The place was crowded with boats fishing close to the shore. The banks were dotted with tents and fish stages, the rocks covered with fish curing and drying. We picked up a seven fathoms bank close to the shore, on the south-west side, on which the capelin were in abundance, but cod would not take the bait. "All the fish," they said, "have been taken at Webeck."

There was so much ice this season that it chilled the water, and made the fish so lazy and torpid, that they would not take bait, although the fish could be seen at the bottom in thousands like a wall. They could be jigged in small quantities, but nothing would coax them to bite. A dish of fried capelin is indeed a treat. The capelin is peculiar to Newfoundland and Labrador. It is a very delicate fish, resembling a smelt. Its visits are during August and September, for the purpose, no doubt, of spawning on the beaches. At times they are so numerous as to darken the sea for miles, while the cod feed on them with the utmost voracity.

The manner of the capelin spawning is one of the most curious circumstances attending its natural history. The male fishes are somewhat larger than the females, and are provided with a sort of ridge projecting on each side of their backbones, similar to the eaves of a house, in which the female is deficient. The female, on approaching the beach to deposit its spawn, is attended by two male fishes, who huddle the female between them, until her whole body is concealed under the projecting ridges, and only her head is visible. In this state they run all three together with great swiftness upon the sand, when the males by some imperceptible inherent power, compress the body of the female between their own so as to expel the spawn from an orifice near the tail. Having thus accomplished its delivery the three capelin separate, and paddling with their whole force through the shallow surf of the beach, generally succeed in

regaining once more the bosom of the deep. It may be ascertained beyond a doubt that the evacuation of the spawn is caused by compression, because, when taken in the hand, the female capelin invariably yields up its spawn the moment it receives the slightest pressure from the fingers.

6th.—At 4 A.M. cold, but fine. Strong north-west wind; weighed and started for the north. The navigation was rendered doubly anxious and dangerous from icebergs and masses of ice breaking up from Occasional Harbour to Seal Islands. Passed vessels in numbers running south with full cargoes of green fish before half the season was over. In every cove and harbour passed we saw many fishing vessels, boats fishing off rocks wherever the eye wandered in all directions, and in some harbours there were 1000 boats.

When off "Round Island" we obtained the position of the most easterly point of Labrador. Its latitude was correct; its longitude  $10\frac{1}{2}$  miles too far east; the variation  $37^\circ$  w. This position (which there was no doubt about) placed the ship on the top of Pond's Island. The whole coast is 10 or 11 miles too far to the eastward, and I can never feel that we were much indebted to Mr. Lane's chart. It was found in many points simply imagination. Even a correct eye sketch would have been more correct and useful.

In passing the "Indian Tickle," our least water was three fathoms; indeed, that was little enough for a stranger. Winding through this Tickle was exceedingly pretty. Everywhere vessels and fishing boats; people running down to the fish stages, gazing at us with wonder and astonishment. Full of anxiety, we passed safely through the Tickle; but then an east wind set in and brought a black and rolling fog within  $1\frac{1}{2}$  miles of us, covering up islands and reefs, and threatening to envelop us. So we returned, and anchored in five fathoms in Indian Tickle harbour.

Here, in less than half an hour, 126 codfish were taken by hook and line. Some were caught by the back, some by the eye, some by the belly, two were on some lines, by the men and some of the young officers.

Scarcely had the anchor been down when a south-west wind blew all the fog to sea again. I did not like to see a fine evening slip by (as time was very precious), so weighed and steamed for Greedy anchorage, passing through fleets of fishing vessels, and anchored at 8 P.M. Full speed and sail got us in safely before dark, and we anchored in eight fathoms. Here we were visited by the agent of Lamour and King, of Plymouth. He said his people were suffering much from sore eyes, caused by ice and the cold south-east winds, which had been very



prevalent. Indeed, for the first two or three days my own eyes were so inflamed that I had to leave off looking through my glass.

The aurora was brilliant at night, and was followed by west and north-west winds, with heavy squalls of wind and rain from the north. Banks, with fish, east of Cape Webeck 50 miles were reported by a boat's crew.

7th.—Started early with a fresh west wind for Indian Harbour Esquimaux Isles, where Sir L. McClintock finished his line of soundings from Greenland. At 9 A.M. we sailed out of the chart by "Lane," and, indeed, I was not sorry for it, when I found an island like "Gready" not even inserted. Every other detail was equally incorrect. The Doctor's advice was everywhere sought after. The moment they knew that there was one on board off they rushed and pulled him on shore. They are entirely without medical aid, and trust altogether to nature.

At noon, passed between George Island and Hern Islands in Hamilton Inlet, without seeing the group of sunken rocks placed on the chart; ran a line of soundings across, and found the distance from Gready to Indian Island to be 45 miles, instead of 55 on the chart. A strong outset from the inlet was felt, obliging us to steer two points to windward of our course: found the whole passage deep and clear.

In a violent squall of wind and rain from the north anchored in the outer anchorage of Indian Island in six fathoms; white sand; fishing boats rushing into port to avoid the squall. At 5, the wind having lulled, shifted our anchorage to the west side of the island, and anchored in six fathoms, apparently near the shore on either side, but on sounding found three fathoms close to the rocks.

Landed and visited Mr. Norman, the chief agent, and made arrangements about the *Alma Jane* landing our coals on arrival, and for pilots to Webeck and Hopedale. The Esquimaux was absent, but was sent for at once.

It was extremely difficult to obtain pilots at all, for the Esquimaux did not like to have charge of a large vessel which they were quite unaccustomed to, and the fishermen would not leave their lucrative employment to act as pilots, and this threatened to be a very serious difficulty indeed.

\* On entering Indian Harbour every rock was covered with fish drying and curing, men carrying wet fish in barrows from their boats to the "washhouse," boats arriving with their loads of fresh caught fish, brigs and brigantines laying ready for their cargoes, people rushing down to all points to see a man-of-war steamer, Indians going to the tops of hills and peeping over in wonder at us as we twisted our little vessel among the rocks

and islands. It had now cleared up a lovely evening, and it was altogether a very novel and interesting scene.

Five brigs were waiting for cargoes of fish, each vessel insured by its own insurance company.

8th.—Prepared for surveying the harbour. No Esquimaux pilot had arrived, and it may take many days before they could pack their traps, say "good-bye," and prepare to start. After measuring a base, started at noon for Webeck, Cape Harrison.

The strong north squalls had now commenced and may be almost expected daily. Herrings were anxiously looked for by the fishermen, as they had now no bait, capelins having got coarse. Herrings were about, but they would not "mesh." The fishermen make 10% or 15% more on the voyage; but now the capelins having grown large and coarse, "you may as well throw down a stone to the cod; they won't take it." On sighting our anchor we found, to our surprise, both flukes gone—a most unaccountable accident, for we anchored in sand. Shifted our sheet-anchor for a bower.

A clear passage was found north to Cape Harrison from Cut-throat passage; but the currents have been found invariably to the south, only changed by a strong south-east gale. On passing from Indian Island to Webeck found numerous fishing-boats "jigging," that is, with two hooks backed and a lead between resembling a small fish, in which manner they are caught by all parts of the body, head, tail, fins, &c.

In some of the fishing-ports scarlatina had made some ravages; and it was much dreaded here, but had not made its appearance yet.

The distance from Cut-throat to Webeck, by patent log, was 44 miles; by the chart it was 27. Probably Webeck will be found farther north in latitude. In the track from Cut-throat to Webeck we passed Sloop Island, and 14 miles north from Cut-throat "Quaker's-hat," an island 25 feet, with a reef about 15 feet above water this side of it. There is an island, Split Island, 50 feet high, on the port hand in Byron's Bay, 16 miles from Cut-throat, bare and rugged; having a detached rock on the north and south sides of it. None noticed on the charts.

We ran anxiously along in untravelled waters until arriving at Webeck at 9:30 P.M., anchoring in  $8\frac{1}{2}$  fathoms, passing through the North Channel over a 12-foot rock, as the fishermen said, on arrival; but we did not get less than 9 fathoms in the channel. We felt a strong indraft into Byron's Bay, and evidently a strong northerly set.

At Webeck we were informed that there were 200 sail of fishermen 180 miles north of this to Windy-tickle, and the best fishing along the coast has been at Webeck.

After a dead calm and a gloomy sky, with no indication by the barometer, it came on to blow a gale from south. Webeck is a good and safe harbour, but bad for the fishermen. They cannot get their small boats alongside in a breeze of wind.

9th.—Prepared for the survey of Webeck, although blowing a gale, by putting up stations, getting sights, and measuring a base. The wind gathers into the anchorage in a most unaccountable manner, while blowing only moderately outside, as well as in the harbour south of this. The fierce steady gale pressed very hard on the vessels in the bay. Towards evening there was a shift to west, with lightning and heavy clouds, and, during the night, thunder, lightning, and rain.

Blasts of hot wind, raising the thermometer to 72°, were very singular, and felt by all on board. The blasts were from south-west.

10th.—Pretty fine. Measured the base; got all our magnetic and "fox" observations, and commenced the triangulation of the harbour. Several vessels sailed to-day with fish for the south.

12th.—The barometer fell, with the weather, 3, and the rain and east wind continued forty hours, when it began to veer north, and then the barometer rose with it. This cold, raw, and wet weather did not prevent the fishing-boats going out to fish.

13th.—We had exactly forty-eight hours of hard rain, with cold east wind off the ice. Then the wind backed to west and south-west. The barometer fell to 29.35 during the night, and the morning looked gloomy and threatening; but after a little northerly puff the day cleared off most beautifully and enabled us to get on well with our survey. Barometer now began to rise.

Having previously obtained our first set of equal altitudes for the meridian distances, taken the magnetic observations, and measured a base over huge boulders of granite, and amidst clouds of hungry mosquitoes, we were ready to commence the boat-work, having fixed sufficient objects for sounding. My orders were never to leave the ship without a boat, for fear of accidents; but the *Dinghy* being called into requisition for observing tides and for landing a party with the theodolite, and for other purposes, the copper punt did her duty.

Lieutenant Wharton, my senior assistant, generally took the first cutter, and with him, one of the midshipmen, Mr. Cuthbert to assist, always sounding in parallel lines, and in this manner a good many miles of water was pulled over during a long and calm day. Mr. Covey, the Navigating Lieutenant, with Mr. Rogers, midshipman, took the second cutter and sounded in the same manner; and the two young midshipmen very often obtained a keen and

sharp appetite for breakfast by starting very early and white-washing all the smooth-faced rocks and prominent points with the various letters of the alphabet and the Roman numbers. Mr. Baillie, Navigating Sub-lieutenant, occupied the gig (a new and convenient boat which belonged to the *Royal Alfred*). He, like myself, had no assistant and had to work his wits and fingers pretty smartly to take angles, soundings, note them down and plot them, and steer the boat as well. I had boards fitted to lay across the stern-sheets, so that the work was put on the rough sounding sheets in the boats, and in this way no blanks were left, and the soundings were always complete for that day. The "whale boat" was usually my boat for work. The angles at the main stations, the coast line, and the soundings about any reefs, or dangers, generally occupied my time. And lastly, the dinghy, with the pilot and a quarter-master observing the tides, exhausted our complement of boats. I could well have worked one or two more if I had had them.

Generally, at six, the boats were called away, and the men always took their dinners of preserved meats with them, landing if possible, and having their dinner-hour without interruption. Although hard work, pulling and sounding all day, particularly if wet and cold, yet they like it. They like the change from the monotony of cleaning arms, guns, brass-work, and sweeping decks.

From the top of Webeck Island we counted fifty-two large icebergs aground in the offing.

14th.—At 5.30 A.M. recommenced our survey, and at noon, having nearly finished the harbour, started for Indian harbour to meet our coal vessel, as the delay in meeting her would cause heavy demurrage of 4*l.* per day, the Hudson Bay steamer passing us going north. We sounded all the passage between Webeck and Cut-throat run, finding, from 12 to 18 fathoms, stones: a clear run of about 37 miles without a danger.

On arriving at Indian harbour, to our surprise, found the *Alma Jane* hove to, ready to go in. She had just arrived, and, as if by magic, we had both turned up together. We entered the harbour and moored, getting the coal vessel lashed alongside us.

15th.—In a dense fog commenced coaling, and had 50 tons in by evening. It turned out a lovely day at noon, and we progressed with the survey which had been previously commenced. At 9 P.M. a heavy squall came on from north-west. The glare of the moon, which was at full, reflected on the clouds, and the aurora, bursting forth its corruscations here and there, had a very alarming effect. It all passed over in an hour.

16th.—A very heavy thunderstorm, accompanied by rain,

passed over at 3 P.M., while I was out in my boat at Baccalao (or Puffin Point). The island was quite precipitous, except at one small cove where the bow of the boat would only fit into. We had to keep the boat off the rocks by pushing out the oars and boat-hooks. The rain came down in torrents, and if the wind had shifted one point we must have jumped out at the risk of safely landing, and abandoned the boat to her fate. The thunder was very loud; the hills reverberated, as if they would split in atoms, and the vivid lightning seen through the rain was very grand. In the evening it cleared up fine, and the Newfoundland steamer *Alert* arrived with Mr. Gedden, to report on the fisheries at each place. He paid me a visit, and reported a timber vessel wrecked on Lark Point, Belle-Isle. Of course I could render no assistance.

It was mentioned to me that the compasses were much affected by the nature of the rock on Observatory Point; but, on investigation, I found it was not so to any great extent. A portion of the rock, when powdered fine, gave a per centage of 4 or 5 per cent. of iron, attracted by a magnet. Some of it placed in tanic acid (the most severe test) showed little or none; and a very delicate compass-needle was deflected only 55 minutes, at a height of 5 feet from the stone. No doubt there is a little, but not much that would deviate the needle. Heavy squalls again to-night, with lightning from north-west. Weather cold.

*Sunday, 18th.*—Many families came off to-day to join in our prayers, and to see the first man-of-war that had entered the harbour. In the afternoon numerous visitors came from all parts of the Esquimaux group to visit the *Gannet*.

On Monday, the 19th, was a cold wind, north-west, but it did not prevent surveying and coaling; but at one time we were so cold that I had to return to the ship and warm up for a second trial.

*20th.*—A promising morning. Unmoored and left our snug anchorage, having obtained our Esquimaux pilot, John Took-tooshner, a comic old fellow, with one tooth in his upper jaw in the shape of a V., which made an impression in his lower lip of the same form, by which he may easily be known. He never *knew* anything but "I suppose so;" and a term he often used was "handy by," meaning close to; his native place, "Windy Tickle." Carried a line of soundings to Cut-throat Run, and then made sailing directions to Webeck, where we arrived at 2 P.M., sounding off the entrance to complete our plan. We felt quite at home now on this route, recognising all our islands, and reefs, and rocks, as we passed them, as well as the huge icebergs which had now come close on the coast.

Started at 2 for Aillik, over new and anxious ground, passing out of the limits of the North American station at 3 P.M. I conclude that the *Gannet* is the first ship of war which has done that for many years. The evening was fine and the water smooth, with rather a heavy ground-swell from the eastward. We took the outside passage, as the pilot was afraid of a "breaker" between the islands on the inner; he was not yet at home in the vessel, and felt somewhat uneasy. His names of the different islands passed it would be impossible to write down, or even attempt to pronounce without fear of lockjaw; but if my reader (if I ever have one) can imagine a word sounded like the noise a cabby makes with his cheek, and tongue, and teeth combined, when he wishes the animal to go on, for the *first* syllable, and then the call a fowl makes to her brood when she wishes to collect them, for the *second*—the *third* syllable I *can* write—"took"—and by combining these you have in *three* syllables the name of an island off the inlet of Cannuckthowatooktuock!

At 9 P.M., rather dusk, we managed to crawl into the anchorage of "Aillik," or "Eyelick," in 6 fathoms, passing over a ridge of rock with only 3 fathoms on it, which our "Boski" did *not* know. A few lights were seen in the windows on shore. The steam whistle was sounded, and answered on shore by two muskets, and we all retired to bed very tired. We were very thankful that we had arrived at another stage of our journey without a mishap.

Here particularly, as well as along the whole coast, it was impossible not to observe the almost visible rising of the land, by the uniform beaches of boulders, sand, and shells, left to view at 20, 30, and 40 feet above the *now* sea-level. This is also the case on the coast of Newfoundland. It would almost be worth while to make careful observations to determine at what rate the sea is becoming so displaced, and if at a uniform rate along the whole shores and islands; indeed, from my own experience, I believe this change to be visible over the whole world, certainly in the northern hemisphere. Either the water is subsiding, or the land is upheaving.

21st.—Sunrise revealed to us the Hudson Bay settlement of "Aillik," a comfortable red house, a hut near it, a fishing stage and house, and an old store-house; a flagstaff on the hill displaying the red ensign.

I visited the place in charge of Mr. E. A. Goldston (formerly Mr. Bright), with his head man "Rennie Labbie," who had been thirty-five years in the place. Furs were not to be had. He said we were the first vessel of war that had ever visited them. I begged of him to record it in his journal. There was

a large lake of fresh water close to the dwelling, from which a vessel could most easily fill up. Wood was scarce. Small stunted pine-trees in the glen were all that could be obtained. Mosquitoes were in myriads, and their attention to us on landing was very great.

From this we counted sixty-five icebergs—some very large—and a group of sixteen islands without name or place on any charts.

Started at once, the day being fine, for Hopedale, but the weather looked dull and threatening, passing through numerous islands, reefs, and flats. We had to sound very carefully through "Sugar Loaf Tickle," as the pilot was not "sure of it." We got no less than 15 fathoms in its centre. Very few fishing-boats were now seen (they may be further in among the islands). They were always a good guide to me for a deep channel, as they are never in less than 14 fathoms fishing. At (Sugar Loaf) Tickle, from the mast head, were counted ninety-five islands. From the bridge I counted sixty-five, and sixty-two icebergs at one time.

We arrived at Hopedale at 2 P.M., finding only four or five fishing vessels, which were waiting for a fair wind south. At once the Esquimaux came off in their baidars and kyaks, and gazed in wonder at the Oomiak-wak (*Gannet*), the first steamer of war they had ever seen. The brig *Clinker* (Hill), was here in 1821.

I visited the mission under the care of Messrs. Ribback and Kretschmer. The former had been here twenty-five years, and with his wife and family possessed a comfortable house, a good large church surrounded by several Esquimaux huts with innumerable dogs, but there were no hunting Indians here.

We had collected a band of music in some very unaccountable "drums and fifes" way, and our men generally played from 8 till 9 P.M. The moment they "struck up" was the signal for all the Esquimaux and the boats from the fishing vessels to come to us (no women, they are prohibited from visiting vessels by the mission), and the delight of the Esquimaux was beyond description. As I paced the bridge and contemplated our position, then far off the Admiral's command, on the bleak, barren, and almost unknown wastes of Labrador, far from home and friends, surrounded by those who had so lately been savage heathens, but now baptised into Christianity, the feeling which came over me is not easy to describe. Great praise is due to the Moravian missionaries who have worked hard to implant the Christian faith on these apparently animal savages, and they have well succeeded; but on the Indians—"the inland hunting Indians"

—not so. They are so attached to their old superstitions that “they do not hesitate to sacrifice a favourite child on the grave of its deceased parent,” under a belief that their earthly dissolution is at once succeeded by a blissful reunion above.

They are very strongly attached to European clothing, and eagerly barter their jackets, boots, trousers, and garments for any worn-out article of dress. Their huts are comfortably built of logs, floored with plank, and covered on top with turf, on which the grass grows luxuriantly, and sometimes flowers; a small frame in the roof, with the intestine of a seal for a window; a porch outside the door for the dogs. In vain I endeavoured to make a sketch of the inside; the numbers flowing in “to see” quite prevented such a thing, and I could not tell them to keep away. They were mostly fat, very fat, good-tempered women, with their babies dangling in the hoods of their jackets, and squeaking too. One child was sucking a strip of raw fish with the utmost vigour and delight.

During the rain, having nothing else to do, I wandered over the grave-yard, and read some of the *memoriams*. Some I recorded. The graveyard was very large for so small a place, and was a sad illustration of the rigour of the climate. The graves were very neatly kept, painted white, with a wooden border, the headstone was laid on the middle of the grave, and surmounted with forget-me-not and other wild flowers.

The babies are carried in the hood of the mother's jacket, and it is most amusing to see them giggling them, both when walking and sitting, of course the whole fat body going too. The jacket is neatly made of American linen with a hood the edge of which is trimmed with fur, and the centre with a band of embroidery, the cuffs of the sleeves and the tail (which is very peculiar) with embroidery also, the whole trimmed (or edged) with red or blue braid.

The ladies wear sealskin breeches, often covered with a petticoat or gown. The babies are comfortably encased in a thick flannel or blanket dress, skin tight, with a red handkerchief tied over the head, and they look very funny and mummy-like when danced up and down.

All the Esquimaux about Hopedale (about 300) are baptised into the Christian faith, and assume names taken from the Bible. The Esquimaux farther north, who have not yet embraced Christianity, indulge in a plurality of wives.

They have here a great number of their peculiar dogs, so nearly resembling wolves. These dogs are very fierce; they are, however, nearly starved, and a fish-bone thrown to them causes a savage battle until the victor carries it off. They have been known to devour the unprotected children of their masters.



They are very useful for dragging sleighs, wood, luggage, &c., over the snow in winter, and the pups are valued as a delicate species of food.

There is very little intercourse here with the Indians. Unless driven in by famine they do not appear on the coast. They bring all their commodities to the settlements by water in open boats, which they procure by barter, and during the time so occupied the tribe repose at night under tents of sealskin. In general they profess the Roman Catholic faith, by simply worshipping a small picture of the Crucifixion, which they have obtained from the Canadian missionaries, and worn round their necks. They bear a great hatred towards the Esquimaux. The hunting Indian is naturally stupid, cowardly, and superstitious; the Esquimaux, on the contrary, is active, vigorous, and enterprising. The latter bear a strong resemblance to the Tartar and Chinese.

22nd.—Was dull and gloomy. Several vessels were calling in for the night from the north, with green fish to cure, proceeding southward. They have had a good fishing season at Windy Tickle, but could take a few more.

23rd.—We commenced sounding the harbour in the afternoon in rain, but no wind. There was a sort of Scotch mist; however, it did not prevent our sounding. It was quite calm and smooth, and the objects were visible; and I know that we were all anxious to be at work, for it was far preferable to sound in wet and calm than in wind and sunshine. The rain awnings were spread snugly, and oilskin coats were provided for those outside,—leadsman, helmsman, &c., and I am sure that none suffered.

Lieutenant Wharton, in the cutter, went away to the south-east, and sounded all the southern entrance carefully and closely, putting in some rocks and coast-line.

Navigating Lieutenant Covey sounded the north entrance in the second cutter, and navigating Sub-Lieutenant Baillie sounded out the harbour in the gig, and put down many rocks, shoals, and dangers. I amused myself in the mist fixing points, reefs, and dangers, and putting in some coast-line. The dinghy at her usual work, the tide-pole; and any deep soundings left unfinished were put in by the ship, as well as the currents, sailing directions, &c.

24th.—The Moravian mission, Mr. Ribback and wife, Mr. Kretschmer and wife, and all the Esquimaux ladies in their best attire, visited the ship. The missionary gentlemen looked very comfortable, but curious in their entire sealskin suit, the women in their "attigeks" with their sealskin trousers and boots, many

of them having their babies in their hoods, jiggling and lulling them to sleep. As this was the first vessel of war they had ever been on board, they were lost in wonder at our nice *houses*, at the engines, the men's hammocks, and the manner in which the men furled the sails and sent the t'gallant yards down.

During the winter the thermometer falls to 30° below zero, frequently 25° from January to March, and the wind blowing at the same time makes it very cold indeed.

On the island of Zach pencil lead has been found. Copper and gold are also said to exist about Hopedale.

There was no work done by the Esquimaux while the *Gannet* was in harbour. They were all so absorbed in everything done on board that they could not be persuaded to work. When the bugle sounded for hoisting up boats, for quarters, or sunset, they would all rush to the rock to see what was going on. The only word I was perfect in for the few days at Hopedale was "oxeni," which means "How do you do?" It is one of those few words without a "cluck" or a "took."

*Sunday 25th.*—When at Hopedale we heard that Mr. Mackenzie one of the Hudson Bay Company's officers, had slipped off the bridge of the Labrador steamer when going in, and was unfortunately drowned. He was on his way to Ungava.

We all visited the afternoon service at the church, and certainly a more imposing and interesting sight I have seldom witnessed. There were 57 men, 50 women, 4 men playing the violin, one the French horn, another the bass fiddle, and another the harmonium. The whole of the service was singing one long hymn. Six women were arranged in a back form singing their parts from *printed* music, four men on the opposite side, and all the others joining in.

*26th.*—In the midst of a north-west gale we finished the survey of Hopedale Harbour, and started for Aillik. The barometer was low, 29·65, the weather gloomy, and at noon rain and cold came on, but by this time the boats had been hoisted up. In our passage we ran over two dangers which might have finished the *Gannet*, but good luck still followed us, and we anchored in safety at the Hudson Bay Company's settlement of Aillik. The gusts of wind during the night were very strong, but we had a snug and sheltered anchorage with excellent holding ground, the two points of the west part of the bay in line. Messrs. Bright and Goldston visited us, and sent their despatches to St. John's by *Gannet*. Here we made an eye sketch of the harbour, which, in the absence of a survey, is useful.

*27th.*—A cold and windy morning, but fine, and we started

early for Webeck, making sailing directions as we proceeded. At noon we were off Webeck, where we added some soundings and coast line to our chart at the tail end of a thunderstorm which threatened every moment to wash chart and instruments off the bridge, and roll ourselves after them. The north-west gale of yesterday had left a heavy swell, which the ship felt much. We then started for Indian Harbour, where we arrived at 8 P.M., sounding the "run" in, and having another escape by passing over a shoal patch near Ragged Islands. Two young Esquimaux dogs, which were obtained at Hopedale for presents to friends at Halifax, regaled themselves during the night by eating *two pair of shoes* between them, a rather expensive supper for their owners.

28th.—Was fine, but threatened fog. It did not, however, prevent both ship and boats from doing a real good day's work. None were idle to-day. Ship and all the boats were away early. Lieutenant Wharton took the gig to-day as he had a long way to pull. Mr. Covey and Mr. Cuthbert accompanied him. He had to sound and examine Gibson Harbour (for small vessels) as well as Duncan Passage, put in the coast-line of Big Island, sound round the Seal Rocks, and carry a line of soundings to the Duncan Passage,—an active day's work, which was satisfactorily performed, and he only returned to the ship when a strong south-east wind and dense fog made him retreat.

Mr. Baillie took my boat (the whaler) as he had to land on several small islands with a surf on the beach. The coast-line of Double Island and Tinker Island was put in, and lines of soundings between them completed before he returned to the ship.

The ship was occupied all day in putting in lines of deep soundings at the approach to Herbert Island, and on the west side of Sir Rodney Mundy Island towards the Walker or Black Rocks, and with two patent leads going and proceeding half speed except when approaching a danger. A good day's work of 52 miles of soundings was obtained, and we did not desist until late in the evening when a strong south-east wind and fog compelled us to run into Ice Tickle, a snug harbour on the north side of Sir Rodney Mundy Island.

Next day Lieutenant Wharton and myself, in our boats, went to search for the rocks on which so many vessels had struck when running north. They were both found in the passage, one having only one foot of water on it, the other a-wash at low water. I named them Wharton and Baillie. Marks were obtained for clearing them. At the same time Mr. Baillie sounded out the harbour in the gig, and Mr. Covey in the

second cutter sounded the southern entrance to Icy Tickle. The water being smooth and no wind, a good day's work was performed, and we all returned to the ship at sunset.

Three hundred vessels have anchored at one time in Ice Tickle on their way north in July. They come in from the south through the west channel, and out to the north through the east. It is the chosen highway for all vessels.

This has not been the best of seasons for fish. The capelin and cod "spurred" on the 10th June, and the vessels did not arrive until July. The time of the fish visiting is very irregular and uncertain. Herrings not arriving now for bait and for barrelling make it a poor season, the fishermen having nothing further to do.

There were many bitter outcries by the fishermen at the exorbitant price they were compelled to pay for their provisions, absorbing all their small profits. I have no doubt it could be remedied. Three merchants in Newfoundland the other day, partners, dissolved. They retired with 40,000*l.* each, besides the standing property. They had been agents for supplying the fisheries for fifteen years. This will give a small idea of the profits.

30th.—Fog and rain. Shifted round to Indian Harbour, and commenced coaling from the vessel. It was rather hard on the men working in wet and cold, but it could not be avoided; time was too precious, and it will take two days to land the coals.

31st.—A good deal of thunder during the night and "north squalls," which cleared off the fog and rain. The new moon and the Aurora were visible. We were all day landing coals from the brig, a most laborious job, with a boat or two surveying and completing the plan of the islands.

*Sunday, 1st September.*—Glad indeed all of us to get a day of rest in the full acceptance of the term. The morning was fine, with a cold north-west wind. This month commenced with cold and wet. We had indeed been favoured with good weather. Ducks and wild geese passing over to the southward showed evidences of an approaching early winter, and the wet and cold experienced by those employed in boats all day must very soon end.

2nd.—Fine, but threatening in the north. We finished landing our coals, got up steam, and started for Greedy anchorage.

On passing through Greedy the boats were taking plenty of herrings, and some of the boats plenty of cod, others near them not catching a fish. The day turned out fine, with a north-east breeze, to which we spread all our canvas.

. We anchored at Indian Tickle at 5.30 P.M., in  $4\frac{1}{2}$  fathoms, sand and shells. The *Fawn* had been here with the Governor of Newfoundland, and was to revisit shortly. Mr. Warren gave a glowing and favourable description of the value of this tickle as a highway for fishermen. 3000 vessels had passed here this season. Three vessels had struck on sunken rocks. There were upwards of 30,000 fishermen on the coast this season.

3rd.—Was a lovely day, but very cold. Stationed the bay, took sights, measured base, and prepared for survey.

It was said here (with how much truth I cannot say), that Indian corn has been found in the crops of the curlew on their first arrival on this coast. Where do they come from? or where do they get it? Our sportsmen got a great number of curlew, and a snipe was also shot.

In Indian Tickle there were 800 persons, half of whom were Roman Catholics, the remainder consisting of Wesleyans, Presbyterians, and Church of England. The Roman Catholics have a place of worship, and it was contemplated a short time since building a church, the plans of which I saw, cost 500*l*. But the bishop made a mistake, and there is a delay about it unfortunately.

7th.—We have been enjoying a few very fine days of real summer. Yesterday was very hot. I have left a self-registering thermometer here for the winter, to see what the lowest temperature will be. At six this evening a sudden gust from north-east brought cold, and damp, and wind, just allowing our boat time to return from the completion of the survey of Indian Tickle.

Here we obtained our last series of latitudes, longitudes, and variations; and I have shown a small plan of the difference that existed in former charts, and those found by us. Generally the coast is 11 miles too far east; latitudes pretty correct.

We had much difficulty with our magnetic observations from the quantity of iron that was present in the rocks. It deflected the needle  $12^\circ$  at this place, and all our observations had to be repeated at another. This was rather provoking, as the observations had to be taken with four different instruments, and some of them delicate ones.

Sunday, 8th.—It blew a north gale, very fierce. We always looked forward to Sunday as a real day of rest after our six days of constant boat work, sometimes 15 or 16 hours a day. Early in the morning a large brig, deeply laden, anchored from the north with both anchors alongside us. At noon, blowing a gale, she weighed again, much to our surprise; and in less than five minutes she was a wreck.

9th.—We steamed out at ten, after receiving the master, crew, and passengers of the wreck, passing the ill-fated *Terra Nova*, and through the intricate tickles, with rocks and hidden dangers around where more than one vessel this season had met her end; also Domino Harbour, a fine sheet of water. Rounding Round Island at 1 P.M., we steamed against a fresh south wind for Occasional Harbour, where we arrived at 7 P.M., and anchored on our old spot in  $7\frac{1}{2}$  fathoms on the south side, the only place where shoal water can be had.

10th.—Wild and stormy off the land. Started at 9, making a passing survey of the harbour and soundings. It came on to blow from south-east, and rain with gloomy weather. Ran into Fox harbour, St. Lewis Sound, where there was less difficulty in entering than when the large iceberg was across it in August. We heard that the *Fawn* was at anchor in Marnham Bay. It blew in heavy gusts during the night with rain, the wind having shifted to north-east.

11th.—Started early, and sounded the entrance to St. Lewis Sound, where some soundings were wanting. It was still blowing hard from north-east, but it was no use waiting for fine weather. After that we started for Newfoundland. The weather was dull and stormy; only two icebergs of any size were seen.

In a fresh gale from north-east and a tumbling sea, we rolled past Belle-Isle, crossed the straits, and anchored in the snug harbour of St. Anthony, in five fathoms. Here were several fishing-boats, and stages on the shore; and I must say, from the little I saw, that the Frenchmen looked more substantial and comfortable than those of the Newfoundland. There were at anchor a bark, brig, and several schooners. We found it a very snug anchorage with good holding-ground, but numerous rocks along the shore.

12th.—It looked such a lovely day that we made a very early start, and rattled along 8 knots; but alas! with a fresh south-west wind, a very strong current setting into White Bay from yesterday's north wind, but it did not last long. As we approached Funk Island it came on to blow hard from south-west, with a heavy sea. We got stars to confirm our position. The wind continued until the evening of next day, when moderating a little we turned south.

13th.—At 8 P.M. we were preparing for a gloomy night by seeing (as we thought) the moon getting obscured by a patch of cloud or fog and gradually becoming darker, when to our surprise we saw that it was an eclipse partial, '69 being darkened.

14th.—It blew hard with a heavy sea all night, and the ship

tossed about a good deal. It was too misty to see Baccalieu light, but at eight in the morning we were off the island standing into Conception Bay. The wind lulled a little, and we stood for Cape Francis, passing along the wild and weather-worn coast of Newfoundland; not so barren and washed, however, as Labrador, having a few stunted pine-trees in the glens, which destructive man was firing in all directions. Here and there was a whitewashed house,—a cold and dreary fisherman's winter-residence.

Torbay, a wide open bay with some houses and fish-flakes, was passed; its headlands bare red sandstone. The coast along here was hardly recognisable, and very imperfectly laid down on the chart. After struggling close along the coast against a strong south wind with heavy gusts off the headlands, which were truly bold and grand, we turned into the snug yet narrow harbour of St. John's. It was like going into a summer-house, so warm and so tranquil after our three days' strong breezes. We anchored at 3 P.M. in seven fathoms mud. Here we found the French Commodore, Théodore de Lapelin, in his frigate the *Armorique*.

*Sunday, 15th.* St. John's is an important and stirring place, vessels constantly going and coming, and the wharfs in a state of bustling activity. The boarding-houses and "sailors' homes" are very numerous; and I suppose, like all others, where the unsuspecting and simple tar is taken in and done for.

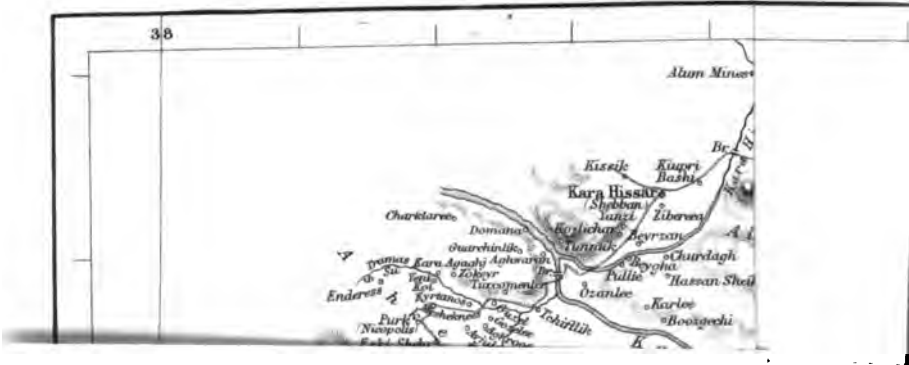
One cannot avoid noticing the many poor and distressed about the streets of St. John's, and the numbers constantly appealing for alms. If I am not in error one-third of the revenue is annually given in aid of the poor. Why is this? Simply because the fisherman is robbed, and has nothing to give his wife and children after his hard season's fishing. I acknowledge that some are improvident, and it is difficult to wean them from old habits; but there are some few of the 30,000 who would (if they could) lay by a few shillings if it were possible to get it.

*17th.*—The leading members of the Chamber of Commerce paid a visit to the *Gannet* to see the result of the first voyage to North East Labrador, at their suggestion. They appeared very much interested and delighted at the prospect of soon having charts for their vessels to sail by. They declared that no request from the Government of Newfoundland had ever been so promptly carried out by the Imperial Government as the one now before them.

*18th.*—The Governor, his Excellency A. Musgrave, paid the ship a visit to-day for the same purpose, and expressed much gratification at the interest shown to improve the condition of







the many thousands of fishermen and their families depending on the fisheries for their support.

There are good accounts in all quarters from the Tilt-Cove copper-mines. The copper is said to be second to none in the world, realising 20*l.* a ton. Shipments are constantly taking place, affording a cheerful prospect to any who may be thrown into distress by failure of the fisheries. I am sure that on the coast of North-East Labrador similar mines will be found, and all that is required is a small capital and a little energy to work them successfully.

I find, on referring to the returns in the Government office of the number of fishermen employed in Newfoundland, there is nothing definite known; but in 1857 the population was 122,000: 800 vessels were employed fishing; in these were 15,000 men, and the tonnage 60,000 tons. The fishing-boats were 12,000 in number. Surely these numbers are worth looking after and improving.

19*th.*—Strong south-west gale and rain prevented our starting, but in the evening it chopped round suddenly to north-east, and we were off. Running down the coast of Newfoundland we were off Cape Cod light at midnight, 9 knots an hour. There was a heavy sea left by the south-west gale the night before, and the *Gannet* dived a little into it. Next day, unexpectedly, we had a fine north and east wind, and we rattled along briskly.

While at St. John's, we found by nine separate observations, two days following, that the variation of the compass was 30° 41' w., and not 32° 21', as the chart shows.

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XI.—*Journal of a Tour in Armenia, Kurdistan, and Upper Mesopotamia, with Notes of Researches in the Deyrsim Dagh, in 1866.* By J. G. TAYLOR, H.M. Consul for Kurdistan.

(Communicated by the FOREIGN OFFICE.)

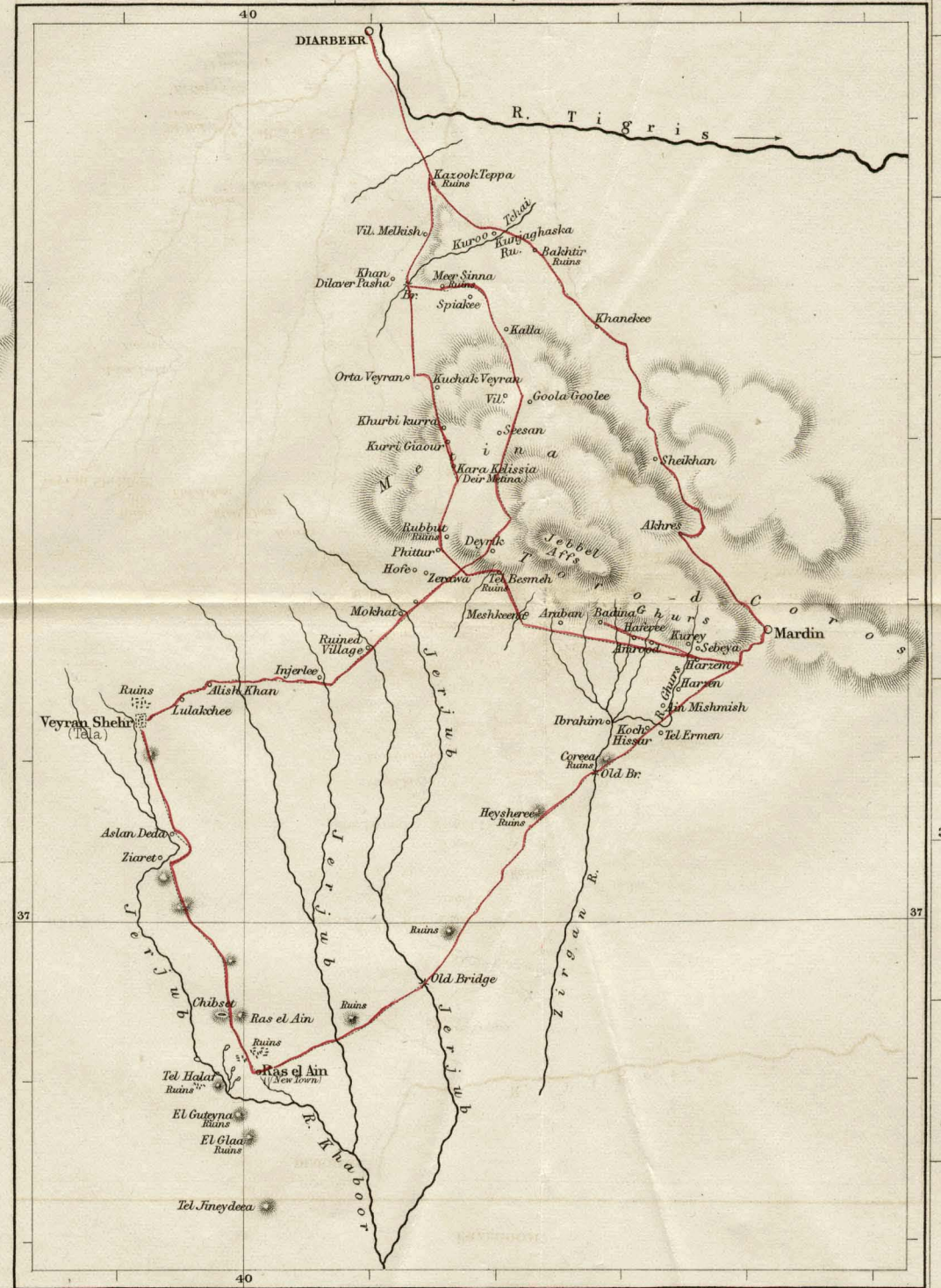
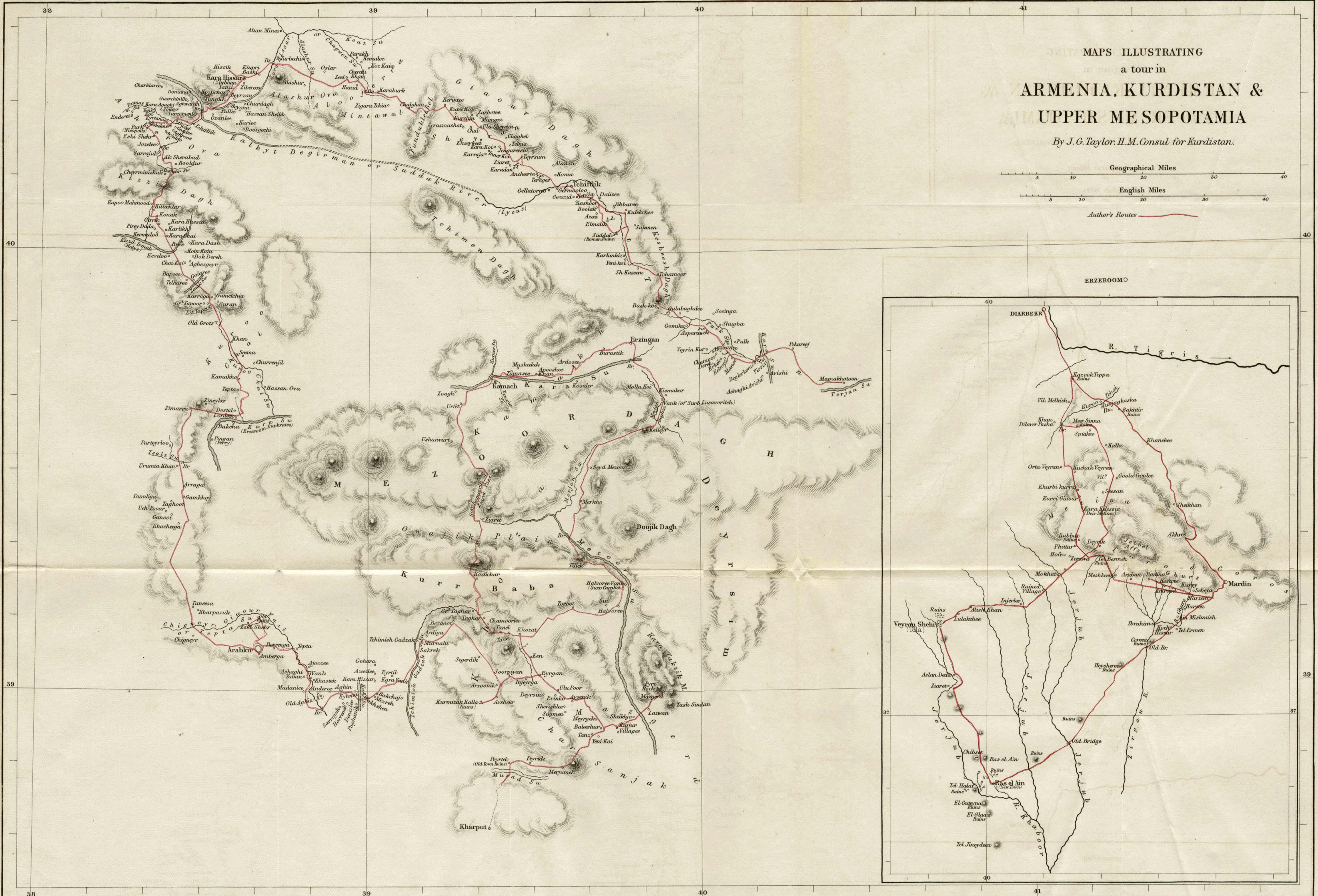
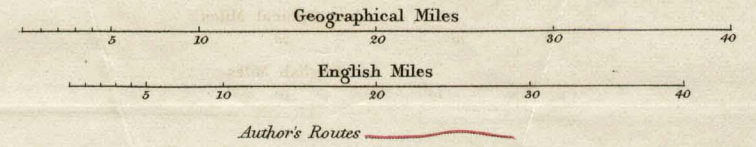
Read, June 22, 1868.

I LEFT Erzerum in company with Mons. A. de Courtois, the French Vice-Consul, who came as far as Diarbekr with me, and then returned to his post. Our route to Mamakhatoon was by Jinnis and Yeni Koi; then over the steep Ardooshi Pass into the valley of the Terjan Su, which flows past the town; the whole distance being fourteen hours and a half from Erzerum.



MAPS ILLUSTRATING  
 a tour in  
**ARMENIA, KURDISTAN &  
 UPPER MESOPOTAMIA**

By J. G. Taylor, H.M. Consul for Kurdistan.





*August 5th, 1866.*—Mamakhatoon boasts of a fine caravanserai, commodious barracks, and a telegraph-station on the Erzangan and Erzerum line. An older and interesting relic exists, in the remains of a tomb erected over the burying-place of a lady unknown, excepting as the daughter of a former padisha. The tomb itself is a fine specimen of massive Saracenic architecture, with the melon-ribbed pointed roof common to some of the Seljook edifices of Asia Minor and Zenjide monuments at Jezireh, in Mesopotamia. It is about 20 feet high, standing in the centre of a circular walled court, that had originally been domed. Arched recesses are carried round the interior, containing several graves of former Moslem dignitaries. The entrance to the court consists of a fine-pointed gateway, with an elegant Cufic inscription round it in the modern character.\* Over the inner gate and on each side legends in Arabic character record the name of the builder. Outside, on the stone gate-posts, is a pentagonal figure, formed by the names of Mehemed and the four first califs. The whole appears to date from the eighth century of the Hejreh. This town is the capital of the extensive Kuzaa, or district of Terjan, in which modern name some authors appear to find a corrupted form for the older one of "Derecene" of Xenophon's retreat.

*6th.*—Started in an easterly direction at 5:54 A.M. in the valley and along the banks of the Terjan Su for 1 hour 10 minutes, when, turning out of the former, we ascended on to a table-land in a northerly course. From this point the village of Kuter Kinpri—where there is a bridge over the Euphrates—was the barren upland into the true valley of the Kara Su, and, passing through vast fields of wheat and barley, reached the thriving village of Pekkareej at 9:40 A.M. Three-quarters of its inhabitants are Armenian, the rest Moslem, but all live in harmony and seem to thrive equally. The houses are built round the base of an isolated hill or mass of rock, about 300 feet high. On the top are some remains of an ancient building, from which steps hewn out of the rock are distinctly to be traced as far as an aperture, a few yards lower down, forming the entrance to a subterranean stair, in admirable preservation, communicating

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\* This ruin is attributed, I believe, in error to the Ak Coinloos. The melon ribbed roof is characteristic of a style prevailing at an earlier date, while all Ak Coinloo monuments I have seen—although more ornamented—are imitations more or less of the plain angular Armenian cupolas observed at Echmiazin, the churches and monasteries about Van and in some other parts of Kurdistan. The Cufic inscription round the gateway, the most modern specimen of that beautiful character, warrants my assertions, as I am not aware that on any of the numerous tombs of the Ak Coinloo at Ikhlut, Diarbekr, or elsewhere, are the inscriptions they bear in any other character but the complicated Taalig Arabic.

with a spring of fine water at the foot of the rock. The shaft slants rather steep east and west; part of it is blocked up, but I descended as far as the 113th step and found them all carved out of the solid stone. The dimensions of this excavation were 10 feet high and 8 feet broad, the steps being 8 feet long by 2 feet broad and  $1\frac{1}{2}$  feet deep. These remains are connected with those of an old heathen temple, that formerly stood at the summit of the rock, and was probably dedicated to Mihr or Mithra, the same as the Armenian Ephestus, or Vulcan.\* After breakfasting we travelled on at 3 P.M. in a westerly direction over the fine plain to the Kara Su, and descended into its Hawi † by a very steep incline at 3.48. This Hawi is about a mile broad, the Kara Su entering it by a narrow gorge at its further end, flowing about north-west and south-east. A few yards lower down, near Pirriz village, it is again confined within high narrow banks till opening out in the Terjan valley further south. In the valley we were now in it receives a considerable tributary, containing a body of water equal if not larger than the trunk-stream, called the Pulk Su, having its sources in the numerous brooks and rills flowing from the Kesheesh Dagh, that even now showed several large fields of snow on its peaks. We crossed the Kara Su at 4.12, the water reaching up to our horses' knees near an old mill, and then followed the course of the Pulk Su in a direction s. 54 w., crossing and recrossing it several times as far as the Chiftlik of Begler Kome, at a point where the small Manse stream joins the Pulk Su, which we reached at 4.50. Here the latter flowed in an easterly direction through a fine though narrow valley—full of rich herbage—bearing west, bounded at some places by high rocks, which still further west swell into the Pulk and Sari Kaia hills. From here, ascending to an upland and having for the last hour followed the valley of the Manse Su through luxuriant corn-fields, we reached Manse village at 6.17. It is embedded in groves of poplar and watered by the different rills ultimately composing the stream we had been following at the foot of the Sari Kaia Dagh, a spur of Koozichan. It runs close down to the back of the village and is continued further west, being a prolongation of the same chain that bounds the south-western side of the Pekkareej Valley, where

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\* Pekkareej occupies the site of the old Armenian town of Pakarinch, where Mihr or Mithra was worshipped by the idolatrous Armenians. This divinity had a temple here at the commencement of the fourth century. St. Gregory the Illuminator destroyed it and distributed the treasures he found there to the poor. It was then as now a town in the province of Terjan. 'Moses of Chorene,' Book II., ch. xii. 14; ch. xiii. 'Injijan Geog.,' p. 24, 25.

† A Hawi means all the low lying flats on either bank of a river running through a broad deep sided alluvium valley, flooded in spring, but available for agriculture as the waters recede.

its foot is watered by the Kara Su. Manse contains about sixty houses, of which forty are Moslem and the rest Armenian.

7th.—We started early; our general course during the day was w. 25 n. in a winding road to the Bash Koi Mountain, and after that w. 45 n. Leaving Manse at 6.42, our road led by an easy incline and then a short descent to the Veyrin Kar stream, which we crossed at 7.40. It joins the Pulk Su near Pulk village, and though now a small brook, swells in spring to the dimensions of a river. It has its sources close to, and name, from the small village of Veyrin Kar, about two miles off west, and receives the drainage from a part of the Koozichan Mountains that rise at its back. In 34 minutes, by a circuitous path at one side of the valley of the Pulk Su, we were opposite the Kizzilbash village of Shogbeh, one mile to right, situated near an isolated rock on the Pulk Su. From this point the Pulk ravine—a continuation of the valley—and village with the junction of the Veyrin Kar bore nearly due east, about three miles off. We reached Asparawek, inhabited by Armenians, in 42 minutes from this. It is built at the foot of a hill, at one side of the Shogbeh Plain, bounded to the north-east by the Pulk River. The plain, though small, is well cultivated; the crops of wheat and barley were heavy, and I was glad to see that flax also formed part of the cultivation. At the back of the hill we passed a sulphur-spring, whose waters tainted the herbage and atmosphere for a considerable distance. The source was heavily impregnated with the mineral, and the country about appeared equally rich in it. Eighteen minutes further the sparkling Gomika brook crossed our road, rattling over a pebbly bed to its junction with the Pulk Su, between our point and Sosinga Village to right. In 42 minutes, and after crossing the Pulk Su, flowing through another delicious valley of rich herbage and cultivation, we arrived at Gulabaghdee Village, situated on some high land on the left bank of the Pulk Su, tenanted by Kizzilbash. Their chief treated us with the utmost hospitality. Nothing could equal his desire to make us as comfortable as his limited means permitted. Although the village generally was composed of the usual mud-hovels, there were three or four neatly-built commodious houses, constructed of cut stone, belonging to the chief men, and some pains had been taken to make their interiors accord with their outward appearance of comfort. In the vicinity was the usual burial-ground, containing, among many others, some neat tombs, marking the resting-place of members of our host's family. They were not dissimilar in build and position to those placed over Moslems; but on the side-stones were engraved figures denoting the former occupations and pursuits of the deceased. Thus on one were the

figures of a saddled horse, but no stirrups, a curved riding-stick and pistol, powder-flask, sword, &c. ; on another a spindle, pipe, comb, or sheep, denoting the last resting-place of a female. The poorer classes were content with a very rude representation of a curved stick, pen, or pistol. We left at 2 P.M. and reached Bash Koi Village and mountain of the same name in one hour. From here the road led by a steep ascent of 40 minutes to the rocky Kara Dash point. The mountains rose high about us, most of them covered with fine grass ; but one close to right was a mass of sheet rock, descending in a perpendicular to the valley. A still steeper though longer decline, occupying us 35 minutes, led to the luxuriant gorge of the Schamoor Su ; following its windings for some time, and then descending a mountain spur, we arrived in one hour at Tchamoor Village, situated at the extreme northern end of the spur, divided into two parts by a small ravine on the eastern side. Our road for the latter part was lined with wild rose-bushes, and the high mountain slopes about covered with a thick underwood of dwarf oak, spreading down the edge of the ravine. The upland near and about the village was excessively fertile, groaning under the weight of a rich harvest the villagers were then occupied in housing. Tchamoor has a population of sixty families, three-quarters Kizzilbash and the rest Greek, who have constructed a fine-looking church in the centre of the hamlet. Generally speaking, the mountains on our left-hand during the day's journey are tenanted by Kizzilbash of the Koozichan Kuzzaa, while the plain and mountains to the right are in that of Terjan, populated by Moslems and Christians, with a few Kizzilbash villages here and there. The Kizzilbash of the Koozichan belong to the Shah Hussein and Ballabanlee tribes.

8th.—The night and morning were extremely cold, and we were glad to gather round a roaring pine-wood fire while sipping the morning cup of tea preparatory to a start. The direction to Kalkyt was north-west by west, although the road we first took bore nearly due west. On leaving the village we again descended into the Tchamoor ravine, and crossing the shallow stream flowing through it, ascended the opposite side. Its slopes were covered by a profusion of beautiful flowers ; among them one of the thistle species, with fine branching pointed narrow leaves at the bottom, and at regular distances all the way up cellular cushions encircling the stem. From each cell issued a single horn-shaped flower, like that of a honeysuckle—exuding the same sweet odour—of a white colour, with pink lips. In each cushion there were six to ten cells, and as many flowers, the top of the plant being surmounted in the same manner. The height

of different specimens varied, ranging from one to three feet, all growing in a light soil among stones.\* One hour after starting we stopped at a tomb of a certain Sheikh Kassem, a Kizzilbash chief, who formerly ruled supreme at Tchamoor. Round the building that covered the grave were three inscriptions in modern Arabic—one bearing the name of the tenant, a second the Moslem Shehadet, and a third some illegible words and the name of Ahmed ebn Drees at the end. In hunting among the old grave-stones I stumbled upon one bearing part of a Latin inscription, DEIIV.† The guides could give me no information from where it had been procured, nor did they know of any old ruins in the neighbourhood. From here we descended on foot by a very steep pass and through a splendid foliage of the wild cherry, maple, oak, and pine for 20 minutes to the bank of a stream, called by the natives the Deveh Koori Su, as it has its sources in a mountain, called indifferently by that name, and Keshesh Dagh. This is the same stream that Kiepert calls the Kalkyt and Kara Su, which, according to his map—erroneously, as it will be seen—flows past Shebban Kara Hissar. It is the true Lycus or Suddak Su,‡ that after leaving Tchiftlik flows south and then west at some distance from Kara Hissar—about 15 miles—and forms the chief arm of the Iris or Yeshil Irmak, joining it at Eupatoria. Our road for the rest of this and the following day lay in the bed of the valley, through which it flows in a tortuous course, confined by rocky hills on either side. The valley itself never exceeds a breadth of 600 yards, but it is narrower at some places than at others. In 20 minutes passed the miserable and apparently deserted village of Yeni Koi, and the last in the Terjan Kuzzaa; from here on the country being under the government of the Kalkyt Mudir a subordinate of the Kaimakam of Erzingan. Twenty-five minutes from this we passed through the village of Karlan Kiz, composed of log-huts, built of large timbers, let into each other on the plan pursued by settlers in the American backwoods. This peculiarity of

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\* I believe this plant is unknown in England, but it has been long ago cultivated in France, where it was known as the "*Morina Orientalis*" of Tournefort, who introduced it, and gave it the name of his friend Dr. Morin; from his first producing specimens of the flower in Paris, from seeds furnished him by Tournefort, procured near Erzerum at the Kirk Degermauler. — *Tournefort*, vol. iii.

† This stone from our subsequent discoveries must have been procured from the ruins of Saddak "Sattala" close to.

‡ The Latin "*Lycus*" seems to have been simply a translation of the original Armenian name of this same river, which was called the "Kail Ket" or Wolf River. In the modern name of the Kuzzaa "Kalkyt," the old epithet is preserved to this day. Injijan places its source with truth about six hours from Erzingan, but commits a grave error in stating it falls into the Euphrates.

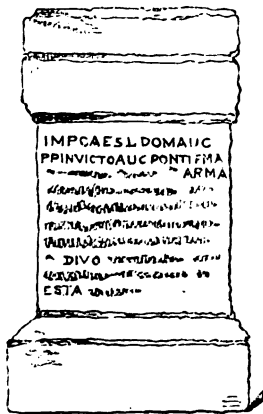


building I was told was confined to this district; but I have observed it elsewhere on the road between Trebisonde and Erzerum. Seventeen minutes from the village the road was crossed by the Trebisonde and Erzingan telegraph on the high road connecting the two towns. Half an hour further on passed Suddak Village, with some ruined arches on one side of it—the road as before winding, and in the valley of the Su or river of the same name. Its banks are prettily though scantily wooded, and the land on each side covered with fine crops the peasantry were now harvesting. Forty-three minutes further on we lost sight of Suddak, situated half way up the chain of hills that form separate sides of the valley. We stopped for a few minutes in a thick grove close to Sugmen Village, to allow the mules to come up; then leaving the river and valley crossed a low spur of ironstone and reached Kullekchee Village in 38 minutes from our last halting-place. We returned to the valley of the Suddak Su, and following its banks for two hours and a half, past Jibberee and Daüsee Villages, reached the upland of Kalkyt. The river here takes a northerly and then a westerly bend round Tchiftlik; we, however, proceeded nearly due west towards the village for 27 minutes, when we descended into the valley of the same name, close to where the Balakoo Su (an affluent of the Suddak) enters it. The crops of barley and wheat, and mixed wheat and rye, were very fine: everything bore a smiling appearance of busy toil, women and men in the fields gathering the harvest and laden Arabas bearing the produce to the village before us, which we reached and found our tents pitched in a pretty spot under the welcome shade of some poplars, on the bank of the Balakoo River, half an hour after. The Mudir who had come out to meet us regaled us with the usual stories of a deficient Ailik and the Haiwanler he was called upon to waste his abilities over: he had the sense to leave us after exhausting his far-fetched comparisons between Stamboul and Kalkyt, Poleetika and Esheklik.

9th.—Tchiftlik, as its name implies, was formerly a stud-farm for the use of the Ottoman cavalry. So many coins of different dynasties and nations were offered to me for sale, that I resolved to return and visit Suddak, where I was assured the majority had been found. Leaving then our baggage at Tchiftlik, we went to Suddak by another and a shorter route over the mountains, and reached it in four hours. I was much pleased with the curious massive remains still in situ.

The first object of antiquity that arrested my attention was a Roman votive altar, turned on one side in a field occupying a part of the ground of the old town. It was considerably damaged, as also a Latin inscription of Domitian, consisting of twelve lines

it originally bore on its face. The first and second lines were legible, and the whole stood thus:—



Several other stones were shown us bearing inscriptions in Byzantine Greek; but they were of no interest, and had been simply epitaphs on deceased citizens. On none, most unfortunately, was there any clue to the old name of the city. In passing through the village, which is built on one of the mounds covering the *débris* of ancient edifices, I saw a small piece of mosaic, and being assured that several more existed, made a rigid search in all the wretched hovels of the place. In the Kehya's house I found the hearthstone was composed of one large fragment, representing the centre part of a human figure, as large as life, in minute mosaic of brilliant coloured stones. The fragment was 3 feet long by 2 broad, and evidently a magnificent specimen of that beautiful art. The colours had not suffered from the action of the fire, but it was minus the head and feet, and altogether far too damaged to remove. In another house was part of a mosaic pavement, 6 feet long by 3 broad, forming part only of one side. The border consisted of fine cone figures, succeeded by a series of lozenges in black, white, slate-colour, green, yellow, and red stones, in alternate rotation, and then a prolonged geometrical figure in small black stones, in a white field, the whole surrounding a centre of crossed lines forming squares, each containing a smaller one, with the corners at right angles to the sides of the former. Another and larger piece was kicking about the public thoroughfare. These remains had been dug out of the top of a hill at the back of the ruins overlooking the village. On its summit was a small spring, whose waters, collected in a large artificial basin, had at one side the ruins of buildings from whence they had been dug out. The ruins of the town itself were inclosed on three sides by a deep ditch and high wall—14 feet of the latter being at one point still standing, though in a dilapidated condition. It was composed of rough pieces of stone—imbedded in a cement of lime and small pebbles—faced with large even-cut polished blocks. The northern side, with a gate in the centre, was 366 paces long, the two others 246 each, with a gate in either corner; but at one only could I discern the remains of a bastion. To south-east and south-west were two large mounds (probably forts); for in one, where excavations had been made to procure material from the

old buildings, were the remains of high massive walls of great thickness and solidity. It is in this mound that the majority of coins offered for sale at Tchiftlik are procured, and on its summit are also dug up skeletons and coffins containing relics of the Byzantine period—proving the total ruin of the earlier construction at the period of the latter occupation. About a mile south-east of the village are the remains of seven arches, forming one side of a semicircular building—probably a bath—with opposite corresponding buttresses, at a distance of 11 paces from the former. The Turkish Government make use of the old cut-stones found here to construct the government buildings at Erzingan.

10<sup>th</sup>.—Returned to Tchiftlik.

