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CONTENTS OF VOL. XV.

	PAGE
REPORT of the Council	v
Balance-Sheet for 1844	viii
Estimate for 1845	ix
Accessions to the Library	xi
List of Members, &c.	xxiii
List of Public Institutions, &c., to which Copies of the London Geographical Journal are presented	xxxiii
Names of Individuals to whom the Royal Premium has been awarded .	xxxv
The President's Address on presenting Medals	xxxvii
Address at the Anniversary Meeting, May 27, 1844, by RODERICK IMPEY MURCHISON, Esq., V.P.R.S., &c.	xli

ARTICLE

- I.—Journal of an Expedition from Pirara to the Upper Corentyne, and from thence to Demerara, executed by order of Her Majesty's Government, and under the Command of Mr. (now Sir) ROBERT H. SCHOMBURGK, K.R.E., Ph.D., &c. &c. 1
- II.—Memoir of the South and East Coasts of Arabia. By Captain STAFFORD BETTESWORTH HAINES, I.N. Part II. . 104
- III.—Account of Governor G. GREY's Exploratory Journey along the South-Eastern Sea-board of South Australia. By Mr. THOS. BURR, Dep. Surv.-Gen. Communicated by Lord STANLEY 160
- IV.—The Geography of N'yassi, or the Great Lake of Southern Africa, investigated; with an account of the Overland Route from the Quanza in Angola to the Zambézi in the Government of Mozambique. By WILLIAM DESBOROUGH COOLEY 185
- V.—Remarks on the Gulf of Mexico; with Notes on Tampico and its vicinity, and on the Navigation of the River Tobasco. By Mr. PETER MASTERS, Master Mariner, of Liverpool. Communicated by Lieut. Colonel COLQUHOUN, R.A., F.R.S., 1844 236

ARTICLE

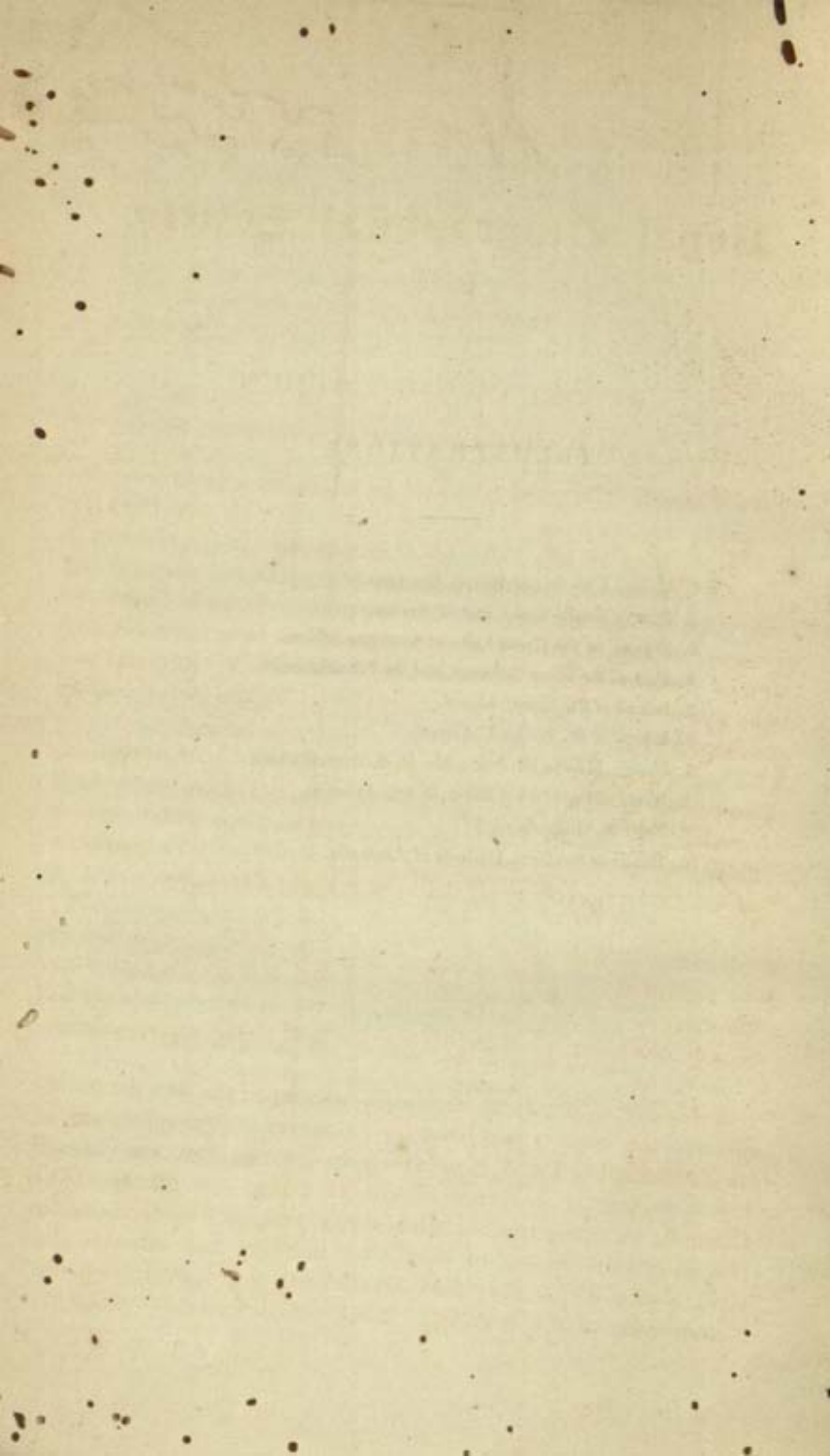
VI.—A Description of the Island of St. Mary (Azores). By CAREW HUNT, Esq., H. M.'s Consul for the Azores . . .	PAGE 258
VII.—A Description of the Island of St. Michael (Azores). By Mr. Consul CAREW HUNT . . .	258
VIII.—Notes of an Excursion from Batúm to Artvin. By M. FRED. GUARRACINO, H. M.'s Vice-Consul at Batúm. Communicated by Mr. Consul BRANT . . .	296
IX.—Exploring Excursions in Australia. By Mr. HENRY STUART RUSSELL . . .	305
X.—Extract of a Report of Mr. John Edward Eyre to Governor Grey, dated Moorunde, 20th January, 1844, containing a Notice of the Lower Course of the River Darling. Communicated by Lord STANLEY . . .	327
XI.—Some Account of Peel River, N. America. By Mr. A. K. ISBISTER, late H.H.B.C.'s Service. Addressed to the Secretary of the Royal Geographical Society . . .	332

MISCELLANEOUS.

I.—Extract of a Letter from Mr. JOHN DUNCAN to the Librarian of the Royal Geographical Society. Dated Annamaboe, December 7th, 1844 . . .	346
II.—On the lower Course of the Dnieper; being an Extract of a Letter from Prof. HENRY MALDEN to the President of the Royal Geographical Society . . .	351
III.—On the Physical Structure and Arrangement of the Islands of the Indian Archipelago. By Mr. W. EARLE . . .	358
IV.—On the Languages of Australia; being an Extract of a Despatch from Capt. G. GREY, Governor of South Australia, to Lord STANLEY. Communicated by his Lordship . . .	365
V.—Some Remarks upon the Freezing of Streams in North America, in connexion with the supposed Congelation of their Sources in High Latitudes. By ALEXANDER C. ANDERSON, H.H.B.C.S. . . .	367
VI.—Notes on African Geography. Communicated by Mr. MACQUEEN . . .	371

ILLUSTRATIONS.

1. Map of a portion of British Guayana.
2. Part of South-East Coast of Arabia.
3. N'yassi, or the Great Lake of Southern Africa.
4. Part of the River Tabasco, and its Tributaries.
5. Island of St. Mary, Azores.
6. Island of St. Michael, Azores.
7. Sketch Map to Illustrate Mr. H. S. Russell's paper.
8. Sketch Map of Peel River, North America.
9. Eastern Archipelago.
10. Range of Southern Dialects of Australia.



Royal Geographical Society.

1845.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING, 26TH MAY.

THE Council have great pleasure in reporting a progressive increase in the number of new members. In the year 1843 the accessions were 16 only; in 1844 they increased to 38, and in the present year to 47; thus affording the best proof of the increasing estimation of the Society in public opinion. In addition to the ordinary members THREE honorary members have been elected, two of them not previously connected with the Society, and one who was already a corresponding member. A new corresponding member has also been added to our list.

There have occurred 33 vacancies, of which 15 by death, viz. 2 corresponding and 13 ordinary members, and 9 by resignation. Nine have been struck off for non-payment, their united arrears amounting to 54*l*. The Society now consists of 684 members, besides 62 foreign honorary and corresponding members.

Trustees.—The office of a Trustee having become vacant by the lamented death of Mr. Francis Baily, Mr. W. R. Hamilton, who has ever taken so lively an interest in the welfare of the Society, has been appointed by the Council to the vacant office.

Treasurer.—Mr. John Biddulph, who since the first establishment of the Society had been its Treasurer and *ex officio* one of its Trustees, has found it necessary in consequence, the Council regret to say, of declining health to resign the offices. The Council, in accepting Mr. Biddulph's resignation, tendered to him an unanimous vote of thanks for his long and valuable services, a vote which they feel assured will meet with the hearty concurrence of the Society. The Council have appointed Mr.

Robert Biddulph to succeed his father as Treasurer, which appointment they trust will be approved.

Finances.—The accompanying Balance-sheet, made up to the 31st of December, 1844, will, it is hoped, satisfy members that the Council continue to conduct the financial department with the same regard to economy as heretofore. There has happily been no occasion to encroach upon our funds, nor are there any outstanding debts except for the usual current expenses.

Arrears.—The same attention has been paid in the last as in former years to get in the arrears due to the Society, and with so much success, that 124*l.* have been recovered, notwithstanding which there still remained due on the 31st of December, 403*l.*, of which sum 158*l.* are owing by members abroad.

Money Grants.—No money grants have been made since the last Anniversary, not from any want of readiness on the part of the Council to assist travellers, but from motives of necessity and prudence, such as it is hoped will be duly appreciated by the Society.

Royal Donation.—Of the two gold medals forming the donation of Her Most Gracious Majesty, that called the Patron's Medal has been awarded to Professor Carl Ritter for his important geographical labours, and that called the Founder's Medal to Dr. Charles T. Beke for his explorations in Abyssinia.

Private Donation.—The Council have to report, with sentiments of gratitude for his liberality, a third donation of 50*l.* from Mr. James Alexander.

Journal.—The members of the Society will have perceived that the determination of the Council respecting the editing of the Journal, as announced in the Report of last year, has been crowned with complete success. The two Parts of the volume for the year were punctually ready for delivery at the times appointed; the 1st Part in June, the 2nd at the end of December. The 2nd Part of Volume XIII., which various causes had delayed, has been issued, so that the arrears in this respect have

been got up as was promised, and the Journal will henceforth appear with the desirable regularity.

Library.—The accessions to the Library since the last Anniversary Meeting consist of 206 books and pamphlets, and 188 maps and charts, 113 of which latter were presented to the Society by the liberality of the Lords Commissioners of the Admiralty, who have so largely contributed to enrich the Society's collection.

In conclusion, the Council beg to state that, prosperous and flourishing as the Society is, its necessary expenses compared with its receipts are still such as to preclude the possibility of funding the compositions of new members, nor can the Council expect to have the means of so doing, so long as the Society remains burthened with the expense of apartments. The Council are still willing to encourage a hope that Her Majesty's Government may see the expediency of placing the Royal Geographical Society in a condition of greater-utility by the grant of apartments.

In the meantime the Council invite all members who have the real advancement of the Society at heart, to continue their exertions to increase the number of subscribers as the substantial means by which the income of the Society may be made to equal its expenditure.

BALANCE-SHEET FOR 1844.

Dr.

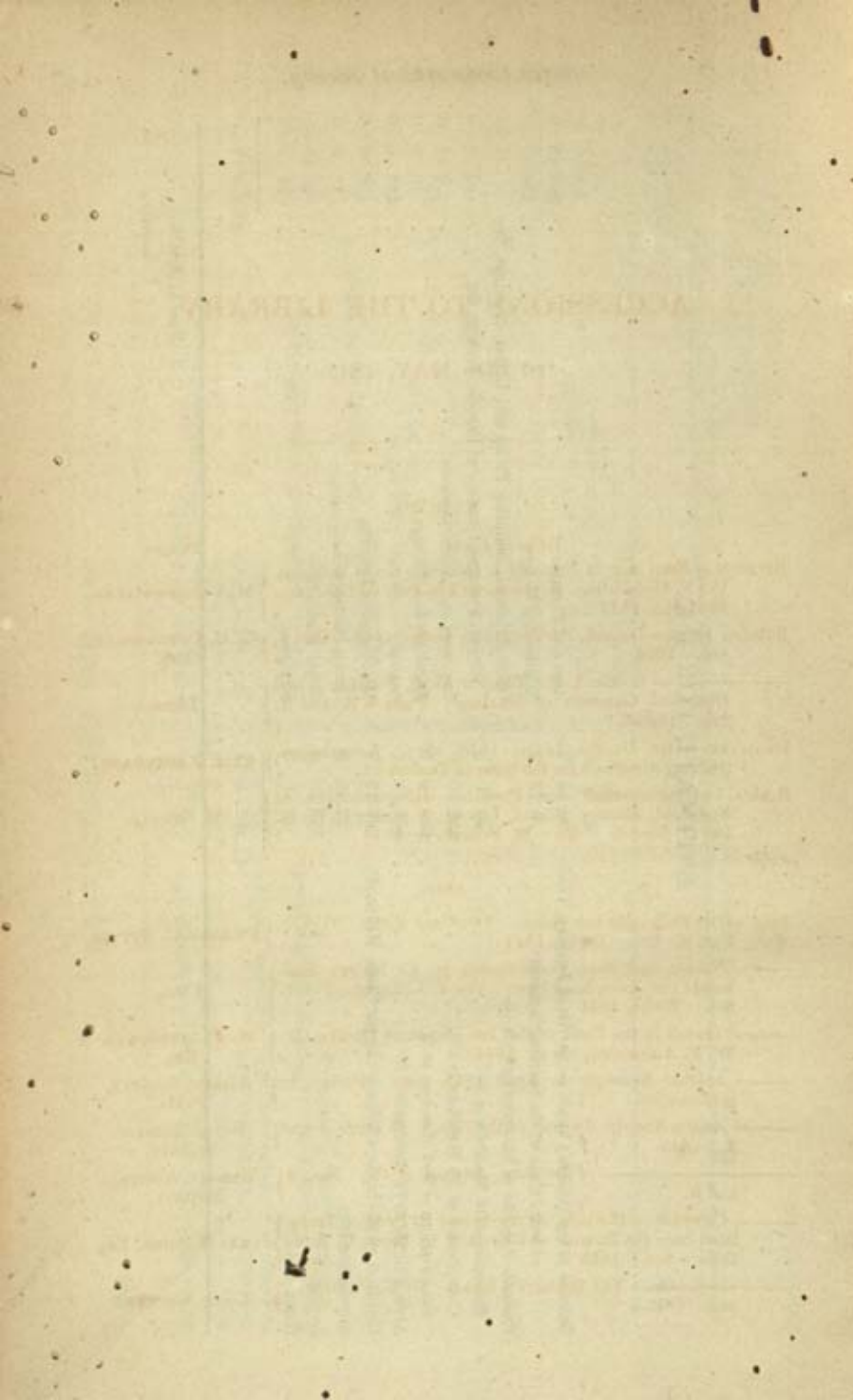
Cr.

	£.	s.	d.		£.	s.	d.
Balance in the Banker's hands on the 1st of January, 1844	51	5	11	House Rent and Fixtures	263	13	0
of Petty Cash in Secretary's hands	1	19	0½	Salaries of Secretary, Editor, and Librarian	400	0	0
Entrance of 36 Members, at 2 <i>l.</i>	108	0	0	Collector's Salary	21	0	0
Composition of 21 Members, at 17 <i>l.</i>	357	0	0	Messenger's Wages	20	8	0
Subscription of 255 Members, at 2 <i>l.</i> , minus 19 <i>s.</i> underpaid	509	1	0	Firing and Lights	32	12	7
Arrears paid up	124	0	0	Stationery	17	18	3½
Dividends for twelve months on 257 <i>8<i>l.</i></i> 4 <i>s.</i> 4 <i>d.</i> 3½ per Cents.				Freight, Duty, Carriage of Parcels, Postages, &c.	45	7	9
Reduced (Income Tax deducted)	87	12	2	Evening Meetings	14	0	2
Royal Premium	52	10	0	Insurance and Advertisements	6	8	0
Journals sold	87	9	0	Instruments for Mr. Duncan, 13 <i>l.</i> 18 <i>s.</i> 5 <i>d.</i> , and repair of Barometer, 1 <i>l.</i> 10 <i>s.</i>	15	8	5
Index sold	40	0	0	Furniture, Repairs, and Fittings	49	6	10
Donation of James Alexander, Esq.	50	0	0	Journal Printing, Part I. Vol. 13, and Part I. Vol. 14	£319	0	3
				Illustrations for Part II. Vol. 12, and Part I. Vol. 13	98	5	6
				Miscellaneous Printing	11	6	6
				Books, Maps, and Bindings	16	7	6
				Stitching Index	7	12	11
				Royal Premium	46	0	0
				Grant to Mr. Howse, for Cree Grammar	50	0	0
				Sundries, including Christmas Boxes	3	13	8
				Balance in the Banker's hands	20	14	2
				of Petty Cash	9	13	7
					£1,468	17	1½

The above Accounts have been compared by us with the corresponding vouchers, and found correct.

W. P. CRAUFURD, } *Auditors.*
 GEORGE RENNIE, }
 JOHN BIDDULPH, } *Treasurer.*

February 6, 1845.



ACCESSIONS TO THE LIBRARY.

TO 13TH MAY, 1845.

EUROPE.

*Titles of Books.**Donors.*

- BELGIUM.—*Essai sur la Statistique Générale de la Belgique.*
Par X. Heuschling. Supplément à la 2^{de} édition. 8vo. } M. VANDERMAELEN.
Bruxelles, 1844
- BRITISH ISLES.—Ireland, Parliamentary Gazetteer of. Part 1, } G. G. CUNNINGHAM,
8vo. 1844 } Esq.
- Scotland, the Topographical, Statistical, and
Historical Gazetteer of Scotland. Parts 5, 6, and 7. } Idem.
8vo. 1843
- DENMARK.—Den Danske Lods. 1843. 8vo. Copenhagen. } Capt. ZAHRTMANN.
(Sailing directions for the coast of Denmark)
- RUSSIA.—Détermination des Positions Géographiques de
Novgorod, Moscou, Riazan, Lipetsk, Voroneje et Toula. } M. STRUVE.
Par O. Struve. 4to. St. Petersburg, 1844

ASIA.

- ASIA.—Die Erdkunde von Asien. Von Carl Ritter. Vol. 7, } Professor C. RITTER.
Part 2. 8vo. Berlin, 1844
- Namen und Sach-Verzeichnisse zu C. Ritter's Erd-
kunde von Asien bearbeitet. Von J. L. Ideler. Vol. 1. } Idem.
8vo. Berlin, 1841
- Travels in the Track of the Ten Thousand Greeks. By } W. F. AINSWORTH,
W. F. Ainsworth. 8vo. 1844 } Esq.
- Journal Asiatique to April 1845. 8vo. Paris. In } ASIATIC SOCIETY,
continuation } PARIS.
- Asiatic Society, Journal of the Royal. 15 Parts, 1 and } ROYAL ASIATIC
2. 1844 } SOCIETY.
- of Bombay, Journal of the. Nos. 5 } BOMBAY ASIATIC
and 6 } SOCIETY.
- CENTRAL.—Bokhara, its Amirs and its People. Trans-
lated from the Russian of Khanikoff by Baron C. A. de } JAMES MADDEN, Esq.
Bode. 8vo. 1845
- The Bokhara Victims. By Capt. Grover. } CAPT. GROVER.
8vo. 1845

Titles of Books.

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- CHINA.—Dictionnaire des Noms Anciens et Modernes des Villes et Arrondissements dans l'Empire Chinois. Par E. Biot. 8vo. Paris, 1842
- Recherches sur la Hauteur de quelques Points remarquables du Territoire Chinois. Par M. Biot. 8vo. Pamphlet. 1840
- Mémoire sur divers Minéraux Chinois appartenant au Jardin du Roi. Par M. Biot. 8vo. Pamphlet
- Etudes sur les Montagnes et les Cavernes de la Chine. Par M. Biot. 8vo. Pamphlet. 1840
- Recherches sur la Température Ancienne de la Chine. Par M. Biot
- Mémoire sur l'Extension progressive des Côtes Orientales de la Chine depuis les Anciens temps. Par M. Biot. 8vo. Pamphlet
- Sur la direction de l'Aiguille Aimantée en Chine, &c. Par M. Biot. 4to. Pamphlet. 1844
- INDIA.—Specimens of the Illustrations of the Rock-cut Temples of India. By James Ferguson, Esq. Folio
- KASHMIR.—Travels in Kashmir and the Punjab. From the German of Baron C. Hügel, with Notes by Major Jervis, F.R.S. 8vo. 1845
- PERSIA.—Travels in Lauristan and Arabistan. By the Baron C. A. de Bode. 2 vols. 8vo. 1844

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- ABYSSINIA.—Travels in Southern Abyssinia through the Country of the Adel to the Kingdom of Shoa. By Charles Johnston. 2 vols. 8vo. 1844
- A Statement of Facts relative to the Transactions between the Writer and the late British Political Mission in Shoa. By C. T. Beke. 8vo. 1845
- ALGIERS.—Tableau de la Situation des Etablissements Français dans l'Algérie en 1842 et 1843. 4to. Paris, 1844
- EGYPT.—Miscellanea Egyptiaca anno 1842. Vol. 1, Part 1. 4to. Alexandria
- Ein blick das Nil-quellland. Von C. Ritter. 8vo. Berlin, 1844
- Observations on the proposed Overland Route via Egypt, &c. By J. A. Galloway, Esq. 8vo. London, 1844
- Crania Egyptiaca; or, Observations on Egyptian Ethnography, derived from Anatomy and the History of the Monuments. By Samuel G. Morton, M.D. 4to. Philadelphia, 1844

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Almanack for 1845. 8vo.	J. E. WORCESTER, Esq.
BOLIVIA.—Description de la Nueva Provincia de Otúquis en Bolivia. Por M. Bach. 8vo. Buenos Ayres, 1843	DON PEDRO DE ANGELIS.
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CHILE.—Notice sur le Chile. Par un Voyageur Français. 8vo. Paris, 1844	THOMAS FALCONER, Esq.
COLUMBIA.—Mission de la Colombie, Lettre et Journal de M. J. B. Bolduc. 8vo. Quebec. Pamphlet	Idem.
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The History of Oregon and California, and the other Territories on the N.W. Coast of North America, &c. By R. Greenhow. 8vo. Boston, 1844	R. GREENHOW, Esq.
The Oregon Question, substance of a Lecture before the Mercantile Library Association, January, 1845. By W. Sturgis. 8vo. Boston. Pamphlet	WM. STURGIS, Esq.
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A Complete Descriptive and Statistical Gazetteer of the United States, &c. By Daniel Haakel and J. Calvin Smith. 8vo. New York, 1843	J. E. WORCESTER, Esq.

POLYNESIA.

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Finance Minutes and Estimate of Expenditure of the Colonial Government of South Australia. Folio. 1843	Idem.
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Company, Twelfth Report of the Directors of, 8th of April, 1844	DIRECTORS OF THE NEW ZEALAND COMPANY.

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ANNALI Civili del Regno delle due Sicilie, Jan. to Dec. 1843; Jan. to Aug. 1844. 4to. Napoli	General VISCONTI.
ANNUAL Supplement to Willich's Tithe Commutation Tables, 1845	C. M. WILlich, Esq.
ARABIC without a Teacher, or the Eastern Traveller's Inter- preter. By Assaad Yacoub Kayat. 1844	M. ASSAAD YACOOB KAYAT.
ARCHIVO Americano	THE EDITOR.
ARCHAEOLOGIA, Vol. 30. 4to.	SOCIETY OF ANTIQUARIES.
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ASTRONOMICAL Observations made at the Radcliffe Observatory for 1842. By M. J. Johnston. 8vo. 1844	THE RADCLIFFE TRUSTEES.
ATHENÆUM Club, Catalogue of its Library. 8vo. 1845	ATHENÆUM CLUB.
BERICHT über die zur Bekanntmachung geeigneten Verhand- lungen der König Preuss Akademie der Wissenschaften zu Berlin. May, 1844	Professor RITTER.
BRITISH Museum, List of the Specimens of the Lepidopterous Insects in the. 8vo. Part 1	THE TRUSTEES OF THE BRITISH MUSEUM.
— Catalogue of the Tortoises, Crocodiles, &c. in the	Idem.
— List of Specimens of the Myriapoda in the	
— of Birds in the	Idem.
— of Mammalia in the	
— of Birds in the. Part 1. Accipitres. 8vo. 1844	Idem.
COMPTES Rendus Hebdomadaires des Séances de l'Académie des Sciences, to April, 1845. 4to.	ACADEMY OF SCIENCES, PARIS.
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CONTROL of the Privy Council over the Administration of Affairs at Home, in the Colonies, and in India. 8vo. Pamphlet	M. SAXE BANNISTER.
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ETHNOGRAPHY.—Dictionnaire Français Berbère Dialecte écrit et parlé par les Kabailes de la division d'Alger. Royal 8vo. Paris, 1844	MINISTRE DE LA GUERRE, PARIS.

Titles of Books.

Donors.

- ETHNOGRAPHY.—Dictionary of the Galla Language. Composed by Charles Tutschek, and published by Lawrence Tutschek. Part 1
- Grammar of the Galla Language. By Charles Tutschek. Edited by L. Tutschek. 8vo. Munich, 1845
- Die Sudsee volker und das Christenthum eine Ethnographische Untersuchung. Von Carl Meincke. 8vo. Preaslan, 1844
- Grammaire et Dictionnaire Abrégés de la langue Berbère, composé par feu Venture de Paradis. Revus par P. A. Jaubert. 4to. Paris, 1844
- Rudimenta de la Langue Arabe de Thos. Erpénus, traduits en Français, accompagnés des notes et suivis d'un supplément indiquant les différences entre le Langage Littéral et le Langage Vulgaire. Par A. E. Herbert, Capt. 8vo. Paris, 1844
- Vocabulary of the Language spoken by the Aborigines of South Australia. By H. A. E. Mayer. 8vo. Adelaide, 1843
- Vocabulary of the Parnkalla Language spoken by the Natives on the Western Shores of Spencer's Gulf. By C. W. Sturman. 8vo. Adelaide, 1844
- ERGÄNZUNGEN zum 3 theile 2 band der deutschen Ausgabe von A. von Humboldt's Central Asien. Von Dr. W. Mahlmann. 8vo. Berlin. Pamphlet
- FRANKLIN Institute, Journal of the. Vols. 6 and 7. 8vo. 1844
- GEOGRAPHY.—Annuario Geografico Italiano, pubblicato da Annibale Ranuzzi. Anno primo. Bologna. 8vo. 1844
- Elementi di Geografia generale ossia descrizione compendiate della Terra di Adriane Balbi. 8vo. Torino, 1844
- Traité de Géographie qui donne la Connaissance et l'Usage du Globe et de la Carte. Par P. du Val. 8vo. Paris, 1672
- Ultimi Progressi della Geografia, Sept. 1843, da J. Gräberg da Hemsö. 8vo. Milano, 1844
- GEOGRAPHICAL SOCIETY.—Monatsberichte über die Verhandlungen der Gesellschaft für Erdkunde zu Berlin, 1843, 1844, and 1845. 1st Part
- Bulletin de la Société de Géographie de Paris, to April 1845, in continuation
- Journal of the Royal Geographical Society, Vol. 13, Part 2, and Vol. 14, Parts 1 and 2
- Bombay, Transactions of the, 1836 to 1844. 2 vols. 8vo
- GEOLOGICAL SOCIETY of London, Proceedings for Session 1843 and 1844
- GEOLOGY.—Die Geologie in ihrem Verhältnisse zu den übrigen naturwissenschaften. Von Dr. Karl Schaffnau. 4to. Munchen, 1843
- HINTS for collecting Information, compiled for the use of the China Expedition. 8vo. Calcutta, 1841
- SIR THOMAS D. ACLAND, Bart., M.P.
- M. CARL MEINCKE.
- THE GEOGRAPHICAL SOCIETY, PARIS.
- GOVERNOR GREY.
- Rt. Hon. Lord STANLEY.
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Titles of Books.

Donors.

- HISTORICAL Sketch of Pepys' Island in the South Atlantic Ocean. By Pedro de Angelis. 8vo. Buenos Ayres, 1842 } DON PEDRO DE ANGELIS.
- ICE in the North Atlantic. By W. C. Redfield. 8vo. Pamphlet W. C. REDFIELD, Esq.
- INDIAN Tribes, Some Account of the Conduct of the Religious Society of Friends towards the. 8vo. London, 1844 } DR. HODGKIN.
- LETTERS from Abroad to a Friend at Cambridge. By John Hogg, Esq. 8vo. London, 1844 } JOHN HOGG, Esq.
- LETTRE sur l'utilité des Musées Ethnographiques dans les Etats Européens. Par M. P. F. de Siebold. 8vo. Paris, 1843 } M. JOMARD.
- LOGARITHMIC Tables to seven places of Decimals. By Capt. R. Shortrede. Royal 8vo. 1844 } CAPT. R. SHORTREDE.
- LOGARITHMS, Compendious Tables of. By Capt. Shortrede. 8vo. Pamphlet. 1844 } CAPT. R. SHORTREDE.
- MADRAS Journal of Literature and Science, No. 30, for June 1844 } MADRAS LITERARY SOCIETY.
- MARCO Polo, Travels of, Edinburgh Cab. Library. Edited by Hugh Murray, Esq. Edinburgh, 1844 } HUGH MURRAY, Esq.
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Harbour	.	.	.
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 Wyld, Mr. James

Y.

- *Yarborough, the Earl of
 Yates, Rev. James, M.A., F.L.S. and
 G.S.
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- 1831.—Mr. RICHARD LANDER, for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin, in Central Africa.
- 1832.—Mr. JOHN BISCOE, for the discovery of the land now named "Enderby's Land" and "Graham's Land," in the Antarctic Ocean.
- 1833.—Captain Sir JOHN ROSS, R.N., for discovery in the Arctic Regions of America.
- 1834.—Major Sir A. BURNES, C.B., F.R.S., for the navigation of the River Indus, and a journey by Balkh and Bokhara across Central Asia.
- 1835.—Captain Sir GEORGE BACK, R.N., for the discovery of the Great Fish River, and navigating it to the sea on the Arctic Coast of America.
- 1836.—Captain ROBERT FITZROY, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.
- 1837.—Colonel CHESNEY, R.A., F.R.S., for the general conduct of the "Euphrates Expedition" in 1835-6, and for the accessions to comparative and physical geography relating to the countries of Northern Syria, Mesopotamia, and the Delta of Susiana.
- 1838.—Mr. THOMAS SIMPSON, [Founder's Medal,] for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.
- Dr. EDWARD RÜPPELL, [Patron's Medal,] for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.
- 1839.—Mr. R. H. SCHOMBURGK, [Patron's Medal,] for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.
- Major H. C. RAWLINSON, E.I.C., [Founder's Medal,] for his travels and researches in Susiana and Persian Kurdistan, and for the light thrown by him on the comparative geography of Western Asia.

- 1840.—Lieut. RAFFER, R.N., [Founder's Medal,] for the publication of his work on "Navigation and Nautical Astronomy."
- Lieut. JOHN WOOD, I.N., [Patron's Medal,] for his survey of the Indus, and re-discovery of the source of the River Oxus.
- 1841.—Captain JAMES CLARK ROSS, R.N., [Founder's Medal,] for his discoveries in the Antarctic Ocean.
- Rev. Dr. E. ROBINSON, of New York, [Patron's Medal,] for his work entitled "Biblical Researches in Palestine."
- e 1842.—Mr. EDWARD JOHN EYRE, [Founder's Medal,] for his explorations in Australia.
- Lieut. J. F. A. SYMONDS, [Patron's Medal,] for his survey in Palestine and levels across the country to the Dead Sea.
- e 1843.—Mr. W. J. HAMILTON, M.P., [Founder's Medal,] for his researches in Asia Minor.
- Prof. ADOLPH ERMANN, [Patron's Medal,] for his extensive geographical labours.
- 1844.—M. CHARLES RITTER [Gold Medal,] for his important geographical works.
- Dr. BEKE [Founder's Medal,] for his extensive explorations in Abyssinia.
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PRESENTATION

OF THE

GOLD MEDALS,

AWARDED RESPECTIVELY TO PROFESSOR CARL RITTER AND
DR. BEKE.

THE President opened his Address in the following words:—

“The award of the gold medal, which bears the impress of our gracious Sovereign and Patron, the Queen, to the great Prussian geographer, Carl Ritter, will be hailed by the cultivators of our science all over the globe, as the best earned tribute to merit of a high order which this Society has ever paid. If distinguished explorers of distant lands had this year come before us with fresh claims, we might have continued our usual habit of adjudicating the royal medals to such individuals; but when such men do not appear, it is incumbent on us to cast our eyes on those who, though not themselves personal explorers of distant lands, have thrown new and powerful lights on what I may term the philosophy of geography. At the very head, then, of this class of inquirers stands Carl Ritter. He was the first who laid down and admirably carried out the principle, that in order to form clearer and more instructive ideas of geography, it was above all essential to study the configuration of the great masses of land. When looking to his method of bringing out in striking relief and comparison the respective features of each country, we can indeed at once comprehend where all the great cities must have been placed, and where nature refused to admit their establishment. The whole history of mankind is, in short, a result of this principle. M. Ritter is gifted with an erudition so profound that nothing escapes his keen research, whilst his great talents, his veracity and extreme accuracy have enabled us to profit by his beautiful and compendious works, as much as if we had laboured through all the original sources of his knowledge. But in eulogising our medallist I cannot stop here. All external nature is in truth developed by him, for he makes us acquainted with the productions of the different soils and tracts; and tracing their limits with precision, he explains the reasons of such boundaries. Take, for example, his illustrations of the geography of plants; and we must all admit that his history of the distribution of the banana, the mangoe, or the *Borassus flabelliformis*, and of different species of figs, and of the Indian tamarind, as well as of the Phoenix, or common date, and of the *Mangifera*, or celebrated Eastern palm-tree, is a real masterpiece of scientific composition, and worthy of the praise of a Humboldt, a Brown,

a Wallich, or a Royle. I advert to this point among the numerous acquirements and researches of M. Ritter, because it has not perhaps as yet been sufficiently remarked upon or culled out from the mass of materials in his great work. Every subject, however, which he touches is thoroughly fathomed. If he alludes to sugar, as having been formerly cultivated at the foot of Mount Zagros in Mesopotamia, he lays before his readers such a complete history of the material as was never before presented to the public. In zoology, as in botany, he is equally happy; and camels, tigers, lions, and elephants are all treated of in the same full, satisfactory, and judicious manner.

"But, above all, the different races of the human species are, as it were, individualized and characterized with an astonishing sagacity; and whilst, in delineating their history, he transports us across immense plains or mountain chains without fatiguing our attention, he also leaves on our minds a deep and lasting impression of the configuration of every part of the globe of which he treats.

"Again, when we view him as an antiquary, his work is a rich mine, which is transfused with the essence of the most learned writings of the ancients. Guided by the physical geography of the land, the many great movements of the human race, whether under Alexander the Great, the Sultan Mahmoud, or other great conquerors, are illustrated, and followed to their extreme results, in a manner worthy of a D'Anville or a Rennell. In a word, I am sustained by the opinion of the best geographers in Europe, when I say that there is no living person to be compared to Carl Ritter, for the immense quantity of his valuable accumulations; there are few who could have arranged them in so lucid and philosophical a manner; and no one has surpassed him in zealous devotion to the great cause of the advancement of our science.

"Whilst one of our illustrious foreign members, Alexandre von Humboldt, has recently in Berlin spoken to me of Carl Ritter, as being 'unquestionably the first geographer of the age,' another, I rejoice to say, of the band of great men, in whom Prussia may well glory, my eminent friend Leopold von Buch, who is now present, has testified to me in the warmest manner his admiration of the intrinsic merits of the scientific researches and personal character of his enlightened countryman. It is indeed with a satisfaction which I want words to express, that I should be so fortunate as to occupy the chair of this Society when such an award is made, and be thus enabled to consign to the hands of the great geologist of the Continent the medal which the geographers of Britain have adjudicated to their great foreign contemporary."

Then rising and addressing Baron Leopold von Buch, the President added:—

"M. LEOPOLD VON BUCH.—In placing in your hands the gold medal of the Royal Geographical Society, decerned to your distinguished countryman, Carl Ritter, I deliver it to one who has so full a perception of his real deserts, that you cannot but feel deeply gratified to see them valued as they are by your old friends, the men of science of England. After an absence of thirty-six years, you have revisited

our shores, during which time your researches, geological and geographical (for the sciences never can be separated), have extended from the remotest parts of Scandinavia to the southernmost corners of Europe, and have shed bright rays of light on the structure of many lands, from the Alps to the Canaries. The high estimate, therefore, which *you* have formed of the labours of M. Ritter must have the greater weight with us, more especially with those who, like myself, have been honoured with your intimate acquaintance, and know how to appreciate the value of your sincere opinion, founded as it is on the careful study of the works of a contemporary worthy of yourself. Assure therefore M. Ritter, I beg of you, that in delivering to you this medal for him, I experience, as a geographer, precisely the same degree of satisfaction as when, in my former capacity of presiding over the geologists of England, I had the happiness of transmitting to you the Wollaston medal of the Geological Society; and, believe me, that by such awards both Societies feel that they have acquired real and permanent honour for themselves."

To this the Baron L. von Buch replied:—

"SIR,—The honour conferred on M. Ritter by your distinguished Society will certainly be appreciated by him as one of the most gratifying testimonials which he could have anticipated, in proof of their kind acknowledgment of his remarkable and useful labours. On his own part my friend will no doubt express his warmest thanks for this distinction; and in the mean time believe me, that I feel deeply honoured in being made the bearer of the Victoria medal to a countryman, whose warmth of heart and, I would venture to say, truly Christian character, are no less admirable than his profound learning and sound reasoning."

On the adjudication of the Founder's Medal to Dr. Beke, the President thus addressed the Society:—

"The exploratory travels of Dr. Beke through the interior of Abyssinia, accomplished by great individual exertions, under circumstances of severe privation, were so fully commented on in my discourse of last year, that all those who are desirous of seeing such zeal and ability rewarded, must have anticipated that, as soon as the results of his labours were given to the public, this Society would not be backward in tendering to him one of its Royal medals.

"In addition to the vast number of new points, the latitude and relative position of which Dr. Beke has laid down, and the construction of an original map, extending over 70,000 square miles of a country hitherto almost unknown, and never geographically surveyed, I now learn that even those surmises, which he threw out at one of our meetings, concerning the Dedhesa being the direct if not the principal source of the Bahr-el-Azrek, as derived by him from converse with the natives, have been completely realised through the subsequent explorations of M. d'Abbadie.

"But it is, after all, for the amount of fresh geographical knowledge afforded to us of a region, to which our attention was first roused by Bruce, that great pioneer of enterprising and disinterested geographers, that we award our medal; and this honour is rightly assigned to Dr. Beke, upon the very same grounds as those which have previously regu-

lated our conduct in respect to many distinguished explorers of distant countries, difficult of access, and dangerous to European life."

Then rising, and addressing Dr. Beke, the President said:—

"Dr. BEKE,—In common with all those who admire that ardour in the pursuit of fresh geographical knowledge, to attain which you have explored a large portion of Abyssinia, I have great pleasure in delivering to you this medal of our royal founder King William IV.; and whilst I deeply regret that the limited funds of our Society did not admit of our supplying you with additional means, which would have enabled you further to enrich our archives by extending the area of your researches, I congratulate you on the success which has attended them; and hope that, as our good opinion and our medal are all we can now offer, you will be gratified in having your name enrolled among those British geographers who have previously been distinguished like yourself."

Dr. Beke, in reply, said:—

"Sir,—It is with no ordinary feelings of pride and gratification, that I receive from this distinguished and learned Society so unequivocal a proof of their estimation and approval of the little, that I have been permitted to add to the common stock of knowledge of Eastern Africa and its inhabitants.

"I had hoped that it would have been in my power to complete the task which I had set myself in visiting Abyssinia, by laying before the public the general results of my travels and researches there. But this hope, owing to the pressure of other avocations, I am for the present reluctantly compelled to abandon; and a considerable portion of the information obtained by me must unavoidably lie dormant for an indefinite period, possibly until it shall have lost most of its interest and value. My chief consolation under these circumstances is, the consciousness that I have accomplished all that lay in my power, and that others are satisfied that I have done my duty. And I will add that, should the time arrive when I may be at liberty again to turn my attention to my past labours, the remembrance of the reward I have this day received will encourage me to discharge the obligation, which every traveller in distant and unknown countries may be considered to incur.

"To the Council of the Royal Geographical Society I beg leave to return my best thanks for the honourable distinction which they have conferred upon me; and to yourself, Sir, for the complimentary terms in which you have been pleased to communicate to me the award of the Council."

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY
OF LONDON;*Delivered at the Anniversary Meeting on the 26th May, 1845.*

BY

RODERICK IMPEY MURCHISON, V.P.R.S. & G.S.,

CORR. ROYAL INST. FRANCE, &c.,

PRESIDENT.

GENTLEMEN,—During the year which has elapsed since I addressed you from this chair, our Society has not only produced fruits of equal value to those of former years, but has exhibited proofs of having obtained still stronger hold on public opinion, by a very marked accession of new members, among whom are many persons of high consideration. Notwithstanding, however, this numerical prosperity, we have not, I lament to say, been yet able to obtain from Her Majesty's Government the sole small boon we sought for at their hands, of the grant of apartments; and though, in comparison to recent years, our finances are in a flourishing condition, inasmuch as, during my Presidency, we have not been obliged to encroach upon the remaining portion of our capital, we are compelled to absorb annually the composition fees of new members, as well as our annual income, in order to enable us to meet our current expenses, and at the same time to communicate to the public that geographical knowledge, which in most other countries of Europe is accumulated and diffused at the public expense. At our last anniversary I announced, that the one thing alone wanting to render our career permanent and useful was the grant of an apartment, which would save us from a heavy annual outlay, and would place us in a condition really to advance geography, by occasionally helping the wants of meritorious explorers of distant lands; and though this, my fervent hope, has not been realized, I trust that a Society, of which Her Majesty is the patron, and which is constantly employed in works of acknow-

ledged national utility, will not have much longer to make this appeal to Her Majesty's Government.

OBITUARY.

In accordance with custom, I have, before entering upon the scientific topics of my address, to perform the duty of paying our tribute of regret to our departed friends and members who have made themselves useful in their generation, either by the services they have rendered geography or other branches of science.

At the head of this list I place the name of Mr. Francis Baily, who from the foundation of our Society was one of its trustees, and at the time of his death was President of the Royal Astronomical Society, a Member of the Royal Irish Academy, a Corresponding Member of the Institute of France and of the Royal Academy of Berlin, and of many other scientific bodies.

The task of recording the eminent qualities, the arduous labours, and useful life of Mr. Baily in his capacity of President of the Royal Astronomical Society, of which he was the main-spring, has devolved upon Sir John Herschel, who has performed it in a manner equalled only by the deep interest of the subject. I shall not, therefore, attempt any eulogium of our deceased and much-esteemed trustee further than to say that, whether as an active member of the Council of the Society, or as a steady friend of the British Association for the Advancement of Science, of which he was a co-trustee with myself, I have had abundant opportunities of witnessing the value of his labours, and that I most sincerely deplore his death.

Among other valuable members of our Society who have been taken from us, I will first mention that very scientific seaman and gallant naval officer Captain Basil Hall, who, by numerous descriptions of distant lands, brought their features and inhabitants so vividly before the public eye; and who, by the zeal, acumen, and perseverance with which he worked out every question he considered, proved himself to be a son worthy of his father, Sir James Hall, the celebrated Scottish philosopher. In characterising the admirable style of my deceased friend, which has justly acquired for him a place among the British Classics, I have heard with delight one of the most eminent scholars of the age* thus speak of it:—"Basil Hall's style appears to me to be the very model of correct and perspicuous writing, combining elegance and ease with a terse and precise mode of expression. His skill in describing external objects, and especially any artificial or mechanical process, is unrivalled.

* Dr. Coplestone, the present Bishop of Landaff.

He knows how to finish his picture, and knows where to leave off. The reader sees, as it were, whatever he describes; and such is the felicity of his language, that it impresses the matter indelibly on the memory, as having afforded not only pleasure, but instruction."

We have, further, lost the Dean of Carlisle and Mr. Guillemard, who, though not positive contributors to science, were, throughout their long lives, its steady friends and supporters, and were beloved by all who knew them.

I have next to record the decease of Sir Gore Ouseley, whose diplomatic services to his country will occupy a fitting place in the page of history, and whose loss will be deplored by every contemporary who enjoyed his acquaintance. Deeply versed in Oriental literature acquired during a residence in Hindostan, he was one of the few public men who had thereby the power greatly to influence the conduct of eastern monarchs, to whom he was accredited. Of this power I will now merely state that, when the last great European struggle was at its height, and Napoleon was on his march to Moscow, Sir Gore Ouseley, His Britannic Majesty's Ambassador at the Court of Teherán, brought about with the mediation of England an important treaty between Russia and Persia, whereby a large Russian army on the frontier of the latter country was at once liberated, and, advancing upon the south-western flank of the French armies in Russia, mainly contributed to produce their rapid retreat, and the rout of the Beresina. For this important service in the cause of the Allies, our ambassador received from the Emperor of Russia the high honour of the Cross of St. Alexander Nevsky of the first class. As a cultivator of art, science, and literature, and in the whole tenor of his life, Sir Gore Ouseley united in his own person the most liberal views with the most courteous and agreeable manners.

Lastly, I have to lament the death of Dr. Edward Goodenough, the late Dean of Wells, for many years head master of Westminster, and son of the scientific Bishop of the same name. Dr. Goodenough was one of the earliest members of our Society; and we have in our Transactions a prominent proof of the interest he took in cultivating that department of the science of geography, which consists in the comparison of ancient names, places, coasts, and seas with those of the present time. His learned paper on the voyage of His Majesty's ship *Blonde* in the Black Sea, whilst it contributed to illustrate the observations of Polybius on that part of the world, and the *Periplus* of the Euxine, as recorded by Arrian, was one of the most interesting communications given to the public during the infancy of this Society.* As a personal friend

* See Journal of Royal Geographical Society, vol. i.

of Dr. Goodenough, I can testify, with many who surround me, that he was as good and amiable in private life as he was eminent for his learning.

Of Foreign Corresponding Members, M. Duponceau, of Philadelphia, and M. Ferdinand de Navarette have passed away. The former, who was of French origin, was President of the Philosophical Society of Philadelphia, and is well known to the students of Philology by his numerous writings on the American languages. M. de Navarette was Director of the Hydrographic Dépôt at Madrid. He was author of a Collection of the Voyages and Discoveries of the Spaniards, and we learn with regret that he has left some important works unfinished. Don Sebastian Miñano, author of the '*Diccionario Geografico de España*,' died also lately at Bayonne.

Colonel Denaix, a most indefatigable labourer in Topography and Physical Geography, was the head Administrator at the Dépôt Général de la Guerre of Paris, and one of the Founders of the Geographical Society of France. He was at great pains to systematise Orography; though he does not appear to have been fortunate in simplifying that very difficult subject, of the classification of the various elevations on the earth's surface. He was one of those who fully appreciated the connexion between Geology and Geography; and he brought his knowledge to bear in explaining a great variety of physical phenomena.

ENGLAND.

ENGLISH SURVEYS.—*Expedition to discover a North-West Passage.*

—The subject of a North-West Passage, from the Atlantic to the Pacific, through the Polar Sea, has at various periods for the last three centuries occupied the attention of the British Government. Several recent expeditions have been sent forth for this purpose, and various geographical and physical observations and discoveries have been made, by which the question of a passage is now almost narrowed to one definite line of route. With a confident hope of accomplishing this object, our first President, Sir John Barrow, recently submitted a plan to the First Lord of the Admiralty, with a request that it might be laid before the President and Council of the Royal Society, by whom a resolution was passed in favour of the measure. It was then further referred to those best acquainted with the subject,—Sir John Franklin, Sir Edward Parry, Sir James Ross, and Lieutenant-Colonel Sabine,—all of whom approved of the plan.

With these separate opinions, the project was sent to the head of Her

Majesty's Government, and being by him approved, measures were forthwith taken to carry it into execution. Two ships, the 'Erebus' and 'Terror,' the same which had been so successfully employed for three years in the Southern Arctic regions under Sir James Ross, were immediately placed under the command of Sir J. Franklin, and have just sailed for the service in question. To obviate delay from calms or contrary winds, or where narrow channels between floes or masses of ice may have to be passed, each ship is supplied with a small steam-engine to work a screw, so as to ensure a progress of four or five knots an hour; and this is so contrived, that it can be let down or drawn up as occasion may require. Each ship is commanded by a captain, thoroughly experienced in seas encumbered with ice; Captain Sir John Franklin in the 'Erebus,' and Captain Crozier in the 'Terror,' with able and intelligent officers under them, several of whom have been instructed in the best method of taking magnetic observations by that zealous promoter of magnetical science, Lieutenant-Colonel Sabine.

The first attempt at the discovery of a N. W. passage in modern times was made by Captain John Ross, and proved unsuccessful; but we all know that, in the following year, Sir Edward Parry entered Lancaster Sound, passed through it and Barrow's Strait, to which it directly leads, and proceeded as far W. as Melville Island: this he found surrounded by ice, as the easterly shores of the Arctic regions generally are now well known to be; and having remained a winter there, he returned by the same route, and without interruption. Since then the Lancaster Strait has frequently been traversed and found free from ice, and has almost yearly been entered by ships employed in the whale fishery. The route by Lancaster Sound and Barrow's Strait leads nearly in a direct line about W.S.W. to Behring's Strait, and is therefore apparently the proper, and, as far as our knowledge hitherto extends, the only maritime route to be pursued on the passage to that Strait. There is, indeed, an opening, which issues from the northern side of Barrow's Strait, called, by Parry, Wellington Inlet, and which in appearance is little inferior to Lancaster Sound; but its direction points towards the Pole, and the only chance of its becoming available for the N.W. Passage would be that it leads into an open sea, and that the cluster of islands in that direction will be found to cease. The track, however, expected to be pursued on this occasion is, through the now well-known Lancaster Sound and Barrow's Strait as far as Cape Walker on the southern side of the latter, between which and Melville Island the expedition is to take a middle course by the first opening that presents itself after passing the Cape, and steering to the southward, and halfway between Banks' Land (if such exist) and the northern coast of America,

steer directly, or as far as the ice will admit, for the centre of Behring's Strait. The distance to this from the centre point between Cape Walker and Melville Island is about 900 miles. The examination of the northern coast of America by Sir John Franklin, Sir George Back, Dr. Richardson, MM. Simpson, Dease, and others, close along the shore that bounds the Polar Sea on that part of it, and the favourable appearance of that sea for navigation, as far as the power of vision extended, together with the absence of all islands, except small rocky patches near the coast, from the 115th meridian W. to Behring's Straits—this ascertained state of things affords a well-grounded hope of a successful issue. As far as depends on my judicious and enterprising friend Sir John Franklin, and his energetic officers and seamen, I have the fullest confidence that everything will be done for the promotion of science, and for the honour of the British name and navy, that human efforts can accomplish. The name of Franklin alone is, indeed, a national guarantee; and proud shall we geographers be if our gallant Vice-President shall return after achieving such an exploit, and gladly I am sure would we then offer to him our Presidential chair, as some slight recompense for his arduous labours.

Admiralty Surveys.—All the Admiralty Surveys which I enumerated in my address of last year are continuing their operations except the following:—*Coast of Lancashire.*—Commander Denham, who for the last three years has been employed on this survey, has now brought it to a conclusion, and is, we believe, preparing his drawings for the Admiralty. *W. Coast of Ireland.*—Commander Bedford has commenced the survey of the western shores of Sligo, Galway, and Clare. *Loughs Correb and Mash.*—Lieut. Beechey was last year appointed to the examination of these navigable lakes, and has now made considerable progress in their survey.

Of Foreign Surveys:—*The West Coast of America* is about to be surveyed by Captain Kellet in the 'Herald,' and Lieut. James Wood in the 'Pandora.' They will commence at Guayaquil (to which place the survey had been extended by Captains Fitz-Roy and Belcher, and published in 16 sheets), and proceed northward along the shores of Granada, Guatemala, and Mexico, of which long line of coast little is accurately known.

Azores and Madeiras.—Captain Vidal has finally and successfully accomplished the interesting survey of these islands.

Western Coast of Africa.—The survey of the western coast of Africa, which occupied several years, and extended from the Mediterranean to the coast of Guinea, was suddenly arrested at Cape Three Points by a fever which attacked the crews of both the vessels employed there; but

another vessel, we understand, is now preparing, with which Commander Denham will continue the survey from that Cape to the Bight of Biafra.

We have received from the Admiralty all the maps and charts which they have published during the past year, among which are 8 sheets of the survey of the shores of Great Britain; 68 of the Mediterranean; 11 of the W. coast of Africa; 11 of the West Indies; 6 of South America; and 13 of the East Indies, China, and Australia.

Survey of Ireland.—During the last year, the 6-inch maps of the county of Limerick, in 61 sheets, and of the East Riding of the county of Cork, in 87 sheets, have been engraved and published. No one can view these sheets, and compare them with those of the counties published at the commencement of the survey, without being struck with the immense increase of detail which they exhibit. This is a gratifying example of advancement in topography, as well as of the increased perfection of the well-devised machinery, by which Colonel Colby achieved the townland survey of Ireland, and by which this extreme minuteness was attained, not only without any increase of expense, but concurrently with an actual and very large reduction; the work at its close having cost only about one-fourth the price per acre which it cost at its commencement.

One important result attending this insertion of detail may be here noticed. Among the primary objects of the survey was the provision of maps to form a basis for the valuation of townlands, with a view to the more equal adjustment of the local rates, which, in Ireland, are apportioned by townlands; and which being based on valuations long obsolete, had become a very unequal and often oppressive tax upon tenants. But it was not intended to extend this valuation to spaces smaller than townlands; subsequently, however, the introduction of the poor-laws into Ireland rendered a more minute valuation desirable, and by an act now before Parliament, consequent on a report of a Committee of the House of Commons which sat during the last session, it is enjoined that the valuation shall descend to farms and holdings. Here we have the most happy confirmation of the enlightened views which led Colonel Colby to introduce these very subdivisions, as soon as he could do so without additional expense. As might be anticipated, the Government have now resolved on completing also the maps of the northern counties. The field operations of the survey have accordingly been directed to this object, in concurrence with the contouring, which was commenced in the N. of Ireland last year. These operations materially assist and cheapen each other, as the contours naturally possess more local value, and are more easily identified on the grounds, when inserted on detailed than on skeleton outline; and

both operations are cheaper when performed at the same time. By the reduction of these contoured and completed sheets to the 1-inch scale, we shall possess also a general map, similar to that of England, with whose value we are all so well acquainted. In my address of last year I described some of the uses to which the electrotype process had been applied in the survey of Ireland, and it is on duplicates produced by this process from the original plates, that it is intended to insert the contours and additional detail. I would recommend any member of the Society who may visit Dublin not to omit seeing the office of the Irish Survey, where these and various interesting operations are in progress, under the management of that excellent engineer, Captain Larcom. Among the other applications of contouring, a map has been there constructed during the past year, exhibiting by lines of equal altitude the relative quantities of land in Ireland, which lie within zones of different elevation. A reduced copy of this map is now upon our table, and various uses in drainage and cultivation, as well as communications, will readily occur to any one who examines it. Nor ought we to forget the curious light which it gives to the geologist, in the questions which raised beaches, and numerous phenomena of elevation and subsidence, present to his inquiry. It was constructed for the use of the commission, of which the Earl of Devon is the chief, and will accompany their report.

The topography of the Ordnance maps of Britain is peculiarly tested at this moment by the numerous railways which are everywhere projected; a trial not only of their correctness in plan, that is, in the horizontal position of objects, but also in elevation (the third Ordinate of the French). In Ireland, railway projects have now become numerous; and by aid of contouring maps, which are sold at a very low price, such projects have been brought before the legislature in a more perfect form, and at far less expense, than would otherwise have been practicable in a single session. When we see so many advantages flowing from the process of contouring, I am, indeed, fully sanctioned in saying, that the British Association for the Advancement of Science is entitled to the gratitude of the public, for having procured the sanction of the Government to the application of that admirable system. In connexion with the survey of Ireland, as well as that of England, I must further mention, that our distinguished associate, the Astronomer Royal, and the Rev. Mr. Sheepshanks have been engaged, in conjunction with Colonel Colby, in the astronomical measurement of an arc of longitude, extending from Greenwich to a station in the island of Valentia, on the coast of Kerry; the results of which will shortly be given to the public.

Memoirs in the last Number of the Journal, or more recently re-

ceived.—The papers received by the Society since the last Anniversary have been commensurate with those of former years both in number and interest. Thus you have had read at your meetings—

An account of the successful ascent of the Karún and Dizful rivers of Persia, by Lieut. Selby of the Indian Navy, who took his steamer to within a few miles of Shuster, in the very heart of the southern provinces of the kingdom.

A description of routes in Kach'hi Gandava, and an account of the Beluchi tribes of Upper Sind'h, by Captain Postans; a paper of great practical importance now that Sind'h is annexed to our eastern possessions.

The Second Part of Captain Haines's valuable memoir of his survey of the S. and E. Coasts of Arabia, also a most valuable document in reference to our navigation of the Red Sea and Sea of Oman.

You have also listened with great pleasure and instruction to Sir Robert Schomburgk's account of his difficult and perilous journey from Pirara to the Upper Corentyne, and thence back to Demerara—a statement combining the exact determination of positions required by the geographer, with numerous details of the productions of a country not visited before by any European, and the most graphic delineation of the manners and customs of the strange people he met with, and the wild scenery through which he had to force his way.

A letter from Mr. Duncan has been communicated to you, describing his route from Annamaboe to the Amissa river on the western coast of Africa; the narrative is highly satisfactory from its unsophisticated style, and the evident truthfulness of its statements. Mr. Duncan, though not a scientific traveller, is intelligent and enterprising, and possesses all the requisites of an excellent pioneer in a country very little known, and of which he will no doubt give us an interesting account.

Mr. Consul Carew Hunt has favoured us with descriptions of the Islands of St. Mary's and St. Michael's in the Azores. In comparatively few words they make us acquainted with all the more important facts of the physical geography of these islands and their productions, as well as with the character and industrial pursuits of the inhabitants.

In that far distant and mysterious portion of the world, Australia, explorers have not been wanting; and the journey undertaken by the Governor of South Australia in person, into the south-eastern portion of that colony, with the favourable report he has given of the result of his exploration, have been communicated to the Society.

Mr. Eyre also, to whom, on a former occasion, you awarded your medal, has lately examined the lower course of the Darling, and thus

filled up a *lacuna* that existed in the geographical delineation of an important portion of that river. Captain Frome's exploratory journey to the country to the eastward of Flinders' Range, and his report upon it, has also been brought under your notice, by which it appears that the eastern portion of Lake Torrens is rather a depression of the soil occasionally flooded than a constant sheet of water, and that its deceptive appearance is due to the mirage. Sir Charles Malcolm has communicated to you the notes of Mr. Stuart Russell, giving an account of his discovery of a large river, in a position where he struck it, somewhere about 150 miles to the N.W. of Wide Bay, and which river he supposes to be the Boyne—a river not laid down upon any of our maps, but the mouth of which appears to be known to the colonists.

In respect to Asia Minor you have heard Vice-Consul Guarraçino's note of his routes from Batûm to Artvin on the Jûrûk, and to Erzurum.

A Memoir, containing practical information, on the Navigation of the Gulf of Mexico, with notices of Tampico, Tuspan, Vera Cruz, Tobasca, &c., by Mr. Peter Masters, and communicated to you by Colonel Colquhoun, has also been read; as well as Notes on South Africa furnished by Mr. Macqueen.

Of these papers some have already been printed in our Journal, and the rest will appear in subsequent "Parts."

Other papers and memoirs have been received, which will in due time be brought before you: of these I may mention

The Journal of a Mission to Tembo, by Mr. Thompson, communicated by Lord Stanley; and Itineraries and Geographical Notices of a portion of Bolivia, by Mr. Consul Masterton, communicated by the Earl of Aberdeen.

Of minor articles I may mention Professor Raffn's notice of the Museum of American Antiquities at Copenhagen, published in our Journal; some notes for the improvement of the map of Morocco, by Mr. Wilshire; whilst two communications, the one from Lieut. Crutenden, the other from Mr. J. Bird of the Bombay Asiatic Society, on the Hamyaritic or Hamaiaric inscriptions in Hadramaut; and an interesting note, by Professor Malden, on the Comparative Geography of the lower Borysthenes, have been read.

Before concluding this enumeration of papers received by the Society since its last anniversary, I must mention three notices on subjects of physical geography: the first, a note on the actual depression of the Caspian Sea, below the level of the Mediterranean, reduced and communicated by Mr. Struve; the second, some remarks on the freezing of rivers in North America, by Mr. A. C. Anderson; and, thirdly, a

notice by M. N. Khanikoff, on the drying up of the Tanghi Darya, formerly a Deltic branch of the Syr Daria or Jaxartes, to which, and to the paper of Professor Malden, I shall elsewhere allude.

I would here call your attention to the fact, that our Journal has hitherto been filled almost exclusively with the narratives of travellers; and although there cannot be a doubt of the value of the papers published in the fourteen volumes of our Transactions, or of the importance of giving publicity to the descriptions of countries little known, with accounts of their productions and their people, still, as the whole interest of geography reposes on the facts comprised under the term *Physical Geography*, it is much to be lamented that this important branch of our science should be, to a great extent, neglected by our countrymen. Independently of the interest which the various facts and phenomena of physical geography possess in themselves, their detail and discussion in the pages of our Journal would give variety to our volumes, and enlist the lovers of pure science into our ranks, as well as those who look to geography solely with the spirit of merchants and colonizers, or for that kind of information which may be so extensively gleaned from books of travel. In the long list (would it were longer still) of our members, are the names of many who do not quit their homes, but who are eminently distinguished for the variety and profundity of their scientific acquirements; many fully competent to understand, to appreciate, and to explain the influences of the grand physical laws of the universe, in determining and modifying the climate and soil of our globe, and the changes which its surface is undergoing. On climate and soil depend the productions of a country, and in great measure the manners, customs, and temperament of its inhabitants; and it is by the diversity of these elements that all the inhabitants of the earth are excited to that exchange of productions, which multiplies the comforts and increases the wealth of all, and which, by inducing inter-communication, spreads civilization and its blessings over the whole earth. It is therefore greatly to be desired, that the scientific men to whom I have alluded would boldly encounter some of the numerous interesting problems of physical geography; so that, blended with notices of the kind which we may term exploratory, our Journal may be varied with scientific discussion.

New English Works.—If I have pleasure in announcing publications which can in any way tend to advance the progress of geographical knowledge, your satisfaction and my own must be greatly enhanced when the name of the authors is an assurance of superior excellence. Mr. Cooley, known to geographers as a most conscientious and correct elucidator of any subject he takes in hand, and whose late work on the

'Negroland of the Arabs' has specially stamped his reputation as one of the first authorities on African geography, is now devoting his energies to the production of a 'Collection of Voyages and Travels,' under the title of 'The World Surveyed in the Nineteenth Century; or the recent Narratives of Scientific and Exploratory Expeditions, chiefly undertaken by command of Foreign Governments; collected, translated, and where necessary, abridged.'

* When it is considered how very little is generally known here of the important explorations undertaken by foreign nations since Humboldt first delighted and surprised the world by the brilliancy of his descriptions and the novelty of his observations, we cannot but hail the forthcoming work of Mr. Cooley as one of the highest interest, and I must express my sincere hope that an enlightened public will duly appreciate the editor's laborious undertaking.

I may also bring to your notice another collection of Voyages, which is projected to be undertaken by the united efforts of the 'Cabot Society.' It is intended that this work shall include expeditions of discovery, voyages, travels abroad, pilgrimages, religious missions, colonization, foreign correspondence, and enterprises of every kind by which the British power has been extended upon and beyond sea.

The first volume of this Collection, under the title of 'The Classical Sources of British History, &c.,' by Mr. S. Bannister, is in the press. A second volume, entitled 'The Missionaries of Ireland and Iona, in the Sixth and Seventh Centuries, containing the Complete Works of St. Columba, Adamnan, &c.,' by the Rev. Dr. Giles, is prepared for the press; and a third is in hand, on the 'Intercourse of Ireland and the other British Isles with the Phœnicians, and other nations, before the invasion of Great Britain by the Romans.' Twenty-three other works are contemplated. The enterprise is therefore important in extent, and certainly not less so in its bearing upon geographical history. There cannot be a doubt of the existence in this country of a vast amount of valuable materials for the compilation of the several works announced by the 'Cabot Society;' and we have every reason to hope that the possessors of these materials will, with the well-known liberality of our countrymen in such cases, allow of their being consulted by the authors of the different histories. If anything can throw a doubt upon the successful completion of the projected publications of the association, it is the magnitude of the undertaking, and the consequently enormous amount of capital which must be expended upon it, with the little probability of an adequate return. As geographers and Englishmen, however, we must approve of works which, if executed in a style commensurate with their importance, must give us much valu-

able information respecting the early voyages of our countrymen, and place in a striking point of view that enterprising spirit which, from the earliest times, has distinguished them.

Mr. Hugh Murray of Edinburgh has published a new edition of Marco Polo, in which some errors of Mr. Marsden have been corrected:

Mr. W. F. Ainsworth has published his 'Travels in the Track of the Ten Thousand Greeks.' The author, well known to you by his able papers published in 'The Geographical Journal,' could hardly have turned his journeys in the East to better account, than by making them serve to illustrate the ever memorable Retreat of the Ten Thousand. Having gone over the greater part of the country through which the retreating army passed, he has had peculiar facilities for producing a good work on the subject, and the light he has thrown upon it constitutes his book a necessary complement to the Anabasis. Need we add that this is one among the many useful results arising out of the exertions of this Society, under whose auspices a great portion of Mr. Ainsworth's travels were executed?

Two works have been published relating to Africa. The first I shall notice is by Mr. Ignatius Pallme, and is entitled 'Travels in Kordofan.' Mr. Pallme, a Bohemian by birth, visited in 1837 the most distant portions of the country acknowledging the government of Mehemet Ali, with a view to the extension of commercial intercourse; and no traveller has ever given so complete an account of that region as Mr. Pallme. Its dreadful climate, its productions and population, the manners and customs of its people, the horrors perpetrated by its conquerors in 1821; the slave hunts, for which alone it appears the ruler of Egypt took possession of it, are all described in the most masterly manner. The importance of the gum and ivory trade is also particularly dwelt upon by Mr. Pallme; and upon the whole this is the kind of book, which we should like to see more frequently resulting from the explorations of travellers. Another work on Africa is entitled 'Travels in Southern Abyssinia,' by Mr. Charles Alexander Johnston. This publication is unquestionably one of considerable interest, particularly for the detailed and evidently faithful pictures it gives, of the manners and disposition of the native tribes with whom the traveller came in contact in his difficult and frequently perilous journey. A great talent for observation, patience under privation, with coolness and resources in difficulty, would, I doubt not, render the writer of this book, if better provided with means and previous study for the great purposes of exploration, a very efficient and trustworthy traveller.

New Works on Asia—Bokhara and the recent Mission.—Whilst speaking of Asia, I must also allude to two other works which have re-

cently appeared: the one, 'Travels in Luristan and Arabistan,' by the Baron C. A. de Bode; the other an English version, by the same author, of the Russian work of M. Nicholas Khanikoff, on 'The Khannat of Bokhara.' In the first of these I was gratified to find that the drawings by my deceased friend Sir Robert Ker Porter, of the ruins of Persepolis, are warmly commended for their fidelity. It is also very agreeable, in following the lively and spirited writer, to hear his observations on the writings of the ancient historians, as he traverses the less explored regions of Luristan and Arabistan, with which our associates Rawlinson and Long have already made us, to a great extent, familiar: the first, by arduous researches, both geographical, personal, and scholastic; the second, by his learned commentaries on earlier works descriptive of the country passed over by the great Macedonian conqueror. The observations with which Baron de Bode concludes his book are highly interesting as a *résumé* of all previous and present knowledge of the ancient Susiana; and the work is well illustrated with maps and sketches.

The work of M. Nicholas Khanikoff (of which I received from the author a Russian copy when I was last in St. Petersburg) has, thanks to Baron de Bode, appeared in an English dress. Notwithstanding all that our countrymen Burnes and Wood have written upon those regions, every one who covets accurate details concerning the geography and statistics of that most remote and most barbarous of the great Asiatic States (with which Russia has so long carried on an advantageous commerce, but with which, alas! we have had only relations of a most doleful character), must be well satisfied with the valuable matters of fact related by M. Khanikoff. Besides sketches of the prevailing and monotonous character of the vast plains and deserts which bound that country to the north, with disquisitions on the course of the various rivers and the deflection of the great Oxus (at no remote period) from its former course into the Caspian; and in addition to descriptions of the adjacent mountains and well-digested documents concerning the productions, population, habits, and customs of the natives, English manufacturers may well learn a lesson in these pages of M. Khanikoff, when they are told, that the coarser though *more durable* cotton goods of the Russian are preferred to those of our own country, which of late years have been too much fabricated for the cheap sale of a showy but slight article.

It is indeed from the real traveller only, who knows the habits of Asiatic people, that our manufacturers can acquire a correct knowledge of the nature of the goods likely to be in demand, in such regions as Bokhara on the one hand, and China on the other.

My brother geographers will doubtless be anxious to glean some in-

formation, however slight, concerning the fate of our unfortunate countrymen Stoddart and Conolly, from one of the few Europeans like M. Khanikoff who last saw them. Having specially interrogated that traveller on this subject, when I saw him in August last at St. Petersburg, I learnt from him that Colonel Stoddart had been for some time living with the Russian party in perfect security, and had even assisted in observations on longitude taken by M. Khanikoff. If this state of things had continued, there is no doubt that, whatever political events might have arisen, he would have been ensured protection, and might have withdrawn with his Russian friends. The arrival, however, of Captain Conolly naturally induced Colonel Stoddart to associate with his countryman; and unluckily the untoward events of the Afghan Expedition, combined with the receipt of a letter in *English*, which the Mussulmen had no means of interpreting, and construed into instructions for their conquest, backed by the treachery of an agent in whom they both placed confidence, led to the imprisonment and subsequent massacre of these ill-fated and gallant officers. This happened, however, long after the Russian mission to which M. Khanikoff was attached had left the country.

In alluding to so sad an event, I should do injustice to my own feelings and those of all whom I address, if I did not express my warm admiration of the energetic and disinterested exertions made by our associate, Captain Grover, to save (as long as the slightest hope remained) the lives of the two gallant English officers; and notwithstanding the melancholy result, as now affirmed to us by the journey of Dr. Wolff, we must all admire the devotion and courage with which that reverend gentleman carried out the noble mission, with which the friends of humanity had entrusted him.

ASIA.

Persia, Hindostan, &c.—Major Rawlinson, well known to the members of this Society for his very learned contributions to our Journal on subjects of comparative geography, being now stationed at Bagdad, has had the opportunity of making some highly interesting explorations at Bisitún, where he has collected many inscriptions which, when deciphered, will no doubt throw great light not only on the ancient history of the country, but collaterally on geography.

Hindostan, &c.—Since the last anniversary, vol. vii. of the 'Trigonometrical Survey of India,' containing the Report of the meridional arc from Beider to Dehra Dún, has been put to press under the immediate superintendence of our valued new associate Colonel Everest. It will be published during the ensuing summer. Vols. viii. and

ix. have been received from India. The former contains the Reports of the Calcutta and Bombay longitudinal series; the latter the Reports of the Budhou, Rangir, and Amua meridional series, and the Pilibet, Terai, and Himalaya longitudinal series. The triangulation of other meridians to the eastward is in progress, under the superintendence of Captain A. S. Waugh, the successor to Colonel Everest.

During the past year sheet 50 of the Indian Atlas, containing Agra, Bhurtpur, Jeipur, &c., and sheet 56, comprising part of the Nizam's dominions, have been published. Sheets 67 and 68, comprising the principal portion of the Doab, will be completed in the autumn. These are based upon the triangulation directed by Colonel Everest.

As geographers, and apart from any political or commercial purposes which they may be calculated to promote, we cannot but look forward with great anxiety to the projects, still very imperfect and immature, for constructing two railways through the most interesting portions of the Company's territories in India. I shall only advert to the one project for carrying a railroad from Calcutta to Mirzapoor, just below the junction of the Jumna and the Ganges; and the other from Bombay, right across the peninsula to the course and mouths of the Godavery River, and the port of Coringa in the Bay of Bengal.

With respect to the maritime surveys of the coasts of India and parts adjacent, executed by order of the Court of Directors of the East India Company, the charts of the Gulf of Cambay, the Malacca banks, and coast of Kattiwar, by Lieut. Ethersey, I.N., have lately been published. The survey of the western side of the Gulf of Manaar, including the coast from Cape Comorin to Point Calimere, by Mr. Franklin, R.N., will shortly appear. That officer is at present occupied in surveying the eastern side of the Gulf. The coast of Africa from Cape Gardafui to Berburra has been surveyed chiefly by Captain Careless, I.N. The completion of the survey of the coast of Arabia, from Misenat to Ras el Had, may be shortly expected.

Here I may specially congratulate you on the renewal of the active services of our associate, General Monteith, of the East India Company's Engineers, the son-in-law of Mr. Murdoch, a learned geographer, one of our earliest friends and councillors, and one of the most ardent supporters of this Society. In former years, General Monteith, who has diffused much knowledge concerning the southern and eastern flanks of the Caucasus, was employed in deepening the important passage of Manaar, between Ceylon and the southern part of Hindostan—a most laborious and difficult operation. He is now about to proceed to complete that important work, which I have no doubt he will effect in the most perfect manner. In alluding to this operation, I might indeed

further mention many other labours of this distinguished engineer in different parts of Asia, of which he has a most extensive knowledge; and whose opinion must be most useful to his country, whether as respects the condition of the rivers tributary to the Tigris and Euphrates, or the northern frontiers of Persia. I may also say that, amid his surveying journeys, General Monteith has never lost a single opportunity of collecting objects of natural history, many of which he has liberally placed at my disposal.

Lastly, in respect to Asia, it may be stated that M. Emile de Chamcourtois has explored Kurdistan geologically, and communicated a note of his observations in a letter to M. Elie de Beaumont;* and that the publication of M. Jacquemont's voyage, of which you have all heard, has been concluded.

AUSTRALIA.

In recapitulating the papers received by us since our last anniversary, I mentioned several relating to Australia, and said there was no lack of explorers; in further confirmation of which I may state that Captain Sturt has proposed to traverse the whole island from S. to N., and from E. to W.: and although, upon this project being submitted first to the Colonial, and then to the Home Government, it was found impracticable from its magnitude, the Government, anxious to profit by the enterprising spirit and ability of Captain Sturt, recommended a modification of his views, and authorised an expedition to be conducted by him, to explore the country as far as the mountain chain supposed to be at some distance, in a N.W. direction, from the Darling, and to run parallel with that river. For this purpose the Government have contributed funds (2,500*l.*), and Captain Sturt is no doubt by this time far on his journey over, if not already returned from, the regions he was to explore. He was to ascend the Darling as far as Laidley's Ponds, and attempt to penetrate thence in a north-westerly direction. From the facilities granted by the Governor of South Australia, the liberality of the Home Government, and the known zeal and practical ability of Captain Sturt, we have every reason to hope that ere long we shall be made acquainted with a large and, from its proximity to the settled parts of the country, important region of the island.

In reference to the encomium which I last year thought it my duty, as it was my pleasure, to bestow on the gratuitous and important researches of M. Strzelecki along the great Cordillera of Australia, I now congratulate you on the appearance of the volume, in which the

* Comptes Rendus, April, 1844.

condensed results of his travels are embodied. The trade of bookselling is, I regret to say, very adverse to the development of that species of detailed knowledge which geographers specially covet, particularly from those who describe new lands; hence this able and industrious explorer has been necessarily compelled to abstain from giving us his views in the form of a narrative, followed by general inferences, and to abridge that style of graphic description in which I know he excels. The work, however, which is now produced, small though it be in relation to what M. Strzelecki could bring forth, is a well-arranged and methodical view (geographical and geological) of a great and slightly known chain; and he is entitled to our warmest thanks for considerably improving our acquaintance with the physical features and structure of this lateral back-bone of the vast south-eastern continent, and for presenting to us a new map of that part of the world.

Future Prospects of Intercourse between the British Colonies of Asia and Australia.—If on a former occasion I specially dwelt on the desirableness of completing a survey of the eastern Cordillera of Australia, and on the urgent reasons for raising Port Essington in the scale of maritime establishments, I am now impelled to refer to another operation in those south-eastern seas, which seems to me to be a great maritime desideratum. I speak of the attainment of a more correct knowledge than we now possess, of the seas, coasts, currents, and winds of that portion of the surface of the globe, which lies between our East Indian and Chinese possessions on the N.W., and our chief colonies of Australia on the S.E. The projected establishment of a continuous periodical chain of steam communication between Great Britain and China, by the Straits of Malacca (no wild vision), suggests the possibility of a branch line of packets from this great trunk line to Sydney being also established at no distant period; and if so, the most eligible line for such branch would seem to be from Singapore through Torres Straits.

After advertng, on a former occasion, to the great advantages to be derived from the colony of Port Essington, whether commercially or politically considered, I specially cited the opinion of that very intelligent young officer, Captain Owen Stanley, that great benefits might follow from a survey of the seas, coasts, and fertile islands north of Australia, which are grouped around Timor. I would now further throw out for your consideration, as an object highly deserving the attention of a government, solicitous to provide for the enterprising commercial interests of Great Britain, that a more extended, nay, a general exhaustive, survey should be undertaken, of all the tracks, which such steamers as I have contemplated may be destined to follow. As British geographers we must naturally wish that the fragmentary character of the information we

possess, respecting the winds, currents, and shoals of that region, and of the best practicable line of communication, should be speedily augmented, corrected, and extended, whilst commercial men would rejoice in the acquisition of knowledge, which might be turned by them to good account. The region I allude to may be regarded as a great gulf, whereof the chief Australian headland on the W. is Cape Harvey, a little S. of the tropic of Capricorn, and its eastern limits the Isle of Pines at the S. extremity of New Caledonia, a little N. of the same tropic. The chief western shore of this gulf is, in fact, the eastern coast of the continent of New South Wales; its eastern shore the Isle of Pines, New Caledonia, the Archipelagoes of Mallicolo, Queen Charlotte, the Solomon Isles, and the Louisiade; its bottom being the northern extremity of the coast of New Guinea. The width of this gulf, in the parallel of the tropic, is about 15° of longitude, and at the bottom, or in lat. 10° , about 5° of longitude. In a general sense it may be described as extending, in a N.W. direction, from about lat. 24° S. to lat. 8° . Forming an angle in this gulf lies Torres Straits, or the channel which connects the sea of Eastern Australia with the Asiatic Archipelago. Now, if I am correctly informed, our acquaintance with a very considerable portion of this region is still very imperfect; for though Cook ran along the greater part of the eastern coast, and though Flinders, King, and Stokes have successively explored portions of it with great ability and considerable detail, there is still much to be added respecting inlets, heights of adjacent land, currents, and other essential points of inquiry. Though the W. coast of New Caledonia, and the Archipelagoes before-mentioned, have been examined by Bougainville, Cook, Bligh, and others, its exact line has not yet been thoroughly laid down, the heights of its promontories are for the most part little more than conjectural, and the openings between the islands, whether as to number or extent, are not well ascertained. Towards the bottom of the gulf, the coast of New Guinea, from Cape Rodney of Bligh to the north-western extremity of Torres Straits, appears to be known only from the observations made on board the 'Harmuzeer' and 'Chesterfield,' as published by Flinders. Concerning the waters of the gulf, thanks to our adventurous navigators, Cook, King, Flinders, Stokes, and Blackwood, we already possess a considerable amount of knowledge, particularly as respects Torres Straits and the Barrier Reefs; but still much remains to be worked out.

Between the straits and the chains of islands forming the W. side of the gulf, for example, the sea and its shoals and islets are only known from the direct passages of Surville, Bougainville, Cook, Flinders, and those of a few transient merchantmen, or an occasional ship of war.

Again, though it is understood that for nine months of the year the prevailing winds blow up the gulf, or from the S.E., there appear to be many local exceptions; and I am not aware that the passage through Torres Straits from the westward has ever been attempted. Looking to the dangers of its reefs, the transit of sailing vessels during the prevalence of the south-eastern winds could never be thought of. A main point, therefore, to determine is how far such a passage may be practicable during the remaining part of the year.

The whole subject, indeed, of the direction, intensity, and steadiness of the winds throughout the great gulf in question, as well as the nature of the currents, opens a fine field of nautical research. The indraught of Torres Straits, and the general set of the winds during the season, in which that sea has been hitherto navigated, may explain what has been observed, that without the reef, and in mid-sea, a predominating current has been found to set in to the W. of N. But it is right to endeavour to know, whether during the remaining three months of the year the same current prevails, what are the currents, what the openings in the cluster of islands forming the W. side of the gulf, and what effect such local currents may have in modifying the predominant stream. I presume not to offer these suggestions in any other spirit than that of an anxious looker-on; for I well know that, as far as means have been allowed to them, our gallant and intelligent surveyors have nobly done their part; and I further know that the eminent geographer, who so ably directs the hydrographic department of our naval service, requires no stimulus from a landsman to carry out any project which may prove beneficial to his country.

I am aware that even whilst I speak, Captain Blackwood is employed in the arduous survey of Torres Straits, and that already a chart has been prepared in the Hydrographer's Office, which will shortly be given to the public; but this is part only of the scheme required; and, desirous to see it much extended, I am now appealing to those of our rulers, who take prospective views of the future development of British commercial enterprise, or the contingencies of war, and who may therefore naturally wish to render, as speedily as possible, our previous knowledge of these seas more perfect. When we consider that the most direct line of communication between Singapore, Hong Kong, and the subordinate settlements of that great field of commerce on the one hand, and all our important Australian colonies on the other (Swan river alone excepted), lies through this gulf, and when we know that New Zealand, an important British settlement, forms the extreme south-eastern limit of this great gulf, there is every prospect that eventually it must become a high road of intercourse, which will knit together the

islands with our great Asiatic and Australian colonies; hence therefore I venture to say that a complete *exhaustive survey* of the whole of the gulf above defined would be a true service to science, and a noble spur to national industry.

AFRICA.

Of the geography of Africa our knowledge advances but slowly, considering the vicinity of that continent to Europe, and the resources of every kind which the present age places at our disposition. With Algeria, indeed, the exertions and ability of the French engineers are making us well acquainted; and the liberal views of the Ruler of Egypt have so completely thrown open the Delta and the whole of the lower course of the Nile to the investigation of travellers, that we have become nearly as well informed regarding that river and its banks, as we are of the Rhine. Our attempts to put a stop to the odious trade in slaves, and the numerous vessels that cruise, in consequence, along the western shores of Africa, have also increased our acquaintance with the coast, and the mouths of its rivers in that direction. Along the E. coast we have done comparatively little; and as for Abyssinia, which of late years has been the scene of so many explorations, though now much better acquainted with it than formerly, it is still very partially known to us; whilst the hydrography of the Galla country, in the eastern portion of which extensive rivers take their rise, and where, it appears, the source of the White Nile is to be sought, is quite unknown. Indeed, it would be difficult to instance any part of the world, whose streams have given rise to a greater diversity of opinion respecting their course. Thus, upon the whole we have a most limited knowledge of Africa, and that little confined almost exclusively to the coast: of the interior we are nearly as ignorant as we ever were; and, unfortunately, the hostile disposition of the inhabitants, except on a few points, and the fatal influence of the climate, still oppose obstacles to research of the most formidable nature. From Egypt we have just received the first part of a new publication in French, entitled '*Miscellanea Egyptiaca*,' published by the Historical and Literary Association of Egypt, and printed at Alexandria. This Society, founded on the 15th February, 1842, by Messrs. T. E. Prisse and H. Abbott, has now acquired consistency, and reckons among its members many well-known Eastern travellers, and individuals of scientific and literary eminence in Europe. If we may judge from its Transactions already published, it bids fair to take a high standing among the scientific institutions of the day. The first part of their first volume contains '*An Account of a Tour to Bubastis, Sebennytyus, and Menzaleh*,' by Sir Gardner Wilkinson; 'Extract of

a *Journal of Travels in Abyssinia*, by J. G. Bell, Esq.; 'Account of an Excursion into the Eastern Parts of Lower Egypt,' by Mr. E. Prisse; 'Notes on Sennaar,' by A. D. R.; and 'Observations on the Climate of Egypt,' by Dr. Verdot. This enumeration sufficiently shows that our own peculiar science has a large share in the labours of the Egyptian Association, a circumstance which, as geographers, we hail with pleasure. We think the Association highly valuable, and I am sure all present will join in best wishes for its continued prosperity.

Abyssinia.—Among the papers just enumerated is one by Mr. Bell. It will be remembered that in my last year's Address I mentioned this young officer of the Indian navy, and spoke of his having been dangerously wounded while travelling in Abyssinia. Those who wish for details of his adventures will find them in the '*Miscellanea Egyptiaca*.' He travelled in the years 1840, 1841, and 1842; and although his paper does not contain much geographical matter, still every little is of interest, relating to Abyssinia. The traveller's account of the desperate attack made upon himself and attendant by eight armed men, and which, notwithstanding the great courage evinced by the two travellers, ended, naturally enough with such powerful odds, in their being both most desperately wounded, is a fresh proof of the dangers and sacrifices, by which the increase of a little geographical knowledge is too often purchased.

I also mentioned last year, among other travellers into north-eastern Africa, Messrs. Ferret and Galinier, but could say nothing of the result of their labours, which was not at that time known. Since then a report has been made to the Academy of Sciences of Paris, by a committee appointed for the purpose, upon the labours of these gentlemen.

It appears they were abundantly supplied by the French Government with instruments. After remaining eight months at Cairo, in order to learn the Arabic language, they embarked on the Red Sea, accompanied by Messrs. Bell and Rouget. They arrived at Djiddah in 33 days, and sojourned there a month. Here they were not idle, but constructed a map of Hedjaz and Asyr. Leaving Djiddah on the 21st October, 1839, they arrived in 9 days at Massowah, where they landed, and, without loss of time, proceeded to Adowa, the capital of Tigré. They explored a great part of Tigré and Semen, often in the midst of great difficulty arising from the unsettled state of the country. In May, 1842, they were at Gondar, whence, taking different routes, they returned to Massowah in August. Here the excessive heat forced them to embark immediately. They landed at Cosseir, whence they crossed the desert to Thebes, and then descended the Nile to Cairo. On the 23rd January, 1843, they arrived in France, having been absent three years and three

months. M. Rouget had died, and also M. Schœfner, who had accompanied M. Lefevre. The death of M. Dillon, who was buried by the present travellers, I have already had occasion to mention.

The principal fruit of Messrs. Ferret and Galinier's journey is the map they have constructed of a considerable portion of Abyssinia: the main points in this map have been determined by astronomical observation of the latitudes of 9 points, and by the longitudes of Intetchaou, of Adde Costi, and of Axûm; the features of the country are filled in by bearings and distances, and the modes usually employed in military recognizances. The directions of the rivers also have been more accurately laid down. Thus the Assam, on which the capital of Tigré is situated, is said by Messrs. Ferret and Galinier to flow to the S. and not to the N., as laid down by all former travellers except Rüppell. The Mareb was ascended, and the longitude and latitude of its source determined. Other rivers, known only by name, have been laid down with tolerable accuracy. The Tacazi is also rectified, by the travellers' own observations, and by information acquired in the country, from its source to its junction with the Nile in Sennaar. Tigré and Semen have been mapped in great detail.

The heights of several mountains, &c., have been taken barometrically, though not by corresponding observations. Mount Deljem was found to be 4620 metres high, and at this elevation there is always snow. Numerous meteorological observations were made in Tigré. No magnetic observations were made; indeed it appears that in providing the instruments for the scientific pursuits of the expedition, magnetism was overlooked. A geological map of Tigré and Semen and nine sections of the country, the whole coloured, have been prepared, together with a descriptive memoir of the primary, transition, secondary, and tertiary formations of the ancient volcanoes, the thermal springs, the iron and salt mines, and fossil combustibles, specimens of which have been brought home. The travellers have also made a collection of birds; though, after Rüppell, there was little to glean in that department of natural history. Among the insects collected there are 140 new species. Of plants, 600 had been collected; but, the travellers having been plundered, only 250 specimens were brought away, of which, however, 60 are entirely new. Particular attention has been paid to those vegetable productions that are applied by the natives to useful purposes, and several that are curious in this respect are mentioned in the Report of the Committee: one produces a very rich indigo colour; the mixture of two others gives to leather a beautiful red dye. The geographical position and height of the *habitat* of plants have not been neglected. A collection of seeds was brought away, but unfortunately lost; a casualty which had been provided

for; and a second supply is expected to arrive safe. I am happy to add, that the Academy recommends that the fruits of this expedition be forthwith published.

In the 'Comptes Rendus' will be found a Report of the exploratory expedition into Abyssinia, under the direction of M. Lefevre, assisted by MM. Petit, Quartin, Dillon, and Vignaud. These gentlemen commenced their operations in the Dhalac archipelago, opposite to Massowah, in the Red Sea, where they convinced themselves that these islands, together with the whole of the coasts on both sides of the Red Sea, have been upheaved. The results of their travels are, an account of the physical geography of the country, vast collections in natural history, particularly birds, a herbal of 1600 or 1800 plants, of which 500 or 600 are new species, and a topographical map of the country from 16° N. to 8° S. latitude, and from 35° to 38° E. longitude. The base of the triangulation was a line extending between Dama Galela and Nahailé, two points from which a great extent of country may be seen. Forty positions were astronomically determined. Meteorological and magnetic tables have been prepared, as also tables of the productions of the three kingdoms, notices of commerce and navigation, vocabularies of the languages, accounts of the religion, laws, manners, and customs of the people; with geological maps and sections, and numerous drawings. There can be little doubt that the two last-mentioned travels will materially add to our knowledge of a great part of Abyssinia, and we therefore look with interest for their early publication. Two of the fellow-travellers of M. Lefevre died, as I stated in my last year's Address. The melancholy details of the death of M. Dillon, as given by M. Petit (himself subsequently drowned), and reported by M. Lefevre, will be found in the 'Bulletin de la Société de Géographie' for January of the present year.

In speaking of French travellers in Abyssinia, I must not omit to mention M. Antoine d'Abbadie, who, with his brother Arnauld, has been for so many years in that part of Africa. On the 3rd of January a letter was received in Paris from M. d'Abbadie, dated Saka, 16th September, 1843, in which the traveller states that he had passed through Guderu and Jimma to Saka, in Euarea. He gives it as his opinion that the river Omo is probably the same as the Djob, or Juba, or Gojeb, which he writes Gwadjab, and which, after receiving the Gibbi, falls into the Indian Ocean. He formerly thought that the Waby was an affluent of the Jubba, but is now satisfied that it enters the sea at Magadoxo. He says he remained two months at Saka, and made many observations of lunar distances and hour angles, &c., for latitude, which he has sent home to be calculated. He further states, that according to a well-

informed Mohammedan, a native of Dar-Sale, who has been twenty-two years in Enarea, the Dedhesa river is the same as the White Nile, but that this proved to be an error. The Dedhesa, which runs due N., as laid down by Dr. Beke (see part ii. of vol. xiii. of our Journal), not only runs to the Bahr-el-Azrek, or Blue Nile, or Abai, but is regarded by M. d'Abbadie as the principal branch of that river, in which he perfectly coincides in the opinion entertained by Dr. Beke, that the Abai is not the main branch of the Bahr-el-Azrek. The Baro he regards as a western branch of the White Nile. A letter, of the 7th October, from Geddeh, states, that M. d'Abbadie had returned from Euerea. There has also been received from him a letter, dated the 5th August, and we find in the 'Athenæum' one still later from Gondar, dated September, and addressed to our foreign secretary, M. Renouard.

Abyssinia and Galla.—Charles Tutschek.—Before quitting the subject of explorations in Southern Abyssinia and in the neighbouring country of the Galla, I beg to pay a tribute of respect to the meritorious labours of the late Charles Tutschek, a native of Bayreuth in Franconia, who, soon after the commencement of his studies as a jurist at Munich in 1837, (by the accidental circumstance of his having been appointed to take charge of the poor blacks, natives of the Galla and other neighbouring countries, who had been brought to Europe by the Duke Maximilian of Bavaria,) was induced to devote himself most ardently to the study of the Galla language. By the help of these natives, one of whom was a Galla and another a Darfurian, Charles Tutschek was soon enabled to collect a sufficient knowledge of the language to put to the proof the various words brought home by Ludolf, Brown, Salt, Seetzen, Burckhardt, Rüppell, and Bruce; and being supported by the encouragement and advice of Carl Ritter of Berlin, whilst he evinced unremitted patience and good sense in eliciting words and sentences, and principles of the grammar, and facts, and places, from his own illiterate pupils, he at length succeeded in compiling the materials of a lexicon, and a grammar of the language. Unhappily for the cause of literature and geography, C. Tutschek, when on the point of setting out to visit the country on whose resources and idioms he had so long dwelt, with the hope of rendering himself useful to the ignorant Gallas, and to his own enlightened countrymen, was cut off by disease in September, 1843.

The task of editing his posthumous writings was left to his brother, Lawrence Tutschek, who, in 1844, published the Lexicon, dedicating it to Maximilian, Crown Prince of Bavaria; and in the course of this year he has succeeded in giving to the public an 'Elementary Grammar of the Galla Language,' dedicated to one of our members, Sir Thomas D. Acland, who is also one of the warmest friends and a most liberal pro-

motor of the cause of African civilization, and on whom may be said to have descended the mantles of a Wilberforce and a Clarkson.

Nothing can more effectually tend to improve our knowledge of the still unknown portions of the globe, than a preparatory acquaintance, on the part of the adventurous traveller, with the language of the natives. It presents the readiest means of ensuring a grateful welcome in the hut, and in the palace.

S. Africa.—Descending now the E. coast of Africa, we learn by a letter communicated by Mr. Macqueen, not to ourselves, but to the Geographical Society of Paris, and printed in their Bulletin for August, 1844, that Mr. Krapf was at Brava in December, 1843; that he had entered the Jub, over the bar of which there was, in the dry season, only 2 feet of water, but having 15 or 20 feet within the bar. The lake said by Lieut. Christopher to be without outlet, and to be the recipient of Haines river, Mr. Krapf says is nearer to the sea than was before imagined, and that it is only two or three days' journey from the town of Juba. Independent of this information, there is a passage in Mr. Macqueen's letter to M. Jomard, which, as President of the Royal Geographical Society of England, I am bound to notice. Mr. Macqueen says, "*Je voudrais engager mon pays à suivre les traces du vôtre, à faire quelque chose pour l'amélioration de l'Afrique.*" Far be it from me to wish in the least to underrate the efforts made by our neighbours in the cause of African civilization; but we must vindicate our own claim to having sacrificed more money, more lives, and made greater efforts than all the other countries of Europe put together for ameliorating the condition of benighted Africa. France has abundance of just claims of her own of the highest order, and with all she is now doing, or has done, she will be the last not to admit the due merits of England. It is indeed unnecessary to call your attention to the millions which for this object the British nation sacrificed on the altar of humanity, or of our continued efforts to carry out and complete what Parliament and the country have considered a righteous cause. I will simply add, that even unaided English travellers are now striving to explore tracts of Southern Africa, which no European traveller of the last century has ever trodden. To my great surprise, I recently conversed with an ardent and accomplished youth, Lieut. Ruxton, late of the 89th regiment, who has formed the daring project of traversing Africa in the parallel of the Southern Tropic, and has actually started for this purpose. Preparing himself by previous excursions on foot in N. Africa and Algeria, he sailed from Liverpool in December last in the bark 'Royalist' for Ichaboe, now so well known for its guano; from this spot he was to repair to Walvish Bay, at the mouth of the Kuisiss river, where we

have already mercantile establishments. The intrepid traveller had received from the agents of these establishments such favourable accounts of the natives towards the interior, as also of the nature of the climate, that he has the most sanguine hopes of being able to penetrate to the central region, if not of traversing it to the Portuguese colonies of Mozambique. If this be accomplished (and there are traditions of its having been done in former times by the Portuguese), then indeed will Lieut. Ruxton have acquired a permanent name for himself among British travellers, by making us acquainted with the nature of the axis of the great continent of which we possess the southern extremity. I have much pleasure in adding, that the Admiralty have sent out instructions to the naval officers on the coast to afford Lieut. Ruxton every assistance, and I have no doubt that our member, Mr. Bandinel of the Foreign Office, so zealous in our cause, will aid, by every means in his department, the young and gallant adventurer.

Mr. Ackerman has started from Paris for Madagascar, where he proposes to remain some time. The Academy of Sciences has furnished him with instructions on the principal objects of research, which should fix his attention. We learn that the same individual has presented to the Academy a project for improving the salubrity of the Island of St. Mary's, off the coast of Madagascar.

In the 'Athenæum' for August we find it mentioned that M. Maizan has received a commission to explore Southern Africa. He is to enter the country at Zanzibar and join the Arab merchants, who leave the coast at certain periods of the year for the interior.

The French commander, H. J. Matson, and Capt. Morell, have made numerous observations, hydrographical and meteorological; the former on the W. coast of Africa, S. of the equator, and the latter along the coast of Cape Colony; while the commandants, P. d'Orcel and Lunanoff de Kerdudall, have explored the eastern coasts of the Mozambique channel.

AMERICA.

N. America.—Among the geographers of eminence, whose death it was my painful duty to notice in my Address of last year, was M. Nicollet, whose labours along the Mississippi and Missouri I also mentioned. We have since then been favoured, through the kindness of Mr. Greenhow, with M. Nicollet's map, in 6 sheets, embracing the whole course of the mighty Mississippi, and that of its equally important affluent, the more rapid and tortuous Missouri, together with the vast region lying between these great arteries of the N. American continent. This map is of the greatest importance in itself as depicting the hydro-

graphy of that part of the world with an accuracy of detail sought for in vain in all preceding maps; and its value is still further enhanced by the very able report of M. Nicollet, by which it is accompanied, and for a copy of which we are also indebted to Mr. Greenhow. This report contains, first, a succinct account of the physical geography of the country embraced within the limits of the map, including a narrative of the movements of the expedition during the years 1838-9, and an account of M. Nicollet's visit to the sources of the Mississippi in 1836; and, secondly, an abstract of the principles and methods, by which he was governed, in making his observations both for astronomical and physical geography. There are also three appendices, the first of which presents a tabular view of the geographical positions on which the construction of the map is grounded; the second is a catalogue, drawn up by Dr. James Torrey, of the plants obtained during the expedition; and the third, a list of the fossils of the more important localities.

In this very interesting report, the physical features of the country, the productions of its surface and its geology are detailed; the manners, customs, and language of the tribes met with, are also succinctly described; but the exploration of the portages at and about the sources of the Mississippi may perhaps be esteemed the most valuable portion of M. Nicollet's labours. The account of the pseudo-volcanoes along the Missouri is also very curious. He rightly attributes their origin to those singular centres of slow combustion, which the mineralogist Patrin erroneously considered to be the cause of *real* volcanoes; viz. the penetration of water into the pyritiferous strata, and the consequent decomposition of the sulphuret of iron. The sources of the Mississippi had been already explored by Mr. Schoolcraft and Lieut. Allen; but M. Nicollet is, we believe, the first traveller who has carried with him astronomical instruments, and employed them along the whole course of that river, from its mouth upwards. The report contains also a very interesting sketch of the early history of St. Louis. Altogether the map and memoir are very valuable additions to the geography of N. America.

I shall say nothing of J. C. Fremont's exploration of the country lying between the Missouri and the Rocky Mountains, of Mr. Josiah Gregg's work on the 'Commerce of the Prairies,' of Mr. Greenhow's 'History of Oregon and California,' as, thanks to the kindness of Mr. Thomas Falconer, our Journal contains that gentleman's valuable analytical notices of these several publications; whilst his recent work on the question of the rights of Great Britain to the Oregon territory is satisfactorily deduced from the original rights as derived by us from the

cession of its first discoverers, the French. I must here, however, mention another work by M. Duflot de Mofras, entitled 'Exploration du Territoire de l'Oregon,' in 2 vols. This publication has been made at the expense and under the direct sanction of the government of France. Though not devoid of interest, more especially at the present moment, we do not find in it any new facts observed by the author; neither is there any journal to enable us to verify the track, which he has marked on his map as the course of his journey. Although politics are not our object, I cannot fail to observe that, however indisposed to favour British interests, this author is compelled to admit the validity of the English claims to the Oregon territory.

There has also been published a map of the boundary line between the United States and the adjacent British dominions, from the mouth of the Ste. Croix to the intersection of the parallel of 45° N. lat., by Major Graham, with sections.

Mr. William B. Hodgson has likewise published at New York an ethnological work, entitled 'Notes on Northern Africa, the Sahara, and Soudan, &c.,' which is well spoken of; and his observations on the ancient history of the N. of Africa, and the affinity between the B and the ancestors of the ancient Egyptians, are said to be worthy of consideration.

Central America.—Passage across the American Isthmus.—Having formerly adverted at some length to the projects which had been at various times set on foot concerning the execution of canals, railroads, or passages for commerce, across the great isthmus of America on five parallels of latitude, I am now happy to state, that in consequence of the able reports on the subject, and the confidence reposed in Don José de Garay, and the parties who are at the head of this great Mexican project,* a company has been formed, and is about to be publicly announced, to open a canal from the lakes near Tehuantepec, on the Pacific, across the Cordillera (there very low), to the navigable portion of the river Cuazacualco, which is navigable for 80 miles from its mouth in the Bay of Campeachy or Gulf of Mexico.

I have already so fully anticipated all I could say on the desirableness and vast importance of the execution of such a project, and the British public are now in possession of such clear and copious documents in the work of that skilful engineer, M. Moreau, that I shall restrict myself to the gratifying announcement made to me by one of our members, Mr. De Morgan, that the company formed consists of Mexican, British, and French interests; that the canal is to be cut from the higher portion of

* For an account of Don José de Garay's survey of the isthmus of Tehuantepec, see the able article by Mr. Thomas Falconer in our own Journal.

the river Cuazacualco to the lakes on the shores of the Gulf of Mexico; and that it will be made on the same scale as the Great Caledonian Canal, and therefore passable by vessels of 1000 tons burthen.

When we reflect on the vast saving of nautical risk, time, and expense, which this short cut to the Pacific and all colonies, *in esse* and *in futuro*, whether on the Oregon or elsewhere, to which British enterprise can extend, and think of the vastly greater dangers and difficulties of doubling Cape Horn than those of rounding our Orkneys and the Fitful Head, we can have no hesitation in wishing hearty success to a company, which will thus at once clear away such obstacles, and open out such a grand field of commerce, by the execution of a project which has been a desideratum for centuries, and which never could be so well carried out as in these piping times of peace.

I am acquainted with little other information of interest, which this year has furnished respecting Central America, except that there is a strong probability that a German colony will be founded on the Mosquito coast; the Baron de Felcher having returned from thence with a favourable report on the soil and climate, and the Queen of the country having offered to a commission an extensive tract of land.

S. America.—Of S. America, in like manner, we have heard but little. French Guayana has been recently examined by M. Jules Itier, whose accounts have been successively published in the '*Annales Maritimes et Coloniales*.' M. F. de Castelnau is pursuing his researches in the interior of Brazil with the assistance of the Brazilian Government; when last heard of (22d March, 1844), he was at Goyaz. His intention was to proceed to the W. and descend the Tocantins river, returning to Goyaz by ascending the Araguay.

EUROPE.

Sweden and Norway.—We have lately received 7 sheets of the N. coast of Norway, and a similar number of the hydrographic survey of the southern provinces of Sweden. The former documents were put into my hands by our eminent foreign member Hansteen, when I visited the scientific congress of Scandinavia assembled last summer at Christiania; but I regret that my rapid transit through Sweden and my geological pursuits did not enable me to communicate with our Swedish foreign members, except M. Wahlenberg. I hope, in revisiting Sweden and Norway this summer, to be able to bring from thence some new stores. In the meantime, I can announce to you that since our last anniversary, Professor Keilhau has published a geological map of the northern tracts of Norway in the second part of his '*Gæa Norvegica*;' and that when at

Stockholm I had, through the privilege kindly obtained for me by Baron Berzelius, an opportunity of inspecting a portion of a large lithological map of Sweden, which is in preparation, and in which the varied ancient crystalline rocks of that kingdom will be clearly indicated by the labours of competent mineralogists and surveyors, Messrs. Forsells, Erdman, Franzén, and Troillius. In making inquiries respecting the remarkable phenomenon of the rise of land in Norway and parts of Sweden, to which public attention was first called by Leopold von Buch, and which have been so much extended by the researches of Mr. Lyell, I was informed by Baron Berzelius that there is unquestionably a line from E. to W. across Sweden in the parallel of Solvitsborg, along which the ground is perfectly stable, and has not moved for many centuries. To the N. of it, however, the whole continent appears to have been raised very considerably at comparatively recent periods, and to be still undergoing the same process, the intensity of which increases to the N. The presence of sea-shells not distinguishable from those now living in the adjacent seas at different altitudes are the best proofs of such rise in previous times, and the marks affixed to the rocks prove that this elevation is still proceeding. To the S., however, of the stationary line, or throughout the province of Scania, it is now still more clearly developed, that the land is, on the contrary, undergoing that depression, which Mr. Lyell explained to the English public.

The person above all others who has worked out the phenomena of the depression of Southern Sweden is that eminent and truly learned man Professor Nillson of Lund, who combines a profound knowledge of natural history with great reading and research, and whose labours in ethnology have thrown so much light on the several races of men which from the earliest times have successively occupied his country.* It is not only by showing that the village of Stafsten in Scania is now 380 feet nearer the Baltic than it was eighty-seven years ago, when Linnæus himself measured the distance, but also by indicating that an ancient pavement of the time of Trelleberg has been found at a level of 3 feet below the Baltic, that a depression is proved: Nillson has further shown that both on the E. and W. sides of Scania, turf or peat bogs (evidently terrestrial, because charged with fresh-water and terrestrial remains) are also under the level of the sea; and thus no doubt can be entertained concerning the movement of Scandinavia, which may be resembled to that of a plank upon a raised support, one end of which is ascending and the other descending

* The Royal Museum at Copenhagen affords a splendid illustration of the value saving from destruction, in one national museum, the earliest implements of each age. Arranged according to the scheme of Nillson, the utensils of the successive ages of stone, brass, and iron are admirably developed by the able conservator, Mr. Thompson.

whilst the supported part is stationary. Regretting that I cannot now go further into a subject so interesting to all geographers as well as geologists, I promise you, if health and life for the next year be allotted to me, to enter more fully into the question. There are, indeed, many other phenomena which are not so strictly geological, but that I might, with perhaps some pleasure to yourselves, refer to them on the present occasion. Such, for example, are the views which I entertain of the successive changes in the outline of northern Europe at various periods anterior to our own, and the transport of the great blocks from Scandinavia, not only over countries to the S. (as had been erroneously supposed), but eccentrically, and in all directions. These matters can, however, only be safely handled in a separate work; and having stimulated your curiosity by a notice of them, I must refer you to my forthcoming work on Russia and the adjacent countries, in which I have endeavoured to explain these striking phenomena.

Lastly, in respect to those northern countries, I may say that Captain Roosen of the Norwegian engineers has lately published, at Paris, a new map of the northern provinces of Norway.

Belgium.—M. Linden, we understand, has returned to Brussels from a scientific mission in S. America, after an absence of three years.

Two additional sheets of the Topographical Survey of Belgium have been published, viz. Ostend and Bruges; also

A Nouvelle Carte Générale de la Belgique, par M. Vandermaelen, on the scale of $\frac{1}{250,000}$.

Austria.—In Austria has been published a General Map of Europe, in 24 sheets, by a Society of Geographers at Vienna; also an Atlas of the Austrian Empire, in 15 sheets; and a General Atlas, of 40 maps, besides many maps of ports or harbours. Some Statistical Tables of Hungary, and a Lexicon or Geographical Dictionary of the Austrian Empire, have likewise been published.

Colonel Hauslab of Vienna has published a set of Physical and Geological Maps, showing the natural distribution of the surface of the globe into Orographical, Hydrographical, and Geological basins.

A new Map of Krain, by M. H. Theyer, in 16 sheets, is in progress of publication; 4 sheets have already appeared.

A Map of Bohemia, by Kumersberg, in 4 sheets, is also being published; one sheet of it has been printed.

We learn from our foreign member Colonel Skirbanek, that the surveys of the kingdoms of Bohemia and Hungary, under the direction of the Military Geographical Institute, have been continued on both sides of the Danube. The triangulation of Transsylvania has been finished, and an azimuth measured near Lemberg. It is proposed to continue

the survey next year, when the triangulation will be carried over the N. of Germany in the parallel of Buda by one set of surveyors, while another, beginning its operations in Transsylvania, will push on towards Tameswar and the Banat. At Spalatro, in Dalmatia, where the latitude has been already observed, an azimuth will be measured; and at Fiume, where the azimuth is already known, the latitude will be determined. It is also intended to connect the Naval Observatory at Venice with the general triangulation of Austria, by means of the astronomical admeasurements of the arcs of the meridian between Spalatro and Vienna, between Fiume and Prague, and between Venice and Munich.

The Military Geographical Institute is now engaged on a Special and a General Map of Moravia; of the former, two livraisons have appeared.

The drawing of the Special Map of Bohemia, on the scale of $\frac{1}{1,440,000}$, is begun, in order to its being engraved on copper.

Saxony.—Philology being a branch of ethnology, and this latter intimately connected with geography, the Society will be glad to learn that an association has been formed at Dresden, under the presidency of the celebrated Orientalist Hermann, for the furtherance of philological pursuits. The importance of philology, as affording data by which to arrive at a knowledge of the former relations, and present dispersion of the different families of mankind, cannot be doubted, and it is to be hoped that the learned and indefatigable philologists of Germany may succeed in elucidating a subject still enveloped in much obscurity. In connexion with this, the late discoveries of Hamyaritic, and Cuneiform inscriptions, and the attempts more or less successful of learned individuals to decipher them, have considerable interest.

The Baron V. Wrede, whose Notes of an Excursion in Hadramaut is inserted in our Journal, is publishing at Leipsig the account of his explorations in S. Arabia.

Frankfort.—M. Derfelden de Hinderstein has lately completed his important Atlas of the Dutch East Indies.

France.—In the Bulletin of the Geographical Society of France will be found interesting notices on Kurdistan, by M. Texier.

M. Vivien is publishing the Geographical History of Asia.

M. d'Avezac, who has so greatly contributed by his labours to the geography of Africa, has lately added to the work entitled 'Univers Pittoresque' an interesting volume on the ancient religions prevalent in the north-western regions of Africa.

The Société de Géographie of Paris has published a Grammar and Dictionary of the Berber Language, under the superintendence of M.

P. A. Jaubert; and a French and Berber Dictionary has been published by order of the *Ministre de la Guerre*; both of which works have been liberally presented to our library.

M. Gabriel Lafond, in the last volume recently published of his '*Voyage autour du Monde*,' has given some highly interesting notices on the commerce of the Indian Archipelago carried on by the Malay Boughis.

It is probably known to you that in 1839 Mr. Walkenaer published an atlas, entitled '*Géographie Ancienne Historique et Comparée des Gaules Cisalpines et Transalpines*.' The author has lately added an additional map to the collection, being that of Gaul at the epoch of the fall of the Roman empire in the West.

We have further been favoured by M. Daussy, one of our corresponding members at Paris, with the following notice:—

The survey of the coasts of France in the Mediterranean was terminated by M. Mounier in 1843; there remaining nothing to do but to determine the soundings further out. The death of M. Mounier having put a stop to a career, throughout which he had given proofs of great talent, M. Duperré, who had been his second in command at Martinique and on the coasts of France, was charged with the work. In 1844 all the western portion had been completed, and, with the permission of the Spanish government, the Bay of Rosas has been surveyed as far as Cape St. Sebastian. M. Duperré is now about to start for the eastern portion. The use of a steamer has greatly facilitated these operations.

Of other French engineers abroad, three are in China, one at the Marquesas, and one on the coast of Algeria, but no reports have yet been received from them. The 6th and last volume of the '*Pilote Français*,' which completes the description of the northern and western coasts of France, has been published, so that this great work, which has been twenty-five years in completing by the corps of hydrographical engineers and their able director, M. Beautemps-Beaupré, is now terminated.

The physical portion of the voyage of the '*Vénus*,' forming 5 volumes of interesting observations by M. de Tesson, has been published, and the atlas of the voyage is almost finished.

The physical portion of the voyage of the '*Bonite*,' edited by M. Darondeau, is also rapidly advancing towards conclusion.

The engraving of the charts and plans, illustrative of the expedition of the '*Astrolabe*' and the '*Zélée*,' is also making progress, though nothing of it has yet been published. M. Vincendon Dumoulin, who has charge of the work, and who is also to compile the history of the voyage, has constructed several general maps and charts, composed partly from ob-

servations made during the voyage; several of these latter have been published, and others will shortly be issued.

M. de la Marche, who sailed in 1842 on board the '*Erigone*,' commanded by Captain, now Rear-Admiral, Cecille, has brought hence from his voyage a great mass of magnetical and physical observations made in China, which have been received with great interest by the Académie des Sciences, and which are likely to be soon published.

M. Cazallon still continues his researches on the tides. He has established an instrument at Toulon, which uninterruptedly marks the movement of the tides, and he is about to set up a similar instrument at St. Servan.

M. Keller has made some very interesting observations at Cherbourg on the currents produced by the tides; and he is now preparing a memoir on the subject, which M. Daussy thinks will contain some new ideas.

M. Lefevre's voyage in Abyssinia is about to be published, and a description of the W. coast of Africa, by M. Bouet; as also the voyage of M. Raffenel. This gentleman was despatched in 1843 by the French Governor of Senegal, to explore the river Falémé, and the gold districts on its banks and on those of its tributaries. He visited the upper course of the Gambia, where, it is said, he has resolved, on data quite new, the question of the alleged junction of the upper streams of the Gambia and Senegal; and he has generally improved the maps of the W. coast, particularly as regards the hydrographical system of that region.

M. Daussy has further favoured us with a detailed list of 32 charts and plans, and six works of nautical descriptions and sailing directions, which have been published by the French Ministry of Marine during the past year, kindly adding the promise, that the greater part will be presented to the Society. The detail of the more important voyages now publishing is as follows:—Voyage of the *Bonite*; Historical Atlas, 9th and 10th part; Zoological Atlas, 13th part; Botanical Atlas, 9th, 10th, and 11th parts; Text, 6th livraison; Magnetical Observations, tome 1, 2nd part, 1 volume in 8vo., 7th livraison; Geology and Mineralogy, 1 vol. in 8vo., 8th and 9th livraisons; Zoophytology, 1 vol. in 8vo.

Voyage of the '*Vénus*,' Text History of the Voyage, 4th volume; Physical portion, 4th and 5th vols.; and livraisons 6, 7, 8, 9 and 10 of the Atlas of Natural History; Voyage of the '*Artemise*,' the 3rd vol. in 8vo.

With regard to the Scientific Commission of the North, in Scandinavia, Lapland, &c., of the Atlas there have been published from the 16th to the 18th livraison; of the Text, 4th livraison, being Geology and Mineralogy, 1st part in 8vo.; the 5th livraison, Meteorology, tome 1,

part 1; 6th and 7th livraisons, *History of the Voyage*, 1 vol.; and 8th livraison, *Magnetism*, tome 1, 2nd part.

Of the *Voyage of the 'Astrolabe'* there have appeared:—*History of the Voyage*, 6th and 7th tomes of the text, and 33rd livraison of the *Atlas*; of the *Zoological Atlas*, livraisons 11th to 15th; *Botanical Atlas*, livs. 7th and 8th; *Anthropology*, livs. 1st to 4th; and tome 1 of the *Hydrography*.

Lieut.-Col. Lapie, another of our corresponding members, informs us that the *Dépôt de la Guerre* has published eight more sheets of the Map of France, viz., Mirecourt, Auxerre, Tounerre, Langres, Tours, Blois, Clamecy, and Avallon, which brings up the number already published to 93; 36 are now engraving, eight of which will be published during the present year; the survey of the remaining 28 will be completed also this year, making in all 157 sheets.

Numerous rectifications and additions have been effected in the maps of Algeria, and others very important are now making. Of these maps Col. Lapie has kindly promised to send copies for our library.

Two works by the Scientific Commission of Algeria are about to be published. The first of these, edited by M. Carette, Captain of Engineers, contains a study of the routes followed by the Arabs in the southern parts of the province, with a map on which all the routes are traced. The second contains researches on the Geography and Commerce of South Algeria, by MM. Carette and Renou, with three maps.

A volume will also shortly appear containing valuable information on the Algerian Sahara, by Col. Daumas, with three maps by M. Gaboriaud, Captain of the *Etat-Major*.

A large map of Morocco has been published by M. Renou from materials collected by him during his residence in Algeria. It is said to be rich in details of its northern portion.

M. Emile de Champcourtois has arrived in Paris from a scientific mission to Asia Minor, bringing with him some valuable results of his labours.

Finally, a very important work, the joint labour of the Marquis Fortia d'Urbain, MM. Guerard and Hase, Members of the Academy of Inscriptions, Mr. Miller, and Col. Lapie, has, after many years of laborious research, been completed. It is entitled '*Recueil des Itinéraires Anciens*,' and comprises the *Itinerary of Antoninus*, the *Peutingerian Tables*, and a selection of Greek *Peripli*, in a 4to. volume, and accompanied by an atlas of 10 maps. This work has been obligingly presented to us by Col. Lapie.

Spain.—In Spain a translation of Balbi's '*Geography*' was begun under the title of '*Compendio de Geografia Universal*,' by Don Sebas-

tian Fabregos, the original being augmented and corrected, as far as regards Spain; but when one volume only was published, the translator died, leaving but 4 sheets ready relative to Spain, and as yet no one has taken the work in hand.

There have been published 'El Orbe Pintoresco Daguerreotypico,' 'La Geografia Pintoresca,' third edition; with steel engravings, plans, and maps, which represent the principal cities of the world according to Balbi, Malte Brun, and Miñano; Nos. 1, 2, and 3 de la 'Costa Occidental de Francia,' the last number, including that part between the Olonne Sands and the high road to Seim, by the Hydrographic Society.

Don José d'Urcullu, to whom we are indebted for this notice of what is doing in Spain, further informs us that there will be immediately published the 'Elementos de Geografia,' by Letron.

There have also appeared an elementary geography for children, by D. L. Garcia Sauz, and a Treatise on Geography, by D. N. Rodriguez Solano, in Salamanca.

With regard to maps and charts, there has appeared a chart of the Western Coast of Sumatra, with the Island of Engaño, &c.; also

A Chart of the China Sea, with the Islands of Anambas.

D. Domingo Fontan has nearly finished a Topographical Map of Galicia, ordered by the Government in 1834.

The unsettled state of Spain has been most unfavourable to science; and no surveys, either land or maritime, have been even projected. Nor has any impulse been given to the study of geography, unless it be that several preparatory schools have been established in different cities, and at these geography forms part of the studies of the pupils.

Portugal.—I have much pleasure in announcing that about five years ago a Society was formed in Lisbon, under the designation of the 'Royal Maritime and Colonial Association of Lisbon,' which has already published several volumes of interesting matter, on the voyages and colonial establishments, both early and late, of the Portuguese, in the work entitled '*Annaes Maritimas e Coloniaes.*' It is to be regretted we are not yet in possession of this mine of information respecting the early establishments of the adventurous Portuguese, and where no doubt we should find much valuable information on countries which most particularly interest us at this moment, more especially the E. coast of Africa.

From our corresponding member, Commander Maçedo, we learn that the Topographical Map of Portugal is in progress.

M. de Maçedo has himself published a memoir, to prove that the Canary Islands were not known to the Arabs previous to the discoveries of the Portuguese. Councillor Lopez de Lima has published the first

volume of his Statistical Essay on the Portuguese possessions in Western and Eastern Africa, in Eastern Asia, in China and the South Seas. This work is published by order of the Government; and the present volume relates to the Cape Verd Islands and its dependencies. The Royal Academy of Sciences of Lisbon continue the printing of 'Information relating to the Molucca Islands,' by Gabriel Rebillo, forming part of the series entitled, Materials for the Geographical History of the Countries beyond Sea, &c.

The same Academy is also publishing the second volume of the reprint of the Collection of Opuscula relating to the Navigation, Conquests, and Voyages of the Portuguese. This volume contains the History of 'What Don Christovao da Gama did in the Kingdoms of Prestre John with 400 Portuguese,' by Miguel Cassauhop.

Holland.—We learn that M. Van der Velde, of the Royal Dutch Navy, is about to publish a work on the Dutch possessions in the East, with a large map. The same individual, in conjunction with M. V. de Coppensaal, has undertaken a French translation, and complete revision of the important work of François Valentyn on the East Indies, published in five folio volumes at Dordrecht and Amsterdam in 1726. This has ever been considered by those to whom the Dutch language was familiar, as a most important work; and when, as is proposed in the new edition, all that in the lapse of one hundred and nineteen years has become obsolete shall be eliminated, and all that later researches have corrected or brought to light, be substituted in its place, this will unquestionably be one of the most important works of the day, and its appearance will be hailed by all lovers of oriental geography as a most valuable acquisition.

Italy.—The progress of the study of geography, and its sister sciences geology and chorography, will be greatly promoted in Italy, if sufficient encouragement secures the continuation of an excellent periodical, commenced last year at Bologna by one of our corresponding members, Signor Annibale Ranuzzi. His Geographical Annual ('Annuario Geografico Italiano'), a small and unpretending volume, not only gives a complete account of what has been lately done in Italy, to improve our knowledge of geography, but contains valuable communications from the most distinguished men in that country on the geology, topography, climate, produce, and industry of their native country, with statistical tables carefully compiled, and a complete catalogue of scientific works lately published in the various Italian States. A learned dissertation by Count Gråberg de Håmsö, another of our valuable correspondents, on the early Genoese navigators, will be read with much satisfaction by all who take an interest in the history of navigation and commerce; but

perhaps the most important communication in the volume is a letter from General Visconti, in which he explains the origin of a discrepancy in the height of the dome of St. Peter's at Rome, as given by the estimates formed by the astronomers of that city, and the determination made by Captain Fergola of the Royal Neapolitan Engineers. That officer, not being able to extend his triangulation into the Roman territory, and wishing to make the dome of St. Peter's the termination of one of his angles, was obliged to assume a co-efficient of terrestrial refraction. Not considering the variation of that element in different climates and seasons, he took as its expression 0.08, the quantity generally used in the French triangulations, and given by Puissant in his treatise on geology, found also by actual observation to be applicable in the immediate neighbourhood of Naples. The height of the dome of St. Peter's thence deduced differed materially from that of the Roman astronomers, whose accuracy could not be doubted. This error was pointed out by Colonel Corabœuf of the French Engineers, in the '*Bulletin de la Société de Géographie.*' General Visconti, therefore, caused a fresh calculation to be made along the whole chain of triangles from the Adriatic to the Mediterranean; and thus obtained for the expression in question 0.06415, an amount which, when applied to the determination of the altitude of the dome of St. Peter's at Rome, gives a result nearly identical with that of the Roman astronomers. Though this correction was communicated without delay to M. Corabœuf, it appears to have been as yet unnoticed in France.

There are also several other valuable communications from General Visconti in Signor Ranuzzi's '*Annuario*;' and much as might have been expected from the known zeal and ability of that writer, it may safely be averred that his work exceeds even the expectations which his reputation led his readers to form.

To this I must add, that Signor Ranuzzi, who is one of our best correspondents, has just favoured us with the following interesting information. Among the works which appeared last year, says the Count, one is especially deserving of notice; the volume published at Milan, in consequence of the congress of men of science, and entitled '*Natural and Civil Reports on Lombardy*' (*Notizie Naturali e Civili sulla Lombardia*), published by a society of learned men, under the direction of Signor Carlo Cattaneo. This work, of which the first volume only has yet been published, and which will be followed by Appendices and Supplements, according as more materials are received, will give a full and complete orographical view of Lombardy. At Florence Signor Bianchi has begun to publish a Political, and Signor Marmochi a Physical, Geography of Italy, under the title of '*Introduction to the*

Natural History of Italy, General and Comparative' (*Prodrômo della Storia Naturale, generale e comparativa, d' Italia.*) These two works will be very well executed, and are calculated to extend the knowledge and taste for these sciences among the Italians. They form part of a collection entitled 'The Italian's Library.' Many works of merit were undertaken and continued in the course of last year. Signor Rapetti has gone on with his 'Geographical, Physical, and Astronomical Dictionary of Tuscany,' a work conducted with great care and knowledge. In the Sardinian States Signor Casalis has, in like manner, advanced in his Geographical, Historical, Statistical, and Commercial Dictionary of those States; Signor Dho, the Statistical and Historical Chorography of the same; Signor de Bartholomei's 'The Topographical and Statistical Notices of the Sardinian States,' three works of great value, which throw a strong light upon one of the principal Italian States. 'The Physical, Historical, and Statistical Chorography of Italy,' published at Florence by Signor Zuccagni Orlandini, may be said to be now completed. It is a work of vast extent, which cost its meritorious author much care and indefatigable labour; but is, notwithstanding, far from satisfying all that is required by the actual state of knowledge. He collects a multitude of facts, hints, and observations, but not always exactly and correctly; and he errs especially with respect to order and method. This is what may be said by one who would criticise his work; it will, however, remain a fine monument of the geographical labours of Zuccagni, to whom, says the Count, we were previously indebted for his excellent Atlas of Tuscany; and it will operate as a stimulus to the more careful study of our country (Italy). Signor Marmochi has lately completed his course of 'Universal Geography,' in 6 vols. 8vo.—the most important work on General Geography undertaken in Italy in these latter times. At Naples the Bureau Topographique has published a new chart of the Mediterranean in 3 sheets; and Signor de Luca is superintending the 4th edition of his Geographical Institutes; but Count Ranuzzi does not know whether they have yet been published. It is a good elementary book, of which the 3rd edition was published in 1843. At Turin a translation has appeared of Balbi's 'Elements of General Geography,' published at Paris in 1843; and a sort of summary of his other work, entitled 'A Compendium of Geography.' These works have for many readers the merit of being written by Signor Balbi, a writer who adopts the French, that is, an easy and popular style, but improves it by arrangement, depth, and real knowledge. However, it is well to know that, since the great progress recently made in geography, and since the extraordinary labours of Ritter, Humboldt, Berghaus, &c., have become known, the authority and celebrity of Signor Balbi have

been greatly diminished in Italy, particularly in Lombardy. He will nevertheless always be esteemed one of the distinguished Italian geographers, and an indefatigable, if not a very accurate compiler.