11<sup>th</sup>.—Left at 6:15, in a westerly direction, for Teyrsoom. In half-an-hour reached “Geyrmoloo,” on the Suddak or Kalkyt river, running past “Gellatorna” village,  $1\frac{1}{2}$  miles to our left, in a south-westerly course, which 5 miles further over is nearly west, confined as before between high rocky hills, backed now by the Tchimen Dagh Range. The Gumish Khana villages press close down to our right, and in half-an-hour “Koma,” in a pretty ravine, was about half a mile to right in that district. From here the road became again hilly, and, on the whole, ascending. Passing Alansa village, in half-an-hour, we descended into the narrow “Terages” ravine, and, crossing it, ascended the steep Deveh Yoovan (camel tiring) hill by a winding path between stunted pines and shrub oaks. On completing the ascent we travelled along a well-cultivated fertile upland, and in an hour more left the Kalkyt Kuzaa and entered that of Sheyvan, our route bringing us closer and closer to the base of the arid Giaour Dagh to right. Its summit is broken up into a confused mass of peaks, the spurs running from the range partaking of the same sterile character. The Tchimen Dagh, on the contrary, about six hours to left, presents no elevated salient point, and has the look of a level highland, seemingly thickly wooded for three quarters of the way up, when the vegetation stops abruptly. It abounds in fine pastures and springs, whence its name (the Meadow Mountain), and is the favourite summer resort for the villagers in the neighbourhood. The Tchimen is the continuation of the Deveh Koori, or Kesheesh Dagh, near Erzingan, its true commencement being near the high hill behind Bash Koi, and known as the mountain of the same name. All the streams from Tchiftlik, and further on to the Funduklee Bell, run from the Giaour Dagh towards the Tchimen, and consequently flow into the Suddak, or Kalkyt Su, bounded to the south by the slopes of that mountain. The positions both of the Tchimen and Giaour Dagh, as also of all

the country between Mamakhatoon and Kara Hissar, are entirely misplaced in all editions of Kiepert's large map of Asia Minor. In forty minutes more, and descending for twenty minutes into the Teyrsoom valley, we reached the Greek village of the same name, at the western end of a confined ravine, close to the base of the Giaour Dagh.

12th.—The village of Teyrsoom is solely inhabited by Greeks. There are three others of the same name in the neighbourhood also tenanted by the same people, although many of them have emigrated to the Caucasus. The village is situated on the banks of a small stream running towards the Kalkyt Su, and at the back of the Teyrsoom Dagh, an offshoot of the Giaour. The Teyrsoom Dagh contains a rich lead mine, but Government does not take the trouble to work it, or allow others to benefit by the natural wealth it contains. The hamlet boasts of a fine church, where the services are got over twice a day with the same rapidity—without the decency—that an Arab despatches a pillau, the priest leading off by a series of expectorations right and left of his position before the altar. At the back of the village, on one of the lower peaks, are the remains of an ancient monastery, with fragments of gaudy Byzantine frescoes of the Virgin still existing on the remnants of the crumbling walls of the old structure.

13th.—The Kalkyt Su (Lycus) runs about two hours (5 miles) off from this, near an old Greek monastery, in a westerly direction, bounded as before by the Tchimen Dagh slopes on the left bank, and rocky hills on the right. Our course, on starting this morning, was rather circuitous at first, but then, as usual, north-west. Half-an-hour after starting we skirted the Teyrsoom, or Karadan valley, opening out into fine fields after leaving the village. In the centre was an artificial elevated platform, having a peak at one end and near it a crumbling ruin, pointed out to me as a ziafet frequented by the villagers around. Ascending a low ridge, and passing Telma village, prettily wooded in a ravine to right, we descended into the Seyf Kar Valley. We crossed it in one hour, and again ascended to an upland with the village of Ekseyweet to the left; in ten minutes more we reached Ulu Sheyran village—built at one side of an isolated rock, surmounted by the remains of old buildings—in three hours from Teyrsoom. From these ruins, as also from those of Mumeea, on a hill 2 miles N.N.W. from this, the peasants procure many ancient coins, Roman, Byzantine, and Seljookide. Some few were offered me for sale, but none of any interest. Our road from Ulu Sheyran was at first circuitous, leading by the Kizzilbash village of Chal and its sacred grove of pines and oak, round the hill on one side of which it is built.

After ascending one of its spurs we arrived at an undulating upland dotted with pines and dwarf oak. The road passes a ruined khan, and a rill near, flowing to left, close to Keraz-mashat village, and further off to right the Kizzilbash hamlet of Kootee Koi. The country continues the same as far as Kerintee, also tenanted by Kizzilbash, situated on the slope of a hill forming a spur of Giaour Dagh. From here on commences another important branch of the latter, called the Funduklee Bel, which we had to cross to reach our night's resting-place at Chalghan. A few days previously a party of Laz prisoners escaped from the Erzerum jail, and had now betaken themselves to the wooded peaks before us, from whence they preyed upon the public road and villages about. We had in consequence to take a guard, consisting of a motley crowd of Tchetchens and Koords, and commenced an abrupt ascent followed by an equally steep descent, when another steep climb brought us to a good road, winding among the thick forests that here cover the peaks of Funduklee. Fine firs and beech rose high about our path, so densely matted together that a few yards from it our eyes failed to penetrate the heavy jungle caused by them and a rich undergrowth of shrubs and creepers. An hour further on we reached an elevated spot above the cultivated fields about our intended Konak. Dismissing the guard, a short descent brought us to a cleared open highland. It had an extremely pretty civilised look, clumps of fine fir being scattered over the rich green sward, surrounded by the thick mazes of the virgin forest; small chalet-like cottages dotted the confined space; a few of the larger were collected into a kind of street composing the village of Chalghan four hours from Ulu Sheyran. The Kalkyt Su runs 15 miles south of this village, between the Tchimen and the Aloojerri Mountains. The small cottages about were surrounded by small plots or gardens, neatly cultivated with vegetables, fenced in by long pine logs resting on the stumps of the branches, which for the most part are found on one side only; the other having a curious naked look, perfectly bare, owing to the high winds prevailing in these elevated spots preventing their development on the weather side.

14th.—It appeared, from the accounts of the villagers, that our Laz brigands were ubiquitous; we were accompanied therefore, on starting, by a numerous escort. For half-an-hour our road was over the undulating highland; thick woods to left, and high mountains on both sides, lined the grassy slope afterwards leading into the Chagwen ravine. On a hill slope, 1 mile to left, was the large village of Zigarra Tekieh; it boasts of no less than four Medreasehs. The Kara Su, or Kara Hissar River (called also Koat Su), the principal north-eastern branch

of the Kalkyt Su, or Lycus, has one of its sources in the head of the Chagwen ravine; here it had already swollen to the dimensions of a brawling brook of beautiful water abounding in trout. The main branch of the Kara Su rises at Koat village, in the Aloojeria Kuzaa, and receives the drainage of its mountain slopes. We were now in that Kuzaa, a district of the Kara Hissar Kaimakamlik, a sub-government of the Erzerum Vilaiet, and half-an-hour further on reached Kara Burk village, the residence of its Mudir. The houses are scattered over the summit of a high hill on the right bank of the ravine, surrounded by dwarf oak and numerous wild pear-trees. The Kuzaa, and that of Muntawal, are presided over by Yusuf Efendi, of Baiburt. After breakfasting we again descended into the Chagwen ravine, and followed the stream, through fine meadows, as far as an old ruined bridge an hour and a half from Kara Burk. The ravine opens out into a fine cultivated valley, the Chagwen Su crossing it and then running on its northern side at the foot of the high hills bounding it there. We crossed it at the bridge and skirted the mountain on its southern side for half-an-hour, when the valley ends and the Chagwen Su forces its way through a rocky gap to west on its further course the Kara Su. Forty-eight minutes' ride from the bridge brought us to a miserable khan, opposite Hawza village, on the hill facing it, nearly at the top of a steep incline. This building is called Cheralli Khan, and the conical mountain at its back the Beksamat Bel, from the small square pieces of green stone covering it. From the top of the Khan hill we descended into the Zeel valley, and following the course of its stream reached our camp on a grassy lawn three quarters of an hour from the Khan; the village of Zeel itself, consisting of houses scattered, as at Kara Burk, over the heights, being a little to our right.

15th.—The road to-day was over very hilly ground, the first part being unusually steep; it then descended into a wooded upland separated by a long low spur of the Aloojeria Mountain from the fine Alashar Ova. The spur terminates in a high conical mountain visible a long way off west, called the Arpajuk Dagh. On passing it we were in the Ova, but the road lay on the extreme southern side. The Kara Hissar River, coming from Koat, already swollen by the Chagwen and Zeel brooks, runs at the northern side, where it is joined by the Alashar River; we crossed, running to right after passing through a fertile side valley. A high bridge of a single arch spans the latter, near a couple of dilapidated khans; it makes a short bend here, and then, after forcing itself through a high narrow chasm in the rocks, runs past the Greek village of Turbchee on its course to the Kara Hissar River, thus dividing the western

part of the Ova. This Ova, or broad valley, is extremely fertile and thickly peopled. At its western end it touches upon the spur of the mountain range containing the famous alum mines from whence Kara Hissar derives its affix of Shebban; there, also, a stream, coming from the mines, falls into the former on its right bank. From the ruined bridge our road was a constant ascent through rocky poor ground for one hour; when, gaining the summit, Kara Hissar, its undulating high table-land and smiling gardens were spread out in a delicious panorama at our feet. The whole view was magnificent and unique. Black rocks, shooting out of the verdant base of the plain, twisted into most fantastic shapes, throwing up here and there sharp cones with jagged sides and needle points in groups and isolated, backed by columnar masses of darker basalt. Close to us was the Mutsellim Batran Mountain, so called from a Mutsellim and his party being destroyed by a land slip as they were crossing it. The land about its base is still a dangerous swamp, from the constant filtering of underground sources.\* The same causes are slowly undermining a part of the hill near the town, the water oozing from the ground about it changing its position every year. The descent was steep and long, taking us a full hour before arriving at the bridge across the red muddy waters of the Kara Hissar River, flowing to left and away from the road. Another three quarters of an hour, over a hilly road, brought us to Kinpri Bash, a small suburb of Kara Hissar, in the midst of extensive orchards. Here an Istikbal, sent by my friend Mohi ed' Deen Pasha, the Kaimakam, met us; and in clouds of dust, kicking horses, and indescribable noises, we climbed the steep road, arriving in three quarters of an hour at the top of the high ridge occupied by the town, built round the base of the rock surrounded by the venerable old castle.

16th.—Busy all day in receiving and returning visits.

17th.—This morning, early, visited the curious old castle of Kara Hissar. The rock upon which it is built, in some places artificially, in others naturally scarped, is an isolated mass about one and a half mile distant from the mountain range, to which it is connected by a low ridge. It is about 600 feet high and 3 miles in circumference at base; the greatest height to north, consisting of a flat peak rising abruptly 100 feet higher than the surface of the rock, topped by the citadel; and from thence

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\* Injijan says that it was the Tchaosh Bashi Suliman Pasha and his party who were destroyed by this catastrophe in 1784, on their road to Constantinople from Erzingan, of which latter town Suliman was Governor, and cruelly oppressed the Christians. The Armenian Geographer regards the event as a righteous judgment.

the summit slopes to the south, with a circumference of a mile and a half, surrounded by the old walls following the irregular shape of the rock. The principal gate is to the west; an old structure, repaired by the Seljooks, whose sign, in the shape of a double-headed eagle, it bears on a stone tablet near the key-stone. From here a winding path, encumbered by the ruins of old edifices, leads up to the site of the ancient citadel. At one end there is now a modern octagonal tower, 80 feet high and 35 feet in diameter, containing an inner stair leading up to the roof. The remains of timber in the walls prove it to have had three stories pierced with small windows. It stands at the northern end of a small irregular walled enclosure, containing a large stone cistern in its enceinte. At its southern side this inner fortress is approached by an old Roman gate. Lower down, and outside the walled court, are the remains of a venerable Byzantine church and a smaller temple, standing among masses of crumbling ruin covering the rock to the south; the remains of buildings which at one time, as now at Mardin, rose tier upon tier up the whole slope of the hill to within a few feet of the citadel. The whole, as stated before, is surrounded by a high irregular-shaped wall with occasional bastions and ramparts at points weaker than the rest. At such places the rock, if not naturally, had been artificially scarped to render such positions equally impregnable with the rest. The old Byzantine church had been at one time a mosque, in its turn again deserted and ruined, but bearing undoubted indications of its original purpose. The most ancient portion is constructed of very hard red ironstone, forming part of a nave and domed gallery. On one of the slabs is a perfect Byzantine inscription, and opposite it another, completely defaced by time and the elements. The former stood thus:—



We made minute search in the ruins, but, excepting this inscription and a Roman fragment on part of a circular hollow



stone in the court of the citadel (near the gate) bearing the following characters, Numerous walls and the solid rock, of great size for the inhabitants were scattered about the surface for some way about being fashioned so as to conduct rain-water to them after every shower. A stupendous work for the constant supply of water, like the one at Pekkareej, exists close to the old church. Entering a ruined domed building partially fashioned out of the native rock, a pointed, arched entrance—constructed of Roman brick embedded in a cement of lime and small pebbles—conducts to a flight of 58 steps, 22 feet long and 2 feet broad, in a sloping tunnel 20 feet high, excavated in the rock leading down to an ice-cold spring, but of somewhat brackish taste. The same contrivance for the supply of water during a siege is observable in all the old castles here, in Kurdistan, and Syria; in many cases stretching down to the river itself, when such existed in the vicinity. The most remarkable specimen is one I have described in a former Memoir, as existing in Eggil, on the extreme western branch of the Tigris, before its junction with the Dibeneh Su. An historical relic, far more interesting than any now here, has within the last year or two disappeared. This was a large granite slab at one side of the outer gateway, bearing a Latin inscription of Pompey. From the top of the castle rock, situated half-way up a mountain slope, there is a delightful view of the whole surrounding upland; bounded by high mountains, with the Koat or Kara Hissar Su flowing at its eastern side, and crowded by the beautiful gardens that exist in such profusion on its banks, one hour from the town. The rock itself stands like an island alone in the midst of a waving sea of flowers. Kara Hissar, eighteen hours from Kerasunde, its port on the Black Sea, is separated from it by a huge, difficult mountain-chain called the Kazan Kaia, and part of the Kara Kol Dagħ, which, although practicable even in winter, are at all times difficult, and can only be passed by mules and horses. The Armenians—the Jews of this part of Turkey—are a thrifty, industrious, active race, sparing neither labour or money in bringing up their children in the same active habits as themselves. From its position, undoubted antiquity, and enormous natural strength, Kara Hissar, whatever its ancient name,\* must always have been an important site—whether as a



\* Armenian savants identify Kara Hissar with the Nicopolis of Pompey; an evident error, that town being undoubtedly represented now by Purk, near Enderess, referred to further on. It may have been one of the seventy-five treasure cities of Mithridates, or again the mountain near Dasteira in Acilisene,

refuge city or a military post—for the dynasties that have successively occupied it. Ancient medals and some finely-executed intaglias in cornelian were offered me for sale. I purchased several; among them one of the unfortunate Artavasdes, and a fine Polemon, who gave his name to this part of Pontus. On the left bank of the Koat Su, opposite to, and 6 miles distant from Kara Hissar, situated and partly fashioned out of the rocky peak, is the Greek Convent Maryamana. The curious grot chapel, hewn out of the solid mountain there, is well worth visiting. An annual panayer, or fair, takes place here about the end of August; Greek pilgrims flocking to it at that season to pay their devotions to an image of the miraculous Mother of God, who they say at one time visited the spot.

The limited upland of Kara Hissar is one confused mass of spurs from the mountain ranges about, all meeting and crossing here, some running west to east, others north-east to north-west, the principal chains being invariably in the latter direction, and abounding in the curious isolated volcanic cones alluded to before. The extraordinary aspect of such a formation, viewed from a height on the plain, and their regular character, at first suggests artificial rather than natural forms.

The Sanjak of Kara Hissar is contained in the blank space at present existing in Kiepert's map between the town and the Euphrates. Its chief products are wheat, barley, honey, and fruits, but with the exception of a small quantity of sail-cloth manufactured at Sourzara, it has no exports. The produce of its alum mines, once so extensively forwarded to Europe, is now exported to Turkish provinces solely.\*

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whither he fled when defeated by Pompey at the spot where the latter built Nicopolis. 'Strabo,' Book XII., ch. iii. § 28. According to Strabo it could hardly be the treasure city Sinoria, as he mentions it just before in the second page of the same chapter; but according to Appian, in his history of the Mithridatic war, I should at once identify Kara Hissar with that Treasure city—he calls it Sinorer Castle—whither Mithridates went after his defeat by Pompey. From here "he fled with the greatest speed, after giving the soldiers who accompanied him a year's pay and present from the treasure he had there; and taking 6000 talents himself towards the springs of the Euphrates, in order from there to go to Colchis. He made the journey with so little delay as to cross the Euphrates, about the fourth day." Appian's Mithridatic War in his 'Roman Hist.' Lib. XII. ch. ci. Mithridates then must have crossed the Euphrates at Ashkalla, on the old high road between Colchis and Pontus, twelve hours west of Erzerum, and forty-six nearly due east from Kara Hissar. This same road was the old caravan and Tatar route to Constantinople and Siwass, and is in comparison with other roads, right and left of it, level, and the only one an armed party, such as accompanied the King, could traverse with such speed and so little difficulty; and it is also the only one going in a direct line from Nicopolis—the scene of his defeat—and Kara Hissar, to the springs of the Euphrates which he would necessarily pass near Erzerum on his further road to Colchis.

\* In 1253 A.D., the Ambassador William Rubruquis met at Iconium a Genoese and Venetian merchant, who made a treaty with the Sultan of Iconium, El Melik el Ghaleb Eszed Deen Key Kaos, son of Key Khosroo Seljookide, by virtue of

The roads between Kara Hissar and Erzerum, and between it, Gumish Khana, Siwass, and Erzingan are good; for although confined to deep ravines and narrow valleys, easily obstructed or defended; they avoid the steep rocky highlands, and are perfectly practicable for carts.

*22nd.*—Left Kara Hissar after receiving our European posts, which alone detained us. In two hours and ten minutes after leaving, the last forty being a steep descent, we again reached the banks of the Koat or Kara Su, flowing in a ravine, four hundred yards broad, about a mile from its junction with the Kalkyt Su, or Lycus, close under the Assab Dagh. At this spot there is a curious isolated rock, with a seat hewn out of one side, and steps leading to it from the left bank. The rock is an object of idolatrous veneration among the Kizzilbash around. The Lycus here comes from south, but soon after it turns, near Tunnus village, to west, past the Doman Kaia rock in its course to Koiloo Hissar and Niksar, after which it falls into the Yesheel Irmak, or Iris, at Eupatoria, between Amassia and the Black Sea. Crossing by a rude bridge of four arches, two of them now dry, to the left bank of the Lycus, now a considerable stream, we followed its bends through the narrow Kaia Boghaz ravine for an hour, to the point where it receives the waters of the Enderres stream. Here we finally took leave of the river, coming from east, having followed most of its course from the sources near Tehamoor to this. Our road led along the bank of the Enderres river, and we reached our camp at Tchiftlik, on its bank, half an hour after.

*23rd.*—Tchiftlik is situated at the eastern end of the fine Enderess, or Ashkr Ova plain, and in its most confined part. Owing to the reports of our host we were induced, leaving our baggage here, to visit the extraordinary isolated stone peak of the Doman Kaia Rock. We retraced part of yesterday's route, and reached the Kizzilbash village of Domana, situated at its western base on the highland, forming the right bank of the Lycus, in two hours and a half from Tchiftlik. Inscriptions and old remains were reported to exist on a high pinnacle of the rock behind the village, so taking a guide we commenced the steep ascent. For half an hour the climbing, though fatiguing, was pleasant enough; we then, however, had to throw away our shoes, and scale a flight of smooth, irregular shelves, cut in the rock, for another half hour to reach the object of our journey. The track was narrow and perilous; as

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which the monopoly in the trade of this article was ceded to them wherever found in his dominions, which had the immediate effect of raising its price more than threefold. Kara Hissar formed part of his dominions.

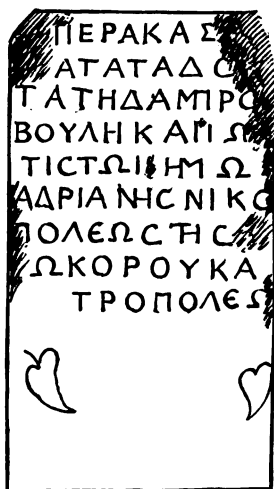
the slightest false step would have been followed by a perpendicular drop of 2000 feet. We at length, however, reached the summit, but were disappointed in finding nothing but the remains of a cell, the abode many years ago of a Christian ascetic, and some small reservoirs for water, hewn out of the rock. The spot is still frequented by Greeks and Kizzilbash as a place of pilgrimage; the former have covered the surface with a number of small crosses, our Tchiftlik host took for the mysterious inscription of Franks. The Doman Kaia stands alone, amid low earthy or conglomerate hills, an isolated mass of rock, with a narrow jagged saw-like top; towering high above all its pigmy neighbours. We returned the same evening to our camp at Tchiftlik.

24th.—Started this morning, at an early hour, taking the road along the valley, with the Enderes Su to our left towards Purk, for 20 minutes, when passing Ak Streho valley and stream to left, we entered the broadest part of the Ashker Ova, or plain. It is about 18 miles long, from south-east to north-west, well watered, and studded with 33 prettily wooded villages. The low shoots of the Genine Bel bound it to south, and those of the Melet Dagħ with the Lycus behind it 7 miles in a direct line from Purk, to North. Towards, the centre, it is marshy, covered with stunted rushes and rank grass, but both sides and to east and west the cultivation is extensive and various, consisting of grain of all kinds, cotton, hemp, and oil seeds. The Enderes River, rising in the Koseh Dagħ, receives the Framas Su, having its sources in the hills behind Purk. Their combined waters run through the centre of the plain, in a tortuous course, but are sensibly diminished in irrigating this large tract. We crossed the stream at Guzzel Village to its left bank, and then followed the southern side of the plain past Giozellee, Kyrtanos, and Mesheknees villages. At the latter we ascended the table-land that bounds it, and reached Purk in three hours from Tchiftlik Purk,\* one hour from Enderes (east), is a large thriving place, inhabited by Armenians. It is imbedded in pretty gardens of fine apricot trees, and boasts of two neat churches, built among the ruins of the old Nicopolis of Pompey.† The western corner of the south

\* Piur in Armenian means 10,000. Piurk many ten thousands. Perhaps in allusion to the former populousness of the place.

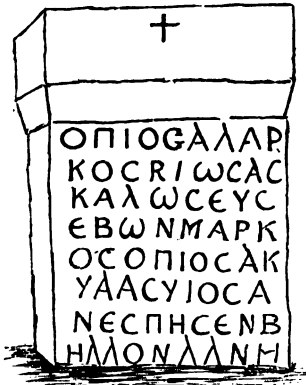
† Armenians persist in identifying Purk with Nicomedia, as erroneously as they do Kara Hissar with Nicopolis. Procopius seems also to have been mistaken in the site of the latter, which, following him, modern travellers have placed at Diorigi, whose position and neighbourhood disagree with Strabo's description of the town and country. Dion Cassius's (quoted by Ritter) description of the plain in which Nicopolis was built coincides perfectly with the Ashker Ova (Asker Ova. Soldiers' plain). Its present name may have some reference to the purposes

part of the ancient wall divides the hamlet in half, and the massive fragments have been extensively used in the construction of the modern buildings, revealing in their squalor and these solid remains significant tales of present decrepitude, as contrasted with the magnitude and magnificence of the former city. Some insignificant confused heaps faintly suggest the sites of temples and other public buildings, but the remains of the old wall are not to be mistaken. They enclose a quadrangular space, whose sides, 1100 feet long, face the cardinal points with square bastions at each corner, and pierced on three of its sides by two gates in each, 70 feet wide. As usual the foundations were massive square blocks of rough stone, with a superstructure of smaller, irregular pieces, imbedded in a conglomerate of lime and pebbles, comparatively rough towards the interior, but exteriorly faced with smooth, polished stone. The gateways, now, alas! ruined, were originally constructed of square columns, composed of three pieces of cut polished porphyry, each 6 feet long, and  $2\frac{1}{2}$  broad, and the same thick, resting on a foundation—like the wall—of blocks of hard sand-stone, 2 feet 8 inches square. Towards the north there seemed to be the remains of a trench, but on the other side I could trace no vestiges of a similar defence. At the back the mountain slope comes rather abruptly down, ending in a kind of hill, surmounted by the ruins of an ancient temple, from which we procured a mutilated fragment of a Roman female, half figure, sculptured in high relief, in a shallow niche on a mortuary tablet of marble. Below it on the same stone was a smooth space, denoting an inscription, but it had been broken off here, and the remnant was not forthcoming. The elders of the village say it was broken off 30 years ago, by some Franks, who took it away with them. In the Kehya's house was a Greek inscription on a stone slab, first seen by Bore, in 1845, and, in consequence of which, he first identified Purk with Nicopolis. I cannot in his travels find a copy of this inscription, and therefore now give it in full as it stands.



for which Pompey built the town, viz., for his worn out troops. The author of the 'Acta Martyrum' (also quoted by Ritter, 'Erdkunde, band vii. theil 10, pp. 796-797) says with truth that Nicopolis was 6 miles from the Lycus.

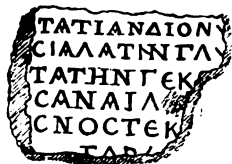
From the simple fact of the name of Nicopolis occurring upon this relic, I should not at once have identified this village as the site of the Roman town; but a few miles further on, as will subsequently be described, I found a relic which fully settled the question. In the new church, on the north end of the village, is also an inscribed stone slab, built into the back part of the altar. It is surmounted by a modern cross, recently engraved. Part of the stone is imbedded in the flooring, but what is now visible above ground stands as here represented.



Fragments of sculptured columns, with portions of Corinthian capitals, are constantly found, particularly at the ruin in the village called the "Zurb Khaneh," or Mint; and mutilated statues occasionally exhumed in the corn fields enclosed by the old walls. The Vandals of the village constantly break them to see—as the Saad Arabs with the Nineveh marbles that fell into their hands in the Busreh marches—whether they contain gold, and consequently just at present the fragments of fingers, heads, and feet of these antiquities are alone to be met with. The largest fragment available which I procured, consisted of a male figure in white marble, apparently reclining against a tree; but hands, head, and feet were all wanting. Roman and Byzantine copper coins were numerous, but in an imperfect state. Among the former were two of Nicopolis, bearing the effigy of Severus, with Greek inscriptions. I saw no gold, and only two silver medals; but the natives are so suspicious of being charged with the unpardonable crime of having found a treasure, that even if coins of more precious metals existed among them, they would probably deny the fact. With regard to information respecting inscriptions it is the same. They are reluctant to talk about them, and either mislead or give an evasive answer; for it is believed these relics denote treasure spots or title-deeds to old estates, and that if even their lands escape sequester, they would certainly be ploughed up in search of ancient hoards. An ancient aqueduct that now, as formerly, supplies Nicopolis or Purk with water, commences about 3 hours off, and is drawn from the Framas Su. The first portion of this work, more than 6 miles long, seems coeval with the ruins, and is quarried out of the native rock. The town of Inderes or Anderes, and seat of

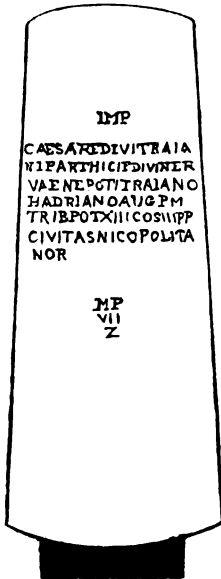
the Mudir of Ash Kar Ova, is on the south-west side of the plain, and contains 300 families, mostly Armenian or Greeks. The natives say it was originally founded by a certain Andrias—probably Hadrian—but the remains near it furnish no clue to its founder.

25th and 26th.—At Purk, and visiting the ruins and village of Eski Shehr, about an hour off. They are situated among gardens, on and about the top of a mass of conglomerate, but in spite of the inviting name, the only antiquity existing above ground is the fragment of a Byzantine inscription over a tomb in the grave-yard, as above.



27th.—We were off early, and passing by Eski Shehr pursued a south-easterly course towards the Ak Shehrabad ravine. For 47 minutes the path took us over the fertile though hilly upland, it then descended into the ravine of the Ak Shehr Su, which it crosses by a wooden bridge near Jozelee Village. Crossing to its right bank we followed the course of the stream upwards, passing, half a mile further on, an old mill to right, with the remains of an old Roman arch near it, and reached Ak Sherhabad Village in 3 hours from Purk. The greater part of the road led by a narrow bridle-path through the ravine; which, widening near the village, affords space for numerous corn-fields. The river is hemmed in by the steep rocky hills on either side, tumbles over rocks, and falls as far as the Asker Ova, when it glides quietly along through charming meadows, till joining the Enderres stream near Kadi Kirrik Koi. Although the ravine and bridle-path alluded to above are narrow, there is still room for a tolerable carriage road; having in some places remains of modern paving; but in others the massive even blocks characterising ancient Roman work. The river divides Ak Shehr Village into two parts; we took up our quarters for breakfast on the right bank, under a thick grove of enormous apricot trees. A dreadful stench soon drove us out, but flight from it seemed useless; the same odour pursued us everywhere, and we only obtained relief on the top of a mound near. On inquiry we found that the cattle disease was very virulent in the place, having, as at Kara Hissar, destroyed most of the villager's cattle, whose carcasses flung into a heap close to, contaminated the air. In the centre of the village we found the interesting relic alluded to before. This was a Roman milestone in red granite, cannon shaped, 5 feet 6 inches high, with a diameter of 1 foot 8 inches at the base, and 1 foot 1 inch at top. The inscription on it was very well preserved; leaving,

in conjunction with the ruins, no doubt as to the identity of Purk with the old city of Nicopolis. From here on I could not discover any traces of an artificial road, although there seems hardly a doubt such a one must have existed, leading probably



Roman milestone at Ak Shehrabad.

to Zimara—to be noticed further on—Dascusa, Melitene, Lavisene, and Aleppo to the sea. On the top of the hill where we breakfasted are some old remains with a subterranean shaft, containing steps, as at Kara Hissar, but nearly entirely blocked up. The road here on bifurcates, but the one west is more difficult, being carried by a cutting through the rock high above the river. The two join some way beyond; we followed the more southerly tract, as it promised to afford us more diversified scenery. A novel kind of conveyance, induced by the hilly nature of the country, called a “kizzikee,” is used by the peasants to transport their crops raised on the highlands to their threshing-floors in the village. It is a square wooden platform, attached at one end only loosely by long pegs to a cross beam, to which are fixed two shafts, whose ends project some way behind the body. On descending hills, the absence of wheels diminishes the impetus, while wear and tear are lessened by

the body moving loosely and easily on the slanting pegs, thus accommodating itself mechanically to the inequalities of the ground and sharp descents. Immediately after starting, at 12.45, we ascended the hill south of Ak Shehrabad, and gained the top in an hour and a half. It was pleasantly wooded with pine; cool springs permeated through the wood, which our thirsty attendants seldom passed without tasting; a nearly universal practice among Oriental travellers. From here, on leaving Bouldur village, 1 mile to left, our road was easily traced, leading far away along the steep sides of the thickly wooded slopes of the northern side of the Kizzil Dagh, to the point where it was eventually crossed to the Chit Kuzzaa. Our course on was first south, then more west. Descending the hill we crossed the Ak Shehr stream, coming from the Kizzil Dagh, flowing to right, near a rude bridge, and then ascended through forests of splendid tall pines, 60 feet high, with diameters ranging from 2 to 3 feet; beech, willow, plane, wild cherry, and a perfect



shrubby of hazel and rose bushes. Half way up the ascent, Cheyrmeemshuk village lay in a fruitful hollow below the path; we crossed its river, an affluent of the Ak Shehr Su having its rise in the pine woods above; from whence it came, tumbling in silver cataracts over moss-grown rocks in its course, to the larger stream many hundred feet below. Nothing could exceed the delightful temperature and magnificent scenery about and below us; hill rising upon hill, mountain upon mountain, deep valleys and precipitate ravines, coloured by the dense foliage of the pine, whose dark shade was here and there relieved by the sunshine playing on the gayer hues of the cherry, willow, and wild rose, with occasionally grey rocky peaks breaking in between, whose perpendicular heights denied them the umbrageous clothing of the mountain slopes around. At 3.18 we reached the highest part of the road, and stopped to take a few necessary compass bearings of the numerous points that offered. The Gemeen Bel Mountain, running north and south, was close to; Kara Hissar rock and the Doman Kaia were easily distinguished, but the Giaour Dagh Peaks had faded away, and could not be accurately made out. The country about on the flat summits of this and contiguous portions of the Kizzil Dagh have been cleared to some extent of the primeval forest, and now bore respectable crops of grain, that at this elevation, however, were not as yet ripe for cutting. It was pitiful to see how ruthlessly the magnificent forest timber had been destroyed by fire and the axe for this purpose; but the same work of destruction appeared universal, though not always so excusable. As at Chalghau, the very fences consisted of huge trees resting on their branches, while here and there it was very evident fire had been wantonly applied. Our road on lay for an hour over the flat top of the range, with the Pollat Derreh to right, after which it descended into a small confined valley, containing an insignificant tributary of the Kizzil Irmak. We followed its windings, passing Kapoo Mahmood Village to right, and Killichlar on a mound to left, till arriving at Konak, the Tchiftlik of the hospitable Kizzilbash Chief Kassem Agha. Before reaching it the road passes his family burial-ground, and I had again occasion to remark how scrupulously the Kizzilbash cared for the dead. The tombs, all constructed of white stone, were numerous, far neater and ornamental than similar Moslem constructions: but to conciliate the dominant party the inscriptions on the head-stones had no reference to their particular faith, consisting solely of invocations in favour of Mahomet, the Aal Mehemed, Ibrahim and the Aal Ibrahim, the name of the defunct, and date of decease. The districts about are nearly

all exclusively peopled by Kizzilbash, distinct from those in the Deyrsim, though professing the same creed.\*

28th.—The Shiftlik is in the Chit Kuzzaa, a territory in dispute between the Pashas of Siwass and Erzerum, 24 hours from the former town and 12 from Zuraa, erroneously spelt Zara in the maps. This Kuzzaa is bounded by that of "Habesh," a hilly district abounding, as I am told, in ruins that time would not at present allow me to visit. Opposite to the Tchiftlik is the Bey Dagh Kuzzaa and the low bare mountain range of the same name running towards and ending in the Siwass plain. Started at 6.15 A.M. in a south-easterly direction; crossing a low spur of the Kizzil Dagh the road descended an hour and 10 minutes into the valley of the Kizzil Irmak skirting several villages tenanted by Kizzilbash. The river rises about 10 miles north of this point, in the Kizzil Dagh, which is generally on this side bare and a deep red colour, hence its name (Red Mountain), and that of the river flowing from it.† Before reaching the Siwass plain—without counting smaller tributaries—it receives the Chit, Habesh or Abesh, Beydagh, and Shemluk Sus above Zurraa; the Chai Kurd and Chandar Sus between Zurraa and Siwass, and the Yildiz Irmak below the latter town. The country on this (southern) side of the Kizzil Dagh contrasts widely and unfavourably with the other (northern) we had left. Here everything bears a starved cold look, devoid of trees and verdure, and scarcely nourishing the stunted crops that even at this late season were hardly

\* These Kizzilbash inhabit the Kuzzoas or sub-districts named below, the most part of them in the Siwass Government, but distinct from other tribes of the same persuasion near and about Siwass, Yozgat, Kaiserieh, &c. The following are the names of the different tribes and chiefs.

| <i>Kuzzaas.</i> |       | <i>Tribes.</i> |       | <i>Chiefs.</i>            |
|-----------------|-------|----------------|-------|---------------------------|
| In Bin Dagh     | .. .. | The Eeboo      | .. .. | Alishan Beg.              |
| „               | .. .. | Balooler       | .. .. | Kesalee Agha.             |
| „               | .. .. | Sarooler       | .. .. | Ibrahim Agha.             |
| „               | .. .. | Sefooler       | .. .. | Kesso Agha.               |
| „               | .. .. | Tooroozanloo   | .. .. | Alishur Agha.             |
| „               | .. .. | Lacheenler     | .. .. | Ali Beg.                  |
| Geen            | .. .. | Geenloo        | .. .. | Ali Agha.                 |
| Karakol         | .. .. | Komershloo     | .. .. | Mustafa Agha.             |
| Kooroo Chai     | .. .. | Zeyrikanloo.   | .. .. | Hassan Agha.              |
| Chit            | .. .. | „              | .. .. | Kassem Agha of Tchiftlik. |
| Shooshar        | .. .. | Bunamloo       | .. .. | Suleyman Beg.             |
| „               | .. .. | Zazaler        | .. .. | Ibrahim Agha.             |

Kooroo Chai and Shooshar lie, the former in the Erzingan district, and latter in that of Kara Hissar.

† This is the furthest Eastern branch and main source of the "Halys," so-called from the saltiness of its waters, a peculiarity it derives from the Beydagh and Shemlook Sus and the salt pans it touches in the Siwass plain; from whence great quantities of that mineral are exported to Arabkir and Kharput.

ready for the sickle. The difference in climate is at once perceptible at Konak, where the morning air was so cold as to preclude writing. At 8·30 we crossed the Kizzil Irmak to its left bank, and left it flowing south-west. After ascending from the valley on to an upland the road was carried up the Bapsee Gedukee mountain towards the peak of the same name, which was reached after a steep climb at 9·40. Deep below was the Kuroo Chai valley, appearing, from the vast accumulation of igneous rocks thrown up to a great height on all sides and in every shape, more like a bit from Pandemonium than the habitable abode of living beings. Yet here and there oases were discernible in the general wreck, containing villages and isolated Tchiftliks. From the top of this hill we had a fine view of the Mezoor Peaks—stretching from below Eggin towards Erzingan—a part of the Deyrsim we had already noted in the morning near Konak; to our right also was an extraordinary volcanic mass—resembling the Doman Kaia—close to Zimara. Everything else was a confused sea of rock and high mountain; the longer and more distinct chains running west and east, with smaller ranges filling up the space at right angles. From here the road was carried for a short distance round the top of the mountain by an artificial cutting sufficiently broad and level for carts; it then, however, became steep, and we walked down it to Bapsee village, arriving there at 10·45. Kuroo Chai is a Kuzzaa or sub-district of Erzingan, and takes its name from the uninviting ravine in which the hamlet is situated.\* As its name implies the valley is a narrow gorge containing at this season the dry bed of a torrent that, during spring and early summer, is filled with an impetuous dangerous stream. The road passing Telharee and Golares villages threaded the gorge. At its extreme end, where it takes a southerly bend, it crosses the Senak Su, a considerable stream, the people say—I can hardly believe them—flows past Divrigi. One hour from Bapsee we left the Kuroo Chai; climbing a high mountain spur to an upland—hemmed in by rock—leading us in another hour to Karraga, a village situated some feet below on the mountain bordering the Karra Derreh ravine at this side. Karra Derreh, though longer and broader, resembles in its prominent features the Kuroo Chai; but the mountains on either side are of soft stone and friable rock that soon crumble into earth. It contains the residence of the Mudir, but it is sandy, hot, and feverish. A stream—now inconsiderable—of bad, slightly saline water flows through it, and subse-

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\* From this to Kharput plain wheeled carriages cease towards the south; but they are employed in the large plain of Erzingan, about fifteen hours east.

quently falls into the Kara Su—Erzeroom—branch of the Euphrates.\* The natives generally shun this place for the pure air of the hills on either side, where water is abundant. To the left of Karraga were the villages of Guran and Gumetchia, and to the right the bigger and lesser Tapoors.

29th.—Nothing could equal the great hospitality of our Kizzilbash hosts. It took us 28 minutes to walk down the mountain side into the valley, running north-west and south-east, with four considerable bends. After entering it we followed the same course, reaching the Mudir's residence called El Khan—an isolated solid building—in 1 hour and 40 minutes from Karraga. About a quarter of an hour, before reaching El Khan, we diverged from the road, and entered a side ravine to visit some grotts high up the friable rock forming the mountain. They appeared to have been inhabited by anchorites, but offered nothing of any interest. My servant, however, picked up a Byzantine coin in one, and the people say many similar relics are occasionally found there. Although the country about Khan is extremely arid and sterile, it seems rich in minerals; and at Siller, four hours off, there is—as I was told—a rich deposit of very good coal. After breakfasting we pursued our morning's course in the valley, quitting it finally, in an hour and a half from Khan, near Seema and Tchiftlik villages. The road then lay over an off-shoot of the Geskoor Dagh, which we ascended to gain the Kamakho upland, leaving on the mountain side opposite the fine village of Churrenjil, on the left bank of the Kara Derreh ravine, with its large gardens in the valley below. The road after passing Kamakho, situated at the extreme southern end of the upland, first ascends a hill, and then almost immediately descends to Tepta village. The whole way, nearly between Kamakho and Tepta, abounds in a soft grey marble, or rather hard gypsum similar to that obtained at Mosul. It crops out everywhere in the light soil of the range; but near Tepta we lost sight of it, the hill leading down to the village being composed of small pieces of schistose rock extremely trying to the horses' feet. The Kara Su runs about two miles off, south-east, between our position and the large Armenian village of Eleej, built on the slopes of a mountain in the Eggin Kuzzaa of the Kharput Sanjak.

30th.—Our tents had been pitched in a garden. We rose early, and mounting the hill we had descended last night, in time to take some necessary observations in the clear morning

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\* Logs of pine timber are floated down this river to Eggin on the Kara Su during spring, as also fire wood to that place and Gumish Maaden on the Euphrates.

light, we had a good view of the Kara Su branch of the Euphrates; gliding between low slopes, and further on entering a gorge with sharp abrupt cliffs on either side. Hassan Ova village, on the Kara Derreh Su, lay about two miles off to left; its course and direction of the valley were nearly south, to the junction of the stream with the Kara Su (Euphrates). The Deyrsim Dagh mountains, here running north-west and south-east, came down at acute angles to the latter with the Bahree Bel and Khosta Dagh, between them Eleej and our point of observation. The course hence was east of south for a quarter of an hour, then south-west towards the Kara Booda ravine and Su; to which we descended by a steep rocky path in another half-hour. This stream falls into the Kara Su, four miles further south, at a point visible from this, and here runs in a confined gorge coming from west. At one side it is pebbly, but on the other a morass, in which my cawass, and the horse he rode, were near being lost. In attempting a short cut they fell in, and the greatest exertions on our part alone eventually saved them. We were now in the Divrigi Kuzzaa, a district of the Siwass Pashalik. The road was over a well cultivated upland—after passing the ravine—with Dostal and Lordeen villages to right and left; it then became entangled in a mass of friable rock hills, alternately ascending and descending the latter. The last part was a most tiresome and fatiguing ascent for the horses of more than one hour, and on reaching the summit we were at the foot of the curious rock near Zimmara, we had noticed from the Bapsee Geduk the day before yesterday. It overlooks the Zimmara valley, having Zineyker village imbedded in gardens and vineyards in a deep ravine to right. The ground about was covered with grey marble, emitting a hollow sound under the horses' feet. Here and there were deep gaps in the surface, the whole hill appearing, from the numerous small domed inequalities, to be perfectly honeycombed below. From this to Zimmara was a fatiguing descent; we reached it in three and a half hours from the Kara Booda valley.\* The village, with the exception of ten Moslem houses, is exclusively inhabited by Armenians. I was led to believe I should find some interesting remains in and about the place; nothing, however, was to be

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\* This seems to be the Zimmara of Cappadocia, noticed by Pliny as being 75 M.P. from Dascusa (? Kebban Maaden, see Ritter's 'Erdkunde,' vol. x. p. 800), "and not to be confounded with the locality of the same name in the Great Armenia, which was below Mount Capotes." But if Dascusa is the present Kebban Maaden Mount Capotes cannot be where Ritter would place it. See Pliny, 'Nat. Hist.,' book v., ch. xx., and note 27 further on.

seen but the remnant of a Roman wall on the rock at its back, and the ruins of an Armenian Zialet; the few coins I obtained having been found at other places. The village is six hours from Divrigi, and scarcely three miles from the Kara Su (Euphrates) at Pingan, where there is a ferry over the river, on the Eggin and Arabkir road. The gardens surrounding it are numerous, occupying one end of a low mountain spur that slopes gradually down to the Kesmeş Su. During the evening a Zabtée arrived in hot haste, demanding re-inforcements for his chief; who, it appeared, had surrounded a party of Kizzilbash brigands from the Deyrsim, in a small valley close to. They had resisted and wounded the sub-officer, who, fearful of losing his prey, now urgently demanded volunteers from Zimmara to secure his game. The Christians readily responded to his call, and returned during the night, reporting the entire capture of the band, and death of the chief from a pistol shot of the sub-officer wounded.

31st.—Notwithstanding the successes of last night, the road, as being within reach of other Deyrsim plunderers, was considered unsafe; at starting, therefore, a party of villagers on horseback and on foot accompanied us. After traversing a great part of the spur we descended more abruptly into the ravine of the Kesmeş Su, and crossed the insignificant brook of the same name; after which, crossing a narrow ridge separating Purteyrloo ravine from that of the Kesmeş Su, we found ourselves in the former, with the village from which it takes its name on the north-west side further down. It was here the capture of the Kizzilbashes was effected last night, and presently the dead body of the chief was carried past on a horse for interment in his village ten hours off. The road leading through the ravine was difficult and tortuous, ending by a steep descent in a rock-girt gorge intersected by the Tchalt or Tsalt Su (River of Divrigi), two hours two minutes from Zimmara. The river was deep, reaching up to the horses' bellies, and about 20 yards broad, confined to the side of the gorge; in spring, however, it occupies the whole with its impetuous torrent. At a bend it makes a few yards further on, it is crossed by a bridge near an old massive khan called Urumia. From here Arraga village, towards which we were proceeding, lay before us, perched up a few feet below the summit of a high mountain. Our road was through a dry hot ravine along the margin of a diminutive streamlet. There was no cultivation till arriving at the foot of Arraga Hill, where were some patches of clover and fine tall poplars. Here we climbed the hill side, reaching the village in an hour and a half from the Tsalt Su. Although

from a distance having an inviting clean look, the hamlet proved a very miserable place, gardens and cultivation being parched up for want of water. The inhabitants generally resort for a livelihood to Constantinople, where they remain years; still the attractions of the capital are not sufficient to cure the veritable "heimweh" that possesses them, and they return to live and die amongst their arid rocks in the wild mountains, that have nothing but fine air to recommend them. Near the village is an old Armenian Zialet dedicated to Arakel, a favourite resort for the devout Armenians from Eggin, Divrigi and Arabkir. After breakfasting and reposing during the heat of the day we ascended to within a few feet of the mountain top, on our further road to a pleasanter resting-place. The air and view were delightful; the latter embraced our day's ride; Zimmara and the high peaks seen from the Bapsee Geduk. A rapid descent from this point brought us to Gumkhoy village, less than an hour from Arraga. The natives were extremely inhospitable, assailing our people with such epithets as "Kaffir," "Deensiz," &c., and at length proceeded to violence. It was with the utmost difficulty that a species of peace was at length restored. I never saw such a set of savages in my life, although the greater part of the men, as at Arraga, had passed their lives at the capital: their women, however—perfect furies—outvied them; jumping on to the backs of my men, clawing and biting them about their heads, faces, and necks, to prevent them using their hands in self-defence. My party certainly got the worst of it, as their clothes were torn to pieces, and some of my money plundered in the skrimmage. We insisted, however, on passing the night there, and so far gained the victory, unsatisfactory as it was.

*September 1st.*—This village is  $8\frac{1}{2}$  hours from Arabkir. The morning's ride commenced by our scaling the mountain side at the back of Gumkhoy; subsequently it lay along its flat summit for four hours, the road being nearly level at first, but latterly uneven and hilly. This is the Saree Tchitchek Dagh, a favourite Koord Yailak. Immediately about our line of route we passed many small encampments of Kizzilbash Koords; they were constantly pressing us to alight for refreshments, their women even rushing out from the tents, holding wooden bowls of Yaoort, stopped us in the road, and as we could not accept their hospitality they did not allow us to pass before tasting their contents. This mountain is separated from that of Arabkir, or Kara Baba, by the Chigneyr Su; there are no villages on it, but in the low-lying lands to our right were many large hamlets standing in orchards. An ancient paved road,

attributed as usual to Sultan Murad,\* but evidently Roman, once led along the top of this range going to Melitene from Divrigi (Tephrike), and probably was prolonged by Zuraa to Nicopolis and Armenia. From the remains extant it seemed to have been solidly and ingeniously constructed. Five hours after leaving Gumkhoy we descended abruptly into the valley of the Chigneyr, or Giaour Yazı Su, coming from the Yama Dagh between this and Divrigi, and falling into the Euphrates below Paghanin. Forging the stream—having a depth now of three feet and a breadth of twenty—we ascended part of the Kara Baba Dagh opposite, with the large Kizzilbash village of Chigneyr close to our right. The country about seemed one mass of dark arid rock, traversed by the remains of a miserably paved modern road four feet broad. In many places it consisted of flights of steps. We painfully ascended for three-quarters of an hour previous to attaining the top of the hill. At the other side we had been nearly stifled by heat; here, on the contrary, the temperature was cold in the extreme. From this point Arabkir was two hours distant east, but hidden by a projecting rock; Amberga village, however, one and a quarter mile south-east of the former, was visible in the deep valley below. The same rocky country characterized the descent; most fatiguing for the men and animals. Passing the Perey Degirman, or fairy's mill, it took us two hours descending to the Arabkir ravine, and another half-hour to our host's house, situated at the nearest or north-west end. I doubt, however, if the direct distance was more than five miles straight road.

9th.—All this time at Arabkir. The Kuzzaa of the same name, with that of Aghin, subordinate to it, contains 320 villages, and the town of Arabkir 7000 houses, of which 1500 are Christian, paying, with the Moslems, 52 piastres and a half only per house for vergoo or property-tax. It is a straggling town, consisting of several scattered mahallas or quarters, distributed low down in a deep ravine, having numerous ramifications on every side, choked with gardens, running far into the arid mountains towering above them. The natives are enter-

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\* In conjunction with Iskender Dhul Kurneyn (Alexander the Great), Sultan Murad IV. enjoys posthumous praise for having originally constructed the buildings whose crumbled remains are so frequent in Asia Minor. The people and legends say this road was finished by the latter previous to his Baghdad campaign, and traversed by him on his march to that city. A manifest error, as he crossed the Euphrates at Birijik, and went from there to Orfa and Diarbekr, then by the desert to Nisibin and Mosul. I say desert, but at that time the country was well peopled, with populous villages at the end of every day's march. See Von Hammer 'Geschichte des Osmanisch-Reichs,' theil v. Appendix.



prising and industrious, carrying the same qualities with them in their emigrations to different countries. As at Eggin, there are scarcely any young men in the place, the proportion of resident males to females being as one to fifteen, all the young men making it a practice to seek fortune elsewhere, and to retire here in old age, to enjoy the earnings obtained during years of voluntary exile. I believe there is scarcely a government office in the whole Turkish empire without Arabkirlee Moslem employés, while some, more fortunate than others, have risen to the highest civil and military rank. Among the Christians, although all are well off, are some very wealthy men, the heads of different houses, whose sons are carrying on the commerce, instituted in youth by their fathers, at Aleppo, Erzeroom, Constantinople, and Cairo. As a consequence of this praiseworthy expatriation, there are no vagrants, what may be called the poorer classes forming the bulk of the bakers at the Turkish capital, and furnishing domestic servants to nearly every household in Aleppo. The limited amount of cultivation carried on in the Kuzzaa, owing to its mountainous nature and poor soil generally, originated perhaps the desire for foreign servitude, now developed into a habit. Fruits are the principal local production, barley and wheat being foreign imports from Kharput. The native industry of the town is confined to some eighty looms, where striped cotton and silk goods, nearly all exported, are manufactured, to the extent of some 2500*l*. annually, including coarse cotton cloths from the raw material, grown near Kharput. The gardens abound in fine fruit-trees; the mulberry, however, is the most profitable, its fruit being made into a kind of thick paste, called "Pesteek," largely exported, and into raki, a villanous spirit, largely consumed in the town and villages. A little silk is also raised; but this branch of industry is as yet in its infancy. A neighbouring district, however, Sheyro, also in the Kharput government, produces a fair amount, nor have the worms been at all liable to the fatal disease incidental to them nearly everywhere else; for this reason there has been a corresponding export of the "graines" to other places, particularly Constantinople, Amasia, and Diarbekr. The proper name of Arabkir is Arapgir, meaning taken by the Arabs; but it is known in the old Turkish fiscal archives as Nareen. The present town dates only fifty years back, the old city now called Eski Shehr, occupying a similar ravine, two miles north-east of this, situated between the Giaour Yazı and Eski Shehr Sus. Some remains of fine old Seljook mosques are still to be seen at the old site; and on a high rock at one side, the ruins of an ancient castle,

with some grotts in the cliffs about.\* Eski Shehr is a delightful spot, higher, and not so confined as Arabkir. The waters of its stream, flowing into the Giaour Yazı Su, rushes through the centre of its ravine, lined with delicious gardens. The Chigneyr or Giaour Yazı Su, a very turbulent torrent in spring, contains, even at this season, a large body of water, and is spanned by a high bridge of two pointed arches, one of them bearing a small defaced modern Arabic inscription on the eastern side of the southern arch. There seems nothing very ancient in the old ruins or castle, nor were any medals offered for sale; I bought some at Arabkir, but they had been brought from the village of Deniztee, four hours south-east of this, near the Chigneyr Su, in the vicinity of Aghin.

I made the acquaintance at Arabkir of a venerable old man, Seyd Osman Nooree, ostensibly a Dervish of the Bektashee order, a sect favourable to the Kizzilbash. He seemed, however, really a Kizzilbash, having a good idea of their doctrines and rites, and being greatly respected by them. He is well read, and, like most of his sect with similar acquirements, extremely tolerant. He was, as far as religion went, a thorough optimist, and looked forward confidently to a millennium of peace, when, he said, "Mollas and Imams, Popes and Priests, will be unheeded; their polemical discussions disregarded; for the descendants of our races will be drawn close together, and exhibit a harmony and community of spirit more consistent with their real position as children of one common Father and God of all."

The little room in which he received me was a pattern Dervish apartment, adorned with the fine skin of the mountain goat, old arms, huge bludgeons, and curious-shaped sticks. Here and there were rude daubs of the Meyvlee mosque at Iconium, the tomb of the Sheikh er' Refaiee, near Hassa, and a curious allegorical picture, illustrating the divisions among the different Moslem sects.

10th.—After receiving our European letters and correspondence we resumed our journey towards "Tchimishgezek" and the Deyrsim. Our road followed the windings of the Arabkir Ravine in a narrow pebbly bed, with enormous rocky cliffs on both sides. At the bottom poplars and mulberry-trees are planted pretty thick, side by side, and the heights crowned with villages in groves. Our course was south of east to Tepteh village, two hours slow marching from Arabkir, situated on the high cliff on the left bank of the Chigneyr, here also

\* D'Anville, vol. i. p. 336, identifies Arabkir with "Arabrace," fixing it south-west of Nicopolis, which is totally erroneous.

called the Tepteh Su. It comes from north-west, and now flows in the ravine traversed by the road. Since leaving it at Chigneyr Village, it had been considerably increased by the Ango Su, joining it between that village and Eski Shehr, on the left bank. The direction of our road and of the stream further on is more south, the former lying along the banks of the latter, which is so pent in by the rocky cliffs already alluded to, that we had to cross it eleven times between this and Ajoozee Village, an hour only from Tepteh. There (at Ajoozee) the high cliffs recede, giving place to low hills of light soil, while the river spreads out in the broad bed of a pebbly howi or valley. An hour further on we halted on a beautiful level lawn, studded with venerable mulberry-trees, covering it with their shade, on the right bank of the Chigneyr Su, close under Ashaghi Yaban Village, for breakfast. As the name of the River Giaour Yazı—applied to it equally with Chigneyr—suggested the probability of old inscriptions somewhere on its banks; and, as although I had commenced my search for such at Chigneyr without being successful, I made up my mind to follow the stream lower down. We sent, therefore, our loads from this by the direct road to Aghin, ourselves taking a more circuitous route past the ruins of Eski Aghin, and the bridge near it over the river we intended following. For the first half hour our route was still along the winding course of the river; here again confined in a deep narrow gorge; we then ascended a steep upland, crossing the Su lower down, near an old ruin and some ancient grotts, to the site of Eski Aghin, on the hill opposite. There was nothing worth seeing; so, retracing our steps and clambering up again to the high land on the right bank of the river, we followed a hilly route, over downs, for an hour and a half quick going, to a collection of old caves, called the Kara Magharaler. Descending a break-neck path, we reached the bridge in an hour and a half from the point where we left the stream higher up. The river here has forced its way through the friable rock, rising for many hundred feet on either bank. The direct road from Eggin to Maaden and Kharput, in spring and winter, is carried along a sloping shelf on the left bank, crossing the river to right by this bridge. Above it the right bank or cliff, composed of loose soft rock, has been artificially equalised by a neat and substantial wall of large blocks of hard, cut stone, so as to avoid any opposition to the race of the current during the annual rises. Although the natives recognise in this work the remnant of a stair, its real use is obvious; as, in its absence, the uneven and projecting portions of the high cliff forming the right bank, composed as they are of loosely-packed masses, would have been directly worked upon at their base by

On key-stone.

ⓧ ΚΥΡΙΟΣ ΘΕΟΣ ΦΥΛΑΞΕΙΤΤΝΕΙΣΑΛΛΕΣΟΥΚΘΗΝΕΔΑΔΟϞΟΥΑΠΟΤΟΥΝΥ  
 ⓧ ΝΚΛΙΕ ΩΣΤΟΥΛΙΩΠΟΣΑΜ

Cross at end on left bank.

Right bank

the water, that would soon have undermined and precipitated them into the bed of the stream, thus throwing its force on the left bank supporting the high road, that would very soon have rendered it as useless for traffic as the side opposite. This work, with the bridge, is evidently early Byzantine. The latter, consisting of a single pointed arch, is built of hard stone, over a narrow but deep chasm formed by the river. It bears on one side a Greek inscription, with a Greek cross at the commencement, and others on the western and eastern key-stones. The inscription, from its position, differs from any I have yet seen. It is not confined to an isolated slab or slabs, but, beginning at the first stone, forming the spring on the right bank, is carried round the arch ending on the left side opposite, in such a manner that each stone is occupied by two large letters only, whereas the whole could have been easily engraved on two of the blocks. The characters are bold and finished, differing in these respects from the cramped and negligent-looking inscriptions characterising a later period. I give the inscription in the margin, and regret it has suffered such damage from time and the weather as to render many of the letters illegible. It is from this inscription that the river has received the name of "Giaour Yazı Su," or "Infidel writing river," from the natives; like most minor streams, however, it bears also the names of villages it successively passes, and is indiscriminately called by the people Yama, Chigneyr, and Tepta Sus, from the hamlets it passes, as also Giaour Yazı. In Kiepert's map it is marked as the Saree Tchitchek Su, from the mountain of the same name, in which it was, erroneously, thought to have its rise. It grew dark before we could get away; we had then to make a vigorous effort to reach Aghin before night. Avoiding the roundabout direct road, we clambered up the steep rock on the left bank, to reach our camp by a more direct cut across country. It took us ten minutes to scale the hill and gain the Eski Aghin upland, covered with blocks of black basalt; twenty minutes' good going brought us to another steep and winding ascent, at the back of the fine village of Anderee, lying in a chalk ravine a mile before us to left, and surrounded by extensive gardens, famous for exquisite water melons. The whole formation from here on

was chalk and lime stone, that in the road had been worked into a fine powder, in which our animals sunk to the fetlock, covering us with the dust. Descending the Anderee Hill we reached Aghin, in half an hour from Anderee. Like it, Aghin is built in a chalk ravine, the houses scattered about in every direction among fruit-trees and vineyards. It contains 320 houses, tenanted by eighty Armenians and eight Protestant families, the rest being Moslems. About two hours off is the village, alluded to before, of Denizlee, where, I was told, were the ruins of an old town and building, the latter having an unknown inscription on the gateway. As the coins I saw at Arabkir had mostly been found here, I regretted want of time would not allow me to visit it.

11th.—Started at 6.30, and reached the Kara Su branch of the Euphrates, near Paghanik Village, in three quarters of an hour from Aghin, by a course generally south of east, over an undulating chalk country. Some miles to our right was Hooerenek Village, on the high road of the Persian Haj, from Erzeroom towards Aleppo. The Kara Su is here about 300 yards broad, but at this season we forded it—although after considerable delay, occasioned by our baggage mules—easily, the water being only up to the animals' bellies. From this the road on bore north of east to Bakchajo Village, in the Tchimishgezek (Kharput) Kuzzaa, tenanted by Armenians, where we breakfasted in a pretty garden, under the shade of some mulberry-trees. The country from the Kara Su to this, as generally between Arabkir and this, is bare, but studded with hamlets, in whose immediate vicinity are some poplar and mulberry-trees. Cultivation is carried on to some extent, and the chalk downs are covered with a thin fine grass, affording excellent pasture for the numerous flocks of sheep and droves of cattle passed during our ride. From Bakchajo our course was north-east, by an easy ascent to and through Kara Vank Village, after which it descended as gradually to the valley and stream of the Tchimishgezek Su, which falls into the Murad Su (Moosh branch of the Euphrates), opposite the ferry of Ashonan, about four miles further off south-east. We sighted the Murad Su at about that distance off, an hour after leaving Bakchajo, running north-west on its course to the point where it and the Kara Su (Erzeroom branch of the Euphrates) unite, above Kebban Maaden, and then first form the Euphrates. After this we turned north 20 east, and descended in half an hour towards the Tchimishgezek River, and running in a deep ravine. The road lay in the latter, the vacant space on the right side being planted with millet and cotton. An hour further on the road ascends the high bank, but still following the tortuous course of

the stream. An hour after we passed the remains of an old Roman road; then, crossing the stream to its left bank, near a picturesque mill in a valley, clambered up the high cliff to the plateau, backed by a higher limestone crag, upon which the town is situated. The houses are prettily situated in gardens, the latter commencing low down on the river's banks, and continued up in successive terraces for some way beyond the town. Cool springs gush out of every garden, forming one stream, that falls, in successive sparkling cascades, from terrace to terrace into the river below. The rock formation is chalk and lime, with high peaks, worn away by wind and rain into the most curious and fantastic shapes, appearing at a distance like shattered columns, human forms, and Egyptian sphinxes. Terrible earthquakes have from time to time hurled large fragments from the higher range into the centre of the town, which is choked by the *débris* of these fallen masses. They stand up in huge blocks or smooth upright sheets, which, at a distance, cheat the traveller into believing he is about to enter into a new field of discovery and research. The able strategist of the late continental war, Von Moltke, visited this place many years ago, when attached to Hafiz Pasha's staff; but I believe it has lately been rarely visited. The town has 800 families, of which 200 are Armenian.

12th and 13th.—We were obliged to make a halt, to complete necessary arrangements for our trip into the Deyrsim, as also to make the acquaintance of some Kizzilbash chiefs in the neighbourhood, who might eventually be of use to us. I took the opportunity of the delay thoroughly to visit the town.\* There are no remains of any great antiquity, the most curious relic being an old wooden door to one of the mosques, having a mutilated Cufic inscription carved round it. Nowhere could I find any traces of the Roman or Byzantine period. Some medals in imperfect preservation were brought to me, mostly Seljook, struck here; as also a new Ortokide coin of Abu Bekr ebu Kara Arslan, the Lord of Kharpout and Mazgerd, in whose dominions this town—18 hours from the former—was situated. I visited afterwards the grotts in the cliffs opposite the town, crossing the river by a fine bridge of two arches. The path then ascended to the base of the rock, access to the caves being by a narrow ledge on one of its strata. A passage 4 feet high and 2 feet broad, pierced with apertures for windows, led

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\* Armenians identify it with the old "Hierapolis," but it is better known to them as "Tchimish Gadzak," which means the "birth-place of Tchimiscez," the Byzantine Emperor. They say, however, it only took that name after his birth. It is placed by their Geographers alternately in the provinces of Khozan and Dzoph. See 'St. Martin,' vols. i. and ii., pp. 95, 165, and 431.

to a series of cells opening into each other by small flights of stairs or narrow passages. There are three tiers, the last tier being reached by an exposed stair cut out of the face of the mountain. In none were any carvings, inscriptions, or relics. The mountain side is wearing away rapidly; large masses fall every year, and there is every probability the grotts will soon disappear entirely. The river of Tchimishgezek rises in the wooded mountains this side of the Mezoor Dagh 6 hours off; it has a large body of water throughout, which serves to turn innumerable water mills and to irrigate the cultivation along its course to the Murad Su.\*

14th.—Ascended by a hot winding road over a detestable ruined *pavé* to the upland leading to the Deyrsim country, erroneously so called, as will be seen in the sequel. Our course, first south of east, soon turned to north 40 east, along a barren island, for a couple of hours, when we turned still more north, with a short distance on a descent, followed by an equally steep ascent to the top of a wooded mountain, 3 hours from Tchimishgezek, overlooking Bezaoot village, belonging to Ali Gako, one of the Kizzilbash chiefs. The path leading down the hill side was too steep to ride; we therefore proceeded on foot, arriving in 30 minutes at the village through a fine shrubbery of underwood and tall oak. Bezaoot is situated in a valley, surrounded by thickly wooded mountains, backed by the arid chain of the Mezoor Dagh. The houses, as is the case among the Kizzilbash, are scattered about near small brooks, or in the vicinity of thick groves of oak and willow, close to spots cleared for cultivation; which, from the general inequality of the surface and rocky nature, are necessarily at some distance apart. Ali Agha—who is more generally known as Prot Ali Agha, from his now professing Protestantism—received us most cordially, and at once gave orders to kill the fatted lamb, which soon was served up to us cut up into small

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\* Joseph Barbaro, the Ambassador to Hassan el Taneel, the Ak Coinloo, passed through this town on his journey from Erzingan to Malatia and Aleppo in 1473. The modern editor of his travels, as quoted by V. de St. Martin, has split its name into two, and thus fabricated two towns which he calls respectively "Cimis" and "Casseg," a palpable mistake for the compound name it now bears. This error has misled Mons. Viv. de St. Martin, who makes Barbaro pass three forts on his road, which he calls "Cimio, Cassag, and Arapchir," he then goes on to identify the first with Kemakh, and the second with Eghin (? Eggin or Aghen). See his 'Asie Mineure,' vol. i. p. 546. Barbaro, however, passed neither of those towns for, thanks to the reigning dynasty, the direct road through the Deyrsim by the Merjan Boghaz was open to him (see further on), leaving both Kamakh and Eggin far to right. This road is now so overrun by Deyrsim brigands that it has long been closed to every one but them and their friends. The remains of another fine road—paved—exist more east, once connecting in a direct line Erzeroom with Aleppo *via* Mazgerd, Kharput, and Malatia, but the same causes close it now to all but Kizzilbash.

pieces, mixed with garlic floating in a small sea of melted butter. Our host prevailed upon us to pass the rest of the day there; we passed our time in conversing with him on the habits, customs, and creed of the Kizzilbash. Ali Gako is a well informed, highly intelligent, and, in his way, a conscientious man. After studying the Bible he forsook his creed, on the teaching of the worthy and indefatigable American missionaries of Kharput. His life and conduct agree with his professions, although the Moslem, indignant at his preferring Protestantism to Islamism—in which indignation Armenians and Catholics join, from similar feelings that he should not have adopted their form of religion—make him out the biggest villain of the entire Kizzilbash. He was eager to discuss any question bearing upon his new opinions, but rather avoided giving information respecting those he had forsaken. However, I gathered enough to afford me a good idea of their general creed during the hours we chatted together. The Kizzilbash are divided—in the Deyrsim—into two portions, those I am among inhabiting comparatively level districts, called the Seyd Hassanalees, in distinction to the true Deyrsimlees living among the rocky heights of the Mezoor, Doojik, and Koozichan mountains. The different natures of the two localities have influenced their respective habits, the one being an agricultural race, comparatively amenable to authority; the other, a haughty, pastoral, and determined rebel tribe. The Seyd Hassanalees, although originally from Khorassan, in Persia, emigrated more lately from the Aghja Dagh, in Malatia, to this; the Deyrsimlees, on the contrary, are without doubt the descendants of the original Pagan Armenian stock existing there even before Christianity.\* The former, from their proximity and common hatred of orthodox Islamism, influenced the latter, who in time imperceptibly accepted the tenets professed by the Hassanalees and grafted Karmathic upon their former mixed Christian and Pagan ideas. Now, therefore, there seems no difference, outwardly at least, between them in the matter of faith; but their physiological types are confirmatory of separate origins. The Deyrsimlees are finer men, with black hair and eyes, long faces,

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\* There is a curious passage in 'Moses of Chorene,' which I think gives the origin of the name of the Mount they inhabit and their descent. "After the arrival after the flood of, Xisuthrus in Armenia, one of his sons, named 'Sim,' went north-west to reconnoitre the country. Arriving at a little plain traversed by rivers, which carry their waters into Assyria, he stopped on the banks of the river for the space of two moons, and gave his name to the mountain." Sim left it, but his grandsons returned and established themselves on the rivers. From what follows, it appears the Moosh Plain is intended, one however can hardly call that a little plain. The description coincides more with the small Owajik Plain and the Mezoor and Merjan Rivers flowing through it. 'Moses of Chorene,' vol. i. lib. i. ch. vi.



and swarthy complexions, resembling what one would suppose was the original ethnic characteristic of the Armenian, and which one occasionally sees reproduced in the inmates of the old convents about Van and other parts of Koordistan. The Seyd Hassanalees are shorter, and have rounder and fairer faces, although, like the others, they have long black hair and eyes, with full dark beards. All the young men indiscriminately wear their hair long in plaited tresses, while the middle-aged let it hang down in two loose locks behind each ear; the old men shave the head entirely.\* The same dress seems common to all; but the Deyrsimlees wear a long melon-shaped turban wound round an elongated felt cap, whose point appears above it; the Hassanalees wind a simple turban round the usual red fez. Their hierarchy, if I may use the term, consists of two degrees only, namely, "Deydees," literally sayers, and Seyds; the latter positions are hereditary; the former devolve their mantles on the most deserving of their disciples.† The popular belief among the Kizzilbash is that "Deydees" do not die, but are received in some mystical way into heaven. In their language there is some difference, the Deyrsimlees speaking a Koordish dialect, involving many Armenian words; while the Hassanalee is a peculiar kind of Zazaa, or mixture between it and the common Kermanjee, although partaking of the large Persian element characteristic of the former. Circumcision is unknown among them all, but they allow polygamy, limited to four wives, whom they can never in any case divorce; their women are free mannered, and rarely hide their faces, while some of them receive strangers openly, and converse with them in open divan. Unlike the Moslems and Christians, the sons when married, however young, have separated establishments in separate houses. All are bound to observe the Jumaa, and generally to keep a fast of ten days at Mohurrem, during which, like the Shiaks, they curse the first Califs, Yezid and Shimr. The entire Kizzilbash, in addition to more primeval belief, are closely allied in doctrine to the Noseyrees, Druses, and Ismailees; each one, in addition to his prime prophet, believes in a Hejjab, or medium, different from the "Bab." Thus with

\* None of them ever cut or shave their beards.

† Mr. Dunmore says they have also a head spiritual chief, called a Raiber or Bishop invested with more than apostolical power. 'Am. Missionary Herald,' vol. liii. pp. 219, 220. The worthy and talented gentleman I quote above lived and travelled a great deal among the Kizzilbash, by whom he was much beloved. Leaving his field to recruit a shattered constitution in America, his active spirit could not brook inactivity; he therefore proffered himself as a military chaplain during the late rebellion, and was killed in battle, deservedly regretted by all his friends;—by no one more so than myself, who have had ample and repeated opportunities of witnessing the fruits of his noble philanthropical exertions in Armenia and Kurdistan, where his name is a "household word."

the Kizzilbash, it is Zeyn el Abadeen who is the medium with Aly, through the "Bab," Sheikh Safee. The Noseyrees formula, although it does not include Sheikh Safee, alludes to him in the interpretation subsequently given by the Druses; he, as well as a subordinate, Salman el Tarsee, are highly honoured. All these sects believe, too, that God visited earth in different forms, and will again visit it. In their sun and star worship, or rather reverence, they are similar, and all equally agree in their respect for our Saviour and the Apostles. But the idea of the metempsychosis believed in by Druses and Noseyrees is foreign to the Kizzilbash, who, as stated before, confine themselves in this respect to accepting the Deydee teaching, that his spirit and self is conveyed at his option into the body of another human being: one branch of them, however, do believe in the transmigration of souls. They live, according to Mr. Ball, near Yozgat. From one of their religious books, called the "Booywick,"\* that fell into my hands, I find their respect for Mehemed is simply a blind to deceive the Moslems, for they have nothing in common with them; no really obligatory fasts, stated prayers, ablutions, or belief in the Koran. They teach the ubiquity and omnipotence of Aly, the creator of everything in heaven and earth, and in contemplation of his magnitude and primeval existence, worship venerable natural objects, as huge oaks, and large isolated masses of rock. They adore the sun at rising and setting, reverence fire, and pray and sacrifice at the sources of rivers. Such practices seem undoubtedly remains of their old Armenian Paganism, which embraced all these forms of idolatry and heathenism; † while their belief in the several incarnations of the Deity is a part of the Hindoo worship introduced into the province of Daron by the Indian brothers Kisané and Samedr, and grafted on the Armenian Paganism in the time of Valarsaces, 150 years before Christ. ‡ But the most interesting features in their observances, are the employment of the Christian rites of baptism, and the Lord's Supper. †

The Kizzilbash in the entire Deyrsim cannot amount to less than 200,000 souls; their co-religionists exist about Diarbekr,

\* They have, according to Mr. Dunmore, another religious book, called 'Yusuf Kitab,' containing portions of the New Testament. The Booywick Mr. D. says is an eclecticism from the Old Testament Scriptures, and their own traditions. 'Am. Mis. Herald,' vol. liii. p. 219-220, and Ditto, vols. lii. liv. and lvi.

† See 'Moses of Chorene,' 'Agathangelos,' and the interesting paper 'Sur le Paganisme Arménien,' by Mons. J. B. Enim of Moscow, translated by Mons. Stadler in 'Revue de l'Orient,' tome xviii., October, November, 1864. The stone worship seems Harranite or Arab. El Gabal had a temple at Emezza as the black stone at the Kaaba.

‡ *Ibid.*, p. 217.

the Aghjee Dagh, near Malatia, at Adiaman, near Orfa, Siwass, and Yozgat, and they extend more or less to the capital itself. They are an independent race, never having known in later times proper subjection, although the villages in the less mountainous parts, or near the seats of different governments, are liable to conscription and ordinary taxes. There are many of this sect to be found among the military, and some of them have risen to the rank of general and Mushir.

15th.—Accompanied by our host's son, we started early, following the wooded ravine close to his house, south of east, as far as Segerdik village, two hours from it. The ravine then opens out into a small valley, watered by a copious stream. Its banks are well cultivated, particularly about the two villages on either side, near the ruins of an ancient town, now levelled with the dust. On a mound on its right bank stands an old Armenian church, with a very primitive altar in it, composed of a single pillar of stone, surmounted by a large square block. The interior is covered with curious shaped crosses, which are reproduced on the tombstones of the grave-yard at its side, denoting the last resting place of former Bishops. The whole country about, and in the Deyrsim generally, contains many old Armenian remains, ruined towns, villages, churches, and convents, but generally speaking, no real Armenians near them, the original inhabitants having long ago been ejected by their Koord neighbours. The churches have mostly ogival arches, and invariably the same primitive altars noted before; little cement is used in the construction of the walls and stone pillars. The sacred buildings are entered by extremely low doors, the sides and pediment being composed each of a single massive block. The inscriptions are all in the old Armenian, but mostly defaced and illegible.

Following a side ravine, we reached Arzoonik village in an hour and a half from Segerdik. Our tents were pitched here, but we proceeded further to visit some old ruins in the neighbourhood, called Kurmizak, or Kurbizak Kalla. The road to it lay through Avshekr—sweet water—hamlet, the property of and inhabited solely by Armenians, situated in a plain; we followed for a few minutes, and then ascended a stony hill to the huge rock, upon which the ruins are perched, reaching it in one hour from Arzoonik. An immense mass of rock rises abruptly in narrow vertical strata from the low-lying hills around, shooting out at the top in sharp pointed needle and saw-shaped pinnacles. The lower strata have been artificially smoothed away or connected by walls so as to render the whole an impregnable fortification. Above the lower works and 50 feet higher another wall of Saracenic date running round the

contour of the rock is surmounted by ruins far older than the former, built up loose, without mortar, with large rough blocks of black stone; whereas the Mahomedan portion below is distinguished by walls of a lighter coloured stone, and far smaller blocks, regularly finished, and imbedded in cement. An inscription over the gateway in the lower and later building had recently fallen amongst the *débris* below. I found several pieces inscribed in modern Arabic with the name of Gheyath ed' Deen Keykhosroo ebn Keykobad.\* There was nothing else of any great interest, apart from the position, but a series of chambers quarried out of the rock, and doused with rough stones, having rounded arches of the same material, differing in this respect, and the form of the arch, from the gate already mentioned. In and amongst the ruins we picked up several arrow heads made of iron, with several defaced copper coins. At the base of the hill, some little way below the lower wall, but still at a considerable height above the plain, is a smooth surface choked with the ruins of an old town. After visiting them we returned by the same route to our tents at Arzoonik.

17th.—Our road was east of north this morning, over an upland to the village of Surpiyan. The chief Suleyman Agha pressed us so hard to stop, that, although early, we alighted to taste some fine water melons, after which we visited the old church, a similar construction to the one at Segerdik. From here on the road sloped down an easy decline, till near the edge of the Injeyrga valley, when it became extremely abrupt to the village of the same name, two hours from Arzoonik. There is an old Armenian church here, repaired, according to an inscription, 300 years ago, and dedicated to Surp Minas. The village, half Armenian and half Turkish, contains about 80 houses, embowered in fine walnut trees, and gardens, watered by several beautiful streamlets. It is situated half way down the slope of a fine though narrow valley; we descended it on foot for ten minutes to a stream called the Ak Su, running in the bottom. Ascending from this a steep hill, Eyrgan was reached in 27 minutes. The village itself is a miserable collection of hovels, but the ruins of the old church dedicated to Surp Aratoon are well worth a visit.

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\* One of the Seljook Sultans of Iconium, who was perpetually engaged in war with the Mongols. He was a son of Keykobad, and succeeded him A.D. 1235. He married a daughter of the King of Georgia. During the first difficulties occasioned by the Mongols, he was on the point of concluding a defensive treaty with Baldwin II. of Constantinople, who sent to France for his niece, daughter of Eudes, Lord of Montaigu, to marry her to him; Keykhosroo engaging to build churches in his dominions, and even to turn Christian. In the end the affair was broken off, and an alliance took place between him and John Ducas Bataze, Baldwin's enemy. Keykhosroo died A.D. 1244. See 'Déguignes Hist. des Huns,' vol. ii., part 2nd, pp. 63-67.

The road to Khozat was for 10 minutes an ascent to the top of the cliff overlooking the Ak Su, far below us, and forming its right bank; the river coming from north flowing south-east. Close to our left was a ravine running at right angles to the stream, spanned by an old Roman viaduct. We descended rapidly to the village of Een, situated in the valley of the Ak Su, which is about two miles long and one broad, bounded by high perpendicular limestone cliffs, the village being situated at its southern end. In front of it is a flat surface, stretching down to the river, most carefully cultivated, and studded with majestic old walnut trees. Small clear streams wander over the fields, and bathe the wide-spread roots of the trees, under whose delightful shade is a constant and refreshing green sward. The ruins of no less than seven venerable churches peer above the branches here and there, their crumbling ruins partly supported by the huge trunks that have grown up and developed themselves since they were deserted. The same fine trees grow in the aisles, casting their shadow over the massive remains, whose solidity seems sufficient to have defied the natural decay of centuries. The inhabitants of this village now are Kizzilbash, who, as elsewhere in the Deyrsim, have driven out the original Armenian possessors. The burial grounds near the old churches are full of tombs, several of the headstones bearing the elaborate flowery cross common to the Armenian clergy; others were rude blocks of stone roughly fashioned into the form of sheep, a custom still observed among the Armenians about Van, and even near Erzeroom. This fashion in a different way, typical of their respective pursuits, has been imitated by the Kizzilbash, who, however, instead of the sheep, have rough models of horses and arms placed over their graves, indicative of less peaceful callings.

Following the Ak Su for another two miles further north, we quitted it for the higher land about Khozat, reaching that village in three hours from Eyrgan. Khozat, which has retained the old Armenian name of the province or rather district, is the seat of a Mudir who has jurisdiction over 170 villages, all in the Erzingan Kaimakamluk of the Erzeroom Villaiet, mostly scattered Mohallas, containing 2200 vergoo payers of 52½ piastres each. In the vicinity of the village is a large barrack, overlooked however by the mountain close to, containing a force of 600 regular troops and six guns, in permanent occupancy. The Mudir, an old friend, did his best to make us as comfortable as he could, in the midst of the dung-heaps and squalid houses constituting the boasted capital of his government; where, as he whispered in my ear, all were Zendeep Devil's sons and Aasee in the highest degree.

18th.—Started some time before daybreak, having a tiresome hot ride before us. The steepness of the mountains in our route would, we were informed, entail a good deal of walking, easier performed in the earlier part of the day than at a later hour. One hour and 47 minutes over an undulating wooded country brought us to the summit of a mountain overlooking the village of Chamoorlee, with a fine view of the Mezoor Dagh peaks and mountains about. On our road to this we had come partly through a well-cultivated valley called Tanel, with the two hamlets of the same name, situated a quarter of an hour from each other in its centre. We descended the steep mountain on foot in half an hour, and then again ascended for a few minutes, when another sharp descent brought us to the first quarter, or Mahalla of Taghar or Taghur. We then followed a wooded ravine, and crossed shortly after the broad pebbly bed of a mountain-torrent, through whose centre flowed a diminutive stream: crossing to the other side of a low ridge between, the river of Tchimishgezek lay across our road. It was rushing rapidly over a stone-bed, and, although not broad, had already a large body of fine clear water, which joins the stream in the torrent we had already passed, the united waters then flowing direct towards the larger Taghar village by a short though difficult gorge. To avoid it we crossed a high spur of the mountains, from whence we again saw Bezaoot, Ali Gako's village, about three miles south-west. The road at this point turned over a finely-wooded country north-east direct to Taghar, four hours and a quarter from Khozat. We were obliged, though so early, to stop here for the night, there being only one village between this and Ziaret, six hours off, where we were told we should not be able to procure food either for ourselves or horses. Taghar is a miserable village on the Tchimishgezek Su, at one side of a small high-lying valley completely denuded of trees, but in a good state of cultivation. At the back of the village, in a wild side ravine, are the ruins of an old Armenian church, such as I have already described at Segerdik. The arch of the apse was circular, in the centre ogival. A part of the circular roofing had fallen away, and I had an opportunity of observing that in their construction large hollow jars or tubes of baked clay had been used; to lessen probably the extra weight the employment of the necessary blocks of stone would have occasioned. The usual burial-ground was situated at one side, having on many of the tombstones the usual episcopal flowered cross. The north-east side of the valley was bounded by the Tchimishgezek Su, issuing from the gorge noticed before; after this it runs west a short way, and then turns to the town from whence it takes its name.

19th.—We had clouds yesterday for the first time during our journey, and this morning the sky was considerably overcast; it cleared up, however, before the mules had been laden. Crossing the valley and river to east we immediately climbed a narrow steep path going N. 34° E., nearly completely choked as was the mountain by a thick forest of dwarf oak. It took us an hour to scramble to the top, over sharp stones and roots of trees that lay across the road. We had a fine view of the surrounding country from this height, although limited in the direction of our route by a higher intervening range, subsequently crossed on our way to Halvoree from Erzingan. Our road was at the extreme edge of the mountain forming one side of a ravine, with a perpendicular drop of more than 2000 feet. The road was tolerably good, and led through similar forests of oak as those clothing the defile we had passed. Numerous species of gall-nuts and the large plum-size excrescence of the oak—in Turkish Hantooft—of a dark red, abounded; but I failed to distinguish the blue species, commanding the best prices in the European market.

We reached the miserable village of Kozlichar in an hour from the top of the mountain, situated in an upland valley half way down the mountain-side further on north-west.

The oak forest, which had ceased on descending from the mountain near the village, again lined our road on the higher lands behind, and for some distance down our subsequent descent towards Owajik, which we commenced an hour and 20 minutes from the village. From our elevated position we saw the Owajik plain bounded to north by the high range of the arid Mezoor Dagh spread before us, dotted with villages in pretty looking clumps of willow; to the north-east were off-shoots of the same rocky range, and to east wooded hills, a continuation of the intervening range we were on, which encloses the plain on that side. The descent, encumbered by blocks of blue granite, was called the Deveh Boyunee and Kazooklee Pass; it was too steep to walk down soberly. Our gait therefore was perforce quickened into a hurried shuffle for the half hour it occupied, the horses and mules taking double that time. We then entered into the pretty Marko valley, and rested for a few minutes under a grove of walnut-trees near a fine brook watering the mountain valley we were in. Close to was a grove of the Gaoot-shrub—the *Evonymus europæus* of Linnæus—with its graceful pendants of fuschia-red flowers attached like chandeliers by their long gossamer-like stalks to the branches and around the stems. From here our descent to Owajik was long but more gradual; we reached the southern side in 1½ hour from the top of the pass. A regular battle between rival Kizzilbash tribes was going on; not the simple process of skull-cracking with bludgeons, but a regular

musketry fusillade. Hostilities were politely suspended to allow us to pass unscathed; and the rival chiefs took occasion to beg my interference between them. I soon found all my exertions would be hopeless, as although the quarrel had originated about a disputed field, so much blood had been shed and lives lost, that it now was a debit and credit account of heads; the losing party insisting then and there upon money or kind in adjustment of the balance. It took us half an hour to ride across the plain, nearly north, to our night's camping-ground at Ziaret village at the foot of the Mezoor Dagh. The valley or plain of Owajik is extremely fertile, and has the advantage of being watered by numerous fine streams; the most considerable, upon which we were encamped close to the village, has its sources close to. They rush from five or six different places from under the base of the Mezoor Dagh, that stretches in a long line along the whole north side of the plain at a right angle perpendicular to it, without the slightest break or slope. This river is, as the mountain, called the Mezoor, which, after receiving the other numerous streams in the valley, forms the river falling into the Murad Su at Wazgerd, six hours from Peyrtek. At first sight it appears perfectly indescribable where the greater part of this large body of water originally comes from. Most of it seems to burst out at once, as if from the stroke of a magic wand from the smooth face of the iron rock; not the slightest fissure or cavity—but with one exception, where it bubbles out of the ground into a large natural basin—being visible. Our subsequent journey explained the cause. The barren rocks of the Mezoor, that spring up suddenly to the height of many thousand feet, enclose in their broad range deep natural basins nearly always filled with snow, that melts partially during the summer heats; but not to an extent sufficient to exhaust these eternal supplies. The water, in the absence of any soil or vegetation to absorb it, filters through the rock at all seasons, and escapes through softer underground strata in the manner noted. When we visited these sources they were icy cold of a crystal brilliancy, full of fine trout, that sailed up in shoals to the very edge of the mountain; in winter the waters are comparatively warm; but at all times they flow as uninterruptedly as now.\* The climate

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\* The present name Mezoor seems a Syriac corruption, for Mendzoor or Mehzoor Armenian. Mendzoor would mean in that language the mighty or large water source or River Euphrates (?) St. Martin says the veritable Euphrates of the Armenians is the Murad Schai, and that it is formed of two principal rivers, which coming from north and east unite in the Moosh Plain. The Murad Schai is sufficiently well denoted, but he has entirely confounded the second river which he most unaccountably calls the Malazgerd River, and states it comes from the north from the Bin Giul Mountains. The Malazgerd River is a ditch falling into the Murad on its left bank, on which side the Bin Giul Mountain is unknown.



here is hot in summer, but most intensely cold in winter; snow lies on the ground unusually long, falling in vast quantities from

This River St. Martin says the Armenians also call Euphrates, by which the Mendzoor Su is also known—as well as the Kara Su—by the Kizzilbash Koords. No river of equal depth and importance falls into the Murad between Diyadin and Peyrtek, as the Mezoor. I think therefore the second river, Armenian geographers allude to, is the Menzoor, rising as it does in the canton of the same name, which has no existence much farther east, and which Injijan mentions is the Doojik Dagh of the present day. The old geographers say it comes from the ancient city of Medzourkh in the high Armenia and in the canton of Menzoor. Faustus of Byzantium's account of the position of this town agrees with the plain of Ovajik and the junction of the two rivers Merjan and Menzoor; at a point where they enter the mountains. "Hair descended on the bank of the Euphrates in a plain covered with a thick forest, at the confluence of two rivers, in a plum-tree grove; at the place, where anciently existed a town founded by Sanadroug, called Medzourkh." This river St. Martin says joins the other branch of the Euphrates, near the town of Mandzgerd, or in Turkish Melazgerd. He here confounds the latter with the former; two totally distinct towns wide apart. Mandzgerd being in fact the present Mazgerd, five hours from Wazgerd, where the Mezoor falls into the Murad. The whole of St. Martin's description and that of Faustus coincide with the Ovajik and the Mezoor, which is the river St. Martin intended to describe. I may add that the Armenian villagers in Terjan, near Erzeroom, all told me long before I saw the Mezoor that one of the branches of the Euphrates—called by them also El Frat—had its source in the Ovajik Plain, and was called "Baba Mezoor" or Mendzoor, the "Father Great River."

The termination "zour," as stated before, seems Armenian or a word common to it, identical with "djour" water. Fire as well as water were objects of worship to the old Armenians, as well as the Parsees. Mah for Mihr was the God of Fire. The present name of the river, pronounced as it is sometimes Mah or Mehzoor, may point to this double worship, formerly practised at the sources of the Mehzoor in the Ovajik Plain at the foot of the mountain of the same name. Among the 28 Yeeds, there is Ardvizoor, "source of the celestial water." According to Moses of Chorene (*Hist. des Saintes Vierges*) the adoration of the "fire-sister" and "source-brother" was practised at the foot of a mountain in a cavern situated at the place called "Bouth." *Revue de l'Orient.* J. B. Emin's *Mem. sur le Pag. Arm.* October, November, 1864, pp. 210-211. The sources even now are venerated if not worshipped by the Kizzilbash, who call them and the Mountain Baba Mezoor, "Father Mezoor." They make frequent pilgrimages and offer up prayers and sacrifices at the sources. The Syrian author of a *Life of Alexander the Great* (printed and translated extracts from which and commentary by Prof. Wolsey of Yale Coll. U. S., exist in second No. of vol. iv. of the *Am. Orient. Soc. Journal*), although in itself, as the Commentator says, an adapted translation of the original Greek work of Pseudo Callisthenes, "a worthless but popular novel," mentions some geographical data, applying to the Mezoor mountain, river, and plain, that are not without value, from their having an air of truth in connection with the actual sites. I allude to that part (p. 419) where it states "Alexander found a declining mountain, the name of which was Moses," Syriac corruption for Moozoor or Mozer; "and they proceeded down it and ate bread there. And they descended to the sources of the Euphrates and discovered it issuing forth from a cave. And they came to 'Haloorus' from which the Tigris issues like a mill stream." The Kizzilbash, and as I have attempted to prove the Armenians too, say one of the real sources of the Euphrates is the Mezoor River; one of its largest sources issues in fact (see text) from the kind of basin alluded to above, which tradition says was cleared out many years ago by a Persian King, at the foot of the Mezoor Mountain. Certainly no other source of the Euphrates answers to this, particularly when taken in connection with the plain, mountain and Haloorus—Korkar Cave—source of the Tigris, about forty hours off. This part of the translation differs from the Greek, and as Professor Wolsey observes, reveals its Eastern origin. The Syrian translator, taking his account in connection with

November and far into April. The peasants use a cart without wheels—a sledge, in fact—by which they transport their grain from the fields to the villages, along the dead level of the plain, which does not even offer a hillock to obstruct them. In the graveyard here we again saw tombs with the species of speaking epitaphs described as existing at Kozlichar; amongst them, on the headstones of two newly-made graves, was suspended the *chevelure* of a centenarian dame, contrasting strangely in its short pure white locks with the long silky auburn tresses waving sadly over the grave of a Koordish maiden, close to. Dependent to them, as in life, were the braided silk threads in fashion among the female *élite* of the world around us. We walked in the evening to the sources of the river Mezoor, about a quarter of a mile west of the village; tradition reports they were cleared out many years ago by a Persian king. They seemed to issue from the base of the mountains; but as heavy masses from the stupendous rocks above encumbered the ground, it is just possible they formerly issued from a cave which those *débris* have now

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the sources of the Tigris at Haloorus; \* evidently alluding here to the Mezoor Dagh and river of the same name, both of which he probably visited or heard of from colonists of his own nation, that—as will be seen in the text hereafter—once lived there. Although the Syrian Essayist makes a jump to Ikhlât (Klat), from Haloorus, and then to Azerbaijan, we find him still in the “Valley of Moses;” “and Alexander crossed the plain Bahelipta, and went and encamped at the door of a great mountain, and there was in it a way by which merchants passed into the regions within.” Although this, taken with the text, would imply a totally different locality, I am still disposed to think the author, not particular about his anomalous geographical information in connection with his history, was making use of a real knowledge of the Deyrsim country for his foreign picture. The declining mountain being the Mezoor Dagh; the sources of the Euphrates, those of the Mezoor branch; the Valley of Moses, the Ovajik Plain; Bahelipta plain, the Mazgerd upland plain; Bahelipta Mazgerd; then as now the gate of the great mountain Deyrsim, through which an ancient high road led into the interior and, as stated in text, once led from the Black Sea to the Mediterranean by Malatia, &c. The Syrian author misplacing his hero, covered ignorance of history with real local geographical knowledge. His scenes are true; but the hero with respect to them a myth; common to all Orientals, who in default of a hero, invariably pitch upon Alexander, placing him among stupendous mountains, impossible positions, and wherever ancient ingenuity constructed works, they are not able to comprehend or otherwise account for. The Mezoor Su may also be that source of the Euphrates which Pliny, quoting Licinius Mucianus, says rises at the foot of a mountain he calls Capotes, 12 miles above Zimmara, the latter town being also according to him 75 miles from Dascusa (Kebban Maaden). See his ‘Nat. Hist.’ book v., ch. xx. The Romans then would have known the Mezoor Dagh as Capotes. There can be no doubt from the detailed course of the Euphrates thus far being given, that Pliny alludes to the Zimmara of Cappadocia, described in p. 21 of this Journal. Licinius Mucianus’s account agrees then with Armenian and Kizzilbash traditions, in identifying the Mezoor River as one of the sources of the Euphrates.

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\* The Haloorus Cave, Castle on top of it, and district in which they are situated, are called to this day by the name of Iskender Dhul Karneyn, and known as such to all old Arab and Turkish geographers, who place them correctly in the province of “Amid” Diarbekr.

completely filled up. On issuing from the rock the streams all unite—almost immediately—containing then a body of water that threatens to carry away everything before it in its rush. One of the sources, confined in a stone basin of artificial construction, is called *par excellence* “Baba Mezoor;” the water bubbles up into it like a mineral spring. At one side is an elevated wooden frame provided with iron hooks, upon which the korbans or sacrifice-animals are suspended before slaughtering, by the devout or rather superstitious Kizzilbash pilgrims resorting to it in great numbers in fulfilment of vows or ordinary course of devotion.

20th.—On leaving Zialet our course for the first mile was over the pebbly plain at the foot of the Mezoor Dagh west; we then entered a narrow defile in the mountains running nearly south and north. The road was most execrable, over loose rock covered with small angular *débris* as sharp as flint, from the crags around us and immense boulders that time and traffic had worn away to the smoothness of glass. Riding was impossible, the animals when free even skating about in a manner threatening the ultimate fracture of their limbs. In one place, an hour and a quarter from the village, we had to unload the mules and convey the charges on men’s backs for a long distance to a safer spot. We followed the windings of the ravine over hilly ground and across numerous rills oozing out of the rocky cliffs on either side, for three hours and a half; when, after a considerable ascent, we reached an elevated ridge—the highest on this road—between two lofty peaks, 300 yards apart, and to our left a large patch of old snow. This spot cannot be less than 8000 feet above the sea-level, and the peaks near an additional 500; the temperature was consequently excessively cold, increased by a high wind; so much so, that we dismounted and proceeded on foot to warm ourselves. We descended by a very abrupt path for 15 minutes into a grassy basin, containing a rill of fine water, where we breakfasted. A fire was absolutely necessary to warm our frozen limbs, which by great difficulty we succeeded in making with the dried cowdung scattered about the spot. Our further course was in the same direction, continually descending, past a Koord Yailak; till finally quitting the pass—called the Zialet and Soghameyrik Pass—in two hours and a half from the point where we breakfasted, and six from Zialet village. With the exception of the latter portion, which also was bare, I never saw such a scene of chaotic grandeur as this defile presents; huge masses have from time to time tumbled down from the perpendicular blueish-grey rock mountains on either side, presenting at first sight an impenetrable barrier to further progress; while other portions hang high over the road, appearing

every instant as about to become detached and to fill up the narrow passage alone now remaining. Not a vestige of soil or any green or growing thing is to be seen, but the parched withered fragments of that most detestable of all plants, the long-spiked rock-thistle; water however abounds, appearing as if sweating out of the smooth face of the mountain-rock. The rills thus formed are quickly lost in the mass of loose flints and stones covering the road, only again appearing at intervals throughout their underground course to the plain, or subterranean basins supplying the sources of the Meזור River. This passage is one of the most direct roads from Erzingan and Kamach to Tchimishgezdek, Arabkir, and Malatia; it is used by the Koords as the highway by which they receive their foreign produce, as salt, coffee, &c. At present merchants and caravans take the round from Kharput, by Malatia, Eggin, and Kamach to Erzingan. On quitting the defile we were in the Kamach Kuzzaa (Erzingan district), having on our left, about two miles off, the village of Ushuwurt, the first we had seen since leaving Ziaret. We proceeded another two hours more, north, still generally descending, and latterly by a very steep incline till reaching our night's resting-place, Urfet. The hamlet is built on an upland at one side of a ravine, surrounded by fine gardens of mulberry, apricot, and walnut; containing 100 houses, nearly exclusively tenanted by Moslems, who however are strongly suspected of being secretly heretic Kizzilbash. During the heat of summer they inhabit the Yailak we had passed in the morning; but they complained bitterly of the annoyances this exposed position caused them from the Koords; who were constantly carrying off their cattle and sheep.

21st.—We walked down through the village into the ravine, opening out into a fine valley, well cultivated, bearing excellent cotton-crops. The cold of the day before was exchanged for an intolerable heat, all the more oppressive from the suddenness of the change. In an hour from the village we touched the Kara Su (Erzerroom branch of the Euphrates), having descended to it almost uninterruptedly from the top of the Ziaret Pass. It was flowing west; we followed its banks upwards, east, through a pleasing valley and corn-fields till reaching Kamach, an hour and a half further on. Our tents were pitched in a clover-field on the left bank of the river, close under that part of the modern town. After breakfast we proceeded to visit the interesting site of the ancient town and castle, with the numerous relics of antiquity about. Kamach is often mentioned in old Armenian historians under the name of Ani, distinct from the celebrated old Armenian metropolis of the same name on the Harpasus; it is called in vulgar Armenian Gumukh, and by the Syrian

chronicler Kamuk; in Turkish Kemakh. It is in the old Armenian province of Egegheats (Acilisene) and in the district Taran Aghi. The old town was built on an isolated rock, 300 feet high, of a semicircular form, the chord running east and west, with the Tanajur or Tana River flowing through the bend between the two points into the Kara Su. The Tanajur valley is extremely deep; its banks covered with fine gardens and substantial houses, forming the principal quarter of the modern town of Kamach which is continued round the base of the rock. It was from this side (the Tanajur) that Tamerlane prosecuted his siege; filling up the narrow valley with trees and stones, thus making a kind of elevation on which he had planted his ladders against the walls previous to a general escalade, when the town capitulated. The rock is perpendicular all round, and in itself one would fancy almost impregnable; but still its natural strength had been largely increased by filling up gaps and protecting more exposed positions. A road cut out of the side of the rock, supported occasionally by brickwork, leads to the top from the lower town; but it is barred by three massive gates which have successively to be passed before gaining access into the interior. Two are Saracenic, one of them containing an inscription recording its capture by Sultan Selim; the third is probably Byzantine. The remains of the old town on the rock, occupying only one of its corners to the north-west, are surrounded by a wall standing inside the outer one encircling the summit; the space between the two also containing detached buildings and streets of a more ancient date. The houses and remains in the more modern portion, together with the ruined mosque, date from Sultan Selim; whereas the other remains are Seljook and Ak Coinloo and their predecessors; as also is a large massive tomb at the eastern end, now wrongly designated a "Boorj," or bastion, by the natives. It is not long since some of these buildings were inhabited; now no one resides there; Sultan Selim's old mosque, too, is deserted. At no time a very solid structure, it has shared the general decay in a greater degree than the solid structures covering the remains of members of far older dynasties. The area of the rock at top is about a square mile. The high road to Erzingan and Erzeroom is carried across the small Tanajur stream by a brick bridge, then ascending the rock opposite by a way cut through it—not a tunnel—having an overhanging roof but open towards the river. It then descends, crossing the Kara Su by a fine modern wooden bridge. The old road crossed the Kara Su close to its junction with the Tanajur; an arch of the old bridge partially built in the rock still remains, as also the road on the right bank (Kamach is on the left) passing along the side of the high chalk cliff, by a

cutting similar to the more modern one. The Kumer Su, rising near and coming from Gerjaunes, joins the Kara 300 yards above the wooden bridge, and a little above the latter are some old tombs, erroneously, I believe, attributed to the Ak Coinloos.

As Mr. Dalyell, my predecessor, had already—four years ago—penetrated the Deyrsim, by the Haramee Boghaz, from this to Halvoree Vank, I made up my mind to enter it in a new direction, *viâ* Erzingan, in order to pursue an untrodden and comparatively unknown track, although it was reported impracticable for horses or mules.

24th.—Last night and the day before we had a considerable fall of rain, the first break in the fine weather we had enjoyed since leaving Erzeroom; the morning broke suspiciously, and it was not long before we were drenched to the skin. Three hours and a half tortuous travel brought us to the miserable caravan-serai of Apoooshee; having passed one village only on the road, through a country devoid of any cultivation. The route, winding across the low spurs of the Kara Dagh, with the Euphrates, or Kara Su, close to our right, was hilly. On the left bank of the river the lofty Mezoor Dagh ran parallel to the stream; its spurs at right angles. At its back we caught occasional glimpses of the Deyrsim, which, with the highest of the Mezoor, had some patches of new snow from last night's storm. Before us, near Erzingan, was the singular conical peak of the Jaaferee Dagh, forming one end of a spur from the mighty Mezoor. This lofty range begins some miles below Eggin, but on the left bank of the Kara Su, where it first begins to take a decidedly southerly course: extending up to Erzingan it merges eventually into the Koozichan or Shah Hussein Dagh. The real Deyrsim fills up the space behind, from opposite Halvoree and Mazgerd to Kyghi; it is not known, as Ritter would lead us to infer, at any point north of the Kara Su, or nearer it than the Mezoor, which in fact prevents its approach to the stream. As before described, nothing can be more arid, bleak, and bare, than this lofty range; it is a single mass of rock devoid of vegetation of any sort but a few dwarf shrubs, and composed of a hard, blueish-grey rock. The spurs, on the contrary, covered with a red earth, nourish particular kinds of grass and stunted trees. From the khan, still following the course of the Kara Su, and passing the two Komaree and Apishta villages on the left bank, we arrived at Ardose in two hours. To reach it we had to climb a hill for a quarter of an hour, and then found it situated in a side ravine off the regular road. The tents were pitched in a pretty garden close on a diminutive mountain lake, in the centre of an upland hollow surrounded by high hills. The

depth of water was extreme, and the lake appears to have been formerly a crater. Its margin was covered with gardens and houses, forming a Mahalla of Ardose. The inhabitants, all Moslems, were some of them excellent marksmen, never failing to hit the wild fowl sailing on the lake with a single bullet 200 yards off, from the clumsy-looking rifles they carried.

25th.—Heavy rain last night again, rendering the morning air at this elevation, accompanied as it was by a high wind, icy cold. We determined, notwithstanding, to take the mountain road to Erzingan instead of returning to the often-travelled track to the same town by the low-lying valley of the Kara Su or Kamakh Deressee. A hilly road took us to a ravine, in which were situated the villages of Tasholer, or Shasholer, and Mezra close together; it then climbed a long and very steep mountain, from which Erzingan was sighted some two hours off in a direct line. Below us, on a mountain shelf, but high above the valley, was the village of Hanzer. We again descended some way; the road then winding, gradually ascended for half-an hour along the face of the hill to another exposed peak lower than the last. From here the descent down the steep mountain side to Burastik village was effected at a quick pace on foot in forty minutes, our whole journey from Ardose having occupied us two hours and a half. Burastik is situated on the slope of the hill, on the eastern side of the Erzingan Plain, opposite the Kesheesh Dagh, with the Sippey Kore Mountain north of the latter, and about a mile and a half north of the pass by which the Kara Su leaves the plain for the Kamakh Boghaz or gorge. From here on, after the first half-hour, the road was over the Erzingan plain, N. 72 E. to the town, an hour and a half from Burastik. The fine plain slopes gently from north to south, acting as a kind of vast drain for the waters coming from the mountains at the north end and two sides, thus conveying them to the Kara Su. Otherwise it is a perfect level, free from stone or elevation of any kind, but some artificial mounds at the east corner. The soil is rich, producing grain, cotton, fruits, and melons in profusion. The town and villages contain, exclusive of the military, 12,000 houses, of which 2,000 are Christian—a far less number than when Mr. Brant visited it in 1836. The position of the town seems totally wrong in Kiepert's map, where it figures 20 miles nearly south of its true point.

26th.—In the evening wandered over the old fortress, now in course of demolition to furnish cut stone for the new barracks. This building, as it now exists, is a species of patchwork, constructed from the remains of far older edifices. The figures and inscriptions, formerly reported as existing here, have un-

fortunately disappeared; the only remains of antiquity we could find *in situ* being fragments of Arabic and Armenian writing of no interest. The walls, however, have from time to time been repaired with ancient *débris*; thus we saw portions of columns with elegant capitals, finely-chiselled ornamented blocks, fragments of old Cufic inscriptions, and elaborate Armenian crosses, mixed up with the massive stone blocks—having a rough boss in the centre—forming the walls.

29th.—The equinoctial gales and storms precluded our proceeding for some days. This day, however, there was a short break, which we at once took advantage of to start. Our road was south till crossing the Kara Su branch of the Euphrates, and then E. 45 S. to Vank, at the foot of the Kazan Kai Peak of the Meזור, and at the mouth of the Merjan Boghaz or Pass. In thirty-eight minutes after leaving the town we crossed a pretty broad stream—a very considerable torrent in winter, called also the Kara Su—by a miserable wooden bridge resting on piles, a few feet below the ford. This stream is not the Erzeroom Kara Su, here called indifferently by that name and Frat by the natives, as we crossed it six minutes further on by a respectable stone bridge supporting a platform of rough logs. I had at first supposed that this Kara Su was only another arm of the Euphrates Kara Su, but it is a perfectly distinct river coming from a different direction, nearly north of east, and having its sources in the mountains on that side of the Erzingan plain.\* After crossing the second bridge the plain ascends gradually to the base of the mountain range. Twenty minutes from it are the tombs of a certain Merjan and his wife Fatmeh, with their three young children, executed in as many different stones finely carved with verses from the Koran, and dates of their decease. Merjan, it seems, was a highly philanthropic man in his day, and had conveyed the straggling waters issuing from the pass bearing his name, at his own cost, by an artificial canal, to the villages and grounds between it and the Euphrates. Passing through Moola Koi village, we reached the Convent of Surp Lusavoritch in two hours and twenty minutes from the tombs. It is situated on a pretty lawn studded with large mulberry-

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\* I believe it to be the River Agathangelos mistakes for the Kail (Lycus), as he says Erzingan (Eriza) was situated on a mound to the north of the Kail before its confluence with the former. Injijan follows him making the Kail fall into the Euphrates. Or else the Kail and Lycus are two distinct rivers; but it must be remembered modern Armenians call the Saddak or Kailket River the Kail, the name being preserved in that of the district far away from Erzingan; besides the Lycus we know falls into the Iris, although Pliny also makes it fall into the Euphrates; "Nat. Hist.," book v. ch. xx. But again, in another place he says as distinctly, "The River Iris brings down to the sea the waters of the Lycus," book vi. ch. iv. There must then have been two rivers of the same name; the one in the Erzingan Plain and the present Kalkyt or Saddak River.



trees watered by the clear Merjan stream that runs past one side of it. The entrance to the Merjan Baghaz and our road lay at the back (south) of the convent, and from here on, as far as Mazgerd, the latter runs through the mountainous country of the unruly Deyrsim Kizzilbash, through Char Sanjak direct to Kharput. We, however, take the round by Halvoree Vank, Sin, and Mazgerd to Peyrtek, and so to Kharput.\*

October 1st.—The violent rain and wind we had last night took off towards morning, enabling us to start at an early hour. We got over the open country between the convent and Merjan Boghaz in twenty minutes, and then entered the narrow pass. It is formed by high spurs of the Mezoor Dagh; the cliffs on either side coming down sharp leave a way about 50 yards broad, at one side of which flows the Merjan Su. Some attempts at a road, by clearing away loose rocks and stones, had been made, enabling us and our laden beasts to proceed with ease; contrasting favourably with the inconveniences of the Zialet Pass. The river crossed it every ten minutes, and at those parts the road is carried over the stream by serviceable bridges practicable for animals. The mountain was barren in the extreme, not a blade of grass or vestige of a shrub to be seen, while the crumbling nature of the cliffs, constantly filling in the chasm by its *débris*, effectually precludes vegetation. In two places there were indications of coal; from which the old priest at Surp Lusavoritch told me he had procured very serviceable specimens of that fuel. We quitted the level portion of the pass in an hour and a quarter after entering it; after this it ascended the side of the mountain opening out into a hilly upland near Kelleyr village, two hours from the convent. The whole road from this till it debouches into the Owajik plain is known by the same name of Merjan Boghaz, as, till arriving there, it preserves more or less its confined characteristic. The Merjan Su, whose course we had followed thus far, comes at this point through a gap in the mountains, flowing past the village from east, our course being now s.s.w. The rocky peaks and spurs of the Mezoor Dagh here again obstructed the road; several of the former were covered with the virgin snow of last night. The pass onwards was very steep and toilsome, passing a large field of old snow about 500 feet below us in a chasm. We still, however, continued ascending, reaching finally its greatest elevation in seventy minutes from Kelleyr. At this elevated point the panorama of Owajik and Mezoor is perfect; the latter crossing our line of view to south, its length at one

\* It was without doubt through this pass that Joseph Barbaro travelled to Tchiunishgezek, Arabkir, and Aleppo; the most direct route and then an often travelled one to the latter town from Erzingan.

side bounding the pass and plain, and at the other losing itself in the Koozichan. Close to our left, a kind of goats' path, winding among the crags, led to that part of the Deyrsim considered as inhabited by the most unruly Kizzilbash, which the Turkish zabtees with us said was forbidden ground for members of their profession. The point we were standing on had been chosen by a late Kizzilbash robber chief as a burial-place; his tomb, occupying the limited surface—from whence probably he had often spied his prey—commanded views of the whole length of the Owajik and Erzingan plains, and the stony pass still many miles before us. The cold here was necessarily very severe; it was with difficulty we handled our instruments and pencils for the requisite observations. Our road on s. 68 w. was such a steep and rough descent that we performed it on foot till reaching the small Avoosan Tarler Valley in forty minutes; afterwards the pass was again encumbered with small sharp pieces of rock, and larger masses, violent earthquakes had hurled from the lofty heights on each side. In two hours from Avoosan we passed a large spring, oozing out of the loose *débris* in the gorge, with a body of water nearly equal to the Mezoor Su at its first source. Further on was a thick grove of wild walnut-trees, continuing uninterrupted as far as the Owajik Plain. The stream, after flowing a mile through the pass, receives the waters of another source, having its rise above 1000 feet straight up the perpendicular side of the mountain. It seemed to issue at once from a cavern, or chasm, and then came tumbling down from that high altitude in a roaring cataract to the stream on our road, also called the Merjan Su, but uniting with the Mezoor Su about eight hours further on in the plain. Twenty minutes later we left the Boghazor Pass by a road crossing a high ridge of the Mezoor Dagh, called, from the numerous robberies that take place there, the Sakkal Tuttan, Beard-seizing Pass. From here we saw the Merjan Su, after quitting the pass, making a considerable bend; then pursuing a southerly course, at the foot of a beautiful upland, through some fine groves of fruit-trees, oaks, and poplar. We again descended on foot, passing to left Hama Dushaghi and Shah Veyrdileyr villages, to the Merjan Su. At this point the apology for a road, from the Vank, crosses the river by a bridge and goes in a round to Khozat. This route is made use of by the Post that goes twice a month to the military station at Khozat; ours was nearly south; so, leaving the road and river here, we turned to the left over some hills, reaching Seyd Mezoor's village, in a heavy fall of rain, in three and a half hours from Avoosan Tarlar. The stormy weather compelled us to take up our quarters in Seyd Mezoor's house; he was absent,

but his son Seyd Makhmood did the honours.\* This gentleman was candid enough to preface his hospitality by stating that all the people about, and even those in the house, were notorious thieves, and that it would be as well if we kept our eyes open and suffered no one to enter the room. As the chamber was then full to suffocation with dirty, rascally-looking Koords, and inquisitive, naked children, it appeared his kindly admonition came rather late, and indeed, after succeeding in clearing the premises, my servants reported several losses.

*2nd.*—Devoured by fleas and all sorts of vermin during the night, we gladly quitted the iniquitous nest at an early hour, accompanied by our host Seyd Makhmood, who volunteered to see us safe across the mountains, whose inhabitants were under his religious influence. Immediately after leaving the village we ascended through a dwarf *Valonia* oak grove towards the rocky peaks of the *Kandeel Tash*; we then descended through a barren, stony country, then soon again ascended a hill, from whence, in one hour and a half south of Seyd Mezoor's village, we had a view of the junction of the *Merjan* with the *Mezoor Su* in the *Owajik Plain*, about 2 miles from the spot where the united streams enter the mountains; then taking an easterly course. After descending the hill further south, we entered a small cultivated valley, and then a beautiful grove of *Valonia* oak, about 2 miles west of the isolated mountain called *Doojik Dagh*; subsequently reaching the hamlet of *Marko* (or *Merkho*), a mile north of *Malmizrek* village, in three-quarters of an hour from our last position. The country about was finely wooded, but broken up into ridges and ravines it was alternately our lot to scale or cross. In the hollows, and some way up the mountain sides, the *sumach* plant abounds. We breakfasted here and then entered the oak forest, which, commencing before reaching the village, continues more or less as far as *Khizat* and *Mazgerd* to the south, and to *Koozichan* and beyond *Taghar* east and west. The road through it, owing to its steepness, narrowness, and density of the foliage, was extremely difficult, not only for our laden mules but also for the horses. We proceeded on foot, descending to a stream in a ravine, an affluent of the *Mezoor*, washing the base of the mountain to south-east. As soon as the mules came up we commenced an excessively steep ascent, rendered more difficult by the increasing density of the forest and the heavy rains of previous days. Although we had been toiling more than an hour from *Merkho* we were scarcely one mile and a half distant from it in a direct line, and

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\* The name of our host's father is common among *Kizzilbash* Seyds, who show their reverence for the river and mountain of the same name by adopting it.

the same entangled road of mountain, rock, and forest, lay still before us. A heavy thunderstorm came on, our difficulties increasing during its progress. The vivid lightning-flashes and loud thunder, reverberating in a thousand awful echoes from the mountains and hollows around, frightened our animals; while drenching rain, coming down in blinding torrents, for some time effectually retarded our course. We took shelter in the small hamlet of Komeleyr, with Ostenik village close to; the road to both was a natural series of sharp-edged steps in the rock; difficult, I thought, for goats even, but our tired horses and laden mules managed to scramble down them, although to the detriment of the little crockery we had with us. Three hours south-west of such work—from Merkho—brought us eventually to the banks of the Mezoor Su, now a fine broad stream flowing through wooded banks in a narrow, deep gorge between the mountains it divides. We forded the stream close to a rude bridge. The water was up to our horses' bellies, and full of trout; some of our people attempted to catch them, but they refused all coaxing. Again ascended the wooded mountains, passing in half-an-hour the two Pezvenk villages, built on level, finely-cultivated plateaus reclaimed from the jungle, imbedded in fine forest scenery. The whole neighbourhood, as far as the eye could reach, was one mass of oak forest mingled with ash, hazel, and poplar, and on the summits pine and fir. The road still continued ascending through this pleasant scenery, the trees, as we advanced, getting larger and larger, and growing so close together as in many places to exclude the light of day. Cultivation, naturally very sparse, was limited to small plateaux occasionally met with on the more exposed portions. It took us a good two hours, climbing by a tortuous road, to reach the summit of the peak forming part of the Bu Kurr Baba Range, contained in the space bounded by the Mezoor to north and Halvoree and Bezaoot to east and west. Unlike the rocky range of the Mezoor Dagh, an arid, unprofitable rock, this mountain has a rich superstratum abounding in fine forests, giving place when cleared to fields producing millet, Indian corn, and barley. The natural productions peculiar to the oak crowd the trees in every direction, *Valonia* being particularly fine, and second-rate galls equal to any I have seen elsewhere.

After a hilly descent of 30 minutes we reached the miserable collection of mud-hovels, called Tillek, situated in a hollow of the mountains, several hundred feet above the Mezoor, whose waters, like a silver line, flow in a deep rocky glen below us. Before reaching it our caravan, which was some way behind, was stopped by a party of Kizzilbash, whom we had passed on

the road: they were proceeding to plunder our effects when our Seyd, surprised at the delay, rode back and arrived in time to prevent the pillage of our goods.

3rd.—The Seyd left here, consigning us to the care of his cousin and a certain Maksood Agha, the chief of Tillek, both of whom performed their devoirs to our satisfaction. Under their guidance we left the village early, scaling on foot a high mountain that first lay on our road. From its summit we saw the Kandeel Tash, near Seyd Mezoor's house, the Mezoor Range, the Doojik Dagh, and our further road to Halvoree Vank, or Surp Carabet. The same fine forest lay all about us; the road far worse than anything we had yet seen, consisting of a miserable goat-path carried far down, high up and along the side of steep slippery rocks, over which it was perfectly impossible to ride. We had taken the precaution, before starting, to send our baggage by a better and nearer route to Halvoree Village, where we intended passing the night; our progress, therefore, notwithstanding the road, was less impeded than it otherwise would have been. We passed the two small villages of Kirimeyr and Sartap only during our walk, and met no human beings. The scenery was grand and exhilarating; immense precipices on one side rising up on the other into gigantic peaks; the immediate road being encumbered with the dense foliage of huge trees and charming underwood—amongst which the elegant Shemshere or Gaoot shrub peeped out, with its beautiful fuschia-red pendant flowers. Valonia abounded everywhere, as also galls, and the fibres about the branches peculiar to the gall-oak; in other places so carefully picked and extensively used in tanning. Our horses had many narrow escapes between this and Surp Carabet; but although maimed and bleeding from repeated falls and stumbles, we eventually reached the church, comparatively sound, in three hours and a half from Tillek—the last three quarters of an hour being a rapid and breakneck descent on foot. In the vicinity there are some very rich copper and tin mines, and immediately above, a large rock composed of loose pieces of an intensely black stone heavier than lead, but shining like marble, which further on is streaked with delicate white veins. Surp Carabet is known by the Koords as Halvoree Vank; there was nothing very interesting in or about it, with the exception of a finely-carved ebony door, bearing an Armenian inscription. The village, situated on a level highland several hundred feet above the Mezoor Su, which runs at its base, contains twenty Armenian and ten Kizzilbash families, and lies in the centre of several well-cultivated fields. The people and dwellings, however, have a look of hopeless squalor and unavoidable misery—the former nearly naked, and the latter tumble-down mud-hovels, unsuited

even for the coarsest animals. From last night's resting-place, and as far as Mazgerd, all the south-west bank of the Mezoor is peopled by the Seyd Hassanaulee Kizzilbash—the country north-east of the same river belonging to the real Deyrsim, and going by that name. From the Vank Village to that of Halvoree there are some traces of a road, constructed by the Bishop's dependants. It is, however, a mere shelf of loose stones, 2 feet broad, supported on small logs let into the rock, or rough steps hewn out of it, which wear and tear have rendered as smooth as glass. In many places it hangs over yawning chasms, or descends towards valleys, as steep and abrupt as the natural incline of the mountain. We continued the journey on foot in preference to trusting ourselves on such a dangerous thoroughfare. Soon after quitting the convent a heavy storm broke over us, lasting as far as the Mezoor River, two and three quarter hours further on south; we then left the river, which from Owajik to this point is confined in a profound mountain-gorge, and turned south-west to Halvoree Village. Our road from the Vank had been, as far as the river, a steep descent: we followed its bank (right) for half an hour, and then ascended an upland, which we traversed for another half hour, till reaching the hamlet at the other end. Our servants and baggage, soaking wet, had already arrived.

4th.—Halvoree is snugly situated at one end of a small but very fertile upland valley, with the Mezoor Su running at its north-east end, on the site of an old Armenian town—the inhabitants being exclusively of the Kizzilbash sect. Some of the old churches and cemeteries, full of tombstones bearing Armenian inscriptions, still exist, though in hopeless ruin—showing, however, in their construction the antiquity of their origin. Our road, as usual lately, commenced climbing a high-wooded hill; it then descended into a hilly upland, cut up by ravines, with some small villages to right and left, whose names our jealous guides concealed. An hour from Halvoree, Shat Agha's Hamlet was to our right, and three miles further on the large village of Sin, or Sim, with some old remains about it, apparently modern Armenian, and not, as I had expected from the name, of the Pagan period. As we advanced over this upland it became more level, producing in some places good cultivation. Near the fine village belonging to Qahraman Agha we again ascended through fine fields fringed with large walnut-trees, and past a Kizzilbash holly-grove. At one side we saw one of the stones worshipped by these people: it was of great size, being only 3 feet square and  $1\frac{1}{2}$  thick, overgrown with moss and lichen, having a hole through one corner. It stood in the centre of a small inclosure, kept scrupulously clean, and shadowed by the overhanging branches of a venerable tree. Three quarters of an

hour further on we passed Toroot or Soroon Village, whose hospitable Agha insisted upon detaining us to taste his bread and salt. In different places outside the houses in this hamlet were small stone statuettes, about a foot high, of horses—placed generally in the most prominent positions, and serving as I was told as hatchments, indicating the decease of a male member of the family. Passing the village we ascended through a thick wood of Valonia oak, and then finally quitting the Bu Kurr Range, entered the comparatively barren chain about Khozat—reaching it finally in seven hours from Halvoree. The varieties of oak, on the mountains we traversed, with but slight interruption, between Seyd Meזור and an hour from Khozat, which, as before stated, extends from Bezoot to Mazgerd, were numerous, and when, as sometimes happened, I found them grouped together, formed a variety of shade and colour difficult to rival. Unfortunately the season was not far enough advanced to enable me to procure ripe acorns from more than the one species—alluded to before as forming an article of sale for tanning at Erzingan. It is a beautiful tree, unlike any of its species I have seen in Kurdistan. The indigent natives use the acorn for food, contriving to concoct a kind of bread from the flour, produced by roasting and then pounding the fruit. This is the only use they make of the apparently inexhaustible vegetable treasures locked up in this fine range of hills, provided by nature in the Meזור Su with an easy, and, from its depth, constant communication to the more civilised country near Kharput and Malatia. The river traversing the mountain passes through the rich Kara Chore and Char Sanjak Plains, and could be navigated by craft at every season of the year.

5th.—From Khozat we retraced our steps to the old convent of Eyrgan; then pursued a new route over the hilly upland about it. An hour and a quarter after we descended into the Ullu Poor Ravine, passing through the village of the same name, with Erinko and Eyriudek Villages to its right and left. We then climbed a steep hill, covered with the stunted oak, whose leaves here, as in the Deyrsim, are collected and used as sheep-forage in winter. At the top of the hill, which occupied 40 minutes in its ascent, was a mass of lime-stone full of fossil-shells of every description—the majority small bivalves of the muscle species, some of which seemed as if only then taken from the water. From this point we had a good view of the old towns and ruins of Sugmen to our right, situated on a high hill two hours and a half from Peyrtek, on the Murad Su.\*

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\* The proper name of this town is Sokman, so called from the prince of that name, son of the prince founder of the Ortokide (Turcoman) dynasty, Ortok.

Crossing the well-cultivated upland in 15 minutes, we descended a steep hill into a deep glen, at the bottom of which was situated the village of Avzoonik, in the Mazgerd Kuzzaa, our resting-place for the night, three hours and a half E. 20 S. from Khozat.

6th.—The morning was excessively cold—we commenced, therefore, the day's journey on foot. On ascending the hill behind the village, and after traversing an upland for half an hour, the Mezoor Dagh—its peaks now covered with snow—was far to our right, and the river of the same name 3 miles N. 53 E. of our position. The road then became more mountainous, till descending into the fine valley of Meyrgek (in the Peyrtek Kuzzaa), with the village of the same name at its further end. This valley is separated from that of Baleeshur by a low range; crossing it we reached the village—also so named—in two hours and a half E. 50 S. from Avsoonik. Since leaving Khozat we had occasionally passed some small cotton-fields; here and about Meyrgek, however, this cultivation had increased, and we found ourselves surrounded by neatly-cultivated fields, bearing good crops of this article. The produce in the Kuzzaa of Peyrtek, or Char Sanjak, as it is also called, is reckoned at 10,000 batmans (27,500 lbs.) annually; but this is a small portion only of the amount it is capable of producing. Baleeshur has at one time been a flourishing Armenian town; its former ruins encumber the fields, and some of its old churches still attest its ancient importance. It is now the property of a local Bey or Agha, inhabiting the village. Close to the village and in many places along the road between it and Mazgerd are the remains of an old paved Roman road, leading through the hilly Deyrsim country to Erzeroom and Erzingan, that went at one time south as far as Malatia. From here both Koords and Christians assured me a traveller following that road could go in four days to Erzeroom.\* We started at 11·47 along a hilly upland through cotton-fields, and in three quarters of an hour passed the two Kujjur villages to right—our road gradually ascending till 12·53. From here we saw the Mazgerd trees in the distance, and numerous villages situated on the left bank of the Mezoor Su running between us into the Char Sanjak Plain to right. Descending towards the valley of the Mezoor we crossed to the left bank of the river, close under Sheikzo or jo (pronounced as “j” in French) Village, in another hour. The river, broad and turbid from late rains, came from 322; it then ran 122 for 3 miles, and afterwards takes a south-west course, through Char Sanjak

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\* This is probably the same road Joseph Barbaro refers to as leading from Trebizonde to Kharput by Baiboset, Erzingan, Moschout, Halle, and Thene. Moschout may be Mazgerd, Halle and Thene, Baleeshur and Peyrtek; the Murad Su as now being crossed at the ruins of the latter old town.



and Kara Chore, to Pirey, where it receives the river of the same name, and there diverges slightly more west, till falling into the Murad Su branch of the Euphrates, above Wazgerd, four hours east of Peyrtek. After crossing it the country as far as Mazgerd is a continuous though gradual ascent over land nearly choked by large masses of basalt, forming the mountain range about. Thriving-looking villages, all tenanted by Armenians, lined the road: in each the high walls of the proprietary Aghas were conspicuous.

We reached the miserable village of Mazgerd, in the Kuzzaa of the same name, in two hours, after crossing the Mezoor Su. It is built in a natural volcanic basin, at the foot of a high basalt range, called the Kara Takhtik. The hills around are of the same formation, piled up in a slanting vertical and horizontal strata. Their chaotic aspect, combined with the large masses lying near the fields and village, gave the whole a sombre and forbidding appearance, increased by the undisguised filth and meanness of the houses and inhabitants. This may be called the gate of the real Deyrsim. The ruins of old Pagan buildings, Christian churches, and monasteries, in and around Mazgerd, irrespective of its name, sufficiently attest its former importance and large population. They occupy the whole of the upper part of the basin, and stretch a good way down the slope to its centre. The modern portions consist of churches, an old mosque and medresseh, massively built of alternate white and black stone, and some kunbets of the same construction. The mosque is a particularly solid building, the stones being far beyond the ordinary size and their thickness supporting four broad flat arches, resting in the centre on corresponding squat pillars. The medresseh is a more modern edifice, while the tombs or kunbets are respectively about 710 and 720.