The Topographical Office at Naples has published the sixth Sheet of the great map of the Kingdom of the Two Sicilies, under the direction of the indefatigable General Visconti. Of the geodetical and topographical labours now carrying on in Piedmont and the Sardinian territories generally, we can say nothing, as these labours are kept secret.

At Milan Signor Civelli has undertaken a large map of Italy in 28 sheets, on the scale of $1:333,333$; 16 sheets of it have already appeared; and Signor Litta has published, as a specimen of a Topographical and Historical Atlas of History, the beautiful 'Historical Tableau of Pavia,' a work for which its illustrious author has already collected a vast quantity of materials, and he has combined together all the materials which were necessary for the great 'Map of Italy and its Confines,' at which he has been working for many years. The last publications at Milan were the maps of Signor Brenna, entitled 'Chorographical Maps of the Province of Milan;' they are a perfect model of accuracy and diligence, and will be considered among the most beautiful maps constructed in Italy; they are on a scale of $1:166,666$. At Venice, Signor Botta has published a new Post and Road Map of all Italy, in one sheet. At Turin a new Universal Atlas has been published by Signor Casella, in 16 sheets, very well executed and very useful to students of geography; it is perhaps the best atlas lately constructed in Italy, and supplies one of the requisites most needed in geographical instruction.

Signor Marmochi's Course of Geography already mentioned is accompanied by an atlas; but we cannot say much for its execution. The Chorography of Signor Zuccagni Orlandini is also accompanied by an atlas and a large general map of Italy, in 15 sheets, on a scale of $1:166,666$; but it is not a very correct work.

At the Scientific Congress held at Milan in September last, General Vacana proposed the adoption of a uniform method of colouring geological maps, recommending that adopted by the German geologists, which Signor Giuli has followed in his useful Mineralogical Map of Tuscany.

Vice-Admiral Albini has published an excellent Sailing Directory for Sardinia. Professor Gallo of Trieste has also published his sixth 'Nautical Almanack,' a very useful and well-executed work, as we are informed.

The Milanese have founded a Chorographical Institution for the collection of information, civil and natural, respecting Lombardy. Signor

Ranuzzi has founded a similar institution for *Æmilia*, *i. e.* all the region S. of the Po, from Piacenza to Rimini; and at Genoa the Marchese Pallavicini has taken steps for establishing one for Liguria; so that, as Signor Ranuzzi observes, when every natural region of Italy shall have followed the example set them by the Lombards, Italy may hope to possess a uniform geographical work, comprehending the whole of the Peninsula, and the adjoining countries.

In addition to the above, we have been favoured by our distinguished Honorary Member, Count Gräberg of Hemsö, with an account of the progress of geographical labours in Italy. He has himself very properly exposed, at the last Scientific Meeting in that country, the great inconvenience of having no less than fourteen different Italian miles, all of which he very judiciously proposes to reduce to one, *i. e.* to the geographical mile of 60 to a degree.

The Milanese Professor of Astronomy, F. Carlini, has published a most interesting paper on the measure of that section of the meridian which, traversing the plain of Lombardy, is terminated by the parallels of Zurich and Geneva.

At Milan the ingenious Captain Joseph Brupacher has terminated, and is about to place in the hands of the engraver, a most beautiful Hypsometrical Map of the Alps and of the greatest part of the Apennines, with the indications of their corresponding passes, in 3 large sheets, on the scale of $\frac{1}{100,000}$.

Professor Vesin has just published a 'Quadro sinottica-statistico del Granducato di Toscana.'

Lastly, Signor Gaetano Osculati, of Milan, already known as the author of a very interesting narrative of his travels in South America, inserted in the 'Politecnico,' has published at Monza, '*Note d'un Viaggio nella Persia e nelle Indie Orientali negli anni 1841 e 1842.*'

Naples.—On the subject of the Geodetic and Topographical works executed by the Royal Topographical Office at Naples, from May 1844 to the end of April of the present year, our zealous Honorary Member General Visconti gives us the following information:—

Signor Marieni, the Austrian engineer, completed in 1844 the whole triangulation of the first order, in Tuscany and the Papal States, connecting it on the N. with that made in Upper Italy, and on the S. with that of the Two Sicilies towards the Roman frontiers. They are now calculating at Vienna all the triangles measured by Marieni; and, in the two sides of the triangulations on the Neapolitan frontier, which have been already calculated, the agreement between the points common to each is as follows:—

Length of the side between Mount Petrella and Mount Serracommune,

beginning from the base, measured in Upper Italy and continuing through Tuscany, 51496·72 metres.

The same distance, according to the calculations made in the Topographical Office at Naples, beginning from the base of the Castel Volturmo, 51496·52 metres. Difference, 0·20 metres.

Length of the side between Mount Petrella and Mount Viglio, beginning as before from the base in Upper Italy, 67047·13.

The same distance from the base of Castel Volturmo, 67047·85. Difference, 0·28.

Differences of so very small an amount in such long distances are certainly wonderful, and for that reason are perhaps to be ascribed to some favourable combinations. It is, however, no less true, that they show a very great agreement between the Austrian and Neapolitan triangulations, and the great accuracy with which they have been carried on by the respective engineers.

Geodetic operations have been undertaken in order to obtain the measure of an arc of the meridian of about $5\frac{1}{2}^{\circ}$ between Termoli, a city on the shore of the Adriatic, and Cape Passaro, the southernmost point of Sicily.

The northern part of this chain of triangles, passing between Termoli and the Basilicata, is almost terminated; but in the remaining part, as far as Cape Passaro, many difficulties have occurred on account of the height of the Apennines in Calabria, and of the position and magnitude of Etna. In several cases, when one station has been supposed to be visible from another, it was found upon the spot that nothing could be seen; so that much time was necessarily lost in the examination of the country, and the selection of the proper stations for the southern part of the triangulation. Such an operation has, however, been completed, and nothing now remains to be done except taking the angles with the repeating-circle at each station, which will be completed within the present year (1845). Malta will also be connected with Sicily by means of one large triangle.

In the course of the Geodetic examination of the above-mentioned country, a site was fixed upon in the plain of Catania for the measurement of a second geodetic base in 1846, to be connected with the triangulation along the meridian of Termoli.

The triangulations of the 2nd and 3rd Order have been continued through the provinces of Terra di Lavoro, Abruzzi, Molise (Sannio), and the Capitanata, in order to supply trigonometrical points to the engineers, who are laying down the country on a scale of $\frac{1}{100,000}$.

Colonel Skribanek of Vienna has proposed to me, says General

Visconti, to make a triangulation across the Adriatic, in order to connect the triangulation of Dalmatia with that of the kingdom of Naples. The General thinks it very possible to effect this operation by the three following triangles:—1st, The Isles of St. Andrea, Cazza, and Pelagosa; 2ndly, St. Andrea, Pelagosa, and Tremiti; 3rdly, Tremiti, Pelagosa, and Monte Calvo, which is the highest peak of Mount Gargano in Puglia (Apulia). St. Andrea and Cazza are points in the Dalmatian triangulation; and Tremiti with Monte Calvo are trigonometrical points of the Neapolitan Survey. General Visconti is now concerting measures with Colonel Skribanek for the execution of this interesting operation in 1846.

When this is completed, the measure of an arc of about 13° on the meridian of Vienna will be obtained between Silesia and Cape Spartivento, the southernmost point of Italy.

The whole of the Topographical Map of the Faro of Messina, on a scale of $\frac{1}{100,000}$, is completely finished. Preparations for engraving and publishing it will now be made, on a smaller scale, but such as will be very serviceable to navigators, and for the various purposes for which the Government is desirous of using it.

The Topographical Survey of the great Military Map of the Kingdom of Naples, on a scale of $\frac{1}{100,000}$, is still in progress. At present little is wanting to complete the topography of the extensive province of Terra di Lavoro.

The engraving of the three last sheets of the great Topographical Map of the country round Naples, on a scale of $\frac{1}{100,000}$, is so far advanced, that it is expected to be finished before the end of the present year.

Great progress has also been made in three more sheets of the Topographical and Military Map of the Kingdom (Naples), on a scale of $\frac{1}{100,000}$; one of these three sheets will be finished and published in the course of the present year.

The engraving of the Nautical Chart of the Mediterranean in three large sheets, with special plans of the principal ports, is almost finished. It will be published in the course of the present year. The works in engraving or lithography for the plans of the principal ports, &c., for the use of the Neapolitan Navy, are in a state of progress.

Prussia, and her advances in geography.—Whilst during the two last years the gold Medals of our gracious Patron have been awarded to Adolph Erman and Carl Ritter; the former one of the most scientific explorers of the age, the latter, as I have already said, the great historian and philosopher of geography—whilst our own Sovereign has been prompt in honouring the brilliant researches of another Prussian subject,

also one of our Medallists, Sir Robert Schomburgk, whose meritorious labours are recorded in our Journal, our illustrious foreign member, Alexander von Humboldt, has just presented to his countrymen the first part of his '*Kosmos*,' the crowning glory of his long and splendid career. Having received the volume only when this address was well nigh completed, it is impossible for me to attempt to analyze its merits, still less to render justice to the boldness of conception, the power of research and combination, or to the breadth and grasp of thought, with which the great traveller of the age has commenced his gigantic effort. That effort, to use his own words, embodies "the hitherto indefinitely conceived notion of a complete physical geography, which has extended with its contemplation, and has resolved itself into a plan perhaps too daring; it includes within its wide grasp a general view of all created things, a complete physical description of the universe." In alluding to this work as the embodying of ideas and images, which have been floating in his mind for more than half a century, he adds, with the modesty which sits so gracefully on the true philosopher, that he now offers to his contemporaries this sketch of the great constitution of nature with hesitation, alarmed lest he has taken falsely the measure of his own faculties, and of his ability to do justice to his vast subject. There is, however, no man living, whose generalizations from observed phenomena can have so great authority as those of the universal Humboldt. He has traversed a greater portion of the earth's surface than any other scientific traveller; and not merely examining the surface of the globe, he has penetrated into its deepest recesses, and has brought into comparison the high table-lands and lofty mountains of tropical America with the desert steppes and hills of northern Asia. At present, we have only before us that part of his great plan, which includes an account of the limits and scientific treatment of physical cosmography, and a general view of the phenomena of the universe, preceded by a dissertation explaining the varied interests excited by the study of nature, and the fundamental laws by which she is governed. In two volumes, which are to succeed, will be described the inducements that exist to the study of nature, the detailed history of natural phenomena, exemplified in the gradual development of the plan of the universe as a whole; and lastly, an account of some particular phenomena, previously considered only with reference to the general argument. Some of the introductory observations in the first volume are already known to the German public, having been delivered in an opening address some years ago at Berlin. They contain also an eloquent and instructive recommendation to the study of physical geography in its highest sense, and in its relations to natural history. The concluding

observations in this chapter, as they bear on the general object of the work, as far as relates to our own department of science, are for us therefore especially interesting.

“Physical geography,” we are told, “naturally tends to, and involves a consideration of the phenomena of the whole material universe, and by no means consists of a mere cyclopædial abridgment of the more important facts and results of observation, a knowledge of which may be obtained from works on natural history and physical science. Such mere results are only so far valuable, as they bear upon the great question of the mutual and harmonious working of those different laws throughout the universe, all of which tend to produce and preserve the existing condition of things.”

I cannot pretend to give here at any length an account of the various subjects discussed in this volume, including geology, on which in another place I might dilate; but I may venture to say that, as geographers, you will find in it much that is deeply interesting and valuable, exhibited in a form that renders it easily available, concerning the subject of temperature, and its relation to the present extension of plants and animals. You will also find the philosophical principles, and the great final object of our science, exemplified and illustrated in the happiest manner, with a profusion of facts bearing on the subject.

I will close these observations with one more short quotation from the conclusion of the volume. As a kind of *résumé* of his account of the actual phenomena of existing nature, Baron Humboldt (and I know you will thank me for attempting to be the first to place his words before you in an English dress) thus concludes:—

“From the contemplation of the distant nebulae, and the systems of double stars mutually revolving round one another, we have descended to the consideration of the minute and infinitesimal examples of organic life inhabiting both the sea and land, and the vegetation which clothes the naked rocky cliffs on the declivity of the snow-capped mountain. All these phenomena may have been produced by the operation of laws, concerning whose nature and mode of action we can attain some knowledge. Other laws however there are, which are less manifest, but whose effect is seen in the highest realms of organic existence, in productions varied in form, and indicating so much creative power exhibited in the faculty of speech, and exemplified in the language of the different races of men. A physical delineation of nature conducts us to the verge of a higher intellectual sphere, whence we have as it were glimpses into another state of existence. It, however, only points to the boundary, and ventures not to advance a single step beyond.”

Passing from the grand subject of Humboldt's '*Kosmos*,' of which you will soon have a complete English translation from the pen of an accomplished lady, already well known to you by her successful version of the interesting travels of Von Wrangel, I will proceed by calling your attention to the deep interest, with which our science is regarded and cultivated in Prussia. Our sister Society in Berlin has so rapidly risen in public estimation, that an eye-witness to one of their recent monthly meetings informs me that, among two or three hundred individuals present, were members of the Royal Family, as well as many distinguished military and other public functionaries. Princes of that illustrious Royal Family are, indeed, foremost among the explorers of distant lands. Prince Adelbert, a nephew of his Majesty, in visiting Brazil, has extended his researches to the river Xingu, which, rising in the province of Matte Grosso, falls into the great Amazon near Villarinho, under the 2° of S. lat. and the 52° of lon. W. of Greenwich. Accompanied by two Prussian noblemen, Prince Adelbert has ascended the Xingu to a higher point than any previous traveller; so that, with his Royal Highness's accomplishments, we may look for some valuable additions to geographical knowledge from the publication of his Journal, which is now printing for private distribution. Another nephew of the King, Prince Walde-mar, having visited Ceylon, is now journeying through Nepaul, having received from the British authorities in Bengal and elsewhere, every attention that is due to his high station. And here I must say, that not Prussia only, but other countries of Germany are distinguished by the explorations of their princes; for it is well known to you that in previous years Prince Maximilian of Neuwied, Prince Bernhard of Weimar, and Prince Paul Wilhelm of Würtemberg, have enriched geography, ethnography, and botany by their several contributions. Nay more, have we not seen amongst us, and participating in the meetings of our men of science, the Kings of Prussia and Saxony, when they recently visited our beloved Sovereign?

In a rapid sketch like this I can now only glance at the efforts which have been made in Germany, and especially in Prussia, to add to our stores of foreign travel. Knowing the intense interest with which his Prussian Majesty viewed the whole progress of our recent warfare in Affghanistan, and how well he judged in sending thither that scientific soldier Major Baron von Orlich. I am most happy to see that the travels of this able envoy have been translated into English. Again, it will be observed that Dr. Schmitz has consigned to us some valuable information respecting Sumatra, whilst Professor Schoenbrunn has passed through the southern portion of Asia Minor, and M. T. Phillippi

the tracts around Tenasserim. But of all the journeys which have recently emanated from the liberal encouragement of the Prussian Government, the researches of Professor Lepsius in Egypt and Nubia, which are now in progress, most particularly merit your attention, because it is quite certain that this distinguished leader and his well-chosen associates will return richly laden with antiquarian treasures, descriptions, and drawings culled from these regions so famous in the early history of mankind. To this point I can indeed say a few words, from personal insight into the nature of that expedition; since from the privilege granted to me by the King of Prussia, when returning from my last excursion to the N. of Europe, I met at his Majesty's table the chief artist of Dr. Lepsius's party, whose state of health had compelled him to return, and whose drawings were no sooner inspected than purchased by that enlightened royal patron of the Arts. I may add, that Professor Lepsius, judging from the much greater perfection of the architecture and monuments in Lower than in Upper Egypt and Nubia, has satisfied himself that civilization did not descend from those high countries, but, on the contrary, was extended thither from the rich and low regions of the Nile.

Other researches of considerable interest are those planned by Professor Koch, and approved by the King, which have been carried out amid the most slightly known districts to the South of the Black Sea. From his admirable account of Asia Minor, it will be recollected that our own associate, and medallist, Mr. W. J. Hamilton, was unable to penetrate into that portion of Pontus between Trebisonde and Colchis, inhabited by the lawless races called Hemshis and Lazes. This has been accomplished by Dr. Koch, who, a skilful botanist himself, and making use of his medical knowledge to ensure protection from the savage natives, was accompanied by an excellent linguist, Mr. George Rosen; and thus we may hope (Dr. Koch having returned to Berlin) that his excursion will lay open to us the peculiar dialects, as well as the natural productions of these wild and hitherto unexamined tracts.

Again I must call your attention to further developments of the former researches of your distinguished foreign member and medallist, Adolf Erman. In announcing to you with pleasure, that the excellent work, '*Reise um die Erde*,' which I previously eulogized with all sincerity, is about to appear in English, I must not lose the opportunity of stating, that the very last communication M. Erman sent to us is one of very great importance. In perusing his Essay on the tides of the Kamshatkan and Okhotskan coasts, founded partly on his own observations, and partly on preceding data, you will perceive that the Sea of Okhotsk (to

which I shall presently allude in speaking of the Russian traveller Middendorff *) possesses the same anomalous tides as those for which the Bay of Tonquin has been celebrated since the publication of the 'Principia' of Newton; such anomalies being now brought to very fair accordance with the theory of the tides advocated by La Place, and successfully developed by Lubbock, Whewell, and Airy in our own country.

Among the Prussian contributions to geographical knowledge in the course of the past year, the new edition of Strabo, published at Berlin by M. Gustavus Kramer, is well worthy of notice. The defects and obscurities of the text of that excellent writer have long been a subject of complaint with all students in ancient geography; and notwithstanding the resources supplied by the French libraries, the translation made by order of the Emperor Napoleon disappointed the expectations of the learned world. Unhappily, M. Dutheil was far from equal to the task assigned to him, and M. Letronne, though one of his assistants, was then too young and inexperienced to remedy the evil arising from his leader's want of knowledge. In this also, as in many of the literary undertakings set on foot by Napoleon's orders, celerity was too much insisted upon. Strange, therefore, as it may seem, no really critical edition of Strabo appeared before the publication of M. Kramer's volume. None of the preceding editors had opportunities of examining the best MSS. themselves, and ascertaining where marginal notes had crept into the text; and what was of more consequence, where whole lines had been left out, because two successive lines ended in the same word. Much, indeed, had been done by the acuteness and diligence of Casaubon, Tyrwhit, and Tzschucke; but a larger portion of doubtful text still remained untouched, though evidently either unintelligible, or such as Strabo could not have written.

Unhappily the text of this author was greatly corrupted, as early as the twelfth century, as appears from the quotations furnished by Eustathius in his 'Commentary on Homer.' It is no wonder, then, if our most ancient MSS., though two hundred years older than Eustathius, are far from perfect. But by a careful comparison of the best copies, and attention to the corrections and additions made by the early possessors of them, M. Kramer has been enabled to restore many mutilated passages; and when better authority failed, to correct, by happy conjecture, a large number of palpable mistranscriptions. He was enabled to effect

* In an excellent periodical, conducted by M. A. Erman, 'Archiv für Russland,' which is, I regret to say, little known in England, he has recently given a sketch of Northern Asia, with an account of the discoveries of Russian and other travellers in that region.—(See Volume for 1843.)

this great work by the liberality of the Prussian Government, at whose charge he spent several years in France and Italy, diligently employed in examining all the MSS. of his author preserved in their public libraries, and carefully collecting such as, from their accuracy or antiquity, deserved peculiar attention. His first volume, containing the first six books, about one-third of the whole work, was printed in the course of last year, and every one interested in ancient geography will look with impatience for the remaining volumes. It is to be hoped that he will add a Latin translation, as the best commentary on his text, and also for the use of those geographers who do not understand Greek. It may be useful to add, that M. Grosskurd, the learned translator of Strabo into German, has published, as a separate volume, a complete index to all the editions of that writer—an aid the more needed, as Tzschucke's edition was never completed, and has no index of names or things.

If from the works of Strabo, and from Europe and Asia, we turn to America, there we find that M. Bellerman, a Prussian artist of merit, employed at the expense of his sovereign, is travelling through Columbia, and has already transmitted to his country characteristic sketches of that picturesque land. Nor is this royal munificence confined to Prussia proper; for at this moment the eminent naturalist Professor Agassiz, a native of Neuchâtel, has been furnished with means to explore during two years the geology and natural productions of the United States, and the countries of the far west. Wherever, indeed, we cast our eyes, we see the same royal finger; and as an old officer of the British Association for the Advancement of Science, I am gratified in being able to say, that Professor Dové, an eminent magnetician, will, through the bounty of the same monarch, be enabled to attend the ensuing meeting at Cambridge, there to join our own Sabine and men of other nations, in comparing the results already obtained. He will claim on that auspicious occasion the continuation of those important operations; the loftiest objects which geography contemplates. Justly, therefore, Gentlemen, have we cause to look with admiration on that powerful kingdom (one of our most natural and oldest allies), which, though devoid of a single oceanic port, and lying in the centre of Europe, is thus urged forward by its Sovereign to pry into the remotest lands, not from the stimulus of lucre or the hope of conquest, but from a pure love of knowledge, and with the wish to elevate the character of his nation.

Well may Prussia stand erect in this peaceful age for leading the way in the diffusion of that geographical knowledge for which we are specially united; and rightly may we augur future success to her efforts, when we know that Alexander von Humboldt is the bosom friend, Leopold von

Buch a chamberlain, and the Chevalier Bunsen the representative in England, of her enlightened and benevolent monarch.

Works and Maps published in different parts of Germany.—Regretting that my imperfect acquaintance with the geographical progress recently made in other territories in Germany prevents my doing justice to the subject, I may however mention, that Russeger's 'Memoir on the course of the Bahr-el-Abiad, and on the so-called Mountains of the Moon,' as well as the Map of Nubia, executed under his directions at the Military Geographical Institute of Vienna, are most valuable accessions. Hopes are further entertained that Seetzen's Manuscripts and Journals of his travels through various parts of Asiatic Turkey in 1802–1809 will shortly be published; and it is anticipated that they may prove equal in interest to the narratives of Burckhardt and Carsten Niebuhr.

In respect to new German Maps, the list would be indeed too copious, were I to attempt to enumerate them. At the head of those for their important bearing on British colonization and its limits in Asia, are the labours of Zimmerman, particularly those which relate to Affghanistan, and the more northern regions watered by the Upper Oxus. Then come the Maps of Asia Minor by Kiepert, and the same author's great Atlas of Hellas and the Hellenic Colonies, in which M. Carl Ritter takes so much interest. In addition to numerous works which are constantly issuing from the establishments of Berghaus of Berlin, including the beautiful little Map of the Great Canary, derived from the labours of Leopold von Buch, and exhibited at our last meeting, an Atlas of China, by Professor Endlicher, of Vienna, is about to appear. From the great reputation of Professor Endlicher as a botanist and Chinese scholar, we may presume that his development of the observations and reports of the Jesuit missionaries will be highly instructive; and with the addition of our own recent surveys of her coasts and harbours, and the Russian exploration of her mountainous northern frontiers to which I have alluded, China will, I trust, be not much longer the great "terra incognita" of the civilized portions of the globe.

Lastly, in respect to Germany, I have pleasure in bringing to your notice, that the different topographical and trigonometrical surveys of the various states of the empire, conducted on the same plan, or nearly so, as in our own country, are in full activity; and that among those recently published, the Map of the Westphalian and Rhenish Provinces, constructed by the Prussian military staff, and the Maps of the Kingdom of Hanover, prepared and published under the authority of that Government by Lieutenant Pape, are highly worthy of commendation, for their fidelity and the beauty of their execution.

RUSSIA IN EUROPE AND ASIA.

Our new Foreign Members, Baer, Helmersen, and Dubois de Montpereux.—In again calling your attention to the progress of our science in the Russian empire, I have sincere pleasure in congratulating you on the selection of two of its distinguished geographers and explorers, to occupy vacant places in your list of foreign honorary members. M. Baer and Colonel Helmersen, both of them members of the Imperial Academy of Sciences of St. Petersburg, are men whose distant researches alone would entitle them to the honour you have conferred on them, and who, to those claims, have added others of not less weight in those philosophical views, with which they have enriched their descriptions of the natural history of remote lands, and the manner in which they have for some years conducted a most useful and praiseworthy work, in which materials of fresh geographical knowledge are grouped together, that would otherwise have been lost to science ('*Beiträge zur Kenntniss des Russischen Reiches*').

The work of M. Baer on the Kirghis Steppes is replete with the most curious information, respecting the wild nomadic inhabitants, who occupy extensive tracts along the south-eastern boundaries of the empire; whilst the data concerning the extreme nature of their climate, and of Northern Siberia, are so well handled, as to have elicited from Humboldt himself the highest praise for their bearing on meteorology. This great geographer, without M. Baer's explorations of Nova Zemlia, would have been unable to give that general view of the great meridian chain of the Ural mountains, with which he has enriched his '*Asie Centrale*.' The same work of our new honorary member has indeed enabled geologists to see in the promontories of those large islands of the glacial ocean, the true physical northern prolongation of the Ural mountains.

To Colonel Helmersen we are not only indebted for graphic descriptions of the Ural and Altai mountains, and comparisons between them and the hilly regions of other countries, but also for many barometrical determinations of heights, accompanied by close and faithful mineralogical descriptions of very distant regions. Whether we look to the routes he followed, in some of the wildest portions of the Altai, and his picture of the natural features, inhabitants, and structure of the country around the great Telezkish lake in the Eastern Altai, and of its inhabitants the Teleuts, or to his notes on the Kirghis Steppes as compared with the Ural, or to the great value of his geological labours in various parts of Russia, as well as in Siberia, which occupy such large portions of the volumes of the Imperial School of Mines, I feel confident that no one could have more thoroughly merited your suffrage; and as,

amidst the many kind friends I have met with in Russia, I especially felt the value of the assistance rendered to me by this "*par nobile fratrum*," Messrs. Helmersen and Baer, so do I particularly rejoice to see them now linked on in so intimate a manner to the Royal Geographical Society.

I must here further seize the opportunity of saying how much I have been gratified by your nomination of M. Dubois de Montpereux to the third vacant place of honorary member; because, though a Swiss by birth, and now resident in his native country, Neuchâtel, he is chiefly known to us and to Europe by his great monumental work upon the Caucasus. Of that work I have already endeavoured to speak in the terms which it merits, in an anniversary discourse addressed to the Geological Society of London, but it is now specially my duty to advert to its bearing on our own pursuits. In truth, M. Dubois' labours cannot be sufficiently appreciated, except by those who, taking the largest and most comprehensive view of our science, delight to regard it as embracing many kindred branches of knowledge, and as comprising, with a true delineation of the physical features of the earth, the structure of the soil, the modifications of the surface, the history of its inhabitants, and its natural productions. From its diversified and bold features, and its precious historical records, no region seemed to have a greater claim on geographical explorers than the Caucasus; and yet, notwithstanding the many travellers who have passed over it, by one line of route or other, from the thirteenth to the present century, no one had so threaded these mountains, and examined their escarpments and defiles, and had so compared them with the accounts of ancient historians, as to make us really familiar with them, until M. Dubois presented to the public the results of his arduous labours. And then in what form do they appear? Not as a dry record of places visited, and of rocks examined, but as a perfect history, as well of each tract, from its earliest geological condition, through all its successive mutations, as of the various races of men by which it has been inhabited during the present era. Such, Gentlemen, is geography in the grandest and most comprehensive sense of the term; and as I am not acquainted with any production of modern times, which more successfully connects the early records of nature with those of the human race, or which more elaborately works out effects to their true causes, so I congratulate you in having the name of Dubois de Montpereux added to your list of distinguished foreign members. This author is, indeed, the more worthy of your special notice, as he accomplished these durable results under circumstances of peculiar difficulty, in a country beset with plague and war, and with no other pecuniary means than those of a slender private fortune, with which, and his own perseverance, he overcame all obstacles, and has put before

the world five volumes, and a splendid atlas, illustrative of the Caucasus and the Crimea, which might do honour to the efforts of any European Government.

Geographical Surveys of Russia—Great Operations of M. Struve and General Tenner.—Whilst, through the exertions of her present enlightened Emperor, the interior of Russia in Europe is undergoing vast improvements—among which the great railroad connecting St. Petersburg and Moscow, and the splendid bridge, on massive granite piers, over the rapid Neva (an effort from which all preceding sovereigns have shrunk), are the most striking, the frontiers of that vast empire are everywhere being surveyed by competent geographers. Even along the central portion of the wild and rugged boundary line, between Siberia and China, surveys, conducted by Colonel Silvehjelm, have produced most detailed and elaborate maps of regions, hitherto only approached at rare intervals by casual travellers. Honoured with the confidence of the Imperial Government, I have recently had the privilege of inspecting these splendid results, and in viewing in detail the physical features of the mountainous tracts, which lie around the great lakes, or interior seas of Balkhat-Danghize and Novr Saissar—names scarcely known to geographers, but which enrich the archives of the imperial état-major. But, apart from these field-surveys, the scientific power of Russia is employed, under the direction of that eminent astronomer and mathematician, Struve, in realizing one of the most arduous enterprises of modern times—to measure an arc of the earth's meridian along her whole western or European frontier, which, when completed, will be the most extensive operation ever yet executed by any government. Commenced by M. Struve in 1820, the progress of this work was reported on by him in 1830, in reference to his own geodesical operations between the river Dūna and the isle of Hochland; and afterwards tracing the results of the geodesical measurements of General Tenner from the Dūna southwards to Belin, in the government of Grodno. Subsequently the works were extended northwards to Finland; and it is only during the last summer that a line of uninterrupted triangles has joined the isle of Hochland with the city of Torneo, and thus united the imperial operation in Russia and Finland with that executed by the Swedish Government in the beginning of the present century. Seeing that such great progress had already been made, General de Berg, when he recently entered on the duties of quarter-master-general of the Imperial staff, called attention to the great importance of extending this meridian further southwards to Bessarabia and the Black Sea, and suggested that M. Struve should unite with General Tenner for that object.

The Emperor having fully approved of the reports and recommendations of M. Struve, this additional mensuration is in full progress, and 50 new triangulations have been added to 183 which had been formerly made, embracing already an arc of $19^{\circ} 15'$, and which, when carried into Bessarabia, will range over $21^{\circ} 48'$.

When we recollect that our own triangulation in the East Indies extended over $15^{\circ} 58'$, and that of the French, from Dunkirk to the Balearic Isles, over $12^{\circ} 23'$ of latitude, we at once see, that the operation described by M. Struve greatly exceeds them in extent; whilst, owing to the vast mass of land possessed by the Russians, it will eventually be the greatest which *can* ever be executed on the earth's surface, particularly if the Swedish Government, encouraged by their present learned Sovereign, should, as is anticipated, prolong the survey to the North Cape. In that event, the whole arc measured across Europe will amount to the astonishing length of $25^{\circ} 50'$. These triangulations of the main land of Russia have further determined the altitude of many portions of the land hitherto imperfectly known by barometrical observations; and of these the published results of M. Struve, concerning Livonia and Hochland, afford an excellent example. In fact, his map of Livonia is, in composition and character, an exact counterpart of the map of Ireland, to which I have elsewhere alluded, on which the relative heights of the various masses of land are indicated by separate colours. I may also add that, by a letter which I have recently received from M. Struve, I learn that in his southward triangulations of the governments of Courland, Vilna, Vitepsk, Volhynia, and Podolia, General Tenner has accurately determined 168 elevations above the Baltic Sea, which thus form the base of a great map which is to be constructed. A remarkable result of this survey, as M. Struve informs me, is, that throughout the whole extent from the Gulf of Finland to the Dniester, or over more than 12° of latitude, the greatest altitudes are everywhere very nearly the same, or about 1000 English feet; whilst one single station only, near Kremenetz in Podolia, has an elevation of 1328 feet, that being the culminating point, as at present known, between the Gulf of Finland and the Black Sea. Hitherto the Valdai Hills have been considered the highest ground in the interior of European Russia, and the barometrical observations of Helmersen and others have never carried them farther than from 1056 to 1100 feet. Rising on their southern slopes, at a height of less than 800 feet, the mighty Volga follows its slow and devious course of 2500 miles before it reaches the Caspian. Hence it is, that the determination of this new point of altitude near Kremenetz, on a far more southern parallel, and from whence the rivers Dniester and Dnieper flow

to the Black Sea, and the Bug and Vistula to the Baltic, is of great geographical importance in a country of such monotonous outline, whilst to a geologist it is specially interesting, as being the culminating point of the southern granitic steppe, which is parallel to the elevated ranges of the Crimea, the Caucasus, and the Carpathians.

Whilst I thus speak of Russian operations, purely geographical, I must not omit to allude, though but for a moment (for, if strictly speaking they come more within the scope of the astronomer, they constitute, after all, one of the corner-stones of physical geography), to the chronometrical expeditions, which Russia has sent forth to determine, with the greatest precision, the longitude of the imperial observatory of Pulkova, around which point the great geographical operations of the empire are to be grouped, and which, in bringing M. Struve and his able associates to our shores last summer, completed this laborious enterprise. Referring to the clear and excellent report of M. Fuss, the perpetual secretary of the Imperial Academy of Sciences, for a well-condensed though more detailed sketch of these operations than I can pretend to offer, and the manner in which the comparisons between Pulkova, Altona, and Greenwich were carried on by numerous instruments, the property of Russia, and by Russian astronomers, at the three places, I will briefly advert to two points. The first is, that as Englishmen we may rejoice, that after very rigorous trials and long comparisons, one of our ablest mechanicians, Mr. Dent, has triumphantly borne away the palm for the superiority of chronometers, which have obtained for him his Imperial Majesty's warm approbation, and a splendid gold medal. The other is, that the final result of this very elaborate and admirably conducted operation has been, that the old meridian of the observatory of Pulkova, as assumed in former trigonometrical surveys of several governments, is found to be in error nearly half a Russian verst in linear dimensions.

We must therefore cheerfully join with the Russians in saying, that never was a longitude between two distant observatories more exactly determined, thanks to the bounty and countenance of the Emperor Nicholas, who, whatever other calls may be made upon his treasury, is always foremost in supporting science by munificent and well-timed grants.

Modern Changes of the Surface in S. Russia.—In connexion with Southern Russia, and the probable changes of its surface, since the earliest historical records, we have been favoured with certain researches of Professor H. Malden, occasioned by his elaborate comparisons of the descriptions of the tracts E. and W. of the N. of the Dnieper, as given by Herodotus, with the present features of that country. Whether indeed the Dnieper, as the father of history would lead us to believe,

had another great mouth, which has been desiccated by the formation of a delta, occupying a large portion of a low sandy tract between the main land and the Crimea, and which eventually ponded back the waters, and threw them into the present stream, or whether the operation was aided by a rise of the land, connected with or parallel to the great lines of ancient disturbance in the Crimea and Caucasus, which bring us down to the mud volcanoes of our days, are points which it would require an assiduous personal examination to determine; though in the mean time we may be reminded, that our illustrious countryman, Rennell, was inclined to believe in the former existence of two mouths of the Dnieper.

The great changes which may be effected in the course of rivers, even by the labours of man, have indeed been strikingly illustrated by M. N. Khanikoff. For a long time most geographers viewed as little better than a fable, the tradition or opinion derived both from the features of the country, the details of the historians of Alexander the Great, or the recital of the old English traveller, Jenkinson, that the main stream of the Oxus, instead of flowing, as it now does, into the Aral, passed westwards along the low steppes, and to the S. of the plateau of the Ust-Urt into the Caspian Sea. Humboldt has the merit of bringing out in all its force the high probability of such having been anciently the case; and the observations of M. Khanikoff, as recorded in our Journal, have, I think, greatly strengthened his inference. We are also now positively assured by indisputable evidence that the river Tanghida, the Orontes of antiquity, which thirty-five years ago flowed into the sea of Aral to the S. of the Jaxartes, was turned northward and deflected into the latter stream by the mere manual labour of the Khohandians, who, fearing that their well-watered and consequently fertile tract might become a prey to their warlike predatory neighbours, the Khivans, constructed a dam, and turned their river northwards to the Jaxartes, thus rendering barren and unproductive a rich country contiguous to the Khivan frontier.

Ust-Urt—Aral and Caspian Seas, &c.—Colonel Helmersen has recently published a memoir on the steppes, that separate the Caspian from the Sea of Aral, which, whilst it is of great geological importance, is specially attractive to those who, like myself, take a lively interest in those questions of ancient geography, which the Baron Humboldt has opened out to us. Carefully examining the fossil shells brought to St. Petersburg by M. Basinier, an adventurous botanist, who has recently explored the country between Orenburg and the Aral, and the western coasts of that sea to the mouth of the Oxus and Khivah, Colonel

Helmersen tells us that the larger portion of that great plateau, called the Ust-Urt, which separates the Aral from the Caspian, is composed of a limestone of the miocene, or middle tertiary age, its lower flanks only being composed of those peculiar and brackish deposits, which my companions and myself have designated Aralo-Caspian.

Judging from the scanty documents previously in our possession, I had been led to believe that the whole of this intervening tract might belong to the deposits of that vast inland brackish sea, whose peculiar remains are preserved in those steppe limestones, which occupy such large tracts around the edges of the Black Sea, the Sea of Azof, the Caspian, and the Aral; but the collections of M. Basinier, and the judicious comments of Colonel Helmersen, seem clearly to prove that, previous to the existence of the great inland brackish sea, the bottom of the more ancient ocean had been raised up in a great promontory, to form the plateau of the Ust-Urt, on the edges of which only the Caspian or brackish water deposits are found adherent.

The latter constitute, in fact, low cliffs not exceeding 200 feet in height, whilst the miocene and oceanic shelly strata rise into the higher lands from 500 to upwards of 700 feet above the waters. Geological evidence thus supports the conclusion, which Baron Humboldt had arrived at by copious study of ancient geography; and it sustains also his views of the continuation of a great meridian line of elevation coincident with one of the last elevations of the Ural chain. The further discovery of a ridge of eruptive rocks on the right bank of the Oxus to the N. of Khiva, as proved by the specimens brought back by M. Basinier, still further supports this view, and leads us to believe that whilst the Ust-Urt may be a parallel swelling out of the land, a line of fissure also extended from the Mugodjar or southern extremity of the Ural, properly so called, to this Khivan ridge, which is exactly of similar igneous composition.

In the mean time we may infer, that for ages after the Ust-Urt was raised up, to form an extensive barrier between the Ural and the Caspian, those seas must still have communicated by the lower southern steppes, and that even after those changes of land and water, which produced the present configuration, had been brought about, the Oxus may during a considerable portion of the historic period have flowed into the Caspian.

New Maps of the Region S. of the Ural Mountains.—On the subject to which I have just adverted, as well as in reference to the whole region S. of the Ural Mountains, I must refer you to the forthcoming work on Russia, which I hoped to have laid on your table this day, but

which, on account of the complexity of the subject and the quantity of illustrations, is delayed for a week or two. I will now, therefore, only say that the general map which is thereto appended, has been greatly improved by the recent researches of other geographers, as well as those of Basinier and Helmersen. In all our European maps hitherto published, the wild tracts of which I am now speaking have been very inaccurately laid down; and I can with confidence refer you to this new geological map, as defining their geographical features with much greater accuracy, than any which you have previously consulted. When at St. Petersburg during the last summer, I obtained from the Imperial staff corps some good additional data concerning the northern shores of the Aral Sea, and the lands extending towards Mount Aïruk. More recently, indeed, I have received a new Russian map of all the territory between the river Ural on the W. and the Irghis and Tobol on the E., executed by M. N. Khanikoff. From these sources, as well as from a most elaborate Russian map of the S. Uralian mountains, completed by M. J. Khanikoff since the publication of the map, which is already in your volumes, I have been enabled, with the assistance of Mr. Arrowsmith, to improve both the general map, and also that of the Ural mountains, which accompany the works alluded to.

The positive contributions to physical geography embodied in these maps of the two brothers Khanikoff, are indeed of too great value to be passed over, without some words of comment and explanation. The map of the Southern Ural and adjacent countries by M. J. Khanikoff, which is not yet published, but of which he has sent me a tracing, embraces a much more considerable tract than that beautiful unpublished delineation, now deposited in your archives, prepared for me by order of General Perovski, and from which I derived the chief new materials in the construction of the recently published map of the Ural mountains. When given to the Russian public it will be accompanied by an elaborate description of the whole region connected with the S. Ural. The map by M. Nicholas Khanikoff of the great region of the Kirghis steppes to the S. of the government of Orenburg, which is also not yet published, embraces the space between the 55° and 44° lat., and the 63° and 85° long. of Ferro. This tract forms part of the territory sketched out by M. Levchine in 1832. That map was founded on the old survey of Muravine in 1792, and on the subsequent researches of Teofilatief in 1815, of Muravief in 1819, of Meyendorf in 1820, of General de Berg in 1822, of Temtchunikoff in 1823, of Butofsky in 1823, of De Berg in 1824, and of Koloskene in 1825. But since that period numerous other researches have been made. In 1832 and

1833 the N.E. coast of the Caspian and the lower portions of the valley of the Ilek were further surveyed, as well as a portion of the valley of the river Ural, and the tract between that river and the Ilek. In 1834 and 1835 the grounds between the Ural and the Tobol were examined, as were in 1836 and 1837 the whole eastern coast of the Caspian Sea, and the tracts between the Lower Volga and the Ural. A reconnaissance was at the same time pushed into the peninsula of Busatchi. In 1838 the north-western shores of the Caspian were surveyed, and the astronomical position of the Fort Constantine, in the valley of the Tobol, on the river Karagaili Ayat, was determined.

In 1839 the tract whence the rivers Ilek and Emba take their rise, and the western slopes of the Mugodjar Hills (the southern prolongation of the Ural mountains), were explored, and the astronomical positions of the forts of Emba and Tchushkakul were fixed.

In 1840 reconnaissances were extended to the tracts between the rivers Emba, Aktikene, Tcheterli, the gulf of Karatamak on the Aral, the western limits of the great sands of Bursuk, the source of the Mani, and into the valleys of the Khobda, Ouil, Saghis and Djanguilava.

In 1841 other reconnaissances were carried into the valleys of the rivers Ore, Kamisha, Kli, Kumeh, Ighis, Taldik, Ulkha-yuk, and Turgay, and also into the environs of Aksakel-Barli, into the sands Kara-Kuni, along the north-eastern shores of the Aral Sea on the right bank of the S.r (Daria) or Jaxartes, from its mouth to the fertile territory of the Khohandians. At the same time, routes were surveyed from the Jaxartes to Khivah by the lake Denkhase, by three different lines over the Ust-Urt from Khivah to Fort Alexander on the Caspian, and to Saraitcheh, on the W. coast of the Aral.

In 1842 the south-western coasts of the sea of Aral, and the mouths of the Oxus, were still further examined; and, besides all this, I may add, that between the years 1830 and 1840, the whole region, embracing the sources of the Turgai, the Ula-tau mountains and lake Denghis, the sources of the Jarissa, the northern shores of the lake Balkash, and that curious N. and S. ridge, the Tarbagatai, which, parallel to the Ural, traverses the Altai mountains as well as the banks of the Upper Irtish, has been surveyed. The results of these various and indefatigable labours of Russian explorers, with the greater number of whose names I am still unacquainted, have never been grouped together, and the copy of the forthcoming map of M. N. Khanikoff (an author already well known to us by his instructive work on Khiva, and his correction of the erroneous idea concerning the Tanghi Daria), has for the first time made them known. The main features, to which I

have now cursorily alluded, will all appear in the forthcoming geological map of Russia in Europe, and its adjacent countries.

Great as the additions are which the map of M. Khanikoff contributes, he modestly acquaints me that it does not rigorously express the full extent of our present knowledge concerning the steppes of the Kirghis; since ulterior researches in 1843 and 1844 have shed new light on the upper valleys of the Ilek, the Tobol, and the Utsa, as well as on the southern shores of the lake Balkash.

Explorations of Dr. Schrenk.—The extreme limits of the wild and remote region, to which allusion has just been made, and tracts far beyond it, have been successfully explored by an able and enterprising botanist, Dr. Schrenk, who has recently returned to St. Petersburg. Remote and unfriended, this ardent naturalist has passed four years in a country, the greater part of which was never before trodden by an European foot. In addition to copious materials with which he will soon enrich botany, geology, and other branches of science, he has made most important observations on the eastern extension of the mass of land, which forms a portion of that vast depressed area so vividly brought before our consideration by Humboldt, and which is now found to extend eastward from the shores of the Aral to the Saissar and Balkash lakes; though in approaching the latter region the ground rises to a few hundred feet above the sea. Thence penetrating to the lake of Issikul, surrounded by lofty mountains considerably south of the range of the Altai chain, and obtaining from one of them a view of the Thian-Chan, whose height he estimates from 16,000 to 17,000 feet, nearly one-half being covered with eternal snows, Dr. Schrenk won for himself the proud title of being the first European who had pushed his researches to the northern foot of the "celestial mountains" of the Chinese empire. It is, indeed, quite clear from what I already know of them, that Dr. Schrenk's researches must materially change all earlier maps. For, though the lake Balkash is laid down, the Issikul does not appear, at least not by that name. Again, the sources of the Tchu river, and its course into the Telekul lake, and the occasional communication between that lake and the Jaxartes (Sir Daria); the true course of the latter stream is the country watered by the upper streams of the Sara Su-a-Ishein, where alone the beautiful mineral "diopase" is found. The definition of various mountain ridges (Ku, Kysil Orai, Tchan-tau, and Aura Kai) are all, I apprehend, new to geographers.

Middendorff's Siberian Travels.—At the last anniversary I endeavoured to convey to you some idea of the enterprising efforts of M. Middendorff in the northernmost extremity of Siberia; but as I then

dwelt almost exclusively on the courage, with which he braved every privation amid the dreariest wilds, I must now advert to some of the great results of his expedition. In the first place, he has carried out the wishes of the Academy of Sciences of St. Petersburg, to ascertain the real state of the question concerning the frozen subsoil of Siberia. By placing thermometers at various depths in the shaft at Yakutsk (to which your attention was formerly directed), he has found that at its bottom, or at 382 feet below the surface, the cold is really— $2^{\circ} 4''$ Reaumur, and that it is probable the frozen subsoil reaches to the great depth of about 600 feet! Notwithstanding this extraordinary phenomenon, the lateral extent of which has still to be determined, it appears that the culture of rye succeeds perfectly under favourable local conditions in those regions; for M. Middendorff assures us that at Amguinsk, near Yakutsk, the crops of that grain are more abundant than in Livonia! Whether the intensity of the frozen subsoil (carboniferous and palæozoic rocks) in the region around Yakutsk be due to the vast mass of land by which that locality is surrounded, according to the isothermal views of Humboldt, or on whatever cause dependent, we now know through the labours of M. Middendorff, that at Turukhansk, on the Yenisei, in 66° N. lat., and therefore 6° N. of Yakutsk, the temperature of the earth seldom descends below zero of Reaumur, and is therefore infinitely warmer than the more southern tract on the Lena. Before, however, we can ascertain to what cause this great difference is attributable, the exact nature of the subsoil in the two tracts must be indicated, and experiments must be instituted concerning *the conducting powers of different rocks*. For if the strata around Yakutsk be (as I have stated) of the carboniferous age, and those near Turukhansk should be tertiary, we may well conceive why the one should be very differently affected to the other. In respect to the northernmost of his explorations, M. Middendorff has thrown quite a new light on the boreal range of vegetation; since, besides the discovery of curious new animals, he has ascertained that whilst rye, turnips, beet-root, and potatoes (the latter however scarcely larger than nuts) grow on the Yenisei to lat. $61^{\circ} 40'$; indigenous plants, requiring less warmth, flourish much farther north, and that even trees with vertical stems reach to *about* 72° N. lat. in that parallel of longitude! This great extension of our previous knowledge on the subject of the limit of vegetation, proves that geographers can no longer mark it by a rectilinear zone, but must accommodate such line to climatological and local conditions; in some tracts running it southwards to about 66° , and in others extending it northwards to 72° . The actual

extension of the line of forests to N. lat. 72° , in the very central parallels of longitude of Siberia (Taimyr), has also a very curious bearing on the interpretations of geologists and palæontologists. Modern geologists, including Humboldt and Lyell, have for some time maintained that, judging from his integument and hairy covering, the mammoth must have been a denizen of the lands, where not only his bones but even his carcase and hide have been found in Northern Siberia; an opinion in which, after personal examination of the edges of the great region of their sepulture, I fully agree, and for which I have elsewhere assigned various other reasons. It was, however, reserved for our great British comparative anatomist, Professor Owen, to show by a close examination of their teeth, that those great quadrupeds were specially organized to live on the branches and leaves of such shrubs and trees as grow in boreal latitudes. Combining this discovery with the evidences of their thick and woolly-clad skin (as formerly insisted on) there is no longer occasion to invoke a supernatural and sudden refrigeration of Siberia, which transferred it from a climate suited to elephants into one of such intense cold that they were thereby suddenly destroyed. M. Middendorff, in short, has ascertained, that in lat. 72° there are still trees which, according to Professor Owen, would suffice for the sustenance of mammoths; and these forests, I may remark, lie very little to the S. of the tracts in which the *greatest* quantities of the fossil bones of those creatures have been discovered.*

But to return to M. Middendorff and his last researches. Undaunted by the severe privations he had undergone in obtaining his knowledge of the far northern lands of Siberia, he next undertook the not less arduous task of traversing the whole of that vast continent to the Shantar isles, at its south-eastern extremity, and thence to return to Nertchinsk along the Chinese frontier. His journey from Yakutsk to Udscoi, on the coast of the sea of Okhotsk, across the Yablouner, or Stanovoi mountains, through thickly wooded rocks, deep morasses, and over swollen rivers, was so successfully accomplished, that the stores he has brought back to St. Petersburg (or which will follow him when more are added to them by his intrepid and faithful companion, Branth, who is still in those regions) will fully lay open the Fauna and Flora of a region never previously explored by a man of science.

Floating down to the sea of Okhotsk from Udscoi, in frail canoes, M. Middendorff and his friends, braving shoals of floating ice and perpetual rains, reached Nikta in the great Shantar island. The wild regions

* See Owen on British Fossil Mammalia—(Elephants).

which were traversed (and which in many parts can only be threaded by following the tracks formed by bears beneath the dense matting of underwood and birch trees) seem to consist for the most part of carboniferous and other palæozoic deposits, which in the ridges, such as the Stanovoi, and again near the coasts, are broken up, dislocated, and metamorphosed through the intrusion of granites, greenstones, and other rocks of igneous origin. These far south-eastern tracts of Siberia (and Yakutsk is similar) seem to contain precisely the same ancient sedimentary strata, as those which form the flanks of the Ural mountains, or western boundary of this vast country, and, like them, to have been similarly deranged at intervals by various plutonic eruptions.*

But apart from the botany, zoology, and geology of the northern and south-eastern extremities of Siberia, much positive geography has been derived from the researches of M. Middendorff and his companion Branth. The Shantar islands, which rise abruptly from the sea, are now made known to us, not only as consisting of quartz rock, granite, &c., but its headlands are shown to be steep cliffs, which extend into the sea in the form of reefs. The currents are powerful and remarkable; vast masses of floating ice encumber the sea during the short summer, even in that comparatively southern parallel of 55° (that of our Newcastle-upon-Tyne); during five weeks the travellers had only eight days without rain; so much does climate depend on local terrestrial conditions. Lastly, in his return journey, M. Middendorff took upon himself (for the thought was entirely his own) to examine the frontier line of China between the sea of Okhotsk and the little river Gorlitza, the western territory of the Amúr, where that great stream, quitting the Russian territory, flows southward and eastwards into China; a tract never explored even by a Cossack. In the ancient treaty of 1689, concluded at Nertchinsk between Russia and China, when the former country ceded the region of the Amúr, of which it had had previous possession, it was simply arranged that frontier marks should be established along the mountain chain, which there extends from the Gorlitza on the W. to the sea of Okhotsk. Russia, however, it appears, never erected these signs, but simply left the boundary question to nature and ancient custom. In ignorance, therefore, of the facts now for the first time ascertained by M. Middendorff, all geographers have made the Chinese frontier pass along the northern slopes of the chain in question. The fact, however, is otherwise; for the precise Chinese have, on their part, erected a line of marks,

* See Russia in Europe and the Ural Mountains, part ii. vol. i.

which M. Middendorff visited (in the last winter, and during a cold which froze mercury), accompanied by some Tongusians and an interpreter; and here he found those barriers invariably on the S. side of the mountains; the Chinese having left all the hilly region of rein-deer, and animals valuable for their skins, to their neighbours, whilst they content themselves with the fertile plains. In truth, the inhabitants of the mountains have regularly paid their fur tribute to Russia, since the first occupation of Siberia. M. Middendorff further ascertained that, between Udskoi of the Russians and the mouth of the Amúr, there is a considerable tract, quite independent both of Russia and China, and occupied by a people called Guilaïques, who pay no tribute to either Emperor; and in that country no boundary marks exist.

Englishmen, who are behind no nation in their love of daring adventure, will doubtless rejoice to learn, that just in the same way as they have often welcomed their own distant explorers, and as doubtless they will receive Franklin and his brave shipmates, when they return to our shores, so did a public feeling, amounting to enthusiasm, prevail at St. Petersburg when the young and intrepid Professor of the University of Kief reached that metropolis, and was rewarded by a general banquet of his countrymen, and the warm commendation of his illustrious Emperor. The Middendorff fête (the first of that sort ever given in Russia), I may also tell you, has further had the good effect of suggesting the formation of a Geographical Society at St. Petersburg, which will, I trust, be constructed on much the same plan as our own.

MISCELLANEA.

Colouring of Maps.—Colour has long been considered a powerful auxiliary to mere engraving in maps of every kind; indeed, for certain special purposes, as in geological maps, it is indispensable. Any other mode of colouring such maps than by hand, has always been considered very difficult, for some reasons sufficiently evident of themselves, and others which it would be too long for me to explain in this place. It is therefore with great pleasure we learn that M. Dufrenoy has presented to the Academy of Sciences a ‘Memoir on the Colouring of Maps,’ by which all the defects hitherto inherent on the application of tints, by mechanical means, have been corrected; and the greatest complication of colouring, as in the case of the great Geological Map of France, by himself and M. Elie de Beaumont, is now effected with perfect ease and accuracy, and at a very considerable reduction of cost.

Measurement of Heights.—The difficulties attending the transport of mountain barometers, even of those on the best construction, for the

admeasurement of heights, are too well known to all travellers for me to insist upon them in this place. Those instruments almost invariably meet with accidents, and hence recourse has been had to observations on the temperature of boiling water, for ascertaining the height of positions. A paper on the subject, by Colonel Sykes, is printed in the 8th vol. of our Journal; but although this mode has the advantage of easy execution, its indications are never strictly correct, and can only be used as approximations more or less satisfactory. In proof of this I have only to refer you to two papers in the *Comptes Rendus* of the French Academy of Sciences (for April, 1844), entitled 'Observations made on the Fülhorn, in the Alps, on the Temperature of Boiling Water,' by MM. Peltier and Bravais.* You will there see how many circumstances must be taken into consideration, and how many corrections, calculated with the minutest mathematical accuracy, must be made before the real height of any place can be satisfactorily ascertained by the boiling of water. That great accuracy may be attained is shown by another memoir on the same subject (*C. R.* Jan., p. 163) by Mr V. Regnault, but this accuracy depends upon a degree of perfection in the thermometers that is rarely possible, and can certainly never be expected in the instruments of commerce; besides, the most perfect instruments may be broken, and the traveller is then left to shift as well as he can, with thermometers whose indications are not to be trusted. I do not mean by this to dissuade travellers from employing the boiling-point of water, as a method of ascertaining heights when their barometers are broken, or when they have none; but I would caution them against a too confident reliance on a method, the results of which are likely to be defective from a great variety of causes. On this subject, therefore, I will only add, that modern science could not offer a greater boon to the traveller, than a really portable instrument for the correct admeasurement of heights, an instrument neither fragile nor susceptible of derangement. Of existing mountain barometers, Sir Robert Schomburgk, an authority in these matters, most strongly recommends Buntén's syphon barometer as the best. M. Arago, we understand, has constructed a portable barometer, much less likely to be broken than those now in use.

Temperature of the Mediterranean.—M. Aimé has communicated to the Paris Academy of Sciences a memoir on the temperature of the Mediterranean; and has arrived, by his experiments in the neighbour-

* M. Izaru has also a paper on the boiling of water in the Pyrenees (p. 169), and MM. Martius and Bravais on Mont Blanc.

hood of Algiers, at the anomalous result, that the temperature of that sea is higher near the coast than further out. This is a subject of no small importance; as from the generally received opinion, that a lowering of the temperature of the sea is indicative of diminished depth, the thermometer had become a valuable addition to former nautical instruments. If however the law of decreasing temperature with decreasing depth be not universal, and if, on the contrary, decreased depth be in some situations a concomitant of increased temperature, the value of thermometric indications becomes doubtful, and reliance on them may even be attended with danger. Independent, however, of observations for temperature made at the surface of the sea, and the relation of this temperature to the depth of water at the place, the temperature of the sea at different depths below the surface is a curious problem of physical geography; it is one which presents apparent anomalies and some uncertainty, from the want of an apparatus that may be relied on as affording a correct indication of the temperature of the lower strata of the water. The indices of Sim's thermometers are liable to be deranged in drawing up the instrument; and although bathometers, and other similar instruments, have been contrived for bringing up water from any depth, they cannot be regarded as furnishing satisfactory results, being liable to have their temperature changed as they pass through strata warmer or colder than the spot from which the water was drawn up. We are therefore glad to learn that M. Aimé has contrived a species of double thermometer, known by the name of *thermomètre à déversement*, for the purpose in question. One of M. Aimé's thermometers is for a temperature higher, and another for a temperature lower, than that presumed at the bottom of the sea: the two are let down together, and from their combined indications, and the ascertained temperature of the surface water, that at the bottom is known. Broken thermometers have been before applied, both for the temperature of the water and that of the land, when that temperature was known to increase downwards, but the application of a similar principle for indicating greater cold appears new.

Soundings.—If the temperature of the sea at different depths be a subject of interest, the actual depths themselves are no less so. Various circumstances combine to render it much more difficult to ascertain the depressions of the land below the surface of the sea, than its elevations above that line. The difficulty of obtaining soundings in deep water is well known, for the operation is only practicable during a calm. We must therefore be glad to hear of any successful attempts to sound whilst a vessel is sailing. An instrument, contrived by M. Laignet for this pur-

pose, is on the principle of a kite reversed—that is to say, the lead descends into the water upon the same principle that a kite rises in the air.

Relief Maps.—Depression of the Dead Sea.—M. Bauer-Keller continues the production of relief maps, and has lately executed a map of the kind of France and Belgium, on the horizontal scale of $\frac{1}{2,000,000}$, and $\frac{1}{400,000}$ for the vertical heights. A relief globe has also been constructed at Berlin, but we do not know of more than one specimen of it having been as yet imported into this country. There are no names of rivers or places upon it, but the principal towns are designated by red spots. In England, indeed, we may well approve of the successful labours of Messrs. Dobbs, Bailey, and Co., who formerly gave to the public the geological relief map of England and Wales, and also the geographical relief map of Arabia Petræa and Idumæa. They have now brought out a highly finished relief map of Syria and Palestine, the tract of all the known world, which, as it must be the most deeply interesting to every Christian, is at the same time the most singular in its orographical features. In this map the biblical reader will have the most accurate idea of the nature of the tracts inhabited by the Jewish tribes; and, using it with the former map of Arabia, he will have no occasion to consult any other document in studying the Holy Scriptures; whilst the geographer can see at a glance the vast altitude of the mountains of Lebanon (from 9000 to 10,000 feet above the sea), the comparative depression of the sea of Tiberias to 328 feet below it, and the extraordinary depression of the Dead Sea to 1312 below the level of the adjacent Mediterranean.* This is by far the deepest known fissure in the crust of the earth in reference to the level of the sea, and is the more remarkable, from the Dead Sea having the extraordinary depth of 350 fathoms! Looking to the eruptive character of the rocks which compose the surrounding high mountains of the Holy Land, we may, indeed, regard this phenomenon as a beautiful and striking illustration of the views of De Saussure and other geologists, that great upheavings have naturally been accompanied by deep lateral depressions of the contiguous lands.

Terrestrial Magnetism.—The British Association, and Connexion of different Sciences.—In bringing to a close these notices on the various steps, by which geography has been recently advanced, and in reverting to subjects connected with our own country, let me say that there is no

* It is well to remind geographers and travellers that the extent of this depression, as determined by the trigonometrical survey of Lieutenant Symonds, R.N., and for which one of the gold medals of the Royal Geographical Society was given to that officer in 1843, agrees very nearly with the independent barometrical observations of M. Berthollet and the French savans.

work which British practical science has produced, that ought to occupy a higher place in our estimation, than the great volume recently brought forth by Lieut.-Colonel Sabine, at the cost of the Government, on the magnetical and meteorological observations made during three years at Toronto in Canada. In referring you to the lucid and modest introduction to the tables compiled from the labours of his brother officers of the Royal Artillery, for a full view of the origin, progress, and ulterior objects of the inquiries into terrestrial magnetism in which Colonel Sabine has been so efficient a leader, you must all feel with me that the problems which, in common with Humboldt, Hansteen, and Erman, he is engaged in determining, are of the highest importance to the ultimate aim of physical geography. Valuable, however, as the researches have been, I thoroughly agree with my distinguished friend, that if they be not followed up by further and continued inquiries into the periodical variations of the magnetic direction and forces, as compared with meteorological phenomena also periodical; and also with those secular changes which, with slow but systematic progression, alter the whole aspect of terrestrial magnetism from one century to another, and which, in their nature, are probably intimately connected with the causes of the magnetism of the globe itself, we shall not be enabled to ascend by the inductive process to the establishment of general laws. Ardently, therefore, do I hope that in the same spirit of liberality which has induced our Government to found magnetical observations, and to publish the splendid mass of knowledge already obtained, supported as they are by the voice of science expressed through the Royal Society and the British Association, they will persevere in eliciting further results, and will, in consonance with other European governments, carry out such a series of observations in future years, as may be recommended by the philosophers engaged in this branch of science, who are about to assemble at Cambridge.

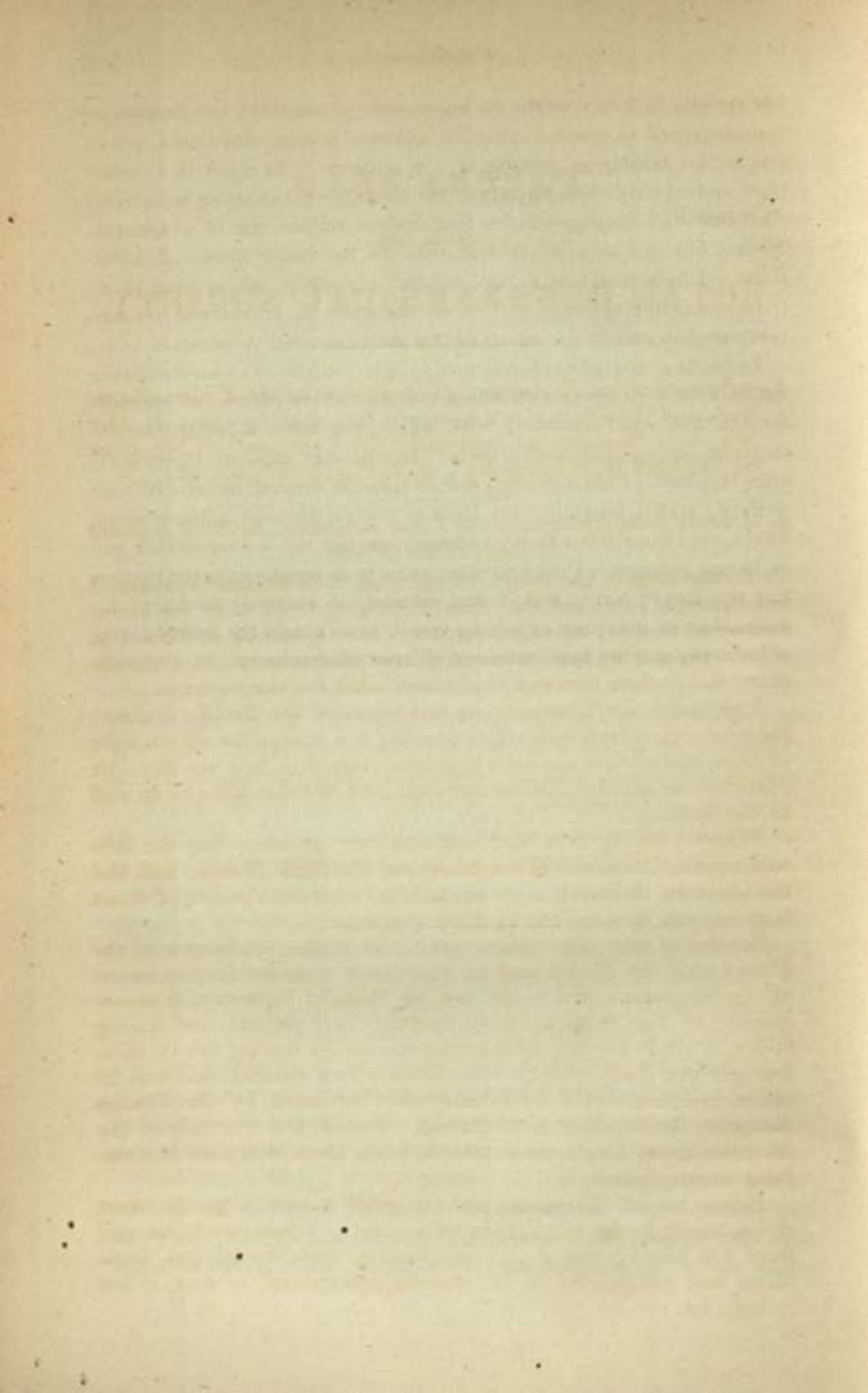
I cannot make this allusion to the British Association without inviting geographers not only to repair to the ensuing meeting at Cambridge, but to endeavour there to propound for discussion, in the Subsection of that great national institution, which is specially allotted to them, more suggestions than they have been accustomed to make in former years. Even those geographers who have no such communications to offer, may rest assured that they will reap much instruction from the assembled geologists, zoologists, botanists, and ethnologists. I might indeed simply refer you to the last volume of the Transactions of the British Association, containing the admirable report of Professor Owen on the extinct mammals of Australia, and to the beautiful gene-

realizations with which it is terminated; and you will instantly see, from evidence offered by his own science, that this great comparative anatomist takes the broadest and soundest views of the connexion between the ancient and modern distribution of masses of land. Showing us that, as a whole, the extinct quadrupeds of our island are closely analogous to those of the continents of Europe and Asia, and that these quarters of the globe are separated by no natural boundaries which could have caused great variation in the distribution of animal life, Professor Owen infers that England must have been a portion of the Continent, when it was tenanted with the same species of now extinct elephants, rhinoceroses, hippopotami, bisons, hyænas, tigers, bears, &c., inhabitants of the common Continent. Even Africa is, on one of its flanks, so slightly divided from the rest of the old world of the geographer, that its existing races of mammals in some sort intermingle; though certain quadrupeds, as the giraffe and hippopotamus, which have become extinct in Europe and Asia, still exist in Africa. But when we cast our eyes to Australia on the one hand, or to South America on the other, then is the fauna as entirely dissimilar in each, as we should expect to find it in countries partitioned off by such wide seas and great natural barriers. From observing the fact, that the fossil mammalian remains of these two continents are as unlike those of Europe, Asia, and Africa, as their present quadrupeds, Professor Owen rightly concludes "that the same forms were restricted to the same provinces at a former geological period, as they are at the present day;" and thus he sustains the views of modern geologists, that in those periods immediately anterior to our own, the great geographical features of the earth must have been the same as those which now prevail.

Conclusion.—In concluding this report on the recent progress of geography, I am but too well aware that, as at our last anniversary, I must apologise for the inadequacy of my efforts. Occupied as I have been, up to the very moment at which I address you, in the completion of a large work on the structure of Eastern Europe, and the Ural Mountains, I have only been able to snatch a few hours at intervals to execute my duties as a geographical President; and without the additional labours of our indefatigable Secretary, this review would have been still more imperfect. If, however, you will pardon me for not bringing before your notice a greater mass of materials, I hope that the picture I have endeavoured to sketch of the progress of our science in those foreign countries with which I am the best acquainted, may, at least, satisfy you that I have the spirit of geography at heart. At all events I trust that you have found in me a person who, zealously devoted to your cause,

has striven, by every means in his power, to augment the number of your members, to attach to your list names of distinguished men, and to render this Society as popular as it is scientific. In my wish to effect these ends, I only claim for myself the merit of endeavouring to increase that *esprit de corps*, which is essential to the success of a scientific Society like our own, solely dependent on the hearty union of individuals. I have therefore a right to feel a pride in seeing men of all shades in public opinion, and of all the walks in letters and science, combining to uphold the efforts of this useful national Association.

In bidding you adieu, Gentlemen, I offer to you my sincere thanks not only for the honour with which you have invested me, but specially for the zeal and unanimity with which you have supported me in carrying out our common objects. In whatever capacity I may hereafter be placed, I shall never cease to take the deepest interest in your welfare; and in resigning this chair to the gallant and noble seaman, whom you have elected as my successor, permit me to congratulate you on having obtained a President who, as he is an ornament to the Peerage and the Royal Navy, will, I feel assured, so zealously discharge his duties, and so steer our exploring vessel, as to obtain the hearty cheers of his crew, and the approbation of all true geographers.



PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY.

I.—*Journal of an Expedition from Pirara to the Upper Corentyne, and from thence to Demerara, executed by order of Her Majesty's Government, and under the Command of Mr. (now Sir) Robert H. Schomburgk, K.R.E., Ph. D., &c. &c.*

1. *Journey from Pirara, by the River Rupununi, to the Wapisiana village, Watu Ticaba.*

IN furtherance of the objects of my mission to British Guayana, I left George-Town on the 15th February, 1843, with the intention of joining the other gentlemen of the expedition at Pirara, to which place they had proceeded from Roraima, while I investigated the regions north of that remarkable mountain-chain.

I ascended the Essequibo on this occasion for the fourth time; the route, therefore, offered no novelty, if I except the appearance of that remarkable comet which we observed first on the 8th March, and which remained an object of wonder alike to us and to the Indians.

Without having met with any accident on ascending the falls and rapids, I reached Wai-ipukari on the 24th March, and had the pleasure of finding my companions, after an absence of about four months, in excellent health and spirits.

Several of our large boats were still at the confluence of the Pirara with the Mahu, and as they were required for the ascent of the Rupununi, and could not be brought by water, in consequence of the rains usually expected in February not having fallen, I made the requisite arrangements for having two of them brought over-land, though the distance in a straight line was 23 miles, and this would be considerably increased by the detours necessary for avoiding high ground. Pasico, the chieftain of the Macusis about Pirara, undertook to bring them, which he successfully accomplished.

Before we left Pirara we had the grief to see it partly burnt down, through the negligence of a child. I fortunately rescued from her blazing hut a poor old woman, who, though she knew there was gunpowder in it, seemed determined to save a few

articles belonging to her absent grandson. The remains of the former Catholic Chapel, and the house of the late Mr. Youd, next fell a prey to the flames, and it was only with the greatest difficulty that the further progress of the fire was arrested.

The preparations for our departure being completed, and a number of Indians engaged to accompany us;—on

April 30th I bade adieu to Pirara: nor was it without feelings of regret that I cast a last glance on the hut which for so many months had been my residence; for humble as was its appearance, when judged of by the scale of European constructions, I contrasted the comforts I had enjoyed under its shelter, with the sufferings of the many nights I had passed under the canopy of Heaven. The ruins of the missionary's house, near which my road lay as I commenced my journey, its blackened walls attesting the cause of its destruction, and the remembrance of its former inmate, whose first arrival at this spot I had witnessed, and under whose benevolent and judicious conduct I had seen the seed of our Christian religion sown in the heart of the savage, but not permitted to ripen into the perfect harvest before it was cut down—all combined to make me sad. The large wooden cross, which, when the Brazilians possessed the village, had been erected in front of the chapel, and which, as a Protestant, I could not view in the same light that a Roman Catholic would, still brought relief to my feelings: it spoke of hope, the hope that there might yet dawn a better day for the poor abandoned beings, who, just initiated into our religion, were again left to themselves and to nature.

As I proceeded to the embarkation at Wai-ipukari recollections crowded upon me: with what various feelings had I, at different times, trodden the same path, from the time when I first traversed the Savannahs, in 1835, in company with Lieutenant (now Captain) Haining,* to the present moment! And had the cause of religion—had humanity been advanced during the long interval of eight years? Alas! no. The ruins of Pirara, scarcely a hut inhabited, the regular paths which traversed the village during the missionary's residence among the Macusís, overgrown with rank grass; no human being visible to greet us with his hearty Tombowai—all replied in the negative.

At Wai-ipukari, I found the bustle of preparations for our journey. The Indians from the Canuku Mountains were all encamped round our tents, to see us once more before we departed. The boatmen were putting the craft in order, and the hoarse voice of the coxswain was evidence of the free use he had made of it during the day. Upon examination of what had been done, and what yet remained to do, it was clear that more than one day

* Since this has been written poor Haining died in Jamaica.

would elapse before we could start on our further ascent of the Rupununi. In order to provide for the multitude, without consuming our salted provisions, hunting parties were immediately despatched in quest of game.

The inlet, on the banks of which we were encamped, abounded in kaimans. On land they are too timid to be dangerous; and the animal is so well aware of the disadvantages under which he labours when on terra-firma, that on the slightest appearance of man he immediately plunges into the water—once there, he is the most dangerous animal in the rivers of Guayana. I was anxious to possess a perfect skeleton of one of these monsters, and accordingly, Naripo, the kaiman-slayer, a fine Macusi, who had settled near Wai-ipukari, was armed with my rifle for the purpose. He promised to do his best to shoot one before we started, and he kept his word, for the following day he arrived with the intelligence that he had succeeded; on hearing which we all started for the sea-like expansion of the Awaricuru, near which Naripo had erected his house, and shot the kaiman. The animal was still in the water, but fastened with a bush-rope, or liana, round the neck to a tree. With the assistance of several Indians, and the greater part of our own men, it was hauled ashore. Life was extinct, and we had nothing to fear, though, when looking at his horrible jaws fringed with teeth, an involuntary shudder almost came over me. Its whole length was 12 feet 3 inches (the largest I have ever seen measured 16 feet; but there may be larger ones); the head was 18 inches long, and the circumference, passing over the eyes, was 20 inches; the girth of the body, where most slender, was 4 feet 5 inches. We placed it in a position which appeared to us the most natural, and our artist took a drawing of it, while Naripo, with no small vanity, related how he had shot it. He went, he said, with his little son, a boy about eight years of age, to the inlet or Kirabagh, and having tied a fowl to a long string, threw it into the water as a bait. The fluttering of the bird in its attempts to escape soon attracted a kaiman to the spot, when it received the contents of the rifle, but apparently with little effect; for though it sank it soon rose again, and made a second rush at the fowl, which had been again thrown into the water. Naripo fired a second time, and little Danappé now loaded his fowling-piece with slugs. The ire of the monster being raised, the dainty bait was withdrawn, and the Macusi merely splashed the water with his foot, holding firmly against a tree on the margin, when the kaiman rushed furiously towards him, and received the shots of both the father and son. Seven discharges were necessary before they proved successful: several slugs had penetrated the skull, and one of the balls had passed through the eye. The drawing finished, the kaiman was hauled on dry ground,

and a kind of cage-work of large sticks built over it, to protect it from the vultures and other carrion-loving animals: this precaution, however, was of no avail, for when Mr. Fryer returned, about a month afterwards, to secure the skeleton, it was not to be found.

I had selected the rainy season for ascending the Rupununi, as at that period I would be able to reach a higher point with our canoes than I could at any other, and the river was now rising rapidly: still were we not ready, and the 3rd of May approached before we could start. At length, the corials being reported ready, we took leave of our Indian friends. In the number were many who had accompanied me on my previous journeys, when I first landed among them, eight years ago: these pressed my hands, a custom with which they had since become acquainted, and gave me their Tombowai, or farewell. We did not start under a good omen, if such superstitions were entertained by any of us. The corial which I occupied, the *Louisa*, ran foul of a sunken stump on leaving the inlet, and one of her planks was stove in. We could scarcely keep her from sinking before we reached the bank of the river. Our Indians were however alert, and, after an hour's delay, the damage was repaired, and we were once more *en route*.

May 4th.—What a night we had passed!—it appeared as if the flood-gates of heaven had been opened. Anxious to make every progress, it was almost dusk before we began to pitch our tents the previous evening, and we had not got them up when the thunder-storm commenced. All sounds were overpowered by that of the falling rain: even the thunder was scarcely audible, and announced itself only by the vivid flashes of lightning, which, as they shot along, illumined groups of canoemen and Indians, seeking shelter as best they could, and trembling with fright and cold. As for keeping a fire alive, it was out of the question, and our tents were no protection from the rain that fell in torrents. We were much amused by my brother, who, having fallen asleep in spite of the uproar, awoke half dreaming, and as the rain fell in heavy drops upon him, and had already saturated his hammock, fancied the river, on whose banks we were encamped, had so much swollen in the course of the night that its waters already reached our tent, and his efforts to escape a watery grave were really ludicrous. I estimated the quantity of rain which fell that night at from 5 to 6 inches. The thermometer stood this morning at 65° F.,* and the wet-bulb thermometer at 64°.7, a certain indication of the atmosphere being overcharged with moisture.

At half past eight we passed the mouth of the Curutoka, which,

* The temperatures mentioned in the present memoir are throughout those of Fahrenheit's thermometer.—(Ed.)

a few miles higher up, is inhabited by Macusi Indians. This stream meanders partly through savannahs, and has its source in the eastern continuation of the Canuku Mountains.

Two hours afterwards we passed the first rapids, which the Louisa did in fine style; but the large canoe had to be hauled over by main force. At a short distance above the point is the site of the former Protestant mission. While the people were occupied pitching our tents, I strolled up the stream, and again had occasion to admire the beautiful palm, the curua of the Macusis. It appears to be a species of *Maximiliana* (*insignis*?) and, if so, is certainly the handsomest of that interesting family, which, though social in its habits, is only found in regions far asunder. Time had wrought great changes since the mission had been abandoned. Vegetation, in tropical exuberance, had overpowered what man had planted; and the cotton plantations and provision fields, which, under Mr. Youd's direction, afforded so gratifying a prospect, presented now only a few straggling shrubs of a *Eupatorium*, numerous young trumpet trees (*Cecropia*, *Phyllanthus*), and various sedges, which being the first occupants of the soil before man had cultivated it, again sprung up when he relinquished his labour. The missionary's house, and the building in which he was wont to instruct the Indian in the Christian religion and the English language, had fallen in, and added the gloom of their ruined aspect to the forlorn appearance of the once flourishing mission; and yet scarcely three years had elapsed since circumstances had obliged Mr. Youd to withdraw.

Seeing marks of recent footsteps, I followed their direction through clusters of plantain trees, which, in consequence of their rapid growth, had withstood the throng of ranker vegetation, and attested by their height, in some instances from 40 to 50 feet, the fertility of the soil. Indeed the Indians consider those regions where the curua grows, the most fertile of the forest. Of the numerous Indian habitations, which I had seen here on a former occasion, only two miserable huts remained, and the pools of water which were standing in them were sufficient evidence that their roofs were not water-tight. I saw no human beings in them; but some wood shavings, a gun with its lock taken to pieces to be cleaned, and a spindle with cotton, plainly indicated that people had recently been there, and that, alarmed at my approach, they had fled into the wood. I went in search of them, but without success, and when I returned to the huts I found there two women and a man, the former spinning cotton, the latter cleaning the lock of his gun, as though they had never been disturbed, and, evincing no surprise at my appearance, they did not even look up from their work. A few words, spoken to them in their own language, soon inspired confidence; and they told me that bearing

me approach, and knowing by the sound that he who came wore shoes, they had concealed themselves till they had ascertained who it was. I purchased some ground provisions of them, and gave the females some glass beads, after which I returned to the camp.

5th.—The first large fall of the Rupununi, which is a little above the late Mission, was passed without accident, and we continued our journey at half-past eight in the morning.* The river Awaricuru, by means of which, and the small river Quatatta, Pirara is reached within a distance of 2 miles, has a second outlet about a mile above the fall, and 11 miles from the lower (outlet?). Such divisions of a river, although frequent near the coast, are but seldom to be met with in the interior.

Three miles higher up, and on the left bank of the Rupununi, a small channel leads to a lake-like expansion of water, called by the Macusi Indians Watawarai, to which they resort for fishing, as this inlet is well stocked with the finny tribe. We halted at half-past three o'clock in the afternoon, and were then in sight of the Canuku Mountains. Thick opaque clouds enveloped their summits and deepened the dark green tint of the gigantic trees which clothed their sides. Our tents were scarcely pitched when the clouds dissolved and the rain poured down in torrents during the whole night.

6th.—Nothing could exceed the beauty of the morning. The sun rose partially covered by fleecy clouds, as if afraid to contend for the supremacy of the day against the dark hovering masses to the west; but when its rays fell upon the rain-drops on the foliage, the scene was one of fairy land. The majestic *Mora* (*Mora excelsa*), refreshed by the late rains, was covered with a succession of leaves whose tints, varied with their age, passed from yellow through red to dark green; while the splendid *Petrea* with racemes of bright blue flowers, sometimes from 12 to 18 inches long, trailed from bush to tree, and with the orange-coloured *Combreta* gave variety to the surrounding scenery.

We were now surrounded by mountains through which the river had forced its way, and, proceeding onwards, arrived by one o'clock at the small river Aripai, on the right bank of the Rupununi. A settlement of Wapisiana Indians was established at a short distance from its mouth, and as I was in hopes of procuring here a fresh supply of provisions, we halted at that early hour. Immediately on landing I proceeded to the village, which is only half a mile from the river. The yells of the numerous dogs informed the Indians of my approach, and when I came in front of the first huts, I found the inhabitants all assembled. An old

* The rocks which form the fall are of compact basalt.

Indian stepped forward, and greeting me in tolerably good Portuguese, said he was the chieftain of the people I saw before me, and who appeared to be all young men. One by one now came up to me and gave me their hand with a good-natured smile. The chieftain's wife, a tall woman, who, although middle-aged, was still good-looking, also spoke broken Portuguese, and dropping her courtesy, seized my hand and attempted to kiss it, which I prevented.

On entering the hut I was accosted by my name, and a young female, whom I remembered to have seen at Senhora Librada's in 1838, welcomed me. She spoke the language well enough to inform me that, dissatisfied with her employer, she had left her and come to this village; the chieftain's wife, a Paravelhana by birth, being a relation of hers.

I perceived no difference in the construction of the huts of this village from those we had seen at the Macusi settlements. Some of the women were occupied in preparing a Laba (*Calogenus subniger*, Desm.), which appeared in such excellent order that it tempted my appetite. Three or four men were lounging in their hammocks, each of whom had a large calabash of yellow plums (*Spondias lutea*, L.; Maropi in the Macusi language), which he was so eager in devouring as to have no time even to cast a glance at me. Large heaps of firewood piled up for use in the winter, when the torrents of rain render the wood in the forest unfit for burning, indicated a foresight I had but seldom met with among the Indians.

The old chieftain requested I would accompany him to his provision grounds, which were adjacent to the houses. He showed me the pride of his heart, spots of cassada (*Janipha manihot*), some, as he said, six moons, others four moons in the ground. (The Indians divide the time from rainy season to rainy season into lunar months or moons.) There were his yams, and there his tobacco plants and arborescent cottons of a size that would have astonished a planter from the south of the United States, and attested the fertility of the soil, which was a black mould slightly mixed with sand. The old man could not sufficiently expatiate on the fertility of the soil around his village, in proof of which he pointed to the graceful curua-palm towering high above the adjacent forest-trees. We saw the trunk of a large silk cotton-tree (*Bombax*, Spec.), which if it had remained standing in his fields, would no doubt have rendered the ground under it useless, by reason of its wide-spreading branches. It had accordingly been cut down, and the labour of the operation may be judged of when I state that the trunk was 25 feet in circumference.

The forests about Aripai abound in cedar-trees (*Icica* of Aublet), so called from their resemblance in smell and in the

colour of the wood to the real cedar (*Larix cedrus*), though they belong to a quite different family.* This tree often attains a height of from 60 to 70 feet, and canoes made of it are considered more durable than those made of any other wood. It is called by the Wapisiana Indians *camiau*, and by the Macusis *paranguai*. The colonists esteem it much for furniture, particularly for drawers, as its aromatic odour keeps away the insects.

I had scarcely made my way back when the whole village returned my visit. Our baggage was examined with eager curiosity; the sight of the objects we had brought for barter excited great ecstasy, and the promise that all the provisions that could be spared would be immediately brought. I observed here a strange custom among the young girls, and adopted by them perhaps till womanhood; they wore their hair short with the exception of a lock, which hung from the crown of the head down towards the neck.

The following day being Sunday, I resolved on remaining here. The season had set in with uncommon rigour; torrents of rain fell during the night; heavy thunder and frequent showers alternated during the day-time with sunshine and blue sky. The river was rising almost visibly, and the current ran, where the river turned sharply round, with the swiftness of a rapid.

8th.—On awaking this morning I found my hut under water, and might have stepped at once from my hammock into the canoe; but, as we had anticipated this, the baggage had been previously secured. The river had risen $10\frac{1}{2}$ feet in 36 hours, and still continued to rise. Previous to our departure the Indians brought us about 30 cakes of cassada bread, for which they demanded mock-coral glass beads and others of a white colour, the latter being the most esteemed by the Wapisiana ladies; the men requested for their share, knives, hooks, &c. A little girl with very pretty eyes, but by no means an intelligent countenance, particularly when seen in profile, appeared not to possess any provision fields to enable her to offer cassada bread, but anxious, nevertheless, to possess some of the favourite beads, she brought under her arm a white hen and a number of young chickens in a small basket, which she set down at my feet. I gladly presented her with what she so much desired, and for which, no doubt, she would willingly have sacrificed her pet, which I returned to her with the young brood; an act of gene-

* I consider this tree to be undoubtedly Aublet's *Iceia altissima*, though in one respect it differs from his description of that species, as it has from nine to twelve pair of leaflets, while Aublet says it has but from three to four. He describes the white cedar, and speaks of a species which he considers to be merely a variety, and the wood of which, he says, is of a red colour. This latter is probably the red cedar I found at Aripai, but which is decidedly specifically different. It may stand provisionally as *I. Camiau*.

rosity so unexpected that she first looked with astonishment at the beads, then affectionately at the hen and chickens, then with smiles of thankfulness at me.

The following are the meteorological observations at Aripai:—

Period and Number of Observations	Instruments.	Mean.	Maxima.	Minima.	Remarks.
From May 6th to May 7th, 11 Observations	Barometer	Inches. 29.667	7th.—10h A.M. Inches, 29.706	7th, from 4 to 6 P.M. Inches, 29.606	The weather very changeable —fine in the afternoon.
	Attached Thermom.	77°.72	7th.—12h. 80°.78	7th.—6h. A.M. 72°.14	
	Detached Thermom.	77.80	81.2	72.50	
	Wet-bulb Thermom.	76.72	7th.—5h. P.M. 79.7*	72.10	

Having brought the corials to our tents, we steered through the rows of trees; certainly a novel species of navigation. The river was in some places running from 5 to 6 knots an hour. The *Louisa* was a fine boat, and her crew some of the ablest men; still there were places where, with all our advantages, we only advanced inch by inch. The other boats had to be hauled along by means of the branches on the river's banks. Accumulating flakes of white foam came floating down the river, which, at those parts where it was narrowed in by the mountains, almost covered its surface, and gave it the appearance of a northern snow-field. Great was its contrast with the verdure and the many-coloured flowers that adorned the banks, particularly where a beautiful *Combretum aurantiacum* (Nov. Spec.) immersed its drooping spikes into the stream below, so bright its colours that their reflected image was visible even in the muddy waters of the Rupununi. This beautiful shrub, common to almost all the rivers of Guayana, appears to bear a constant succession of flowers, but at this season the banks were covered with them, and, together with the *Petrea macrostachya* (N. Sp.) and the thick garlands of pink flowers of several species of *Bignoniaceæ*, presented a most splendid appearance.

In the early part of the morning the heavens looked gloomy; they presented an expanse of a dull blue tinge with here and there a few interspersed cirro-strati. At 10 o'clock the appearance of the clouds became highly interesting. Thick bulky masses of rain-clouds with a blue sky intervening indicated an approaching storm, and offered a fine subject for a painter. The cry of the toucans, that sure prognostic of rain, told us what we had to expect. It is remarkable that the Buradi or Carauwui

* The detached thermometer stood at the same time 80°.2.

(*Ramphastos Toco*), and other allied species, generally commence their cry on the approach of rain. If, therefore, their disagreeable voices assailed our ears at any other time than in the morning or evening, when we allowed them to set up their cry as in the regular course of things, we generally looked out for our cloaks, or made other preparations to avert the threatened wetting. Our toucans very seldom proved false prophets. Noisy as is the Buradi, it is surpassed by a species of hawk, called by the Macusi, Callau-callau; by the Warraus, Yacka-tata (*Ibycter leucogaster*, Vieill.), a bird of prey which appears to be spread all over Guayana, and which has been honoured by the colonists with the name of bull-dog. It is always found in societies of 10 or 12, occupying the loftiest trees along the banks of the rivers, where they act as warders. Scarcely do they spy a boat in the far distance, when they set up their yacka-tata; a cry which, when the whole company join in the alarm, proves almost stunning.

The prospects on ascending the Rupununi, where it has worn itself a passage through the mountain chain, are by no means uninteresting. In one place the mountains approach the immediate banks of the river, and the stream bathes their feet; in another they surround it like an amphitheatre, or recede at the distance of a mile or two; but nowhere do we find a bold cliff overhanging the water. It seems as if the river followed the windings of the valleys, gliding from mount to mount without abrading any portion of their granitic foundations. Wherever the current has washed away the clayey soil, large rounded blocks of gneiss are visible. At one of those spots where a high mountain turns the river boldly to the east, I enjoyed a most beautiful prospect. Not only the banks of the river, but also the steep side of the hill, were almost covered with trees of that species, so splendid in appearance, which I first discovered at the river Scabunk, a tributary of the Takutu, but where the absence of flowers prevented me from ascertaining its character; here they were in profusion.

Among those plants which bear bracts, that organ is generally situated immediately below the calyx; but in this instance the bract sometimes occupies the common situation, but is more frequently attached to one of the segments of the calyx, a peculiarity common to the genera *Calycophyllum*, *Mussaenda*, and *Pinckneya*. This tree belongs to a new species of the first of these, and is of singular beauty. Its large pink bracts almost clothe the tree in that beautiful colour, and it is only upon a near approach that one can discover the shining green leaves, and the spikes of small flowers of a velvety blue. Let the reader call to mind the splendid aspect afforded by our rose bushes in full blossom,—then let him imagine the great garden of nature in

Guayana, clothed in tropical exuberance, and among the luxuriant productions of a genial sun and fertile soil, trees from 40 to 50 feet high presenting a mass of leaves of the colour of the rose, from the deepest carmine to the faintest blush,—and he may form some idea of the picture I now witnessed. The wood of this beautiful tree is extremely hard, of a yellowish brown, and very bitter; and, I have little doubt, possesses febrifuge properties. The Macusi Indians call it Dehpoyeh. I have already observed that it is a new species, and, according to the custom of botanists frequently to name their own discoveries after the patrons of the science of botany, or other distinguished individuals, I have requested the permission of Lord Stanley—who, during the time the plant was discovered by me, was Secretary of State for the Colonies, and by whose authority the expedition was undertaken—to make this splendid tree known to the botanical world by the name of *Calycophyllum Stanleyanum*.*

There were no palms in the vicinity of the spot where we intended to rest for the night, and, as the sky threatened rain, our Indians had to find a substitute for palm-leaves, with which they usually cover their temporary resting-places. The huts were accordingly covered, first, with the branches of trees, and then with a thick layer of fallen leaves, which at this period strewed the ground several inches thick, and thus rendered impervious to the rain. A pair of those pretty monkeys called marmousets in the colony (the red-handed Tamarin, or *Midas rufimanus* of Geoffroy) gamboled from tree to tree near my tent. I was rather surprised to meet this pretty species of *Midas* so high up in the interior, as I had always considered its abode to be near the coast region, where it occasionally visits the plantain-walks † in such numbers, to feed upon the ripe fruit, that it commits great injury. These monkeys are easily caught in traps, but seldom survive their confinement above a few months.

9th.—It appeared the river had reached its maximum height yesterday, as from 2 o'clock in the afternoon of that day to 6 o'clock this morning it fell upwards of 5 feet. We found the large boat (42 feet in length) resting with the stern in the fork of a tree and the bow on dry land; certainly the fault of her coxswain, who had comfortably taken his rest under her awning while the water was running rapidly off beneath her bottom. It required the whole strength of our crew to get the boat out of this unwonted situation.

We entered, at about 11 o'clock, between two large rocks, that

* The description of this beautiful plant was first read at the meeting of the British Association at York, and has since been published in Sir William Jackson Hooker's 'London Botanical Journal,' vol. iii.

† A plantain-walk is a piece of ground allotted for the cultivation of the *Musa paradisiaca* and *Musa sapientum*, or the plantain and banana of the tropics.

part of the river where, on ascending, a continuation of rapids and cataracts commences, forming obstacles to further progress; but the lovely prospect from this point made me forget the dangers and difficulties that were to be surmounted. These natural portals of gneiss form a conspicuous feature in the view. On the river's right, and from its very brink, the savannahs stretched away; towards the S.W. rose high mountains; while the Peak Burukutuau-yari, with its granitic cliffs, formed the background of the picture. The whole landscape appeared "couleur de rose." The splendid *Calycophyllum Stanleyanum* gave a marked and peculiar character to the prospect.

We, in the *Louisa*, halted before noon near Mount Burukutuau-yari; the other boats did not arrive until past 2 in the afternoon. In the meanwhile I walked with Sororeng, one of the Indians who accompanied me to London in 1839, and who since 1837 had served me as interpreter, to a village of Wapisiana Indians, which was called Kuiraton. It is situated about a mile from the river, on its right bank. Here it was that, in January 1838, on my return from the sources of the Essequibo, I was detained for a fortnight waiting the arrival of one of my boats, in order to join our party at the lower Rupununi. I found on my arrival that no other craft was to be had but a small corial, just large enough to hold two persons. I was therefore obliged to send the coxswain and an Indian to Curassawaka, at the lower Rupununi, to bring up one of the boats of the expedition. The interval of 14 days is indelibly impressed upon my memory from the excruciating pains of tic-doloureux and neuralgia which I suffered, in consequence of exposure during our journey to the sources of the Essequibo.

The huts had been removed, and of the five dwellings which composed the settlement in 1838, only three were standing. The greater part of the inhabitants, and among them their chieftain, were absent in the provision-fields, and I found only two men and a few women at the place. One of the latter appeared to have just recovered from small-pox, and another was still suffering under that baneful disease. I learned, to my great regret, that many of the inhabitants had fallen victims to the malady, which had been introduced in 1842 from the colony.

I left a message for the chieftain to come and see me on his return, and, as there still remained a few hours of daylight after my arrival at the camp, I measured the height of the Peak Burukutuau, and found it to be near 2076 feet above the savannah.* A set of altitudes of the sun, W. of the meridian, gave me the chronometric difference of our camp 1 mile W. of

* Buntens's barometer indicated the height of our camp on the savannah to be 407 feet above the sea; the summit of Burukutuau would therefore be 2483 feet above the level of the sea.

Pirara ($59^{\circ} 21'$ W. of Greenwich). On a former occasion I had ascertained the latitude of Kuiaraton to be $3^{\circ} 1' 40''$ N., which would give for the peak $3^{\circ} 1'$ N. While we were still occupied with our measurements, the chieftain of Kuiaraton made his appearance, but, merely waving his hands, he passed on to the camp, where I afterwards joined him. He was a stranger to me; a fine-looking man, and rather tall in stature for an Indian. He bore himself quite upright, and a piece of cotton cloth, thrown over his shoulder in form of a toga, added to the dignity of his mien. One of his followers was entirely painted over with Lana,* with the exception of the face, which was painted with Roucou,† so that the nether parts of his figure presented the appearance of a negro, with which the red colour of the face formed a most ridiculous contrast.

As our journey over land was to commence at Watu Ticaba, I was anxious to send a messenger there to desire of the chieftain that a quantity of cassada bread might be prepared for us, the more particularly as our friends in Watu Ticaba possessed well-stocked provision-grounds, while in and near Kuiaraton they appeared to endure great privations. I was also desirous of procuring a guide, as I was perfectly unacquainted with the Rupununi above Kuiaraton. I succeeded in both objects. Our new pilot was a young man who had been for a short time with Mr. Youd, before that zealous missionary had been obliged to withdraw from Pirara and Curua.

10th.—The thermometer stood this morning at 6 o'clock at $82^{\circ}.3$; the wet-bulb thermometer 79° ; the difference, amounting to $3^{\circ}.3$, proved that there was less moisture in the air than on the preceding day.

Previous to our departure we received the visit of upwards of forty Indians of both sexes and of all ages; they were conducted by their chieftain, and looked with much curiosity at our baggage.

Among the visitors was an old woman, whom I immediately recognized from having seen her on my former visit in 1838, when her appearance was so shocking that I then compared her to a living skeleton, and thought she could not have survived the next month. My astonishment was therefore great indeed, at seeing her among the other visitors, and still strong enough to walk the distance of a mile for the purpose of satisfying her curiosity. Her appearance was rendered more pitiful by numerous white spots of different sizes which covered her body. These patches occupied chiefly the abdominal region, but there were

* A black pigment, prepared from the fruit of the *Genipa Americana* and *G. caruto*.

† The Roucou is prepared from the red pulp which covers the seed of the *Bixa Orellana*.

also some on the face, extending over the chin and under the jaw towards the neck. They were scaly, and, no doubt, the consequence of disease of the cuticle. This ghastly object was strongly contrasted by the appearance at her side of a young mother with her firstborn, an infant of 14 days old, and on which she lavished her caresses.

We fired our small cannon and cohorns before we started, to the great delight of our Indian friends. The reverberation of the sound from the near Burukutuau-yari and the distant mountains, at first loud, then dying away into an almost inaudible murmur, produced a sublime impression.

Our toil now commenced; rapid followed upon rapid, and, as we had but inexperienced hands for our crew, our ascent was not without danger. We passed, in the course of the day, the Curnayair, or Crooked Falls; the Ruru-ruru, the Tremetre, Trekutara-tepau, and several other falls. The hills Matziendaua form, apparently, on the left bank of the Rupununi, the south-eastern extremity of the Canuku chain. At their foot flows the small river Ménérüau. They extend N.N.W., and are connected with the high mountains Awarre-tequi and Burukutuau. Opposite Matziendaua the river Catuau-uru joins the Rupununi on its right. This river has its source in the savannahs S.E. of the Tarucupani, which forms the southern angle of the Canuku chain. Burukutuau bears from its mouth N. 27° E.

It was late in the evening before we had overcome the difficulty of ascending the fall Paratawai; and, as we had to encamp on the open savannahs, without even a copse of bushes for shelter, we earnestly hoped that the night might pass without a storm. Our Indians proceeded with their hammocks to the Matziendaua Mountains, which were thickly wooded at their foot.

11th.—The heavy work at the falls and rapids, the frequent rains and short provisions, combined to indispose our followers to accompany us further. On calling over the list, in order to share out allowances, we found that four Macusís had decamped during the night. If I except one of their number, who had appeared, at least, to be well disposed to give his assistance, the other three had proved themselves the laziest and most indolent of our crew, so that, had it not been for the bad example, and the fear that others might follow, I would have cared little for their desertion. I therefore addressed those who remained in their own fashion, and told them, that if any one was desirous to leave he might do so at once, but that he should not deceive me by stealing away in the night, like a thief or night-murderer (*kanaima*). Not one came forward to avail himself of the permission, and we continued our course with reduced strength.

During the dry season the river must be almost overgrown with guava bushes (*Psidium aquaticum*, Benth). At this time,

with their tops above the water, they assisted us in hauling the canoes over small rapids; besides which they break the swiftness of the current, and their flexible branches allowed the boats to pass over them.

Shortly after eight o'clock we arrived at Paruauku, the portage mentioned by Horstman, Santos, and others; and by means of which the Suwaru-auru is reached in the rainy season. It is a low savannah, stretching W.S.W. towards the Saeraeri mountains, on the eastern side of which (not the western, as I had been erroneously informed) flows the Suwaru-auru. The eastern peak of the Saeraeri mountains bears from hence S. 73° W., distant about ten or twelve miles; the highest point of the Cursatu mountains S. 65° W., and Burukutuau, which we had left the previous day, N. 20° E.; its distance being merely 5 miles. There are several isolated hills in the neighbourhood of this ancient portage, which has been known for the last hundred years, it being in April, 1740, that Horstman traversed it—no doubt the first European that ever set his foot in these regions.* Santos followed in 1775, and Barata in 1793. I gazed with interest on the ancient trees that fringe the river near the embarkation. Perhaps Horstman had encamped here, dreaming of the rich treasures which he fancied were buried in the mountains he saw towards the N., and little suspecting the difficulties which the transport of his boat across the savannahs would cause him and his crew on the following morning.

Some small hills approach the Rupununi a little above the portage, and on the left bank are some hillocks which the Wapisianas call Mawunna-meketsiba, the translation of which is eye-hills. I could not ascertain why they were so named, nor could I myself see any reason for the appellation.

At about 1 o'clock we were opposite the most southern point of the Canuku mountains, which our Indians called Tarucupani. The small river Witzapai joins the Rupununi on its right; and above the junction is a rapid, which, insignificant as it appeared, gave us a great deal of trouble to ascend. A small cluster of trees which we approached after 3 o'clock in the afternoon, was too inviting for us to pass them without pitching our camp under their protecting branches. Trees are so scarce in these savannahs, that we were obliged to carry the poles for our temporary huts with us in our canoes.

12th.—It was fortunate we had yesterday halted in a spot somewhat sheltered, for a thunderstorm came on with hurricane-like fury, that would doubtless have swept away our tents, had they been pitched in the open savannah. Our crew had some

* See Humboldt's 'Personal Narrative,' vol. v. p. 594.

difficulty in securing the canoes from injury, while others were constantly employed during the rain in baling out the water. The thermometer stood in the morning at 70°, and the wet-bulb thermometer showed only a difference of half a degree.

The Rupununi, which the Indians call Camoyepaugh, or Sun River, has not much diminished in breadth. From the entrance among the mountains to the savannahs, it has varied only between 250 and 300 feet. The splendid *Calycophyllum Stanleyanum*, which imparted so peculiar a character to the landscape, has now vanished from the banks of the river, and is replaced by the scarlet Elizabetha (*Elizabetha coccinea*). It was bearing numerous seeds; and the velvety appearance of the seed-pod, of a rich crimson, was not without its attractions, more particularly since the late rains had called forth the budding leaves, whose white colour contrasted strongly with the crimson legumen.

There are very few among the genera of tropical trees which, like the beautiful Elizabetha, put forth leaf-buds enveloped with teguments resembling those of *Liriodendron*, and covered with a viscous juice. The scales of a hard texture drop off, when the delicate pinnated leaf (of a whitish colour when it first bursts) appears partially folded up: it expands in the course of a few hours, but too weak to sustain its own weight until irrigated, when it assumes the position of the older leaves. The light by degrees colours it green; but the various shades of the leaf during its transition from white to green, together with the crimson seed-pods, give the tree a remarkable appearance. It is probable that the dry weather which precedes the tropical rains, may operate in a manner analogous to that of the winter of the northern hemisphere on our deciduous trees, in rendering torpid the vegetative powers; but it is remarkable that its effect should be limited to so few genera, which, like the Elizabetha, produce leaf-buds; nor is that tree at any time entirely deprived of its foliage. While the delicate white leaves make their appearance, others of a yellowish green, and the old perfectly-formed foliage of a dark green colour, cover the tree. I know only of a few trees, and among these a *Bignoniaceæ*, a species of *Erythrina* (*E. corallo-dendron*), and the *Spondias Cironella* of Tussac, which shed their leaves entirely; but even then, these genera are covered with flowers; indeed the *Bignoniaceous* plant was so clothed with bright yellow blossoms that the trees appeared at a distance like yellow hillocks.

Our crew spied out with much pleasure a quantity of guanas on the branches of the trees which girded the river—a delicacy highly prized by the Indians, and not despised by us Europeans. Many of the females had eggs, of which there are frequently from eighteen to twenty-four in the ovary, perfectly formed, and

somewhat larger than the egg of the domestic pigeon. I confess I am semi-savage enough to find them very delicious.

We halted above a rapid near the mouth of the river Kamai-kariba at half-past 2 o'clock. The large canoe, though manned with fifteen paddles, hove in sight only towards 6 o'clock in the evening. I watched them coming up the rapid. When the impediment was nearly overcome, they attempted to cross the stream diagonally by force of paddling—a feat which we in the *Louisa*, with six paddles, had performed successfully; but the coxswain and boatswain not acting in concert, the strong current seized the boat and hurried her broadside down the rapid, to the great consternation of the crew: the next moment she was driven against a rock. The greater part of the people jumped overboard, and swam to the bank. The boat balanced for a moment, but our interpreter, Sororeng, and some of our Indians, by timely assistance, prevented her from upsetting. Mr. Goodall and Mr. Fryer, who were under the tent of the boat, were described to me as having turned rather pale, while I freely confess that, though witnessing the accident from the shore, I felt the greatest uneasiness. As it was, the boat had shipped a great deal of water, and had to be brought in shore with all dispatch to prevent her from sinking. My brother in the mean time had been enjoying himself hunting an ant-eater (*Myrmecophaga jubata*), which he and the Indians had espied drinking at the river's bank, and, jumping ashore, had chased along the savannah. It was unfortunately a female; I have never had the good fortune to see a male of this remarkable animal, although in the course of my journeys in Guayana more than twelve females were procured.

13th.—It had rained nearly the whole night and till after 8 o'clock this morning. While they were loading the canoes I ascended a small elevation, and, looking south-westward, saw the flood at the distance of a mile or two come rushing over the savannahs. I returned with all dispatch to hasten the loading of our canoes. The river had swollen considerably in the course of the night, and had invaded the camp of the Indians.

The great cataract of the Rupununi, the Cutatarua, or Truan, of the Wapisianas, the Corona* of the Carabisi, was before us. We had heard the noise of its falling waters during the past night, but as the river had gradually risen, we found it much less dangerous than we had anticipated, and passed it without much difficulty. We had to unload nevertheless; and as there was a little sunshine after the dismal night, we profited by it and the large granite ledges to dry our baggage. The river near the cataract

* The words Truan, in the Wapisiana, and Corona, in the Carabisi, signify respectively "the fall" *par excellence*, there being no larger one, nor any like it in the Rupununi.

was about eight feet higher than when I saw it in 1835; but the trunk of a large tree that was lying on the highest rock of the fall, and which had been carried there by the flood on some former occasion, proved that it had yet to rise from 14 to 15 feet before it reached its maximum height.*

We started from the upper cataract at 1 o'clock; but our progress was very slow, in consequence of the swiftness and strength of the current. The river Purunaru joins from the S.S.W. on the river's left bank, a small stream when I visited it in 1835, but now nearly as large as the Rupununi itself. Opposite the junction the river Waipopo also comes in.

I halted at 3 o'clock at the fall Saracta, and dispatched my coxswain and some able hands to assist the other boats, which did not arrive until 6 o'clock. Large blocks of granite, near which we encamped, afforded an extensive view; and I ascended to their summit to witness the sunset, a spectacle so rare during the rainy season. The fiery orb surrounded by golden clouds was sinking behind the Cursatu mountains, whose bases were enveloped in mist, while their summits were gilded with the sun's parting beams. The eastern peak of Saeraeri rose above a sea of vapours; and the remarkable mountain Dochlopan, out of the reach of the sun's rays, stood like a sombre rock in the ocean. To the N. black clouds piled upon each other, and capped by the highest pinnacles of the mountain masses, spoke of the storm that was raging there, and contrasted finely with the calm and placid picture in the W. At the same time the moon, then at its full, rose in the E., and of an apparent size of which we in Europe can have no idea. So true it is that in the tropical regions of the western hemisphere not only the earth and its productions, but also the heavens and their phenomena, differ essentially from what we have been accustomed to from our childhood.

14th.—The river had continued to rise during the night, and we were now able to row over the savannahs in a straight direction, avoiding the serpentine course of the river and its increased current. The expanse of waters resembled an extensive lake. The snow-white egret (*Ardea Egretta*) in great numbers, the American stork (*Ciconia Americana*), the stately jabiru (*Mycteria Americana*), cormorants (*Carbo Brasiliensis*), and large flocks of the spurwing plover (*Charadrius Cayanus*), enlivened the surface above, while the tops of trees, granite blocks clothed in tropical vegetation, and here and there a small spot of elevated ground, alone remained visible. We saw the savannah

* On the return of Mr. Eyfer and my brother, about ten days afterwards, the trunk had been carried away—a proof that the water had risen above the rock. This will serve to give some idea of the extent to which the flat savannahs which border the river are inundated.

deer, hemmed in by the water on one of these small spots. They cast an anxious look at our approaching boats, then turned round to ascertain if there were no means of escape, hesitating to take the water, and stamping impatiently with their fore feet. The buck at length plunged into the water, but the doe resorted to a ruse—it doubled down in the grass. Two Indians noiselessly left my canoe; and, swimming with one hand, while with the other they held their loaded guns above their heads, approached the island. Arrived there, they stole gently towards the spot where the deer lay hid. The easterly wind informed the crouching animal of the approaching danger—for, though the sight of the savannah deer is dull, its scent is remarkably sharp—it suddenly rose, pricked up its ears, looked for awhile steadily in the direction whence the scent came, and then endeavoured to escape; but the Wapisiana had already fired with unerring aim; the poor deer sprang twice into the air, and fell lifeless on the ground, shot through the head.

Whenever the water on the savannah became too shallow for us, we were under the necessity of regaining the river, which we had some difficulty in doing, having to cut our way with cutlasses and axes through the thickets that fringed the stream. Myriads of ants, driven by the waters from the savannah, had taken refuge on the bushes and trees; and these now assailed us on all sides, and inflicted merciless bites and stings. That species which, like the bee and wasp, is provided with a sting, is fortunately scarce; for the pain which they cause surpasses in violence either that of the bee or wasp.

I have already observed that, on leaving the Wapisiana village, I dispatched a messenger overland to Watu Ticaba, to inform the Indians of our approach, and to desire them to bring a supply of bread to the mouth of the river Waruwau or Awarra. We were now approaching that stream; and discovered on some high ground, which rose above the surrounding savannahs, several human beings and two or three temporary huts. At some distance from this group stood an individual, apparently dressed according to the European fashion, and holding an umbrella over his head. My glass proved that I was correct; the distance did not allow me to discover the colour of his face; but I saw that he wore upon his head something like a military cap—that his loins were girded by a belt—that his bearing was upright—and that he stood apart from the rest, who remained at a respectful distance. My curiosity was much excited as to who this mysterious personage might be; but, as soon as the canoe touched the ground, this strange personage, shutting up his umbrella, and walking directly up to us, announced himself as the captain or chieftain of Watu Ticaba. The rules of etiquette were of no avail,

and, unable to contain myself, I burst out into a loud laugh at the wonderful metamorphosis of my Indian friend. Imagine, reader, a thin-boned being; his face adorned with an eagle nose and an uncommon large mouth, clad in a pair of sailor's trousers which had once been white, reaching to his ankles, and fitting him à la *Oliver Twist*; and having round his loins a piece of blue cotton cloth, from which depended a naked sword (in which, by the bye, I recognised an old acquaintance); his head covered with a red woollen cap ornamented with a large yellow tassel; and carrying in his hand a blue cotton umbrella (upon which he seemed greatly to pride himself); and you may perhaps form some idea of Captain Wayapari in his full dress. He had inherited the sword from his brother, Captain Siruai, of Eischalli, who bore it with him as a faithful companion when he guided us in 1837 to the sources of the Essequibo. Poor Siruai, I was sorry to learn, had paid the debt of nature; and thus it was that the sheathless sword had descended to his brother Wayapari. As for the umbrella, we learned that Wayapari, journeying lately by means of the portage at Primoss to the Corentyne, had observed that article in the possession of one of the woodcutters at the lower part of the river, and had become so enamoured of it that he procured it at any price. Since it had been in his possession the handle had been broken, but his ingenuity had substituted in its place the forked branch of a tree. His followers were robust and well-made men of the Wapisiana tribe; they had brought down some baskets of bread and several bunches of plantains, which greatly delighted our crew, who had for the last two days been upon short allowance.

Our tents were soon pitched, and protected against approaching rain; fires now blazed in all directions, surrounded by groups of swarthy Indians, warming themselves, or cooking their plantains on the coals.

We had for some days past suffered from a minute sand-fly (*Simulia spec. ?*), which from sunset till sunrise inflicted upon us acute bites, that left marks of a scarlet hue for several days after. I was quite unacquainted with this nocturnal species, as the sand-flies we had hitherto met with had proved troublesome only during the daytime, and vanished at dusk, nor was their bite so piercing as that of the nocturnal species. They were this night so numerous that they compelled us to discontinue our astronomical observations. The size of this little insect scarcely exceeds that of a small pin; and as it attacks not only the face and hands, but gets into the hair and inflicts its bites upon the scalp, we suffered from it more than I can describe.

The meteorological observations at the mouth of the Waruwau (432 feet above the sea) were as follows:—

Date.	Hour.	Barometer.	Thermometer.			Remarks.
			Attached.	Detached.	Wet-bulb.	
May 14th	P. M. 4 30	Inches. 29.575	86°	86°·4	79°	The weather fine, but partially clouded. At 6 P.M. a shower passed over.
„	5 0	29.570	86°·90	87°·6	80°	
„	6 0	29.571	77°	77°	75°	
„	6 30	29.590	77°	77°	75°	
„	7 15	29.602	76°·82	77°	75°·2	

15th.—We recommenced the ascent of the small river Warucan, which was running with uncommon velocity; and as its course was much impeded by trees, we had to overcome some difficulties before we reached the spot from whence the path leads to Watu Ticaba. Arrived there, our boats were unloaded, and the baggage divided into convenient portions for being carried overland.

16th.—I had given orders for starting early in the morning, but the rain descended in torrents, and it was nearly noon before it abated sufficiently to allow us to proceed on our journey. Several Indians had arrived to assist us; and Wayapari, dressed in his gala suit, with his umbrella over his head, led the van. We had not proceeded far when a heavy shower overtook us; Wayapari disrobed himself, and, shutting up the umbrella, stood the shower with Indian fortitude. We had sometimes to wade up to our arms through the water, and every rill had become a torrent. Indeed, if it had not been for the chieftain, who walked before us and searched for the shallowest places to ford the torrent, we might have met with serious accidents. As it was, an Indian boy nearly lost his life while crossing one of the streams just above a cataract. He carried a basket, which he had slung round his neck to prevent the contents getting wet. The torrent swept him away towards the cataract; he sunk, and not being able to rid himself of his burthen, could not stem the current, and was given up for lost, when his brother, who at that moment arrived, jumped into the water, and, fortunately seizing him, dragged him half dead to the shore. Well aware that I could not swim, I grasped with all my strength the pole which assisted me in wading, and I kept as close as possible to Wayapari.

Our march was fatiguing in the extreme: the sun was rapidly approaching the horizon, and as yet nothing was to be seen of Watu Ticaba. The party to which I belonged had been marching and wading for the last six hours without resting; we were all very tired, and indeed the Indians dropped off one by one and loitered behind. We were now ascending some rising ground,

when our guide halted, and raising his umbrella, which he had shut up and carried under his arm during shower and sunshine, his young son commenced blowing a strain upon a fife or flute made of bone—a certain indication that we were near a village. I now observed five huts, and a great stir among the inhabitants. The sound of another whistle reached us from the village, and a ghastly figure of a negro, perfectly naked except the waistcloth, came out of one of the huts and met Wayapari, whom he respectfully saluted, and then placed himself behind him, taking no notice of us, or of any other person of our suite. Thus we entered Watu Ticaba, the locality of which had been changed since I was here in 1837. The former chieftain of the village having died, they had buried him, according to their custom, in his hut, burnt down their dwellings, and established themselves further to the S.E.

The stranger's house (the tapoi of the Macusís) had been put in order for our reception, and that portion of our luggage which had arrived before us was placed upon large beams to prevent it coming in contact with the moist ground. The chieftain now bade us welcome, and the influential men followed his example, while the women and children remained at a respectful distance. I counted fifty-eight individuals of all ages and of both sexes. They did not differ from the Wapisianas we had met on our journey to the sources of the Takutu. We had now full leisure to examine the strange figure of the old negro who came to meet Captain Wayapari on our arrival. His gaunt figure, which appeared all the more meagre and ghastly for being clad only in nature's garb—his close, woolly hair, bleached by age—his ears standing out immeasurably from his head—altogether gave him, when he began to caper and dance for the amusement of others, the appearance of a lascivious satyr in the train of Bacchus. His history, which he told me in sufficiently intelligible Portuguese, was as follows:—He had escaped from the Rio Negro, and after having been for some time among the Wapisianas, he married one of their females, by whom he had a son. This individual, whom we saw the next day, and who was called Wannéhré, might have been about 25 years of age; he had all the striking peculiarities of the negro, being merely in colour somewhat lighter than his father, but in all other respects the negro characteristics were strongly marked, and indicated that in him the father's blood predominated. He had married a Wapisiana woman, by whom he had two fine-looking boys; their hair and countenance generally resembled those of the Indians—though the hair, in one of them, was not quite straight, but might be called wavy, like that of the Teutonic race, and was of rather a dark colour. Their skin was somewhat darker than that of the generality of the Wapi-

sianas. Bastin, the elder, might have been eight years old, and his looks were very intelligent. His forehead was rather arched; and though his lips were by no means curled up, as in the negro, still it might be observed that they were somewhat thicker than those of other children of his age of pure Wapisiana descent.*

I had resolved to send Mr. Fryer back to Demerara with the boats and such of our instruments and baggage as were not indispensable, because we had before us an arduous undertaking, which rendered it impossible to carry any superfluous baggage with us. My brother had likewise resolved to return with his collections to the coast, as the journey overland through pathless regions could add nothing to them, and was likely to endanger what he had already collected. I had ascertained that the provision-grounds at Watu Ticaba were amply stocked with cassada, and Wayapari promised to provide us with plenty, and to inform the other Indians of the neighbouring villages of our wish. The inundation and swollen state of the rivers restricted

* In order to enable the reader to compare the offspring of a negro man and an Indian woman, with an Indian of pure descent, I subjoin the measurement of Wannéhré and of Akarighur, the latter an Atorai of nearly the same age with the former.

	Akarighur, an Atorai.	Wannéhré, a Cobb of mixed blood.	Bastin, the Son of the latter.
Estimated age	20 years	25 years	8 years
Common stature	5 ft. 8½ inches	5 ft. 8 inches	4 ft. 0 in. 1 tenth
	ft. inc. tenths	ft. inc. tenths	ft. inc. tenths
Circumference of the head round the forehead and above the ears	1 10 3	1 10 0	1 8 1
Long diameter, from the occiput to the chin	0 10 1	0 10 0	0 9 6
Length of nose	0 2 2	0 2 0	0 1 5
Breadth of nostrils	0 1 7	0 1 9	0 1 2
Circumference of the neck	1 1 6	1 2 3	0 10 1
Length from the point of the shoulder to the tip of the mid- dle finger	2 6 0	2 6 1	1 9 0
Length of the humerus	1 2 0	1 2 0	0 9 7
Length of ulna	0 11 3	0 11 5	0 7 5
Circumference of upper part of arm	0 11 1	0 11 0	
Ditto at the wrist	0 6 4	0 6 2	
Length from the division of the thighs to the sole of the foot	3 4 0	3 3 5	2 2 1
Length of the foot	0 10 0	0 10 3	0 7 5
Breadth of ditto	0 4 0	0 4 0	0 2 2
Breadth across the shoulder	1 5 0	1 6 0	0 11 0
Circumference at the same part	3 1 3	3 5 0	
Ditto of the pelvis	2 7 5	2 5 1	
Height of vertebral column	1 9 0	1 9 0	1 1 2
Circumference of the upper thigh	1 8 0	1 8 7	
Ditto of the calf	1 2 0	1 5 0	

his communicating with the surrounding villages. Watu Ticaba was comparatively on elevated ground, and the intercourse with the western or left bank of the Rupununi broken up.

17th.—The whole female population of the village was in motion fetching the cassada roots, scraping them, and making them into cakes; even the little girls assisted, and assumed as much importance upon the occasion as if the weal of the whole village depended upon their occupation. Among the females was one who deserves to be mentioned as the belle of the Wapisiana tribe. Although Mayori-Eppong was mother of a fine girl, her youthful appearance did not bespeak it. Her figure was very small, her height being only $4\frac{1}{2}$ feet, but so symmetrical that she might have served for a model; the greatest breadth of her hand was 2 inches and 8 tenths. The Wapisianas marry very early. Mayori-Eppong did not appear above fifteen years of age; and in the neighbouring house there was a young mother with two children, the eldest perhaps two years, the youngest four or five months old, while she herself did not appear more than fourteen. During our stay in the village, I had frequent opportunities of admiring the equanimity and the industry with which, so young, she attended to her maternal duties and the comforts of her husband.

The females puncture and stain the skin round the mouth in an elliptical form. This practice, although occasionally followed by other tribes, is much more general among the Wapisianas. These figures are punctured in the cutis without affecting the cuticle; but their grand art consists in painting with pigment, a practice common to all the tribes of Guayana.

I had an opportunity while here of seeing two females of the mixed race. Their father, a negro, also from the Rio Negro, joined the Wapisianas about 40 years since; in his language and manners he was far superior to the other black man, and his dress, though plain, was clean and neat. When he paid me his first visit he even sported a white pocket-handkerchief. I recollected having seen him some years since at Pirara. He was now accompanied by his two daughters, the issue of his intermarriage with a Wapisiana female, the one a grown up woman, the other a little girl eight years of age; in both, the characteristic features of the father prevailed. I had seen the elder with her father in Pirara; she was then stout, and apparently in excellent health; now she was thin and looked sickly. The father told me, when I asked the cause of this change, that when she accompanied him four years since on his visit to Pirara, she possessed a great many glass beads, which she ostentatiously wore round her person. This treasure, in the eye of the Indians, was coveted by a Macusi, but, reluctant to part with it, she refused to give it away; on which, said the old man, the Macusi, in revenge, administered

poison to her. It is not likely, however, that this was the true cause of her indisposition; but as the disease commenced soon after her return from Pirara, and the Macusís are held in the worst odour as slow-poisoners, or kanaimas, among the Wapisianas, every evil, from the aching of a tooth to the most serious disease, is ascribed to their malignity.

20th.—Early this morning the number of inhabitants was increased by a young stranger. We had seen the mother walking about only a short time previously with her first child, about 18 months old, in her arms, and scarcely 15 minutes afterwards she delivered herself, without any assistance, and was now sitting on the ground with the child in her lap, while her husband was occupied in constructing a small hut of palm-leaves over her head, inside the large hut. The other women did not come near her; a female, after labour, being considered by the Indians as the Jews looked upon them when in that state. A fire having been lighted, and some calabashes, filled with water, put within her reach, she was left to herself and the care of her husband, who kept his hammock almost the whole time from the period the little hut, which was to separate her from the community, was finished. The child was rather small, but nearly as white as a European; the hair on its head rather thick, the face round, and though the nose had not the flatness of the Mongolian race, and was more distinctly formed and projecting, it was uncommonly thick towards the nostrils, the openings directly downwards; the hands and feet were very small, the nails well formed. I presented some cotton-cloth for covering the new-born child, and some glass beads for its future adornment, with which the young mother seemed much pleased.

21st.—Mr. Fryer and my brother left us this morning; we felt the parting. The journeys of both parties had dangers in prospect: they had to descend many a difficult cataract before they could reach the coast-regions; and Mr. Goodall and myself to direct our course towards regions perfectly unknown.

This day the quietness of the village was disturbed. One of the Wapisianas thought he observed during the night, while stepping out of his hut, a Kanaima, or night-murderer, stealing towards the village, who, on seeing him, made his escape across the savannah. This betokened harm to one of the inhabitants of the village, as the Kanaima will execute his revenge (for the perpetration of which he stole near the village) at an earlier or later period.

22nd.—The husband of the young woman who was delivered the other day continued to occupy his hammock; for, according to their superstitious belief, any labour which he might perform at this particular period would have an injurious effect upon the

child; his diet is much restricted for similar reasons. If he were to eat meat or plantains, it would prove hurtful, not to the eater, but apparently, by sympathetic influence, to the child.

The Vaqueiro, or herdsman, I first saw at St. Joachim, in 1838, and met afterwards near the Taurutu Mountains, paid me a visit to-day. He had settled in the neighbourhood of Watu Ticaba, in consequence of some dispute with one of the Macusi Indians, at his former residence. I found him meek in appearance and quite dejected, and soon learned that he considered the Macusi, with whom he had the dispute, had injured him by secret charms and poison.

I was rather astonished when I saw he refused to take the refreshment from me which I offered him, and give as his reason, that his wife having lately borne him a child, it would injure the health of the baby if he were to eat or drink anything presented by a white man.

It has frequently been observed with what stoicism Indians endure pain. I had an opportunity of observing it again to-day. I do not know how I have acquired the honour, but I stand in high repute among the Indians as a great physician. A boy upon whose head a palm-tree had fallen, was brought to me to have his wound dressed. It appeared he had lost a great deal of blood, and it was still flowing. I had the head shaved round the part injured and styptics applied, during which operation he did not give the slightest indication of the pain he must have suffered. He was not more than seven years of age, and in appearance rather a weakly child, which made his fortitude the more remarkable.

24th.—This day did not pass without a bottle of champagne being drank to her Majesty's health. It had been reserved for this purpose, and our numerous followers partook in some measure of the festivities. The bottle, whose contents we emptied to the health and prosperity of Britain's Queen, we buried, with an account of when and why it was emptied of its sparkling beverage, at the spot where the flag-staff now stands, on which, on this occasion, the union-jack was hoisted. Will civilization ever extend to the poor benighted beings who now surround us, so as to render it likely, after the present generation shall have passed away, that the plough or the hoe may bring it again to light? The hope is but slender, and, reluctant as I am to despair, the conviction is forced upon me that the Indian race is doomed to extermination. Six years have scarcely passed away since I wandered to this spot on visiting the sources of the Essequibo. We left the settlement Eischalli Tuna, and passed on our route to the Taruma Indians, three villages of Atorais or Atorayas, and one of Taurais, the latter containing the remnant of that sister tribe of the Atorai nation. The villages have vanished, death has all but

extirpated the former inhabitants, and I am informed that of the true Atorais only seven individuals are alive. From the accounts I received in 1837, I estimated the number of Atorais and Taurais at 200, including the descendants of mixed marriages, and of that number about 60 are now left.