Close to the village a spur from the volcanic Takhtik has thrown up at its southern end an enormous rock, about 800 feet high and 3800 feet in circumference at its summit. At one end of this surface a second mass of basalt shoots up abruptly, with perpendicular sides, to the height of another 200 feet. The flat top of this higher mass has been artificially cut into deep furrows, and the whole of the surface with the furrows and cavities is full of fine earth, like the light ashes of wood-fire, in which the leg sinks at every step. The furrowed remains are, without doubt, those of an ancient pyre of the old Persian worship in these parts, and accounts for the modern corrupted name of the village—a modified form of the more ancient Hormizdgerd, city or abode of Hormizd.\* A great part of this venerable pile had

\* This Pyre must have been visible as far south as Kharput, as up to that town I rarely lost sight of the rock, and it is even to be distinguished from the Mehrab

been thrown down by former earthquakes, and was now lying in disordered heaps at its base. In its prime, the sacred fire burning at the top must have been of an extent sufficient to have been distinctly seen at the furthest end of the Char Sanjak Plain, and from the distant heights close behind the walls of Kharput. The ground slopes gently away to the Murad Su, only broken up at its other side by the low hills between it and the high range on which Kharput is built. This part of the rock and all round the base of the pyre had originally been crowded with buildings, formed of the same kind of heavy black basalt, as also were some primitive capitals of pillars, still scattered among them. One of the latter is held sacred by the Kizzilbash and Armenians of the place, who kiss it devoutly, while the latter also cross themselves whenever they ascend the hill. The circumference of the hills have been surrounded by high walls, constructed of a dark red stone, and although apparently more modern, are still of an undoubted antiquity. The inscriptions on two of the bastions, although of a more recent date than the walls, state they were re-constructed or repaired by one of the Ortokides. They are, however, much mutilated. Near the second inscribed bastion was the rude sculptured figure of a lion on the walls, evidently a Mahomedan work, similar in every respect to the same figures accompanying Ortokide and Seljook inscriptions I have seen elsewhere in Kurdistan. The villagers referred to several other ruins in the Deyrsim; but their information, communicated to me by stealth and in furtive whispers for fear of the Koords, was far too unconnected and vague to warrant my visiting them at present. The Kizzilbash would absolutely refuse to talk of their mountain, wishing, as it seemed, to get us away as soon as possible.

*8th.*—Our road to Kharput forced us again to pass Baleeshur, and from thence to Tanz, a fine village in a bare plain, 5 hours from Mazgerd, south 40 west of Baleeshur. The village was Armenian. From Tanz the road was a constant climb for 2½ hours, as far as the top of a range called Sukkal Tuttan, again suggestive of its being a favourite robber resort. To the left, but a great way below, was the large and apparently thriving village of Merjumeck, and before us the rich valley of Peyrtek, bounded by the Murad Su to south. The plain is full of villages, surrounded by pretty gardens and orchards, the descent to it was extremely abrupt; eventually passing a fine large mahalla, or quarter of Peyrtek, some distance from it,

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Dagh, near Arghaneh Maaden, which commands a view of the Diarbekr Plain. The Armenian geographer Vartan calls it "Medzgerd in Dzoph." The Mezoor River flowing close to it may also have been called so from Hormizd; the Hormizd Zour, Mezd Zoor, or Mez Zoor.

we reached it in 3 hours from Tanz. Peyrtek unlike ordinary Turkish towns, partakes of the straggling character of Koord villages, consisting of scattered mahallas far from each other, and every house standing in its own little orchard; thus stretching over a great part of the plain or low land between the mountain-ranges we had descended and the Murad Su.

9th.—Situating as this old town is on the Murad Su, on the high road through the Deyrsim, between the Black Sea, Kharput, and Diarbekr; it must have been an important commercial site, involving a large trade or transit traffic now entirely lost: the only signs of any such activity we saw were several rafts, laden with firewood, floating lazily down the river to their ultimate destination, Kebban Maaden, the silver mines, a few hours lower down. The closing of the Deyrsim had no doubt a bad effect upon this place, forcing the traffic by the round-about way of Eggin to Malatia or Kharput, instead of taking the direct route alluded to before, as referred to by Joseph Barbaro.\* The Murad Su is here crossed by a miserable ferry-boat, from which the concentrated essence of many years' bilge water exhales odours of the most powerful kind. The right of ferry is farmed yearly for 20,000 piastres. Arrived at the other side—left bank of the Murad—we entered a bare hilly country, continuing an hour and a half; the road then entered the garden tract, supplying Kharput with fruit. Cultivation is carried on in the ravines and on the slopes of the hills, while the vineyards run up to the very top. Water, however, is scarce, and everything looked parched and dried up. Traversing these gardens, and constantly ascending, we reached the brow of the hill, overlooking Kharput Plain in an hour and a half more; eventually arriving at the hospitable house of my friend, the Rev. Mr. Barnum, half an hour later. A short time after the Pasha sent us a cavalcade, headed by his kehya, to invite us to become his guests; after a short rest, therefore, we descended the steep hill leading to Mezireh, the residence of the Pasha and officials connected with the Government, and reached our kouak in three-quarters of an hour from the town of Kharput.

The name of Kharput occurs in Arabic historians as Hisn Ziyad and Khurtburt. At an early period of the decline of the Califate it came into the possession of the Koord Merwanides, of Diarbekr and Farkeyn, from whose descendants it

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\* As the Turkish Government is now turning its attention to a general system of roads, amongst which one to Kharput is suggested, it would be as well to think of this route, which custom has proved is both practicable, easy, and most direct. The Romans used it, and their example was followed by every subsequent dynasty.

was captured by Noored Douleh Balak, son of Behram, son of Ortoq. Up to the Tatar invasion it remained an appendage of the Diarbekr branch of that family, but was wrested from them on the flight of El Melik el Masood, the last of that branch, to Egypt, in Hulakoo's time. The fine old castle, built upon a high mass of rock, is situated in the lower part of the town. The only real ancient part of it is the gateway, showing unequivocal signs of an age dating probably from the early Armenian period; totally distinct from the other remains, all Saracenic, still *in situ*. The walls, fast crumbling into decay, rise to an enormous height on every side, built upon the solid rock itself; in the centre of the ruins is a large well, or rather cistern, now nearly filled up. On visiting it, I could not help recalling the episode in its history, when the gallant crusaders Jocelyn de Courtenay and Baldwin du Bourg were confined by their implacable enemy Balak in its depths. A few modern inscriptions in Arabic are seen here and there, but so damaged as to be illegible. At the foot of the castle-rock are the large thriving villages of Sinaboot, or Sinpurt and Hoosenieh. The former, in its present name, seems to have preserved the name of the Pagan deity formerly worshipped here.\*

I was detained several days at Kharput on necessary business, and then reached Diarbekr by the often travelled highway over the Mehrab, through Arghaneh-Maaden and Arghoneh, to Diarbekr.

My travelling companion, to my great regret, returned in December to his post at Erzeroom; on my subsequent journey to Ras el Ain, therefore, I was alone. The Turkish Government had for some months been engaged in establishing a Tchetchen colony at Ras el Ain. Of the 6000 families that had last year and this emigrated from the Caucasus, about 2500 had already been located there; the rest having been sent to Siwass and its neighbourhood. To keep the colonists—a desperate set of brigands, murderers, and thieves—in proper order, and also to protect them from the Arabs, the local authorities had constructed a kind of fort and barracks for 1000 men at Ras el

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\* The name of Kharput will soon disappear from the maps, it having now been changed into the more orthodox "Mamooriet el Azezeh." The reason is because a literary defterdor found out in some old history that the Pagans had formerly worshipped the Donkey ("Khurr") idol ("Poot") here. On this discovery being made, orders came by telegraph at once to change the name—in all official correspondence—to the one indicated. I may remark that all Moslem historians and geographers write the name Khurt Burt thus *خرت برت* when they do not call it *Hisu Zeyad*. The nearest approach to "Khurr Put" is the old Crusader pronunciation "Carpote;" but William of Tyre followed the Moslem pronunciation, calling it "Quart Pier" or "Quart Pierre."

Ain, at the sources of the Khaboor; lying in and about the ruins of the old town.

Various reasons urged a visit to the site of the new colony; after a short stay at Diarbekr, therefore, I started amidst snow, sleet, and mud, my route leading me in the first instance by Mardin.

It required an hour to descend the steep Mardin rock to the Great Mesopotamian plain, over broken crags, huge boulders, and débris of a ruined paved road. In another hour Harzen Village was to right, situated on the banks of the Ghurs River. It rises (6 hours off) in Mount Masius, close at its back, in the district of the same name, falling subsequently into the Zirgan Su.\* At this season, and indeed in water also, it is a diminutive rill; but in spring the body of water it conveys from the mountains is not fordable; at present it has hardly force to work the few mills along its banks. In 30 minutes more we crossed to its right bank, close to Ain Mishmish Village; and in 40 minutes from it reached Koch Hissar, fording the Ghurs, which had made a considerable bend east again, at one side of a fine stone bridge, near the village. Koch Hissar with Tel Ermen close to, are situated on the site of the old Duneysar; the former tenanted by Moslems, the latter by Armenian Catholics.†

Off very early in a drizzling rain over the level plain, reaching the old mounds of Koree and Horee, in an hour and a half from Koch Hissar. They are situated on the left bank of the Zirgan Su, consisting of one large and four smaller mounds, grouped round its base; the whole covering the ruins of a strong fort and outworks. From its similarity of name, I should have identified this place with the Horre of Ammianus Marcellinus (lib. xviii. ch. 10), which Shapoor passed by on his way to Amida by Mejacarire and Charcha (Kurkh), but that the historian says, after passing Bebase, the Persian king turned to his right, which would lead him over the mountains to the Bisherree Plain, east of Diarbekr. A long circuit it is true; but we know that the traitor Antoninus counselled this plan, so as to lead them through a region, "fertile in everything, and still undestroyed; since the march of the army was expected to be made in a straight

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\* This part of Masius was formerly known to the Syrians as Tora-d-Coros, Mountain of Cyrus, which at different localities takes different names, and near Amid and Mardin is called as above. Assemanus, vol. ii. The Koords and Arabs have corrupted the name into Kurs or Ghurs, and call the mountain near Mardin to within five hours of Deyrik Jebbel el Ghurs, from which the Ghurs River takes its name. See also Aboul Furruf.

† Professor Rawlinson identifies Duneysar with the Assyrian, "Tavnusir," 'Anct. Monarchies,' vol. ii. p. 258. It was Tamerlane's head-quarters when he besieged Mardin the second time.

line" (lib. xviii. ch. 9).\* The Zirgan River, rising also in the Ghurs Mountain, 8 hours off, here flows round the western side of the mounds, in a semi-circle, washing the base of the ruins in that direction. 8 minutes after we crossed it near the ruins of an old bridge, and some broken stone columns with elaborate capitals. We left the river here, and took the direct road to Ras el Ain, across the desert, reaching the first jerjub in 5 hours 30 minutes from the Zirgan. "Jerjub," in Arabic, means a natural drain for water, coming from temporary natural reservoirs or elevations; in entire contradistinction to nahr or shatt, having eternal supplies from springs or other never failing sources. "Jerjub" supposes a dry bed during certain seasons, while the latter terms imply regular streams.† There are no less than seven of these jerjubs, (diminutive plural "jureyjob"), all ultimately flowing into the Khaboor; of these four unite, 3 hours before reaching Ras el Ain, forming the jerjub we are now on; the fifth, called Jurjub Harb, falls during spring or rains into the Ain el Beydha, one of the Ras el Ain springs; and the sixth and seventh join the Khaboor between Ras el Ain and Abou Shakhat. All of them receive the spring drainage, with that arising at other times from rains filling the ravines in Mount Masius, the Deyrik, and Metinan Mountains; none of them, however, have a fixed source, or a continual supply of water at any season. As such they cannot be considered real tributaries of the Khaboor; which, in fact, between Ras el Ain and its junction with the Jaghjagha, or Nisibin River, has only one—the Zirgan—which receives the Ghurs and other small streams. Mr. Ainsworth, probably not being acquainted with Arabic, did not evidently catch the gurgling name given him by the Arab guide, and mistook it for Jaghjagha, which name he has noted in his book instead of Jurjub.‡ This error has been followed by Ritter, in his long dissertation on the Khaboor; § and as faithfully copied by Kiepert, in his maps. On our road thus far we passed, 1 hour 40 minutes from the Zirgan, the Heyshereh Mound and ruins, and 3 hours further on another large mound in a valley, whose name I was not able to find out. We stopped a few minutes at the jerjub to rest our horses, near the massive fragments of an old bridge, evidently ruined for ages. None of the arches

\* His march would then have been first north to the Tigris, passing the old Roman castle of Soure, near Killeth; then along the river west by Kurkh (Charcha), through the Bisherree district. Soure I believe to be Horre.

† <sup>جرجوب</sup> جرجوب Noun Subst. derived from <sup>جرجبت</sup> جرجبت he emptied (a vase or vessel) "evacuit vas."—*Freytag*.

‡ See his 'Travels in Asia Minor,' &c., vol ii. p. 113.

§ 'Erdkunde,' Band vii., Theil elfter, pp. 253-265.

remained, but their foundations were visible in the now dry bed of the torrent on either side. We started on again at 2.50, over a slight elevation, continuing for about an hour, when it was succeeded, as heretofore, by a level plain. At 4 passed close to some large mounds and ancient remains; the ignorant guides differed as to their nomenclature, and in the confusion of names each one in turn volunteered I thought it best to note none. Blocks of cut stone protruded from the sides of the elevation, surrounded by foundations of houses, larger buildings, and streets. From here on the whole way to Ras el Ain was a gradual descent; we reached it after crossing another *jerjub*, at 5.35 P.M.

On approaching Ras el Ain from a distance, it appears like a huge natural basin, the level ground sloping to it from all sides. The ruins of the old town are situated in a semi-circle above the springs, on some low ridges bounding this basin to north. The new town, on the contrary, in spite of all hygienic principles, is built in the bed of the hollow, in the immediate vicinity, and between the two streams formed by the collective contributions of fifteen large sources.\* Generally speaking the ten springs to north-east are small and close together. A narrow, but very deep body of water issues from each, eventually forming, near the new fort, the north-east branch of the Ras el Ain River. Amongst the other springs to south and south-west are two of warm water; one, containing a considerable quantity of sulphur, yielding annually 10 tons of this mineral; but light coloured and of inferior quality. The process used in obtaining it is most primitive. Arab divers collect the muddy residue at the bottom of the pool, and then spread it out in shallow pans full of water, which soon evaporates, leaving the pure sulphur sticking to the sides. The most important and interesting sources of the *Khabor*, are the springs called Ain el Hassan and Ain el Beydha, whose waters, combined with the three others noted on the same side, form the largest branch of the river, which, uniting 1 hour south-east of Ras el Ain with the other one formed by the ten springs first named, compose the

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\* The springs are situated to north-east and to south of the new town. The names of the ten to north-east are Ain Zurga el Fukheyree, Ezzarooq, Ain el Khatoon, Ain er' Rehham, Ain Wurda, Ain Fowara, Ain Umm Khuzuf, Ain Banoos, Ain ez' Zeyn, Ain el Ajooz.

The new town is built close to these, at some distance from the following five, south of it, which form the other arm of the *Khabor*. Their names are:—Ain Jebbara, Ain el Harra, Ain el Kebreet (sulphur hot spring), Ain el Beydha, and Ain el Hassan. All these sources are beautifully clear, the smallest objects being visible at the bottom, although most of them have a considerable and others an extraordinary depth of water. Some two hours off are numerous other sources also falling into the *Khabor*, but an entirely different collection from those here. There are no ruins near them of importance.

real Khaboor River. Ain el Hassan is about a mile round and of great depth. When its water is low there is a whirlpool close in to the eastern bank, which then throws up short thick columns of water at intervals. Old traditions say, that a great many years ago a large marine animal, like a horse, issued from its waters; after which this source was called by its present name, "the Horse's Spring." At Tel Ermen the fragments of a Syriac book, written on parchment, were found a few weeks since, containing, among others, a description of Ras el Ain, and the different animals found there; particularly mentioning the "Hassan el Bahr," "river horse," as being common there and in the Khaboor. About half an hour south-west of Ain el Hassan, and an hour from the new town, is the Ain el Beydha; the second largest source, but when I visited it I could not distinguish it from the muddy waters of the Jurjub Harb,\* which, swollen by the late heavy rains, was pouring into it.

The description Ritter, quoting Schultens, gives † (p. 379) of Ras el Ain and the Khaboor is very correct. It says: "Ras el Ain is a large town, between Haran and Duneyser, where many springs divide into two rivers, subsequently joining each other. One that is outside the town is surrounded with gardens and fields, but the other comes out below the town itself, and at once works many flour-mills. Both united form then the great Khaboor River (upon whose banks are cities and villages, with ferries), which flows into the Euphrates above Rohoba, near Kerkessia." Even at this date the stumps of every kind of fruit-tree are visible in the vicinity, sufficient to suggest the former smiling aspect of the country. They stretch for miles down both banks of the south-west branch, and are continued along the united streams. The Tchetchens were pulling up the roots for firing, in the absence of any kind of wood or fuel in the neighbourhood. On the north-east branch, the remains of

\* This is the Veyran Shehr Jurjub, called also "Arslan Dedeh Jurjub."

† See his Geographical Index to his translation and text of 'Life of Sellah ed Deen,' by Boha ed Deen. He followed Arabian geographers. Aboul Feda says there are more than 300 springs here, one of which is called Ain Werda, and according to Elazeezee Ras el Ain was called Ain Werda, and that it was the principal town of Diar Rebiaa. At the time of the Arab Conquest, El Wakidi in his

فتوح ديار ربيع وديار بكر

states there was a bridge (a kind of suspension bridge) over the Khaboor. He says "Schariam, son of Forninum or Firuf, Governor of all Upper and Lower Diarbekr, who had his head-quarters at Ras el Ain, sent his nephew, the Armenian Governor of Tel Mozen (Tela), to the help of the Christian prince of Circesium Wortbeg (? Vartabet). He caused the bridge over the Khaboor to be destroyed. The bridge rested on iron columns, with chains between them upon which boards were laid." El Jetaklivri, speaking of Ras el Ain, says "Ras el Ain is situated in a level plain, its chief produce is cotton, and there issue from it more than 300 springs forming the Khaboor, on whose banks for the space of 20 Fursukhs are villages and cultivated lands."



masonry, sluices and gates, belonging to the old mills, were *in situ*, only requiring outlay and energy for utilisation. The ruins of the old town, from the accumulations of centuries, are completely concealed from view by a thick coating of earth, presenting now nothing to the eye but an undulating scene of verdure. One of these grassy mounds, larger than the rest, stands out alone from the mass, seeming, from its position and size, to have been formerly a citadel or palace. It is full of fine out slabs, ornamented cornices, fragments of columns and minute particles of different coloured stones used in mosaic. At one part of the ruins a wide fissure discloses at its bottom a deep subterranean basin of beautifully clear water, full of enormous fish.\* There is, apparently, no outlet in the direction of the springs, from which it is distant; but the same kind of fish being abundant in the river, there must be some communication between the two. Towards the north-west it seems to penetrate by a narrow passage far below the ruins; some of the people who accompanied me said they had groped along the tunnel for more than an hour without discovering from whence it really came. Although the position of Ras el Ain and that of its numerous springs is well worth a visit, I was disappointed at there not being, above ground at least, any very interesting remains. One sees certainly the long lines of streets and foundations of buildings, now level with the plain; but nothing more than these and the confused ranges of low green mounds covering the old city. But I had expected to find something to remind me of its former importance,—as a Roman colony, an important Byzantine fortress, opulent Moslem city, and great commercial mart, on the high road between the sea, Serooj, Harran, and Nisibin, to Mosul, Baghdad, Persia, and Serica. The only coins I saw, too—and they were in profusion—were Ortokide and Eioobite; no Greek, Roman, or Sassanian. But among the natural curiosities I picked up were a quantity of small fossil bivalve shells. They existed in profusion, scattered indifferently everywhere among the ruins. The people about insist upon looking upon them as primeval date stones, as, although a yellowish white, their shape and size resemble them exactly. Ras el Ain was captured from the Byzantines under Martemius as governor, after the decisive victory gained by Ayadh ebn Ghanem over the Christians at Murj Raaban, by a stratagem of the renegade Allepine “Yokinna.”† This took place in Omr’s Califate, after a protracted resistance, in A. H. 17,

\* They are very tame and may almost be caught by the hand. This spring may be the fountain of Chabura alluded to by Pliny as in Mesopotamia, and as being one of the places where fish eat from the hand. Book xxxii. ch. vii.

† El Wakidi.

A.D. 638.\* During the Ortokide dynasty it was an appanage of the Mardin branch of that family, and was frequently harassed, and at one time occupied by Jocelyn de Courtenay of Edessa. Tamerlane, after having sacked Mosul in 796 A.H., plundered Ras el Ain, and reduced its inhabitants into slavery.† Benjamin of Tudela, it seems, was the last European who visited it, probably about A.D. 1163. The name is, indeed, omitted in his 'Travels;' but the distances quoted, from Harran on one side, and Nisibin on the other, taken in connexion with the name of the river, would suppose that he did; although his notice respecting it is short and vague. At that time it contained a Jewish colony. This old city has been occasionally called "Invarda," ‡ a corruption of the Arabic Ain Werda, a title, as noted, sometimes applied to it by Arab geographers also, from one of the sources of the same name. I could discover nothing in any of the sources or air of Ras el Ain to account for Pliny's assertion, quoted by Ritter,§ that it is the only place on earth where there exists an odoriferous spring. It is perhaps a parody on the universal stench hanging during night and early morning over the town, produced by the sulphurous exhalations from the Ain el Kebreet, before alluded to. Nisibin is about 20 hours from this; Harran and Orfa three days; and the isolated ridge of the Abd ool Azeez Mountain, eight hours off. An intelligent officer of the Turkish staff corps, Soheyl Bey, attached to the Pasha, had passed along all these routes, and found ruins existing at regular distances throughout;

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\* Ptolemy notices Ras el Ain as Raisena, St. of Byzant: "Resina polis peri ton Aboran." Sept. Sev. erected it into a Roman colony, called Sept. Colonia. In 380 Theodosius enlarged and improved it, calling it Theodosiopolis. Having fallen into decay, it was subsequently again repaired and turned into a fortress by Justinian as a refuge place for his subjects against the Persians. It was the emporium for Diar Bekr, Rebiaa, and Mesopotamia generally. It was the only town in Rebiaa taken during the Moslem conquest by the sword. Its central position and great strategic importance made the Greeks defend it to the last. It was also full of fugitives and their property. El Wakidi says that after sending a fifth of the treasure to the Calif every horseman got 20,000 dirhems (1000l.), and every footman half. In the neighbourhood of Ras el Ain are several isolated old artificial mounds covering ancient ruins, probably the ruins of the forts situated according to Procopius, near Rhesina, that were all strengthened by Justinian. The Tels or Mounds I particularly allude to are called Tel Khullef, El Guteyna, El Gla (a corruption for Kalaa, castle), El Jineydeea. El Gla, from the massive remains *in situ*, may be possibly the site of *Θανουριουρμεγα* of Procopius.

† Arab Shah's 'Life of Timoor,' Ar. Text, p. 97.

‡ See historical tables of Noah, the Patriarch of the Syrian Jacobites in Mt. Lebanon, the continuator of the Syrian Chronicles of Abool Furruj. Asseman., vol. iii.

"Ain Werda, which is Ras el Ain," El Wakidis, Fetooh, Diar Rebiaa, and Diar Bekr.

§ 'Erdkunde,' Band vii., after Theil, p. 379. Pliny calls the fountain that of Chabura, and says Juno bathed there, which gave it that smell. Book xxxi. ch. xxii.

the remains, probably, of ancient military posts or relays connecting the different localities alluded to.

After completing all I had to do at Ras el Ain, I turned towards Diarbekr by Veyran Shehr, the road to the latter being nearly west 57 north, continually nearing that part of Mount Masius near Deyrik Town. An hour after starting the road passed the natural mounds of Chibset Ras el Ain, and in three hours a Tel and ruins. The surface was covered with large blocks of white stone and basalt, the remains of old buildings, but nothing presenting in the whole any decided shape or design. An hour farther on, I stopped to breakfast on the bank of the Veyran Shehr Jerjub, close to a Tel, called Arbeed, and a small Zialet on a hill in the vicinity, called Aslan Deda. The heavy rains of the last few days had filled the dry bed of the Jerjub, which now, full of red muddy water, was tearing along in its course to the Ain el Beydha and Khabor. An hour from this, Aslan Deda Village, now ruined, and its holy tree were close to our left, situated on the Jerjub we had left. The road hitherto had been over a fine undulating plain, generally rising from Ras el Ain, of rich mould; twenty minutes further on, however, the land dipped, and was covered with masses of basalt and white stone. Forty-three minutes afterwards the road crossed a low circular mound, covered with ancient ruins. Standing walls, capitals, and columns, all of basalt, crowded its summit. Veyran Shehr, situated in a marshy hollow, on the banks of a rivulet, was close to; and we dismounted at that ancient site, in twenty-seven minutes from the last Tel or Mound.

I could only stop two days at Veyran Shehr; but two weeks might easily be spent here in examining the ruins in detail. Rain and wintry cold, however—it was late in December—rendered any longer stay there lost time. The ruins have already been visited by Tavernier, Olivier, and, more latterly, Ainsworth.\* He calls it Kohrissar, and is the only person who has, as yet, given a description of it.† His

\* My former visit here was during a hurried flight, when it was utterly impossible to stop even a few minutes consistent with safety.

† It was the head-quarters of the "Dux" of the district, who formerly had his seat at Dara, but in the peace concluded between Chosroes and Justinian it was one of the conditions of the treaty that the army head-quarters should be transferred from Dara to Constantina, which had the effect of increasing the distance for troops between the Persian and Byzantine frontier. Procop. 'De Bel. Gal.' xxii. Mannert says it was built by Severus or Caracalla, and called "Antoniopolis," and A.D. 350, its walls were strengthened by Constantius, who gave it his name. It was subsequently again further fortified by Justinian, who finding the bastions too far from each other built intermediate similar works. Ammianus Marcellinus says it was built by Constantius when Cæsar, and called by him Antinopolis. Lib. xviii. ch. ix.

Assemanus, vol. i. p. 273, says Constantius repaired it, A.D. 350. Cobad

stay, however, was too short to enable him to do sufficient justice to the subject. The walls are still in comparatively good preservation, with the same characteristics as those of Diarbekr, repaired, or rather constructed, also by Constantius, considering the lapse of time and ruin they have been subject to. They form nearly a perfect square, each side being about half a mile long, constructed of even cut large blocks of basalt, with round towers at regular distances, close to each other. It has four gates, on each side of which are ornamental niches for statues; one of them, sadly disfigured, was lying among the ruins. The interior is a mass of ruined tombs, streets, fallen houses, and deserted churches. The remains of baths, or perhaps of a covered market, consisting of a series of fine arcades, occupy a considerable space near one of the sacred buildings. Crosses are carved liberally everywhere, on arches, houses, and shops. In the centre of the town is a fine large spring of delicious water, that falls into a cut stone cistern, and then steals through the crumbling ruins to the brook outside the walls. A high grass-covered mound at the south-east end towers over the walls and ruins, commanding an extensive view all round. It covers the *debris* of the ancient citadel. I succeeded in penetrating this ruin, by an old shaft leading into a high-vaulted passage of cut stone; my progress was stopped by an impassable barrier of ruin.

From Veyran Shehr I went to Deyrik, starting at 8:25 A.M., of a rainy morning, over a soft soil, rendered still more so by heavy showers. The road was 54 east to the village and mound of Lulakchee, fifty-one minutes from our starting-point; twenty minutes after crossed the Alishkhan Jurjub, close to its mean village; road 38 east. From here, on to a mile beyond Injerlee, due east, two hours and forty minutes from Alishkhan. The heavy rain that had been falling ever since we started, compelled us, although so early in the day, to stop at this miserable village for the night. It was dreadfully cold, and no wood, milk, barley, or bread to be had. Locusts for the last six years had devastated the land; the villagers were paupers, huddled together in miserable hair tents at this inclement season, with scanty clothing, and none of the prime necessaries of life even, their only diet being a detestable millet paste. Under such circumstances our party fared badly, and it

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besieged it when Count Leontius was Prefect of the town. Count Peter, a prisoner with Cobad, found means to send information to the Prefect that the Jews who existed in large numbers in Tela wished to betray it to the Persians, proposing to run a tunnel from their synagogue outside the town into the city, and to take advantage of a stormy night to introduce the enemy. This treachery was, from the timely information received, defeated. It can hardly be the Anthemusia of Strabo, although some modern authors identify it as such.

was hard work to warm ourselves, through what seemed to me an endless night.

Next morning saw us at 7·51 in the saddle, pursuing generally a road bearing 38 east, passing a few minutes after a jerjub, now considerably swollen, reaching up to our horses' bellies, but falling rapidly. At 9·12 crossed a similar drain, near a ruined village, surrounded by a small Koord encampment, reaching Mokhat at 10·30. The heavy rain, as yesterday, again compelled a halt; but the palpable misery of the inhabitants, their undisguised squalor and filth, soon drove us on again, although a tempest was raging. We left at 11·47, crossing another jerjub close to Kharraba Village, a quarter of an hour on, then turning towards Deyrik, over a road encumbered by honey-combed masses of limestone. An hour before reaching the village, the Mesopotamian plain ends, and the mountains commence, the road ascending gradually till reaching it, 2 hours 28 minutes from Mokhat. The country from Veyran Shehr to the foot of the hills is a constant, though slight ascent to north, dipping only into shallow ravines at the several points traversed by the Jurjubs. Before reaching, and after crossing them, the ground is invariably covered with blocks of basalt, the waters flowing over a similar construction. Deyrik itself is situated on a low spur of the mountain, at one side of a gorge, perfectly choked with olive-groves\* and pretty gardens, watered by fine streams. Scattered about them are some curious old tombs, in which are found glass bracelets, a light green, stamped with a rude representation of an eagle, and also some carved stones, agates, cornelians, &c., showing, in the figures of animals and profiles they bear, a high degree of art. Close to, in a plain enclosed by a mountain-spur, sweeping round one side to south, are the modern village and ancient remains of Tel Besmel.† They cover an immense extent of ground; the landmarks of the fields, now covering the old city, being pieces of cut stones, fragments of columns, and dilapidated capitals. The extent can be easily judged of, from the low flat mounds that cover this part of the otherwise level plain and their sharp perpendicular sides. In ploughing the different fields, the peasants

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\* The oil produce is on an average about 1400 cwt., valued at 2900*l.*, irrespective of the fruit kept for sale or use. The trees, however, bear only alternate years.

† The name seems to point to a Harranic source, being a compound for Ba or Beit es Sensaa "the heavens," or Baalseemin, worshipped with Besin and other idols at Harran Chevohlron. Vol. i. p. 373, vol. ii. pp. 158, 508, of his *Ssaber und Ssabismus*.

Assemanus writes it, however, following Syriac authors Tela-d-Besme or Tel Besmai, that is the hill or mound of sweet spices. Olympius of Tela and Eugenius of Melitene were defeated here with great slaughter by Cobad and his Huns and Arabs 503 A.D.

constantly pick up fine coins; I purchased two of the beautiful silver tetradrachms of the young Antiochus (Dionysius Bacchus) that had been picked up a few days before. In an isolated hill on the edge of the plain there are rich traces of copper, and all the appearances of a mine having at one time been worked there; the natives, too, have a tradition of the sort, calling the hill in consequence the *Tel es Sipfr*, or *Paaker Maaden*. *Deyrik* was at one time a flourishing place, and even till within the last seven years had some 500 families, who carried on a thriving trade with the Arabs in grain, and taking their wool, butter, sheep, and camels, in exchange. The continued prevalence of locusts, however, combined with wretched government, has reduced the above number to 150 families, who are all engaged in the olive-oil trade, or in that of galls, procured in the chain of mountains between it and *Mardin*, the first part of which, up to six hours' distance east of the town, is called *Jebbel el Affs*. The proper name, however, is the *Toro de Coros*, corrupted, as stated before, into *Ghurs*, near *Mardin*. The old name is not known to the natives, and the corrupted form only applies to the portion indicated; while that part of the range between us and the *Diarbekr* plain goes by the name of the *Metinan Dagh*, from the district also so called, the mountain close about *Deyrik* being again known as *Deyrik Dagh*.\*

Excepting two or three short descents, the first two hours and half from *Deyrik*, towards *Diarbekr*, is an ascent over the *Metina* mountain, and through a well-wooded, gall oak country, as far as the village of *Seesan*; the road then descends easily through the same wooded landscape to the valley and village of *Goola Goolee*, 44 minutes further on. The plain is about 2 miles long, and the same broad, consisting of a stiff red clay the heavy rains of the last few days had turned into a difficult, scarcely passable, morass. It took us 46 minutes crossing, when we again ascended for 52 minutes, slowly, to *Kalla Village*, on the top of a hill, overlooking the large *Diarbekr Plain* and *Tigris Valley*. The town was at this elevation, it being also a clear day, distinctly visible, bearing west 82 north. The ruins of a castle of the later Mohamedan period crown a height at one side of the village; the latter looked as dilapidated as the former, the inhabitants appearing like those of *Mokhat*, to share the decay exhibited all about. Our road thus far had been about north 10 east; but here on as far as *Shiakee Village* it was west 50 north. The road was a descent the whole way, and

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\* The natives divide the Mt. between *Mardin* and *Deyrik* into the "*Lahef*" and *Jebbel Affs*. The *Amrood*, *Balika*, *Bahdina*, *Araban*, *Sheyb*, and *Meshkeena* tribes inhabit the former, and the *Kharoke*, *Tareen*, *Mendeyla*, *Mohlebee*, and *Kusrek* the latter.

we reached it in 50 minutes from Kalla. At Kalla we left the Metina district, and entered that called Shurk, immediately under the Diarbekr authorities.

We slept at the miserable village of Shiakee among the goats and cows filling my host's hovel. Pursuing the same direction as last night—over the saturated plain—we left the direct road to Diarbekr, now impassable, owing to swollen brooks on the road running west, 82 north. In an hour we passed a ruin and mound called Tel Meer Sin, and in 17 minutes more the hill and Zialet on its top called Kara Baba. From here the Kuroo Schai and bridge over it bore w. 78 n.; in 17 minutes we crossed it close to the ruined Dilaver Pasha Khan, after which the course was for 1 hour 40 minutes n. 12 e. to the ravine and river of Moola Koi Tchai. Forty minutes before we had passed the artificial mound and Yezidee village of Teppa\* close to left. For half-an-hour before reaching it, and as far as the Tigris, the ground about the road is strewed with boulders of basalt in a clay soil, into which our horses sank far above the fetlock at every step. The ravine of the Kuroo Tchai, as also the Moola Koi ravine, were also composed of the same basalt, with steep sides. The latter, however, is not so deep as the former, but about five or six times its breadth, through which the stream rushes in three separate channels, crossed by as many dilapidated stone bridges. From this stream to the Mardin gate of Diarbekr was 3 hours 32 minutes, in a direction 16 w. of n.† I reached it late on Christmas Eve.

In the spring of 1867, I made a short tour to Mardin and round along the edge of Mount Masius, past Deyrik and the west end of its mountain, in order to observe its real geographical limits, as also to note the different affluents of the Zirgan close to their sources more correctly than I had done previously.

About two hours e. 76 s. of Diarbekr is the mound of Kazook Teppa. It is of considerable dimensions, covering the ruins of a large isolated building. Shattered columns and capitals strew the ground and are used in the village at its foot for horse blocks, and when found in larger perfect pieces for supports to the roofs of the mean hovels there. My road—I avoided the muddy thoroughfare—led me past it, from whence

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\* Also called Meyrkis Village and Melkish.

† The Mardin gate is the Bab et Tel of Wakidi, and of Arab Shah in his history of Timoor, relative to the siege and capture of Diarbekr by those two men. Ayadh ebn Ghanan had his camp in that quarter. It is so called as from it one can see the curious domed mound called Chunar Teppa, about 3 miles west of Shiakee in the plain on the bank of the Kuroo Tchai.

we took the path close under the base of the hills formed by spurs from Mount Masius. Half-an-hour after leaving the ruin we crossed the Moolla Koi torrent, here called Seypurk Tchai, and 50 minutes further the Kuroo Tchai, close under the village of Kunjaghaska. An hour and 20 minutes from it, over an undulating country covered with fine grass and flowers—it was May—is the large mound also covering large ruins—more extensive than those at Kazook Teppa, and probably the remains of an old town as well as a castle—called Bakhtirree on one side of Baghajik village. From here, on to Mardin and Harzem, there was nothing of any interest. Harzem is situated in a pretty ravine close under the mountains on the banks of the Ghurs Su, a little way below the two villages of Kurey and Sbeya, which, with Harzem, are surrounded by some fine mulberry trees and remains of old gardens. This was a favourite summer resort of the Ortokide kings of Mardin, the last of whom—Mejd ed Deen Eeseh—repaired the Zialet and mosque—built by a faithful servant of one of his ancestors—the ruins of which exist on the banks of the stream close to the stone bridge crossing it here.\* From the mound near I had a good view of the junction of the Ghurs and Zirgan rivers at Tel Ibrahimieh, bearing 232 about three hours off. An hour and a-half from the village travelling west, along the base of the Jebbel Ghurs, crossed the main branch of the Zirgan. We followed it up north for a mile, through a lovely valley full of blooming oleanders and pretty gardens, to some large grotts scooped out of the rock. The position was so charming that I took up my quarters for the day in one, before which were spread a small lawn and clumps of rose bushes and olive trees. A clear brook rustled past the door of the grot, the clear water bathing the base of some stone seats where formerly, probably, the ascetics of the place indulged in the *dolce far niente*, that seems to have been their only claim to holiness. This pretty spot is close under the village of Amrood, and opposite to it, on the other side of the stream, are some large grotts, now used as sheep stables. A hill separated us from the hamlet of Haffaree, so called from the numerous artificial caves about it. A small stream, joining Zirgan, runs through the gorge, on one side of which the houses are built under the shade of a high mountain peak called Pharaon. Our course was west, and, as before, close

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\* The builder's name is Taj ed' Deen ebn Masaood ebn Abd Ullah en Nassree, that is an officer in the service—as the inscription also states—of the King Nasser ed' Deen Ortuq Arslan ebn Ilghazi ebn Elipi ebn Temr Task ebn Ortuq Ne Mohurrem, 608 A.H. The other inscription is that of Melik Reseh, and bears date A.H. 774, but all Arabic authors date the commencement of his reign four years after.



to the base of the hills as far as Tel Besmeh.\* Four hours and a half from Haffaree. During our ride we crossed four other tributaries of the Zirgan, called from the villages they run by close to right of our road the Badineh, Araban, Sheyb, and Meshkeena streams. Tel Besmeh is a large village situated on the left bank of the Deyrik stream† amongst the ruins of the old town. It is about a mile and a half east of Deyrik, and peopled by Christians and Moslems equally. About 2 p.m. we were startled by a rustling sound high up in the air, and an almost instantaneous obscurity, although it was a calm still day without a cloud in the heavens. An impenetrable swarm of locusts soon swept past, alighting about a mile from our position in the midst of some standing crops of wheat, which, fortunately for their owners, were ready for cutting, and therefore unsuited to the delicate tastes of these insects. Three days ago, at Mardin, I had witnessed a similar flight; but, as the main body was over the town, a swarm of birds of the starling species fell upon them and did their best to destroy them. But they did not escape scot free, for, incredible as it may appear, several of them fell to the ground, their feathers having been completely nibbled by the locusts, who stuck to their bodies to the last. When the locusts alighted—which always happens as the day advances and the sun gets hot—the birds again attacked them, slaughtering myriads. They do not swallow them, but simply cut them in two with their long sharp beaks. They perform the operation with such rapidity, repeating it so often, that their beaks become rapidly clogged, upon which they fly to the nearest water, cleanse them, drink, and immediately return to their work, which they do not desist from till the locusts again take wing in the cool of the evening.‡

Our road from Tel Besmeh was more north, and across the mountain slope for two hours to the village of Phittur, situated in a valley which is, to south, separated from the Mesopotamian plain by a detached range of hills. A very large ancient town once occupied this site; its remains strewed the slope bounding the valley to north—consisting of large blocks of cut stone—some of them bearing defaced illegible Greek inscriptions, remains of gateways and tombs. In a hollow close to the village is a spring of clear cold water, more than 30 feet deep, and about the same in circumference; but in summer and

\* Or Tel Besin, as it is also called.

† It loses itself in the plain.

‡ These birds seem to be the same as those called "Seleucides" or "Selucidæ," by Pliny, which, consequent upon the prayers offered up to him by the people of Mount Casius, were sent by Jupiter to destroy the locusts ravaging their crops of corn. Pliny's 'Nat. Hist.' Book x. ch. xxxix. Cuvier's suggestion that they are the "*Turdus roseus*" of Linnæus seems correct. They are called "Sammirmed" by the Arabs.

autumn it is entirely dry. An hour and 10 minutes south-west are two ruins called Z̄erawa and Hofee on the edge of the desert; there, too, we found several slabs—all, however, hopelessly illegible—bearing Greek inscriptions. Two miles off, N. 10 W., on the top of a high peak or ridge, are the ruins of Rubbut, and at its northern base the village and old town of the same name. The old castle on the peak is one of the most extraordinary and curious I have seen, being constructed entirely by scooping out the rock, thus forming walls, houses, and cisterns for water. Brick and stone work are simply auxiliaries, everything else being integral portions of the mountain. The position and nature of its defences would render the fort, even at this time, impregnable; cannon could do nothing against solid stone, and the only path to it is so steep that we found it difficult to crawl up. The length of the rock thus fashioned is about 1000 yards, and breadth 300 to 400, its shape being, of course, irregular, as advantage has always been taken of the natural features of the mountain, which has on the outer side been cut sharp down, and reduced also inside, so as to offer as much impediment and protection as possible. It has been further strengthened at its two weakest parts by two trenches also cut out of the solid rock; 20 yards broad and 30 deep, thus isolating it entirely. Five enormous cisterns, besides hundreds of smaller bell-shaped receptacles—with a small hole at the top, two feet square, covered by a stone—have also been dug in the rock; small artificial channels conduct to each to lead the water to them falling after rain. The only loose cut stone and brick to be seen are such as were employed for roofing the cisterns, and in one or two places about the walls. The cut stone still *in situ* were blocks 3 ft. 8 in. long, 2 ft. 5 in. broad, and 1 thick. In ancient times the fort was approached from the south by a road which, about half a mile from the wall, is carried through a deep tunnel—open at the top—cut out of the rock; about 20 yards broad and exceedingly steep. From the walls we had an extended view to south of the Mesopotamian plain as far as the Khaboor, and to west of the part of the Diarbekr plain ending at the Karracha Dagħ, which to west ends abruptly; entirely separated from the range we are on, though in the maps it appears to be its prolongation to the east. In this manner the entrance to the Diarbekr plain, from that of Mesopotamia, is through an unobstructed narrow level pass of about three miles broad. I should have been strongly inclined, were it not for the geographical description Procopius ascribes to Rhabdium being irreconcilable, to have at once identified these ruins as occupying the same place as that fortress. Its position with the plain



160

156

22

21

20

19

☞ Kaula

Lehua I.  
 Ft. Foulweather  
 Kona Pt.  
**NIHAU**  
 Yama Pt.  
 Cook's Anchorage  
 C. Kawaihoa

Kaula Channel  
 Waialeale Bay  
 Na Pali Pt.  
 Hanalei Bay  
 Kapua Pt.  
 Koolau Pt.  
 Waimea Bay  
 C. Kawai  
 Loloa Pt.

Maui Channel  
 Kanapali Pt.  
 Honokohau  
 Kailua  
 Hanalei Pt.  
 Ulukoua Pt.  
 M. A.  
 Halea  
 C. Kahiki

Lava Pt.  
 Kaulano Pt.  
 Kaibua Bay

Kealekaha B.  
 Kaulawamao

Chart of the  
**SANDWICH ISLANDS**  
 to accompany the Paper  
 by  
 the Bishop of Honolulu.

160

156

(Ager Romanorum), stretching away to Veyran Shekr (Septimia Colonia), 10 hours off, before it; its great natural and artificial strength agree better with the description of the old Rhabdium than any other ancient site—and I have seen, I think, all of them—in the whole range of mountain between this and the Tigris. The only other site that can be identified with it is that of Hatem Tai Castle (I conjectured in my memoir on the sources of the Tigris to be Sisauronon), close to Jezireh, but for strength and importance it cannot compare with Rubbut, nor is there a plain in its vicinity, it being built in a mountain gorge, and not perceptible till you come directly upon it. From here we returned to Diarbekr over the Metina mountain, visiting on our road the old convent of Deir Metina.\* It is rapidly falling into ruin, no one lives there, and the only objects of interest are two fine marble sarcophagi—rifled long ago—in the quaint old chapel. It took us five hours from Rubbut to the other side of the range, and from there, passing Kurr i Giaour, Khurbey Kurro, Kuchuk Veyran, Orta Veyran, and Bir Bazin villages, we reached Meyrkesh—noted before—in four hours and a half, and Diarbekr in another three and a half.

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XII.—*On the Geography and Recent Volcanic Eruption of the Sandwich Islands.* By the Right Rev. THOMAS STALEY, D.D., Bishop of Honolulu.

*Read, June 22, 1868.*

BEFORE speaking of the late volcanic eruption in the Island of Hawaii, a few words may be useful on the geography of the group generally, of which it is the largest and the youngest member.

The Sandwich Islands, now constituting the kingdom of Hawaii, occupy a most central position in the Pacific. They lie in a diagonal direction from s.e. to n.w., between  $18^{\circ} 50'$  and  $22^{\circ} 20'$  n. lat. (so that they are only just within the northern limit of the Tropics), and between  $154^{\circ} 40'$  and  $160^{\circ} 40'$  of w. long. As affording a place of call for ships, merchantmen, whalers, and national vessels, they have been evidently marked out by their situation to have a commercial and political importance beyond that of the island groups in Central Oceania. Their total area is upwards of 6000 square miles. Beginning with the most westerly, Niihau, about 15 miles long, and 1 to 3 in varying width, taking a north-easterly direction, we come to Kauai. These two have an area of 550 square miles. Crossing

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\* Called also Kara Killiseea.

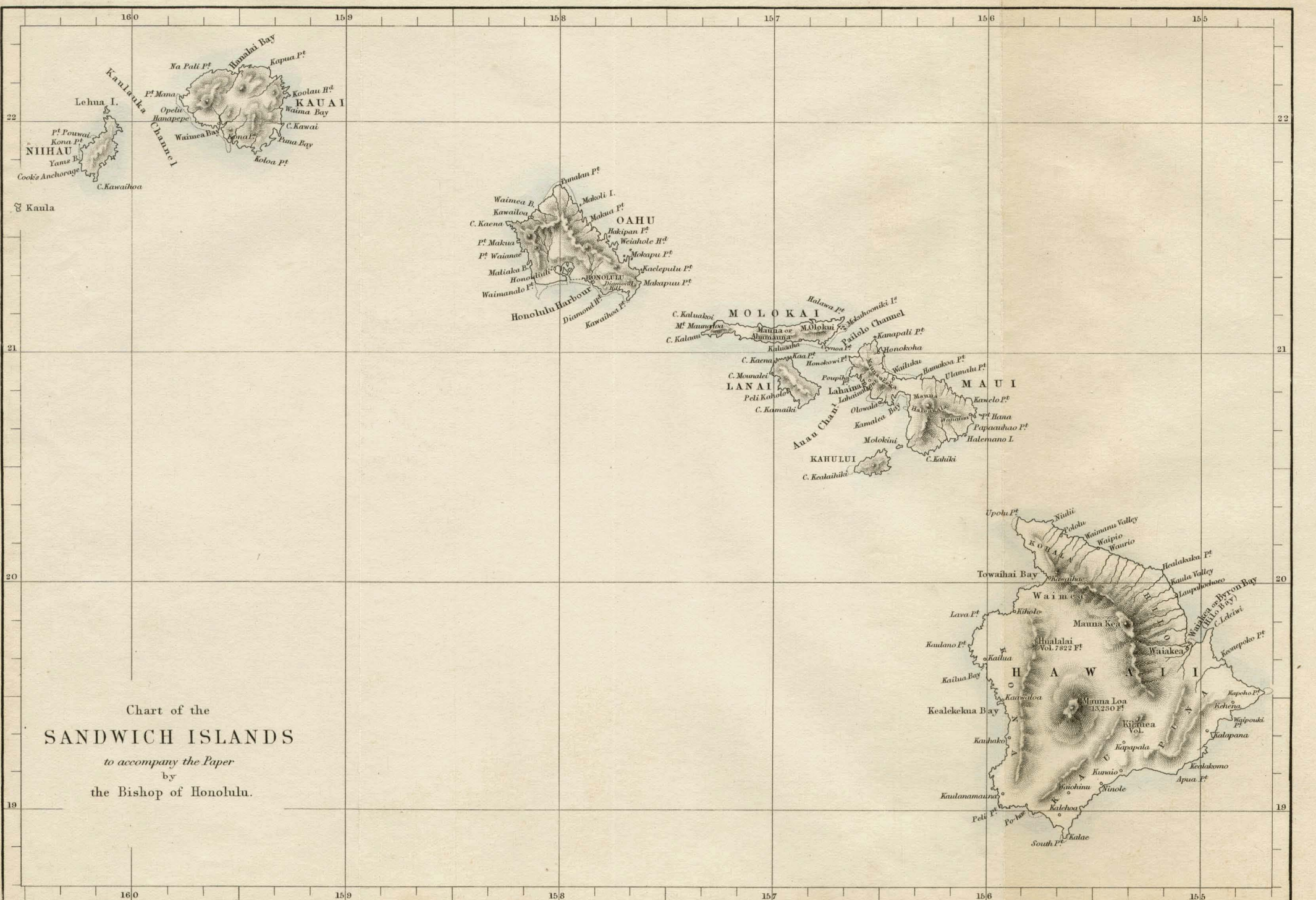


Chart of the  
**SANDWICH ISLANDS**  
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then a channel, which between the nearest points of land on either side is 80 miles in width, the next in order is Oahu, on which is the capital city of Honolulu, the chief port of the kingdom. Its area is 530 square miles. The others occur at less intervals, viz., Molokai, Lanai, Maui, with its islet of Kahului. These four may be put down as having an estimated superficies of 800 square miles. About 4000 will be found to represent that of the largest island, viz., Hawaii. The harbour of Honolulu is formed by a coral reef acting as a natural breakwater: a passage is marked out by buoys, and through it the vessels drawing above 20 feet can now enter. When the American Pacific Steamship Company, in 1866, proposed to run a line of steamers monthly between San Francisco and Yokohama (Japan), they sent an agent to Honolulu, on whose representation the Government deepened the harbour and extended their wharf seawards, so that these large vessels of between 2000 and 3000 tons might coal at its side. When all had been accomplished, the Company thought that the deflection from a great circle course, and then having to beat up in a higher latitude against the there prevalent west wind (a sort of return trade), would cause a loss of time, and they wished to cross in 18 days. In no instance, however, since the line commenced running has the voyage been accomplished in less than from 20 to 30 days. The fact is, they are finding the distance too great to carry the enormous quantity of coal necessary for the voyage: and so that, after all, by touching at the Hawaiian Islands, they would make a quicker and more certain passage, and, from a larger space being available for freights, one more profitable. While speaking of the geographical position of Honolulu, and its effects on the commercial prosperity of the islands, I may state that, within two years at the most, the railway between New York and San Francisco will be completed. The journey from Liverpool to Japan would then be distributed as follows:—

|                       |          |
|-----------------------|----------|
| To New York .. .. .   | 12 days. |
| San Francisco .. .. . | 7 „      |
| Honolulu .. .. .      | 8½ „     |
| Yokohama .. .. .      | 13½ „    |
|                       | <hr/>    |
|                       | 41 „     |

An addition to this of 8 days would extend the voyage to Hong Kong, the whole then being done under 50 days.

How far England has been wise as regards her interests in neglecting the often suggested plan of carrying the trunk line of railway from Canada through British Columbia to the coast, instead of allowing the connexion between the east and west seaboards of North America both by rail and telegraph to be the work

and the monopoly of our energetic cousin there, it is not for me to decide. I will only say that when the distance between New York and San Francisco is accomplished in 7 days (instead of in 23, as now it is over Panama), the present overland route to China by Suez will find it hard to compete, so far as passenger traffic goes, with the more rapid, healthier, and pleasanter route over the North American continent.

Happily for the social and moral improvement of the Hawaiians, the whaling trade has fallen off. In 1867 there were only 90 whalers in the autumn at Honolulu. The other vessels entering were: national or men-of-war, 9,—of which 5 were British, 2 American, 1 Russian, 1 French; merchantmen 109,—of which 54 were American, 24 British, 29 Hawaiian, 2 under other flags. To supply the wants of those ships, no less than of the native and foreign inhabitants, imports are required. Those in 1867 amounted in value to 1,835,808 dollars, nearly 2,000,000 dollars.

*Climate and Productions.*—Honolulu is under the isothermal line of 77° Fahr., the annual range of the thermometer being only 12°. At other places (according to aspect and elevation, of course) the temperature is very different. At Waimea, Hawaii, in the month of July (on a table-land 4000 feet above the sea-level), I have been very glad to have a fire in the room where I slept. Here the average reading is 64°, with a maximum range of 32°. Perhaps nowhere, with the same extent of coast-line and surface, are the local climates so various. Though in the tropics, really there is no tropical wet season; the heaviest rains falling at the winter and not at the summer solstice, as they do in India, for example.

It is *then* the north-east trades—which prevail for 9 months of the year, depositing the vapours of the ocean on the northern and eastern slopes of the islands in gentle fertilizing showers—for a while cease, while southern winds take their place, bringing heavy rain and storms known by the name of konas. It is the eastern trade wind to which we refer when we speak of the windward or leeward side of the islands, and sailing to windward from one island to another. On the whole, the climate is most favourable to vegetation. The soil, volcanic in its origin, is generally fertile. The grass, now very prevalent, though not an indigenous one, is that called *Menenia*, running along the surface, striking roots everywhere on its course into the ground, and forming a most nutritious food for sheep and cattle. There are many cattle “ranches” (as they are there termed) and sheep-farms, in the hands of emigrants chiefly from New Zealand, Australia, British Columbia, and California.

For instance, Niihau is owned by a Scotch family, who came from Canterbury Settlement, and is used by them solely as a



sheep-run. Last year were exported in lbs. of wool nearly half a million, and of hides 304,095. It is pleasant in travelling up and down the island to meet everywhere with one's own countrymen, engaged in these pastoral and other useful pursuits, tending to develop the industry of the kingdom.

To pass over the indigenous *Fauna*,—which is so small as scarcely to deserve notice,—we have of woods, the *Kou* and *Koa*, heavy, hard, and handsomely grained; of *Sandal* wood there is now but a very scanty supply; the *Kukui* is a very common tree, bearing nuts, full of oil, which strung together once furnished the natives (and do still in the more remote parts of the islands) with the means of lighting their dwellings. There is, in fact, no other word in the language now for lamp but *Kukui*. The native food is the *Kalo*, or *Arum esculentum*,—a large succulent root, from whose meal a thick paste called *poi* is made, which when slightly fermented is usually eaten with salt-fish as a relish.

A native cloth has long been manufactured from the bark of the *Morus papyrifera*, or *Uauki* plant, as the natives call it. The plants found in the tropics generally are all easily raised in the Hawaiian Archipelago; while on the high tablelands wheat, Irish potatoes, and the products, both fruits and cereals, of the temperate regions are cultivated with success. Of rice, in 1867, were exported nearly a million of pounds. Coffee is not much cultivated, having had to sustain severe blights; but the increase in the sugar cultivation during the last few years has been remarkable: plantations, with mills for grinding the sugar and all the best and newest appliances sent from England and the United States, are to be found scattered everywhere throughout the kingdom. The export last year was 17,127,187 lbs. It is now about 1000 tons per month. This important element in the industry and material prosperity of the islands, present and future, is in the hands mainly of American, German, and British settlers. The labourers are the natives, and about 1000 Chinese coolies imported by the Government. Generally, the planters prefer the former; but the Hawaiian population is too small, without calling in the aid of the latter, adequately to supply the labour market. In a cursory glance, such as this, at the physical condition of these islands in relation to the industry and pursuits of their inhabitants, perhaps this is the proper place to say a few words on their social condition and political status. The last census, taken in 1867, shows a decrease of the native population of 8300 (or of 11 per cent.) in seven years, and increase of white foreigners of 400 (or of 15 per cent.) in the same period: the total population being 58,765 natives and 4194 foreigners. Into the causes of this

fearful decimation of the native people I will not here enter, further than to record my own conviction that though at the period of their discovery by Cook in 1778 the population was even then numerically on the wane, their diminution has been accelerated by their contact with the habits and, I grieve to say, the licentiousness, of many of our own race who have frequented their shores. During the last few years, the Hawaiian Government has, by liberal capitation grants and suitable regulations, sought to encourage everywhere the formation of Industrial Girls' boarding-schools, in which those of a class most likely to influence for good the next generation may be trained, from a very early age, to a higher appreciation of the dignity of the sex, and to become better wives and mothers than the land has hitherto possessed. The effect has been greatly to multiply such institutions, and they may be expected to have the most salutary results. An excellent Act was passed in the last legislature to regulate "the carrying of passengers between the islands," which prevents "any female under twenty-five years of age being conveyed to any port of the island without a passport from the magistrate of the district where she lives." Under the influence of these and other such remedial measures which the present King's paternal rule has initiated, we may yet reasonably hope to mitigate the evil. I may state that the legislative assembly consists of deputies elected on a property or *industrial* qualification, sitting in the same chamber with his nobles, making a total of 60 members. If he has no children, he may adopt his successor, subject to the approval of his chiefs. The judicial power is vested in a Supreme Court, and several Courts subordinate to its jurisdiction. The kingdom is divided into circuits, and each of these into districts for the administration of justice, with a circuit or district judge over each. The executive is in the King, who has a Cabinet of four Ministers, all foreigners. There is a system of common native schools, at which all children are compelled to attend; not to do so entails punishment on their parents or guardians. At these reading and writing, and so much of arithmetic and other elementary subjects as can be acquired through the native tongue, are taught. English, the study of which is an indication of advancement not only intellectually but morally, has, during the last six years, received a great degree of attention in the schools. From 733 scholars, in 1862, wholly taught in English, the number has now increased to 1000. On the whole, the social elevation of the people, and their preservation even yet from national extinction, are regarded as hopeful. There are well-made roads and an efficient system of police throughout the kingdom. Life and property are as secure as in any civilised

country in the world. I should state that the revenue last year, chiefly raised by 10 per cent. *ad valorem* duties on imports, was 220,000 dollars. Not only are these matters *not* foreign to the physical geography of Hawaii, they are intimately connected with it—setting aside transcendental relations—as the effects to the cause. I may add, they are almost needful to be known before we can understand the accounts which have reached us of the incidents in the late volcanic eruptions. The whole Hawaiian archipelago has been uplifted from the ocean by volcanic agency. Indications are not wanting that the same process is still silently and imperceptibly adding to the elevation of the coast-line throughout the group. The facts on which such a view is grounded are not in my possession; but they furnished, a few years ago, the subject of a very interesting paper in a local journal, contributed by an English gentleman resident at Honolulu, who has the reputation of being a thoughtful and able geologist. It would seem that the emergence of some portions of the islands has been exceedingly rapid. In the island of Molokai well-defined coral is found at the height of 500 feet above the sea-level. A bed of coral, or coral-sand, exists on an elevation in Kauai 4000 feet above the sea-level.

Kauai, with its islets, is far the oldest of the islands. Its volcanic mounds and craters have been rounded off, so to say, in the course of ages into gently undulating hills. The scenery is soft and beautiful. It is a perfect garden in appearance, and most fertile. Still there are some craters and palis to be found in it of great antiquity. The valley of Hanapepe, at the head of which is a beautiful waterfall, has apparently been formed by volcanic action. The basaltic rocks and strata over which it falls have been much reversed and upturned, and present their columnar structure very distinctly to view, inclining to opposite directions at a vertical angle of about 30°.

Proceeding 80 miles eastwards we come to the central group, which, though with no active volcanoes at work, are of a later origin. No severe or destructive earthquakes are experienced in these islands, but only very slight vibrations. I except the submarine shocks, which, as in December, 1860, caused a rise in the harbour of Kahului 8 or 10 feet above its usual high-water level, spreading over the beach and destroying several houses. The chief extinct craters in these islands are in Oahu, Punch-bowl Hill, on which the fort at Honolulu is built—a comparatively small one—and Diamond Head, a few miles east of the same city. It is a promontory, on the top of which is a deep concavity. But it is at Maui we find the largest crater known, I believe, in the world. It is 10,000 feet high, between 20 to 30 miles in the linear measure of its rim, and more than 2000 feet deep. It

forms the umbilicus, so to say, of East Maui, which is one vast mountain, culminating in this crater; the sides rich in verdure and all kinds of vegetation. It will be seen the island of which I speak consists of two well-defined portions, connected by a sandy alluvial neck or isthmus, the lowest part of which is only 7 feet above the sea. The sand is constantly shifting, and as you pass in a vessel on the leeward side you may see clouds of it blown out to sea under the action of the trade-wind. The rock of the cliffs on the east of West Maui, which it terminates sharply, is basaltic. Anything grander or more awful than the view into that deep crater of Hale o ka la, as it is termed, cannot be imagined. It has, however, been so well and so often described, that I will not dwell on it now, but rather hasten to speak of that island which is the scene of modern volcanic action, where it has so recently been displayed with a frightful result to life and property. It would appear that the retreating of active volcanic influence from north-west to south-east, which has been stated to apply to the whole of the group, does so equally to the Island of Hawaii itself. In the north of the island are the heights of Kohala and Mauna Kea (13,000), the last covered with perpetual snow, skirting the grassy and fertile plain of Waimea. Here are craters never active within the period of the traditions of the people. In fact, a line passing through Mauna Kea from west to east would nearly define the parts to the north and south of it, *now* respectively exempt from, and exposed to, flows of lava, and even to destructive earthquakes. Running then parallel with the coast on the west is Hualalai, the last eruption of which was in 1800 A.D., when the stream of lava filled up a bay 20 miles long, and formed a headland running three or four miles into the ocean.

Mauna Loa, or, as it implies, *the great Mountain*, 13,500 feet above the level of the ocean, is to the south-east of Hualalai. On its eastern flank, about 30 miles from the coast, and on a plain 6000 feet above the sea, is the *pit crater* of Kilauea, a drawing of which was shown when this paper was read. Here was supposed to be the dwelling of the terrible goddess Pele, whom the converted chiefess Rapiolani, with a true Christian courage, defied in the presence of assembled multitudes, in the year 1825, by descending into the crater and casting the sacred berries into the seething lava. Its outer rim is about *nine* miles in circumference. You descend some hundreds of feet down a zigzag path cut in the precipitous sides of the pit till you come upon a black ledge. Passing banks of sulphur, and huge blocks of basaltic rocks confusedly heaped together, occasionally springing over crevasses of unknown depth, and

walking over every form of lava, still warm to the feet, you come to the part which is always more or less active. When I saw it the diameter was quite 500 yards; but its area sensibly alters. The depth and immense size of the pit may be expected to keep the lava from overflowing the country, as hitherto, at least in the period of history, seems to have been the case. Between 1856 and 1859 there were subterranean flows, which, after some time, came to the surface 20 miles to the north-east. But usually this volcano is not mischievous. In 1859 an eruption of Mauna Loa took place, passing round the northern end of Hualalai, destroying a village in its course, and projecting a coast-line some distance seawards. The whole country for some miles round this mountain is, if I may so say, one great field of cinders.

I can speak from experience that the ride from Kealekekua Bay, through this lava country to the volcano of Kilauea, and thence to Hilo, during its greater portion at least, is the most trying and painful possible. But from the central table-land on which stand these huge volcanic masses, all round to the coast, the country is fertile, dotted with villages, cattle ranches, and sugar plantations. But over the southern slope now, alas! has swept the most frightful devastation.

On March the 27th, a visitor to the Kilauea observed that the fiery lake had overflowed its usual limits, filling that part of the pit crater with an immense covering of lava. On the same day a column of smoke was seen to rise to an immense height from the summit of the mountain. The next day began a series of earthquakes, not apparently destructive until the 2nd of April, when the most terrific shock of all took place. In the interval one of the English clergy, with his diary and watch at his side, took notes of the direction, violence, number, and time, of each oscillation; whether vertical or horizontal, whether prolonged or instantaneous. His observations are most interesting, and I trust may serve in some way the purposes of science. Upwards of 300 earthquakes were registered by him; some, however, occurring in the short intervals of sleep, and consequently unheeded.

It was the earthquake of the fifth day, April the 2nd, which was so disastrous. Its destructive force was felt most at Kapapala, south-west of the mountain. The land all round a cattle ranch situated here was subjected to a severe mud eruption, burying hundreds of cattle beneath it. A tidal wave the same day for 50 miles north of Alualu rushed inland, destroying several villages and many lives. Stone buildings were hurled down, sometimes burying people in the ruins; not only in the

south, for houses were thrown down in Kona and Hilo. The settlement at Waiohino was utterly destroyed, thirty-three people perishing through the earthquake or tidal wave.