The measles, so fatal to the Indians, has twice decimated the Atorais; and at the commencement of the present year, the small-pox, brought from the colony to Pirara, ravaged from thence southward so far as these poor people. Their belief in the secret influence of the Kanaima, who has only to breathe upon his victim in anger to send him to an untimely grave, operates as banefully as that species of witchcraft called Obeah practised among the negroes, which, acting upon their superstitious fears, is frequently attended with disease and death. Nor is it the Atorais and the Taurais alone, whose rapid extinction is thus going forward; similar causes are operating over the whole Indian population of the colony. The village of Wapisiana Indians called Eischalli Tuna, from which I started in 1837, is no longer in existence, and of its then inhabitants only one female and three children are now living. Many of my former acquaintances among the Taruma Indians are now buried, and I have already alluded to the rapid decrease of the Macusís. But the most affecting picture that now presented itself among the many Indians assembled around us was Miaba, the last remnant of the once powerful tribe of Amaripas. Singled out by destiny to be the sole survivor of a nation, she wanders among the living. Parents, brothers, sisters, husband, children, friends, and acquaintances are all gone down to the silent grave; she alone still lingering as the last memorial of her tribe, soon to be numbered, judging by her faltering voice and tottering steps, with those of whom tradition alone will record that such a tribe existed. Alas! a similar fate awaits other tribes; they will disappear from those parts of the earth on which Makunaima, the good spirit, placed them,* and which, since the arrival of the European, has become the vast cemetery of the original races.

Miaba appears to be about 60 years of age; her hair, however, is not bleached either by age or grief, and would still be called luxuriant if she allowed it to grow; she has a large aquiline nose (a feature of frequent occurrence among the Wapisianas and Atorais), and a low forehead, and the general cast of her face is Jewish.

The language of the Amaripas differed only in dialect from

* This is a common expression among the Indians, always accompanying it with the assertion, that, consequently, neither Portuguese, nor Spaniards, nor English, have a right to remove them.

that of the Atorai. They inhabited the regions about the Tuarutu Mountains, near the river Wampuna; and as Miaha well recollected when the late Dr. Hancock was at the Upper Rupununi in 1811, I had a fixed point from which to date my inquiries as to whether the extinction of the Amaripas had been slow or rapid. She told me that at that time their number was not quite so many as two men had fingers and toes (I concluded she meant about 35 individuals), and of that number Miaha alone remained in 1843.

The grass of the extensive savannahs which surrounded the dwellings of the Amaripas will no more be trodden by one of the descendants of this tribe, and ere long the deer alone will range over those thousands of square miles of herbage plains, once the bed of a vast inland lake, now the grand burial-place of the Amaripas, the Atorais, the Wapisianas, and Macusis. Let us hope, however, that the poor remnant of these people may be preserved from destruction, and that, instructed in the Christian religion and relinquishing their unsettled mode of life and superstitious customs, they may become happy and useful members of a Christian community.

Mr. Goodall has sketched the portraits of several of the remaining Atorais and Taurais, as also of Miaha, the last of the Amaripas; while I have collected a vocabulary as far as circumstances would permit me, to save from utter oblivion a small part at least of the language of a tribe which with one death more becomes extinct.

We had in the afternoon a grand consultation; for although the weather had abated nothing of its severity, and still rendered it impossible for us to cross the rivers, I was anxious to ascertain how many individuals I could depend upon to accompany me from Watu Ticaba to the Tarumas. Captain Wayapari summoned the principal men into my hut, and opened the subject to them. Adopting the squatting posture peculiar to an Indian, he addressed himself to a Wapisiana, who, though by no means old in appearance, seemed to possess great influence, and poured forth such a stream of words that I was astonished at his volubility. His speech was unaccompanied by either gesticulation or strong intonation, but flowed uninterruptedly for nearly half an hour. He to whom the discourse was addressed answered from time to time by the monosyllable *hm*, sometimes varied with *ha*. The harangue concluded, it was responded to by the Wapisiana, but fortunately at less length. I was silent and all impatience for the issue. Sororeng, our interpreter, whose maternal language is closely allied to the Wapisiana, did not betray the nature of the colloquy either by a smile or the motion of a muscle of his face. It would have been a violation of all decorum to interrupt the speakers, upon whom the eyes of the whole

assembly were fixed; some squatting, some standing like statues, but all preserving a profound silence.

The arguments of the first speakers being apparently exhausted, I expected that some of the other chieftains, of whom there were four or five present, would give their counsel. I fixed my eye upon an old man who, with one finger on his mouth, had such an intellectual countenance, that I regarded him as the Solon of his tribe, and imagined he must be a Demosthenes in eloquence. I awaited his harangue with impatience, but he merely smiled. Wayapari, now addressing himself to Sororeng, told him to interpret to me that he himself would accompany us, and procure moreover a sufficient number of people to carry our baggage; but that we had to wait for more favourable weather, which he thought would take place with the young moon five days hence.

Thus ended our palaver, which, if it was not marked by those bursts of oratory peculiar to the Indians of the northern part of America, was remarkable to me for the earnestness with which it was conducted, and the characteristic countenances of the assembly.

It appears to be against their custom to permit females or children to be present at their consultations. A young girl, anxious to offer some cakes of cassada in exchange for some tinkling ornaments, and too impatient to wait till the conclusion of the palaver, unceremoniously came into the hut, but she was as quickly expelled as she had entered.

25th to 31st.—Those Indians who have kept aloof from intercourse with the colonists show the greatest abhorrence for the use of pork. A strict Hebrew could not reject it with greater loathing than does a Wapisiana. An old man of that tribe, whose children had accompanied us on a former journey to Roraima, had permitted their doing so only on the condition that they were never to eat any viands prepared by our cook, for fear he might have used pork in their preparation. We met with another instance at Watu Ticaba. A young Indian female was sometimes so far indulged as to receive the remnants from our table: she began to complain, and became seriously ill. Her relations immediately ascribed it to her having partaken of our food. She suffered the severest headache, and her uncle, who pretended to medical skill, insisted upon bleeding her, an operation which he performed by making three incisions on the side of her head with the serrated spine of the sting-ray, for the purpose of opening the temporal artery. He made a bad business of it, however; at least the other sapient men of the village did not think the incision high enough, and condemned his practice. The young woman felt no inclination to have the operation repeated, and accepting our remedies soon recovered.

This disgust for pork is very remarkable, and is likewise met with among the Indians of North America. Adair, who was forty years among the Indian tribes of North America, gives several instances. The objection does not, however, extend to the native hog (*Dycoteles labiatus* and *D. torquatus*), which is eaten by the laity indiscriminately, except when pregnant, or after delivery. The native conjurers partake but seldom of the native hog, as they consider it injurious to the efficacy of their skill. A candidate for that office does not taste it during his novitiate; in this latter case, however, the prohibition extends to all thick-skinned animals.

The influx of visitors from the surrounding country was very great, and such quantities of provisions were brought to us, that twenty additional canoes would have been requisite for its transport. At the same time, to have refused the purchase, for a few trifling objects of barter, of what they had brought from a distance of twenty or thirty miles, would have proved a great disappointment to them. Among the articles brought to us were many of those fine pine-apples which I already had occasion to admire on my first visit in 1837, for their size and exquisite flavour. That variety which is called in the islands the sugar-loaf pine is very plentiful. The Wapisianas call it *curtoi-ruai* or *tapir's* head, from its form bearing some resemblance to the head of that animal. Nana is the common term for pine-apple in its general sense.

June 2nd.—I had planned leaving Watu Ticaba this morning to proceed on our journey to the Upper Essequibo, but as one of the chieftains with his followers failed to arrive at the stated time, our departure was delayed till the next day. We had been weather-bound for nearly three weeks, and as a favourable change seemed to have taken place I was anxious to take advantage of it. During the period of our sojourn the weather had been exceedingly variable. The results of our meteorological observations were as follows:—

Mean of Meteorological Observations at Watu Ticaba; height 624 feet above the sea.

Period.	Instruments.	Forenoon.		Noon.	Afternoon.	
		6 h.	9 h.		3 h.	6 h.
May 17th to June 2nd	Barometer . . .	Inches. 29·369	Inches. 29·416	Inches. 29·417	Inches. 29·364	Inches. 29·358
	Attached Thermometer	74·64	77·49	83·47	84·06	79·43
	Detached Thermometer	74·80	77·36	82·69	83·55	79·08
	Wet-bulb Thermometer	73·41	75·54	79·41	78·94	76·40

The highest indication of the thermometer in the shade was $85^{\circ}.1$, the lowest 72° . The black-bulb thermometer exposed to the sun rose on the 21st of May at $\frac{1}{2}$ past twelve to 125° ; not surrounded with black paper, but equally exposed to the sun, 113° . The wet-bulb thermometer under similar circumstances, 93° . The thermometer in the shade, 88° .

The evaporation, which, during the twelve hours of the day, amounted in Pirara to 320 grains out of 1000 grains, which were exposed in a cylindrical glass vessel,* in the morning, was only 278 grains. From the 18th of May to the 27th, the prevailing wind was N. It then veered eastward, between E. by N. and N. by E., its force, except during thunder-storms, seldom amounting to more than force 2 of Captain Beaufort's table.

The latitude of Watu Ticaba, deduced from thirty circum-meridian altitudes of α and γ Ursæ Majoris and α Crucis, was $2^{\circ} 32' 3''$ N.; the meridian distance, E. of Pirara, $20^{\circ} 52''$ in arc, consequently $58^{\circ} 59' 8''$ W. of Greenwich.

2. *Journey from Watu Ticaba to the Frog Indians, and thence by the Rivers Caphiwuin and Wanamu to the Pianoghattos.*

June 3rd.—It was nearly 9 o'clock before we left Watu Ticaba this morning; and as several of the Indians who had promised to accompany us had not arrived, I was under the necessity of leaving a great part of our provisions behind. We followed a different path from the one taken in 1837, and shortly afterwards arrived at a small settlement consisting partly of Wapisianas and Atoais. The huts were in a most dilapidated state; fissures and holes in every direction, quite large enough to afford the loungers every facility to contemplate the canopy of heaven without leaving their hammocks; but howsoever wretched the huts, the principal one was provided with two large troughs for Paiwori, besides a number of jars on a gigantic scale, made of clay, intended to be filled with the favourite beverage.

The chieftain was sick in his hammock, and presented a ghastly appearance; indeed all the inhabitants looked sickly, and I was informed that the smallpox had carried many to the grave.

4th.—Our last night's voyage had been on the verge of the savannahs; but we this day entered the forests. After a few hours' march we crossed the first rivulet, which was flowing into the Guidaru. The ground was undulating, and in many places covered with blocks of chert and granite, which extended to considerable distances in a N. and S. direction.

* I have followed here Dalton's plan, as the more rational. The glass vessel was 2.63 inches in diameter, and 1 inch deep. It was generally placed 4 feet above ground.

The forest abounded in that remarkable tree the Murre-Marri of the Macusi Indians, Aublet's *Couratari guianensis*, the woody capsules of which covered the ground. They are of a very remarkable form, sometimes 4 or 5 inches long, and somewhat three-cornered.* We found them very useful as cases for preserving insects and other curiosities in, which were thus effectually secured from accidents.

Our march was this day a short one, for at 11 o'clock we reached a settlement, and, as it was the last inhabited one we should find previous to our reaching the Tarumas on the Cuyuwini, our guides and carriers could not be induced to continue our march further. A circular hut of small dimensions appeared the only inhabitable house. Not less than six hammocks were slung in it, all of them occupied, and the heat was intolerable; several blowpipes, and materials for preparing the arrows, were hanging from the roof ready for use. The thrifty housewife was assiduously occupied in scraping the cassada-roots for preparing bread for the numerous visitors. Her long hair was for the occasion tied up in a queue with uncommon stiffness, so that with every bend of her body, while occupied in scraping the cassada-root, that peculiar ornament was in violent motion, at one time describing circles, at another sticking out almost at a right angle from the head to which it belonged. It was so ridiculous that I could not refrain from laughter.

The hut was thickly surrounded by arnotto bushes (*Bixa orellana*). At some distance from it I observed the remnants of a large fire; and Sororeng, the interpreter, told me that the people had lately burnt one of their dead. The Atorais are, as far as I know, the only tribe in Guayana who place the dead body on a pile of wood and burn it: the ashes are afterwards buried.

We erected our tent at a short distance from the hut, near the provision grounds. The towering stems of some palm-trees, which are called Manica by the colonists, and which I consider to be a species of *Euterpe*, really astonished me by their height. I had one cut down, and it measured, without its feathery foliage, 82 feet: its total length could not have been less than 100 feet; and, in spite of such a height, the circumference of the trunk near the base was only 19 inches.

The mean of a number of circum-meridian altitudes of the star γ Ursæ Maj., and α Crucis, gave me $2^{\circ} 18' 24''$ N. as the latitude of our camp. Our meridian distance was 21 miles E.

* The seed is a *Samara*, or winged fruit, which is attached in three grooves to the sides of a hard and fleshy somewhat triangular body, which fills the woody capsule, and is, near the summit, convex, protuberant, and slightly furrowed, so as to close the capsule firmly. At the time the seeds are mature, this fleshy body shrinks up, and dropping out of the capsule, sets free the winged seeds, which are carried by the winds in different directions.

from Pirara. The thermometer stood at half-past 7 o'clock in the evening at 74°; the wet-bulb thermometer, 72°·9.

5th.—We started at 8 o'clock, and soon afterwards crossed the small river Dohité, one of the largest tributaries of the Upper Guidaru. We again met with numerous blocks from 14 to 15 tons weight, which extended, as on the former occasion, N. and S., and soon stood at the foot of the Carawaimi mountains, which we had to traverse. I estimated their height here about 1000 feet; their highest summit, more to the eastward of our path, is about 2000 feet. On the southern foot flows the river Guidaru.

It rained very heavily in the afternoon, and we were glad to pitch our camp at an early hour, near one of the smaller branches of the Guidaru.

6th.—A march of half an hour through thickets of bamboo and melastomas brought us to the Guidaru, here about 20 feet broad; consequently our present path traversed it much higher up than in 1837.

About 4 miles further southward we came upon an abandoned Atorai settlement, the former inhabitants of which were all dead except two children, who are now with their distant relations near the Rupununi. We had to cross numerous swamps abounding in a species of cacao, (*Theobroma bicolor*?) The large melon-shaped fruits of all sizes, some green, some of a bright yellow, were eagerly collected by our Indians; and indeed the pulpy arillus which surrounds the bean has an agreeable vinous taste. There was sufficient evidence that rats, agouris, monkeys, and peccaries were as eager after the fruit as our Indians, who, however, did not appear acquainted with the fine aroma which the seed itself possesses, and which induced Linnæus to call it the food of gods. We collected a number of seeds, of which I counted as many as sixty in one capsule. They afforded us for some mornings the most delicious cup of cocoa I ever tasted.

It is known to botanists that in *Theobroma*, as in *Gustavia*, *Crescentia*, *Cynometra*, some *Swartzia*, the new genera *Lightia* and *Alexandria*, the remarkable *Omphalocarpus*, &c., the flowering buds break through the rough bark of the trunk in lieu of appearing at the tender branchlets, as in the generality of trees. It is remarkable that cacao in its wild state is only found in swampy, or, at best, moist situations. The trees which I observed, although of a peculiar growth, almost shrubby, and the trunk less developed than in large forest trees, often attained the height of 50 feet. The capsules were large, and contained from sixty to seventy seeds, which were larger than in the cultivated kind, but not so thick.

We passed, soon after noon, the site of the Daurai settlement, where, on my journey to and from the sources of the Essequibo

in 1837-38, we had rested. It was now perfectly overgrown with bushes, and the spots where the huts formerly stood could not be reached without using the axe and cutlass. Scarcely six years had elapsed since I found here a settlement of nearly forty persons; two grown-up individuals of the number are now all that are known to be alive, both of whom, strange to say, are singularly marked—the one from his birth, the other by accident. The younger was born with only one eye, a large tumour over-spreading the place where the other should have been. The elder lost his eye while shooting at a monkey with a blowpipe in a perpendicular direction: the poisoned arrow missed the intended victim, and in its descent fell right back into the eye of the Indian. He had sufficient presence of mind to withdraw it instantly—a severe sickness, however, and the loss of the organ were the consequences. These two individuals have now withdrawn from their former abode, where their wives and children had fallen victims to the unhealthy swamps by which it was surrounded: some young orphans, however, demanded their care when they abandoned the village; and these, with themselves, now constitute the last of the Daurais—soon to be numbered, with the Amaripas, as tribes only known by tradition among the old men of the adjacent and more populous nations.

7th and 8th.—On the first of these days we continued our march till 2 o'clock in the afternoon. It rained almost the whole night, and had not ceased when we started on the morning of the 8th. Knowing, however, that we should reach the first Taruma settlement at an early hour, we passed on. The site of the village had been removed from its former position to another near the left bank of the Cuyuwini. We reached it soon after 11 o'clock, delighted that our pedestrian wanderings were for the present at an end. The weather had, upon the whole, been favourable to us; for a cessation of rain had enabled us to cross with comparative ease the swampy ground which we had found it difficult to traverse even in December, 1837, and which in the rainy season is scarcely practicable.

We crossed a large clearing, their former provision fields, but now apparently abandoned for more fertile grounds. Cassada plants (*Janipha manihot*), from the former cultivation, were growing up amid a rank vegetation, but had nevertheless a strong and healthy appearance, proving the great fertility of the soil, and that it was not exhausted by former crops.

We found three dome-shaped huts, one of large size and very neatly finished with branches of the Murumutu palm (a species of *Astrocaryum*, perhaps the *A. Murumuru* of Martius). The inhabitants were for the most part absent, some on visits, others hunting. The latter arrived in the evening; they had not been

very successful, as a single coita (spider-monkey), and a few toucans, were the sole produce of a whole day's hunt. I recognised only two of my former acquaintances among them; many had died since I last visited them, and some had moved higher up the river.

The few remarks which on a former occasion I made upon the Tarumas as a tribe* may be here repeated, with such additional information as I have been able to procure.

It appears the Tarumas were formerly located at the tributaries of the Rio Negro, and the Portuguese missionaries had some neophytes of that nation in Manaos. Disagreement with the other tribes, however, and other circumstances, induced a portion of the Tarumas to fly. They proceeded up the rivers which have their sources in the Sierra Acarai of the maps, and settled at the head waters of the Essequibo. As to the neophytes who had remained at the Rio Negro, death had committed such ravages among them that Von Martius, not aware of the party that was settled at the Upper Essequibo, pronounced the tribe extinct. Meanwhile information that a tribe of Indians called Tarumas was settled at the Upper Essequibo was brought to Demerara half a century ago by Mahanarva, a Carib chief, who had lived some time at the Cuyuwini; but such was his exaggeration, that he described them as amphibious and living in caverns under the water, and flying on the approach of man. Mr. Morrison and myself were the first Europeans who visited them, which we did in December, 1837, and found the first settlement we fell in with, about 5 miles higher up than the present one. I have since seen from 100 to 150 individuals of the tribe, who in stature are little inferior to the Wapisianas, but by no means so good looking. The features of their females are not engaging; and they are so slovenly in their persons as almost to create disgust. The head of the Taruma is somewhat small in proportion to his body, and the outline of the cheek-bone rather hard; in colour, however, and in the general proportion of their bodies, the Tarumas do not much differ from the generality of Indians. The dialect spoken by these people differs from that of the other Indians of British Guayana, and the pronunciation and accentuation of their words are so strange, that their language strikes the most unconcerned in philological researches as different from the Macusi and Carib tongues. Their huts are dome-shaped, and do not materially differ from those of the Wapisianas. The interior has a more cheerful appearance, as the horizontal or cross-pieces of wood that connect the upright in the hut of the Macusi and Wapisiana are dispensed with. The

* *Vide* vol. x., p. 167, of our Journal.

centre of the floor is occupied by the large trough for the intoxicating drink, and the hammocks are slung from the upright central pole to the circular wall, along which runs a kind of grating, occupied by the dogs as their sleeping-place.

The Tarumas are great dog-fanciers, and are very skilful in training these animals for the chase; but as fire-arms are still scarce among them, few of the dogs stand fire. I have elsewhere* given a full description of one of the finest dogs I saw among the Indians, and which came from the Tarumas. We saw here some fine specimens of that variety, which resembles Buffon's St. Domingo greyhound; but none could vie with the dog alluded to, and which I unfortunately lost by an epidemic that prevailed among the canine race in Pirara. The stock of other domestic animals possessed by the Tarumas was small; but I observed a few cocks of our dunghill-breed, which evidently were kept more for state than use, as they were unprovided with hens. Like other Indians, these people neither eat their flesh nor make use of their eggs. Two trumpeters (*Psophia crepitans*) were masters of the poultry-yard; to their sway four-footed and two-legged animals alike submitted. If any disaster occurred they settled the dispute by their interference, and all new comers had first to submit to their ordeal, viz., a severe pecking and slapping with their wings before they were duly admitted of their society. We had brought some poultry with us, and among the rest a cock, which imagined it had as much right to crow and flap its wings as those that were born or had been long at the place. This caused contention, and the new comer had to fight it out with its conquerors; but it was ridiculous to see how quickly the trumpeters settled the matter, and, pecking at our poor cock, soon drove him out of the field. They equally attacked strange dogs, which generally ceded to them the palm of victory, and sought safety in flight. The Indians had brought three powis (*Crax alector*) to the place, a bird much larger than the *Psophia*—but so little rest was allowed the latter, that the owner of the powis was obliged to tie them up.

The inhabitants of the village appeared to cultivate the sugar-cane to some extent—at least large quantities were brought to us for barter. It was of that variety which is called the Otaheiti cane (*Caná de Otaheiti*). As common as the banded and Bourbon cane is near the coast, I have never seen a plant of that description among the Wapisianas and Tarumas. It is known that Cook and Forster were the first who made us acquainted with the Otaheiti cane. Bougainville introduced it into the Mauritius, whence it found its way to Cayenne, and from thence, towards the

* *Vide* vol. xiii., p. 65, of our Journal.

close of the last century, to Martinique, Guadaloupe, and St. Domingo. Captain Bligh brought some to Jamaica, and scarcely fifty years have elapsed and we find it spread over the tropical part of America, esteemed alike for its superiority by the planters and the Indians—the provision-grounds of the latter being never without it.

The cane cultivated by the Indians differs neither in size nor sweetness from the Otaheiti cane which is cultivated along the coast; and as, no doubt, scores of years have elapsed since it was transplanted among the Manihot or Cassada fields of the interior, it may be considered as acclimated, and it is not likely that, with common attention, it will degenerate in its quality.

In the provision fields behind my tent stood one of the finest trees I have ever seen in my wanderings. The compound leaf, the small leaflets, and indeed the whole appearance bespeak it to be a mimosa. Its whole height is 168 feet;* the trunk, from the base to the first branches, 73 feet. About a foot and a half above the ground it measured only 27 feet in circumference, but ascending perpendicularly of almost equal thickness to the first branches. It appears like a slender column bearing its finely-formed leafy capital. Numerous nests of the Oriole, which generally build in families, were constructed on one of its branches near the summit, sure of being there unmolested by either monkey or tiger-cat. The Indians themselves seemed to have some regard for this singular tree: it stood amidst the provision fields, and while almost all the other trees had been felled by the axe, this was spared; which made its gigantic size appear all the more striking.

We remained at the Taruma place much longer than I wished; but, as on leaving Watu Ticaba, we could not procure a sufficient number of carriers for all our baggage, I was obliged, on my arrival here, to dispatch people for the remainder. The delay was, however, favourable to more detailed observation. I have mentioned the Indian females as ill-favoured and neglectful of their persons. Their hair is uncommonly coarse and wiry, and does not fall over the outlines of the head, but stands out as if the individual were frightened, or as the imagination of the artist paints Shakespeare's witches. They paint their whole body, including the face, with broad black bands, without order and of unequal thickness; and their peculiar walk, with protruding abdomens, their coarse voice, and the peculiar intonation of their language, increases the abhorrence which the *tout ensemble* excites.

The Tarumas are famed as manufacturers of cassada graters, which they barter to a great extent with the neighbouring nations, chiefly the Wapisianas, who carry them to the colony, where they

* The height was ascertained by measuring a small base line, and ascertaining the angles with a sextant and artificial horizon.

receive about a Spanish dollar (4s. 2d.) for each. These graters consist of a flat board from $2\frac{1}{2}$ to 3 feet in length, and from 15 to 18 inches broad, and which is prepared from the soft wood, or outer layers of the Purple-heart tree (*Copaifera Spec.?*) After it has been properly smoothed and a slightly concave form given to it, the Indian marks it with cross lines, along which he beats in, one by one, small angular pieces of a hard rock (very compact green-stone), which he calls tempé, and which is found a few days' journey up the Cuyuni. The angular points project about a line and a half out of the wood. The board being covered with these stony asperities, he takes the milk of a tree called Hennicarro, which he colours with roucou or arnatto (*Bixa Orelhana*), and spreading it equally over the board, it serves as a glue in fixing the rocky fragments, besides giving a varnish to the whole. It is afterwards painted fancifully according to Indian taste, and exposed to dry in the shade, when the grater is completed. It is not possible to complete a grater in less than five or six days, including the fetching and preparation of the materials. Nevertheless he exchanges it for a common knife with the Wapisiana, who carries it 400 or 500 miles and sells it for a dollar. Time is, however, of no value to the Indian; and the inclination to work at that particular job is his sole inducement, regardless of the little reward of his labour.

13th.—This was one of the hottest days we had had since we left Pirara; the forenoon was cloudy, the sun scarcely making its appearance till after 12 o'clock. At half past 1 o'clock the thermometer under the tent, open and surrounded by bushes, stood at $91^{\circ}2$; the thermometer exposed to the sun, at 132° ; and the black-bulb thermometer, 136° , above which it would have risen if the length of the tube had permitted it.

14th.—The weather was similar to that of the preceding day till evening, when a white fog arose, which increased in intensity till midnight.

15th.—On the morning of this day the rain commenced, and continued uninterruptedly till noon on the 16th, occasionally coming down in torrents. On the following day I resolved, in spite of the weather, to proceed without waiting for the remainder of the luggage from Watu Ticaba.

Notwithstanding the rain and clouds, I had been enabled to procure 28 circum-meridian altitudes of north and south stars, which gave me for the latitude of the settlement $2^{\circ}4'30''$ N. The chronometer (Frodsham's) made its meridian distance $39'56''$ (in arc.) east of Pirara.*

* Pirara $59^{\circ}20'0''$ W. of Greenwich.
Taruma Place $39'56''$ E. of Pirara.

$58^{\circ}40'4''$ W. of Greenwich.

Sixty-five observations of the thermometer and barometer during our stay gave the following results:—

Instruments.	Mean.	Maxima.	Minima.	Remarks.
Barometer.....	Inches. 29.270	12th, at 11h. 30m. A.M. In. 29.316	14th, 6 A.M. In. 29.191	The greatest range during one and the same day was 19.3 for the Thermometer, and 0.118 inches for the Barometer.
Attached Thermom.	79°.68	13th, at 1h. 30m. A.M. 90°.8	10th, 10 A.M. 70°.3	
Detached Thermom.	79°.92	91°.2*	70°.5	
Wet-bulb Thermom.	76°.92	83°.7	69°.6	

The following meteorological table will give the other data of my observations at the usual hours:

Period and Number of Observations.	Instruments.	Forenoon.		Noon.	Afternoon.	
		6 h.	9 h.		3 h.	6 h.
9th of June to 17th inclusive, 65 Observations.	Barometer	Inches. 29.230	Inches. 29.268	Inches. 29.279	Inches. 29.226	Inches. 29.225
	Attached Thermometer	71°.60	76°.46	82°.24	81°.93	76°.67
	Detached Thermometer	71°.90	76°.62	82°.25	81°.95	76°.18
	Wet-bulb Thermometer	70°.13	75°.08	78°.16	77°.96	74°.72

The evaporation amounted on the 12th of June from 6h. A.M. to 6h. P.M., to 252 grs. out of 1000 grains exposed to the sun.

I vibrated the magnetic needles on the 13th of June. The result of 100 vibrations at 88½° was 2m. 53s. 08 per L. a, and 3m. 42s. at 90 per needle L. b.

The settlement is entirely surrounded with wood, the nearest savannah being about 30 miles to the north of it, and the small river Cuyuwini, here only 100 feet broad, flows at a distance of a few hundred yards. Its height above the sea, according to Bunten's barometer, was 745 feet.

18th.—We this morning commenced our journey by water in two small corials and six bark canoes, the whole party consisting of twenty-three individuals. The river was full to overflowing; the current, nevertheless, quite sluggish, and the water muddy. The few trees and shrubs that were in blossom along the banks of the river had only one or two flowers of a white colour, and of great fragrance. It is remarkable that white flowers, under the tropics, possess the greatest fragrance. The sawarai-palm, the murumuru, and the Uassa (*Astrocaryum Jauari*; *A. Spec.* and *Euterpe*) were the most frequent palms, occurring in small groups. The beautiful *Ionopsis violacea*, with its large paniculated scapes of nodding flowers; *Brassavola Martiana*, *Zygopetalum rostratum*, the common *Epidendrum variegatum* (alike abundant at the shores

of the sea as in the interior, at a distance of 600 miles from the ocean); here and there a *Brassia*; and a peculiar orchideous plant (of which, from its large clusters of stems, I expected some striking and handsome flowers when I first visited the Cuyuwuni in 1837), were the genera of that order which I found in blossom. I was much disappointed in the last of these, their large clustering stems producing only heads of small white flowers, nestling, as it were, in a gelatinous substance. I have seen something similar in a highly interesting plant, the genus and affinities of which I have not been able as yet to make out to my satisfaction. This gelatinous substance is so abundant, that it flows off as soon as the stem which bears the clusters of flowers is shaken.*

19th and 20th.—Since we left the Taruma place the rain has descended in torrents. It is peculiar, that about 10 o'clock in the forenoon, severe showers set in and last for an hour or two, when they abate, and the weather becomes variable. The river had overflowed its banks, so that we were compelled to pitch upon a sand-bank, a few feet above the water, as the only possible spot for establishing our night quarters. But no sooner had some of our Indians jumped upon it than they began capering about as if suffering from St. Vitus's dance, and immediately retreated. The whole place was swarming with that species of ant which our creoles call the yagerman, and of whose unmerciful bites we had already had sad experience. The day was far advanced, and it was doubtful whether we should find another convenient spot for our camp; we therefore determined to contend with the ants for the possession of the place. A fire was soon lighted, and by means of large fire-brands and calabashes of water we broke their columns, and eventually succeeded in driving them away from as much ground as we required for our tents, and we passed the night in peace.

21st to the 23rd.—We entered the Essequibo at half-past nine o'clock on the morning of the 21st of June, and its bed being full to overflowing, the current, which I found in November, 1837, to be scarcely more than half a mile per hour, now ran at the rate of three miles, and rendered our progress very slow.

With the best intentions of making the meteorological observations this day, scarcity of provisions obliged us to push on in order to gain a village of Taruma Indians. Indeed on the 23rd we had to paddle on from 6 in the morning till half-past 6 in the evening without permitting even a short repose to our people. On arriving we found the greater part of the inhabitants absent on a fishing expedition; but as one of our bark canoes had started

* Aublet's figure of *Serapias Caravata* (t. 320) resembles this plant. I observed it likewise, to my astonishment, on the high mountains in the Island of Grenada.

from our last camp 7 hours previous to ourselves, it had reached the settlement earlier than we, and had sent for the absentees, who were hourly expected.

The place consisted merely of two huts; one in the form of a common shed, the other circular, and perhaps from 45 to 50 feet in diameter; rising, not like the generality of huts, in a dome shape, but pyramidal. It was open above to allow the smoke a free passage; and overtopped by a smaller roof, to protect the inmates from the inclemency of the weather. A tree, taken out of the ground with all its roots, but of which the branches were cut, being fixed to the uprights at about 5 feet from the ground, supported the smaller roof at its upper end, while the roots served as pegs to hang up divers household utensils, caps, &c. The tree was stripped of its bark and painted according to the Indian fashion. The interior of the hut did not differ otherwise from the general construction; numerous dogs were lying peaceably on the gratings, and, to my astonishment, did not set up that furious barking which had so tried our patience during our sojourn at the former Taruma village.

I observed large baskets full of the leaves of the *Bignonia Chica*, with which the Indians prepare a red pigment, called Caraveru, by almost all the Guayana Indians. The leaves are dried in the sun, and at the first exposure, after having been plucked from the vine which produces them, they show the abundant feculent substance which they contain. This colouring matter is more known in the United States than in England, and is used as a dye. The artist of our expedition, Mr. Goodall, considers the pigment equal to madder, which is rather an expensive colour. The caraveru might form an article of export if it were sufficiently known; the more so, as its preparation is extremely simple.

I allowed our crew a day of rest. The weather had been very unfavourable during our journey; and those among us who wore clothing had no opportunity, except at night, to change their wet garments for a dry suit.

The Indians of the village offered their services for fishing or hunting. We were told that pacu and haimura (*Myletes Pacu* and *Erythrinus Macrodon*, vide Fishes of Guayana, in Naturalist's Library, vol. i., p. 236 and 254) were very plentiful, and in the course of the day several were brought to us. These two kinds of fish are here baited with the ripe berry of a species of *Phytolacca*. A bunch of these berries is suspended about an inch or an inch and a half above the water; and should there be any pacu in the neighbourhood they are sure to be attracted to the spot, and as they rise above the water to seize the dainty morsel, the Indian shoots them with his arrows. This fish is equally partial to the ripe fruit of the Lana (*Genipa Americana*, *G. Carutã*, &c.); but,

as the subtle fish might suspect some danger if the fruit were handled by man, the Indian presses it without touching it with his hands, and puts it into a little basket made of withs, which he suspends as in the former instance. The Indians assert that the pacu scents the fruit at a great distance; it likewise takes the hook, which is baited with the fruit of the genipa, the crabwood (*Carapa Guayanensis*), or the acidulous berry of the casami, a species of *Eugenia*. The pacu ascends the river only when it is full to overflowing; when the water is low, and the rocks that impede their course are nearly above the water and overgrown with different species of *Lacis*, the fish will not take any bait, as he then feeds on the aquatic plants.

Numerous pine-apples of a superior taste, the orange-coloured fruit of a species of *passiflora*, which the colonists in Demerara call Scimitu, and large bundles of sugar-cane, were brought to us. Some of the cane measured above 8 inches in circumference, and the joints were from 7 to 8 inches apart.

25th.—We started in the morning, but the strong current prevented any rapid progress. A circumstance this day occurred which induced me to remark, that the chief apprehension I have ever entertained in travelling through the forests and savannahs of this country, has been of the venomous snakes which lurk in such places. Indeed the repeated instances I have known of death or misery for the rest of life which has followed the bite of one of these reptiles, are well calculated to inspire dread. I was sitting with Mr. Goodall under his tent towards dusk, when I felt something crawling between my feet, and before I had time to see what it was, Mr. Goodall jumped in great terror from his seat, crying, "A snake!" Although I felt when it crawled along my foot, I could not see it, but Mr. Goodall considered it to have been a rattlesnake; I doubt this, as they are not generally found in forests. But I was none the less thankful that I escaped unhurt; a single motion of one or other of my feet might have induced the snake to inflict its bite.

26th.—The morning was quite foggy, and we could scarcely see a few yards before us. Indeed the Essequibo rather resembled the Thames in a November morning than the tropical river we were navigating. The thermometer stood at 72°; the wet-bulb thermometer at 70°·7, and the air had a sulphurous smell, which I found annoying to my lungs. The rain set in again at 10 o'clock, and lasted the greater part of the afternoon.

27th.—We arrived at about 10 o'clock at the second Taruma settlement on the Essequibo. Since I last visited it (1837) they had removed the site of the village more to the southward. We were instantaneously observed, and a large crowd assembled in front of the principal hut. It appeared that our Taruma friends

had got better acquainted with fire-arms since I visited them on a former occasion; and one less familiar with their customs might have taken alarm on seeing them place themselves in a line near the bank of the river and fire off several muskets. It was, however, a mere *feu-de-joie*. Those who had no muskets had each a calabash in his hand, which was emptied before we touched the ground. "Paiwo, paiwo!" cried our men; "we have just arrived in time to partake of a paiwori feast." And so it was; my old acquaintance, Yarimoko, the Barokoto captain, came staggering toward me, and gave me his hand—an example followed by all the rest as well as they could. As I had to go through the ceremony of shaking hands with upwards of fifty, babes at the breast not being excepted, I was really tired. Some of the children, from 5 to 6 years of age, struggled most valiantly to subject themselves to the friendly shake; but when they perceived that the colour of my face was so different from what they were accustomed to see, besides being mustached and whiskered, they commenced crying most lustily.

The Barokoto, who was already a fine-looking Indian when I saw him in 1837, had become more portly in the interval: his beard was certainly stronger than I had seen it in any other Indian of pure descent. His two former wives were dead, but he had consoled himself with two others; the one *enceinte*, the other a young girl perhaps not yet fourteen years of age, who appeared so much attached to her husband that she followed him like his shadow. Their years were certainly disproportionate, for he was 50 or upwards. Such mis-alliances, as we should call them, are by no means uncommon; and the strong frame of Yarimoko made it probable that he would outlive many of the striplings around him. On entering the festive hut, we observed a corial or boat 22 feet long and $3\frac{1}{2}$ wide, which had evidently been filled with their drink, but which was nearly empty to the dregs. Next to it stood a large trough about 15 feet long, $2\frac{1}{2}$ wide, and $1\frac{1}{2}$ deep, filled to the brim with paiwori, which was yet to be emptied before the feast should be over. The men were highly painted with *caraveru*, and wore on their heads that tasty cap made of the green feathers of the parrot, surmounted by the snow-white plumes of the Harpy eagle (Cocoi, in the Taruma language; Guan, in the Macusi; the *Harpyia destructor*). The ceremony of greeting their acquaintances and the stranger, by inquiring after every individual of the family, occupied several hours.

At a later period they resumed their dancing, which did not differ much from the same amusement as practised among other tribes. The men had large sticks in their hands, round which a number of seeds were tied that made a rattling noise when the stick was struck upon the ground. Others had merely their bows

and arrows, and other implements of war and the chase; in a word, every one carried something. They placed themselves round the large vessels that contained their drink, and having sent forth their loud and startling yells, followed by a shrill whistle, which they produced by blowing through their fingers, they put themselves in motion, going round the troughs sometimes slowly, sometimes quicker, stepping after each other, keeping time and bending the whole body at each step. After this had been continued for some time, another yell was set up, when the women, who had not been present during the first dance, issued from a neighbouring hut, led by one of their number having in her hand a maracca or rattle; the others followed in succession, each having her right hand on the shoulder of the one who went before; and all with looks bent on the ground. Some carried their babies, others a puppy, or some other object on their left arm. They now joined the men in the dance, forming an inner ring near the troughs, and going round them in a contrary direction to that of the men. Their step remained always the same, however rapid or slow that of the men might be, and they accompanied their dance with a low monotonous song.

They continued their amusement till far in the night, and in order to avoid disturbance I had removed my tent to some distance. At an early hour in the morning I was awoken by loud voices hard by. It appeared that some one of the votaries of the feast had indulged too deeply in his potations, and persisted in preferring the cold wet ground to his hammock, to which his better half objected; and, after a long debate, she induced him, partly by good words, partly by threats, to follow her into the house. The mode adopted among the Warrau Indians in similar cases is admirable. When the men are intoxicated with paiwori, and the persuasion of their wives remains without effect, the women join together, and, raising the refractory votary of the Indian Bacchus from the ground, place him with great agility in his hammock, and with a rapidity truly surprising, lace him in, where he remains like a mummy, or a babe in its swaddling clothes, till he comes to his senses.

Yarimoko was merely a visitor at the village; his own settlement was a few miles higher up the river. The information I received with regard to the Corentyne, and the possibility of descending that river, was quite contradictory. The Barokoto acknowledged ultimately that he had drunk too much the previous night, and that his head was not yet clear. He seemed to have some object in view by deterring us from commencing our journey. He told us of water-spirits which dwelt in the Corentyne, and who wrought the destruction of any one who navigated that river; and when he found this had no effect, he said the country we had to

pass through was inhabited by Indian sorcerers and tribes of very bad character, and that food was scarce. I treated his observations as they deserved; and in order to impress him with the power of white men, I profited by circumstances, as the great discoverer of the New World had done before us, and predicted that, in the course of an hour, the sun would be partly obscured. He related, through our interpreter, what I had told him, and a cloudless sky favoured me by allowing the partial eclipse to be visible. I showed it to those who were sober, through the telescope of the sextant, well knowing that their relation would lose nothing by being repeated. Yarimoko left the village the next morning (June 29th), and, before going, promised that he would accompany me to the Maopityan or Frog Indians, where we might procure information with regard to the Corentyne, which he called Curitani, and that his people should prepare bread for us, as the Maopityans were short of provisions.

The Tarumas do not like to intermarry with other tribes; indeed the Barokoto Yarimoko, who is the head of one of the settlements, is the only exception among those at the Essequibo and Cuyuni. A few more Tarumas are said to live among the Maopityans, of whom some of the men have married Maopityan women. This repugnance to intermarry with other tribes must materially tend to keep down the number of this tribe, which does not exceed 150, among whom a great family likeness prevails. It must also be observed that, as the number of women is not equal to that of the men, young girls, before the age of puberty, are admitted to the rights of married life, a practice which must injure their health, and prevent their becoming mothers; or, if they have children, they usually do not survive many days, or remain sickly beings all their lives. We saw at the Barokoto's place a young woman not more than 12 years old, or 12 rainy seasons, as they term it, with a child at her breast. Another woman with an infantine face had already the signs of puberty, and had been a wife for some years without having had any offspring. This early intercourse, and the circumstance that chastity is no virtue among unmarried women, among the Indians, must also greatly tend to the decline of the tribes.

The language of the Taruma Indians is not disagreeable, when slowly articulated; but it is their peculiar mode of speaking it, and of uttering the first syllable of each word strongly through the nose, that renders it inharmonious. It would take a European years to learn that nasal twang—that starting and raising of the voice, that renders their dialect one of the most remarkable among the tribes I have hitherto visited. They possess the sound of the English *th* and the Greek *ph*. While European languages are distinguished by the brevity of the numerals, the Indians require

great circumlocution to express a number above five, which, being the number of fingers of one hand, serves as a radical number. Six, in the Taruma language, is thus expressed, "Oshokia akanna urapani ahumi;" signifying that one finger from the other hand must be added to the radical number. Twenty is expressed, as in other Indian languages, by "one man,"—namely, the number of fingers and toes a man possesses, "oshe coarse," in Taruma.

It is very remarkable that they call an eclipse of the moon "piwa-toto;" being a compound of "piwa," moon, and "toto," earth. Are we to suppose that this is accidental, or are they aware that the interposition of the earth is the cause of the eclipse? and whence have they derived that astronomical knowledge?

Well acquainted with the aversion of the Indians to meddle with the dead or to touch their remains, I have experienced an almost insurmountable difficulty in procuring any skulls for the elucidation of the physical character of the different tribes. From what I had observed, however, of the chieftain at Watu Ticaba, I was encouraged to offer him a large present if he would give his assistance for the disinterment of one of the Wapisiana skulls. I succeeded beyond expectation; and though the skull which I procured was not quite perfect in consequence of the root of a tree having grown over it, nevertheless it was sufficiently so for the study of its form. This success emboldened me to put the question to the Barokoto, who, to my astonishment, entered immediately into the proposal, and observed that, if handsomely paid, he would give me the skulls of his mother-in-law and of two of his former wives, the elder of whom I had known on my former journey. He came this morning (July 5th), and requested that, while he should go for the skulls, I would remain at the place, to avoid suspicion. He accordingly started with Mr. Goodall, my coxswain, and the interpreter, to the site of the former settlement, and commenced digging where his former hut stood, and soon exposed the bones of the younger of the two.* The elder was buried close to her; and Mr. Goodall relates that he appeared rather affected at seeing her remains, and told him that she had been a very good wife, who had always seen that his comforts were provided for. She was buried in a bark canoe, and with her was deposited a bottle and a drinking-cup. On inquiry, he told Mr. Goodall that she herself had requested it, that she might not suffer thirst while proceeding to the other world; the bottle still contained some water. In the grave of the younger were some glass beads, and a few articles of dress. Next to her was the grave of

* Judging from the skull and teeth, she could not have been more than ten years of age when she died, and, as Yarimoko told me, she had never recovered after giving birth to her first child.

her mother, and of her young child. Near the remains of the child was lying a looking-glass and a broken cutlass; and near those of an old woman were some glass beads. The child must have been very young, as the skull was broken up, and could not be removed. The other three were, however, in good order. As ready as Yarimoko appeared to part with the members of his own family, he could not be induced to show Mr. Goodall and his party a grave where a man was buried. The former he considered his property in life and death; but over the remains of an individual who was not connected with him by the ties of blood or marriage he considered he had no right.

As we were the first white people who paid a visit to the Maopityans, I had, in the first place, despatched messengers to inform them of our arrival, and to request them to meet us at that place on the Essequibo, where we had to disembark in order to continue our journey overland. The time had now approached when we might expect to find them at the spot; and I gave the necessary orders for our departure the next morning, the 8th July.

I must confess that of all the Indian tribes the Tarumas appeared to us the most friendly and obliging. We lacked neither fish nor game during our stay. Whenever we found that our larder was getting empty, hunting or fishing parties were undertaken, and it was sure to be replenished. That excellent fish, the Haimura (*Erythrinus Macrodon*), was very abundant; and one which was caught in a trap measured 3 feet 4 inches, and weighed 30½ lbs.

Forty circum-meridian altitudes of α and β Centauri, and γ Ursæ Majoris, gave me as a mean $1^{\circ} 43' 58''$ N. for the latitude, and the chronometer gave the meridian distance $59^{\circ} 9'$ E. of Pirara.* The following data are extracted from the Meteorological Register:—

Number of Meteorological Observations from June 27 to July 6 inclusive, = 81.
The height of the settlement is 767 feet above the sea.

Date.	Instruments.	Mean.	Maxima.	Minima.	Remarks.
		Inches.	29th June, 9 A.M.	6th July, 6 P.M.	
1843.	Barometer . .	29.248	29.341 in.	29.166 in.	Weather quite variable, frequent thunder, with rain, and severe fogs in the morning. The air generally calm, and if there was a slight breeze it came in general from the E. by S., & E. by N.
June 27th to July 6th inclusive, 81 Observations.	Attached Thermometer . .	75°.11	30th June, 1 P.M. 80°.60	28th, 6 A.M. 67°.28	
	Detached Thermometer . .	75°.22	80°.60	67°.00	
	Wet-bulb Thermometer . .	73°.92	77°.20	66°.00	

* Pirara $59^{\circ} 20' 0''$ W. of Greenwich.
2nd, Taruma Place on the Essequibo $59^{\circ} 9'$ E. of Pirara.

$58^{\circ} 20' 51''$ W. of Greenwich,

The greatest range, during one and the same day, was on the 28th of June, when the thermometer varied $12^{\circ}.8$, and on the 1st of July the barometer varied 0.107.

The evaporation for the 12 hours of daylight was—

On the 2nd July, 13 grains out of 1000 grains.

„ 3rd „ 21 „ „

„ 4th „ 17 „ „

July 8th.—We started this morning at 8 o'clock, accompanied by several of the men from the Taruma settlement, and the number of our fleet of bark canoes was considerably increased in consequence. After we had proceeded for about 3 miles, we halted at Yarimoko's settlement, where we found a large quantity of bread prepared for us, which we bartered for cutlasses, axes, knives, &c. The chief himself accompanied us with his whole household, including men, women, children, dogs, parrots, and all that was moveable. He himself, with his three wives, of whom the youngest had not yet arrived at puberty, occupied a bark canoe for their exclusive use, of which he acted as coxswain, and his wives as paddlers. I do not think they would have looked upon him with much affection if they had known that only a few days previous he had disinterred the skulls of his former wives to sell them to me; and that a similar fate might await their own skulls if they should die before him, and another traveller direct his course to these regions. He wisely kept his dealings in organic remains to himself.

One of the Tarumas of our party, a handsome young man, was attacked while *en route* by a strange disease: his tongue and teeth bled to such an alarming degree that towards nightfall he was sinking rapidly. Our small medicine-chest was, unfortunately, not provided with a styptic, and I was really glad that I succeeded towards evening in arresting the profuse bleeding with warm vinegar. His case was very remarkable indeed: the great discharge of blood did not come either from the lungs, the windpipe, or its termination the bronchia, but from the tongue, from which it oozed, and from the place where, several years ago, a molar-tooth had been extracted. He only complained of a weariness in his limbs and great chillness, and the day after the bleeding he felt quite giddy. He observed that he had suffered in a similar way when his face had swelled considerably. I thought it best to send him back to his settlement the second day after the bleeding commenced, as I did not consider him strong enough to undertake the journey overland.

9th and 10th.—We reached the mouth of the small river Urana at 9 o'clock. We had now to continue our journey overland, and accordingly abandoned our bark canoes. I was disappointed in not finding the Maopityans, whom I expected to have met there. Our baggage was soon unloaded, and put into a temporary hut;

and as the Maopityans did not arrive in the course of the day, I started next morning, leaving the greater part of the baggage behind, to be brought after us. We had proceeded, however, only a few miles this morning (the 10th), when the barking of dogs announced the approach of strangers, and our Taruma messengers, accompanied by 14 Maopityans, stood before us. The latter differed in figure and dress from the tribes I had hitherto seen. Although they were only of middle stature, they were thinner and more bony than the Tarumas, their heads laterally flatter, and the eyes brilliant; but what most astonished me was the peculiar way in which they wore their hair: it was plaited in a long queue, which hung down the back, and in lieu of being wrapped round with becoming black ribbon, as we still occasionally see it among gentlemen of the old régime in Europe, the Maopityan had inserted it into a tube from 10 to 12 inches in length, made of palm-leaves, and ornamented with numerous strings, to which feathers of all colours were attached. There were four females among their number, who, if they were a fair specimen of the Maopityan ladies, gave us rather a good opinion of their looks. We admired the ingenious, if not pretty way, in which they wore the cincture which attaches the only piece of dress the females of the uncivilized Indians wear in the interior. A piece of round bone, very neatly worked, and from which long strings of beads were suspended, was worn as an ornament in their ears. The men used, for a similar purpose, pieces of bamboo about 2 inches in circumference, which were passed through the lobes of the ear; and below the angles of the mouth were holes for the reception of small sticks, ornamented with feathers, which very much resembled the antennæ of a May-bug.

They greeted us with much cordiality; and as a severe shower of rain detained us for some time at the spot where we met, many a curious glance was thrown at us and at our baggage. The rain descended in torrents. I resolved to proceed only a short distance, in order that the Maopityans might fetch up the baggage we had left at our last night's camp. Their own burdens which they had brought with them were therefore set down, and they started off in all haste. Scarcely, however, were they out of sight, when the Tarumas in our company fell, like locusts, upon the Maopityans' baggage, and commenced an examination of it which, for minuteness, might shame the overhauling of our strictest custom-house officials. Nor did they confine themselves to a mere examination, but began appropriating to themselves, not only the eatables, but everything else they took a fancy to. Perceiving my astonishment, they endeavoured to bribe my approval of their proceeding by the offer of one of the combs, which the Maopityans execute very skilfully; but, to their great surprise, I expressed to their chief my

detestation of their conduct, and insisted that he should order his people to restore everything that could be restored. The smoked maipure (*Tapirus Americanus*) and apuya (*Dycoteles torquatus*), which they had swallowed in a ravenous manner, could not, of course, be restored; but I saw that every other article was packed up again, as they had found it, and, keeping watch over it, I did not leave the baggage until I saw every person on his march. Our Macusís and Wapisianas had naturally no hand in this attempted plunder.

11th and 12th.—Our course during the first of these days was E.S.E. The path led us over hills from 100 to 150 feet high, which alternated with low swampy ground, overgrown with the manica palm (a species of *Euterpe*); the graceful *Mauritia aculeata* (here, however, of such a height, from 60 to 70 feet, that I have some doubts whether it be really the *M. aculeata* of H. and B.); numerous scitamineæ; the turu (*Ænocarpus Batava* and *Bacaba*) and muru-muru palms (*Astrocaryum Murumuru*); and that remarkable palm the *Iriartea exorrhiza*, which raises its trunk, by means of a number of roots similar to the banyan-tree, 6 to 8 feet above ground, and which may be compared to scaffolding, from the middle of which the trunk rises.* Of equal interest was a palm which our Macusís pointed out to me with great delight, and which furnishes the outer cases of their blow-pipes. I consider it an *Iriartea*, though it has not that peculiar growth of its roots.

We pitched our camp near numerous blocks of granite, and starting next morning at half-past six, crossed soon afterwards the small river Onoro, which falls into the Essequibo. Our path was now more level, as it followed the valley of the river. After noon we reached the foot of a mountain, which our limbs, fatigued with a march of six hours, refused to climb. I therefore gave orders to pitch our camp, and with Mr. Goodall and two guides went in the direction whence the sound of a cataract seemed to promise one of those sublime scenes of nature so frequent in the interior of Guayana. We had advanced about a mile when we came in sight of a magnificent cascade, formed by the Onoro, which precipitates itself from a height of about 100 feet into the valley. Our Maopityan guides remained at a respectful distance, not venturing near for fear of spirits. Mr. Goodall and myself got as near as we could, and then scrambled to the summit.

The black masses of rock which rose above the foaming waters were clothed with verdure, and chiefly overspread with a *Lycopodium* interspersed here and there with a scarlet *Justitia*. I found there a plant of great interest to me; it was a *Solanææ* of humble growth, but whose flower resembled an *Auricula* in colour. I was

* "Radices 8, 10, 20 et plures altitudine 6, 8 pedum e terra emergentes atque in conum vastissimum dispositæ."—(Mart.)

astonished at the total absence of Orchideæ, which generally delight in those situations where the spray of a cataract preserves a constant moisture. The high trees prevented our enjoying a prospect from our elevated situation, but we could see to the S.W. the mountains we would have to ascend the next morning.

The thermometer stood under the tent at 3 o'clock in the afternoon 78° , at 6 o'clock $74^{\circ}2$; the difference between the wet and dry bulb was, during the former hour, $1^{\circ}6$, during the latter $0^{\circ}8$ or $\frac{4}{5}$ ths of a degree. The barometer varied between $29^{\circ}148$ and $29^{\circ}114$.

13th.—Started soon after 6, ascended and halted 40 minutes after 7 on the summit of Mount Zibingantzacko. Buntén's barometer was here consulted,* and we found that our height was approximately not more than 370 feet. We again crossed the Onoro, rushing turbulently towards the large cataract. We thus ascended and descended hill after hill, and, although the intermediate valleys were always considerably higher than our camp last night, we descended nevertheless, in several instances, from 200 to 300 feet, in order to ascend a similar height at the distance of a few hundred yards. These mountain valleys between hill and hill were swampy and overgrown with *Manica* palms, and with the beautiful *Mauritia flexuosa*, or Ita palm. As splendid as this latter tree appears in the savannahs, which seem to be its favourite place of growth, it cannot vie with the specimens I saw here. Some of the trunks attained a height of more than a hundred feet before the beautiful fan-shaped leaves spread out in tropical grandeur. Their luxuriant growth was really surprising, the more so as I had hitherto seen them only on plains and arid savannahs, while here, at an elevation of not less than 1200 feet above the sea, their summits stood 120 feet above the ground.† The other species with a prickly trunk (*M. aculeata*) grew to a height of from 50 to 60 feet, and was much more robust than the specimens I had seen at the Rio Negro, nor did it grow here in groups. The Maopityans call the Ita, Kibi; the Tarumas, Yuro-i.

We traversed the summits Honicuri, Yiatzo, and Kabai okitza, and after descending into the valley between the sixth and seventh summit, we found the first rivulet, which flows towards the Amazon. It was then about 10 o'clock, and our barometer indicated a height of 1130 feet above the sea. The ridge which causes the division of the basins of the Essequibo and the Amazon, in these regions, is 120 feet higher. The small rill is the

* Barometer $28^{\circ}749$ in.; attached thermometer $70^{\circ}43$; detached thermometer, $71^{\circ}35$; wet bulb, 70° .

† "Crescit raro in elevationem octigentorum pedum supra oceanum adscendit regiones maritimas potius quam interioris terræ continentem amans."—(Kunth.) I observed them on savannahs as high as 3300 feet above the sea, near Roraima.

Caphiuin, or Apiniau, which receives the Wanamu, and forms at their junction the Caphu, the river Trombetas of the Portuguese.

We now followed more the direction of the ridges of the hills, having previously crossed them transversely. Our course continued E. by S., deviating scarcely half a point. The narrow valleys, or glens, which divided the hills, descended towards the east. Having passed the summits Ketia-una and Kenukawai, the latter the twelfth hill in the course of the morning, we traversed three more, and then descended towards the river Darura, one of the first tributaries of consequence which joins the Caphiuin, or Apiniau. It was just noon, the greater part of our people far behind, and even Mr. Goodall, who otherwise proved himself such an excellent pedestrian, had dropped among the reserve, and I was about giving orders for pitching our camp on the banks of the clear mountain stream, but our Maopityans, anxious to reach their home, described the distance of their settlement as only a couple of miles, and, after a rest of half an hour, we commenced our march anew. I found it, however, a good five miles before we entered the provision grounds, and heard the barking of the dogs announcing our arrival.

We saw before us two huts, the one of uncommon large size, the other smaller, but both overtopped by that peculiar small roof which gives to them an Asiatic appearance, still further increased by pieces of wood, cut in different shapes, hung up along the eaves, and which the wind moved to and fro. We directed our steps to the smaller of the two, where we were welcomed by the chieftain (a Taruma by birth) and all the other inhabitants who had not come to meet us at the Essequibo. It was ridiculous to see with what fear depicted in their faces the females gave us their hands; they had no doubt been schooled to tender their welcome in that way; but if they had expected an electric shock the hand could not have been offered under greater apprehension. Our Macusis and Tarumas, who considered themselves so much better acquainted with European politeness, laughed most heartily at their awkwardness. I noticed among them a young woman with a frightful tumour on the left side of the abdomen above the hip, and what rendered her appearance still more shocking, she was *enceinte*. She possessed much more courage and vivacity than the others, and with a smile gave me a hearty shake when I offered her my hand.

After the first burst of welcome was over I went to the large hut, the dwelling of all that remained of the tribe of Maopityans, or Frog Indians. The interior of the hut was similar to that of the Tarumas, but surpassed in size any I had seen among the Indians. It measured 86 feet in diameter, and was of a proportionate

height. That peculiar ornament, the painted trunk of a tree, which the Maopityans call Aiyukuba, was more adorned with Indian figures than I had seen it among the Tarumas.

The flatness of the head and consequently the long face and short circumference is peculiar to the tribe. I have not been able to learn, upon the most minute inquiries, that the form is given to the head by artificial means. The occiput of the men is high, and almost perpendicular above the front; the frontal bone is small with regard to extent, and in no comparison to the face below the eyes; the cheek-bones are harsh and prominent; but the most remarkable part of the head is the great extent between ear and ear, if measured from the upper part of that organ, and the line continued above the eyebrows, to the commencement of the other ear.* It surpasses the measurement of other Indians generally by an inch or two. The lower jaw-bone is of great depth, a formation which is generally considered as a sign of animal propensities, which, however, their high front seems to counterbalance. Their noses are good. The features of the females are regular, the brow delicately arched; the eyes are large and black, and, like those of other Indian females, possess fire only when animated, at other times their usual expression is that of diffidence and bashfulness, and are seldom raised to the speaker. The average stature of the men is 5 feet 6 inches, that of the females 4 feet 10 inches. The tallest of those who form the remnant of the tribe was only 4 feet 11½ inches; but their form is good, and the hands and feet very small.

The bows of the Maopityans are larger than those of the Macusis and Wapisianas, being generally from 6 feet 10 inches to 7 feet in length. The lower or convex side runs more in an edge than in the bows of the former tribes, and they are likewise differently strung. Iron is still scarce among them, and the greater number of arrow-points are made of bone. They possess a kind of arrow-poison which they prepare from a root, which was the only part of the plant I saw, and from which I judge it to be herbaceous. The poison is neither so strong nor does it retain its quality so long as the Urari of the Macusis. The remarkable tube, or blow-pipe, the Cura of the Macusis, is known to them

* I add a comparative measurement to substantiate the foregoing statement:—

	Maopityan Indians.				Taruma.	Wapisiana.	Atoral.
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.
Circumference of the head along the frontal sinuses and temporal ridge	1 9.3	1 10	1 9.8	1 9.1	1 10.6	1 10.2	1 10.3
Long diameter of face	0 9.5	0 9.1	0 9.8	0 10.1	0 10.1	0 10.2	0 10.1
Diameter between the processes of the helix	0 11.8	0 12.5	0 13.1	0 12.0	0 11.2	0 11.1	0 11.0

only from description, nor did I see any fire-arms among them; but when I recollected, that on my first visit to the Tarumas in 1837, the whole tribe possessed only two old-fashioned fowling-pieces which they were sadly afraid to fire off, and that at my present visit I saw scarcely a man without one, it was clear the Maopityans could as easily procure themselves these weapons, so superior to their bows, the more so as they are considered good trainers of hunting dogs, and among the Indians of the interior a good hunting dog, like a marriageable girl, commands a gun.

One of the men dressed himself in the way they use for great occasions, and he felt quite proud when the artist of the expedition, Mr. Goodall, took his portrait. The arm is ornamented with bracelets which are 4 inches broad, and which are made by winding the young leaflets of a palm round a form of wood of the same thickness as the arm: they are afterwards ornamented with Indian figures. They are worn round the upper arm, and a bunch of the large tail feathers of the red and blue maccaw (*Macrocerus aracanao*) are fixed between the arm and the bracelet, overtopping the head of the wearer by 5 or 6 inches; add to this the two parcels of parrot's feathers attached at right angles to two pieces of wood fixed in holes that have been bored, when young, below the angles of the mouth, and which, as already observed, may be likened to the feelers or antennæ of a May-bug, and besides all this, that peculiar head ornament, the queue, encased in a tube, and adorned with numerous strings of red cotton, to which feathers of divers colours are attached, and it will be confessed that the Maopityan in his holiday dress presented a very peculiar appearance. He had in his hand a thick piece of bamboo which, in consequence of its being hollow, makes a loud noise when stamped upon the ground, but which for the sake of more noise is surrounded with hard shelled seed-pods,* which adds a peculiar shrill sound.

These people are very ingenious; the combs which they manufacture are really handsome. The teeth are made of palm-wood, and fastened into a piece of bone. At the distance of an inch and a half below this bone are fixed two pieces of palm-wood, one on each side of the teeth, and the space between the two pieces and the bone is plaited with red and white cotton, which serves both as ornament and for fixing the teeth firmly. Like the Tarumas, they do not cultivate much cotton, and prepare their hammocks of the fibres made of the young leaves of the *Mauritia* palm. Their waist-cloths are of spun cotton, but they barter them from their next neighbours, the Woyawais, who, it appears, are great cultivators of the useful cotton-plant.

* They appeared to me to resemble a *Thevetia*.

These Maopityans are the last of their tribe; their whole number amounts to only 39 individuals, namely, 14 men, 11 women, 8 boys, and 6 girls. They were formerly divided into two small settlements, but latterly they united, as if a sentiment of their approaching extinction had brought them together.

In their vicinity was a small settlement of Taruma Indians, the chieftain of which they invited to preside over them as captain, and he and his people moved over to the Maopityans, who thus connected themselves closer with the Tarumas. They are now living together in the great circular hut, forming a community of 60 souls, isolated from other Indians by thick forests and high mountains; their nearest neighbours being, to the south, the Woyawais, to the west the Tarumas at the Essequibo, both about 4 or 5 days' journey from them. They call themselves Mawakwa; the Wapisianas, however, call them Maopityans, from "mao," a frog, and "pityan," people or tribe.

Their provision-fields were very extensive, but they had been improvident, and the cassada plant was not yet ripe for use; and the information of Yarimoko was quite correct, that they mixed rotten wood with their cassada flour to make it last the longer. Our glass beads and knives were, however, too seducing, and the women (to whose department the barter of the produce of the provision-grounds belongs) readily parted with what they could spare.

I was naturally anxious for information as to the direction we should take in order to fall in with the head waters of the Corentyne. The intermediate space between this settlement and the river appeared to be quite uninhabited; and although the people knew of the existence of a river of the name of Curuni, the only practicable way, they said, to reach it would be to follow the Caphiwin or Apiniau, until it is joined from the N. by the Wana-mu, then to ascend the latter to the settlement of the Pianoghotto and Drio Indians. The Frog Indians were, however, no great navigators, and their fleet was most miserably inefficient, consisting merely of a few bark canoes in a rotten state. I therefore gave the necessary orders to construct wood-skins, or bark canoes, for our own navigation, and, in expectation of such straits, the coxswain had been ordered to provide himself with the necessary tools, and principally a pair of good American axes,* on our starting from Pirara. All hands were soon engaged in felling trees for the construction of our craft. I engaged at the same time

* A traveller through the forests of the interior should consider an American axe an indispensable tool. A dozen other axes of the best European manufacture will not prove equal to a good American felling axe. Two of these axes have been used during our expedition, which lasted four years, and were, at the end of that time, as serviceable as at the commencement.

two Maopityans to proceed next morning to the Pianoghottoſ at the Wanamu, to inform them of our intended visit, and to request them to meet us with provisions, as the scarcity among the Maopityans did not promise a large supply.

The Indians between the 4th and 5th parallels of latitude generally make use of the Bully-tree (*Mimusops Spec.?*) for canoes; but as this useful and magnificent tree does not grow here, we had to use two other trees, one apparently allied to the locust (*Hymenæa Courbaril*), and the other the white Maran, or Balsam Capaiva tree. I was quite astonished when I became aware of the fact, that the latter tree is likewise used for such a purpose.

The coxswain, who had been present when they felled the trees, told me, that when they came near the heart, the balsam gushed out in such quantity that several gallons might have been collected. In the absence of bottles they brought several joints of the bamboo filled with it, which being ultimately put into quart bottles filled five of them. It was perfectly white and transparent. The Maopityans, like all other tribes, call this plant Maran, but its medicinal qualities are unknown. Indeed, I have never seen an instance of that peculiar disease for which it is used in Europe among the tribes of the interior. The Indians use the balsam like palm oil, to anoint their bodies with.

The layers of the liber of a species of *Amyris* were found by Cailliaud to be used by the Nubian Mohammedans as paper, on which they write their legends;* we may therefore conclude that the bark parts easily from the wood, and this quality seems to belong to the whole order of *Amyridacæ*, to which Lindley has joined the genus *Copaifera*:† and the Indian selects the bark of these trees for the preparation of his slight skiffs. Some of these trees, however, must attain an enormous size, as a single one gave us two bark canoes, each 35 feet long, and 4 feet 5 inches wide. The bark of the tree, which I considered to be a species of *Hymenæa*, is much thicker than the former, and nearly half an inch in thickness. The wood is white, and appears to be rather soft; but the heart is heavy and close-grained, and apparently of great durability. One of these trees, which was cut down near our camp, measured 125 feet from the base to the top of the branches. The Maopityans call this tree Yaru-yaru.

16th.—After suffering the pains of labour for nearly 3 days, the young woman with the large tumour this morning brought a child into the world. Previous to her delivery she had been

* Lindley's 'Natural System of Botany,' 2nd edition, p. 165.

† I do not follow Endlicher in his 'Genera Plantarum,' who considers *Copaifera* as belonging to the *Leguminosæ*, though it possesses leguminous fruit; in every other respect it seems to belong to *Amyridacæ*.

kept in a small outhouse, but had afterwards walked to her accustomed place in the large hut. The Indians invited me to see the infant, and accordingly, provided with some suitable presents, I went. I have before observed that this woman was more lively than the others, and when she saw me approaching her hammock she held the child up, and appeared particularly proud that her first-born was a boy. Nature had here done all. If her deformed body and protracted labour be considered, it is surprising in how short a time after, she could sit up and smile at her baby and at the presents it received from me. She is a Maopityan, and the second wife of a Taruma, the father of the child. Polygamy appears very common, but, in the present instance at least, it is clear that beauty was no motive of choice in the second marriage. The first wife, who has had two children, was a fine-looking Indian.

The new-born child had all the characteristics of the mother's tribe. It was not quite an hour old when I saw it, and the flatness of its head, as compared with the heads of other tribes, was very remarkable. Its size was $14\frac{3}{4}$ inches; the circumference of its head $13\frac{1}{4}$ inches. A female child of the same tribe, not quite 2 months old, measured 17 inches; the circumference of the head $13\frac{1}{4}$ inches; the circumference round the abdomen $14\frac{3}{4}$ inches. A third one, 4 (lunar) months old, measured 23 inches, and was $17\frac{1}{2}$ inches in circumference round the abdomen. In all three cases the profuse hair on the head of such young children appeared to me remarkable.

We had most unfavourable weather during the commencement of our stay at the Maopityan settlement. Georgetown, on the coast, is famed for the severe showers of rain to which it is subject; but the torrents which we experienced on the night of the 15th of July, surpassed in violence anything I had ever witnessed. The noise of the descending rain overpowered the thunder, which could only be heard when the thunder-cloud passed over our head, and clap followed clap. The succeeding morning was fair and cool; and the thermometer, which during the previous rainy days had stood at 70° , now indicated only 69° , a degree of freshness which rather surprised me, as we were not more than 880 feet above the level of the sea, and near the equator.

The latitude of the settlement was $1^{\circ} 25' 18''$ N.,* and its distance, by chronometer (Frodsham's No. 369), $14^{\circ} 37'$ E. of the Taruma place on the Essequibo.† The following table will give the necessary comparison; it rests upon forty observations:—

* This is the mean of 43 circum-meridian altitudes of α (Bet) Centauri and γ Draconis.

† $58^{\circ} 6' 14''$ W. of Greenwich.

Period and Number of Observations.	Instruments.	Mean.	Maxima.	Minima.
From July 14th to	Barometer	Inches. 29.094	15th July, 10 A.M. Inch. 29.173	16th July, 5 P.M. Inch. 29.022
July 18th,	Attached Thermometer .	72°.57	15th July, 3 P.M. 80°.42	17th July, 6 A.M. 66°.20
40 Observations.	Detached Thermometer .	73°.04	80°.50	66°.00
	Wet-bulb Thermometer .	71°.72	73°.70	65°.90

18th.—Our bark canoes being ready, and the women having prepared us as much cassada flour as they could spare in their straitened circumstances, we engaged six men from the village to accompany us to the first Pianoghotto settlement, and started on the following morning.

The Caphiuin was scarcely 15 yards broad where we embarked, and full of rocks, and otherwise obstructed by trees that had fallen across, through which we had, in many instances, to cut a passage for our boats: this, together with the want of skill of the Maopityans, frequently endangered our frail canoes. Indeed the awkwardness with which the Maopityans paddled, drew down upon them the ridicule of our Macusis, who considered themselves very superior boatmen.

Several small rivers joined the Caphiuin, after which it increased in size, and forced its way turbulently through the mountain chain. We passed Mount Yucawari on the 20th. I estimated its summit at 1500 feet above the river, which was about the average height of the hills we had hitherto passed. The direction of these ridges is by no means uniform, and deviates generally between N. and E., and N. and W.

The flora of the banks of the Caphiuin exhibited all the luxuriance of the tropics. The scarlet *Iseria*, the blue *Petrea*, the long pendulous flowers of the *Posoqueria*, with its rounded fruits of citron-yellow, and large green, shining leaves; the flowing risps of Aublet's *Carapa Guianensis*; the ant-tree (*Tachigatia pubiflora*), with its upright panicles of yellow blossoms; the splendid *Clusia insignis*, with its large rose-shaped flowers and aspect as if formed of virgin wax, each petal tinged with rose; Aublet's crimson *Eperua*, remarkable for its falcate pods, pending from the trees on thread-like peduncles; the banks of the river, adorned with graceful bamboo bushes and gigantic *Musaecæ*; numerous palms, and the *Theobroma cacao* growing spontaneously, the majestic *Bertholletia*—all united to render the picture highly interesting to the botanist, and delightful to the eye. The falls and rapids now became numerous. We halted in the evening of the 20th at the head of Uwiya, the first fall which was of any consequence. The dykes which caused it were

slaty greenstone, and, according to the chronometer, we were then 10 miles E. of the Maopityan settlement.

We passed, soon after noon of the 21st, Mount Caramuzin, about 2000 feet above the river, or 2850 above the sea. It is on the river's left bank, and is in its form more pointed than the other mountains we had passed. Our camp was pitched this night near another fall. The rock was here of greenstone, passing into clay-slate, and, stretching right across, caused the river to fall perpendicularly, as over a mill-dam, into the basin below. Some cavities in the hard rock were very remarkable. They were shaped like soup-plates or saucers, about 8 inches in diameter, and 2 inches in depth, and quite smooth. I was unable to account for their formation. Observations of northern stars gave for the latitude of this place $1^{\circ} 23' 23''$ N., and its meridian distance by chronometer was $13^{\circ} 11'$ E. of the Maopityan settlement.

The following day we lost two of our bark canoes. One ran against a rock and split, and the second sunk; two of the Maopityans went through the heavy surge at the foot of one of the falls, which caused it to be swamped.

We had proceeded only a few miles on the morning of the 23rd of July when our progress was stopped by the large cataract Wamaru Serrika. Here we had to carry both the boats and the baggage over a distance of 700 yards, which occupied the whole day. A barometrical measurement gave me 45 feet for the total height of the fall.

24th.—The difficulties which the navigation of the river presented were still further increased by our not understanding the language of our guides. It appeared that only one of them had been down this river before, and then, as far as we could understand him, he was very young. This man was, moreover, sullen, and not favoured by nature with much discernment. I gave him a seat in my own bark-canoe, which by the Indians is considered an honour, but it did not change his manners. We had scarcely advanced a mile on the morning of this day when another large fall was before us. We had again to unload, and carry the baggage about 600 yards overland. The boats were lowered down the fall, and here I met with a painful accident. Anxious to witness the passage of the corials over the impediment, I crossed a small island, from whence I could observe the manœuvres of the crew. Deeply intent upon what they were doing, I paid no attention to the objects immediately around me, and had placed myself unwittingly and without hat under the large nest of a brownish species of wasp. I must have touched it, and roused their ire. The first intimation I had of the dangerous proximity was the violent pain I experienced from their stings in fourteen

different parts of my head, and, not being able to get the wasps out of my hair, they continued to inflict their wounds. Had I not been ashamed of showing any weakness before the savages, I might have cried out with the pain; which, strange to say, communicated itself to the right arm, chiefly under the arm-pit. I passed a feverish night, and felt the consequence of the stings for some days after. Having passed some more cataracts and rapids, the river became comparatively smooth. It had scarcely increased in breadth for the last 50 miles, and in lieu of mountains, groups of small hills, scarcely 150 feet in height, approached the banks, while the stream itself was studded with numerous blocks of granite of the usual spherical form.

26th.—The trees near the banks of the river were this morning enlivened by large flocks of small monkeys; they consisted chiefly of pisas and yarkis (*Pithecia spec.?* and *Cebus Capuchinus*), and some squirrel-monkeys (*Callithrix sciureus*), and, astonished at seeing human beings passing their abode, they exhibited every attitude and grimace which their agility and curiosity, at the strange sight of us intruders, called forth. We had hitherto been accompanied by a general silence, interrupted only by the noise of falling waters, our own voices, and the splash of the paddles. This day it was otherwise; several feathered songsters raised their voices, discordantly broken in upon by the noise of an assembly of hawks (*Ibycter leucogaster*, Vieill.), known in the colony by the name of bull-dogs, and which, when perched on the summits of the highest trees near the banks, never fail to greet the passing boat with their stunning cry.

A large Coaita monkey (*Ateles paniscus*), resting with its long legs on a curved branch, while it kept its erect position by grasping with its spider-like arms some branch above it, reminded us forcibly (at the distance we were from the animal) of the human structure—the more so as she was a mother, and had a young one clinging to her breast. We had not proceeded a great distance when the howling in unison of half a dozen Araguatos, or howlers (*Stentor seniculus*, Geoff.), resounded like the roar of lions through the surrounding forest. They did not observe us, and we were able to come quite close to the trees where they were sitting: I counted six. Amidst the deep bass of several old ones, was distinctly heard a shrill, fine voice, proceeding from what is called by the Creoles “the singman,” or precentor; no community or group of howlers is without him, and he is naturally distinguished by his diminutive size as compared with the others. So say the Creoles; and although the fact is uncontested that, whenever they commence their dreadful howling, the shrill voice is heard amongst them, we, as naturalists, cannot agree with the woodman, that nature should select one from the rest and

give him a smaller size, that he may act as leader in the discordant concert. It is most probably a female, or a young aspirant who has not yet acquired the sonorous bass voice of the aged.

We had commenced shortening our allowance, and the Indians could not resist the temptation of replenishing the larder. The crack of the percussion cap,* the report of the gun, the cry of the startled singers, and the heavy fall of one of them, was the act of a few moments.

The hollow sound of rushing waters informed us that we were approaching another cataract. We had passed in the course of the morning numerous small hills on our right and left, without any serious obstacle interrupting our navigation, but, on approaching a hill which extended N. and S., we saw another fall before us. The Maopityans call it Karamatahura: it presented a very remarkable appearance, for the greater volume of water flowed about 150 yards along a raised ledge of granite, like a natural aqueduct, in a S.E. by E. direction, about 20 feet above a smaller branch of the river, which precipitated, at the commencement of the ledge, into the basin below, and then flowed gently along the foot of the natural aqueduct, while the waters above were rushing turbulently towards the abrupt termination of the granite ledge, where it again united with the former stream by forming a large cataract. These shelves of granite astonished me by their vastness; the action of flowing water having denuded whole tracts of their earthy covering, they now appeared like gigantic terraces.

The rocks were covered with that strange water-plant the Wirinye, belonging to the genera *Mourera*, *Podostemon*, *Lacis*, &c., and the river having fallen in the course of the last two days they now raised their branches above the water, and were in full bloom. Here I secured a specimen of that kind of fish, of a dark-blue colour, which on the one hand resembles closely the Pacu (*Myletes Pacu*), on the other Pirai (*Serra-salmo niger*),† and of which I saw the first in the river Padamo, a tributary of the Orinoco.‡ The Maopityans call it Umursu, but, with the exception of Sororeng, who had already accompanied me as interpreter on my former journey to the Orinoco, none of our Indians had ever seen one before.

While our boats were being lowered down the cataract (which nearly occasioned the destruction of my own skiff), Mr. Goodall occupied himself with making a sketch of this remarkable fish,

* The Macusi Indians call the percussion caps taki-pang, the sound of the words intimating the explosion of the cap and the heavier report of the gun.

† *Vide Fishes of Guayana*, in 'Naturalist's Library,' vol. i. pp. 225 and 236.

‡ *Journal of the Royal Geographical Society*, vol. x. p. 241.

of which it is my intention to give elsewhere a full description. Scarcely had we overcome this obstruction and proceeded half-a-mile further when we halted at another fall, where the river, shooting over an inclined plane for the distance of about 400 or 500 yards, formed a precipitous cataract at its extremity. We had again to unload, and as the day was already so far advanced I gave orders at once to encamp at the foot of it.

The black pacu abounded here; our crew waged war against them with bow and arrow and cutlasses—indeed a wholesale slaughter took place, and upwards of twenty were secured. It was quite an enlivening scene; every person wished to carry a prize away, and many a tumble took place, when from over eagerness they paid no attention to the slippery rocks, or when too venturesome the force of the current carried them partly downwards to the foot of the fall.

We made out from our guides that this was the last fall of consequence we should meet with in descending the Caphiwin. The barometer showed a descent of 222 feet from the place of embarkation at the Maopityans, which in a direct line is nearly 50 geographical miles from Karamatahura, which makes about 4.4 feet per mile. I formerly considered the Padamo (a tributary of the Upper Orinoco) as one of the rivers the most obstructed by falls and rapids, but the Caphiwin far surpasses it. The latitude of the foot of the lower fall was $1^{\circ} 21' 50''$ N. and its longitude $57^{\circ} 16' 50''$ W. of Greenwich. The mean of barometrical observations from 3 o'clock in the afternoon to 6 o'clock in the evening $29^{\circ} 34.9$; attached thermometer $79^{\circ} 7$; detached, $79^{\circ} 9$, from which data the descent mentioned above has been reduced.

27th.—This morning we chased a jaguar that was swimming across the river, but we were too far off to intercept its course. He turned himself leisurely round, throwing a glance at us, and measured the distance our boat was from him, and, no doubt, satisfied that he was safe, he continued his course, bearing his tail curled high above the water.* He ascended the bank by means of a tree that had fallen into the river, and, shaking the water, like a poodle-dog, from his spotted skin, walked leisurely into the thicket without giving us even a second glance. My rifle missed fire twice, to my great annoyance, as I felt most anxious to send a ball after him, if it had only been to make him trot a little faster out of our sight.

The jaguars appear to be very numerous hereabout; it was only yesterday that we saw the marks of their feet near our camp, and a few days previously we saw one crouching on the

* They always swim across the river with their tail cocked up, and we recognized by this circumstance whether it was a jaguar or any other animal that swam before us.

trunk of a tree: when the boat got quite near, it jumped down and scampered into the bush. But our black cook tells the best story, and still trembles at the recollection of his adventure. One night, he says, while lying awake in his hammock, he saw a huge animal who came up close to him, smelling him all over. He feared to move, and seeing a pair of eyes like burning coals, shut his own; but when the beast's snout came near his face he could retain himself no longer, and giving a tremendous shriek, which awoke the whole camp, he jumped out of his hammock, and nothing in the world could induce him to return to it that night. He preferred sleeping on the ground under the tent of the coxswain.

We passed about noon the river Camu (Sun river), which joins the Caphiuin from the N.N.E., and is nearly of the same size as its recipient. It is now uninhabited, and has its source, as we were given to understand, in some high mountains. After this junction the Caphiuin turns a point more to the S., and some of its reaches trend even to the W. of S.; its banks are low, and it no longer meanders through small hills as it did yesterday. I estimated its average breadth at about 300 feet.

28th.—An hour before noon we passed one of those temporary huts which the Indians, when on fishing expeditions, or while travelling, erect on the banks of the river, and, miserable as they are, they attest that human beings have constructed them for their abode. We had not seen one since we left the cataract Uwiya, a sure token that ages had elapsed since human beings had travelled up or down this river. Uwiya appears to be the "Ultima Thule" of the Maopityans down the river, and the hut we had just passed "the furthest" of the Pianoghotto Indians upwards, while the intermediate 70 miles was the haunt of the jaguar and tapir, and, as our Indians no doubt believe, the abode of all kinds of hobgoblins and other spirits, mischievously inclined towards the human race.

A small fall, which however occasioned us some difficulty, induced me to encamp. While they were pitching our tents I observed some smoke at a short distance before us, a sight hailed with delight in the wilderness, as a sure token of the presence of man. One of the bark canoes was quickly brought over the fall, and with our precious guide, the coxswain, and Sororeng, we pulled towards the place, and eagerly climbed the steep banks in expectation of finding people. The furious barking of half-a-dozen dogs soon proved that we had not been mistaken.

We found a man, a young woman, no doubt his wife, and a young girl, arrived at puberty, but who, like the poet, seemed to think that "beauty is, when unadorned, adorned the most," and accordingly despised even the fig-leaf. A boy about 13 years of

age, and in the same naked state as the young girl, came out of the wood, curious to see what caused the barking of the dogs, and appeared awfully frightened at sight of my white face. It was a Zurumata family, a branch of the Pianoghotto tribe, who were clearing a new provision-field. Two small panaps, or temporary huts, served them as shelter. The man had all the appearance of a Maopityan, nor was the pig-tail wanting, sheathed in a tube of palm-leaves and ornamented with coloured feathers. He wore below the knee a band of cotton strings, from which hung a large tassel, coloured red. Round the ankles were tied some strips of palm-leaves. The young woman did not differ in her attire from the generality of the Indians; but her qué-yu, which is usually made of glass beads, when this so much coveted article is to be procured, appeared to be made of seeds. The other two individuals, as already stated, were naked. This family appeared to be short of provisions, and we understood it to be their intention to return the next morning to their settlement, which they hoped to reach in five days.

The junction of the Wanamu and Caphiwin appeared to be a few miles to the eastward, but as I could not ascertain whether we should find people I was uncertain as to our route.

We returned to the cataract, where the ledge of rocks promised me an opportunity of taking astronomical observations for latitude; but with the exception of some circum-meridian altitudes of Mars and γ Draconis, my object was frustrated by thick black clouds which rose in succession to the N.E. and spread over both hemispheres. Numerous shooting stars, some apparently taking their course upwards, became visible when the opaque clouds did not interfere, and proved that the upper atmosphere was clear. The barometer stood at half-past nine o'clock $29^{\circ} \cdot 382$; the attached thermometer $73^{\circ} \cdot 4$; the detached thermometer 74° , and the wet bulb at 73° : our latitude was $1^{\circ} 7' N.$; and our meridian distance from the Maopityan settlement, according to the chronometer, $1^{\circ} 13\frac{1}{2}' E.$

29th.—We reached, after three hours' paddling, the junction of the Wanamu and Caphiwin. The former joins from N. by E., while the last reach of the Caphiwin before the junction is N. $81^{\circ} E.$ The united streams, after their confluence, continue their course towards the E. by S., taking ultimately, if the information of the Indians be correct, a more southern course. The Pianoghotto and Maopityans call the two rivers, from their confluence, Caphu or Kaffu. I estimated their united breadth at from 500 to 600 yards wide; the Wanamu is, at its mouth, about 350 yards wide, and the Caphiwin of a similar breadth. According to my observations of last night the latitude of the junction was $1^{\circ} 2\frac{1}{2}' N.$, and its longitude $56^{\circ} 48' 43'' W.$ from Greenwich.

The barometrical observations gave me a height of 540 feet above the sea. From the information which I afterwards procured, I have no doubt that the Caphu is the river Trombetas Oziximina, or Acunhas Cunuriz, which falls in $1^{\circ} 57' S.$, near Obydos, into the Amazon. The junction is, according to Von Martius, 451 Parisian feet (about 480 English feet) above the sea.* The river Trombetas is remarkable as being one of the last passes where the fable of the existence of the Amazons has placed the republic of warlike women, who only once in the course of the year, namely in April, received men into their society. It was at the mouth of this river where, according to Father d'Acunha, Orellana found, in 1542, women fighting among the men; and on my inquiries while travelling at the Rio Negro, that river was always pointed out to me as the one at whose sources the Amazons resided. The upper branches of the river Trombetas were perfectly unknown; large cataracts and the fear of savage Indians had prevented the inhabitants of the lower Amazon from ascending that river to any distance, and for want of better information it was the subject of the strangest stories.† The Caribs of the Corentyne pretended that these women without husbands inhabited the regions near the sources of the Corentyne, which we now know to be at no great distance from the northern branches of the river Trombetas. We have therefore, as well from the S. as from the N., the same traditions that the Amazons of the New World inhabited a central district, from whence the rivers flow northward towards the Atlantic, and southward towards the Amazons. The route of the present journey, which traversed these very regions, has only added to the conviction, that the existence of Amazons was one of those inventions calculated to captivate the attention, and add to the wonders of which the New World was considered the seat. The inhabitants of the central district were perfectly unacquainted with even the tradition of the existence of such a republic, which, I trust, will henceforward be regarded as a mere groundless fable of the dark ages.

We now entered the Wanamu, or, as the Indians at its upper course call it, the Yau-uh; it has, like the Caphiwuin, yellow, muddy water. Indeed, save when we left the Essequibo, I have not seen a single river with black water. Its current was about

* I consider Von Martius' numbers too high; he gives for Barra de Rio Negro 522 Parisian feet (556 English), a height which Fort San Joaquim does not possess, though it is nearly 300 miles higher up the Rio Branco, which has several rapids and a large fall.

† M. Montravel, in his late Report to the French Government, respecting the expedition up the Amazons, for the purpose of surveying that river, observes, that the inhabitants near the mouth of the Trombetas pretend that it possesses rich gold mines near its sources. The regions through which I travelled did not exhibit the appearance of being rich in precious metals.

one knot and a half per hour; it was studded with blocks of granite and foaming rapids at a short distance from the junction, and we anticipated many impediments in its ascent.

As our provisions were low, we hoped the information we had received of the existence of Indian settlements near the mouth of the Wanamu would speedily be realized, though we began to have our doubts: noon passed without our meeting with any sign of an inhabited place, and on closer inquiry, by means of the few words I had collected of the language of my guides, I ascertained, to our great disappointment, that the nearest village was a journey of eight days from the mouth of the Wanamu. We had been toiling eleven days without interruption, and eight days' journey was yet before us. Reduced to less than a single basket of bread and eighty pounds of cassada flour, we had now to adopt the most rigid economy.

The river as we advanced flowed between hills which approached its banks; their height did not exceed 200 or 300 feet, and as they presented the same outlines to which we had for some time been accustomed, the scenery was monotonous. Rapids were frequent, but by no means of such a height as those of the Caphiwiin. The banks of the latter river abounded in carapa-trees* (*Carapa Guianensis*, Aublet), Brazil-nut (*Bertholletia excelsa*, H. and K.), and the wild plantain-tree (*Phanakaspermum Guianensis*, Endlicher), not one of which was to be seen during the first days of our ascent of the Wanamu. The nights were foggy and clouded, and a heavy mist generally obscured the sun at his rising, until he reached from 20° to 30° above the horizon, when it cleared, and a strong breeze set in from the N.E. The heat between one and two o'clock was frequently intense, and the thermometer, freely exposed to the sun, rose to 128°. In the morning at six o'clock it varied from 68° to 71°, otherwise the weather had been fair for several days past, and it was evident that the dry season had set in. The river Curiau joined the Wanamu in about 1° 16' N. lat. I estimated its breadth near the junction at 200 feet, and according to the direction as pointed out by our guide, it comes from the N.W. Fifteen miles above the junction I discovered the first block of granite since we left the Essequibo, covered with Indian picture writing. I had in vain looked for such near the large falls of the Caphiwiin; but as the river was much swollen, it is possible, if there were any, that they might have been covered by the water. At the present locality there was on the left bank of the river a large block of granite about 40 feet in diameter, covered from the water's edge with figures, many of them much worn, and the

* The Indians press out of the fruit an oil, which they use chiefly for anointing their hair.

connection between the adjacent figures effaced; but Mr. Goodall and myself measured and figured as many as time would permit.

August 3rd.—During the preceding night, when all was hushed, I had caught the sound of falling waters, but as, after proceeding about 2 miles this morning, we saw no fall before us, I concluded I must have been mistaken. About half a mile above our last night's camp (in lat. $1^{\circ} 30' N.$) a river of the size of the Curiau joined the Wanamu on its right bank. Our guide, who appeared the most stupid of all the Indians with whom our travels had made us acquainted, gave me merely a broad ha! for answer when I inquired the river's name; and as I could not obtain anything further from him, I introduced the river under that name in the map. We soon afterwards again heard the sound of rushing waters, and still no fall in sight. At last, after nine o'clock, we found we had not been mistaken, and fall above fall presented itself to our eyes, while the river betokened the difficulties we should here have to surmount.

Little hills, consisting of heaped-up blocks and clothed in verdure, encompass the river, which has forced its way over the granite ledges. We had to unload the corials several times while passing over the impediments which the cataract Zibi threw in our way, and we did not pass it altogether without accident. I had a favourite hunting dog of the Taruma breed, which attempted to swim across the river a little above one of the cataracts, but the current was too strong for him; he was carried down and rose no more. The name of this cataract, Zibi, appears to have fixed itself in the memory of our guide in consequence of the tradition, that the spirit which dwells there demands from every party that passes, a victim as toll. He had spoken of this previous to our reaching it, and our Indian crew greatly dreaded the passage. The loss of the dog did not appear to have satisfied the spirit of the waters, for one of the bark canoes was swamped while ascending the last fall of the series. I saw the accident from a distance, and a pang shot through my heart as I recollected that it contained our last basket of cassada flour: it was, however, most fortunately saved.

We halted a short distance above the great fall, which, according to my observations last night, was in lat. $1^{\circ} 33' 30'' N.$, and 88 miles E. of the Maopityan settlement.

5th.—The crew of one of the boats came in after nightfall without their craft, which, having split in two, they had abandoned, and made their way through the forest. The loss was not great; the only difficulty was how to divide the crew, as our canoes were all overloaded, and the one which I was in was now threatened with a similar fate.

Eighteen days had now elapsed since we left the Maopityans,

and we commenced to look with suspicion on our guide, whose conduct had by no means inspired us with much confidence. This morning, however, we found some floating branches on the river which appeared to have been broken only that morning, or, at the farthest, the evening before. Full of expectation I encouraged the Indians who were in my craft to double the quickness of the strokes of their paddles, and the canoe in which I was, being in advance of the others, we were just turning round a point when I saw a bark canoe with two men and several dogs coming from the opposite direction towards us. Resembling in their attire the Maopityans, I conjectured they were the two men I had despatched two days previous to our departure from the Maopityan settlement to inform the Pianoghotto Indians of our intended visit. Scarcely, however, had the Indians got sight of us, when they turned the head of their boat, and paddling with a swiftness that fear alone could accomplish, all our calling to them that we were friends proved of no avail. Our guide remained deaf to our entreaties to speak to them, though we knew that he spoke their language; and as the other Maopityans, who might have been better inclined, were far behind us, we could only follow the fugitives in the hope of overtaking them, and prevent their spreading any unnecessary alarm. We now saw a second canoe coming down the river, in which there were likewise two men; but, suspecting us as the others had done, they also turned their boats and fled. We were close upon the hindermost boat, when they turned into one of the inlets, where, supposing them to have landed at their settlement, we followed them; but to our mortification we found only their canoes with their hammocks and other things, and the dogs still tied up; the men had fled into the wood. I now forced our guide to follow them with one of our own Indians, and in order to pacify their apprehensions, I ordered the other boats to proceed onwards, and took the lead. After a progress of about 15 minutes, I heard the barking of dogs, and turned into another inlet, where I soon discovered the landing-place of the settlement. I hastened with the greatest eagerness up the high banks, and saw a few huts before me, tenanted only by barking dogs and our guide and the Macusi Indian, who, not being able to overtake the strangers, had arrived a little before us, and found that all the inhabitants had fled, leaving everything behind them. We found the cassada upon the baking-pans, the matappa filled with grated cassada root, a pepper-pot and some fresh cassada on the spot where they had been eating when the news must have been brought to them, all showing that they must have fled in the greatest consternation; they had not even taken their hammocks with them, which I never before knew the Indians to leave behind them.

We again despatched some of the Maopityans after the fugi-

tives in the hope that they might yet overtake them, and had now leisure to look round us and brood over our ill luck. Our position was anything but cheering; there we were, entirely unacquainted with our distance from the next settlement or the direction we should take to reach it, while those from whom we expected information fled at our approach.

The place did not appear like a permanent abode; a small mud hut not quite finished, and several panappes or temporary huts, constituted the settlement. We observed, however, 8 or 10 cutlasses, several new axes, knives, and scissors, all of Dutch manufacture, and an abundance of a coarse kind of beads, but I could not make out what they were made of. Indeed, among all the contradictory information we had received from the Maopityans, it appeared they had spoken truth when they had said that the Pianoghottos traded with the Indians and the Maroon negroes of Surinam.

I gave strict orders to the Indians who had accompanied us not to touch anything of the different articles which had been left behind by the fugitives. Our Macusis and Wapisianas obeyed these orders, but not so the Maopityans, who most ravenously fell on the eatables, alleging as an excuse their excessive hunger. Those whom I had sent after the fugitives returned towards evening without success; they had traced them for some distance, but said they had lost their track. I think the provisions they had seen on arriving at the deserted village was most likely the cause of their early return. I now began to mistrust the Maopityans more than ever, and soon found I was justified in so doing. I had retired to my hammock, when a Wapisiana, whom we called by the name of Moller, and who was the only one who appeared to be on familiar terms with and understood our guides, came with the information that he had overheard them planning to pilfer the place during the night, and then leave us to our fate. They had been occupied since nightfall in preparing cassada bread, and had likewise scraped together what eatables they could lay their hands on. My resolution was soon taken. Mr. Goodall and the coxswain having received their orders, I put an end to the preparations of the Maopityans, and placed them all six in the round hut, and loading our guns before their eyes with double balls, assured them they would be used if they made any attempt at escape. Long after midnight I threw myself into my hammock for an hour, and was up before dawn; the coxswain having the watch from four in the morning. I interrogated him as to whether all was right, and he thought it was; but on inspection I found that three of the prisoners had escaped: fortunately the other three, and among them our precious guide and the chief man of their number, had not been equally successful.

With day-light I was enabled to look about, and found that previous to my stopping their proceedings last night, they had succeeded in pillaging the huts of everything valuable. On our arrival we had counted eight axes and a similar number of cutlasses; two only of the former remained, and hammocks, pakals, with their little treasures, glass beads, &c., were all gone; indeed, they had almost succeeded in making a perfect clearance, and their design as communicated by Moller was placed beyond doubt.

I gave the three who remained to understand that the guide and the other principal man were to remain as hostages, and I threatened to fire upon them should they attempt to escape, while the third was desired to restore the stolen things, and that the two would remain as prisoners until he and his accomplices, whom we knew could not be far off, had succeeded in finding the Pianohottos and induced them to return to the village.

The one whom we allowed to go free now went several times to the adjacent forest and back, no doubt carrying messages and advice from the prisoners to the three men whom the coxswain had allowed to escape. In an hour's time we saw nearly all the stolen articles returned, and we were told that their three comrades were gone after the fugitive Pianohottos to induce them to return. One of them arrived about noon in breathless haste, communicating the information that some of the Pianohottos were coming in a canoe, and he advised that we should allow the guide and the other prisoner to go to meet them and speak with them. This ruse, however, did not succeed; and, taught by our morning's experience, we kept the closer watch over our prisoners.

The adjacent fields abounded in cassada plants, and I employed our Macusís in preparing bread, keeping an account of the number of roots which we used for our most pressing necessity, in order to pay for it as soon as we should meet the owners, or, if this could not be, to leave the payment behind.

Our situation was by no means pleasant, and had it not been for the discovery of the plot, we should have been far worse off. Our hope was built on a friendly intercourse with the Pianohottos, as sad experience had proved to us that the Maopityans did not intend to act honestly by us from the commencement. All their information with regard to distances proved incorrect; and had they succeeded in escaping during the night with their plunder, which, under existing circumstances, it would have been impossible to replace out of our own stores, they would no doubt have embroiled us with the Pianohottos, even if these had returned, and who doubtless would have ascribed the theft to us. It was equally evident that the two messengers whom we had dispatched from the Maopityan settlement for the purpose of

informing the Pianoghottos of our intended visit, had never proceeded on their journey, and, most likely, only awaited our departure to return to the village.

The following days passed between hope and anxiety; sometimes buoyed up by the information that traces of the people had been discovered, then again disappointed. The few hours' rest which our close watch over the prisoners allowed us to take in turn was disturbed by swarms of mosquitoes, and to make matters still worse, Mr. Goodall's health gave way, and I myself became unwell. Determined, however, to prevent the escape of our prisoners, I ordered our tents to be set up right across the entrance, so that any person going in or out was obliged to pass under our hammocks. Our own Indians, who equally depended upon our success for their safe return, and whom I knew I could depend upon, were quartered in the hut with the two prisoners, the coxswain and one of the canoemen in a small hut behind, to prevent their breaking out of the hut in that direction; and for keeping us all on the alert, those upon whom the watch fell as well as the rest, we trusted to the swarms of mosquitoes which rendered it next to impossible to enjoy sound rest.

One of the hostages whom we had allowed to start with one of our own Indians in search of the fugitives, returned on the 9th instant with the information that, while stealing softly along, they had heard the cry of a child, and soon after observed a woman squatting under a hut of palm-leaves, trying to quiet her infant. As soon as she became aware of the presence of the two men she cried out to spare her life. Her fears being quieted, she related that the men in the canoes, who had first seen us when we approached, had thought we had come to murder the men and take the women into slavery, and had accordingly fled with the greatest precipitation, taking nothing with them; and as the next settlement was five days' journey off, she being sick was afraid to undertake it, and with her husband and child had remained in the hope that, not finding any person, we would have left the place ere this. The cries of the child for bread had induced her to steal near the settlement, and she had approached it close enough to see me sitting under the tent. She had taken some yams out of the field and returned to the temporary hut. Her husband was absent at the time the Maopityans found her, and she would not return alone, but begged the Maopityans to bring her some bread for the child, which was crying for hunger. I hastened them back with bread and presents; but they soon returned; the fears of the woman must have been re-awakened, for she did not wait for our men, and had again fled.

In order to satisfy myself of the correctness of this account I examined the provision-ground along with Sororeng, and he soon

pointed out to me the marks of recent footsteps. The impression of the child's feet, where the soil had been moistened by the dew, was very distinct, and we followed to the spot where the mother's curiosity had urged her forwards towards my tent, while the child had remained behind: at least, Sororeng drew my attention to the deeper marks of the child's feet, which he ascribed to its remaining standing at the same spot for some time.

11th.—The three Maopityans who, in the first instance, had escaped during the watch of the coxswain, returned voluntarily this evening. They pretended having been in search of the Pianoghottos, and said they had fallen in with the camp of one of the parties on the third day (August 8th), but, unfortunately, the dogs of the strangers had given the alarm, and they had all fled, leaving, luckily for the starving Maopityans, some smoked meat behind.

Our situation was really critical. We had sufficient evidence of several parties, one of which could not have numbered less than twelve persons, having passed our camp in different directions, no doubt spreading the alarm of the arrival of enemies; and that we might easily be overpowered will be evident, when it is considered that our whole party consisted of only thirteen persons and two dogs, of which number the six Maopityans may be, perhaps, considered as so many enemies; at least, I could not trust men who, by their former actions, had shown themselves deficient in a virtue possessed by all other Indian tribes—common honesty. Indeed I had no doubt but they would gladly join any attacking party, in order to share in the spoil and prevent our informing the Pianoghottos of their dishonesty.

Mr. Goodall's indisposition under these circumstances was the more unfortunate. I resolved, however, as soon as he should be sufficiently recovered, to push on towards the N., leaving the baggage behind, and taking only the most valuable instruments of the expedition. According to my observations Demerara was in the direction N.N.W. about 400 miles; and the Corentyne, where it becomes navigable, most likely not more than 60.

13th.—One of the party who was despatched in search returned this afternoon, and brought the joyful news that they had fallen in with people near the small river Iriau, and that two of the Maopityans were coming with them by water. Our joy at this news was great. We fancied our difficulties were now at an end, and our Indians collected round the narrator to hear more of the particulars. The moments appeared hours before the strangers arrived; they consisted of a man, two women, and two children, and we recognized in the Indian and one of the two women the Zurumatas whom we had met near the mouth of the Wanamu. As far as I could learn, by means of imperfect inter-

pretation, they had proceeded, from the place where we had met them near the Wanamu, to some Pianoghotto villages that lie to the northward, to convey the wonderful news of our arrival, and while there, some of the fugitives from the present place had brought the news of our arrival, taking us for others accompanied by hostile Tshikianas. He had told them of their mistake, and volunteered to proceed to this place for the purpose of proving that he had no fear. He said that eight Pianoghottos were to follow him next day to assist us as guides. We were all now most thankful that our affairs had taken such a favourable turn, and in our joy, heaped presents upon our informants; a looking-glass seemed to cause them great delight.

We waited until the 16th for the arrival of the Pianoghottos, but in vain; and, as Mr. Goodall was by this time sufficiently recovered, I considered it better, now that we knew where to find the people, not to delay our departure.

We had been at this place 10 days, which were, I must confess, passed in great anxiety of mind. My astronomical and meteorological observations were, however, not neglected. The latitude of the settlement, deduced from 84 circum-meridian altitudes of N. and S. stars, was $1^{\circ} 40' 5''$ N.; the longitude, by chronometer, $1^{\circ} 35' 55''$ in arc, to the E. of the Maopityan settlement.

The mean of meteorological observations gave the following results:—

Period and Number of Observations.	Instruments.	Mean.	Maxima.	Minima.
August 7th	Barometer	Inches. 29.258	7th.—10 h. A.M. Inch. 29.341	8th.—6 h. P.M. Inch. 29.216
to	Attached Thermometer .	81°·39	8th.—2 h. P.M.	14th.—6 h. A.M.
August 14th	Detached Thermometer .	81°·47	91°·56	66°·92
inclusive.	Wet-bulb Thermometer .	77°·05	92°·0	67°·0
			82°·9	66°·5

On the 26th of August I boiled the baromeric-thermometer; the mean of the boiling-point was $211^{\circ} 093$; the barometer stood then 29.278; the attached thermometer $77^{\circ} 54$; detached thermometer $78^{\circ} 3$; the wet-bulb thermometer 76° . The wind blew from the S.E. with the estimated force of 4, according to Captain Beaufort's table.

The height of the village, according to the barometer, taking the mean of its observations as above stated, and comparing it with the mean of observations in Georgetown, would be 753 feet.

The weather was generally fine, the morning foggy, and the evaporation amounted on the 13th of August, during the 12

hours of the day (from 6 A.M. to 6 P.M.), to 266 grains out of 1000 grains exposed to the air. The wind blew with considerable force on the 12th of August, as already indicated; but otherwise it was generally calm.

The magnetic intensity was indicated—

Per needle L (a) by 100 vibrations at 82° in $2^m 53^s \cdot 75$.

„ L (b) „ „ 87° in $3^m 42^s \cdot 60$.

3. *Journey from the Pianoghutto Village to the River Cutari, and thence by the Corentyne to Georgetown, in Demerara.*

August 16th.—About the time that we intended to start, the Maopityans, with the exception of one, were nowhere to be found. The Zurumata and his family had likewise vanished, and we considered ourselves in the same predicament as on the 5th instant. I had, however, gathered sufficient information of our road; and as the Maopityan who had remained was willing to accompany us, and said the others would follow as soon as they had set a new bark canoe afloat, we started on our journey, and this the more readily as I expected to meet the Pianoghottos who had promised to come to our assistance.

We descended the Wanamu for about 10 miles, and then turned into the Iriau, one of its tributaries, which joins it on the right. The river was much impeded by trees that had fallen across, and by small rapids; it was scarcely 60 feet broad, and its current strong; our progress was therefore slow. We heard on the morning of the 18th the barking of a dog, and found on the river's left bank the Maopityans, who had just arrived, having walked overland. They told us we had now to abandon our canoes, and continue our journey overland, and that it would take us 5 days to reach the first settlement of Pianoghottos; but, as a kind of consolation, they assured us the Pianoghottos whom they had expected the previous day would, no doubt, arrive in the evening. The Zurumata was with them, and confirmed their account; but here again we were doomed to disappointment. Fortunately for our larder a fine forest-deer, weighing about 70 lbs., was brought in by our huntsman.

19th.—The Zurumata and our villainous guide had taken their departure during night, and only three Maopityans were left, who naturally pretended they knew nothing about the others. The day looked as gloomy as our situation, and we were, after all, reduced to the necessity of abandoning our baggage, and proceeding on our journey. Indeed, were it not for our faithful Macusis and Wapisianas, who accompanied us from Pirara and Watu Ticaba, we should now be quite alone, in lieu of which we

were at least able to save the instruments and documents of the expedition, and some other articles. It was, however, with a heavy heart that the selection of the most indispensable objects was made. There lay the collections I had made since leaving Pirara; we had conveyed them many hundred miles, and, in spite of cataracts and miserable boats, they had reached this spot in safety, only to be left behind with very little hope of seeing them again. How frequently did I reconsider our disposable force, to see whether certain objects of peculiar interest to science, or to myself personally, could not be stowed somewhere! but the few Indians we had at our service were already heavily enough burthened with the instruments, and such articles of barter as were necessary to secure our subsistence and return to the coast.

Towards evening it began to thunder, and so vivid and rapid was the lightning—flash succeeding flash—that the whole vault of heaven seemed on fire, while the peals of thunder followed in such quick succession that the greatest interval between them only allowed me to count four, while eight times out of ten I could only count two or three; and this lasted for 2 hours. There was little rain during the time the thunder continued; but after the electric clouds had passed, which was about midnight, it came down in torrents, and continued the whole night and following morning until 10 o'clock.

20th.—We left the least valuable man in charge of our goods and chattels. Clothes were at a discount, since necessity forced us to limit the quantity of our baggage; and Mr. Goodall accordingly rigged out the guardian of our baggage, a figure made of straw, with some old trowsers, a jacket, a pair of boots, and a hat, giving him, with artistic skill, the caricature resemblance of a gruffy old gentleman. A roof of palm-leaves being constructed over our baggage, we left it and departed.

We had to cross the left bank of the Iriau, which from the heavy rain was rising rapidly. A tree that was lying across the stream was partly under water, and moreover in an inclined position, so that I feared for the safe passage of our Indians with their burden; but they all reached the bank in safety.

Our path led us over hills and through swamps abounding in the graceful uassa-palm (a species of *Euterpe* or *Ænocarpus*), the upper column of which contains the rudiments of the leaves, and affords, like the *Euterpe oleracea*, an excellent vegetable. We may probably be accused of barbarism for destroying thirty or forty of these graceful palms to provide ourselves with a dish of cabbage; but hunger has few scruples, and must plead our excuse.

21st.—Shortly before noon we reached a small stream running

to the N.N.W., and consequently in a contrary direction to those we had hitherto crossed. We had now left the basin of the Amazon. Though the hills we passed over in the course of the morning were somewhat higher, none of them exceeded 400 feet, and those which formed the "*divortia aquarum*" were scarcely 150 feet high. A walk of a few minutes brought me to an abandoned house, which my observations placed in lat. $1^{\circ} 49' N.$, and $3' 14''$ in arc, E. of the Pianoghotto settlement at the Wanamu; we therefore crossed the division of the two fluvial systems in lat. $1^{\circ} 48' 30'' N.$, and in long. $56^{\circ} 30' W.$ of Greenwich. The mean of the barometrical observations, compared with the mean in Georgetown, gave for the height of the abandoned settlement 794 feet.* We found evident marks that people had been here very lately. A parcel of beads were hanging up in the hut, and a fine large cutlass of English make, with the old mark G. R., and the crown over the letters, was hid between the leaves of the hut. The adjacent forest abounded with the majestic *Bertholletia*, which bears the delicious Brazil-nuts. They were bearing young fruit, but many of the last season were lying on the ground, and afforded our Indians and ourselves a great treat. I found, while returning from my astronomical observations, that the coxswain had erected our tents beneath one of those giants of the forest, which could not be less than 100 feet high before it branched out. I arrived too late to prevent him from doing so, but I really feared an accident might happen if a heavy wind should shake one of the fruits off, which are, when full grown, as large as a child's head; and so it happened, for, while Mr. Goodall and myself sat at dinner, the thunder-storm, accompanied by a whirlwind, swept over the place, and four of the fruits, with a shell as hard as that of the cocoa-nut, came down, one of which fell near where I was sitting with such force that it partly buried itself in the ground.

The next morning we had to ford a river about 80 feet wide, which the Maopityans called Aramatau. Our route was more hilly. The valleys were as swampy as they had hitherto been, with here and there large blocks of granite half buried in the ground. The three Maopityans who, contrary to expectation, had remained with us, had told Sororeng that we should this day (August 23rd) reach a settlement of Pianoghottos. They were, therefore, directed to start an hour before us, to prevent any apprehensions and further flight of the Indians. Indeed, we

* The data were—Barometer 29.195 inches.
 Attached Thermometer $74^{\circ}.04.$
 Detached ditto $74^{\circ}.33.$

The wet-bulb thermometer showed, from six in the evening to half-past eight next morning, no difference with the detached thermometer.

found sufficient evidence that the fugitives from the Wanamu had taken their road in this direction, and, no doubt, spread the alarm of the arrival of the Tshikianas. We followed at our usual time of starting, and had to cross several hills from 500 to 600 feet high.

Various were our conjectures as to whether we should find any people to-day, and how they would receive us. A cry of astonishment from some of our Indians, who had kept up with me, attracted my attention; a recent encampment was before us, the fires still burning—an Indian pot, which evidently had been emptied in haste, as part of its contents was lying on the ground—a bunch of plantains in a corner—and, what might greatly have alarmed us, a pool of blood near one of the huts—all combined to make us believe that the three Maopityans, on coming up with the encamped Pianoghottos, had again put them to flight. The blood, on closer inspection, proved to be that from a bush-hog, of which we found some remains. Nevertheless these signs were by no means calculated to soothe our apprehensions, and we redoubled our pace, anxious, if there were a settlement before us, to ascertain whether it contained human beings or not. After crossing a hill about 500 feet high, we ascended another of about half that height, and saw before us a cleared space several acres in extent, being the provision-fields of the settlement. All was silent—not the barking of a dog nor the sound of a human voice. I feared our worst apprehensions were again realized. Three huts now came in sight, and “Thanks to God here at least are people” burst from my lips as I saw a number of athletic men before me. I hastened towards them, and tendering my hands received their ready grasp, and was really overjoyed at the hearty welcome.

It appeared our Maopityans had met a hunting party this morning, and, after having partaken with them of their morning meal, during which they found time to explain our objects, they all proceeded without delay to the settlement to give information of our coming. I had seldom seen a finer set of men than those who now stood before me; some appeared to be 5 feet 6, and 5 feet 8 inches in height; their limbs strong and muscular. In their attire they resembled the Maopityans. That important piece of head-dress, the queue, was attended to with such neatness, that it would have done honour to a Parisian coiffeur of the old régime. The hair of the hinder part of the head was all gathered up into the queue; that on the forehead was cut rather short, with the exception of two tufts sweeping from the ears towards the face, much in the fashion of our gallants who are not graced with the head of an Apollo. Neither male nor female were painted in lines, but their whole body, with the exception

of the face, was covered with roucou, or red paint. The men wore a profusion of beads round their wrists and across their shoulders, and, like the Zurumata, a band of cotton below the knee, with a long tassel hanging from it. The ankles were tied with strips of palm-leaves, ornamented with red and black paint. Their waist was girded with a broad piece of bark, from which their waistlap was suspended. Almost every man wore one of those combs which we first saw among the Maopityans; they were tied to a string, and hung round the neck, so that they fell upon the breast. The females did not wear this peculiar ornament. The bows and arrows of these people were long, the former strung like those of the Maopityans; but that formidable weapon for close fight, the war-club, as among the Maopityans, was not used. The females were less favourably gifted by nature than the men; and of ornaments, if I except their own manufactured beads, they wore but few. As if fashion were here reversed, the females had shorn their hair short, which did not tend to improve their looks; two, however, had long hair, which they wore in queue like the men.

They brought us presents of sugar-cane, pine-apples, cashews (*Anacardium occidentale*), and some new-made bread, for which I gladly gave them some glass-beads and fish-hooks. The settlement consisted of three huts, a round one resembling in its structure those of the Macusís, and two open sheds. With the exception of dogs, and some fowls of a pure white colour, they had but few domestic animals.

My inquiries were now directed towards the continuation of our route; and, from what I learnt, I have no doubt that the Curuni, or Curuwuini of the Pianohottos, and the Curitani of the Maopityans, is one and the same river. Their next neighbours to the E. are the Cocoipityans, or Harpy-eagle Indians; and 5 days' journey to the eastward are the settlements of the Mekurus, or Maroon negroes of Surinam. The Pianohottos trade with the Maroon negroes, and give, in return for axes, knives, and cutlasses, which we saw they possessed in abundance, hunting dogs, waistlaps, hammocks, and cassada-graters.

The small stream which runs at the foot of the mountains flows into the Cutari, which we crossed near its source on the 22nd of August. The Cutari joins the Curuni; both are said to be of equal size.

25th.—With the exception of some young puppies and the fowls we are again the sole occupants of the place. I had yesterday a long palaver with the chieftain, in which I desired him to send his people for as much of our baggage as they could convey, and, as I accompanied my request with a handsome present to himself, and a promise to pay his people, he consented. At

daybreak this morning I found the whole village in motion; men, women, children, and dogs all wandered out, proving that they had not acquired sufficient confidence in us to leave their women and children under our guardianship.

The three Maopityans, whom I had paid for their services, returned with them. I likewise sent payment to a fourth, who I knew had failed to accompany us further only in consequence of a bad foot; but I thought I punished the other two very leniently by merely withholding their payment. Seven days were likely to elapse before the people returned, and as I resolved on descending the Cutari, the coxswain received orders to prepare the necessary number of bark canoes for our navigation to the coast.

As far as we could understand, there is a tradition among the Pianoghottos that, once upon a time, but long since, Caribs came up the Cutari, and one of the Indians, who knows a few words of the Dutch Creole language, from his intercourse with the Maroon negroes, said, that after descending the Cutari for 10 days, people are again met with, though he did not know to what tribe they belong. His imperfect knowledge of the Creole language did not give me sufficient confidence to rely implicitly upon his information.

This settlement is pleasantly situated; it stands on the summit of a hill, which, by a barometrical measurement, rises 216 feet above the small brook, that, higher up, forms some fine cascades. The summit is a circular plain, about 800 yards in diameter, and has been cleared by the Indians for their provision-grounds, in which they grow cassada, plantains, and bananas, yams, sugarcane, pine-apples, &c.; all of which appear to thrive equally well in the yellow soil.

There is another settlement about half a day's journey farther to the W., which lies on the Cutari, where we intended to embark; and the coxswain was sent to search for trees in the vicinity for the construction of our craft, while the remainder of our crew were busily employed in preparing bread for our journey, as I had bought a whole field of cassada from one of the Indians before he left.

28th.—Mr. Goodall and myself were taking our breakfast this morning, when I saw a strange Indian stealing round the large hut, wistfully looking at us. When he became aware that I had observed him, he approached us uttering what I took to be a salutation. All at once he squatted on the ground, covered his face with his hands, and broke out into such a strain of lamentations that we were quite surprised. Our Macusi Indians collected round him, and appeared equally astonished; but their curiosity had no effect upon him, for he continued his lamentations,

his whole body appearing convulsed from their excessive violence. Each of his words was twice repeated in a chanting tone, first slow, and then with a strong intonation, and, as they generally ended with a vowel, the effect was by no means inharmonious. Thus he continued for about twenty minutes without interruption, when he rose, wiped his eyes, and addressed me again in his language, of which I did not understand a single word. I had now more time to look at the individual: he was young, and not so tall as the generality of the Pianoghattos I had lately seen, and of a slight but well-proportioned figure; he was entirely daubed over, except his face, with red paint, and on the breast he wore a comb; his waist was girded with bark, to which the waistlap was fixed, the red colour of which was relieved by strips of palm-leaves; he had neither bow nor arrows, merely a short Dutch knife in his hand. He directed his looks solely towards me, and did not deign to throw even a glance at the Macusis round us. His agitation had not yet subsided, and he continued to tremble, either in consequence of his previous lamentations or through fear. A present of some trifles reassured him, and he now gave me to understand that he was hungry. Our huntsman had been fortunate enough to shoot a wild hog the previous day, and with a large piece of meat and a cake of cassada-bread he returned to the wood and disappeared, I suppose, to carry the news of what he had seen to his companions, as he pointed eastward and showed the fingers of his hands, making at the same time a motion as if that number were coming.

29th.—I was rather astonished this morning at seeing Mr. Goodall out of his hammock earlier than he was accustomed to be when not *en route*, and his loud speaking to the Indians led me to suppose that he had been disturbed. I was soon made acquainted with his grievance: legions of ants had directed their march through his hut, and a detachment had assailed him in his hammock and driven him fairly out of it. The chief column of the marching army of ants was about six inches broad, and until nine o'clock they marched on without intermission through the tent, besides which there were several branches of minor extent.

I now examined my own hut more minutely, and observed there several other columns, but of less breadth, that continued marching uninterruptedly until the heat of the sun caused them to retire into their caverns. Indeed the whole open space in front of the huts was traversed by numerous columns, carrying away towards their burrows crickets, spiders, cockroaches, and other noxious insects, which they must have surprised during their nocturnal rambles or hunted out of their holes. The ant was small, and without those prickles which distinguish the genus *Atta*, or Cushi ants of the colonists. They were, probably, a

small species of that kind which is called the hunter, or yagerman, and of which Mrs. Carmichael has given such a lively and interesting description.

A party of Indians arrived about 10 o'clock, and we recognised among them the one who visited us the previous day. An elderly and good-looking Indian, who appeared to be the chieftain, closed the party, which consisted of ten individuals. He came towards me, and uttered a similar salutation to the one yesterday, and then pointed to the hut, where he took his seat, and, accompanied by the other Indians, they all broke out in lamentations in the same manner as the young man. The wailings over, the chieftain rose and began to converse. In the absence of the inhabitants we did the honours of the village, and placing some meat and bread before them, they were soon engaged upon it. But now came the question, which they soon rendered intelligible by signs:—What is in those boxes we see before us? and nothing less would satisfy their curiosity than opening the chests and displaying their contents. The lot fell first on my own canister, that being of larger size. My military appointment as colonial aide-de-camp raised great exclamations of wonder, no doubt in consequence of the silver lace upon it. I have remarked that among all the Indian tribes I have visited, silver has more attraction for them than gold. Most of the Indian languages have a name for the latter, but for silver they have adopted the Portuguese word "*prata*." In the Macusi language gold is called *carucuri*.

My large telescope proved of great interest to them, but a still greater sensation was caused by the sight of our fowling-pieces. 'Arquebusa, arquebusa!' escaped from almost every lip, and women and children ran away crying when we took one of them up, fearing it might be fired off; but I refrained from causing such a shock to their nerves.

The dress of our visitors did not differ from that of the other Pianoghottos. There were three females among the party, but none of them more favoured with good looks than the ladies we had previously seen. A kind of stays (at least I can find no other name for that peculiar article of dress), which, of smaller dimensions, we had already seen among the Maopityans, reached from mid-way of the back for about eighteen inches downwards, and kept their figure upright. It was made of seeds of the same kind as we had previously seen. Large strings of the same description of seeds were fixed round the upper arms and wrist, and when their apron was attached to the stays, there hung a large tassel, also made of these seeds; each string terminating with the hard shell of a nut. Two of the females wore their hair in a queue, the third had it cut short.

I had now an opportunity of learning the mode by which they manufacture their beads, which is so ingenious that I must describe it. These seeds are of a shining black, and almost twice as large as hemp-seed; they are first perforated by means of a piece of hard wood, and while fixed to the wood, the lower end is rubbed briskly over a rock (decomposing gneiss), which takes off the pointed part of the seed; it is then reversed, and the same process repeated, after which they are strung upon a thread. If a considerable quantity is thus prepared and strung together, they take another kind of rock (decomposing mica slate), which they pound coarsely, and then, having fixed firmly one end of the string of beads and holding the other end in the left hand, they take, in the right, a quantity of the pounded stone, which they rub up and down the seeds till these have acquired an uniformly cylindrical shape. The tree which furnishes the seeds is of a large size, and, when young, has its trunk and branches, as also the mid-rib of the leaves, covered with prickles; the leaves are without stipules, lanceolate, abruptly pinnate, with pellucid dots, and of an aromatic pungent taste, which is likewise peculiar to the wood and branches: the seeds are shining, and have a testaceous integument. Though I have not seen the inflorescence of the tree, nor the manner in which it bears its fruit, I have little doubt that it belongs to the *Xanthoxylaceæ*. The seeds have a very remarkable taste, almost resembling spermaceti. The Pianohottos call them 'were,' and, as already observed, use them as a substitute for beads. The females make their short aprons of them, which constitute their full dress, and when finished, fringe them with the horny seeds of another tree (*Vantanea Guianensis*), which are much larger, and make such a rattling noise at every movement of the wearer, that the approach of a female is heard long before she comes near. Indeed, when they go to fetch water from the brook, which they always do in company, the noise they make is both great and peculiar.

The rock which they use for grinding, and which is decomposed gneiss, is called Were Kitto; the other, for polishing and rounding the seeds, called Tzai, is a decomposing mica slate.

We soon made great progress in becoming acquainted with our visitors, and their curiosity at our doings became almost troublesome; besides which, they had a custom which did not agree with our reduced stock of articles for barter, being uncommonly covetous of whatever their eyes rested upon. To keep them in good humour I was frequently obliged to encroach upon our store of glass beads: indeed I have seldom seen Indians among whom the men have shown such a decided love for beads—even knives appear to have less attraction for them; and as for combs, that article in so much demand among the Macusis, they do not

care the least for them, well knowing that they are capable of making a substitute for them which answers all their purposes. By promising them some beads I easily induced the chieftain and some others to sit or stand to Mr. Goodall for their portrait. He considered them, however, the most fidgety of all the Indians he has depicted—they could scarcely remain in the same position for a moment. The old chieftain has certainly the most characteristic face among them. Although he is of no great stature, being only 5 feet 2½ inches, he is portly and well made. His face has a thorough Indian expression, the forehead receding, and the eyes so oblique that he can almost look upwards without bending his head back. Another peculiarity, in which almost all the Pianoghotto share, is the great depression on the side of the head, below the parietal bone, and between the outer angle of the eye and the ear (*os sphenoides*). The ear is uncommonly large (3 inches in this individual), which I might in this instance have ascribed to his wearing pieces of bamboo in the ear, if it were the laps or *lobuli* which determined the size of it. The ears of a boy who was 4 feet 7 inches in height, were 2 inches and 7-10ths in length, and 1 inch and 5-10ths in breadth. The waist was small, the young men being seldom more than 2 feet 3 inches round; but this may be ascribed to their wearing, from their earliest youth, tight girdles, about 6 inches broad, made of the bark of a tree—a custom which must be injurious to their health. It appears they are as vain of a small waist as any fair lady of European birth and boarding-school education. It was ridiculous to see how they contrived to make their waist appear smaller, by drawing in their breath when I came to measure that part of their body.

Their language has many words similar to the Macusi:—*ina*, yes; *seni*, this; *amoré*, you; *urupa*, bow; *purau*, arrow; *weh*, sun, &c., are the same in Macusi and Pianoghotto. They call the sun *weh*, like the Macusi, but the moon *nuna*, like the Caribs, and a paddle *pura*, like the Wapisianas: indeed it appears to be a language much intermixed with other words.

The custom of each tribe of Indians having their own names for the adjacent tribes, as also for their chief rivers and mountains, renders it very difficult to identify the said tribes and rivers, &c. Thus the Maopityans, whose name is a Wapisiana word, are called Mawakwas by the Tarumas, and Tziraus by the Pianoghotto, who call themselves Pianohutto; the Tarumas, Zarumas; the Atorais, Orais, &c. The river Wanamu is called Pianoghotto by the Tarumas, and Punama by the Pianoghotto.

Towards the E. from our present abode, it appears dwell the Orokoyanna (Parrot Indians), the Hackuyanas and Mekuros, or Maroon negroes, inhabiting the affluents of the Marowini; towards

the S.S.E. the Tshikianas, who inhabit the banks of the Caphu, and who are described as warlike; near the sources of the Wanamu, at a distance of five days' journey, are the Drios, a sister tribe of the Pianoghotto, a small number of whom live likewise in a village only a few miles further N. from hence. Far to the S.E. reside the formidable Maipurishiannas, or Tapir Indians, who are described as cannibals, and who use the skulls of their enemies as drinking vessels; towards the S.W. reside the Tunayanna (Water Indians); and farther westward the Carawayanna, the Barakuty, or Barokoto, and the Woyawais. The W. appears uninhabited. On my mentioning the names of the Arawaak and Waraus, they pointed to the northward.

The mode of singing among the Pianoghotto is very remarkable: one begins, who, in a voice and manner that we would call reciting, gives utterance to his words in short phrases and in a plaintive tone, while the others, however many they may be, accompany these words by humming a plaintive melody. They are the instruments that accompany the recital, as in some of our melo-dramas. I greatly regretted not knowing their language, that I might have understood the purport of their peculiar song.

31st.—A great number of the Indians returned this day with some of our baggage, and we subsequently purchased some of their curiosities. The greatest admiration is due to the waist-laps of the men, which are so firmly woven of indigenous cotton, that they would do honour to a European manufactory. They are the handiwork of the Pianoghotto and Drio dames. Their spindles, although simple, and the circular piece at the end, which sets it in motion, rather coarsely executed of bone, are, nevertheless, very neat, and terminate in a piece of bone very neatly cut out, through which the thread is conducted. A pair of Pianoghotto ear-rings would prove rather too ponderous for our European ladies to have a chance of becoming fashionable. They are made of the large teeth of the waterhaas (*Hydrochaerus Capybara*, Desm.), and provided with an ingenious spring, which keeps them fast in the ear. Their baskets, or zumpas, on which the bread is set before the men when taking their meals, are very neatly made, exhibiting the Grecian pattern. Their arrows are well made, and richly ornamented where the feathers are tied to them; and some of their bows, made of letterwood, were from 6 feet 8 inches to 6 feet 10 inches in length.

September 1st.—We broke up our encampment and prepared to leave this settlement, in order to proceed to the next place, where they were preparing the bark canoes. We had been here nine days, and though all the baggage had not yet reached, nor was likely to reach us, I did not wish to delay our departure. The prolonged stay had enabled me to make a series of meteorological

logical and astronomical observations, of which the results are as follow:—

RESULTS of One Hundred Meteorological Observations.

Period and Number of Observations.	Instruments.	Mean.	Maxima.	Minima.	Remarks.
August 21st to September 1st, 100 Observations.	Barometer . . .	Inches. 29.074	30 Aug. noon. In. 29.139	Inches. 29.028	Weather generally fine, with slight airs from the E. and E. N.E. On the 27th August, thunder in the W.—Height of the village above the sea, 940 feet.
	Attached Therm. .	80°.82	29 Aug. 2h. 30m. 90°.44	65°.12	
	Detached Therm. .	80°.96	91°.40	65°.60	
	Wet-bulb Therm. .	76°.42	83°	65°.1	

I found the latitude of the place to be $2^{\circ} 1' 40''$ N., and the longitude $56^{\circ} 28' 20''$ W. of Greenwich. The evaporation amounted during the twelve hours of day to 371 grains out of 1000 exposed in the morning. During the twelve hours of night (the vessel placed under the tent, which was open at its sides) it amounted to 18 grains.

I have already observed that the settlement was 216 feet above the river Cutari, here about 24 feet wide. This small river forms a number of fine cascades, and the rock over which it precipitated itself was a very coarse granite.

The path to the neighbouring settlement, which is inhabited by Drios, led over a continuation of small hills, the highest of which was perhaps not more than 250 feet. The Brazil-nut tree, or Toka, as the Pianoghattos call it, is very abundant. Like many tropical trees, it was shedding its leaves, and the path was thickly covered with them.

We crossed the Cutari after a march of three hours; a farther march of half an hour brought us to the settlement. Our canoes were not in so advanced a state as I could have wished for the sake of despatch; the bark does not always part as easily at one period as another, and several trees which had been cut down proved useless for our purpose.

The following day we had a visit from some Drios, who reside at the head of the Wanamu. The false alarm had reached them, and they proceeded *en masse* to the place from whence their countrymen had fled at our arrival. Here the mistake was explained to them; and some of them, anxious to see white people, did not mind the journey of five days out of their way to satisfy their curiosity. They were tall and well-made men, from 5 feet 5 inches to 5 feet 7 inches in height, and had ornamented their bodies by incisions, like the South Sea islanders. They were the first whom I met in Guayana who ornamented their bodies in this manner. Otherwise they were dressed like the Pianoghattos; and following their custom of painting the whole body red, and

allowing the face to remain of its natural colour, they have, like the former, rather a ghastly appearance. In some instances, however, they paint half the face red. I presented them with combs, fish-hooks, glass-beads, &c., and they departed shortly after, greatly satisfied.

As far as I could understand from these people, who corroborated the account received previously from the Pianoghutto chieftain, the Maroon Negroes on the Marowini and its western tributaries are very numerous. They live in large villages, in huts like those of the Indians, and each village has a chief who presides over it.

These Maroons are the descendants of the fugitive negroes, who, forced by the cruelties to which they were subjected, fled as early as the commencement of the last century into the forests, and settled first near the rivers Surinam, Saramaca, and Copename. Under the command of chiefs, whom they selected from among themselves, they cultivated sufficient land for their subsistence, and made frequent incursions into the neighbouring plantations. The colony was obliged to send several expeditions against them, which, ill-conducted, failed; and their number increased considerably, when, in 1757, the slaves of the plantations near the river Tempati revolted and joined the rebels.

The colony was under the necessity of entering into a treaty with them in October, 1760, according to which they were acknowledged as free, and bound themselves to assist in defending the colony, and to deliver up not only the slaves who had deserted to them since the 14th of October, 1759, when a preliminary treaty was signed, but likewise every other slave who should subsequently make his escape to their territory. The colony engaged to pay an annual tribute, or as, in consideration for the feelings of the colonists, it was called, annual presents.* Their number was estimated, in 1760, at 20,000, which was no doubt an exaggeration. From Anka, where their principal camp was formerly situated, and where the Dutch colony maintained a resident, they have in time advanced farther to the S.E., and chiefly to the S.W., where they are settled near the river Tapanoni, the south-western branch of the Marowini. Our Drios and Pianoghottos are

* These articles were signed at the plantation Rama, opposite the negro camp, and sixteen of the chief captains of the Maroons were present. It is related that they swore to keep the treaty, the obligation being solemnized according to their manner; for this purpose a small quantity of earth was mixed with water in a calabash, and each of the contractors having made an incision in his arm for the purpose of procuring some drops of blood, it was mixed up with the earth, of which the white deputies, as well as the negro chiefs, were obliged to drink, in pledge of their faithful adherence to the contract. The name of the principal thief was Araby, and his authority was generally acknowledged by the Bush or Maroon negroes all over Surinam. They have since remained quiet, and, as far as I know, have fulfilled their engagements.

their matties or friends ; nevertheless the Indians, and especially their better-halves, complain sadly that they drive very hard bargains, and are uncommonly sparing in their dealings in glass-beads :—our liberality in this article won their hearts.

It was difficult to ascertain the number of Maroons near the Tapanoni : five of the Drio Indians pointed to their fingers and toes, and then carrying with violent gestures their hands to the head, pointed to their hair, by which they wished to impress twenty times more than they had hairs on their head.

On the 5th of September the coxswain announced that our bark canoes were ready. While felling the copaivi and locust-trees he had been assisted by some of the Pianoghottos, who, as Jason related, broke out several times while working with him in lamentations similar to those of the first Pianoghottos who came to visit us. Sororeng understood that a tradition prevailed among them that the arrival of the first white man betokened the extinction of their race. If that be the case, we have to admire their hospitality, which was no way diminished by any angry feelings against those who brought this dread tradition so forcibly to their minds, and rendered the period of their extinction definite.

One of the greatest ornaments of the forest round us, is a lofty tree covered with a multitude of pink blossoms. The Drios call it Maipuremu ; it proved to be Aublet's *Vantanea Guianensis* (Aub. p. 572, t. 229), which, in consequence of the imperfect account given of it, has been shifted from its place in the natural system. The peculiar formation of the anthers, and the drupaceous fruit, show it to belong to *Humiriaceæ* ; and it is, according to Mr. Bentham, very nearly allied to *Helleria* of Von Martius. The drupes are furrowed like the stony seeds of our peaches, but they are twice as large. The Indians cut them in halves, and wear them as ornaments, particularly the children.

Not more than half of our baggage had arrived, and, as misfortune had decreed it, the salt, and our tent-covers, and a great part of my collections remained behind, nor could we induce any of the strange Indians to undertake the long journey a second time. I therefore resolved on departing the next morning. Thirty circum-meridian altitudes of northern stars gave me for the latitude of the place $2^{\circ} 3' 30''$ N., and the chronometer indicated that it was $6' 19''$ in arc, to the W. of the Pianoghotto village, consequently in longitude $56^{\circ} 34' 39''$ W. of Greenwich.

I adopted this place of our embarkation as a new starting-point for the chronometrical distances in our journey to the sea-coast.

6th.—One of our new bark canoes had split during the night, and the necessary repair delayed in some measure our departure. The Drios had brought us what provisions they could spare, which unfortunately consisted of yams, a very bulky article. One of the

Indians, however, consoled us with the assurance that after 10 days' journey we should again find inhabitants.

Before we started, I walked once more to the settlement, our tents having been erected at some distance from it. Not a soul was to be seen: they had departed in the morning. Their apprehension that we might perhaps carry some of them off with us, no doubt induced them to retreat before our departure took place.

We embarked at noon in five bark canoes. The Cutari was scarcely more than 30 feet in breadth; quite shallow, and so impeded by trees fallen across it, that parties had been occupied the two previous days in cutting a passage for our craft. Nevertheless, we made but slow progress; and after three hours' paddling were only a mile and a-half in a direct distance from the place of embarkation.

10th.—The history of the preceding five days may be comprised in a few words—our advance slow, and connected with unceasing labour. It appears the Cutari is only navigated when its bed is full to overflowing, and none of the trees thrown down by the fury of the winds or torn off by the torrent, which were now lying across the river, had been cut through to admit even the passage of such small craft as ours. Every morning regularly we despatched half of our party in advance to cut such trees as offered the greatest obstacle, while the rest of us followed about noon. The river is monotonous: its banks offer scarcely any plants of interest to a botanist. I observed a few cacao or chocolate-nut trees, with ripe fruit on them, and numerous *Bambusaceæ*. But the river itself abounds in *Haimuras*, and we this evening caught seven in the short space of an hour. One of the Indians was very severely wounded in the thigh by one of these fishes.

11th.—The Cutari took a more western course, deviating in its direction perhaps one or two points on each side of W. It was increased to a breadth of about 80 feet, frequently crossed by ledges of granite, and impeded by rapids. We arrived by 11 o'clock at the junction of the Aramatau with the Cutari. We crossed the former river on the morning of the 22nd of August, while walking from the Iriau to the Drio settlement. It is, near its mouth, about 20 feet wide; and the united rivers are about 500 feet wide, and take a N.N.W. course. About 2 miles from the junction commence a series of falls and rapids, of which the largest is from 12 to 15 feet high. They extend N.N.E. for about 2 miles; after which the river again flows N.N.W., and at the distance of 4 miles from where it received the Aramatau, joins the Curuni, forming at the junction two large falls.

I have related in my *Journey to Esmeralda** that the river

* See *Journal of Royal Geographical Society*, vol. x. p. 240.

Kundanama joins the Padamo in a similar manner, and what is the more remarkable, the recipient is there free of falls. In the present instance both rivers are impeded at their junction by extensive dykes, which consist of granite composed almost entirely of red felspar. These rocks were more or less covered with *Podostemaceæ*; and the pretty *Mourera*, with its lilac blossoms, presented a very pleasing appearance among the foaming waters.

We observed numerous Pacus, apparently of a different species, or perhaps merely a variety of the common Pacu (*Miletes pacu*).^{*} Their back appeared black, and their sides reddish; but as we did not succeed in procuring one, I could only judge of them from seeing them swimming in the limpid stream. We were highly amused at the Macusi, Carutshi. A large sting-ray (*Trygon garrapa*)[†] was lying partly concealed in the sandy bottom at a spot where the river was shallow, and, anxious to procure it for his dinner, he took his paddle, and, standing up in the boat, struck it on the head. This rough treatment appeared to rouse it from its lethargy, and with one leap it sprang out of the water directly into the boat where Carutshi was standing, who, nearly as quickly as the fish had jumped in, jumped out into the water, and it was some time before he could muster sufficient courage to attack the sting-ray, which so unceremoniously had taken possession of the boat, much to the merriment of the Indians who witnessed the affair. I could scarcely have thought it possible that an animal so unwieldy in appearance, possessed sufficient agility to leap from its hiding-place under the water, at least 18 inches above the surface, into the canoe.

The Curuni, as far as we could see up its last reach, before the junction, appeared, like the Cutari, to be studded with rocks. It comes apparently from the E.S.E., and, from what we heard at the Drio settlement, it has its source near those of the Tapanoni, the western branch of the Marowini. Its upper course is inhabited by the Eagle Indians.

According to my observations of N. and S. stars, the junction of these two rivers, of equal breadth at their confluence, takes place in latitude $2^{\circ} 20' 50''$ N.;[‡] and the chronometer showed that we were $7' 52''$ in arc W. of our embarkation, the direct distance of which was S. 25° E., 19 miles, and we had required 6 days to accomplish it. The barometer, as compared with its height at the coast, showed we were 612 feet above the sea.

It smelt round our camp like an onion-fair. That liana which smells so strongly of garlic, grew in abundance round us, and a

^{*} Fishes of Guayana, in Naturalist's Library, vol. i. p. 236.

[†] Fishes of Guayana, in Naturalist's Library, vol. ii. p. 182.

[‡] This is the result of 65 circum-meridian altitudes of 34 and 38 Sagittarii, 3 Cygni, a Pavonis, a Cygni, and a Cephei.

great many of the branches having been cut to clear the spot, the smell was really oppressive. I have met with it frequently; but have not been fortunate enough to find it either in blossom or bearing fruit, in order to determine its character. I have no doubt that the Powis (*Crax alector*) feed upon the berries or the leaves of this ligneous twiner, as the flesh of that bird, at certain periods, tastes strongly of onions.

12th.—The united rivers presented a continuous course of rapids; they were not dangerous, but they delayed our progress. After 10 o'clock in the morning we came, however, to a fall where the water rushed over two ledges, the first forming a cataract from 8 to 10 feet in height, and the second from 15 to 16 feet. Near the foot of the latter rose, from amidst the foam of the cataract, a solitary rock in the form of a huge pile, studded with laminar mica. The morning sun threw his rays upon the northern side of this singular rock, and rendered it of dazzling brightness—realizing the picture which Raleigh drew of Guayana, where every rock was described as argenteferous. While we were occupied in carrying our baggage overland, and drawing the boats after us, Mr. Goodall took a sketch of this cataract, which, for want of another name, I have inserted as Sir Walter Raleigh's Cataract in my map.

The heat at 2 o'clock in the afternoon was very oppressive. The thermometer rose to 142° in the sun. The barometer had fallen; at least it stood lower at 4 o'clock than the previous day; and our descent that day could not have been less than from 35 to 40 feet, which ought to have caused the mercurial column to rise. I have frequently observed that a high barometer predicts rain, while a low barometer, in rainy weather, frequently indicates a change for the better. The effect is therefore the reverse of what takes place in Europe.

13th.—Heavy thunder and rain rendered our night-quarters very uncomfortable, and we greatly felt the absence of our tents. We started in the morning during rain. The river continued its monotonous course towards the N. by W. It was now about 300 yards broad, and small hills, lined with low trees and thick bushes, approach its banks. Here and there are seen wide-branching silk-cotton trees (*Bombax spec.*), or the stately purple-heart, which rose above the lower vegetation, consisting of the wild arnatto (a species of *Bixa*), the water-guava (*Psidium aquaticum*), an Inga and numerous Jacana trees (*Triplaris Americana*), and Cecropias (*Cecropia peltata* and others of the same genus). There was almost a total absence of Orchideæ, a circumstance which seldom occurs in the tropical and moist regions of Guayana. The current is very trifling, amounting to about a mile in an hour, where it is not accelerated by rapids or

falls. The latter are caused by ledges of rocks of hornblende gneiss, here and there traversed by a vein of quartz. We halted for the night near the mouth of a small river, which joined the Curuni on its left bank; a few yards lower down another stream came in from the right. Our latitude this night was $2^{\circ} 34' N$. Here I suffered a loss which I felt very severely. It will be recollected that I lost a very fine Taruma dog at one of the cataracts, and of all the dogs I had purchased one only now remained—an animal the more remarkable from its being a cross-breed between the Taruma dog and the *Canis cancrivorus*, Desm. A jaguar during the night carried him off from the midst of our camp; and thus was I not only deprived of what I considered a treasure, but, what was worse, his place as a good purveyor of our larder could not be supplied in the wilderness.

14th.—We passed the river Sipariwini at half-past 7. The rapids continued, and the heat was oppressive in the afternoon. The thermometer rose, in the sun, to $135\frac{1}{2}^{\circ}$, a heat to which we were equally exposed, as the small size of our wood-skins or bark canoes did not permit the erection of anything to shelter us from the burning rays. I regretted this the more for the sake of Mr. Goodall, who continued indisposed; and I myself was then suffering under acute rheumatism.

We were drenched with rain. During the night a severe thunder-storm passed over our camp, against which the temporary tents, made of wild plantain-leaves, could afford no protection. I shall not easily forget one of the thunder-claps. I was just on the point of rising out of my hammock, to see whether I could not make the roof a little more water-tight, when I saw the tent clearly illuminated with a rose-coloured light; and the thunder following instantly after it, might have been compared to the firing off, close by, of the heaviest pieces of ordnance—

“Twas listening fear, and dumb amazement all.”

I stood transfixed, anxiously listening whether I should hear cries of distress; but, as if Nature had been for a while appeased by the effort, the heavy rain ceased, and all was calm. The voices of our Indians relieved the suspense, which, during that awful silence, they had no doubt equally shared with me. On inquiry I found that all was well; and the electric fluid had no doubt struck the river close by. The following day we met with an accident. In descending one of the falls, the small boat which contained our kitchen utensils swamped and sunk. Our loss, however, was but trifling; and as the boat fortunately did not sink in deep water, we were able to recover it again. It was to be ascribed to the imprudence of our cook, a most ill-fated being, who, when I travelled without a European companion from

Roraima to the Cuyuni, on a former occasion, likewise sunk a boat; and we were not then so lucky, but lost every article of kitchen utensils, without saving so much as a plate, knife, fork, or spoon, or a grain of salt; and thus was I obliged to do without these comforts for nearly a fortnight. The rock which caused the cataract, in the present instance, was mica slate, which occurs much more frequently in the Curuni than in the other rivers we had passed. It is here and there traversed by veins of quartz.

The heavy rain had caused the river to swell. In the evening we halted near a small stream, which was pouring out its whitish waters with such impetuosity that they rushed for several hundred feet into those of the Curuni, forming a white band, narrow near the mouth of the river, and from thence spreading like the tail of a comet. We found several bark canoes tied to the banks of the river, and a narrow foot-path. We little thought that they would prove the last vestiges of man that we should see till we reached the Caribs at the lower Corentyne. We had been informed that a path of three days' journey led to the settlements of the Indians located at the Upper Sipariwini.

The cloudy state of the weather precluded my taking more than three altitudes of the α Lyra when near the meridian; they were, however, sufficient to prove that our progress had been slow;* and I was therefore under the necessity of putting the expedition upon short allowance, and to declare war against all animated nature, not excepting the Iguanas, of which large numbers, roused by the sound of our paddles, jumped from the adjacent trees with a loud splash into the river, and were sure to cause us the heaviest disappointment by escaping from our pots. On the evening of the 17th we were successful enough to hook a large *Paruaruima* (*Phractacephalus hemiopterus*), measuring 4 feet 2 inches in length, and 2 feet 11 inches in girth. It is a pity that this fish is almost all head and tail. The mis-shapen head is covered, as it were, with a cuirass, and in the present specimen it measured 1 foot 5½ inches, and thus very materially diminished its usefulness as food for fifteen individuals.

In the afternoon of the 18th we found that the river took a western and frequently a southern course, consequently retrograde; its bed was so studded with isles and falls that it appeared almost impossible to find a spot where it flowed gently along. Small hills of from 200 to 300 feet in height approach its banks, and it divides into so many channels that we scarcely ventured to lose sight of each other for fear of being separated. Mr. Goodall, who was now in tolerably good health, had unfortunately, since we had been put upon small allowance, been restored to his best

* The latitude was, according to these observations, $2^{\circ} 48' N.$; and a set of hour angles gave for our distance, west of our embarkation, about 22 miles.

appetite, and both of us encouraged the rest of the crews by paddling like themselves from morning until we pitched our camp at night.

Numerous ledges of rocks or bars extend right across the river in a N.W. and S.E. direction, and cause dangerous falls. These rocks were, for the most part, composed almost wholly of felspar. On arriving at one of the cataracts, I led the way with my own little bark, and the others followed. Hitherto, thanks to a kind Providence, we had been successful, though we came from time to time in rough contact with some sharp rock which pierced our skiffs, none of them half an inch in thickness,* and caused the water to spout in like a fountain, when pieces of shirts and trousers were resorted to for stopping the leak, and which always proved sufficient for the purpose. With the exception of one bark canoe, which we were obliged to abandon, we have hitherto suffered no loss since the canoe with our kitchen sunk to the bottom.

The labyrinth of islets (indeed the river cannot be less than 8 miles in breadth, at least this is the distance between hills and hills)—the numerous cataracts and rapids—induced us to call this region, the Falls and Rapids of the Thousand Isles.

The flora of these islets is not much diversified: the *Elizabetha coccinea*, the Jacaranda, the *Laurus surinamensis* which margined the river's banks, a *Strychnos* with clusters of white flowers of delicious perfume, the *Clitoria arborea*, struck me as not hitherto observed. I ought not to forget an uncommonly pretty *Asclepiadeæ*; its flowers, of a rich velvety purplish-brown colour, hung down in large racemes. It appears to be a new genus of this difficult order. The rocks, where they were above water, were covered with an arborescent *Solanum*; *Orchidæ* were still wanting, at least I saw none near the banks nor in the adjacent forest, where we encamped. Our latitude was this night (September 19th) $3^{\circ} 21' 30''$ N.; our progress westward from our embarkation $41' 47''$ in arc. During the last two days we had made $13\frac{1}{2}$ miles, westing. This slow progress, and the probability that we should not find human habitations for a week or ten days more, obliged me to curtail our allowances still more, so that we were reduced to 4 ounces of cassada-bread or farinha de manioc, and such game and fish as luck procured us. The river being swollen, it was very difficult to obtain fish.

20th.—Islands, rapids, and falls continued: the deep and sonorous roar of falling waters which broke upon us from time to time as the woods carried the sound, apprized us of some great obstacle which we would have to surmount; and after paddling for about 2 miles, we found ourselves at the head of some falls, the height

* The one I was then in was only four lines, or one-third of an inch; Mr. Goodall's, which was the thickest, five lines.

of which was 52 feet,* and which for grandeur vied with any I had seen in my peregrinations. We had here to unload and carry the baggage and boats more than a mile over low hills about 150 feet high, to the spot where the river again becomes navigable; a labour which it took us more than a day to accomplish. The rocks at the head of the cataract were gneiss, and here and there coarse quartzose sandstone or conglomerate cemented by iron; but near the foot of the cataract huge blocks were lying about in the greatest confusion, as if they had been shattered by some great convulsion of nature. These blocks consist of fine-grained gneiss, traversed by layers approaching in appearance decomposed epidote(?) The gneiss is stratified, and on some of the blocks it appears much contorted.

This delay gave me an opportunity of noting the hourly observations of the barometer and thermometer on the 21st of September, which were as follow:—

Hourly Observations on September 21, 1843; Height, 330 feet above the sea.

Instruments.	Hour of Day.	Highest.	Hour of Day.	Lowest.	Mean.
	h.	Inches.	h.	Inches.	Inches.
Barometer	11 A.M.	29.712	7 P.M.	29.640	29.668
Attached Thermometer . .	1 P.M.	84° 56	5 A.M.	71° 60	75° 56
Detached Thermometer . .	1 P.M.	83° 00	5 A.M.	71° 50	75° 70
Wet-bulb Thermometer . .	1 P.M.	79° 40	5 A.M.	71° 00	74° 24
Temperature of the river . .	2 P.M.	85° 00	3 A.M.	81° 70	83° 23

It was fortunate that the cataract obliged us to stop this day, as our reduced circumstances would scarcely have allowed such a delay for the purpose of making observations.

Since we had entered this continued series of rapids and falls we lost all sight of game and fish. We had to preach philosophy to our murmuring stomachs to satisfy themselves with 4 ounces of bread. It is a great misfortune at such a time to be blessed with a good appetite.

We started early in the morning of the 22nd, from the foot of Frederick William's Cataract, under which name, in honour of my sovereign, the King of Prussia, this magnificent fall will appear in my maps; and which, according to the chronometer, was 45' 15" west of our embarkation, or 57° 19' 54" west of Greenwich.†

The river widened considerably, extended no doubt by the numerous islands. In the afternoon it presented, where the sight

* The whole height of these falls, from their head to the place where we embarked again, was 65 feet, according to the barometer.

† I did not succeed in procuring any observations for latitude; but as our progress on the 20th was trifling, and the latitude having been found the night previous to be 3° 21' 30" N., and on the night of the 23rd, 3° 38' 38", by assuming Frederick William's Cataract 3° 30' N., we cannot be a mile from the truth.

was not interrupted by islets, a breadth of about 4 miles; ledges of gneiss traversed the river in a N.N.E. and S.S.W. direction, one following the other, like furrows in a ploughed field. Large spherical blocks of a coarse-grained granite, or at other times shaped like an obelisk, were lying upon these ledges. A small chain of hills, their highest summit about 400 feet above the river, extended from the left or western bank of the river, for about 2 miles inland, and closed the background of the picture, on approaching from the N. as we did. Our latitude, determined from some very good observations, was $3^{\circ} 38' 38''$ N., our distance W. $54' 43''$ in arc, from our embarkation; our course since the 17th had been N.W. by W.

We nearly lost one of our canoes the next morning on descending a fall. Some of the baggage got wet; but the sun shone bright, and the mishap was soon remedied. We paddled on unceasingly for nine hours, and stopped at night on a small island, our larder enriched with some Iguanas and a crane; the latter promised a delicious soup; but unfortunately we spoiled it by using gunpowder as a substitute for salt, of which we had been deprived for some days past. The taste of the nitre and sulphur perfectly spoiled an entertainment so eagerly anticipated by our hungry stomachs.

24th.—While hauling one of the boats over a rapid, the poor Arecuna Indian, who, the reader of the *Geographical Journal* will perhaps recollect, was severely wounded by a sting-ray during our ascent of the Takutu, met with a similar accident this day. He suffered most excruciating pains; the wound had been inflicted near the ankle. The juice of the moco-moco (*Caladium arborescens*) having been recommended to be taken inwardly, with a little spirit, and outwardly squeezed into the wound, was tried, with the exception of the spirit, of which we had none, and for which water was substituted, but it did not appear to diminish the pain.

The rocks which formed the rapids were compact red felspar, stratified in an E. and W. direction, and traversed from N. to S., so as to form oblong squares. Large blocks of the same rock were lying upon them.

We halted at 11 o'clock at the head of a large cataract, and it became evident that we should have to unload the canoes, and carry the baggage overland. While I was looking out for a fit place to transport it to the foot of the cataract, I observed on the banks of the river the remains of some old huts, and, on closer inspection, found that we were at the path which leads from the Corentyne to the Essequibo; and, as a further proof that my surmises were correct, we now discovered two corials hauled up on the land, one above 40 feet long, the other about half that

size. While ascending the Rupununi last March, I saw at one of the settlements a Carib, who told me he had lately come with others from the lower Marowini, and entered the Corentyne to join their relations at the Rupununi, and that they had left their craft at the place where the path leads from the Corentyne to the Essequibo. We were now persuaded, that after so many toils, we had, at least, reached a part of the river which we knew had been visited by human beings, while I am almost convinced, that for ages man has not traversed that part of the river which we had navigated since we left the spot where we found the old rotten bark canoes, and since which period (Sept. 15th) we had been struggling with cataracts, and had suffered half starvation. Though we were well aware that our trials were not yet over, it was consoling to know we were navigating the Corentyne, and that men, before us, had passed up and down this part of the river.

The antiquity (as far as this word can be used in things relating to America since its re-discovery) of this path rendered it very interesting to me. It must have been already known in the seventeenth century; at least D'Acunha found, in 1639, among some of the Indians near the Rio Negro, iron tools, such as hatchets, bills, knives, &c.; and on inquiry, was told that they had received them from the people who dwelt in the country nearest the sea on that side, and who had light hair, by which D'Acunha supposed they alluded to the Dutch. Dr. Southey, while speaking of Ajuricaba, one of the most powerful caciques of the Manaos, and who lived about 1720, observes that he made an alliance with the Dutch of the Essequibo, with whom he traded by the way of the Rio Branco. The trade on his part consisted in slaves. In order to obtain them, he hoisted the Dutch flag, scoured the Rio Negro, and captured all the Indians on whom he could lay hands.* Only a few of these slaves were carried down the Essequibo, the greater part being taken to Surinam by the path which, from the inlet Primoss, leads across the river Berbice to the Corentyne, which river it meets at the cataract where we were encamped, and this path is still called among the Macusi Indians, the slave-path, or Tuari Yemori, and this is likewise the way by which Don Francisco Jose Rodriguez Barata went twice from the Amazon to Surinam, on affairs of his government, in 1793.† Though I had only walked along that path from the river Berbice to the Essequibo, my present journey

* Southey's 'History of Brazil,' vol. iii. pp. 710; 11. Ribiero reports that Ajuricaba was taken prisoner with 2000 (?) Indians, while Jao de Maya da Gama was governor, and carried in chains to Para; and a mutiny on board the vessel having been discovered, he jumped into the river to drown himself.

† Humboldt's Personal Narrative, vol. v. p. 480.

made me likewise acquainted with the part where it strikes the Corentyne.

The Caribs, those scourges to the less valiant tribes, settled from Surinam along the Rupununi, and by means of another much frequented path held intercourse with the Caribs of the Caroni and the Orinoco.

The scenery is uncommonly picturesque near this cataract; blocks of granite of a spherical form, from 50 to 60 feet high, lie about in great confusion, crowned with tropical vegetation; the wax-flowered *Clusia*, the yellow *Cyrtopodium*, the thread-like *Rhipsalis* with its pearly fruit and upright or columnar cerei, give to these singular rocks a marked tropical appearance. We here enjoyed, after a long period, the first emotions of satisfaction, and I gladly availed myself of the privilege of discoverers, more particularly as I could not at that time learn whether the cataract possessed a name or not, to introduce it into my map as Lord Stanley's Cataract.* Upwards of 50 circummeridian altitudes of the stars, δ Cygni, α Pavonis, α Indi, α Cygni, α Cephei, gave me as a mean $3^{\circ} 59' 16''$ N. for the latitude.

Our Indian discovered with great joy some *Kaitshara* or *Penguin* (*Bromelia karatas*) with ripe fruit. This fruit resembles a banana in miniature, and grows in the middle of the plant, perhaps from 80 to 100 nestling together. They contain a succulent flesh of an agreeable vinous taste when ripe; and although this was not quite the case in the present instance, they were highly acceptable, and by boiling them we counteracted their astringency. They were the more welcome, as neither of the huntsmen we had sent out on our first arrival had brought in any thing, and the attempts of our fishermen during the night had met with no better success.

The Indian whom I had met at the Rupununi, and who told me of having left his corial at the path, had given me permission to use it, if I should want it; and he directed me to deliver it to his brother, the Carib Chief William, at Tomatai.

According to the barometer, we were still 230 feet above the sea, and we had yet to overcome many an impediment before we could get into smooth water. I therefore took the corial, and had it repaired as far as it was possible to do so in a few hours.

We started on the morning of the 25th of September at half-past 6 o'clock; but we had scarcely proceeded a mile, when another cataract, where we again had to unload, impeded our progress. The rocks, which here consisted of quartz and felspar pebbles cemented by iron, were lying about in the greatest con-

* On our arrival at the Carib settlement, I learnt that it was known to them under the name of Aritapu; I have, nevertheless, preserved the name I gave it under our first impressions.

fusion imaginable, and had the appearance of having been vitrified in a furnace. On some spots where the iron cement was more prominent, they were so smooth, that we had to guard ourselves against slipping. The smaller rocks, where heaped together, looked strikingly like the refuse from a smithy. Our course varied between N. and N.N.E., the river still studded with islets. While we turned round one of the islands, my boat being as usual in advance, we saw a large Puma (*Felis concolor*) drinking at the margin of the river; though he observed our boat, he scarcely took any notice of us; unfortunately the only gun we had in the boat was wet from the severe rain, and it missed fire. We were not 15 yards from him, and he leisurely put himself upon his haunches like a dog, and appeared rather to have every inclination to attack our boat than to be frightened at our approaching him. The Indian Sororeng was so exasperated at his audacity and the inefficient gun, that he threw a large piece of wood at him which was lying at the bottom of the boat; this induced him to return leisurely into the wood.

Violent rain induced us to pitch our camp in the afternoon of the 26th as early as half-past 1 o'clock, and we were so hungry that we thought success might perhaps crown our endeavours to procure some game or fish. The Indians brought in a Maam (*Tetrao guianensis*, Gmel.) of the size of a pullet, which to divide among fifteen would have required a pair of compasses and scales.

We saw on the morning of the 27th a large amphitheatre of hills about 200 to 250 feet high, which surrounded the broad expanse of the river, here from E. to W. about 3 miles broad, the hills covered with a thick forest of umbrageous trees. The intermediate space between hills and hills was broken up by islets; blocks of granite heaped up in the most fantastic forms met the eye in every direction, and predicted the dangers we should have to encounter. In advance of the others, I gave orders to the coxswain to halt at one of the rocky islets, and climbing to the summit, our route lay before us. The remembrance of what I felt at the sight before me, will remain as long as memory lasts. Enormous masses of stone, black as iron, extended as far as the eye could reach, against which the river dashed its waters with the greatest fury, the white foam forming the strongest contrast with the gloomy tint of the rocky masses; and when my looks fell upon the miserable skiffs to which our lives would be confided, skiffs whose construction could not boast of a woody fibre, when I recollected the privations we had all suffered and our consequently enfeebled state, our only hope of surmounting the dangers before us rested upon Him who is almighty, and whose aims and ends we poor mortals cannot fathom.

It was impossible to give orders, or maturely to consider and pre-arrange what was to be done; we had to leave our actions to circumstances, and till the moment should arrive for averting the dangers we had to brave. As I have generally done, so I did in the present instance: I took the lead in my boat and ordered the others to follow it at the necessary interval, if it should pass successfully, or to profit by any disaster which might befall us, by avoiding the danger. Far be it from me to seek to impress the reader with the belief that I felt no apprehension while my light skiff danced upon the contending waves, and passed between the black pointed rocks that beset its course—though I have passed hundreds of cataracts, it would be sheer bravado to assert that I did not breathe quicker or feel my chest more contracted than usual when passing a fall; but I may with truth declare that those feelings were trifling when compared to what I experienced when, having arrived at the foot of the cataract, my boat bore round to await the descent of the others, and I witnessed the imminent danger of every successive skiff as it is hurried down with the swiftness of an arrow, and when the slightest mismanagement might entail destruction to those who were in it. And how frequently had I not to endure this painful excitement during the course of this day! I now called to mind, that about the same time of the year, in 1836, when at the foot of the great cataracts, the Caribs had told me it was impossible to pass the falls of the river above them, and that it was only when the river was full to overflowing that they could be surmounted.

Worn out with fatigue, we halted at 4 o'clock in the afternoon. We had no guides, and circumstances, and our experience of former situations of the same nature, could alone direct us in selecting our path, where, as far as the eye could reach, rocks and foaming masses of water were visible. We had to contend with legions of ants for the possession of our camp, and received many a bite while preparing our night quarters.

Hunger is a very disagreeable feeling; one's ideas get confused, and there is felt a vague sensation which ultimately engenders headache, and also an uneasy spasmodic contraction near the region of the stomach: such were my feelings this day; I did not dare inquire after those of the others—I was sure their answers would have aggravated my own suffering. The report of a gun roused me from my reverie: what can the lucky hunter have killed? was my first thought, and the moments which succeeded seemed as hours. At last an Indian arrived with heavy step, carrying on his shoulders a large black female spider-monkey. I glanced at Mr. Goodall, whose countenance depicted disappointment and disgust, but which sad necessity and the large vacuum that two ounces of farinha must have left in his stomach

induced him to get the better of. He watched the preparations as the Indians proceeded step by step, first singeing off the hair from this human-like form, and then placing it in an upright position, with the arms crossed, when, the skin looking white now the hair was off, the sight proved too much for him, and I myself felt something like disgust at the meal before us. The sound of a heavy body falling on the ground drew my attention to a different direction, and, to my great joy, I beheld a fine young forest-deer, over which young Ammon stood, leaning on his gun with proud satisfaction. This was indeed a happy turn in our affairs. I have tasted the smaller kind of monkeys several times, but have never partaken of one which approached so nearly to the human form as this. The Indians were less scrupulous.

28th.—We had to unload our craft twice in the course of the morning. In order to avoid the great cataracts, I sent off at the dawn of day the interpreter Sororeng and another Indian to seek for the portage which I knew from my former journey up the Corentyne to exist, but the position of which the Caribs had kept secret from us in 1836. We had been fortunate enough to select the right direction for our descent, and the leading canoes had already arrived at the embarkation by half-past six o'clock. We now unloaded for the third time, and took baggage and boats for about a mile overland, and arrived at the other end of the portage. I was here among objects familiar to me—the great cataracts of the Corentyne. Barometrical observations gave me for the descent from the place where we disembarked to the deep and extensive bay at the foot of the great falls 90 feet; but from Lord Stanley's cataract 163 feet.

Recollecting how successful we had been in fishing and hunting while here in 1836, we did not proceed any further, and all hands that could hold a hook and line, or a rod, or were able to shoot, were sent in quest of game or fish; the hunters returned unsuccessful, and the fishermen reported that they had not had a single nibble.

How shall I describe the three succeeding days! The river being much lower than we had found it in 1836, rapids and falls impeded its course where seven years before we had found no difficulties, and now, with increasing labour, our exhausted state was the more keenly felt. Several of the Indians suffered from fever, and our little company was so divided that we could scarcely spare the physical force of a single individual; the greatest persuasion was therefore necessary to encourage our people, and show them in perspective the plenty they would enjoy when we should once gain the lower Corentyne and the settlements where we had sojourned on a former occasion.

We started from the Great Cataracts with 8 lbs. of farinha (a

coarse kind of tapioca), and had a journey of from 3 to 4 days before us ere we could reach human habitations, supposing even that the Indians had not removed. I had therefore to reduce our allowances to 3 ounces a day. Since our provisions had been so short, Mr. Goodall scrupulously divided the quantity of farinha into 15 portions, and we allowed every other person to take his share, reserving the two last for ourselves, in order to prove to the crew that we did not wish to fare better than they. I had been in similar straits before, and the small quantity which fell to my share was partaken of in small pinches, and thus prolonged the enjoyment; but poor Mr. Goodall knew no economy in such a case, and dispatched his share instant—*the consequence was, he suffered more severely.* In spite of our debility, we paddled from daylight until 5 and 6 o'clock in the afternoon, and from the 29th of September to the 1st of October we failed in shooting any bird, or catching any fish, to add to our meagre allowance.

On the morning of the 1st of October we divided the last of our provisions, amounting to something more than 2 ounces to each individual; but happily, on the evening of that day, after having travelled 26 days without meeting a human being, we entered the Carib settlement of Tomatai.

We had started from our night camp very early, but a heavy easterly wind and the broad expanse of the river caused waves for which our craft appeared but ill calculated, and our progress during the morning hours was not very rapid. About 5 o'clock I recognised familiar objects: Christian, the Carib settlement, was before us. The grass had overgrown the path which leads from the landing-place to the houses, and told us plainly that the place was deserted. This was a great disappointment; we however found some papaw-trees bearing fruit in the abandoned provision-fields; these we considered more than delicious, and, somewhat refreshed, we urged on towards Tomatai.

The corials tied near its landing-place, and a couple of dogs gambolling among the rocks in front of it, presented to our longing eyes a most delightful picture. Our skiff had scarcely touched the ground when I immediately jumped out and hastened towards the huts, unobserved by any one till I approached quite close. Old Williams, at this time the Indian chief of the place, was at work upon a basket; he raised his head, and though seven years had elapsed since he had seen me, and without having the slightest knowledge of my coming, he immediately recognised me. When I told him of our sufferings, and whence we had come, the good-natured squaw hastened to bring some cassiri, which, for the occasion, she tendered in a fancy tumbler, and a plate of delf loaded with fish and fresh cassada. Mr. Goodall, who soon followed, was equally served, and the smoking pepper-

pot and some cakes of cassada were placed before our starving crew.

Old Williams's curiosity about the Indians who inhabit the upper Corentyne was insatiable, for all that the Caribs knew about that river extended no further than to the slave-path; above that, in their belief, were regions inhabited only by the water-mama, sprites, and hobgoblins.

The next morning I continued my journey. The previous day had convinced me of the impossibility of entering the sea-reach of the Corentyne with our bark canoes, and I accordingly hastened towards the post, to make arrangements for proceeding without delay to the coast. Mr. Goodall had been desired to follow the day after, in order to allow our worn-out crew a day of rest.

The hospitality so peculiar to the West Indian was heartily lavished upon us on our arrival at the cultivated parts of the colony, and we ultimately reached New Amsterdam, in Berbice, on the 9th of October, and Georgetown, the capital of British Guayana, on the 12th of October, 1843.

We had every reason to be grateful to a kind Providence which had thus conducted us safely through so many dangers, had crowned with success the mission which had been our object, and enabled us to perform our arduous duties without the loss of a single human life.

These satisfactory feelings were greatly increased by the circumstance that, with the exception of a few thermometers, and the mountain barometer, constructed according to Fortin's plan, the instruments which were carried over several thousand miles of pathless regions were brought safely back to the colony, where I thus had an opportunity of verifying them.

The general map of British Guayana which I have constructed from my exploratory expeditions is based upon the following data, viz., the determination of the latitude of 174 different points, obtained by 4824 altitudes of heavenly bodies, and the determination of hour angles for meridian distances, and the rate of the chronometers for 223 different stations, ascertained by 5801 altitudes of the sun or stars.* The meteorology of the regions I have examined has received particular attention. The barometer, with the attached and detached thermometers, were regularly observed wherever we remained stationary; besides which, the temperature of the water, the evaporation, the quantity of rain

* If from the above observations, amounting to 10,625, we subtract 230, made by Lieut. Glascott, R.N., then assistant surveyor of the boundary expedition, the remainder were taken by me individually, and that number does not include the lunar distances and altitudes connected with those observations, which amount probably to 5100 more.

which fell, the extreme of the heat of the sun, and several other meteorological investigations were carried on wherever circumstances allowed it. The number of barometrical and thermometrical observations alone amount to 6692, not taking into account the other meteorological data which I procured during my journeys.

It is no doubt very difficult, under any circumstances, to convey with safety a collection of objects of natural history from foreign parts to Europe; but the greatest difficulties are connected with transporting objects of that description over pathless regions, such as those in the interior of Guayana, where beasts of burden are unknown, and where, on arriving at the rivers, still greater hazards are encountered in the shape of dangerous cataracts and rapids.

I have frequently lost, by accidents which occurred to our boats, the collections which I had brought together with the greatest exertions, or, as in the instance related in the foregoing pages, have been obliged to abandon them. It gives me, therefore, great pleasure to be enabled to add something to the national collections in the British Museum, where I have deposited about 2500 specimens of dried plants, 100 specimens of woods, a quantity of dried fruits, a flower and young leaf of that wonderful plant the *Victoria Regia*, and several other botanical objects preserved in spirits; a collection of birds' skins; upwards of 100 specimens of fishes, in spirits, from the rivers of the interior of Guayana; a geological collection extending from the Orinoco to the equator; and an ethnological collection, consisting chiefly of numerous weapons and the household utensils of the Indians of Guayana.

The Royal College of Surgeons has been presented with some skulls and with a perfect skeleton, as well as a number of plaster casts of Indians. The model-room of the Admiralty has received 106 specimens of woods, many of them accompanied by dried twigs, some of them with the flower of the tree which furnished the specimen; and different scientific societies and institutions have been presented with various curiosities from Guayana. The Royal Garden at Kew has received several living plants, chiefly of that interesting family the *Orchidæ*.

I trust, therefore, that my exploring tours in a province so little known previous to my investigations, and which combines tropical exuberance with fertility and extent, may not only have contributed to the extension of geographical knowledge, but may also have proved beneficial to different branches of natural history.

I cannot conclude this memoir without drawing particular attention to Bunten's siphon barometer, whose advantages are incalculable for those who traverse wild and pathless regions.

The barometer No. 430 of his construction has accompanied me during my last expeditions through forests and over mountains, and in my boat navigation of impetuous rivers; and on my return to London I found, on comparing it again with the barometer at the Royal Society, that, in spite of all the severe trials to which it had been exposed, it had not varied. On previous expeditions I have used Troughton's, Englefield's, and Newman's barometers, and though every precaution was taken with them, I never succeeded in bringing any one of these instruments safely back to the coast regions.

The all-interesting question in physics, terrestrial magnetism, was not neglected during my journeys in Guayana, and I found opportunities for vibrating a pair of Hansteen's needles (the use of which Colonel Sabine, R.A., had kindly procured me*), at 17 stations, extending N. and S. from the 8th to the 1st parallel N. of the geographical equator, and from the 56th to the 62nd meridian W. of Greenwich. The magnetic inclination, and chiefly the declination, were likewise ascertained in many instances.

I have now drawn attention to the general results of my exploring tours; many of the elements collected remain in their crude state, my active life not having permitted me as yet to turn them to account, but I trust an opportunity will be afforded me for working up these materials, in order to advance our knowledge of the physical geography and natural history of Guayana, as also of MAN, chiefly as he is exhibited in the few remains of the aboriginal races, thinly dispersed over many hundred thousand square miles, and fearfully hastening, as by a divine decree, to complete extinction.

II.—*Memoir of the South and East Coasts of Arabia.* By Captain STAFFORD BETTESWORTH HAINES, I. N.

Part II.

HAVING, in Part I. of my *Memoir of the South and East Coasts of Arabia*,† attempted a description of that part which had been minutely surveyed as far as Misenát, I commence from thence, trusting that, though all parts of the coast are not actually laid down by survey, I shall be able, from my knowledge and experience of the localities of the different points, to give some useful information to the mariner and to the geographer; and, in so

* They are the needles L (a), L (b), mentioned in Table LII. of the Magnetic Survey of Great Britain, and worth their weight in gold.

† *Journal of the Royal Geographical Society*, ix. 125.

doing, I can only again offer my sincere thanks to the officers of the Indian Navy mentioned in the note,* whose utmost zeal and exertions, united with every friendly and good feeling, were always rendered throughout our long and fatiguing cruises.

Wādī Masīlah.—A large and extensive valley, forming the line of communication between the sea-port towns and the province of Hadramaut. It commences in $15^{\circ} 25' N.$, and $50^{\circ} 55' E.$, having on its W. side the high range of mountains called Jebel Asad. The valley is well watered by running streams, and the villages and palm-groves are numerous. The inhabitants are of the Mahrah tribe.

Sihūt.—A town which from the sea looks large, but on visiting it the greater part of the buildings are found to be in a dilapidated state. It is $15^{\circ} 12' 30' N.$, and $51^{\circ} 19' E.$ Its population varies from 300 or 400 to 2000, according to the trade and season. The town and district are under the government of Sheikh 'Alī Bakrīt. The people are of the Mahrah tribe. Considerable intercourse with the interior is carried on through Wādī Masīlah, and the following distances may be relied upon as the length of journey for a camel laden with merchandise, viz. :—

Sihūt to Terīm	8 days.
„ Shibām	8 „
„ Do'án	12 „
„ Wādī Ahmed, an extensive valley, abounding in villages and cultivation	12 „
„ El Gharfah [Karfah]	7 „
„ Tehrīn	8 „
„ Ghassam [Kásim]	8 „

The traders of Sihūt have about thirty large and small vessels belonging to them, with which they carry on a lucrative trade in grain along the coast. At other times their smaller vessels are employed in shark-fishing, from which they derive considerable profit. The fins and tails of the shark, after being dried, are sold at Makallah, or Maskat, and ultimately are sent to China *viâ* Bombay. The scattered stone-buildings in the neighbourhood of Sihūt have been erected as places of defence against small arms; and the revenue collected and secured by the local governor, Sheikh 'Alī, but rarely finds its way into the coffers of the Sultán, whose residence is at Keshin.†

The anchorage is an open roadstead; and the bank of soundings extends seawards to a considerable distance, having 21 fathoms at 6 miles off-shore, with regular decreasing soundings as land is approached.

* Lieut. (now Commander) Sanders, Lieutenants Jardine, Shephard, Ball, Rennie, Cruttenden, Stevens, Barrow, A. Grieve, Dr. Hulton, and Mr. Purser Smith.

† Spelt Gheshen, and probably pronounced Geshén by Capt. Haines.

Proceeding eastwards, the first cape, or rather projecting point, is called Rás Aghrib,* a high, red, sloping point, having 16 fathoms about 2 miles off. Between this cape and Rás Hattáb† there are three bluffs, nearly equi-distant, with small sandy bays between them.

Rás Hattáb‡ is a piece of land, moderately elevated, terminating in a low point, in $15^{\circ} 21' N.$, and $51^{\circ} 36' E.$, which forms the western boundary of Bander Libán.§

Immediately eastward of Rás Hattáb, and close to the beach, in the centre of the bay, is situated a town named Hattáb, containing about 100 houses and three mosques,—the western one having a minaret. To the W. of the town, about 1 mile, there is a grove of date-trees, and to the E. there is a well. The town contains a population of about 400 souls, and is under the government of Keshín, or Kesheín.

Bander Hattáb, or Libán, is a deep bay, situated immediately to the W. of Rás Sharweín, having regular soundings, and affording shelter against strong easterly winds. With a fresh sea-breeze, there is a considerable surf on the beach.

Rás Sharweín is a high dark point, having two remarkable peaks on its summit (commonly called by seamen "Asses' Ears"). This mountain gradually decreases in elevation towards its southern extreme, which is in $15^{\circ} 19' N.$, and $51^{\circ} 46' 30'' E.$ This cape forms the western side of Keshín Bay.

The town of Keshín, or Kesheín, in $15^{\circ} 24' 50'' N.$, and $51^{\circ} 49' E.$ (frequently called Kísín), is a miserable straggling village near the sea, in the centre of a bay formed by the projecting points of Rás Sharweín and Rás Derkah.¶ Some of the houses are built of stone and mud, two stories high: the others are of cajans,¶ bamboos, and mats. At this village resides the principal chief of the Mahrah tribe, Sultán 'Omar ibn Tawárí, who assumed the supremacy after the death of his brother Seyyid ibn Tawárí, the lawful heir, Ahmed ibn Seyyid, being too young to govern.

Having, in the execution of the commands of the Bombay Government, had opportunities of judging of the character of this chief of a once powerful tribe, I must digress a little from my subject, as it will not only enable me to give an insight into the character of a proud and remarkable Arab chieftain, but also afford an opportunity of explaining circumstances regarding

* Rás Aghrib, Western Cape, or 'Akáb, *i.e.* Eagle, according to M. d'Abbadie (*Bulletin de la Société de Géographie*, xvii. 134).

† 'Atáb (D'Abbadie).

‡ Cape Woodman.

§ Or Lubán (Olibanum). * Port Frankincense.

¶ Vulgarly pronounced Dergeh (D'Abbadie, l. c. p. 154).

¶ Dolichos Kájang (*i.e.* Káchang, the Malay word for pulse).

which, a publication on Sokotrah, by my assistant, the late Lieutenant Wellsted,* of the Indian Navy, appears to have caused an erroneous impression.

In the beginning of 1834, I received the commands of the Bombay Government to survey the Island of Sokotrah trigonometrically, and immediately left Rejjat Jazar, and stood down to Morbát, to ascertain who, by hereditary right, held legal tenure of that island. Having been successful in my inquiries, I set sail for the anchorage under Rás Derkah, and from thence immediately opened a communication with Sultán 'Omar ibn Tawári at Keshin. After presenting a few trifles to the Sultán and his nephews, 'Abdu-llah and Ahmed, I received a written document, properly signed and sealed, granting me full permission to examine all harbours, &c., on the island.

Having received this, I weighed anchor, and in 3 days reached Tamarid, in Sokotrah, when I soon found myself on friendly terms with the peaceful inhabitants of the island. My first duty as a surveyor, was to commence in such a manner as to be certain of completing the survey in every branch, and having the chart draughted within the time granted to me by Government; and as the kindness of Rear-Admiral Sir Charles Malcolm left me to judge of the practicability of examining the interior of the island, I availed myself of it, knowing how anxious the Government has ever been for the advancement of geographical knowledge.

I decided, therefore, that, while I conducted the trigonometrical survey of the island, my assistant should travel leisurely through the interior; and, to assist him, I ordered Mr. Midshipman (now Lieutenant) Cruttenden, who understood the Arab language and character well, to accompany him.

Having executed the commands of Government within the time specified, I forwarded a fair copy of my survey, with my own observations on its anchorages, and those of my officers during the cruise, consisting of papers from my assistant, Lieutenant Wellsted, the late Dr. Hulton, and Messrs. Cruttenden and Smith. It will therefore be evident that Lieutenant Wellsted was only a subordinate officer, acting under obedience to my orders.

A direct communication by steam being the anxious object of the Supreme Government of India, it was considered probable that Sokotrah might answer as a depôt. I was, consequently, sent on a mission to Keshin to obtain the island by purchase.

* Capt. Haines was probably not aware that poor Wellsted was what the French call a *tête exaltée*: on that account, every allowance must be made for his many defects. He borrowed from every one he met, but did not know how to digest the materials thus raked together.—F. S.

On arriving there, I dispatched Lieutenant Wellsted on shore to inform the Sultán of my arrival, and to ascertain when it would be convenient for him to see me. The reply of the chief was "To-morrow;" and I accordingly went over, accompanied by Lieutenant Sanders, Dr. Hulton, Messrs. Smith and Rennie. We were ushered into the house of Sultán 'Abdu-llah, with whom we found Sultán Ahmed, the rightful heir, a lad of about eighteen years of age. The chief Kází* then made his appearance, and the nephew 'Abdu-llah, having retired for a few minutes, returned leading in his uncle, Sultán 'Omar ibn Tawári, who is totally blind, about fifty years of age, though apparently more, from bodily deformity, his stature not exceeding 5 feet, 3 or 4 inches; his head is large, with a round forehead; his eyes very disgusting, the eyelids hanging down so as to leave the dull, filmy eye visible and protruding; his voice is strong, and in manner he was extremely frank and energetic.

After the usual salutations and polite inquiries after each other's health, he begged us to be seated on a carpet, and after a minute's pause, said—"I wish I could see you. Your voice is young and strong. Have you been long away from your home?" I replied—"I have served my Government for many years; and have now the pleasing duty of informing you that I have been honoured by receiving its commands to thank you for your liberal kindness last year, and to assure you of its friendship: also to explain to you its wishes on some important points, as soon as we shall be alone." The room was cleared in an instant, with the exception of the Sultán's family, and the Kází, when I was desired to express my wishes freely.

I explained to him that to carry on steam-communication between India and England, a depôt under British control was requisite; and that, consequently, I was commissioned by Government to purchase Soķotrah from him. I pointed out its inutility to him, and the advantages he would derive from disposing of it to the British nation for a sum of money; and also explained the advantages that would be secured to his people by trading with the island when under the British flag: in fact, I described the advantages arising from the sale of the island in as glowing terms as I possibly could. He listened calmly and attentively. The crafty 'Abdu-llah also appeared deeply interested; whilst Ahmed's idiotic countenance exhibited a careless indifference to what was said. The Kází listened in silence.

A few minutes' consideration sufficed to enable Sultán 'Omar to decide upon his reply; and he commenced by complaining that the British had promised that his boats and men only were to be employed in coaling steamers; whereas the Bengal steamer

* Judge.

was otherwise assisted, to the injury of himself and people. I told him that the duty I came on, if successful, would annul all former agreements; when he, to evade the point of transfer, asked me where I intended to go after leaving Keshin. I replied that my cruise would chiefly be influenced by his decision with respect to the transfer of Sokotrah by sale, to the British.

After a pause, he said, in a firm and decided manner—"Listen, Captain Haines, and I will give you an answer. As sure as there is an only God, and He in heaven, I will not sell so much ground" (making a span with his fingers). "It was the gift of the Almighty to the Mahrabs, and has descended from our forefathers to their children, over whom I am Sultán." I pointed out to him that the island was conquered by his tribe after its evacuation by the Portuguese; that it was so widely separated from him that its value could not be compared to what I was prepared to offer; but hastily interrupting me, he exclaimed—"Aná má yá'thí* (I will not give) so much ground (confining his span to 2 inches); but I am ready to abide by our former treaty."

Determined to leave this resolute old man on good terms, and not being desirous of prolonging so unsatisfactory a visit, I rose, and in a laughing manner said—"Well, Sultán 'Omar, since your determination of 'Aná má yá'thí has not been very long considered, either for your own benefit, or with the consent of the elders of your tribe, I will return to my ship, and remain some time, to enable you to consult with your family and friends on the advantageous offer I have made on the part of the British Government."

On my repeating the Sultán's expression, "Aná má yá'thí," a general laugh ensued, and we parted apparently the best friends.

Several letters passed between me and the Sultán afterwards, on the subject of the transfer; but he remained firm to his first decision, and no argument that I used could induce him to waver.

The character of this old chief I admired: a cripple, and deprived of his eyesight, he never forgot that he was the patriarch of his tribe—and avarice (that Arab vice) failed to tempt him to barter his birthright for money. He evinced no anger throughout; was polite, but firm; telling me that he knew we could take his country by the strong arm, but that he believed our principles of justice would not permit us to do so. On parting he said—"God is witness we have both endeavoured to fulfil our respective duties: you, to your Government; and I to my tribe, as their father. Farewell."

* Probably for Aná má U'áfi, and remarkable as giving the sound of *th* to the letters *fi*.—F. S.

Having thus totally failed in the purchase of the island, I stood over to Sokotrah, and assisted in landing the troops sent from Bombay to protect the coal.

I have made this digression, and introduced Sokotrah, merely in justification of myself and other officers under my command; Lieutenant Wellsted having introduced my name erroneously into his work. He published my Vocabulary and Meteorological Register, and stated other matters so as to make it appear that he was the principal throughout. To the late Dr. Hulton, and Lieutenant Cruttenden, I.N., he was much indebted for information never acknowledged; and an extract from his official letter to myself, dated 18th July, 1835, upwards of a year after Sokotrah was surveyed, will sufficiently show what aid I derived from him:—

“I send the working chart, which I should feel greatly obliged if you would cause some one to trace off, and send back. You will at once perceive it is but a poor specimen of chart-making. It is the first I ever made—or rather, I may say, attempted to fill up.”

The chart here alluded to consisted of only a few calculated distances, which I had put on paper so that Lieutenant Wellsted might lay down the soundings of the channel between the Abyssinian coast and the “Brothers,”—which, I regret to say, he did incorrectly.

But to return to Keshin. That village has a paltry bázár, kept by a few Banians; and the whole population does not exceed 300 or 400 souls, who possess two or three trading boats, and ten smaller fishing-boats.

During the strong north-easterly monsoon, the surf on the beach in Keshin Bay is so high, that landing from ships' boats is at times dangerous; but the native fishing-boats, which are sewn together and have almost a flat floor, pass through the surf in safety, and are hauled up immediately after the fisherman's daily toil is over. Trading-boats land their goods in the N.E. monsoon at a small nook immediately to the W. of the precipitous cliff, called Rás Derkah, the eastern point of Keshin Bay. During the S.W. monsoon a swell rolls in to the Bay, unless close in, on the Rás Sharweïn side. The soundings all over the bay are tolerably regular, with good holding-ground in 6 to 10 fathoms. The surrounding coast is low, and sandy near the sea, having a high range of hills of a dark hue in the background, with a barren tract of undulating sand-hills intervening.

The country on this part of the coast is extremely barren; in fact equalling in sterility the desolate appearance of the Arabian coast on the south side of the Persian Gulf. To the inhabitants,

it has one recommendation: fish, which is plentiful, and of excellent quality, forms the staple article of their food, and in a dried state, is given to their cattle.

The Mahrah tribe is, even at the present day, numerous and powerful; its territory, with some few exceptions, extending from Misenát to Rás Sejer, near Dhafár. This tribe is, however, subdivided into different branches, under distinct chieftains, the principal of whom are these:—

Sultán 'Omar ibn Tawári, the representative of the reigning family.

Isá ibn Mobárek ibn 'Alyán ibn Kaishát, chief of Farták.

Sayid 'Akil ibn Ahmed ibn 'Abdu-llah ibnu-l Hussain ibn Sheikh Abú Bekr, chief of Jaizer.

Sheikh 'Alí Bakrít, chief of Sihút.

Principal Sub-divisions:—

The sub-divisions of the Mahrah tribe, Beit 'Efrit, are—

Beit Zehád	Beit Ahmed
„ Húshí	„ Jeizát
„ 'Arfát	„ Safái
„ Kaishat	„ 'Alyán
„ 'Osmán	

Of these sub-divisions the most numerous are Beit Zehád, the sheikh of which is Mukaddam Hussain, Beit Ahmed, and Beit Kaishát. These have the greatest weight in the councils of the tribe. There are three Sayyeds* residing at Sihút, who have some influence from their holy descent and superior abilities.

On great political points many of the elders are consulted; and I know that at one time they meditated the removal of the British troops from Sokotrah by force, but were prevented by 'Isa ibn Mobárek, who strongly protested against such folly, and refused to allow his boats to carry the Bedouins over to that island.

The religion of the tribe is, of course, Mohammedan, and some of the more educated among them are scrupulously attentive to its tenets. The poorer classes show great indifference to it, and many are unable to repeat the prescribed forms of prayer. Their males are circumcised just before marriage, frequently not till they are twenty years of age. Their long bushy hair is then frequently shaven, and replaced by a turban, if they can afford one; if not, their hair is gathered together so as to form a round knob at the back of the head; and the head is generally encircled with frequent folds of the "Faṭilah," or match prepared for their matchlocks, which are manufactured in Hadramút.

A short sword of inferior workmanship, and the never-failing yanbe', or crooked dagger, gaily ornamented with silver, and frequently with gold, complete their accoutrement.

* Or sheriffs, i.e. descendants of the Prophet.

Their males in person are light and active, of middling stature, with well-knit limbs. They are crafty, extremely hardy and bold. Their dress is a turban with a blue ground and white stripes, and a coarse dark blue waistband with loose folds in front, one end passing over the shoulder and back, and the other hanging down the right side. Their skins are deeply dyed with the indigo from their clothes, which are seldom, if ever, washed.

When I was received by Sultán 'Omar ibn Tawári, he wore a *sidi-riyah* or waistcoat of *Kimkháb** over a blue *tóbó†* or shirt. The natives belonging to this tribe are, generally speaking, when young, very good-looking, especially the females; but, as with the males, their skins are discoloured by the dye from their dress, which is composed of blue cotton, and forms their only garment. Their hair is plaited with silken thread, and hangs down in long tresses over their shoulders; their only ornaments are ear-rings and arm-lets. They apparently pride themselves on the antiquity of their tribe, claiming a descent from the tribe of 'Ad ibn Aus ibn Irem, ibn Shám (Shem) ibn Núh (Noah). Sheddád ibn 'Ad, in the arrogance of his heart, built the famous palace and gardens of "Irem Dhátu-l 'imád;"‡ but, on preparing to take up his residence there, he and his followers were destroyed by a storm of wind from heaven, and the palace for ever hidden from mortal eye, till a man named Ibn Kelábah, in searching after a lost camel, caught a glimpse of it, and, entering, carried off a jewel, which was presented to the Khalífah Mo'áwiyah ibn Abú Sufyán. From that period, the palace again became invisible. The remnant of the Adites, on professing the faith of Islám, were spared, and Arab tradition makes them the parents of the tribes inhabiting *Ḥadramáut* and the Land of Frankincense. It is worthy of remark that the language now spoken by this people is an unknown tongue to the other Arabs—harsh, guttural, and apparently uttered with difficulty. It has been supposed, with great reason,§ to be the remains of the ancient *Himyarí* language.

Rás Derkah ||—A bluff, precipitous, and sharp point in 15° 26' 39" N. and 51° 55' 10" E., about 300 feet high, may always be known by having the low sandy bay of *Keshín* westwards, and the

* Damask-silk.

† Properly *thaub*, i.e. garment.

‡ 'Irem adorned with lofty buildings' (Korán, lxxxix. 6; Sale's Koran, ch. lxxxix. p. 490, 4to. ed.). *Dhátu-l 'imád* was added by Mohammed to make a rhyme with *Ad*.

§ Jauhari, in the *Ṣaḥāḥ* (*Ván-Kúli*, i.e. the Turkish version of that dictionary, i. 359), quotes this Arabic proverb:—"Let the man who enters *Zafár Himyarise*, i.e. speak the *Himyarí* language. It is called *Iḥkilí* by M. Fresnel, who gives an interesting account of it in the *Journal Asiatique*, iii. vi. 79. See Pococke's *Specimen Hist. Arabum*, p. 151; *Káwús*, Turkish Version, i. 277, 829; *Ván Kúli* (Turk. Vers. of the *Ṣaḥāḥ*), i. 121, 359. The Turkish translator says, that the *Himyarí* substitutes *m* for *l* in the article, and for *n* in the determinative particles.

|| Pronounced *Dergah*, or *Dergeh* (D'Abbadie, l. c. p. 134).

equally low sandy coast extending as far as Rás Farṭák eastwards. The strata of the cliff are as follows, beginning from below:—

No. 1. Secondary limestone, forming a foundation for the more distinctly stratified masses above. The outer surface rendered cellular by the action of the sun and air, with sharp irregular points. The colour internally differs, some specimens being nearly white, some cream-coloured, others variously tinged by the presence of the oxide of iron. Large caves are formed in its substance by the violence of the waves dashing against its base. Some portions of it have masses of flint imbedded.

No. 2. White shell limestone, pretty compact internally, but externally, in consequence of the decomposition of the shells, porous, and full of minute cavities.

No. 3. Common grey limestone, the tint becoming gradually lighter as it approaches the layer No. 2. The layer above this appeared to consist of puddingstone, and those above that again had a different appearance, some seeming to be slaty, others to consist of sandstone, and the uppermost part of the cliff appeared to be nothing but loose stones, sand and gravel. The dark patches on the summit of the cliffs are excavations in its substance, in parts of which were found large masses of rounded limestone, imbedded in a matrix of the same nature. In it we also discovered a few fossil remains of shells (one tolerably entire). The cliffs from the verge of the cape extend about 2 miles westwards, when they suddenly turn northwards, and form two or three slight bends: and to the N.E. of the cape, there is a sunken rock some distance off-shore. The cliffs continue in a N.E. direction till they meet the sandy beach, which runs in an E.S.E. direction to Farṭák.

While communicating with Keshín during the N.E. monsoon, I invariably anchored in 6 or 7 fathoms, sandy bottom, with Rás Sharweín S. $54\frac{1}{2}^{\circ}$ W., Asses' Ears S. 66° W., the town of Keshín W. 3° S., Rás Derkah N. $83\frac{1}{2}^{\circ}$ E., all true bearings. I also made it one of my well-fixed meridional points for cross measurements to other places.

On the low shore between Rás Derkah and Rás Farṭák are the villages of Qadífat,* Kesid, Wádi Kerbrát, Saghar, Hasweíl,† and immediately under the south-west part of the mountain of Farṭák lies the village of Saíf, or Kersah. Most of the villages have some stone buildings, and a small plantation of date-trees in their vicinity. One or two of them are situated a short distance inland. To the south of the village of Hasweíl there is a small pyramidal hill. The villages of Qadífat and Kesid are under Keshín, and those to the east of them, are subject to Sheikh 'I'sa

* Commonly pronounced Godífat.

† Hesweíl (D'Abbadie, l. c. p. 134).

ibn Mobárek, chief of Farták. These villages may, in all, contain a population of 2000 souls, whose principal food is fish, millet,* bread, and dates. They are poor, but well armed, and ever ready to resent an injury. The latter was proved by the people of Wadí seizing a Pór-bander boat under English colours, in retaliation for the release of a number of their slaves by the persons in authority at Pór-bander.

The soundings along this coast are regular, but shoal-water extends for a considerable distance off the shore. A vessel wishing to anchor off any of these villages can choose her own depth from 10 to 6 fathoms, but her boats will generally experience a very heavy surf on the beach. The best anchorage and place for communication is off the village of Farták, known as "Saïf, or Kersah." A ship may there anchor in 9 fathoms $\frac{1}{2}$ a mile off-shore, with gradual soundings to 40 fathoms $3\frac{1}{2}$ miles off; but off the east side of Mount Farták the soundings become much deeper, and continue so round the cape.

The people of Farták and the other villages have several bugalás and small boats belonging to them, and the nook near the village of Saïf affords them shelter during the north-east monsoon. Sheikh 'I'sa ibn Mobárek is both feared and respected by those under him: his trade gives him power to reward his followers, and enables him to call in the assistance of the neighbouring Bedouins when required; his voice, therefore, in the councils of the tribe, has great weight.

Rás Farták,† in $15^{\circ} 36' 40''$ N., $52^{\circ} 21' 10''$ E., allowing

* A kind of holcus, the Indian juwári, and dhurrah of the Arabs, sorghum vulgare of botanists.

† I conceive there has been a great error committed by certain geographers in placing the ancient Syagros at Rás el Hadd, and I am inclined to place it with Dr. Vincent at the modern Rás Farták, for the following reasons:—In Arrian's description of different parts of the Arabian coast,* the first place named is the village of Arabia Felix, which may fairly be fixed at 'Aden; from it he carries his reader to Cana, the site of which I have determined to be the modern Hishn Ghoráb. He then mentions the extensive bay of the Sachalites,^b supposed to be the long line of low coast between Makallah and Keshín; he afterwards remarks* that the promontory of Syagros, and beyond it the Port of Moscha^c and the islands of Zenobius follow in regular succession. What then can this order of succession be but Shehr, Farták, Dhofár, and the Curia Muria (Khuryán Muryán)^c islands? beyond all these, is Rás el Hadd, which is itself alluded to as the place where the coast takes a sudden turn towards the Persian Gulf.

The

* p. 156, ed. Blancard, Amst., 1683.

^b The gulf called Sachalites (Arrian, *Peripl. Maris Erythr.* p. 158). Sachal is, as M. Fresnel has observed (*Journal Asiatique*, iii. x. 191), identical with Shíhr, or Shahr, as it was, perhaps, anciently pronounced.

* Vincent's *Periplus of the Erythrean Sea*, pp. 331, 344.

^c Mosen Asahem in Capt. Haines's MSS., which is evidently an error of transcription; perhaps he wrote, 'the ports of Moscha and Omana,' as in Dr. Vincent's work, p. 344.

* Erroneously Khartán and Martán in most of the Arabian geographers—*t* being distinguished from *y* only as its two points are above, instead of being below, the letter.

Bombay, flag-staff to be in $72^{\circ} 54' 26''$ E., is a lofty mountain about 2500 feet high, forming a very prominent cape, which may be seen by the navigator 60 miles off on a clear day. At a distance, it has the appearance of a dark-looking island, but on a near approach, is found to be connected, by hills of much less elevation, with the range of high mountains surrounding the extensive bay of Farták. I had no opportunity of going up to the summit of this promontory, or of permitting those under my command to do so, which I regret, as many fabulous tales are told of its productions. We saw with our glasses, however, on the western side, nearly as high as the summit, a very large grove of trees growing in a circle, the centre of which was apparently barren. The trees were tempting indeed to an observer accustomed to nothing but barren and naked ranges of hills and hillocks of sand, mile after mile; and this mountain, like an oasis in the desert, was doubly pleasing from its being the only green spot visible. What it could have been we were unable to conjecture, but the natives say that there are ruins in its vicinity; and this may be another relic yet remaining to point out the power of the Himyari kings when trade, under their rule, flourished in these seas.

Between Rás Farták and Rás Seger* the coast forms an extensive bay, the concavity of which is more sudden immediately round the high land of Farták. During the survey of this coast I sent the small tender round the bay, and by so doing gained the following information.

Immediately after passing the high land of Farták, there is said to be a creek, having sufficient depth of water over the bar at high tide, to enable their bugalás to enter for safety during the southwest monsoons, with deeper water inside. The first town visible, close along shore, is El Jaizer, a considerable place under the government of Sayyad 'Aḳīb ibn Aḥmed. It has cultivated ground in its vicinity, and is a place of some importance, situated

The promontory of Syagros is marked as the largest in the known world,* and it certainly is the boldest and largest of any on the south coast of Arabia; and had there been another of larger size, the remark would not have been made. But, perhaps, the best argument that can be adduced in favour of Farták is the form of the cape as seen from the west, and we know how fanciful the ancients were in their description of coasts, and how their ingenuity was often exerted to trace the resemblance of the land to some living creature or well-known object. Not only the ancients, but navigators of all countries, have done this. The Arabs have their Ras Kalb, Dog's head, the English their Asses' Ears, Paps, Dolphin's Nose, and such like; and why should not the ancients have their promontory of Syagros or the Wild Boar, which the form of Farták, when seen 20 or 30 miles off from the west, strongly resembles?—(*The Author.*)

* Shejer, i.e. tree; but M. d'Abbadie (l. c. p. 135) has Šáyir.

* Arrian, l. c. p. 158. This opinion is corroborated by the learned and acute M. Fresnel, who observes (*Journal Asiatique*, iii. x. 192) that a cape two days' journey beyond Hásik is still called Sauḳirah, pronounced Saugirah, and almost identical with Syagros.

about 7 miles from the sea. Close on the sea-shore is the village of Jowári, with a mosque, a few houses, and perhaps 200 people.

A few miles to the north of Jowári, on the sea-shore, is the village of Fittok, and a short distance N.N.E. of Fittok, near the sea-shore, is a considerable town called Dunkót,* which has a fort, and considerable cultivation round it.

The coast, from the high land of Farták, is low near the beach, with high land in the interior, but a few miles north of Dunkót the hills come close to the sea, in the vicinity of which, some few people reside under the protection of a small fort known as Jarjet (Jádet?). There are also two pretty villages near it, each having for its protection a fortified house. One of these, called Hau, is near the sea, and has some date-trees near it; the other, Rás Yúl, has a plantation also.

These villages terminate the plain, and from them steep precipitous mountains commence, running towards Seger. Between Rás Yúl and Rás Seger there are two ravines, through which the mountain-torrents find an outlet to the sea. Of these the southernmost is called Kaïs ibn 'Osmán, and the other Kaïs ibn 'Omar. The tender, while circumnavigating the bay of Farták, found anchorage all along in 6 and 7 fathoms, with a sandy bottom, rather too close to the shore; outside, from 7 to 12 fathoms, she generally found rocks and sand, and in deeper water mud and sand.

Rás Seger, a high, steep and slightly-projecting cape, forms the east point of the deep bay of Farták. It consists of limestone, and is about 3000 feet high, with level table-land on the summit. This cape forms the boundary between the Gharrah and Mahrah tribes.

The next point to Rás Seger is Rás el Ahmar, the red cape, a continuation of red irregular hills running out from the steep mountain range skirting the whole coast from Rás Seger to Rás Nüs.

The hills forming Rás el Ahmar terminate in a low point under which there is a small anchorage and shelter from south-westerly winds, called Bander Rísút. This cape is the western boundary of the low land of Dhafár,†—which from it extends along the coast nearly 40 miles, and inland for a still greater distance. Rás el Ahmar is in $16^{\circ} 55' N.$ and $54^{\circ} 2' 00'' E.$, and the small anchorage of Bander Rísút is immediately on its east side, affording shelter for small vessels during the strong south-west winds, which not only blow during the regular monsoon, but frequently during January, February, and March.

The soil of the district or province of Dhafár (for there is no town of that name†), is abundantly luxuriant, well irrigated by

* Vulgarly pronounced Dumgót.

† Or Dhofar.

‡ Perhaps Captain Haines was misled with respect to the present existence of that

mountain-streams, enabling the inhabitants to employ their industry in cultivation if they choose, and abundantly repaying the farmer for his labour. Still, though nature has been thus bountiful, the people are extremely indolent, generally contenting themselves with what the soil yields spontaneously, in preference to improving the crops by tillage. In some parts which I shall hereafter mention, the little labour they have bestowed on cultivating the ground has amply repaid them, and has, in fact, been one means of making them more industrious.

On the lofty mountain range of Subhân, 4000 feet high, which runs parallel with the coast at a distance of about 16 miles, and has a luxuriant Tehâmah, or belt of low land between it and the sea, the soil is good; wild clover growing in abundance and affording pasture for cows and immense flocks of sheep and goats, while in many places the trees are so thick that they offer a welcome shade impervious to the scorching rays of the sun. Mr. Smith, an officer of the vessel which I commanded, was deputed by me to examine the whole of the Subhân range. He traversed it entirely in perfect safety, and, under the name of Ahmed, became a great favourite with the mountaineers. He was everywhere hospitably entertained by them, and they would not even permit him to drink water from the numerous clear mountain-streams that were meandering in every direction. "No," they said, "do not return, Ahmed, and say we gave you water while our children drank nothing but milk." In every instance they gave him the warmest place at the fire, and invariably appointed some one to attend to his wants. They even extended their generosity so far as to offer him a wife and some sheep, if he would only stay and reside among them. On Mr. Smith's expressing a wish to see some of the numerous wild animals whose footsteps were everywhere visible over their park-like mountains, they immediately despatched a party, who returned with a splendid specimen of an ibex,* a civet-cat, and a very fine ounce. He himself saw plenty of smaller game, such as antelopes, hares, foxes, guinea-fowl and partridges.

These hospitable mountaineers are handsome, well-made, active

place by the strange pronunciation of the natives of Mahrah. A passage in M. Fresnel's paper on the Geography of Arabia (*Jour. Asiat.* iii. x. 192) seems to justify such a supposition:—"Remarquons ici," he says, "que la position assignée par Ptolémée à la métropole de Sapphar (*Zhafâr* ou *Dhafâr*), le Sephar de la Genèse, le *Tefôr* des modernes Homerites, cadre parfaitement avec celle du promontoire *Syagros*, supposé *Râs Sangra* (*Saukirah*). En effet, la longitude Orientale de ce cap surpasse d'environ deux degrés celle de *Zhafâr* dans nos meilleures cartes. Or, je vois dans Ptolémée la longitude de Sapphar marquée 88 degrés, et celle de *Syagros extrema* 90 degrés, ce qui nous donne précisément la différence voulue de 2 degrés dans le sens voulu. Je ne puis donc comprendre pourquoi d'Anville a mis Sapphar du côté d'Aden, et rejeté le promontoire *Syagros* à *Râs-al-Hhadd*."

* I have the horns by me, as a fine specimen; they are 3 feet in curve, with 21 knobs.—S. B. H.

men, and always well armed, their weapons being the same as those used by the Mahrahs. They are of the Gharrah tribe. Their women are handsome, and much fairer than any seen on the coast. I have seen as many as 200 at a time, who came down to barter their cattle, butter and gums, for dates, at Morbat. Curiosity induced me to ask them how they accounted for being so fair, and their reply was, that it was owing to their drinking nothing but milk from their childhood; little dreaming that they were indebted to the renovating breezes and temperate climate of their native hills, on the summit of which in February the thermometer ranged from 49° to 72° Fahrenheit.

The dress of these women consists of a coarse cotton petticoat, with a blue robe over it; their dark hair, as usual, is artificially lengthened and arranged in long narrow twisted tresses.

The plants found by Mr. Smith in the Subhán mountains were the same as those in the more elevated parts of Soḡotrāh; dragon's blood, frankincense and aloës were seen in abundance.

We now return to the Tehámah or low land. The first village near the sea, to the E. of Rás el Ahmar, is called Audád, being about 1 mile S.W. of the principal village of Sallálah, and having a population of 300 or 400 souls. This village is protected by a fort, and has its "Jámi," or mosque, in which the service on Friday may be performed.* It is surrounded with gardens, date-trees and millet† fields, with some wheat, cotton, and indigo; and the soil is abundantly irrigated either naturally or by artificial canals from the neighbouring lakes.

The next village near the sea-shore, S. E. of Sallálah, is Haffer, in 16° 57' 30" N. and 54° 11' 00" E., about 1½ mile distant, containing a population of about 100 men.

Two miles and a half E.N.E. of Haffer, there is a fresh-water lake, formed by a copious spring, near which there are extensive ruins. This lake is deep and thickly covered with bullrushes, where we here found abundance of wild-fowl.

About 1½ mile inland, and 2½ to the N.E. of Haffer, is the village and white mosque of Robát, with a population of 100 or 200 souls. The whole country surrounding the above-mentioned villages is cultivated, producing cotton, indigo, millet,‡ and other kinds of grain, a few vegetables, but no fruit. They apparently

* *Majid*, whence our word mosque, signifies "a place of worship;" *Jámi*, "a place of assembly," a meeting-house. The latter only has a pulpit (*minber*), whence the *Khoṭbah* (prayer for the Sultán) is pronounced and sermons are delivered by the *Khatib* (preacher), and where the sacrifices and services of the great festivals (*id-el-Kurbán*, &c.) are performed.—*Murádjah d'Ohsan*, *Tableau de l'Empire Ottoman*, ii. 453, 8vo, ed.

† *Dhurrah*, *Sorghum vulgare*.

‡ In the original, *Jowári*, *Sorghum vulgare* (the *Dhurrah* of the Arabs), and *Bájrí*, i.e. *Pennisetum typhoideum*, probably called *Te'am* (food) by the Arabs.

care little for either of the two last named articles, their accustomed diet being milk and millet-bread, with meat occasionally.

Three miles to the E.N.E. of Haffer is the fort and village of Diríz, having a population of about 150 souls. The village has a salt lake immediately eastwards of it, and from thence, proceeding in an easterly direction, towards Morbát, all traces of cultivation are lost till we reach the village of Thagah (Thákah), which has a small population, with a date-grove and some cultivated ground west of it. There are also several ruined forts near the hills, which at Thákah approach the sea. Thákah is in $17^{\circ} 00' 40''$ N. and $54^{\circ} 30'$ E.

The extensive plain of Dhafár is bounded on the W. by the high mountains of Seger, and to the E. by Jebel Subhán. To the N. each of these mountains gradually decrease in elevation, while towards the sea they are skirted by a low sandy beach, having regular soundings and good holding-ground, from 10 to 4 fathoms. During the north-easterly monsoon, the gusts off-shore from the N. and W. are at times very violent.

The sea-coast continues low and sandy till within 17 miles of Morbát, when it is terminated by a dark precipitous bluff of moderate elevation.

Trading-boats now frequently touch at the villages along the shore of Dhafár, and barter dates, rice, and cloth for gums, butter and grain; and, as this coast forms the shore of the gum-country, it might, with a good system of government, and an industrious population, be rendered a most flourishing tract. This fact did not escape the notice of Sayyad 'Akíl, a celebrated chieftain on this coast; and, had Providence ordained him a longer life, the now neglected plain of Dhafár would, doubtless, have presented the same appearance of opulence and bustling activity as characterized it in former ages.

The frankincense and gum-arabic annually exported from Morbát and Dhafár vary from about 3000 to 10,000 maunds,* which is nothing to what might be procured, the trees being exceedingly numerous on the mountain-declivities and in the valleys inland, and attaining a height varying from 15 to 25 feet. The bark is of a greyish colour, easily pierced, and the leaf large. In this neighbourhood is found the aloë-tree† of Sokotrah, growing out of masses of primitive limestone, apparently without any earth to sustain it. Its height averages from 3 to 15 feet.

The inhabitants of the villages in the plain appear to have but

* Mans; but do the Arabs use this Indian measure?

† Sabr, the name given by Captain Haines, is the Arabic word for the aloë. His drawing shows that it must be the variety called "arborea" by Förskal (Flora Arabica, p. cx.). The officinal aloë is called Aloë Socotrina.

little intercourse with the Bedowins of the interior, who only visit them for purposes of trade.

The people of the plain are of mixed blood, owing to the influx of settlers during the time of Sayyad Moḥammad 'Aḳīl. They are (as most town-bred Arabs) timorous, indolent, and much addicted to the use of tobacco. The dress of the higher orders is that commonly worn by all respectable merchants, viz., a white robe, bound round the waist with a shawl, and a "fótah," or waistband. Their heads are shaven, and protected by the customary 'amámah,* or turban. The poorer classes wear merely the "fótah," secured to a neatly-plaited leather belt, the workmanship of the Bedowin girls, called "'akab," which is tightly secured round the waist: when out of doors they wear the yambe'.†

The Gharrah Bedowins, who are the roving rulers of the country, prefer their glens and mountains to the hotter Tehámah, and wander from spot to spot, as the pasture serves for their cattle and flocks. They employ themselves during the S. W. monsoon in collecting gum, and frequently reside in the cavities of their limestone mountains.

They are a fine, athletic race of men, dressed in a blue, glazed waistband, which is, in general, their only covering. Their arms are the matchlock, yambe', and short, straight sword; but some, who cannot afford to purchase these weapons, arm themselves with a piece of very hard, heavy wood shaped thus,—



which they throw with great precision as far as 100 feet—at that distance, indeed, they could kill a man. This weapon is thrown so as to rebound along the ground, and every lad carries one in his hand. They allow their hair to grow long, and it is then gathered up behind, like the Mahrabs', which gives them a wild appearance.

Immediately before the fast of the Ramazán‡ both males and

* Or 'Immámah, from its fulness or size; properly a large, official turban—such as judges and public officers wear.

† Spelt Jambéa by Captain Haines; but that Yanbe' is the proper spelling appears from Niebuhr (*Arabia*, p. 62), who, as a German, spells it Jambéa. The final *a* is used to express the letter 'ain. The word is probably a colloquial term introduced in modern times. In this sense it is not found in Arabic lexicons: it means literally, "it flows, spouts out," as blood from a wound, or water from the earth, hence *Yanbe'*, a spring, is the name of a town in Arabia, on the Red Sea, from the abundance of springs in its neighbourhood. Janbíyah might mean in Arabic a "side arm;" but no such word appears to have been ever used, therefore it must be supposed that Niebuhr's orthography has been adopted by Captain Haines.

‡ Ramadhán, in Arabic.

females visit the Tehámah for the purpose of barter, and it was then that we had an opportunity of seeing them.

It struck me that their women (who are modest, though they wear scarcely any covering), and their young men, have a Jewish cast of countenance. Their faces are longer than Arab faces generally are, their eyes large and bright, and they have figures that would have delighted the eye of Canova, could he have seen them. They are much fairer than the Arabs of the coast, and were apparently pleased to see men stouter and fairer than those of their own tribe. Indeed, they were frequent lookers-on at my crew when playing at cricket; and I then had forty fine extra Europeans on board, having saved the crew of the *Reliance* whaler, which had been wrecked on one of the Curia Muria [Khuryán Muryán]* Islands.

The Gharrah Bedowins seldom eat meat, excepting on festivals; not that they dislike it; as their favourite dish is young camel's flesh, but they value the milk too highly to slaughter the females of either camel, cow or goat. The males of the two latter, they frequently dispose of on the coast for dates, cloth, &c.

As Sayyad 'Aḳīl, formerly ruler of Dhafár, was at one period conspicuous and much dreaded, I shall add a short account of him, to show how from being an object of detestation, he at last commanded respect, and even veneration.

The 'Aḳīl† family were merchants. The brothers Sayyad Moḥammad and 'Abdu-r-Raḥmán were in the habit of trading in a large bugalá belonging to their father, which gave them a predisposition for a roving life; and, as Fortune favoured their speculations, they added to the number of their vessels, and purchased 500 slaves from Mozambique. In one of their voyages Sayyad Moḥammad visited Dhafár: the luxuriant appearance of the country tempted him to settle there, and he gradually rose to be master of the place. With a large retinue of slaves, assisted by his own ability and bravery, he defeated the Gharrah tribe in every engagement, and was latterly much dreaded by them. Under his just rule, the district flourished, and trade and population increased. He extended his conquests as far as Morbát, and there built a fort for the protection of the town.

Ambition and avarice, united with his predilection for a roving life, led him to commit piracies on the high seas; and his vessels,

* Curia Muria, the name introduced into European maps by the Portuguese navigators of the sixteenth century, shows what the vowels of these names should be, while the Khartán Martán of Idrisi and other Eastern geographers prove that the fine nasal was, as is often the case, dropped in common parlance, and that through the ignorance of transcribers the letter before á was written with two points above instead of below, and made *t* instead of *y*.

† 'Aḳīl is the name of a distinguished Bedawí tribe (Burekhardt's Notes on the Bedowins, p. 232).

among other prizes, captured in the Red Sea an American ship, of which all the crew were murdered, with the exception of one boy, whom he carried to Dhafár, and educated in the tenets of the Mohammedan faith. When we arrived at Dhafár, this young man had nearly forgotten his mother tongue. He was a Mohammedan, and had a wife and several children, and seemed perfectly contented with his lot.

After some years of cruelty and plunder, the Sayyad's conscience smote him, and he suddenly gave up the sea, and settled quietly in Dhafár, anticipating the comforts of a quiet life, and anxious to make others happy; but in this he was disappointed. The Gharrah tribe deceived him, and for a time led him to imagine that they were contented with the justice of his government. They traded freely with the Tehámah, and apparently all animosity between them and him was buried for ever. This calm lasted from 1806 to 1829. The district still improved, and even Morbát could number a population of perhaps 2000 souls. This bold rover, with his mode of life, had changed his habits also. He became devout, and averse to shedding blood; was loved by his subjects for his mild and impartial rule, and dreaded by his enemies. Treachery, however, had long been at work, and opportunity alone was wanting for the Gharrahs to take their revenge for the many acts which they deemed tyrannical and oppressive. Moreover, there were many others between whom and the chief there existed a mortal feud, on account of relations who had been slain by his followers; and all these persons eagerly joined the cabal against him.

The long wished for opportunity occurred after the month of Ramazán,* in 1829. The Sayyad, returning from Morbát with a smaller retinue than usual, was mortally wounded by a match-lock-ball, fired from the low brushwood. When he fell, his slaves immediately fled, and the Bedowins, who were lying in ambush, dispatched him at once. His body was afterwards found, by a strong party sent out to recover it, pierced with numerous wounds from their daggers, or yambe's.

The Imám of Maskat, hearing of the death of Sayyad Mohammad 'Aqíl, sent a force to take possession of the territory for the brother of the deceased, Sayyad 'Abdu-r-Rahmán, who was still a merchant, and at that time in Bombay. But, when he heard the particulars, he prudently declined the proffered honours of so unsatisfactory a sovereignty, and preferred the more peaceful and profitable calling of a merchant, which he still exercises at Mokhá, where he is distinguished for his intriguing disposition, as well as his great wealth.

The Imám of Maskat requiring troops for the settlement of

* Ramadán, or Ramadhán, in the mouth of an Arab.

his southern possessions, the force at Dhafár was withdrawn, and the district once more fell under the rule of the Gharrah tribe, who soon drove away the greater part of the inhabitants by a system of plunder and monopoly, and thus their villages have dwindled away almost to nothing.

Immediately E. of the cliffs to the W. of Thákah the soundings on the coast become deeper, with alternate cliffs and small sandy beaches. About 7 or 8 miles W. of Morbát there is a small rock, called Jawání (Husein), having some ancient ruins of hewn stone on its summit. It is distant about 50 yards from the mainland. Its length is about 300 feet, by 200 broad. Tradition says a bridge formerly connected it with the mainland.

Morbát, or Merbát,* is a small village,† in $16^{\circ} 59' 15''$ N., and $54^{\circ} 47' 40''$ E. (reckoning from Bombay, as before stated), situated in the centre of a small but well-sheltered bay, named after it, containing about 50 houses, and a population from 150 to 200 souls, who may be divided into three classes:—1st, a few Arab merchants not born there; 2nd, Arabs who are either descended by their mother's side from individuals of the Gharrah tribe, or have married Bedowin wives; and, 3rdly, slaves, the females of whom are not celebrated for their morals. The head man, or Sheikh, when I was there in 1835, was Ahmed of the Makyat branch of the Gharrah tribe, a strong, well-made man, 5 feet 7 inches in height, and 35 years of age, with good features, and a benevolent countenance. I received great civility and politeness from him. He was true to his word, and extremely obliging, which much facilitated my work. In return for his kindness, I presented him with a rifle, thirty German crowns, and some cloth. The population we found extremely indolent, addicted to smoking, and lolling at their ease. They possessed no vessels, not even fishing-boats, and were too lazy to make rafts.‡ One of the younger merchants purchased a boat from a bagalá, while we were there, with the money he had amassed to pay for a wife, which speculation turned to good account, as I employed him to supply the ship with water.

The houses in the village are miserable hovels; those that are inhabited are erected on a rising ground, immediately S. of the landing-place, having to the S.E. a small, square, ruined fort; and to the N. one of much larger dimensions, built by Sayyad Moḥammad 'Akíl, surrounding which, are the relics of numerous houses in ruins.

* Murbát, commonly pronounced Merbát, is the spelling fixed by Abú-l-feda, Geog. i. 98.

† Its position was derived from numerous observations. By 30 azimuths in 1834, and the variation determined at $3^{\circ} 12'$ W. In 1836, variation by 62 observations on shore was $2^{\circ} 27'$ W. High water at 8 or 9 hours, rise and fall 6 feet 10 inches.

‡ Catamarans.

There are the remains of another village near the base of Jebel 'Alí (a red granite hill near the beach at the head of the Bay), which apparently surrounded a tomb called Kubbat * Sheikh ibn 'Alí, dedicated to the patron-saint of the place. On the extreme point, forming the south side of the anchorage, are the ruins of another tomb called Kubbat Sheikh Hidrús [Idris?].

Both the inhabitants and vessels are supplied with water from holes dug in the sandy soil of a small valley near the hill called Jebel 'Alí. This water is brackish and unpalatable at first, but becomes tolerable after a time, and we never found it to possess any pernicious quality.

Morbát affords but few supplies. All we obtained were goats and bullocks brought from the interior, and a few radishes and onions from Dhafár: wood is brought from the mountains.

Morbát or Merbát Bay is a small, secure, and well-sheltered anchorage for 24 points of the compass, but from S. to W. it is open. The low and rocky point to the S., called Rás Morbát, has a sunken rock off it, at 300 yards' distance. The bay turns suddenly from the pitch of the point, in a northerly direction, having two or three small points and bays, ere that upon which the present village stands is reached, and from thence the deepest bay of any, forms the landing-place; and after passing the watering-place, the shore turns gradually in a western direction towards Dhafár.

During the N.E. monsoon the water is as smooth as a mill-pond. The soundings extend but a short way off-shore; and a vessel will quickly shoal from 30 to 10 fathoms, between which and 5 fathoms, from 500 to 600 yards off-shore, there is the best anchorage. I generally anchored in 6 or 7 fathoms off the village.

A leading mark for making Morbát, used by native navigators, is Jebel Dekan (or Jebel Morbát), as they term it, being nearly true N. from Rás Morbát. This peak is nothing more than an elevated part of the Subhán range, from which the mountains rapidly decrease in height in a westerly direction, thus rendering it a conspicuous object from the sea.

The revenues of Morbát are trivial; but the Sheikh receives a present from most vessels anchoring in the port, which enables him to pay the annual stipend of 70 dollars to his tribe, and to live respectably himself. He also levies a small anchorage-fee (nominally), in proportion to the size of the vessel, and the will and liberality of the Nákhodá.† I have known one, two, or three

* Kubbah, or Kobbah, whence our word alcove, signifies a sepulchral chapel—a saint's shrine, frequented by the devout—a place of pilgrimage. K is pronounced in this part of Arabia, and in Egypt, commonly like *g* in *goose*. Ghubbat, as Capt. Haines spells it, means a bay or creek.

† Master of the ship; an Indian term from náó, ship, and khodá, which here signifies not God, but lord or master.

bags of dates given, and sometimes a bag of rice. The power of the Sheikh extends nominally from Thákah to Rás Nús; but I doubt whether he would attempt to inflict fine or punishment upon any offender except one of his townsmen.

While surveying and examining this part of the coast, I took an opportunity to ascertain the number of vessels that annually supply the S.E. and Southern coast of Arabia with dates, thence deducing an estimate of the immense quantity brought from the Persian Gulf and Maskat. This also shows that any strong naval power could almost cause a famine among the inhabitants of that tract.

Some of the more intelligent merchants, when I mentioned this to them, were much astonished at my remark, as to the ease with which the inhabitants of the south coast might be punished for any offence they had committed by a blockade, which would almost reduce them to starvation, as the growth of dates on their coast would not supply one-twentieth part of the quantity needed for their support. When they clearly understood me, one of them exclaimed—"That is not the idea of a man, but of the devil; for into man's imagination such a thought for the wholesale destruction of his species could never enter. Say no more about it; for dates are bread, and bread is the staff of life."

The season for the run of the trading-boats down the Arabian Coast from the Persian Gulf is from the beginning of November to the end of December. From the 21st of November to the 10th of December, 40 boats anchored in Morbát Bay, all laden with dates, and varying in size from 30 to 150 tons; and 121 boats passing the port were hailed, varying from 30 to 300 tons, which is about one-half the number for the season; so that the whole may be nearly as follows:—

	Tons.
In 18 days, 40 boats anchored with dates, average 80 tons	3,200
In 18 days, 121 vessels passed with dates, average 80 tons	9,680
Total	12,880

This amount I witnessed; but believe that the remaining days in the two months above mentioned would make the annual supply little short of 25,000 tons.

The larger class of boats return before the S.W. monsoon sets in; but others, well equipped, with a navigator on board, return with the "*Tadhbirah*"* in June, or after the first blast of the S.W. monsoon has been felt upon the coast, their cargo being

* *Tadhbir*, as it should be written, signifies a certificate: it is here probably used technically for the first indication of the monsoon.

principally coffee. The smaller craft, called bedans, baḳárahs, batillahs, and tránkís* of the Moṣeírah and Súr districts, make a coasting voyage, and employ themselves in fishing along-shore, and then return with the current in March or April. I have met them in fleets of fifty or sixty boats, with from eight to ten men in each, and do not hesitate in saying that they plunder whenever an opportunity offers without personal risk. As a proof of this I may mention, that while carrying on a trigonometrical survey of the coast below Cape Isolette, I had left the ship in my launch and cutter at 3 A.M., accompanied by Lieutenant Sanders and Midshipman Fleming, with the view of commencing my work about eight miles to the N. in Jinzerah Bay, by sunrise. When we were about four miles from the beach, and it was still dark, we crossed a large baḳárah on the opposite tack, and spoke her in passing. The cutter being some distance astern, with only Lascars in her, my attention was naturally attracted to her, as I doubted the honesty of these traders much: nor was it without reason, for the baḳárah wore round and stood for her. We immediately bore up to the assistance of the Lascars, and when close, received a volley of matchlocks from the baḳárah, which we returned, and stood for her. Finding that we were well armed, and not inclined to be intimidated by her fire, she took to her heels. I ordered the cutter to keep on her off-shore side, while I pulled and sailed in the launch in her wake, keeping up a fire of musketry. My object was to keep her in-shore close to the high breakers, and, as the day dawned, for the surveying-vessel to open fire upon her, and cut off her retreat, as she was too fleet for us.

As daylight dawned, the nákhodá of the boat found himself in a most awkward predicament. On his larboard bow was the *Palinurus* within half a gun-shot; on his starboard bow and beam heavy breakers; close astern the launch, firing at him; and on his larboard quarter the cutter. He was so hemmed in that his only alternative was to run his vessel ashore, which the second 9-pounder shot from the *Palinurus* compelled him to do, and all hands swam on shore. I afterwards sent the launch with a gun to destroy her; and complained to the Imám of Maskat, whose subject owned the boat. He immediately took notice of it, and imprisoned its nákhodá and owner for life.

Prior to quitting the subject of Morbát, I would observe that during the prevalence of the sudden and dangerous blasts from the N. and W. (called by the Arabs belát†) which a vessel will sometimes experience in Curia Muria Bay, a strong south-

* *Taránkí* is probably an Indian term from *táran*, "to cross over, to swim."

† *Belád*, i.e. country, land; the final *d* is often pronounced like *t*. *El belád* here signifies the land, provinces, countries in the interior.

easterly breeze will be found blowing over the point of Morbát during the day, and light and variable airs during the night with smooth water.* I account for this change of wind by the extensive precipitous wall of Subhán, which forms a barrier on its S. and E. face, varying in elevation from 3000 to 5000 feet, and running in a N.E. by E. direction from Morbát to Rás Nús; so that on rounding Rás Nús for Morbát the wind diminishes in strength, and gradually blows parallel with the line of Subhán, until the Valley (Wadí) of Dhafár is opened, through which northerly and westerly winds rush down with violence. Owing to the same cause but very little rain falls during the year upon the rocky belt of land at the base of Jebel Subhán, and Morbát rarely has the benefit of a shower, while to the W. the sides and summit of the Subhán range are covered with verdure.

Rás Morbát is a low rocky point forming the southern part of Morbát Bay, and the S.W. point of the low belt of land which extends in breadth from 6 to 12 miles from the Subhán mountains. Its extremity is very low, and a rocky reef extends from it about 400 yards. Caution, therefore, is requisite in rounding it, as the soundings are very bold—10 fathoms being close off the pitch of the reef, and 20 fathoms not 300 yards from it. It is in $16^{\circ} 57' 50''$ N., and $54^{\circ} 47' 26''$ E.

From Rás Morbát to Bander Gingerí [Kinkeri] the coast is low, rocky and irregular, forming several small sandy bays with rocky points and small isolated rocks close to them. The soundings are deep, giving in some places 100 fathoms within a quarter of a nautical mile, and 30 or 40 fathoms within 200 or 300 yards.

Bander Gingerí [Kinkeri †] is a small sandy bay to the westward, and immediately under the high conical hill bearing that name. It is $2\frac{1}{2}$ miles broad at its entrance, and $1\frac{1}{2}$ deep, affording shelter from easterly and north-easterly winds, but open to the S. This bay has irregular soundings all over it, varying from 8 to 12 and 16 fathoms, over falls with a bottom of rocks and sand; and in the centre, on a line drawn from point to point, it has 26 fathoms, with deep water immediately outside the bay.

Jebel Kinkeri, a remarkable conical hill, in $17^{\circ} 1' N.$, and $55^{\circ} 7' E.$, close to the sea, and 1300 feet high, is composed of limestone, with veins of chalk and gypsum traversing its southern face, with portions of shelly limestone on its summit. Lieutenant Jardine, I.N., an officer whom no trifling difficulties could deter

* These alternate land and sea breezes by night and day are common in tropical and semi-tropical countries. During the whole of the summer the inbat (imbatto), which is a strong sea-breeze, cools the air at Smyrna, and is succeeded by light air from the land at night.

† Kinkar, or Kankal, means a tiara, or conical vessel for measuring dry goods; called Jenjari by M. d'Abbadie, but as *j* and *k* have nearly the same sound in Egypt and many parts of Asia, such changes in orthography are not uncommon.

from accomplishing the wishes of his superior in authority, succeeded in ascending to the summit of this steep hill, and from it obtained corroborating true bearings. The ascent was extremely difficult, and it was only by great perseverance that he managed to carry up the theodolite and sextant in safety.

Between this peak and Morbat there is a very small bay, sometimes frequented by fishing-boats.

To the N.E., 13 miles from Jebel Kinkeri, there is another called Moseirah,* of a similar formation, with a rocky irregular coast-line between them. One valley (Wádi), with a little brushwood, may be seen about half way between them: otherwise the same feature in outline extends to Rás Nús,† the S.W. point of Curia Muria Bay, with deep water close to the shore the whole way.

The belt of low land from Morbat to Rás Nús is called by the inhabitants "Şelláh."‡ It is bounded on its N. side by the Subhán range, and its S. side by the sea. It varies in breadth from 6 to 12 miles, and extends N.E. by E. and S.W. by W. 36 nautical miles.

The whole of this rocky belt of land is extremely desolate. Scarcely a vestige of vegetation is to be seen; but in the hollows of the water-courses, antelopes and hares manage to pick up a scanty subsistence, and in a ravine near Rás Nús there are some date-trees, which owe their existence to the mountain-streams, which, after heavy rains, force their way to the sea.

Before leaving the country of frankincense, which I consider as commencing at Rás Farták and terminating at Rás Nús, I would observe that the whole of it is a high tabular limestone, varying in elevation from 3000 to 6000 feet, extending through Hadramaut to the confines of Yemen.

The Curia Muria Islands,§ I am aware were formerly called the Isles of Incense; though, with what propriety, will be shown as my description of the coast and islands proceeds. Should I be wrong in fixing Nús as the boundary, Rás Karwaú or Saukirah will be the north-easterly termination of the frankincense country.

Rás Nús, in $17^{\circ} 12' 30''$ N., and $55^{\circ} 22' 30''$ E., is a low but prominent cape, forming the S.W. point of Curia Muria Bay. Immediately over it there is a high mountain, running from the S.W. and N.E. and shaped like a quoin, the highest and most precipitous part being near the sea, somewhat like a bluff.

Immediately S.W. of Nús is a large mass of rock near the sea,

* The little goal, or object sought; Mazeira of the Portuguese maps.

† Probably Anús.

‡ Or rather Sáliḥ, for Kaum Sáliḥ, the people of the Prophet Sáliḥ who was sent to convert the tribe of Thamūd, as Húd was sent to the tribe of 'Ad.—Pococke, *Spec. Hist. Arab.*, p. 36, 37; Sale's *Koran*, Prelim. Disc., p. 59.

§ Properly Khuryán Muryán.

shaped like a tub. The constituent rock of Mount Nús (which is 1200 feet in height) is granite; the cape being a low point jutting from it, and forming the S.E. point of a small boat-anchorage named after it.

Bander Nús* is a small anchorage, formed by a slight concavity of the coast between the point of Nús and a slight projecting rocky point called Rás Samhör, which has a small reef off it. Shelter is here found from southerly and westerly winds, but the anchorage is close to the shore. Our tender anchored in 9 fathoms, sand and rock, about 500 yards off, with the point of Nús S. 5° E., and near the date-trees, which are the mark for a spring of good water, from which coasting-vessels frequently supply themselves. This spring is sufficiently abundant to supply two and three vessels in a day; and firewood is procurable from the ravines in the neighbourhood.

The population near the sea is scanty; indeed, on this part of the coast, we found only a few half-starved wretches, who call themselves servants of Nebí Šāleh ibn Húd,† to which office they appear to attach considerable importance, and are highly proud of it. Their poverty may be accounted for by their being chiefly dependent upon the generosity of travellers for their subsistence. They are poor creatures, nearly naked, and living in circular low hovels, loosely constructed of stones, and covered with sea-weed and the leafless branches of small trees. Their huts exactly correspond with the description given of them by Ibn Bātūtah in the fourteenth century.

Their holy functions have not, apparently, improved their morals; at least, they could not resist the temptation afforded by my launch, which with some officers and ten men spent one night at Hāsek, as on their departure in the morning, they discovered that not only their three cooking-pots had been stolen, but the remains of their provisions also, consisting of biscuit and salt-pork.

Rás Samhör is a low rocky point, forming the northern extremity of Bander Nús, and having two small rocks a few yards distant from it. The tomb of Nebí Šāleh ibn Húd,‡ placed in a small valley between Rás Samhör and Rás Hullán, about 1 mile from the sea, in 17° 16' 30" N., and 55° 21' 40" E., was once an edifice of some strength and splendour. It is 50 feet long, and nearly of the same breadth. Its roof was originally supported by sand-stone pillars, and hewn blocks of the same kind of stone formed

* Port of Nús.

† The Prophet Šālih, son of Húd. They should say Húd-ibn-Šālih. Concerning Húd, i.e. Eber, son of Salah and grandson of Arphaxad (Gen. x. 24), much may be found in d'Herbelot's *Bibliothèque Orientale* (Houd).

‡ Kabr Húd, the tomb of Húd in Abū-l-fedá, Geogr., i. 99; Edrisi, i. 54; Pococke, *Spec. Hist. Arab.*, p. 36. It is only from extreme ignorance that they say Nabí Šālih instead of Nabí Húd-ibn-Šālih.

its walls. The whole is now a mere heap of ruins. It is said to have been frequented as a place of worship and pilgrimage prior to the time of Moḥammed. Húd must have lived about the time of Abraham, after the destruction of the tribes Thamúd and 'A'd. The veneration formerly shown to the remains of this saint has much diminished; few strangers now visit his shrine, and they only coasting-traders, attracted by curiosity rather than devotion. The Gharrah tribe make no annual visit to the tomb to thank the prophet for their enjoyment of all earthly comforts, which, according to their ideas, consist of their wives, children and flocks.

The tomb itself, supposed to contain the prophet's body, is 23 feet in length by 4 in breadth, and is constructed of fragments of white limestone and madrepore, plastered with clay and cement. The pilgrims approach the last resting-place of the departed saint with great reverence, walking slowly round it three times, and frequently inclining their heads so as to press their lips on the tomb. Prayers are repeated as they walk round, which being finished, they slowly retire, and make a last prostration at the door.

Rás Hullán* is a low rocky cape immediately to the S. of Rás Samhál, and bearing from it S. 25° W. true. Rás Samhál is a low rocky point on a transit line with Rás Nús and Rás Hásek. It takes its name from the Wadí Samhál, a well-wooded valley, which has a spring of fresh-water, and a pool of brackish water near the sea. The three capes last named are merely slightly projecting rocky points, close to each other, and forming the irregular outline of the coast between Nús and Hásek.

Rás Hásek is a low projecting rocky point in 17° 21' 35" N., and 55° 23' 50" E., forming the S. point of Ghubbet-el-Dhúm.† It affords a shelter from southerly winds for boats that have occasion to anchor at Bander Hásek‡. The bay forming Bander Hásek is very small, and the soundings do not extend off shore 400 yards, at which distance I could not find bottom at 130 fathoms. At a short distance from the centre of the bay, and in a valley, are the ruins of the ancient town of Hásek, with the stumps of a few dead date-trees, and a well of brackish water. Some of the people here were entirely without clothing, living exclusively on fish, and wretched in the extreme. Immediately to the S. of Rás Hásek, in a slight curvature of the coast, there is a plain called Súk Hásek, from its having been the market-place when

* Cape Kid.

† Ghubbet-el-dúm, *i.e.* palm-tree-bay. Dúm is the bifurcate palm, called by botanists *Cucifera Thebaica*; but here it signifies the Nebek, a kind of jujube (*Zizyphus spina Christi*), according to M. d'Abbadie, *l.c.* p. 132.

‡ Port of Hásek, a town of great antiquity in this part of Arabia.—Edrisi, *Geogr.* i. 54.

Hásek flourished. This curve in the coast is sufficient to shelter two or three boats from northerly winds.

An inlet of the sea (the bed of which is now a marsh, separated from the sea by a belt of sand, the accumulation of centuries) once existed in Wádí Hásek, and in all probability formed its ancient port, as its waters would almost wash the base of the old ruined town. A few stunted date-trees are scattered over its surface, and the bed of the valley higher up is densely filled with acacias, tamarisks and other small trees. The slopes of the mountain produce the lubán, or frankincense, which is collected in small quantities by the Bedowins in the proper season.

The coast from the sea has a wretched appearance, not the slightest marks of vegetation being perceptible to the eye. On shore, however, the valleys are found to be well wooded, having each either wells or a rivulet of fresh-water. To those who prefer grandeur and sublimity to the softer features of landscape, the solemn unbroken face of these limestone mountains, and the sharp peaks of the granite ranges (one of which, Jebel Habaríd, attains an elevation of 4000 feet), present a very striking scene; but the sailor, and still more the surveyor, weary of looking upon the same barren peaks, prefers the sight of green trees, and sighs for a verdant plain where he may stretch his limbs after months of confinement on board a vessel, where his space is limited to 26 by 96 feet.

Curia Muria Bay.—Ghubbet-el-Dhúm is a bay on the W. side and within Curia Muria Bay, having Hásek for its southern and Rás Montejib for its northern boundary. The land surrounding it is high, precipitous and tabular; containing three conspicuous ravines, the principal of which, called Rekót, is said to extend to the confines of Hadramaut, having the peak of Habaríd and the Subhán range as its southern boundary.

As far as we examined the valley it appeared thickly wooded, and apparently well watered. The breadth of the water-course, and the huge masses of rock that have been swept down it, fully attest the force of the torrent after a heavy fall of rain.

At the entrance to the Wádí we discovered a spring and a lake; the latter being, from its neighbourhood to the sea, brackish. It was apparently the remains of rain-water mixed with water from the sea which had oozed through the sand. During the rains this watercourse would doubtless be a river discharging itself into the sea; which accounts for the "Prim" * river, marked in the old maps and charts of this part of Arabia. Some wild ducks and widgeons were shot on its banks.

At the extremity of Wádí Rekót, or Dhúra, which the Bedo-

* There was a town on the coast of Hadramaut called Berím (Jehán-númá, p 491), whence, changed into Prim, this supposed river received its name.

wins stated was 7 days' journey (140 miles*) from the sea, we were told it opens upon a fine and fertile country, abounding in all the necessaries of life; which, according to Arab ideas, I conceive to mean millet,† dates, and plenty of water to irrigate the soil and make it yield a good harvest without any great exertion of labour. The country is called Jezzár, and is inhabited by a branch of the Mahrab tribe. The principal town in this fertile district is called Jezzár also; and there is another large Bedowin station 3 days' journey from the sea, or about 60 miles. The mountainous tracts on the way to Jezzár are also fruitful, yielding abundant pasturage for the flocks and herds which form the chief wealth of the inhabitants.

Rás Montejib is a bluff headland, slightly projecting from the Bay of Ghubbet Dhúm. From it the coast takes a turn more northerly till it reaches the sandy beach which extends for 15 miles E.N.E. to the western cliff of Shuwámíyah.

Rás Shuwámíyah is a name borne by two different bluffs, neither of which deserve the appellation of capes, being only slight projections distant from each other $10\frac{1}{2}$ miles E. $\frac{1}{2}$ S., and $10\frac{1}{2}$ miles N. The coast between them is a line of limestone cliffs, forming a table-land from 400 to 600 feet in height. The western bluff is the darkest land surrounding the bay; having some trees and fresh water close to it, near the sandy beach above mentioned. The eastern bluff bears from Ras Minjí S. 83° W. true, distant $10\frac{3}{4}$ miles. The whole coast is bold, having 12 and 15 fathoms within 500 yards of the shore.

Rás Minjí is a slightly projecting bluff, nearly 700 feet high. Close to it, eastwards, we found a pool of fresh-water near the sea. The soundings between Rás Minjí and Shuwámíyah are bold, with overfalls. This forms the boundary between the Gharrah and Jenábí tribes.

Rás Karwáu is a low, black, slightly projecting and rocky cape, in $17^{\circ} 53'$ N., and $56^{\circ} 22'$ E.; from which a sandy beach commences, extending in a westerly direction for about 7 nautical miles. This cape is nearly insulated by a small salt-water lake, at the head of which the water is fresh. In the vicinity of this lake we found a few poor Jenábí fishermen, with their families, residing in excavations of the rocks, and subsisting entirely on fish, but possessing a few goats and sheep that grazed on the mountains, tended by the women. I employed them to procure wood and water for the vessel, and wished to pay them in crowns, but they preferred coarse blue and white cloths and rice. In the neighbourhood of this lagoon we found hares, foxes, partridges, plovers, ducks and widgeons.

* One hundred and twenty miles would probably be nearer to the exact distance.

† Jowári, vulgarly called dhurrah by the Arabs.

Native boats running down the coast with dates, frequently anchor for shelter off the low, sandy line of coast to the west of Sherbedát,* and it has therefore obtained the name of Bander Sherbedát. It is good anchoring ground all along, from 5 to 10 fathoms, but on approaching Minji Bluff the bank deepens suddenly from 7 to 30 fathoms. Inside there are $10\frac{1}{2}$ fathoms; the bottom is sand, but outside it becomes rocky.

During the belád or northerly winds, which blow with great violence, a vessel coming from the N.E. should round Rás Karwáú very close, and be prepared for strong gusts, both in rounding and in working in towards the anchorage, off the pool of water.

A large mangrove-tree† near the pool, affords a conspicuous mark for knowing the position of it.

Rás Sherbedát, the eastern point of Curia Muria Bay, is a steep projecting bluff in $17^{\circ} 53' 13''$ N., $56^{\circ} 24' 47''$ E. It has an even table surface, and steep precipitous sides.

Sherbedát and Karwáú are well known, and much dreaded by Arab navigators, from the violent gusts frequently experienced off them, often occasioning the loss of mast, sail, or yard. These blasts may be expected from the end of October to the beginning of March, blowing from N.N.E. to W.N.W. I have rounded these bluffs with double reefs on the cap, and fore-topmast stay-sail, which was as much as the vessel could stagger under. But after opening Sherbedát Bay, we were always able to work into the anchorage under close reefs and courses.

The height of Ras Karwáú is about 800 feet. Its components are nearly the same as those of Sherbedát—namely, a species of sandstone, more or less compact, lying over a horizontal stratum of chalk with masses of flint imbedded in it, and also in veins or seams. This latter stratum is about 25 or 30 feet thick, and has many fossil remains, while the former varies in thickness from 5 to 10 feet: in some places between the two strata are enclosed beds of shells, coral, and other marine productions. The summit of Rás Karwáú appears to be composed of tertiary limestone with fossil remains.

Having thus far attempted a description of this extensive concavity in the line of coast called by Arab navigators Ghubbet Curyán Muryán, I will proceed to describe the islands so named, and the dangers which are situated on the outer edge of the bank of soundings running from the north shore, which is 26 or 27 miles distant, and therefore forms the outer barrier to this extensive bay.

Jezírat Kiblíyah,‡ the Eastern Island, and third largest of the

* Shirbetát (D'Abbadie, p. 132).

† Rhizophora Mangle.

‡ Written Jiblea by the author, and Qibly by M. d'Abbadie. (Bullet. de la

group, is nearly 2 miles long, $1\frac{1}{2}$ broad, and 5 miles in circumference, forming from every point of view several peaks which are composed of primitive limestone, more or less allied to granite. It is rocky all round, with the exception of a sandy nook east of the N.W. point, in which we were able to secure our boats. The highest peak is 550 feet above the sea, in $17^{\circ} 29' 16''$ N., and $56^{\circ} 24' 22''$ E. It is merely barren rock—visited by a few birds of the gannet species. Its other occupants are almost every thing that is disagreeable to man—and they thrive well: snakes, rats, mice, scorpions, and centipedes without number. We found some graves, and some skeletons, in such positions as if the poor creatures had perished from starvation. This supposition was afterwards partly confirmed by the inhabitants of Hulláníyah, another of these islands, who informed me that a ship and a bagalá had been wrecked there, and that in consequence of their not being able to render them any assistance, owing to their having no boats, the crews perished miserably.

Four-Peaked-Rock is a small rock, so named by me from its outline. It lies N.W. of the north-westerly point of Kiblíyah, distant from it 1280 yards, with a rocky channel between them having 2 and 3 fathoms. It is elevated about 100 feet above the level of the sea, and has a shoaly reef extending three-quarters of a mile from its N.W. end, on which there are four small rocks dry at all tides, and several parts of the reef are also dry at low water spring-tides.

Well Rock is a small rock situated off the S.W. part of Kiblíyah, distant from it 800 yards, with a channel of 7, 8, and 12 fathoms water between them, only a few yards from the rock in a south-easterly direction. This rock derives its name from a natural well in it, where we found salt water of a beautiful pink colour, which I imagine is thrown up during the S.W. monsoon.

Dangers off Kiblíyah.—There is a small and dangerous rock even with the water's surface at low tide, situated to the east of this island. It bears from the highest peak E. 11° S. true—and is 7728 yards distant from the island by trigonometrical measurement. Within a few yards of it, the cross transits are Four-Peaked-Rock, in one with the north end of Kiblíyah—and Well-Rock on, with the south end of Hulláníyah. Vessels should be cautious in rounding this island at night, as the soundings are a bad guide; and with a vessel in a breeze, there would be scarcely time to discover the dangers, particularly as the breakers on the rock are not always visible.

Soc. de Géog., ii. 17, p. 132), which shows what it really is, viz., Kiblíyah, i.e. turned towards the Kiblah; but, from the Egyptian use of that word in the sense of eastern, it is here given to the island which is furthestmost from the Kiblah. Kiblíyah has become Jiblíyah by the same substitution of *j* for *k* as is noticed above (p. 127).

Between the rock and the island, the least water is 9 fathoms. Two miles to the N. 95 fathoms; one mile and a half to the S., 60 fathoms; and to the eastward 170 fathoms, at a distance of two miles and a quarter.

The channel between the islands of Hulláníyah and Kiblíyah is perfectly safe, with from 20 to 46 fathoms, and without danger, unless close to the islands.

Jezirat Hulláníyah* is the largest of the Curia Muria islands, being $7\frac{3}{4}$ miles long, by $4\frac{1}{2}$ broad, and nearly 20 nautical miles in circumference. It is composed almost entirely of variously coloured granite and limestone, is mountainous and entirely barren; indeed, on its western side, scarcely a bush was perceptible, but on its eastern face we found a few wild flowers, and a little grass, which served as subsistence for 30 or 40 wild goats. Wood is a scarce article; the largest, and in fact, only tree being the tamarisk. We found three wells of indifferent water, and dug a fourth for our own use, which the inhabitants immediately named "Bír Inkilíz." In the vicinity of the best well on the northern side, and about 1000 yards distant from the "Bír Inkilíz," we found while digging some feet under the surface, two tompons,† and some oaken bucket-staves, from which I should conclude that the place had been dug previously by some whaler. This well is in the N.E. bay, called Ghubbet er-rahíb,‡ in a valley known as Káset el Wádí.§ The other wells are situated towards the eastern side, one northwards, and one southwards.

The eastern and western ends of Hulláníyah terminate in comparatively low points, while the centre is filled up with close ranges of granite mountains, the highest part of which is 1503 feet above the level of the sea, and forms a cluster of chimney peaks closely united. The N.E. end of this range forms a majestic bluff, of 1645 feet in height, being the most lofty part of the island. This bluff forms the N.W. point of the N.E. bay, called Ghubbet er-rahíb. It is steep too, and there are 12 and 13 fathoms close to the rocks.

Hulláníyah is the only island of the Curia Muria group that is inhabited. Its population in 1835 consisted of 7 families, amounting in all to 23 souls.

I found these poor people inoffensive and civil. The men were of small stature, the women stout, and all very far from handsome. They calculated upon one death annually, which did not occur in 1835, while one birth was daily expected, and did take place

* Kid or sheep island. Hullán is a young kid peculiarly fit for sacrifice.

† Plugs or bungs for cannons.

‡ Spacious bay.

§ The bowl of the valley.

before we left the islands, and added one male to their number. This however is not likely to continue, as the women are considerably past the bloom of youth. They have no idea from what part of the coast they originally came, or whether they belong to the Jenábí or Gharrah tribes. It is most probable that they belong to the latter, and that they originally came from Hásek. They profess Mohammedanism, but they are not very scrupulous observers of its tenets; indeed, we saw but one who could say his prayers. Their huts, built of loose stones, are either square or circular, about 5 feet high, and covered with sea-weed. They change their habitations with the seasons, as the surf on the weather side is unfavourable to their fishing from the rocks. They have no boats or rafts, though their daily subsistence depends chiefly, if not entirely, upon their baskets and fishing-hooks. When unsuccessful in fishing, which is seldom the case, as the fish are abundant, crabs and shell-fish serve them for food.

I presented them with white and blue cotton cloth, knives, needles, thread and fish-hooks; and during our sojourn amongst these rude and simple islanders, many an unusual meal of rice did they receive, which they divided with the greatest impartiality. They grill their fish without scaling or cleaning them; and for weeks together this forms their only food. Sometimes they obtain a little tobacco from passing boats, which they consider as a very great luxury.

On enquiring why there appeared so many graves on different parts of the island (I must have seen from 600 to 800), they could give no satisfactory answer, though the oldest among them remembered the Jowásimí pirates visiting the island in about 1816, plundering them of every thing, and carrying away a large part of the population, which since then has never been heard of. Since the Jowásimí pirates have been put down by the English, they have not been molested; but on the contrary, are enabled to obtain from vessels passing the island, small and useful articles in exchange for their dried fish. The boats that touch here, generally anchor in 10 to 12 fathoms, with a sandy bottom, 500 yards off shore, abreast of a small sandy nook, on the north side of the island, and about $1\frac{1}{2}$ mile to the west of two conspicuous sand-hills, that may be discerned at a distance of 3 or 4 leagues. They are about $2\frac{1}{2}$ miles east of the western point of the island.

Besides the trading boats that occasionally touch here, the island is sometimes visited by a boat belonging to the Khalfán family of the Mabrah tribe, who claim the Curia Muria group as their hereditary property. The principal members of this family at present are,

Mohammed ibn 'Alí ibn Seyyid* ibn 'Omar,
 Mohammed 'Alí ibn do do do do,
 Nájim ibn Ahmar.

They reside at Ghazír, and their periodical visit to the islands is for the purpose of claiming any ambergris that the inhabitants may have collected, as well as to obtain a large portion of whatever money they may have received in exchange for their fish. In return they are frequently rewarded with a little tobacco, dates, and coarse cloth; the liberality of the donors generally being limited by the amount of tribute they may have succeeded in exacting.

The anchorage above alluded to, is near the well on the N.W. side of the island, but completely open to easterly and westerly winds, with a breeze from the N. The island is a dead lee shore; any vessel, therefore, anchoring here must be prepared to start at a moment's warning. A small tender which I had, saved herself during one of these violent "beláts," or northerly winds, by running between the sunken rocks off the west end of *Hulláníyah*, and anchoring under the lee of the island; and not 20 days afterwards, the vessel which I commanded had to slip her best bower anchor at 48 fathoms, and, under close reefs, was only just able to weather the outer sunken rock.

These poor islanders, though separated from other nations for a considerable part of the year, and able to exist upon their own resources, enjoy occasional opportunities of visiting the coast, which they consider as the height of temerity. Within the last few years, a few have mustered sufficient courage to embark on board a trading-boat, taking with them salt-fish for barter; and I was present at the return of one of these bold adventurers, who landed amidst the wondering acclamations of the rest of his countrymen, with whom he had spent his life: although he appeared rejoiced to return to the scenes of his early youth, it was evident when he walked up to his friends, dressed in a bright chequered turban, with a gay dagger, that the simple islander was changed by seeing the world, and that considerable self-esteem and pride had found their way into his bosom.