On the 7th of April, ten days after the first symptoms of the convulsion, a new crater opened on the flank of Mauna Loa, whence a stream of lava flowed into the sea half-way between Apua and the southern point, the mud-flow meanwhile wending its course to the north of this direction. One of the fairest parts of the island was thus in a single day converted into a black-looking desolate tract of cinders and lava. In many places in Kau the ground has opened, chasms of unknown depth have formed, whence sulphurous exhalations are emitted: a fissure, some miles in length, has extended inland from the coast, crossing one of the island high roads, and so deflecting it that what were contrary sides before are, at the point of breakage, now in one and the same straight line.

The floor of the crater in the Kilauea volcano has sunk some hundreds of feet. At Lahaina, 120 miles from the starting point of the eruption, the column of cloud ascending from it was observed under an angle of  $3^{\circ} 30'$ , which (allowing for 500 feet of altitude, the position of the observer) indicates a height of nearly eight miles. So vast a body of vapour rushing visibly upwards with tremendous rapidity showed an immense heat at its base. The great rarefaction by heat of the air near the new crater would cause a powerful upward draught; then the cold air charged with the vapours of the surrounding sea would rush in to take their place. Rapidly ascending, vast quantities of water would be precipitated in the form of cloud, and, when cooled, sink and be borne westwards by the trade-winds. This exactly happened; for, days after the eruption, the leeward islands were enveloped not only in a close oppressive atmosphere, but in clouds and heavy rains. A very distinct odour of sulphurous acid was perceptible at Honolulu, 200 miles distant, two days after the eruption.

The facts that I have grouped together connected with the recent catastrophe may serve possibly the purpose of those who investigate the laws, if there be such, which regulate volcanic agency.

XIII. — *Notes on the Physical Geography, Climate and Capabilities of Somerset and the Cape York Peninsula, Australia.*

By DR. ALEXANDER RATTRAY, M.D. (Edin.), R.N.

(Read, June 22, 1868.)







Two circumstances have contributed more than anything else to the rapid development of Australia, viz., the discovery of gold and the introduction of sheep and cattle farming. To the latter we are to refer a peculiarity in its settlement, observable in no other of England's numerous dependencies. Sheep and cattle farms are unusually large, many comprising hundreds of square miles. Hence, wide tracts are taken up in an incredibly short space of time. Northern Queensland has been the chief theatre of this during the past eight or ten years; and the whole of eastern and north-eastern Australia, as far as the bottom of the Gulf of Carpentaria, is now more or less completely occupied by squatting stations. As outlets for the wool, tallow, hides, and other products of these regions, and inlets for imported goods, seaports soon become necessary. But as the squatting districts are comparatively thinly peopled, one necessarily suffices for a wide extent of territory; and hence, as port after port has been opened along this coast within the past few years, they are to be found, not on neighbouring bays, but widely and often many leagues apart. Port Denison, Townsville, Cardwell, &c., along the east coast of northern Queensland and Burketown, at the bottom of the Gulf of Carpentaria, have thus sprung into existence. Four years ago the Queensland government made its latest effort in colonisation at its northern extremity, within 5 miles of Cape York, and therefore well into the tropics (lat.  $10\frac{1}{2}$  s.). In this, however, as the chief objects were political and philanthropic, they were aided by the Home Government, who sent H.M.S. *Salamander*, Captain the Hon. J. Carnegie, by whom the new settlement of Somerset was founded on the 1st August, 1864.

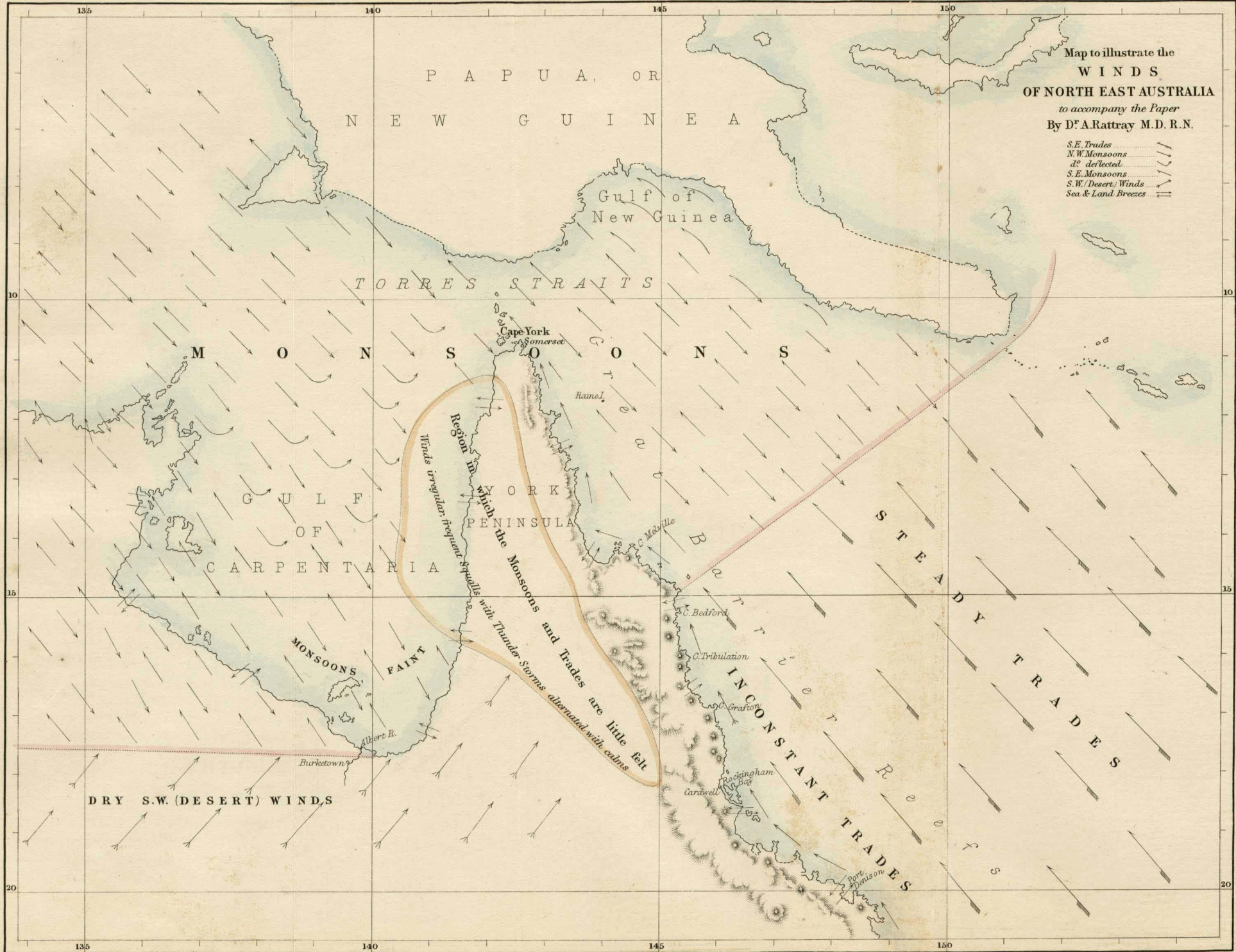
In the two great divisions into which Australia may be divided, viz., the larger extra-tropical and the smaller inter-tropical portion, colonisation has hitherto spread principally along its eastern, western, and southern shores, *i.e.*, in those parts which possess a temperate climate. But notwithstanding the preference which the Anglo Saxon race thus shows for cool or cold regions as sites for settlement, over warmer latitudes, and the greater success which almost always, if not invariably, attends colonisation in the former, previous attempts to reclaim the north coast of this continent have not been wanting. Since 1824 no fewer than three efforts have been made in this direc-



Map to illustrate the  
WINDS  
OF NORTH EAST AUSTRALIA

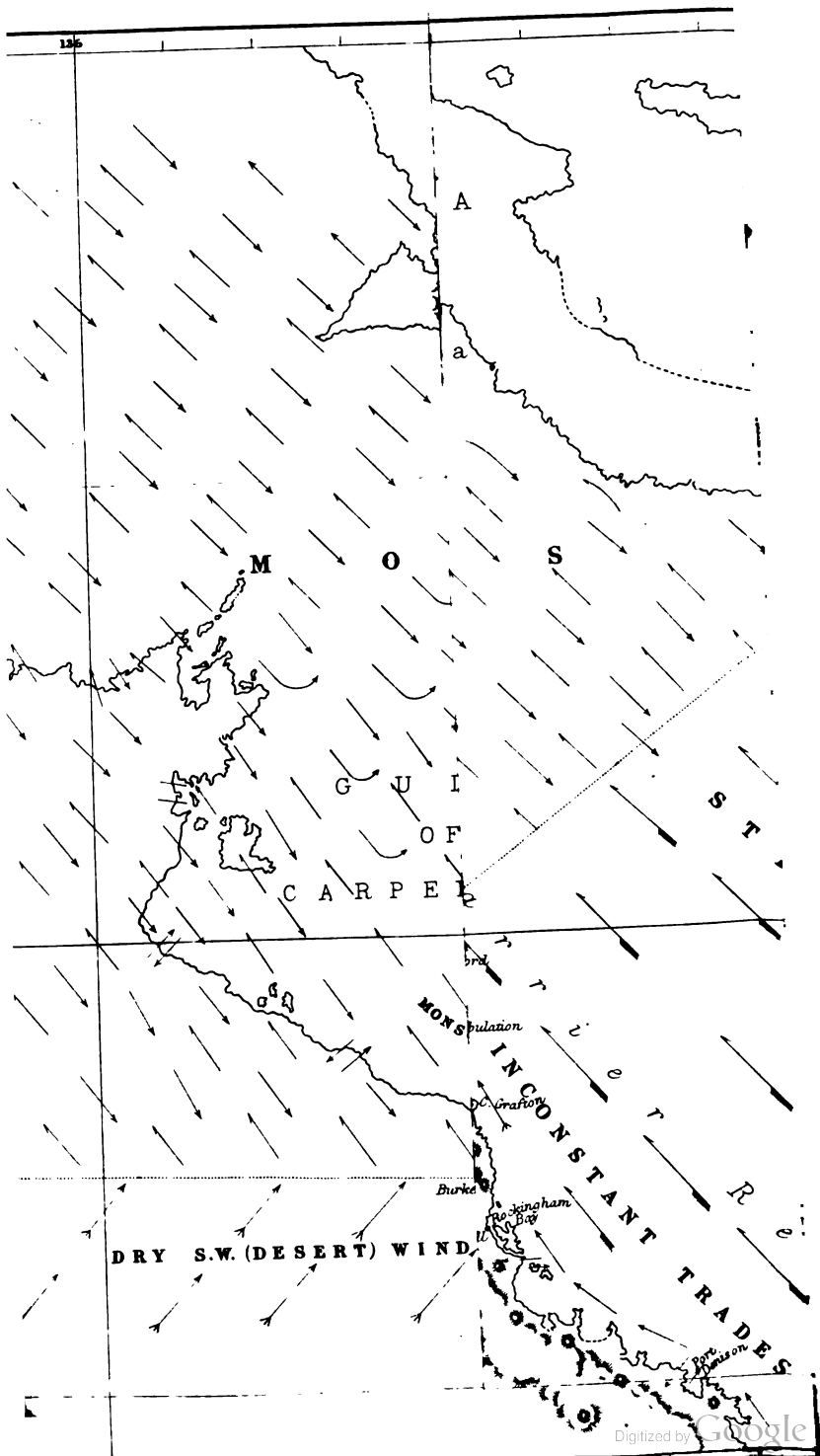
to accompany the Paper  
By D<sup>r</sup>. A. Rattray M.D. R.N.

- S.E. Trades 
- N.W. Monsoons 
- d<sup>r</sup> deflected 
- S.E. Monsoons 
- S.W. (Desert) Winds 
- Sea & Land Breezes 









tion under the auspices of the Home Government, who sent ships and men to plant military establishments in turn at Melville Island, Raffles Bay, and Port Essington. With all three, however, the issue proved unfortunate; and for their failure various reasons were given. Hostilities with the natives, the unhealthiness of the climate, and unfavourable reports as to their success, appear to have been the principal of the assigned causes which led to their more or less speedy dissolution; but, doubtless, in addition to local insalubrity, the inability of the other colonies of Australia, at that comparatively early and undeveloped stage of their existence, to promote and aid private emigration, and thus give them that kind of support which they most wanted, and which probably more than anything else would have contributed to their permanency by making them something more than mere military posts, conducted largely, if not principally, to their want of success and early development; while another reason was their badly-chosen geographical site. Planted, as they were, along that part of the coast which lies to the west of the Gulf of Carpentaria, they were more than 600 miles from the Barrier Reef, the most frequent scene of those disastrous shipwrecks, for the relief of which, and the aid of those crews who not unfrequently escaped death in one shape only to meet it in a worse form at the hands of the natives, the settlements were then, as Somerset is now, principally meant. The last and longest-lived of these three military establishments, that of Port Essington, was finally given up in 1849 after an existence of twelve years; and since then, until the projection of the late experiment, no further attempt has been made to colonise this seldom-visited but no doubt valuable part of Australia.

Almost contemporaneously with the settlement of Somerset the South-Australian Government founded a colony on the Adelaide River, along the north-west coast; but this has been recently abandoned. Still more lately the township of Burketon has been formed on the Albert River, at the bottom of the Gulf of Carpentaria, which still exists, though situated in a low-lying, unhealthy, marshy district, intersected by numerous creeks and small rivers, and which has recently suffered to the extent of fifty deaths in a population of 200 by "Gulf Fever," a species of bilious remittent. This and Somerset are thus at present the only settlements along the northern or tropical coast of Australia.

For various reasons, political, commercial, and philanthropic, the formation of a settlement at or near Cape York had for many years been contemplated by the Home Government, but no active steps were taken until the Queensland legislature took

the initiative and suggested its early establishment. As the new colony, unlike its predecessors, thus receives colonial as well as government aid, its prospects so far are auspicious, and its future more promising than that of its predecessors. Situated in the midst of savage and even cannibal tribes, and 1100 miles from the nearest settlement among the islands, that of Coepang in Timor; and 550 from the nearest Australian township, that of Cardwell at Rockingham Bay; 21 marines, a lieutenant, and surgeon, were sent to protect it for three years, until the dangers apt to surround new settlements during the embryo stage of their existence were safely passed, while H.M.S. *Salamander* had to make three trips yearly from Sydney to provision and protect it. Within the past few months she has been relieved by H.M.S. *Virago*; while the marines have been recalled and replaced by a small body of well-armed police, provided by the Queensland government.

Established now for three and a half years, we can judge more accurately than at first of its probable future, and whether the objects held out in its settlement are likely to be realised, *e. g.* :—

1st. There appears reason to doubt if it will ever become a second Singapore, as many anticipated, either in population or traffic. At present there is only one small squatting station. The withdrawal of the marine force has reduced the number of inhabitants to about sixteen, chiefly employés and their families. A few small coasting craft trading to the Gulf or engaged in trepang fishing, occasionally touch here; but ordinary merchant vessels, of which from 50 to 80 pass through Torres Strait yearly from the southward, seldom call, unless specially chartered. Recently, from one or other of the ports in the south they do not require supplies, nor if they did could they procure them, as there are no provision or other stores, and the water is scanty and bad; and to anchor in the 3 or 4 knot current of the Albany Pass would be not only an unnecessary delay, but unsafe and troublesome. It is necessary to state, however, that, like other places, Somerset has shared in the depression attending the late monetary crisis in Queensland, and suffered from the temporary stoppage of the line of mail steamers connecting Sydney, &c., with Batavia, India, and China, that made it a port of call; and there are grounds for believing that it may yet be a place of some importance.

2nd. It may be useful as a coal depôt for Her Majesty's Navy and the mercantile marine, especially mail steamers running between the Australian colonies and the marts of Southern and Eastern Asia by the Torres Strait route, a service which the Queensland government, in conjunction with those of

Victoria, South Australia, Tasmania, and New Zealand, are now making strenuous efforts to re-establish.

3rd. Politically it may prove important as a naval rendezvous, where Her Majesty's ships may command the traffic through Torres Strait in the event of war with any other great power.

4th. As a port of safety for the crews of vessels wrecked in Torres Strait, or on the adjacent Barrier Reef, or any of the numerous passages through it, e.g., Bligh's or Raine Island entrance, it will be more convenient and of easier access than its predecessor, Port Essington, which was too distant from the usual scene of such disasters. Three crews (forty men) of ships lost within 200 miles of Somerset were rescued by the settlement during 1866, and conveyed southward by H.M.S. *Salamander*. Singular to say, though all three were British, only one knew of the existence of Somerset, and the other two reached it by mere accident.

5th. As head-quarters for the prosecution of Beche-de-mer fishing on the extensive coral reefs of the adjacent seas, it has already proved invaluable.

6th. At a future day it may become developed as a dépôt for trade with the still unexplored and little-known Papua; a company to examine and settle which was lately formed at Sydney, but the project proved abortive.

7th. It can never be either an agricultural or a pastoral place, for there is little back country, and what exists is of indifferent character, rocky and poor, and so unfit for either purpose that Somerset will long have to derive its supplies of food, &c., chiefly from abroad, and will never be able to export those of home growth, or produce either cattle, sheep, tallow, hides, cotton, sugar, rice, &c., in such abundance as may the settlements further south.

8th. With little back country, no internal resources (mineral or otherwise), and few inhabitants either to supply with imports or furnish articles for exportation, its trade, at least until commerce becomes developed with Papua and other islands of the Eastern Archipelago, can only be a transit traffic, like that of Galle, Aden, Suez, and similar places, which are little else than ports of call for mail steamers and merchantmen.

9th. As the centre of a new and wide mission-field, as yet occupied by only one delegate and an assistant, sent by the Society for the Propagation of the Gospel, amid races still little influenced by demoralising intercourse with white men, and comprising, not only the natives of North Australia, but those of Papua and the intervening islands—the mystery that still hangs over whom may yet be first dispelled by the missionary—

Somerset is a station to which too much interest and importance cannot be attached.

Eastern Australia may be said to consist of two parts; one well-known, the other almost a "terra-incognita." New South Wales and Queensland, long occupied, are more or less densely settled as far as the Gulf of Carpentaria; but the Cape York Peninsula beyond has been only imperfectly explored by Leichhardt, who crossed its southern part on his way to Port Essington; by Kennedy, who almost reached its northern extremity by skirting its mountainous and river-intersected eastern coast; and more lately and successfully by the Jardines, who by following a better route along the comparatively level land found westward of the mountain range, arrived safely at Somerset, near Cape York. The principal topographical feature of Australia regarded as a whole is, that it is essentially a flat continent, consisting of an extensive low-lying scantily-watered interior, comprising stony or sandy deserts, with an occasional patch of fertile land and hills, often isolated and rising to no great height: and of high land which skirts the coast and shows itself prominently in two mountain ranges, one in Western Australia, short and of no great height, the other longer and loftier, which forms the backbone of Eastern Australia. The latter, commencing near Cape Howe, runs northward at a distance of 50 to 100 miles from the sea, materially modifying the topography, and forming one of the principal features in the scenery of this district. In New South Wales and Southern Queensland their height varies from 2000 to 3000 feet. Further north they skirt the coast 30, 20, or even 10 miles inland, and attain their greatest altitude of 4000 or 5000 feet near Cape Tribulation, where they appear to rise abruptly from the shore. Viewed from seaward, nowhere along the entire eastern seaboard of Australia, does finer scenery exist or apparently better land than from Port Denison to Cape Bedford; a feature especially noticeable in the vicinity of Cape Tribulation, and the range which culminates in the highly picturesque Peter-Boite (3311 feet), with its sloping sides wooded from base to summit, deep well-timbered gorges, and valleys luxuriant in vegetation, all indicating great fertility of soil. Thence onward to Cape York the hills of the rapidly narrowing Peninsula gradually decrease in height, become less wood-clad, more barren and bare, and, as a range, more irregular and broken in continuity, while the land diminishes in fertility; and finally they terminate near Cape York in a series of undulating elevations seldom more than 300 feet above the sea-level.

If a straight line be drawn from Cape Grafton westward, it

will be found to touch the bottom of the Gulf of Carpentaria and isolate the Cape York Peninsula. Now it is the part thus cut off which presents this change in fertility, physical appearance, and geological character. Thus the principal features of this triangular tract on proceeding from its southern broad end to its northern pointed extremity, are first, a gradual decrease in the height of the main mountain range; and second, a progressively diminishing luxuriance in the vegetation, which, as we enter the tropics, does not assume the character we might expect from the latitude. Now the physical geography and geology of this portion of north-eastern Australia will doubtless materially influence its colonization, and the spread of settlement; and there are several reasons why it does not appear to possess advantages equal to those of many other parts of this still sparsely peopled continent: *e.g.*

1st. Its comparatively small area necessarily gives a limited back country for agricultural or pastoral farming.

2nd. Much of it is mountainous or hilly. There appears to be little really good land; and the greater part of the level country is both naturally infertile and badly watered, the rivers being few and small.

3rd. Its geological features and soil are for the most part unfavourable, as evinced by the barrenness of the country to the west of the main range, and the increasing scantiness of the vegetation along the east coast downward to Cape York, which though near the equator does not show a tropical luxuriance.

We must not therefore be over sanguine as to the future success either of the Cape York Peninsula as a whole, or its only township in this extensive area and lengthy seaboard, the sickly settlement near Torres Strait. Very visionary views were doubtless held with regard to Somerset, and the district at the extreme northern end of which it lies, prior to the formation of the former; and a future was anticipated that will probably never be realised. But although neither are so well adapted for colonisation nor likely to become of such importance as then believed, this is no more than more careful observation and forethought might have predicted. We do not disparage inter-tropical Australia as a whole however. It is a region that will probably prove of value to this southern continent; and may one day be, in some respects, the India of Australia; but for many obvious reasons, physical, geographical, and geological, Somerset and the greater part of the Cape York Peninsula are not likely to become of such importance as that more extensive and better watered tract which lies to the west of the Gulf of Carpentaria, in which there appear to be both less limited latitude for settlement and a more promising soil.

The rapidly increasing importance of Australian commerce, especially with India, China, England, and America, and the recently proved practicability of another, and in some respects better, route to the latter two than by Cape Horn, viz., by the Cape of Good Hope; give to Torres Strait and the already well-known but not yet thoroughly appreciated inner and outer Barrier-reef routes, an interest that would not otherwise be awarded them. The character and capabilities of these two ocean highways, their difficulties, dangers, and respective merits, advantages and disadvantages, have all been admirably laid down in the Admiralty Sailing Directions:—while their Survey by Blackwood, Owen Stanley, and others has rendered both passages not only easy but safe for careful navigators: and the great question now appears to be, which is preferable for sailing ships and which for steamers.

It is unquestionably the easy passage through the open Coral Sea, and the more intricate navigation of the long tortuous river-like track inside the Barrier-reef, which cause so many commanders of merchantmen to prefer the former, in which the final short cut *through* the reef, which usually lasts no longer than two or at most three days, is the only period of anxiety. But it is this brief run, whether by the Raine Island or Bligh's entrance, which constitutes the great difficulty and danger, and in which so many vessels are wrecked. Now why run such risk, when it might be avoided? The tri-annual trips of H.M.S. *Salamander* up and down the inner route during the past three years, whilst tending Somerset; the passage of other men-of-war and of mail steamers to Batavia; all safely accomplished; ought to prove the ease with which it may be traversed under sail or steam in its whole length, including its most intricate portion near Torres Strait, even in dark nights. Although the navigation has been materially benefited by the beacons placed by H.M.S. *Salamander* where most wanted it might be still further improved; and, by being more fully beacons, buoyed, and lighted, made at least as easy as that of the English channel. But even now, could merchant-mariners be prevailed on to make trial of what is little else than coasting throughout, they would soon prefer it, notwithstanding its tediousness and intricacy, but far greater smoothness and safety, to the outer or ocean route, in which the danger of stranding or wreck is so much increased. No small part of the alleged danger of the inner route is fanciful. Its simplicity, ease, safety, and comparative celerity are obvious advantages over the outer passage, in which so much more anxiety, difficulty, and danger, both to life and property, are encountered in making the entrance and passing through it. Although the



inner route thus first requires to have its navigation rendered more easy and complete; a careful survey of those numerous "openings" and "inlets," which exist in the great Barrier-reef of Australia, like gateways of access from the open ocean to the smooth waters inside, and the busy ports that will probably ere long exist along this coast, will soon become imperative, and all the more called for as many believe that some of the larger of these would afford considerably safer, easier, and speedier passage to Torres Strait for such vessels as may continue to choose the outer route, than either the Raine Island inlet or Bligh's entrance, the two now most preferred by merchantmen.

As the salubrity and diseases of a coast or country are necessarily greatly influenced by their Physical Geography, the preceding remarks are necessary before attempting to form a just estimate of the *Climate* of North-eastern Australia, and the Cape York peninsula. Whether regarded as the centre of a circle, hundreds, nay thousands of miles wide, and stretching beyond the mainland over islands and seas little known, and some still unvisited by Europeans, or as part of a continent with regard to much of which our knowledge is still very limited, the following account of the meteorology of Somerset and the Cape York Peninsula, as yet undescribed, will be of considerable scientific interest:—while, as part of a region now being slowly colonised by Great Britain, and likely to be frequently visited by Her Majesty's ships, observations on the nature of its climate and particularly as to its Medical Climatology will appear of equal importance to medical men, and of especial value to the naval surgeon. Our knowledge of the climate of tropical Australia is very slight. That of Port Essington, which proved locally unhealthy, has been fixed by its seven years' occupation by a detachment of marines who left it in 1849: while of that of Cape York, visited for brief periods by H.M. ships *Fly* and *Rattlesnake* (1842-50), scanty though accurate notices have been published; but beyond this, until the first visit of H.M.S. *Salamander* in August, 1864, we knew little with regard to the meteorology of this region, of which it will be interesting to know whether it possesses special characteristics, or is merely regulated by laws already well known and universal.

Regarding Australia as a whole, there are several peculiarities in its physical geography which combine to modify its climate and give rise to marked local peculiarities, which it will be necessary to briefly allude to, as some of these influence the district now under consideration; *e. g.*:—

1st. Situated entirely on one side of the equator, it is, unlike every other continent, the South Polar excepted, completely water-girt; a circumstance which principally affects its coasts,

equalising their temperature, increasing the rainfall, and altering the humidity and ozone of their winds. It stands boldly out in the ocean: and, except on its north coast, which adjoins the large islands of the Eastern Archipelago, far from other great bodies of land, which therefore cannot influence its climate, except indirectly. Save on the north, the oceans which surround it are both extensive and deep, and indeed constitute the great mass of the southern hemisphere. Hence why the isotherms of this region are so straight and preserve nearly the same latitude as they circuit the globe, except where they diverge slightly to the northward from the heating effect of the pointed southern extremities of America, Africa, and Australia (Map). The isotherm of Sydney is probably the straightest of all in the southern hemisphere; and yet, curiously enough, nowhere does the equatorial belt bend more than opposite tropical Australia. Again the ocean currents which impinge on its shore are temperate, inasmuch as they flow from eastern and western sources, and run along the same latitude for many hundreds, and even thousands of miles; and none of them bring either heat from the equator or cold from high latitudes to materially modify climate, as the Gulf-Stream does the former to England, and the Iceland current the latter to Labrador.

2nd. It is essentially a flat continent, consisting of an extensive low-lying interior, encircled by a border of more elevated land, partly mountainous. Hence the rivers of the interior are few and unimportant, dwindling down to shallows and creeks during greater part of the year, rendering this part of Australia, with its alternate tracts of fair country and patches of desert, comparatively infertile as a whole. The proximity of the mountains to the sea along the east coast, and exposure to the moisture-laden ocean winds, which make their outer aspect the principal watershed, influence the humidity of the air, and rainfall, of both slopes, one of which is the dry and the other the wet, the former scantily and the latter well wooded. Along the coast the mountains never rise above 5000 feet, which makes the deposit of dew and the rainfall comparatively slight. Hence the rivers are never large, but short, rapid, and unimportant; and either flooded during the rainy season or dried up in the summer into marshy lagoons or "creeks." Again, except the Gulf of Carpentaria on the north, and the Great Australian Bight on the south, no deep bays project into the land to fertilise it, and furnish means of inter-communication. In the interior we find deserts faintly retentive of the scanty rains; while the bordering mountain chain consists of a volcanic centre flanked by sandstone, both little absorbent: and hence the dry atmosphere both of the interior and of the land near the coast, especially

during summer. Hence also the high thermometric range of the interior, its great midday heat and nocturnal cold. Thus also may we account for the fewness and unimportance of the rivers of the interior, and the usually parched nature of its soil, except for a brief period during the rainy season; and also for the occasional droughts of many parts of the coast during the dry summer. Hence also the moistureless winds which often blow in all parts of the coast region from the overheated interior. Hence also the north-west monsoons of the north coast; an indraught caused by the heat of the barren interior of tropical Australia acted on by the powerful summer sun. Hence also the dry though healthy climate, free from morbidic miasms, of Australia as a whole.

The climate of the whole of Northern Australia beyond the 23rd parallel, including the Cape York peninsula, as yet little studied, is necessarily tropical throughout, differing occasionally according to latitude, &c.; and is moreover of a twofold character, inasmuch as the region which lies to the northward of lat.  $15^{\circ}$  to lat  $18^{\circ}$  s. is in the monsoon district, while all between this and the  $23\frac{1}{2}^{\circ}$  s. lat. is within the limits of the south-east trades. In both, instead of spring, summer, autumn, and winter, the year may be divided into the wet and dry seasons. Confining our attention to Somerset and that part of the Cape York peninsula which lies in the monsoon district, *i. e.* from about Cape Melville northwards, we find that the wet season corresponds to the north-west and the dry to the south-east monsoon, of the principal characteristics of which the following is a summary.

In the *wet* season the north-west is the prevailing wind, lasting usually for three months and a half, *viz.*, during the latter half of November, December, January, and February. Blowing then both from the north and west, and sometimes from the south-west, the air is highly moisture-laden, accompanied by an overcast sky and heavy rains, the weather being oppressive and weakening. Rain falls most frequently with a south-west wind, the probable reason of which will presently appear. This monsoon is much less constant than the other, and occasionally alternates for a day or two, with breezes from the opposite quarter, especially at its commencement and decline. Its advent is often strong, squally, and accompanied by thunder and lightning, calms, fog, and a sultry clammy atmosphere; but its force, as a rule, is not so great as that of the other monsoon. As with the latter, the north-west varies in direction from south-west to north; while its beginning and close are by no means regular in their accession, but come sometimes earlier and occasionally later than usual.

In the *dry* season the south-east monsoon prevails, lasting usually from March to October, or November; marked by a more or less constant breeze having a general southerly and easterly direction; occasionally of force 7;\* often lulling night and morning, but rising with the sun towards afternoon; moisture-laden and cool; sky usually clear and sunbright; showers very unfrequent. The coolest and finest months are July, August, and September, when the sun is furthest north. The greater part of this monsoon is wonderfully bracing and enjoyable in the shade, though hot in the sun, when the thermometer rises sometimes to 120° Fahr.; but less pleasant for a month or fortnight towards its commencement and close, when the weather becomes variable as the one monsoon merges into the other, and this loses while the incoming breeze gains force.

According to Macgillivray ('Voyage of *Rattlesnake*'), the natives of the vicinity of Cape York divide the year into three, viz., *Aibu*, or fine weather; *Kuki*, or wet weather; and the *Malgui*, or change. The latter, or transition from the dry to the wet monsoon, is marked by calms or light winds, sometimes from the west, and by gloomy unsettled weather, overcast sky, occasional showers, and frequent violent squalls of wind and rain. As the west and north-west winds gradually set in the weather moderates; rain becomes more frequent and heavy; the breeze steadies and alternates with the occasional lulls, calms, and fogs, already described as marking the rainy season when fairly set in. During the change from the wet to the dry monsoon also we usually have more or less unsettled weather, with squalls, and alternating north-west and south-east winds, that by-and-by merge into the steady south-east trades.

The nature of these periodic winds is evident. The belt of trade-winds would extend in a continuous circle round the globe if the equatorial ocean were uninterrupted by land. The latter, however, in certain regions acts as a disturbing influence and causes them to be turned back on themselves during a certain part of the year when the sun is over the land, the rapid and intense heating of which it is that causes the deflection. The limited monsoons of the Pacific coast of Mexico, and those of the Gulf of Guinea, are merely the trades of the northern hemisphere deflected; and those of the coast of Brazil, the trades of the southern hemisphere similarly acted on. But it is in the Indian Ocean where those periodic winds are most extensively developed. Here they exist over a huge quadrilateral, in which both the northern and southern trades are deflected—the conti-

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\* Reckoned according to the ordinary sea scale, which ranges from 1 to 12: from 1 to 3 being a light wind, 5 to 7 fresh, 7 to 8 strong, and 10 to 12 violent.



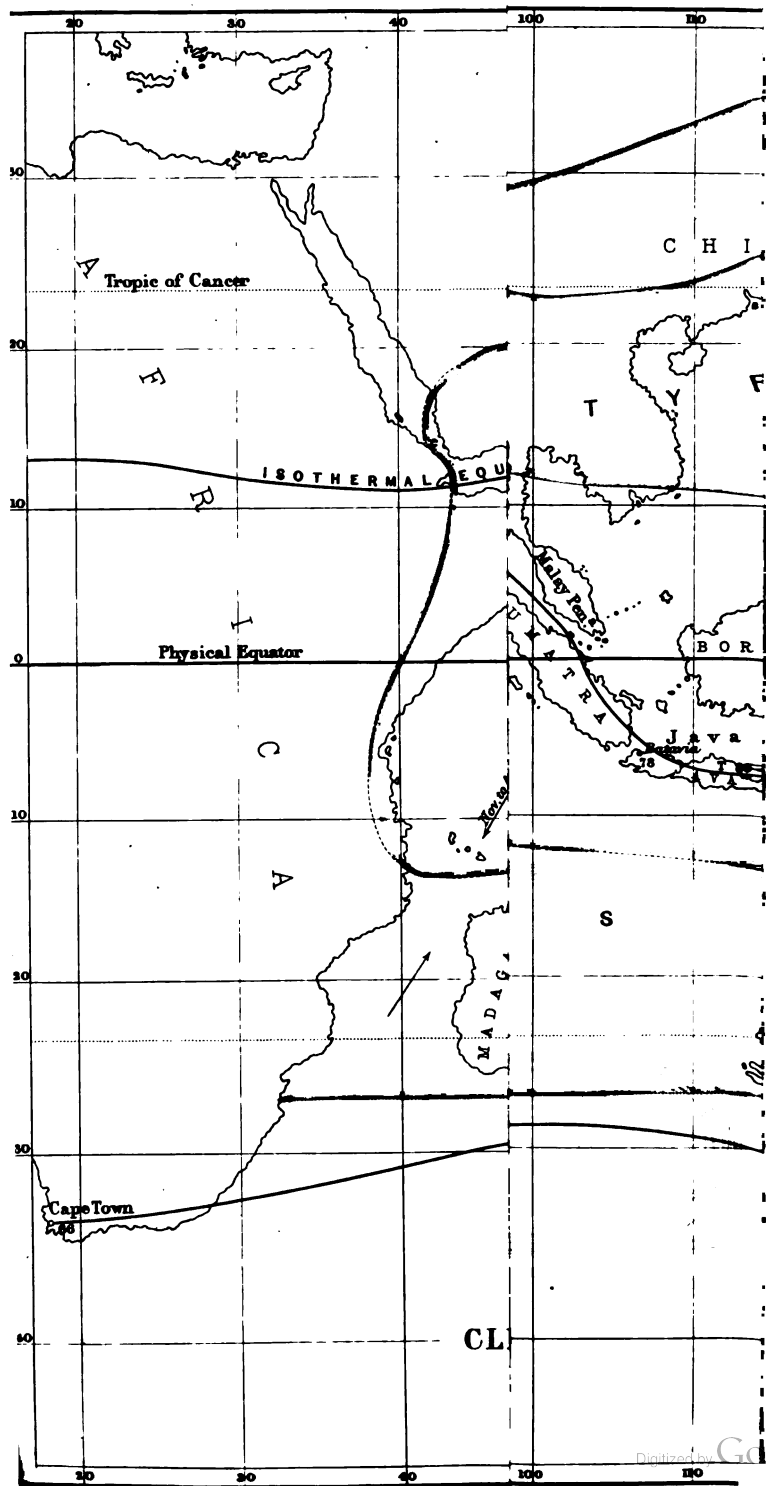


MAP  
 illustrating the  
**CLIMATE & PHYSICAL GEOGRAPHY**  
 OF  
**NORTH EAST AUSTRALIA**  
 to accompany the Paper by D<sup>r</sup>A. Ratray, M.D. R.N.

Published for the Journal of the Royal Geographical Society by J. Murray, Abchurch Lane, London, 1868.







ment of Asia forming the heating surface which acts on the northern trades and converts them into the monsoons of India and China; and Africa and Madagascar on the west, with North-Australia, New Guinea, &c., on the east, that cause the monsoons of the southern hemisphere. The winds of Northern-Australia and New Guinea form the south-east corner of this monsoon area. On either side of the equator, though of the same nature, the breezes necessarily blow, as the trades do, in different directions and with dissimilar force. Thus, while those of India are south-west and north-east, those of Northern-Australia are south-east and north-west. This is owing to the relative position which the land on either side bears to the central sea. Again, while the south-west monsoon of India prevails during the same months as the south-east of North-Australia, the former is a rainy wind and the latter dry. And further, while the opposite or north-east monsoon of India prevails during the north-west wind of Australia, the former constitutes the dry and the latter the moist or rainy season. Thus in either hemisphere it is the breeze which blows *from* the equator (*i. e.*, the centre of the Indian Ocean) to the north or to the south respectively, which is the rainy wind. The general limit of the monsoon region in the southern hemisphere is lat.  $10^{\circ}$  or  $11^{\circ}$  s. The heating influence of Madagascar, however, extends it at its south-west corner, while Australia and Papua carry it still further down towards the east, where it reaches to about  $15^{\circ}$  s. lat. From the limited area and smaller heating power possessed by the narrow Cape-York peninsula, aided by the cooling influence of the waters which bathe it on both sides, the monsoons do not extend quite so far south as in the more extensive tract further west, where they doubtless blow also with greater force, especially near the coast.

Again in the Indian Ocean, between Australia and Madagascar, where no land exists to make the monsoons pronounced, they blow both feebly and irregularly, their force increasing towards the land on either side, especially Australia. And we find it stated that "the parts where the north-west and south-east monsoons prevail with greatest strength and regularity are in the Java Sea, and from thence eastward to Timor, amongst the Molucca and Banda Islands, and on to New Guinea." This is only what theory would predict, and its correctness we can vouch for from a recent passage through these waters in H.M.S. *Salamander*. Blowing strongly as we passed through the funnel-shaped Torres Strait, the monsoon gradually lessened in force as we made westing in the Arafura Sea, till about the south point of Timor-laut; but thence along the south and east coasts of Timor, Sandalwood Island, the straits of Lombok, and Java Sea,



they blow even more decidedly and strongly than at Cape York itself; intensified, doubtless, by the indraught caused by the sun's heat on these extensive equatorial islands.

Lat.  $15^{\circ}$  s. is usually laid down as the southern limit of the Australian monsoons. The results of recent travel and settlement, however, tend to render it almost certain that they extend as far as  $18^{\circ}$  south; since they are found at the bottom of the Gulf of Carpentaria during the hot and wet months of summer. The monsoons of India and those of North-Australia are thus totally distinct, although they come in close contact at the equator—blowing, however, in opposite directions. It is the huge heating surfaces of Australia, and especially its dry parched interior, which is the cause of the north-west monsoons of this part of the globe. Were Australia removed there would be no monsoons in this region, and south-east trades would prevail throughout the year; while those of Asia in the northern hemisphere, and slight monsoons in the Mozambique, would alone remain of the present monsoon quadrilateral.

The south-east monsoons of North-Australia may be regarded as the regular trades, continuous and identical with those which girdle the southern tropic, though differing somewhat from them. The action of the sun's heat when in the northern hemisphere during June, July, August, and September, on the surface of Sumatra, Java, Borneo, and other large islands of the Eastern Archipelago, and especially New Guinea, only 90 miles from Cape York (and also on Northern Australia itself) causes an ascending current of warm air, which has to be replaced by colder and heavier air drawn from the south-eastern current; which, when superadded to, necessarily intensifies the force of the ordinary south-east trade of this region. Moreover, it is to the heating effect of the solar rays on these same land-surfaces during the advancing day that we are to ascribe the increasing force of the monsoon towards afternoon, when the effect of the Coral Sea (which keeps its heat better and cools more slowly than the land) comes into play; and though not sufficient to cause a counter-current seaward (south or south-east), is yet strong enough to exactly counterbalance the south-east trades of the day-time. Hence the morning, evening, and often nightly calms. Their cause is thus identical with what creates ordinary sea and land breezes; Papua and the northern part of the Cape York peninsula being the one agent and the Coral Sea the other. In proof of this we find that further south, as at Rockingham and Cleveland Bays (lat  $18^{\circ}$  and  $19^{\circ}$  s.), out of the monsoon but in the trade-wind region, the sea and land breezes are regularly established, and supersede the south-east trades night and morning, though not during the day; while at Somerset, during

the south-east monsoon, cold land-winds not unfrequently blow at night from the south-west, with a considerable reduction of temperature, and sometimes more pronounced local sea and land breezes. We know little of the meteorology of that part of tropical Australia which lies to the west of the Gulf of Carpentaria; but it is probable that the influence of the Coral Sea, weakened by distance, will not so much affect this monsoon or cause a similar daily increase and morning and evening lulls. In short, these peculiarities prevail only near the north-east coast, except it be that the wide Gulf of Carpentaria takes the place of the Coral Sea and influences the south-east trades in a similar though minor manner. But, on the other hand, the effect of the extensive land-surface in question on the south-east trade which blows over it will be to lessen its intensity during the day, and increase it at night. The heating land tends to counteract it by day, and rapidly cooling, to augment it by night. In brief, the south-east trades, which on the north-east coast are intensified by day, and just balanced night and morning, blow here less strongly during the day, and with greater force at night. Thus the south-east monsoon winds of Torres Strait are only the south-east trades, frequently intensified by day and lulled at night by local and easily explained causes; and those of North-west Australia the same wind decreased by day and augmented at night by readily-understood influences.

Along the south of New Guinea, and especially in its Gulf, *i. e.*, close to the motor power or land surface, the heating of which so augments the monsoons of the Torres Strait region, these winds are doubtless stronger than along the east coast of the Cape York peninsula. But on this we cannot speak definitely, for Papua presents so much in its geographical position, physical features, &c., that elsewhere materially influences and modifies climate, that its climatology, a fertile field for future enquiry, will doubtless be found to possess many peculiarities and anomalies to be elucidated only by more prolonged and accurate research than has yet been possible in the visits of two of H.M. surveying vessels only (*Fly* in 1842-6, and *Rattlesnake* in 1846-50), which did no more than survey the south-east coast, and never ventured to send expeditions inland.

Though termed the south-east monsoon because it blows principally from that part of the compass, this wind ranges over several points, and is often s., s.e., s.s.e., and so on; while another peculiarity consists in this, that within a certain distance (say 8 or 12 miles), and the same may be said of the trades further south, it takes more or less the general direction of the coast, which, however, as a whole, has itself a south-east

and north-west trend from Sandy Cape northward. We are to look for the cause of this in the mountain range that runs up the north-east coast of Australia comparatively close to the sea; which, though not very lofty, is sufficiently elevated to deflect the lowest, and hence densest, stratum of air, and cause it to follow the sinuosities of its bays and headlands. 200 or 300 miles from the coast the monsoons and trades are more direct and constant, being there uninfluenced either by sea and land breezes or by the contour of the land. By being thus turned aside we may partly account for another peculiarity in the monsoons of the Torres Strait region. Like the trades generally we might expect the south-east monsoon to blow most strongly near the equator, and hence at Torres Strait than further south. Still this will not altogether account for their force at Cape York, and we must look to the above-mentioned fact for a satisfactory explanation. Turned aside thus, the south-east monsoon follows the contour of the coast, getting stronger as we approach Torres Strait, through which its course is unopposed. The same wind, impinging on the coast of New Guinea, is doubtless similarly deflected westward by the lofty mountain range running through that island in a general east and west direction, but with a northward bend likely to promote this effect. Concentrated thus, the monsoons of the north-east coast of Australia and Gulf of Guinea find an outlet in Torres Strait, through which they rush in a westerly course; and so strongly do they blow, both here and along the coast to the north of Cape Melville during those months in which it is best developed, that H.M.S. *Salamander*, unable to steam against it and the strong tide, has on more than one occasion been compelled to anchor for several days until it lulled. This usually occurs during June, July, August, and beginning of September, when the heating power of the sun, then close to the equator, on the shallow seas between Asia and Australia, is greatest.

This deflection of the south-east monsoon, by the coast of north-east Australia, necessarily makes it less strongly felt in the region beyond; and, conjoined with other causes already spoken of, forms another reason for believing that in western tropical Australia they blow with less force, at least during the day, than near Cape York. We at least know, for certain, from the travels of Leichhardt and the Jardines, that both the south-east monsoon and trade are little felt in the comparatively level part of the Cape York peninsula which lies to the west of the main mountain range, and the Gulf of Carpentaria adjacent to it. Another reason why the south-east monsoon blows so strongly near Torres Strait will be given hereafter. Meanwhile

one effect of its concentration is to materially increase its humidity, which is often very observable at Somerset. Further south, along the coast, its moisture necessarily decreases, *pari passu*, with its lessening force.

The opposite or north-west monsoon may be termed a prolonged sea breeze, and regarded as the south-east monsoon deflected or turned back on itself by the influence of the land of Australia. When the sun is in the southern hemisphere, and right over this, especially its parched interior, the super-heated air rises and creates a north-westerly current; which, coming from the equator, is warm, and from over the sea moist. This land surface however, much less extensive than that of the Asiatic continent, leads this monsoon, unlike the winds of India and China, to last no longer than 3 or 3½ months, if so much; after which, when the sun again recedes, the influences which cause the opposite breeze come into play, and the more prolonged south-east wind is resumed. Though called the north-west monsoon its direction often varies. Rains often prevail then, for a reason to be presently explained. It is often irregular at Cape York and along the adjacent eastern coast, as south-east winds occasionally intervene and blow for days; while calms are frequent, doubtless because the heating power of the limited area of the taper point of the Cape York peninsula is often counterbalanced by the cooling influence of the extensive water-surface on either side of it, and the temperature of the air thus prevented from rising sufficiently high to cause an equable, strong, and permanent wind. The more extensive area of Arnhem's Land, to the west of the Gulf of Carpentaria, doubtless makes the north-west monsoon of that region both stronger, more regular, and more equable; and those occasional lulls and counter-currents unfrequent; while it probably comes earlier and lasts longer, as it will also in New Guinea, the extent of which land-surface, traversed by lofty mountains, will lengthen and render more regular this periodic wind in that region, and assimilate it to its analogue in India and China. Thus while the south-east monsoon is *regular*, the north-west is *irregular*. Moreover the warmth of the adjacent waters of the Gulf of Carpentaria, Arafura Sea, Gulf of New Guinea, and Coral Sea often act so as to modify and even occasionally counterbalance the north-west monsoon in a manner to be presently described. Thus it is probable, that in the wide tract of country to the west of the Gulf of Carpentaria, both monsoons will be found on closer investigation to blow more regularly and equably, though perhaps with less strength, than at Cape York, where there are many and serious disturbing influences at work to

interfere with their constancy, force, and direction ; while again the north-west monsoons are no doubt longer and the south-east winds shorter in duration, each occupying a portion of the year more akin to what prevails in India.

Here, as in other monsoon regions, major and minor differences may be observed in the two great divisions of the year. Thus the rainy season may commence sooner, be delayed, or show a greater or less rainfall. While again the south-east winds may be either strong or gentle, wholly dry, or varied by occasional showery or hazy weather. More or less important differences like these frequently occur, even in successive years : *e. g.*, during 1866-7 the wet monsoon did not fairly commence at Cape York till the end of February, and only lasted a fortnight, the rain however which fell then being great. And again, at the Adelaide River settlement, lately abandoned, the rainy season did not set in till the end of January, 1867, though the rain fell heavily, and one night to the extent of 5 inches. These irregularities are more apparent towards the verge of the monsoon region.

To accurately determine when the monsoons of the north-east coast of Australia change, is of interest not only in a scientific but in a mercantile point of view in connexion with the commerce carried on between these colonies and India, China, and England *viâ* Torres Strait, which is a shorter and in some respects easier and better track than either that to the east of New Caledonia or to the west of Australia, although it has one disadvantage, *viz.*, that ships cannot make this passage during all parts of the year. The northward voyage can be easily accomplished by sailing vessels only during the south-east monsoon, and the southward trip only during the prevalence of the more fitful north-west wind. At other periods the passage either way is apt to be tedious. It is therefore a matter of importance to lay down with precision the time of change of the monsoons, so that vessels going either up or down may not be disappointed in the wished-for winds. Unfortunately, however, little that is trustworthy has since been added to the information so diligently collected by MacGillivray, and published, some fifteen years ago, in the '*Voyage of the Rattlesnake.*'

In endeavouring to define and classify the various influences which more or less affect the prevalent winds of Cape York and its vicinity, it must be remembered that the climate of any locality is often materially modified by that of surrounding districts ; and that this forms the centre of a wide area, of the climate, &c., of which we as yet know very little, and in many respects nothing at all. The western half of Papua, for example, only 90 miles from Cape York and almost visible on passing

through Torres Strait, has never yet been visited by any traveller to define its climate and meteorology, or otherwise add to our scientific knowledge. While of the climate of the Gulf of Carpentaria and Northern Australia beyond, we have as yet only fragmentary, imperfect, and, with one or two exceptions, unscientific accounts made by settlers, and hence of doubtful value. When we know more of this wide and yet unexplored region, it is probable that other agencies than those here subjoined will be found to operate on and modify the prevailing winds and climatology of Cape York.

1st. The hilly range which traverses the whole length of the Cape York peninsula deflects the south-east trades and monsoons, causing them to follow the contour of the coast, and thus vary with every headland and bay, although they still preserve a general south-easterly direction; and further tends to intensify them as they near the funnel-like opening of Torres Strait. The same obstruction, moreover, prevents these winds from being much felt in the region beyond, and at the same time acts as a sponge by abstracting their moisture and precipitating it as dew or rain on the eastern slope; a fact which partly accounts for the parched character of the country to the westward.

2nd. It is to the opposed and alternately ascendant heat of the Cape York peninsula, and perhaps Papua, on the one hand—and of the seas which bathe the former on its east and west coasts on the other—to which we are to ascribe those lulls and calms which occur in both monsoons, the occasional reversal of the breeze during the north-west monsoon, and the frequently increasing strength of the south-west wind during the afternoon. Further south, in the trade-wind region, the sea and land breezes are regularly established.

3rd. Blowing from a long distance over the Southern Ocean and Coral Sea, the south-east monsoons are both moisture and ozone-laden, and rust iron even more readily than the wet north-west winds. Again, the north-west monsoons, blowing from the warm equatorial Indian archipelago, largely composed of shallow and hence highly heated inter-insular seas, are sufficiently moisture-laden and warm to precipitate the heavy rains which then prevail. So also the south-west winds, coming from the super-heated surface of the Gulf of Carpentaria during the wet monsoon, are rainy and are the winds with which rain is most frequently associated in this region.

4th. Like the trade-winds elsewhere, the south-east monsoon or exaggerated trades of this region take a more westerly course as they approach the equator: and as the trend of North-Eastern Australia takes more and more the same direction as

we go north, this wind thus follows the coast outline: an effect aided as above-mentioned by the mountain-range.

5th. That the physical geography of Torres Strait and its vicinity, and especially the shallow neighbouring waters, have a material influence on climate, temperature, and particularly the prevalent winds, which become modified in force, direction, and character, is not a mere supposition but an opinion based on facts. This narrow passage acts as a funnel for the concentration of westerly currents both of warm water and heated air. Here it must be remembered we are not only in the tropics, but within  $9^{\circ}$  of the thermal equator; and the following table will show how much the temperature of the sea in any region—say at the equator—is above that of higher latitudes; and how rapidly it rises as we near the torrid zone. The higher temperature for the same parallel, in the southern hemisphere, will be apparent. Heated principally by radiation, the warmth of the air necessarily rises with that of the sea.

TABLE to show the TEMPERATURE of the SEA (surface) and AIR, according to Latitude. (DAYMAN—Voyage of *Rattlesnake*.)

| Latitude North. |     | Sea.        |     | Air.        |
|-----------------|-----|-------------|-----|-------------|
| $0^{\circ}$     |     | $0^{\circ}$ |     | $0^{\circ}$ |
| 23              | ... | 69          | ... | 68          |
| 21              | ... | 71          | ... | 66          |
| 18              | ... | 73          | ... | 68          |
| 15              | ... | 73          | ... | 72          |
| 8               | ... | 82          | ... | 78          |
| 6               | ... | 84          | ... | 82          |
| $5\frac{1}{2}$  | ... | 82          | ... | 79          |
| 5               | ... | 83          | ... | 82          |
| Equator.        |     |             |     |             |
| 1               | ... | 83          | ... | 77          |
| $2\frac{1}{2}$  | ... | 80          | ... | 79          |
| 5               | ... | 80          | ... | 78          |
| 7               | ... | 80          | ... | 79          |
| 12              | ... | 81          | ... | 79          |
| 15              | ... | 80          | ... | 79          |
| 17              | ... | 81          | ... | 80          |
| 20              | ... | 80          | ... | 78          |
| 26              | ... | 67          | ... | 76          |

These observations were made in the Atlantic; but the same law prevails in the Pacific, and in Torres Strait itself, and is indeed universal, and the true cause of the trade-winds and monsoons. This will be evident from the following observations which give the temperature of the sea and air for similar latitudes (lat.  $11^{\circ}$  s.) in the same (south) hemisphere in the Atlantic, middle of the Pacific, and Torres Strait, about the same period of the year (March). Observations for the same

year would be more satisfactory; but it would obviously be difficult, and for one observer impossible, to obtain this:—

| S. Atlantic (Lat. 11° s.)<br>1864.                  |      |       | S. Pacific (Lat. 11° s.)<br>1860.                  |      |       | Torres Strait (Lat. 11° s.)<br>1867.                  |      |  |
|-----------------------------------------------------|------|-------|----------------------------------------------------|------|-------|-------------------------------------------------------|------|--|
| H.M.S. <i>Salamander</i> .                          |      |       | H.M.S. <i>Topaze</i> .                             |      |       | H.M.S. <i>Salamander</i> .                            |      |  |
| Temperature of Air.                                 | Sea. |       | Temperature of Air.                                | Sea. |       | Temperature of Air.                                   | Sea. |  |
| 80½                                                 | 80½  | .. .. | 74                                                 | 73   | .. .. | 78½                                                   | 81½  |  |
| 78½                                                 | 79½  | .. .. | 74½                                                | 73½  | .. .. | 82½                                                   | 82½  |  |
| 78½                                                 | 78½  | .. .. | 74                                                 | 74½  | .. .. | 81½                                                   | 81   |  |
| 77½                                                 | 78½  | .. .. | 76                                                 | 75½  | .. .. | 84                                                    | 83½  |  |
| Highest observed Temperature of Sea in S. Atlantic. |      |       | Highest observed Temperature of Sea in S. Pacific. |      |       | Highest observed Temperature of Sea in Torres Strait. |      |  |
| 83° Fahr.                                           |      |       | 83° Fahr.                                          |      |       | 84° Fahr.                                             |      |  |

These observations were made at noon; and show, first, how high the temperature of the sea and air at Cape York is, when contrasted with that of the middle of the same ocean (Pacific) of which it is an outlet, and that of the more distant Atlantic; and second, how much higher the warmth of the sea is above that of the air at Cape York, contrasted with what occurs in the middle of the two oceans, where we find comparatively little difference in temperature. The whole proves how warm the water at Cape York sometimes is at this particular season, as contrasted with that of the same latitude elsewhere; from which we may reasonably conclude that it is so as a rule during the entire year. These facts also go far to lead us to believe that, like the aerial, so the aqueous thermal equator reaches far south in this region, and probably passes through Torres Strait. For the cause of this we are to look to the shallowness of the water; and if we extend our survey we shall find that it is to the comparatively trivial depth of the seas in and about the Indian archipelago that the remarkable southward bend of the aerial equator in this region is due; for we must recollect that the air which overlies sea or land is not heated directly but indirectly, and by radiation; and that the temperature of either the land or sea respectively does not depend on that of the air, but the latter on the former. The following experiment, made in Torres Strait, will show that shallow heats more rapidly and intensely than deep water:—

ALBANY PASS (Coal Bay), 8th March, 1867, 2 P.M. Temperature of air in shade, 82° Fahr.; force of wind, 4°; of tide, 3 knots; a good swell on.

| Distance from Shore. | Depth of Water. | Temperature of the Sea. |
|----------------------|-----------------|-------------------------|
| 200 yards.           | 54 feet.        | 82½° Fahr.              |
| 30 feet.             | 9 "             | 83° "                   |
| 20 "                 | 4 "             | 84° "                   |
| 10 "                 | 1 foot.         | 84½° "                  |
| 5 "                  | ½ "             | 84½° "                  |



Thus the temperature of the surface-water, 200 yards from the shore, in a strongish wind and tide and good sea, when the temperature of the air was  $82^{\circ}$  Fahr., was  $82\frac{1}{2}^{\circ}$  Fahr.; whereas 30 yards from the shore of a bay in which she was anchored, exposed to the wind and an ebb-tide, it was  $\frac{1}{2}^{\circ}$  more ( $83^{\circ}$  Fahr.) in a depth of 9 feet; 20 feet from the shore, at a depth of 4 feet, it was  $84^{\circ}$  Fahr.; 10 feet from the shore, at a foot depth, it was  $84\frac{1}{2}^{\circ}$  Fahr.; and 5 feet from the shore, at half a foot depth, it was as much as  $84\frac{3}{4}^{\circ}$  Fahr., *i.e.*  $2\frac{1}{4}^{\circ}$  Fahr. above what it was in mid-channel.

Thus the difference between the temperature of surface-water in 9 fathoms, and that of half a foot in depth, was no less than  $2\frac{1}{4}^{\circ}$  Fahr. The influence of the shallowness of the water on its temperature would have been more marked, had there been less tide and wind to agitate the sea, and thus diffuse its surface-warmth rapidly; and also had the shallow part been more extensive; for here the sandy beach shoaled rapidly. More favourable conditions usually prevail in and near the numerous coral-reefs, shoals, and lagoons of this region; and especially the latter, in which the water often varies from a few inches to one or two feet in depth, and is but seldom and little influenced either by waves or tides to disseminate its surface-heat, or by winds to abstract it. Here the influence of the sun on the sea is more fully effected, and the result is water almost at a blood-heat, with a temperature closely approaching that of the still more highly warmed land. But to this we must still add another source of caloric in the numerous sandy patches, coral-reefs, and islands which bestud this strait and its vicinity, which necessarily contribute materially to raise the temperature. The effect of the sun's rays on these numerous islets and the shallow waters which encircle them is to raise the temperature of the air overhead, above that of neighbouring seas. Hence, as water is more retentive of heat than land the temperature of this region is doubtless often, especially at night, above that of the adjacent land; and thus when well warmed, especially when the sun is perpendicular, we can readily perceive that the effect will often be to cause an influx of air from adjacent regions, and bring surface-currents from over neighbouring lands or seas. As we shall presently see, this is what actually occurs. So great is the effect of these shallow waters on the air that we doubt much if the average annual temperature at Torres Strait, and a little to the east of it, is not greater than that of the land on either side—in Papua to the north, and the Cape York peninsula to the south. It is to the influence of this shallow region that we are doubtless largely indebted, with the effect of the Australian and Papuan surfaces, for the great

southward bend of the thermal equator in this quarter of the globe.

These remarks will render it evident that the shallow waters of Torres Strait and the adjacent coral-reef regions, heated partly by bathing warmer land-surfaces and partly from its mere shallowness, has a material influence both on the winds and temperature. Much of this region is no more than from 6 to 10 fathoms; but even in its deeper parts, the 15 or 20 fathoms form a marked contrast to the 35 of the Gulf of Carpentaria and Arafura Sea, the 30 and 40 common in the Java, Flores, Celebes, and other adjacent seas, the 150 to 300 of the neighbouring Coral Sea within 50 miles of Cape York, or the far deeper waters of the Indian and Pacific Oceans, seldom less than 1000 fathoms, and usually far more. Now let us conceive the effect of the sun on the reefs, islands, and shallow waters of Torres Strait. As in the above experiment in Albany Pass, we can readily perceive how water heated even no more than 2° Fahr. above that of the neighbouring seas, and probably it is often more, should cause an indraught to replace the heated air which rises overhead. This will partly explain the increasing force of the south-east monsoon during the afternoon when the sun is high, and this region most warmed. Hence also partly why these winds increase in force as we near Cape York: we are approaching this superheated region. And again it is greatly owing to this furnace-action during the summer season, when the sun is overhead and strongest, that we are to ascribe the frequent diversion of the north-west monsoons to a south-westerly course. The latter, which are the rainy winds of Cape York, are originally the north-west monsoons. On reaching the Gulf of Carpentaria, where they become if possible more moisture-laden, they begin to be deflected towards the warmer regions of Torres Strait, and take a south-westerly direction. We must not forget that at this season the sun is in the southern hemisphere and overhead or nearly so, *i.e.* directly over Torres Strait as well as over the entire length of Rossel's current which feeds it, and which is thus highly heated long before it reaches Cape York, where it at length arrives to become an important storehouse of heat and moisture. Were it not for the disturbing influence of these shallow waters, the rainy north-west monsoons would blow over, water, and fertilise the western part of the Cape York peninsula. As it is they are turned aside, and hence the parched barren character of this district, where neither monsoon blows with its full force; as the moist north-west wind seldom reaches it, and what of the south-east breeze it receives over the mountain-range is previously deprived of its moisture. Hence the atmo-

sphere is dry and parched, the vegetation suited only for arid districts (tea-tree, spinifex, &c.) ; the winds irregular, and often light ; and is the reason why both this and the adjacent part of the gulf are often visited by violent squalls and thunderstorms.

Thus, in the chain of islands which connects Asia with Australia and the dry parched interior of the latter, on the one hand—and in the shallow seas which intervene, on the other—we have a double influence which materially affects the climate of this region. The warming of these islands and continental surfaces by the sea raises their heat to a maximum ; while the inter-insular waters, which probably rise to a higher temperature here than in any other part of the ocean, serve to preserve their warmth. Hence why the average annual temperature of this region as a whole is so great, and why the thermal equator passes through it, and here reaches a higher latitude than in any other part of the southern hemisphere. Somerset and the Torres Strait district would share the same exalted temperature were they not acted on by other influences which lower it.

It is moreover to the varying shallowness of different parts of these seas, and the relation which this has to the size, contour, and general physical geography of adjacent land-surfaces that we are to look for an explanation of the differences of temperature and the modifications of winds and other peculiarities in the climate of different parts of this extensive region. The waters of Torres Strait are doubtless shallower than those of any part of the Indian archipelago. The influence which this has on the winds and climate of Cape York is very apparent ; and similar phenomena will probably be found to prevail in many other parts of the Indian archipelago.

6th. Consisting of the south-east trades reversed by the heat generated by the massive island-continent of Australia, this north-west wind about Cape York is neither so regular, strong, nor prolonged as it doubtless is further west ; and for this reason, that the peninsula—pointed, narrow, isolated, and moreover bathed by the sea on either side—is never heated so highly as the larger portion of Inter-tropical Australia to the westward of the gulf, which has no such adverse influences to counteract the sun's rays ; and hence the counter-current or north-west monsoon is brief, feeble, and more irregular, seldom lasting over two and a half or three months ; and also why, during the monsoon, the winds and rain are often replaced for hours and even days together by dry breezes from the opposite quarter, and why the north-west is an irregular monsoon, the period of its accession, duration, and decline being very uncertain. The Gulf of Carpentaria is thus an influence which disturbs the north-west monsoon. Had the former not existed, and the land from

Cape York to Cape Arnhem been continuous, this periodic wind would have been more regular and pronounced than it is, especially at Cape York.