The western point of *Hulláníyah* is called by the Arabs "Rás Shatt;," † by the islanders, "Erékhi Frahunt." The eastern point is called "Rás Sáir."

The high bluff called *Erekh Er-rahib*, is in 17° 32' 43" N., 56° 7' 17" E., allowing the Bombay flag-staff to be in

* This is the same word as is spelt before, according to the Indian pronunciation, Sayyad: it signifies a noble or lordly personage, and especially one descended from the Prophet. For an account of the Khalfán family see De Sacy's *Chrestomathie Arabe*, 2nd ed. iii. p. 357.

† Point Shore.

72° 54' 26". The variation in 1835, by upwards of a hundred observations, was 2° 45' westerly. High-water, fall and change, 8 h. 20 m. Rise and fall, 6 feet 6 inches. On the N. side, the ebb sets to the eastward, on the S. to the westward. The flood sets *vice versâ*. Ghubbet er-rahîb, or "the large bay," forming the N.E. side of Hulláníyah, is $3\frac{3}{4}$ miles from point to point, and $1\frac{1}{4}$ mile deep. Its N.W. point is the highest part of the island, forming a bluff, as before mentioned. Its S.E. point is Rás Šáir. Shelter might be found in it from south-easterly, southerly, and south-westerly winds, and a vessel might obtain fresh water by anchoring in 10 or 12 fathoms, about 800 yards off shore, with the extremities of the bay from N. 35° W., to S. 65° E. true, abreast of a small nook with a sandy beach, which may be known by a small peak that forms its eastern side. This nook is situated 1 mile to the westward of the E. end of the long sandy beach in the centre of the bay. The well is at a distance of 400 yards, in the centre of the valley, turning westwards, and is the best built well on the island.

Besides the goats, before mentioned, some wild-cats were seen, as also whip-snakes, scorpions and centipedes.

Kirzáwet,* or Rodondo, is the smallest island of the Curia Muria group, being a mere rock, which has a double peak, and a low point extending eastwards. The base of this island is formed of four rocks, all closely grouped together, composed of red granite. The highest peak is elevated 230 feet above the level of the sea, and bears from the majestic bluff of Hulláníyah true N. 55° 20' E., distant $6\frac{1}{4}$ nautical miles. The only dangers off it, are two rocks, one situated about 300 yards to the W. of it, and the other to the N.W., 100 or 200 yards off, with a channel having from 8 to 16 fathoms water between them. In all other bearings this island may be safely approached, as it has 20 fathoms within 500 yards of its shore. It can be seen 25 miles off on a clear day, from an elevation of 13 feet.

The channel between the island of Hulláníyah and Sódah is $4\frac{1}{2}$ nautical miles broad, but the safe channel is on the Sódah side, owing to the western point of Hulláníyah having several sunken rocks off it. The extreme sunken rock on the W. bears N. 86½ E. true, from the high peak of Sódah, and is distant from the low point of Hulláníyah 3660 yards, thereby reducing the channel to 5190 yards. The sunken rocks alluded to, are in some parts dry at low water in spring-tides; at other times, in a breeze, there is a break on them. They are distinct from each other, having 10 to 12 fathoms water between them; but I should not recommend any vessel to attempt to run through that pas-

* Or Kirzáút. Rodondo, "round," is a Portuguese name.

sage, unless it were unavoidable, as the tides are strong, and the breaker on the rock is the only guide. The advice which I consider as most necessary, either for night or day, is to keep on the Sódah side of the channel, which is rocky all over, with overfalls of 3, 6, and 10 fathoms at a cast; but in no part between Sódah and the western sunken rock, are there less than 7 fathoms, unless very close to either. In mid-channel there are 12 and 13 fathoms. The ebb sets through the channel northwards, but it is much influenced by the sunken rocks.

Sódah* Island is the second largest, and second towards the W. of the Curia Muria group. Its highest peak is 1310 feet above the level of the sea, composed entirely of granite, stratified like Hulláníyah. Its extreme length is 3 miles, and its breadth nearly 2 miles. Its shape is an oblong, concave in the centre of its longest side, and its outline is an irregular slope from the high peak to its extremities, which from all views are low. There is a bay on its south side, about 1500 yards deep, with good anchorage, decreasing from 10 fathoms as you approach the centre of the bay. The entrance is $\frac{1}{2}$ a mile wide, and the bay is exposed only to winds from W.S.W. to S.

This island has many small projecting points, off which, reefs extend from 100 to 300 yards, affording coves for boats. It is extremely barren, having no trees but tamarisks. Here and there a few wild flowers, similar to those in Hulláníyah, are scattered about, and a scanty supply of grass and moss was found near the summit of the peak. It was inhabited about 20 years ago, and the remains of rude dwellings are still visible on its south side, near a well, which on our arrival was dry; but which, on being cleared out, yielded a quick supply of brackish water. The last dwellers on this desolate spot, were two women: of these one died, and the other remained "sole monarch of all she surveyed," after the decease of her companion (with whom she confessed to have repeatedly quarrelled), until taken off by a charitable Arab navigator, and conveyed to Hulláníyah, where she was living in 1836, and told many strange tales.

The soundings immediately round this island are as follows:—

Between the E. and N. points 20 to 30 fathoms, close in; from the N. to the W. point 20 to 30 fathoms, a mile off; on its S. side 60 to 130 fathoms, $\frac{3}{4}$ mile distant; and off the S.W. side 40 fathoms at a mile distant.

Off the S.E. side, between this island and Hulláníyah, the bank extends southwards, but deepens suddenly from 33 fathoms.

At the E. end of Sódah there is a sunken rock 1100 yards off-shore. The channel between the island and the rock is safe.

* That is, black.

Westwards of the rock $\frac{3}{4}$ of a mile, a vessel will have from 25 to 30 fathoms, deepening further off.

The high peak is in $17^{\circ} 29' 37''$ N.; and allowing Bombay flag-staff to be in $72^{\circ} 54' 26''$, is $55^{\circ} 56' 25''$ E.

Hásikí,* the western island of the Curia Muria group, is $1\frac{1}{2}$ mile long by $\frac{3}{4}$ broad, composed of granite, without a vestige of vegetation, or the appearance of ever having been tenanted by man. It was covered with thousands of birds of the gannet species, the excrement from which gave the island a white appearance. It is rocky all round, with 2 nooks on its eastern side.

The most elevated part of this island is 500 feet above the sea, and is situated in $17^{\circ} 27' 16''$ N., and $55^{\circ} 40' 49''$ E. Like Sódah, it has a sunken rock off its western side, with an intermediate channel of 16 fathoms. This rock is about 150 yards long; and is visible from the beach with the slightest swell. There is no other danger off this island.

The channel between Hásikí and Sódah is safe, with the exception of the sunken rock off the W. side of Sódah, previously mentioned. In a line drawn from the N. side of Sódah to the N. side of Hásikí, there are soundings from 35 to 40 fathoms: to the S. of that line the water suddenly deepens off the bank.

The longitudes here given are deduced from chronometric measurements made in 1834—5, and 6, with 8 and 5 chronometers to a fixed point, and from them again by trigonometrical measurements, assuming Bombay light-house to be in $72^{\circ} 54' 26''$ E.

From Rás Karwáú to Rás Saukirah,† the land is about 600 feet above the sea, precipitous to the water's edge, and composed of tabular limestone. Between these points there are 3 slightly projecting bluffs, between which the coast is slightly concave. The soundings along this line of coast are regular, a vessel finding 27 fathoms 300 yards off-shore; but, after passing Saukirah, the bank of uneven soundings, called Rejjat Jeddar,‡ commences. From Rás Saukirah, which is elevated 622 feet above the sea, the bluff cliff takes a sudden turn to the north, leaving from thence a barren sandy beach as far as Rás Khasháim.

Off Saukirah the soundings are more shoal off-shore than in-shore, varying from 25 to 33 fathoms.

To a vessel making Rás Saukirah from the N.E. it will appear a perfect bluff, slightly concave in the centre of its perpendicular, and to the N.N.E. of it there will rise a barn-shaped hill, which at first appears separated, but on a nearer approach is found to be situated on the summit of the adjacent table-land. The

* Hásikí, rapidly pronounced Hákí, signifies belonging to Hásik, and evidently derives its name from the neighbouring town so called.

† Vulgarly, Súgrah or Sógrah.

‡ Or Rejjat el-Jázir. Rejjat signifies "Ripple."

whole line of coast, with the sun shining on it, has the appearance of clay cliffs. The table-land runs more easterly under the barn, and gradually approaches the sea-shore near Karát, when it is again lost in the northern distance, leaving merely a sandy shore, thinly sprinkled with mangrove-bushes, until it joins the table cliffs of Ras Khasháim.

Rejjat Jezzá, a rocky bank of overfalls of considerable extent, commencing immediately N.E. of Saukirah, and extending along the coast for 20 miles, and off-shore 12 or 15 miles. In some parts there is a depth of 12 fathoms for 14 miles off-shore, and 26 fathoms at a distance of 18 miles. In other parts 5 and 6 fathoms are found 8 and 10 miles off-shore, while, close in, the bank is nearly dry at low-water, 2 miles from the beach. This bank is much dreaded by the Jenábi fishermen, as the rocky bottom destroys their káir* cables. There is also a very heavy ground-swell at times, and the natives feel doubtful whether dangers exist or not. I found none under 6 fathoms, but during November, I had frequently great difficulty in keeping my station, with sometimes two anchors and 160 fathoms of chain-cable.

I had much trouble in surveying the miserable tract of coast between Saukirah and Khasháim, as, during the N.E. monsoon I experienced, at all times, a very heavy swell, the vessel rolling her scuppers under with a whole cable on end and top-gallant masts on deck. Two or three times, indeed, she carried away all deck and bit-stoppers, straightened hook-stoppers, and took out the bowers to the clinch. Notwithstanding the weather, the vessel, tender and boats, by the resolute perseverance of my officers, accomplished this part of the survey, with about 5000 miles of cross-soundings, in less than two months, without a single accident, or even sickness, to those thus exposed and wet through from seven to ten hours a day.

This desert line of coast is scantily inhabited by a few miserable fishermen of the Jenábi tribe, who, from their mode of life, may be classed among the Ichthyophagi. They go out to fish seated on inflated skins, and it is surprising to see how well and safely they push off through a heavy surf, such as no boat could live in; and from my experience on this coast, I can with confidence state that they are seldom without such a surf as would make the landing in a ship's boat, a hazardous experiment. They catch immense numbers of sharks, and while fishing, they would, to an observer, appear to be protected by a charm, as the sharks never appear to attack their exposed limbs. They dry the fins and tail, which they carry to Jezírah, whence they are exported to Maskat by passing vessels. Poor wretches! their fate appeared

* Káir is the fibre contained in the husk of the cocoa-nut.

a hard one. I pitied them, and made them a present of some rice and cloth, which put them in ecstasies. Rás Khasháim is a dark, bluff, slightly projecting cliff, but certainly not sufficiently prominent to deserve the appellation of a head-land, bearing (W. ?) from Rás Jezírah (Cape Isolette).

The cliffs from Khasháim, of a similar formation with Rás Karwáú, run in an E.N.E. direction nearly 3 miles, and then turn northerly, forming a concavity in the coast, with a sandy beach called Bander Jezírah.* The cliffs are steep and inaccessible, and the soundings very bold, having 3 and 4 fathoms within a few yards.

Bander Jezírah is a small bay with a sandy beach, situated immediately westward of Rás Jezírah, or Cape Isolette,† and between the latter and the cliffs of Rás Khasháim. In the bay, the soundings are principally mud and sand, and a vessel may anchor in any part of it. Boats from northwards frequently anchor here to procure sharks' fins. If, however, a vessel is caught with a strong S.S.W. wind, which is not unfrequent during the N.E. monsoon, she should change her position round to the N. side of the point.‡

Cape Isolette, or Rás Jezírah, $18^{\circ} 58' 28''$ N., and $57^{\circ} 51' 7''$ E., has received its European name, I imagine, from its appearing like an islet when approached from the sea, while the point is in reality formed by three different capes, viz. Rás Markaz, Rás Jezírah, and Rás Khasháim, which make one prominent cape, marked on the old charts Isolette. Rás Markaz,§ which is a high bluff table-land with precipitous cliffs, I saw twice at 33 miles distance, and Rás Jezírah at 26 miles.

When first seen, Rás Jezírah presents the appearance of small hillocks; but on a nearer approach a small circular hill is observed on the summit of the cape, resembling a rude natural pillar. This, however, is not distinguishable until long after the high peak (in some points of view appearing like a saddle) is in sight from the deck.

This cape is chiefly of a limestone formation, lying in horizontal strata, of which the lowest is of a more compact structure, and in some degree hardened by the action of sea-water. The upper stratum approaches more nearly to chalk, having imbedded in it small shells and pebbles, while at the highest part of the peak or

* Port Island.

† More properly Cape Island. "Isolette" would be in Arabic Jazeirah, but no such diminutive appears to be in use. It is called Madrakah by the Indians (D'Abbadie, p. 131).

‡ The position determined as the eastern extremity of the sandy beach of Jezírah Bay 1800 yards E.N.E. of the natural pillar named Tagrad Ahbak, is in $1^{\circ} 58' 28''$ N. and $57^{\circ} 51' 07''$ E.

§ Cape Centre.

cape, the hill is of an uniform structure, and partakes of the character of a trap formation (green stone).

From Cape Isolette a low point runs out to the N.E. $4\frac{1}{2}$ miles, from the extremity of which the coast forms a concavity for a short distance, and then turns northwards to Rás Markaz.

The coast from Jezirah to Rás Ruus* has never been surveyed, and I have never run along it. The water is shoal, and the bottom very uneven, from Rás Markaz to Ghubbet Hashish† (the bay and channel between Mošeirah and the main), which is reported by the natives to be unsafe, though hundreds of small craft, of from 40 to 50 tons, continually pass through it.

Navigators passing along the coast from Isolette northwards should be very careful, as I always experienced a strong indraught or current towards the channel, generally of 2 or 3 miles per hour, compelling me to steer two points higher than the direct course.

While coasting along Mošeirah I made its length $38\frac{1}{2}$ miles; its N. end, Rás Jeï, in $20^{\circ} 43' 30''$ N., and $58^{\circ} 57'$ E.; and its S. end, Rás Bîr Resâs,‡ in $20^{\circ} 8'$ N., $58^{\circ} 38'$ E. Boats were numerous, and one village was perceptible; but I did not land, my orders being to commence my survey from Isolette. The soundings on the E. side of Mošeirah§ appeared very deep, and without danger, but northward they apparently extended a considerable distance off-shore. I had 60 fathoms 20 miles from the coast, in lat. $21^{\circ} 15'$ N.

The island of Mošeirah is of a moderate height, its loftiest peak being about 600 feet high, as far as I could judge. Its outline is uneven, broken by numerous rocky points and sandy bays. Parts of it are cultivated, and its population (of the Jenâbî tribe) tolerably numerous. When I was surveying at Rás Jezirah, Mošeirah was governed by two sheikhs, apparently independent of each other, but nominally tributary to his Highness the Imâm of Maskat. They have many boats, and I fear are much given to plunder when they meet any party weaker than themselves.

The Arabian coast from Mošeirah to Rás Ruus is moderately elevated near the sea, with slightly projecting rocky points. Inland the mountains are high. The soundings along the coast are bold.

Rás Ruus is a slightly projecting but bold rocky cape, with an anchorage on its south-western side. From this cape the land takes a more easterly turn, running nearly N.E. and S.W.; and about 5 miles N.E. of the cape there is a bluff point under which vessels can find shelter from the northerly winds. Five miles to the N.E. of this bluff there is another cape called Rás el Khabbah,

* Cape Heads. Ruweis (D'Abb.).

† Cape Leadwell.

‡ Herb or Grass Bay.

§ The goal, or object aimed at.

under which similar shelter is found. Its extreme point bears N.E. in 6 fathoms, about 600 yards off-shore. This cape is in $22^{\circ} 4' N.$ by observation, and on exactly the same meridian as the low sandy point of Rás el Hadd.

From Rás el Khabbah the line of coast runs in a N. $\frac{1}{4}$ W. direction till it reaches Rás Aḵanís, or Aḵnís,* being very bold, running out into small bluff points, with intervening, sandy bays. Its aspect is extremely sterile, but flocks of goats and sheep were seen grazing on it. The soundings are deep close in-shore.

Rás Aḵanís, or Aḵnís, on the eastern point of Arabia, bearing from the low sandy point of Rás el Hadd nearly S.S.E. 5 miles, is a bluff rocky point under which boats find tolerable shelter during northerly winds, in 6 fathoms, with sand and rocks, the point bearing N.E. This cape is in $22^{\circ} 18' 45'' N.$, and $60^{\circ} 0' 40'' E.$ There is a well of water W. of it, inland from the sandy beach.

Rás el Hadd,† the N.E. point of Arabia, is a low sandy point in $22^{\circ} 23' 30'' N.$, and $60^{\circ} E.$, allowing Bombay lighthouse to be in $72^{\circ} 54' 26'' E.$ It has a spit running from it for nearly 300 yards. From this point the land suddenly turns, in a W.N.W. direction, towards Khór‡ Jerámah. When off Rás el Hadd, a fort, with a village and some trees, are seen near the pitch of the cape, called by the natives Gharkah; and W.S.W. from Rás el Hadd about 10 miles, and N.W. from Rás el Khabbah, is Jebel Sáffán,§ a very good mark for knowing Rás el Hadd.

From this low sandy cape, in a N.W. by W. direction, rocky cliffs and points extend till you open Hajarah Bay, which is 3 miles from the cape. The points at the entrance are rocky, but with deep water in the channel, and anchorage ground in from 10 to 20 fathoms outside. The upper part of the bay, which almost joins the village of Gharkah, is shallow.

From Hajarah Bay the coast continues in a north-westerly direction as far as the entrance to the fine inlet of Khór Jerámah, at the entrance of which a vessel may anchor in 8 or 9 fathoms, or proceed at once up the creek, carrying 6 and 7 fathoms; but she must keep on the left-hand side, as a shoal, with 2 or 3 fathoms on it, exists on the right-hand side of the channel, about a quarter of a mile from the entrance.

This creek is 4 miles deep, but narrow for the first mile and a half, till you open out an island, on each side of which there is a clear channel, the western one having 3, 4, and 5 fathoms, and

* Aḵanís, or aḵnís (al ḵanís?), summits—ḵanís is the crown of the head. Jinz (D'Abb.).

† Cape Boundary.

‡ Properly Khaur, i.e. a bay, gulf, or inlet.

§ Mount Captain. Saffnah is a ship, and Saffán the captain of a ship; but Sfanát, given by M. d'Abbadie (p. 132), is put for Saffánát, 'pearls,' and probably right.

that to the eastward 6 and 7. From this island, the creek opens out to 2 miles in width, and becomes shallow at its upper part, on the S. side, the shore of which is low marshy ground, covered with wood.

The entrance to Khór Jerámah is in $22^{\circ} 28' 10''$ N., $59^{\circ} 53' 30''$ E. Full and change, 7 hours; rise and fall of tide, 9 feet.

Šúr Creek is the next on the coast; it has shallow water 10 and 12 feet off the entrance, and a bar across it, with only 2 and 3 feet water on it at low tide, deepening to 15 feet further up the channel. There is a small village on the left side of the entrance, and a larger one further up the creek on the right hand, with the fort and village of Šúr about $3\frac{1}{4}$ miles from the entrance. High water at full and change, 8 hours; rise and fall nearly 10 feet.

APPENDIX.

I.—On the Winds and Weather within the Gulf of 'Aden.

WITHIN the Gulf of 'Aden—that is, between the meridian of Cape Guardafui and Báb el Mandeb—during the months of January, February, and March, easterly and east-north-easterly breezes may be expected, increasing from 'Adén to the Straits. The thermometer ranges from 68° to 80° Fahr., with pleasant and generally clear weather. Rain may sometimes fall, but not in any great quantity. These are the principal months for the trade, in which boats from 50 to 300 tons are engaged.

In April and May the winds are generally light, varying from E.N.E. to S.E. and S., with clear weather. I have, however, seen thick, hazy weather; and in-shore, I have experienced land breezes from 4 to 8 A.M. in those months, and on one occasion, in May, a strong westerly breeze. In April the weather becomes warmer, and the mercury rises to 80° and 86° ; and in May, owing to light winds and calms, the heat is frequently intolerable, the thermometer then ranging from 84° to 95° . I have seen it rain at 'Aden three days successively in April, but in some years scarcely a shower has fallen. Heavy dews at night may always be expected.

June is a very unsettled month. The wind is uncertain, and the weather at times clear, but generally hazy. In the morning it is either calm or else there are very light airs, which sometimes increase towards noon, and blow pretty fresh from the S., occasioning a long swell on the Arabian coast. Towards the middle of the month, between Burnt Island and the Straits, westerly winds may be expected, blowing through the Straits with violence, and sometimes enabling a vessel bound to India, to reach the monsoon. During these strong westerly winds, the thermometer will fall below 80° in the morning, and not exceed 85° during the day; and the change of temperature felt by a person coming down

the Red Sea is surprising, as immediately after the Straits are passed the mercury falls 10 degrees.

July and August may be classed together as similar. A few clear days occur, but generally speaking the sky is hazy; and I have experienced a thick impenetrable fog for 2 or 3 days together.

Taking the average of 6 years' experience, out of 62 days, it blows hard from the W. and S.W. for 38 days, and during the remainder, there are moderate and fresh southerly breezes during the day, and light airs at night, with a long swell setting on the Arabian coast. The climate, owing to the strong westerly winds and rain *within* the Red Sea, is not so insufferably hot as in May and June: indeed in-shore, the mercury sometimes falls to 68° and 70° in the morning, and does not rise above 82° or 84° during the rest of the day, but the general average is between 77° and 87° Fahr. This relates to a vessel at sea, but within the town of 'Aden, the thermometer varies from 84° at sunrise to 104° with the sun past the meridian, during the westerly winds; while at the W. point, forming the entrance to its splendid harbour, the thermometer varies from 74° to 88° at the same period. This difference is caused by the wind's crossing the high mountain of Shemshán before it reaches the town of 'Aden, whereas at the W. point it meets with no obstruction. During 6 years, I never recollect seeing more than a few passing showers of rain outside of the Straits, but in general, the dew at night is heavy. In these months, a vessel may in the evening, after the southerly wind subsides, experience a severe land-quall, with thick dust, which, rising as a dense cloud, gives good time for the seamen to prepare for it.

In September the westerly wind ceases, and land and sea breezes prevail during that and the following months, with calm sultry nights, rendering the heat oppressive. The thermometer ranges from 84° to 96° Fahr. Towards the latter end of October, the nights become cooler, and at sunrise, the thermometer will sometimes stand as low as 78° and 79°. I have witnessed a few slight showers in October. From the commencement of November to the end of the year the weather gradually becomes cooler; and the N.E. monsoon, which reaches Makallah about the 5th of November, gradually increases, blowing fresh at the spring-tides: and, strange as it may appear, it is a fact that for four years successively, I observed that, from the 27th of December to the 3rd of January, the weather was generally threatening, and a gale blowing, with heavy rain on the Arabian coast. During these months the winds are principally from E. to E.N.E., with pleasant weather, and a temperature ranging between 76° and 84°.

The wind which is generally termed in India the S.W. monsoon, blows out of the Red Sea in a southerly direction varying with the line of mountains on the Arabian coast. Outside of the Straits it takes a westerly direction, but it seldom extends far beyond 'Aden. At Rás 'Ağēir, on the coast of Africa (commonly known as Guardafui), it blows with great violence along the coast from about N.N.E., and thence across the Gulf of 'Aden to Rás Rehmat, a cape S. and W. of Makallah. On this line, a vessel generally enters the monsoon when proceeding from the Red Sea eastwards.

From Rás Riyámat to the Straits, the westerly and southerly winds

prevail, and a long southerly swell is experienced. The monsoon, however, forms a decided line from Rás 'Aseir to Rás Riyámat, and thence eastwards as far as Rás el Hadd, blowing with more or less violence according to the month and the moon's age.

II.—On the Winds and Weather likely to be experienced beyond the Gulf of 'Aden, along the line of the Arabian Coast as far as Rás el Hadd.

In December, January, February and for 15 days in March, the N.E. monsoon blows along the line of coast, changing according to the inflection of the land; while, at a distance from the land, it blows from N.E. to E. by S., with clear, pleasant weather, free from squalls and rain. This description will answer for every part of the coast above alluded to, with the exception of that part which lies between Rás Seger and Rás Karwáú; and more especially with the exception of the extensive Bay of Curia Muria, which is so entirely different from other parts of the coast that I have judged it best to give a Table of the weather during the tedious, trying time that I was employed in making a trigonometrical survey of it. The sudden changes of the winds, and the great violence with which they blew, frequently rendered the position of the surveying-vessel which I commanded dangerous; nor could she have been extricated but for the activity of the officers and crew, and her good supply of ground-tackle (4 chains of 125 fathoms each, and 6 anchors out-board). It is also necessary to observe that these changes give no warning; owing to which I was compelled, for the safety of the vessel, to secure her 30 miles from the islands, while I surveyed them in my boats: and it was not an uncommon occurrence for boats to be manned and ready, when, from a clear, serene sky, a light arched cloud would appear over the table cliffs surrounding the Bay, and in five minutes (just time enough to run the boats up) we could not see 10 yards from us, and it blew a perfect gale from the northward. These winds are termed by the Arabs Balát, or Belát, and are much dreaded: but what surprised me more than these land-winds, were the frequent and heavy gales from S.S.W. during February and March, blowing for 6 days together. In one of these, after the close of the survey of the islands, I was overtaken, when surveying round the Bay on a dead lee-shore, having parted two bowers. My night-orders were to run the staysail up if she parted, and steer for the sandy beach on the N.W. side of the Bay, the only way to save the crew, as the vessel would never work to windward in blowing weather.

I now subjoin the following Table of the weather:—

SYNOPTICAL TABLE of the Weather experienced off the Curia Muria Islands in 1835 and 1836.

Date.	Winds.	Date.	Winds.
Dec.		Feb.	
14	Light E.N.E. to E.S.E.	1	E. and moderate.
15	Light S.E.	2	E.N.E. and light.
16	Light S.E. and S.	3-5	Fresh gale N. to N.W.
17, 18	Hard gale from N. to N.W.	6	Moderate E.N.E. breezes.
19	Fresh W.N.W.*	7	N.E. to E.S.E. moderate.
20	Fresh gale N.W. to N.	8, 9	Fresh gale N. to N.W.
21, 22	Moderate A.M., light P.M. N.	10	Moderate N.N.E. to E.N.E.
23, 24	Light E.N.E.	11	Fresh southerly gale to S.E. by S.
25-27	Light airs and calms.	12-14	S. to S.W. by S.; fresh gale.
28	A.M. N., P.M. S.E.	15	Calm light airs, clear sky.
29, 30	Light E.N.E. and S.E.	16-18	Hard gale N. to N.W.
31	Calm.	19, 20	S.S.E. to S.W. fresh.
Jan.		21	Moderate gale at S.S.W.
1-5	Hard gale N. to N.W.	22, 23	N. moderate gale.
6	Fresh A.M., P.M. light airs.	24	Gale at S.S.W.; squalls and rain.
7-11	Light land and sea breezes.	25, 26	Hard gale S.S.W.†
12-17	Moderate from N.E. to E.S.E.	27	Moderate S.S.W.
18-23	A furious <i>beldt</i> from N. to W.N.W.	28	S. by E. to S.S.W. moderating.
24	Moderate gale, P.M. light airs.	29	Moderate.
25-27	Blowing a gale from N. to W.N.W.	March	
28	Moderate N.E.	1	S.E. by E. to S.; moderate.
29	N.E. to N. moderate.	2	E.S.E. to S.S.E.
30	N.N.E. light.	3	Fresh S.
31	N.E. moderate.	4	Light airs from N.N.E. to E.

* Reliance whaler wrecked during the night, crew saved by me.

† Vessel parted two bowers.

These northerly gales do not extend far southwards, but appear to be confined to the limits above-mentioned: when clear of Curia Muria Bay, and past Rás Nús, they blow along the line of coast, being influenced by the high range of the Subhán mountains towards Morbat, in which anchorage the water is smooth from the wind's blowing off-shore: but through the deep valley of Dhofár it again blows off-shore with great violence.

The southerly breezes appear also confined to that part of the Arabian coast, as to the southward they are seldom felt, and the S.W. monsoon does not reach Sokotrah before the 1st or 10th of May. For three years successively, it reached Sokotrah the 4th of May, with heavy rain on the 6th and 9th: so that navigators coming from the Gulf towards the Red Sea must not take the S.S.W. winds they may fall in with in February or March for the S.W. monsoon, as has been the case; and in consequence of such a mistake, a fast-sailing vessel, to my knowledge, bore up for Bombay. From the 15th of March till April, the winds are light and variable along the whole line of coast, and the weather warm: land

and sea breezes then enable the crowd of boats from Şúr and Moşairah to run back with their cargoes of shark-fins, the produce of some months' toil, to the southward. The sky is then generally cloudless, and the atmosphere light and pure, with heavy night-dews.

May is a doubtful month; for if the monsoon is early, it may blow hard from the S.W. At times, however, moderate weather is experienced.

During June, July and August, the S.W. monsoon is in its full strength, and at times blows very hard along the whole line of coast, particularly in July. In the early part of June, large boats run from the Red Sea to the Persian Gulph; and this voyage, which is accomplished after the first blast of the monsoon, is termed the "tadhbir." * They also set sail at the latter end of August, and run up during the "deg-máni," † or after the strength of the monsoon is over.

During the month of September the winds are moderate from the W. and S., and the weather is warm.

In October light uncertain breezes and calms are common; land and sometimes sea-breezes when in-shore; and at night cloudy with passing showers of rain.

In November I have found the N.E. monsoon generally reach the coast of Arabia between the 18th and 20th; after which the winds blow along the coast—that is, from the N. and E.; but prior to the monsoon, the weather is the same as in October, and also rainy.

On concluding this subject, I would observe that the experience of several years along this coast has taught me not to place implicit confidence on the regularity of the seasons, as I have frequently during the same month, in different years, experienced exactly opposite winds. In March, 1835, I was twenty days in passing from the Curia Muria islands to Makallah, with southerly and westerly winds, and adverse currents: and in March, 1836, I was only three days working the same passage, having the N.E. monsoon with me. Further, I have observed, that at all seasons, and on all parts of the coasts of Arabia, particularly when the land is low, the wind is influenced more or less by the sun's position, and the changes in the state of the atmosphere towards the sea; and even in strong breezes the same influence prevails to a certain degree.

III.—*Remarks on the Currents on the Şómáli and Arabian Coasts.*

To the currents in the Gulf of 'Aden and on the Arabian coasts, I have devoted considerable time and attention, with but little satisfaction to myself, and I fear to little purpose. I have, however, traced on an outline-chart, the currents I experienced in different years and seasons, which may serve to put the navigator on his guard, and show him the necessity of nocturnal as well as diurnal observations.

My endeavours to ascertain the cause of such currents, and to reduce them to principles which might guide others, entirely failed; nor am I at this moment satisfied as to how the currents are set in motion—whe-

* See Note, p. 125.

† Probably *dekmaní*, "the season of mischief"—if so, *ba'd ed dekmáni* would be, "after the violence of the monsoon is past."

ther by submarine impulse—by a change in the component parts of the water—by different degrees of evaporation—or by the pressure of prevailing winds. I am, however, more inclined to believe that the latter is the principal cause, and that it is the pressure of the water caused by the prevailing monsoons that causes the strong in-shore current. But this theory will apply merely to the coast-current: whereas at sea I have experienced a current running in circles or bands of 60 miles in extent; and not unfrequently have I borne up and set a topmast studding-sail with a foul wind, in order to escape a contrary current; and when by observation, I have found the vessel in another stream, or out of the former current, I have hauled to the wind again, and by such means have beaten fast sailers who were working up in-shore.

It is an established fact that the water is raised to a higher level in the northern parts of the Red Sea during December, January, February and March, from the force of the strong southerly winds that then blow up that sea; and that in July, August and September, it is several feet lower, from the force of the strong N.N.W. winds blowing down towards the Straits. This fact is proved by the "Durable" shoal, which, though situated in the middle of the sea, is at one time sufficiently dry to have a tent pitched upon it, and at another season is covered with water. The same difference of elevation may be also observed on the coral reefs near Jiddah.

On the Arabian coast, from Rás Isolette to the Straits of Báb-el Mandeb, in-shore, during the strength of the N.E. monsoon, the current runs with the wind. In March and April (and sometimes as early as February) this current changes, and it flows towards Isolette during the S.W. monsoon. In April I have measured the current with the patent log, and the vessel at anchor, and found it setting up the coast at the rate of 2 miles per hour, and much faster off the Palinurus Shoal. In May, June and July, I have also measured the current at different stations on the Arabian side, between 'Aden and the Straits, when at anchor in from 6 to 10 fathoms, and found it 2 and $2\frac{1}{2}$ miles E.N.E., varying in rapidity with the strength of the wind. During the N.E. monsoon it sets with equal velocity into the Red Sea. This would materially tend to prove the effect of pressure: but, strange as it appears, though the wind is the same on the Šómáli* coast, or the S. side of the Gulf of 'Aden, during the N.E. monsoon, the currents are sometimes running in a precisely contrary direction, without any apparent cause. This led me at one time, to imagine that the narrow entrance to the large body of water within the Red Sea (which is, moreover, reduced by the islands called the Brothers) forms a kind of barrier or point of deflection; that the current from the Mozambique Channel rushing past Rás 'Aseir at 3 or 4 miles per hour, bifurcates at that point: one branch going northwards; while the other, diminished in rapidity by the absence

* This current on the Šómáli coast in the N.E. monsoon is very uncertain. The natives say, that when the current on the Arabian coast is running one way, that on the Šómáli coast is generally opposite. In the N.E. monsoon vessels have met strong northerly currents when to the northward, or rather when Rás 'Aseir was open, which, as soon as the Cape was shut in, changed to the westward. Again, currents frequently set to the eastward, between Zeila and Berberah, during the N.E. monsoon.

of the strong southerly wind, sweeps along westwards as far as the Straits—when, being influenced by the current out of the Red Sea, it turns up eastwards, gradually recovering its former velocity, as it again comes under the influence of the monsoon. While the two coasts forming the Gulf of 'Aden have their own currents, the central part of the sea has others running in every direction, except during strong breezes, when pressure undoubtedly influences the whole. Thus, for instance, a vessel in July, crossing over from Burnt Island with a strong westerly breeze, will find the current change from W. to N.W., N., N.E., E.N.E., increasing in strength as she approaches the Arabian coast, and will probably be prevented from fetching it within 20 miles of 'Aden, under a press of canvass. During the N.E. monsoon, of course, a contrary rule prevails; and a vessel leaving Berberah for 'Aden will work up some 15 or 20 miles east of Siyárah, before she ventures to stretch across to the Arabian coast.

A vessel running up her northing, on the E. side of the African coast, during the S.W. monsoon, and wishing to stand for 'Aden or the Red Sea, should be very careful for the last two or three degrees, as N.N.E. and N.E. currents will be met with. I have found a current of 3 or 4 miles an hour, which, as you round the Cape, sweeps more eastward towards Soğotrah; in a sailing vessel, therefore, the Cape should be rounded close, otherwise she may lose her passage, as I have known to be done by a fast-sailing vessel.

Northwards of Tañl Far'un and the Brothers, from June to September, I have always experienced a strong N. or N.E. current, which renders it difficult to fetch the anchorages on the N. side of Soğotrah. In July, when in the latitude of the N. side of Soğotrah, and only $1\frac{1}{2}$ degree W. of Rás 'Aseir, I have had light airs and calms, with a current 58 miles due S., while in previous years, and in almost the same position, I have found a N. current, which gradually drew eastwards as the vessel stood to the S.E.

On the N. side of Soğotrah, in March and April, I invariably found a strong W. current, so much so, that I have known a fast 10-gun brig take twenty days to make Tamaridah from Kolonsir, and she then succeeded only by standing over to the Arabian coast, and working up along it eastwards before she stood across; and I was obliged to anchor my vessel at the first place where I could obtain anchorage-ground, and proceed in one of my boats to Tamaridah, throughout March, owing to the light airs and strong currents.

The true cause, therefore, of these currents appears to me to be principally the pressure occasioned by the prevailing monsoons, increasing and decreasing in the same ratio as the winds, and influenced in some degree by the moon's age, and consequent change of the tides which are by no means regular.

IV.—On the Variation of the Compass.

There can be but little doubt that the westerly variation is decreasing along the coast of Arabia, as previous navigators, touching on the parts of the coast that I have attempted to describe, have made the variation considerably more to the W. than I found it to be, and I am unwilling

to doubt the correctness of their observations. The excellent instruments with which I observed, and the number of my observations, enable me to assert with confidence that the variation was ascertained with great correctness during my survey of the coast.

The variation from Isolette to the Straits varied from 3° to $5^{\circ} 45'$ W., increasing towards the Straits. In some places I found the needle influenced by the metallic veins in the rocks, among which I may mention Bá-l Háff,* Makátin, Jebel Hadid† at 'Aden, and Báb-el-Mandeb. At the three former places, this influence was trivial, but on the Peak of Minhali, or Rás Báb-el-Mandeb and Perim‡ Island, or Meyún, it was much greater. The following observations taken at fixed stations will show:—

Observers.	Number of Observations.	At what Place.	Results.
Lieut. Sanders and myself	72, morning and evening.	On land by jetty at Perim	$5^{\circ} 32' 0''$ W.
Myself	8, morning	At north end of fundamental base on sand	$5^{\circ} 42' 0''$ "
Lieut. Sanders .	6, morning	At second corroborative base on main to the eastward of Minhali	$5^{\circ} 40' 0''$ "
Myself	28, morning and evening	Rás Sheikh Sa'id, a low, black point N. of Fisher's Rock, on sand	$5^{\circ} 43' 0''$ "
Lieut. Sanders .	8, morning	Same place	$5^{\circ} 50' 0''$ "
Mr. Cruttenden .	8, morning	Same place	$5^{\circ} 47' 0''$ "
	130		$5^{\circ} 42' 20''$ W.

THEODOLITE BEARINGS AT DIFFERENT STATIONS.

Place.	Observer.	Object.	Magnetic Bearings.
At Pyramid on Perim Island	Myself . . .	Minhali Peak	N. $68^{\circ} 24'$ " E.
High Brother . . .	Lieut. Sanders	High Brother Peak	S. $7^{\circ} 36'$ 30 W.
		Pyramid on Perim	N. $5^{\circ} 21\frac{1}{2}'$ 0 E.
		Minhali Peak	N. $19^{\circ} 31'$ 0 E.
Minhali Peak Pyramid	Lieut. Sanders	High Brother	S. $6^{\circ} 2'$ 0 W.
		Pyramid on Perim	S. $52^{\circ} 34'$ 0 W.

Westerly variation observed at Perim pyramid } 7 58 W.
by myself, 11 observations }

N. $68^{\circ} 24\frac{1}{2}'$ E. High part of Minhali. N. $5^{\circ} 21' 30''$ E. High Brother.
S. $52^{\circ} 34'$ W. Perim Pyramid. S. $7^{\circ} 36' 30''$ W. Perim Pyramid.

15 50 difference of cross-bearings. 2 15 0 difference agreeably with difference of Azimuth.

* Bá-l-Háff, Father Háff, for Abá-l-Háff.

† Mount Iron.

‡ These names are evidently Persian, as the Arabs have no P. Berim is the name of a town in Hadfamaut, and Meyún is the common pronunciation of *Miyán*, "Middle," in Persian. Berim is probably the true name of the island.

On High Brother in the Bay 500 fathoms N. 6 W. of Peak.	At what Place.	By what Means.	Result.
True bearing of Minhali pyramid, by 14 observations with sextant and false horizon, N. 14 9½ E. 5 42	On board, at anchor, under the Cape on the fore-castle.	Magnetic bearings by a prismatic compass, and true bearings to an object. Head, N.N.W.	5 20 W.
Which obs., N. 19 51½ E. magnetic, is about the difference of station and the magnetic bearings at the Peak of High Brother: at the station it agreed, proving no attraction at the Brother.	On board, at anchor, at the top-mast head.	By prismatic compass and true bearings I took it aloft to see whether the metal about the decks influenced the needle, which in some places it did considerably.	5 30 "

The result of 72 observations on the sandy beach at Perim differing from 11 observations taken on the summit, convinced me that some local attraction existed, and consequently I tried various ways to ascertain the truth. I took 28 observations on the Point of Rás Sheikh 'Alí, on the sand, clear of all metallic influence. These observations agreeing with those taken on the sandy beach at Perim, and with others taken at the second corroborative base to the eastward of Minhali, led me to believe that the attraction arose from minerals in the stones of which the pyramid is built, the specific gravity of which is 2·688. I then observed magnetic and true bearings on Minhali Peak, as likewise on the Peak of the High Brother, and of Rás Siján,* as well as on board, and the result is shown in the table, proving local attraction on the summit of Perim, at the Pyramid, and in a still greater degree at the Peak of Minhali, the specific gravity of the component rock of which is 2·578. A specimen of the latter, weighing 17 oz., broken off from the summit, attracted the needle, *when close*, 10, 12 and 13 degrees, according to the position in which it was held. The vertical angle of the needle was very much changed, and the rock apparently affected its dip or depression more when the needle was caused by the influence of attraction to diverge E. or W. of the true N.

The variation determined by the squadron under Sir Home Popham, in 1800, at the extreme of the Straits of Báb-el-Mandeb, was 9° 20' W., which gives a diminution of westerly variation of 6' 14" annually, rather large I admit; but the proof of diminution is, that the westerly variation formerly found to exist at Perim, is exactly the same as that at Suez, ascertained by late observations.

* Cape Peak: Siján is the plural of sáj, a teak-tree. Théka, or téka, is the true Indian name, represented by our word teak, which was sounded like *take* when first used by English writers. "It is called teke by the Portuguese," says Dr. Fryer (Travels, p. 178), "and sogwan [ságuan] by the Moors."

V.—*Remarks on the Navigation of the Gulf of 'Aden, and along the S. and E. Coasts of Arabia, with advice as to the best way of working through the Straits of Báb-el-Mandeb against strong S.E. and N.W. winds.*

In the first place I would observe, that the entrance into the Red Sea has generally been divided by seamen into the small and large Straits. I will, however, describe them as the North (small), South, and Centre (large) Straits, as there are decidedly three channels.

The North, or small Strait, is between the rocky island of Perim (Meyún) and Rás Báb-el-Mandeb, on which rises the Peak of Min-hálí, but, more correctly I should say, Pilot Rock, or Jezírat Hasan,* which channel is about 2800 yards broad between the nearest points, increasing in breadth at the entrance E. or W.

In this Strait there is no danger, but a spit of broken ground runs out a short way from the N. side of Perim, and another from Pilot Rock to the low black point N.W. of it. The discolouration of the water distinctly points out the position of both. The soundings are bold and irregular in the centre and over on the Perim side; but on the N. side to the N.W. of Pilot Rock regular, with sandy bottom. The soundings in the North Straits are from 8 to 12 and 16 fathoms. The tides are very irregular, both in time and strength. Sometimes in the centre I have experienced very little ebb, while at others, particularly at night on the full and change of the moon, the tide runs at the rate of 4 knots per hour, creating a strong ripple when opposed to the wind, and rendering a dull, heavy vessel almost unmanageable.

It is high water at twelve hours. Rise and fall of tide 7 feet, with anchoring-ground in every part.

The Large (or Centre) Straits are formed by the channel between the islands called the Brothers, or Jezírat-es-Sab'ah,† and the S. side of Perim, and are from 9 to 10 miles broad, and perfectly safe. The soundings towards the Brothers are deep, having, on the true meridian between the High Brothers and the W. point of Perim harbour, 178 and 185 fathoms, 3 miles distant from the former, and the same to the eastward, with deep water close to them; but towards the West Brother and Jebel Siján it is shoaler, without danger. On the Perim side of the channel a bank of soundings projects to the distance of 3 miles off the island, having 40 to 60 fathoms on its outer edge, and gradually shoaling to 20 fathoms close to the island. This bank is connected with that running along the Arabian coast, and from which you deepen suddenly into 150 and 180 fathoms. The greatest depth I found in the large or centre Straits, was 185 fathoms.

The Southern Straits are formed between Jebel Siján, on the Abyssinian coast, and the Brothers. The narrowest part of the channel is $3\frac{1}{2}$ miles broad, and lies between Siján and the West Brother.

The soundings are pretty regular, having 8 to 12 and 15 fathoms all over, with good anchorage-ground. The only danger exists on the Abyssinian shore, which has a rocky reef along it, in some places ex-

* Islé of Hasan.

† The Seven Islands.

tending $1\frac{1}{2}$ mile from the beach, on which you suddenly shoal from 5 or 6 fathoms.

The currents or tides are strong and irregular, setting with the line of coast. High water 11h. 40m. full and change: the flood tide rising suddenly 1 or 2 feet. Ten fathoms is a good line to avoid the shore reef.

Of course, with a fair wind in passing through the Straits, the nearest course to the destined port would be chosen by the navigator. The northerly or small Straits would, therefore, be generally preferred, and any remarks for the same are unnecessary, as a mid-channel course will take a vessel clear of all dangers; but these Straits having, even of late years, been frequently mistaken, I deemed it advisable (to prevent any recurrence of similar errors) to etch, on the trigonometrical survey of them, a correct outline of Báb-el-Mandeb Peak and Perim, as seen when a ship is making the Straits from the eastward. From this sketch it will be perceived, that from the vessel a small peak will first be seen at a distance of from 25 to 30 miles (dependent, of course, on the state of the atmosphere). On nearing it, others gradually rise to the eye till they become united. At the distance of from 15 to 20 miles, Perim will be seen from the deck to the S. of the Peak first seen. Perim, on rising above the horizon, appears low, gradually sloping from its centre, which is 230 feet high, to its extremes. How mistakes have occurred, and do so frequently happen, I cannot conceive. It is, however, only necessary to remind the stranger that the outline of Perim is even and unbroken, and sloping gradually, whereas the Cape has many irregularities, with the Peak of Minhali, or, as it is sometimes called, Quoin Hill, which is elevated above the sea nearly 1000 feet, and therefore cannot be mistaken.

If a vessel has to work through with either a south-easterly or north-westerly wind, I consider the small Straits as preferable, since there is anchoring-ground all through them, and good anchorage on either side of the Cape, in the event of accident or failure: the stream, also, is more certain. With strong breezes in the N.E. monsoon I have been detained 2 or 3 days; and I have known vessels bear up 6 or 7 days successively, after trying both large and small straits. I invariably got through best at night, owing to the tide's running stronger. With strong north-westerns I have been equally detained, owing to the uncertainty of the tides, which are influenced by the strength of the wind. Indeed, after a fresh north-wester I have known the flood in the channel run for 16 hours, and *vice versa*, after a south-easter, the water at the same time ebbing and flowing on the beach with regularity. My experience teaches me that the certainty of currents or tides in the fair way depends entirely on the preceding weather, and a navigator may make his calculations accordingly.

I have known vessels endeavour to beat through the large Straits, owing to their having more sea-room for night-work; and, though carrying a press of canvas, even to the springing of a lower and topsail-yard, splitting topsails, &c., they have not succeeded. One instance, in particular, came under my knowledge of a fast sailing man-of-war's being compelled to bear up, after ineffectually striving for 10 days to

beat up into the Red Sea. The cause of this was, that sufficient care was not taken to ascertain in which channel she gained most. In the large Straits the currents are conflicting and unsteady, generally running in circles, and rendering it almost impossible for a dull sailer to get through.

Vessels lying at Mokhá during the strong southerly gales which blow with violence in December, January and February, should never attempt to work down to the Straits; as, however well manned and equipped she might be, a fast vessel would tear herself to pieces, and probably carry away some spars. She should wait for a lull, and then work tides, day and night, anchoring close in-shore with the flood. When she reaches the North Straits she should anchor close under the lee of Pilot Rock, so as to have the whole night-ebb to work through with, to accomplish which, activity, seamanship, and a good eye are the only requisites. I only once failed, after weathering the Rock at 2 A.M., owing to my splitting a double-reefed main-topsail, foresail and main-top-gallant-sail in a strong gust. A vessel entering the Straits from the eastward with a north-wester has only to work night or day in soundings off the Arabian shore. At night the soundings are an excellent guide, and, working in between 15 and 35 fathoms, a vessel cannot miss the small Straits, the edge of the bank off-shore being very precipitous. It is only to be regretted that all commanders, who wish to enter the Red Sea, do not provide themselves with the Trigonometrical Survey of the entrance to it, executed by myself and my officers on a large scale for the benefit of navigation, and sent home by me for publication when I was draughtsman to the Indian Navy.

I consider the North Straits, therefore, as decidedly the best to work in, and the Arabian side preferable. As an additional proof of this I may mention that, in July, 1818, two sister ships-of-war, the *Mercury* and *Aurora*, mounting each fourteen guns, left 'Aden for Mokhá. They had very heavy weather on the passage, and parted company: the fastest sailer trying the Abyssinian shore, while the other, keeping over to the Arabian coast, worked up without difficulty, and beat her consort 7 days in a distance of 140 miles.

Vessels working along the Arabian shore between 'Aden and the Straits, during the months of June, July and August, will frequently experience thick, hazy weather, with great change of temperature. I have known it vary in 24 hours, from 89° to 64° (Fahrenheit), with slight showers of rain, while the barometer was but little altered. If the wind is blowing from N.N.W. to N.W., frequent gusts may be looked for, especially in-shore; and, when the weather has been quite moderate, I have known very fresh southerly winds set in suddenly. The breezes generally increase from sunset to midnight, when they fall light, with a heavy, long, southerly swell. During the months of June, July and August a vessel in the Gulf of 'Aden, should have good sails bent, and take care to be on the bank of soundings in proper time, so that she can anchor in from 10 to 20 fathoms should it fall calm, or the current be against her. On the Abyssinian coast, during these months, the necessity of having good sails and rigging is equally great, as the

gusts off-shore are, at times, very violent, with (strange to say) a swell, frequently setting along-shore from the W., which causes a very heavy surf on the beach.

With proper precaution there is little danger. A good look-out, the lead and observations by night are requisite, and should be carefully attended to. The most dangerous part of the coast is the reefs off Zeila', and the bank of broken ground running off-shore for 2, 3, and 4 miles between Rás 'Arah, or Cape St. Anthony, and Jebel Ján.* On this there are several shoal-patches, with $1\frac{1}{2}$ to 2 and 4 fathoms on them at low water, and several vessels have been wrecked upon them. A vessel navigating between these two headlands of 'Arah and Ján, should not come under 20 fathoms at night, and 15 in the day-time, as the water shoals so suddenly that a vessel, with good headway on her, after getting a cast of 15 fathoms at night, would hardly have time to pass along the lead again before she would be in the broken ground. In the day time, the edge of the reef is perceptible between Isolette and the entrance to the Red Sea, so that there is little danger, and all that does exist, has been pointed out in my Memoir of this Survey, Parts I. and II. It remains for me, therefore, only to give my opinion as to the best manner of proceeding from the Red Sea eastwards.

During December, January, February and March trading-vessels arrive from the eastward, carrying a light or strong monsoon, as the case may be; and very few, if any, except square-rigged vessels attempt the passage to India, it being generally so long and tedious. I have always experienced the greatest advantage in paying constant attention to the currents which, during December, January and February, usually set along the coast in a W.S.W. direction. If I found the current in-shore strong against me, I always stood out to sea for 60 or 80 miles, availing myself of all changes of wind. If the winds were light, I preferred being in-shore, so as to avail myself of tides and land-winds, but only when the current was not strong to the W.S.W. I have known one vessel fortunate enough to find a S.S.W. breeze off the Curia Muria Islands, and make the passage to Bombay even in these months in 21, while other ships were 90 days. In March and April, I found I could do better in-shore, as the currents are favourable, and the winds light and variable. In May, I should recommend a ship to work in-shore as far as Farṭak, and thence take the open sea if bound to India, or keep well off-shore if wishing to make the Persian Gulf.

September and October are tedious, trying months for making a passage either to or from the Red Sea, as the winds are so very light and uncertain. I have tried passages both in and off shore, but I found it the best plan to work according to the currents, and if I found land and sea breezes to avail myself of them, and anchor when requisite.

VI.—On Salt's Rocks.

Owing to the Bengal steamer's having, in the night, nearly run on Taḥl Far'ún,† or Salt's Rock, from their positions being incorrectly

* Perhaps Kán; the writing of the MS. is doubtful. In the map (Geogr. Jour., ix. 123, 127) it is Ján.

† The watering-place of Pharao. Fir'aun is commonly pronounced Far'ún.

laid down, I determined to fix its true place, and left Kolonsir in order to obtain sights for this purpose, and, by observations made the next day on Salt's Rock, I found its exact place.

Having, in my run, discovered that the rocks are considerably more to the westward than previously laid down, and that 'Abdu-l Kúri, which was distinctly visible, must also be to the westward, and thereby reduce the passage between Cape Guardafui and the latter—an important matter to our steamers and other vessels; and after fixing the position of the rocks, I took observations in order to determine the variation, and took true bearings to 'Abdu-l Kúri, the result of which at once proves what I have above asserted—that 'Abdu-l Kúri is closer to the N.E. point of Africa than was hitherto supposed.

The following are the results on Tahl Far'un:—

OBSERVERS.

Lieutenant (now Commander) Sanders, with Captain Haines's sextant, by Troughton:—

Meridional altitude $122^{\circ} 26' 33''$, lat. $12^{\circ} 25' 46''.3$.

Captain S. B. Haines, with the Honourable Company's sextant, by Dollond; the best sextant and strongest power in the ship:—

Meridional altitude $122^{\circ} 24' 45''$, lat. $12^{\circ} 25' 50''.\frac{2}{3}$.

Lieutenant Rennie, Honourable Company's sextant, by Gilbert:—

Meridional altitude $122^{\circ} 28' 35''$, lat. $12^{\circ} 25' 45''$ N.

Longitude of Kolonsir, by trigonometric and several chronometric measurements with 6 and 8 chronometers, allowing the Bombay Light-house to be $72^{\circ} 54' 26''$ E.:—

Is Kolonsir $53^{\circ} 34' 23''$ E. Sight Station.

Honourable Company's chronometers,	}	$1^{\circ} 21' 55''$
298, M'Cabe		
,, 216, ,,		
,, Baird . . .		
,, ,, . . .	}	$1^{\circ} 21' 58''$
,, ,, . . .		
,, ,, . . .		
,, ,, . . .		
Captain Haines's chronometers, by	}	$1^{\circ} 21' 22''$
Frodsham . . .		
,, Young . . .		
Mean . . .	1	$21 \quad 50$ E. of Tahl Far'un.
Kolonsir long.		$53^{\circ} 34' 23''$ E.
		$1 \quad 21 \quad 50$
Long. of Salt's Rock		$52 \quad 12 \quad 33$
Variation		$2 \quad 50 \quad 0$

From Sight Station on Tahl Far'un, or Salt's Rock, the following bearings and angles were taken:—

	True.
E. bluff of 'Abdu-l Kúrí	S. 35° 22' E.
W. extreme of island to the right of ditto	∠ 57 12
True bearing W. extreme of ditto	S. 21 50 W.
Haycock Hill, right of East Bluff	42 25
True bearing of Haycock Hill	S. 7 03 W.
East Bluff, right E. extreme of 'Abdu-l Kúrí	∠ 8 20
True bearing of E. extreme of ditto	S. 43 42 E.

'Abdu-l Kúrí is a long and moderately-elevated island, in lat. between 12° 9' and 12° 12' N., which will, by true bearing from the fixed position on Taħl Far'ún, give the long. of the E. and W. ends thus:—

Taħl Far'ún	52° 12' 33"
S. 21° 50' W. 16° long.	0 6 20
Long. of the W. end of 'Abdu-l Kúrí	52 6 13
S. 43° 22' W. 20° long.	0 15 30
Long. of the E. end of 'Abdu-l Kúrí	52 28 3

By which calculation, Cape Guardafui (allowed as proved), by the survey of the *Palinurus*, in 51° 20' 45" E., and 11° 50' 45" N., will bear, from the W. end of 'Abdu-l Kúrí, S. 66½ W. only 48 miles.

Salt's Rocks extend, in a N.E. and S.W. direction, about 2000 yards, and in breadth do not exceed 200 or 300 yards. They are divided, to the westward of the centre, by a narrow and shallow rocky channel.

The eastern rock is the largest, and has one large peak, elevated about 400 feet above the sea, and two or three smaller ones. The western rock has one peak of equal height, and one smaller one. It is composed of granite, and from all points of view has a white appearance, from the multitudes of birds (gannets) that frequent these rocks. Not a vestige of vegetation of any kind was found on them, and their only occupants were birds, vermin and lizards.

The Taħl Far'ún rocks appear, in different points of view, to have two, three, four, and five peaks, and in the day-time they can be seen 7 or 8 leagues off; but at night, though clear, I could not discover them with a good night-glass at the distance of 8 miles.

I had not sufficient time to make a minute survey of these islands, but while on Taħl Far'ún I dispatched my quarter-cutters in different directions in order to take soundings.

Northwards the bank does not extend far from the rocks, but to the N.W. had 33 fathoms 2 miles off:—

To the W.S.W.	20 fathoms 2 miles off.
„ S.S.E.	15 „ 3 „
„ S.E.	11 „ 2½ „
„ E.S.E.	9 „ 1 „

And within these limits overfalls of 2, 3, 4, and 6 fathoms, at a cast, rocky bottom. I do not know whether any danger exists between 'Abdu-l Kúrí and Taħl Far'ún, but recommend caution.

In the night, when 8 miles off the rocks, I was suddenly disturbed by hearing Lieutenant Jardine, the officer of the watch, call to the quarter-master, and tell him to jump into the chains, and take a cast of the lead: no bottom was found, so I directed the deep sea-lead to be hove, but, finding no bottom at 80 fathoms, and the ship being apparently on a bank with discoloured water, I examined the sea-water with a microscope, and found it full of small animalcula, in shape resembling limpets, of a white colour, which of course at once accounted for the white appearance of the water in a clear, star-light night: this appearance was similar to muddy water in 5 and 6 fathoms.

Having experienced a similar white appearance on the coast frequently, and tried the same experiment, I merely mention it that navigators may not give notice of a supposed danger when the experiment of sounding will prove that there is none.

'Aden, May 4th, 1844.

III.—*Account of Governor G. GREY's Exploratory Journey along the South-Eastern Sea-board of South Australia.* By MR. THOS. BURR, Dep. Surv.-Gen. Communicated by Lord STANLEY.

Governor Grey's Letter to Lord Stanley.

Adelaide, June 22, 1844.

MY LORD,—I have the honor to report, that towards the end of the month of April last, I left Adelaide for the purpose of exploring the south-eastern portions of this province, which abut upon the territory of New South Wales.

This part of South Australia has been hitherto almost unknown, having been only traversed in one direction by overland parties; and as the line of route which they had always pursued, passed through a country for the most part of a very unpromising character, it was very generally imagined that the south-eastern portions of the province offered little inducement to settlers, and that there was little probability of any continuous line of settlements being established between South Australia and New South Wales.

I hoped, however, that a minute examination of this country, and more especially of those portions of it which were yet unknown, might show that these impressions were without foundation; and in order that the exploration which I was about to undertake might be rendered as effective as possible, I took with me Mr. Bonney (the Commissioner of Public Lands), a gentleman of much enterprise and ability, and who was the original discoverer of the overland route from Port Phillip to South Australia; and also the Deputy Surveyor-General, Mr. Burr, with whose

knowledge of the bush, and talent for surveying and exploring, I was well acquainted. I am happy to be able to assure your Lordship that the results of our journey were of the most satisfactory nature; and that we ascertained that by keeping near the sea-coast, instead of pursuing the line of route previously adopted, there is an almost uninterrupted tract of good country between the rivers Murray and Glenelg. In some places this line of good country thins off to a narrow belt; but in other portions of the route it widens out to a very considerable extent, and on approaching the boundaries of New South Wales it forms one of the most extensive and continuous tracts of good country which is known to exist within the limits of South Australia.

One peculiarity of the good country near the south-eastern boundary is, that it is of recent volcanic origin, and that there is every reason to suppose that some of the numerous craters with which it abounds must very recently have been in a state of action. The accompanying map of the newly-explored country, executed by Deputy Surveyor-General Burr, contains plans and elevations of two volcanic mountains, which convey a very good idea of the character of these hills; and the enclosed sketch by Mr. G. F. Angus, a young artist who accompanied me, represents very faithfully one of the most remarkable of another species of crater, which are very numerous in this country, and which are filled with fresh water, and are almost unfathomable. The water in the one represented in this drawing was 103 feet deep, close to the edge of the crater.

The length of time occupied in our journey, and the extent of the country which we traversed, preclude me from attempting to give a detailed statement of the results of this expedition in the form of a Dispatch; and I have, therefore, enclosed for your Lordship's information a Journal of the proceedings of the Expedition, which has been drawn up by Deputy Surveyor-General Burr. I think it, however, proper to state briefly the following points which it has decided, and which, as bearing directly upon the future prosperity of these colonies, it is desirable that your Lordship should be made acquainted with.

The south-eastern portion of the province of South Australia has now been ascertained to be at least as fertile as any other known portions of that colony; and the excellence and great extent of the good land in that portion of the province, the whole of which belongs to the Crown, affords a guarantee that the fund arising from the sale of land, and consequently the means of defraying the expenses of emigration, will increase, for a considerable number of years to come, with the increase of the population; and nearly the whole of this country being unoccupied, a large outlet

yet exists for the rapidly-increasing flocks and herds of the colonists. These circumstances cannot fail to produce most advantageous results, both for the inhabitants of this colony, and for the commercial interests of the mother-country.

Another material point connected with the fertile tracts of land in the south-eastern part of South Australia is that this good country lies in the immediate neighbourhood of the sea, and that this part of the coast contains three bays, one of which has been ascertained to afford good anchorage to small vessels, even in the winter season, and there is good reason to suppose that the other two bays, more especially Lacépède Bay, will be found to possess the same advantage.

The inhabitants of the country which has now been explored, will therefore be able with great facility to ship their produce to, and to receive their supplies from, the adjacent ports, either in New South Wales or South Australia.

As this country lies immediately between New South Wales and South Australia, and forms an almost continuous link of good country between the rivers Murray and Glenelg, and can, in its natural state, be traversed in nearly all directions by drays and carts without the slightest difficulty, there can be but little doubt that in the course of the next few years an uninterrupted line of settlements will exist between Adelaide and Port Phillip: indeed the squatters from New South Wales have already begun to occupy the most extreme south-eastern portion of this new country with sheep and cattle stations.

During our journey we had an opportunity of visiting Rivoli Bay, which is one of the bays to which I have before alluded, and which had previously been only seen from a distance. I formed our depôt at this bay, and proceeded with a detached party to the S.E.; and during my absence a survey of the greater portion of the bay was made by some men of the Royal Sappers and Miners; and the master of a whaling-vessel which was lying there at anchor having lent his boats for the purpose, soundings were obtained both across the entrance to the bay, and over that portion of it which affords the best anchorage.

I thus have it in my power to enclose a chart of a considerable portion of the bay; and I have also forwarded an outline sketch of Rivoli Bay, which was made by Mr. G. F. Angus.

I have the honour, &c.

(Signed) G. GREY.

P.S.—Since writing this dispatch I have received another very interesting sketch, which I have forwarded for your Lordship's

information. It gives an outline of Mount Schanck, which is the mere elevated shell of an extinct crater; and it shows in the foreground another of the extinct craters full of fresh water, which are found in the coral formations.

(Signed)

G. GREY.

Extracts from Deputy Surveyor-General Thomas Burr's Journal of his Expedition in company with Governor Grey.

10th April.—At 1 P.M. I left Adelaide for Mount Barker; and on the

11th.—The drays, which had been dispatched from Adelaide on the 9th instant, were overtaken by me at a sheep-station on the Bremer; proceeding with which, we encamped at 4 P.M. on the N. coast of Lake Victoria, about 12 miles from Wellington.

13th.—Arrived at Wellington, on the river Murray, at 3 P.M. On the road we met a party of eleven persons, with seventy head of cattle and four horses, on their way to Adelaide from Port Phillip. They had been nine weeks on their journey, which was performed without accident.

14th.—Proceeded up the Murray river to the crossing place; the weather was very boisterous, and the road along the river, at the crossing, under water for a considerable distance; however, we succeeded, in the afternoon, in getting all over to the E. side of the river, except one empty dray, and the bullocks and horses.

15th.—One of the horses, on landing, after swimming across the river, put his near hind foot into a hole in a sunken rock. The hole being wide inside, the horse by struggling got his foot turned round, and so firmly fixed in the stone, that notwithstanding every exertion was made to extricate him, by the men belonging to the party and by the natives, some of whom, although it was a cold day, remained in the water for more than four hours, and endeavoured, by diving, &c., to set the horse's foot free, it was not until the horse had been thus confined, with only his head out of water, for more than five hours, that he was released. This was accomplished at last by a native, who contrived to work with a hammer at the rock under water, and, by increasing the size of the aperture, set the horse's foot at liberty. This accident detained us so long that we were unable to proceed on the journey to-day. The horse died from the effects of the cold two or three days afterwards.

16th.—Started at 8 h. 20 m. down the river Murray; signalized when opposite Wellington. On finding that his Excellency had not arrived there, we proceeded about 6 miles down the river, to the head of Lake Victoria, and encamped for the night.

17th.—Arrived at Bonney's water-holes on Lake Albert at 1 h. 30 m. Met Mr. Bonney, Commissioner of Crown Lands there: he had gone on ahead of the party on the 14th.

18th.—Having procured a supply of seven sheep for the party we proceeded on our journey. On the eastern borders of the lake we passed several huts of a far better description than those built by the natives more to the westward. These huts were nearly circular, and 7 or 8 feet in height. The wall was composed of small spars placed in the ground, and rising to about 5 feet at a steep angle; on the top of these spars other lighter ones were placed, and met at the centre; these were but slightly inclined, and formed the roof; the whole was covered with turf, with the exception of a triangular doorway, facing the N.E.

Having followed the overland track round Lake Albert until it took a westerly direction, we left it, and steered nearly S., over a narrow branch of the desert. At 1 h. 55 m. the horse-dray arrived on the Coorong, and a proper place was selected for encamping: at 2 h. 50 m. the bullock-drays arrived.

19th.—According to directions given to me, the party was to halt, until his Excellency arrived, at the first good camping-ground which we came to on the Coorong; we therefore remained stationary this day. At 3 h. 45 m. the Governor arrived, and went over to see a party who were on their way overland with horses. They had had an unpleasant journey, more than four months out, and were very short of provisions: we supplied them with flour, mutton, tea, and sugar. They informed us that there was a creek on this side the Glenelg, bearing westward, about 50 miles from the coast, on which there were some settlers; also that we should meet two bushrangers on the road, who had five horses with them, and were making their escape to Adelaide from Portland Bay.

20th.—Encamped at 3 p.m. on a flat, near to the spot where M'Grath was murdered by the natives, about two years ago. We saw many natives, who endeavoured to make us understand that they had not been concerned in that murder, or in the murder of the passengers of the *Maria*.

21st.—In consequence of our being crippled by the loss of two pair of bullocks—one pair having been left on the other side of the Murray, and another rendered unavailable through accident—the serviceable number was reduced to eight: it was, therefore, considered advisable to leave some of our luggage and one dray behind, and to put the whole of the remaining baggage on one dray; but notwithstanding the load was thus considerably reduced, the eight bullocks were found insufficient to convey it in one dray, as in a soft or heavy soil it sank considerably: the load was therefore divided again, and on we started with the two drays, each

having a team of four bullocks. At about 4 miles we met a party which corresponded so exactly with the bushrangers that had been described to us on the 19th as being on the road, and who we might daily expect to meet, that we were rather suspicious; and it was not until after a very minute examination that the police were satisfied they had not captured a prize. After a delay of about twenty minutes each party proceeded on its respective route; and at 4 h. 45 m. we encamped on a fine flat, with several wells of excellent water.

22nd.—Rode on, as usual, ahead of the drays, and at 1 p.m. made the "Salt Creek," or "Bonney's Creek." After we had been there about 40 minutes an overland party arrived, consisting of eleven persons, with four horses and a tilted cart. It was the same we had met on the river Murray, only nine days before, conducted by a person named Wood. His Excellency, accompanied by Messrs. Bonney, Gisborne, and myself, walked up the creek about 2 miles, when we came to a large hole containing salt water. On walking round this hole it was observed that the native dogs had been there recently, and at several places had scratched away the earth; at one place a small hole had been made by them, only removed by a ridge of earth about 6 inches across and half an inch in height above the water in the large hole: on tasting the water in the small hollow it was discovered to be perfectly fresh.

23rd.—At 8 h. 50 m. the Governor's party started for Mount Gambier, and Wood's party for Adelaide. At about 5 miles we came to a well of water, situated about 50 yards to the right of the road. The well contains the best water for many miles, and its situation does not seem to be generally known. In April, 1842, when I had the honour to travel this road with the Governor, this well was discovered by his Excellency, who left the road to shoot. Since that time, I have inquired of all persons that I have met who had travelled on this road, and have found invariably that this well was not known to them. It is situated about 50 yards to the right, after the road leaves the scrub and passes on to the sand-hills. In order to render it conspicuous, we set up marks in such a manner as to direct the traveller to it. About 4 miles beyond this well his Excellency crossed the Coorong at a place where the water did not exceed 6 inches in depth, and went to the beach. The sand-hills from this point are from one-third to half a mile across, and about 200 feet in elevation above the sea. Amongst them the scenery is very beautiful, and may be termed mountain-scenery in miniature; in some places the sand-hills rise precipitately, in others gently; there are many glens and lofty summits, with undulating plains. Shrubs of a peculiar character, and fine bright green foliage, grow among these dunes in luxuriant patches,

whilst in other places nothing but the bare white sand is seen, forming a remarkable contrast. Among these sand-hills we saw several spots which are termed "sand-patches." They are rather remarkable, for they have the appearance of trees or shrubs composed of stone. On inspection I found that these stone shrubs were invariably hollow, and in several cases when I examined the inside of these tubes the appearance was that of a cast, taken from the stems or branch of a tree; this leads me to believe that the sand-patches have been formed as follows:—A shrubbery similar to those at present seen on the sand-hills has at some former period been wholly, or in part, covered with drifting sand; the trees thus covered would naturally die; the dead wood absorb the moisture and form a nucleus around which the lime in the mass would accumulate, and cement the sand in the immediate neighbourhood: this would go on for a time, when a portion of the sand which covered the shrubbery being thus cemented, the remainder, which would still be loose, might by some peculiar eddy of the wind, caused by hills or dales formed in the mean time, be drifted to some other spot, leaving only the portions which had become consolidated, and which have now every appearance of petrified trees. I am still more inclined to believe this to have been the case from having seen similar tubes, on the western side of Spencer's Gulf, with the wood actually filling them.

I believe there are sand-patches presenting a similar appearance to those on the Coorong, the origin of which is quite different; but as they did not come under our observation during this journey, it may not be necessary for me to enter more fully into the subject.

The rollers on the beach were considerable, although the day was perfectly calm. At 3 h. 45 m. we encamped near the road: a well was dug, but the water was brackish, and only fit for cattle.

24th.—Having dispatched the drays, his Excellency proceeded to Wambat range, about 2 miles to the E. of the road, from a point on which we proceeded 10 miles in a S.E. direction, to the top of some low scrubby eminences, beyond which to the N.N.E. and E. were apparently a succession of low barren ridges, with wide valleys between them; to the S.E. there were some distant ranges, which appeared to be wooded. From this place we struck off S.W., and crossed a low swampy ground that must be subject to periodical inundations of fresh water, for there were numerous fresh-water shells (particularly *Bulimus*) on the surface. This swamp continues from where we were to the salt creek. The salt is rotten, but good. There are upon it many small sand-hills, well wooded and grassed, which from the range have much the appearance of islands. Encamped at

the crossing of the Coorong in lat. by Regulus $36^{\circ} 30'$; here is a well of tolerable water. A remarkable change takes place in the character of the country at this point. The Coorong, which has been continuous for many miles (from the sea-mouth of the Murray), becomes here a succession of lakes, and instead of washing immediately under the dunes of sand, there is a space of half a mile of grassy flat between the dunes and the Coorong. The dunes of sand beyond this point also lose their mountain character; they do not attain near the altitude of those to the N., and are no longer bare, but covered with vegetation.

25th.—Rode over the sand-hills to the beach, which we followed for two or three miles. On our return at noon we met another overland party. This party consisted of twelve persons (all male); they had with them 550 head of cattle, 320 rams, and 12 horses. At 1 P.M. we came to the granite rock. This is, perhaps, the most remarkable feature in the country that we had seen to the E. of the river Murray. It consists of a large protruding mass of coarse-grained red granite, with numerous embedded masses of fine-grained dark grey granite, and to the N.W. a vein of vitrified quartz rock. It rises to about 20 or 25 feet, and to the N.W. consists of a large smooth mass, rising like a blister from the plain, whereas to the S.E. the blocks are irregular and piled one upon another. There are several small patches with soil upon which kangaroo-grass and casuarina grow. On this spot we saw several kangaroo-rats, which belong to a new species. To the E.N.E. and S.E. there are several other protruding masses of granite near to that described, as also to the N.W. jutting into the sea. The Coorong may be considered to cease at this point. This low granite-range forms a water-shed, throwing the drainage to the N. and S. respectively, to the salt-creek and the sea-mouth of the Murray and to Ross's creek, that by an embouchure, through which a considerable quantity of water flows, finds its way to the sea: on the shore the granite-rock forms a remarkably bold point in a long straight line of coast, and has evidently been taken for a cape by Flinders and M. Baudin; on the chart of the former it is called Cape Bernouilli,* and on the chart of the latter Cap Morard-de-Galles. This rock projects but a few feet into the sea; there is, however, from this point a sunken granite reef jutting into the sea, which, I have no doubt, will be found to be connected with those rocks that break the water, and render it so tranquil in Lacépède Bay: in all probability the entrance to this bay will be found to bear nearly N.N.W. from its bight. We passed four wells on this day's

* The C. Bernouilli of Flinders is not exactly the Morard-de-Galles of Baudin. Flinders's C. Bernouilli is 4 miles N. of the granite rocks, and is clearly more of a cape than is laid down in Mr. Burr's map.—(J. A.)

journey, which had been dug by different overland parties at their camping-ground, and we dug a fifth at our own camp: water was obtained at $5\frac{1}{2}$ feet, in a bluish sand, which lay beneath a white sand. In the sand were numerous shells in a perfect state of preservation, and either belonged, or were nearly allied, to those species which are now found on the coast.

26th.—His Excellency crossed over to the beach from the camp this morning, and followed the beach to Ross's creek; we saw many portions of vessels that had been wrecked, but there was nothing by which they could be identified. It was remarked by Mr. Bonney that there was a great difference in the surf on the beach from that which we had observed on the previous day, when the weather was calm, whereas on this day, with a moderate breeze setting in from the sea, there was no surf, and the sea appeared more like a lake. We were at a loss to conceive the cause of this difference, and went on to the sand-hills to look for breakers, but were unable to see any; speculations were entered into as to the cause of this stillness of the ocean on an apparently open coast. At this time we were not aware of the granite-reef spoken of in this journal on the 25th instant, but not seen by me till the 13th of May, although it is previously mentioned as being connected with the granite-rock. At Ross's creek we noticed for the first time a trellis, which is erected by the natives and used by them to capture birds. The trellis is formed by seven slender sticks, two of which are fixed in the ground about 5 or 6 feet apart, and rise about 4 feet; the tops of these are connected by a third, whilst the remaining four are placed diagonally across. At about 4 feet from the trellis a hollow is formed, which is screened by small branches of trees that rise about 2 feet from the ground, and a small hole is left at the back through which a native creeps, and thus concealed, places the first and second finger of his left hand across his lips, which are slightly opened, and by drawing in his breath, he makes a chirp that calls the birds, which, thus enticed, perch on the trellis-work. The native, concealed in the small bower, dexterously places a noose, attached to a long slender stick held in the right hand, round the neck of any bird that may settle on the trellis, and draws it into the bower. The process is similar to wiring pike. Corporal Mason, of the police, shot several ducks at Ross's creek. His Excellency, being desirous to communicate with the natives, and to establish a friendly intercourse with them, went to their *warleys*, but they had fled. We saw their tracks, which we followed for a short distance; so rapid had been their flight, that they had left some of their goods behind them, and on further pursuit we discovered a basket, an old rug, a digging stick, &c., which, in their trepidation, they had

also left hung on a tree, and in order to mark the spot a fire-stick had been left. The Governor placed some damper in the basket, and we gave up the search. I have no doubt they were watching us from some thicket. There is a very extensive plain at Ross's creek; the soil is rich, but a great portion appears to be subject to annual inundation. This plain is bounded to the S.E., and E. and N., by a low casuarina range. Encamped a short distance to the right of the road amongst the casuarina hills; a well was dug through sand, and tolerable water obtained at about 5 feet. There were many recent shells in the sand, and a recent sandstone with shells in it; the shells were either identical with, or nearly allied to, existing species; at about 4 feet below the surface there was a thin bed of sea-weed between recent sandstone; the sea-weed had every appearance of that at present on the coast.

27th.—His Excellency determined on halting with the drays for two days, in order that the equestrian party might visit Cape Bernouilli, and that the bullocks and dray-horses might be rested. At 9 h. 40 m. his Excellency started for Cape Bernouilli; at about 2 miles we made the coast. We passed several fresh-water tea-tree swamps, also some salt lagoons; but by the course which we followed we did not cross any swamps, and a dray might be taken to the coast. Our course is tolerably well defined, as seven horses passed and repassed it. We noticed the same smoothness of the sea as on the preceding day, but could not perceive the cause until we were within 4 miles of Cape Bernouilli, when a heavy surf presented itself, stretching from the cape to the N.W. and N.N.W. until lost below the horizon. The view from Cape Bernouilli is magnificent; the sea was broken for miles as far as the eye could travel; the breakers extended from the coast to the S. round to the W. and N.W., when they were lost in the distance. From this to the coast on the right the water was as smooth as a lake. I have an idea that Lacépède Bay is sheltered by a granitic reef connected with the granite rock on the coast before mentioned, which is a portion of the granitic chain that terminates the Coorong, and forms the water-shed of the salt-creek to the N. and Ross's creek to the S., and that this granite will be found to protrude in many places to the N.E., between the head of the Coorong and the river Murray.

28th.—Remained stationary.

29th.—Proceeded on our journey, and at night we came up with a party from whom we obtained eleven more sheep. At 4 miles from the camp we passed a well which had been dug by Mr. Bonney in his overland expedition in 1839. The well was sunk through a recent limestone containing many shells. As the water was good, we filled our kegs and proceeded. At 200 yards we entered a wood, the character of which was quite distinct from

that which we had previously seen; the wattle, gum-tree, black-wood, &c. grew luxuriantly, and there was a water-course having a drainage from the eastward. His Excellency was desirous to visit the country round Mount Benson; we therefore left the drays in the road, and steered in the direction of that mount. We passed over about 2 miles of the forest before mentioned, and came to a plain bearing E. and W. On this plain we for the first time met with a calcareous Tufa, which is generally termed "Biscuit." This Tufa presents a singular appearance; the plain was covered with it in pieces of various sizes, some being small and some of a considerable size; each piece was nearly circular, and had much the appearance of ship-biscuit. One of these cakes was broken by me; the form was nearly circular. They appeared to be formed by the deposit of lime held in solution by shoal-water. There is a nucleus for each, round which the lime is deposited in successive layers. If the nucleus had had a rotatory motion instead of being stationary, these biscuits would be in the form of a globe instead of being nearly flat. Beyond the biscuit-plain, we come to a fresh-water tea-tree swamp, with a drainage towards the coast; and from this to Mount Benson the country was gently undulating and grassy, thickly wooded with casuarina, banksia, and stringy bark. From Mount Benson we had an extensive view over an undulating, grassy, and thickly-wooded country, and had a good prospect of Guichen Bay. Returned to the road, and at 4 P.M. encamped under the range immediately to the E. of Lake Hawdon. This range is rather singular; it falls down abruptly to a swampy flat, and immediately below the range there are a succession of tea-tree swamps, in which is an abundance of excellent water.

30th.—Showery morning. We made very little progress this day, as we were desirous to find one of Mr. Bonney's old halting-grounds; but being unsuccessful, we encamped in a scrubby plain at night, without water.

1st May.—Our cattle having strayed in the night, we lost much time in looking for them. When found, we proceeded on our journey, which was very short on this day, as we did not make more than 5 miles when we came to a tea-tree swamp immediately under a casuarina range, at which we halted, and dug two wells; we came to good water at about 4 feet. Four natives joined our party; they were very shy, but we were able to get them to the camp. Mr. Bonney prevailed on the eldest of them to go with him and show him a native well, for which service he was rewarded with a shirt, and Mr. Gisborne also gave a shirt to one of the others for standing in the same position whilst Mr. Angas made a sketch of him. These natives seemed tolerably well satisfied with their visit to our camp, and were particularly

well pleased with some grease and a damper that was given to them. In the evening his Excellency and I rode to the top of a range about 3 miles to the S.W. We were much delighted with the prospect. To the S. we saw Rivoli Bay, with two vessels riding at anchor, whilst immediately between us and Rivoli Bay and to the W. there was a lake (Lake George), only separated from another large lake (Lake Eliza), which terminated near Guichen Bay, by a narrow strip of land. These lakes had not been previously seen, and were named by the Governor. We were able also to see a high range to the S.E. and Mount Muirhead. There are many low ranges well grassed, and wooded with banksia and casuarina, in the neighbourhood of Lake Hawdon.

2nd.—Off at 8 h. 30 m. Passed for 4 miles over a country wooded with casuarina, banksia, and stringy bark, with several tea-tree swamps, when we came to a long plain, which we followed for about 3 miles in a S.E. course; passed by a casuarina hill, with a good supply of fresh water at its base. I climbed up a tree at the top of the hill, and saw Mount Muirhead and high sand to the S. and S.E.; the country immediately round appeared to be wooded with casuarina. The range between the coast and our line of route was of a similar description. From this we proceeded on a course rather more southerly, which we followed up for 4 miles, until we came on the coast-range; the country was well wooded, and adapted for cattle. We crossed over the coast-range, and encamped on the borders of a plain covered with biscuit (Tufa), about 3 miles from the coast. The range, where we crossed it, was finely grassed and well covered with timber, with casuarina, banksia, and stringy bark. We passed by a camp of natives; they had two wambats roasting for dinner; but these natives were so timid that we were not able to communicate with them. On our approach they ran off into the woods, and left everything behind them.

3rd.—Up at break of day. The Governor walked over to the beach at Rivoli Bay; the party consisted of seven persons. On arriving we signalized and were heard by the whalers. We walked towards the nearest point from the vessels, and on coming near were met by a party of sailors who had been sent to see who we were. The surprise of the whalers was great; they considered we must be a party from some ship that had been wrecked; on hearing that the Governor was with us, their politeness was great; they took us in one of the boats to an island on the N.W. point of the bay which is covered with penguins. From this island I took many bearings to distant points situated to the S.E. The whalers had a station (two huts) on shore, and had dug a well, in which there was good water. The vessels in Rivoli Bay were the *Isabella* and the *Prince of Denmark*.

schooners, from Hobart Town. Mr. W. Sherbert, of the *Isabella*, spoke in high terms of the bay. Back at the camp at 11½ A.M. His Excellency determined on moving the camp to the beach, near to the place where the whalers were stationed, and on establishing a dépôt there, at which the drays, tents, &c. should be left; and on proceeding from thence on horseback, with a reduced party, to Mounts Gambier and Schanck. At 3½ P.M. the whole party had removed to the spot fixed upon for the dépôt, a large well was dug, and excellent water found in a bluish sand at about 5½ feet. The rock at Rivoli Bay is a kind of oolitic limestone, and on the beach there are numerous flints of various sizes.

4th.—At 8 A.M. his Excellency and I started for Mounts Gambier and Schanck: we were accompanied by Messrs. Bonney, Gisborne, and Angas, and three of the mounted police. One packhorse went with the party. We followed the outline of the coast for about 8 miles, when we struck rather to the right of our course, in order to have a view of Rivoli Bay, having taken bearings to Cape Lannes, Cape Martin, the Reefs, and the vessels, to assist in ascertaining their relative positions. We proceeded on a course nearly S.E. for about 1 mile, when we came to a tea-tree swamp, draining into a lake to the left. This lake was not previously known: his Excellency named it "*Lake Frome*," after the Surveyor-General. We then bore off to the right, to some low grassy hills, which we followed for about 8 miles. From these hills we saw a large lake, which his Excellency named "*Lake Bonney*." For about 2 miles, after leaving these hills, we crossed a plain, when we came to a swamp, in which there was a native well. At this place we halted for an hour to dine. We then followed the range, under which the well was situated, for 3 miles, when we crossed a swamp and followed another range until it became nearly dark, when we tethered our horses in a beautiful valley, lighted our fires, and made arrangements for sleeping; as it was dark, and we had dined only a few miles back, we did not trouble ourselves looking for water, although there was plenty in the neighbourhood.

5th.—Soon after 6 A.M. we were on our way. The morning was so foggy, that we were unable to see any distant object by which to direct us in our course; consequently, the compass was in constant use. At about 2 miles from the place where we had bivouacked, we came rather suddenly on a camp of natives; there were several fires, but we only saw two of the natives, who were men; the remainder of the party had no doubt concealed themselves. These natives did not appear hostile, but were quite unacquainted with the manners and customs of white people; they did not know the use of damper. The Governor dismounted,

went towards them, and giving a piece to each, endeavoured to explain that it was food; whether they profited by the lesson I cannot say. After leaving the natives we followed the range for about a mile, when we crossed a plain, and came to another narrow range, having passed which, we reached a prettily wooded plain, and followed it for about 8 miles, when we stopped at a tea-tree swamp, dug a well with water within a foot of the surface, made our several fires, and, having tethered our horses to enjoy the luxuriance of the pasture, proceeded to breakfast. A fine range lay about 6 miles to the north. The trees for several miles had altered much in character; the blackwood grew to an enormous size, the Sydney wattle was intermixed with the gum, the mahogany, &c. Having breakfasted off a turkey shot the previous day, we proceeded on our route. The country had much improved since we crossed the Coorong, and we had passed many places which I have no doubt will ere long be occupied by settlers; but in the last few miles this improvement had increased rapidly, and we were fairly in a country of volcanic origin. One mile from the place where we had breakfasted his Excellency noticed some volcanic rocks. We pursued our course through luxuriant forests, and at 2 P.M. passed a small flat which presented a remarkable appearance; the whole surface was bristled with rocks, which stood up from 1 to 12 inches, and might be considered Alpine ranges in miniature; they were of coral limestone. At about 28 miles we crossed a watercourse with many holes, but at the point where we crossed there was no water. At 3 P.M. I called the attention of his Excellency to what appeared to be a chasm in the rock, and which was about 200 yards to the left of our line of route; we made off towards it, and discovered it to be a well of pure water of an oval form, the longest diameter of which was 80 yards, the shortest 70 yards, with perpendicular or overhanging cliffs. Our tether ropes were immediately put in requisition, for the purpose of ascertaining the depth of this singular well. A large stone was tied at one end of the line, which was let down from the cliff; the stone sunk immediately, and the bottom was reached at 132 feet, namely, $28\frac{1}{2}$ feet from the crest of the cliff to the surface of the water, and $103\frac{1}{2}$ feet for the depth of the water. This however can give but a poor idea of the depth of the water in the centre, as the place where we measured it was close to the edge. This well is situated in a level country, and there is no indication of it until one approaches close. The rock is a coral limestone, and the water, although of an inky blue when seen from above, is perfectly pure and fresh. This well was called by the Governor "The Devil's Punch-bowl." At 1 mile S.E. we came to another well, similar to that just mentioned, except that it was divided into two portions by a narrow rock that sloped gradually to the

water, which could thus be reached with little difficulty. From this second well we had a view of Mount Schanck, which bore 108 (deg. ?),* and was 10 miles off. We made for Mount Schanck, and after crossing a narrow belt of scrub, with deep pits and chasms, we came again into a beautiful country. At about 2 miles from Mount Schanck we crossed a dray track running at right angles to our path; we were at a loss to know whether the station to which this track led was to the right or to the left, but from the appearance of the sheep tracks, which were fresh, we considered that the station must be to the right. We then made for a rising ground, and from thence saw something moving among the trees to our right. On calling we were answered by the barking of dogs, and made off in the direction from which the sound came, and in 1 mile arrived at the head station of Messrs. Arthur. There is a well of water similar to the "Devil's Punch-bowl" close to the station, and Mr. Arthur has put up a windlass, with a rope and bucket, on an overhanging rock, and thus the water required at the station is drawn from the well. Mr. Arthur informed us, that he had thrown a weight attached to a line into this well, and the water near the edge was 156 feet in depth; he said there were several similar wells within a mile or two of the station, but that he was not aware of the existence of the large one which we had passed in the afternoon.

6th.—His Excellency with Mr. Arthur visited some caverns in the neighbourhood, and procured from one of them many bones and teeth belonging to the kangaroo, opossum, wambat, and dog. Some of the teeth were very large, and must have belonged to animals far exceeding in size those of the same species which are met with at the present time. During the absence of his Excellency, I walked round to see several wells similar to those we had met with on the preceding day. One of them, which is about 3 miles W. of Mount Schanck, has been converted by Mr. Arthur into a sheep wash. The sheep are driven down an inclined road cut through the coral limestone, which is very soft and easy to work before being exposed to the atmosphere; when properly cleaned the sheep pass up another inclined road, which is arched over on the opposite side of the well. After breakfast we rode to Mount Schanck, tethered our horses at the foot of the mountain, and ascended on foot. This mountain rises at an angle of about 45° for about 600 feet from a comparatively level country, and attains the altitude of 800 or 900 feet above the sea level. There are three distinct craters: the principal one is 500 yards in diameter; the crater to the E. is about one-third as high as the principal one, and 200 yards

* The direction, inadvertently left out in the text, will be seen on the map.—Ed.

across; that to the S. is rather more elevated than the eastern one, and about 250 yards across. The small craters are on the slope of the main crater; they are all nearly circular; there is no water in either of them, but they are covered with rich vegetation on the inner and outer slopes. From the rim of the main crater there is a very extensive view; many of the hills in New South Wales about Cape Bridgewater are plainly visible. At the base of Mount Schanck, to the S.E. and S.W., there is a large mass of cellular wacke, which is generally bare and rises abruptly above the plain, with a wall nearly perpendicular about 6 or 8 feet in height. The wall has much the appearance of having once formed a sea beach. When riding on the S.E. end of the mountain we noticed a hollow sound, as though we were riding over a vault; this sound was not so apparent on the other sides. The basalte, or cellular wacke, in some places formed dykes in the inner slope of the crater, where it contrasted beautifully with the vegetation, which on either side of the walls of bare rock reached from the top to the bottom of the slope. The crater was inhabited by numerous animals, the traces of which were plainly visible. The lava that I obtained was nearly black, and in irregular masses. Having devoted as much time as could be spared to Mount Schanck, the party proceeded to Mount Gambier, which is situated 8 miles from Mount Schanck, and in a direction 9° E. of N. The country that we passed over was of the richest description, and the scenery beautiful. Mount Gambier is rather higher than Mount Schanck, and of an oval form. The length is 600 yards, the breadth 120 yards, and the largest diameter has a direction nearly E.S.E. We passed up to the top of the crater at a low point to the S.E., from which we proceeded along a sidling pathway to the bottom. About one-third of the eastern portion of the crater forms a lake, with high perpendicular cliffs, except to the west, where it is bounded by a gently sloping hill that runs nearly N. and S. across the crater, dividing it into two nearly equal portions. The water in the lake is good and very deep, and there were numerous ducks upon it. The western portion of the crater has several small lagoons, which contain water; by the side of one of these we bivouacked for the night. There is a cattle station about 2 miles to the right of Mount Gambier belonging to Mr. Henty. Having descended from Mount Schanck, we dined on damper and tea. The night was exceedingly dark, with heavy clouds, through which occasionally a star was seen; when the moon rose, the effect was singularly beautiful; to the E. the black wall which surrounded us was finely thrown out in relief by clouds which rose behind in silvery masses. During the short time of light which remained, after our getting to the crater, his Excellency walked to the eastern rim with Mr. Arthur, to see

two other craters that are situated immediately to the E. of that in which we were. The second crater has no water in it. The third forms a large lake of deep water, and is only separated from the second by a narrow ridge, which is nearly perpendicular, and forms a bridge between the second and third.

7th.—The rising of the sun this morning was magnificent; the atmosphere was clear, the rosy hue of the sky was cast upon the side of the crater, and showed upon its eastern wall two men and several dogs, whom we afterwards found were coming to us with a supply of beef. When the sun was well up, we made our exit at a low point to the W. in the rim of the crater: it was excessively steep, but the horses managed to scramble up; his Excellency, with the remainder of the party, descended to the plain below in our line of route, whilst I and Mr. Arthur ascended to the highest point of the mountain. Having taken the necessary bearings, or rather such as my time would allow, we descended to the plain, to which our horses had been led. I procured some red porous lava and other volcanic productions from Mount Gambier. Mr. Arthur left us here, and we proceeded on a N.W. course, through a country very finely timbered with gum trees, Sydney wattles, stringy bark (Sydney), and blackwood of gigantic growth. We crossed, at about 9 miles, two narrow swamps, and then entered a forest principally wooded with stringy bark; this we followed for about 3 miles, when we passed over a swamp for about 2 miles, at the termination of which we again entered a fine country, that continued through the remainder of this day's journey. At about 2 P.M. we made the top of a range, the principal summit of which his Excellency has done me the honour to call after my father. The Mount Burr range is about 1600 feet above the level of the sea, and generally steep to the S., S.W., and W.; but on the opposite side the ascent is more gradual, so much so, that we were hardly aware of being on high ground until we were near the summit; it appears to be connected with Mount Gambier by a lower range, which we had kept on our right during the day. From the most western point of the Mount Burr range that we visited, we were able to see Mount Gambier and Rivoli Bay, with many other points. After I had taken some bearings we proceeded about 5 miles, when we came to a fine spring, which rises at the foot of a limestone hill, and forms a pretty little stream. At this place we saw a new kind of cockatoo; it was small, and of a dark rifle green: unfortunately we were unable to procure one as a specimen. We bivouacked near the spring, which is about 4 miles S.S.E. of Mount Muirhead.

8th.—We started early this morning for the dépôt, and after riding about 14 miles across a fine plain, 6 or 7 miles N. of our track on the morning of the 5th, we came to the range crossed on

the 2nd. We fell in with some natives at a camp on the range; we saw only women and children, and they ran off and concealed themselves in some reeds at a well hard by; his Excellency dismounted and followed them, and although they were exceedingly shy, he succeeded in holding a short converse with them. He gave one of the women a handkerchief and some damper: with the former she expressed herself much pleased; she was quite unacquainted with the use of the latter; on being shown that it was intended to be eaten, she put some into her mouth, but did not swallow it in our presence. By the camp of the natives there were many small fish and beetles, some of which were roasting for dinner; these delicious morsels would have been overcooked in consequence of the delay occasioned by our visit, had we not removed them from the fire. We examined all their shields, spears, &c. Mr. Angas took sketches of such as were of a different make from those we had previously seen. There was one piece of limestone rock $4\frac{3}{4}$ inches in length, and $1\frac{1}{2}$ inch in diameter, which was used by them as a pestle for pounding roots: this I coveted for my cabinet, and consequently stole; but as a good supply of damper was left in its place, I trust they will pardon the theft. The boomerang is used by these natives, but does not appear to be in use by those farther north. From the natives' camp we proceeded to Lake Frome, and followed a native path which went round the head of the lake. At 3 P.M. we arrived at the dépôt, having ridden along our outward track for about 5 miles. During our absence, Corporal Ide and Private Baker, of the Royal Sappers and Miners, had made a chart of the bay, and Mr. William Sherbert, the master of one of the whaling vessels in the bay, having allowed them the use of a boat and crew, they were enabled to take the soundings over a portion of it.

9th.—His Excellency, accompanied by Mr. Gisborne, went to a rock (Sherbert's rock), in one of the boats belonging to the "*Prince of Denmark*," to hunt the sea-lions which are on that rock. Mr. Bonney and I started homewards with the bullock-drays; the horse-dray remained behind to bring any specimens that his Excellency might procure. At about 2 miles from the camp we passed a number of natives, but they were too shy to speak with; although Mr. Bonney rode after them, and made signs of friendship, they ran off and concealed themselves. Soon after 4 P.M. we arrived at our camping ground of the 1st and 2nd May, having halted for two hours in the middle of the day: and in about half an hour, the Governor, with the remainder of the party, came up. His Excellency had been so fortunate as to capture one of the sea-lions, by putting two balls into its head; the party in the boat landed on the rock, and killed it

with clubs. There were four of these monsters on the rock: that which was killed roared loudly when he received the shots, and showed fight afterwards when approached. The length of this animal is 8 feet, the girth of the body 9 feet; the head is much like that of a lion, and when enraged he bristled his mane, roared loudly, and opening his mouth displayed his tremendous teeth. On opening it, the stomach was found to be lax, and not muscular, so that in this respect the stomach of this animal almost exactly resembles that of an albatross. The sea-lion lives on squid and small fish, and is in the habit of swallowing stones; in this it also resembles the albatross. In the stomach of that shot by his Excellency there were five large pebbles (limestone), which weighed in all $4\frac{1}{2}$ pounds. The Governor had also brought with him two natives (young men), who I believe were with those passed by Mr. Bonney and myself in the morning, and who, on seeing us with the bullock-drays, considered that our party was gone, and went down to look about for any little thing which might have been left behind, for soon after our departure they came to the camp. At first they appeared surprised to find any one there, but having gone so far, found it difficult to retreat. After a little parleying they were induced to go to the camp, and expressed themselves much pleased with everything they saw, more especially with the well. Having thus made acquaintance with the party, and feeling that they were safe, they were induced by a little coaxing to come on, and were much delighted at riding on horseback. They were very merry fellows, and exceedingly careful not to give offence: they would not move hand or foot without first obtaining permission; when they wished to sit down, they asked leave most submissively, and did not rise without doing the same. A sheep had just been killed, the head and interior of which were given to them. They first asked whether they might put it on the fire to cook, and when it required to be turned, they sought permission to do so, as also to eat it when cooked. Mr. Gisborne, to assist them in their meal, cut the head into pieces, and tried to divide the bone with a large buck knife which he had: the blade of the knife broke, leaving a portion in the head, and Mr. Gisborne kindly spent some time in taking it out, fearing lest the poor fellow should swallow it. At dinner time the use of knives and forks, and spoons, and pannikins, &c., was explained to these good natives, and they expressed themselves much satisfied with the treatment they received, and were particularly pleased with eating sugar. When they had been well feasted, and had anointed their bodies with grease, they wished to go to bed; and on being shown where they were to sleep, which was at a fire about 20 yards from the camp, they laid themselves down to rest. I wished very much to get

the latitude of the camp, but as Regulus, the only star which passed the meridian at a reasonable time, was in its place for taking an altitude, he was obscured by a cloud, and we all retired to rest.

10th.—At 1 P.M. the dogs barked a great deal, but as it was supposed that their uneasiness arose from wild dogs being in the neighbourhood, no notice was taken of them. At 2h. 20m. A.M. I was aroused by the serjeant-major of police, who came to ask what was to be done, as the natives had decamped, and had taken the sheep with them. I immediately went out and ascertained that these submissive natives had taken the opportunity when we were asleep, and had stolen everything they could lay their hands on. They had taken six spoons, four forks, and six knives, which had been used at dinner, and were cleaned for breakfast, and wrapped up in a couple of towels; they had also taken three pannikins, an axe, and the sheep (the head of which they had eaten for dinner), with a portion of the rope with which it had been hung in a tree: not satisfied with this, they had been daring enough to go to serjeant-major Alford and private Hall of the police, and had stolen their hats. I was much amused, during this examination, by Baker (who was sleeping under one of the drays) putting his head out and drily saying, "Give a look round and see that none of the drays are gone." Having satisfied myself as to the extent of the loss, I retired again to rest, knowing that pursuit would be useless. I have no doubt but the natives who served us this trick were conjurers or jugglers amongst their tribe, for they were the most active and restless fellows I ever beheld. During the time they were with us they were continually in motion, and said "Lip, lip," which might have been intended for "Sleep, sleep," as I have no doubt they were anxious we should sleep. In all probability there were others who helped them off with the plunder, and they will be considered great men among their tribe. They are the first natives I have known who have been able to set up housekeeping with family plate. If our party had consisted of only three or four individuals, there is every reason to believe that, in order to attain their end, these natives would have committed murder; but, with a party so large as ours was, they were afraid of causing an alarm, in which case they must necessarily have been overpowered. At about 8 A.M. we were on our road. At 4 miles from the camp we passed over a low ridge to the southern border of Lake Hawdon, where we struck off in a course nearly N., across the swamp which surrounds the lake, and, having gained one day on our outward journey, at 4h. 40m. we arrived at the spot where the Messrs. Scott were stationed with their sheep when we passed on the 30th of April: as this was a good camping ground, we remained there for the night. During the day we had seen many

emus, kangaroos, and wild dogs, and had some good hunting after several of them.

11th.—Rather a wild-looking sky, but as there were only a few showers, his Excellency determined to visit Guichen Bay; accordingly, orders were given for the drays to proceed to a certain spot, which was chosen as a camping ground for that night. Having made these arrangements, his Excellency, accompanied by Messrs. Bonney, Gisborne, and myself, with one of the police, proceeded to the bay, where we arrived after a ride of about 10 miles; our course was nearly W. On the road we passed a place covered with calcareous tufa, in balls nearly spherical. From the coast-range we descended a valley to the bay. Near the coast we came unexpectedly on two natives who were lying in the grass; we halted and spoke to them, but they seemed much annoyed at being disturbed, and rose, each having a large bundle of spears in his hand. They would not approach us, but walked off in our rear, at an angle of about 45° from our course, looking scornfully and with suspicion at us, but evidently afraid. After they had walked about fifty yards they sat down, and the younger one showed that he recognised us. He was one of the natives who had been at our camp on the 1st instant, and had been well treated. The shirt that Mr. Gisborne had given him was laid aside. These natives would not become reconciled to our presence, but called out for the natives in the neighbourhood. We therefore rode on, and after I had taken the bearings which would suffice to give a general idea of the form of the bay, we returned, and passing over a very picturesque country came to the overland road, about 5 miles from the place at which we were to encamp for the night. Just after coming into the road we encountered a thunder storm, with heavy rain; which I have great reason to remember, as my mare was knocked up a few minutes before it commenced, which obliged me to walk to the camp.

12th.—His Excellency left us, accompanied by four of the police, at 9h. 45m. this morning. There were heavy showers occasionally in the day, especially during the early part. At 10h. 5m. the drays started. We halted for a few minutes at Ross's Creek to take water for the night, and then proceeded for about 4 miles, when we encamped.

13th.—I rode off to the Granite Rock, as we passed it, with a view to get one of the kangaroo-rats, of the kind which we had seen there on our outward journey; but the gun would not go off in consequence of the rain, which had fallen since we started, having damped the caps. From thence I proceeded to the beach, and visited the granite rock mentioned on the 26th of April; from the sand-hills near which, I perceived that the Wambat range had not terminated, but, though farther removed from the coast, continued towards the S. Mr. Bonney and I met

on the coast, he having left the road some time after. At 2½ P.M. we arrived at the place where we had previously encamped at the crossing of the Coorong, and halted.

14th.—This day we proceeded to about 40 miles beyond the place where we encamped on the 23rd and 24th of April.

15th.—We passed the Salt Creek, and encamped on a plain 2 miles beyond.

16th.—Messrs. Gisborne and Angas left us this morning for Adelaide; we encamped on a flat near the Coorong, at which the Governor stopped in May, 1842.

17th.—At 1h. 30m. P.M. we arrived at the place where M'Grath was murdered, and, having taken up the articles we had left there on our outward march, proceeded. At about 1 mile from the well Mr. Bonney and I went off the road, and met an old native, who was sitting under a little bush. We immediately recognised the old man as one we had seen at the same place on the 20th of April, and who was then in good health, and robust; but what a change! Now he was lying, almost without covering, by a small fire, with a few sticks by his side, and nearly dead for want of food. He was very glad to see us, and vociferously asked for damper, making us understand by signs that he wished to have branches of trees placed so as to make a warley, also that he required fire-wood: these wishes were complied with, and a plentiful supply of each was brought to him; but we noticed that he was much emaciated and in great distress. I therefore sent for Jemmy, the native who accompanied us, and although Jemmy belonged to the Rapid Bay tribe, he was able to understand a good deal of what the old man said, and in this way I learned that, being sick and unable to provide for himself, he had been left by his tribe to perish (this is commonly done by the natives). On examination, I found that the poor old fellow had lost the use of his legs, and was therefore unable to move about in search of food; that the small bundle of wood that lay by the fire had been reached by him around where he lay; and that he had been left thus for seven days, to die of cold and hunger. As he had collected all the wood that lay within his reach, and was destitute of food, in the course of a few hours he must have perished. I measured his arm above the elbow, at the thickest part, and found that it was barely five inches round; his stomach was in folds, for want of food; and in every respect the most emaciated being I ever beheld. Finding this to be the case, I considered that the warley we had made, and the food we had given to him, with the fire-wood we had put within his reach, would only last for a short time, when he would be in as bad a situation as that in which we had discovered him: I therefore put him on Hall's horse, and Jemmy, who showed great kindness towards the old man, was put behind to keep him on, as he was unable to sit upright. We thus pro-

ceeded to the drays, and having made as comfortable a place as time would allow on one of them, the old native was taken from the horse and placed on the dray. We proceeded 4 miles, and encamped for the night. The natives who had left the old man we had brought on, encamped near us: on the invalid's being informed that this was the case, he was very anxious that we should shoot them. The natives came to our camp, but it was a long time before he would speak to them.

18th.—As I was anxious to get to Adelaide as soon as possible, I struck off the road across the desert for Mr. Giles's head station on Lake Albert. The old native we had saved from perishing was brought on with the drays; when he left his kindred he said in his native language that he "would return when he became fat." A boy, about nine years old, belonging to his tribe, wished to come with me to Adelaide, and accordingly I brought him. At 3 P.M. we arrived at Mr. Giles's station, having crossed the desert at a narrow part; and when free from scrub and hills, our course from the Coorong was straight, and we came into an overland road, about 3 miles from Bonney's water-holes. I would strongly recommend persons who are going overland to follow our track, as by doing so they will only be one day longer than by going to the Salt Creek by the road through the desert, and will save two days by the road in general use along the Coorong. Our track may be known, as it is well beaten by our three drays having gone in line over it. We passed just to the left of a sand-hill, about 5 miles from Mr. Giles's house at Lake Albert, and came into the overland track about 3 miles from the water-holes.

19th.—Encamped on the eastern side of the river Murray, 3 miles below Wellington. The old native we had brought with us was rather troublesome, as he wished to be left behind with some natives we met on Lake Victoria; however, as he had come so far, I did not like to leave him behind on the lake, and wished to take him to Wellington, where he would have been properly taken care of. During the night, however, he was conveyed away by the natives, and concealed in the reeds. The boy I took up yesterday was much alarmed at the natives on the lake, and when we were near any of them he concealed himself under a large cloak in the dray.

20th.—Followed the river Murray to the upper crossing-place, and encamped at 2h. 20m. P.M.

21st.—We were moving by peep of dawn, and by 11h. 30m. A.M. all was over the river, although we were much troubled by the bullocks—they were urged in, but would not cross: the boat then took one in tow, and I expected that the others would follow, but they would not do so; and it was not until three of them had been towed across, and a fourth taken in tow, that the remainder would follow. Having seen everything safe on this side of

the river Murray, I considered that my duties as regarded the expedition were concluded, and as Mr. H. Giles was on his road to Adelaide, I accompanied him; we rode straight across the scrub to Mount Barker. The scrub in some places is very thick and high, but, with a little labour, a good dray-road might be cleared. Arrived at Mount Barker, where I remained for the night.

22nd.—Discovered on the estate of Captain Davison at Mount Barker some of the first granite I have seen in that neighbourhood. At 2 P.M. I reached home; and therefore bring this report to a conclusion.

In the foregoing pages I have given a detailed account of the proceedings of each day. I may now be permitted to offer a few remarks relative to the country passed over during the expedition.

From the neck of the peninsula which separates the Coorong from Lake Albert to the Salt Creek, or Bonney's Creek, there is a belt of grassy casuarina hills, with numerous plains of good soil, and in which water may be obtained within a short distance of the surface, as far as I have seen not exceeding 6 feet. This belt is bordered to the N.E. by the desert, and to the S.W. by the Coorong.

From Bonney's Creek to the crossing of the Coorong, a distance of about 35 miles, the road passes generally amongst a succession of salt swamps and low scrubby hills; but in this distance good water may be obtained at two points,—viz., at 5 miles and at 30 miles, leaving only a space of 20 miles to be passed over without water. About 2 miles N. of the road, and following a direction nearly parallel to it, there is a low range (Wambat Range), behind which there is an extensive fresh-water swamp several miles across, which appears to be subject to annual inundations. The soil on this swamp is similar to that of the flats of the river Murray. There are many grassy isolated hills in the swamp; these hills have much the appearance of islands. Beyond the swamp to the N. and N.E., there are a succession of ranges which do not from a distance look very promising.

From the crossing of the Coorong to Cape Bernouilli the country improves: from Cape Bernouilli to Guichen Bay, and for some distance around Mount Benson, and to Lake Hawdon, there is an useful tract of country.

The range that follows the coast from Cape Bernouilli to Lake Bonney, and which we crossed at several points, is very picturesque, as far as we saw of it, especially immediately at the back of Rivoli Bay; and there are many other similar ranges, separated by low level ground, a great portion of which is subject to inundation; but the soil is excellent: and some of these plains have been so far raised by the action of earthquakes as to render them dry, and available for pasturage or agriculture.

Rivoli Bay was mentioned in a former part of this report as

having been spoken of in the highest terms by the masters of vessels at anchor in it. Mr. Sherbert informed me that he had anchored under Cape Lannes, and afterwards gone round between the reefs and the land to the spot where the vessels were at the time we were there; that the depth of water within the reefs was from 5 to 6 fathoms. He also informed me that a vessel entering the bay must keep well out to the westward, and then run right in about midway between Penguin Island (Cape Martin, probably Cape de Joffa of the French, but not previously named in the English charts) and the next reef to the S., which is about $1\frac{1}{2}$ mile from the island, and not between the two reefs, which are about $1\frac{1}{2}$ mile apart: the channel is from $3\frac{1}{2}$ to 5 fathoms deep.

From Rivoli Bay to Mount Schanck, and from thence round by Mount Gambier back to Rivoli Bay, we passed, for the most part, over a country of the richest description; the soil was a dark-brown loam. The trees grow luxuriantly; the blackwood grows there to an enormous size: beside which there are several trees quite different from those in the neighbourhood of Adelaide. We also saw several new birds; but owing to the rapidity of our movements, we were unable to procure any specimens.

The country around Mounts Gambier and Schanck is evidently a coral reef, which has been raised from the deep. As these reefs always occur, forming a succession of islands which have a particular line of direction, we may hope to be able to follow this line up, and to discover more tract of country of a similar description to that which we visited.

Lake Bonney is the largest sheet of water we saw to the S. of Lake Albert. This lake borders the ocean, and at one point there does not appear to be anything to divide the lake from the ocean, as there is an apparent gap in the sand-hills. If this should be the case, and a navigable entrance be found even for very small craft, the lake will be of great value to this part of the country; but considering the openness of the coast, I much fear any connection between the lake and the ocean would be choked up by sand.

There is much of the country from the river Murray southward, within the limits of this province, which still requires to be explored before we can give any decided opinion as to its character. There are several points, as far as I could judge during this expedition, from which an examination of this country might be undertaken. One is from Cape Bernouilli, or Mount Benson, or somewhere in that neighbourhood; another, from Mount Muirhead, in a course to the E. of N. In either case, I believe that the mysteries of this portion of the continent might be solved; or it might be done from several places on the river Murray, between the head of Lake Victoria and the Great Bend.

IV.—*The Geography of Nyassi, or the Great Lake of Southern Africa, investigated; with an Account of the Overland Route from the Quanza in Angola to the Zambézi, in the Government of Mozambique.* By William Desborough Cooley.

ABOVE three centuries have elapsed since accounts of a great sea in the interior of Africa reached the Portuguese settlements on both sides of that continent. But this information, though positive and well attested, was too meagre and incomplete to be capable of satisfying curiosity or of holding a permanent place in systems of geography. Being made subservient to theories, and varying with them, it gradually lost the character of authenticity, and fell into unmerited disregard. Some accounts more recently received from the same quarters have hitherto added but little to our knowledge; for they have been but imperfectly understood; their bearing on what was previously known having wholly escaped notice. The object proposed in this paper is to collect and compare the several statements extant respecting the great lake in the interior of Africa, to determine their true meaning and value, and thus, with the aid of new particulars derived from original sources, to endeavour to establish the geography of that region on a firm and consistent basis.

Already in 1518 we find it stated as a fact, learned from the natives of Congo, that the river Zaire rises in a lake in the interior, from which issues in the opposite direction another great river, presumed at that time to be the Nile.* No matter what may have been the lake intended in this instance by the people of Congo; theory and an exaggerated estimate of distance easily carried it into the middle of the continent.

De Barros presents to us the results of more searching inquiry, modified by the influence of current systems. He tells us of the great lake in the centre of Africa, "whence issue the Nile, the Zaire, and the great river the branches of which encompass Benomotapa, besides many others that are nameless. It is a sea of such magnitude as to be capable of being navigated by many sail, and among the islands in it there is one capable of sending forth an army of 30,000 men."† The following important sentence alludes to the sources of information as well as to the peculiar form of the lake; "according to the accounts received from Congo and Sofalah, the lake must be a hundred leagues in length." With respect to the great river encompassing Benomotapa, he explains to us that "one branch of it is the Espiritu Santo (the Manyissa at Dalagoa Bay); the other, the Cuama, which is called in the interior, Zembere (Zambéze)." The practice here exem-

* Fernandez de Enciso, *Suma de Geographia*, fol. 55 b.

† Asia, Decad. I. x. i.

plified, of deriving several rivers from a common source, remained long in vogue with geographers. As to the river called Zembere, it is obvious that it can be no other than the Zambéze, and that to the still further corruption of the same name is due that of Zembre or Zambre, subsequently given to the lake.*

The next original authorities demanding our attention are Duarte Lopez, Joao Dos Santos, and Do Couto, who were nearly contemporaneous observers, though separated by some years in the order of publication.† The information collected by Lopez was unfortunately not given to the world unalloyed, nor by himself, but was elaborated by Pigafetta into a system harmonizing with the prevalent opinions of the age, and in this form was published in 1591. Yet in the midst of this editor's theories, we can at times detect the original simple truth, as well as the motives which led to its perversion. Lopez had heard of a lake called Achelunda (Acalunda for Acalunga, or rather O-calunga, in the language of Angola, *the sea*).‡ from which the Quanza and other rivers were said to take their rise; the Zaire also flowing through it. But besides this lake, which was of minor importance, Pigafetta places two great lakes further east, in which, according to him, are the sources of the Nile, Zaire, &c. It is evident, that in placing two lakes at the sources of the Nile, he sought to maintain some agreement with Ptolemy, from whose authority nevertheless he ventured to dissent respecting the position of the lakes. His words are as follows:—

“It remains for us to speak of the Nile, which does not rise in the country of Bel Gian (the Emperor of Abyssinia), nor yet in the mountains of the moon, as Ptolemy writes, from two lakes, east and west of each other, and 450 miles asunder. For in that latitude lie Congo and Angola on the one side, and Monomotapa and Sofalah on the other, with 1200 miles from sea to sea. Now Odoardo (Duarte Lopez) affirms that *there is but one lake in this region*, on the confines of Angola and Monomotapa. It is 195

* Benomotapa must also be considered as a misprint for Monomotapa. The disfigurement of proper names in the Decades of De Barros and his continuators is so frequent and manifest that no critical student can allow their text to be conclusive authority with respect to names. We find in their pages Aghirimba for Agizimba; Zuzuama for Cuama; Suabo for Cuavo. These errors, with hundreds more, have been copied with thoughtless servility. The Cuavo being supposed to have a common source with the Chire which joins the Zambezi, the names also of these rivers were confounded. Hence we find, in some maps of the present day, the Chire called, by a double error, the Suabo.

† Do Couto was at Mozambique on his return from India in 1565; Lopez went to Congo in 1578 and stayed there some years; Dos Santos resided in Monomotapa from 1586 to 1597.

‡ Many examples might be adduced of this change of termination: thus the river Lelunda, near St. Salvador, was also called Lelougo. A-calunga is the dative case; but it could not be expected that strangers learning these names should be able to strip them of inflexion.

miles in diameter, and information respecting it is furnished by the people of Angola, and by those of Monomotapa and Sofalah; who give us a full account of this while they make no mention of any other lake, so that we may conclude that there is no other in those latitudes." . . . "It is true that there are two lakes, not however lying east and west, but north and south of each other, and about 400 miles asunder. The first is in 12° S. latitude. The Nile issuing from it, does not, according to Odoardo, sink in the earth nor conceal itself; but after flowing northwards it enters the second lake, which is 220 miles in extent, and is called by the natives *a sea*. Respecting this lake very positive information is given us by the Anzichi, near Congo. They say that on the lake there are people in great ships, who can write, have weights and measures, build houses with stone and lime, and may be compared with the Portuguese; whence it is to be inferred that Prete Gian is not far off."*

The passage just quoted will, on mature consideration, be found to warrant the following conclusions:—1. The inhabitants of Monomotapa and of Angola concurred in representing, that on the route between those countries there was a great lake, and only one. 2. The Anziki, north of Congo, also knew of a great lake to the east of their country. 3. Though Pigafetta, in assuming that these accounts referred not to the same, but to different bodies of water, may have been merely overcautious and anxious to shun the necessity of extending the newly-discovered lake through seven or eight degrees of latitude, yet it is more probable that he thought to reconcile them in this way in some measure with the authority of Ptolemy, which seemed the more easy, as the distance between the sources of the Nile, according to the Alexandrian geographer, corresponded tolerably (allowance being made for the diameters of the lakes) with the difference of latitude between the country of the Anziki and Angola.

But the two lakes which thus sprang from two sources of information respecting one lake, were not wholly separate, but were connected by the Nile flowing northwards; and on the eastern side of this river, between the two lakes, Pigafetta places the great empire of Monemugi, to which, as he asserts (erroneously, though his words long continued to be repeated), both Kilwa and Mombasa were subject. This is, we believe, the earliest mention of a nation, which was afterwards for ages supposed to occupy the vast area between Monomotapa, Abyssinia, and Congo, and to be closely connected by commerce with the towns on the eastern coast of Africa. It will be seen lower down that the country of the people here intended is in reality not far from the eastern shores of the great lake.

* *Relazione del Reame di Congo.* 1591. p. 79.

Pigafetta is also the first writer who expressly names the Cuavo (the Cuavi or Quavi at Kilwá) as one of the rivers which descend from the lake.

Although implicit reliance cannot in general be placed on the reports of mere compilers, yet we cannot refrain from quoting in this place a passage from Dapper's 'Description of Africa,' which, if it be not merely an embellished paraphrase of Pigafetta, offers certainly a remarkable confirmation of that author's statements. "East of Makoko" (the King of the Anziki), says Dapper, "and somewhat to the south, is the kingdom of Monemugi, which others call Nimeamaye. At the extremity of this country, as the blacks tell the Portuguese, is a lake which they call a sea, containing many inhabited islands, and from which flow many rivers. On the eastern side of the lake is a land where they hear the ringing of bells, and see buildings like churches. A people with smooth hair, dark, but not black, came from the east to trade with the islanders in the lake. They are more polished in manners, and better attired than other natives. The blacks of Pombo, when asked respecting the distance of the lake, say that it is at least a 60 days' journey, going constantly eastwards."*

The missionary, Joao Dos Santos, resided some years in the Portuguese possessions on the Cuama; great weight is therefore to be attached to his testimony, however brief it be, respecting the geographical information derived from the natives. His words are as follows:—"The Caffers say that they have heard that this river (the Zambézi) rises in a great lake in the centre of Ethiopia, from which issue also some other great rivers, flowing off with different names and in various directions; and in the middle of the lake are many islands, well peopled, rich, and abounding in provisions. They say also that this river is called Zambézi, from the name of a people through whose territory it passes on issuing from the lake."† Here we find reproduced the ideas of De Barros respecting the connexion between the lake and the river Zambézi, though free from the misprint which disfigures that historian's pages. It still, however, remains for us to inquire who are the people from whom the river derives its name.

The historian Do Couto alludes frequently to "the famous lake in the middle of Africa;" but in only one passage does he state a particular connected with it, which is likely to aid us in

* Beschryving van Afrika. Amat. 1671, pt. ii. pp. 219-285. Malte-Brun (*Précis de Géogr.* tom v. p. 104), mentioning the Mono-Emugi, adds "ou, selon une orthographe plus authentique, *Mou-Nimigi*." For this orthography, however, there is no authority whatever. All the Portuguese writers call them Monemugi or Monoemugi; the latter form evidently gave rise to Dapper's Nimeamaye. Pombo signifies "the route;" the blacks of Pombo are the blacks on the line of road referred to.

† Ethiopia Oriental, II. c. ii. fol. 44 b.

connecting the early accounts of the Great Lake with those of recent date. He relates, that "in 1570, there issued from the heart of Ethiopia, from the shores of that great lake whence flow the Cuama, the Zaire, the Rapta, and the Nile,—hordes of barbarians like locusts. They collected various savage tribes on the way, among others the Macabires and Ambios. They entered Monomotapa from the north."*

It was probably this irruption of wild tribes from the north on the Portuguese settlements which led to the belief that the country near the lake was the 'Officina gentium,' whence first issued the hordes who at various periods laid waste different quarters of the African continent. A region so physically interesting and mysterious naturally attracted the embellishments of historical speculation, and was made the scene of wonderful events fantastically moulded from materials supplied by falsehood and exaggeration. A generalization so specious was eagerly adopted and obstinately retained. We find it stated that "there was a nation called in their own country Gangedes; in Congo, Jagas; in Angola, Guindes; in India (Eastern Africa) Zimbaz; in Ethiopia, Gallas; and in Sierra Leone, Zumbas, a name afterwards changed into Manes, and who lived on human flesh."† The Agows of Abyssinia were also reckoned as a branch of this widely-spread nation, the names Agow, Agaghi, and Giaga, being deemed the same. Modern writers have contributed their share to these ethnological absurdities.

But in order to strip these African wars and revolutions of the fancied grandeur which has alone caused them to be hypothetically referred to one great nation spreading from the interior, nothing more is necessary than to examine carefully the original accounts of those events. And it will be seen lower down, that unless we expel the fabulous as far as possible from its holds in the vicinity of the Great Lake, we shall hardly be able to discern the truth in the very scanty rays of historical information which proceed to us from that region.

Respecting the irruption of the Ambios on the Zambezi in 1570 we find nothing more than what is related by Do Couto. It appears to have closely resembled the march of the Mantatizi towards the Orange river in 1822, when the ravages of the invaders recoiled on themselves in the shape of famine.‡ "The barbarians," says Do Couto, "ate everything; human beings, oxen, buffaloes, wild beasts, snakes, and dogs; they left nothing

* Decad. X. c. xiv. He says they came "da banda do Borro." Borro or Bororo is the expression used by the boatmen on the Zambezi to signify the North.

† Sandoval, *Historia de Etiopia*, p. 429.

‡ This invasion is well described by Thompson; *Travels and Adventures in South Africa*, 1827.

behind but heaps of bones. In the desert they devoured one-another." But it is important to observe that they appear to have been easily repulsed by the small force at the disposal of the Portuguese. Their leader was named Senzabuco.

This alarming invasion has been passed over in silence by most writers on African geography and history, who, on the other hand, magnify immeasurably the petty wars of the Mumbos and Muzimbas. The former of these tribes, dwelling N.E. of Tete, being engaged in hostilities with some of the native allies of the Portuguese, took possession of Chicarongo, about 10 leagues from that town. The captain of Tete immediately marched against them, and, storming their encampment, put them all to the sword, to the number of 600. Their chief, Quizura, who is said to have paved the entrance to his house with skulls, fell on this occasion. Such was the end of the Mumbos.*

The history of the Muzimbas afforded a far better theme for embellishment and amplification. In 1592 this tribe, whose territories lay on the northern side of the Zambezi, nearly opposite to Sena, provoked in a similar manner the hostility of the Portuguese, André de St. Iago, the captain of Tete, who had just defeated the Mumbos, crossed the river and marched against them on the one side, while the captain of Sena, Pedro Fernandez de Chaves, advanced to attack them on the other. The Muzimbas, lying in ambuscade, first cut off St. Iago and his European followers, who imprudently marched a long way a-head of their native auxiliaries, and then moving rapidly to the S.E., served Fernandez de Chaves in the same manner. In this unfortunate campaign the Portuguese lost 130 men, besides the two captains. The following year (1593) Don Pedro de Sousa, the captain-general of Mozambique, took measures to humble the Muzimbas. With 200 European soldiers and a large body of natives he invested their encampment or fortified town; but they defended themselves obstinately; his artillery made little impression on their intrenchments or barricades, and after enduring the hardships of a two-months' siege, he found it expedient to retreat, abandoning his artillery to the enemy. The Muzimbas, though again victorious, yet made offers of peace, which were accepted; they protested at the same time that they were not the aggressors.†

But a short time previous to these events, in 1589, it happened that while Th. de Sousa Coutinho was preparing to lay siege to Mombasa, he found that the place was already invested on the land side by a host of barbarians called Zimbas. These, as he

* Do Couto, Dec. XI. c. xv. Dos Santos, fol. 65 b.

† Do Couto, Dec. XI. c. xxvii. The writers who have exalted the Mumbos and Muzimbas into great nations cannot plead that they were misled by the original historians of these petty wars. Dos Santos begins his narrative thus (fol. 69): "A Muzimba Cafer, the lord of a little village, and with a few followers."

was informed, had taken Kilwa by surprise the same year, and came originally from the banks of the Cuama, "wandering over half of Ethiopia, and devouring everything on the way." Mombasa being abandoned by its inhabitants, Coutinho entered the town and the Zimbabwes withdrew; but they soon after reappeared at Melinda, where they were checked, however, by the courage of Math. Mendez de Vasconcellos and 30 Portuguese, and an army of 3000 Mossequios, natives of the adjoining coasts, coming soon after to the aid of the town, the Zimbabwes were completely defeated and dispersed. "This," says Do Couto, "was the end of the Zimbabwes, who had come 300 leagues from the country along the banks of the river of Sena (the Cuama)."

Now that these Zimbabwes had ever come from the neighbourhood of the Cuama or Zambezi may well be doubted, notwithstanding the native testimony alleged in support of that statement. In forming an opinion on such a question Africans would be much less likely to investigate the truth than to allow themselves to be guided by the suggestions of Europeans or by resemblance of names. It has been seen that the Mumbos and Muzimbabwes were small and settled communities, situate in a country divided among petty chiefs, hardly one of whom, probably, could muster a thousand men; and that the latter obtained a fame and celebrity which, with the writers of those days, might pass for strength and numbers, simply from their having signally defeated the Portuguese. That an army of 20,000 men should emigrate from one of those states is not very credible; that it should penetrate through the numerous nations of the Macúá, and direct its attacks against the well-built towns of the coast from Kilwá northwards, where the population is not only numerous, but superior in arms and civilization to the natives of the interior; and that having achieved so many triumphs, it should at last be totally routed by a handful of natives, is all in the highest degree improbable. But when it is also considered that the Muzimbabwes near Sena rose from quiet obscurity into historical distinction just *three years after* the defeat and dispersion of the similarly named tribe at Melinda; that the name in question is of a form so common in Eastern Africa, that its very frequency baffles the attempt to trace the connexion of those that bear it; and that there is at present a tribe named Masimba on the coast at Wassína, near Mombasa, while a people of similar name still possess territories on the northern side of the Zambezi, it will be manifest that the identity or common origin sought to be established involves an amount of improbability which far outweighs the evidence offered in its favour.†

* Decad. XI. c. vi.

† Masimba means the lions; Mizimbui the torrents; the latter name occurring on the coast 50 miles south of Cape Delgado, has been mistaken by Sandoval for that of a nation. Do Couto (Dec. IX. xxv.) calls the population north of the Zambezi collec-

Were further argument necessary in order to expose the inadequacy of the grounds on which it has been attempted to link together petty tribes so as to form them into one great nation, it would be enough to direct attention to the superstructure of absurdity reared upon this basis. Cavazzi da Montecuccolo, the historian of the Capuchin missions and a leading authority, gives the following account of the origin of the Jagas.* A warrior named Zimbo, chief of the Muzimbi, and whose mistress Tembandumbi was as martial as himself, ravaged Congo—but we are not told at what time nor whence Zimbo came.† Having laid waste that country he withdrew into the interior, and, joined by the Mumbos, penetrated through the empire of Monemugi. One division of his innumerable army, under Quizura, advanced against the Portuguese, but was repulsed; while the main body, led by Zimbo himself, continued its course to Kilwa, and so on to Melinda, where it was defeated. Zimbo, thus compelled to retrace his steps, continued his retreat as far as the Cape of Good Hope, whence he turned northwards along the western coast and entered Benguela from the south. There he died, but his followers, divided among many leaders, made their appearance soon afterwards in Angola under the name of Jagas.

There is no need of lengthened criticism in order to show the utter groundlessness of this narrative. Zimbo is altogether a fabulous personage; he is nowhere mentioned in the history of Congo, which country was attacked by the Jagas several years before the Muzimba rose into eminence. The account of his attack on Monemugi and alliance with the Mumbos is a tissue of mere fiction with gross exaggeration. In what follows, the real order of events is reversed, the attack on the Portuguese being made to precede that on the eastern coasts. The retreat to the Cape of Good Hope and march to Angola, where the Muzimba became changed into Jagas many years after the predatory bands thus named had been settled in that country, are all fabrications of the most unskilful kind. It is manifest that the theories connecting the Jagas with the Muzimba, and elevating these into a great nation coming from the lake, are wholly without foundation.‡

tively Masimba. That a people of similar name now dwell in that country we know from the testimony of Major Monteiro (*Annaes Maritimos*, 1843, No. 11).

* *Historica Descriptio de' Tre Regni*, &c. Milan, 1690. p. 146.

† Tembandumbi means mistress of the house, and is the ordinary title of the chief wife in Angola.

‡ Yet Carl Ritter, who with little knowledge of original authorities has a great leaning to the grandiose, clings to the belief of a great nation sending forth devastating hordes about the same time to different quarters of Africa. The dates with which he seeks to support this opinion are all erroneous. In the case of the Muzimbas he inverts the true order of events, placing the campaign of 1589 on the coast in 1593, and for all this, he cites the 1st Decade of De Barros, who died in 1571! (See his *Afrika*, p. 140.)

But there is one writer, Jarric, the Jesuit historian, who varies widely, in an important particular, from all other authorities on the events in question. In speaking of the invaders who appeared before Mombasa and Melinda, and who are elsewhere named Zimbas or Muzimba, he calls them Imbies.* When describing their arms and customs he evidently has in view the Muzimba near the Zambezi. To what, then, are we to ascribe such a variance in a writer generally exact, and possessing large stores of missionary information? The fact seems to be that, like other writers of his age, he generalized somewhat incautiously, and having received an account of the irruption from the N. on the Zambezi in 1570, and desiring to represent all the unquiet tribes of Africa as members of one family, he made the tribe who figured on that occasion the head of the family, and thus for the Muzimba substituted the Ambios, or, as he writes the name, Imbies. If this supposition be correct, then his authority favours the conjecture that the Ambios, or Imbies, who came from the lake, were no other than the M'Biza, or Moviza, as they are called by the Portuguese, who still occupy its south-western banks. Having thus discovered who were the Ambios, we cannot hesitate to recognise in their allies the Macabires, a people rich in flocks and herds (from Muca-biri, a shepherd), who, with their industrious and comparatively wealthy neighbours, were driven from their homes by some great calamity, which may perhaps be brought to light in the sequel of our inquiry.†

Had the inventors and propagators of these tales taken the trouble to examine diligently the sources of African history, they could not have failed to perceive that the petty wars and tumultuary movements which they sought to elevate into grand conquests and revolutions, are of very frequent occurrence in that quarter of the globe. Not long previous to 1624 the country between Tete and Sena was kept in disturbance by a chief named Hemozura, who was said to have an army of 20,000 men. The missionary accounts of these wars present nothing remarkable or certain except the self-complacency of the ignorant writers and the extravagant bad

* Jarric. *Histoire des choses memorables*, &c., tom ii. p. 163.

† Muca-biri, a shepherd, in the Bunda or Angolan language, makes in the plural, Aca-biri; but a Portuguese would be more likely to say Macabires. In order to justify this attempt to explain from the Angolan language names occurring in the centre of Africa, it will be enough to state that from the confines of the Hottentots in the south to the equator on the eastern coast, and to Cameroons on the western, there is but one family of languages which may be appropriately called the Zingian languages. Notwithstanding the variety of dialects, each tribe can understand its neighbours. There is little reason to doubt that a native of Angola would be soon able to make himself understood in Zanzibar. We are justified in calling the Moviza comparatively wealthy. The Cazembe's envoy, in describing his route to Tete, says (*Das Neves*, p. 397), on reaching the Aruangoa, "here ends the nation of the Vavúa," that is, of the rich people; he speaks of the Moviza. The Mumbos were, according to *Cavazzi* (p. 146), "*Nazione di esercitio pastorale*."

taste with which they relate incredible barbarities perpetrated by the natives. But along with them we find the following description of the lake from the pen of Luigi Mariano, a missionary at that time residing near Sena :—*

"The lake of Hemosura is 97 days distant from Tete. From Moravi to the lake is half a league, as I have been assured by one who had noted every particular. From the lake flows the river Cherim, extremely gentle at first, but its bed being afterwards divided by numerous rocks, the stream becomes too furious to be navigated. Moravi lies between the lake and the Zambezi; the town is well peopled, and there are merchants in it with whom we carry on a great trade. Beyond that, there are two principal kings; the one is Massi, who is 15 days distant from Moravi, the other is called Rouenga, and is 5 days' journey farther off. The people of Rouenga beyond that distance have no knowledge of the commencement of the lake, so great is its extension. It is 4 or 5 leagues wide, and in some places the land cannot be seen across it. It is all sprinkled over with islands, where those who navigate it can stop for rest. There is a great abundance of fish in it; the depth is 8 or 10 fathoms, and the Mozambique winds raise a great sea on it; so that whoever would go there for discovery ought to go in April or May. The shores of this lake have plenty of millet, flesh-meat, and ivory, which may be had cheap. There are many boats there called *cochi*.† For an expedition of discovery to this quarter it would be requisite to have a good stock of merchandise of the kind in demand on the Cuama, such as pieces of cloth, strings of beads, large and small, and besides this it would be necessary to have forty people between whites and blacks; and it is thought that it would be a very difficult undertaking, particularly in case of such a cruel war being kindled as that which rages at present. Nor would it be possible to go by way of Massi, the king of which is friendly, because, among other difficulties, travellers are there liable to be attacked by severe sickness; and, finally, the long navigation on wearisome rivers in ill-fashioned boats, passing through the territories of barbarous Caffers, who are little to be trusted, would render such an expedition a fearful matter; nevertheless, I shall not hesitate to proceed on it, having received the holy commands to do so."‡

* *Lettere Annue d' Etiopia, Malabar, Brasil e Goa.* Rome, 1627. p. 334.

† *Cochi* is the word for boat on the Zambezi (Botelho, p. 254), and Mariano was probably mistaken when he supposed that it belonged to the language spoken near the lake.

‡ It is evident that Bowdich (*Discoveries of the Portuguese*, p. 132) erred in stating that Mariano recommended an expedition of discovery to this lake. The French translator also of the *Lettere Annue* (*Histoire de ce qui s'est passé en Ethiopie, &c.*, Paris, 1628, p. 438) being misled by some ambiguity of expression, has made Mariano say, that he would not be sparing of exertions, as he had received the holy commands to proceed on that expedition.

The first thing that calls for remark in this account is the name Hemosura, given to the lake, perhaps for want of a better, from the chief who at that time figured so conspicuously on the northern side of the Zambezi. But it is still more probable that the name used in the original information was Murusura, and that Mariano or his editor, confounding the two names, or venturing rashly on emendation, preferred that which was more familiar to them, as being therefore the more authentic.* By the winds of Mozambique we must understand the westerly winds which during March and April blow strongly in the Mozambique channel. With respect to the river Cherim, said to flow from the lake, it is evident that Mariano had in view a river Querimba, that is to say, a river entering the sea somewhere opposite to the Querimba islands. The other geographical details furnished by the Jesuit's letter may be discussed with more advantage hereafter.

From what precedes, it will be evident that already in the beginning of the seventeenth century a number of particulars respecting the lake were known which, had they been skilfully combined and viewed in just relation to one another, would have formed a valuable accession to geography. It was known that there was a great lake in the interior of Africa, on the route between Angola and Monomotapa, two months' journey from the former country, and somewhere to the N. of Tete; that with respect to form and dimensions its length was comparatively very great; that there were many islands in it with a numerous population; that the natives called it *a sea*; that it had some connexion, at least *by name*, with the Zambezi; that a people named Ambios or Imbies (M'Biza) dwelt on its shores towards the Zambezi; while on its eastern side was the great kingdom of Monemugi, and on that side also the Quavi, or river of Kilwa, was supposed to issue from it.

But this information had not the effect of rousing the enterprise of the Portuguese, although great benefits might have been expected to accrue to their colonies on both sides of the African continent, from the exploration of the route overland between them. Do Couto feelingly laments the inertness of his countrymen. "We are beaten," he says, "on our own ground by the English and the Dutch; wherever they go, they are sure to make discoveries; whereas we remain in ignorance of the value and extent of our own possessions, because we are Portuguese."† The

* It must be observed that in the *Letture Annue* the history of the chief Hemosura is followed immediately by Mariano's account of the lake of Hemosura. The chief's name is said to have signified *omnipotent*. Another great warrior, the leader of the Mumbos, was, as has been seen, called Quizura; may not these names have been related in sense and derivation with that of Naula, or, in the plural, Amazula, assumed by some tribes near Natal, and which signifies "from above" or "heavenly"?

† Dec. IX. c. xxv.

same historian relates, that Francisco Barreto, when appointed to conquer the gold mines of Monomotapa, began with attacking Patta and other towns on the eastern coast of Africa by way of prelude to his grand enterprise. "While thus engaged he made the acquaintance of some Moors (Sawáhili) who are extremely intelligent and are used to travel through every part of the interior. From some of these, who were of the kingdom of Atondo (Watondui), he learned that from Kilwa or Atondo the other sea of Angola might be reached with a journey of 15 or 20 (150 or 200?) leagues; and that they sometimes visited a market where they met traders from that other sea, and bartered with them. "I found," continues Do Couto, "among the records in Mozambique a letter from Barreto to the king, stating these facts, but omitting, unfortunately, an account of the route across; and with it was the king's reply, recalling the general's attention to the main business (the conquest of the mines)." *

There were not wanting at the same time abundant proofs of commercial intercourse carried on between the two coasts by the natives—chiefly, it was said, by those of Butúa, a supposed kingdom of the interior adjoining Monomotapa † Dos Santos saw in Sofalah articles of European manufacture which had been brought in this way from Angola. The possibility, and even the facility, of travelling overland from the Zambezi to the Quanza were earnestly maintained by some of the best-informed writers of the seventeenth century.‡

Nevertheless it was not till near the close of the last century that any steps were taken by the Portuguese government to explore the interesting regions adjoining the African colonies of that kingdom. In 1796 Francisco José de Lacerda e Almeida, a gentleman of some scientific attainments, was sent to prosecute discoveries from the eastern side, and, to aid him more effectually in his preparations, he was appointed governor of the Rios de Sena. On arriving in the colony he was thwarted in every movement by the local authorities, but on the other hand found that his projects of discovery had been anticipated, and a path into the interior cleared for him by a private adventurer. A creole, named Gonzalo Caetano Pereira, had established himself on the northern side of the

* Decad. IX. c. xx.

† It may well be questioned whether there be such a kingdom as Butúa or Abutúa. The fact seems to be that the word for *people* (Batúa, the plural of Motúa, a man) is used to signify a nation, and especially a foreign nation—the Heathen. The people who attacked the Bechuana in 1822 were called Batúa, but the missionaries recognized the meaning of the name; the Amarula, when they descended on Dalagoa Bay, were called by the same name, but the Portuguese throwing back the accent, changed the word into Vátua, and so Capt. Owen called the invaders Fetwah.

‡ "Let us now quit Monomotapa," says Jarric (tom. iii. p. 346), "and doubling the Cape of Good Hope, proceed to Angola—though there is nothing to prevent our going there by land."

Zambezi, about three days' journey from Tete, and maintained a lucrative commerce with the interior by means of *Muzimbazos*, or native itinerant traders. In this way he became acquainted with the *Moviza*, an industrious trading people; and by their means again he opened an intercourse with their sovereign the *Cazembe*. The field for his enterprise being thus enlarged, he determined on sending his son with a large quantity of merchandise to the distant capital of that chief.*

In May, 1796, Manoel Caetano Pereira started from Marengue, 3 days distant from Tete, with a numerous retinue of slaves and *Moviza*. Trading as he went, which necessarily caused delay, he reached in 45 days the river *Aruangoa*, which falls into the *Zambezi* at *Zumbo*, above Tete, and must have consequently flowed towards his left hand. This river, which was crossed in canoes, divides the territories of the *Maravi* chiefs from those of the *Moviza*. Crossing the country of the latter people, he came in 20 days to their northern limit, at a river called *Zambezi*. "But this," observes Lacerda, "cannot be our *Zambezi*, nor any of the rivers that join it from the *Chire* upwards, because the *Zambezi* of the *Moviza* flows to the right hand with respect to one who crosses it going from Tete; and in that quarter (on the right hand) there is, according to the native accounts, another river, of which I shall speak presently."

The *Zambezi* forms the boundary between the proper dominions of the *Cazembe* and the country of the *Moviza*, who are tributary to him; or, as Lacerda expresses it in the phraseology of the natives, "between the country conquered by his father *Muropua* and that which he conquered himself." A journey of 30 days from the river brought the traveller to the town of the *Cazembe*, by whom he was well received and kindly treated during a residence there of six months. Pereira's account of this monarch's state and demeanour—his rigorous justice, or, as we should call it, barbarity—the discipline of his troops and the superior civilization of his people, whom Lacerda compares in this respect with the *Mexicans* and *Peruvians* at the time when *America* was first discovered—has already appeared in various publications, and need not be here repeated. Many geographical particulars collected by him still call for discussion. On his return to Tete he was accompanied by an embassy, composed of a prince of the *Moviza* and a chief named *Catara*, who had been to *Angola*, and who furnished in detail an account of the route from the *Cazembe* to Tete, which may be occasionally referred to with advantage.

* Lacerda's dispatches, containing an account of Pereira's journey, formed part of the materials from which Bowdich compiled his volume on the Discoveries of the Portuguese, &c.; but these documents have been since published entire in a little Portuguese work entitled '*Considerações politicas e commerciaes sobre os Descobrimentos e possessões dos Portuguezes*,' &c. Lisbon, 1830, by José Accursio das Neves.

But we must now turn to consider the mysterious river above alluded to. Beyond the new Zambezi, Pereira came, it appears, to a lagoon of such extent that he spent a day in crossing it, with the water to his waist. "According to the natives," says Lacerda, "this lagoon discharges its waters by two canals, one into the Zambezi and the other into the river Murusura, on the banks of which the king above mentioned (the Cazembe) resides. This river Murusura passes behind the mountain of Morembála, which is near the mountain opposite (to Sena), called by our people Manjava-matope, or Chire; and they (the natives) take 3 days to cross it (the Murusura) to the town of the Cazembe, resting on islands by night.* They add also that their Zambezi joins this river (the Murusura) a good way below the town (of the Cazembe)." Lacerda then goes on to remark that the Moviza, being great travellers, might possibly be well informed respecting the course of this river; though the great breadth of the stream in the country of the Cazembe is hardly reconcilable with the moderate size of the Chire; and yet this might be explained by the fact that the river above flows through immense plains, while below it is confined by mountains. Finally, however, he inclines to the opinion that the Murusura flows to the east of the Chire, and is one of the rivers which enter the sea between Quilimane and Mozambique.

The word Murusura was new to Lacerda, or else he could not have so far mistaken the information given him by the Moviza, for it signifies the *water* or *waters*, and is used here as the denomination not of a river, but of the great lake. This might be suspected at once from the great breadth assigned to the Murusura and from other circumstances, but the fact will become quite manifest when we shall have surveyed the lake from its opposite or north-eastern side.

In 1835, an intelligent Sawábili, or Mohammedan native of the eastern coast of Africa, named Khamís bin Othmán, usually residing in Zanzibar, but who travelled much on the main land, came to London, attended by a slave, a native of Iáo. From these men, the former in particular, a good deal of information was obtained, but what was furnished by the latter bears more immediately on the matters which we are now discussing.

Naşib the M'yao was a strong-built young negro, of middle size, with good forehead, large eyes, and open countenance; features not coarse, and complexion of a pale, dull black, not inclining in the least to brown. His native country Iáo was described by him as populous and fertile, being well watered by streams

* Bowdich here makes Lacerda say that Pereira took three days to cross the Murusura, a mistake calculated to deprive the information offered of nearly all its value.

running into the Livúma. Going from Kilwa to Iáo, the traveller reaches the Livúma in 25 or 30 days. This is a great river, with trees on its banks of such magnitude that canoes capable of holding 30 or 40 people can be hollowed from their trunks. Beyond the Livúma, on a hill near the river Mulondwézi, is the town of Kungombe, the king of which does not allow strangers to pass without paying their respects to him and making him a present. A journey of 6 weeks from Kilwa, or of 15 days from the Livúma, brings the traveller to the river Kelingo, on which stands Lukelingo, the capital of Iáo.

The Miyao (the Mujáo of the Portuguese), or natives of Iáo, are much esteemed in the slave-market of Zanzibar, where 7000 or 8000 of them are sold annually; but of this number a large proportion go voluntarily into servitude, seeking their fortunes. They carry down to the coast for trade wax and ivory; for their own use they manufacture some narrow cotton cloth, striped blue and white. On the river M'bungo, about 2 days' journey from Lukelingo, are the Mabungo, who are described as being white people: women of this nation fetch as high a price in the market of Zanzibar as the handsomest Abyssinians;* the men are seldom seen in slavery. Their prowess in war is much dreaded, and an alliance with them constitutes the chief protection of the Miyao against the Macúa towards the coast, who, being supplied with fire-arms from Mozambique, harass their neighbours with slave-hunting incursions.

The road from Lukelingo to the interior crosses two lively streams, one shaded with gum-copal trees, the other, the Kitope, overgrown with canes, and then winds up the sides of N'jesa.† This mountain is very high, and hail-storms (rain-stones, as Nasib expressed it) are frequent on it; but in this, as in every other part of eastern Africa to which our inquiries have extended, snow is quite unknown. Geese and other water-fowl resort to the summit of the mountain in countless numbers. N'jesa is densely peopled, the cottages or hamlets—for there are no towns or villages—being thickly and uniformly spread over its surface.

From the summit of N'jesa may be seen, at the distance of 8 days' journey—that is, from 40 to 50 miles—N'yassi, or the sea, with numerous islands sprinkled on its surface. A small river, the Matufizi, which is often dry, descends to it from the mountain. The waters of N'yassi are quite fresh, and abound in fish. The lake is navigated in canoes made of the bark of trees sewn together, and large enough to hold 20 persons. Its south-western shores cannot be descried from any place on the opposite side

* 3000 dollars have been paid for one.

† The name given by Nasib to the first of these streams, Comazinghi, is Arabic; he had probably forgotten the native name.

known to the Sawahili or to the Miyao, but its breadth is confidently stated to be a 3 days' voyage, paddling 6 or 8 hours a day, and resting by night on some island. Its length, according to Nasib, is a voyage of 2 months at the same rate, towards the setting sun, by which we must probably understand the N.W.; but he added that an English ship might sail the same distance in one month.

The people dwelling on the shores and islands of the lake are called in general Mun'yassi. Those at the foot of N'jesa are the Mucomango, five of whose islands were known to Nasib. He had heard of another nation of Mun'yassi at a great distance northward (north-westward) called Mucaranga, whom he subsequently and spontaneously explained to be the same as the Monomoézi. The Mucomango trade with the M'biza, or, as the Portuguese call them, Moviza, who inhabit the opposite shores of N'yassi. These two nations and the Mucaranga or Monomoezi closely resemble one another, being tall and handsome, not black, but of brown complexion, and similarly marked on the temples. They are also distinguished by their industry, commercial activity, and comparative civilization.

Nasib knew nothing of the Cazembe, at least by this name, but he had heard of Muropua, a great kingdom at an immense distance. When questioned respecting the Maravi he denied the existence of a nation or people of this name; but there are chiefs so entitled: his king (the king of Iáo) is a Maravi, and so is the chief of Kungombe. Thus the Maravis of geographers may be classed with the Dembos, Jagas, Milúas, and Fumos, nations unknown to the Africans by these names, which are properly only chiefs' titles.* In the present case the title seems to extend through the high land from the Zambezi to the Livúma. But there was another interesting particular learned from Nasib: when asked repeatedly whether he had ever heard of the river Murusura, he manifested increasing impatience, till at length he found means of explaining that the question was absurd, for Murusura (*morisuro*) is not a proper name, but signifies *water* in

* Battel, who was a very ignorant man, and can be reckoned an authority only as to what he actually saw, discloses unconsciously the true application of the word Jaga: "In all this camp (16,000 strong) there were but twelve natural jagas that were their captains, and fourteen or fifteen women." (Purchas his Pilgrims, vol. ii. p. 977.) It is probable that the name of the Amakosi (on the eastern frontier of the Cape Colony) is derived in like manner from Nkosa, a chief or rich man; but the name Amakosi being first used by the Gonaqua Hottentots, who subsequently became mixed with the Caffers, differs from its root in having the clucking sound. Do Couto says (Dec. XI. ciii.) that the Caffers have no kings but encosses. The chiefs round Tete bore the same title (Dec. X. c. xv.). Again, is there not reason to suspect that the Mumbos, who have never been heard of since they first alarmed the Portuguese, were only a branch of the Mucaranga nation, who call their king Mambo (Dos Santos, fol. 63)? The title Fumo given to the village chief or elder seems common to all the Zingian nations.

general; so that N'yassi, or *the sea*, may, it is evident, be also called Murusura, or *the water*.*

Lacerda, in his dispatch containing the narrative of Pereira, observes, that the cloth with which the Moviza bartered was obtained by them from the Mujáo (Miyao), and that these again procured it from Zanzibar, to which place much of the trade once belonging to Mozambique had been transferred. "The Moviza," he adds, "being great traders, go a long way into the country, and even penetrate at times to Luilhim." In this name it is easy to recognise the Portuguese abbreviation of Lukelingo; and Lacerda argues that the Moviza may be supposed to be well acquainted with the course and outlet of the Murusura, since they must cross it on their way to the capital of Iáo. But we have already seen that the traveller from Iáo to the Moviza must cross N'yassi, and the water-passage in each case takes three days, the nights being spent on islands. These circumstances, combined with the estimates of geographical position, prove beyond a doubt that the Murusura, or *water*, having on its western shores the Moviza and the Cazembe's dominions, is identical with N'yassi, or *the sea*, on the eastern side of which dwell the Mucomango and the Monomoezi, both similar to the Moviza in physical character and national marks. For the Murusura, respecting which our information comes from its western side, is limited, as to position, on that side by the routes from Tete through the country of the Moviza, and by the statements of these people that it passes behind (eastward of) the hills of Morembala. But of N'yassi we know that its eastern shores are 15 days' journey from Lukelingo, which is a month or 6 weeks distant from Kilwa, and 2 months or more from Mozambique. We must suppose, therefore, either that the Murusura and N'yassi are one and the same lake, or else that there are here two lakes of similar characters, extremely close together, and both embraced at their southern extremities by the tribes called Maravi. But the Moviza and Miyao speak of but one lake interposed between them; and consequently the Murusura must be the sea, or N'yassi.

The importance of establishing the fact, that what Lacerda, relying on the testimony of the Moviza, calls the river Murusura, is in reality the great lake, or N'yassi, will become manifest on

* In the language of Iáo, *risuro* means water. The Moviza on the other side of the lake have the same word, for in the account of the route from the Cazembe to Tete, collected by Lacerda from a native (Das Neves, Considerações, &c., p. 396), we find mention of a *mocuro*, or rivulet, and again of a *rucuro grande*, or great piece of water. These words ought to have been written *mocuro* and *rucuro*: Bowdich does not improve the latter by changing it into Rekooro. Nasib did not possess language nor grammar enough to enable him to explain the particular force of these several expressions; but according to the analogy of the Bunda, *risuro* would be the singular, *masuro* the plural, and *mo-risuro* and *co-risuro* (which latter Nasib seemed to prefer), ablative cases, perhaps of manner, as the place *with the water*.

reflecting that the road from Tete to Lucenda, the capital of the Cazembe, is the beaten road from Monomotapa to Angola; that the abundant information which we possess respecting that road contains no further allusion to the lake; that the various accounts of the lake derived from the people on its eastern side are in like manner silent as to its western shores, and do not in the least help us to a positive knowledge of the fact that the shores occupied by the Monomoezi on the one side, and the subjects of the Cazembe on the other, are washed by the waves of the same narrow sea: so that if Lacerda's words respecting the river Murusura had remained without elucidation, we should still want confirmation of the ancient accounts which place the great lake near the country of the Monomoezi, and on the ordinary route between the opposite coasts of the continent; and with it we should want also the certainty resulting from the harmonious union of so many authorities.

Pereira, as we have seen, spent 95 days on his journey to Lucenda. But Catára, the Cazembe's envoy, reckoned only 34 days from his chief's residence to Java, 5 days from Tete. Pereira included in his account the delays occasioned by trading, and thus exemplifies the mode of loitering on the road which lengthens so immeasurably the itineraries of native Africans. When Mariano therefore tell us that lake Hemosura (written probably for Murusura) is 97 days from Tete, we can at once perceive that he only communicates what he had heard from one who travelled like Pereira. The nearly equal length of the journeys in the two cases might suggest also at first view their reference to the same route and destination. But Mariano's informant takes no notice of the Moviza, nor of the numerous rivers on their side of the lake: all his statements refer to its eastern side; for towards that side extends the title of Maravi; the kingdom of Massi mentioned in the Jesuit's letter is but a misprint or false reading for Niassi, the supposed country of the Mun'yassi; and in his Rouenga we can recognise the country of the Mucaranga: indeed, the circumstance that Massi (N'yassi) is placed by him 15 days from Maravi, leads to the conjecture that the seat of authority thus indicated was no other than Lukelingo, and that when Rouenga is said to be 5 days further (than Massi), we must simply understand that it is 20 days from the capital of Iáo. If then we be right in supposing that Hemosura was written, by way of emendation, for Murusura, and that Massi is a misprint for Niassi, the name of the sea being also mistaken for that of a nation, it follows that Mariano's language, correctly interpreted, proves directly the identity of the Murusura with N'yassi.

Nasib's master, Khâmis bin Othman, had also been frequently to the shores of the lake, or, as the Sowáhili call it, Ziwa. And here again, as it deserves to be remarked, native sources may be

detected in the information of our early geographers; for, as on the eastern side of Africa the Quanza was said to flow from Achelunda (A-calunga), which in the language of Angola means the sea, so on the eastern side the Quavi was reported to descend from Zébé—that is, Ziwa in Sawâhili, or the lake. The route taken by Khamis to the lake was not that which leads from Kilwa to Luke-lingo, but up the valley of the Lufji, a river so little known to geographers, and yet of so much importance (for it is probably the greatest river of eastern Africa), that some notice of it here would be excusable, even if there were no reason for our entertaining the question of its connexion with the lake.* Our chief authorities shall be, Lieutenant Hardy, who accompanied Captain Smee when the latter was sent by the government of Bombay in 1811 to collect information on the eastern coast of Africa, and Khamis bin Othmán, the errors of the English officer's journal with respect to proper names being corrected by the experienced Sawâhili.†

The mouth of the Lufji lies due W. of the watering-place on the western side of Monfia island. This river indeed is supposed to have many mouths, but the branch here indicated is that which retains the name, and may be conjectured to be the most northern of all, and to follow closely a chain of hills extending from the S.W. to Point Púna. Though not above 400 yards wide at the entrance, and difficult of access, it is a great river a few miles up, being in some places ordinarily above a league in width, and during the floods, in April, May, and June, expanding into a sea. Arab vessels of 150 tons burden can ascend it for a week, and boats for a month; its further navigation is prevented by the rapidity of the stream. Crocodiles and hippopotami are unusually numerous in this river.

The country near the mouth of the Lufji is occupied by the Mazingia.‡ Towards the summit of the Delta, and on its southern side, are the Denkareko, whose huts are constructed on stakes at some height from the ground, for security perhaps not only from sudden floods, but also from the attacks of wild beasts. These people carry their plaintains, melons, and other fruits in canoes down the Quavi to Kilwá, making the voyage in a single day; whence it may be inferred that this river is a branch of the Lufji, or at least

* It is remarkable that no trace of this river, the largest and most famous on the eastern coast of Africa, and the most frequented by native traders, should be found in the charts of Capt. Owen. In Saulnier de Mondevit's map accompanying Lislet Geoffroy's Memoir on a Chart of Madagascar, &c. (Lond. 1819), the position of the river's mouth is indicated by the name of the village Oufidy.

† Khamis had visited India, Persia, the Red Sea, Madagascar, the Isle of Bourbon, Mauritius, and had sailed with Capt. Owen as interpreter along the coasts of Arabia and Eastern Africa. He could converse in fourteen languages.

‡ This name seems to signify the road or land along the water. The people are named from their territory.

that it drains the country inundated by the latter. Above the Mazingira, on the northern bank, are the Wingara, the Ruguru, who also possess the adjacent hills, and the M'sagara. On the southern bank are the Mantu and Wohaha.* The country on both sides is extremely fertile, producing two crops of rice or other grain a-year. The tribes dwelling near the Delta are accustomed to rely much on the bounty of nature; but the higher the river is ascended the more numerous become the signs of industry and cultivation. The people are everywhere fond of trade, and kind to strangers.

As a sequel to this account of the Lufiji we shall add, from the same authority, a description (evidently due to a different informant) of another remarkable river further S. "The Nearsfer river is 16 days S. of Tanquirra (Kilwa Takiri†): one branch of it enters the sea at a place called Muggore (Mongáo), where there is a harbour and town of the same name. This river is said to extend to the opposite coast, and though narrow at its entrance, becomes 2 days' sail across for boats with a fair wind, most parts of it higher up. There is a very high swell, and generally strong winds on the springs blowing down it, particularly in April, May, and June, when violent storms are frequent. Forty-five days up this river are the Black Mountains, said to be of pyramidal form, and to stand at some distance asunder. Only one of them is reported to be very high. Among the towns up the river are Ingo-manger (N'gomanza) and Beser (M'biza). There are two islands at its mouth."‡

The indications here given of the position of this river on the coast leave no doubt that the Livúma is intended.§ But there are portions of the description not applicable to any ordinary river; and besides, what can we make of the name Nearsfer, which ending with a consonant and also containing a triple consonant, revolts from the fundamental laws of the language to which it is supposed to belong? Let us then endeavour to correct this name by a kind of analytical method, remodelling it on the supposition

* The existence of the Mantu may be questioned. This name may have arisen from that of the Ncutu, miswritten and placed on the wrong side of the river.

† There are at least five places called Kilwa, viz. K. Majinjera, which is the island commonly known as Kilwa; K. Kevingi or Old Kilwa, a village on the coast a few miles north of the island; K. Cuávi; K. Ugóga and K. Tekiri; the last, south of the island, on a part of the coast remarkable for the number of wild beasts infesting it.

‡ Ngomanza and M'biza (in the charts Hambiza) are not up the Livúma but at its mouth. Have the names of the villages at the mouth of the river been confounded with those of the nations occupying the opposite shores of the lake—the Mucomango and M'biza?

§ The word Livúma means "the gut," which suggests that the river is deep and inclosed within high banks. Khamis bin Othman, travelling by land from Kilwa to Mozambique, found the Livúma a mile wide, 8 or 9 days' journey from the sea. The Sawáhilli in general say Rivuma and Rufiji. The inland nations and the Arabs substitute L for the initial R.

that it is disfigured by those general orthographical and clerical errors which we have learned to detect in nearly all the proper names occurring in Hardy's journal; we must, therefore, strike out the letter *r* after open vowels, and we must change *f* into *s*; by this process Nearsfer is converted first into Neasfe, and finally into Neasse (N'yassi): and thus the mystery which hung over the described river is cleared up. The native who gave this curious information considered the Livuma to be the continuation and outlet of N'yassi. "Forty-five days up that river [exactly the distance of Lukelingo] begins," he says, "the Black Mountains, one of which [perhaps N'jesa] is very high:" here we see the river represented as flowing through the mountains, on the sides of which it really has its sources, and extending beyond them to a great and unknown distance, with a width of two days' sail. With respect to the winds blowing down N'yassi in April, May, and June, this account agrees precisely with that given by Mariano.

Khamís bin Othmán, when questioned respecting the outlets of the lake, declared at first that three rivers issue from it—viz., the Livúma, the Lufiji, and the Ozy; but, perceiving that this statement was ill received, he admitted that with regard to the Livúma and Ozy he spoke only from hearsay, but as to the Lufiji he maintained that he had himself seen its first egress from the lake. It is manifest from Nasib's statement that the Livúma collects its waters on the sides of N'jesa, 40 or 50 miles from N'yassi. The Ozy again was explored about twenty-five years ago by Fomalât, the ex-sultan of Káo, an island and town a little way up that river, to a distance of 2 months' journey, till the diminished stream, unable to float a canoe, could be no longer followed through impenetrable forests. These two rivers therefore cannot be supposed to derive their waters from the great lake; and the claims of the Lufiji to that distinguished origin alone remain for inquiry.

The route of Khamís to the lake was, as has been already stated, chiefly along the valley of the Lufiji. Passing through the territories of the Zugúa and the Ncútú, he arrived at the river in the country of the M'ságara. This distance he thought might be performed in 15 days, and the lake reached in 15 more; but he admitted that the journey usually occupied above 2 months; and it is evident that he abridged his estimate of the time required, in the endeavour to adapt his language to European ideas of reasonable speed. He reached the lake in the country of the Muchíva.* The last three days were over a dry country, which can be crossed

* The existence of the Muchíva so far north, seems liable to suspicion. The Xeva of Major Monteiro (*Annaes Maritimos*, 1843, No. 11, p. 541), a tribe of the Maravi, are probably Muchíva. The Daibyes of M. Cossigny also (*Annal. des Voy.*, tom vi. p. 348) may be the same people, their name being mutilated by Arabs and Banyans.

conveniently only in the rainy season. This last circumstance calls for particular attention, as it seems to negative completely the asserted connexion between the Lufiji and the lake. The route thus briefly described appears to be that usually followed through the country of the Monomoézi; the details of which, as represented in a kind of map, drawn with little geographical skill, but, we believe, with substantial fidelity, by an Arab merchant of Zanzibar, shall be now given with a few words of explanation.*

From Zanzibar the traveller to Monomoézi and the lake crosses over to Buromaji, a town with a small river on the main land not far from Point Puna. Thus the course taken at first starting is S.W., and the tribes dwelling due W. of Zanzibar are not touched on by the route. From Buromaji to Mazinga, 1 day: the river of Mazinga is, according to our Arab traveller's map, identical with the Majisima (*i. e.* cool water), which enters the sea about 10 miles N.E. of Buromaji. To Kiwáha, 1 day. Boyúni, 1 day. Mokúndi, 1 day. Sungwi, 2 days. During these last 4 days the road crosses the hills from which flow the streams already mentioned. Cora, 2 days. Rúvu, 3 days. Kidonde, 1 day. The last 6 days through the country of the Zarámu. M'gaita, 2 days: the Rúvu, which appears to have been touched upon before, is here crossed; it is much infested with crocodiles, and is represented as the river named on the coast the Kingáni, which discharges itself into the bay opposite to Zanzibar, between the villages Cavóli and Catíni.† Dotúmi, in the country of the N'cútu, 2 days. Riguru, 2 days: the mountains which bear this name give rise to the Rúvu and several smaller streams. Zungoméro, 2 days. Through the Rohambi people, 6 days. Kisanga, 2 days. The river of Maroro is then crossed, and the town itself reached in 2 days: making the whole time from the coast to Maróro 30 days.

Proceeding on his journey, the traveller marches through the country of the Woháha, 8 days, crossing the Kidéji, which joins the river of Maróro; he then goes on to Powaga, 8 days, and there he meets the Swaha river, which is said to come from the lake. This river cuts through a chain of mountains 2 months' journey in length, and abounding in salt and iron. The eastern extremity of this mountain chain is inhabited by the Woháha, and above them by the Lucósi. Below these mountains the Swaha receives the river of Maroro, and soon after runs into the Lufiji.

* This valuable document has been communicated to me by Mr. John S. Leigh, who has visited Eastern Africa and has made a very complete vocabulary of the Sawáhili language.

† Kingáni means *bar* river; the stream, though large, is quite inaccessible for boats. The banks in front of it are called Watóndui or the *picking-grounds*, *i. e.* the banks for gathering shell-fish. Hence the kingdom of Atondo, a name given by Do Couto and other old writers, to the whole country round this bay.

From Powaga to Osenga, 5 days; and thence to Sanga, 2 days; the road going along the left bank of the Swaha, but at the last-named place the river and the hills are left to the S. Atumba, 5 days. Onanguira, the first town of the Monomoezi country, 1 day. Casandarara, 2 days. Suangara, 2 days. Ogunda, 4 days. Oshisha, 2 days. Osenji, 3 days. Osagozi, 2 days. Ogara, 1 day. Oha, 4 days. Thus we find that from Buromaji to Maroro is a journey of 30 days; to the commencement of the Monomoezi country 59 days; and to Oha 79 days. The king of the last-named country is the sovereign of the Monomoezi. From the last town in Oha to the nearest shores of the lake is a distance of 4 days.

In another part of this volume will be found an account of the route from Buromaji to Oha and the lake by a native of Monomoezi, the perfect agreement of which with the account given above speaks well for the truth and accuracy of both. They differ only in the variable element time—the one reckoning 62, the other 75 days to Ogara—and in the names to such an extent as may be fairly ascribed to variety of dialect, the difficulty of seizing the sounds of a foreign language, and errors of transcription. In some important particulars these two statements mutually complete and explain each other. We learn from Lief bin Saïd (the native of Monomoezi) that the general direction of his route was about 20° S. of E. The river called by him Matoney is obviously the Swaha of our Arab traveller. The latter makes this river pass, on its way down from the lake, near the towns in his route from Oha to Powaga; the former speaks of the Magozi, a great river at Ogara, which, he says, comes from the lake; here again then we can recognise the Swaha under a local name.

In our Arab map there are a few details which call for notice and correction. The Lufiji is there made to issue from the lake and flow through the Oranga country, having on its right bank the mountains of the Dwéwé, on its left those of the Woháha. Below the latter it is joined by the Swaha on the left, and then, about halfway down to the sea, it receives from the right a great river descending from the Dwéwé country, which abounds in iron, and is resorted to by traders from Kilwá. Now it is hardly credible that a river having a course of 300 or 400 miles through various African nations should bear the same name throughout. Names so comprehensive are not adapted to the social wants of uncivilized men. We dare say that the name Lufiji reaches but a short way above the Delta of the great river which we have here in view. The Lufiji of the Arab's map, between the lake and the Swaha, appears in all the nakedness of theory, without towns or other substantial details on its banks—the creation of an inexperienced geographer, who attempted to give local existence to a name.

There may indeed be a river in that quarter, but as to the knowledge of its source and the name Lufiji, we reject them altogether. Again, the name Swaha is assuredly an ill-written appellative derived from Zíwa, and signifying the *river of the lake*: its extension therefore may be tolerated; but at the same time it must be borne in mind that the river called by our native geographer Swaha may be known in the countries through which it flows by other and different names.

There remains another authority respecting the waters of the Lufiji, which, with all its imperfections, is still capable of affording some instruction. In Lieutenant Hardy's account of that river there are passages calculated, from their confusion and obscurity, to daunt the most intrepid inquirers: for example, he begins as follows. "The river Linfee or Loffih is conjectured to give passage to the waters of the Niger (!). It serpentine for 11 days, and then goes direct for 3 months and 15 days up to a lake, in which is a high rocky hill with a few trees called Zuwarhah. It is a day's journey round this lake, from which a branch runs 2 months westwards, and afterwards southwards." Now, for the sake of brevity, we shall here lay aside the analytical mode of discussion; and shall state at once the supposition which can alone give sense and consistency to the passage before us. Hardy heard of, and, mistaking the word Zíwa for a proper name, confounded together two lakes—one, an expansion of the river, a day's journey round, with an island and trees at the head of the Delta; the other, the great lake, $3\frac{1}{2}$ months distant. With the aid of this comment there is no difficulty in understanding the following passage. "The western branch of this river (*i. e.*, the branch which goes furthest westward) from the hill is called Condoha, and it is said to go 4 or 5 months' journey to its source. Marrorer (Maroro) is a town on its banks, 1 month from the hill, and Singoser (Sagozi) is another, about 2 months. The tribes inhabiting the western branch are called Wangarah (Wingara, or rather Winjara), but this is probably the name of an island formed by two channels, 28 days from the hill. A white man, supposed to be Park, is said to have travelled here twenty years ago."

In explanation of these last words, it must be observed that among the topics of inquiry included in Smee and Hardy's instructions, the fate of Mungo Park was not forgotten. The possibility of a connexion between the scene of that traveller's adventures and the eastern coast of Africa being thus impressed on their minds, they seized eagerly on whatever seemed to support it. Hence the reference to the waters of the Niger; the arbitrary treatment of the name Wangarah, the supposed island between two channels, 28 days from the hill, being evidently the country of the M'sagára. The white man alluded to was pro-

bably Pereira, or allowing for looseness of expression in respect to time, Lacerda.

But the substantive matter of the passage quoted above bears directly on the scope of our reasonings. It is impossible to overlook the affinity of the names Zuwarhah and Swaha; and since the former is evidently meant for Ziwa (the lake), our conjecture respecting the latter is confirmed. These names are applied respectively to *the lake*, and the river of *the lake*. The name Condoha may be a local one (Kindoca) derived from the Mوندoca, a tribe well known at Kilwá. As to Maroro and Sagozi, we have seen that the former is 30 days from Buromaji, and the latter a month or six weeks further up the country. The perfect coincidence of this account of the river with those already given, might be easily demonstrated, if the difficulties of the case were such as to justify the multiplication of details. Enough, however, has been already said to establish the general facts with which alone we can here attempt to deal. The river Lufiji it seems may be traced up to Zuwarhah (Ziwa^h or the lake), 3½ months distant from the coast; and on its banks 2 months above the Delta is the town of Singosi (Sagozi). Now of the two itineraries already referred to, one represents the Swaha as flowing from the lake near the several towns enumerated down to Powaga. The other places at Ogara, the town next above Sagozi, a great river, Magozi, which is said to issue from the lake. We see, therefore, that the accounts furnished by Hardy fortunately bind together all these details, and that the Magozi as well as the Swaha, which receives the river of Maroro, are but portions under different names of that great river, which he traces up from the mouth of the Lufiji by Maroro and Sagozi to Zuwarhah, that is, Ziwa, or the lake.*

We have thus succeeded in uniting the testimony of four witnesses quite independent of each other, viz., Lieut. Hardy's informant, Khamis bin Othman, the Arab whose map lies before us, and Lief bin Sáid, the native of Monomoézi, respecting the route up the valley of the Lufiji to the lake, and their concurrence in all essential particulars is such as to leave no reasonable doubt of the general veracity and correctness of their statements. There is one particular nevertheless, in which they all agree, and which may yet be justly suspected of being not a known fact, but merely a natural conjecture. They all say that the great river along the valley of which the route to Monomoézi lies, descends from the lake, but they furnish no details confirmatory of this statement;

* The plural of Ziwa is Waziwa, which is also used by the Sawáhili to signify the south (a proof by the way that there are many lagoons round Kilwa, the Sawáhili language being originally that of the Kingózi at Lamu). But an Arab would be more likely to inflect it after his own fashion, making for the plural perhaps Ziwáhah; and for the adjective Ziwáf.

nor, with one exception, do they pretend to speak as eye-witnesses. Khamis bin Othmán, it is true, declared that he saw the outlet of the lake, but it was he also who said that the Livuma and Ozy issue from the lake, thus showing how easily his reason could yield to ill-considered inferences. It is not at all surprising that uneducated men, little on their guard against the fallacies of hasty induction, should feel themselves entitled, after marching up the valley of the river for 60 or 80 days towards the lake, to infer with perfect confidence its course for 6 or 8 days more in the same direction. It is certain, nevertheless, that between the lake and the populous country of Monomoézi, there exists a seam of waterless desert 3 or 4 days wide; but if a river descended from the lake, why should not its banks exhibit a continuous population? There is another circumstance which must not be overlooked. Nasib stated that N'yassi has no crocodiles or hippopotami, which are extremely numerous in all the rivers running eastwards to the sea. Now the river Magozi, we are told, is filled with hippopotami, whence we may with probability conclude, that it has no connexion with the lake.

We cannot close our critical inquiries respecting the Lufiji without glancing at what seems to be the earliest notice of this stream. The floods of the Quavi at Kilwá soon caught attention, but the Lufiji, removed from the path of European commerce, could only be known through the reports of natives which were liable to be misunderstood. Pigafetta, in speaking of the former river, uses the following words: "Il quale nasce del lago medesimo del Nilo e prendendo il rio lascia sessanta miglia presso il mare, corre grosso e alla bocca forma una grande isola," &c.* The obscurity of this passage arises from the natural presumption that *lascia* is not a proper name. Hartwell, the English translator of Pigafetta, avoids the apparent difficulty by shrinking from the duty of faithful translation, and omitting the troublesome words. But we have a far more competent expositor of Pigafetta's meaning in his learned and judicious contemporary, Giovanni Botero, who thus recasts and corrects the passage above quoted—"Il fiume Coavo, che ha l' origine dal primo lago e mette nel ocean ocon due rami, de' quali il piu orientale ricevendo in se la Lasia, sbocca a Quiloa."† Now by the adoption of a very slight and admissible emendation—by merely reading *Lafia* for *Lasia*, we have at once the Loffih or Loffia of our maps (the Lufiji), and succeed in developing completely the manifest sense of our authors.‡ They had learned that 60 miles inland, at the

* Descrizione del Reame di Congo, p. 74.

† Delle Relationi Universali. Ferrara, 1592, p. 312. In the 2nd edition 1598, p. 310, *Lasia* is misprinted *Basia*.

‡ The j or soft g is nearly a liquid in Sawáhili, so as to escape detection by an unpractised ear; thus Ugúja (the native name of Zanzibar island) seems to be pro-

head of the Delta, the Quavi joins the Lufigi, but they do not seem to have been aware that the stream which bears the latter name itself reaches the sea.

The earliest mention of the empire of Monomoezi is found, as has been already observed, in Pigafetta's account of Congo. Giovanni Botero says, in a volume published a year later than that of Pigafetta (in 1592), that "this prince (Monomoezi), was discovered by the Portuguese, *not long ago*, perhaps during the wars which they waged so unfortunately with Monomotapa." * The interval of twenty years which had elapsed between the wars here alluded to, and the time of Botero's writing, ill agrees with the expression *not long ago*, and it is far more probable that the important discovery said to have been recently made by the Portuguese, is to be referred to the eastern coast, and to T. de Sousa Coutinho's campaign of 1589.† The name Monomoezi, or as it might perhaps be better written, M'wana-M'wézi, is a political appellation, M'wana implying sovereignty.‡ The national name, or perhaps rather the general denomination of the race and language, is, as was stated by Nasib, Mucaranga (that is to say, Ranga-man). Another authority to the same effect—for supported by the ingenuous Nasib, and offering a particle of novel information in the midst of a heap of exploded misconceptions, he may perhaps be thought worthy of credit—is Senhor Botelho, formerly governor of Mozambique, who denominates the Monomoezi country, Western Mucaranga.§ Thus, the name in question is remarkable for the extent of country to which it is applied; for it stretches with little interruption from Monomoezi over the whole of Monomotapa to Inhambane or Cape Corrientes, from the 5th to the 25th degree of latitude. People with the Muca-

nounced Ugúya; Angaziya (one of the Comóro group), Angaziya. In like manner Lufiji sounds to a careless observer Lufiyi. It is extremely probable that the name of Mondia island might be correctly written Mofiji.

* Delle Relazioni Universali, 1592, p. 310.

† The Monomoezi were unknown to Livio Sanuto, who seems to have possessed all the information attainable in his day, and whose "Geografia" was published in 1588 posthumously, it is true, but yet not long after it had been out of the author's hands.

‡ From Congo across to Zanzibar this word takes the various forms of Mani, Muene, Muana, and Buana, which last signifies *master* in Sawáhili. The original meaning, however, of the word, which is always prefixed to the name of the land giving the title, is probably very different. The geographers of the seventeenth century took care to point out the fact that "the empire of Monomoezi lies immediately round the Mountains of the Moon." They would have been delighted had they known that Moézi signifies, in Sawáhili and Mucaranga, the moon—in Bunda, riégi or moégi.

§ It is to be supposed that Senhor Sebastião Xavier Botelho had some information which induced him to make a second Mucaranga; but why he called it Western we find it hard to explain. That he is less trustworthy than Nasib will be evident from his own words. "Western Mucaranga contains Corruro-Medra, Mujao, Mococo, Turgeno, Gingir-Bomba, Mano-emugi, Ruenga, and Borofo" (Memoria Estatística, &c., Lib. 1835, p. 311). With the exception of Mano-emugi (which includes Ruenga) and Mujao, which is certainly no part of Mucaranga, all these names must be excluded from authentic geography.

ranga marks on the temples are to be seen also in Dalagoa Bay. The Mucaranga in Monomotapa and at Inhambane are described by the more intelligent of the missionaries as being well-disposed, half-civilized people, much superior to the neighbouring tribes of a different race.* The Monomoezi, in like manner, are thought in Zanzibar to be raised far above other African nations in arts, industry, and politeness. It is not improbable that the Mucumango and the Moviza, who join active industrious and commercial habits to physical endowments and complexion like those of the Monomoezi, are to be considered as severed branches of the Mucaranga stock.

Two centuries and a half have elapsed since Europe first learned the existence of the empire of Monomoezi; yet our acquaintance with it has not only not gone on increasing during that time, but the very name has sunk into obscurity. It was at first presumed that this powerful empire filled the vast space between Monomotapa, Abyssinia, the great lake (or lakes according to the theories of that time), and the eastern coast; that it waged perpetual war with its inland neighbours, but maintained peace with the maritime states for the sake of commerce. The information which we at present possess respecting it is but of a vague and general character. The country seems to be an elevated plain, the ascent to which lies chiefly in the territories of the M'sagára and of the Wohaha, where the lake-river (Swaha) cuts through the mountains. A long way south of this river is the country of Oranga (or probably O-r'wanga, the Rouenga of Mariano), which may be presumed to belong to Monomoezi. North of Oranga and near the lake come the kingdoms of Ovinza and Oyíyí; next is the kingdom of Oha, of which we know that in width from the lake it extends about a month's journey. North of Oha is Osówi, and beyond that again Ocanga, both which are said to have their tributary kings. Beyond Ocanga are M'sarara, Onambiwa, and Ebanda, whether towns or kingdoms we know not, nor would the distinction be of much importance; and then come "the people who use the brass wire." It remains for us, therefore, to conjecture who are the people thus indicated. Now the chief consumers of brass wire known to the merchants on the coast, are the Meremongáo, whose country is about 2 months' journey from Mombasa, behind the Wanyika. The Meremongáo, who are themselves the great smiths and cutlers of Eastern Africa, wear brass wire twisted tightly round their arms.† It is probable,

* Dos Santos (Ethiopia Oriental) says, "the Caffers of these countries are of good disposition and well inclined." Godinho (Vita Patris Sylverii, p. 80) testifies to the same effect of the Mucaranga at Inhambane. Do Couto (Dec. XI. c. iii.) carries the name down to Cape Corrientes. Anguiano (Epit. Hist. del Imp. Abyss. 1706) observes that the Mucaranga differ little from the vassals of Monoemugi.

† The Meremongáo iron is said to be of the best possible quality. As a considerable

therefore, that they or some immediate neighbours with the same fashions, border on Monomoezi, the northern limit of which empire will be thus rudely fixed in the third or fourth parallel of south latitude.

The Mucaranga, or people of Monomoezi, still retain the commercial habits for which they were formerly so much noted. They descend annually in large numbers to Zanzibar. The journey to the coast and back again takes 9 or 10 months, including the delay of awaiting the proper season for returning. It would appear that they start on the journey down in March or April, probably at the end of the heavy rains, and return in September. They are decently clothed in cotton of their own manufacture; but the most obvious mark of their superiority above other nations of Eastern Africa is, that they employ beasts of burden, for their merchandise is conveyed to the coast laden on asses of a fine breed. From a town or tribe called Zanganyika, on the opposite or south-western side of the lake (which near Ohā is 3 days' voyage across), they obtain copper, ivory, and oil of a red colour. They are said to have formerly used for money "little balls, like glass, of a reddish colour."* There is no difficulty in guessing what is here meant to be described. The most famous mountain of Eastern Africa is Kirimanjara, which we suppose, from a number of circumstances, to be the highest ridge crossed by the road to Monomoezi. The top of this mountain is strewn all over with red carnelian, the rounded pebbles of which were doubtless the money referred to. The importation of beads has probably caused the disappearance of the carnelian currency.

The geographical outlines of the country between Nyassi or the great lake and the eastern coast of Africa, have thus been traced, chiefly along the valleys of two important rivers, the Livúma and the Lufiji, not, indeed, with the faultless precision derivable from scientific data, but yet, so far as general features are concerned, with tolerable correctness, and on perfectly solid grounds. Our calculations of distance and position rest, it is true, on elements, which, taken by themselves, are variable and uncertain. But by means of a route from the western coast to the lake, such as might be fairly presumed to be of similar rate with those from the east, the errors of our map arising from the indeterminateness of days' journeys as a measure of distance, might be reduced to a trifling amount; for the question of absolute distance would then be converted into one of mere proportion. Such a route lies fortunately now before us.

quantity of it is sent in bars to the Persian Gulph, it is not improbable that the fine temper of the Damascus blades may be due in a great measure to its excellence. The Meremongao themselves make swords on the model of those of the Knights Templars.

* Botero, *Delle Relationi Universali*, 1592, p. 311.

In 1802 M. Francisco Honorato da Costa, the superintendent of the factory in Cassangi, east of Angola, sent two of his pombeiros (native mercantile travellers) into the interior, for the purpose of exploring the route across to the Portuguese possessions on the Zambezi. They were instructed to visit the Muata Yanvo, King of Muropúa or of the Milúa, and also the Cazembe, on their way to Tete, and to represent themselves as being envoys from Mueneputo (the king of Portugal), seeking intelligence of his brother, who had travelled into the interior some years before, and had not been afterwards heard of. It may be presumed that the person thus designated was Lacerda, who in 1799 reached Lucenda, the town of the Cazembe, where he died, leaving a journal which has recently come to light, but the publication of which is not sufficiently advanced to aid us materially in our present inquiries.

Da Costa's pombeiros accomplished their undertaking, and returned to Angola with a letter from the Governor of Sena in 1814. Their journal contains, in particulars of each day's journey, abundance of curious and interesting matter; yet it is wholly deficient, as might be naturally expected, in the scientific elements of geography. It offers no measure of distance but days' journeys, without any intimation of the time spent on the march. The direction followed is but occasionally and vaguely pointed out; little is said of the course of the rivers, or of the ridges separating the great basins. These points are left to the sagacity of those who would represent the route on paper. Yet notwithstanding these defects, we feel no difficulty, owing to the necessary coherence of truth, in tracing with firmness, and we believe with no great amount of error, the route therein described. In this work of interpretation care has been taken not to deviate from simplicity for the sake of courting verisimilitude, nor to take advantage of refined conjectures. The travels of the Pombeiros shall be here succinctly related in all their leading particulars, precisely as they themselves meant to relate them. But before entering on the narrative, it may be as well to discuss preliminarily two questions of some difficulty which present themselves at its very outset.

The Pombeiros started from Mucari, a *feira* or factory in Cassangi. Now, respecting the position of Mucari we have no direct information. We know, however, that Cassangi is a state of no great extent, lying between the rivers Quanza and Quari, or Quango, where they approach within 12 short days' journey of each other.* The Quanza in this part of its course, coming

* The missionary Cannecatim, who is disposed to derive all African words from the Bunda language, asserts that the name Cassangi is properly Cassunci (the last syllable pronounced as in Italian), which means "a pullet!" a whimsical name for a kingdom.

from the south-east, is bordered on its right bank by a range of mountains, the streams from which running north-eastward to the Quango, water the plains of Cassangi. The capital of this kingdom, Polongólo, was found by the missionaries, whose day's journey cannot be estimated at more than 6 geographical miles, to be 18 or 20 days from Embacca, which latter place is 7 or 8 days from Loanda, according to modern reckoning, at the rate of about 15 miles a-day. On one occasion a party of missionaries travelled from Loanda to Polongolo in a month.* From all this it may be deduced that the capital of Cassangi, the centre of its trade and population, is not above 250 miles in a straight line from Loanda.† If, then, we place Mucari at an equal distance from the sea, and on the right bank of the Quanza, we shall probably not err materially from its true position.

But again, our African travellers say nothing of the direction of their route from Mucari to the capital of the Muáta Yanvo, or King of the Milúa. It is intimated, indeed, in an official letter accompanying their journal, that they marched along the Quanza, leaving Cassangi on the left.‡ This remark, however, can apply only to a very small portion of their journey. Now all the information collected by the Portuguese respecting the Milúa nation, or kingdom of Muropúa, place it to the north of Cassangi. Vague and exaggerated as are the current accounts of that kingdom, they establish one fact indubitably, which is, that the direct road to Muropúa from the Portuguese factory, lies across Cassangi.§ The king, or chief of this country upholds the protective system, and allows no commercial intercourse to be carried on across his territory without his intervention. The Milúa are not permitted to bring their slaves, wax, and ivory, to the Portuguese, nor the latter to visit the former, through Cassangi; consequently the pombeiros were obliged to make the circuit of this country, going some distance up the Quanza and through the dominions of Bomba, in which they crossed the Quango, and then turning towards the north, till they arrived at the residence of the Muáta Yanvo. The starting point and direction of the route being thus approximately determined, we shall now proceed with the narrative.

But local names usually belong to ancient language, and are more worn down by common use than any other class of words. It is more reasonable to suppose that the words Kachi-ianchi, the middle of the country, the midland or "land between the rivers," gave rise to Cassangi.

* Cavazzi da Montecuccolo, *Istor. Descr. de' Tre Regni*, &c., pp. 641, 649, 657.

† Bowdich (*Disc. of the Portuguese*, &c., p. 9) says, that the farthest fair or trading station in Cassangi is 700 miles from Loanda. Cannecattim goes farther (*Diccionario da Lingua Bunda*, preface, p. viii.) and says, that it is 500 leagues (the entire breadth of the continent) from the western coast.

‡ *Annaes Maritimos*, 1843, No. 11, p. 539.

§ *Memorias contendo a Biographia do Vice Almirante, Luiz da Motta Feo e Torres*, p. 299. *Cannecattim, Collecção*, &c. sobre a lingua Bunda, preface pp. xii., xviii.

The pombeiros Pedro João Baptista and Anastacio José (of whom, the former, being the author of the journal, shall be alone mentioned in the following pages) left the trading station of Mucari on their expedition into the interior near the end of November, 1802. They had with them, for the necessary presents and to defray their expenses, goods to the value of nearly 500*l*. On the 6th and 8th days of their march (for it would be useless to recount the incidents, or name the halting-places of every day) they crossed desert tracts, which probably mark the ridge dividing the basin of the Quanza from that of the Quango. On the 11th day they crossed the Jombo, which runs into the latter river. They were now in the territory of Bomba, where for some cause not stated, they were detained above two years, till Da Costa liberated them by the payment of some cloth, and they were allowed to proceed. Having passed through a place called Pepumdi Songo, on the banks of the Jombo, they came in three days more to the Quango, and one day's march beyond that river brought them to the capital of Bomba, which thus appears to be 30 days distant from Mucari. Four days further on they were seized, and heavily mulcted by a chief surnamed Quisengue, who having been defrauded by a pombeiro from Mucari, thought himself justified in this mode of retaliation. At length, on the 45th day (delays and detentions not being taken into account) the travellers reached the territories of the Múata Yanvo, at the town of a chief named Chacabungi.

Travelling 11 days through the domains of Chacabungi, Pedro arrived at the great river Casasi, which he crossed in a canoe.* In 10 days more he crossed the Lulua also in a canoe, and then in 11 days reached the Mussumba (court) of the Muáta Yanvo, which is accordingly 77 days from Mucari.† This is the most meagre and unsatisfactory portion of the pombeiro's journal. His silence respecting the manner in which he crossed the Quango raises the presumption that he forded it. He tells us nothing of the Seculo, or great chief Bomba, nor of the advantages arising from the command of the ford, or ferry of the Quango. This omission is but imperfectly supplied by the following passage from a letter of Da Costa, in which that chief's titles are enumerated, "Seculo Bomba, Cambambi, Camasaca, and Mujumbo Acalunga, Sovereign and Lord of all the Songo, by which we pass to the inte-

* In Pedro's journals this name is written Casais; but Casasi appears to be more in conformity with the general principles according to which the language is constructed. This river is the Casati of Douville, who picked up the names of just two of the numerous rivers of the interior.

† For Lúhia, which is printed in the Annaes, I read Lulúa. The name of the same river is also systematically written, in one journal, Lanhua, the liquid *n* (or in Portuguese *nh*) taking the place of *l*. The name thus modified is frequently printed Lanhua. These various readings and misprints are here all reduced to Lulúa.

rior." D'Anville, in one of his maps, places the territories of a chief, entitled Muzumbo Calunga, or *the Mouth of the Sea*, in the interior, south of Benguela, and near a river entering the sea at Angra Frio. That able geographer obviously derived his information from Angola; but disposed to exaggerate distances by the obscurity of his data (for he could trace the Quanza no higher than the Quindonga Islands), and misled by the apparent meaning of the name, he placed the supposed principality towards the sea. The words Musúmbu Acalunga, however, really signify the mouth, that is, the opening or access to the sea, and are probably used to designate the pass to some part of the Quango, where the river, spread over a wide bed, admits of being forded. In a country where the titles of the chiefs are invariably taken from their lands and possessions, the great ford of the Quango would of course add to the verbal honours of its owner.* When the original accounts of Lake Achelunda or Aquilunda are attentively examined and their chief features marked—the lake in the latitude of Angola; its name (Acalunga) Angolan, the Zaire (Quango) passing through it, and the Quanza said to originate in it, which can only be understood as indicating the direction in which the lake lies—there seems to be much reason for suspecting that they refer solely to that part of the Quango near which is the Musumbu Acalunga, or pass to the water.

Pedro gives no account of the Muáta Yanvo, nor of his subjects, the Milúá; nevertheless he furnishes a direct proof that the kingdom named Muropúa is that of the Muáta Yanvo.† Having nothing to add to the information respecting the Milúá, already published by Bowdich, we shall take this opportunity of correcting a mistake of this writer, who says "a horrid practice of sacrificing from 15 to 20 negroes every day, prevails both at the court of the Muata and that of his Queen."‡ This leads the reader to suppose the existence of sanguinary rites among the Milúá, for which there is no authority whatever. The statement here quoted seems to have had no other foundation than the report of Pombeiros, that "owing to the severity of the laws, 8, 10, or 15 negroes, are executed daily in the town of the Queen of the Milúá."§ Though severe laws are barbarous, they do not by any means characterise

* "The lord of the port" is the title which Pedro invariably gives to the master of a ferry. In the Quorra, the head ferryman is called "Serki bekinroa," the king of the black water, that is, of the sea.

† There are two copies of Pedro's journal of his route from the Muata Yanvo (or as he writes it, Hianvo) to the Cazembe, which have appeared, the one in No. 5, the other in No. 7 of the *Annaes Maritimos* for 1843. In the former he writes uniformly Muropue, in the latter Muata hianvo. It is remarkable that he never uses the word Milúá.

‡ Bowdich, *Discoveries of the Portuguese*, &c., p. 15.

§ *Memorias contendo a biographia do vice Almirante Luiz da Motta Feo e Torres*, &c. &c. Paris, 1825, p. 301.

the lowest stage of barbarism, as the criminal codes of Europe a nations can fully attest. Besides, the report in question has an intrinsic right to be regarded as a constant statistical fact, and is more to be suspected on account of the comment which accompanied it when first published in Portugal, namely, that from such cruelties the wretched Africans can be rescued only by the slave trade!

On the 22nd of May, 1806, Pedro left the town of the Muáta Yanvo or Muropúa, as that sovereign is named from his kingdom, and proceeded on his journey to the Cazembe. His road lay up the valley of the river Luiza, which he had crossed 4 days before his arrival at the capital, and which runs into the Lulúa. He had the rising sun on the left hand, full on his side. Near the town the road was crowded with people bringing cassava flour into the town. From the 6th to the 9th day the road went along the valley of the Calalimo, then across the Cazala, a stream 20 fathoms wide, and the water of which was up to the traveller's waist. On the 14th day the Caginrigi was crossed in a canoe.* All these rivers join the Lulúa. The people hitherto met with on the road were either going to the mines to buy salt, or returning from them with their loads. Near the Cazala was encountered a party on their way to the capital, laden with fish. In the desert of Canpueje, beyond the Caginrigi, were found some huts constructed by the people of the Alunda or Arunda, that is to say, by the mountaineers or bushmen.† It is of these stragglers evidently that Bowdich has made *the nation of the Varoondas*. Beyond this, several considerable rivers were passed—the Reu; the Ropoeje which enters the Lubilaje; the Ropele flowing into the Luburi, and near which wild swine were seen feeding; and at length, on the 30th day, the Luburi itself was crossed, 40 fathoms wide with gravelly bed and water to the waist. In this part of his journey Pedro enjoyed the company of a large number of people who were on their way to the salt mines. At the Luburi commenced the domain and jurisdiction of the lord of the frontier, the Quilolo

* In the other accounts which have been collected of the route between the Muata Yanvo and the Cazembe, the Caginrigi is not mentioned among the four unfordable rivers crossed on the way. The name affords some explanation of this circumstance. It is evidently a diminutive and plural, corresponding with the Caginghigi of the Bunda, and signifies *the brooks or torrents*. We may conceive the name therefore to be given to a stream running in a number of channels which are either forded separately, or crossed in a canoe where they unite, according to the season.

† These people are called in one journal (No. 5) *viagantes Arundas*, in the other (No. 7), *viagantes da Alundas*. Alunda, the plural of Mulúnda, signifies in Bunda, *islands*, while Alundu from Mulundu, means *mountains or wilds*. Such is the distinction made by Cannecatin, who represents the Bunda language as he conceives that it ought to be; yet there is good reason for supposing that one word originally expresses both rock (or mountain) and island. At all events the fine orthographical distinctions exhibited in the Bunda language as written by the missionaries, are never adopted by Pedro. In Sichúana also lundu means mountain.

or captain Chamuginga Musenda. The language of his followers and slaves resembled that of the Cazembe's people.

Three days beyond the Luburi, our traveller waded through the Lufula, a fine stream running into the Lualaba. A little further on, he came to an extensive marsh or lagoon, called Quibonda, which it took half a day to cross. Here he encountered some hunters on their way to the mines to sell their venison for salt. The road now led up and down over a succession of ridges, branching from a mountain called Impume, and strewn with rocks of a green colour, indicating the presence of copper; the streams from these hills all descend into the Lualaba. As far as the river Catomta, crossed on the 38th day, our traveller's course had been so shaped that the rising sun was always on his left hand; but thenceforth (September 11), he had it constantly in front; he may consequently be supposed to have there turned nearly due east. Having visited Muiri, the lord of the copper mines, he next came to the Luigila, which forms at its junction with the Lualaba the marsh of Quigila, celebrated for its production of salt. The Lualaba, 50 fathoms wide, and a tributary of the Lulua, was crossed in a canoe on the 41st day: Quiburi, the lord of the salt marsh, hospitably entertained the strangers. Continuing their march, they went along the Bacasacala, which falls into the Lualaba, to its sources, and in five or six days reached the summit of the ridge which separates the waters flowing to the east and west.

The river Luburi forms the boundary between the dominions of the Muata Yanvo and of the Cazembe. Yet Chamuginga Musenda, whose town stands a little south of that river, is subject, according to Pedro's account, to both those potentates. For when the Cazembe's ancestor was sent eastward to conquer new territories, that chief was placed at the Luburi to afford succour to travellers and maintain the communication between Muropua and its conquests. It is chiefly at the town of Chamuginga Musenda that the salt merchants provide themselves with the goods required for their traffic. In the mountains between the Luburi and Lualaba, and which pour their waters into the latter stream, are the copper-mines divided between two chiefs, Muiri and Cambemba, who were formerly independent. The bars of copper forming the tribute due to the sovereign are paid by them to the lord of the salt marsh, who transmits them to the Muata Yanvo. The Quilolo Quiburi, the Cazembe's maternal uncle, was the ruler of this country at the time of Pedro's journey eastward, but died shortly before his return. He received the strangers hospitably, who repeated to him the story of their being in quest of Muaniputo's brother. "This we did," says Pedro, "because we knew that these chieftains never allow a traveller with merchan-

dise to pass across their territories." Quiburi informed them that some white men had recently visited the Cazembe's town, and had left behind them one of their number, a soldier. In return for eight days' entertainment, Pedro gave the Quiburi a looking-glass and a musket, with a small quantity of cloth.

The chief's residence is on the south side of the Lualaba, directly opposite to the salt marsh of Quigila. In order to make the salt, the grass or other herbage of the marsh is burnt; the ashes are then collected, and water poured on them; which, being strained off, yields salt by evaporation.* This production constitutes the sole wealth of the country; the soil, if not sterile, is at least uncultivated. This, we are told, is the result of custom. The chiefs of old never sowed nor planted, and those of the present day abide by the ancient usage. The wants of the people must be all supplied by means of salt; with this they purchase the grass-cloth or fine matting, which hides their nakedness; with salt they buy millet and coarse pulse. But the provisions thus imported from a distance are excessively dear; during the rainy season, when the marsh is filled with water and no salt made, the people at Quigila feel much distress; but should the engrossing labours of the harvest interrupt the transmission of grain, then they are reduced at once to the brink of famine.

Yet the Lualaba and the streams flowing into it abound in fish, a grateful resource, though inadequate to counterbalance the failure of the staple articles of food. The numerous lagoons also scattered over this elevated tract are frequented by water-fowl, of which our author names in particular the Hunda, a species of goose apparently new to him. Large herds of antelopes, droves of zebras, and crowds of other animals, with the names of which Pedro was unacquainted, assemble round the marshy spots and dry lakes, or salt-licks, as the North Americans would call them. The total number of rivers, great and small, crossed on the way from the town of the Muata Yanvo to the sources of the Bacasacala, was 116. As to the rivulets met with during 8 or 10 days' march across the ridge, it is impossible to decide to what basin they belong. On this wild tract, the travellers were terrified at one of their halting-places by the roaring of two lions close by, "the whole blessed night." They also saw eight of the animals called Muquete, which however they leave undescribed.

On the 55th day of the journey Pedro crossed the Luviri in a canoe. This river, 12 fathoms wide, runs into the Luapula,

* *Annaes Maritimos*, 1843, No. 9, p. 427. The reputation of Quigila certainly cannot be due to the salt obtained in this way. But Pedro incidentally tells us elsewhere that another kind of salt—*Sal de pedras*, or rock salt—is also brought from Quigila. *Annaes*, 1843, No. 5, p. 190.

which was on his right hand or to the south, as appears from the sequel. At the Luviri he was entertained in the village of the chief Luncongí, and further on, in that of Muachi. The language addressed to the travellers on reception was nearly the same at every station throughout the journey. The chief in each instance "expressed his gratification at receiving white men, whom he held in high estimation, and his pleasure at finding that they were now allowed to pass from the Muata Yanvo to the Cazembe, a thing unprecedented. The Cazembe was in good health, and had recently been visited by white men from the other side." From the 60th to the 64th day the road led over the mountain called Conda Irungo, passing first along the valley of the river Cavula-ncungo, and afterwards descending the mountain by that of the Lutipuca.* Near this river, at the eastern foot of the mountain, was a dry lake, ten leagues in extent, and crowded with wild animals of many kinds. Cutting across the western extremity of this hollow, the travellers came to the Luapula, 50 fathoms wide, and crossed it in a canoe, lodging on the other side with the lord of the port, that is to say, the master of the ferry. Their course hitherto from the river Catomta had been eastward, but they now turned a point or two northwards, so that they had the sun (in October) on the right hand. The next stage brought them to the habitation of Pemba, the Cazembe's sister, who heartily welcomed the strangers, gave them at once a goat, 40 fresh fish, besides cassava, and the beer called pombe. She related the history of Lacerda's visit to her father, the Cazembe Hunga Amuronga, who refused to give that traveller permission to proceed westwards to the Muata Yanvo. Messengers were now sent to the Cazembe to apprise him of the Pombeiro's approach to his capital; in five days they returned, bearing as a present from the prince a goat, five measures of cassava flour, and one of fresh fish, together with a slave girl, and some words of gracious welcome. Leaving the hospitable hamlet of Pemba, the travellers continued their march along the bank of the Luapula, the river being on the left hand. The sun (at the end of October) was on the right, and their course consequently lay north of east. After three days march they crossed from the Belengi, which enters the Luapula to the Cannegoa which joins the Mouva. On the side of the last named river, or broad lagoon, stands the Cazembe's town, Lucenda. In the evening of the 73rd day of march, Pedro and his companion took up their abode in the house of the Cazembe's porter, where they feasted on cassava, pombe, and a hundred slices of fresh meat, sent to them from the royal mansion.

The streams, great and small, met with between the sources of

* Conda, in Congoese and also in Sawáhili, means hill.

the Bacasacala and the Mouva at Lucenda were 47, making a total of 163 from the capital of the Muata Yanvo to that of the Cazembe. The total number of days' marches was, according to Pedro's journal, 73, and of days of rest 22; but under the latter head are reckoned only the regular halts of a single day, and no account is taken of lengthened delays, such as 16 days at the guide's village, a month with Muene Casamba at the Caginrigi, 12 days with the chief at the Ropoeje, 8 days with Quiburi, &c. &c. In fact, Pedro was above 5 months on the road, from May 22nd to October 31st.* It is of some importance to ascertain the dates of his progress, since the relative position of the rising sun is the only indication which he gives us of the bearings of his route. The earlier part of his journey, during which he had the sun full on the left side, was performed at the season (from May till September) when that luminary reaches its greatest northern declination; from the Catomta onward he had the sun in front about the time of the autumnal equinox (from the 11th of September); and consequently his expression, with whatever latitude it be understood, refers to an easterly course. Towards the conclusion of the journey, when he had the sun on the right, a southern declination of 8° (at the end of October) must be allowed to modify the turn towards the north, which necessarily affects that portion of the route. It is obvious that the expressions, "the sun on the right," "on the left," "in the face," embracing, as they do, 180 degrees of the horizon, ought not to be taken literally; they are vague indications, and must be understood as such.

The detailed account here given of the route from the capital of the Muata Yanvo to Lucenda agrees in all essential particulars with the information on the same subject collected by Lacerda. He learned that the journey between those places is of 2 or 3 months; and that in the course of it there are four rivers crossed in canoes, and not fordable—viz., the Ruapura, the Mufiva (Mufira), the Guarava (misread for Luarava), and the Rofoi (Rufua).† In these names it is easy to recognise the Luapula, Luviri, Luabala, and Lufula. One of these rivers, it is added, is so broad that it takes half a day to cross it—an obvious reference to the lagoon of Quibonda, near the Lufula. When Lacerda adds, however, that these four rivers all run to the left hand (of one going from Lucenda to Muropua), and consequently flow towards the western coast, he errs both as to the fact and the inference: for the Luapula flows decidedly to the right hand in that case; and the Luviri, though it runs to the left, joins the Luapula, and never

* This is stated according to the pombeiro's journals in the *Annaes*, Nos. 5 and 7. In the general report of his proceedings (*Ann. No. 9*, p. 429) he says, that he arrived in the Cazembe's town on the 31st of December, 1806, and had his interview with that sovereign on the 1st of January, 1807.

† Bowdich, *Discov. &c.*, p. 98. *Das Neves, Considerações, &c.*, p. 394.

approaches the western coast. It is incorrect also to say that there are no inhabited places the whole way, except at the four rivers named above. The country is certainly thinly peopled, yet the dwellings of chiefs and their retainers are to be met with every 16 miles on an average, according to Pedro's journal. The worst part of the journey lies between Quigila and the Luburi, about 13 days' journey—80 or 90 miles—over dreary mountains; yet in the middle of this wild the traveller can rest in the village of Muíro, one of the lords of the copper-mines. As to the Varrundas or Varoondas, the nation said to be scattered over this vast region, it has been already explained that the scattered inhabitants of the woods and mountains (Alunda) have been in this case mistaken for a separate nation.

Early in the morning, after the arrival of the Pombeiros in Lucenda, they received a message from the Cazembe, requesting that, in order to signalise so remarkable an event as the arrival of white men from Muropua, they would fire as many shots as they could. Pedro complied by firing three shots, which were answered by one from within the walls of the royal dwelling. When daylight was fully come they were led to a public place, where they found the Cazembe seated in state surrounded by his grandees, and clothed in silk and velvet, with beads of various kinds on his arms and legs. The Cacoata or guide sent with them by the Muata Yanvo, being desired to speak, briefly stated that he conducted white men sent by the king called Muani-puto, and who wished to proceed to Tete, and that his king the Muata Yanvo recommended them to the Cazembe's favour. He then delivered the presents from his master. The Cazembe replied in a few words, expressing his respect for the Muata Yanvo, and so the ceremony of introduction concluded. The travellers, however, had hardly reached their dwelling when they were recalled to a private audience with the Cazembe, who informed them that he had been long aware of their being on the road to him. On a subsequent occasion they found a Portuguese soldier and three native traders from Tete, waiting to receive them at the Cazembe's doors. The first of these had been two years in Lucenda, soliciting in vain for permission to proceed to Angola. The presents from Muani-puto, consisting of specimens of satin, cups, a musket, and two small looking-glasses set in gilt paper, gave much satisfaction; and the Cazembe spoke so fair, that Pedro, to fix him in his good intentions, added largely to the gifts. He even grew so frank as to disclose the fact that a scarlet coat and handsome buttons, intended for the Cazembe, had been appropriated by the Muata Yanvo.

Towards the end of April, 1807, the Cazembe, in fulfilment of his promises to Pedro, began to collect his forces, for the purpose

send such rich presents of baskets of salt, cotton cloth, beads, &c., as had never been received before from the same quarter. When Mutanda therefore returned from the wars, and likewise sent presents to the Muata Yanvo, with excuses for not paying his respects to his sovereign in person, alleging that his feet were sore, his mulambo or offering was rejected as being much inferior to those sent by the slave Quinhata, the Muata Yanvo at the same time reproaching his son Mutanda with want of attachment. The latter, irritated by this treatment, had Quinhata seized and thrown into the river Mucuregi. The Muata Yanvo then drove Mutanda into exile, and established Ganga Abilonda, the son of Quinhata, in the government of the salt-pan, giving him the white staff, the knife, the shield, javelins, and many captains to obey him.* He also commanded him to carry his arms abroad, and gradually to extend his conquests wherever he met with desirable territory; and thus the Cazembe at length settled in Quichinga, where he reigns at present. Many years have elapsed since it was customary for the Cazembe to pay his respects to his sovereign in person; for the predecessors of the reigning Cazembe were forbidden to quit their dominions, lest the people might take advantage of their absence to throw off their allegiance.

In this traditional account of the origin of the Cazembe's kingdom there is nothing which positively assigns that event to a recent date. For though some expressions relating to the early growth of his power seem as if they were applicable to the Cazembe of Pedro's time, yet this will be found on consideration to arise from the want of what may be called chronological perspective, or from that unskilfulness which in the historic as in the graphic art confounds the near with the distant. The word *anciently* is used in speaking of Mutanda's promotion, and moreover, the last sentence of the preceding paragraph broadly intimates the gradual rise of the Cazembe's independence, which was not effected by force or revolution, but by time and distance, policy on the part of the Muata Yanvo making a virtue of necessity, and cloaking under palatable commands to the viceroy the inevitable defection of the latter. In short, we may as well suppose a succession of seven or eight Cazembes as of only three. But this step once made, we cannot avoid venturing on a conjecture of some importance, since it tends to give fixedness to the tradition now before us. The Moviza were the original occupants of the territory held by the Cazembe's followers. If the invaders be supposed to have approached from the Luapula, which is most probable, then the dispossessed people would naturally retire south-east-

* The Cazembe of Pedro's narrative called his father Hunga Amurounga (Annaes, No. 7, p. 296), which name has an obvious resemblance to Ganga Abilonda; indeed the latter seems to be the Angolan form; the word Ganga (properly Nganga) meaning priest.

wards, parallel to the shores of the lake through their own country, and being hotly pressed, they would necessarily cross the Aruangoa, and throw themselves on the country immediately north of Tete. Now this is exactly what happened in 1570; but since there is certainly no nomade population near the great lake, and the Moviza, who were among the wanderers on that occasion, are an industrious nation, more civilized than their neighbours in general, it is reasonable to suppose that they emigrated under the impulse of necessity, and not of mere ambition. Is it not probable, in short, that they were then flying from the Cazembe, whose conquests therefore must have taken place about that time? *

It is now time to conduct Pedro to Tete. During the first four days after leaving Lucenda he crossed several rivulets joining the Mouva. The 5th day brought him to the Luena, 17 fathoms broad, which descends into the Carucuige.† The town of the chief Muenepanda was reached on the 7th day, and on the 13th that of Luibue, who had been killed by the Cazembe in the late wars. On the 18th day of the journey the traveller crossed the river Lubanzenge, in which the water reached to his waist, and in 2 days more the Hiabengi or Hianbigi (the Zambezi). On the 23rd day the road left the low country, and began to ascend through rocky hills. On the 30th the Aruangoa, a fine stream 30 fathoms wide, was crossed on foot. Hitherto the travellers had had the sun (at the season of its greatest southern declination) in front, but for the remainder of the way it rose on the left. Passing through the territories of Mocanda, they forded the Bue on the 43rd day, and in 3 days more came to what Pedro calls "the old place of Gonsalo Caetano Pereira, by which we are probably to understand Java. On the 51st day they reached Machinga, the estate of Dona Francisca Josefa de Moura.‡ The day following they crossed a deep river, which was probably the Aruangoa of Lacerda. The estate of Manoel Caetano Pereira (Marengue) received them on the 54th, and on the 57th day of the journey (the 2nd of February, 1811), crossing the Zambezi in a canoe, they arrived in Tete.

This route will be found to agree perfectly with that of Catara already referred to; the difference in names between them being

* The Moviza, while spread over the low country previous to the Cazembe's invasion, would necessarily be distinguished from the pastoral people (Aca-biri) occupying the hills, and must have carried the latter with them in their retreat southwards. The Mumbos were a pastoral people (*Nazione di esercitio pastorale*, Cavazzi, p. 146).

† Luena is elsewhere written Roena (Bowdich, *Discoveries*, &c., p. 96), and is probably the same name originally as Aruangoa, or, as the older writers have it Ruenia (De Barros) and Arroenha (Do Couto). It is a true Mucarangwa word, three rivers so called entering the Zambezi (Lacerda, in the *Annaes*, 1844, No. 11, p. 400). Its occurrence so far north therefore is interesting, as helping to prove that the Moviza are Mucarangwa, and as a vestige of their dominion.

‡ Machinga means "the lash," an appropriate name for a slave depot.

such as would necessarily ensue from the changes made by a dozen years among the chiefs. Pedro travelled more slowly also than the other, taking 46 days to Java which Catara reached in 37. It is also to be remarked, that his journey was performed in the driest season of the year; hence he forded the rivers which Pereira was obliged to cross in a canoe. The rivers and rivulets passed on the way amounted to 102, of which number 45 were in the low land between Lucenda and the hills of the Moviza. This journal brings clearly into view one or two particulars of some importance. In the Lubanzenge forded on the 18th day, and the water of which was up to the traveller's breast, may be recognised the main channel of Catara's "Risuro Grande," "Great water," and of the broad lagoon, which, according to the Moviza, is connected at once with their Zambezi and the Morisuro. We learn also that the low country continues for 23 days from Lucenda to the hills of the Moviza, which form a barrier 6 or 7 days' journey in width between that low plain and the Aruangoa.

Again, from this highland the Aruangoa flows south-westwards to the Zambezi, and the chain of hills N. of it probably holds a parallel course. The general course of the Zambezi of the Moviza seems also to be in a parallel direction, or from S. W. to N. E. This being admitted, we arrive at a natural and complete explanation of the native accounts of the Zambezi related by Dos Santos; for an untaught people are swayed in such matters by loose ideas of direction and proximity. Regardless of physical laws, they dwell in thought on the impressions of sense, and so they often infer from the bearing of the valleys what can truly follow only from the course of the waters. Many examples of rivers thus reversed are to be found in the history of African geography. The report therefore mentioned by Dos Santos, that the Zambezi issues from the great lake, passing through the territory of a people of like name, amounts, when truly interpreted, to the following hypothetical statement: that the valley of the northern Zambezi approaching that of the southern river of the same name, may be inferred to join it—an inference confirmed apparently by the sameness of name; and that the waters of the lake being supposed to flow up the valley of the former, through the country of the Moviza or M'biza, will of course descend in that of the latter river. As to the derivation of the word Zambezi here assumed, it need hardly be observed that the Africans are no better versed in etymology than geography. Unwritten languages fluctuate perpetually; the roots of significant names become obsolete, and it is only by research extending through the family of languages to which they belong, that their sense can be recovered. In the present case, however, Pedro affords us valuable aid; for he calls the northern Zambezi—translating

the name evidently into the Bunda or Angolan language—Hianbigi or Hianbege, or, his orthography being corrected, Yambegi. Now this word, as well as Zambezi, has the prefix of a possessive case, and there seems little reason to doubt that it means "of fish." The river Zambezi is therefore "the fish-river." *

Having conducted our traveller to Tete, we must now endeavour to determine as accurately as possible the position of that place. The navigable course of the Zambezi has been hitherto estimated with all the exaggerations of early geography. The Portuguese writers inform us that Sena is 60 leagues (of 18 to a degree), or 200 geographical miles above Quilimane; and that Tete is at an equal distance above Sena. The time ordinarily required for the voyage on the river up to Sena is a month; from this town to Tete is for the natives a voyage of 6 weeks, the adverse current in Lupata, or *the Glen*, running even in the driest season with great force.† The speed of the canoe is from 7 to 15 miles a-day, according to the load and season of the year. The incorreciness of the above-mentioned estimates of distance may be easily proved by an appeal to facts. Lieut. Browne found that the difference of longitude between Sena and Quilimane is but 90 miles, the distance between those places by the river, which is here extremely circuitous, not exceeding 140 miles. Now the missionary Gonzalez Sylveira ascended the Zambezi from Quilimane to Sena in 8 days. Dos Santos, embarking on the Luabo branch, arrived at the same place in 9 days. It took Berni, another missionary, 17 days to reach Sena. But again, from Sena to Tete, Dos Santos ascended the Zambezi against a strong current in 7 days. On his return he descended the same distance in 4 days, and from Sena to Quilimane in 7. The jesuit Tho-

* In Congo and Angola the words mbize and mbige respectively, mean "fish." The river in the former country, which is commonly called Ambriz, is properly Ambize, fish river. There is also a Luambige or fish river joining the Zenza in Angola. The Lulua is called by Da Costa (Annaes 1843, No. 6, p. 239) the Luambeje, which he supposed to run to the eastern coast.

† It is commonly supposed that Lupata signifies "the Spine of the World." This explanation of the word, however, does not in truth belong to Dos Santos to whom it is usually assigned, but to his very inexperienced translator and abridger, Gaetan Charpy (l'Hist. de l'Ethiopie Orientale. Paris, 1684), who, by his summary mode of curtailment, brought those two expressions into juxtaposition. Dos Santos (part ii. fol. 726) describes the dangerous rapids "na Lupata onde ha grandes Serras." The river in Lupata is narrowed to 100 yards; as to the height of the impending cliffs, the reader may consider whether a few hundred feet be not enough to satisfy the most extravagant description of them. Senhor Botelho, it is true, assures us (Memoria, &c. sobre os dominios Portuguezes, p. 312) "that Lupata touches the clouds, and is covered with perpetual snow;" but we much prefer the soberer statements of Das Neves and of the merchants who have travelled over the country in question (Correia da Serra, in the Investigador Portugues, No. IV.), and who report that the hills at Lupata are of moderate height and covered with trees. The glen gives its name to the district. (Do Couto, Dec. ix. c. 23.) Lacerda (Annaes Marit. 1844, No. 10, p. 380) presents us with the true interpretation of the word Lupata, "they give this name to the place where the hills come together."

maun was conveyed a prisoner in a small canoe, from Tete to Sena in 7 or 8 days, and thence to Quilimane in 3 weeks.* From these facts we may legitimately conclude that the distance by the river between Tete and Sena is probably less, certainly not greater, than between the latter place and Quilimane. Tete may therefore be supposed to be not more than $1^{\circ} 15'$ W. of Sena, and nearly in the 16th parallel of S. lat., Machinga, 4 days' journey from it to the E. of N., being found by Lacerda to be in $15^{\circ} 19' 15''$.†

Pedro met with but a cold reception in Tete, and to add to his mortification the governor refused to furnish him from the royal stores with the goods required to defray the expenses of his return. After much delay a contribution was levied in his behalf on the principal inhabitants of Tete and its neighbourhood, to the amount of 468 pieces of cloth. Thus inadequately supplied, he set forward on his return in the latter end of May, 1811. He marched, he says, "with the help of God, but without arms and powder." From this time his journal offers few details of his proceedings, and scarcely any dates. He says that on his return to Lucenda he staid there nine months, while the Cazembe was preparing presents for the Muata Yanvo. He was attacked in February on his journey by Muene Cassamba, whom we find in his route eastwards, placed at a distance of 18 days from the town of the Muata Yanvo; we may consequently infer that he arrived at this place in the beginning of March, 1813. In the course of his journey from Lucenda to the Luviri he suffered much distress, which must not, however, be charged on the nature of the country. When travelling eastward he never found any difficulty in obtaining such provisions as he could pay for. But on his return he wanted means of payment. The stock of goods which he received in Tete was neither suitable nor sufficient. The Cazembe, through policy or covetousness, took from him nearly all his merchandise, giving him (though this is not expressly stated) slaves in return. Thus, with means reduced, he had more people to feed. For the support of his whole party he had but 600 sambos (zimbo or cowries) given him by the Cazembe. The consequence of all this mismanagement was, that by the time he arrived at the Luviri, the slaves had all either died for want of food or run off, as Pedro remarks with much simplicity, "for want of chains to hold them." He arrived in Angola some time in 1814.

A tardy and unsuccessful attempt was made a few years ago

* Vita Patris Gonz. Sylv., p. 106; Ethiopia Oriental, II., pp. 72, 75; Il Genio Vagante, tom. I. p. 321; Thömann's Reisebeschreibung, p. 100.

† Unfortunately I have not been able to procure that part of the *Annaes Maritimos* (No. 9, 1844) which contains the beginning of Lacerda's journal of his expedition, and in which I hoped to find the position of Tete fixed by good observations.

by the Portuguese to retrace from E. to W. the route which had been thus explored by the Angolan pombeiros. An expedition commanded by Major José Maria Corrêa Monteiro, and consisting of 420 persons, slaves included, left Tete on the 1st of June, 1831, and arrived in the Cazembe's town (the name of which, Lucenda, we first learn from Monteiro) on the 19th of November, five months and a half having been spent on the journey. Permission to proceed westwards to Muropúa was peremptorily refused by the Cazembe, and the expedition, reduced by sickness and famine to 300, set forward on its return on the 11th of March, 1832. The journal of this expedition has not been published; but our regret on that account has been much diminished by reflecting on the unsatisfactory character of Monteiro's brief letter, dispatched from Lucenda with native couriers to the governor of Angola.* In that letter the writer states gravely that he marched 302 leagues on a N.E. course. In the direction here stated such a length of march from Tete is strictly impossible; but a march of 302 leagues two points E. of N. would have brought the Major at once to the equator and to the coast. As to the interior, he could hear of only two great kings, viz., Matianva (Muata-yanvo) and Muenemputo. Of the application of the latter name he appears, most unaccountably, to have been quite ignorant. He heard also of Massungu Congo, which he supposes to be the Congo of history.† On his way northward he first went through the territories of the Muzimba and Xeva, and then entered the country of the Auembe, who have expelled its former possessors, the Moviza. As to the Cazembe, he figures in this letter as a robber; for instead of hospitably feeding the Major's retinue of 300 or 400 people, he made them pay—and somewhat dearly—for whatever they consumed.

We have thus completed our review of the routes from the opposite shores of the African continent to the vicinity of the lake, and find that from Buromaji, near Point Púna, to Oha in Monomoezi, is a journey of 79, or, in round numbers, 80 days—the shores of the lake being still 6 or 8 days distant. Again: from Mucari in Cassangi to Lucenda is a journey of 150 days; and if we add 40 for the distance at the same rate between Loanda and Mucari we shall have 190 days for the whole journey from the former place to Lucenda, which is nearly in the same meridian as Oha. Now the breadth of the continent between Loanda and Point Púna will be found to be 1590 geographical miles; while the two routes extending from those points to the same meridian measure 1740 miles; the excess of the lines of

* *Annaes Maritimos*, 1843, No. 11, p. 540.

† From west to east throughout Southern Africa, the word *mozungu* is used to signify a "white man;" the Sawáhilli say that it originally means a "wise man."

route above the rectilineal distance across the continent amounting to 150 miles, or about one-twelfth of their whole length, arising evidently from those wide deviations which could not be taken into account in assuming the rate of march. These routes from the E. and W. reach the same meridian; yet so moderate is the rate of travelling assumed, that it is impossible to abridge them—to place Oha further E., or Lucenda further W. The route to Monomoezi is travelled annually, and has been so for centuries, and we know of no difficulty attending it which could justify the reduction of the day's march to less than 6 geographical miles. On the W. again, of the 190 days' march, above 100 were in a direct course a little S. of E. (from Loanda to the Quango, and from the Catomita to Lucenda); and 6 miles a day is so low an estimate of the rate of travelling over a thinly-peopled country that no contraction of the route can be allowed here; and besides, Lucenda is connected with Tete, the position of which is not liable to much doubt, by a route of about 50 days, the latter half of which lies nearly in the meridian.

Thus it appears that Oha and Lucenda are fixed points in the same meridian, about 200 miles asunder. Between them is the lake—7 days from the former and 3 days (25 or 30 miles) wide. Represented under these conditions, it will extend from S.E. to N.W., distant about 50 miles from Lucenda. That the direction here given to the lake is the true one, may be collected from nearly all our authorities respecting it. The Moviza told Lacerda, in Tete, that the Morisuro (the lake) passes behind the hills of Morembala. He, still relying on the information derived from them, believed that it reached the sea between Mozambique and Quilimane. Mariano was told that it flows towards the Quirimba islands. Others, as we have seen, look upon the Livuma as the continuation of the lake. All these hypothetical statements are manifestly founded on ideas of direction, and show that the lake, viewed in its chief dimension, makes a considerable angle with the meridian. But, besides, Nasib stated positively that N'yassi, seen from N'jesa, extends towards the setting sun. We are informed that the westerly winds blow down the lake, and raise a great sea on it. The road from Lucenda to the Aruangoa evidently goes parallel to the lake, and we have seen that the direction of that road was, in December, towards the rising sun, or two points S. of E.; and, finally, the northern route to the lake by the valley of the Lufiji is longer by a third than the southern route, through Lukelingo; from all which it may be concluded that the lake extends chiefly from S.E. to N.W. This direction, it may be observed, is parallel to the line of volcanic action drawn through the Isle de Bourbon, the north of Madagascar, and the Comoro Islands, and to one of the two lines predominating on

the coasts of southern Africa wherever there are no alluvial flats, and which may be considered as the results of mineralogical laws, and as marking the principal fractures of the rocky system.*

The road from Tete to the Aruangoa goes at first some points E. of N., and we may, without much error, assume its general bearing to be due N. On the right are chains of hills, which at the sources of the Aruangoa unite with the hills of the Moviza, and, probably, with the continuation of N'jesa also. A glance at the map will show that in that position, or somewhere about 350 miles N.W. from Mozambique, there is a central highland, from which rivers flow to every point from E. by S. to W.—from the Livuma round to the Aruangoa. That highland supports and incloses the southern extremity of the lake. Looking down from it on the water we have on the right, or towards the N.E., the heights of N'jesa sloping gradually to the shores of N'yassi; on that side we can see but one small stream—the Matuizi—which is often dry. The ridge of which N'jesa seems to be the culminating portion, may be naturally supposed to extend a considerable distance, forming the Black Mountains alluded to in Hardy's journal. Further N., where our routes again bring us near the lake, we find it bordered by a seam of elevated land, without water or population. Though not much raised perhaps above the level of the lake, yet it has the character of the summit of a ridge. But on the opposite, or south-western side of the lake, we see a low country intersected by numerous rivers, the largest of which—the Luapula—flows north-eastwards to the lake. The Mouva is an extensive lagoon; the Loena, or Roena, descends into the Caruige, which, as salt is obtained from it, we may infer to be a shallow lagoon; further S. again the Lubanzenge expands into a lake connected both with N'yassi and the New Zambezi. In this low and marshy tract there are no cattle. The road through it goes at some distance from the lake, probably to avoid the lagoons and on account of the greater facility of crossing the rivers higher up. Thus we see that the country on the S. W. is drained into the lake, which is confined on the opposite side by a ridge backed by an elevated table-land, the streams from which flow eastwards to the ocean.

While the general direction of the lake and the characters of its opposite shores are thus manifest, the geographical position of its southern end admits of being determined with sufficient accuracy. For there can be but little doubt as to the position of Lukelingo, distant a journey of 6 weeks' ordinary, or 1 month's expeditious, travelling from Kilwá, and half as far again from

* The great Comoro island or N'gazija is still an active volcano, eruptions taking place from it every three or four years. On these occasions fish are collected in great quantities on the surface of the sea, killed by the streams of red-hot lava.

Mozambique.* Fifteen days—that is to say, 90 or 100 miles—westward of Lukelingo is the lake. Now a journey of 28 days northward from Tete brings us to the hills and the line of route which confine the lake, the former on the S., the latter, less closely, on the W. If, then, a line of 200 miles be drawn nearly due N. from Tete, and another 360 miles in length be drawn S.W. by W. from Kilwa, they will meet on the lake at no great distance probably from its termination.

It has been already observed that the results of our inquiries all tend to vindicate the correctness of the ancient accounts of the lake. It is easy to recognise in N'yassi the lake 100 leagues long described by De Barros; and that from which the Ambios (M'biza) descended southwards towards Tete, according to Do Couto; and that on the shores of which Dos Santos places a river Zambezi, flowing through the territory of a people of similar name; and that of which the eastern banks are occupied, according to Lopez, by the Monomoezi. The physical advantages and superior civilization of the Monomoezi, Moviza, and other Mucaraunga tribes round the lake, who are not negroes, explain the early reports which led the Portuguese to believe that Prester John, that is, the empire of Abyssinia, was not far from its shores. Our conjecture, that the kingdom of the Cazembe was founded in 1570, accounts for the descent of the Moviza and pastoral tribes at that time, and explains, from the fact of their being merely fugitives, how it happened that the progress of such a multitude was arrested without bloodshed.

As to the outlet of the lake, there seems to be on the eastern coast but one opinion among those who seem best qualified to decide the question. The numerous traders who visit the Monomoezi all believe that the Lufiji descends from the lake. But we have shown that this unanimity does not by any means merit the confidence due to actual knowledge. The journey of the traders up the country terminates in fact at some distance from the lake, but they naturally and inevitably infer the continuation through that distance of the river along the valley of which they have been travelling for months. Yet neither the Lufiji, nor any other river of eastern Africa, as far as our knowledge reaches, possesses the characters of a stream descending from a great and central reservoir; and on the western coast there is but one river with those characters, which is the Zaire.†

In the preceding paper, many pieces of information, derived

* The Miyão, the Monjou of Salt (Voy. to Abyssinia, p. 32), who dwell at the sources of the Lávuma, are placed by Carl Ritter (Erdkunde, Afrika, p. 157) on the southern slopes of Dyre and Tegla, in Kordofan!

† It is to be lamented that we know nothing with certainty of the name of the Zaire above the falls. The missionaries seem to have generally called it the Bancari (Carazzi, p. 5). It would be ridiculous to suppose that the name used by the natives in the

from many different sources, are combined so as to complete, explain, or corroborate one another. It must not be supposed, however, that the harmony thus established among them is due to any efforts of adjustment, or that the authorities here relied on have been selected or explained with a view to mutual agreement. On the contrary, every statement brought forward has been interpreted from itself, as far as possible, and nothing has been wrested from its natural meaning for the sake of adaptation. The fact that so many independent authorities should have been so closely combined, without the necessity of straining them for that purpose, is itself so strong an argument in favour of the conclusions here arrived at, that I cannot refrain from dwelling a little on it, although in so doing I shall be obliged to advert to some of my previous labours. In 1832, in the *'Foreign Quarterly Review,'** I ventured to assert that the empire of Muropua is identical with the country of the Milua. This is now fully proved. In Bowdich's map, which was then generally followed, these names are placed far asunder. About the same time I induced Mr. J. Arrowsmith to place the Morisuro—not westwards from Tete, as in Bowdich's map, but towards the N.W., on the ground that the first steps in the route were directed decidedly towards the N. Thus I placed the Morisuro near the actual site of the lake before I was acquainted with the meaning and application of that name. In 1835 I gave, in the *'Edinburgh Review,'* a general account of N'yassi and of the route to it by Kilwá through Lukelingo.† It was there stated that the Monomoezi, Mucomango, and Moviza are probably of the same race. At that time I had before me a map of the lake, founded chiefly on the routes of Pereira and Nasib. In the course of this summer I received the detailed routes to the country of the Monomoezi, and also the numbers of the *'Annaes Maritimos'* containing the journals of the Pombeiros, and Lacerda's observation of latitude at Machinga. The copious information thus obtained has been added to the map without disarranging in the slightest degree what was previously done. Can such coincidence be conceived possible, if the original outline were not substantially correct?

lower part of the river is not a local but a comprehensive geographical name. The interpretations of the word Zaire given by early writers must be rejected; that word signifies neither "I know" (so, cioè, Sapio, in latino. Pigafetta, p. 6), nor "stream of intelligence" (rio de entendimiento, Sandoval. Hist. de Etiop. p. 65). The name of the river learned of late years has been also misunderstood, for when the natives told Tuckey that Moienzi enzaddi (Muenya zinzádi) signifies the river that swallows all other rivers, they merely meant to inform him that the stream in the largest sense, all the channels included, was known by that name, which plainly signifies "the river of the islands;" thus expressing the visible character of the river. "Il fiume Zaire (says Pigafetta, p. 14) nel quale sono molte isole." "Forma questo fiume reale molt' isole" (Zucchielli, Relaz. del Viaggio, p. 135).

* Review of Dauville's Discoveries, No. 19, p. 205.

† July, 1835, p. 342.

V.—*Remarks on the Gulf of Mexico, with Notes on Tampico and its Vicinity, and on the Navigation of the River Tabasco.*
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Currents of the Gulf.—The current between Cape Antonio and Cape Catoche sets N. nearly, or a little to the W. of N.: it attains occasionally a velocity of from $1\frac{1}{2}$ to 2 miles per hour, and is found in its greatest strength in mid-channel. Near the meridian of Cape Catoche it begins on the Campeche side to take a more westerly course; and about half a degree to the westward of the Cape, on the Campeche Bank, it runs nearly W., with a velocity considerably diminished.

Near the Cuba shore an eddy or counter-current frequently sets round Cape Antonio to the eastward; which, in vessels bound to the Gulf of Mexico, will be best avoided by keeping the mid-channel; this course is also advisable from the nature of the coast of Yucatan, which is very low, and the character of the soundings, which are so irregular as to be no guide in ascertaining the position of the ship. To the westward of Cape Catoche the soundings are more regular, and may be depended on.

From Point Palmas, near Lisal, to the southward of Campeche, there is usually but little current, and what may be found to exist will be dependent on the wind. From Laguna along the southern shore of the Gulf a current sets invariably along-shore to the westward, the velocity of which is governed by the strength of the land and sea breezes. The sea-breeze commences generally in this part of the Gulf from N.E., and gradually as the sun passes to the westward of the meridian hauls round to E. The land-breeze blows from S. to S.E.

Along the western shore of the Gulf of Mexico the current is also governed by the wind, and allowance should be made for its effect, particularly between the parallels of 24° and 26° .

In most of the charts published, the current on the N.W. shore of the Gulf, on soundings, is described as setting to the eastward; but it is well known to those who have had experience in its navigation that this is erroneous, and that from the S.W. pass of the Mississippi to the Bay of Galveston the current sets invariably to the westward, inasmuch that vessels bound to New Orleans, which have been caught to leeward of it, although the smoke of the steamboats in the Mississippi has been distinctly visible, have required several days to make sufficient casting to obtain a pilot.

To the eastward of the Mississippi there is generally a current in that direction along shore. During a norther I have found, from abreast of the Bay of Espirito Santo, round the Tortugas,

a current of from 2 to 2½ miles per hour, setting to the S.S.E., and striking across to the Cuba shore.

I have occasionally found a narrow stream of current setting out of the Gulf of Mexico, and have learned upon inquiry that it has also been experienced by others, commencing in about lat. 24°, long. 95°, and running E.N.E. to lat. 25°, long. 91°; from whence, to lat. 25½°, long. 88°, it becomes more easterly, and gradually, as it nears the Tortugas, inclines to the S. of E.

I have been informed by officers of the Mexican navy, and by several masters of vessels in the Gulf trade, that in the event of a vessel being caught in a Norther off or near to Vera Cruz, when it might be dangerous to run for the anchorage, that by standing to the eastward to about long. 92° or 93°, a strong set of current will be found a few hours after the breeze has sprung up, running to the northward; and that ships which have laid-to in the gale, in about the longitude above stated, have found themselves next day to the northward of their position on the previous one, owing to the strong set of a current from the southern part of the Gulf.

It would appear that when it blows strong from the northward the waters of the Gulf of Mexico are forced to leeward, and having accumulated to a certain extent, a reaction takes place, the water in the first part of a Norther being driven to the southward generally over the whole of the Gulf, and the current produced being strongest in soundings. Having, however, no outlet, and being resisted by the coast and the current over it, the reaction cannot take place along-shore, so that the accumulated water becomes forced out to the northward, where there is the greatest depth, and consequently the least resistance; that is to say, between the coast of Vera Cruz and the western edge of the Campeche Bank, in the direction above mentioned.

In a similar manner, perhaps, may be explained the effect of the S.E. winds, which are the most prevalent, and which move the waters of the Gulf towards the Bay of Galveston, but meeting the influence of the stream from the Mississippi (and particularly of that branch which escapes by the S.W. pass) the accumulated water is prevented from taking a free course eastward along the northern shore, and a reaction takes place towards the middle of the Gulf. It is this cause, probably, that produces the eastern current setting out as before stated, which varies in its force in proportion to that of the wind, and when strongest has a motion of three-quarters of a mile per hour, but in general less.

In running over the northern part of the Campeche Bank until W. of the Alacranes, the current will be found in general to set due W., and its velocity to be governed by the wind then and previously prevailing, and also by the strength of the trade-wind

in the Carribean and Cuba seas; for at times there is no perceptible current in the Yucatan channel, and consequently little or none on the Campeche Bank.

Tampico.—The town of Tampico, or Santa Ana de Tamaulipas (as it has been lately called), is built on a rising slope of ground, between the river Panuco and the Laguna del Carpintero, and is about 5 miles by land, and 7 miles by water from the bar. The streets are wide, and laid out at right angles to each other. Although recently built it has a respectable appearance: and in the principal streets there are some very fine houses, both of brick and stone, many of them in the old Spanish style, with azoteas or flat roofs; but most of the houses which have been constructed since 1825 have pitched roofs, and are covered with slate or shingle, which is found better suited to the heavy rains of the wet season, and are less expensive than the flat roofs. There is a small church near the middle of the town, of rather a mean appearance; but another has been in progress of building close to it for several years, and it is likely more will elapse before it is finished. By the side of the new church is a tower, built in commemoration of the defeat of the Spanish invasion in 1828. In the same square is the prison. In the centre of the square (Plaza de la Aduana), which is near the Mole, is a monument erecting in honour of the President Santa Ana. The custom-house is on the north side of the square.

There are two hospitals situated at the western part of the town, for military and civil patients: to the latter all ships arriving at the port have to pay, and any of the crew who may fall sick are received there.

The Protestants have a burying-ground just outside the town, walled in, near to that for the natives and foreigners of the Catholic persuasion.

To the E. of the town a canal connects the Laguna del Carpintero with the river; and since it has been cut the town is much more healthy: for as the lake had no outlet, the water in the dry season nearly all evaporated, and what remained became stagnant, the effluvia from which caused a great deal of sickness, particularly bilious fevers. The canal is crossed by a stone bridge, and on the side opposite the town a paseo or public walk has been formed; but, although recently made, it is going to decay, and the trees which were planted are nearly destroyed for want of care.

The market, which is near the custom-house wharf, has been for the last few years very well supplied. Beef of a middling quality is always to be had, mutton is rather scarce, and the pork is none of the best. Venison is sometimes to be procured, and in the winter season wild ducks are very cheap, besides snipe of a large size, and other game. Although a great number of wild geese

are to be seen feeding in the lagoons, they are seldom shot, being very shy. Fowls and turkeys are almost always to be had at a reasonable price, as well as fruits peculiar to the Tropics: the oranges are of an excellent flavour. The market is generally well supplied with mullet and prawns; and the fish which are caught outside the bar are of an excellent quality, though very scarce. Oysters are brought from a lake a few leagues north of the bar; there are plenty in the lake of Pueblo Viejo, but they are not good. In the summer season turtle are plentiful about the bar and along the coast, and often come into the river; they are generally of a large size. I have bought them, weighing from four to five hundred pounds, at a dollar each. Tortoises are in immense numbers in the lagoons, and also in the river above the town.

Sportsmen may have plenty of amusement early in the morning along the banks of the river, and of the small lagoons; and the very best time is immediately after a Norther. But in these excursions care should be taken not to catch cold, as it is generally succeeded by fever.

The population of Tamaulipas is about 7000.

Pueblo Viejo (or the Old Town) has fallen off in trade very much since permission to vessels from a foreign port to discharge has been discontinued, it being now only a port of entry for the coasting trade. The town is in the state of Vera Cruz, on the borders of the Laguna de Tampico, which is very shallow: the channel from the river is also narrow, and not of sufficient depth for vessels to enter the lake. The merchandise, destined to be landed at Pueblo Viejo, has in consequence to be discharged into canoes of a light draught of water; and at low-water spring-tides even these cannot approach the town. The greater number of the houses are built of adobes,* in a straggling manner, forming a kind of street. The few shops in the town are but indifferently stocked, as Tamaulipas monopolizes nearly all the trade. The Lake of Tampico is celebrated for its prawns, which are very large; immense quantities of them are caught, and, besides supplying the vicinity, a large quantity is salted and dried, and sent to the interior for sale. The population of Pueblo Viejo is about 1500.

About five miles to the S.E. of Pueblo Viejo is the village of Tampico El Alto. It is built on a ridge of hills towards the sea, from whence it can be seen. The population is about 100. There is a feast held here annually, in celebration of an image of Christ, which is placed over the altar of the church.

The town of Panuco is situated on the right bank of the Montezuma, and is about 85 miles above Tamaulipas (by the river).

* Large bricks, in which straw is intermixed, dried in the sun.

A few years since a number of vessels loaded here with fustic; but this branch of commerce has fallen off, and vessels not being at present allowed to go up the river above the place of discharge (Tamaulipas), it has greatly declined in prosperity. Panuco is much more healthy than the city, and not nearly so much infested with mosquitos. The population in 1835 was from 700 to 800.

The River Montezuma (or Tampico, as it is sometimes called), between Tamaulipas and Panuco, has some very good ranchos (small villages) upon its banks, which produce maize and sugar-cane: and there are also a few cattle ranchos, which are well stocked. About 15 miles above the city the scenery greatly improves, and at Topala, near which are the ruins of an ancient city, it is very interesting. Above Tamaulipas about 17 miles is an establishment for making bricks, carried on by some Americans, which fully supplies the wants of the town.

Vessels drawing more than 9½ feet water find much difficulty in navigating this river, as in places it is very shallow. Very few vessels have proceeded above Panuco, and then only a few leagues. The produce of the country is generally brought down in canoes. A branch of the Montezuma runs through a district in which there is an immense bed of a very bituminous coal: it ignites easily, and when used with a small quantity of wood throws out a great heat. It is now employed by the blacksmiths in Tampico, and no doubt would answer well for steam-boats; but the great drawback is the cost of freight in bringing it down to the city, as only craft of light draught of water can pass the rapids and shallows of this branch of the river, on some of which there is at times only 12 to 15 inches water. The coal lies at and near the surface, and the expense of digging is trifling, labour there being cheap. This bed of coal was discovered some years since by Don Pedro Bertrand, on his own estate. Several barrels of it were brought to England and have been analyzed.

The Tamesi branches off to the N.W. from the Montezuma (or Panuco) immediately above the city of Tamaulipas. It unfortunately has a bar which extends across its entrance. The ranchos on this river are said to be better cultivated and of greater extent than those on the Montezuma below Panuco.

There cannot be the least doubt but that Tampico would be a flourishing port if there were a fixed government, and more energy in the native inhabitants, who are jealous of any innovations in their established customs, and look on foreigners with suspicion. Large quantities of cattle are raised both in the States of Tamaulipas and Vera Cruz, at no great distance from the port; and the exports of hides, tallow, bones, jerked-beef, as well as of cattle, might be very considerable. The sugar-cane grows to great perfection, and could be cultivated to a great extent. There

are several kinds of timber of beautiful grain for furniture, and also medicinal plants and dye-woods, which are now entirely neglected (with the exception of fustic), and most probably will remain so, until the country shall be in a more settled state, and industry protected from indirect imposts.

Laguna de Tamiagua.—The Laguna de Tamiagua is divided from the Laguna de Tampico by a neck of land, over which is the main road from Pueblo Viejo to the city of Mexico. From Tampico El Alto the road descends towards the S.E., and at about a league from it are a few houses: this is the place of embarkation on the N. shore of the Lake of Tamiagua, which is a beautiful sheet of water, and of great extent. The eastern side of the lake is divided from the Gulf of Mexico by a narrow strip of sand hills, covered mostly with low brushwood, but in many places with lofty trees; its breadth across varies from half a mile to a league. From this side of the lake and for a great distance the land on the western side of it cannot be seen, being below the horizon. Near the town of Tamiagua the lake contracts in width, and the western shore begins to appear. The water is quite fresh and clear, abounding in fish and alligators; and, during the season of the Northerners, in geese, ducks, snipes, and other game.

The vessel I commanded lay at Tampico, and there was a cargo ready for us at Tuspan; it was necessary, however, to ascertain what water there was on the bar of the latter before taking the vessel there, as she might not be able to cross it—for this purpose I left Tampico in the evening, and about midnight engaged a canoe with two men at the head of the lake of Tamiagua, to take me to Tuspan; we started with a light land breeze, but towards morning it died away to a calm.

The Island of Ramirez, which lies about half way along the lake, and about 2 leagues from the eastern shore, had a beautiful appearance as the day broke. The lofty trees with which it is covered were reflected on the lake, which appeared like a sheet of glass. The centre of the island being the highest part added to the effect; my canoe-men informed me that there are a great quantity of deer on it (and also on the other islands which are farther to the westward) and that they have often seen them swimming to and from the main land. The wind raises the sea very quickly in the lake, and canoes are often lost in crossing it if caught in a Norther, or a strong sea-breeze, both of which we experienced.

In passing along shore we saw a number of deer.

At about 7 o'clock in the morning we stopped at a rancho (being the only one between our place of embarkation and the bar of Tanquijo), where we procured a supply of milk, tortillas, and tasajo (maize cakes and jerked beef), as we were short

of supplies when we started. The person who was the owner of this rancho is also proprietor of the greatest part of the land on the eastern borders of the lake; he cultivates a small piece of ground, and raises sufficient maize, &c., for the use of his family; it is merely a cattle rancho; and he has a great number on it. The large track of land which he holds, I was informed, cost him only 1500 dollars.

Having laid in a sufficient supply of eatables, including the game we had shot as we came along the borders of the lake, we proceeded on our voyage. Towards noon a strong sea-breeze sprung up, which not only made our progress tedious (as the breeze was nearly direct against us), but in rounding some of the points of land there was a great chance of being swamped, although in general we were under the weather shore. At last we were obliged to haul the canoe on the beach in a small sandy bay in company with two other canoes, also bound to Tuspan. As the wind had hauled far to the southward and blew very strong, we made sure of having a Norther very soon; but were in hopes of getting through the lake before it came on. Towards evening the sea-breeze died away; and the next morning shortly after daybreak we arrived at the town of Tamiagua, where we stopped to rest about an hour.

The town, or rather village of Tamiagua, is situated on the western bank of the lake, at a point where a channel about a mile across discharges a portion of its waters over the bar of Tanquijo to the N.E. of the town: the bar has scarcely sufficient water on it for boats. The largest body of water runs farther S., and a part of it enters the River Tuspan about a league below the town. Tamiagua was, some years since, celebrated for the fishery carried on there, the produce of which was salted and sent into the interior, but it has since greatly declined in prosperity. The town being on low land, is very unhealthy, of which there was full evidence in the appearance of the inhabitants, who had a most squalid and wretched look; in the rainy season it must be half under water. The houses are built of adobes and in a straggling manner, close to the lake. The few shops are badly stocked, and are chiefly for the sale of spirits, with a few eatables. The number of inhabitants in 1830 could not be more than 200.

We had scarcely left Tamiagua when the Norther, with which we had been threatened, came on; fortunately it was a dry one, but it was excessively cold, and we felt this the more as the previous day and night had been sultry and hot. We ran for some time with the wind nearly right aft under our sail, which was the corner of a raw hide lashed up against a pole in midships, and reduced to its smallest size. The lake soon contracted to a narrow channel, not above a quarter of a mile across; and making a few

small bends, it sheltered us from the sea, which we should otherwise have felt severely. The general direction of this part of the channel is about S.S.E. After about an hour's run we left the main channel, and struck off more to the eastward into a very narrow passage, where there was not more than room sufficient for two canoes to pass each other, and in one part for a short distance, barely enough for ourselves; here the trees in most places hung quite over the channel, and completely sheltered us from the wind; but overhead in the upper branches the Norther whistled furiously. Having proceeded through this passage about 2 leagues, we came out on the N. side of a small lagoon, about a league across, in which the sea was breaking; and not considering it safe, we made fast under the lee of the forest, expecting the wind would moderate towards evening. We had not lain here much more than an hour when we saw a canoe push off from the weather shore not far from us, and make for the channel, on the opposite side of the lagoon; we watched her motions and expected to see her swamped; however, she got safe across, although she was a larger canoe than ours: we then determined to make the same attempt, and having secured everything from getting wet as far as we could, we set our sail (the hide doubled up to the size of a pocket-handkerchief) and shoved off, and away we went at a great rate with the wind right aft; the little canoe completely dancing on the waves; but our patron managed her beautifully, so that we scarcely shipped any water. We had to keep a sharp look-out for logs of drift-wood and shoals, of which there were several in the lake: we were not long in crossing and getting again into smooth water. The canoe-men informed me that the water in this lake was not anywhere above a couple of fathoms deep, and in most places much less. The channel we had now reached took us but little time to pass through, when we again entered another lake, much smaller than the last, and as the Norther had moderated, there was but little sea; having run through this lake and a short channel, which took us about half an hour, we entered the Tuspan River near the bar, and the same evening arrived at the town of Tuspan.

The bar of Tuspan is in lat. $21^{\circ} 2' N.$, long. $97^{\circ} 16' W.$, and is very shallow. Vessels which draw more than from 5 to 6 feet water cannot pass it, but in the river the water is much deeper. The town is situated on the N. bank of the river, about 5 miles above the bar, and is built between hills close to the river in a straggling manner; it has rather a pretty appearance when first seen, but on landing the effect in a great measure is done away with. The trade of Tuspan is inconsiderable, a branch of it is carried on by canoes with Tampico, through the Laguna de Tamiagua; but the chief trade by sea is with Cam-

peche, in small craft; vessels occasionally also come here from other parts of the republic.

The fustic produced here is of a superior quality, and equal in appearance to that of Cuba. Caoutchouc is collected in the neighbourhood, but not in large quantities; it is said to be of a very good quality. The sugar-cane, as on the River Montezuma, grows to a great height, but its cultivation is not carried on to any extent.

The scenery about Tuspan is very fine; the land on both sides of the river, which is undulating, is in general well cultivated; and from the top of the hills, which rise above the town, the country has the appearance of a garden: the river is about a third of a mile wide.

The great drawback to the place are bilious and intermittent fevers, which are said to be more prevalent than in Tampico.

Judging from the size of the town, the inhabitants could not exceed a thousand; and the greater part of these appeared to have but little energy: in almost every house the Campeche hammock was hanging up for a lounge, and in most of them more than one. A few of the houses are built of stone, and have a lime ash-floor, but the greater part of the town is built of adobes with earthen floors.

Poultry, pigs, fruit, and Indian corn are reasonable, and the river is well supplied with fish.

Approach to the River Tabasco.—The bar of Tabasco is difficult to make, the land being quite low along the coast, the Isla del Carmen included; and although the charts have on them the "Mounts of Gabriel" between the San Pedro Bar and Laguna de Terminos, there is no such elevation on this part of the coast as from that indication would be supposed. The highland of San Gabriel is in fact upwards of 60 miles inland. The wooded country between San Pedro and Point Xicalengo may be called by the Spaniards "Monte de San Gabriel," and this description would be correct, meaning thereby the Woods or Forest of St. Gabriel—the term "Monte" signifying a country covered with timber, but not an elevation.

From Laguna to the Rio San Pedro the coast runs nearly E. and W. A few miles to the eastward of the mouth of the San Pedro is the entrance of a small river, the width of which appears not to be more than 100 fathoms; there is a vigia (beacon, or sea-mark) on its eastern bank near the shore.

From the bar of Laguna to the bar of San Pedro the soundings are very irregular in several places, particularly near Point Xicalengo; and from Laguna to the eastward they are still more so. The soundings abreast of the Isla del Carmen are consequently but an indifferent guide to indicate the distance from the

land; and during the night time the water should not be shoaled to less than 10 fathoms. From San Pedro to Tabasco, and as far W. as the entrance of the Chiltepec river, the soundings are regular, with a bottom of blue mud.

On the W. side of the entrance of the San Pedro there is a vigia and a few huts. The mouth of the river appears to be from a third to half a mile across. The bar is shallow, and only passable for bongos (large canoes) of from 3 to 4 feet draught of water.

From the Rio San Pedro towards the bar of Tabasco the land trends to the S.W. The most remarkable object that can be distinguished from the general appearance of the coast in approaching the bar from the eastward are some trees on the northern part of the Great Ox island (Isla del Buey), which are higher than any others, and form a kind of bluff. This island is on the W. side of the entrance of the Tabasco river.

The small Isla del Buey lies about three-quarters of a mile to the N. of the large island. There is usually a hut and vigia fixed on it, but they have often been blown or washed down during the Northerers. Between the islands the water is quite shoal, being passable only for boats, and the channel appears to be fast filling up. As the Small Ox Island is merely a low sandbank, it cannot be seen until close in to the bar.

The distance from the bar to the entrance of the river, abreast of the eastern point, is about 2 miles.

About a mile above the entrance of the river, on the E. bank, is situated a small fort, mounting about a dozen guns, in which is a vigia, from whence all vessels that make their appearance are signalized to the town of La Frontera. Close to the fort is the pilot establishment, which consists of a few houses, and boats, with men enough to manage one boat. As vessels scarcely ever take in any part of their cargo outside the bar, launches are not required, and the pilots have only small boats.

Between the fort and the Frontera, and about a mile from the former, is an island about $1\frac{1}{2}$ mile long, which, like the country round, except where clearings have been made for the cultivation of maize, is thickly covered with trees. From its N. end a spit of mud runs out for about a mile. The channel is on its E. side, and abreast of the island it is rather less than half a mile wide. On the western shore, from a little above the Arroyo del Trapiche (which is opposite the Frontera), down inside the island, and also inside the Isla del Buey, the water is only of sufficient depth for boats.

The river abreast the fort, and also at the Frontera, is from three-quarters to a mile wide, but above it is much less.

The tide flows, at full and change, on the bar of Tabasco, at 10 A.M., with a rise of 2 feet; and there is one tide only in 24

hours. The recurrence, however, is not regular; for from the great influence of the wind on the water of the Gulf, the tides vary both in height and in time.