7th. That Papua, only 90 miles from Cape York, with a great and almost continental area, and lying within a few degrees of the equator, does influence materially the climate and, especially, the winds of this region, cannot be doubted. It is to the heating of this vast mass of land, in conjunction with that of Australia, that we owe the monsoons of this region. It is to the sun's influence on it during the day when the south-east monsoon prevails, that we partly owe their increasing force, especially in the afternoon, as we approach Cape York. While, again, to its lofty mountains and the physical conformation of the converging coasts of New Guinea and North Australia, are we partly indebted for the westerly deflection and increased force with which the pent-up south-east monsoons blow through Torres Strait till they again spread out and become feebler in the Arafura Sea beyond. Nor can we doubt that the effect of the heated lofty land of the east end of Papua is to cause a land-wind, the direction of which would obviously be south-east. This will be strongest and most lasting when the sun is in the southern hemisphere, *i.e.* during the prevalence of the north-west monsoons. Is not this influence, superadded to others already mentioned, the cause of the south-west rainy winds of Torres Strait during this monsoon? The effect of sea and land breezes in modifying the monsoons of the Indian archipelago is thus, though not so marked here as off the south-east coast of Timor and in the Java Sea (Maury), at least very decided; and if Jansen's opinion as quoted by Maury be true—*viz.*, that the north-west monsoons of North Australia are the north-east trades deflected, the cause of this being, of course, the heat of the land—we have here in these south-east winds occasionally prevalent at Cape York a second deflection, again induced, partly at least, by large masses of land, though principally by the furnace-action of the warm waters of Torres Strait. Much of this, however, is necessarily conjectural until we can obtain results from personal observation of the climate and meteorology both of the coast and interior of that land of mystery—Papua.

The climate of that portion of inter-tropical Australia, which lies to the south of the monsoon but in the trade wind region, is still little known, except along the east coast, where we find sea and land breezes prevalent night and morning, in addition to the south-east current of the daytime. It is only over the open ocean that the trades blow uninterruptedly; and in the interior, a district not yet fully explored, they are doubtless much modified, if not altogether abrogated by local causes, to be

elucidated by future investigation. For example, at the Albert River, instead of *moist* south-east trades, *dry* south-west winds, coming from the interior, are frequent. For various reasons already alluded to, the climate of the western Cape York district and the adjoining part of the Gulf of Carpentaria, is one peculiar to itself, differing widely from that of Somerset and neighbouring regions. Cyclones do not often occur in the monsoon region, but small ones occasionally blow with considerable violence further down the north-east coast in the latitude of the trade winds, and at least as far north as the Endeavour River.

Thus, as elsewhere, many influences combine to form and modify the prevailing winds of Cape York and the north coast of Australia. Confining our attention briefly to the special meteorology of this district, it appears unnecessary to load these pages with statistics of barometric, hygrometric, thermometric, electric, and other variations of the different seasons. Still, as mere verbal statements are valueless in one sense, and as bare platitudes without proofs, though not quite worthless, are yet liable to be received with a certain amount of doubt, we shall endeavour to follow a medium course, and advance no fact without some evidence of its scientific accuracy.

Dividing, then, the year into two, according to the monsoons, we find that the temperature from the beginning of March to the end of October, which constitutes the cool and dry season, varies at Somerset from about 61° or 62° Fahr., to 85° Fahr. in the shade. The pleasant and often strong south-east monsoon blows right up the Albany Pass, which has the same trend, and thus keeps the atmosphere of the anchorage and of Somerset itself pleasantly cool and wonderfully enjoyable for a tropical climate. In an expedition, made by Captain Carnegie (Sept., 1865), near the close of a very dry season, from Somerset across the narrow point of the peninsula to the shores of the Gulf of Carpentaria, the temperature was never over 85° (shade), proving the influence of the adjacent waters on both sides in equalising the temperature of the land. During the wet north-west monsoon, the temperature ranges from 75° to 90° (shade), but from the excessive humidity of the air the weather is then much more oppressive than with the south-east winds. During 1866 the highest thermometer in the shade was 90° Fahr., and the lowest 62° Fahr., thus giving an annual range of 28° Fahr.; while the average annual temperature was 78° Fahr. The daily and monthly thermometric variations are neither sudden nor great. The highest daily range of heat (12½ Fahr.) observed in the register of H.M.S. *Salamander*, occurred during August (dry season), and the lowest (9½° Fahr.) during January (wet season). The greatest monthly range observed was 14½ Fahr. The hottest

months are thus those of the wet season, particularly December and January, and the coolest those of the dry monsoon, especially August and September. The annual range for 1866, viz., 28° Fahr., is small, since 25° or 30° Fahr. is by no means an uncommon daily range at Brisbane, situated in the temperate zone (lat. 27½° s.). The average annual temperature of Port Essington, as given in Johnstone's 'Physical Atlas,' is 83° Fahr., which is 5° or 6° above that of Somerset; and the reasons are obvious. For one, Cape York is bathed on both sides by the sea, which keeps its temperature low, and prevents it from rising so high as if it had a wider extent of back country. Another reason is, that Somerset is more exposed to the cooling influence of the south-east monsoons, and less subjected than Port Essington to the warming effect of the north-west winds.

The limited annual thermometric range agrees with the law which finds that of low less than that of high latitudes, and, moreover, shows that the climate of the pointed northern extremity of the Cape York Peninsula partakes more of the littoral than of the insular or continental character. This will be evident from the following contrast with that of other and not too distant tropical places:—

ANNUAL RANGE OF TEMPERATURE.

|          |   | Latitude.         |         | Range of Temperature. |
|----------|---|-------------------|---------|-----------------------|
| LITTORAL | { | Madras .. ..      | 23° N.  | 34° Fahr.             |
|          |   | Callao .. ..      | 12° S.  | 22 "                  |
|          |   | Bangkok .. ..     | 13¾° N. | 13 "                  |
|          |   | Somerset .. ..    | 10½° S. | 28 "                  |
| INSULAR  | { | Trincomalee .. .. | 8½° N.  | 17 "                  |
|          |   | Colombo .. ..     | 7° N.   | 10 "                  |
|          |   | Guadaloupe .. ..  | 16° N.  | 19 "                  |
|          |   | Barbadoes .. ..   | 13° N.  | 12 "                  |
|          |   | Manilla .. ..     | 14½° N. | 12 "                  |
|          |   | Amboyna .. ..     | 3½° S.  | 10 "                  |

Again, both the annual range of temperature for Somerset, the only part of inter-tropical Australia the meteorology of which has yet been studied (viz., 28° Fahr.), and also that of Sydney, in extra-tropical Australia (viz., 61° Fahr. in 1859, and 62° Fahr. in 1860), confirm the law that the range of temperature here, as in the southern hemisphere generally, is not so high as in corresponding latitudes in the northern half of the globe. Here, for example, we never meet with an annual range like that of Canada (138° Fahr.), or of Pekin (115° Fahr.), and for obvious reasons. We have not similar extensive tracts of land like those of Asia, Europe, North America, to cause these great reductions of temperature in winter, and high thermometer in summer; or those icy currents of water coming direct

from the poles, or warm ones from the equator, to cool or heat the land and superincumbent air; the one to increase the summer heat, and the other to augment the winter's cold.

Although the general warmth of the southern hemisphere is higher than that of the northern as a rule, a contrast of the average annual temperature of Somerset with that of places in about the same latitude on the other side of the equator, will prove that this general law is not carried out here. In this respect it resembles Callao, situated in about the same parallel on the opposite shore of the Pacific, whose climate, superior on the whole to that of Somerset, inasmuch as it has no rainy season, is wonderfully cool for a place so near to the equator. Thus we find from the following table that it is less by  $4^{\circ}$  Fahr. than that of Madras; by  $6^{\circ}$  Fahr. than that of Kouka, in the interior of Africa; and by  $7^{\circ}$  than that of Maracaybo in South America; all three situated about the same distance from the equator, but in the opposite hemisphere; and whose temperature therefore it ought, reasoning from the above law, to have exceeded.

|                                       | Fahr. |                                  |
|---------------------------------------|-------|----------------------------------|
| Somerset, average temperature 1866 .. | 78°   |                                  |
| Madras .. ..                          | 82°   | } Johnstone's Physical<br>Atlas. |
| Kouka .. ..                           | 84°   |                                  |
| Maracaybo .. ..                       | 85°   |                                  |

The solution of this apparent anomaly is to be found in the proximity of Somerset to large sheets of water, which both equalise and lower its temperature. The same cause keeps the annual range of temperature at Cape York so much lower than at other places along the coast of New South Wales, *e. g.* Sydney, where it is often more than  $60^{\circ}$  Fahr.

We may now give a contrast of the annual average temperature of Somerset with that of places situated about the same distance on the south side of the equator.

|                | Latitude.                  | Fahr. |
|----------------|----------------------------|-------|
| Benguela .. .. | $12\frac{1}{2}^{\circ}$ s. | 77°   |
| Bahia .. ..    | $12^{\circ} 57'$ s.        | 78°   |
| Callao .. ..   | $12^{\circ}$ s.            | 73°   |
| Somerset .. .. | $10\frac{1}{2}^{\circ}$ s. | 78°   |

Somerset is thus surpassed in the comparative lowness of its average annual temperature only by Benguela and Callao, which is to be accounted for by the former being in a somewhat higher latitude, and the latter by the same reason, added to others still stronger, *viz.*, its proximity (50 or 60 miles) to the base of the Andes, from whence cold winds occasionally blow down to lower its temperature; and, above all, the influence of the cold antarctic coast-current which washes the adjacent shore.

In ordinary circumstances the rise and fall of the barometer at Somerset is comparatively slight, as in the tropics generally, the annual range being seldom more than 0·50 or half an inch. Before squalls and cyclones, however, it sometimes falls considerably; but this does not usually last long. During the dry south-east monsoon from 29·80 to 30·20 may be given as the range, and 30·10 as the average. During the rainy season its range is from 30·00 to 29·70, the average being about 29·85 or 29·90. Thus, during the *dry* months, it is seldom *below*, and during the *wet* season seldom above 30·00.

The hygrometer (Mason's) shows that the atmosphere of Somerset is driest during August and September, when the greatest difference between the wet and dry bulbs is 9 or 10, and the average, 4, 5, or 6. The same prevails along the tropical part of this coast in this the summer season. During the heavy rains occasional calms, squalls, and frequent mists of the rainy season, the hygrometer indicates an uncomfortably moist atmosphere; a fact further rendered evident by the perspiration, which constantly exudes, and renders the skin clammy, the saturated atmosphere preventing evaporation. The difference between the wet and dry bulbs, then, is usually from 1° to 1½° or 2°; and very rarely, and only for brief periods, 4° or 5°; and this prevails, not only here, but as far down the coast as Cape Capricorn.

The rainfall varies considerably in different years, both in the regular rainy and the so-called dry season. In the latter showers are usually unfrequent, slight, and brief. During the north-west or rainy monsoon heavy and prolonged rains are common, sometimes with high winds, but not unfrequently with calms. Occasionally (as in 1866-7) the yearly rainfall is comparatively slight for a tropical region, and the north-west monsoon brief; the sky is clear and less clouded, and the air less damp. Thus in this monsoon region, as in the trade wind zone further south, as well as in Queensland and New South Wales, the length and characteristics of the seasons are very uncertain. Several wet ones, welcome, unless too moist, to the farmer of Eastern Australia, may be followed by one of intense and lasting drought, causing great loss by parching the land, destroying the grass and other crops, and starving thousands of sheep and cattle by the deficient water and pasture supply. At Somerset, during the year 1866, the annual rainfall was 103 inches; during the previous, and also during the past year (1867) very much less. Further south, along the coast in the trade wind region, although the rains do not partake of the monsoon character, either as to intensity or duration, they agree in being most copious during summer, when the sun is



to the south of the equator. They differ, however, from the monsoon rains in being by no means unfrequent, though less copious, during the summer, when occasional showers occur, usually attracted by the mountain range which skirts this coast. Still further south, beyond the tropics, the rains, as in all temperate climes, are irregular, and occur both during summer and winter; although, as in other temperate latitudes, by far the most copious and prolonged during the latter. Thus, as the summer is essentially the rainy season in the tropics, both in the trade-wind and monsoon regions, so is the winter in extra-tropical regions. Although a hazy horizon in the south-east is not uncommon during the prevalence of the dry monsoon, indicating a highly moisture-laden ocean air, fogs and mists are very rare in this comparatively rainless season. During the fortnight or month which precedes and follows it, ushering in and out the opposite monsoon, they become more common, and during the wet season itself very frequent, though more so in some years than in others, and then they usually prevail during the calm intervals between the heavy rains of these months.

No systematic series of observations has yet been made as to the electric conditions of the atmosphere of this region. During the wet season, thunder and lightning are common, and often accompanied by squalls and heavy rain. The electric explosions are seldom near the earth, however, but usually distant, and dully heard high overhead through the dense masses of cumuli and nimbi, and are thus seldom attended with such danger to life and property as in New South Wales and Queensland, where their altitude is often less, and deaths from lightning by no means rare.

Observations with regard to the subtle gas, ozone, nature's chief disinfectant and deodorizer, her principal antidote to and preventive of many infectious and miasmatic diseases, and now regarded by some as a potent instrument both in the production and cure of disease, were made by Lowe's test paper. At Somerset, during the prevalence of the north-west or rainy monsoon, the average discolouration was from 1 to 3 only. On one occasion it rose to 7, and once to 12, with a temporary south-east wind. Ozone was not unfrequently absent, especially during calms. During the opposite or dry season (south-east winds) the average was 3, and the highest 9. Ozone was very seldom entirely absent, and then usually during calms. It marked highest during S.E. and E.S.E. winds, chiefly when the air was very damp and hazy, or after showers. Along the coast between 14° and 25° south latitude, including all between the southern limit of the monsoon and Brisbane, the quantity of ozone with westerly and north-westerly (both dry) winds was small; but with east

and south-easterly breezes, especially if much rain fell, it usually rose, and sometimes reached 11 or 12. At Moreton Bay (south latitude  $33^{\circ}$ ) the quantity during calms and light winds was little, and often none. With westerly (dry) winds rather more; but with sea breezes, and hence a moist atmosphere, *e.g.* E., S.E., S.S.E., S., and N.E., &c., it was abundant, especially when the hygrometer indicated saturation. With heavy rains it was abundant, viz., 8 to 10, even in the absence of thunder and lightning; and occasionally it rose to 12 with a southerly (ocean) wind following a thunder, lightning, and rain storm from the west. At Sydney little is found with calms or north-west and west (*i. e.* dry or land) winds; but in calms, with an overcast sky and damp air preceding rain it is often considerable; but most prevalent with east and south-east (*i. e.* moist) winds, and less abundantly with west (*i. e.* dry) breezes. During very heavy squalls from the east (*i. e.* the ocean), with rain, it sometimes rises to 12; and during north-easterly winds with a damp atmosphere to 15.

From these facts we may therefore draw the following deductions:—

1st. That along the coast of Australia the quantity of ozone is more influenced by the direction, source, and velocity of the wind than by the humidity of the atmosphere or its electric state.

2nd. That both in the monsoon and trade wind regions of this coast (*i. e.* the tropics), and in the latitude of variable winds (extra-tropical), it is found in greatest abundance during certain winds, and least copiously in others.

3rd. That those which blow most directly from the ocean are the ozone-bearing winds, while such as come from a landward source are least impregnated.

4th. That its amount in the ozoniferous winds is affected by moisture, and is greatest when the air is most highly saturated, and especially when rain falls.

5th. That the rainfall taken alone, has little, if any, influence on the quantity of ozone in the air. If it had the latter would not prevail most during the south-east or dry wind.

6th. That although ozone is least abundant at Cape York during the north-west monsoon or rainy season, when thunder and lightning are frequent, and most evident during the opposite or dry south-east winds, when these seldom occur, we must not conclude that the electric state of the air has no influence on its formation and quantity. For the electric explosions of the former season usually occur high overhead, and seldom in the lower strata of air, which are apparently little affected; whereas the ozone-bearing south-east winds come from higher

latitudes, especially the verge of the tropics, where electric explosions are also very common in Australia, particularly during winter (May, June, July), near the surface; a fact previously alluded to. Observations on the electric condition of the atmosphere at Somerset during the two different periods, and for the region about  $23\frac{1}{2}^{\circ}$  s. lat., would determine this.

7th. That about Brisbane it is present in greatest abundance during thunderstorms, with rain coming from seaward, which makes it appear as if both moisture and electricity took part in its production, the ocean surface, where the air is both most humid and most highly electric, being doubtless its source; the latter being the agent which causes and favours its generation: and that moisture, either in the shape of rain, fog, or mist, are agencies which attract, perhaps concentrate, and certainly carry it along as they do the electric fluid itself.

8th. That, for reasons already mentioned, the great abundance of ozone at Cape York during the south-east monsoon, when rain, thunder, and lightning are unfrequent, and its smaller quantity during winds and rain coming from sub-equatorial and apparently more highly electric regions, and, on the other hand, its greater abundance further south during winds from seaward than from landward, tend rather to prove that ozone is than that it is not electrified oxygen, but some other compound of the latter gas.

9th. That though its unquestionable oceanic frequency might lead us to infer that ozone may be a compound of aërial oxygen with some gas derived from the sea, *e. g.*, chlorine, these phenomena are equally explicable on the supposition that it is an oxydated form of oxygen, the formation of which may be going on at all times over and close to the ocean, cotemporaneously with evaporation, though materially aided by certain conditions, and especially accelerated by electric commotions: while calm weather retards its formation by lessening the evolution of moisture; high winds and rough water having, for an obvious reason, an opposite effect.

The characteristic aspects of the wet and dry seasons at Somerset are widely different; nor is this more marked in the inanimate world than in the animal and vegetable kingdoms. As in the tropics generally, there is no real winter; and throughout the year perpetual summer seems to smile. Even in the cool south-east monsoon, which is the normal winter, gaily painted flowers and gaudy insects are by no means rare; for nature never sleeps in warm as in cold climes; and the great difference between the two seasons consists mainly in the profusion of animal life and exuberant vegetation which characterise the *wet*, and the paucity of the one and semi-dormant, or

rather parched state, of the other, which mark the dry. Hence we never witness here the gradual development of the seasons; spring slowly expanding into summer; that again merging into autumn, to be in turn followed by winter; as we have in temperate latitudes where the sun is the revivifying agent, while here it is the rain. And as in the one, nature is reanimated slowly by the gradually increasing intensity of the solar rays, and months are occupied in the process; in the other, she springs into life and asserts her genial sway with such incredible celerity, that nothing can be more wonderful than the difference noticeable, even a few days after the advent of the north-west monsoon, with its profuse and invigorating rains. Grasses, ferns, bulbs, &c., soon shoot forth and grow with amazing rapidity, buds sprout, and flowers bloom, till soon the whole country, profusely covered with vegetation, and clad in a gorgeous robe of bright green, variegated with gay flowers, assumes more the aspect of a tropical land than during the more lengthy dry south-east monsoon, and yields a strong contrast to its late parched cheerless character. In this change the animal kingdom participates. From every crevice in the perforated ironstone rock, every hole burrowed in the hard stony soil, scorpions and lizards come forth, snakes, *e. g.* the carpet snake, often 12 feet long, and the rarer but venomous black or brown snake; while occasionally the huge gavial, 20 or 25 feet long, tempted from the not far distant muddy and mangrove-fringed bays which lie towards Cape York, shows its serrated back as it floats lazily with the tide through the adjacent Albany pass; or the ungainly sun-fish, as it swims along with the peculiar fan-like motion of its dorsal and ventral fins. Insect life, rare in the dry season, now teems. Butterflies of many fine varieties flaunt their gaudy forms. Ants, both winged and wingless, beetles, scolopendræ, &c., abound on every bush and tree, and hide beneath each stone. The air is alive with the hum of the native bee, the chirp of the cricket, and the song or cries of pairing birds, among which we may notice the black cockatoo, the common yellow-crested white cockatoo, the parraqueet, the rare and beautifully plumaged rifle-bird (*Ptilorus magnifica*), a pretty migratory wood-kingfisher (*Tanysiptera silvia*), and the laughing jackass, of wider distribution; while the mosquito and several varieties of the common house fly often become a household pest. Soon after the cessation of the rain, however, the gay flowers wither, and with them insect life rapidly disappears. The Lacertæ and Ophidiæ return to their subterranean haunts to hibernate; the few migratory birds which annually visit Cape York from New Guinea and the intervening islands are no longer seen, the ground becomes more and more parched, the

streamlets occasionally met with in the gullies during the other monsoon soon dry up; while the few streams in the neighbourhood dwindle down to a low ebb; the verdure which clothes the parched soil gradually loses its freshness, becomes scorched, and ultimately withered; the grass loses its succulence, and, lacking nourishment and water, domestic animals like the sheep, ox, &c., unless carefully tended, become thin and wasted. With a climate hotter, more oppressive, weakening, and less healthy and pleasant to the mere traveller than during the south-east breeze, the north-west monsoon season is far more enchanting to the naturalist and enlivening to the lover of the beautiful in nature; who may then revel amidst life of every form and hue; nor fail to find, in whatever direction his predilection lies, a fruitful field for his energies.

Among the causes which influence or modify the climate of Somerset and the region of which it is the centre, and distinguish it from that of places in a similar latitude whether on this or on the other side of the equator, the following are the most important.

1st. Influence of the sea. Nowhere around the entire circuit of the globe does the thermal equator take a greater bend than to the north of Australia; which indeed is the only region in which it lies to the south of the Physical equator. About Java it reaches its southernmost limit; and the reason of this is obvious. Over a large part of the globe the heat of the land, the mass of which lies in the northern hemisphere, causes the temperature of the latter to predominate as a rule. Hence the thermometric or thermal equator lies for the most part in the northern half of the globe, extending sometimes to lat.  $15^{\circ}$  N. In the wide Pacific the balance of caloric is in favour of the ocean, the heating power of which predominates and causes the equator of heat to bend well into the southern hemisphere where the great mass of water lies. Again, while it curves as far north as the equator opposite Papua, where the land has again a local predominance, we find that in the island-studded seas that lie between that island and Java, it bends well to the southward, viz., to about lat.  $8^{\circ}$  S. Here, although the warming influence of Asia must be great, this is more than counter-balanced by the effect of the sun on the shallow inter-insular seas now alluded to, which necessarily heat sooner and more highly than the deeper Pacific and Indian oceans; and by solar action on the Australian continent to the southward. That this is the true explanation is proved by the fact, that the isothermal equator followed westward takes a very large bend to the north as soon as we pass Java and get out of the influence of Australia and this confined sea; and into a region where the unmodified

effect of the extensive continent of Asia is permitted to come into full play. The experiments previously given go far to prove that the average annual temperature over a wide extent of shallow water like that which lies between and around the numerous islands of the Indian Archipelago and Northern Australia, may be raised above that of a similar extent of land in the same latitude, while the aerial currents over them are also modified; and to this, the alternately ascendant heat of the land and sea, are we to ascribe the frequent morning and evening calms; the augmenting afternoon breezes of the south-east monsoon; and the more prolonged and frequent inter-pluvial calms of the rainy season at Cape York. The heating influence of the solar rays on the shallow inner Barrier-reef route which runs along north-east Australia from 15 to 30 miles off the land, has a corresponding though more local effect on the winds of this coast in modifying the south-east trades and making them in certain regions give temporary place to morning and evening sea and land breezes. To the proximity therefore of Cape York to the Pacific, and especially to the inter-insular seas now alluded to, are we indebted for its high annual average temperature, and also for the comparatively great heat of the wet north-west monsoons when the temperature rises to  $90^{\circ}$  Fahr., and the winds blow over and from this region. High though the average annual temperature of Somerset therefore is, it is considerably under what it would be, were it not for two other influences: the first of which is, the prevalence of the cool dry south-east ocean winds during eight or nine months of the year, and the second is the proximity of the adjacent seas, viz., the Coral Sea and Pacific on the east, the Arafura Sea and Gulf of Carpentaria on the west, and Torres Strait on the north; conjoined with the narrowness and limited area of the pointed northern extremity of the Cape York peninsula. Were it not for this the average annual temperature of Somerset would be higher than it is; and more like that of Port Essington, which though in the same latitude 600 miles further west, is  $5^{\circ}$  Fahr. higher. Under similar influences, viz., proximity to the sea, to a cold coast current, and a lofty mountain range (Andes), the average annual temperature of Callao and Lima, situated in about the same latitude but on the opposite side of the Pacific, is  $5^{\circ}$  under that of Somerset; and again it is to its vicinity to cooling and equalising seas that the average annual temperature of Batavia, situated much nearer than Somerset, and indeed close to both the thermal and physical equators, is the same as that of the latter place. These influences combine not only to lessen the temperature of Somerset and its vicinity; but also to make it more equable, and to diminish both its annual and daily range.

It is to proximity to the Gulf of Carpentaria that we ascribe much of the rainfall of the hot season at Somerset. Rain is frequent with south-west winds that come from the shallow and highly-heated gulf-region. Originally humid north-west winds they here become super-saturated, and at the same time deflected, from a previously explained cause. Again, it is to proximity to the wide Pacific, combined with the influence of the sun's rays on the immense dry barren interior of Australia that we are indebted for the south and south-east winds common during certain seasons along the coast of New South Wales. Coming from the sea they are highly moisture-laden and often accompanied by rain or fog.

2nd. Currents and tides. The principal ocean current of the South Pacific is an easterly one which originally forms part of a much larger that comes from the Antarctic Ocean, and divides into several smaller streams to the west of Cape Horn. Originating in the south frigid zone its waters are at first cold; but turning westward about  $95^{\circ}$  w. long. and  $25^{\circ}$  s. lat., they get gradually heated as they flow among the myriad islands of southern Polynesia: until, passing the New Hebrides and New Caledonia, it breaks into two, of which one branch runs southward along the east coast of New South Wales; while the other, under the name of Rossel's drift, takes its course through the Coral Sea and the narrow-funnel-like opening of Torres Strait where it forms a one-knot current. Warmed in its lengthy circuit of several thousand miles among the waters of the South Pacific in the latitude of  $20^{\circ}$  to  $23^{\circ}$  s., especially during the north-west monsoon of Cape York when the sun is in the southern hemisphere and overhead; it has become a warm current ere it reaches Cape York, where, as already shown, its temperature is usually within a few degrees either above or below that of the air. This current doubtless serves slightly to raise the average annual temperature of Somerset; but it unquestionably has a still more important equalising effect on the climate; and to this we must partly ascribe the comparatively limited range of temperature both annual and diurnal. Strong tides run through Albany Pass and Torres Strait, say from  $1\frac{1}{2}$  to  $4\frac{1}{2}$  knots either way. The westward is the stronger, being aided by Rossel's drift. The influence of these tides on the climate is not very apparent; but it is probable that they have a cooling effect; and act by mixing the surface waters as they heat, with the cooler layers below, so as to reduce their temperature and indirectly that of the air; and at the same time equalize both. If no such tides existed we can readily conceive how warm the shallow waters in these regions would become; how hot the air over them; and how sultry the climate. Thus the

effect of the currents and tides of Torres Strait, though somewhat like that of the adjacent seas, is not shown in a very marked manner, or readily specialized; and is directed not so much in raising the temperature of the air and the prevalent winds as in rendering them equable.

3rd. Prevailing winds. Although often very irregular near the coast, especially towards the south, and often supplanted by sea and land airs or variable winds as far north as Rockingham Bay; the influence of the south-east trades which blow from Cape Capricorn northward, in reducing the temperature and humidity, and generally modifying the climate of the whole of the north-east coast of Australia, is very marked. Coming cool and moisture-laden from the South Pacific, they render the summer season enjoyable; and to them are we indebted for the showers which then prevail, and the heavier rainfall of the winter season, without which this region would be parched and barren. While without the cool south-east winds that prevail from Cape Melville to Torres Strait and blow with greater force than the latter, of which they are merely an exaggeration, the temperature of Somerset would be much more oppressive and unhealthy than it is. Even though highly saline and humid, contrasted with the still moister north-west monsoons, it is comparatively a dry wind, which rapidly evaporates perspiration, and thus conduces much to personal comfort. Remove out of this breeze, and the heat becomes oppressive and stifling, especially in the full glare of the sun: whereas in the shade, as this wind blows freely by, the atmosphere feels pleasantly cool and enjoyable. It is their temporary cessation during the morning and evening calms of this coast that makes their value in cooling the climate most apparent. The opposite effect of the sultry and humid north-west winds and their intervals of calm in rendering the temperature of Somerset and its vicinity hot, stifling, moist, debilitating, and unhealthy, is too evident to need comment. The influence of the sea and land breezes which prevail from Rockingham Bay southwards, on the temperature and salubrity of this coast, is also very marked; inasmuch as they aid in lowering the former and in raising the latter.

4th. The Physical Geography of Australia as a whole and of the Cape York peninsula in particular, materially influences their climate, especially as to temperature winds and rainfall. To the great heat of the extensive, comparatively flat, and rainless interior of Australia is due the hot "southerly busters" of New South Wales, and the "Brickfielders" of Melbourne, both prevalent during the summer season; the former having as their name implies a general south or south-west direction, and the latter a north-west one; which points to the overheated



interior as their source. So the hot and dry westerly winds, that not unfrequently prevail in New South Wales, have the same origin. While again the hot and dry south-west winds of the Albert River district and country bordering the bottom of the Gulf of Carpentaria, and that which forms the western part of the base of the Cape York peninsula as far north as the Mackenzie River, blow likewise from the superheated interior. Further north, an opposite effect is observable: for there instead of a scorched rainless interior to heat and dry the winds, we have in the Gulf of Carpentaria a wide and shallow sheet of water which both raises the temperature and loads the air with moisture, and increases thus the amount of precipitation. The main mountain range of Eastern Australia also influences in no small degree the meteorology and climate of this coast and peninsula. Coming in contact with its cool summits from 2000 to 3000 feet high, the south-east and east moisture-laden winds from the Pacific have their damp precipitated principally over its eastern side, while deflected to a more northerly course. Thus these winds are little felt in the region beyond; although the mountains are not sufficiently high to prevent them sweeping partly over, to furnish a limited rainfall to the western district and cool its temperature. The influence of this range is less marked in the south than in northern Queensland, and in the Cape York peninsula. The smaller altitude of the ridge in the extra-tropical regions, where rain falls all the year round, especially in winter, permits the moisture-laden breezes which bring it to blow well across and precipitate their moisture over a more extensive tract beyond, which has the larger Murray, Darling and other rivers to drain it; after which they sweep onwards over the low sandy interior as dry breezes. Further north the greater height of the range causes most of the moisture to be precipitated on the eastern slope, the result of which is that on the west a more limited tract is watered, and the rivers which drain it are few and of little consequence. Hence the parched often herbless character of the far interior which consists of sandy or stony deserts with occasional patches of scrub or stunted trees (tea-tree spinifex, eucalyptus, swamp-oak, desert-pea, &c.); all admirably fitted for a rainless region where vegetation is nourished by scanty dews or absorption from occasional half-dried streams and the shallow "creeks" or pools left in the deeper parts of their otherwise arid beds. Hence also the totally different character of the well-watered eastern and the badly supplied tracts west of this range; in the former of which vegetation is abundant. Those wide districts of undulating or nearly level pasture land that form the well-known grass-clad "Peak" and "Darling Downs," &c., the

finest squatting districts of Eastern Australia, lie on the flanks of this range. Although sufficient moisture is thus precipitated on the eastern slopes to water well the limited region which lies between their base and the coast; another cause makes its supply very irregular and either too copious or scanty. The short distance between their source and the Pacific, into which they flow, necessitates a rapid stream; and thus when rain falls they rise quickly and rush impetuously towards the sea; overflowing their banks, carrying trees, cattle, houses, and people in their course; flooding and devastating wide districts by destroying the crops. Carried quickly off the rapidly-sloping surface, the rain has no time to soak into the soil, which soon dries and does not retain its moisture like level country. Hence during the dry summer season, when rain seldom falls, we have long droughts lasting for weeks and even months, when the withered herbage that supplies scanty feed for the numerous flocks, and a scarcity of water, often sacrifice thousands of cattle, and prove more ruinous to the squatter than the floods of winter. Thus to this mountain range is chiefly due the fertility of the south-east settled portions of Australia; and further north that of Northern Queensland and the lower part of the Cape York peninsula, watered by the Burdekin and other rivers; and still further north that of Rockingham Bay and the well-wooded district beyond, as far as Cape Grafton. Its lessening height however in the upper two-thirds of the Cape York Peninsula renders the streams both few and unimportant. Hence the dryness of this region, its gradually decreasing fertility, and the peculiar vegetation which prevails as we approach Cape York, except along the borders of streams, where alone it shows a tropical luxuriance. The geological character of the east coast of Australia and Cape York Peninsula also materially affects the character of its climate. The non-retentive soils of New South Wales and Queensland, consisting of disintegrated volcanic rock, sandstone or shale, and beyond Cape Bathurst post-tertiary ironstone; and the hilly or undulating character and rapid drainage of the whole of this tract; are influences which more or less perceptibly affect climate, as they manifestly do the vegetation, by rendering the soil and superincumbent air dryer than they would be were the former clayey and more absorbent and the land more level. As it is, the winter rains soon dry up or run off, and hence the parched appearance of the northern end of the Cape York Peninsula during great part of the dry south-east monsoon.

The *Salubrity* of Somerset and its vicinity is a subject of no less importance than the nature of its climate; inasmuch as on this depends much its future as a field for successful settle-

ment; and the class and number of settlers likely to resort thither. Emigrants of European extraction invariably and wisely prefer a healthy and if possible a cool climate. If that of the region now under consideration is both sickly and sultry, it will probably influence the prospective population by leading to the immigration of Chinese, Malays, New Hebrides, and other South Sea Islanders accustomed to solar heat and exposure without causing inconvenience or running any risk to health; by whom heavy out-door work may be done. The insalubrity of Port Essington first led to the belief that inter-tropical Australia as a whole was unhealthy; an idea which that of the bottom of the Gulf of Carpentaria appears to confirm. There is little doubt however that this in the two places now named, arises purely from local causes and is exceptional. The spread of settlement of late years into northern tropical Australia appears to render a candid and unprejudiced estimate of the climate of Somerset necessary; and all the more so inasmuch as hasty deductions and prematurely formed opinions based on limited observation have already led to publicly expressed inaccuracy on the subject.

For at least 7 or 8 months of the year the climate of Somerset and its vicinity, and the entire eastern coast of the Cape York peninsula, is certainly fine *for a tropical latitude*. Though the temperature is high and the sun sultry where there is no breeze, the pleasant and often strong south-east monsoon which prevails and blows right up the Albany Pass, suffices to keep the atmosphere both of the anchorage and Somerset itself, which is also exposed to its current, pleasantly cool. No local influences exist to make the place peculiarly unhealthy, and, as far as yet seen, the climate at this season is remarkably salubrious for so low a latitude: and comparable only to that of Callao in nearly the same parallel on the opposite side of the Pacific, which differs in some important respects, yet resembles it in healthiness. It thus contrasts strongly with Port Essington, 600 miles further west. During the first six weeks (August and half of September) which followed the settling of this colony, no sickness occurred among the 120 men of H.M.S. *Salamander* who slept on board; or among the 30 marines and colonists camped on shore; although the majority of both were exposed for many hours daily to the full influence of the sun, and that often when working up to their waist in water in loading and unloading boats on a shallow beach. But this was evidently too favourable a season, and the period too brief to enable us to form a trustworthy opinion, especially as the men were fresh from the healthy climate of Sydney, and lately arrived from England with hale and hearty constitutions uninfluenced by long residence

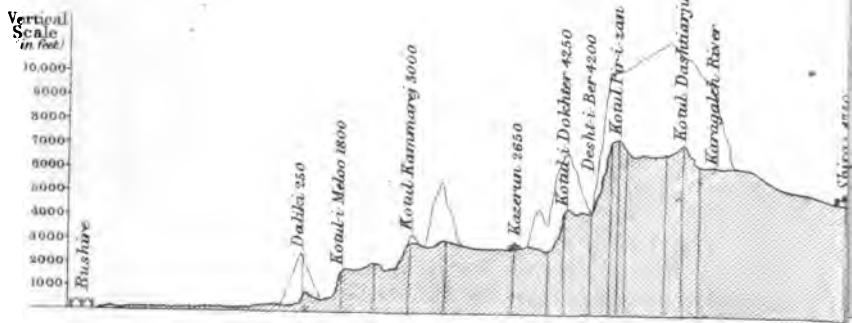
in the tropics or exposure to other debilitating causes, and kept in good spirits by genial work and the exhilarating prospect of colonial pay. Longer experience has shown that its damp atmosphere is apt to induce rheumatism in predisposed subjects, and to enervate the weakly, and even the strong. The remaining four months which comprise the hot, rainy season, are both less pleasant and healthy; and although the young and vigorous may withstand, perhaps for some years, the debilitating influence even of this season, various complaints are apt to occur, especially among the weak, such as rheumatism both acute and chronic, while even the hale feel languid and listless. Though damp, the air during the south-east winds of Cape York is *comparatively* dry contrasted with the saturated atmosphere of the Gulf of Mexico, Bay of Panama, or Hong Kong harbour, while the strong evaporating breeze makes its humidity less apparent, and renders the climate at this season healthier than it would otherwise be.

Climate in the tropics is perhaps oftener a remote than an exciting cause of disease. Far more frequently, however, it is accompanied and intensified by other morbid agencies; and of these none is so common as malaria. When this is absent, a tropical climate may be remarkably salubrious to the European constitution, provided hygienic and other indications necessary to preserve health under such altered circumstances are fully and assiduously attended to. The climate of Somerset is an example of this. No malaria or other morbid influences beyond those of climate exist here, and the latter are materially diminished by the cool, bracing breezes of the south-east monsoon, which frequently last for nine or even ten months, and contribute much to strengthen and enable the system to withstand the weakening effects of the wet season. But with this limitation there appears reason to believe that the climate of Somerset is no exception to the great law that change from a cold to a warm climate is sooner or later productive of disease and mortality in the white constitution; the chief maladies apt to occur being fevers, affections of the biliary organs and alimentary canal. Nor are Europeans here exempt from the rigorous law of climate common to all mankind, viz., that the white races attain the most perfect health and longest life above 40° N. and 30° S. latitude, while serious physiological changes are liable to occur the nearer they approach the equator; health first suffers, and disease may ultimately ensue. Three years' experience of the effect of this climate on a detachment of 20 marines, and a few private settlers and government officials stationed here, and on the crew of H.M.S. *Salamander*, who

spent about four months of each year along this coast, fully corroborates what theory first led us to expect.

Thus, although several circumstances, such as geographical position, peculiar form, relation to the seas which bathe it, and the absence of geological and other physical causes of disease, all combine to render the climate of Cape York not only cooler and more pleasant, but also more salubrious than that of many other inter-tropical places in the same latitude; it should not be forgotten that it is a tropical climate after all, and though comparatively healthy and no active disease prevails, still it is, as with all torrid climes, unsuited for the prolonged residence of the white races, whose constitutions are adapted for a lower temperature, and for that only; and out of which, especially when they proceed to a warmer, their health slowly but surely deteriorates, although they may perhaps be fortunate enough to escape the more serious disease which a stay in all low latitudes is apt to occasion. The climatic effect observable in the 240 sheep taken north from Brisbane to supply the colony on its first settlement is interesting, and tends to support this opinion. Under the influence of the withered herbage of the dry season, a scanty supply of water, and the hot atmosphere, they diminished in bulk to an average of 25 lbs. each. After the advent of the wet season, however, and under the profuse succulent herbage which then rapidly springs up and clothes the parched country with a pleasing covering of bright green, they soon gained in weight. But, half-starved thus for eight months, and overfed during the remaining four, a result could not be expected otherwise than injurious to the breed both as to carcass and wool. This has been less apparent among cattle and horses, of stronger and perhaps more pliant constitution, doubtless from the briefness of the trial: and after an exposure of three years, it may now be regarded as proved that sheep at least, if not horses and cattle, do not thrive well, although, like Europeans, they may struggle through their existence in a latitude in which the herbivora never flourish. Thus the salubrity of the climate of this locality is only relative, and though genial enough compared with other tropical climes, and healthier by far than many, still, like all places situated near the equator, it is apt, and indeed certain, to enervate and weaken the European constitution after a more or less prolonged stay, and predispose to, if it does not actually induce, disease. All tropical climates are debilitating, and that of Somerset is no exception to the rule. Healthy it may be to aborigines born and reared here, and possessing systems adapted for and accustomed to torrid heat, but it is assuredly sickly for the white races of cooler





climes. Occasionally the young, strong, and healthy appear to flourish and even fatten for a time, but with the majority the reverse sooner or later happens; and probably when longer tried and better known, it will be found, as indeed it already has, unsuited and even dangerous for the prolonged residence of Europeans, and especially unfit for open-air work in the sultry sun; and further, that though the cool south-east monsoon is enjoyable enough for a warm climate and not specially insalubrious, the opposite humid and rainy season is more weakening and far less healthy. Even during the comparatively cool south-east monsoon, the heat and increased perspiration cannot prove otherwise than slowly debilitating; while in the wet season the cutaneous exudation, so copious as to keep the surface constantly bathed, is notably weakening and unhealthy. In proof of these opinions corroborative facts might be given, were they necessary or appropriate here.

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XIV.—*On the Elevation of the Country between Bushire and Teheran.* By MAJOR O. ST. JOHN.

THE country traversed by the main road between the north of the Persian Gulf and the Caspian may be generally described as a succession of long valleys of inconsiderable breadth and various elevation, separated by parallel ridges running north-west to south-east.

On examination of the comparative height and extent of these ranges, they are found to group themselves into four systems or chains, of different physical aspect and geology, and with well defined watersheds.

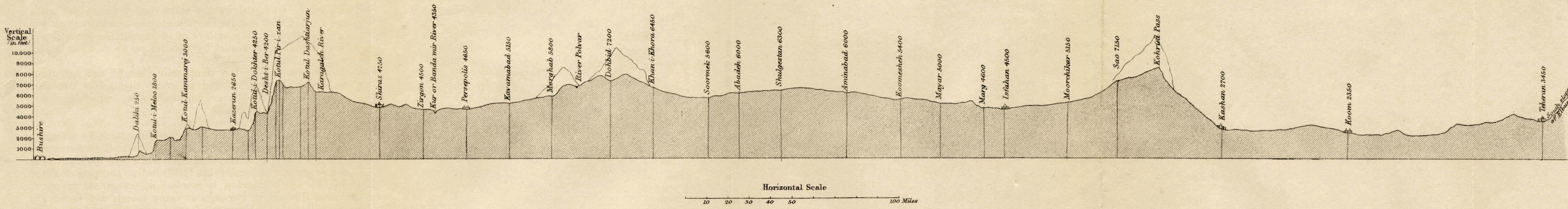
After leaving the shores of the Persian Gulf at Bushire, a traveller skirts the hills in a northerly direction for 40 miles. He then crosses two inconsiderable ranges of tertiary formation, the summits of which are about 3000 feet above the sea, to the valley or plateau of Konartukte (1800 feet). The pass of Kotul Meloo, by which this last is reached is, though short, one of the most difficult in Persia, and many camels and mules are annually lost in the ascent of its formidable declivities. A somewhat similar, but less arduous pass, leads to the fertile valleys of Kammarej, Shapoor, and Kazerun, 2800 feet above the sea. The hills hitherto crossed are composed of sandstone of loose texture, marls, and gypsum. At Kazerun we enter the great series of saddle-shaped hills of nummulitic limestone, which is the great geological characteristic of this part of Persia.

Up to this point the scanty vegetation is confined to ragged



SECTION  
from  
BUSHIRE TO TEHERAN

*to accompany the Paper by Major O. S. John.*





bushes of wild almond and *Rhamnus* scattered over the hill sides, with a few stunted terebinth trees towards the summit of the passes. From Kazerūn till the limestone formation is left, the hills are clad with forests of gall-nut oak, hawthorn, wild pear, terebinth, and many other shrubs, principally *rosaceæ* and *amygdalaceæ*. From the nummulitic limestone to the crest of the Elburz there is not, except in the beds of the rare streams, a bush six feet high unplanted by the hand of man.

Eight miles from Kazerūn the road abruptly ascends 1500 feet by the Kotul Dokhter Pass, and five miles further on rises 3000 feet higher to the summit of the pass of Kotul Pir-i-zan, 7250 feet above the sea. The summits on each side of this pass tower 2000 feet above it, and some parts of the range attain an elevation of 11,000 to 12,000 feet, and are clad with snow for six months of the year.

We are now on the watershed of the first range, which extends from the high summits north of Bebetran, in 31° north latitude to 28° of latitude, at least, if it is not continued still further to the south-east. Not a drop of water from its northern slopes, as far as I have seen or can ascertain, reaches the Persian Gulf. From its summit to that of the Elburz, the few streams that are not absorbed by irrigation form the salt lakes of Neyris and Makelm, or lose themselves in the sands of the great eastern desert.

From the crest of the Kotul Pir-i-zan we descend 750 feet to the valley of Dashtiarjun (6500 feet), and crossing a spur of the range whose watershed we have passed, emerge upon the table land of Persia, here 6000 feet above the sea, but descending 1250 feet in the thirty miles which intervene before we reach Shiraz (4750 feet).

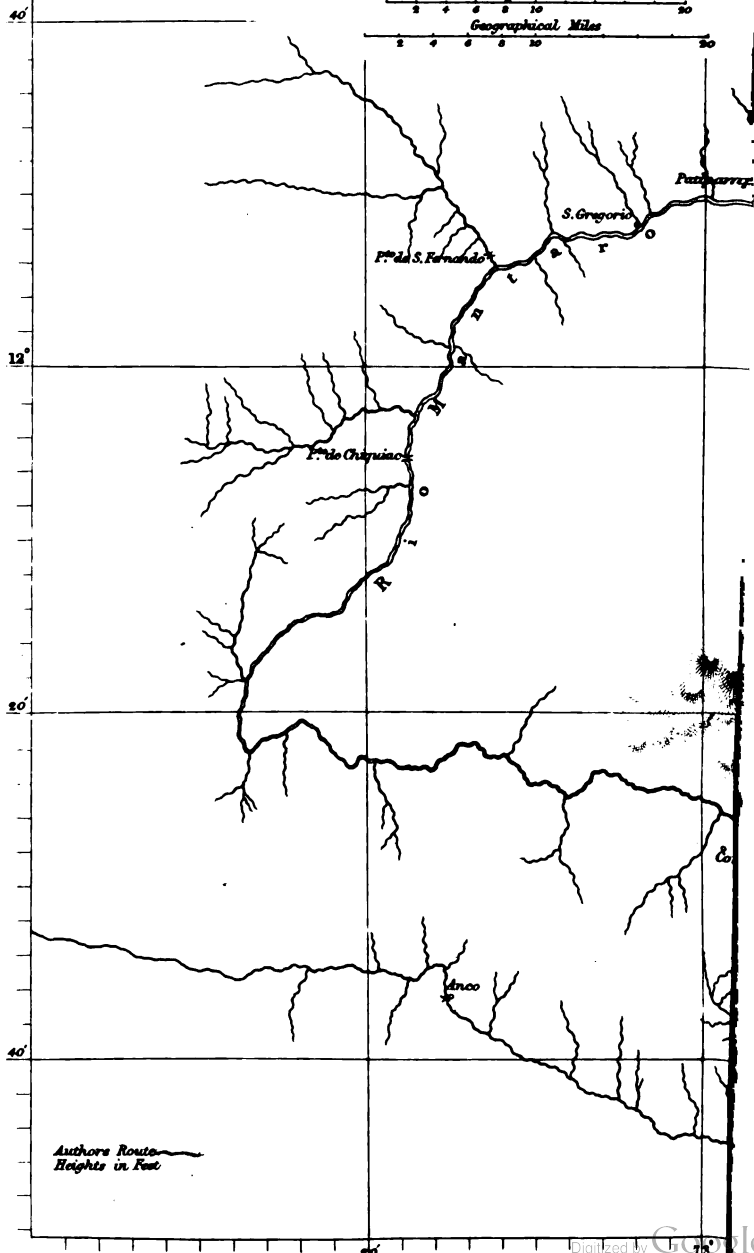
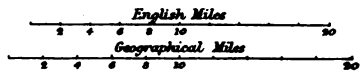
For the next 100 miles, the northward road winds at the same level through several short parallel ranges of the same formation, separated by valleys varying in width from 2 to 15 miles.

Here the monotonous limestone ridges are exchanged for a chain of fantastic peaks, forming the summits of the second range. This chain, a prolongation of the great Bakhtiari range (which is probably the highest in general level in Persia, exceeding even the Elburz), is crowned by peaks from 9000 to 11,000 feet above the sea, and is crossed by passes 3000 feet lower. Some of its higher plateaux are well watered and fertile, forming the summer home of countless wandering tribes, others are utterly deserted. Descending the long gentle slopes of this range, we turn to the north-west, and without crossing any elevation of importance, but imperceptibly falling 2000 feet in the last 100 miles, we reach Isfahan, 4500 feet above the



Map showing  
 The Junction of the Rivers  
 MANTARO AND APURIMAC  
 (PERU)

to accompany the Paper  
 by Professor A. Raimondi.



Authors Route  
 Heights in Feet

sea. Fifty miles further to the north, gradually rising again as we proceed, we reach the great range of hills which extends from Hamadan to Yezd, forming the boundary of the great salt desert. Its height above the sea in the part where we cross it does not exceed 10,000 feet, the summit of the pass being 8200. The ascent on both sides is gradual, descending 5500 feet to the plain of Kashan (2700), 30 miles from the crest of the pass at an almost even slope.

We now travel in a north-west direction along the narrow strip of inhabited country lying between the mountains we have just left and the salt desert, at an elevation of 2000 to 3000 feet. Crossing three isolated ranges of inconsiderable height, we reach Teheran (3350 feet), lying at the foot of the Elburz, which towers to a height of 9000 feet above it.

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XV.—*On the Confluence of the Rivers Mantaro and Apurimac, in the Huanta Mountains.* By Professor ANTONIO RAIMONDI, Honorary Corresponding Member, R.G.S.

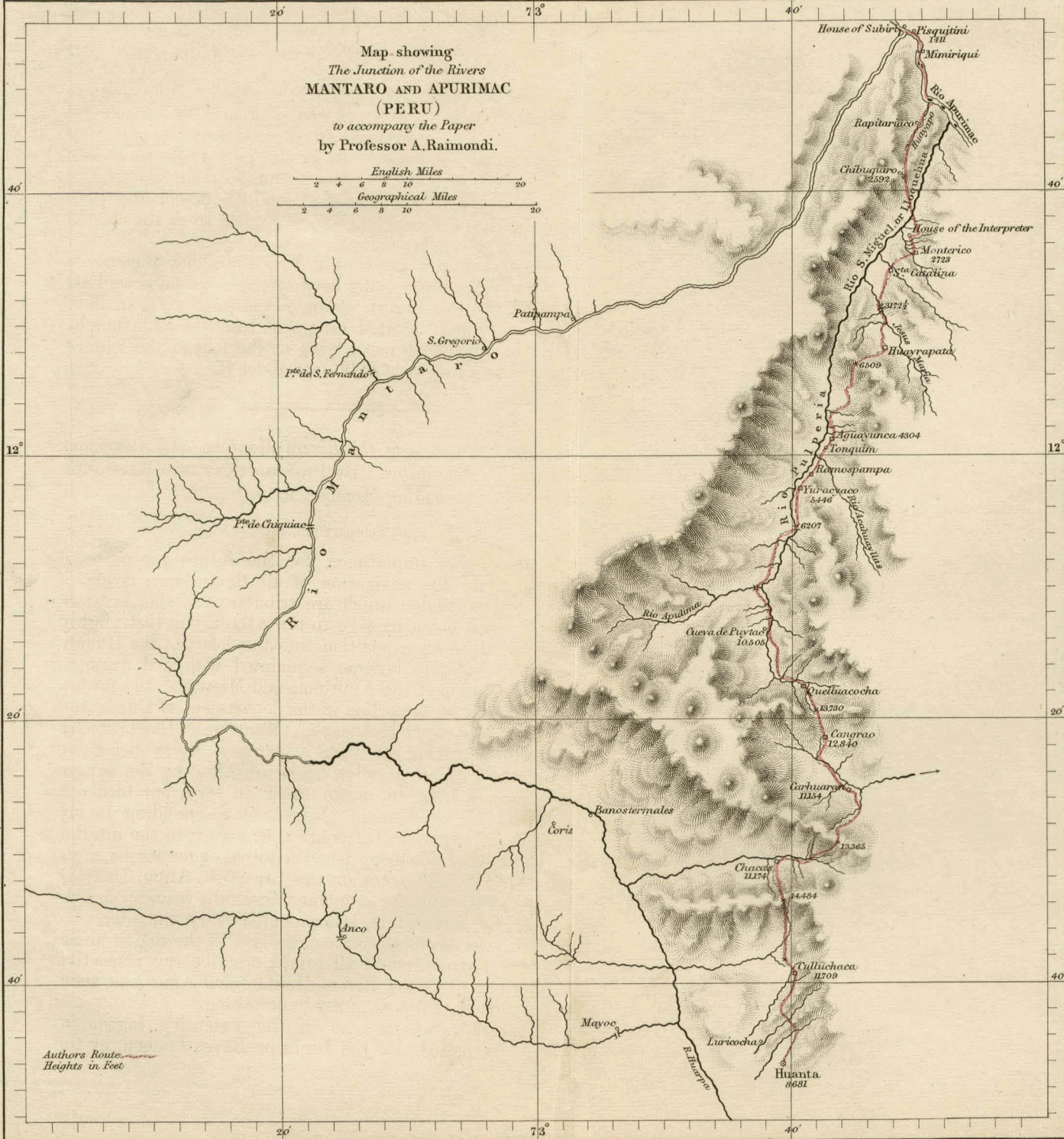
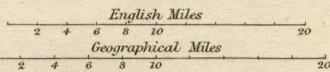
Read, February 8th, 1869.

As it is of primary importance, for the future prospects of Peru, to facilitate the navigation of all those large rivers of the Trans-Andean region which are tributaries of the Amazon, and thereby open out a passage to the Atlantic by that mighty river, I resolved on an expedition into the heart of the Huanta mountains, in order to become acquainted with and examine the point of junction of the Apurimac and Mantaro: the former passing through a great portion of the department of Cuzco, and the latter by Jauja and Huancayo. Many were the obstacles to the accomplishment of such a journey, there being no roads, and the parts in question being inhabited by the savage Campos or Antes tribe, the same which, in 1852, put to death the Reverend Father Cimini. Nevertheless, confiding in my seventeen years' experience of continuous travels in the interior of Peru, and in the knowledge I had acquired by numerous negotiations with the wild races on the Rivers St. Anna, Ucayali, and Amazon, I did not for a moment hesitate in carrying out my project, and, fortunately, I surmounted every difficulty.

With the view of imparting a clear idea of the region under consideration, I shall first of all briefly describe the respective sources and extent of the Rivers Mantaro and Apurimac, their confluence forming the goal of my undertaking.

The Mantaro takes its rise in the extensive lagoon of Chinchaycocha, called also the Junin or Reyes Lagoon, by the

Map showing  
 The Junction of the Rivers  
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 (PERU)  
 to accompany the Paper  
 by Professor A. Raimondi.



Authors Route  
 Heights in Feet

inhabitants of the two places of like names, situate at a short distance from it. The river flows in an almost exact direction from north to south, and further down is called the Huaypacha, from the mineral district of that name which it traverses. Its next appellation is the "Oroya," on account of a suspension-bridge over it on the road from Lima to Jauja. A little further down, it directs its course towards the south-east, enters the beautiful valley of Jauja and Huancaya, and, consequently, assumes each of those names. At the end of that valley it passes under a chalk and stone bridge, near the Iscuchaca district, where it is called the River Angoyaco, and where it takes another direction, flowing downwards towards the east with but slight deviations.

Two leagues from Iscuchaca it receives the River Huancavelica; and, passing by the towns of Anco and Mayoc, and near the district of Huanta, forms a junction with the important River Huarpa. Here again it alters its course, proceeding towards the north, north-west, and west; consequently, in an almost contrary direction, and bathing the base of the towns of Coris, Paucarbamba, and Colcabamba. Somewhat further on it returns towards the north, but finally winds along in an eastern direction, thereby surrounding, in its tortuous progress, the land peninsula which is formed by the province of Tayacaca. In the last part of its course it receives the name of Mantaro, and, passing by the eastern Cordillera in a deep and narrow ravine, enters the territory inhabited by the savages, where it forms a junction with the Apurimac.

This latter river springs from the lagoon of Villafró, at a distance of 2 leagues from the town of Caylloma, and, proceeding north-east and north, traverses the province of Canas, passing between Coporaque and Pichihua and at the foot of Checca. It then bathes the province of Paruro, running at the foot of the chief town of the same name; receives the waters of the Rivers Velille and San Tomas (which flow through the province of Chumbivilca); and then assumes a north-west direction, dividing the provinces of Paruro and Abancay from that of Cotabamba, and being augmented on its course by the River Mamara, which intersects the last-named province. Further down, its volume of water is increased by the River Pachachaca, which runs through the province of Aymaraes and a portion of Abancay. Finally, it unites with the important River Pampas (whose distant source is in the Cordillera of Castrovireyna), and after being secluded, as it were, amongst mountains peopled by savages, forms a junction with the River Mantaro.

With the view of accomplishing the projected expedition, I

left the town of Huanta on the 13th of September, 1866, taking with me a month's provisions and an assortment of knives, hatchets, fishhooks, and needles, as well as glass beads of various colours, and other articles, serving as objects of barter with the savages.

Huanta is the chief town of the province of the like name and of the department of Ayacucho. It is a regularly-built one, situate on a plain some 8681 feet above the level of the sea, and distant a league and a half from the Mantaro.

A few paces from the town I quitted the beautiful and verdant open country in order to ascend a badly-constructed road on gritstone heights, intersected by small ravines, which were watered by inconsiderable rivulets. The way bore N.N.E. and N.N.W., so that the general direction was more or less north. In these ravines one meets only with a few small specimens of the *Alnus acuminatus* and *Escallonia resinosa*, and with some shrubs of *Colletia*, *Tecoma roseifolia*, *Kageneckia oblonga*, *Vallea cordata*, *Barnadesia spinosa*, &c. Somewhat more than a league from Huanta there are traces of porphyry rock surging up through the gritstone and appearing on the surface; and at a distance of 3 leagues from that town one comes on the mineral establishment of Culluchaca, producing a kind of argentiferous sulphate of lead, blended with antimony, and known in the country by the name of "soroche." The soil in the immediate vicinity of Culluchaca is formed of conglomerated strata and of metamorphic gritstone, having the appearance of stratified porphyry. This formation closely resembles the one in Chile, described by Mr. Darwin as appertaining to the *Upper Oolitic*.

The mineral establishment of Culluchaca is situate at 11,709 feet above the level of the sea.

The road continues to ascend from Culluchaca, and half a league from that place we reach the extremity of the small ravine which passes by it. We next leave a ridge behind us, and enter on another ravine of calcareous formation. Following up this fresh path, and still ascending towards its summit, we reach the highest point of the way, 14,484 feet above the level of the sea. The geological formation of this part appertains to the carboniferous. In the calcareous substance one perceives a few scanty products, almost identical with the *Productus semireticulatus*, and some stems of *Crinoides*. From this point the road descends, by a small ravine, to the Chacas establishment, distant 6 leagues from the town of Huanta. This establishment covers a great extent of ground, and undergoes every variety of temperature, from very mild to the coldest. The dwelling-house, which is built on the left bank of a rivulet that flows into the Mantaro, is 11,174 feet above the level of



the sea. This estate produces barley, wheat, maize, and lucern, so that a traveller may find some of his wants supplied.

From the Chacas property the road bears to the east, skirting the brook, which has to be forded a little further up: and about a league and a half from Chacas the rivulet in question is passed, and one has to ascend in a general north-east direction, treading on carbonate of lime until an elevated point (called in the country "Abra") is attained, its altitude above the level of the sea being 13,365 feet. This point serves as a line of demarcation between the waters which descend to the Mantaro and those which form a junction with the Apurimac. On arriving at the other side we experience a notable change of climate; the region now entered being very humid, and evening very frequently bringing in those dense mists which are so common in the province of Carabaya. The geological formation is also different, the slate appearing in almost vertical layers,—a species of rock which is characteristic of the Eastern Cordillera.

We have then to descend towards the north and north-east, following the right bank of a rivulet which bathes a narrow ravine. The inclined slopes of the latter are dotted with shepherds' huts. After descending a league and a half we cross the brook, and, making a *détour*, still continue the descent as far as the village of Carhuaran, which is inhabited by the independent and turbulent Iquichanos Indians.

This place has a somewhat frigid temperature, being situated on an elevation of 11,154 feet; but it presents an agreeable aspect, the huts being surrounded by groups of trees of the *Sambucus Peruvianus* and *Polylepis racemosa* species, and by some *Datura sanguinea* shrubs.

As it was my desire to approach as near as possible to the junction-point of the two rivers—which would be more or less towards the north—I did not pursue the course of the Carhuaran, as it took an easterly direction, but proceeded to reascend the Carhuaran valley and diverged to the north-east for more than a league; afterwards I crossed the river, and went up another height to the north, following a brook which flowed down by the other bank. When near its source, and on a sufficiently cold "pampa" (extensive plain), I found a few small huts for shepherds, where I was enabled to pass the night. This spot, which is called Cangrao, is 12,840 feet above the level of the sea.

On reaching Cangrao, the road—a wretched one—presents a continuous ascent as far as another "abra" at the height of 13,730 feet, and from that point the road descends to the north-east, to the rugged and broken ground of Quelluacocha,

so called from a little farm of the like name, which is about a league distant.

From Quelluacocha I took a northerly course, on the right bank of the rivulet, and along a narrow and dangerous path. Near Quelluacocha the traveller wends his way through numerous *Chætogastra* shrubs, and further on, in the declivity, appear some *Hesperoméles*, and a beautiful kind of *Ericacea*, with prettily coloured tubular flowers, appertaining to the genus *Ceratostema*. A league more or less, from the above-named little farm commences the descent, and with it a progressive increase of vegetation, so that one meets successively with the *Barnadesia polyacantha*, and with various kinds of *Rubus*, *Osbeckia*, *Chusquea*, &c.

Some two miles from Quelluacocha, the path lies on the left bank of the river, and leads to a large projecting rock, called the cave of Puytac, which affords shelter during the night.

This cave is 10,505 feet above the level of the sea. Vegetation is not of a very elevated kind, but it is sufficiently diversified by shrubs of *Chætogastra*, *Berberis*, and *Vallea*, as well as by a variety of *Ericaceæ*, *Rubus*, *Sisirinchium*, *Lobelia*, and *Bomaria*, and a multitude of filices, mosses, and *Lycopodia*, covering all the rocks around with an agreeable verdure.

From the cave of Puytac the traveller takes a northerly direction on the left bank of the rivulet, which now descends precipitously, and soon the road itself partakes also of that character; vegetation becomes higher and more luxuriant, the shrubs give way to small trees, and the latter to those of fuller growth: at the same time the path is rendered very uneven by numerous roots serpentine on the surface of the soil, whilst the landscape varies at each step, appearing every moment more beautiful and imposing. After advancing a good league, I reached a somewhat copious river, known by the local name of *Apulima*, over which is thrown a tottering wooden bridge.

This river rolls down boisterously amongst the rocks, with a course from west to east, and from that point the road winds along to the E.N.E., and immediately afterwards to the N.N.E. After the river is passed, the road becomes worse, being stony and very abrupt in descent; and soon afterwards one encounters a series of—what may be called—stair-steps, or *échelons*, of so uneven a shape as to be impassable for any beasts with burdens, so that travellers are obliged to proceed on foot, and do the best they can to get their unladen animals over that part, with the view of making use of them in those tracts which are somewhat level. Vegetation now becomes more robust; beautiful *Begoniæ* and fuschias, as well as the *Dalea*, *Psoralea* and variegated *Aroidea* brighten up the path, whilst the *Cecropia*,

with its large parasol-like leaves, the resinous *Clusia*, with pulpos foliage, and the *Oreocallis grandiflora*, together with superb clusters of flowers, diversify the aspect of the entire landscape. After passing the Apulima, and proceeding some two leagues further on, I followed the descent of the principal river, which takes the name of Pulperia, and which is crossed by a miserable wooden bridge. The height of this spot is only 6207 feet above the level of the sea.

The road continues bad, in an almost northerly direction, and such tracts as are not formed of high stone-steps are so covered with brushwood, that it is very difficult to walk on them; nevertheless, the way, although very stony, becomes somewhat more even. After proceeding a league from the bridge we come in view of the first "casucha," or small hut of the mountain. The place is called Yuracyaco, and is situate 5446 feet above the level of the sea. Half a league further on, in a north-east direction, is another inhabited spot, known as Ramos-Pampa, where maize, yuca (*Manihot aipi*), and some clusters of sugar-cane are produced. Amongst the wild plants may be enumerated some species of *Serjania* and *Visnea*, various kinds of *Philodendron*, the strange-looking *Caladium pertusum* with leaves characterised by large openings or holes, the *Cascarilla magnifolia*, and a few *Calophylla*, &c.