Vessels for the Tabasco, when they have made clearly the entrance of the river, should keep the eastern point bearing S.S.E., which is in a fair way for running over the bar; but should the wind be light, they must stand into 6 fathoms water and come to an anchor to await a pilot; and before the sea-breeze sets in sufficiently strong to carry the vessel over the bar, he will come off. The bearings for the mid-channel over the bar, in December, 1841, were the eastern point on with the centre of the island, which is in the middle of the river about a mile above the fort, the bearing S.S.E.½E.; but since that date the channel has altered a little. The leading mark in 1842 for running-in was the hut on the E. point on with the island (as above) until abreast of the Small Ox Island, from which the eastern shore had to be approached as the vessel entered farther inside. Or by running in with the extreme point of land on the eastern shore on with the high trees, which open out to the westward of the island, the bearings will be S.S.E. These high trees are opposite La Frontera.

In the season of the Northers (from September to March) there is in general 11 feet water on Tabasco bar, and sometimes more; but this depth cannot always be depended on, for if a freshet takes place (caused by heavy rains in the interior) and continues any length of time, the water shoals, by the accumulation of sandy deposit which then takes place on the bar, and which has been held in suspension in the river until it meets the waters of the Mexican Gulf. It appears at first singular that although the specific gravity of fresh water is less than salt, yet it should hold particles in suspension, which are deposited as soon as it comes in contact with the salt water, and the way that I presume this must be accounted for is, that being obstructed in its course by logs of wood (snags and sawyers, as they are called in the United States), in the narrow channel of the rivers, the water acquires a velocity which enables it to keep in suspension what would otherwise be deposited on the bottom; and that when the fresh water escapes from the narrow channel of the river, and comes in contact with the Mexican Gulf, it spreads over so large a space as to lose its carrying power, when a deposit of the heavier particles takes place, forms a bar, and fills up the deeper parts of the channel. Both the bars of Tampico and Tabasco are always without the line of the coast; and it is a well-known fact at both places, that when the river is highest, which is caused by the rains in the interior, there is less water on the bar; and when the river is lowest, the channel being then contracted in its width, the water is deepest on the bar. In December, 1842, there were only 7 feet on the bar of Ta-

basco at high water. This was shortly after the rainy season, and the northers up to that period had only been slight breezes. We succeeded in getting inside by discharging part of our ballast. Shortly after a strong Norther came on which deepened the water to $10\frac{1}{2}$ feet; but another freshet or rise took place in the river immediately after, and the bar was again filled up to $8\frac{1}{2}$ feet. It is to be observed that almost every gale from the N. has an effect on the bars of Tampico and Tabasco, and often alters the channel, particularly at the former place, and generally deepens the water, the changes depending more or less upon the strength of the gale, but the passages thus opened are liable to be again filled up, as stated above. Vessels have been detained upwards of 4 months inside the bar of Tampico in the rainy season, waiting to get out, and more than 2 at Tabasco. The last-named port has an advantage over the former, in respect to the depth of water on the bar, which is on most occasions greater; and also that, excepting in a Norther (shortly after which the sea goes down), the bar can be crossed in a small boat or common-sized skiff, in which the pilots come off to board vessels. Although the bearings of the channels for running over Tabasco bar have been mentioned, no vessel should, unless in a case of necessity, run for the river without a pilot.

The Frontera de Tabasco is built on the E. bank of the river, and is a straggling village, the houses of which are chiefly built of bamboo, having the interstices filled with mud; a few of the better sort are of adobes, and of wood brought from the United States. The church is situated in a square, about the middle of the town, and is of the same materials as the houses. No stone is to be found near the Frontera except that which has been brought as ballast. There are several shops, indifferently stocked, but sufficient for the wants of the place. There is no market, and supplies are at times difficult to be obtained. Beef, of an inferior quality, may however be had two or three times a week; and canoes often come down from the different rivers with plantains, pigs, poultry, eggs, &c. Fish, being plentiful in the river, can be purchased almost daily. The Frontera is the general stopping-place for vessels on arrival, and they have here to deliver their papers and dispatches, which are forwarded in canoe by the custom-house authorities residing here to the collector at San Juan Bautista, the capital of the state, a distance of 24 leagues; at which place also the merchants reside. The latter, as well as the logwood-cutters, have, however, agents at the Frontera.

Little fruit is produced here, except cocoa-nuts, limes, and mangoes, which are plentiful in their season. The mangoes are of an excellent quality, and very large. Vegetables are not to be had at any price.

Opposite to the Frontera is the Arroyo del Trapiche, which communicates with the river Chiltepec, and is navigable only for canoes; and about a mile and a half higher up on the right bank is the Arroyo de Paula, which is likewise shallow.

The Tabasquillo branches off from the Tabasco to the S.W. about 3 leagues above the town; and although it is very narrow, the water is deep enough for any vessel that can pass the bar to go up and load. The banks of this stream are in most places lined with lofty trees. It is preferable, from the extreme annoyance of mosquitoes, to take in cargo off its entrance (in the Tabasco) than to go up to the loading-place within it.

About a league above the Tabasquillo is the point called Los Tres Brazos, or the Three Arms, at which the rivers San Pedro el Chiquito and the Usumasinta* join the Tabasco; their general direction from their entrances is towards the S.E. The current is said to be stronger in these rivers than in the Tabasco, and the navigation not so good, there being many shoals in their different reaches. Vessels go up to load logwood, but have great difficulties to contend with. At the rancho of Inoceta, opposite to the entrance of the Pajaros river, the Palisada which empties itself into the Laguna de Terminos, branches off from the Usumasinta, leaving the latter to fall into the Tabasco at Los Tres Brazos, as before mentioned.

At 9 leagues from the Frontera the Chilapa river enters the Tabasco; and at this place is a very fine rancho. On the left bank of the latter, and about 2 leagues higher up, is the Rancho de Escobas, at which canoes bound from the Frontera to the capital (which invariably leave at from two to three in the morning) generally stop for a few hours in the first part of the night, taking care to arrive at Escobas before dark.

Two leagues above Escobas the river Chilapilla joins the Tabasco. This river, I was informed, has but few trees on its banks; and is narrow, but has sufficient water for vessels to go up and take in their cargoes. The principal place of loading is Píal, about 10 leagues above its entrance, which is 13 leagues from the Frontera. This stream is not nearly so rapid as the Tabasco, but much more so than the Chilapa. Its general direction is about S.E. to E. There are two arroyos which branch off from it to the S.W., communicating with lagoons, but they are without water in the dry season. At the entrance of the Chilapilla is a rancho, the hut being merely a few poles stuck in the earth and covered with palm-leaves, leaving the sides entirely open except on the N. Canoes occasionally stop here a few hours on their passage up the river, when there has been a breeze to assist them

* Vide the description of this river by Col. Don Juan Galindo, in vol. iii. of this Journal, p. 59

against the current ; but nothing is to be had but a few tortillas, and sometimes a few eggs, and supplies should not be depended on. Those who have to go to the capital (or any other place on the river) will do well to lay in stores for the voyage before they start.

Above the Chilapilla are several small streams, but most of them, if not all, are navigable only for canoes in the rainy season.

There are a few shoals along the banks of the river ; but the least water is said to be Acachapa, in the Torno del Diablo (the Devil's Bend), about 2 or 3 leagues below the capital.

No vessel that takes in cargo for Tabasco ought to draw more than 8 feet, as it has to be delivered from the vessel at the capital, San Juan Bautista, and is not allowed to be forwarded in small craft unless she has received injury, and there is risk of the goods being damaged.

Vessels which have to proceed up the rivers above the Tabasquillo should be provided with a few light Manilla or Coir lines, for warping, there being several reaches which will cause a great detention if not warped through ; and these materials being far preferable to rope made of hemp for that purpose, from floating easily clear of the logs, which are plentiful along the banks of the river and in shoal places.

The current in the Tabasco, as well as in the rivers branching from it, is very strong in the rainy season, or at other times when there has been a great fall of rain in the interior, and warping then is out of the question, or nearly so. In the Tabasco, with a N. wind, most of the reaches can be sailed through. The breadth of the river varies from 120 to 150 fathoms, but in some places it is less.

The capital of the state or department of Tabasco, called Villa Hermosa de San Juan Bautista, but most commonly known by the latter name only, is about 24 leagues from the Frontera, and is situated on the western or left bank of the river Tabasco. It is built on the first elevation of rock formation above the alluvial deposit. Most of the houses are of stone, constructed in a substantial manner, and have flat roofs, and many are of considerable size. As the custom-house is here, all the goods which enter the river have here to be discharged ; and for this purpose the vessels haul alongside of the river-bank, and deliver by a stage. There is not much regularity in the plan of the town ; the streets are mostly narrow, and far from clean. At the south end of it there are the remains of some houses which formed a very good square ; but most of them, during the revolutions with which Tabasco has unfortunately been visited, have suffered greatly by the shot. Through the N. end of the town runs the Arroyo de Chiltepec when the river is high or in the rainy season ; but when it is low

and there is no stream through the arroyo, the stench is enough to cause a plague; and in several places in the streets there remain pools of stagnant water, which no doubt are the chief causes of the capital being very unhealthy, although a little expense would remove the evil. The town, where it is divided by the arroyo, is connected by a wooden bridge.

San Juan Bautista is in general well supplied with provisions, such as beef (of an inferior quality), pigs, poultry, fruit, and sometimes game and fish.

The import trade of Tabasco carried on with the republic is chiefly with Campeche, and the foreign with the United States and the Havannah, with a few occasional vessels from Europe.

The exports are chiefly logwood and cocoa. The fustic, although considered of a very good quality, has been but seldom exported. The timber for the purposes of ship-building is of a superior quality, and is probably not surpassed in any other part of the world; besides which the country produces a number of woods for furniture, of beautiful grain, dye-woods, and medicinal plants, which have scarcely been considered worth the trouble of collecting for export, although used occasionally in the country.

There is no state in the republic of Mexico that has so many advantages, in a commercial point of view, as Tabasco. The soil is exceedingly fertile: it produces maize and frijoles in abundance; with excellent sugar-cane, which grows to a great size and height; and the cocoa is in great request in other parts of the republic. Coffee and the cotton-plant have also been tried, and found to answer exceedingly well. The country, too, is intersected by splendid rivers, and by means of steam-vessels the produce of the interior could be brought down with great facility to the coast for shipment. But to realise these advantages is wanted peace, the removal of obstructions to commerce, and laws better administered; which would give an impulse to enterprise, and develop the resources of the country. Unfortunately, these are the wants of all parts of the republic.*

The state of Tabasco is not considered favourable to health; and it is necessary for those who visit it to be careful in their habits, never to keep on clothing that is damp, and to avoid exposure to the sun, and sleeping in the night air. The mosquitoes of the rivers are more numerous, I believe, than in any other part of the world; and in addition (particularly near the bar), swarms of sand-flies, after dark, produce an annoyance that is at times

* Humboldt, on the authority of an intelligent traveller in 1824, states, that the Tabasco is navigable for canoes to Quichula—75 to 80 leagues above Villa Hermosa (San Juan Bautista); but that "it presents considerable danger, being enclosed for the greater part of its course between mountains, and resembling rather a torrent than a peaceful river."—*Essai Politique*, 2nd ed., in 8vo. Paris, 1827, ii. 352.

almost unbearable. During the night, on three or four occasions, we were much incommoded by flights of moths, rather larger than that of the silk-worm, and of the same colour; they passed above us in such numbers that the flight had the appearance of a heavy fall of snow, very few of them flying so high as 40 feet above the water. They all proceeded in the same direction with the land-breeze, and all which fell on our vessel appeared to be females full of eggs. As soon as they came in contact with the rigging, or fell on deck, they burst open and deposited their eggs; and those that were not killed crowded away to a corner, and soon died. On one occasion we swept up from our decks upwards of a dozen gallons of them. The smell from them was very offensive and sour, and it took three or four days before we could get clear of it.

In ascending these rivers in a canoe, for any distance, a mosquito curtain is indispensable; for when the canoe is propelled by poling (which is the case always against the stream, unless the breeze is favourable) she has to be kept close to the bushes, from whence the mosquitoes come off in clouds, leaving no means of escape but under the mosquito curtain.

The river Chilapa at its junction with the Tabasco is said by the natives to be 9 leagues from the Frontera by canoe, and in no part of this distance is there less than 3 fathoms' water; the banks in most places are clear of shoals; indeed it may be considered that there is nothing to bring a vessel up but what can be seen. It may be as well to remark that the estimated distance by canoe is oftentimes not the actual distance of one place from another on the turns of the river, but the time it requires to perform a certain distance, which will of course depend upon local circumstances, such as the strength of the current, or the difficulty of poling, &c.

As the Tabasco takes a sudden turn to the S.W. at the entrance of the Chilapa, a stranger might mistake the latter for the former; and their breadth is here nearly the same: from the mouth of the Chilapa to the entrance of Laguna del Viento, on the larboard hand going up, is about half a mile. This lagoon is very large, insomuch that, except an island or two, we could not see the land in a S.E. direction from an elevation of 12 feet. The breadth of the Chilapa is here about a quarter of a mile or less, with only a few trees on the banks of the river. Above this point the river gradually contracts in breadth. At half a league from the mouth is the entrance of the Arroyo de Jaboncillo, which in the rainy season is joined to the Laguna del Viento. This arroyo is navigable for a few leagues up, and has been taken for the Chilapa, but the Jaboncillo runs in a S.E. direction, whereas the Chilapa takes a turn to the S.W. After passing the Arroyo, the larboard or eastern shore should be kept aboard, as about a mile farther up are two branches running off from

the Chilapa to the S.W., the lower one being an arroyo and the upper one an entrance to a lagoon, into which the current sets strong. The river then makes a turn to the S.E., and from the lagoon to the Cojinicuil (about 15 leagues) there are no more branches; the current is also much retarded, and throughout the whole distance, with very few exceptions, the banks are covered with lofty trees, which, from the number of parasites that hang from the branches, particularly the moss, which falls down in long festoons as on the Mississippi, have a beautiful appearance. In going through the Chilapa, after the first league, the courses are of no service, and the topsails can only be of use where the wind is through the reaches, which are not of any length, the river making short turns.

The Chilapa in its narrowest part is not less than 20 fathoms wide, but the average is about 30 fathoms. It is very beautiful, but this soon loses its effect, as there is no change, being the same thing one day after another—the same limited view, with lofty trees, and only a solitary canoe passing now and then; besides which the progress in ascending the river in a vessel is necessarily very tedious, the greatest part of the distance having to be warped through. In the morning and evening a few birds may be seen, but for most of the day everything has the stillness of a desert, and the silence of the night is only broken by the loud croaking of the bull-frog, preceded in the evening by the chirping of innumerable insects in the woods, or previous to a Norther; by the howl of the coyote (jackal): for from the entrance of the Chilapa to within 3 leagues of the Cojinicuil, which is at the first rancho, there is not even a solitary hut. At this place several families reside, who are employed in cutting logwood in the adjacent forest, and cultivate a patch of ground in maize for their own use, but not sufficient for their consumption. The second rancho is within a league of the former, and the third is about 15 leagues from the mouth of the Chilapa, and 1 league from the Cojinicuil. These ranchos are on the left bank of the river or south side; and but few supplies can be obtained from them. At the third rancho more ground is cultivated than in the others.

The Chilapa above the Cojinicuil is a much broader stream than below it: the ranchos are frequent, and the ground is cultivated for growing maize, pumpkins, plantains, &c., and in some of them orange and banana trees are planted. Poultry, pigs, and eggs can be purchased, and sometimes fish; and the latter being plentiful in the river, can be caught early in the morning or in the evening, in abundance, near the logs of drift-wood which lie along the banks of the stream. Game is at times plentiful; and up the small rivulets there are two or three kinds of snipe, one as large as a pullet; also curlews, spoonbills, and other aquatic birds. In

the lagoons adjacent to the river, there are, in the season of the Northerners, an immense quantity of geese and ducks; but the former are very difficult to get near, and are but seldom shot.

About $1\frac{1}{2}$ league above the junction of the Cojinicuil is the Rancho de Magaña, which, being better arranged, deserves more particularly to be mentioned than the others. There are here several huts, or more properly speaking houses, built mostly of cane filled in with mud for the walls, and palm-leaf roofs larger than ordinary, situated close to the banks of the river, under the shade of some high trees. Here many families reside, who are employed in cultivating several acres of ground, in cutting logwood, and in fishing. In going up to Tepetitán in a canoe, we stopped here for an hour, and looked over the establishment. There were about thirty men, women, and children altogether, chiefly of a mixed race between the Negro and the Indian, and most of the adults, when Mexico was a Spanish colony, had been slaves; the whole of them were clean in their dress, such as it was, and so also were the houses; every thing, indeed, had the appearance of their being in circumstances far above want. At this rancho they had planted a number of cocoa-trees, the first we had seen except a few at the Frontera. We obtained a supply of excellent oranges, and they sent to the canoe a quantity of tortillas for our use. The men were at the time preparing their lines, with a great number of hooks on each, for catching fish, which they take at times in great quantities, and then salt and send for sale to the different towns. We bought a few from them, weighing several pounds each, the flavour of which was not unlike salted salmon. They take also a large quantity of *Peje Lagarto* in the neighbouring lakes, which are cured by thrusting a stake through them, and cooking them over a slow fire, which smokes them at the same time: as they are neither scaled nor cleaned, and are very tenacious of life, they are often half-cooked before they are dead. The *Peje Lagarto* is a fish with the head formed very much like that of an alligator, and which is covered with thick scales of a dirty brown colour; they are often caught of a yard or more in length, and are in great demand amongst the Indians and lower class of people. At the capital it is no unusual thing to see a dozen canoes loaded with them for sale, already cooked in the manner described.

From the entrance of the Cojinicuil to the mouth of the Chilapa the bearing is N.W. nearly, the distance (in a direct line) 26 miles, and from the Cojinicuil to the Encrucijada is about S.W. 8 miles. At this place is the head of the river Chilapilla, which takes a N.W. course, and discharges itself into the Tabasco, its whole length in a direct line being about 20 miles. No rivulets connect the Chilapa with the Chilapilla. Above the Encrucijada

the Chilapa loses its name, and is called the river Tepetitan. The current in the Chilapa in the dry season is seldom more than half a mile an hour, being much less than in any other of the main branches of the Tabasco. The Tepetitan has a stronger current; but as the Chilapilla, although not so wide a stream as the Chilapa, takes off a large body of water, the current in the latter, below the junction, is diminished.

I had occasion to go to Tepetitan, the person from whom our cargo was bought residing there; it took 21 hours to ascend the stream in a small canoe with two men, the current running down about three-quarters of a mile per hour.

The town of Tepetitan is situated on the left bank of the river of the same name, and by the stream is about 14 leagues above the mouth of the Cojinicuil (judging by the time it took to arrive there), and about 40 leagues above the Frontera.

The town is built in an irregular manner, of the usual materials (cane or bamboo, mud and adobes), stretching along the banks of the river for about half a mile. The population is from 1000 to 1200, including half-breeds and Indians; and there are but few pure whites in the place. A considerable quantity of sugarcane and maize is grown, and rum is distilled largely in the district. Of this spirit there is an immense consumption among the Indians.

Between the Encrucijada and the town, the river is nearly 100 fathoms wide, and opposite the town is fully so; and it is said to be deep enough for any vessel that can cross Tabasco bar. There was a small schooner from Campeche discharging her cargo, but it is seldom any but very small craft come up to Tepetitan.

The Tepetitan has a much finer appearance than the Chilapa or the Tabasco, below the capital. On the banks are a number of ranchos, both for rearing cattle and for cultivation, the latter of which yield all the products of the climates within the tropics, which grow with scarcely any care taken of them. The cocoa-tree is a native of the province, and it is planted on several ranchos. The fish, particularly of the larger kind, are more numerous than in the rivers below. Tortoises are also in abundance. Deer and wild hog can be purchased occasionally; also armadillos and iguanas, which, although excellent eating, are chiefly made use of by the lower class of people and Indians. Besides the game already mentioned, we often bought pheasants as large as turkeys, and Chachalacas about the size of a small fowl, neither of which can be surpassed in flavour by any other game.

In proceeding up the river we saw a number of large ring-tailed monkeys, which during the night made a loud disagreeable noise that resembled the roar of a tiger. In some of the trees from eight to ten of them were extended on the upper branches

sunning themselves. An Indian shot one on our return; the length of its body was full $2\frac{1}{2}$ feet. There are also in the woods great numbers of coyotes (a species of jackal common in all parts of Mexico), which go in packs, and, shortly before a Northern springs up, make a most horrid yell.

On arriving at Tepetitán we found Don Jose — (the person I had business with) was chief *alcalde*, and a person of much substance and influence in the place. He invited me to his house, and I was received by him and by his wife (a *Campechana*) in a very hospitable manner.

Don Jose had a very fine estate on the other side of the river opposite the town, planted with sugar-cane and maize, on which he had built several small houses and stores, which formed a village that had a very decent appearance; and near to it he had a distillery and also a carpenter's shop, &c., for keeping his canoes and craft in repair. He informed me that altogether he had upwards of 500 men, women, and children, on his estates, nearly all of whom, except the children, were in his debt, more or less, and were looked upon as so much property—being slaves, without the name. I was informed that, though severe with those who misbehaved, he was a good master: and while we were taking in the cargo we had opportunities of seeing that this was the case.

While at Tepetitán, Don Jose proposed a visit to the ruins of Palenque. He said it would take 12 hours to arrive in his bongo at the place at which we should have to land, where he would have horses ready to go on, and in 6 hours, with moderate riding, we should arrive at the ruins. I was sorry to be obliged to decline the invitation, it having been previously arranged that my vessel should go up the Cojinicuil and load at the Tumbadero. As the bongo was large and well fitted up with a cabin in the after-end, and had also a cabouse, &c., it would no doubt have been a pleasant trip.

I remained at Tepetitán two days, and then returned to the vessel, which lay at anchor in the Chilapa, opposite the mouth of the Cojinicuil.

In ascending this river, the direction for the first 2 leagues is easterly, after which it becomes N.E.; it is very narrow throughout. About 2 leagues from its mouth is a small stream called the Arroyo de Palencio, which comes in from the S., and has only sufficient water for small canoes in the rainy season. About a league higher up is El Pozo Grande, where, after making a short turn to the N.W., the direction again becomes N.E., leaving a deep bend, in which the depth of water is diminished; the river here is about double its usual width, and is broad enough to allow a vessel to turn, which is not practicable in any other part, excepting near the Tumbadero, and there we had barely room to

swing bows down, the river being only about 15 fathoms wide. Two leagues above the Pozo Grande, and 1 league from the Tumbadero, the Arroyo de Jaboncillo branches off from the Cojinicuil; it is for about half a league down not more than 10 fathoms wide, and in the dry season is quite shallow. This Arroyo enters the Chilapa, as has been already mentioned, near the entrance of the Laguna del Viento.

The banks of the Cojinicuil to within a mile of the Arroyo de Jaboncillo, are covered for some distance back with lofty trees, between which there grows a thicket of creeping plants and underwood, so interwoven that it is impossible to pass through, excepting where a path has been made by cattle or by deer, and such is the general feature of the country to some distance from the coast. In ascending the Cojinicuil we had in many places to cut away the branches of trees that hung across the stream, and did not leave us room to pass. The river being so narrow, and the turns frequent, the sails were of no utility; and besides the height of the trees kept the wind off so much, that for the most part the vessel was becalmed. To the S. and E. from the banks of the river (the last 3 leagues) the forest of the coast appears to terminate, and is succeeded by low prairie and marshy land, interspersed with lagoons and streams of water. There are no ranchos on this river, nor does it appear that there has ever been a clearing for the purpose of cultivation, the trees and bushes growing close down to the water's edge; there are indeed but few places where a landing can be made, except where tracks have been made by the cattle and the alligators, which last are very numerous.

At the Tumbadero there is only a shed for the logwood, brought down and deposited here by the small craft, and a hut for an Indian and his family, who remain here in charge of it; it is a most miserable place, there being no possibility of walking more than 50 yards from it, and the only advantage it possesses is, that of enjoying the full benefit of the sea-breeze, there being few or hardly any trees from N.E. to S.E. and S.W.

In the Cojinicuil there is but a slight current, which in general changes morning and evening; its strength when at the greatest (in the dry season) is not quite half a mile per hour, against which we towed with two boats quite fast; there is also a rise and fall of about 3 inches. It appears likely, that when it is high water at one end, it may be low water at the other: the land and sea-breezes being no doubt the cause, acting on the Chicati and other rivers.

About 60 fathoms above the Tumbadero, the river Chicati and the Cojinicuil separate from the Arroyo de Meluco; this Arroyo, which flows through a large savannah, brings down from the great logwood district an immense quantity of logwood, which is ex-

ported from Tabasco. In the rainy season there is sufficient water for the bongos and other craft, some of which carry upwards of 1000 quintals, to load above and proceed to the Frontera without lightening; but in the dry season they have to discharge into small canoes, at about a league above the Tumbadero, at which place it is either shipped in vessels loading there or forwarded in craft to the Frontera. There is in the Cojinicuil not less than 15 feet, with the exception of a shoal about 30 fathoms above El Pozo Grande, over which there is 10 feet. This shoal is formed by a few trees, which will soon be destroyed by the worms in the river.

The Chicati, which is a continuation of the Arroyo de Meluco, receives most of the water that is brought by it, and is said to join the Usumasinta about 6 leagues down. In the dry season its current was about 2 miles per hour. At the fork of the river it is about 60 fathoms wide, and at a short distance from the Arroyo de Meluco the water is at least 15 feet deep, and continues so for some miles down. For this distance there are here and there on the banks of the river a few trees.

The Arroyo de Meluco joins the river Tepetitán about 3 leagues above the town of the same name; and S.S.E., 6 leagues from the Tumbadero, it enters the logwood forest. In this part of its course it winds through low savannahs, interspersed with many small lagoons, that in the rainy season are overflowed. The country in a S.E. and easterly direction appears to be of the same character for several leagues, with scarcely any trees, up to the margin of the forest.

The general character of most rivers within the tropics on the American continent, where the land in the vicinity is low and formed by alluvial deposit, is, that near all points the water is shoal, and the bends of the river opposite, deep in proportion; and if in a reach that continues for any distance, it happens that the banks are covered with timber, the deepest water will then in general be found at the side on which the high trees grow close down to the river; the exceptions being, that where drift-wood accumulates, it forms a bank of mud or sand around it, and diverts the course of the stream.

The greatest part of the logwood is cut and piled in the dry season, particularly that which is near the coast. As soon as the rivers rise in the rainy season, the land becomes intersected by a number of small streams, and the wood is removed in small canoes to a cleared and more elevated place, where it is then cleaned of the bark, and from thence removed in larger craft.

The logwood cutters are mostly paid by the job, and can earn from a dollar to a dollar and a half per day—two days' pay being sufficient to keep a family for more than a week.

The greatest part of the logwood, however, is cut, and the land cultivated, by people who are in a state of modified slavery; and women are to be had as domestics under the same system, both in the state of Tabasco and Oaxaca; and it exists in other parts of the Republic. It happens in this manner—when a person is employed that is clear of debt, the first object is to obtain as much money and goods as they can from their employer; which they will take up, if allowed, often to an extravagant amount; and instead of endeavouring to pay their debt they in general get further into it. As the laws of Mexico compel the debtor to work out the debt, the party becomes bound to his employer; and it often happens, if either the man or woman are good hands at work, that they are induced to involve themselves so far as to have no power of clearing off their account for a length of time, or perhaps for ever: by this means their services are secured, and they are likewise compelled to work at the general rate of wages; should either party, however, be desirous of parting, the employer gives a paper stating the amount that is due; and with this the servant looks for another master, who has to take up the bill, and by paying it the servant becomes, until it is discharged, that person's property. If a man thus circumstanced leaves his employer and works for another without permission, he is liable to be punished by the *alcalde's* orders; and he may complain to the same authority against his master for ill treatment. And it is often the case that their value for service is represented by the amount of the debt. It is not unusual for a woman to be in debt from 200 to 300 dollars, and a man from 400 to 500, and sometimes much more. Employment being plentiful and food cheap, they could keep out of debt if they chose; and they occasionally work hard, but it is only by fits and starts: and there is a great want of habits of industry and economy among them.

VI.—*A Description of the Island of St. Mary (Azores).*

By CAREW HUNT, Esq., H. M.'s Consul for the Azores.

THE Azores, or Western Isles, consist of nine islands, which occupy an irregular line, at unequal distances, stretching from the intersection of 37° N. with 25° W. (the situation of St. Mary's) in a W.N.W. $\frac{1}{2}$ W. direction, to the intersection of 39 $\frac{1}{2}$ ° and 31° the situation of Flores. The distance between these two points is about 400 geographical miles.

The names of the islands, following them from E. to W., are St. Mary's, St. Michael's, Terceira, Graciosa, St. George's, Pico, Fayal, Flores, and Corvo: the two first and the two last being

separated by about 100 miles from the others, which form the central group of the Archipelago. Their aggregate area has been variously estimated by different authorities; but taking the trigonometrical measurement of the outlines laid down in Laurie's last chart of the Azores as a guide, the account of the Portuguese engineers may be considered correct, and the whole be stated at about 700 square miles. A more accurate statement may, perhaps, be given when the survey, which has been commenced by our Government, under the command of Captain Alexander Vidal, R.N., has been completed.*

The aspect of all the islands is very similar in general characteristics, presenting an elevated and undulating outline, with little or no table land; and rising into peaks, of which the lowest (that of St. Mary's) is nearly 2000 feet, and the highest (that of Pico) nearly 8000 feet above the level of the sea.† Their lines of sea-coast are, with few exceptions, high and precipitous, with bases of accumulated masses of fallen rock; in which open bays, or scarcely more enclosed inlets, form the harbours of the trading towns. Their surface is irregular like their outline; an ascent leading from the sea to the central ridge, broken into successive acclivities by the manner in which the ejected volcanic matter has been deposited; and the communication between two such lines of ascent being frequently interrupted by the occurrence of deep ravines, cut by the rains of winter through the yielding soil.

The first discoverers of the Azores admirably mention in their histories their densely wooded state, and the great size of the trees and shrubs. This is no longer a true picture. Great havoc was made by the discoverers themselves in burning down extensive tracts, as an easy mode of clearing the land; volcanic eruptions must have overwhelmed much of the remainder; and the demands of an increasing population probably completed the destruction of what these two causes had spared. Forests there are now none: small and young plantations, the property of private individuals, and occasional wilds of heath and shrubs, with orange gardens and a few straggling rows of poplars, make up the present phase of the "densely-wooded Azores." Some of the masses of lignite found in the ravines, where they protrude from the high side walls of pumice, tufa, and scorix, in which they are embedded, show to what a size the present species of myrica, cedar, myrtle, and *Erica arborea* once attained; trunks of the two first being found of 3 feet diameter, and of the last more than 12 inches, presenting their peculiar marks of growth, and being easily recognised in their state of lignite.

* This excellent survey has been completed since the present paper was written.—Ed.

† The exact height of Pico Alto at St. Mary's is 1889 feet, and that of the Peak of Pico 7613 feet, both measured barometrically by Capt. Vidal.

It will be seen in the separate accounts of the islands* that there is little that is striking in their natural history, except, perhaps, the apparent inconsistency of its classes, in their geographical relation to each other. The animals and birds, few in number, are those of Britain; the fishes of a mixed British and West Indian character; the insects and plants partly British, partly peninsular (Spanish and Portuguese); but in no class are there types which exclusively ally this archipelago with either southern or medio-European localities.

The climate is particularly temperate and equable, the extremes of sensible heat and cold being however increased by the degree of humidity present in the atmosphere. The range of the thermometer is from 45° Fahrenheit, the lowest known extreme, or 48°, the ordinary lowest extreme of January, to 82°, the ordinary, or 86°, the highest known extreme of July, and near the level of the sea. Between these two points (both taken in the shade) there is, from month to month, a pretty regular gradation of increase or decrease, amounting to somewhat less than four degrees. Of other points in the meteorology of the Azores an account will be found under the heads of some of the particular islands; the separate description of which commences with the following account of St. Mary's.

St. Mary's.—The island of St. Mary is about 7 miles in its greatest, and 5 miles in its smallest diameter, and contains an area of 36 square miles, or about 27,000 English acres. It has nearly in the centre the double-peaked mountain of Pico Alto, 1889 feet in height, which falls on the E. and W. sides to a shelving base of about a mile in breadth, and 850 feet above the sea. To the N. and S. it throws out a range of undulating heights, which terminate at the sea in lofty mural cliffs of more than 200 feet in elevation. The E. side of this range is covered with hills, diminishing in altitude as they recede from the centre, and intersected by numerous gorges of increasing width and depth, the channels by which the heavy rains of winter reach their points of discharge. The W. side is a slightly inclining and undulating plain, also cut by ravines, terminating in cliffs more than 100 feet high. The aspect of St. Mary's is therefore on all sides perfectly bold; the central peak distinct, the subordinate range high and of varied outline, and the coast abrupt, precipitous, and based by the usual accumulation of fallen masses.

The surface on the W. side is much overlaid with stones, and bears a spare vegetation of the grasses and weeds of argillaceous soils; the central range is covered with the common heath, myrtle, and arbutus of the Azores, and the E. side is occupied for the

* Mr. Hunt kindly promised to communicate to the Geographical Society accounts of the other principal islands of the group, and has since sent home a description of St. Michael's.—ED.

most part with the agricultural produce of the island. Of trees there are a few in small plantations, and there is an increasing inclination to extend the culture of the orange; but the shrubs of the mountains, which now contribute most to the wooded appearance of the surface, are fast disappearing under the axes of the fuel-cutters, and the demand for land suited to the cultivation of corn.

In its geology St. Mary's is not like the other islands, where the surface is of recent volcanic matter which conceals whatever may have been their original constitution, or the progress of their growth. It is of trap formation, and contains in its beds of marine shells proofs of its elevation from the sea. It is necessary to observe with respect to its exceptive nature, that the basalt, columnar and massive, which appears as its base, is also found in a narrow locality at St. Michael's, and gives reason to suppose that the two islands may have a mutual origin. There is also an exact identity in the older porphyry or porphyritic lava of St. Michael's and that which has formed the mountain of Pico Alto; while the decomposed syenite described lower down, as found at the latter place, closely resembles some of the ejected masses of that island.

Count Vargas de Bedemar, a Swedish naturalist, who published an account of the Azores in 1837, is of opinion that St. Mary's is a fragment of Madeira. There is certainly a resemblance in the predominance of pectinal shells in their marine deposits; but the former has no beds of helices or other terrestrial shells, nor does its calcareous matrix, which is of much harder consistence than that of Madeira, enclose any vegetable remains. On the other hand, there is a great similarity in these respects between St. Mary's and Sicily (a circumstance which deserves further investigation), whose testaceous remains include all the species which have been recognised here.

The lowest bed, which is of somewhat different elevation at the E. and W. sides, is a blackish basalt, glittering with minute crystals of iridescent olivine. It is in most parts massive and compact; but on the S. shore occurs in contorted and irregular columns, and, in a small division to the eastward of Villa do Porto, in a distinctly prismatic form. In the last locality the columns rise to a nearly even height above the field in which they appear, inclining towards the N. at an angle of about 30°. It would seem that they had originally a level upper surface, and that they were thrown into their present position with the same general shift which takes place in the partial upset of a loose pack of cards.

In more than one part of the base are dikes of a harder and lighter-coloured basalt, varying in thickness from 2 to 5 feet, which, however, have not divided the overlying strata.* A fur-

* A dike crosses the bay of Villa do Porto, running from S.W. to N.E., in the direction of the Beacon Hill, with which it may possibly be connected.

ther change was effected by the creation of new and extensively ramified fissures in the base, and the injection of a fused calcareous substance, which has taken the semi-crystalline texture, and has much the colour of the Lisbon limestone. These veins are less abundant on the W. than on the E. side, from which they are doubtless continued to the N.E.; the Formigas rocks, at a distance of 20 miles, being equally full of them.

The character of the lower bed having been described, the relative position of the others will be better pointed out in the following Table, and by a reference to the accompanying map.

Letters of Reference.	SECOND BED.	UPPER BED.	SURFACE.
A.	A blackish porphyritic amygdaloid, passing into coarse red wacke—the amygdaloid possessing but a small proportion of carbonate of lime; the wacke abounding in augite and imperfectly crystallised hornblende.		A strong greyish argillaceous soil, mixed and covered with small decomposing basaltic pellets, which display a concentric laminated structure.
B.	A scarcely penetrable concrete of marine shells of the Tertiary period, so firmly imbedded in a granular semi-calcareous cement as in no case to come out entire. The species recognised are as follows:— <i>Pecten jacobaeus</i> — <i>Tornatella fasciata</i> — <i>Turbo rugosus</i> — <i>a natica?</i> <i>a cytherea?</i> and <i>a turritella?</i> Rounded nodules of the preceding amygdaloid are found imbedded in this concrete; probably derived from its surface, and a proof of its existence below.		The same.
C.	The columnar basalt (pyramatic near D) before described. It is uncertain whether it is a part of the base or a more recent bed.	A new porphyritic amygdaloid, containing perhaps 50 per cent. in nodules of carbonate of lime.	The soil the same as before; but having loose masses of cellular amygdaloid not porphyritic—the cellules encrusted with zeolites and other trappan minerals.
D.	The new porphyritic amygdaloid appears, here and there, to have forced itself between the base and the shell-bed.	A confused concrete of sand, shells (of the species described), and a fine-grained tufa, with horizontal layers of carbonate of lime. The shells very brittle.	The same.
E.	The same as at A.	The porphyry of Pico Alto.	A friable scoriaceous soil, coloured deep red by iron, and very barren.
F.	The only discoverable bed above the base in this division is that of Pico Alto; composed of a light brown porphyry, the base trachytic, and containing crystals of dark red and glassy felspar.		A fertile argillaceous soil, occasionally strewed with loose masses of basalt.

These data render it probable that the beds of the island lie in the successive order displayed in the section subjoined to the map. And it would appear, with respect to the course of changes, that

the fundamental bed of basalt, when forming the bottom of the sea, was not level, but ascended to the eastward, as if it had flowed from that direction; that a submarine eruption produced the second beds of amygdaloid and wackè, and that to this succeeded a deposition of marine shells. From the partial fusion of these may have been derived the calcareous veins now found in the basalt, and from a mixture of the fused matter with sand, the cement which now so firmly holds the shells together. The elevation of the whole, and the formation of the porphyritic mass in the centre, perhaps concluded the series of operations; which of the two last had precedence, there might perhaps be found positive indications to prove. There are no marks of marginal erosion by water, which would have been left if the appearance of the higher parts of the island had long preceded that of the lower. If the rounded nodules of amygdaloid, now embedded in the shell limestone in great numbers, and larger pebbles found in other localities, are to be regarded as proofs of marginal water-wearing, it would appear that the island has been subjected to an alternation of elevation and re-immersion in water of great depth and consequent pressure.

Near the base of Pico Alto, by the side of the road leading from the tower to Saint Lorenzo, is a high bank of soft composition, which, at a few feet distance, much resembles syenite. It is possible that this may be the decomposed remains of a syenitic dike, and that Pico Alto was not without its eruptive disturbance before it issued from deep water. Some of the ejected *débris* of the quiescent volcanoes at St. Michael's exactly resemble the substance of this bank, except that they have lost little of their original hardness and consistence. The dikes which have been left after the later of the operations described might perhaps be discovered in a boat; but the height of the perpendicular cliffs renders the search by land equally dangerous and uncertain.

The large masses, which now appear as small islands off different parts of St. Mary's, form a striking feature in its geology; presenting as they do proofs of the immense force by which they were detached. The largest, to the westward, appears to have sunk on one side; while another on the eastward, which contains a cave full of stalactite, would seem to be a fragment fallen from the semi-circular and crater-like excavation at G.

On the N. and E. sides and near the S.E. angle are copious springs of excellent water; in the other parts of the island there are none of any volume, and the inhabitants of the town suffer great privations in summer in consequence. The largest springs are found at H. and L., where they are of sufficient power to turn a common overshot mill-wheel, and prove, by their undiminished

flow in summer, that they are the regular discharges of large subterraneous reservoirs. In the heavy rains of winter the ravines all over the island carry off torrents of water; leaving, however, sufficient to percolate through the higher strata to keep the regular springs open all the year round. At Villa do Porto a ravine has been cut out about 80 feet in depth, the water escaping by a similar cavity in the dike which leads to the Beacon Hill.

The simple minerals are not numerous, but they are in general excellent examples of their species. The augite of Villa do Porto occurs in splendid and well-formed crystals, many of them more than three quarters of an inch in diameter. To the eastward small but well-defined crystals of analcime and sarcolite are found in the cellular amygdaloid; on the sea-shore E. of Point Malbusco are beautiful specimens of stilbite; while on the northern side and near Saint Lorenzo there is an abundance of large mesotype, thomsonite, and arragonite, but, unfortunately, so firmly retained by a hard matrix that the specimens extracted are seldom satisfactory. Near the parish-church of Santo Espirito subterraneous deposits of a soft ochrey earth are explored by the native masons for use in making cement; and the sea-sand abounds in grains of specular and octahedral iron.

The plants do not differ from those of the other islands, of which a list will be given under the head of St. Michael's; but the number of aloes in flower (exotics), and prickly-pear cactus in fruit during many months of the year, give to St. Mary's at first sight a more tranquil appearance. *Rocella tinctoria* grows to a larger size here; while of the *Algæ*, *largussum vulgare* and *vacciferum*, so abundant at Flores, appear to be unknown, and *Zonaria pavonia* grows in greater luxuriance. Is it Humboldt who mentions that various arborescent ferns of great size are found here? None exist at present.

No proper account of the climate can be given, as no one has either a barometer or a thermometer. The larger springs of water have at their points of discharge an uniform temperature of 68°, which would prove that the mean annual heat is not much greater here than in the other islands. It is said that less rain falls than at St. Michael's, for which the proximity of that island and the greater height of its mountains (4000 feet) may be a sufficient cause.

The population was taken by census in 1840, when the total number was 4666 souls, living in 1081 houses. About one-half this number of houses forms the small town of Villa do Porto and the hamlets of Santo Espirito and Santa Barbara, the remainder consisting of single dwellings built on the farms cultivated by their respective occupiers. A further reference to the official returns

shows the people to be chiefly engaged in agriculture. Of the whole number there were—

	Males.	Females.
Under seven years of age . . .	494	472
Above " " " . . .	1719	1981
<hr/>		
Proprietor farmers and their families . . .	59	64
Non-proprietor ditto " " . . .	369	406
Agricultural labourers " " . . .	954	1108
<hr/>		
Making a total of	1382	1578
	<hr/>	
	2950	

The predominance in the number of females over males, which, it is to be observed, is confined to the ages above seven years, is to be attributed to the annual emigration of agricultural labourers of the latter sex.

There were in the year preceding the census, 195 births, 29 marriages, and 173? (the official number 73 must be an error) deaths. At this rate population should be increasing; but the contrary is stated to be the fact. The author of Boid's Account of the Azores (published in London in 1837, but written about 1832) states, without giving his authority, that the population of St. Mary's was then 5500 souls, and that it had decreased very much during the preceding twenty years. It is difficult to ascertain the truth of this, as the census was formerly much neglected in these islands, and the authorities being opposed to the emigration of the inhabitants, it is carried on in a great measure clandestinely. The proportion of births to marriages would show that there is a pretty equal number of the former legitimate and illegitimate.

The people are generally well-formed and active, and their complexion and cast of features partake more of a northern character than is generally seen in the Portuguese. The men are of good height and muscular, although frequently exposed to scarcity of food. In their manners they are mild and engaging, ready to lend each other services or provisions, and scrupulously exact in salutations, to which they give greater apparent cordiality than is observed in the neighbouring island. They are of grave temperament, and disinclined to popular sports and amusements, owing probably to the constant and sensible difficulties of their existence, and the ever-present reflection that they are, in their own words, "very poor." Yet, superficially, there are no indications of this poverty: their dress is whole and cleanly, and their houses are well kept, both inside and outside, and in good

repair. The cheapness of lime, pottery, and tiles enables them, at a trifling cost, to provide themselves with a sufficient stock of necessary household utensils, as well as to preserve the roofs and plaster of their houses. Indeed, there is perhaps no country of the same resources where the external appearance of the houses lends a more cheerful air to the landscape, or shows more outward signs of prosperity and generally diffused wealth.

Their language shows the effect of their insular situation in a number of local terms not understood elsewhere. They are also distinguished by a peculiar plaintive pitch of voice in speaking, which is more strongly perceptible when they are excited or angry.

Judging from the opinions expressed by the people as to the state of public morality at St. Michael's, it would seem that vice is not prevalent in their character. Nor do the annals of the island exhibit any recent examples of grave crimes, or any great amount of minor offences. The prison of the place, intended for the confinement alike of debtors and offenders, is seldom tenanted. Such an apparent result might arise from other causes than a high state of morality in the people; but those causes would be known, and if they comprehended neglect of their duties by the authorities, the general complaints would be too distinct not to be well known. Will not this be considered an unusual state of things, when it is added that St. Mary's is made, by the judicial authorities of the other islands, a kind of penal settlement for the transportation of minor offenders?

The dress of the men is a coarse woollen or linen jacket, waist-coat, and trowsers, of domestic or British manufactured materials; the feet are bare; the hair cut; and the head covered with a carapuça. The carapuça is a close skull-cap, with a very large front, useful in shading the eyes from the sun, and a back curtain which falls on the shoulders, while it is brought round to the front and fastened under the chin. The dress of the women is of the same materials, closely covering the person; the feet are bare; the hair braided and plaited down the back; the head-dress the same as that of the men, but sometimes exchanged for a plain white handkerchief.

The schools of public education established by government (at the expense of the local funds) are not attended by more than fifty-two pupils, all males; nor is there any growing disposition to increase this number. The course of education does not comprehend more than the rudiments of reading and writing, and after making a little progress in these branches, the boys are removed, in order that they may enter upon those occupations by which they may earn their subsistence. A few, the children of persons in better circumstances, complete this rudimentary course.

The religious duties of the people are, as to externals, fulfilled with great exactitude and regularity, and more personal respect is paid by them to their clergy than is observed in the neighbouring island. They are, however, aware that this body, in receiving salaries, small though they be, from government, no longer depend exclusively on their parishioners for support; and they therefore contribute few voluntary offerings to increase the pittance paid to the clergy.*

The people do not appear to be subject to severe internal diseases; but some of an external eruptive character are both widely spread and aggravated. As a consequence perhaps of their poor diet, the summer no sooner sets in than the itch becomes almost universal, exciting no remark, and causing no feeling of disgrace. The local pharmacopeia, which is composed chiefly of herbs, is insufficient to check its progress; and the only cure expected is the return of winter, with its specific of colder weather.

In investigating the occupations of the inhabitants, nothing is more striking than the tenure by which the agricultural portion generally hold their land. The farmer is a tenant-at-will, paying to the landlord in the nature of rent, after deduction of tithe from the whole, *one-half* of the produce in kind. An average rent of between five and ten bushels of wheat per acre (the wheat selling for about 6s. the bushel) is sometimes paid; but the average of production being no more than fifteen bushels per acre, the tenant, in common years, gains nothing by this commutation, and is a decided loser in times of scarcity. The old system of a partitive rent naturally finds support from long-established custom, and the cases in which rateable rents are paid must be viewed in the light of individual experiments. Such a mode of tenure is obviously ruinous to the cultivator, while it enhances the income of the proprietor, and gives him a despotic influence over his tenantry. If the numbers of the population have decreased, and still continue to decrease by emigration, the radical cause will be found in this tenure of land; for while the peasant of St. Mary's can earn a comfortable subsistence at St. Michael's, or become wealthy in the Brazils, he is not likely, with the knowledge of those results of emigration, to prefer an existence bordering on starvation in his own island.

The whole quantity of agricultural produce is comprised in 2500 quarters of wheat, 2500 quarters of Indian corn, 200 boxes of oranges, and a small quantity of wine, potatoes, beans, and other articles not registered. About half the wheat and all the oranges are exported; the remaining provisions are consumed on the

* The superior priest receives 40*l.* a-year, the inferior priests 30*l.*, and the curates 20*l.* a-year each.

island. To the growth of this produce is appropriated one-sixth of the whole area; the remainder is sterile. Of the western plain the greater part is fit only for pasturage, the rest being either barren mountain-land or underwood. There are about 2800 head of horned cattle, 2000 sheep, 1200 pigs, 600 goats, and 100 horses and asses. For these the grass and other fodder of the island do not afford a sufficient supply of food; and they are therefore fed in winter on the bruised leaves of the aloes, which are cultivated for the purpose on the stony ground and the otherwise unprofitable sides of the ravines.

The land communications are extensive, and in dry weather excellent; the nearly exclusive use of ox-carts for transporting produce maintaining a good width, and the firm consistence of the soil giving them a resisting and durable foundation. The island is on all sides easy of defence against external attack, the various landing-places being close to and commanded by high positions, and without cover for a disembarking force. The artificial defences are at present insufficient in number and in bad repair, and the number of landing-places would render a large force necessary for the repelling of invasion; as may be seen on reference to the map, on which they are marked with an anchor.

The best internal positions are those on the eastern side, except that any attempt to cross the deep ravines of the western in the face of an effective enemy, would be very disastrous. The deepest of these lies close to the town, and would be easily defended under cover of the houses; while in turning it, a force would be commanded by the adjacent Beacon Hill to the eastward. There are several disused convents and other large buildings in good repair, which would serve as good and easily-defended quarters for an occupying force, and the surplus production of corn and cattle would give for their use an abundant first supply of provisions. On the whole subject, however, the best information could be given by Captain Vidal, whose name has already been mentioned, and whose profession and experience in surveying would render him a high authority on a question of this nature.

VII.—*A Description of the Island of St. Michael (Azores).*

By Mr. Consul CAREW HUNT.

1. THIS island, as delineated in the accompanying map, lies between the 25th and 26th meridians of W. long., a little S. of the 38th parallel of N. lat., describing a curved figure of pretty regular breadth as a whole, and occupying an area of 224 square miles. The chief town, Ponta Delgada, is at the W. side of a

wide bay on the S. coast, situated, according to the latest published charts, in lat. $37^{\circ} 45'$ N. and $25^{\circ} 35'$ W. long.

There is considerable variety in the aspect as the island is passed from E. to W. The E. end rises from a bluff sea-cliff of between 1200 and 1400 feet elevation to a lofty inland peak, from which a central range, varying in height between 2000 and 2500 feet, runs to the westward, terminating in the Serra da Agoa de Pao, 3060 above the sea. The sea-coast gradually declines in approaching the last point, where it is not more than about 100 feet high. The part next seen is lower, and its outline, as presented by the summits of numerous volcanic monticules of about 1300 feet elevation, united in a central ridge more undulating; the western extremity being marked by the conspicuous Serra Gorda, 1574 feet above the sea:* its shores on both sides are low, broken, and rocky. Of the remaining part the aspect is that of a vast truncated cone, irregularly cut off at an elevation of about 1800 feet, and falling on the N., W., and S. sides to a perpendicular coast of between 300 and 800 feet high. The outline is varied by the intervention of peaks, thrown up on the summit and flanks, and round the foot of the mountain.

In the higher parts the surface is generally covered with an undergrowth of heaths, cedar, laurel, laurestinus, and other evergreen shrubs, which give the mountains an exceedingly rich and wooded appearance, notwithstanding the inroads of cultivation and the more destructive demand for fuel. Like all volcanic countries, the face of the island is uneven and irregular, being deeply excavated by numerous ravines, and roughened by streams of semi-vitrified and scoriaceous lava that resist all atmospheric influences and repel vegetation. Heavy rains falling on the mountains afford a constant supply of water to 4 lakes at the bottom of extinct craters or subsidences, and a number of minor reservoirs, and through them to small streams rapidly running down on all sides into the sea.

The geological formation of St. Michael is volcanic, on a base in some parts of a whitish grey trachyte, in others basalt. The beds of lava lying between this and the surface are neither numerous nor thick, the height of the island being chiefly due to the accumulation of tufaceous and other softer depositions. Of the 7 or 8 successive beds, only parts of the uppermost have been formed since the discovery of the island, the others being of an unknown antiquity. Local historians have not been wanting, even in the earliest times, to record the various phenomena affecting the

* The ascertained measurements in this paper were obtained through the kindness of Captain Vidal, of Her Majesty's steam ship *Styx*, when that officer was surveying the island in 1844.

geological character of the island, which may be given in the following chronological order:—

A.D. 1445. It is stated that when the island was first discovered, it rose at the E. and W. ends into peaks of equal altitude; but the discoverers then leaving it and returning in the next year, were witnesses of a volcanic eruption that enveloped the W. end, when the peak had lost one-third of its height, presenting a broken line of truncation instead of its former cone. The scene of this change is the so-called valley of the Sette Cidades, a plain occupied partly by two lakes, partly by small hills, of pumice and scorix, 884 feet above the level of the sea, and surrounded by a ridge with peaks of between 1880 and 2810 feet elevation. The division marked A in the map was covered by this eruption and its showers of dust and stones.

A.D. 1522. In the month of October of this year, the town of Villa Franca on the S. coast was destroyed by the fall of two considerable hills from their foundations, during the prevalence of an earthquake.

A.D. 1538. At the latter end of this year a large islet, three miles in diameter, was thrown up in the sea N.W. of Mosteyros; but, being formed of loose matter, it soon disappeared, nor can any trace of it now be discovered. The ejection of islets of this kind has been a common event in the Azores, and many formed of firmer materials still exist to show their usual shape and character. Among them are, an island off Villa Franca, part of one joined to the land and forming a small bluff point at Rosto de Caen, a point N. of Mosteyros, and the moros or bluffs of Capellas and Ribeira Grande.

A.D. 1563. Between the 25th of June and the 7th of July a number of successive streams of lava issued from the sides of Monte Volcam, now known as the Serra da Agoa de Pao; and, on the latter date, the peak of the mountain sunk, as that of the W. end is said to have done in 1445, and left in its place a deep valley nearly 2 miles long and 1 broad, now chiefly occupied by a lake whose surface is 1634 feet above the sea. The lavas of this eruption cover the western points of the mountain, extend to the N.W. as far as Rabo de Peixe (where a solitary and prominent bluff marks their meeting with the sea), and on the N. to Ribeira Grande. The first appearance of the Furnas hot-springs has been attributed to this convulsion; but no account exists as to those of the Caldeiras, at the northern foot of the mountain.

A.D. 1591. Several severe shocks of earthquake occurred between the 26th of July and the 12th of August, when Villa Franca, after having been rebuilt to the westward of its former site, was again destroyed, and the sea broke high over the valley

of Povoação on the S.E. coast, and washed away a great part of the village.

A.D. 1630. On the 2nd of September an explosion took place near the lake of the Furnas, unaccompanied by lava, when the neighbouring mountains were thickly covered with pumice and scoriæ, and the lighter particles carried to Terceira, a distance of 90 miles. A circular hill of regular figure was formed on the spot, in the centre of a plain surrounded by a low ridge, to which the name of "Lagoa Secca" has been given.

A.D. 1652. On the 10th of October an eruption of lava broke out from the sides of the quiescent Pico do Fogo, on the N.E. of Rosto de Cao, forming the rocky slope over the sea-coast and some narrow tracts towards the N. shore. This was followed on the 19th by an eruption from a neighbouring hill, which took the same courses.

A.D. 1707. A torrent, attributed to the breaking of a water-spout, suddenly flowed through Ponta Delgada in the month of November, and caused great damage.

A.D. 1720. A succession of violent shocks of earthquakes injured the towns and villages, and shook down large portions of rock from the shores and inland precipices; where indeed there are numerous traces of catastrophes of this nature. A torrent ran down the sides of the Sette Cidades mountains and cut out a deep ravine near Mosteyros in its passage to the sea.

A.D. 1744. On the 5th of October a similar fall of water took place at the E. end, washing down the valleys of Povoação and Fayal da Leira, and carrying away great parts of the two villages. The cause of such floods, even now not unknown in the Azores, has not been explained, nor has any record been left of the duration of the torrents and attendant circumstances, or the probable quantity of water discharged. With respect to Povoação it may be remarked that the peculiar shape of the valley, wide above and contracting with steep sides to a narrow outlet below, and its proximity to the highest mountains, expose it to heavy falls of rain and a great accumulation of water in that lower part where the village is built; and if to this be added the fact that an inch of rain frequently falls within an hour at the level of the sea, it will appear that the destruction of the village may not have been caused by any very extraordinary meteorological phenomena.

A.D. 1755. The earthquake that destroyed Lisbon was sensibly felt at St. Michael's, where the sea rose high above its usual level and broke over the land, washing down the houses built on the lower parts of the coast.

A.D. 1806. A mass of rock, resting on argillaceous earth, slipped from its place in the precipitous sides of the valley of the Furnas, leaving a chasm of more than 100 yards' diameter.

A.D. 1811. During the summer a similar fall took place, so close to the last-named locality that the two existing chasms are only separated by a narrow ridge about 100 feet high. On the 13th of June an island was thrown up in the sea near Ginites, to which the name of the British man-of-war *Sabrina* was given by her commander, who witnessed the explosion. It was soon worn away by the sea, and is now only to be traced in a submarine cone 15 fathoms under the surface.

A.D. 1838. A land-slip occurred in the summer near the Furnas, opening a cavity more than 400 yards broad and 100 feet deep, in the thick deposit of pumice of those parts.

A.D. 1839. On the 5th of December a rise of the sea, like that of 1755, washed down several houses and parts of the cliffs on the S. coast, subsiding with the fall of the tide. It occurred at the time of spring tides, after a gale of wind from the N.W., which had veered to S.E. without moderating, the barometer standing at 28.82 inches. The change of wind acting in opposition to an acceleration of the great Atlantic current (whose course here is from the N.W.) at the time of full moon and under a diminution of atmospheric pressure, would probably produce an unusual tide; but it is remarkable that it was not observed at St. Mary's, nor did it extend to the westerly islands. At Ponta Delgada the rise was $10\frac{1}{2}$ feet above the high water mark of spring tides, whose ordinary rise is about 6 feet.

The geology of St. Michael's will be more easily illustrated by dividing the surface into 5 districts, each of which has its distinctive characteristics, although contiguous parts pass so confusedly into each other, that, strictly speaking, there is no line of demarcation between them. The first district, marked A in the map, is that of the Sette Cidades mountains; the second, B, that of the Serra Gorda and its succeeding line of peaks; the third, C, of the Serra da Agoa de Pao; the fourth, D, of the Furnas; and the fifth, E, of the Pico da Vara.

In the order of formation the last is probably the oldest; in the fourth there has been no eruption of lava since the discovery of the island, although the surface must have been totally changed by the pumice of 1630; the present covering of a great part of the third has been formed since the middle of the sixteenth century; none of the older lavas appear in the second; while the oldest rocks are found in the first.

The first division, A, contains an area of about 51 square miles. Its lowest bed would appear, from a small exposure near Feiteiras, to be a pure greyish white trachyte, which, it has been thought, may be the original nucleus of the island. Above this is a compact grey lava, with microscopic grains of olivine and hornblende or augite (probably the latter), possessing all the density

of a basalt of submarine formation. It may be traced in the coast near Relva, Feiteiras, Candelaria, Mosteyros, and Capellas. Next above it are three or four beds (in some parts only one) of a porphyritic rock composed of peppercorn grains of green and iridescent olivine, with larger fragments of augite, thickly embedded in a base of semihard compact grey lava; the whole making a stone of great beauty, but too perishable for works of art. These beds are separated from each other and from the rock below by thick deposits of earth and pumice, containing masses of rock of every description and size. They do not appear on the N. coast, where they are concealed by the matter of subsequent eruptions. The next in succession is a delicate dotted grey lava, the spots being of greenish black hornblende which has lost its crystalline structure, and become only indistinctly separate in the trachytic base. Over this are a hard fine grained lava, like the lowest, but cellular, and a softer kind with small bright grains of olivine.

The beds of earthy deposit dividing those of rock are of nearly uniform character, argillaceous, friable, and of yellowish brown colour. The heat of the succeeding streams of fluid lava has converted their upper surfaces into a red ochrey substance, when the roots and other remains of ferns and associated plants of the time are now found in the state of a scarcely coherent charcoal. Among the embedded fragments are pieces of dark brown porphyry with crystals of glassy felspar, and amygdaloid, containing calcedony, arragonite, and other trappean minerals, like the rocks of the Pico Alto at St. Mary's. The great crater of this division is the valley of the Sette Cidades, said to have been formed in 1445. It will, however, be observed that the discoverers of the island, who have transmitted this account, had not at the time explored its interior, nor gone so far to the W., as to ascertain, by a view of its other sides, that the lost peak did not stand at the side of, instead of upon, the present valley. On the other hand the regular position of the beds and form of the cavity, which have not been disturbed by any lateral subsidence, are favourable to the conclusion that the historical account is correct.

In shape the valley is an ellipse of about 3 miles' length from S.E. to N.W., and $2\frac{1}{2}$ miles' breadth from S.W. to N.E. The ridge bounding it is of nearly equal height throughout, except where it runs into peaks; and on the N.W. presents a gap between two hills 1620 and 1770 feet high. On the S.E. a short chain, 2 miles long, points towards Ponta Delgada, terminating in the Pico de Carvao, 2632 feet above the sea. Besides the two great lakes occupying the greater part of the interior, there are reservoirs of water in some of the enclosed monticules; all supplying by filtration the streams of the outside, as well as the aqueduct constructed for the conveyance of water to

the port. The sides of the crater are nearly perpendicular, and display the parallel beds of successive eruptions with great clearness, the whole presenting the most striking specimen of a quiescent volcano to be found in the Azores, and not perhaps inferior to many in the world. The only existing remains of volcanic activity are found in two hot springs near Mosteyros and Candalaria, issuing in the sea below high-water mark.

The surface of this division, as of all the others, varies much in character, being in some parts a yellow argillaceous earth highly susceptible of fertilization, in others a mixture of pumice and scorix, or a vitreous intractable lava which defies the efforts of the husbandman.

The second geological division, B of the map, occupies the least elevated parts of St. Michael's; its low shores forming on the N. side the wide and open Bay of Ribeira Grande, and on the S., in reverse, that of Ponta Delgada. It contains an area of about 44 square miles. Along its middle runs an irregular line of hills and craters of different degrees of elevation, beginning at its W. end in the Serra Gorda 1574 feet high, and continued through the Pico da Cruz 1262 feet, the Pico da Pedra 1224 feet, and the Pico do Fogo 1031 feet above the sea. To the eastward of the latter, the line merges into the acclivity of the Serra da Agoa de Pao and the limits of the succeeding division. The soil is in general more fertile than the last; but it also comprises extensive patches of scorix as well as of vitreous lava, well adapted for vineyards but no other purpose. There are no hot springs or other signs of subterraneous heat, and the whole division is deficient in water, in consequence of its inferior elevation. On the N.W. side of Ponta Delgada, in an orange garden, is a remarkable cavern, 140 yards in length, 8 in breadth, and 5 in height, the walls and roof of lava with a semi-opaline or pearly surface, on which are seen occasional pendulous points, like melted pitch congealed in the act of dropping, and the bottom of rich brown fine-grained earth. At the N. end the passage has been closed by a wall, and at the S. the roof descends until it comes in contact with the bottom. The sides have all the superficial character of the roof, and apparently have not been rent asunder in their present condition; but the lateral surfaces of an existing crevice may have been enamelled by fresh lava, the crevice filled with earthy deposit, and the whole afterwards covered by the stream of fluid matter now forming the roof. The cave might have been opened subsequently by the infiltration of water, which would naturally have the effect of condensing the dry pulverulent deposition, and leaving a cavity above it. On the N. side of the Pico da Pedra is a perpendicular hollow, 140 feet long from N. to S. and 110 feet broad from E. to W. Its greatest

depth is on the N. side, where it measures 74 feet; the comparatively recent fall of loose masses having diminished it at the other end to 51 feet. This appears to have been formed by the sinking of the crust into a vast subterraneous blister, after the cooling of the whole mass of lava, of which a single eruption has evidently supplied the bed where the hollow occurs. The scorix underlying it are scarcely visible at the deepest end.

No clear indications of the order of even the greater eruptions of this division are afforded by any sections, nor can those of the numerous smaller craters be satisfactorily ascertained. The most considerable streams have been those of the Serra Gorda and the peaks of Cruz, Pedra, and Fogo. The former, a grey lava, cellular (the cellules coated with oxide of iron) and containing small imbedded grains of olivine, ran over the present site of Ponta Delgada. There are a few patches of the porphyritic lava of the first division, which also forms the upper bed of Cruz and Pedra, and is found to be 70 feet deep near the latter peak, and nearly 40 in the sections of the sea-coast on the S. side. The lava of the Pico do Fogo is full of bright grains of light green olivine, and may be generally seen on the slope towards the sea as well as on the N. side of the island, passing into a similar rock thrown out by the Serra da Agoa de Pao. The depth of this bed near Alagoa is about 40 feet.

Some notice is due to the shape of the hills of the central line of this division. They are mostly rounded cones and entire, but many have the horseshoe shape of the islets round the coast. The direction of their excavation, in the latter case, is irregular, as if it had varied according to that of the wind at the time of their ejection. It is indeed very possible that when the light matter chiefly composing them was thrown out during the prevalence of a strong wind, it fell to leeward of its point of discharge, taking a horseshoe shape in obedience to that veering to which strong winds are subject; and that when the explosion took place in calm weather the products fell perpendicularly, and rose in a cone.

The third division, C, contains an area of about 41 square miles, is high and mountainous, and bears in many points a resemblance to the Sette Cidades. Like that division it runs to a great elevation above the sea, the height of the Serra da Agoa de Pao being 3060 feet; its surface comprises extensive deposits of pumice; the older porphyritic rocks show themselves below its more recent lava, and it contains the trachyte supposed to be the nucleus of the island. Its principal crater is the valley formed in 1563, if indeed there is any other locality deserving the name; for it is doubtful if the whole of the line of heights running to the eastward and losing itself in the plains over the Furnas, have not its origin in

the ejected matter of the terminal craters. The line consists for the most part of a number of separate cones of great elevation, varying between 1800 and 2600 feet, in some places passing into each other, in others divided by deep valleys of small extent. Above Villa Franca they stretch out into a plain of small area known as the Achadas. They are chiefly composed of pumice and pumiceous scoriæ enclosing fragments of lava, porphyry, syenite, and pitchstone; the two former being identical with existing beds, the latter only found as solitary ejected masses. From want of cohesive power in the substance of the cones, the heavy rains cut deep gorges in their sides and cause land-slips and consequent precipices, very dangerous to any unwary explorer, who may be tempted to wander from beaten paths into these solitudes. A lake about a quarter of a mile in diameter, situated in the plain at a depth of 60 feet below the general surface, and accessible only at one side, seems to have been formed by such a subsidence as gave rise to the cavity of the Pico da Pedra; there being no rising ground round it or other existing mark of its having been a crater, to which, in some respects, it bears so strong a resemblance.

In this division the lowest beds are the basalt and trachyte of the Sette Cidades, the former visible on all parts of the coast, the latter in ravines E. of Villa Franca. The next is the grey dotted lava, that at a distance of $\frac{1}{2}$ mile S. of Ribeira Grande (in the course of the river) envelopes the rolled masses of the ancient sea-beach. Above this is lava with grains of olivine, and the succeeding, and perhaps final bed, of simple blue lava. Fragments of brownish porphyry, with crystals of glassy felspar occur, whose beds have been here covered by subsequent eruptions, although visible in the next division, where they seem to have succeeded the fundamental basalt, but preceded the dotted lava. There are the usual intermediate deposits of earthy matter of every degree of density and hardness, enclosing small and large fragments of lava, porphyry, pitchstone, conglomerate, and a syenitic rock composed of opaque and transparent felspar, hornblende, quartz, and schorl, with occasional crystals of mica, specular and octahedral iron and other minerals. A conglomerate is found near Villa Franca consisting of all these fragments embedded in a hard striated base of lava passing to pitchstone; its striæ, of the colour and lustre of obsidian, showing it to have been in a state of fusion. About 1 mile from the shore opposite the town is an islet hollowed out inside, now serving as a harbour of refuge for fishing-boats and other small craft. The date of its rise is not known. It is a rough tufaceous rock containing the fragments of the conglomerate of Villa Franca, and rises from the points at the entrance to a height of 148 feet on the seaward side. The sea has separated a portion of the latter part, and is gradually undermining

the whole through several lateral fissures, as well as round the exterior.

The fourth division, marked D, comprehends the formations in the neighbourhood of the Furnas valley, and occupies an area of about 40 square miles. The lowest beds are those of the preceding division; while the upper, as seen in the valley, have the characters of the next, some in being porphyritic, others in a disposition to crystalline structure, and all in exhibiting great compactness and absence for the most part of the cellules so common in lavas of other parts.

As the first and third divisions have their central craters, so this appears to be due to the eruptions of the valley, where, apparently, a former elevation has subsided after emission of the lavas. The other craters are clearly defined and bounded, but of this the limits in some parts cannot be ascertained, either from the sides having given way, or being concealed by the elevation of the plain. The extreme breadth at present from W.S.W. to E.N.E. is more than 2 miles; its interior being occupied partly by a lake 1 mile long and $\frac{1}{2}$ mile broad, partly by the circular enclosed plain of $\frac{1}{2}$ mile diameter called "Lagoa Secca," or dry lake, partly by the undulating valley and its village of the "Furnas," and partly by the hills separating this valley from the lake and "Lagoa Secca." The surface of the lake is 995 feet above the sea, and about 100 feet above the village; and the peaks overlooking the whole, between 1500 and 2300 feet above the former level. Lofty mural precipices bound the northern and more distinct parts, showing in their sections three beds of lava, not far below the upper surface, on a deep bed of earthy tufa. On the E. are hot and cold mineral springs, much resorted to by invalids, and near the N.E. margin of the lake other spots with a high degree of volcanic heat, to which probably are owing both the temperature and impregnation of warm chalybeate springs issuing at the opposite side of the adjacent ridge.

The surface of the hills on the S. is covered with pumice, in one part of which the land-slip of 1838 took place. On the N. are the plains, known as the "Achadas," of argillaceous soil, in most respects like those near Villa Franca. This division is abundantly watered by constant showers in summer, and more continuous falls of rain at other seasons, supplying the visible and subterraneous reservoirs from whose unabating sources numerous streams run through the ravines. The Riberia Quente (or Hot River, so called on account of the boiling springs in its course), the largest river in the island, rises in and is supplied entirely by the waters of the Furnas. It runs a tortuous course of rather more than 4 miles, and reaches the sea in a mouth 20 feet wide and a mean of about 18 inches deep.

In the common spring water there is no vegetable adulteration or impregnation with mineral elements; but when it rises to the surface, after traversing parts under the influence of present heat, or changed by that of the past, it takes up their chemical constituents, and appears, according to *their* nature, a hot or cold chalybeate, saline or alkaline spring, simple or mixed. The result is the production of the mineral waters of the place, held in high estimation locally for their medicinal qualities, and not unknown to men of science abroad, on this account as well as for their siliceous and alkaline constituents and deposits.

These waters are divided, according to their particular elements, into the following four kinds:—*First*, the Caldeiras, or Boilers, containing a volume of carbonic acid, with sulphuretted hydrogen, and about two thousandth parts of solid residuum, one-sixth silica, and the remainder alkaline carbonates and neutral salts.* *Second*, hot chalybeate of the Quenturas, containing a volume of carbonic acid, and one thousandth part of residuum, two-thirds carbonates of lime and soda, with muriates and silicates of soda and potash, and nearly a fourth oxide of iron. *Third*, “Agua Feuca,” a tepid chalybeate, containing less carbonic acid and more iron than the second; and *fourth*, the cold “Agua Azeda,” or acid water, containing a volume and a quarter of carbonic acid and two grains of residuum in an Imperial pint. Of these two grains about a fifth is carbonate of iron; the remainder, alkaline, carbonate, and sulphate, with silica and carbonate of lime.

Of these waters the first is used for baths only; its softness to the sensations and tranquillizing effect on the system, united with stimulant qualities, eminently recommending it for this purpose. It is found to be very useful in cases of chronic rheumatism, and in removing the fat and bloated habit brought about by high living and inaction. It has been further recommended by an intelligent traveller for paralytic loss of power in the limbs, gravel, secondary syphilitic symptoms, chronic gout, dry and hard skin, whether as a specific disease or symptomatic of internal derangement, unless attended by inflammation, liable to be increased by stimulants; and, finally, for the prevention of diseases to which the full habit of an indolent life may be tending.† The temperature of this water is nearly 210° F., the boiling point at the height of the Furnas above the level of the sea.

A similar use is made of the second water, efficacious in re-

* Dr. Webster, of Cambridge, Mass., was the first to discover (in 1843) a minute proportion of lithia in this water.

† Dr. Bullar, of Southampton, one of the authors of a recent work, ‘A Winter in the Azores,’ the best existing account of the climate, waters, and diseases of the islands.

storing strength to convalescents, and giving tone to the habit of those in want of it, who can at the same time bear its active qualities. By Doctor Bullar it is particularly recommended for diseases peculiar to the female constitution.

Less use is made of the third water, although it is a valuable adjunct to the medicinal virtues of the valley. It contains more iron than that usually drunk, is free from its salts, and, being tepid, may be taken internally in cases where cold water would be improper.

The fourth spring is only used for drinking; its transparency, sparkling appearance, and acid taste rendering it agreeable, notwithstanding its strong chalybeate character. The sick, convalescent, and healthy drink it indiscriminately; nor do any bad consequences appear to ensue from its universal application, although it acts on the kidneys of those who are not accustomed to it. Dr. Bullar praises it as an exhilarating beverage, giving tone to the stomach and energy to the system, as adapted for calculous complaints, and as highly strengthening, in the shape of a cold bath, when the invalid has sufficient vigour to support the re-action.

Most of these waters rise in a locality very interesting to geological observers. The boiling spring, as it runs towards the river, deposits its earthy matter as a sinter, and has by successive layers raised a bank of this substance, interstratified with a loose and dry argillo-siliceous powder, nearly 6 feet above the intersecting road. The water of the chalybeate springs throws down a thick loose coating of oxide of iron of deep orange colour, and that of the cold springs covers the stones in its course with a thin but perfectly formed and visible film of bright black sulphuret of iron. An adjacent hillock composed at one time of earthy matter, enclosing fragments of lava, porphyry, and amygdaloid, has been altered in its whole mass by the streams of sulphurous gas rising everywhere through it; while the iron alumina and alkalies of both earth and stones have been converted into ochre and alum, and their silica disengaged and left to mix with numerous small crystals of brilliant yellow sulphur and the other products. In breaking up the larger stones their interior is found scarcely changed, but passing gradually to the decomposed substance of the outside and the loose matter surrounding them.

Appearances of the same kind show themselves at the lake and other parts of this division. Carbonic acid rises in the running streams, giving them the disturbance of ebullition, and in a few spots where it is emitted in dry cavities, the graves of accumulated heaps of coleoptera, juli, lithobii, glomeres, and other insects.

The fifth and remaining geological division, marked E in the

map, comprising an area of about 48 square miles, is perhaps the most ancient, as it is the highest part of St. Michael's; the Pico da Vara, near its centre, rising 3560 feet above the level of the sea, and the fundamental and succeeding rocks partaking of the character of St. Mary's. The base appears at Ponta da Ajuda in columns of basalt covered by the sea, and in some parts near Ribeira Quente is disposed to the same structure. Over this are deep beds of tufaceous earth, as is usually the case in the island, the greater part of its elevation being due to them; and these are succeeded by lavas, porphyry, and the finer covering of earth more argillaceous than in the other divisions. Besides Vara the peaks of Bartolomeo and St. George rise here to a height of 2927 and 2455 feet above the sea. The cliffs of the eastern shore are proportionately high, probably from the encroachments of the sea, having, abreast of Bartolomeo, between 1267 and 1347 feet height; and here a long shoal stretching to the N.E. seems to point out the destruction of a former constituent part of the island.

This division is distinguished from all the others in being without craters, and having on its surface no loose scorix or streams of vitreous lava, and no pumice of its own ejection. It is abundantly watered, but possesses no mineral springs or signs of volcanic activity.

The original minerals of St. Michael's are not numerous or of large size, yet they are not all without interest to mineralogists. Quartz is formed in brilliant minute crystals in the ejected syenite of Agoa de Pao, and in cells of the amygaloids of the Furnas, Pico da Vara, and Sette Cidades. At the last place it is simple and stalactitic, associated with milk-white calcedony and uncrystallised and radiating arragonite. With the arragonite the base is so much imbued, that muriatic acid produces effervescence, even where none of the mineral is visible with a lens of quarter inch focus. Olivine is found imbedded in most of the lavas, not large or distinctly crystallised but of highly brilliant lustre and colour, in concretions varying in size from a pigeon's to a goose's egg, and also in rolled crystals among the sea and river sands when it has been freed from its matrix. Augite is generally small and uncrystallised or fractured, but in the scorix of the Pico da Pedra it occurs, though very rarely, in crystals of half an inch diameter, retaining all their regularity of form under a dull scoriaceous surface, and in a few well-formed crystals in reddish wackè at the Sette Cidades. The pumice of Agoa de Pao contains innumerable fragments of black pitchstone, mostly porphyritic, seldom of even a tolerably fine kind, yet interesting on account of the beautiful iridescent tarnish presented by its fresh fractures.

Titanitic iron forms nearly ninety per cent. of the sea sands N. and S. of the Serra da Agoa de Pao, where its greater specific

gravity has lodged it during the abrading process by which its softer matrix was washed away. In the ejected syenitic masses of the same parts are minute but brilliant crystals of specular, with others of oxidised octahedral iron; and to the felspar and shorl of these masses are attached microscopic but distinct and sharply-formed red-yellow octahedral crystals, the angles giving a mean of $109^{\circ} 28'$, of which the writer has not yet learned the name. It has been suggested that they may be "Pyrrhite," a mineral found by M. Perowski of St. Petersburg, near Menziusk,* in a drusy cavity of felspar; in which case they will merit the attention of collectors. The minerals of the Furnas are siliceous sinter, (inferior to the Icelandic) rare coatings of fluorite, sulphur, in small crystals and larger crusts; silica, separated by local heat from its parent earths and rocks; supersulphate of alumina mixed with an alkaline base; muriate of soda; films of sulphuret of iron, of which Dr. Webster found masses under the surface; and substances in amygdaloid decomposed, which are no doubt common trappean species. Glassy felspar abounds in the porphyries, but always in small crystals.

The particular geological features of St. Michael's having been described, it will not be improper to consider to what era its earlier formations may be referred. Its fundamental basalt, the brown porphyry of the Pico da Vara, the Sette Cidades, and Agoa de Pao, and the arragonitic amygdaloid and augitiforous wackè of the Sette Cidades are rocks of St. Mary's, for which island the pliocene station of Sicily has been proposed, but there are no organic remains to prove the connection. If, however, the sulphur of the Furnas and Ribeira Grande is derived primarily from the decomposition of animal matter, as Professor Gemellaro of Sicily has shown with respect to the substance generally, it is possible that the same testaceous mollusca exist in another form below St. Michael's, which are found in a fossil state at St. Mary's; and that these two islands are linked in a chain of tertiary formation, extending through the Azores to the westernmost island of Flores, where a subcrystalline limestone, without organic remains, occurs in abundance.

In its Botany the Flora of St. Michael's represents the whole Archipelago, in which the most recent investigations have found 437 phænogamous and 139 cryptogamous species. Of this number, excluding 63 indigenous, two-thirds are British, and the remainder peninsular and Madeira plants. The following are the peculiarly Azorian given in Scheubert's "*Flora Azorica*" (Bonn, 1844), and Watson's Amplification in the London Journal of Botany for November, 1844:—

* Nertschinsk?—Ed.

Cryptogamous.

Bryopsis penicillata.
 Ulva subrii.
 Rhacotheca Azorica.
 Gymnomitrium erythrorhizum.
 Hypnum Hochstetteri.
 Allantodia Azorica.
 Lycopodium cernuum.

Phænogamous.

Holeus rigidus.
 Deyeuxia caespitosa.
 ——— Azorica.
 Gaudinia fragilis.
 Festuca petræa.
 Carex Guthnickiana.
 ——— Azorica.
 ——— lævicaulis.
 ——— rigidifolia.
 ——— Hochstetteriana.
 ——— Floresiana.
 ——— Vulcani.
 Luzula Azorica.
 Juncus lucidus.
 Smilax tetragona.
 Habenaria micrantha.
 ——— longibracteata.
 Juniperus oxycedrus (variety).
 Myrica Faya.
 Euphorbia Azorica.
 ——— Stygiana.
 Urtica Azorica.

Persea Azorica (two varieties).

Plantago Azorica.
 Scabiosa nitens.
 ——— neglecta.
 Bellis Azorica.
 Solidago Azorica.
 Senecis pseudo elegans.
 ——— malvæfolius.
 Tolpis microrrhiza.
 ——— nobilis.
 Microderis rigens.
 ——— filii.
 ——— umbellata.
 Rubia splendens (variety).
 Asclepias fruticosa.
 Erythræa diffusa (variety).
 Myosotis Azorica.
 Convolvulus Sepium (variety).
 Euphrasia Azorica.
 Lysimachia Azorica.
 Myrsine retusa.
 Erica Azorica.
 Vaccinium longiflorum.
 ——— cylindraceum.
 Sanicula Azorica.
 Nasturtium flexuosum.
 Cardamine Calderarum.
 Cerastium Azoricum.
 Hypericum foliosum.
 ——— decipiens.
 Rhamnus latifolius.
 Rubus Hochstetterorum.

No other wild animals are seen than the rabbit, ferret, weasel, rat, mouse, and bat; to which may be added the frog, introduced a few years ago by a landed proprietor, and now inhabiting every pool. The fish are mostly the same as those of Madeira, described in the Reverend Mr. Lowe's excellent work.

The birds permanently belonging to the island are the buzzard, which gave its name to the "Açores," little owl (*Strix passerina*), starling, blackbird, chaffinch, mountain finch, canary finch, yellow wagtail, redbreast, black cap, willow wren, golden-crested wren, wood-pigeon, rock-pigeon, red-legged partridge, quail, sanderling, green sandpiper, Sandwich tern, herring-gull, common gull, and stormy petrel. In addition to these, of which some are rare, others common, the following are occasional visitors:—the swallow, eagle-owl, raven, crow, pied woodpecker, hoopoe, bullfinch, goldfinch, heron, crane, bittern, spoonbill, cur-

lew, woodcock, snipe, kingfisher, water-rail, coot, puffin, wild swan, widgeon, and teal.

Although the climate is variable both in heat and humidity, it is of the most temperate kind, and the changes do not materially affect health, personal comfort, or the operations of out-door business. As in summer it is seldom that clouds do not float in the atmosphere to offer an occasional mitigation of the sun's heat, so in winter there are few days when this is not felt, and during the whole year there is not one of necessary total suspension of agricultural labour.

Taking the average of the five years 1840, 1841, 1842, 1843, and 1844, and reducing the observations to apply to the level of the sea at half-tide, the barometer ranges between 30·69 in. and 29·46 in., the extremes having been 30·87 in. and 29·10 in., and the mean pressure 30·166 in., varying between 30·240 in. of 1844, and 30·067 in. of 1843. The mean of the summer half of the year (April to September, both included) is 30·212 in., of the winter 30·120 in., both the maximum and minimum having been always attained during the latter season. In summer the average range has between 30·57 in. and 29·62 in., in winter between 30·69 in. and 29·46 in., the greatest, a mean of 1·23 in., taking place about the time of new year, and the least, 0·95 in., near Midsummer.*

There is no regular characteristic in the winds except a prevalence at times from the N.E. or N.W., and the ordinary change from a S.W. gale to a moderate N.W. breeze. The latter circumstance is well known to mariners of the trade, and taken advantage of by them in returning to port after having been compelled to go to sea by a gale of wind from seaward. During the last five years there has been a mean number of 9 calm days, and the following number, omitting fractions, of each wind: N. 27; N.E. 110; E. 20; S.E. 40; S. 17; S.W. 51; W. 20; N.W. 71; indicating that the island is removed from that part of the Atlantic where westerly winds generally prevail, and has a preponderance in the ratio of 37 to 26 of northerly and easterly over those from other points of the compass. Storms are not frequent or generally of long duration, but they are heavy while they last. They have been found by observations, carefully registered on 5 of the islands, to possess a decidedly rotatory character (interfered with, however, by the great altitude of Pico), but not a

* Three years' observation at Archangel, in the N. of Russia, gave a different result. The mean of the winter half-year, calculated for the Estuary of the Dvina (which is probably higher than the ocean), was 30·08, of the summer half 30·01; the terrestrial range being 1·35 in the former, and 1·30 in the latter season. At New York, Mr. Redfield found the mean of the barometer to be higher in winter than in summer; whereas in Newfoundland, at London, and Cadiz, it is higher in summer than in winter.

regular course of progression. Some tend to the S.E., others to the N.E.; none appear to pass to the westward or to range from due E. more than between N.N.E. and S.S.E. S.W. gales, the most formidable in an open port of southern exposure, shift as has been stated, generally to the N.W., and moderate at that point, proving that they have a south-easterly course, their centres passing to the northward of the island. With respect to the mean force of winds, it appears to be distributed as follows:—N. and E. less than 4 of the table of forces used in the Royal Navy; W. 4; N.E. and S.E. more than 4; S. and N.W. $4\frac{1}{2}$; and S.W. nearly 5. Of the summer months the average force is little more than 3, of the winter under $5\frac{1}{2}$. Observations having been made to ascertain how far the state of the sea prevents communication with the shore at Ponta Delgada during the year, it results that there are 50 days of interruption; 41 in winter, and 9 in the summer half-year.

A Table is subjoined to exhibit the averages of atmospheric temperature, and it is only necessary to add that the extremes of the whole year have been 46° and 84° ; 46° and 76° of the winter; 46° and 84° of the summer; 46° and 72° of February; and 64° and 84° of the month of August.

Winter Half-year.	Average.				Summer Half-year.	Average.			
	Maxi- mum.	Mini- mum.	Mean.	Daily Range.		Maxi- mum.	Mini- mum.	Mean.	Daily Range.
October . . .	75	58 $\frac{1}{2}$	66.6	6	April	72	50	62	6 $\frac{1}{2}$ *
November . . .	71	50 $\frac{1}{2}$	63.2	7	May	75 $\frac{1}{2}$	56	65.3	5 $\frac{1}{2}$
December . . .	70	48 $\frac{1}{2}$	59.1	7	June	78 $\frac{1}{2}$	61	68.9	5 $\frac{1}{2}$
January . . .	69	48 $\frac{1}{2}$	59	5 $\frac{1}{2}$	July	82 $\frac{1}{2}$	63 $\frac{1}{2}$	73.1	5 $\frac{1}{2}$
February . . .	69	48	58	6 $\frac{1}{2}$	August . . .	82 $\frac{1}{2}$	63	74.4	5
March	72	43 $\frac{1}{2}$	60	6 $\frac{1}{2}$	September . .	80	64 $\frac{1}{2}$	73	5 $\frac{1}{2}$
The half-year .	75	48	61	6.4	The half-year .	82 $\frac{1}{2}$	50	69.5	5.6

A much greater proportion of vapour exists in the air in all seasons of the year than is known in England, in consequence of the small size of the island and its higher mean temperature. The mean hygrometrical dew point of the summer half year has been $58\frac{1}{2}^{\circ}$; of the winter, 55° ; making the quantity of vapour in a cubic foot of air 5.35 grains and 4.87; and the mean dryness $11\frac{1}{2}^{\circ}$ and $6\frac{1}{2}^{\circ}$ respectively. Either in consequence of this greater humidity (whose extremes, in grains of vapour, are 7.80° and 2.90°), or the conducting power of the mountains, heavy thunderstorms are unknown, although ships have been struck by lightning in the neighbourhood, a circumstance deserving investigation.

In different years there is a considerable variation in the quantity of rain and dew, the mean of the whole year being nearly

30 inches near the level of the sea, and the maximum 42; while it is probably not less than 50 on the mountains. There is not the same irregularity in the evaporation, its annual amount neither greatly exceeding nor falling short of the mean of 45 inches. The rain of the summer months amounts to 9, of the winter to 21 inches, the evaporation being of the former season 28 inches, and of the latter 17. As a natural effect, vegetation languishes in the lower parts of the island during the drier part of the summer, and plants, whose roots grow near the surface, are dried up, while agricultural crops are not unfrequently lost from excessive dryness. The soil of the island being endowed with little capillary attraction, its surface becomes dry and dusty, when there is still sufficient moisture 9 inches below to support plants whose roots descend to that depth; and although the proportion of clay is small, there is sufficient to retain water and prevent its loss by filtration.

It was ascertained by the census of 1840 that the population numbered 80,809 souls, living in 19,726 houses, and divided into classes as follows:—

Above 7 years old.	Total.	Males.	Females.
Proprietors of land	1,828	874	954
Farmers not proprietors . . .	2,628	1,258	1,370
Agricultural labourers . . .	38,830	18,575	20,255
In trade	306	145	161
Artisans and apprentices . . .	6,998	3,304	3,694
Fishermen	2,980	1,426	1,554
Muleteers and ass-drivers . . .	972	462	510
In civil employments under government	617	296	321
In professions and the like . . .	4,959	2,370	2,589
Clergy and nuns	256	179	77
No fixed employment	4,003	1,905	2,098
Mendicants	514	224	290
Military	365	365	..
	65,256	31,383	33,873
Under 7 years of age	15,553	7,715	7,838
Total	80,809	39,098	41,711

This does not include about 200 foreign residents, of whom two-thirds are British subjects.

Of this number rather less than 20,000 live at Ponta and in its subordinate villages; nearly 9000 in villages of the west end of the island; 8000 in the district of Capellas; 15,900 in the town and district of Ribeira Grande; 7000 in the town and district of Alagoa; 7800 in the town and district of Villa Franca;

8600 in Povoação and its villages; and 4500 in the eastern district of Nordeste.

The military are stationed at Ponta Delgada, where also reside the majority of the traders, artisans, fishermen, nuns, and mendicants; the landed proprietors are nearly divided between the three towns of Ponta Delgada, Ribeira Grande, and Alagoa; the other classes are distributed proportionately over the island. The ratio of the productive to the unproductive part of the population is .453 to .547; taking the whole as unit. Of the productive part, the agricultural, including the labours of women and older children, is 328; of other branches, 121; leaving a loss of .004 for ineffective children. The profits of agriculture support .660; trade and its employments, .010; other classes of labour, .240; professions and private means, .069; the public revenue, .015; and charity, .006.

There is a considerable predominance of females over males, chiefly in the ages above seven years, owing no doubt to the emigration of male labourers to the Brazils. The authorities make great efforts to prevent this drain of the best part of the population, by peculiar observance of the passport laws, but without effect. The emigration is, however, less extensive at St. Michael's than in the other islands, because the labourer can find nearly constant employment at adequate wages; for while at St. Mary's the proportion of males to females is 477 to 523, at Pico 473 to 527, and at Fayal 446 to 554, at St. Michael's it is 483 to 517.

During the year before the census there were 708 marriages, 3860 births, and 2252 deaths; making for every thousand of the population 8.7, 47.7, and 27.8. If the public document conveying this information be correct, the proportions are very striking, and show that, as no increase has taken place in the number of the population of late years, the emigration is very great. But even in the extreme of this case there will be a considerable excess of births unaccounted for. The proportion of births to marriages is also unusual, and would fix a character of immorality on the people—that is, indeed, apparent in their habits. An establishment is maintained at Ponta Delgada for the support of illegitimate children, which receives an average yearly number of 168 of both sexes, or 21 for every 100 of the whole number born; but as this does not include the children of many who support them privately, or those dying before they can be sent to the establishment, it may be affirmed that considerably more than a fifth part of the births are illegitimate; and that, large as this proportion is, the numbers are greater in the towns than in the villages, in spite of the means notoriously in common use to anticipate parturition.

In physical characteristics the people present a much greater

variety than would be expected within such narrow limits, and marked local distinctions show that comparatively little amalgamation has taken place between the inhabitants of different districts since they were peopled by the first settlers. Light hair, a round face, and grey eyes, distinguish the natives of the N.W. parishes; brown hair and eyes, a lower forehead, and narrower face, those of the S.W.; black hair, round and full dark eyes, oval face, expanded forehead, and compressed mouth, those of Ponta Delgada and its neighbourhood; black hair, dark elongated eyes, heavy eyebrows, low forehead, pointed and wide nose, large mouth, protruded lips, and generally a sharp face and diminished facial angle, those of Ribeira Grande. Nothing can be ascertained as to their various origin; but it may be conjectured that the first inhabitants of the N.W. parts, where the principal village is called Britanha, came from Britain; of Ponta Delgada and its neighbourhood, from Spain (possibly during her dominion over the Azores); and of Ribeira Grande from the N.E. of Portugal. Both men and women are of about a middle size, and great height is a rare characteristic; but they are well, though sparely, made, and active. The men are capable of long continued labour and exertion; as they prove in working day after day with a short-handled hoe, and in the ease with which they accomplish journeys of 30 miles on foot without stopping.

A constant exercise of this capability for active habits, joined to a temperate use of stimulants, simplicity of food, and a mild and equable climate, renders the diseases of the people as simple as they are few. Dr. Bullar had more opportunity, during a stay of 150 days in 1839, of forming an opinion on the subject than the local physicians, who are not often consulted by the sick poor; as he resided in the rural districts, he gave his advice gratuitously, and earned a reputation for kindness of manner and readiness of access, which must have brought great numbers of cases under his notice. He states that he treated 465 patients, and on this experience founds a conclusion that the common diseases are not so much active as atonic, less inflammatory than nervous. He found a prevailing complaint to be a painful affection of the nerves of the stomach, coming on soon after meals, and lasting for years, without much disorder of the digestive functions or general health. The existing cause among the poor he believes to be vegetable diet (also too much used by the rich), and advises one of a more stimulating kind. He does not allude to the relaxing influences of a constantly humid atmosphere, which possibly has great effect in the creation of such a condition. To this complaint he adds rheumatic neuralgia and loss of sensation in single nerves; asthma, with and without hypertrophy of the ventricles of the heart; leprosy, unfrequent: a few scrofulous

diseases; bronchial inflammation; fever, with inflammation of the mucous membrane; simple tumours, requiring removal; and bronchocele.* Consumption is so rare that Dr. Bullar saw only two cases; and he considers this further evidence of the effect of great vicissitudes of temperature in multiplying cases in other countries; and also that humidity in this climate is favourable to those predisposed to the disease.

There are in the island three public hospitals for the sick, where poor patients receive treatment gratis; one is at Ponta Delgada, one at Ribeira Grande, and the other at Villa Franca. Their aggregate annual income is more than 6000*l.*; their expenditure 5500*l.* The whole average number entered yearly is 2725; of whom 2650 are cured, and 75 die; the small proportion of deaths being rather a consequence of mild diseases than of an effective system of management in the hospitals.

The people are generally industrious, sober, frugal, and, with an exception common in southern climates, cleanly in their persons. Their address is mild and engaging, but they are of passionate temper and vindictive disposition; and, notwithstanding the familiarity of their salutations, naturally distrustful of each other, and deficient in real cordiality of feeling. In domestic life they are harsh and cruel; men beating their wives, and mothers their children, with the greatest ferocity. Their moral character is also of a low standard, whether as regards truth, honesty, or chastity; nor in any class are breaches of these virtues sufficiently reprobated to correct the popular neglect of them. As if sensible of their dangerous propensities, the people never live in retired situations at a distance from the protection of neighbours, but construct their habitations in villages, where they can at all times command assistance.

This precaution so far gives security that fewer crimes are committed than would be expected from the passions of the people. During the years 1842, 1843, and 1844, 279 offences were reported to the authorities—16 murders, 11 violent rob-

* Bronchocele is not so common as to be in any degree a popular feature; but being in a great measure confined to the mountainous part of the island, it would be interesting to ascertain how far its occurrence may arise from causes operating among the people of Switzerland. Dr. Johnson, in treating of the goitre of that country, states that he found twenty cases above the lake of Geneva for one below it, and attributes its greater prevalence to the water used for drinking, which loses its bad qualities by deposition of suspended matter in the lake. The Rhone, it may be observed, rises at the foot of primitive mountains, and in its passage through the Valais, is fed from similar sources, taking up in its rapid course the elements of primitive rocks. Now, if the constituents of granite and gneiss are a mean of .69 silica, .16 alumina, .01 lime, .11 alkali, and .03 iron—and those of lava, .60 silica, .17 alumina, .05 lime, .05 magnesia, .10 alkali, and .03 iron—it follows that water flowing through both formations will have very similar qualities; so at St. Michael's the effects of the mountain-water may be the same with those of the Rhone above the Lake of Geneva.

beries, 54 common thefts, 126 riots (mostly attended by woundings), and 72 minor offences—giving a mean of little more than one offence for every thousand souls of the population per annum; of which one-tenth may be called of a grave nature. As there is no efficient system of police, the perpetrators of crime frequently elude discovery; or, if discovered, may escape punishment by the intimidation of principal witnesses (accomplices deriving no advantage from giving evidence); or, being convicted, suffer punishments very little proportionate to their offences. In spite, however, of this practical encouragement of crime, the island enjoys great tranquillity; and it may be inferred from this fact that the people present great susceptibilities for improvement.

Some progress has been made towards this object by the institution of local schools for gratuitous education, but the number requires to be increased. According to public documents there are only 13 in the whole island; the number of private establishments being 54; and the total of pupils being 848 males and 451 females. This number bears a proportion of $\cdot 0161$ to the population—the males of $\cdot 0105$, and the females $\cdot 0056$; the proportion of male pupils to the total of the sex being $\cdot 0216$, and that of the females $\cdot 0108$. Assuming that one-fifth of the population is within the usual ages of scholastic education, it will follow that only one-twelfth of the number requiring instruction actually receive it; yet this is above the proportions of the continental provinces of Portugal, where the highest number is 1 in 14. As the parochial clergy are paid by government, and do not discharge very active duties, the charge of keeping schools might be laid on them; and a much smaller sum than it would be necessary to pay to lay teachers, added to the priest's stipend of about 30*l.*, or the curate's of 20*l.*, would induce them willingly to regard education as one of their regular parochial functions.

There is nothing peculiar in the popular costume except the carapuça of the men, with a wide front and longer points than that of St. Mary's, now fast giving way to common straw and felt hats, and the large hooded cloak of blue cloth worn by the women. With respect to the higher classes, it is almost unnecessary to say that their dress and customs are those of other civilized countries. In their manners there is a remnant of the courteous forms of bygone days; the requested permission to visit, the ceremonious conducting of the visitor to the seat of honour, the studied polite inquiries, the prolonged leave-taking, the formal offer of services, the special communication of domestic events, and many other polite offices—which, if not valuable for their sincerity, are agreeably contrasted with the gradual introduction of more republican manners among younger members of society.

No manly sports, the holiday amusements of other countries,

engage the many days of abstinence from labour authorised by the church; the few with which the people are acquainted are confined to boys. The popular recreations are church processions, street masquerades and their accompaniment of water-throwing during the carnival, rustic feasts and imitation royal levees in celebration of the Whitsuntide holidays, and the evening "charamba," where a crowded circular dance is performed, with immovable gravity, to the unvarying yet melodious strains of a wire-strung guitar accompanied by a doggrel vocal recitative.

Though small in size, the houses of the poor are strongly built, well roofed with straw or tiles, and provided with ample doors and unglazed windows. The interior, however, is finished with no attention to comfort. It is generally divided into compartments by screens of cane or basket-work, on an earthen floor beaten hard by use, but often damp by absorption from a humid atmosphere; the walls are seldom plastered; and, on the whole, the houses seem intended to afford shelter from the elements, but no other advantage. It can indeed scarcely be otherwise, as the people, with few exceptions, build their own habitations. A man setting up in life takes a perpetual lease of a small plot of ground, and, according to his means, raises on it a house costing between 10*l.* and 40*l.* There are few whose means allow them to expend money on comfort; their object being to provide the necessary shelter for their families, and, if they can, storehouses for their stock and crops.

In a proportionate degree the same may be said of the middle and higher classes; with rare exceptions, of persons who, having resided in foreign countries, decorate one or two reception-rooms. An open entrance and condensing stone staircase introduce damp, to be deposited on the bare whitewashed walls; the badly fitted doors and windows give rise to draughts of air when not swelled by humidity; the want of ceilings below admits to the first floor sitting-rooms either the cold of vaults or effluvia of horses and other animals occupying them; no fire-places warm the rooms; no grate furnishes the kitchen; and, to complete the style of arrangement, there is either a total want or inconvenient adaptation of other desiderata deemed indispensable in England. It is not then surprising that, while the climate and mineral waters invite invalids—despite the defective means of transport and the length of the voyage—they are repelled by the known want of accommodations; which, if somewhat superfluous to the healthy, are almost necessities to the sick. If houses were built, as in most other countries, purposely for letting, the appreciation of better arrangements might induce the proprietors to adopt them, and the general style of construction be gradually improved. But from the slow progress made by all artisans employed in

building, rather than the greater expense of rough materials, houses cost more than in England, and are not profitable investments for capital. A dwelling-house, built in the usual manner, of two stories, the upper for residence, the lower for stables and store-rooms, and having within its foundations an area of 2000 square feet, costs about 1500*l.*; and one of 1500 square feet, 800*l.*; but the highest rent that could be expected for them would not exceed 30*l.* and 20*l.* per annum respectively—an income of between 2 and 2½ per cent. This, in a place where the rates of discount for bills vary between 10 and 20 per cent., is sufficient to prevent any speculation in house-building. Fortunately, however, for persons in situations under government, and other temporary residence, there are always empty houses requiring tenants, and the supply is equal to the demand; but it is a general complaint that, although other domestic expenses are the same as at Lisbon, rent is as much dearer as the houses are less finished and comfortable.

Although the means of living at the command of the people, judged according to usual criteria, should be more than sufficient for their necessities, their condition is generally low, and there is even much indigence to be found. Higher wages are paid for daily labour of all kinds than in England, taken according to the prices of the common bread-corn in both countries, wheat in England and Indian corn at St. Michael's. The wages of agricultural labourers in the former at 18*d.* per diem, are in a ratio of 2·5 to the price of 60*s.* a quarter for wheat; the artisan's at 30*d.*, nearly 4·17. The average price of Indian corn at St. Michael's is 22*s.* per quarter; the labourer's wages of 7*d.* being as 2·65, and the artisan's of 17*d.* as 6·44; to which may be added, that the effective value of English labour, whether in the field or the workshop, is double that of St. Michael's. There is a constant demand for labour of both kinds, without improving the condition of the labourer; and among the tenant population there is a general complaint of irresistible pauperization by the exactions of landed proprietors.

A common estimate of the whole landed rental is 150,000*l.* per annum; and this would appear, from the average exportation of 30,000 quarters of corn valued at 50,000*l.*, and 90,000 boxes of oranges valued at 40,000*l.*, to be correct. Subtracting from it the value of oranges, and 10,000*l.* for the wine produced by vineyards, the rental paid by arable land is found to be 100,000*l.* Of the 147,200 acres of area, the official accounts give 2100 to orange gardens, 2400 to vineyards, 40,100 to arable land, and 102,600 to mountain grounds, lakes, rivers, roads, and dwellings. So little of the mountain-ground pays rent, that the 40,100 acres of arable land may be considered as charged with 100,000*l.* The

total average quantity of corn produced is stated by the tithe-contractor to be 45,000 quarters of Indian corn, worth 50,000*l.*; 15,000 quarters of wheat, worth 35,000*l.*; and 24,000 quarters of beans, worth 30,000*l.*; a total of 120,000*l.* Rents vary, according to locality and other circumstances, between 10*s.* and 7*l.* per acre, but the average would appear to be 2*l.* 10*s.*; against which the cereal crops place no more than 3*l.*, paying rent, seed, and tithes, but leaving all other charges to be provided for by the secondary crops of green vegetables. Of these the chief are potatoes and cabbages, both articles of extensive consumption, whose average produce is 6*l.* 10*s.* per acre; a sum sufficient to support the farmer, but not to raise him from his dependence on his landlord. The average rent ought not to be more than 25*s.* an acre, but the landlord will not propose a reduction; and so long as a rural population of 40,000 souls is apportioned on the same number of acres of land, he will scarcely be requested to make it. The true remedy lies in clearing the mountains, and thus increasing the quantity of disposable land, and improving the modes of cultivation; but both require capital, and therefore are not within the reach of those whose condition would be improved by them.

So far as the means of the husbandman allow, his system of agriculture is good: the great principles of cleaning and manuring being well understood and generally put in practice. Manure is sown with the crops requiring it, and weeds are kept down by frequent hoeing; yet the want of natural fertility in the soil prevents it from yielding at any time the occasional heavy crops of other countries. An acre of potatoes produces between a hundred and fifty and two hundred bushels; of Indian corn, between twenty-five and forty-five; of wheat fifteen to twenty; and so, proportionately, of other crops. A rough analysis of the soil gives in 100 parts a mean of 3 water, 88 silica, 5 alumina, and 4 oxide of iron; and it is therefore deficient in the powers both of absorption and capillary attraction, liable to become dusty on the surface soon after the heaviest rains, and without those salts which in other soils are brought up and lixiviated for the nourishment of plants. The implements of husbandry are a light plough, whose rough iron-pointed mould-board serves as coulter and share; a hoe, made of a 10-inch square plate, narrowed at the back, and set on a 2-foot handle at an angle of 45°, a most awkward instrument in an unpractised hand, but serving all the purposes of hoe and shovel for its master. These, with a bill-hook for fences, form the whole stock of implements of a small St. Michael's farmer; his means of transport for produce being the ass, with its heavy pack-saddle and panniers, or the old Portuguese ox-cart, labouring heavily on its ungreased revolving axles.

The ass carries a load of about two hundred weight a distance of ten miles; the ox-cart, drawn by two, four, or six oxen, according to circumstances, from ten to twenty hundred weight; the transport costing about a penny per hundred weight for every English mile of distance.

To the poor cultivator belong, such as they are, the profits of arable land, pasturage being confined to the mountains, and dry forage consisting of the leaves of Indian corn; the proprietor generally holds in his own hands the management and returns of vineyards and orange-gardens. Two thousand four hundred acres of land are occupied by the former, producing annually between 2000 and 10,000 pipes of a thin pale white wine, carelessly made from grapes that in their best state are deficient in saccharine matter. A pipe gives a fifth of lees for distillation, and these their twentieth part of proof spirit, the whole liquid yielding less than 5 per cent. As the average value of a pipe is about 2*l.* 10*s.*, the value of an acre of vineyard 16*l.*, the annual charge for tithes, pruning, and manufacturing, 1*l.* 8*s.*, and the average production little more than a pipe, the profit on vineyards is about 7 per cent. of the capital invested. The cost of an acre of orange-garden is 50*l.* for the ground (twenty years' purchase of the rent), and enclosing and planting, 18*l.* It pays its charges in cereal crops during the first ten years, when it comes to yield 30 boxes of oranges, worth 10*l.*, increasing this progressively to 20*l.*, or even 25*l.* per annum; its charges for pruning and dressing in the latter state being repaid by the firewood, and its nett return amounting to between 15 and 30 per cent. per annum.

Taxation is generally light on land, although bearing on trade in proportion to the prohibitory policy of the Portuguese government. The whole local revenue amounts to 35,000*l.* yearly, land paying in tithes and minor charges, 12,600*l.*; trade, in duties of customs, 10,800*l.*; national property, judicial fines, post-office, and others, 11,600*l.* The rate paid by land is about one-twelfth of the rental; by trade nearly 29 per cent. on chargeable foreign products. In Portugal land pays 5*s.* per head of the population, at St. Michael's 3*s.*

Few articles of any kind are manufactured by the people, whose dress consists chiefly of British fabrics. Some strong linen was formerly made for exportation to the Brazils, but the market has been lost since the independence of that country, and the trade is now confined to the place. A coarse thin woollen drugget employs a few domestic looms; a rough, weak, red pottery is made at Villa Franca from the clay of St. Mary's; an oil is expressed from the berries of the mountain laurel (*Persea Azorica*), consumed when it is made; and an inferior lime is made from Lisbon limestone with faggot-wood, to supply the moderate de-

mand for building purposes. To this brief account of industrial products, it may be added, that there are in the island, according to official documents, 151 stone-cutters, 618 masons, 496 carpenters, 256 tailors, 71 tanners, 434 shoemakers, and 56 blacksmiths.

There is a considerable external trade in proportion to the population; the imports of 1844 having amounted to 102,156*l.*, and the exports to 120,432*l.* Of the imports, 28,500*l.* of textile fabrics, and 11,500*l.* of corn and other articles came from England; 1000*l.* of hides, and 6400*l.* of colonial produce from Brazil; 1500*l.* of wood and whale-oil from the United States; 10,000*l.* of liquors; 6000*l.* of textile fabrics; 6500*l.* of colonial produce; 10,500*l.* of silver coin (Spanish and Brazilian dollars); 5000*l.* of stamp-paper and soap, and 14,000*l.* of other articles, from Portugal. Of the exports, 60,300*l.* of oranges went to England; 59,800*l.* of corn and other agricultural produce to Portugal; and 400*l.* of various articles to America: a great part of the difference between exports and imports having been remitted to absentee proprietors resident at Lisbon. Ships anchor in the open bay of Ponta Delgada, at about a mile from the shore, in 30 fathoms' water, where they can easily slip and go to sea to avoid the dangers of a southerly gale of wind. The aggregate number engaged in the trade annually is 200 British, and the same number of Portuguese and other foreigners. At the time of spring-tides the rise and fall is six feet, high water occurring at three-quarters of an hour after noon; and as this is the same at all the islands, it would appear that the course of the tidal current being perpendicular to their line of position, is from S.S.W. to N.N.E. With respect to the rise of water however, there is a considerable difference: at St. Mary's it is 6½ feet, at St. Michael's 6, at Terceira 5, at Fayal 4, and at Flores 3 feet; the difference amounting, in a distance of 325 nautical miles, to 3½ feet, or more than 1 foot for every 100 miles. At Madeira the rise increases to 7 feet, its distance from St. Mary's being nearly 500 miles.

It is remarkable that a port of such active trade as Ponta Delgada is wanting in three important requisites: banking establishments, mail packets, and a repairing dock. Money is lent by private individuals on immovable securities at usurious interest, which is at once deducted for the whole term of the loan, from the principal advanced. Letters are made up by a local post-office, and sent to Lisbon by private ships; and the correspondence with England is carried during the winter months by obliging shipmasters; both uncertain modes of transmission, yet resulting, as it happens, in wonderfully few cases of miscarriage. A small basin, called the "*Arcal*," has generally served for the repair of ships of light draught, without offering any facilities for

the trade generally, or to the more valuable traffic passing near the Azores between other countries. It is now in course of reconstruction, having been destroyed by the gale of December, 1839, and will be deepened to 15 feet for the purpose of receiving such ships of that draught as may come for repairs. A larger dock, capable of holding 400 ships, to be formed in front of the town, has long been projected, and finally proposed to be built, at an outlay of 150,000*l*. How far this proposal will be carried into effect it is impossible to say, the resident capitalists being unwilling to undertake it, and the guarantees offered being insufficient to satisfy foreigners that they will have due security for their investment. If the resident monied men (whose aggregate capital, not including landed property, is probably not less than half a million of pounds sterling) are unwilling to provide the means of making a dock, of which the advantages are entirely local, is it to be expected that foreigners will be found to do it? It is, indeed, a proof of great want of patriotism, that a large amount of money is kept without employment in this island, which might be used to confer an inestimable benefit upon its people, to advance its prosperity and improvement, with a certainty of secure returns for its employment. In the meantime, nearly a hundred millions sterling of outward and homeward bound cargoes annually cross the Atlantic in the neighbourhood of the Azores, without a single secure harbour between the termini of their voyages, into which ships can be taken for shelter or necessary repairs, which at present are sought only by those in the utmost extremity.

The internal communications are generally indifferent, from the want of an efficient system of public inspection and management; although there exist the best possible materials for making them, and one or two good lines, offering in their ease of draught and durability the best encouragement for the repair of the others, where 6 oxen are required to draw the load of 1 horse on an English road. In their present state the roads of the island are less useful for transit than for impeding the advance of a hostile force. As they wind along the coast they are frequently interrupted by deep ravines, practicable only by a sloping descent at one side, and a parallel rise at the other, where the advancing force would be exposed to a destructive fire. As the capture of the chief town would be the conquest of the island, the advance would always be on that point, and this could be better effected by landing in some part of the bays of Ribeira Grande and Ponta Delgada than elsewhere. There are many beaches and landing-places on the coast, marked with a cross in the map, but they are mostly commanded by high cliffs or small forts. During the last civil war the commander of Dom Pedro's forces attacked the island on the N. side, landing on a stony beach, undefended ex-

cept by strong natural obstacles, when his 1500 men, clambering up a precipitous water-course, succeeded in routing 5000 strongly entrenched, and supported by a park of artillery.

It now only remains to refer to the publications affording the best information about St. Michael's. The best charts, at present, are those by Laurie and Norie of London, which will soon be superseded by the results of the survey made in 1844, under the direction of Captain Vidal, of her Majesty's steam ship "Styx." This survey will supply extensive soundings, correct topographical details, and faithful views of land, not found in any existing charts. Of books, the best on geology is an account by Dr. Webster (Boston, 1821); on the climate and diseases, the 'Winter in the Azores' of Dr. and Mr. Bullar (London, 1841); on the botanical flora, Scubert's 'Flora Azorica' (Bonnæ, 1844), and a more complete list by Mr. Hewitt Watson in the London Journal of Botany, of November, 1844. But the thorough examination of the island is still to be undertaken; and there is no doubt that it would afford interesting discoveries to the geologist, naturalist, and philosopher in all branches of knowledge on which this paper is offered only as an imperfect communication.

VIII.—*Notes of an Excursion from Batúm to Artvin.* By M. FRED. GUARRACINO, H. M. Vice-Consul at Batúm. Communicated by Mr. Consul BRANT.

I LEFT Batúm on Sunday morning at 6 o'clock, and proceeded along the beach in a northerly direction. I chose the longer road round the peninsula rather than that across its neck, as in some places the latter was difficult to pass on account of deep mud. I, however, soon had reason to repent of the choice, when, half an hour after starting, I found myself unexpectedly before a rapid and deep run of water. I say unexpectedly, because two days before I had passed by the spot, and did not observe the least sign of a stream; but during the night the snow on the edge of the marsh had thawed, and the water rising, forced a passage through the bank of shingle into the sea. I have since learned that a similar occurrence is frequent after heavy rains, but the streams soon dry up, and the action of the sea, throwing up the shingle, obliterates every vestige of them. We managed after some difficulty to cross the water, which though deep was only 3 yards wide, by throwing over it a branch of a tree, and holding on by it as we passed on our horses. For half an hour we continued along the sea-shore, which turns gradually to the W., and reached the plain of Cahaber, on which a tribe of Koords have

their winter quarters. After traversing the plain for about a mile, we came to a house which the Sanjak Bey was building. I found the bey surrounded by fifty or sixty followers of Mehdet Bey, who was himself a fugitive from his home in Adjarah, on account of his being compromised in Kior Hussein Bey's late revolt. These people gain a subsistence by plundering all travellers whom they meet, and if pursued by officers of justice, hide themselves in the woods. The Sanjak Bey, being a relative of Mehdet Bey, not only connived at their acts, but, it is said, even participated in their plunder. He ordered two of his men to accompany me to the banks of the Jorúk, which I reached by proceeding westward from the bey's house, at half-past 8 o'clock. I estimate the distance from Batúm at about 7 miles. There is a road to Artvin on both banks of the Jorúk. I followed that on the western bank, as the better one, having crossed the river in a ferry-boat at Kizil Toprak. At this season the Jorúk is there only 30 yards broad, and 7 or 8 feet deep, but from the month of May to the middle of September its bed stretches to a width of 200 to 300 yards. Our road turned due S. through a forest of large beech-trees, and over undulating ground. In consequence of a late fall of nearly a foot of snow, my guide lost the way soon after we entered the forest, and instead of getting through it in half an hour, we were 2 hours wandering about. On emerging from the wood, we descended to the river, bordered here by a level of 300 to 400 yards wide. The eastern bank is a continued plain as far as this, from the river's mouth, a distance of about 8 miles. In half an hour we reached the termination of the level, quitted the river and turned to the right over a hill, on the top of which is situated "Om-boli," a village possessing thirty well-built houses, and contiguous to a large forest of oak, chestnut, and alder trees. Passing through the village, we descended the hill, and in 15 minutes came to the Jorúk again, which here flows through a plain of about 2 miles in length and breadth. We saw on the opposite side of the river the village of Erghe, which contains forty houses; owing to the quality and size of the tract of cultivable land which surrounds it, it is the most flourishing village in the district of Batúm. At the end of this plain the valley of the Jorúk contracts, and the district of Batúm terminates. The Adjarah-Sú, coming from the E., here unites with the Jorúk, and forms the boundary between Majhal and Batúm. Our road now passed along the slope of a rocky hill, and continued so for nearly an hour, after which, gradually ascending, we came to the small village of Miruvet, situated at the mouth of a ravine by the river's side, and containing five or six houses. On the opposite bank of the river is another village, called Maghul Ispir, containing from

thirty to forty houses, and the ruins of a large building, which belonged to the agha of the place, but was destroyed by Bahir Pasha on account of its owner, a partizan of Kior Hussein Bey's, having resisted the pasha's troops during the bey's revolt. A curious fact connected with this was related to me by a native of Miruvet, and afterwards repeated to me by several other persons. I mention it as tending to show how little Hafiz Pasha could depend on the troops sent by Osman Pasha to co-operate with him in subduing Kior Hussein. While the latter was at Majhub Ispir with his followers, Uzunoglu Mehmet Agha, the commander of Osman Pasha's troops, came to Miruvet; it was agreed between Kior Hussein Bey and Uzunoglu that a feigned engagement from the opposite bank of the river should take place, but that neither party should direct their fire on their opponents. The men maintained a constant fire for two days, and of course without a shot taking effect. The troops, who were apparently enemies during the day, crossed the river in boats in the night, and feasted together.

On leaving Miruvet we proceeded by the side of the river for an hour and a half, which brought us to Maradít. Maradít is a large village, possessing a bazaar of about seventy shops, built around a quadrangle. The village itself is on the top of a hill, half an hour distant from the bazaar, which is situated on the banks of the river. The village has been placed in this position to avoid the effects of the fever, which in the hot season prevails near the water. The shops at Maradít were supplied in small quantities with almost every kind of European manufactures consumed in these countries, as shawls, prints, calicoes, striped nankeens, and handkerchiefs. The shopkeepers usually purchase their goods at Trebizond, excepting one or two of the most wealthy, who visit Constantinople once a year. Close to Maradít I met sixty natives of Artvin and its neighbourhood proceeding to Khoppa, on their way to Trebizond, to embark for Constantinople in the steamers. These people resort to the capital to work there as labourers, and when they gain a little money, return to their families, with whom they reside until their cash is finished, when they again resort to the capital to earn more. This is a common custom among the inhabitants of Livaneh, and other districts in the Pashalick of Kars. On an average 150 persons a month, either going to or returning from Constantinople, pass by Maradít, which is reckoned 6 hours from Batúm.

I left Maradít at 3 o'clock, and continuing along the banks of the Jorúk, which are here flat, for about 4 miles, saw the village of Hebba on the eastern bank; opposite this village the road turns a little to the W., and ascends the slope of a mountain for half an hour, after which it descends again rather rapidly to the

opening of a ravine, where Kadapha is situated. We reached this village at 5 o'clock in the evening. It is reckoned 8 hours, or about 24 miles from Batúm. There being no coffee-houses or other public places in the village, in which travellers can rest, they are obliged to have recourse to the hospitality of the natives, who, differing in this respect from those of other parts of Lazistan, are famed for their civility to strangers. The natives of the valley of the Jorúk cannot, however, properly be called Laz, although the villages on the western side are included in Lazistan, yet both in language and habits they resemble the Georgians. They are Mohammedans without any mixture of Christians. I took up my lodgings for the night in a large stone house, belonging to the Mukayid, or registrar of the village, who hearing while I was at Maradit of my intention to stop at Kadapha, had prepared a room for me. I learned from him that this village is composed of upwards of 200 houses, about half of which are close to the Jorúk, and the remainder scattered in the neighbouring ravine, through which runs a torrent into the Jorúk called the Kara Dereh Sú.

The inhabitants of Kadapha collect a little wax and honey, and grow a small quantity of wheat and barley; but owing to the mountainous nature of the country in the neighbourhood, the produce is insufficient for their consumption, and they resort to Batúm in winter to gain their livelihood by labour.

I left Kadapha next morning at half-past 5 o'clock, and in 10 minutes after passed Mirkuvet, a village containing about fifty houses. Our road lay through narrow fields, between the Jorúk and the foot of the mountains on our right. It continued so for nearly an hour, when turning a little to the W., it became very narrow, and ascended the mountain by a very steep path for about a quarter of an hour. After this our course became S. again, along the slope of the same mountain, the road being still narrow and rocky. We rode for nearly 2 hours, when we reached at 9 A.M. the large village of Botchka, situated on the side of the mountains; here I stopped to breakfast. The distance is called 2 hours, but the difficulty of the road rendered our march so tedious.

Botchka contains from eighty to a hundred good-sized houses, several of which are of stone and built in contact with each other. There are but two or three shops in the village, and they are supplied with European goods. The natives employ themselves in making bricks and earthen jars, with which they supply the whole coast between Rizeh and Choruksú, and they act as boatmen on the river. In their calling they are considered very expert, and their village furnishes about thirty boats, which ply on the Jorúk, and to Khoppa by sea. The total number of boats on

the river is about eighty; of these, Botchka furnishes thirty, Maradít twenty, and other places thirty more.

We left Botchka at 9½ A.M., and a few minutes after passed an old fort, said to be Genoese. It is placed at the opening of a valley, through which flows the Itchkaleh Sú, coming from the W., and falling into the Jorúk. We crossed the stream by a stone bridge, and in a quarter of an hour reached Zituret. Large quantities of tiles are here manufactured, and from hence the whole coast of Lazistan is supplied. A mile beyond it we crossed another stream called the Murghur Sú, also emptying itself into the Jorúk from the westward. This stream forms the boundary between the province of Lazistan and that of Livaneh, which we now entered. The road turns slightly to the E., and continues in this direction for about 2 miles, then leaving the banks of the Jorúk, it winds off to the westward over a hill, on which is situated Dampal, containing about twenty houses. After riding through the village, we turned towards the river again, reached its banks in 20 minutes, and proceeded along them in a south-south-easterly direction till 12½, when we came to a deserted khan called Omana Khan. Our horses having lost nearly all their shoes from the rocky nature of the roads, we were obliged to stop here and shoe them afresh. This operation I was forced to perform myself, and knowing there were no farriers on the road, I had brought with me the necessary utensils. The horses shod, we continued our route in a southerly direction through some ploughed fields. Directly we got out of these, a steep ascent commenced by a narrow road, and we continued along the slope of the mountain, either ascending or descending, for 2 hours, when we passed by a stone bridge, a stream called Hatil Derreh Sú, and from thence by a similar kind of road reached Artvin at 5 o'clock in the evening. The distance from Botchka to Artvin is 8 hours, or 24 miles.

The town of Artvin is on the western side of the valley of the Jorúk, and built on both sides of a ravine, which runs down to the river. It has the appearance of a large village, most of the houses being built of wood, and separated from each other by gardens planted with mulberry and olive trees. There are a few well-built stone houses belonging to Turks, but these are at some distance from the rest, at the mouth of the ravine, where is situated the Mohammedan quarter. The largest edifice in the upper part of the town is a newly-erected Catholic church. The greater portion of the expense of constructing this church was defrayed by an Armenian Catholic banker at Constantinople. This person was originally to have borne the whole cost of it, but the Catholic bishop having had it built on a larger scale than intended, the sum of 2000*l.* furnished by the banker was insufficient, and the natives, not to leave the thing unfinished, were obliged to contri-

bute 1000*l*. more. This even would not have sufficed, had the latter not lent their gratuitous assistance in carrying the stones and timber from the neighbouring hills. In doing this, even the women aided, and a Turk told me that it was astonishing to see with what zeal and perseverance they performed their labour. The building is entirely of stone, about sixty feet long by twenty-six wide, lofty and light, with a vaulted roof, and, without any pretension to architectural beauty, is, nevertheless, a creditable performance.

Artvin is the capital of the district of Livaneh, and contains 1000 houses; of these 606 are Turkish, 334 Catholic, and the remaining 60 Armenian. The total amount of population in the place is reckoned at about 5500 souls. The Catholics are more numerous than the Turks, although their houses are fewer. This is owing to the custom prevalent with the Turks, of sons separating from their parents as soon as they marry, whereas the sons of the Christians continue under the parental roof after marriage. The Bazár is situated at the upper end of the ravine, and consists of about two hundred very small and mean shops in a narrow and dirty street. There are also two or three coffee-houses, in which travellers lodge, as there are no khans. The shops are scantily supplied with European goods, as the consumption is limited, the natives using for clothing, cotton stuffs manufactured here by the Catholic Armenians. The native manufactures are a coarse cotton cloth called *shilleh*—sometimes dyed red, and used for shirts and aprons by women; but, when undyed, by men; a striped cloth called *manissah*, used both by men and women; and towels and bath cloths: all these are made with British cotton twist, which forms the principal article of import at Artvin. The quantity consumed annually amounts to about 2000 batmans, equal to 33,000 lbs. English, which native merchants bring from Constantinople. The trade of Artvin lost its importance when the Russians prohibited the entry of European manufactures into Georgia. Previous to this an active intercourse was carried on with Ahkiska, which was supplied with many articles of British manufacture through Artvin. This year the depression in the trade was greatly increased by the scarcity of wheat and barley throughout the country, in consequence of which horses were nearly starved during the winter, and unfit for carrying burdens of any sort. Goods could not be transported from Artvin to Erzurúm, a distance of 42 or 45 hours, even by paying eight times the price of other years. The scarcity was felt more severely in the district of Livaneh, because even in plentiful years it is dependent on the neighbouring provinces for wheat and barley, as the mountainous nature of the country does not afford sufficient arable land to produce the required supplies, notwithstanding every foot of ground

is cultivated which can be so by any degree of labour, and it is extraordinary to see spots which are apparently inaccessible bearing crops.

The musselim of the district of Livaneh resides at Artvin : he is a miralai or colonel, and was left there by Bahri Pasha of Kars, who lately visited Artvin to inquire into the conduct of Yussuf Bey, the then musselim, accused of having extorted a sum of 300 purses, or 1500*l.*, from the natives. The pasha, finding the accusation proved, obliged Yussuf Bey to return the money to those from whom he had exacted it, removed him from his post, and named Mustafa Bey, the present musselim, in his stead, with a salary of 30*l.* per month. This sum is to be levied from the inhabitants of the district. The Artvinlees were well pleased with the arrangement, as it relieved them from the extortions of the native beys, of whom there are several, and to whom the government of the district had been hitherto confided. The beys, however, long accustomed to be uncontrolled by a musselim chosen from among themselves, finding they could not under the present one act as they pleased, formed a scheme to get rid of him. On a report of Bahri Pasha's removal from Kars being spread at Artvin, they persuaded the natives of the villages, naturally a turbulent set, to refuse contributing their quota to the salary of the musselim, and to threaten him with a revolt if he did not leave Artvin. They were on the point of acting up to their threat while I was at Artvin, but hearing that Bahri Pasha was confirmed in his post, they abandoned their plans, and the day before I left, went to the musselim and expressed a repentance of their proceedings. The musselim told me that this was an act only prompted by their fear of the pasha, and that he was sure they would recommence their intrigues again were they to learn the probability of the pasha's removal. Under a lax administration, the beys were the instigators of all the disorders which occurred in the country ; but by the vigour, activity, and disinterestedness displayed by Bahri Pasha, he succeeded in gaining a complete control over them, and was both respected and feared.