A short distance from this place the traveller crosses the river Acahuayllas (which runs from s.s.e.), and turns, when on the other bank. After ascending a few paces he arrives at a roofed house, called Tambo de Tonquim (Tonquim Shelter); and a little further on, at another house with a convenient traveller's hut known as the Aguayunca.

Near all the *tambos* (shelters) of the Huanta mountains, the people cultivate a large kind of grass, viz., the "saylla," which serves as fodder for cattle. The *tambo* of Aguayunca is situate on the right side of the ravine, at only a few feet above the level of the river, but at 4304 above that of the sea. A little beyond Aguayunca, the river opens out a passage through a narrow gorge, so that the traveller is obliged to wend his way quite close to the water-side—for a league or so—traversing various brooks on his path; finally, on quitting the ravine, he ascends a long hill by a very difficult path, amidst thick brushwood. In various tracts, the path is furrowed and excavated by the action of the rain-water, forming a sort of causeway, with deep earthen ruts at the sides—like so many defiles—which, overshadowed as they are by the dense foliage of the large plants that intertwine their boughs and intercept the light of day, have all the appearance of subterranean mining galleries.

At last the summit of the rising ground is attained, the culmi-

nating point being 6509 feet above the level of the sea, and forthwith commences a series of *échelons*, by which the traveller continues descending, for a considerable way, in leaping fashion, directing his course towards the north-east. During the descent he perceives some tufts of purple cascarilla (*Chinchona purpurea*), and of *Bambusa*, to the latter of which the inhabitants have given the name of "sama."

After a descent of a league and a half, the Tambo of Huayrapata is reached, and further down the farm of the same name, where, for the first time, one sees the *coca* plantations. The descent is continued, on a very uneven and slippery kind of clay, and generally in a northern direction, as far as the bank of the river Jesus Maria, which runs almost exactly from s.s.e. Here the heat becomes sufficiently great—the thermometer showing a temperature of 78°·8 Fahrenheit, at 11 A.M., on the 18th of September. The elevation (taken near the river) above the level of the sea is only 3172½ feet. The way then follows the left bank of the river for about a mile, and, after the latter is crossed, winds up N.N.E. to some hillocks—the path being a very bad one, and, for the most part obstructed with vegetation. Amongst the numerous plants springing up spontaneously in this pathway, may be mentioned the *Carludovica palmata*, a variety of *Heliconiæ*, *Maranthæ*, *Alpinisæ*, the *Cecropia*, and the tree-nettles.

The path is also diversified by a few brooks, and some small clusters of chocolate-trees; and, after running to the extent of a league, leads to the farm of Sta. Catalina, where sugar-cane and coca are reared.

At a short distance from this spot, the way lies across a rivulet, and soon becomes a very rugged one, with continuous ascents and descents, passing through several small ravines, and near some hovels, with tobacco and coca plantations, until it leads to the farm of Monterico—a good league's distance from Sta. Catalina.

The farm of Monterico, which is situated the furthest in the interior of all, borders on the territory inhabited by the savages, and belongs to Mr. Miguel Lazon, a resident in Huanta. The dwelling-house, which is built on rising ground, a little more than half a league from the principal river, and 27 leagues from the town just mentioned, is 2723 feet above the level of the sea. This farm, which covers an extensive tract of land, laid out with coca trees, may be regarded as the largest one amongst the Huanta mountains; and I may state here that it also produces very good pine-apples.

Although not without much difficulty, beasts of burden are

brought up to this farm and employed for the transport of coca to the town of Huanta.

In the woods contiguous to the farm, I observed various kinds of *Urostigma*, which yields a milky sort of juice; also a number of *bombacææ*, appertaining to the genera *Bombax*, *Helicteres* and *Cavanillesia*; likewise varieties of *Rubiaceæ*, of *Chinchona*, *Cascarilla*, *Genipa*, and a beautiful kind of *Warszewizia*, of the size of a tolerably high tree. When in flower, it is the ornament of these woods, with its innumerable lanceolate twigs and its red carmine colour, which give it the appearance of a bannerol or "*banderilla*," the name proper to it in this part of the country.

When this estate is left behind, the traveller's difficulties increase, for there the road terminates; and although it is anything but a good one, still it has been of advantage to him, as it saves great time being lost in opening a passage through the thickets which cover the Trans-Andean region of Peru. Despite that drawback, however, the obstacles I had to overcome were less serious than those I had encountered amongst the forests of the province of Carabaya, particularly as the ground is less rugged, and as I had the good fortune to secure the services of a trusty guide, in the person of an old Indian, whom I engaged near the farm in question, and who was not unacquainted with the woods lying on my future course. Moreover, although totally ignorant of the Spanish language, he was able to converse in Quichua, and also knew some words of the dialect spoken by the Campos savages, with whom at times he carried on a little barter, and who inhabit the adjacent territory.

And here I feel it incumbent on me to offer some advice to travellers who may be desirous of exploring those parts of Peru which are peopled by savage tribes. In the first place, they must be very cautious in the choice of a guide, particularly when he is to act also as an interpreter, because at times there is more danger in treating with an uncivilised race through him than in a direct manner. Generally speaking, such Indians as reside in the immediate vicinity of the savages carry on with them a comparatively petty but profitable traffic, giving for an *arroba* (25 lbs.) of chocolate fruits of good quality—which the savages gather in the woods where it grows spontaneously—such mere trifles as a small knife, or some other article of no intrinsic value. Now, the Indian is naturally very distrustful, and his first impression when a stranger visits those parts, is that the latter intends depriving him of his trading intercourse with the "infidels," for so the wild natives are generally called here. The result is that, if the new comer be totally unac-

quainted with their language, the interpreter, in order to rid himself of an importunate rival, will at times make them believe that the ultimate object of the visit is to carry off the women and make the men slaves, so that, excited to vengeance, they put the stranger to death. Thus the murder of the Rev. Father Cimini, amongst these very Huanta mountains, was committed at the instigation of an interpreter, and perhaps to the like cause may be attributed the assassination of Viscount d'Osery, who was attached to Castelnau's mission, and who in the year 1846 met his death at the hands of the very Indians who were conducting his canoe, in North Peru. The primary endeavour of the traveller should be to gain the confidence of his guide or interpreter, and to make him understand, in every possible way, and without raising any suspicions, that there is no intention whatever to carry on any traffic, but merely to make a collection of remarkable birds and insects, or else to gratify curiosity, by becoming personally acquainted with the people in question.

If the visitor be desirous of obtaining anything from them, he should bring with him certain objects of barter, such as hatchets, knives of various sizes, fishing-hooks, large-sized needles, and necklaces of coloured-glass beads; but it will be better to effect all exchanges through the medium of the interpreter himself, in order not to awaken any misgivings on his part. In the first place, the interpreter will make a better bargain, and in the second he will see that the stranger has not come to spoil his custom, by exchanging for certain articles others of greater value than those which the Indian traders themselves are accustomed to offer. At the same time, it will be as well for the traveller to keep a few small objects about his own person, for example the hooks and needles, and some metal buttons, in order to make presents to such of the natives as show him any particular kindness, by bringing him fruit, yucas, &c. In that way he will raise up friends for himself without any prejudice to the interpreter's interests.

Finally, in order to avoid all danger on the part of the savages themselves, he should show that he places implicit confidence in them, just as if they were old friends—give and receive edibles and drinkables, take part in their amusements, without manifesting the slightest apprehension, win the affection of their children by regaling them with little dainties, such as a piece of sugar, cakes, &c., and exciting them to catch butterflies, and to search for shells, flowers, &c. It is, no doubt, to such a plan of conduct as the foregoing that I am indebted for the avoidance of any mishap during my many travels.

Returning, however, to the narrative of my journey, I was

fortunate enough, as said before, to meet with a good interpreter, in a house near the Monterico farm, and I at once engaged him. I soon learned that the River Apurimac would be reached from that establishment in a very short time, if the course of the river could be followed, but that that way was almost impassable; consequently, I decided on proceeding along the bank of the principal river, crossing it at a certain spot, and then advancing along the other side, until I approached as near as possible to the River Mantaro, which would lie to the left. Accordingly, taking with me my guide-interpreter, and four men to carry the requisites for a few days' expedition, I left the farm of Monterico, and proceeded in a north-west direction for about a quarter of a league, when we reached my guide's house. We soon, however, resumed our journey through some cultivated grounds (his own property), and then descended as well as we could towards the level of the river, taking a northern direction. We thus advanced along its right bank, until we attained a point where the river is divided into two branches by a large boulder, but they are sufficiently narrow to admit of being crossed on the planks thrown over them. In this part the river San Miguel, or Lloquehua, is a copious and precipitate river, flowing between elevated and very smooth and slippery rocks, so that it was only with difficulty, and by supporting each other, that we got across the two arms in question. On the right side of the river, and at a short distance below the bridge, we came upon the first dwelling of the savages, inhabited by three men and two women.

We continued our journey on the other bank by a sombre height, but as there were only a few shrubs we were not obstructed on our way. For more than a quarter of a league we kept tolerably close to the river, but afterwards proceeded at a greater distance from it, taking a N.N.W. direction, the one in which, as the interpreter stated, we should find a spot inhabited by savages. Our course was now a very difficult one, the ground being uneven, and moreover, completely covered with small shrubs, several of which, for example the *Paullinia* and *Acacia*, rent our clothes, and not unfrequently our flesh, with their thick thorns, producing a painful sensation; whilst others, stretched like ropes across our path, were constantly tripping us up. Amidst this chaos of vegetation, certain species of *Marantha* and *Calathea*, extended their broad and variegated leaves around us. On a further advance, we found the ground more sloping, and the difficulties on our way increased by the brushwood. After a good league's march we saw some smoke before us at a short distance—the certain sign in these parts of the vicinity of a dwelling of savages—and, in effect, after going

about a quarter of a league further on, and just as we emerged from a thicket, we found ourselves only a few paces from a *casucha* or hut of Campos natives, with two men, two women, and several children. We met with a friendly reception, and after our interpreter had explained, as well as he could, the object of my journey, our male hosts, without moving from their seats, made a sign to their wives, who thereupon went out, but returned in a few minutes with two large pine-apples which they laid at my feet. Afterwards, they brought in a fermented beverage, prepared from Yucas, and which bears the name of *istia*, the same kind of drink that is called *masato*, in the littoral province of Loreto. I ordered the interpreter to pay in fishing-hooks for the pines and the *istia*, and on going away I presented two needles to each of the women, and some cakes to the children, at which they all seemed much pleased.

This was my first interview with the so-much dreaded savages of the Campos tribe of the Huanta Mountains, and almost all the others whom I afterwards met with received me in more or less the like manner.

The spot in question is called, in their language, *Chibuquiuro*, and is situate at 2592 feet above the level of the sea.

The language of the Campos savages is a very sonorous one, and without the strong gutturals of the Quichua; in fact, nearly all the words terminate in vowels, like the Italian.

One singularity which I noted amongst the people is the total absence of that curiosity which is so common to the inhabitants of the woods in the littoral province of Loreto, and of the valley of Sta. Anna, where the traveller is surveyed from head to foot, and where the natives place their hands on his body, his dress, his buttons, and, in fact, everything that is new to them. Here, on the contrary—I know not whether designedly or through natural apathy—they bestow no apparent attention on anything; so that even when I drew out my Gay Lussac barometer, in order to take an observation, for the purpose of ascertaining the altitude, the Campos did not stir from their places, nor inquire of the interpreter what I was doing; whereas in other parts I have been not a little interrupted during my observations, as the inhabitants were anxious to touch everything they beheld.

We left Chibuquiuro by a path which the Campos had opened out towards the Apurimac, and we proceeded along a hill shaded by luxuriant vegetation. After advancing along the rising ground for half a league in a N.N.E. and north-east direction, we skirted the eminence by a path not more than a yard in breadth, and with so deep a precipice on each side that a glance below sufficed to make one giddy. To the right flows the River San Miguel,



at the distance of about half a league; and to the left extends a very deep ravine, where a brook, called Huayapo, takes its rise. Whilst traversing this dangerous pass, to avoid falling we were obliged to take hold of the trees.

On quitting that point we still proceeded along uncultivated ground, but the view became gradually more extended. We next ascended another hill, for about a third of a league, until we reached the summit, which is about 3012 feet above the level of the sea. Here we were shut in, as it were, by a wood, but, on advancing a few steps further, we beheld all at once one of the most beautiful and charming of landscapes,—the sombre aspect of the forest being replaced by scenery radiant with light, and the horizon bounded by some distant hills covered with trees, near which, like a cineture of brilliants, flowed the River Apurimac. Continuing our journey we soon began to descend, and then suddenly, like the picture of a phantasmagoria, the luminous scene disappeared, and we were again plunged in the obscurity and silence of the primeval woods. The path, too, was so steep that we could scarcely keep our feet, and, as before, we were under the necessity of laying hold of the branches of the trees to maintain our equilibrium, much of the path being, so to say, affixed almost perpendicularly to the soil. Descending more or less in that kind of way for a league or so, we reached the brink of the Huayapo, a scanty brook, flowing between the folds of two hills, too steep to walk on, so that the easiest mode of advancing is to take to the bed itself of the streamlet, in thoroughly aquatic fashion. The natives, who do not make use of any kind of covering for their feet, naturally enough would prefer the water to the thickets and brushwood, where they are liable to be beset by reptiles and tormenting thorns; but as for Europeans, such a continuous promenade through water and on shifting sands is anything but agreeable.

This singular road has to be traversed for more than a league. About midway from the point at which we entered it we found another hut of savages; but the only occupants were a man, a woman, and their two children. Here we were again supplied with yuca—this time baked—for which, as in the former case, I instructed the interpreter to present some fish-hooks to our entertainers.

On leaving this place, which is called Rapitariaco, we re-entered the brook, and resumed our aquatic march for another half-league. The ravine then spread out, and presented to our view the welcome Apurimac, flowing tranquilly on its course, and quietly, as it were, inviting commerce to navigate its waters. At this point it is some 394 feet wide—its speed being at the rate of one league per hour. It may be stated, however, that

that speed is greatly increased in some parts of its course. The depth varies considerably—in fact from 19 to 25 feet, and even more where there is but little current, down to at times less than 6½ feet, in those parts where there are strong currents. Here the direction of the river is from east to west, but it soon veers to the north. Some two-fourths of a league higher up than the mouth of the Huayapo Rivulet, the Apurimac divides into two branches and forms an islet.

On landing, I found two other natives in a hut, and, through the interpreter, obtained as exactly as possible some particulars respecting the Mantaro; they giving us to understand that the point of junction of that river with the Apurimac was but little distant. On my inquiring whether they had any canoes, they pointed out one, but stated that it was leaky. Thereupon I examined it, but I did not care to entrust myself to it; moreover, it was very small, and only capable of holding two persons. I then distributed some knives amongst them, and, on their part, they undertook to construct a raft for the purpose of descending the Apurimac until it united with the Mantaro. Accordingly they at once set to work, by cutting down the requisite timber on the hills, whilst we prepared our camp, as we would have to make a stay of at least two or three days.

Other natives speedily made their appearance, and—just as if the word had been passed around—the number was soon augmented by fresh arrivals, so that in a short time they amounted altogether to sixteen. Thanks to the gift of a few knives, some of them assisted in the construction of the raft; some procured wood for combustion, whilst others commenced erecting a little hut, composed of the stems and leaves of the *Gynerium saccharoides*, which is found in abundance on the banks of the river. Meantime, a few offered to catch some fish for us: in fact, I never met with such willingness elsewhere to perform all I required to be done, and never shall I forget the agreeable moonlit nights I passed on the banks of the Apurimac, encircled by those so-called savages, who undertook to teach me in their language the names of all the objects I showed them or pointed out, and who indulged in immoderate but good-natured laughter whenever I pronounced the words badly.

By the following day the construction of the raft had already somewhat advanced, and those Indians who had gone out fishing came back and deposited at my feet from three to four *arrobas* (75 to 100 lbs.) of fish, so that my porters set about salting and drying a quantity to serve for other occasions. On my part, I busied myself with taking meteorological observations, looking after insects of various kinds, and collecting plants in the woods in the vicinity.

METEOROLOGICAL OBSERVATIONS ON THE BANKS OF THE APURIMAC, AT A SHORT DISTANCE FROM THE MOUTH OF THE MANTARO, ON THE 22ND OF SEPTEMBER, 1866.

| Hour.      | Pulcrimeter.          |                        | Barometer.<br>Millimètres<br>reduced to 0°. | Condition of the Sky.                         |
|------------|-----------------------|------------------------|---------------------------------------------|-----------------------------------------------|
|            | Free<br>(Centigrade). | Moist<br>(Centigrade). |                                             |                                               |
| 6·30 A.M.  | 20·5                  | 18·8                   | 721·65                                      | Sunny.                                        |
| 7·30 A.M.  | 22·0                  | 20·8                   | 721·55                                      | ..                                            |
| 8·30 A.M.  | 24·2                  | 22·7                   | 721·55                                      | ..                                            |
| 9·30 A.M.  | 27·5                  | 26·0                   | 721·75                                      | ..                                            |
| 10·30 A.M. | 27·7                  | 26·5                   | 721·20                                      | ..                                            |
| 11·30 A.M. | 29·5                  | 28·2                   | 721·00                                      | ..                                            |
| 12 noon    | 30·1                  | 28·7                   | 719·45                                      | ..                                            |
| 1 P.M.     | 31·0                  | 29·6                   | 717·75                                      | ..                                            |
| 1·45 P.M.  | 32·0                  | 31·0                   | 717·25                                      | ..                                            |
| 3 P.M.     | 32·4                  | 31·7                   | 716·50                                      | } Sunny, reflection<br>from the warm<br>sand. |
| 4 P.M.     | 30·0                  | 29·6                   | 715·60                                      |                                               |
| 5·30 P.M.  | 27·0                  | 26·5                   | 715·80                                      | Sunny.                                        |
| 9 P.M.     | 21·0                  | 20·7                   | 717·55                                      | Setting sun.<br>Moon.                         |

It is generally admitted that, in the tropical zone, the difference between the maximum and minimum of the atmospheric pressure on one and the same day does not exceed three millimètres; nevertheless, in various parts of Peru, for example in the one now under consideration, the difference corresponding with horary variations is as much as six millimètres.

The raft was finished by the third day; and I must state here, to the honour of the constructors, that it was of very elegant form, and well made. In effect all the planks had been rendered quite white by stripping off the bark, and they were fastened together by large wooden clamps, made of black and very hard wood, cut from the trunk of a palm-tree of the *Bactris* genus. Moreover, the timbers were further secured by uprights made with strips of a very tenacious bark, cut from the *Bombacea* or *Urostigma*. The fore-part of the raft tapered more or less to a point, like the stem of a vessel, for the purpose of making way through the water with greater facility—a contrivance of which even the civilised Indians of the north of Peru do not avail themselves.

As the raft was somewhat too small to convey the entire party, only myself, the interpreter, and three of the natives of the place, embarked on it.

Two of the latter were to conduct the craft, whilst the third one took charge of the comparatively more valuable portion of my little cargo, which was deposited in a small well-caulked sort

of cabin. As for the porters I had brought with me, they were to remain behind and await our return. After these arrangements had been made, we commenced floating down the current of the Apurimac in quest of the Mantaro.

Many portions of the former river are characterised by smooth pools, so that the water appears stagnant, as in lagoons; but in other parts it rolls boisterously along over a bed of stone. At times our raft would make a plunge and be for a moment under water, immersing as it were in a bath, but of so light a nature were the materials of construction, that it rose immediately to the surface like a cork.

We passed a few little islands and beach-like banks, where we saw some small huts, but no signs of any habitations, as the savages do not live on the banks of rivers, but generally at some little distance in the interior. At intervals we had an alternation of apparently stagnant parts and strong currents, so that, in the course of one hour, we passed nine rapids, some with a heavy surge. We kept to the middle of the river, as there was much water there; but at times we could see ridges of small stones at the sides, along which the waters rushed tumultuously and furiously.

We had thus continued for some two hours, when all at once one of my companions exclaimed, in his own language, "Behold the Mantaro!" and he then pointed to a muddy river on our left which flowed with no little speed into the Apurimac. Thereupon we approached it, and finding it a copious stream, concluded at once that it could be no other than the former river, as stated. In fact, all the other rivers in these parts are very small ones, and always limpid. A few paces further down we met with two other arms, and soon afterwards a third one; but the wild natives who dwell on the bank opposite the mouth of the Mantaro stated that the number of outlets varied—there being sometimes only two, and at other times more than three, according as the waters of that river increased or diminished.

In order to ascertain more exactly the point of junction with the Apurimac, we descended a little further towards the north-west, but contrived to float along the waters of the Mantaro, which—although there is now only one river—are easily distinguishable, for a comparatively long distance, by their slimy colour, as those of the Apurimac still continue transparent. Soon afterwards we landed, and proceeded along the dry bed of a brook for half a league, in order to examine the principal arm a little higher up.

The River Mantaro, near its mouth, is much more rapid than the Apurimac; but a little further up it is also apparently stag-

nant in some parts. The inhabitants of the vicinity stated that a canoe could only ascend it some six or seven leagues from the outlet,—that is to say, to a point which they called Masangaro, beyond which the stream is obstructed by rocks.

The Apurimac is known under the name of the “Catongo” to the Campos savages, who inhabit this region. The latter appellation signifies in their language “beyond”—“beyond river;” because they navigate it to a point beyond Simariba, a trip which is performed in about five days. At the time of my visit, —and it happened to be the driest season of the year—the river had sufficient water to be navigable by large canoes. There are some rapids here and there, but they are not particularly dangerous, as the natives who dwell near the banks daily pass up and down the river, much beyond Simariba, although their canoes are respectively formed only of the trunk of a tree. When they descend the stream they keep to the middle, and when they row against the current they creep along the banks and amongst the little arms of the river which form numerous islands disseminated on their track. In ascending the river much exertion is at times required, as the water of the little channels which the natives enter is here and there so low, and so very shallow over the stony beds, that they are obliged to get into the water and pull the canoes bodily up a species of inclined plane.

During the rainy season the force of the current considerably increases, and at that time it is impossible for the canoes to ascend the river, so that it is only navigated in the dry season. I am convinced, however, that small barges would be able to navigate the large arms of the river, even in the latter season.

A little beyond Simariba one meets with the wild natives along the entire course of the Apurimac, but never in any large number, there being only small huts here and there, containing one or two families.

The river which is thus formed by the junction of the Mantaro and “Catongo,” or Apurimac, is called the *Ene*. Even in the dry season it has sufficient water to admit of the use of small steamers,—the more so that, a few leagues further down, it is augmented by the junction of the Perene, a somewhat important stream formed by the Chanchamayo, Tutumayo, and Pangoa Rivers.

Opposite the mouth of the Mantaro extends a plain about a league in width, inhabited by a family of savages, under a chief named Subiri—the tallest man I ever met with amongst the wild natives, as he is six Spanish feet in height. He is the owner of a large canoe, in which he is accustomed to descend

the stream as far as the River Tambo, which is a large tributary of the River Ucayali, and which is formed by the junction of the Ene and Perene. Sometimes Subiri navigates the last-named river as far up as the vicinity of Chanchamayo. I was informed by him that the Tambo presents no obstacle in the way of navigation, so that if a regular service were established on the River Ucayali, a passage inland could be effected, by means of the Tambo and Ene, as far as the junction of the Rivers Mantaro and Apurimac—a distance of 32 leagues from the town of Huanta.

**METEOROLOGICAL OBSERVATIONS** taken in the dwelling of the before-named SUBIRI, opposite the point of Junction of the RIVERS MANTARO and APURIMAC.

| Month and Day. | Hour.      | Thermometer.     |                   | Barometer (Gay Lussac) in Millimètres reduced to 0°. | Sky.  | Observations.                                                                    |
|----------------|------------|------------------|-------------------|------------------------------------------------------|-------|----------------------------------------------------------------------------------|
|                |            | Free Centigrade. | Moist Centigrade. |                                                      |       |                                                                                  |
| September.     |            |                  |                   |                                                      |       |                                                                                  |
| 23             | 9·30 A.M.  | 27·1             | 26·5              | 722·20                                               | Sunny | The house of Subiri is situated from 2 to 3 mètres above the level of the river. |
| 23             | 11·45 A.M. | 31·2             | 30·0              | 721·10                                               | „     |                                                                                  |
| 24             | 9·0 A.M.   | 21·8             | 21·0              | 722·60                                               | „     |                                                                                  |
| 24             | 10·0 A.M.  | 26·5             | 25·4              | 722·10                                               | „     |                                                                                  |

Taking the average of the foregoing observations, the altitude of the place in question is 1417 feet, and deducting from same the height of Subiri's house above the level of the river, we find that the altitude of the point of junction of the two rivers is about 1411 feet.

ANTONIO RAIMONDI.

*Lima, May 19, 1867.*

**XVI.—The Jaxartes or Syr-Daria, from Russian Sources.**

By ROBERT MICHELL, F.R.G.S.

It is not more, I may say, than ten or twelve years ago that the Jaxartes (or Syr-Daria as it is styled in the vernacular of Central Asiatics and by the Russians) was generally believed to have issued together with the Oxus or Amu-Daria from the Lake Sary-Kul, on the Upland of Pamir, between 73° and 74° of E. longitude from Greenwich, and in about 39° of N. latitude. But this is not astonishing. If we refer to the general geography of Asia, as it was understood five or six years ago, we shall be

no less struck by the discrepancies between facts as then stated and as portrayed on the maps of the present day. Although the sources of the Jaxartes are now pretty well ascertained, and although the entire course of the waters of that river from near Lake Issyk-Kul to the Aral has been revealed to us within the last few years, yet every new Russian map of the country through which it runs shows how much our ideas of its common features are still formed from conjecture.

Russian men of science have long been working in this field, but unfortunately the results of their discoveries are described in a language wholly incomprehensible in Western Europe, so that our latest information is generally referable to three or four years back, and by the time the Russians feel themselves sufficiently secure in their newly-formed province of Turkistan to admit into it any traveller from Western Europe, thirsting for scientific knowledge, the arrears of information gained by the Russians themselves will be enormous; so great, indeed, that we shall never be equal with them in an acquaintance with the country until we have original accounts of travel in our own language.

Indebted as I am in this compilation for materials received, though indirectly, from various members of the Russian Imperial Geographical Society, I must here make a thankful acknowledgment of their assistance. The principal authorities on whom I have drawn are Admiral Boutakof, Colonel Meyer, Professor Maksheyef, and Colonel Poltoratski, besides the 'Russian Military Journal.' At the same time I am so fully conscious of my inability to handle the subject properly that I ought at the outset to apologise for attempting to do so. But it is a pleasing task, and I am obliged to the Council of this Society for inviting me to write a digest of Russian Accounts of Surveys of the Jaxartes, and of explorations of the adjacent country.

My only claim to the indulgence of the Society rests on a knowledge of Russia and of the Russian language, which has enabled me for several years to follow the progress of the Russians in Central Asia, and to gratify my growing interest in the subject by the study of all that has been written upon it by Russian authorities.

Western Europe and the Indian public are inclined to regard with great jealousy the advances of the Russians in Central Asia and their political relations with the Khanats, and attaching great political importance to their situation, treat as comparatively insignificant the scientific data collected by Russian explorers in those countries. For my own part I would humbly express my belief that the contributions to science which Russian officers and civilians have made since they have been able to

penetrate into the interesting regions of Central Asia, are of greater value and importance than the political side of the question as regards our Indian possessions. It must sooner or later be acknowledged that the scientific results of the recent Russian extensions are of superior interest to all other considerations, not only to us, but to Russia herself, it is difficult to see what other moral or material benefit she can possibly derive from an accession of territory in Central Asia.

Those who form a correct estimate of the power of the Russians to affect us in any way on the North-West frontier of India, and who know the footing on which they stand in relation to the Khivans, Bokharians, Kokandians, and nomads, entertain only a feeling of pleasure at the prospect of comparative well-being now opening before the degraded fanatics of those regions, and they rejoice to see that a large tract of the earth's surface is being cleared of the dark shadows which tyranny and barbarism have so long cast over it. With these feelings, on the other hand, is mingled a not altogether unfounded suspicion that the position of the Russians in Central Asia is extremely precarious. Their position in Turkistan is so isolated, their means of communication with the mother-country so difficult, their forces in the province so slender, whilst the races are so numerically overwhelming, and moreover so mistrustful, treacherous, and fanatical, that they might any day be overtaken by some great calamity.

Impelled by a desire to strengthen their position in Central Asia, the Russians have of late years made such enormous strides in that region that it is time to inquire into the results of their advances from a geographical point of view. They have taken town after town, fort after fort from Kokand, Khiva, and Bokhara, until they have found themselves at a great distance from their former line of frontier. It has been a common phrase among the Russian soldiers in the Steppe that expeditions would have to be sent in search of them, for, from their ceaseless advances, it appeared to them that they were marching to the extreme limits of the earth. It cannot be said, and it is officially denied at St. Petersburg, that the conquest of what is now the province of Turkistan has been effected in pursuance of any line of policy. The respective Governors-General of Orenburg and Western Siberia and the local military commanders have extended their authority step by step until it was found necessary by the Imperial Government to draw a frontier somewhere. Having flanked the Kirghiz Steppes on the East and West, it was deemed necessary to close the frontier by a line from Vernoë to the Jaxartes through Auliétâ. When this was done it was still the argument in all official reports that the inviolability of Russian



territory could not be secured without the capture or demolition of Kokandian strongholds in the vicinity of the new Russian line and the "pacification" of the outlying country and people, and those who were in consequence empowered to act as "circumstances might dictate" pushed on and annexed, and reported afterwards.

With a very slender military force, the Russians have now occupied both banks of the Jaxartes, or Syr-Daria, which borders an area of more than 1,000,000 square versts, or about 143,000 square miles, with a population of about 1,000,000: but besides holding the course of the Jaxartes from the Sea of Aral to Khodjend they have also a triangular slice of Bokharian and Kokandian territory on the South side of the Jaxartes from Khodjend and from Fort Chinaz at the mouth of the Chirchik to Samarcand. The line of Russian picket-posts from Djizak \* to Oura-tiupé (135½ miles to the South-East of Djizak) runs along the foot of the Nurataù hills which form the northern boundary of Bokhara proper. From Oura-tiupé the Russian cordon proceeds in a North-Easterly direction to Khodjend by Fort Naù. This triangular projection of outposts from the Jaxartes to the base of the mountains forming the Northern wall of the valley of the Zeravshan entirely closes the mouth of the Ferghanah Valley (or valley of the Jaxartes) which constitutes Kokand, and entirely excludes therefrom the Bokharians. Thus by separating the two Khanats of Bokhara and Kokand, the Russians have prepared the way for dealing separately with both. The trade between Bokhara and the Western Provinces of Khiva has always passed through Kokand and its capital, and through Margilan and Ush, thence over the Kashgar-Davan—a pass in the South-Western extension of the Celestial Mountains, to Osh and Kashgar, and so on to Kuldja and Chuguchak. This trade the Russians have now intercepted.

From Khodjend, which has, it is said, a population of 45,000 to 50,000—a chain of Russian posts extends almost due North to Tashkend along the high road between those two places, the distance from one to the other being about 54 miles. Fort Keleùchi lies midway, on the small river which runs into the Jaxartes parallel with the Angren, and at the head of which is fort Abyk, at the Western base of a spur of the Urtak-taù Mountains. These mountains, it would seem, form a natural barrier between the Russian and Kokandian territories. No doubt all the country to the West of this spur (called the Namangan Range) is now claimed by the Russians through their nominal subjects, the nomads, although the only Russian fort

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\* Djizak is 80 miles south of Chinaz.

immediately West of the meridian of Tashkend is Niaz-bek, which commands the waters of the Chirchik, or Chatkal, here diverted into a system of irrigation canals on an extensive scale. From Tashkend the road proceeds due North (67 miles) to Chemkend on the Badam River, thence by Tairam and Kara-Murt, across the Tersa River and through a mountain pass between the Karataù and Alexandrovski chain of mountains, to Aùliétá. From this point the Russian military line stretches along the Northern base of the Alexandrovski Mountains to Vernoë, by Merké and Tokmak. The mountainous country between this line on the North and the Jaxartes on the South contains no permanent settlement. It is roamed over by nomad Kirghizes and their herds, and has been pretty well explored by Messrs. Semënof, Severtsof, and others. Between the almost rectangular triangle described by the line from Tashkend to Aùliétá, and from the latter point to the Western extremity of Lake Issyk-kul we find a kind of "No Man's Land," rarely visited by Kokandian "ziaketchis," or collectors of tribute, and freely travelled over by Russian scientific explorers. I may here observe that, according to all accounts, this mountainous district equals, if it does not surpass, in the imposing magnificence of its scenery, anything that is to be seen in Switzerland or the Caucasus. Some of the sights witnessed by Mr. Severtsof and described by him in a highly interesting orographical and geological paper,\* are no less astonishing for their wonderful peculiarity than remarkable for their beauty.

The line, then, that may be transversely traced from Khodjend to Issyk-kul, indicates a hiatus between Russia and Kokand devoted only to Kirghizes, travellers, coal and gold seekers, and occasional despairing "ziaketchis."

*South-Eastern Frontier.*—The Russian frontier line from the East, commencing from the Tarbagatai Mountains, bordering the South-Eastern extremity of the Semipalatinsk region (now included within the new province of Turkistan), passes due South close by Chuguchak, across the Emil River which runs into Lake Ala-kul, then a little to the East of Lake Kikché-Ala-kul and on towards the Eastern extremity of the Ala-taù Mountains, along which it trends to the frontier post of Borokhudzir, which is situated at the foot of the Southern slope of the Alataù, immediately opposite to the sources, on the other side, of the Kok-Su River, which runs Northwards and continues its course to Lake Balkhash, under the name of the Karatal. From this point of the Alataù the Russian frontier proceeds across a steppe country to a point on the Ili, some little way to the East of the mouth of

\* A translation of this memoir will appear in the next volume of the Journal,  
VOL. XXXVIII.

the Naryn, one of its tributaries, leaving that river to the right and running in a zig-zag direction along the ridge of the Kegen Hills, so as to include the valley of the Cholkoda. It then cuts the head waters of the Tekes River from Chinese Tartary, and stretching to the South round the Eastern sides of Sumbé Hill and of Khantengri (an elevation in the Celestial Mountains) it turns off towards the West along the latter chain, and nominally running along the Southern slopes of the Kirghiz Alataù, South of Lake Issyk-kul, finally fades away at the Western extremity of that range of mountains.

Such is the Russian line of frontier in that direction. I will only add that the last point of contact between the Chinese and Russian dominions occurs at the mountain knot from which the Kirghiz Alataù strikes off in an independent chain from the Southernmost extension of the Thian-Shan, and which separation of these two branch systems originates the valley of the Naryn or head main branch of the Jaxartes.\*

### I. *The Jaxartes, or Syr-Daria.*

The Jaxartes, or Syr-Daria proper, commences from the confluence of the Joloshan, or Gulishan, and Naryn, in the vicinity of Namangan. The Naryn takes its rise in the Southern slopes of the Kirghiz Alataù, and winds through 6° of longitude (79° to 73° E. of Greenwich), rushing with the impetuosity of a mountain torrent through the lovely valley of Ferghanah, fed on both sides by numerous tributary streams of which the most conspicuous, from the North, is the Little Naryn, and at its head the Djungol and the Namangan. Then comes the Joloshan from the South, issuing from Chatyr-kul Lake and draining the slopes of the mountains forming the left side of the river valley; from here the blended waters of the Joloshan and the Naryn flow on under the local appellation of the Syr-Daria.

The head waters of the Syr-Daria are but obscurely known, even to the Russians. In its course through Kokand the river still preserves its character of a mountain torrent. On the left the river is flanked by the South-Western spurs of the Celestial Mountains, which form the water-parting of three river-systems, viz., those of Eastern or Chinese Turkistan, where the Kashgar

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\* In the autumn of the year 1867, when an envoy from the Ameer of Bokhara arrived at Orenburg to negotiate a treaty, it was proposed by General Kryjanovski to draw a line of frontier between Russia and Bokhara along the ridge of the Snowy Mountains to the South-East of Oura-tiupé, and by the chain walling Shuhr-i-Subz on the North to lake Iskander-kul, the true position of which lake was then, and still is I believe, quite a matter of speculation. From here it was proposed to continue the frontier along the mountains on the North side of the valley of the Zeravshan, then across the Steppes and desert to the Yany-Daria, an arm of the Jaxartes.

and Yarkend Darrias flow Eastwards to the Tarim, and of Western Turkistan, which has two systems, one traversing Bokhara in the Zeravshan, the other Kokand, in the Syr-Daria—both pursuing a Westerly course towards the Aral, separated by the Kashgar-Davan and Nuratau Hills, and an ever-widening expanse of desert known as the Kizyl-kum. On the right the Naryn and Syr are bounded by the Kirghiz Alatau and Urtak-tau Mountains, and by an offshoot of the latter, called the Namangan Range. Higher up from Chemkend to Fort Djulek the Syr-Daria is bordered, though at some distance off, by the Karatau Mountains, the extreme North-Western continuation of the Thian Shan; then still on the right by a saline desert plain and the Kara-kum sands.

Admiral Boutakof, who is so well known in connexion with the survey of this river and the Oxus, and who is a gold medallist of this Society, ascended in 1863 to Baidyr-Tugai, situated within the Tashkend district at a distance of 538 miles from Fort Perovski. He believes that the river is navigable for some way beyond that place, basing his assumption on statements made by Kirghizes to the effect that the depth of water from thence to Kokand is such that there are no fords below the latter town, and that the natives are obliged to use boats for the transport of camels. Steamers have, however, subsequently (in 1865) passed up to Chinaz, and from there to Namangan: that is 200 or 250 miles higher still.\*

Admiral Boutakof succeeded in surveying and mapping 1003 miles of the course of the Jaxartes, calculating from its mouth.

From the confluence of the Naryn and Gulishan the river flows in a Westerly direction, deflecting a little to the South, and after passing Khodjend, turns abruptly to the North at a place called Kosh-teirmen; from here to Hazret (Turkistan) it runs North and North-West, pursuing this course as far as Yany-Kurgan, situated about midway between Din-Kurgan ( $43^{\circ} 51' 59''$  N. lat. and  $67^{\circ} 10' 44''$  E. long. of Greenwich) and Ak-Cheganak ( $43^{\circ} 57' 14''$  N. lat. and  $66^{\circ} 51' 33''$  E. of Greenwich); from Yany-Kurgan it inclines gradually to the West, and winds away to the Aral without deviating from this general direction.

From Baidyr-Tangai, in  $42^{\circ} 1' 40''$  lat. and  $68^{\circ} 8' 17''$  E. long. of Greenwich, the river presents a magnificent mass of water

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\* I borrow, of course, largely from a short account of the Admiral's survey, given by himself, in which he observes that he has not written a full report of that valuable service. For the loan of that abstract (a translation of which appeared in a published report of the Calcutta branch of the Asiatic Society in 1867), as well as for other materials, I have to express my great obligations to that distinguished and intrepid officer.

running in a single bed. The banks, which are of an argil-salinous and sandy character—for the most part inundated at high water—are depressed, but abrupt, by the margin of the river, so that the depth immediately under them is one fathom, sometimes even more. There is nothing in them to attract the scrutiny of the geologist. When they are flooded the inundation extends from 500 fathoms to 3 and 5 miles. The swamps so formed are covered with reeds, but after the waters subside the ground affords excellent pasturage to the herds of Kirghiz cattle. Here the Kirghizes take up their quarters for the winter. These meadow-patches are relieved to the eye by occasional sandy hillocks from 30 to 40 feet high, on which grow the Tamarisk, Djida (*Eleagnus Angustifolia*), and Turanga, or "Tatarix." The width of the river from Baildyr-Tugai to Fort Perovski is from 150 to 400 fathoms; the depth rarely less than 3 and frequently 5 fathoms. The rapidity of the current in the main channel is never less than 3 knots, and it increases even to  $4\frac{3}{4}$  (7 versts) miles per hour. The current is strongest at about 10 or 11 o'clock A.M. After that time it decreases in velocity till 2 P.M., when it again begins to run quicker, resuming sometimes in the evening the velocity of the morning. As an instance of the difficulty of making head-way against the stream, it is said that it has taken a fortnight and more for steamers to perform a passage of 67 miles from Fort Perovski to Djulek. But generally speaking, with a fair wind, vessels steam up the river at the rate of 3, seldom 4 versts (2 to  $2\frac{3}{4}$  miles) per hour, and down at  $6\frac{3}{4}$  and 10 miles in the hour.

The Syr-Daria is covered with ice for nearly 5 months in the year, *i.e.*, from the middle of November to the middle of March. It is flooded from May to the end of June, and again in September, owing to the melting of the snows in the Thian-Shan mountains which occurs at those periods. The superabundance of water in the Syr-Daria depends on the heated state of the atmosphere on the mountains, and on the quantity of snow lying on their surface.

It is feared by many that without the most costly and extensive artificial works the river will never be a practicable water-way, on account of the nature of its bed, which is constantly changing, as well as on account of the tortuosity and velocity of its stream. It is observed that, for one reason or another, the Syr is shallowing year by year. The water is of a muddy yellow colour, but it is soft, and is pleasant to the taste after being allowed to settle. It has the peculiar effect of making the hair fall off the head if it is constantly used in ablutions,

The bottom of the Syr-Daria is chiefly composed of mud and sand. It is, however, rocky (freestone)  $3\frac{1}{2}$  miles below Ak-Djar, a little above the parallel of Turkistan. In 1845, Admiral Boutakof struck on a rock on his way to Fort No. 1, and the men who went into the water to shove off the steamer (*Perovski*) brought up from the bottom a piece of wood resembling the tamarix species in a lignite state.

From the mouth of the Arys (an affluent from the North between Chemkend and Turkistan) to Utch-Kayuk (lat.  $43^{\circ} 14' 12''$  and  $67^{\circ} 47' 14''$  E. long. of Greenwich) the Syr-Daria winds very tortuously, and gives rise in its passage to a large number of islands, many of which are 2 miles long. On these islands vegetation is much more abundant than along the banks of the river; the "Djida" (*Eleg. August.*) there grows to a height of 4 fathoms, and the "Turanga" swells out to a diameter of 10 inches. The brushwood on these islands is very dense; it is infested, according to the Kirghizes, by tigers and wild boars. Eight miles below Baildyr-Tugai are the ruins of a small Kokandian fort called Bau-Kurgan, which Kirghiz tradition affirms was demolished about 100 years ago; and 40 miles back up the river on the South bank are to be seen the remains of the town of Tunkat, now called Iskillé, after a saint whose tomb, raised by Tamerlane, is still there.

Beyond the jungle which fringes the river below the mouth of the Arys an open space becomes visible at some 4 or 5 miles from the Syr-Daria, which is studded with clayey sand mounds tufted with a meagre brushwood; they are supposed to have been artificially formed. On a sort of table-land, within 7 miles, in a line almost direct to the North from the mouth of the Arys, are to be seen the remains of what may have been the citadel of the ancient town of Otrar, where Tamerlane died. Lower down, a distance of  $8\frac{1}{3}$  miles separates the abandoned Kokandian fort Utch-Kayuk (or Kaik) from the mouth of the Arys. Throughout this extent of the Syr-Daria the character of the river and its banks, and of the vegetation along them, is the same as higher up, and islands similar to those before mentioned occur parallel with the shores.

The forts below Utch-Kayuk are Din-Kurgan, Yany-Kurgan, Djulek and Ak-Mesjed (now Fort Perovski); then follow Chim and Kosh-Kurgans, on the Djaman-Daria, as the river is there called; next, Forts No. 2 and 1; and, lastly, the abandoned Raïm fort at the mouth of the Syr-Daria. The ruins of an old Kokandian fort, Kuliki, are situated on the Kuvan-Daria, 13 miles below the issue of that arm from the Syr. The next are Kumysh Kurgan, also on the Kuvan, 10 miles below Kuliki and

Khodja-Niaz, where the course of the Kuvan terminates in an extensive marsh in the sands of the Kizyl-Kum.

Turkistan (Hazret) is not visible from the Syr, being situated in a hollow of the foreland of the Karataù mountains, on the Initchké rivulet.

From Djulek to Fort Perovski the Syr-Daria makes an endless series of bends, after a large curve to the West and North from Tiumen-Aryk to Djulek, within which the space is known as the Misheùli-Kum Sands.

Djulek stands on the right bank of the Syr. It was erected in 1861. Prior to that period there had been no surveys or "reconnaissances" made above this point; so that when it was resolved by the Russians to occupy it, Captain Meyer was entrusted with a force of about 800 soldiers and Cossacks and 250 armed Kirghizes, with 9 guns, to explore the country and to take and demolish the Kokandian fort of Yany-Kurgan,\* 48½ miles above Djulek in a straight line. This he accomplished in the marvellously short space of three days, and following Eastwards the road to Turkistan, with a slight turn to the North, he reached the Karataù mountains, and, skirting these, he returned to Djulek.

From Djulek to Fort Perovski, by Kum-Suat (50 miles above the latter), the distance by road is 63½ miles by land, and 128 by water.

Fort Perovski (Ak-Mesjed) was, before the occupation of Tashkend by the Russians, the metropolis of the Steppes and the centre of administration of the line of the Syr-Daria. It is situated on a low marshy ground. The clayey banks of the river have been here very much washed away within the last ten or twelve years, and the water has encroached to within 20 fathoms of the fort itself; so that the consequences of the inundation may be ultimately the ruin of the walls. The only vestige of the old Kokandian fort is a tower about 50 feet high, which is inside the present fort, and from the top of which a view of 13 miles of country is obtained. The summer here is dry and sultry, the temperature reaching 40° Reaumur. Hot winds frequently raise a cloud of saline sand-dust, which envelops the whole place and renders it almost uninhabitable. Man and beast are put to torture by gadflies, and the air is thick with gnats. In the fields there are great numbers of phalangi, scorpions, and tarantulæ. As rain falls here only once, seldom twice, during the summer, the fields are necessarily artificially irrigated.

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\* This fort is not to be confounded with the fort of the same name a little to the south of Djisak.

At a distance of  $6\frac{1}{2}$  miles down stream, and a little above Kuvala, the *Syr-Daria* throws off an arm called the *Yany*, or, as the Kirghizes call it, the *Djany-Daria*, which flows to the South, terminating in Lake Akcha-Kul, at the head of Lake Kukcha-Dengiz, in the Kizyl-Kum sands.\* Admiral Boutakof says there is evidence of this arm having once found its way to the Sea of Aral.

Sometimes in the summer the *Djany-Daria* runs dry at a point 20 miles short of Akcha-Kul. Captain Meyer, who has minutely surveyed the various arms of the *Syr-Daria* in this stage of its course, and who, as well as Professor Maksheyef, has written several graphic descriptions of them, ascertained from the Kirghizes of this locality that the *Djany-Daria* was, about 150 years ago, called by the Kipchaks the *Inker-Daria*, or disobedient River, because of its sluggish current from Kukcha-Dengiz to Lake Djailendé, close to the Aral Sea, owing to which those people could not utilise the river according to their wishes. His own observations at the same time lead him to believe that the *Djany-Daria* once issued from the *Syr* some way above Fort Perovski, *i. e.*, at Boktulen, whence it ran parallel with the main stream to Khan, from which place it deflected to the South-West, as it does now, and proceeded to Kukcha-Dengiz and across the Kizyl-Kum sands to Lake Djailendé-Kara-Kul, which latter he supposed to be identical with the lake at Daù-Kara formed by the waters of the *Amu-Daria*, or *Oxus*.

Failing in their endeavours to clear the mouth of the *Inker-Daria*, the *Kara-Kalpaks*, who were the then owners of this country, were obliged, about 150 years ago, for want of sufficient water to abandon these shores and to remove to the *Amu*. The present mouth of the *Djany* is shown to have originally been an irrigation canal, dug soon after the exodus of the *Kipchaks* by a few remaining members of the same tribe settled on the banks of the *Syr*. The water running into this fresh channel ultimately forced a passage to the old bed of the *Inker*, when this stream was called the *Djany-Daria*, or *New River*. This mouth was afterwards dammed up by the *Kokandians*, who established their authority there and built *Ak-Mesjed* in 1820; and the *Russians*, who have ejected them, have also endeavoured to keep it closed, but ineffectually. As Captain Meyer's observations may not as yet be known to English readers, I will make

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\* Kukcha-Dengiz is the central lake of three, which are connected by straits. The topmost lake is called Akcha-Kul. Kukcha-Dengiz is about 13 miles long from North to South, and about 2 miles broad. These lakes are enclosed within sandhills. The soil near the margin of the waters is some parts clay. The water is fresh. Akcha-Kul is surrounded by an argillaceous schist.



a brief quotation on the subject of the desiccated channels through which a portion of the waters of the Syr found passage a great many years ago. Whilst this matter is not irrelevant to the main subject of my paper, it refers somewhat, at the same time, to that portion of Sir Roderick's Address of last year, which dwells on the Aralo-Caspian basin :—

“ The *Djany-Daria* flows by a row of ruined forts in a South-East direction to Bish-Mazar hill; then, turning off to the South, ends its course in a lake in the Kizyl-Kum sands. From Kukcha-Dengiz there are still traces of river channels, through which in former times the water flowed to the Daù-Kara locality and joined the Amu-Daria. The circumstances which confirm the truth of the traditions to this effect are, that in these beds, along the bottom of the hills, roots of reeds, lying in rows, are still distinguishable, though they are quite rotted. Similar remains of reeds are found in the beds leading from the lakes to Daù-Kara to the North-East. In the dry beds out of Lake Kukcha-Dengiz and from Daù-Kara I found quantities of fresh-water mollusks. In others the mollusks were all *oceanic*, and must, consequently, have belonged to a different period. Again, the elevation by the side of Lake Kukcha-Dengiz is ostensibly of the same formation as the hills which enclose the lakes at Daù-Kara. These hills are of sand, intermixed with mica, and rest on an argillaceous stratum. It is to be presumed that the whole of this locality rose gradually but simultaneously, and that by the process of upheaval the waters of the Syr were for ever separated from those of the Amu-Daria. That the surface of this locality has been raised, I am convinced from those same remains of reeds which occur in rows along the margins of the sands. It is remarkable that these rows are not found only on horizontal plains, but they stretch also down the slopes of the hills. If the ground had not been raised, these rows of reeds should lie horizontally, indicating the level of the water during their growth. I am of opinion that this upheaval is referable to not more than a century back, when the Kara-Kalpaks noticed the sluggishness of the current of the Inker-Daria from Kukcha-Dengiz to Djailendé. It may be that the surface is still rising; but in every case it is very evident that the *Djany-Daria* will never again flow in these channels.

I have hitherto spoken of only one tradition and of corresponding confirmatory traces left by the river itself. There exists another version which has also a verification in nature. In 1849, Captain (now Admiral) Boutakof was shown by the Kirghizes the embouchure of a river on the South-Western side of the Aral Sea, which they called the *Djany-Daria*. How was this to be explained? Let us return to Bish-Mazar hill, to which the river yet flows as it has flowed for ages. From this hill, in a Westerly direction, a dry bed is really traceable across the sands, commencing from the bend in the *Djany-Daria* and continuing to the sea itself, into which it disembogued through two mouths—the *Bas-Uziak* and *Kara-Uziak*. I did not discover any organic remains in any portion of this bed, which is distinctly marked. The Aral had evidently many deep as well as shallow inlets, now either partially void of water or preserved as swamps; they are all, however, filled with sea mollusks, and were apparently at one time the bottom of a sea. The Aral has undoubtedly retired from its Western shores, for the Kirghizes even yet distinctly recollect the time when there was water where now the land is dry. This falling back of the Aral is traceable in the dunes, where it may be observed that the mollusks are fresher as one approaches nearer to the sea and their colour is better preserved. The *Djany-Daria* did, a very long time ago, actually run in this bed, and, although based on tradition, the

statements of the Kirghizes are correct. That this course is much more ancient than the first-mentioned is marked by an absence along it of ruined forts like those that exist on the other river. One only earth-mound of doubtful origin at the Kum-Bugut dam points to the labour of man's hand in this part. By this bed the *Djany-Daria* joined the *Kuvan*, as is shown on old maps. My belief in the continuation to this day of the rising of the earth's surface over this extent of country is supported by the truthful observation of Admiral Boutakof that the *Syr-Daria*, with its mouths, is shifting more and more towards the North."

Thirteen miles below the issue of the *Djany-Daria* the *Syr* throws off another branch on the South, called the *Kuvan-Daria*, or *Chirgaili* branch, which, 200 years ago, is believed to have flowed into the *Aral*, but which now falls short of that sea by about 135 miles, and empties itself into the marshy lake in the vicinity of *Khodja-Niaz*. The cause of the interruption of its course was the enmity subsisting between the *Khivans* and *Kokandians*. The latter dammed up the river at several places near *Batpak-Utkul*, and so effectually cut off the supply of water from the *Khivans*, converting thereby the whole of that part of the country into the waterless and dreary desert which it now is. They did the same with the *Djany-Daria*, constructing the *Kara-Bugut* dam, ultimately destroyed by the celebrated *Kirghiz Bey-Bukbar*. The depth in the *Kuvan* is sometimes  $1\frac{1}{2}$  foot, but it averages from 3 to 4 feet, and is from 20 to 50 fathoms wide. On both banks there are *Kirghiz* villages, fields, and pasture-grounds; the margins being fringed with the wild date-tree, with prickly bushes and willows. The *Kuvan* was formerly the principal channel of the *Syr-Daria* to the sea. During Admiral *Boutakof's* visit in 1845, it was still within the memory of some old men that the current of the *Kuvan* was strong enough to move rocks, whilst the *Djaman-Daria*, now the main channel, had a very feeble current.

Ten miles below *Fort Perovski* the *Syr-Daria* divides into two water-courses, the one on the right called the *Kara-Uziak*, and the chief one, that on the left, called the *Djaman-Daria* (out of which the *Kuvan* runs), which means *bad* river—so called because of its crooked and narrow stream as well as by reason of its shallowness.

At *Fort No. 2* these streams unite once more, and the river then continues to flow under the name of the *Syr-Daria*.

The course of the *Djaman-Daria* is sinuous in the extreme, a circuit of 7 to 14 miles leading back sometimes to the point started from. The tongues of land separating the stream thus running in contrary directions are in some places not more than one-third of a mile or so in breadth. In 1853 and 1854 Admiral *Boutakof* noted the existence of a bend opposite a

place called Tubek-Tugai, where the river, after deflecting for about 5 miles, returned to the same spot; this neck of land, which was only one fathom wide, was broken through in the spring of 1855, and the angle in the river thus cut off now forms a pool. Irkul, another lake in the Air-Chakty Sands, owes its origin to a similar circumstance.

In the year 1863 the course of the Syr-Daria was in some places straightened by cutting across strips of land between the curves of the river, and it was the year before last a question whether the *Djaman-Daria* could not be improved, or the navigation facilitated by canalizing the Kara-Uziak. It is this part of the river, between Forts Perovski and No. 2, that presents the greatest obstacles to its navigation. Vessels drawing even so little as 3 feet of water cannot run through the only available channel—the *Djaman-Daria*, during more than two and a-half months in the year—that is when the river is flooded.

The *Djaman-Daria* is from 40 to 80 fathoms wide; its average depth is from 7 to 10 feet on the subsidence of the waters, but the minimum depth at the same period at its upper course, and over its broadest parts, is  $1\frac{1}{2}$  foot. The banks on each side are thickly wooded, and the margins are lined with reeds and sedge. The bed of the *Djaman-Daria* is chiefly of a saliferous formation. There is tolerable pasturage on both sides, with thickly-populated Kirghiz encampments. The eye reposes with great satisfaction on the aspect of the country by the river. It is a great relief, after traversing the dreary and soul-oppressing steppes and sandy desert, to arrive at the narrow zone of cultivated maize-fields, melon beds, water-raising pumps, and Kirghiz "*yurts*." Even travelling from fort to fort, where nearly all the necessaries of life, not to mention ordinary articles of use and comfort, are provided by Russian traders, it is a satisfaction to the Russians who have spent so much energy in becoming the masters of the Syr-Daria to find, at least, Kirghiz tribes settled here and there along its banks, contriving to subsist on the products which the narrow alluvial zone may be forced to yield.

The *Kara-Uziak* strikes off to the North from the Syr. It separates into two streams at  $8\frac{1}{2}$  miles below its issue, and flows for 24 miles in a deep and regular bed, throwing off right and left several small arms which afterwards again unite with the main stream. Farther on the Kara-Uziak spreads into a countless number of lakes and swamps choked with reeds, which, just escaping Lake Kok-Aryk, drain off their waters at first into several distinct channels having one common direction, and

ultimately concentrate in a single bed by which the *Kara-Uziak* proceeds 53½ miles to Fort No. 2 in the form of a regular and deep river.

The island formed by the partition of the river into the *Djaman-Daria* and *Kara-Uziak* branches, is called *Kosh-Kurgan*; it is 74 miles long by 8½ broad. The *Djaman* and *Kara-Uziak* are connected by a stream which flows through this island, called the *Kitkan-Su*, 4½ miles from the point of partition. Here the *Djaman-Daria* is at its shallowest, just above the spot where the *Kitkan-Su* flows into it from the *Kara-Uziak*. In the course of time it is expected that the principal volume of water will be discharged into the *Djaman* through the *Kitkan-Su*, or *Uziak*, and that the former will be impassable from the *Syr* for the bar occasioned by its sluggish current and the rush of the water through the *Kitkan-Su*. The latter is from 3 to 5 fathoms wide.

The *Kara-Uziak* receives the greater portion of the waters from the *Syr-Daria*. After filtering through the reeds in one stage of its passage, and leaving in these the sediment which gives its waters their turbid and yellow appearance, the *Kara-Uziak* concentrates in one bed, of which the banks and bottom are rendered firm by the roots of reeds and by marine plants, and flows perfectly transparent until its junction with the *Djaman-Daria*. There its clear waters reach almost across the entire breadth of the *Syr-Daria*, preserving a distinct outline from the muddy stream supplied by the confluence of the *Djaman-Daria*. Three or four miles below Fort No. 2 the waters of the *Syr-Daria* degenerate again into the uniform muddy hue of the *Djaman*.

The average depth of the *Kara-Uziak* is 4, 5, and 6 fathoms, the breadth in its lower course is from 40 to 60 fathoms.

The density of the reeds, and the rapidity of the current in the *Kara-Uziak*, render its navigation almost a matter of impossibility. Its bed cannot be cleared, and drawing off, as it does, most of the waters of the *Syr-Daria* (its bed being so much deeper than that of the *Djaman*) it causes the *Djaman* to become so shallow that towards the autumn of the year no vessel can pass through it. At the same time evaporation here is so great that the bulk of the waters of the *Kara-Uziak* escapes in the process. The inundations of this branch cover an area of 2000 square versts (nearly 287 square miles). The banks of the *Kara-Uziak*, according to Captain Meyer, are totally unfit for cultivation, so that even supposing any attempt to clear this channel for navigation proved successful, it would be the signal of the ruin of agriculture along the whole of the *Syr*, because to make the *Kara-Uziak* a practicable waterway

all the other channels will have to be closed, when the rush of waters through the *Kara-Uziak* would cause a great fall in the level of the Syr, a circumstance which would prevent the irrigation of the fields above.

Thirty or forty years ago the *Kara-Uziak* was nothing more than an irrigation canal dug by the Karakalpaks.

Twenty miles above Fort Perovski the Syr throws off another branch on the right, called *Ber-Kazan*. The surrounding land is submerged at high water after the flood has supplied several lakes to the North-West and the Bysh-Aryn canals. This stream ultimately effects a junction with the *Kara-Uziak*.

At  $1\frac{1}{3}$  mile above the *Ber-Kazan*, and 50 fathoms from the margin of the Syr, are situated the ruins of a Kokandian fortification overgrown with brushwood, and not, therefore, distinguishable from the banks.\*

Fort No. 2 (or Karmakchi) is about 117 miles below Fort Perovski, by road along the *Kara-Uziak*—that is about midway between the latter and Fort No. 1. The road passes by an almost continuous swamp where game of all kinds is very abundant. Immense flocks of wild ducks, geese, swans, and other water-fowl, literally cloud the skies when they rise disturbed from the lakes and pools. Pheasants may be observed under the cover of the prickly plants on the dry ground. Herds of “*Saigaks*” (Scythian antelopes) perpetually cross the path of the traveller, and wild boars and tigers still find shelter amidst the jungle notwithstanding the continued efforts to exterminate them for the premium set on their skins by the Russian authorities, and the frequent firing of the reeds. At this stage the “*Saxaul*” grows in thick but short stumps; it is very good as fuel, but it is apprehended that the quantity of it growing along the *Syr-Daria* will fall short in a few years of that required for the supply of the flotilla. The firing of 12,000 pouds (190 tons) of this fuel in 1867 by the Kirghiz marauder Sadyk was a severe punishment to the Russians. Sadyk—a partisan of the Ameer of Bokhara—is still at large; he continues to this day to harass the Russians on their advanced line.

The banks of the *Syr-Daria* below Fort No. 2 are mostly depressed, and consist of saliferous and arenaceous loam. In some parts, however, they are precipitous—as at *Tasty-Djar* and at *Ak-Djar*, on the South side. At the first-named point there are strata of reddish sandstone alternating with gravel. The elevation of the earth is here about 100 feet. The mounds on the opposite bank, rising 80 feet, are of loam. There is, too,

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\* From the confluence of the *Kara-Uziak* and *Djaman-Daria* at Fort No. 2, the *Syr* is navigable at all times when it is not covered with ice.

a succession of sandy hillocks studded with tamarisk and prickly plants. All along the river extends a zone of jungle with grass of great density and succulence, which narrows towards the mouth of the river where the Kizyl-Kum sands approach the Delta and all around is consequently bleak and barren.

Fort No. 1 (or Kazaly) is the first point on the Syr-Daria line from the mouth of the river. It stands on the banks  $46\frac{2}{3}$  miles from the embouchure. Immediately under it are moored the steamers and barges of the flotilla. In the settlement around it is carried on a trade in raisins, filberts, pistachio nuts, flour, and silk and cotton stuffs. The traffic in the neighbourhood of the fort is considerable. Caravans cross the Syr at Uchurgo, Murtuk, Mailibash, Chirik, and Kame-Kalgan,—all within the *rayon* of the fort, and distant from it respectively 11, 28, 30, and 107 miles in the order in which they are named. Higher up the Syr caravans from Bokhara and Tashkend traverse the river at Ush-Kayuk, almost in the meridian of Turkistan, whence they proceed along the Myn-Bulak River by Lake Telekul-Tata,—leaving Fort Perovski far to one side. The distance from Fort No. 1 to Fort Perovski is  $233\frac{1}{3}$  miles by road along the Kara-Uziak. This track borders the steppe which is relieved by small undulations covered with reeds and prickly shrubs.

At the embouchure of the Syr-Daria, the banks are composed of saliferous clay. A line of grey and perfectly bare heights is observable on each side about 13 miles above Raim, beyond a deep border of dense jungle. These heights are from 150 to 200 feet above the level of the river. Between these elevations on the North side of the river, where they are more numerous, is the little valley of Aigerik, where the Kirghizes sow millet and barley. This valley is 20 miles distant from the Syr-Daria both at Raim and Fort No. 1.

On the left bank of the river  $14\frac{2}{3}$  miles below Fort No. 1, are the ruins of a Khivan fortification Djan-Kaly abandoned and demolished towards the end of 1847.

The shoals in the river commence within about 10 miles of the Aral, and increase in number and dimensions towards the mouth of the Syr-Daria where the river opens out into three estuaries or *limans*. Of these the Southernmost, or the *Shavarli*, estuary opens between the left bank of the river and the island of Kos-Aral; the central estuary lies between this island and that of Surato, and the Northern estuary occurs between the latter island and the Unadym neck of land.

The principal mass of waters separating into three courses pours into the central estuary. At the entrance of all three of these estuaries lies a bar which is composed of a deposit of mud

and sand washed down by the current and stopped by the action of the sea; the former bringing down sedimentary matter, and the latter washing up the sand during the prevalence of North and North-West winds. This bar is not wide, but it is found to be a great obstruction to steam navigation. The greatest depth over it is not more than 3 feet.

The North and South estuaries are so shallow and so entirely choked with reeds that they are quite impassable. Since 1847 the delta of the Syr-Daria has changed very much. During an eight years' experience of it, Admiral Boutakof observed great variations. The South estuary was silted up and the waters were altering their course into fresh channels farther North, whilst a number of islands springing up through the formation of shoals and accumulation of reeds, willow-trees, and all sorts of deposit, aided towards the diversion of the stream.

At a short distance below Fort No. 1, the Syr-Daria sends off streams right and left, which supply the lakes *Raim*, *Djelangatch*, *Aigerik*, and *Kamyshlybash*. The two first named are at the bottom of either side of an elevated tableland 200 feet above the level of the water; this elevation occurs at  $1\frac{1}{2}$  mile from the margin of the river.

Some seventy years ago, when the Kara-Kalpaks inhabited these localities, they constructed a dike 10 miles long, parallel with the right bank of the Syr-Daria opposite the former Aral fortification (about 57 miles by water from Fort No. 1.), which served to prevent the overflowing of the river here. This dike was ruptured in 1847, when the outlying lowlands were at once submerged, but it was repaired by the Russians prior to the removal of the Raim Fort to Fort No. 1, the lands were reclaimed and meadows and vegetable gardens reappeared.

When the Syr-Daria swells with the snow waters from the Thian-Shan the flood reaches Fort Perovski suddenly, but it is some time before the waters rise in the river below the confluence of the Djaman and Kara-Uziak, owing to the lakes and pools in the latter, and to the numerous channels that have first to be fed. In the same way the flood subsides at Fort Perovski long before the Syr-Daria in its lower course has discharged its superfluous waters. Thus the lakes caused by the flooding of the river act like reservoirs, giving gradations of rise and fall below the island of Kash-Kurgan. Perhaps this circumstance might suggest and afford the means of rendering the entire course of the river navigable at all times, except in the winter, when it is frozen. As it is, the Syr-Daria is unserviceable to all intents and purposes; it is not (because it cannot be) employed as a highway for commerce. If Admiral Boutakof, who is now the Governor of the Syr-Darian district of the new province of

Turkistan, can make the Syr-Daria navigable for steamers and other craft from the Aral to Khodjend it would indeed be the making of the province, and there would be no occasion for discussing the question—started in Russian papers—of a railway from Orenburg to Tashkend, should funds and other means even be forthcoming for the enterprise, after the completion of a line from Samara to Orenburg.

At Fort No. 1, the difference between the highest and lowest levels of water is about 7 to 8 inches.

Strictly speaking there are no lakes on either side of the Syr-Daria; there are only a great many depressions in the land which fill with water from the mountain streams and “Kara-Su;” these hollows are also fed by channels which conduct the water from the river during the floods. The Kirghizes, however, make no distinction between these and lakes proper, and dignify them equally with the name of “Kul” (lake). In many of these the water is preserved only during the summer, and when dry enough for the purpose they are utilised for cultivation.

“Kara-Su,” or Black water, is a generic term for sluggish streams fed from springs and marshes and which never freeze.

## II.—*Tributaries.*

Throughout the whole surveyed course of the Syr-Daria, that is from Baidyr-Tugai downwards, that river has only two affluents: the *Arys* and *Sauran-Su*. Those higher up still of any important dimensions are the *Chilik*, *Keles*, and the *Chirchik*, on the right bank of which is situated the town of Tashkend; the other rivulets issuing from the Southern slopes of the Karataù Mountains, such as the *Djedéli*, *Satyn-Sai*, *Achalgandy*, *Sert-Su*, *Karasakty*, *Initchké*, on which Turkistan is situated, and the *Karachik* lose themselves in swamps before reaching the Syr-Daria, and the latter runs a course of 460 miles without receiving a single tributary.

The *Arys* river has its source in the Kulan range of the Karataù chain, and the valley of this river, like that of the Tersà farther East, separates the Karataù from the Urtaktaù Mountains, the latter terminating in an abrupt spit 2000 feet high over the river below the mouth of the *Arys*. The *Arys* has an absolute elevation of 1950 feet; it has several affluents from the mountains on both sides. The largest of these affluents occur in the mid course of the *Arys* after passing Yaski-Chu settlement; they are the *Baroldai* on the right, and the *Mashat* and *Badam* on the left. Chemkend stands on the last named. A great many other streams run towards the *Arys*,



without however reaching it; they are led off into irrigation canals. The lower course of the *Arys* extends about 47 miles from the mouth of the *Badam* to the *Syr-Daria*. Here its current is slow and its depth gradually greater from the ford at that part, and the *Arys* becomes accessible to steamers of 4 feet draught, for 2 miles up. Copses of "Djida" (*Eleagnus Angustifolium*), and prickly shrub (*Caragana jubata*), and "Turanta" (*Populus diversifolium*), clothe 13 miles of its banks on both sides, from the mouth.

The *Chirchik*, or *Chatkal*, as it is called in its upper course, is formed by the confluence of the *Kara-Kyspak* and *Kara-Kuldja*, flowing from the meridional range or mountain knot between the *Urtak-taù* and *Namangan* Mountains, from both of which the *Chatkal* receives feeders at intervals of about every 2 or 3 miles. The current of this river is extremely rapid. Its fall from the mouth of the *Kara-Kyspak* to *Chipash-Kurgan*, a distance of 20 miles, is 750 feet; there are no fords across it. The depth, too, is very great, and the breadth in the main channel is from 20 to 25 fathoms. But with all its rush the current of the *Chatkal* is smooth and not interrupted by rocks, so that it serves admirably for floating down timber to *Tashkend*.

Throughout a course of 180 miles from the *Kara Kyspak* to *Tashkend* the fall of the *Chirchik* is not less than 5000 feet. It flows within 5 miles of *Tashkend*, issuing from the mountains at about 7 miles above *Niaz-bek*,\* through a very narrow and impassable gorge. The *Tashkend* road, instead of passing through this gorge, trends across the mountains, which shows that the river here must break through precipitous clefts of the range. In the *Tashkend* Valley the *Chirchik* flows between steep banks, and although it is led off into a number of irrigation canals, there are still no fords. South of *Tashkend* it spreads out into wide marshes 7 miles from its mouth, from which the river issues again in one bed, 40 fathoms wide, fordless, and so disembogues into the *Syr-Daria*.

In consequence of these marshes the *Chirchik* is navigable only below them, that is, 7 miles up from the *Syr*. If they were canalised, the rapidity of the current alone would still be too great a difficulty for steamers to overcome.

### III.—*Ruins*.

There are a great many tombs, in the shape of beehives and square towers, built of clay or brick, or both, between *Fort No. 2*

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\* *Niazbek* is a fort on the *Chirchik*, distant 10 miles from *Tashkend* to the *South-East*. It commands the canals by which the fields of that town are irrigated.

and the embouchure of the Syr-Daria. These are mostly situated along the banks and are in a dilapidated condition. There are likewise several cemeteries of ancient date. Admiral Boutakof interrogated the Kirghizes as to the time to which these isolated tombs and cemeteries belong, but he could gain no information on the point; and yet to one of the tombs—that of “Batyr” Kharkut, on the right bank of the Syr-Daria, 13 miles below Fort No. 2—the Kirghizes had themselves built an additional wing on being struck with a recollection of the length of the late “Batyr’s” legs, which they thought the former dimensions of his resting-place could not admit of being stretched out to his comfort.

Captain Meyer mentions several pieces of white marble which he saw lying about near the ancient tombs by the Syr. He describes them as quadrangular pillars, 1 yard long by 5 inches across the section of the square. One side of these pillars, he says, is carefully polished and bears ornamental inscriptions and Arabic characters. The fragments of these being scattered about, he could not make out any complete word of the inscriptions. One stone, he says, bore characters which were unintelligible to him; but he thinks they may have been figures effaced by time. From the small number of these pieces of marble lying about, they could only have been the ornaments of some edifice. He relates the following legend in connection with these pieces of marble:—“Batyr,” or Khodja-Khorkum, feeling conscious that his existence was about to terminate on this earth, galloped on his miraculous steed to the land of the Prophet, and returned the same night with these stones for his tomb. From this Captain Meyer concludes that the marble is of foreign extraction, and that the people who once lived here had relations with populations enjoying Arabic cultivation. The erection of the ancient tombs found about here was, no doubt, contemporary with the existence of the town of Djankend.

The ruins of Djankend lie at a distance of 14 miles from Fort No. 1, on the left bank of the Syr, and about 3 miles off the river. They consist of a quadrangular wall of burnt brick, with a trench running all round. The Northern and Southern sides are 150 fathoms long, and the Eastern and Western 100 fathoms. The wall on the South side has crumbled away and filled up the trench. The height of the walls is 4 fathoms and the thickness of the basement 5 fathoms. At the North-Western angle the wall is higher and even thicker. Here must have been the citadel. In several places the walls project in such a manner as to have enabled the holders of the place to throw missiles at assailants venturing into the trench. There is an entrance into the interior

of this quadrangle from each side; the space enclosed is filled with heaps of bricks and with earthmounds rising above the level of the walls. Outside this enclosure, on the South-Western side, is or was a cemetery, and on the Western and Northern sides the ground within a radius of about 2 miles is covered with "kurgans" or hillocks, which appear to contain the ruins of dwellings of all kinds; now they are overgrown with prickly shrubs. These hillocks in some places run in continuous lines, and the excavations which have been made here by Mr. Lerche, of the Imperial Academy of Science of St. Petersburg, by Mr. Vereschagin, and others, have led to the disclosure of skeleton-houses and a long row of what are believed to have been shops. Large quantities of burnt or glazed bricks of very superior quality have been dug out by the Kirghizes, and some of them have been used by the Russians in the construction of their forts on the Syr-Daria. Many curiosities have been unearthed in this place, such as glass objects, gold and silver coins, earthenware cups and vases, architectural ornaments, some of which, as well as a great number of bricks, were found to have a coating of blue enamel and inscriptions in relief; but from all these no clue has been obtained by which the foundation of Djankend might be attributed to any particular people. A comparison of the relics here found with such as exist in Samarcand, Sogd, and Merv, might perhaps lead to some conclusion. There is a tradition that this place was at one time the residence of certain "Kizil-Bashas" (as the Kirghizes call the Persians), or kings of this country. The last of these, it is said, married the daughter of a neighbouring prince and put her to death because of the impartiality with which she lavished her affections. Her father, who was a conjuror or "canny" man, avenged his dear daughter's death by visiting his selfish and cruel son-in-law's country with serpents, by whom the latter and all his people were very soon duly devoured. The Kirghizes believe that the whole of this place is still infested with that vermin; but, with the exception of one serpent, measuring a yard and a half, which was found killed, none have ever been seen there by the Russians.

#### IV.—"Aryks," or Canals.

The "aryks" (canals) and dikes along the Syr-Daria, as those of the Oxus, are the principal supports of settled life by the river. The level lands on the right and left banks, where the sands of the desert do not extend to the very river, are intersected in all directions by "aryks." These "aryks," when flooded, have always proved to be the greatest impediments in

the way of Russian columns bent on attacking any forts. Their great depth and width render them generally impassable. In any places not inundated by the overflowing of the river there could be no agriculture but for these water-conduits, and in olden times, as already mentioned, it was sufficient to have stopped the supply of water, by damming a water-course, to have converted a fertile oasis into an almost barren desert. At several places along the Syr-Daria there are still traces of entire systems of irrigation now forsaken. It is evident that at these places there must have been in remote ages large settlements and cities, in which everything must have worn an appearance that would contrast strangely with the present aspect of those localities. And this change has doubtless been brought about more through the agency of warring man than by natural causes. Perhaps even if the waters of the Syr-Daria had from the first been allowed to run their natural course instead of diverting them into a variety of artificial channels, it would to this day have pursued its original way into the sea of Aral by the Djany-Daria. If it is a fact that the alteration of the course of the Syr-Daria from Fort Perovski to its mouth is attributable to the upheaval of the soil, it is I think no less admissible that nature has been largely aided by man in controlling the stream. Certainly the great number of dams and irrigation systems, dating speculatively from 150 to 200 years ago and upwards, appear to have been contemporaneous with the diversion of the streams.

About the most remarkable irrigation systems are to be seen between the river at Djulek and the Western extremity of the Karataù, on a level known as the Misheùli-kum Sands. Here is a hollow, called Ak-Aryk, commencing from the banks of the Syr at Ak-Djar settlement in the form of a system of canals now unused. From Sar-Kuduk this hollow becomes a deep ravine, reaching to the Sary-Kul Lake at Djulek. Besides this hollow there is a large canal, called the Tuimen Aryk, which runs parallel with the former as far as the Kara-Murun Hills—the so-called Westernmost ramification of the Karataùs. These systems served at one time for the irrigation of the fields; they now preserve only the traces of their former selves. At some earlier period of this country's history there must, it seems, have been life and animation here, judging by the great number of ruins of forts and structures, besides the three large tombs "Uk-Chata," not far from Djulek. The most considerable forts are those of Tokbura and Sulak-kurgan, half-way between Djulek and Yany-kurgan. There are also the remains of an ancient town on the Syr, at the mouth of the Tuimen-Aryk. Now, all the country

round and about is an arid wilderness. The only spots where there is any water in pits are Kuk-Irein and Sar-Kuduk, with other small springs fed, in all probability, by the accumulating snow-waters in the Taraigyl. Some such occur also along the road from Djulek to Yany-Kurgan.

The range of country between the Western extremity of the Karataù and the salt lakes in the meridian of Fort Perovski, is said to be literally scattered with ruins of ancient settlements. This extent also is now a waterless desert. Even the wells that are there are dry. Twenty miles below Fort No. 1 there is, among other irrigation canals, that of Boidjidé. Captain Meyer, who surveyed this part in 1861, and who had thus an opportunity of judging of the changes to which the country had been subjected, was astonished at the dimensions of this "wonderful achievement of man's hands." It is immense. He followed the canal for 47 miles, and then even did not come to the end of it. At that extent it loses itself in the dunes of the Aral. Its depth was from 2 to 3 fathoms, and breadth from 3 to 5. It is very judiciously laid along the base of an elevation, so that the outlying fields might easily have been irrigated without recourse to artificial means for raising the water. The water of the Syr now reaches only 5 miles into this "Aryk," beyond that the hollow is choked up with sand for two-thirds of a mile. From a comparison of the bricks in the ruins of the ancient town of Djankend—7 miles from the mouth of this canal—with those in the ancient tomb of Big-min-aka, this monument of bygone days must have belonged to the period of the existence of Djankend.

#### V.—*Climate, Soil, Animals, and Natural Products.*

To within almost the meridian of Tashkend only a very narrow margin along the Syr-Daria is capable of being cultivated. The steppe on both sides of the river from there becomes more and more barren and saline towards the West. The best spots are North of the Arys, by the Arystandy rivulet between the Chilik and Turkistan, and South of the Arys from the Turlan pass across the Karataù mountains, leading from Turkistan to Cholak. South of the Arys the soil of the Steppe at the foot of the mountains is all over the same; it produces the same kind of vegetation for a great distance, and this consists of a variety of herbs growing densely, of the "Alhagi Camelorum" and other kinds. There is no brushwood. Under cultivation, the productiveness of the Steppe varies according to the local conditions of irrigation.

As to the fertility of the valley generally of the Syr-Daria, the statistics given by a Russian agricultural priest residing at Fort Perovski, on the harvests gathered on the alluvial plains bordering the river all along its course, are very startling. Even so low down as at Fort Perovski wheat is said by him to yield 70 fold, barley 100, millet 500, "and these," adds the same local authority, "are only moderate figures." Later and *reliable* authorities, have however stated the general crops raised by the Syr-Daria to vary from 2, 3, and 6 fold. Here is a wide discrepancy.

In places more distantly situated from the river, but still geographically within its valley—such, for instance, as the neighbourhood of Turkistan—the soil is not so good. The crops along the river are not unfrequently devoured by the scourges of Steppes, the locusts, and destroyed by the overflowing of the Syr. In such cases a second harvest of barley or millet is said by some to be sown, and gathered in October. There are here and there small plantations of cotton and madder. The Northern limit of the cotton plant is at Mankend, near Chemkend, although it has been made to grow still farther North, at Almaty or Vernoe, and even at Guriëf at the mouth of the River Ural.

As an industry, the rearing of silk-worms is pursued only at Khodjend and Namangan, along all the Southern tributaries of the Syr and at Margilan. These are the three centres of this industry, besides Kokand, so that it is limited to the Ferganah valley. The mulberry-tree grows at all the settlements along the Chirchik, but in the province of Turkistan the silk-worm is reared only at Tashkend as an experiment.

Rhubarb, liquorice-root, wild chicory, and madder, with other roots from which dyes are extracted, are found on the Syr. Mr. Severtsof has discovered "Asafœtida," and many varieties of flax and hemp, with very firm staple. The fleece is soft and silky.

The beehive has not yet been introduced on the Syr-Daria, but it is a question whether this industrious insect might not be acclimatised on its banks and made to suck honey from the scented flower of the Djida between Djulek and Fort Perovski.

The river is well stocked with fish, such as the sturgeon, silurus, carp, chub, miller's thumb, "sandre," bream, pike, perch, and a species of herring.

*The animal kingdom* along the Syr-Daria is represented by the striped tiger, which Humboldt says is of the same species as that of Bengal, and the wild boar. In the adjacent Steppes are the wolf, fox, and hare, and farther to the East the "kulan."

(a wild horse). Around Fort Perovski there are the "Saigak," antelope, and—burrowing in saliferous districts—the Siberian marmot and the jerboa.

The feathered tribe is represented by the pheasant and the migratory swan, goose, duck, crane, heron, pelican, cormorant, sea swallow (tern), snipe, starling, and lark. The birds of prey are the common eagle, gerfalcon, &c. Among the reptiles and insects are scorpions, tarantulæ and phalangi, and during the summer, swarms of locusts, gadflies, gnats, and thrips. The locusts are providentially followed by flights of small birds, natives of Bokhara, who feed on them.

The summer heats in the valley of the Syr-Daria reach to 35° and 40° Reaumur, and in winter the thermometer rarely stands so low as at 10° Reaumur. Snow lies on the ground three months in the year, so that relatively to European countries of the same latitude the winter in these parts is severe; all the rivers freeze, excepting the "Kara-Su," and snowstorms are of frequent occurrence.

The strong exhalations from the river banks are unhealthy, and would be very injurious but for the constant aerial currents which save the people from fevers. The summer heats are particularly fatal to camels, although they first show symptoms of distemper when the temperature begins to cool. About that time, *i.e.* in August, the cattle are generally stricken with the plague.

The prevailing winds are those from the northern points of the compass.

The banks of the Syr-Daria are peopled by wandering Kirghizes. A settled population is found only in the towns situated along the highways of traffic, *i.e.* in that portion of the valley of the Syr-Daria where Tashkend is the nucleus of industries. It is true there are some aùls of "Iginitches" or cultivators of the soil, who eke out an existence through their labours in the fields as low down as Djulek, but they are not numerous, as the only lands that yield a return for the energies expended upon them are the narrow strips immediately by the margin of rivers. Below Djulek the Syr-Daria is singularly bare of population. The Kirghizes who roam over the country between the Syr-Daria and the Southern slopes of the Karataù mountains belong to the middle horde. But there is another tribe, that of the Kungrad Kirghizes, who nomadise here; these are the best to do, having more comfortable "yurts" and larger herds of cattle than the others.

The strength of the Aral Flotilla in 1866 was as follows:—

|                       | Numbering. | Guns. | H.-power. | Tons. |
|-----------------------|------------|-------|-----------|-------|
| Steamers .. .. .      | 3          | 8     | 100       | 359   |
| Steam cutter .. .. .  | 1          | 2     | 12        | 16    |
| Floating dock .. .. . | 1          | 0     | 4         | 172   |
|                       | —          | —     | —         | —     |
|                       | 5          | 10    | 116       | 547   |

besides a number of barges, boats, &c. The steamers are from 12 to 40 horse-power each, but as they were built for these waters before the Russians were acquainted with the character of the Syr-Daria, they are found not powerful enough to contend with the current, and they draw too much water for its navigation. A new steamer and three iron barges, each capable of carrying a cargo of 150 tons and drawing only 2 feet, were in the same year placed on those waters, and one more steamer was last year being constructed in England for service there. Another boat was also purchased for the Syr-Daria of 70-horse power, 150 feet long, which is calculated to make  $11\frac{1}{2}$  miles per hour up stream, and to tow barges laden with 150 tons of cargo at the rate of  $3\frac{1}{2}$  miles an hour. The greatest difficulty, that of the shallows of the Djaman Daria, the Russians will endeavour to overcome by the employment of these flat-bottomed boats. One more difficulty, that of the scarcity of fuel along the river, still exists. Admiral Boutakof says that the 'Saxaül' will shortly be all exhausted, and that even while it lasts steamers cannot take in a sufficient supply of it for any long passage, because the crooked and heavy logs of that stunted tree occupy too much space in the hull of a boat. It is reported that layers of coal have been discovered in the slopes of the Karataü, on the Great Bugun River, within 60 miles of Chemkend, in the vicinity of Chulak, near Turkistan. These Colonel Tatarinof has been engaged in working. But the great, almost insuperable, difficulty of conveying coal to the river, even if it should be found to exist in these mountains in sufficient quantities and of a serviceable quality, is a great drawback to navigation on the Syr-Daria; this difficulty is owing to the absence of forests, and without timber no coal found at a distance in the mountains could be made available.\*

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\* Coal has been recently discovered in the mountains near Khodjend, and is said to be supplied in sufficient quantities to supersede the use of any other fuel in that town.



## APPENDIX.

LIST of ASTRONOMICAL POINTS along the JAXARTES, from FORT PEROVSKI to BAILYR-TUGAL Determined by ADMIRAL BOUTAKOF.

| NAMES OF PLACES.                                                                | Latitudes. |    |    | Longitude from Greenwich. |    |    | Deviation and Inclination of the Magnetic Needle. |     |    |    |
|---------------------------------------------------------------------------------|------------|----|----|---------------------------|----|----|---------------------------------------------------|-----|----|----|
|                                                                                 | °          | '  | "  | °                         | '  | "  | °                                                 | '   | °  | '  |
| Fort Perovski .. .. .                                                           | 44         | 50 | 36 | 65                        | 27 | 24 | 6                                                 | 13  | 61 | 34 |
| Fort Djulek .. .. .                                                             | 44         | 16 | 53 | 66                        | 23 | 3  | 5                                                 | 47  | 61 | 5  |
| Ak-Cheganak .. .. .                                                             | 43         | 57 | 14 | 66                        | 51 | 33 | 4                                                 | 19  | 60 | 45 |
| Ruins of Din-Kurgan .. ..                                                       | 43         | 51 | 59 | 67                        | 10 | 44 | 4                                                 | 29  | 61 | 0  |
| Ferry at Utch Kayuk, oppo-<br>site to ruins of a Kokan-<br>dian Fort .. .. .    | 43         | 14 | 12 | 67                        | 47 | 14 | 4                                                 | 13½ | 60 | 50 |
| Djessyn - Kurgan, on the<br>Arys, 11½ versts from the<br>ruins of Otrar .. .. . | 42         | 45 | 56 | 68                        | 15 | 10 | ..                                                | ..  | .. | .. |
| Sazan-Tugai .. .. .                                                             | 42         | 26 | 22 | 68                        | 12 | 12 | ..                                                | ..  | .. | .. |
| Bailyr-Tugai .. .. .                                                            | 42         | 1  | 40 | 68                        | 8  | 17 | ..                                                | ..  | .. | .. |

TABLE OF CORRESPONDING LOCALITIES, ON BOTH BANKS, FROM FORT PEROVSKI UPWARDS TO BAILYR-TUGAL.

[Places marked \* are astronomical points determined by Admiral Alexis Butakof in 1863.]

*Left Bank (South).*

Kara-Kuj.

Torp-tinbek locality.  
Kel-tup locality.

Ken locality.  
Kermek-Sada locality.  
Boldakty locality.  
Kanymchik Island.  
Hodjon locality.

Djaly locality.  
Anyapamin locality.  
Turaugita tomb.

Kara-gul locality.

*Right Bank (North).*

Fort Perovski,\*  
Sabalak locality.

*Former Birubaef post.*

*Ruins of Mama-Seyt fort.*  
Kanda-Aral locality.  
Kum-Suat locality.\*

Kara-Elza locality.

Sandy mounds. Kuidji locality.

Sarakty locality.

Saxaül.

*Sary-Cheganak.*  
Kal-Murun.  
Maili-Kum.  
Sun Karly.

| <i>Left Bank (South).</i>                                                          |                                                             | <i>Right Bank (North).</i>                                                                     |
|------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|                                                                                    | Fine meadows<br>on both banks.                              | <i>Ak-Djur.</i><br><i>Tar-tugai.</i><br><i>Kuk-Cheganak.</i>                                   |
| Bukhtuhú.<br>Bushagau.<br>Adidarty.                                                | Fine meadows<br>on both banks.                              | Karabatyr.<br>Burtata port.<br>Kara Murun Mountains.                                           |
| Ak Djippé.<br>Kolgan-Syr.                                                          | Fine meadows<br>outside sandy<br>mounds to Ak-<br>Cheganak. | <i>Fort Djulek*</i><br><i>Kaüstyn-Kum sands.</i><br>Kaüz-Tugai.<br><br><i>Tarpi-Kum sands.</i> |
| Koz-Celgi.<br>Kosh-Belgi tomb.<br>Tokyr-Kum.<br>Bokü-Ata tomb.<br>Bekpesyk sands.  | Saxaül.                                                     | <i>Mesheuli.</i><br><i>Djanama.</i><br>Baba-Seyt.<br>Ditto, tomb.                              |
| Turangil sands.<br>Bil-Turangil ditto.<br>Kargaly Lake.<br>Kiik-Kurgan.            | Sand-mounds.                                                | <i>Yu Lake Ak-kul.</i>                                                                         |
| Ak-Cheganak.*<br>Bish-Kazak.                                                       | Saxaül.                                                     | <i>Bish-Ala Lake.</i><br>Miuz tomb.<br>Bish-Data.                                              |
| <i>Fort Balapau.*</i>                                                              | Saxaül.                                                     | Katy Kizik.<br><i>Tyumeu-Aryk.</i>                                                             |
| <i>Left Bank (South).</i>                                                          | Meadows.                                                    | Almaly-Tugai.<br>Burkul Lake.<br>Vraly-Tugai.                                                  |
| Kuyuk locality.<br>Karai.                                                          | Course of river.                                            | <i>Right Bank (North).</i><br><br><i>Ruins of Yang-Kurgan.</i><br>*Ditto Din-Kurgan.           |
| <i>Kuk-Djida.</i><br>Kokais tomb.                                                  |                                                             | Djindjai tomb.<br>Kaigak.<br>Djalangatch.<br>Kuk-tol Lake.<br>Kargaly-Tugai.                   |
| Bish-Turanga.<br>Apanych-Tugai.                                                    |                                                             | Miyami.                                                                                        |
| Djinam-Mula tomb.<br>Chermaükty.                                                   |                                                             | Kaükty.                                                                                        |
| Kuilaka.<br>Kuilaka-Ata tomb.<br>Kizi-Utkun.<br><i>Ak-djar.</i><br>Tiura-Kul tomb. | Sand-mounds.<br>Meadow.                                     | Kamyn Mula tomb.<br>Arayat.                                                                    |
| Tugusken (off the river.)<br><i>Former Fort Ak-kala.</i><br><i>Ditto—Djadygyr.</i> |                                                             | Apraim Kul Lake.<br>Kyzyl-Ata mound.                                                           |
| Sauza.<br>Myrza Tugai.                                                             | Meadow.                                                     | Kyzyl-Bair.<br>Ak-Tash Mula tomb.                                                              |
| Myrza-Kul Lake.<br>Kazak-Bai.                                                      |                                                             |                                                                                                |

*Left Bank (South).*

Keliu-Tiuba mound.  
Abyz-tiuba.  
Abyz-Mullah town. ;

## Kair-tup.

Tuz-Baie mosque.  
Kurgau-kul lake.  
*Aldami-Tugai.*  
Bazdata (Tinra Tam) mosque.

Arpa-Suip Kun.  
Kugol-tup.  
Yaman-kul Lake.  
*Ak-kum.*

## Ak-kul-Tugai.

Djaman-Tugai.  
Alagul-Tugai.  
Balta-Tugai.

## Kara-Chokul-Tugai.

*Sagindyk-Tugai.*

Isen-Tugai.  
Maya-kum mound.

Bayalytch-Tugai.  
Suyaiu-Tugai.  
Chingildy.  
Sengildy-Tuga.  
Kukchu-Tugai.

## Kukcha-Tugai.

## Kuk-Sarai.

Baijan-Tugai.  
Baiten.  
*Sayau-Tynhya* Mound.  
Sazau-Tuga\*.  
Saza-Tuga.

Uzun-Aral-Tugai.  
Ruins, Iskillé.

## Jungle.

Jungle on both  
banks.  
Jungle.

## Jungle.

## Jungle.

Meadows and  
jungle.

Sand-mounds.

Meadows with  
jungle.

Salines.

## Jungle.

*Right Bank (North).*

Djanam-Kul.  
Sarabai-Tugai.  
Imbech-Alta tomb.  
Imbech-Kul.  
\*Savrun ruins.

## Sary-Kamys.

Ak-Yar.  
Syrgau-Tugai.  
\*Turkestan.  
Kyr-Krank.  
Kuplin-tup.  
Kulak tungai.  
Beglik-Aral Island.  
Utch Kaik Fort.\*

Ili Bai tomb.  
Dim-Uzak.  
Sary-Chungul Tugai.

Yalan-tuz.  
Dji-Chalarsty.  
Chayatom-Kinu.  
Utch-Kaik.  
Kuchan Asar-Kul Lake.  
Kanly.  
Kara Sengir.

Kuk-Cheganak.  
Ruins.\*

Djesin-Kurgau.\*

Sheity-taù.

Kuk-Cheganak.  
Arkundy-Tugai.

## Urunduk-Tugai.

Djingaldy-Mulah mosque.

Baigaska-Kul Lake.  
Sasyk - Mulah (Aulié) mosque.

Kuk-Karkara.  
Karka-Tugai.  
Munchakty.  
*Sasyk-kul-Tugai.*

Ferry.  
Bagai.

*Left Bank (South).*

*Kuk-Turangil Tugai.*  
*Ak Suat Tugai.*

Beir-Kurgan Fort.  
 Suat-Tugai.

Baildyr-Tugai.

## Pasturage.

*Right Bank (North).*

Buzaga-Tugai.  
 Yanama-Tugai.  
 Kizyl-Djangil.  
 Kara Sengü-Tugai.

## Pasturage.

Randy-Tugai.  
 Latitude 42° of Greenwich.

Longitudes 66° 30' and 68° 51' (about) embrace Fort Perovski and Baildyr-Tugai.  
 Longitude of Perovski about 45° of Greenwich.



## I N D E X

TO

## VOLUME THE THIRTY-EIGHTH.

- Abai, or Blue Nile, 9.  
 Abou Szoueyra, well of, 238.  
 Abuya-meder, 40.  
 ——— Mountains, 41.  
 Abyssinia, Portuguese Expedition to, in  
 the 15th, 16th, and 17th centuries, 1.  
 ———, plateau of, 19.  
 ———, sea-coast of, 48.  
 ———, scientific observations in, 49.  
 ———, trigonometrical survey of  
 the highlands of, 48.  
 Abyssinian Expedition—  
 Geographical results of, 12.  
 Scientific results of, 49.  
 Adabagi, 30.  
 Adigerat, 28.  
 Adulis, 13.  
 Aficho, 46.  
 Aghin, 314.  
 Aguayunca, 418.  
 Aguila Point, 86.  
 Agula, 31, 34.  
 Aillik, Hudson Bay Company's settle-  
 ment, 271, 275.  
 Ain Huthera, 251.  
 Ajoozee, 313.  
 Ak Shehrabad, the "Kizzikee," 302.  
 ———, Roman milestone at, 302.  
 Ak Su, the, 323.  
 Akula-Guzay, 21.  
 Alashar Ova, 292.  
 Alaska, Mr. Whympers' journey to,  
 219.  
 Albany Pass (Coal Bay), temperature  
 at, 389.  
 Aliaska Peninsula, 220.  
 Ali Gako, 318.  
 Aloojeria Kuzaa, 292.  
 Amalekite ruins, 243.  
 Amba Adana, 21.  
 ——— Alagi, 37.  
 ——— Aradon, 32.  
 ——— Ferrah, 37.  
 ——— Tsion, 30.  
 ——— Zanet, 6.  
 Ambala-sieda, 45.  
 American Isthmus, 69, 73.  
 Amrood Village, 358.  
 Anderee Hill, 315.  
 Andreavski, 234.  
 Annesley Bay, 12, 14.  
 Anric, 234.  
 Antálo, 25, 32, 35.  
 ———, plain of, 35.  
 ——— to Magdala, climate of region  
 between, 47; magnetic courses and  
 distances between, 36.  
 "Aphoon Mouth," 235.  
 Apulima River, 418.  
 Apurimac, the, 414.  
 ———, meteorological observations  
 on, 426.  
 Arabi-Teleeki, 22.  
 Arabkir, 310.  
 ——— the Kuzzaa, 310.  
 Arafah, 14.  
 Aral flotilla, the, 455.  
 Ardose Village, 332.  
 Ardooshli Pass, 281.  
 Argutti, 29.  
 Armenia, 281.  
 Arogyè, 46.  
 Arquia, 95.  
 ——— River, 76.  
 Arraga, 308.  
 ———, Armenian Zialet near, 309.  
 Arys, mouth of, 437.  
 Arzoonik Village, 321.  
 Ashangi Lake, 38.  
 Ashkr Ova Plain, 298.  
 Asmara, 11.  
 Asparawek, 284.  
 Assab Dagh, the, 297.  
 Atala, 35.  
 Athabasca Pass, 127.  
 Atrato River, 72, 86.  
 Atsbi, 15, 34.  
 Àùliétá, 433.  
 Australia, Eastern, 374.  
 ———, main mountain-ranges, 406.  
 ———, monsoons, 380.  
 ———, physical geography and cli-  
 mate of, 377 *et seq.*  
 Avoosan Tarler valley, 336.

- Avzoonik Village, 342.  
 Ayba Valley, 37.  
 Ayoun Mûsa, 238.  
 Azebo Gallas, the, 38.
- Bäbuk, 161.  
 ———, Nirbisi plant at, 160.  
 Baccalao or Puffin Point, 270.  
 Baidyr Tangai, 435.  
 Bakchajo Village, 315.  
 Bakhtiari Range, 412.  
 Balakoo Su, the, 287.  
 Baleeshur, 342.  
 ———, Roman road near, 342.  
 Bapsee Village, 305.  
 ——— Gedukee Mountain, 305.  
 Baraka, 25.  
 Barrier-reef of Australia, 376.  
 ———, inner route of, 376.  
 Barkhá Village, 163.  
 Barutguddy, 17.  
 Bash Koi Mountain, 284.  
 Battle Harbour, 263.  
 Bebetran, 412.  
 Bella Coola, 122.  
 Belleisle, Straits of, 262.  
 Bentinck Arm trail, 123.  
 ———, Lieutenant Palmer's report  
 on, 123.  
 Bering Sea, 219.  
 Ber-Kazan River, 444.  
 Beshilo River, 35.  
 ———, ravine of the, 44, 46.  
 Bezoot, 317, 324.  
 Bickmore, Albert S., Journey from  
 Canton to Hankow, 50.  
 Bisan, 11.  
 Blue Nile, the, 35.  
 Boasnam Rock, 113.  
 Bogharzor Pass, the, 336.  
 Bogos, 35.  
 Bogota, 74.  
 Boocah, 14.  
 Brachiopoda, fossil, 62.  
 Brahmaputra River, 133, 141; memo-  
 randum on, 211.  
 British Columbia, agricultural resources  
 of, 126.  
 ———, geography and moun-  
 tain passes of, 118.  
 ———, overland route by,  
 128.  
 British India, 129.  
 Bruce in Abyssinia, 12.  
 Bu Kurr Baba Range, 338.  
 Burketon, 371.  
 Bushire and Teheran, elevation of the  
 country between, 411.  
 Bute Inlet, 122.  
 Buya, 33.  
 Byron's Bay, 267.
- Caiman, 78.  
 ——— Point, 86.  
 Cana, 92.  
 Cangrao, 416.  
 Cannuckthowatooktuock Inlet, 271.  
 Canton, 50 *et seq.*  
 ——— to Hankow, proposed railway  
 routes, 67.  
 Cape Francis, 280.  
 ——— Grafton, 374.  
 ——— Harrison, 267.  
 ——— York Peninsula, 370; climate,  
 410; monsoons, 391; temperature,  
 395.  
 Carhuaran, village of, 416.  
 Cariboo, 119, 126.  
 Carpentaria, Gulf of, 370, 375.  
 Carribbees, Cunas, territory of the, 94.  
 Carthagens, 73.  
 Cascade Range, 119, 121.  
 Cassia River, 60.  
 Cataracts, the, 112, 118.  
 Celestial Mountains, 434.  
 Chacas, mineral establishment, 415.  
 Chachu Sangpo River, 212.  
 Chagwen ravine, 292.  
 ——— Su, the, 292.  
 Chaksamchori chain-bridge, 215.  
 Chalghan Village, 291.  
 Chamoorlee Village, 324.  
 Charta Sangpo River, 212.  
 Château Bay, 261.  
 Chelicut, 32.  
 Chimkend, 433.  
 Cheyrmeemshuk Village, 303.  
 Chibuquiro, 423.  
 Chibisa, 111, 118.  
 Chigneysu, the, 313.  
 Chimmo, Commander W., visit to the  
 north-east coast of Labrador, 258.  
 China, 50, 60, 64, 67, 68.  
 Chinsamba, village of, 115.  
 Chit Kuzzaa, the, 304.  
 Choco, 107.  
 Chore, 118.  
 Chucunnaque River, 70, 81, 92.  
 Chu-Najo River, 212.  
 Chûng-Chû, 159.  
 Chusul, 136, 213.  
 "Cocks' Comb Rock," 52, 55.  
 Codazzi, M. Augustin, map of Darien,  
 109.  
 Coltog, 226.  
 Columbia River, 120.  
 Columbian Canal International Com-  
 pany, 73.  
 Conception Bay, 280.  
 Congo River, 73.  
 Coral Sea, the, 382.  
 Cordillera, the, 70, 84.  
 C. vilham, Pedro de, 2.  
 Co-Youkons, the, 227.

- Co-Younk River, 229.  
 Culluchaca, mineral establishment, 415.  
 Cuna language, 100 *et seq.*  
 Cunas, the, 96 *et seq.*  
 Cuque, 95.  
 Cuti, 95.  
 Cut-throat men, 270.  
 ———— Passage to Webeck, 267.
- Dafat Mountains, 40.  
 Dahab, 250; traces of smelting furnaces near, 246.  
 Dalanta, basaltic wall of, 47.  
 ———— plateau, 43, 44.  
 Dall, Mr., geological observations in the Youkon country, 236.  
 Dankali country, 11.  
 Darchan, 138, 153, 177.  
 Darien, Isthmus of, 69; climate and soil, 86; inhabitants, 90; proposed line of canalization, 72; religion, 94; scientific explorations on, 69; vegetation, 88.  
 ————, supplementary note on, 105.  
 Darien, South, map of, 108; note on, 109.  
 Dashtiarjun, valley of, 412.  
 Debang Monastery, 168, 169.  
 Debaroa, 3, 5, 11.  
 Debra Damo, amba of, 27.  
 Dehra, 131.  
 Deir Metina, convent of, 361.  
 Demálang, 135, 166.  
 Denizlee, 315.  
 De Puydt, M. Lucien, Scientific Explorations in the Isthmus of Darien, 69.  
 Deyrik, olive groves of, 355.  
 Deyrsim, the, 316, 332.  
 ————, Dagh, 281.  
 ————, rock thrown up by the volcanic Takhtik near, 343.  
 Diarbekr, 346, 353.  
 ————, Kazook Teppa, mound of, at, 357.  
 ———— Plain, 360.  
 Digarcha, 164.  
 Dihong River, 219.  
 Dildi, 41.  
 Djaman-Daria River, 441.  
 Djankend, ruins of, 449.  
 Djany-Daria River, 439.  
 ————, Capt. Meyer's observations on, 440.  
 Djizak, 432.  
 Djulek, 438.  
 Doba, 38.  
 Doman Kai Rock, 297.  
 Dom Cristofero da Gama, 5, 6.  
 Domino Harbour, 279.  
 Dongpu, 179.  
 Dongolo, 31.  
 Dolo, 32.  
 Dras River, 216.
- Eggin to Maaden and Kharput, road from, 313.  
 Elburz, 412.  
 Eleej, Armenian village, 306.  
 El Hesse Wells, 239.  
 El Huther, 252.  
 El Múrka Plain, 239.  
 Enderres River, 297.  
 Erzerum, 281; high road to, 331.  
 Erzingan, 333; mountain-road to, 333.  
 ———— and Kamach, road from, to Tchimischgezek, Arabkir, and Malatia, 330.  
 Eski Aghin, 313.  
 ———— Shehr, 301, 312.
- Fála plateau, 46.  
 Father Alvarez, narrative of, 4.  
 Ferghanah Valley, or Valley of the Jaxartes, 432.  
 Ferrah-Ambah, 37.  
 Focada Mountain, 27.  
 Forest Pass, the, 54.  
 Fort Perovski, 438.  
 ———— Youkon, 232.  
 Fox Harbour, 262.  
 Francisco Paez, 8.  
 Fraser River, 124, 126.  
 Fremona, 7, 8.  
 Funduklee Bel River, 291.  
 Funk Island, 291.
- Gala Mountain, 161.  
 Ganges River, 218.  
 Gannet, H.M.S., voyage to the N.E. Coast of Labrador, 258.  
 Gartokh, 130, 139, 141.  
 ———— to Lhasa, halting-places between, 207; marches between, 208.  
 "Geyrmoloo," 289.  
 Gemeen Bel Mountain, 303.  
 Genfel Valley, 31.  
 Geni Roi, 281.  
 Geronimo Lobo, Father, 10.  
 Ghubbet Dacnoo, 13.  
 Giaour Dagh, the, 289.  
 "——— Yazi Su," the, 314.  
 Goldan Monastery, 169.  
 Gomika Brook, 284.  
 Gonzobo, 22.  
 Goona-Goona Village, 26.  
 Goonda-goonda Peak, 29.  
 Gorgora, 9.  
 Greedy Anchorage, 265, 277.  
 Great Tibetan road, 203.

- Greek Convent Maryama, 296.  
 Gulabaghdee Village, 284.  
 Gula Mukado, 21.  
 Gullaba, plain of, 26.  
 Gumkhoy Village, 309.  
 Gyangze, 145, 165.
- Hadas River, 16.  
 Haffaree, 358.  
 Haik-hallat, 32.  
 Halvoree Bank, 334.  
 ——— Village, 340.  
 Hamas George, 24.  
 Hangchau, 64.  
 Hankow, 50, 56, 66.  
 ———, geological formation at, 66.  
 Haramât, plain of, 30.  
 Harat Range, 27.  
 Harzem, 358.  
 Hawaii, kingdom of, 361.  
 Hawâkil Bay, 12, 14.  
 Hazeroth, 251, 257.  
 Herbert Island, 276.  
 Himalayan chain, 138.  
 ——— lakes, 152.  
 ——— range, 138.  
 Hingan, 61, 62.  
 Hingping, limestone stratum at, 55.  
 Holland, Rev. F. W., on the Peninsula of Sinai, 237.  
 Homatheo River, 124.  
 Honolulu, Bishop of, on Geography and Volcanic Eruption of the Sandwich Islands, 362.  
 ———, climate and productions of, 363.  
 Hopedale, Moravian Mission at, 272 *et seq.*  
 ———, the Esquimaux at, 273.  
 ——— Harbour, 275.  
 Howse Pass, 122.  
 Hualalal, 367.  
 Huanta, 415.  
 ——— Mountains, 413: the Campos Savages of, 423.  
 ——— River, savages of, under Subiri, 428.  
 Huarpa River, 414.  
 Huayapo Rivulet, 424.  
 Hudson Bay Company, 232.  
 Hunan, 62, 63, 68.
- Icy Tickle, 277.  
 Igtigalik, 225.  
 Inderes or Anderes, 300.  
 Indian Harbour, 266, 269.  
 ——— Ocean, monsoons in, 381.  
 ——— Tickle, 278  
 Indus River, course of, 216; bridges over, 217.
- Injeyrge Village, Armenian Church at, 322.  
 ——— Valley, 322.  
 Iscuchaca district, 414.  
 Isfahan, 412.  
 Islamgywè Saddle, wells on, 46.  
 Issyk-Kul Lake, 430.
- Jaaferee Dagh, the, 332.  
 Janglache, 134, 146, 163, 216.  
 Jaxartes, or Syr-Daria, River, 429, 434; Admiral Boutakof's survey of, 435; astronomical points along, 456; corresponding localities on both banks, 456 *et seq.*  
 Jebel Eth Thebt, 245.  
 ——— Hadëed, 243.  
 ——— Hummâm Faroun, 238.  
 ——— Katherine, 243.  
 ——— Mûsa, 238 *et seq.*; convent life at, 241; region round, 242.  
 ——— Odgme, 252.  
 ——— Serbal, 247, 254.  
 ——— Um Alowee, "the Mother of Heights," 246, 256.  
 ——— Um Shaumer, 242.  
 Jesus Maria River, 419.  
 Jinnia, 281.  
 Jitta River, 43.  
 Jong-lam, 146.  
 Jurjub Harb, 350 *note.*
- Kalkyt, 286.  
 ——— Su, the, 290, 297.  
 Karlan Kiz Village, 286.  
 Kamach, 330.  
 Kandeel Tash, the, 339.  
 Kau, 369.  
 Kausi, Valley of Hanapepe, 366.  
 Kara Baba Dagh, the, 310.  
 Khara Chore and Char Sanjak Plains, river traversing, 341.  
 Kara Hissar, 292 *et seq.*  
 Kara Su, the, 283, 991, 297; branch of the Euphrates, 307, 315, 330.  
 Kara-Uziak River, 441.  
 Karra Derreh, 305.  
 Karraga, 306.  
 Kashan, plain of, 413.  
 Kathmandû, 131, 144; Col. Crawford's trigonometrical survey of, 142.  
 Kauai, 361, 366.  
 Kazan Kaia, mountain-chain, 295.  
 Kazerûn Valley, 411.  
 Kelley Village, 335.  
 Kerintee, 291.  
 Kesheesh Dagh, the, 283.  
 Kesme, Su, ravine and brook, 308.  
 Khaboar River, sources of, 348; tributary springs of Ain el Hassan and Ain el Beydah, 349.



- Kham** or **Nyahrong**, 173.  
**Khamba la Pass**, 151.  
**Khambalá Mountain**, 166.  
**Kharput**, 345, 346 *note*.  
**Khodjend**, 432.  
**Khozat**, 323, 341.  
**Khurs-Abur ridge**, 23.  
**Kiaquor**, 3.  
**Kilauea, volcano of**, 368.  
**Kumaon**, 130.  
**Kinpri Bash**, 293.  
**Kirong**, 133, 159.  
**Kiyang**, 63.  
**"Kizilbash," the**, 284 and *note*; their care for the dead, 303; religion and habits, 318.  
**Kizzil Dagh**, 303.  
     — **Irmak, valley of the**, 301.  
**Koch Hossar**, 317.  
**Komayli**, 17, 19.  
**Konak**, 303.  
**Konartukte**, 411.  
**Kongone**, 118.  
**"Koozilvac" Mouth**, 235.  
**Koree and Horee Mounds**, 347.  
**Kotch à Kutchin tribe, the**, 232.  
**Kotal Dokhter Pass**, 412.  
     — **Pir-i-zan Pass**, 412.  
**Kurdistan**, 281.  
**Kirmizak, ruins**, 321.  
**Kuroo Chai Valley**, 305.  
**Kuvan-Daria River**, 441.  
**Kuzzaa, the**, 310.  
**Kwangsi**, 56; inhabitants, 56, 57; province of, 62, 68.  
**Kweikong River**, 52, 58, 61; trade in salt, 53.  
**Kweilin**, 55.
- Labrador, North-east Coast of**, 258.  
**Lahama**, 369.  
**Lama Gûrâ, Chief of all Tibet**, 168, 172.  
**Lapthal Camp**, 178.  
**Lara River**, 70.  
**Lât Valley**, 40.  
**Lhasa**, 130, 141, 167; customs, 169; manufactures, 172; monasteries, 169; New Year, 170; religion, 173; temperature, 198 *et seq.*; thermometer observations, 152; weather, 204.  
     — **River**, 211.  
     — **to Shigátze**, 176.  
**Likche to Chushul, tributaries of the Brahmaputra between**, 214.  
**Ling-sun**, 59.  
**Liverpool to Japan, time-table of**, 362.  
**Livingstone, Dr., Report of Search Expedition for**, 111.  
**Loangwa, the**, 117.  
**Loh territory**, 165.
- Lucien de Paydt, M., Scientific Exploration in the Isthmus of Darien**, 69.  
**Ludolf's 'Ethiopia,' 9.**  
**Lycus River**, 283, 291, 297.
- Mágdala**, 45 *et seq.*  
     —, topography of, 35.  
**Mai Mena**, 24.  
     — **Wahiz, source of**, 29.  
**Maiyen**, 18.  
**Makata**, 114, 117.  
**Makhan, Vale of**, 38.  
**Makololo, the**, 111.  
**Mali, the**, 80.  
**Mamakhatoon**, 281; tomb at, 282, and *note*.  
**Mamelukes and Kaveaks in Russian America**, 223.  
**Mansarowar**, 130, 138, 141.  
     — **Lake**, 211.  
**Manse Village**, 283.  
**Mantaro, the**, 413, 427.  
     —, junction of with the Apurimac, 42.  
     —, meteorological observations on, 429.  
     — and **Apurimac Rivers, in the Huanta Mountains**, 413.  
**Mao-mi**, 165.  
**Maponda**, 112, 117.  
**Marble Wells, the**, 50.  
**Marden**, 347.  
**Marib River**, 25.  
**Marenga**, 111, 115.  
**Maribam-la Pass**, 146.  
**Markham, Mr. C. R., on the Portuguese expeditions to Abyssinia**, 1 *et seq.*  
     —, on the Geographical Results of the Abyssinian expedition, 12 *et seq.*  
**Masius, Mount**, 347.  
**Massowa**, 3, 8.  
**Maui, crater at**, 366.  
**Mauna Loa, or the Great Mountain**, 367.  
     —, pit crater of **Kilauea**, 367.  
**Mazگرد Village**, 343.  
**Medangpodo**, 131.  
**Melato**, 226, 234.  
**Melozecargut River**, 230.  
**Merjan Boghaz, or Pass**, 334.  
     — **Su, the**, 335.  
**Merkho Hamlet**, 337.  
**Mesopotamia Plain**, 360.  
     —, **Upper**, 231.  
**Metina Mountain**, 356.  
**Meyrgek Valley, in the Peyrtek Kuzzaa**, 342.  
**Mezoor Dagh, the**, 332, 335.  
     — **Peaks**, 305.  
     — **River**, 326 and *note*; "**Baba Mezoor**," 329.

- Miautse, the, 59.  
 Michell, Mr. R., on the Jaxartes or Syr-Daria, 429.  
 "Mission," the, on the Lower Youkon, 224.  
 Mizitsu, the, 112.  
 Mohammed Gragn, 5.  
 Mokad nebi Mûsa, seat of the Prophet Moses, 253.  
 Moukden, 64.  
 Monterico, farm of, 419.  
 Montgomerie, Captain, Report of a Route Survey from Nepal to Lhasa, 129 *et seq.*  
 Moola Koi Torrent, 357.  
 Morien, or Cow Bay, 259.  
 Mount Palmer, 125.  
 Mudhullo Torrent, 18.  
 Muktináth, 132.  
 Mulkutto, 12, 14.  
 Mutsellim Batran Mountain, 293.  
 Mumeea, ruins of, 290.  
 Munzinger, M., labours of, in Abyssinia, 34.  
 Murad Su, the, 315, 317 *note*.  
 Muzo, mines of, 97.  
  
 Narichu (Brahmaputra) River, 134.  
 Nari Khorsum, 205.  
 Naryn and Gulishan rivers, 435.  
 Negûs David, the, 4.  
 Nebhaguddy Torrent, 17.  
 Nepal, 129 *et seq.*; observations for latitude, 180 *et seq.*; of the boiling point, 190.  
 — to Lhasa, route-survey, 129; results of the expedition, 141 *et seq.*; the Pundit's Diary, 154.  
 Newfoundland Fisheries, 281.  
 New Guinea, monsoons at, 383.  
 Newicargut, 230.  
 Nicopolis of Pompey, 298.  
 Niihau, 361.  
 Nique Chain, 82.  
 Norton Sound, 219, 222.  
 Nuclukayette, 230.  
 Nukb Hawy Mouth, 244.  
 — Pass, 254.  
 Nulato, Russian Post, 227.  
 Nusb Wady, 250, 251.  
 Nyassa, Lake, 113.  
  
 Oahu, 362, 366.  
 —, extinct craters at, 366.  
 Occasional Harbour, 264, 270.  
 Ouret River, 28.  
 Owajik Plain, 325, 335.  
  
 Pamalombe, 112.  
 Pampas River, 414.  
 Pa-anna, Isthmus of, 69, 93.  
  
 Panjan Ringbo-Che, 164.  
 Papua, 382, 393.  
 Paruno, province of, 414.  
 Pascual, cacique of the Cunas, 49.  
 Pati Nubri, 160.  
 Paya, 83, 95.  
 Pekkareej, 282.  
 Penanangchu River, 135, 215.  
 Perene River, 428.  
 Peru, trans-Andean region of, 420.  
 Petoragurb, 153 *note*.  
 Peyrtek, 345.  
 Phittur Village, 359.  
 Pinglo, 54.  
 Pinogana, 83, 94.  
 Pisis, 74 *et seq.*  
 Pomfunda, 112.  
 Porcupine River, 232.  
 Port Essington, 371; temperature at 395.  
 Portland Creek, 260.  
 Portugal, former status of, 1.  
 Portuguese expeditions to Abyssinia in the 15th, 16th, and 17th centuries, 1.  
 — Jesuits in Abyssinia, 7 *et seq.*  
 Poyang Lake, 65.  
 Prester John, 1.  
 Puerto Escondido, 85, 86.  
 Pulk Su, the, 283.  
 Pundit, diary of a, 154.  
 Purchas's 'Pilgrims,' 8.  
 Purk, 298, 301; ruins, 300; "the Zurb Khaneh" aqueduct, 300.  
 Purteyrloo Ravine, 308.  
 Puytac, cave of, 417.  
  
 Quellnacocha, 417.  
 Quesnelle River, 124.  
  
 Ragolay River and tributaries, 15, 16.  
 Raha-guddy, 18.  
 Raimondi, Professor Antonio, on the Confluence of the Mantaro and Apurimac, 413.  
 Raka Sangpo River, 151.  
 Rakas Tál Lake, 153.  
 Ralung, 151.  
 Ramote, 15.  
 Rasa Village, 15.  
 Ras el Ain, 346, 349, 351; Ritter's description of, 350.  
 — Mohammed, 250.  
 — Sufsâfeh Peak, 256.  
 Râswâgarhi, 155.  
 Ras Walda Selassyè, ruined palace of, 33.  
 Rat River, 233.  
 Rattray, Dr. Alexander, on Somerset and the Cape York Peninsula, 370.  
 Rephidim, 253.

- Rio Lara, the, 71.  
 — Sasardi, 71.  
 Rithmah, 252.  
 Rocky Mountains, 119 *et seq.*  
 ———, passes of, 127.  
 Round Island, 265.  
 Route Survey from Nepal to Lhasa, 129.  
 Rubbut, 360.  
 Ruo, the, 118.  
 Russian America, first travellers in, 220.  
 ——— line of frontier, 433.  
 Russians in Central Asia, 430.  
  
 Sachertelontin Village, 229.  
 Sáme Monastery, 170.  
 San Blas, 71.  
 ——— coast, 94.  
 Sandwich Islands, geography of and volcanic eruption, 361.  
 San Francisco, 128.  
 Sanjak of Kara Hissar, 296.  
 San Miguel River, 422.  
 Santa Maria, 93.  
 Sárá, 167, 169.  
 Sarawe, 35.  
 Saree Tchitchek Dagh, the, 309, 314.  
 Sari Kaia hills, 283.  
 Sarka, 174.  
 Sarká-jong, 162.  
 Sasardi Morti, 94.  
 Saskatchewan territory, 119.  
 Savannah River, 70.  
 Seal Islands, 265.  
 Segerdik Village, 321.  
 Selassyé, Peak of, 45.  
 Selkirk Fort, 233.  
 Senafé, 12, 19, 20; region round, 21; plateaux, 22; river-beds, 24; valleys, 23; vegetation, 25.  
 ——— Pass, 16.  
 ——— to Antalo, route of the British army, 26.  
 Senna, 118.  
 Senned, Plain of, 246.  
 Serabit-el-Kadim, 255; mines of, 251.  
 "Seven Stars" rocks, 52, 55.  
 Seyd Osman Nooree, a Dervish at Arabkir, 312.  
 Seyd Mezroor's Village, 336.  
 Shabro Village, 155, 158.  
 Shabrú, 132.  
 Shamazano, 21.  
 Shauking, 50, 51, 55.  
 Shayok River, 216.  
 Shemshere, or Gaoot shrub, 239.  
 Sheren, 250.  
 Sheyro, 311.  
 Shiftlik, the, 304.  
 Shigátze, 145, 164; meteorological observations, 196; the Pundit's observations at, 144; thermometer observations, 152.  
 Shigátze to Tadiúm, 177.  
 Shogbeh Village, 284.  
 Shohos, the, 13.  
 Shumazano Valley, 23.  
 Siang River, 61, 63, 65.  
 Siangtau, 65.  
 Siangyin, 65.  
 Sichang, 64.  
 Sierra de Estola, 80, 85.  
 ——— Mali, 75.  
 Sigyllye, ruins of, 247.  
 Sikiang River, 50.  
 Simariba, 428.  
 Sin, or Són, 340.  
 ——— Wilderness of, 255.  
 Sinai, peninsula of, 237.  
 ———, Arab encampment, 239.  
 ———, route of the Israelites, 255.  
 Sinaitic inscriptions, 257.  
 Sinchau, 62.  
 Sir Rodney Mundy Island, 276.  
 Skeena River, 126.  
 Somerset, Australia, 371; climate, 400 *et seq.*; temperature, 394 *et seq.*  
 ——— and the Cape York peninsula, Australia, 370.  
 Sonakte, 17, 18.  
 Sooroo, Upper, Middle, and Lower, 17.  
 South America, 69.  
 Sowayra, Mount, 22; sandstone of, 22.  
 St. Anthony's Harbour, 279.  
 — John, Major O., on the country between Bushire and Teheran.  
 — John's, 260.  
 — Lewis Sound, 279.  
 — Mary's, ruined church of Adigerat, 29.  
 — Michael's (Norton Sound), 221.  
 — Paul's Island, 260.  
 Staley, Right Rev. T., on the Sandwich Islands, 361.  
 Stekina River, 220.  
 Subanshiri River, 218.  
 Subiri, Chief, 428.  
 Suddak, ruins at, 287; inscriptions, 288.  
 ——— Su, the, 286.  
 "Sugar-Loaf Tickle," 272.  
 Sugmen, ruins of, 341.  
 Suquonyilla Mountains, 230.  
 Suriquilla Lagoon, 76.  
 Surp Carabet, 339.  
 ——— Lusavoritch, convent of, 334.  
 Surpiyan Village, 322.  
 Sydney Harbour, 259.  
 Syr-Daria River, 429, 434; canals, 450; climate, &c., 452; ruins, 448; tributaries, 447.  
  
 Tadiúm, 138, 144; Monastery, 146.  
 ——— to Dongpu, 178.

- Taghar, 324.  
 Taipings, the, 60, 63.  
 Takkazzyè River, 35, 42.  
 Talla Labroog, 133.  
 Tambo River, 429.  
 Tamjan Tarjum, 211.  
 Tanajur, or Tana River, 331.  
     Valley, 331.  
 Tanela River, 75 *et seq.*  
     Village, 77, 95.  
 Tanta, 45.  
     Plateau, 45.  
 Tanz village, 344.  
 Tapalisa, 95.  
 Tarena Isles, 86.  
     Peak, 75.  
 Tarjums between Lhasa and Gartokh, 148.  
 Tashilumbo Monastery, 134, 164.  
 Tashkend, 432.  
 Taukatse, 62.  
 Taylor, J. G., H.M. Consul for Kurdistan, Tour in Armenia, Kurdistan, and Upper Mesopotamia, 281.  
 Tchalt Su, the, 308.  
 Tchamoor Ravine, 285.  
     Village, 285.  
 Tchiflik, 287, 297.  
     Purk, 298.  
 Tchimen Dagh, the, 289.  
 Tchimishgezek and the Deyrsim, 312.  
     Su, the, 315, 324.  
 Teheran, 413.  
 Tekonda, 19, 20.  
     Pass, 16.  
 Tel Besmeh, ancient remains of, 355 ;  
     swarm of locusts, 359 ; village, 359.  
 Temple of Dobaiba, 91.  
 Tepteh Su, the, 313.  
     Village, 312.  
 Terjan Su, the, 281.  
 Terra Nova, 279.  
 Teyrsoom, 289, 290.  
 Thájung, 138.  
 Theodore's Road, Abyssinia, 43.  
 Tibet, 150.  
 Tibetans, the, 139, 147.  
 Tiburon Cape, 84, 94.  
 Tickle Harbour, 265.  
 Tiedeman's Glacier, 124.  
 Tigré, 3.  
 Tigris River, 357.  
 Tih Plateau, 255.  
     Range, 252.  
 Tillek, mud hovels of, 338.  
 Tilt Cove Copper-mines, 281.  
 Tingri Maidan, 157.  
 Tor seaport, 250.  
 Torbay, Labrador, 280.  
 Torres Strait, monsoons at, 389 ; temperature of sea in, 389.  
 Toti-phu Hill, 174.  
 Towshecart River, 230.  
 Trans-Himalayan exploration, 129.  
 Trebissonde and Erzingan telegraph, 287.  
 Tserena, 21.  
 Tuimen Aryk, 451.  
 Tutumates, the, 86.  
 Tuyra River, 70, 90 ; tributaries of, 83.  
 Ulu Sheyran Village, 290  
 Ulukuk Village, 225.  
 Um Rayther, basin of, 257.  
 Um Shaumer, 250.  
 Unalacheet River, 223.  
 Uraba, gulf of, 73, 86.  
 Urfet, 330.  
 Utch-Kayayuk, 437.  
 Valonia oak groves, 337 ; near Dookjik Dagh, 341 ; from Bezaoot to Mazgerd, 341.  
 Vernoë, 433, 453.  
 Veyran Shehr, 353 ; Ainsworth's description of, 353 *note*.  
 Veyrin Kar Stream, 284.  
 Waddington, Mr. A., on British Columbia, 118.  
 Wadela Plateau, 42.  
 Wadjerat Mountains, 35.  
 Wady Aleyat, storm at, 248.  
     Baba, 247.  
     el Ain, 251.  
     es Sheikh, 253.  
     Feiran, 239, 249.  
     Ghurundel, 238.  
     Kyd, 245.  
     Mughâra mines, 251.  
     Sebaizeh, 245.  
     Shellûh, 239.  
     Telleger, 252.  
 Waiohino, settlement at, 369.  
 Wandaj Pass, 41.  
 Wark-Waha Valley, 46.  
 Webeck, Survey of, 268.  
 Wharton and Baillie rocks, 276.  
 Whympet, Mr. F., Journey in Alaska, 219.  
 Wofela Plain, 39.  
 Womberat, table-land of, 39.  
 Wreck Bay, 261.  
 Wuchau, 53, 61.  
 Wudharsha Stream, 27.  
 Wudukalee, district of, 21.  
 Yamdokcho Island, 151.  
 Yamdochko Lake, 135, 151, 166.  
 Yangtse River, 51, 58, 64.  
 Yellow Head Pass, 119, 127.  
 Yeni Koi, 281, 286.  
 Yohchau, 65.

- Youkon River, 220, 228; "rapids," 231;  
 tributaries, 229; warm springs, 226.  
 ———— Fort, 219; "the Ramparts,"  
 heights near, 231.  
 Young, Mr. E. D., on the Livingstone  
 Search Expedition, 111.  
  
 Zach, Island of, 275.  
 Zambesi, mouth of, 111.  
  
 Zanskar, the, 216.  
 Zeel Village, 292.  
 Zialet, 324, 329.  
 Zigarra Tekieh Village, 291.  
 Zimmara, 307.  
 Zineyker Village, 307.  
 Zirgan River, 348, 358.  
 Zobul Plain, 40.  
 Zulla Village, 13.  
 "Zurb Khaueh," ruined aqueduct, 300.

END OF VOL. XXXVIII.