The district of Livaneh counts altogether 130 villages, and contains, including those of Artvin, 8000 houses. Its exports, besides shilleh and manissah, are butter, wax, honey, and olives, with a little oil made in the neighbourhood of Artvin, where the olive-tree thrives. A very small portion of the olives are, however, pressed ; it being more profitable to salt them, as in that state they are much sought after for exportation to Ahkiska. The climate of the district, near Artvin in particular, is very mild ; and winters sometimes pass without any snow falling, excepting on the summits of the mountains. The heat in summer is, however, said to be very oppressive, the place being surrounded by hills and

mountains of limestone. The atmosphere at the upper part of the town is disagreeably dry, whereas the inhabitants of the lower portion complain of great dampness. The distance is about a mile and a half, on a steep ascent.

I lived while at Artvin with the Catholic bishop, a native of Bitlis, but brought up at the Propaganda at Rome; his name is Salviani: he is an intelligent person, has travelled in Europe, and is much respected by the native beys and Turks, over whom he possesses great influence. The entire management of the affairs of the Catholics is confided to him, and the musselim hardly ever interferes. The bishop decides their lawsuits, and has the power of punishing them by fine, imprisonment, and the bastinado.

On quitting Artvin I descended to a bridge over the Jorúk below the town, and engaged a boat to take me to Batúm for the sum of 60 p. = 12s. The boats cannot navigate the river higher up than this bridge, on account of rocks in the middle of the stream, which is in that part only 15 or 20 yards broad. I embarked in the boat at 6 o'clock A.M., and reached the mouth of the river at half-past 3 in the afternoon, having landed for half an hour at Maradít, so that we came a distance of, I should think, 55 miles in nine hours. There being a heavy sea on, the boat could not get out of the mouth of the river; I therefore landed, and mounting my horse, which I had sent from Artvin the day previous, rode into Batúm in two hours.

The Jorúk is neither so broad nor so large as I was led to expect by report. It is true that when I came down, the river was in its smallest bed; but in many parts between Botchka and Artvin, its banks rise in abrupt acclivities, attaining the elevation of mountains, so that the water cannot spread between them. The depth at this season varies from 8 to 2 feet, but in the melting of the snow it rises perhaps 20 feet where the bed is confined; and, where not so, it increases in width 200 yards. The width now in most parts was 40 to 50 yards. Rapids occur at almost every turn on first starting from Artvin, near which place there are also two or three falls of $1\frac{1}{2}$ to 2 feet: the frequent occurrence of rapids requires very expert management. I experienced considerable apprehension on approaching these places, until I had passed two or three of them. It appeared as if the boat would inevitably be dashed in pieces at every turn, but I gained confidence after witnessing the skill of the boatmen. Accidents are, however, of frequent occurrence; and last autumn a boat, with twelve persons in her, struck against a rock at a rapid, went to pieces, and every soul in her was drowned. The boats used on the Jorúk are flat-bottomed, about 50 feet long, sharp at both ends, 4 to 5 feet broad in the centre, drawing 15 to 18 inches when they are fully laden, and carrying from 6 to 8 tons weight. At

present the boats are chiefly employed in transporting bricks, tiles, and lime. The latter is made in villages on the mountains bordering the valley of the Jorúk, wood being more plentiful there than close to the water: it is brought down to the river's banks on horses. Occasionally iron and other merchandise are sent up the stream from Batúm; but traders with goods destined for Artvin, coming from Trebizond or Constantinople, prefer landing them at Khoppa, whence they are conveyed overland. The distance from Khoppa to Artvin is only 18 hours. Were the road from Batúm to Artvin made wider in some parts, I am of opinion that land-conveyance would also be adopted for the goods sent up from thence, both as the more expeditious and less expensive mode; but with the roads in their present state, this would not be practicable, as in many parts of them a laden horse cannot pass. The country people, who sometimes bring down produce from the villages, are obliged to unload their horses and carry the loads on their backs when a pass of this sort occurs. This proceeding would be too dilatory and troublesome for a caravan of merchandise; and the drivers cannot stand the fatigue when it is often repeated, as would be the case on this road.

The rapidity of the current, the sharp bends and rocks, are, I think, insuperable obstacles to the navigation of the Jorúk by a steamer—an idea I was led to entertain by reports of its size. The numerous rapids between Botchka and Artvin would at any rate render it impossible for a steamer to proceed higher up it than the former place, which is but a little more than half way; and an enterprise of this nature would on that account prove of but trifling utility to commerce.

The valley of the Jorúk, as far as I explored it, does not afford important resources for trade, as the people generally are poor, and the country unproductive. It is too mountainous to supply cattle or to produce grain for exportation; and the only exports beyond the insignificant articles mentioned might be fir timber, for which the Jorúk offers a great facility; but this branch is neglected.

A steam communication between the capital and Batúm would, in time, probably tend to give this country an active transit commerce, and Artvin might become the channel of a transit trade with Persia, as by landing goods at Batúm, and from thence passing them by Artvin, Kars, and Byazid, there would be economy both in expense, in distance, and time. I cannot exactly state what may be the difference between this road and that by Erzrúm, but a Georgiap once told me he estimated the journey would be curtailed about seven stages. The situation of Artvin with respect to Kars, and Ahkiska, Erivan and Gumri would doubt secure for it the transit trade of these places.

There is a tradition that in old times caravans for Persia did go by Batúm, and from thence through Artvin or Adjarah; but I could not trace the tradition to any authentic source, although it is in the mouth of every one. When questioned on the subject, no one can state more than that he had heard such was the fact.

The mountains near the Jorúk are mostly limestone, and, like the Taurus, may possibly be metalliferous; but I cannot state so from my own knowledge, being ignorant of mineralogy: there are, however, no mines actually worked in Livaneh or the neighbouring provinces.

IX.—*Exploring Excursions in Australia.* By Mr. HENRY STUART RUSSELL.

[THE following account of some Exploring Excursions made by Mr. Henry Stuart Russell, and his brother Mr. Sydenham Russell, is taken from a rough Diary, and Letters to their Mother, and from a letter addressed by Mr. Glover to Rear-Admiral Sir Charles Malcolm, by whom the narrative has been arranged, and communicated to the Society; with a short description of the country to which it relates.]

The Darling Downs, which from their extent, fertility, and beauty, may be ranked amongst the finest districts of Australia, are situated on the western slope of a portion of the great mountain range which runs nearly parallel to its E. coast. They were discovered by Allan Cunningham, who did not however proceed further north than the Condamine, on the western side of the range; and only took a bird's-eye view of them from a height. Their mean elevation at the station of his tents, in the valley of the river, he determined to be 1877 feet; but Mount Mitchell, the highest peak of the range above them, rises to 4100 feet. Mr. Cunningham looked upon the Condamine as the southern boundary of the Downs; but the settlers now place that river further to the S., at Herries's Range, which runs nearly E. and W., making the Peel and Canning Downs of Cunningham to form part of what are now called Darling Downs (though a strip of scrubby land intervenes between them and the river). From Herries's range they extend northward to lat. $26^{\circ} 50'$, six miles beyond Jimba,* at present the most northerly station. Their breadth may be estimated at from 30 to 40 miles, sloping gradually from the great eastern range down to the Condamine.

A stream which rises about 10 miles S. of Cunningham Gap, is considered to be the main source of the Condamine. It passes about 20 miles to the S. of Hodgson's Station (Mr. Russell's

* Scougall's station, called by the natives Jimba, which name we shall retain.—C. M.

point of departure); and, after an irregular course, empties into a lagoon having no apparent outlet, and which lies at a direct distance of about 60 miles W. by N. from its head. From information obtained from the Hon. W. Wrottesley we learn that many streams join the Condamine on its way—the principal one from Herries's Range—and that its direction is to the S. of W., as far as the junction of Canal Creek, below which the road turns off to Sydney. He states that, "as far as he knows the river, it is a chain of ponds and reaches through which there is a perceptible current;* the ponds are separated from each other by necks of land ranging from a few yards to miles in length, and beneath which the water forces its way. The reaches are generally deep, with high reeds fringing the edges of their banks. The waters of the Condamine are clear and pure to the taste; but more to the southward the western rivers are often brackish."

Such are the distinguishing features of the country that borders the western side of the dividing ridge, from Herries's Range on the S. to a little beyond Jimba on the N. The district on the eastern side is of a very different character. Its breadth from the base of the range to the sea may be estimated at from 50 to 80 miles: and the following description of it is given by Mr. Russell, from a journey he made in February 1841, from Darling Downs to Moreton Bay, which is the only sea port accessible to the settlers for shipping the produce of the western country for Sydney, and for receiving returns from thence.

After ascending by a gradual rise from the Darling Downs to the summit of the range, the descent on the eastern side is by the most dreadful road it is possible to imagine; the drays descend by means of ridges or spurs thrown off from the main range; one would scarce believe that the bullocks or horses, much less drays, could descend or ascend some of the ridges we travelled over; this is the great obstacle to settlers on the Downs. Some of the different "pinches" through and down which a dray has to go have received appropriate names, such as Hell-hole, &c. When the drays go down, the wheels are locked together, and sometimes heavy trees are fastened on to lessen the rapidity; even then the weight sometimes overpowers the pole bullocks, and away bullocks, dray and all go to destruction. Twenty-six bullocks have frequently to be yoked to one dray. This sort of country continues for 6 miles, and causes much expense from the continued smashing of drays. In it several rivers take their rise; some,

* In Australia the minor rivers are seldom in continuous streams. Where the soil is soft the water forms for itself a deep hole, from which the current flows partly under ground, partly above into another hole of the same description: so that in dry seasons what is called a river is in reality merely a chain of ponds, similar to a series of fish-stews in England, without any visible connexion.

like the Brisbane, are navigable for small craft. Having got down this formidable road, says Mr. Russell, and reached the plains, our way lay through a verdant though rather uninteresting flat country. In a few days we arrived at the station belonging to the Government overseer, Mr. Thorne, who takes care of all Government stock, farms, &c. It is called Limestone,* and is about 60 miles from the Downs. It consists of merely the overseer's house, situated high upon the bank of Limestone Creek, which runs into the Brisbane, on which a penal settlement is established about 25 miles beyond this. These settlements are formed generally at a distance from the colony as places of punishment for men who have been convicted of some crime in the colony, and here suffer a colonial sentence: they can only be entered by leave of the Governor. We stopped at Thorne's this day, and visited another Government farm about a mile distant, called the Plough Station, and here saw fine crops of maize, but the wheat had totally failed. The usual plan adopted in Australia of ploughing-in the grain was not followed in this case; it was merely harrowed-in, and the consequence is that the seed can get no root, the heat turns the uppermost soil into dust, and the grain cannot settle, so that in a dryish season wheat has no chance. On the Darling Downs we seldom killed wethers under 70 lbs., or beef under 7 cwt.; while here a sheep weighs barely 40 lbs., and a bullock is reckoned good at 5 cwt.

The next day we proceeded to Brisbane Town; and passed two Government stations on the way, one for sheep, the other for cattle, both under the charge of prisoners working hard for their ticket of leave, or temporary freedom. The country has nothing but gum-trees, and a shrub which emits a most peculiar nauseous odour. After 4 hours' ride we saw Brisbane Town, which at first sight is very pretty, and situated upon the opposite bank of the river, a large stream 360 yards broad, with 4 fathoms water at high tide. The town is about 40 miles from the bay, which extends 15 miles further before it reaches the open sea. The first houses seen from this side of the river are the Government stores, and close by the water-side is a large stone building; above and along a pretty esplanade facing the river are the military barracks, commandant's house, and the hospital. At the back, away from the water, were various houses, the postmaster's, superintendent of works', and female factory, in which the female prisoners were formerly confined; the latter, as well as the prisoners' barracks, were at this time empty, the prisoners having all been sent back to Sydney, the district being about to be thrown open for public sale. The squatters have greatly bene-

* From some good limestone rock which is plentiful there.

fited this part of the colony; they have explored this fine tract of land, and have formed a line of road over a most difficult country from the Darling Downs to Moreton Bay.

[*The following is an account of an expedition from Darling Downs, down the Condamine, through a country previously unexplored.*]

On the 23rd of October, 1841, a party of four, viz., my brother Sydenham, Glover, Isaacs, and myself, left Hodgson's station with two pack-horses, besides those we were riding, with provisions of flour, &c., for a fortnight. Our object was to find a run for our sheep and cattle. We went northward for about 60 miles, when we reached Jimba, having crossed several creeks, or streams, running W. This station we immediately left, and entered upon land hitherto unknown. Our course was N.W., over some excessively hot and dry plains, the reflection from which was very painful to the sight; Sydenham was terribly blistered; and although the sun had not this effect on me, it burnt any exposed part almost black. As evening was closing in, we feared we should have to pass the night without water, of which by this time we all stood greatly in need. I was for changing our course, so we altered it from N.W. more W., and soon beheld a beautiful reach of the river we were in search of, the distance from Jimba being, as near as we could judge, 40 miles; from this reach there was a continued water-course, which I had no doubt was the Condamine. We followed the river down for 5 days, say about 100 miles, in a N.W. direction, when the country becoming flat, without ridges, and covered with a baramba, or bastard rose-tree, we halted; and having satisfied ourselves that there was little or no chance of finding a good run in this direction, we turned back; and reached Jimba in three days. Here we separated, my brother and one of the party returning home; Glover and I made a harassing attempt to cross the eastern range, and reach Wide Bay, but in this we failed; and our horses being knocked up in the thick scrub, we returned to the Downs. I was very unwell after our first trip, from having caught cold when encamped: it had rained three days and nights, accompanied by terrific thunder-storms. The effect of the lightning on some immense trees was truly awful; it rent them asunder like twigs, sending the enormous branches to a great distance. Our blankets were wet through, and the grass, which was as high as the saddle, was not a very dry berth.

[*This endeavour to discover a run having failed, it was necessary without delay to make another attempt; and Mr. H. Russell being too unwell to encounter fresh hardships, it was undertaken by his brother, Mr. S. Russell, from whose letter to his mother the following account of its success is obtained.*]

Having accompanied my brother Henry in his late unsuccessful expedition, in which we struck upon what we conclude to be a portion of the lower course of the Condamine, I set out, soon after our return, to explore the country in another direction, Henry being unable, from illness, to join me. I left Hodgson's Station on the 7th of November, 1841, accompanied by Isaacs, a capital man for the bush. My object was in the first place to discover, if possible, the reappearance of the Condamine, after losing itself in the lagoon, being persuaded that as the latter had no visible outlet for the waters it received, they must escape by some subterraneous channel, and might somewhere be found to reappear upon the surface. On the second day we reached Taylor's Station on the lagoon, which is 7 miles in length, and having followed it up to its furthest extremity, we shaped our course from thence in a direction, as nearly as we could judge, the same as the river had held before it fell into the lagoon.

At the end of one day's journey we came upon a small gulley across which we could jump; this gradually widened, till it broke into a deep, rocky river-bed, on both banks of which was a fine, open, grazing country; and here we took up thirty miles on either side, marking two trees with our initials, as having taken possession by right of discovery; which would prevent any one else from settling on it within three months from the date of the licence given for it by the commissioner of the district. It requires one to be well acquainted with the peculiar nature of the rivers in Australia to trace out their true course, for some of them, particularly in a dry season, present only long reaches, or mere pools, and are here and there entirely lost; though there are others which have a full stream throughout the year, such as those on the eastern side of the Great Range, which run into the sea. This river is a very fine one for this country, its direction is first N.W. and then more northerly, of course not running, except in floods, but having beautiful long reaches, with deep water, and fine large lagoons branching out of it.* The country on the W. side, though not hilly, is undulating, on the E. flat and rich, the best for pasturage. There is plenty of the best kind of timber, iron-bark, blood-wood, pine, swamp-oak, and, the best I think of all building-woods, stringy-bark; in fact we have found a most beautiful spot for our head-quarters, with this great advantage, that we shall not be troubled by the natives, as they never harbour where the country is open; and we have no scrub on our station. By the bye, when we were following down the river we came suddenly on a native encampment:

* Lagoons are small lakes lying off from the main stream.

strange to say, we were within twenty yards of them before either party saw the other; I galloped up to them, when they one and all bolted into the river, leaving their opossum cloaks, spears, bommerangs, tomahawks, and all kinds of things at our mercy. I bawled out "Bel coolot," which means "not enemies;" and after a short time they came over to us, but we could not make them understand, although we had a native boy with us, but he was of another tribe, the languages of the tribes are so different. Their spears are about 15 feet long, some slender, some very heavy. They can throw them 40 yards, and can hit anything. The mulla-mulla is the worst weapon; it is a short club about 2 feet long, which they throw with awful force. On our return, the report we made of the country was hailed with joy. We have called our new station, after you, Cecil Plains.

[In the month of April, 1842, circumstances took Mr. Russell to Moreton Bay; and being anxious to visit Wide Bay, of which little was known, a party was formed for exploring that part of the country. The following are extracts from his journal:—]

Brisbane, April 27th.—Our party for exploring Wide Bay consists of Mr. Petrie, the superintendent of Government works here, Mr. Jolliffe of the navy, and the Hon. Mr. Wrottesley, with seven convicts to man the boat. We expect to have some trouble with the natives, of whom we know nothing beyond their having murdered the crew of the 'Stirling Castle,' wrecked there some years ago. We hope with a fair wind to reach Wide Bay in three or four days. It is rather a hazardous experiment in an open boat, only 32 feet in length, along a coast where heavy seas prevail.

May 4th.—Having completed our preparations last night, at 4 A.M. we embarked, with the addition to the party of two natives as interpreters. We pulled down the Brisbane, receiving three cheers from such as came to see us off. We were well armed, and had nothing to fear but gales and rough seas; we therefore felt comfortable enough. At the mouth of the river we caught a fine S.W. breeze, when, making sail, we ran through the bay to the N. passage, between Cape Moreton and Brady's Island. Our intention to land in the evening was prevented by the wind rising, and with it a considerable sea. We now found our boat by no means fit for heavy seas, and began to look out anxiously for the northern point of the island; it got too dark, however, to see it, and being afraid of running among the breakers, we anchored for the night, although the clouds to the eastward had a threatening aspect.

5th.—After all we had a fine night, but a jumping swell by no means easy to sleep upon. I managed to curl myself like an opossum in the stern sheets, and had a good nap before my watch

came. At dawn made sail with a fair wind, making the mouth of the Morouchidore (or Swan River), the farthest point N. as yet explored. Here we meant to land, but were again doomed to disappointment, there was a double bar across, with heavy breakers, which we could not venture through, for fear of the boat being swamped in the surf, so, continuing our course, we rounded a point of head-land, which we named Petrie's Head. Took the bearings of several remarkable mountains inland with a Kater's azimuth, but found to our great vexation the sextant had been forgotten. Petrie, who had come out with the intention of laying down a chart for Government, was much annoyed. We continued to run three or four miles from the coast at a good rate, and towards evening came to a headland, which formed a small deep bay. This we supposed to be the Harvey's Bay of Navigators. We were not a little delighted at the prospect of getting ashore for a night. Immediately on entering the bay we saw a great number of the natives emerging from the bush, and running unarmed along the beach to meet us; but there was still too much surf to run the boat on shore, so we anchored as near as we could, when they immediately rushed through the surf to us, one of them carried Petrie on shore on his back, and I mounted another. As soon as we landed they began to examine our countenances to see if we were frightened. It is a remarkable thing that if they cannot trace fear in the face of a white man it returns upon themselves, and in this instance two or three strapping fellows tried to conceal their fear by laughing long and loud, whilst trembling in every muscle of their legs and arms. These blacks knew a good deal about white men by report, and in this very tribe we understood there was a runaway convict who had been living with them ten years; on hearing this, Petrie was anxious he should join our party, considering he might become not only useful as an interpreter, but able to give us good information of the country and of the native tribes. When extreme severity prevailed in the penal settlements, many convicts ran away into the bush, to chance their lives amongst the natives rather than suffer a living death whilst undergoing the punishment of their crimes. Many had been immediately speared from going to them with their clothes on, the natives being ignorant of what clothes are, supposed a clothed man to be some strange creature. As soon as we got our arms on shore we gave the natives a biscuit or two, and told them all to be off, which they did not seem to like, detaining, however, two as hostages; the blacks we had brought with us were in a great fright. Kept a careful watch throughout the night.

6th.—Petrie wrote a note to the runaway convict, and persuaded some of the natives to take it to him at their encamp-

ment about 20 miles distant. We waited anxiously for a time, and in the afternoon saw two or three men coming along the beach towards the bay. By the telescope we could distinguish the runaway, looking as much a savage as any of them, with his spear in his hand. Petrie and Wrottesley took their guns and went to meet him. Jolliffe and I staid to guard our camp. The scene at the meeting was curious; the man could not recollect his own language for some time, but he afterwards told us that when he saw the note, although unable to read it, he knew that his countrymen were near, and felt overjoyed at the chance of returning once more among civilized men. When pressed to join us, and return to Moreton Bay, the cruelties he had suffered filled him with dread, and it was long before we could persuade him that it was no longer as when he had left; and being at last convinced by what we told him, he expressed his willingness to work his best if they would not flog him, and to make himself useful as interpreter between us and the natives. His name was Bracefelt, but he was called by the natives Wandî, from a fancied likeness to a man who had died some years before, the son of one of their fighting men, upon whom he was thus fathered, and his life saved. He could speak four different languages of the natives, and had been in the habit of taking his part in the fights between them, but never could be persuaded by them to turn cannibal. He was soon washed and clothed, and in a few days became perfectly satisfied, and seemed glad to have been rescued from his *black* life.

7th.—We took some observations northward from a high point jutting out into the sea, upon which we supposed Brown, of the 'Stirling Castle,' to have been murdered by the natives some years ago, on which account we called it Brown's Head; but subsequently, on information from the natives, finding ourselves mistaken (Brown having been killed 45 miles N. of where we were), we called it Bracefelt's Head, it being the place where Bracefelt had joined us. No actual survey having been made of the coast, of course we were fully justified in naming places as we thought fit; the names that Petrie marked down will be duly printed in the Government chart. By the assistance of Bracefelt we took down the native names of the mountains seen in the interior; Mandan, Carura, Coollimew, Coura, Yure-Yuro, Eirange, and Boppol are the most remarkable.* The natives are so observant of every thing in nature connected with their own peculiar run, that they have a name not only for every tree, shrub, grass, flower, bird, beast, or insect, although every tribe differs in

* These mountains are volcanic. We could also see, a few miles inland, some large lakes, which Bracefelt told us were salt, having communication with the sea.

its language, but they know every piece of ground in the same district by its own peculiar name, every mile of river bears its own appellation from the source to the mouth, and the mouth itself has always a name of its own. These are the streets and roads through the bush, by which they can direct each other almost to within a hundred yards of the intended rendezvous.

8th.—Fair wind and fine weather. A pair of trousers belonging to one of the crew were missing this morning. The guilty one took care to get away, and we saw little more of our black friends, as they were evidently afraid of our resentment on the discovery of the theft. The coast which we ran up for about 35 miles was steep and sandy, native signals in every direction; in the evening we came to a headland, which we soon found to be the scene of poor Brown's death, and landed without seeing any natives; altogether this small bay seemed to be the very picture of solitude and desolation. We named the northern headland which formed the bay Brown's Cape.* From this cape we could see the mountain called Boppol bearing N.W., as also the southern entrance to Wide Bay, formed by the main and Sandy or Frazer's Island: it bore N. by E. about 5 leagues. This was our desired point. All the charts, including that of the Admiralty of 1835, are so inaccurate as to satisfy us that they have been laid down from vague report, certainly not from survey.

9th.—Sailed away with a fresh wind towards the S. entrance of Wide Bay, the natives following us on the beach. On nearing the entrance we found a sandy spit running out a mile or more from the main, round which we should have gone, instead of keeping so much in-shore; by this mistake we were in the surf, which was breaking very heavily, before we knew where we were. As it was, it looked unpleasant: had we been swamped the natives on shore would have made a good dinner of us. Finding ourselves in amongst the breakers, we out oars and soon got out of our peril, and ran at a splitting pace into one of the most beautiful harbours, to look at, one can fancy. Frazer's Island, which forms Wide Bay, or more properly speaking, "sound," for it is 25 miles long, runs nearly parallel to the main, trending more easterly towards the northern extremity, thereby leaving a wide open entrance. At the southern extremity the island is not more than three-quarters of a mile from the main. A spit of sand comes out both from the island and from the main; but by not attempting to run in until the round mountain, called Boppol, is well open, between the two shores, the channel is clear and good, with at least 6 fathoms water. We landed on the main,

* Off this lies a dangerous rock, just showing itself above water. It is about 350 yards N.N.E. from the headland. We always found a strong current setting to the southward.

on a beautiful sandy beach, near a camp of natives, who all deserted their gunyas immediately on our approach. We saw a canoe coming from the island. The canoe is called condol by the natives: it is nothing more than pieces of bark tied together with ropes also made of bark. Some went to examine the land, some to look for water; I waited for the canoe, and after some hesitation, on cooing to them, they approached unarmed to where I was. They wanted me to go and visit their camps and see their gins (wives), but, not being quite sure of my new acquaintances, I declined. The water party now hove in sight, and Bracefelt, who had lived also with this tribe for some years, brought one with him to tell us all about the bay. The rest of them now came forward, and were very desirous to exchange names, the greatest compliment you can pay them. They rub their noses with their finger, and mention their name, and you are then expected to follow the example by rubbing your nose and mentioning your name; then rub again with names exchanged. I sung a song in English, to which they listened with the greatest gravity and attention, as if understanding every word of it, beating time by slapping their hands upon their thighs; on finishing they all burst into a fit of laughter. I dare say they thought it was a war-song, but it was "Oh, dear, what can the matter be!" They offered me the greatest present they could think of, some native human bones, which they take great care of, and from which they had lately peeled the flesh: I declined the intended delicate present. Having taken in our water, we sailed up the bay about 10 miles along Sandy Island, which we named Frazer's Island, after the captain of the 'Stirling Castle.' We landed on it, and encamped for the night. From this we could see the mountains near which we had encamped on Brown's Cape. This mountain Petrie, the day before, had named, after me, "Russell's Cap," from some resemblance it had to a "wide awake" I was wearing. It was very high, and a remarkably good land-mark from sea.

10th.—No wind, up before the sun, and pulled out. We had not started 10 minutes before we were enveloped in a dense mist, and lost sight of the island, though close to it. Anchored in the main channel, and attempted, but in vain, to catch some fish with salt pork. We could hear the cooings of the natives in the mist, they seemed to be all around us, little dreaming they were so near such strange neighbours; secure, however, in our invisible position, we disposed ourselves to sleep till the fog should be dispersed; I soon woke up again, and finding we were still in the clouds, and all but myself asleep, I amused myself by watching the king-fish in pursuit of small fry, and in attempting to get a shot at some enormous turtle that now and then put their heads up, and went down with a splash like a porpoise.

Turtle-soup and steaks floated before my eyes in aldermanic grain-deur; but my hopes were never realized. At about 12 o'clock the sun "biggie" made its way through the thick mist. The water was smooth as glass, and it appeared to be actually steaming; to our delight and astonishment in a few minutes every vestige of mist disappeared, and rolled over to the southward. In the afternoon a strong north-wester set in, and we were forced to pull against wind and tide; our two native interpreters we now found knew no more of Wide Bay and its rivers than we did; we went poking about in different quarters, trying an inlet here, and an inlet there, till we found ourselves bewildered amongst numerous islets and shoals. From Frazer's Island westward to the main, at this part, is about 5 miles; the bay is filled with low muddy islands covered with the mangrove, and with mud banks uncovered at low water. In fact any one channel is so narrow at low water that I doubt much whether the southern part will be found accessible to anything but steamers of small draught. Here we nearly succeeded in procuring the most perfectly beautiful specimen of the gigantic crane I had ever seen, but he took wing just before we got within shot of him. We landed for the night on one of the small islands that had been so puzzling to us: the fire-flies were so numerous that the scrub seemed to be alive with them, the brilliant light (which was the more beautiful from its not being a continued stream, but emitted at intervals of a few seconds, as they flew about), is a bright blue spark, lighting up the space around for the distance of a foot. On this islet we were surprised to find a great quantity of pumice-stone, although the islands themselves were evidently formed by deposits caused by the tides meeting the outpouring of some river.

11th.—This morning we once more attempted to run through the maze of shoals and islets, but were unsuccessful, and returned to our night quarters. Wrottesley proposed to call them "Humbug Islands." Seeing a large fire on Frazer's Island, we started off for it under sail and reached the spot in an hour; here we found many natives, who flocked down to see us, and helped us to get a supply of water. Leaving a party with the boat, Petrie and I went to a high point, about two miles distant, to take a view of the country. We found (as I mentioned in my previous journey from Jimba) that the mountainous country and main range appeared to fall away to the northward, no rising was visible beyond, and we were not a little delighted to see the courses of two large rivers to the northward of where we stood, running into the bay. The farthest part of the island seemed distant about 25 miles: the lay of this great bay or sound is about N. and S. We only visited the more southern part, and cannot,

therefore give an opinion upon its capabilities. We certainly found innumerable shoals and islets: we also found one large navigable river, without a bar, I therefore think that it is well worthy of a complete nautical survey. After taking the bearings of some remarkable mountains inland, we returned to our boat, which being supplied with water, we again started, and by dark made the mouth of the long wished-for and long looked-for river, which we afterwards found the natives called Monobocola. We landed on the northern point, forming the mouth, where we encamped, and, from its being very scrubby, called it Jolliffe's Beard, as he had the thickest beard among us. We found the sharp stones rather a hard bed.

12th.—Went to the top of the rising bank and discovered a new species of pine, of which we cut a sample, and, as usual, marked our names on the trunks of several of the trees with tomahawks: saw no natives. Taking the flood-tide we pulled up the river at 9 A.M., sounding as we went. As I have no map I will only make a few remarks, so as to give a general idea. The tide flows at least 30 miles up, and is navigable for vessels drawing 12 feet; whereas the Brisbane, running into Moreton Bay, is only navigable for vessels drawing 8 feet. The river has no bar, but at its mouth there are sand banks, dry at low water, and leaving only a narrow channel between them: we ascended about 50 miles. The river after losing the tide soon becomes small; the banks are low, but in most parts well timbered with large trees. We found on the river plenty of ducks and black swans, but saw no natives. However on this river there was a tribe, Bracefelt said, with which a white man, named Davis, called by the natives *Darumboi* (kangaroo-rat), had lived. He had absconded from the penal settlement 14 years ago, and had not since been heard of. This evening we encamped again on the banks of the river, the boat being anchored in the stream.

14th.—We now became very anxious to see some of the natives who inhabit this part of the country, that through Bracefelt we might get all the information we could, we therefore proceeded up the river as high as a boat could go, say 50 miles from the mouth: having reached this point we encamped on the left bank; both banks were covered by a thick scrub, and a little further back were sandy ridges. Petrie sent Bracefelt with the black, to look for natives, he once returned and said he could see nothing of them; he went out again and came back frightened, stating he had found an encampment of natives, but had never expected to find them collected in such great numbers,* if, how-

* We afterwards found that this was the season when the natives resort thither to feed on the fruit of the Bunya Bunya, and that no less than sixteen tribes had already assembled. This tree is a noble pine, growing as straight as an arrow to the height of

ever, two men would accompany him to within a short distance, and wait to see if any attack were made, he would enter their camp and speak to them. Jolliffe and I offered to go, but he said he would rather take two of the crew armed; I thought this rather strange, as he could have depended more upon us than upon convicts, but it turned out afterwards that he had fears of our being speared, and he valued our lives more than theirs. The natives were at this time only $1\frac{1}{2}$ mile distant. Bracefelt, who had met this tribe ten years before at the Bunya Bunya, but could not answer for their recollecting him, now stripped, took his spear as he was wont among his own tribe, and accompanied by the two men and by our native man Wallupe, who went very unwillingly, approached cautiously, and saw that the natives thought themselves in perfect security, little dreaming who were their neighbours. Bracefelt halted the two men, and then, with Wallupe, went over the creek between them and the camp, and walked straight into the midst of them, calling out his name "Wandi;" they were completely taken by surprise, and seizing their spears, hundreds rushed out from every corner of the scrub yelling like madmen. Darumboi at the moment was at the other end of the camp with his adopted father, skinning a kangaroo they had just killed. As soon as he saw Wandi he rose, and perceiving the two other white men at a distance, he rushed by him and ran at full speed to them; he was unable to do more than say a few words in English. Bracefelt's surprise was great on seeing Davis (as he had no idea that he was still living). He went to him and told him in the native language how we had come, and also that if he chose he might join us. Davis, who only remembered the penal settlement in its days of tyranny, accused Bracefelt of having brought the whites to take him, that he might get off his own flogging, on his return. All this time they had been walking towards our camp, and this was said just as they came in sight. Bracefelt stepped back, and raised his spear, Davis did the same; all the black devil seemed to rise in them both, when Bracefelt sang a war-challenge at the top of his voice, which we could plainly hear. It was truly a curious scene, two white savages challenging each other to fight, their spears raised on high, and with all the air, attitude, and ferocity of natives; their bodies all *coochée*, or painted and tattooed across the chest, besides large scars of former wounds in their backs and legs. Davis, or Darumboi, was the finer man of the two, and about 27 years of age, he had been transported when only eleven; on seeing us they paused, and after a little, both came towards

from 100 to 300 feet. It bears a large cone full of nuts, which are excellent when roasted, but taste, when raw, like the horse chestnut. The natives of the district have desperate ways to maintain their own against intruders.

us. When Davis came to the top of the sandbank overhanging our camp, he took a long frowning look at us, as in defiance. On calling him he rushed down, and addressed himself to Petrie, whom Bracefelt pointed out as being a Government officer. The first words he uttered were "My name's Jem Davis from Glasgow;" and unable to say another word in English, he ran off into a most rapid *black speech*. Bracefelt afterwards told us "that he had escaped from the settlement, because the prisoners were used so cruelly, that they cut each other's throats, that they might get sent to Sydney to be hanged. This was a fact; he ran away at 13 years of age through fear of being murdered by his messmates, who thought death preferable to the cruelty with which they were treated. Davis was wearing the necklaces and armlets of the natives. As he went on, and saw we did not understand him, and he was unable to express himself in English, he worked himself up into a violent passion, tearing and clawing the ground with his hands, and sinking his voice from the shrillest tone to a mere whisper, the very picture of a Bedlamite. He has since told me his feelings were so excited on once more meeting with his fellow-countrymen, that he cannot recollect what passed. After much talking, Bracefelt, who was standing by, got him to be silent; and said that Davis wished to explain to us that we should be in great danger if we went up the mountain, from which we were now only 3 miles distant, thus dividing our party. He told us the cause of the mortal enmity of the natives to the white men arose from a fearful crime committed by the latter some time back. The natives, having a strong predilection for mutton, stole the sheep; many came from a distance to feast on the white man's flocks. The shepherds seeing such numbers of fierce men, resorted, it is said, to poison; at all events, from some cause about thirty were reported to have died. They believed that those unfortunate men were poisoned, and it created among them, far and wide, a direful feeling of revenge, which to this day has not subsided. Only two months ago two men of Mackenzie's were murdered; the watch of one of these murdered shepherds was now in the possession of Darumboi's father, and he promised to get it if we would allow him to return for that night; he also said that he would frighten them about our strength, and do all he could to prevent an attack; he went, and we got all ready, keeping sharp watch all night. Darumboi told us that the way they would come upon us, would be by creeping through the long grass, and if any white should fire a gun, they knew that it would require reloading, and twenty or thirty would immediately rush upon and spear him. This was all very fine; however after a few hours we lost the anxiety we at first felt, and betook ourselves

to the boat, which we anchored for the night under the dark side of the bank, fell asleep, and never woke till sunrise. Had the natives attacked us in this position we should have fallen an easy prey, as the banks were high and scrubby all around, and they might have speared us without our getting a shot at them in return.

15th.—Next morning fired two guns as a signal for Davis to come, and he soon made his appearance with his father and the watch. The father was an ill-looking fellow, but said nothing, and backed out of the water from us. Davis told us that he frightened them with the account of our strength, which kept them quiet. On his getting into the boat he tore off his bracelets and threw them into the water, but I caught them and have kept them as curiosities. In the evening we had Davis shaved, well washed, and dressed; he was cut in every direction, either in tattooing or with the stone knives in fighting; he had the wound of a spear through his thigh, and a bommerang had smashed his right knee. He was evidently well acquainted with the northern country, and what we had previously heard from Bracefelt perfectly coincided with his statements; he knew of three other rivers running into Wide Bay, and told us their names; but what pleased me most was, to hear him say there was a large river running into the sea, many miles N. of Wide Bay. This river, the natives said, came from the back of the Bunya Bunya Mountains, which is our Downs, but they could not say where the source was. Davis became gradually civilized, caught up his own language quickly, and by the time we got back to Moreton Bay no one could have believed he was the same independent looking savage that startled us on the night of the 14th.

The natives followed us a long way on the banks of the river, keeping up a conversation with Darumboi, whom they were evidently very sorry to lose; he told us they hung about his neck and kissed him at parting, and cut their own heads as a sign of grief. The various intonations of voice, according to the degree of grief, were quite affecting at times; we could see but little of them, however, as they would not even show, but kept peering from behind the trees at a distance, and moving as the boat moved. On the 17th ran down to our former station on Frazer's Island, and on the 18th, getting a good N.W. breeze, we ran under "Russell's Cap," but we had baffling winds and a head sea till the 24th, when the wind changed, luckily for us, for our provisions were out when we arrived at Moreton Bay.

The following singular account of the cannibalism of the natives of this part of the country I received from Bracefelt and Davis, who had lived so many years with them, and I have no reason to doubt its general correctness and truth:—

The natives supposed all their own men who had died or been killed in battle to become white men, because, before eating them (for they are cannibals), they draw the skin off, and roast the flesh before cutting it up. When flayed in this way the flesh of a black man is perfectly white. They believe he becomes a white ghost in another country beyond the sea. Accordingly, when they first heard of whites, they supposed them to be the ghosts of their own dead come back; and if any one could fancy he traced a resemblance in a white to any deceased relation or friend, he took the white man under his protection, in the full persuasion that it was his son, brother, or whoever it might be, returned to him. In such a case, a white man has nothing to fear from the tribe to which the patron belongs. They will kill a fat white man sometimes, to eat, if he is not owned by any of the tribe as some ghost of a returned relation, but they will not skin him, as they suppose him to have been already skinned when eaten as a black. In cutting a man up they open his back, and having extracted the bones from the legs and arms, these are eaten by the men as being the titbits. They then cut the head open, and pick it, the viscera and heart are given to the gins, whom they use worse than dogs.

After our expedition to Wide Bay I returned to the Downs; and, on the 24th November following, again set out to explore a part of the country of which I had heard much from Davis, the runaway convict; but I can only give you a vague account of this expedition, as I had broken my compass and have lost the diary I kept for you. By his account there was in the interior from Wide Bay a fine country watered by a large river, and as we were in want of another run for our cattle, I decided on setting out in search of it. I accordingly engaged a man of the name of Orton, of Worcester, to accompany me. This man had been transported when a boy of thirteen: a fitter person for my purpose could not have been found; for, besides possessing a great deal more general information than half of the emigrants, he had the experience of nine years in the bush: he was patient and persevering, always had his wits about him, and was moreover an excellent shot. With Orton, then, and a black boy, two good rifles, plenty of ammunition, and three fresh horses, we started on our search. We made Wide Bay, where Mr. Eales had formed a station; having recruited ourselves, and finding the country all round a labyrinth of thick scrub and rocky ranges, and unsuited for a station, I again set out, taking a course inland, say about W.N.W. Day after day we went on, forced generally to lead our horses through a country, of whose gloom and horror it would be impossible for me to give you an adequate idea. We had now been out a month from the Downs, our horses were tired, and our

stock of food exhausted, but I determined to proceed, depending for subsistence upon our rifles, and these were soon tried upon the largest kangaroo I ever saw.

After a few days we began to emerge into a clear country; but our situation was scarcely improved, for every night, as soon as the sun went down, there came on a most violent thunder-storm. I had no other protection against the wet than an old cloak, and Orton nothing but a threadbare blanket. On awaking one morning I found myself in a pool of water, cold and cramped, for we could keep no fire alight through the night; and my only resource was to walk about till sunrise. I shall never forget the awful thunderstorms, or rather hurricanes. The lightning, thunder, wind, and rain, were incessant: the thunder the loudest I had ever heard, and the lightning the most vivid imaginable. Our hats were blown over the trees, and the rain fell so heavily on my uncovered head as to be hardly bearable; but, after all, I was none the worse for it, and resolved on finding a run, if any such existed. We felt convinced that the mountains we saw in the W. must throw off water, and our toils were at length rewarded by finding ourselves upon the banks of a noble river running N. This river I suppose to be the Boyne, which the charts* lay down as running into the sea in $24^{\circ} 30' S.$ The stream presented one of the finest bodies of fresh water I have seen in the country, with beautiful open land on each side of it; but we were not in a state to explore further, being quite unable to cope with any strong party of the savages should we fall in with them; and, though hitherto successful to the utmost of my hopes, having found this noble river, we were thus compelled to defer the prosecution of our discovery till we could revisit it (as I resolved to do) with a more numerous party hereafter. We accordingly took our departure homewards in a direction about S. by W., getting to the westward of the great range. I can give you no conception of the country we had to cross: in some places we could scarcely see the sun for hours together. On the 15th day from that on which we turned back from the river, we were somewhat surprised at finding ourselves on the Condamine, and at no great distance from Jimba. I give the credit of this to Orton, who, from his extraordinary knowledge of the lay of the country, proved himself a most trustworthy guide. We were right glad to partake once more of the good things of this life, though kangaroo and wild honey are excellent food when you can get nothing else. We received hearty congratulations from every one; and got no little credit for our bold search

* The charts Mr. Russell here alludes to must be colonial, as no such river as the Boyne is to be found on our maps at home.—Ed.

through so bad a country. In proof of the difficulties it presents, I must tell you that after my return, a party, with natives, started off to take advantage of my discovery: they followed our tracks and reached Wide Bay; but two days' subsequent travelling in the bush was enough—their hearts failed them, and they came back.

On this journey between Wide Bay and the Boyne we had fallen in with a party of natives, which will show you how little they are to be feared if they find you prepared and determined. We were getting into the western country, and had been travelling for about three weeks, when we got entangled in a thick brush-wood, through which, with great difficulty, we forced our way. After being in it for some hours, our attention was attracted to some smoke that rose before us; and, approaching cautiously, we saw in an open space from fifty to sixty blacks, with their *gins* (wives) and children. The *gins* are very ugly, though beautifully formed. Some were talking, some laughing, and others were arranging their nets for kangarooing; some were practising with the spear, others with the boomerang. We watched them for some minutes, when I hallooed. Dreaming of no intrusion, their wonder was great at seeing us: they stood their ground, and we saw some of them hiding their weapons, to use, I suppose, if they found a good opportunity. We halted within about 15 yards: they neither approached nor retreated, but one man, evidently not belonging to them, came forward, and to my astonishment addressed us with, "Who are you, white fellow?" This man proved to be a runaway from the South, he had committed some depredations, and was afraid of being shot; the others had never seen white men before, though they had heard of them. We allowed this fellow to come close up, desiring him to tell the others to stand back. I stationed our native boy behind, to see that they did not steal round us. They wished to be friendly, but we declined further intercourse, upon which they gently retreated, making no attempt to molest us. Had they seen us first, they would, in all probability, have tracked us unseen, and, taking a favourable opportunity, have attacked us; but finding us prepared, and coming boldly up, they left us. Such is their character. If they see you are afraid, they will attack you; but advance without fear, and they are cowards.

[On Mr. Russell's return from this expedition he immediately made arrangements to set out again with his brother, Mr. Glover, Orton, and the black boy, to revisit the river he had discovered; but of this journey, so interesting to geography, we have no account from him. The following is given by his friend and companion, Mr. Glover, to Sir Charles Malcolm.]

I shall have great pleasure in complying with your request,

by giving you such information as I possess with regard to the Condamine and Boyne, and shall feel most happy if I can aid in throwing further light upon my friend Henry Russell's discoveries, than what you may have found in his journal, kept, I believe, merely to give his mother an outline of his rapid journeys in search of a good station, certainly with no view to publication.

You are already aware that I accompanied him on his first expedition down the Condamine; and on his last, down the Boyne—two rivers, as we have proved, in no way connected; to them, therefore, I will principally confine myself.

At the close of the year 1841, Henry and Sydenham Russell, Isaacs, and myself, started from Hodgson's station on the Darling Downs, in search of a pasturage for our flocks. Before descending from the Downs we proceeded to Jimba, which lies, as near as I can calculate, 60 miles due N. from our starting point, and is the last station in that direction on the Downs. At this time little or nothing certain was known of the Condamine below a large lagoon, which lies 25 miles W. of Hodgson's. Some supposed it was lost in a swamp, others that it was one of the tributaries to the Darling; for various reasons we were of opinion that it took a turn northerly somewhere below the lagoon. We went on this supposition from Jimba, which we left at daylight, we took a N.W. course, and travelled all day.* Seeing no signs of water we were considering what to do, when, curious as it may appear, we were guided by our horses, who seemed from instinct to know where water was, for when we gave them their heads they pushed rapidly forward; just before dark we came on a beautiful reach of a large river, which we concluded, from after observation, must be the Condamine.

There are convincing reasons, I think, that the Condamine is an inland river; whether it is eventually lost in the sand, or takes a turn to the southward, remains to be proved: it cannot turn E. as the main range lies between it and the sea. I have already stated that we came on the river in rather more than a day's journey from Jimba, say 30 miles; this station being about 10 miles below the plateau of the main range, gives a distance of 40 miles from the summit. We found, on our journey along the river, streams or creeks flowing into it on both sides, the eastern ones from the range, one from the southward joined the Condamine a few miles above where we turned back; it is nearly as large as the main river, and, I am inclined to think, is a stream I came upon far inland from Hodgson's, whilst on an expedition with Pemberton Hodgson. There is a marked difference in the

* A day's journey, where the bush is not very thick, may be calculated from 25 to 30 miles. Sometimes, however, from dense underwoods, it is much less.

character of the soil over which these rivers run, the affluent has a sandy bed, the main branch is either chalk or clay; but to return to our journey. We found the soil on both banks of the river a rich loam; the timber is remarkably fine, consisting of the black-but, apple-tree, flooded gum, myall, and swamp-oak. The country is unfortunately very flat, there being few ridges, which renders it unavailable for sheep-feeding; some of the open flats are exceedingly rich, and covered with a fine fattening grass. It would be a good country for cattle were it not for the frequent dense scrub, and for the innumerable hostile natives who find a ready shelter in it. Finding no country that would answer our purposes, we returned, in three days, in a straight direction to Jimba. When we left the Condamine it was running W.N.W. The Condamine before this expedition was almost unknown below the lagoon, though Mr. Scougal had some sheep on the Myal Creek extending down to the river below. The distance we went down the river might be 80 miles as the crow flies; we returned, fully convinced that the Condamine was a western river. I have now given you a hurried, but I hope, clear account of this expedition, and will proceed to that of the Boyne.

The Boyne was discovered by Mr. Henry Stuart Russell, having with him his servant, Orton, and a native, in the following way:—Mr. Russell had heard from Davis, a runaway convict, whom he found with the natives up the Monobocola on his expedition to Wide Bay, that there was a very fine country immediately in the neighbourhood of Eales's Station (which report he found wrong, so far as to its being near that station). He determined on a journey down to Wide Bay, and from thence to prosecute his research; having reached Eales's he only remained long enough to recruit, and started in company with an overseer and a man of Mr. Eales's in a W.N.W. direction, and had one of the most formidable journeys that can possibly be imagined. The overseer and his man very soon returned, disliking the dreary waste and rugged country they encountered. It was indeed a very hazardous undertaking, as they had to travel through the Bunya Bunya country, which at that time was swarming with natives, who assemble for the purpose of feeding upon the fruit. After travelling over a broken and rugged country they came upon a large flowing stream which he supposed to be the Boyne. He found a lovely country upon the river, and left with the determination of revisiting it. Delighted with the report he brought in, we (the party before mentioned) started off with about a month's provisions in a due N. direction from Jimba, with the full intention of tracing the river down to its very mouth, which the nature of the country and want of ammunition afterwards prevented us from entirely accomplishing.

On leaving Jimba the whole character of the country alters: instead of the wide-spreading plains upon the Darling Downs, the traveller comes upon a fine undulating country thickly timbered, and covered with the most luxuriant grass; the ridges are chiefly granite. There is very little, indeed no standing water for the first 12 miles; four miles further on is Hungry Flat, so called from our suffering from hunger whilst there. Here we found a chain of ponds running W., which supplied us with water. At the end of this valley we with difficulty fought our way through a scrubby pass, on clearing which we burst upon a fine open forest glade with a rich dark soil. A stream from the great range runs through it into the interior. Being now some 24 miles N. of Jimba we determined to change our course, and cross to the eastern slope of the range; this we did, and having descended about 4 miles from the summit, say 200 feet, we came upon a creek,* which we followed; it zigzagged a good deal, but its lay was decidedly northerly, becoming larger every mile. We thought we had got on one of the main branches of our wished-for river, the Boyne, and so it proved to be. The bed of this river, near its source, lies in a valley, elevated above the sea, I dare say, 1500 feet; receiving small tributaries from the higher country both E. and W. Its bed is here sandy, with much of the tea-tree growing in and about it; a great quantity of high reeds grow also along the edges of the reaches. On our first day's journey down the river we passed over some lovely country; nothing can be more beautiful and luxuriant than the valleys. The foliage of all the trees, amongst which is conspicuous the wide-spreading apple-tree,† appears fresher and brighter than in any other part of Australia that I have been in. Droughts we found were unknown, the soil dark and rich, the grass chiefly oaten, which is the most fattening; the ridges high, always the sign of good sheep ground, they are well wooded, chiefly with the broad-leaved iron bark; here is also found some bad land consisting of sandy ridges, with a thin and rank grass. The honeysuckle, forest oak, dog-wood, and spotted gum, are found here—all signs of a bad rotten soil. However, the bad country is very little compared with the good. On our second day's journey down we found the reaches increasing greatly in length, a sure mark of a large river, many streams, both from the E. and W., emptying themselves into the main stream, the land becoming more mountainous, the valleys richer and more fertile. The third day we passed Barren-

* It must be borne in mind that all the streams here about are chains of ponds or reaches. The Boyne is of this character until joined by the Stuart, which at their confluence is a full flowing stream.

† This tree takes its name from its resemblance to our apple-tree at home, but it bears no fruit.

downen, a beautiful spot, which we afterwards made our station; it is 50 miles in a direct line N. from Jimba. On the fourth day we came upon a river flowing in from the eastward in a full stream, it is about 25 miles below Barrendowen; this we called the Stuart, after the discoverer, Henry Stuart Russell. Not far below this we came on his tracks where he discovered the Boyne, from which he returned, crossing the main range, going down upon the Condamine, and returning up the river, and so to Jimba, his old place of departure.

We continued our journey down, keeping along or near the banks of the river for about 300 miles, though the distance from Jimba I do not think was above 180 miles direct, lying N. by W. and S. by E. (this would place us about lat. $24^{\circ} 15' S.$), when we turned back, having then been 16 days from that station. Our return to our station on the Downs, taking a straight course, occupied 10 days. When we turned back, the river was flowing considerably to the eastward of N.; and, to judge from appearances, we were not far from the sea. From its size, I am of opinion that at this part the river is navigable. Though the Boyne, from the confluence of the Stuart, contains a larger body of water than any river I know in Australia, still, for the greater part of its course, it cannot be navigable, as it flows in many parts rapidly over rocky beds. The trees growing on its banks are the wild fig (excellent eating), the apple, western currajog, white and red cedar, chestnut, and the tea-tree; also the passion flower, which is only found on eastern waters. The myall and western currajog are western trees, and I have never found them before on any eastern river. Where our journey terminated the climate is too warm for the growth of wool, but excellent for the cultivation of rice, sugar-cane, and other tropical productions. On the upper part there is an expanse of the finest country for sheep and cattle, and also for the cultivation of European productions.

I have now given you a hurried sketch of our two expeditions, and shall feel pleased and gratified if any information I have been able to contribute may be found of service to my sincere friend, Henry Russell. Nothing would have delighted me more than to have accompanied him on an expedition to the Gulf of Carpentaria, which would, I doubt not, have laid open a valuable country into which Asiatic emigration might be introduced to any extent required. I shall conclude this letter with a short account of the natives who inhabit the countries which the Boyne and Stuart, with their tributaries, water. I found them in considerable numbers, and have even seen 400 men at a time, with not an old man amongst them: they are generally a fine-formed race, both men and women, many of the former six feet, and many of both sexes far from ugly: they are treacherous, cruel, and great

thieves. When I first went to Barrendowen I tried kindness, I showed them how they might have flocks, &c. of their own to feed upon, and gave them presents, but all in vain. They are a restless race, never remaining above a day or two in one place, except when planning some expedition against a hostile tribe, or to rob the white man. When they are bent on an act of murder and robbery they assume towards their intended victims a manner of great kindness; two of my poor herdsmen were murdered by the very men who had been associating with them and helping them only the very day before in fishing, in all apparent simplicity and kindness. In fact, I have now ascertained that when the natives are seemingly the most friendly they are meditating some act of treachery. To conclude, as far as experience yet goes, I should say the native Australian is, like the brute, incapable of forethought; and in no instance that I have heard, have they attempted to add to the comfort of existence by building huts, or by rearing herds of cattle or sheep, &c. They kill all within their reach, and thence move to another ground. Whether they ever will be brought into a state of civilization I have doubts: in my opinion, the only hope there is must arise from some bold missionary who dares venture to live amongst them, as Bracefelt and Davis did. Such a sacrifice on the part of an educated man is almost beyond hope.

X.—*Extract of a Report of Mr. John Edward Eyre to Governor Grey, dated Moorunde, 20th January, 1844, containing a Notice of the lower Course of the River Darling.* Communicated by Lord STANLEY.

THE European population settled upon the Murray River, though at present somewhat limited in number, is, I am happy to say, gradually increasing, and during the ensuing year I have hopes that several new settlers may locate themselves in a district which only requires to be better known to be more appreciated. One very considerable cause of distrust on the part of those wishing to settle upon the Murray arises from the ill success or losses that have hitherto attended all agricultural attempts yet made there. These have had two causes. In the year 1842 the fall of rain at the Murray was so slight, compared with that which fell around Adelaide, that an impression went generally abroad that no rain ever fell in so level a region, or at least not sufficient for the purpose of the husbandman. The past year of 1843 has fully proved the error of so hasty an assumption, and an abundance of rain fell during the usual seasons for wet; the crops prospered and grew luxuriantly, when another evil appeared and again de-

prived the farmer of his expected harvest. This arose from the unusually high state to which the Murray rose during the months of September, October, and November. From previous experience it had been apparent that the river rose periodically several feet, and usually overflowed many of the alluvial flats lying between the bank of the river and the fossil cliffs. Considerable labour and some expense were bestowed in damming up the passages by which the water escaped from the river to the lower levels, and in digging canals for the purpose of irrigation; these were completely successful as long as the river did not attain a greater height than it had risen to in 1841 and 1842; but upon its rising several feet beyond this level, there were of course no impediments to its progress: the dams and ditches were all destroyed, and the whole expanse of alluvial flats were again laid under water, in some places fully six feet deep, and of course all cultivation was completely annihilated by the ravages of the flood. So unfortunate a termination to a second year's labour has certainly been disheartening, and I fear has led to the erroneous idea that it is impossible to keep out these destructive inundations. The ensuing year will, I trust, however, see these difficulties fully conquered, and embankments thrown up at all the openings through the river's bank, so as effectually to block out the highest flood, at the same time that a few shallow ditches cut around those lands intended for cultivation will afford the important, and in Australia almost unknown, power of completely irrigating at pleasure all such lands. Thus what has been inconsiderately deemed an insuperable objection to the valley of the Murray, will, I believe, eventually prove to be its highest recommendation. In a future report (not having the documents now by me) I shall have much pleasure in forwarding to his Excellency the Governor some tables of the fall of rain at the Murray during the years 1842 and 1843, also of the rising and falling of the river, its highest and lowest levels, and the periods at which such changes appear usually to take place. I may here however remark that, during my residence at the Murray, I have never known any sudden rise in its waters to occur, so that the flood never comes unawares upon the settler: the change of level seldom exceeds an inch or two in a day, unless very strong southerly winds have driven the water back, and retarded the ordinary current; then, perhaps, as much as six or seven inches rise may have taken place; but even in these cases the water again recedes as soon as the wind changes or lulls. The falling of the river appears to be as gradual as its rise.

With respect to the aborigines, I am happy to say that no disturbances whatever have occurred in the district under my charge. A few trifling petty thefts have sometimes taken place, but no

serious offences either against the persons or property of Europeans. Among the natives themselves I have sometimes been called upon to afford protection or redress to the helpless or the injured.

During the past year I have been obliged to make some considerable deviation from my former system of issuing flour at the full of every moon to all natives indiscriminately who chose to assemble to receive it. This change was rendered necessary in consequence of the great number of natives that assembled (from 300 to 400, in the early part of 1843), and in order to prevent the tribes of my neighbourhood from visiting Adelaide, where they were very troublesome to Europeans, and greatly interfered with the Adelaide natives.

In disregard, however, of all my requests and injunctions to the contrary, several of the tribes still persisted in deserting their own district and crowding into town. Upon their return again to the Murray it became necessary to fulfil the threat I had held out to them, and stop that monthly issue of flour which hitherto they had regularly received. This punishment was principally confined to the tribes very near Moorunde, or a little to the south of it, as I still continued the usual issue to all those who had been well behaved and had attended to my requests. During the ensuing year I would still propose to adhere to my present arrangement. It appears to me that, unless the Government can afford to supply a sufficient quantity of flour for all natives who may come, and which would amount at the least to six tons annually, that it will be better to present it only to the more distant tribes when they visit us, and to such of our own immediate families as may be deserving of it for their good conduct, or for their quietly residing in their own district.

It remains for me to give a slight outline to his Excellency of a recent journey made by me up the Murray to the Darling, with the fourfold object of cementing the good understanding existing between the distant tribes and Europeans; of learning whether any of the parties said to be on their route from Sydney overland, with stock, were actually approaching the boundary of South Australia; of determining, as far as might be, the cause of the unusually high flood in the Murray this year, by ascertaining whether it came down through the channel of the Murray or the Darling; and, finally, of investigating the probability or otherwise of a route to the interior by the ranges near Mount Lyall.

On the 4th December I left Moorunde with a party consisting of Mr. Scott, one policeman, and a native of Moorunde: in all we were three Europeans and a native, each mounted, and one pack-horse carrying provisions. Proceeding up the right bank of the Murray, we arrived at the Rufus on the 8th December, and

delayed there a day, to enable me to get a Rufus native to accompany the party, as I found my Moorunde black did not understand the language of the Darling. Guided by our new conductor, we struck across through the scrub to the Darling, crossing a large anabranche of that river, running through the scrub half way between Lake Victoria and the Darling, with a course of fully 60 miles, nearly parallel to the latter river. In this we obtained water where we struck it; but farther north, as we afterwards found, it was quite dry, owing to the rise that had taken place this year in the waters of the Darling being so slight. To the southward the quantity of water increased gradually until it joined the Murray lagoons; and upon our return, when we struck it lower down, we were obliged to swim our horses across it. This singular watercourse forms in times of flood another connecting channel between the Darling and the Murray, leaving an immense desert island of low or scrubby lands between it and the Darling. When the Darling is flooded this channel is filled, but when only the Murray has risen, as was now the case, the back waters from that river do not reach so far up as where we first struck the lagoon: a great part of its course is marked by lines of the river gum-trees.

Early on the 12th December, we struck the Darling upwards of 70 miles above its junction with the Murray, and now found that it had been but very slightly flooded this year: its waters, though muddy, were fast receding, nor did there appear to have been a greater rise than three feet this season. In many places the river was shallow and easily fordable, presenting, from the strong contrast of an apparently very small body of water with a deep, wide, muddy channel, an idea of insignificance not justly due to a river having so long a course. In many places, however, the actual width of the water could not be 15 yards, and fallen trees frequently obstructed the channel nearly quite across. To compensate however for this, the banks of the river were lined with most beautiful gum-trees, gracefully overhanging, and with a wide-spreading dense foliage to the very ground. I have nowhere seen in Australia so pleasing or picturesque an effect produced by the eucalypti as was the case along the whole course of the Darling.

After travelling 55 miles up the Darling from the point where we first struck it, we reached a clear deep channel on the west bank, and which was evidently a very considerable anabranche of the Darling in times of flood, its channel exactly resembling that of the river itself in character, with deep muddy banks, and the strata distinctly marked in narrow horizontal lines. This large anabranche occurred at that bend of the Darling where the river turns from a south-westerly to a nearly south course; but I regret

I had no instrument with me to determine its exact latitude. Proceeding four miles further north we had a fine view of the ranges laid down by Major Mitchell to the west of the Darling. From our position, the most southerly point of these ranges bore N. 42° W., and the intervening country appeared low, and for the most part subject to inundation. A very high distant peak, visible only with the telescope, bore N. 14° W., and I thought it might be Mount Lyall, but the day was too hazy to determine with certainty. I was now almost within reach of the point I wished to visit when unfortunately circumstances compelled me to return. My health, which for three months previously had been very bad, was now daily getting worse; a cold caught one wet night in the beginning of the journey caused a relapse of my complaint, until at last I could hardly keep my seat upon horseback at all. With much pain, therefore, I was compelled to leave unaccomplished one of the principal objects I had in view when I set out, and on the 15th December I reluctantly turned back to make the best of my way home again. Proceeding down the Darling on our return until within a short distance of its junction with the Murray, we went over all that part of the river's course left unvisited by Major Mitchell, and thus connected the two lines of that traveller, only on the opposite side of the river to that on which his track lies. I was anxious before I turned back, if possible, to have determined our position more nearly by reaching the creek laid down as 'Laidley's chain of Ponds,' but though within so few miles of it, I was too ill to attempt to proceed further. The natives described this creek as a chain of ponds or sheets of water, connected by a running stream, and falling into the Darling at a place called 'Weēl-yu-rārah:' they said it came from the hills I had seen, and told me that water was to be found all the way from the Darling to Mount Bryan under these hills, by which route the natives frequently crossed backwards and forwards, though chiefly, I apprehend, in the winter season.

In the brief outline I have just given of my late interesting excursion, his Excellency will at once notice the very beneficial influence exercised among the natives by the Government establishment at Moorunde, and which extends in a greater or less degree to the farthest point we reached, or about 330 miles distant from Moorunde by our line of route. We continually met with large bodies of natives along our whole course, especially on the Darling; we had them frequently encamped close to us, and yet never felt it necessary to keep watch at night, nor did the natives annoy or harass us in any way; in fact it would have been impossible for us to pass through them on better terms, or in a more friendly manner.

In passing up the river I occasionally met with old acquaint-

ances, and sometimes with one or two individuals who had even been down to Moorunde; and at the very furthest point reached, I heard of two natives having crossed thence from Mount Bryan, after receiving blankets from me at Moorunde at the last May issue.

In concluding my Report I would fain hope that if no other good has been accomplished by our hurried and harassing journey, at least the way has been opened for a future expedition to travel with ease and safety and on friendly terms with the natives. The fact of so small a party as three Europeans and a native passing on such good terms among the very numerous tribes of the Darling, once considered so hostile, may, I think, fairly warrant my drawing such a conclusion; at all events, I shall be most happy to make the attempt during the ensuing winter if no other occupation interferes, and if His Excellency will provide me with the equipment necessary to take the field for a couple of months. That time would, I think, suffice for tracing up "Laidley's Ponds," and for examining the whole of the ranges near Mount Lyall, in order to determine the probability or otherwise of a route being found under them leading to a better tract of country inland. I confess my own impressions are unfavourable to such an opinion; but still the exploration would be interesting, and would decide the character of the only part of the southern portion of this continent upon which even the slightest doubt remains. I may remark that the ranges, as seen to the N.W. from the Darling, struck me as bearing a strong resemblance in appearance to those visible to the N.W. from the great south bend of the Murray River, and I thought they looked more connected than I expected to have found them. I omitted to state that, in travelling up the Darling, we found the feed for our horses generally very bad, and the deep muddy banks of the river rendered it very important to select an eligible place for the horses to drink at, to avoid their slipping in and getting drowned; whilst the strong tenacious character of the soil in the alluvial flats bordering upon the river caused it to open into deep holes and cracks, rendering it both difficult and dangerous to ride over them.

XI.—*Some Account of Peel River, N. America.* By Mr. A. K. ISBISTER, late H.H.B.C.'s service. Addressed to the Secretary of the Royal Geographical Society.

SIR,—The interest with which the members of the Royal Geographical Society view all attempts to extend our knowledge of the new or unexplored regions of the earth, has induced me to lay

before you the following brief notices, the result of a residence of some years in the Arctic regions of North America.

There is, perhaps, no portion of the globe of which less is known, either in its physical or geographical relations, than that to which I have just referred. Hearne, about eighty years ago, was the first to penetrate through the country, and, under circumstances of difficulty and privation of which few, except those who have been similarly engaged, can form an adequate conception, he succeeded in reaching the sea at the mouth of Coppermine River. His narrative, in which he announced this discovery, inasmuch as it went to controvert the prevalent opinion of the time, that the northern shores of America were *not* washed by the ocean, was received with little or at least far from general faith, and it was not till Sir Alexander Mackenzie, by descending the river which bears his name, re-discovered the ocean, that the existence of an Arctic Sea was placed beyond dispute. The discoveries of these two enterprising travellers gave a new impulse to geographical science, and by reviving the dormant but still popular question of the north-west passage, and thus diverting the national mind into a more favourite channel, mainly contributed to throw inland discovery into the shade. Sir Alexander Mackenzie in 1792 undertook a second expedition with the object of penetrating across the continent to the Pacific, the result of which was equally satisfactory with his former journey, three years before, to the shores of the Polar Sea. Sir John Franklin, in addition to the valuable accessions he made to our knowledge of the sea-coast, the survey of which was the more especial object of his two expeditions, furnished much important information regarding the interior, and what was scarcely of less consequence, gave us an accurate delineation of the route which he had followed in common with Mackenzie, who, though remarkably correct in his general details, could not, from his previous habits, be expected to possess the scientific knowledge of his successor. The surveys of Mackenzie, Franklin, and, at a subsequent period, of Sir George Back, may be said to comprise all the accurate information we possess of the extensive region lying between the parallel of Red River, in latitude 50° N., and the Arctic Ocean on the east side of the Rocky Mountains—while on the west side the northern limit may be generally indicated by the tramontane route of Sir Alexander Mackenzie, between the parallels of 48° and 52° N. The researches of Behring, Tchirikoff, and Kotzebue among the Russians—of Drake, Meares, Vancouver, Cook, Beechey, and others among ourselves, were confined to the exploration of the coast. The overland expeditions of Lewis and Clarke in 1805, and of Hunt in 1811-12 among the Americans, as they did not embrace any of the territory beyond the parallel of the mouth of

the Columbia, may be said to have added little or nothing to our previous knowledge. A considerable portion of the country to the N. of the line here drawn, has been long since settled by the servants of the Hudson's Bay Company; but, so far as I am aware, its geography has been very little attended to. By a late compact with the Russian government, a large accession has been made to their territories, which now extend as far N. as Cape Fairweather; and it is to be hoped some enlightened men will be found among their number who will respond to the calls which science has so long been making on their exertions.

Under the circumstances to which I have thus briefly adverted, I trust I shall be justified in offering my mite towards the attainment of the desirable objects which the Geographical Society has so much at heart. For the meagreness of the following details I can offer no apology further than that, in the circumstances in which I was placed, it was impossible for me to make them more ample or more worthy your notice. The party to which I was attached, it must be remembered, was fitted out solely for the purpose of establishing a trade with the Indians, towards which it was of course expected by our employers our undivided attention should be directed. The duties of an Indian trader are of sufficiently multifarious a nature to occupy the attention of any man, and I think it unnecessary to state that under happier auspices, and had the sanction of the Hudson's Bay Company been extended to the undertaking, I should have been enabled to devote more time to those botanical and geological researches which confer so much value upon the narratives of my predecessors in Arctic discovery. To my senior officer Mr. Bell I owe much, as well for many acts of personal kindness as for his valuable assistance in the survey, which he was the more anxious to promote as it referred to a route which he was himself the first to open up.

On his return from his second expedition to the shores of the Polar Sea, Sir John Franklin, while ascending the Mackenzie a little above lat. $67^{\circ} 42'$, was led into a river which he had not discovered in his descent. From its large size he at first mistook it for a branch of the Mackenzie, and ascended it a considerable way under this impression; but finding his mistake, he retraced his steps, and regaining the main river continued his route upwards.* The favourable accounts he gave of the new river, which in honour of Sir Robert Peel he named Peel River, and more particularly his representations that the Indians inhabiting its banks were clothed in furs, soon attracted the attention of the gentlemen of the Hudson's Bay Company, to whom he communicated this information. It was not long before it was ascertained that the

* See Franklin's *Second Journey*, p. 181.

country contiguous to the Peel was the favourite habitat of those animals whose skins found their way by barter between one tribe and another to Fort Good Hope, the lowest establishment of the Company on the Mackenzie, and at that time the most flourishing post in the district.* The project of establishing a fort in this rich region was early formed, and instructions were accordingly issued to the superintendent of the district to take the necessary steps to that effect. Various obstacles intervening delayed the desired settlement, till, in 1839, Mr. Bell, an experienced clerk, was commissioned to make a preliminary examination of the river, and apprise the natives of the Company's intentions to open a trade with them in the ensuing season. The result of his exploration was such as to induce Mr. M'Pherson, the manager for the Company at that time, to decide upon establishing a trading post there the year after, and Mr. Bell and myself were accordingly appointed on this duty.

Shortly after Mr. Bell's departure for Fort Good Hope, his winter station, we were visited by Messrs. Dease and Simpson, who having completed, for the time, their survey of the coast, had come to pass the winter with us. Mr. Simpson left us in December, and at parting was kind enough to leave a pocket-sextant and a spirit-level with me, and as I had besides two very good compasses and the free use of Mr. Bell's valuable watch, which he had newly received from a London maker whose name I do not at this moment recollect, I unexpectedly found myself in possession of the means of making a survey, the result of which is the chart which I have now the honour to lay before you.

On the 25th of May, 1840, I left Fort Simpson, with the intention of joining Mr. Bell at Fort Good Hope, where I found everything in readiness for our immediate departure. Our party consisted of Mr. Bell and myself, twelve Orkney-men and Canadians, and four Indians with their families, who were engaged to act as fort hunters. We were supplied with an abundance of goods for the trade, implements for building, and as much provision as our craft could stow. On the 3rd of June we left Fort Good Hope in two boats, and by rapid travelling arrived at the mouth of Peel river about noon on the 6th. Here we found a party of the Indians belonging to the river, who, aware of our intention to settle among them, had waited for us at this place with the view of acting as an escort to our party in the event of a collision with the Esquimaux, whose uniform hostility to the

* The Hudson's Bay Company's territories, for the convenience of management, are parcelled into "districts," over each of which an experienced officer is selected to preside, with such discretionary powers for the conduct of the business as the general "council," which meets once a year, may think proper to invest him with.

whites rendered a meeting with them anything but desirable. These simple and kind-hearted creatures received us in the most enthusiastic manner, and testified their joy by singing and dancing incessantly the whole time we were on shore. After distributing a few presents among them, and taking an observation for latitude, we embarked and commenced our ascent; several tracks of moose and a very recent one of a large grizzly bear (*Ursus ferox*) were observed along the banks, which were here very low and alluvial, and still miry from the recent subsidence of the water. The *Alnus glutinosa* and *Hippuris vulgaris* constituted the principal if not the entire vegetation.

An aft wind soon after rising, we proceeded at a rapid rate up the river, and encamped about 30 miles from its mouth in sight of the Rocky Mountains. The character of the country had even already entirely changed. The banks, though still low and alluvial, were strongly impregnated with dark vegetable matter, and clothed with a dense vegetation of pines, poplars, and a thick underwood of different kinds of willow; and so sudden had been the transition from sterility to luxuriance, that we could scarcely believe that a few hours before we had been travelling through bleak, unrelieved desolation. The flat, swampy soil bore evident indication of having been lately inundated, and the height to which the last flood had reached could be distinctly observed on the trees, which were thickly coated with mud up to the water-line. Next day we resumed our march, and passing the Rat River, found, about 10 miles above it, another large party of Indians encamped, who received us with the same demonstrations with which we were before greeted by their friends. This being the spot selected for the site of the establishment, we encamped; and as Mr. Bell had traced the river to its source the previous year, and it being desirable to get the buildings erected as expeditiously as possible, our survey for the time had to be postponed; and, owing to various circumstances which shall afterwards be mentioned, I was not able to resume it until the winter had permanently set in. Mr. Bell gave me the following account of the river above this point when he ascended it the year before. For about 30 miles above the situation of the fort it presents little worthy of notice, being similar in character to the portion already described. Here the first rapid occurs. It is caused by a contraction of the banks of the river, which here begins to flow over a hard, pebbly bottom that succeeds rather abruptly to the soft alluvial bed over which it had hitherto been observed to run. The natives at this place had constructed a barrier of basket-work, which extended completely across the stream, sufficiently open however to permit the water to pass freely through its interstices, for the purpose of catching the fish which ascend from the sea during the summer.

This was effected by a very ingenious contrivance. When I passed here in the winter, this specimen of Indian mechanics had been entirely swept away by the drifted ice. The rapid, we understood, was the general rendezvous of the more infirm members of the tribe and such of the women and their families as did not accompany their husbands on their hunting excursions. After the rapid had been passed, a very perceptible change could be observed in the swiftness of the current—a fact sufficiently accounted for by the circumstance that the stream was now rushing from the sub-alpine region of the mountains, along the base of which it had hitherto proceeded with a gentle and uniform flow. It would be tedious to describe each day's progress in detail; to-day's was but a repetition of yesterday's struggle against the rapidly increasing current; the men, now straining on the tow-line and dragging the reluctant boat after them—now plunging breast-deep into some river which poured its turbid contents into the main stream in the line of their march—now, when the current, directed by some opposing spit on the other side, bore down with its whole volume upon the bank which, by constant attrition, it had worn into a perpendicular cliff, and sometimes undermined it, embarking and bending to their oars, making for the opposite side with what vigour they might, when the everlasting tow-line was again thrown out, and the same unvarying round of tramping, tugging, and wading had to be repeated. Occasionally the monotony of the march was enlivened by a moose or bear appearing at the river's brink, at which times, especially when their stock of fresh provisions was ended, a general chase was given by old and young, and rarely was it desisted from till the unfortunate intruder was brought down. In the mean time they were advancing fast into the heart of the mountains. The banks of the river had now entirely changed their aspect, and instead of through the low, unvarying mud-cliffs, with the sombre and cheerless appearance which the recent deposit of alluvium had imparted to them, the water-course was not unfrequently through bold, romantic defiles, so steep and lofty as often to hide the midday sun from view. It was, however, soon found impossible to advance against the hourly increasing torrent with the cumbrous boat, and it was accordingly left in charge of half of the party, while Mr. Bell and the remainder proceeded up the river in a small Indian canoe, which had been stowed in the boat to provide for the anticipated emergency. Two rivers were shortly after passed flowing from the eastward, which were named after Messrs. Simpson and M'Pherson: they seem to be the main feeders of the Peel, into which innumerable little mountain rills also empty themselves.

Soon after passing M'Pherson's river, the canoe, for the same reason which had led to its adoption, was abandoned, and the

party proceeded on foot among the mountains, fording such streams as crossed their path, and, after no slight hardships and not a few complaints from some of the men of numbness in the limbs, produced by wading in water whose temperature was scarcely above the freezing point, though it was then the middle of summer, Mr. Bell reached what seemed to be the head waters of the Peel. The minute streamlets into which it had now ramified had become so insignificant, seldom exceeding 15 or 20 yards (feet?) in breadth, that he considered it useless to prolong the survey any farther, more especially as the short arctic summer was more than half over, and he had still the exploration of the Rat river before him. Accordingly, after making a hasty examination of the surrounding country, he commenced his return and soon arrived at the boat-encampment, where the rest of the party awaited him. The boat was again launched; and, borne onward at a rapid rate, they soon reached the branch which communicates between the Peel and Rat rivers.* This little stream is very tortuous, and cuts completely through the mountains at nearly a right angle to their general bearing, but so level is the bed which it has found for itself between the mountain ridges, that it is often difficult, in the middle of summer, to say whether it flows from the Peel to the Rat or from the Rat to the Peel river; an evident proof that its current is entirely regulated by the relative heights of the two streams which it connects. At the time of their visit the current was setting into the Peel, and it was with no small astonishment that the crew, after mounting the stream for some time, suddenly found themselves in what they deemed a continuation of it, sweeping down at a rapid rate towards the sea. Apprehensive of meeting with the Esquimaux if they followed the course of Dease's branch (into which they had now fallen) to the sea, Mr. Bell did not think it prudent to venture further than about 20 miles from the fork, and accordingly turned after proceeding thus far and continued his course up the Rat river. His intention was to trace it up as far as the portage, where he expected to meet with the Tramontane Loucheux (probably the mountain Indians of Captain Franklin), who annually resort to this rendezvous for the purpose of trading with the Indians on the Peel. After a few days of smooth travelling, compared to what they had previously been engaged in, the party arrived at the Portage, where they found a large band of the Indians they had expected already

* What is here called a 'branch' communicating with the Rat river is set down by Mr. Isbister, in his map, as a continuation of the Rat river itself. It would, in fact, be a Deltic branch of that river, if its waters always flowed into the Peel; but as they sometimes flow in the contrary direction, it is one of those anomalous features in hydrology for which the science has not as yet any specific name. It is, like the Casiquiare, a connecting channel between two distinct basins.—Ed.

encamped. After some time had been spent in bartering such furs as the Indians had to dispose of, Mr. Bell commenced his return, and reached his winter quarters, as I have before stated, in safety, after spending a little more than two months on the river.

The district through which the Rat river flows, as a reference to the sketch-map will show, is of a very different character from that through which the Peel takes its course. It derives its waters from numerous small lakes, with which the flat swampy country to the W. of the mountains is studded, and being thus independent in a certain measure of the annual melting of the snow, which is the great support of the Peel, it is comparatively little affected by the summer heats, and consequently suffers but little augmentation of its volume from this cause. Its water has the peculiar swampy taste which indicates its origin. Its banks are low, with little or no wood, but clothed instead, with a long rank grass and some dwarf willows, with occasionally a few interspersed clumps of stunted pines. The soil is composed of strata of various coloured sands, overlying clay enclosing gravel and small water-moved boulders, and supporting a thin vegetable coat, in many places going to peat. The river, when I saw it in the winter, some distance above the Portage, trends to the S., and, according to the account of the Indians, extends to a considerable distance into the interior.

[Mr. Isbister now occupied himself in taking observations for latitude and longitude, and testing his instruments in every available manner, although he was constantly interrupted by the imperative necessity of attending to the arduous duties of his station; and we only regret that our limits prevent our giving at length the stirring narrative of his detached excursions.]

From the time, says he, of my arrival from Fort Good Hope till the middle of December, I was constantly on snow-shoes, visiting different places along the river, and in searching for lakes in its vicinity. During these excursions I had ample opportunities of surveying the river, and the country to the eastward. I had been able to lay down a considerable portion of the stream, by tracing it up through all its windings, but having to carry all my provisions, blankets, &c., on my back, by which means long voyages were utterly impracticable, and finding from the time consumed in this mode of exploration, and from the great impediment which the uneven and broken-up surface of the river presented to our progress, that it would be impossible for me to complete the survey on this plan, I was obliged to adopt another. We heard that a numerous band of the "distant Loucheux" were encamped on the upper part of the Rat river, on the W. side of the mountains, with a plentiful supply of the com-

forts of life, of which we had hitherto enjoyed so scanty a share. With the twofold motive of tracing the Rat river, which as yet had been but partially surveyed, crossing the mountain-chain, and obtaining some provisions, I resolved to go in quest of them. Five of our own people and seven Indians (our four hunters and three Loucheux, who had given us the information) volunteered to join me. Having equipped ourselves with ammunition and some tobacco for the Indians we expected to meet, and 15 lbs. of pemmican (the usual allowance for one day to one-third of our number), we set out long before dawn, and soon reaching the mountains which were about 10 miles distant from the river, encamped the first day under a small clump of trees in one of the valleys of the first range. The next day a little before sunset we reached the summit of the middle and highest range. We were now exposed to the full fury of a storm, from which we had hitherto been partly sheltered, but which now swept with fearful violence over the dreary, shelterless waste, and exhausted as we were with hunger, cold, and the fatigue of a hard day's march, we had no alternative but to push on, whatever the consequences might be, till we came to wood. After travelling all night, about noon we found ourselves at the entrance of a shelving valley, which led us to a deep gorge, evidently the bed of some mountain *coule*.* We scrambled down its precipitous sides, resolving to follow its course, in the hope that it would lead us to wood, where we might encamp; and we had no sooner reached the bottom, than we found ourselves in an agreeable calm, while the temperature had, to our sensations, risen more than 20°. The walls of the defile were from 400 to 500 feet high, and composed chiefly of a reddish compact limestone, with partings of dark carbonaceous matter, which at a distance gave it the appearance of the slaty structure, reposing upon primitive rocks. Its course when we fell upon it was S.S.W., but it soon changed to W. Wolves, mountain goats, and rein-deer were occasionally observed on the high ledges above us, but beyond the reach of our guns; and, what was still more acceptable to us, thin clumps of wood began to open on the view. About an hour's walk further on brought us to a fine hummock of pines, where we encamped; and, as soon as the fire was kindled, and our frozen limbs thawed, we lay down to sleep with feelings which few of us can ever forget.

Having coated our faces with grease as a defence against the raw air, we started alert and fresh from our night's repose. After a day of pleasant travelling, enlivened by an animated chace after

* From *couler* (Fr.), to flow; probably a Canadian name for a stream or torrent. Thus, "Coules des Roches," a river of the island of Montreal.—ED.

the rein-deer, which were often met with in large herds, we encamped near a bend of the Rat river, in lat. $66^{\circ} 50'$, and long. 138° W., in a low level country about 20 miles beyond the mountains. Next day, a hard march of fifteen hours in a S.W. direction, brought us to the Indian camp above the Portage, where we were received with unbounded hospitality.

It being necessary to wait a few days here till such of the party as were out hunting should return, I spent the interval in tracing the course of the mountains to the southward and examining their geological structure. On my return I found the party ready to start. After seeing them fairly on their way under the direction of our own people, I left them to pursue their route at leisure, and, selecting two of the most active of the Loucheux, I proceeded upwards along the mountains, in order to satisfy myself fully of the continuity of the chain, and crossing them near one of the points to which I had carried my survey from the other side, I followed the river down to the fort, where I arrived in time to receive our friends whom we had left behind.

As soon as the Indians had gone, being necessarily confined to the house for some time until my wounds had healed, I employed myself in finishing the chart of the Rat river. For the interstitial data I was here, as before, in the case of the Peel, indebted to the notes of Mr. Bell. Dease's branch, which, from want of time, I was unable to follow to the sea, flows, according to the information of the Indians, through a low level country, well wooded with spruce firs, and frequented by moose and rein deer, and I have little doubt it is the same with a river observed by Messrs. Dease and Simpson, to flow into the most westerly channel of the Mackenzie, a little before it joins the sea.

On the 15th of April I left Peel river, along with four men, and crossing the country with the view of falling upon some part of Red River, I traced it for about 20 miles to its junction with the Mackenzie. It is about a quarter of a mile wide where I saw it, and rises, according to the Indians, in the mountains, and flows through a district similar to that which borders the Peel.

The cold during the months of January and February was intense; the thermometer ranging between 40° and 67° minus.

Natural History.—The valuable writings of Dr. Richardson have so amply illustrated the natural history of the arctic regions, as to render it unnecessary for me to dwell at any great length upon the productions of the district laid open by our expedition, and indeed such was the harassing nature of my duties, that, rich as an unexplored country always is in objects of interest to the naturalist, I could spare but very little time to such investigations. It is generally admitted, as a botanical axiom, that the more di-

versified the surface of any country is, the richer, *cæteris paribus*, will be its "Flora," and to this general principle the region through which the Peel flows furnishes no exception. At its mouth, as I have already observed, the vegetation is spare and scanty, but at a short distance up, as soon as we reach the shelter of the mountains, it breaks out into a luxuriance unknown on the Mackenzie in the same latitude. The *Pinus alba*, *Populus trepida et balsamifera*, the latter of which affects the drier situations, *Alnus glutinosa*, a few *salices*, and a rank growth of different herbaceous plants, clothe the banks to a distance of from 4 to 5 miles on each side. Somewhat higher up we meet with the *Betula glandulosa*, *Pinus microcarpa*, and *Juniperus prostrata*. These constitute the principal arboreous plants to be met with, and they may be found in variable proportion, fringing the river for about two-thirds of its course. Above this, wood becomes scarce. *Saxifragæ*, lichens, and other *rupestrine* plants, and different kinds of moss in the swampy districts, constituting the prevailing vegetation; while the lofty rocks, among which the river here sweeps, are almost entirely destitute of any covering. The *Betula papyracea* and *Pinus Banksiana* are said to occur in the dry valleys among the mountains, but I never met with either of these trees myself, and I am disposed to regard their existence as extremely doubtful. The *Pinus alba* is the king of the arctic forest, and it grows to a considerable height for so high a latitude. One which we felled for the buildings measured 70 feet in height and 3 feet 3 inches in diameter at the base. It forms a conspicuous ornament to the borders of the river and the larger lakes, but never extends to any great distance inland. The alder is generally found accompanying it, forming a dense underwood, while the soil itself is generally covered with moss, studded, in favourable seasons, with *vaccinium* and *Rubus chamæmorus*, which grows in immense quantities. Towards the mouth of the river the surface is generally usurped by *Hippuris vulgaris*, or a coarse grass. Beyond the locality of the *Pinus alba* the prevailing tree is a stunted *Pinus microcarpa*, thinly strewed over the country, which scarcely supports anything else but mosses and lichens. This is the general description of the unbroken flat which extends to the west of the Rocky Mountains. These few observations will serve to give a general idea of the botanical features of the country. My very limited experience in cryptogamic botany, the lack of the necessary time and opportunities, and, above all, the want of the indispensable requisites of paper for forming a collection, a microscope, and a catalogue to which the species might be referred, put it out of my power to enter into more minute investigations.

The zoology of Arctic America is so well known, and the

"fauna" of Peel river, richer though it be in degree, differs so little in kind from that of the neighbouring district of the Mackenzie, as to render it unnecessary for me to enter into any details upon this subject. The rocky mountain range which farther to the S. exercises so marked an influence on the geographical distribution of animals, seems here to lose its distinctive character; all the animals found on the E. side being met with in equal, if not greater, abundance on the W. From this remark, however, the moose-deer (*Cervus alces*) is to be excepted. As far as my own observation and information went, they are not found beyond the mountains, which may thus be considered the western limit of their range. The mountains themselves are principally inhabited by the grizzly bear, the common wolf, the ovis montana, and capra Americana of Richardson. The musk-ox is said to occur in the country to the W. of the Rat river. These are the only peculiarities which seem to call for notice under this head.

On the subject of geology, I have little to add to the incidental remarks I have already made. The soil of the lower part of the valley through which the Peel flows is generally an alluvium derived from the annual overflowings; and from the accessions it yearly receives from this source, it has attained in some places to a considerable thickness. On penetrating this we come to a diluvium, containing gravel and small boulders, which becomes the subsoil immediately underlying the thin vegetable covering of decayed moss, &c., wherever the inundations have not reached. Higher up, thick beds of aluminous shale occur, and the soil is in many places strongly impregnated with alum. A hill by the river side, a little below where it emerges from the mountains, was found to be so rich in this mineral, that it obtained the name of "Alum Hill." Several very pure crystals were picked up on its sides. Alternating with the shale we sometimes find thin strata of brown coal, a formation which seems to be extensively distributed over all the country N. of Slave Lake. A loose red sandstone prevails in the district W. of the Peel, and is apparently the general underlying rock to these superficial deposits. It first appears a few miles above the Fort, where a thin belt is observed to run across from the "Narrows" of the Mackenzie, cropping out occasionally as it approaches the mountains, and forming an undulating ridge of low hills. Most of the elevations which occur on the W. side of the river are due to the faults or other local displacements of this formation. To this succeeds a limestone deposit. The line of junction of the two rocks can be distinctly traced at the Narrows, and also in some situations in the mountains where the limestone is observed to crop out from under the sandstone, crowning some of the higher ridges. The

country between the two rivers, though generally low and swampy, is occasionally intersected by ranges of hills which are apparently low spurs from the neighbouring mountains. With regard to the Rocky Mountains themselves, those great geological parents of the new continent, and the great modifiers of its climate, their geological structure is here of a very simple type. Obeying highly uniform laws of arrangement, they are in a great measure free from those interruptions which occur in the more complicated mountain groups of Europe, whose irregular and often contradictory structures, arising from the numerous cross chains which intersect each other, it is frequently difficult, as has been often observed, to reconcile or explain. Opposite the Fort, the range has dwindled down to a comparatively insignificant elevation, few of the peaks rising above 600 or 700 feet in height. The chain, however, continues decided and unbroken till it is intersected by the Rat river, where the continuity is suddenly arrested. Viewed from the W., they present a soft undulating outline, rising in a series of terraces, the inferior ridges consisting generally of sandstone, while the higher are capped by limestone. As we trace their course to the S. they gradually increase in altitude, and assume a more irregular and rugged appearance; rising often in abrupt precipitous crags, and presenting the general characteristic features of a primitive district. Gneiss, syenite, greywacke, and slate, and more rarely granite, occurring in their usual geognostic relations, and imperceptibly merging into each other, form the general nucleus over which sandstone, in the inferior, and limestone in the higher ranges are generally dispersed, while in other instances, the examples of which multiply as we proceed southward, the primitive rocks protrude in bold, craggy peaks and irregular ridges. The ranges vary from 10 to 5 in number, pursuing a relatively parallel course, and occupy from 50 to 90 miles in breadth. The eastern aspect presents a remarkable contrast to the western. Rising abruptly from the barren flat which reaches almost to their very base, their steep, castellated flanks contrast strongly with the graduated approaches of lower hills which are observed on the other side of the range. As might be expected primitive and transition formations predominate on this side; some of the scarped walls exposing greywacke and greenstone. Gneiss and slate, which I rarely met with in the lower part of the range, become more abundant as we advance to the S., where gneiss seems to be the prevailing primitive rock. Fringing the lower eastern border are interrupted chains of isolated peaks, which on being traced up prove to be abortive ranges, and, what is worthy of remark, these, generally speaking, attain a higher elevation than the main chain, and are almost entirely of primitive or transitional structure.

The greatest number of ranges which I observed were 10, and these, so to speak, die away, the outer ranges on both sides sending off spurs, not always easily referable to their originals, till they reach the Rat river, when they are reduced to five. Here the continuity of this remarkable chain of mountains may be said to end. Beyond this limit we find them forming straggling irregular ridges and solitary peaks, without parallelism or continuity, though when viewed from a distance the whole mass may be seen trending towards the coast and still preserving a connected outline. The succession of strata from secondary to primitive, which I have described to be from W. to E., appears to be the reverse of that observed by James, Douglas, and others, in the more southerly sections of the range, while at the same time they agree in characterizing the eastern aspect as abrupt and precipitous. The high sandstone walls which they speak of as occurring on this side I did not meet with, though it is highly probable that the underlying rock in the neighbourhood of the Rat river is of this material. The season at which I visited this part of the country was very unfavourable for geological investigations, and the deep covering of snow, which lay everywhere on the ground, prevented me from profiting by any natural sections which might exist in the district, so that I was unable to satisfy myself how far this conjecture might prove true. The result of my cursory observations I have already given in a former page when speaking of the Rat river.

I have designedly omitted any detailed account of the Indians of this quarter, as the many interesting anthropological questions which would arise out of this subject would lead me beyond the limits which I have prescribed for myself in this short sketch, and would besides be anticipating what I mean shortly to lay before the public in another form. Being myself a native of the country, and familiar with the languages and customs of most of the Indian tribes, on the E. side of the mountains at least, I am not without hopes that I shall be able to add somewhat to the slender stock of facts which seems to be possessed by many of the writers on the subject of the aboriginal population of America.

MISCELLANEOUS.

I.—*Extract of a Letter from Mr. JOHN DUNCAN to the Librarian of the Royal Geographical Society.* Dated Annamaboe, December 7th, 1844.

I HAVE not yet started on my journey to Coomasie, owing to the unsettled state of the Ashantee country, which is at present at war with one of the kingdoms to the N.E. The Ashantees have, however, returned, as they say, victorious, which is very doubtful—having lost an immense number of men. Another obstacle has also prevented my journey, which is not yet removed. A woman, belonging to a trading party of Ashantees, returning from the coast, while yet in the Fantee country, was attacked and robbed, and, it is said, murdered; the culprit was immediately apprehended, and carried to Cape Coast, where he now awaits his trial. The King of Ashantee, from the above cause, has closed the road and the trade at the same time, until the affair is adjusted. There were strong rumours of a war being the consequence, happily without foundation, and I have strong hopes of the road being again open, ere long, to trade. Governor Hill kindly wrote a letter to the king at Coomasie, demanding to know whether he would permit me to pass through his country to the Kong mountains, and through Mr. Chapman, the resident missionary at Coomasie, whom I met some days ago a short distance in the interior, I am enabled to give you the king's reply. It was to the effect that "he would be very happy to see me in Coomasie; he had heard of my intention of visiting him, and would gladly afford me every protection whilst in his kingdom;" but Mr. Chapman seems to doubt whether, on account of the late war, the king would allow me to go further, and considers it would be unsafe to do so under such auspices. I am determined to force a passage in some way or other, as far as the Kong mountains, if I find that the king objects; in which case I intend to make a large canoe, and proceed up the river Volta.

This river is of much more importance than is generally supposed. I have made many inquiries respecting it, and from what I can learn nothing certain is known, either of its position or magnitude, beyond its embouchure; so that a survey of it may prove of great advantage to the mercantile world. I intend to fit my canoe with revolving paddles, which have much greater power

than the common paddle, as I take as few men as possible. My health, thank God, is as good as ever it was in England, although I have tried my constitution much of late, getting wet, and sometimes sleeping in the open air. I can stand the heat better than most of the natives; with the thermometer at 115° Fahrenheit in the sun, and 95° in the shade, I have often walked the whole day, accompanied by some native merchants, who, though carried in a basket and covered by an umbrella, can hardly stand the heat. The real truth is, I cannot afford to ride, and when asked by the merchants the reason I walk—they declaring I will kill myself—I have always a good excuse, not wishing to disclose my poverty, by saying, none of the people can carry me, which is certainly the fact, as Mr. Hutton, intending on one occasion to treat me to a ride in a basket, could not find carriers strong enough in all Cape Coast.

I have little to add in the shape of news, but as I am well aware you take a great interest in anything that concerns my proceedings, I will give you, in as few words as possible, an account of one day's journey of last week.

December 1st.—Started from Annamaboe, accompanied by Mr. Cobold and Mr. S. Brew, the former an English, the latter a native merchant; we soon reached a small town, 1 mile E. by compass from Annamaboe. Having been introduced to the king, who received us very graciously, we proceeded on our journey along a very narrow path amongst rocks and bushes; the paths are generally so narrow as only to admit one foot in width, so that we were compelled to walk pigeon-like, *five over five*; we at length reached the beach, and, it being high water, we had to travel on the loose dry sand, which, with the thermometer at 115° of Fahrenheit, is fatiguing beyond conception. Continuing 2 miles along this sandy beach, magnetic E. (the compass varies here nearly two points, but I take all my bearings magnetically), the path turns to the left, in a N.E. direction through the bush, passing through a Dutch town called "Small Cramantine," a town of considerable size, and which was formerly a place of great trade. The remains of a strong Dutch fort are still standing, the outer wall of which, with the exception of the S.W. corner battery, is in good condition. There are still a number of guns of large calibre in the fort: the inner court is entirely overgrown with bushes and trees. This fort is better situated than either Cape Coast or Annamaboe. It is built on a small but steep rock close to the sea. Facing the sea the rock is about 300 feet high, and nearly perpendicular, it is therefore perfectly unapproachable in that quarter; the land side being also very steep, the fort might, with a properly maintained garrison, defy any attack from the natives, however numerous. The place being de-

serted, the trade is transferred to Annamaboe. The streets, or passages between the houses, are almost impassable to Europeans; the houses being built on rock, and the earth having worn away, it is necessary sometimes to climb and sometimes to descend. The natives are a very indolent and lazy race, and when asked the reason for not making their streets level, reply that "they will do it if you will pay them;" they are withal a very kind people.

After passing through the place and rounding the fort, the rugged path again takes a S.E. direction to the beach. After 2 fatiguing miles along the sand, we again bore to the left, ascending a steep hill of 300 feet in height, on the summit of which a large town is situated, named also Cramantine. We halted in the market-place, under a tree, for refreshment, surrounded by a great number of the natives. Mr. Brew had a musical box, which created among them great astonishment. I was shown a place in the town where, I was told, a child had lived ever since the beginning of the world. It had never grown any larger nor eaten anything, and was still alive. This gross superstition was firmly believed in by Mr. Brew. On my remonstrating with him, he declared it to be true, as both himself and his father had seen it. I determined to convince him of the absurdity of this story. I therefore sent for the old hag, or fetish woman, who had charge of this little black Adam, and begged a sight of him. She remarked, he was not quite prepared to receive visitors, but would shortly be ready to meet the white men. In the mean time she would show us a great curiosity. We were then led into one of the fetish houses, and shown part of the hollow trunk of a decayed palm-tree, covered all over with white spots. The fetish woman stated that this tree had been thrown down from Heaven as a present to her, and she, as well as the rest of the people, always made fetish to it. I endeavoured to persuade the people of its absurdity, which greatly displeased the old dame. Having in my hand an English oak stick, with a spring dagger in the head, I told her if her tree came from Heaven my stick came from the opposite direction: I gave the stick a smart jerk, the dagger immediately flew out exciting great surprise, many of them running away calling out white man's fetish stick. Being anxious to proceed on our journey, I again desired to see the fetish child, but was still told he was not quite ready. Hundreds of natives were assembled outside the paling which surrounds this little fellow's house. The house stands in the centre of a circle, enclosed with a fence of long poles stuck into the ground so close to each other, that when the little gates are shut the house cannot be seen. No one dared enter the yard until a sign was given from the old dame, as she said her fetish would destroy any one who might enter before the signal was given. I was determined to expose this absurd

superstition, and entered the gate in defiance of all threats and entreaties. I examined the dwelling of this little wonder, but found it tenantless with the exception of a few centipedes which had there taken up their abode. The old lady was very much incensed at my exposure and declared vengeance against me, at which I only laughed. Mr. Brew was much ashamed, although when in the house he trembled for my safety.

Descending the hill eastward, after proceeding a mile in the bush, we again reached the sandy beach, and after 4 miles fatiguing march through sun and sand we arrived at a town called Ouro, or Salt Pond (Salt Pond bears from Annamaboe E. 5° towards N.), named, no doubt, from a salt lake which divides the town. It is a very interesting little town, and the people more obliging and hospitable than at any of the other towns I have yet visited. A high sand-bank alone divides the lake from the sea, which frequently breaks in. The evaporation from the excessive heat is so great that the lake is excessively salt, especially at this dry season. Previous to the Ashantees destroying the town, salt collected from this lake was the chief trade. Between the town and the sea is a beautiful plantation of cocoa-nut trees, all in full fruit, the water from which is delightfully cool even in the hottest weather. I walked round the town alone (my companions, although carried all the way, being quite overcome with the heat); after which we went to the mission-house, where we got the use of a table to dine upon. There is no minister, but a very well-educated young man teaches a school; he received us with great kindness and attention. The water here is very bad; the only water at all drinkable is obtained from holes dug in the sand. After dinner my companions, complaining of illness, proposed two hours rest. I therefore went round the town with my gun and shot some birds. I fancied I had not seen any of the same species before, but on examination I found that this species change colour twice in the year, from grey, or yellow, to a jet black. Great numbers of birds in this country entirely change their colour.

About 2 o'clock we were again on the march for the river Amissa, which bears nearly E., keeping still along the beach. The tide had now ebbed, so that walking on the moist sand we had a firm footing, rendering this part of the journey much easier. Proceeding about 2 miles we reached a small croom, or village, near which was another small salt lake. Here I observed two natives eagerly engaged in cutting up what I imagined to be the carcass of an ox, but which turned out to be a large blue shark. They were preparing it in pieces for the market. I find it is a choice fish with them. Continuing a mile further we reached the Amissa, which, at this time of the tide, was very shallow and easily forded. My fellow travellers were carried across, and sent a canoe to bring

me over also. We then marched into the town of Amissa, which is only 200 yards in the bush from the lake. The king, a very good old man, now met us, and directed a house of several apartments to be cleared for our reception. When I say cleared, I mean swept out and cleaned, as in country villages they have generally no more furniture than a few rush mats, rudely made stools, and earthen pots. They have no spoons, even eating soup with their fingers. I walked round the town, and afterwards took a bath in the river. Supper being prepared, we invited the old king to come and take a glass of grog with us; he came, accompanied by a few of his cabareers and principal men, and enjoyed himself. During the evening, however, one of our friends got rather a little too much hollands, and, losing his equilibrium, overturned the light. The old king, fancying some premeditated attack, grasped me tightly round the waist, begging for protection. I soon procured a light from some lucifer matches, and then found all the cabareers had fled. The people are great cowards except among themselves. Bidding his Majesty good night, we lay down to rest, but as it turned out only to scratch. We were besieged by myriads, and about 3 o'clock our garrison surrendered. We then tried the open air, but found that still worse; upon which my fellow-travellers resolved upon a retreat, but as I had come so far to see the Amissa, I was determined to remain. I again lay down outside the house, placing my gun near my head, and soon fell asleep. I was awoke by something moving my cap; raising myself up I observed apparently a very large dog; upon my reaching for my gun he ran with great violence against another hat, but being obliged to pass me again, I perceived him to be an immense wolf, or what the natives call a patakoo.

About 7 o'clock the old king visited me to know how we had slept. The poor old man seemed very sorry when he found all gone except myself; he invited me into his house, but, having breakfasted, I immediately commenced my journey to a small town called Arsafah, bearing from Amissa E. 10° towards S., and distant 3 miles. The old king accompanied me out of the town to put me in the right path, giving me many a hearty invitation to pay him another visit. I now crossed another arm of the Amissa close to Arsafah. On entering the village I was met by a young educated African, who was agent for some Annamaboe merchants. He kindly gave me the use of his house to rest in. After dinner I commenced my return along the beach, and reached Salt Pond after a very toilsome march, and there rested for the night, and on the following day returned to Annamaboe.

A serious affair has just occurred at Danish Accra. The governor summoned one of the native chiefs to come to Accra to settle palaver. Previous to entering the fort, the chief stopped

to have palaver with the inhabitants, and a warm altercation ensued; on which the chief and his people said they would return home without coming to a settlement. They, however, only returned to arm themselves with muskets, and then commenced an attack upon the people, killing a considerable number, after which they made a quick retreat. The townspeople, recovering themselves, went in pursuit, and made a desperate attack in return: 30 heads were brought back into the Danish fort, among which was the head of the chief. Danish Accra is at present in a very unsettled state. It is reported that the governor intends to march some distance into the interior to chastise the natives.

I was yesterday summoned to the fort at Annamaboe to be present at the palaver of the principal messenger of the King of Ashantee, respecting my passing through his country. I obtained no satisfactory reply from him, as he possesses, like all his countrymen, a considerable degree of low cunning. He stated the king's objection to my proceeding beyond Ashantee to be merely a doubt for my safety; but this is, of course, only an excuse. The soldier, whom the governor dispatched with his letter to the king respecting me, being sent for, candidly confessed that the king, in the first instance, dictated a letter, stating his great satisfaction at the idea of my paying him a visit, and expressed his readiness to forward me to the Kong mountains. Having left Coomasie and proceeded on his return for two days, a messenger overtook him, saying the king had forgotten something; he therefore went back; the letter was demanded and torn to pieces, and another written, expressing his pleasure to see me in Coomasie; but that he could not permit me to proceed beyond, until the affair of the murder, before mentioned, had been settled to his satisfaction, or the man delivered to the Ashantees. Of course this cannot be complied with, as the alleged murder was committed in the Fantee country; but it appears there are very strong doubts of any murder at all having been committed.

13th.—My old ship the *Prometheus* has already taken two very fine slavers, and, within the last two months, the *Penelope* has also taken two; three more having escaped. She had five in sight at the same time. I am now arranging for my expedition up the *Volta*, and must therefore conclude with every feeling of respect.

II.—*On the lower Course of the Dnieper; being an extract of a Letter from Prof. HENRY MALDEN to the President of the Royal Geographical Society.*

I SHALL be happy to give you such information as I can upon the subject of Herodotus's description of the parts of Scythia E. of

the Borysthenes; but I am afraid that his evidence is not good enough to warrant us in drawing any certain conclusion with respect to the ancient state of the coast. However, it is the result of my experience in many similar cases, that it is worth while to examine strictly what an ancient author says, in order to prevent more from being ascribed to him than he really does say.

Herodotus gives a minute account of Scythia and the Scythians, partly from his own observation, partly from enquiries instituted in the country itself (b. iv. chaps. 16, 24, 76). It is clearly implied in his narrative that he had been at Olbia, the great Greek colony on the western bank of the Boug, near its mouth (chaps. 18, 24), and also at other trading settlements along the coast of the Pontus (chap. 24). In coming from Greece to Olbia, he would probably, almost certainly according to the ancient method of navigation, make a coasting voyage along the western coast of the Black Sea, touching at many intermediate points. He shows a full and accurate knowledge of the lower part of the Danube and of the streams which fall into it (chaps. 48—50). It is not probable that he travelled inland into these regions. He may perhaps have gone some little way up the river, and it is observable that he gives the native name as well as the Greek name of the Pruth. But it is rather more likely that he got his knowledge from the people of the Greek colony called Istria, at the mouth of the Danube, which he mentions in b. ii. chap. 33. There was another Greek settlement at the mouth of the Tyras, or Dniester (b. iv. chap. 51). And there is a passage which implies that he had been on the banks of the Dniester (c. 82), and another which shows it still more clearly (c. 11). It is likely, however, that Olbia was his head-quarters during his researches in Scythia, both from the superior importance of the place, and from his making it his starting-point in his enumeration of the Scythian tribes (chap. 17). From a comparison of chaps. 52 and 81, it appears that he visited some part of the country between the Boug and the Dnieper, and that too at a distance up the Boug of four days' sail from the sea, reckoning the voyage *down* the river. His description of the Dnieper (Borysthenes, chap. 53) seems like the description of an eye-witness; and I believe that he travelled as far as the western bank of that river, or sailed up it. But there is no indication of his having crossed the Borysthenes, nor of his having sailed along the coast eastward of its mouth. He mentions "the Race-course of Achilles" (the Kosa Tendra and Kosa Djarilgatch), but not in such a manner as to show that he had seen it. How imperfect his knowledge of the coast E. of the Borysthenes was appears from this, that he seems not to have known that the Crimea was a peninsula, nor to have had any knowledge of the Isthmus of Perekop. In chap. 99 he

compares the shape of Taurica, or the Crimea, to that of the extremity of Attica ending at Sunitum, and to the Japygian promontory, or part of Apulia cut off by a line drawn from Brundisium to Tarentum. So that it is evident that he conceived it to be merely a wedge-shaped projection, a corner of Scythia, which (with the exception of this projection) he conceived to have a *south* coast on the Euxine and an *east* coast on the Mæotis, or Sea of Azof, the general directions of these lines of coast being at right angles to each other (chaps. 99 and 101). The belief which the Greeks had, true or false, that the Tauri sacrificed to their gods all strangers who landed on their coasts, would tend very much to prevent voyages of discovery or trade to those parts. Where Herodotus speaks of "the Rugged Chersonesus," or peninsula, as he does in chap. 99 and elsewhere, he means not the whole Crimea, but only the smaller eastern peninsula ending at Kertch and Jenicale. He speaks of a trench cut across the entrance to it from the Tauric mountains to the Mæotis, which must have been in longitude $35\frac{1}{2}$. If he ever visited the Cimmerian Bosphorus, of which I do not remember any sufficient indication, he probably got at it by a different route, and not in his Scythian travels. It is likely that the Greek traders to the Bosphorus kept along the northern coast of Asia Minor to the point from which they could make the shortest passage across to the S.E. coast of the Crimea, and so along the coast to the Bosphorus.

This is rather a long preamble; but I wish to show that, although Herodotus visited Scythia, he does not describe the part of the coast East of the Borysthenes from his own observation, but on the authority of native Scythians and the Greek traders.

Herodotus then, after speaking of the great number of rivers in Scythia, says that he will mention by name those only of them which are commonly spoken of, and "which are accessible to vessels from the sea;" and then he enumerates the Ister with its *five* mouths, and the Tyras, the Hypanis, the Borysthenes, the Panticapes, the Hypacyris, the Gerrhus, and the Tanais (chap. 47). Now there is no doubt or difficulty in identifying the Tyras, Hypanis, and Borysthenes, with the Dniester, Boug, and Dnieper, and the Tanais with the Don. The difficulty is, what we are to understand by the Panticapes, the Hypacyris, and the Gerrhus.

We must observe, first, that Herodotus makes them all fall into the Euxine, and not into the Mæotis. He describes them thus more particularly:—"The Panticapes flows from the north and out of a lake. The Agricultural Scythians inhabit the country between this river and the Borysthenes. It flows out into the

wooded country, and after passing by this, joins the Borysthenes" (chap. 54).

"The wooded country" he has before described as the region next above the sea-coast to the east of the Borysthenes (chap. 18); and in chap. 76 he describes it more particularly as parallel to the Race-course of Achilles (Kosa Tendra and Kosa Djaril-gatch). "The Agricultural Scythians," also, he has before described as living E. of the Borysthenes, their country stretching eleven days' sail up the river (in another passage, chap. 53, he says "ten days' sail," but there perhaps he is speaking of a voyage down the river; or one day may be allowed for the breadth of the wooded country)—and extending three days' journey towards the E., and reaching to the river Panticapes (chap. 18).

Of the Hypacyris he says, that it issues from a lake, and flows through the middle of the Pastoral Scythians, and falls into the sea by the city Carcinitis, cutting off on the right the wooded district and the Race-course of Achilles (chap. 55). The Carcinite Gulf was the Greek name of the Gulf of Perekop. Of the Pastoral Scythians Herodotus has said before that they live to the E. of the Agricultural Scythians, beyond the river Panticapes, and spread to the E. fourteen days' journey, over a country bare of trees extending to the river Gerrhus (chap. 19). These two streams, the Panticapes and the Hypacyris, do not seem to be described as being of such a magnitude, that their disappearance in such a region would be very wonderful; and, moreover, I observe on the modern map a small stream passing by a village called Kalantchak, on the road between Kherson and Perekop, which in the position of its mouth answers very well to the Hypacyris.

The description of the Gerrhus is the part which opens a field for speculation. First, however, as to a *place* or *region* called Gerrhus. Herodotus says, in his description of the Borysthenes (chap. 53): "As far, then, as the *place* (or *region*) called Gerrhus, to which is a voyage of *forty* days, the Borysthenes is known, and it flows from the N.; but above this point, through what nations it flows no one is able to tell." I have underlined the word "*forty*," because, although all the MSS. and older editions have it so, a recent editor (Matthiæ) solely, I believe, on considerations of probability drawn from modern geography, has chosen to alter it to *fourteen*. This is a dishonest mode of dealing with the text of ancient authors. Herodotus reckons the course of the Borysthenes from the mouth of its estuary at the promontory of Kinbourn; but however short a day's voyage up the stream may be reckoned (and I suppose 10 miles is as little as can be reasonably given), Herodotus must have had an exaggerated notion of the distance to which the Borysthenes

was navigable, and can have known nothing of the cataracts. I have no information respecting the rapidity of the stream of the Dnieper, and shall be glad if you can tell me its rate.* It is clear that Herodotus conceived the Borysthenes to be navigable up to the point which he names, and does not use the expression, "forty days' sail," merely as a measure of distance: for in another passage (chap. 71) he says, "The place of sepulture of the Scythian kings is at Gerrhi, the place to which the Borysthenes is *navigable*." This last passage is important also, inasmuch as it shows that the district of which he speaks was notable.

Now with respect to the river Gerrhus, what he says is this (chap. 56): "The seventh river, the river Gerrhus, is *parted off* from the Borysthenes at that part of the country up to which the Borysthenes is known: it is parted off then, beginning from this place, and it has the same name as the place itself, Gerrhus. But as it flows into the sea, it is the common boundary of the country of the Pastoral Scythians and that of the Royal Scythians, and it discharges itself into the Hypacyris." The word which I have translated "*parted off*," clearly implies that he conceived the Gerrhus to be an arm of the Borysthenes: and it seems, by a comparison of his language respecting the Hypanis and the Borysthenes, that the latter part of his description means only that the Hypacyris and the Gerrhus had a common mouth, or flowed into the same estuary.

In the passages cited before, chaps. 18 and 19, he has said that the country between the Borysthenes and the Panticapes, occupied by the Agricultural Scythians, is three days' journey broad; and that the country between the Panticapes and the Gerrhus, lying on both sides of the Hypacyris, and occupied by the Pastoral Scythians, is fourteen days' journey broad; thus giving seventeen days' journey between the Borysthenes and the Gerrhus, reckoned above the region called the Wooded Region. Herodotus's idea of the country, however false it may be, is consistent with itself. An arm or mouth of the Borysthenes, branching off from it at a distance of forty days' sail from the sea, might very well be seventeen days' land-journey distant from it, where both streams were approaching the sea.

A mistaken notion of the general line of the coast is, I think, a main cause of the exaggeration of the distances between the rivers. Herodotus seems to have conceived that the southern coast of Scythia, from the northern mouth of the Danube to the southern promontory of the Crimea, was nearly in a straight line. He makes an allowance, indeed, for the projection of Taurica

* La vitesse du courant varie selon les localités. En aval des cataractes elle est assez faible pour que les bâtimens puissent remonter le fleuve à voiles par le plus petit vent. *Hydrographie de l'Empire de Russie*, p. 122.

(the Crimea), conceiving it, as I said before, to be a wedge-shaped corner of the country (and, apparently, to stretch out towards the S.E.): but otherwise he takes the line of coast to be generally straight, and estimates the distance from the Ister to the Mæotis at 4000 stadia (about 460 miles), which agrees tolerably well with the real length of the windings of the coast (chaps. 100, 101). Neither does he seem to have been aware of the great curve in the course of the Dnieper, but speaks of the river as flowing from the N.

There is, however, an inconsistency, or apparent inconsistency, in two statements of Herodotus, which deserves notice. Where he reckons the southern boundary of Scythia from the Ister to the Mæotis at 4000 stadia, he also calls it twenty days' journey, expressly reckoning a day's journey at 200 stadia; and he makes the Borysthenes the middle point, assigning ten days for the journey from the Ister to the Borysthenes, and ten days from the Borysthenes to the Mæotis (chap. 101). When he names the Borysthenes, he means specially the trading town or port of the Borysthenitæ, otherwise called Olbia, which he has elsewhere mentioned as the middle point of the coast (chap. 17). Thus, in one passage he makes only ten days' journey from the Borysthenes to the Mæotis; in another he makes seventeen days' journey from the Borysthenes to the Gerrhus, which of course is between the Borysthenes and the Mæotis. It may be answered that, in his description of the boundaries and extent of Scythia, he uses the day's journey as a fixed measure of length, according to the rate of travelling in Greece; whilst in his more general description of the country he followed the reports of travellers in the country itself. No doubt, a Greek day's journey of 200 stadia, or more than 22 miles, was much more than would be accomplished by a traveller in ancient Scythia, especially in a journey of several successive days. It is observable that elsewhere, when Herodotus speaks of a continued journey, even along the high-roads of the Persian empire from Sardis to Susa, he reckons the day's work at only 150 stadia. He is speaking, of course, of travelling on foot.

This apparent inconsistency, then, may be explained; and, as I said before, his other statements are consistent. The account of the Scythian tribes between the Hypanis and the Tanais, which is contained in chaps. 17—20, is manifestly founded on the very same data as the account of the rivers in chaps. 51—57.

Herodotus thought his informers trustworthy; and he is in general so careful and so conscientious in reporting testimony, that it is not right to set his statements aside as so much sheer error, without considering whether it is possible that his accounts were less erroneous with respect to the state of the country in his age, than they seem to be with reference to its present state.

Major Rennell, in his *Geography of Herodotus*, has suggested the hypothesis, that the tract between the Borysthenes and the Mæotis was anciently a delta of the river, and that the Gerrhus was the eastern stream of this delta. But he supposed at the same time that Herodotus was mistaken in believing that the Gerrhus flowed into the Gulf Carcinites, or Gulf of Perekop; and on the authority of Ptolemy he conceived it to have flowed into the Mæotis. This is, in fact, rejecting the chief point in Herodotus's description. The aspect of the country upon a good map has impressed me strongly with the same notion, that it was a delta in some geological period; and I would throw out the speculation, not only that the remains of this delta still existed in the time of Herodotus, but that his Gerrhus was a mouth of the Borysthenes still flowing where he says it flowed, into the Gulf of Perekop. His description of the two rivers Panticapes and Hypacyris, intermediate between the Borysthenes and Gerrhus, that is, between two mouths of the Borysthenes, yet described as flowing out of lakes and not out of the Borysthenes, seems to me to accord well with the notion of a delta partially dried up. If the geological state of the district admits this theory as a possible one, then if we make allowance for an exaggeration of the distance between the two ancient mouths of the river, and of the distance of the head of the delta from the sea, the main points of Herodotus's account may be received as true. If I am not mistaken, the eastern bank of the Dnieper continues rocky some way below the cataracts. The exaggeration of distance, therefore, must have been very great. I should be glad to know exactly how high up the river the alluvial plain begins. I suppose that the geological difficulty will be, not in admitting the existence of a delta, but in admitting its obliteration within a period so recent.

If this hypothesis be not admissible, I am afraid that nothing remains to be said, except that the persons on whose testimony Herodotus relied, mistook the Gulf of Perekop for an estuary like the Dnieprovskoi, and imagined the existence of the river supposed to fall into it; mistaking, also, some branch falling into the Dnieper for an arm parting from it.

Ptolemy gives the name of Gerrhus to a river falling into the Sea of Azof, which is supposed to be the modern Molotchinoia. But it will not at all save the credit of Herodotus to make this his Gerrhus. And, in fact, he seems to have known nothing of the coasts of the Mæotis. His descriptions of the nations of the interior, according to the most probable interpretation that can be put upon his positions, bearings, and distances, belong to tribes lying between the mouth of the Boug and

Orenburg, which seems to have been the limit of his knowledge.* It seems likely that the Greek traders of Olbia kept up a communication so far in a regular and systematic manner. Herodotus speaks of the Scythians who made the journey to the extreme tribe which he mentions, transacting business in seven languages and by means of seven interpreters (chap. 24). But, except in this direction, his knowledge seems to be vague; and of the coast of the Mæotis in particular he says nothing, except that it was occupied by the Royal Scythians.

III.—*On the Physical Structure and Arrangement of the Islands of the Indian Archipelago.* By Mr. W. EARLE.

A TRAVELLER in the Indian Archipelago soon perceives that there is an essential difference in the structure of the various islands. Some are only moderately elevated, with the land sloping gently towards the shore, and having regular soundings far out to sea. Others again rise abruptly from an unfathomable depth, and contain lofty mountains, some of which are active volcanoes; while a third class, comprising some of the larger islands, as Sumatra and Borneo, are of a mixed character, partaking in part of the peculiarities of both the others, the limits, however, of the two formations being very distinctly defined. The object of this paper is to point out an arrangement which will present at one view the character of the different islands. This arrangement has suggested itself to me during a personal acquaintance with the Indian Archipelago extending over a period of several years, and I feel that, had it previously existed, it would have very materially assisted me in pursuing the inquiries that I have lately had occasion to make in that part of the world.

The contrast which the volcanic islands of the Archipelago afford when compared with the continent of Australia is very strikingly presented to the view of a voyager from Port Essington, crossing for the first time the sea that separates the continents of Asia and Australia. Even before he has lost soundings on the great bank which extends from the northern shores of the latter continent, the lofty mountains of Timor rise up before him. As he nears the land the colour of the water suddenly changes from green to a deep blue; he has now passed the steep edge of the bank, and is floating on the unfathomable seas which bound the

* This has been shown, in opposition to the views of Heeren, by Mr. F. W. Newman, in a paper read to the Philological Society, March 24, 1843. (Proceedings, vol. i., No. 7.)

volcanic islands of the Archipelago. On closer examination, he finds that the land of Timor rises abruptly from the depths of the ocean; so much so, that from many of the precipices which overhang the sea, a line of great length will not reach the bottom, while the very few spots on which anchorage is to be found are so close to the shore as to be available only when the wind blows from the land. And to complete the contrast, if the weather is clear we perceive that one of the mountains near the east end of Timor is an active volcano. The chain of islands which extends from Java to Timor is of the same character; lofty volcanic peaks, some in a state of activity; while the islands are separated from each other by narrow channels of unfathomable depth, through which the current from the Pacific, caused by the prevalence of easterly winds, rushes with great force; but on passing these the voyager again perceives a change in the colour of the sea from deep blue to green, and, on sounding, he finds a bottom of stiff clayey mud, resembling exactly that of the bank which fronts the northern coasts of Australia; he is now on the great bank which extends from the south-eastern extremity of Asia far into the seas of the Indian Archipelago. The islands now lose their volcanic character, and on arriving at Singapore, near the extremity of the Malay Peninsula, the general resemblance of the country to that in the neighbourhood of Port Essington is sufficient to strike the most careless observer. The land low and undulating; the shore with red cliffs alternating with sandy beaches; even the rocks of the red iron-stone known to Indian geologists by the name of *laterite*, are perfectly in character with the country of the Cobourg Peninsula, and even on closer examination little difference can be discovered except in the vegetation.

These banks of soundings which extend from the continents of Asia and Australia form very remarkable features in the geography of this part of the world, and, as such, are deserving of more attention than has hitherto been bestowed upon them, since it will be found that all the countries lying upon these banks partake of the character of the continents to which they are attached; while those which are situated on the deep sea which separates them are all of comparatively recent volcanic formation, with the exception of a few small coral islands, which, in all probability, are constructed upon the summits of submerged volcanoes.* The depth of water on these banks averages about 30 fathoms, deepening rapidly as the edge is approached, and shoaling gradually towards the land. It will be seen that the one I have termed the Great Asiatic Bank extends into the Archipelago from the south-eastern

* See Darwin.

extreme of Asia to a distance of nearly 1000 miles, in fact to within 50 miles of Celebes, and I strongly suspect that it will be found to extend to the south-western extremity of that island also; but as there is a space of nearly 30 miles across which no soundings have been carried, I have preferred reducing the bank to the limits for which we have actual data.

Countries lying on the Great Asiatic Bank.—The similarity that exists in the direction of the mountain ranges in the south-eastern part of Asia has often been the subject of remark. These invariably run in a direction nearly N.N.W. and S.S.E., and are all of the primary formation. The chain which extends along the Malay Peninsula is the most conspicuous of these ranges, and is continued at intervals to Banca and Billiton, and perhaps may be traced as far as the north coast of Java. It is this range that most abounds in metals, or, at all events, in which mining operations are pursued with greatest success, probably from the strata, owing to its central position, having been little disturbed by the convulsions which have shaken the countries on either hand. The productiveness of the gold mines of the Malay Peninsula and of the tin mines of Banca is well known. This range may be considered as the back-bone of the Great Asiatic Bank. Sumatra, which lies on its western verge, has been subjected to volcanic action, but not to so great an extent as to disturb the direction of its mountain range, which runs parallel to that of the Malay Peninsula. The third and last range that can be traced into the Indian Archipelago is the one that traverses Laos and Camboja, at the southern extremity of which it disappears for a time, showing itself only at Pulo Condor and the Natunas, until it emerges near the north-west extreme of Borneo, and is continued along the entire west coast of that island. Here it again disappears, and only shows itself again on the north coast of Java, where it ceases entirely; the remaining portion of this island, with, perhaps, a part of the north-west extremity, being either of volcanic formation or of alluvial deposit. It is rather singular that the celebrated teak-tree, which abounds on the Cambojan part of this range, but is not found in Borneo, is again met with here, the projecting part of the north side of Java, between Samarang and Surabaya, being a vast teak forest, from the timber of which the greater portion of the shipping employed in the Archipelago is constructed. Java is the only island in the eastern seas in which the teak-tree is indigenous, nor will it thrive in the volcanic parts of the island where its cultivation has been attempted. This, which we may call the Cambojan Range, is also rich in minerals, especially the Bornean part of it, where large quantities of gold and many diamonds are obtained by the miners. The volcanic islands of the Archipelago also contain

metals, gold-dust being found at the bottoms of many of the mountain streams, but it does not exist in *veins*, as in the Malayan Peninsula and on the west coast of Borneo, these having apparently been broken up by the violent convulsions to which these islands have been subjected. The metal is therefore only obtained from the bottoms of the mountain streams, where it has been deposited when the earth in which it was contained was washed away.

Volcanic Islands of the Indian Archipelago.—The lines of volcanic action to which these islands have been subjected can be traced with tolerable distinctness. One of these extends along the W. coast of Sumatra and the S. coast of Java, whence it is continued by a chain of islands separated by narrow but deep channels to New Guinea, and can be traced through that island to the Louisiade Archipelago, and is probably continued by New Caledonia and Norfolk Island to New Zealand, thus forming a curved line resembling the letter S. The other line commences in Kamtschatka and extends through the Kurile Islands, Japan, and Laochoo, to the Philippines, where it separates into two branches, one traversing Palawan and the N.W. part of Borneo, where it terminates near the limits of the Great Asiatic Bank, and the other continuing in a southerly direction until it comes in contact with the Sumatran line. It is near this point of contact that the volcanic action has been strongest, throwing the islands into fantastic forms, of which Celebes and Gilolo furnish striking examples. These islands all rise abruptly from an unfathomable sea, a circumstance unfavourable to their productiveness, since a large portion of the rich soil created by the decomposition of the volcanic rock is washed away into the ocean. Java, however, is in a great measure exempt from this disadvantage, owing to the Great Asiatic Bank extending to its northern coast, which prevents this soil from being lost, in lieu of which it is deposited in vast plains lying between the mountain range and the sea. These plains are so surpassingly rich, that they not only yield a sufficiency of grain for the consumption of a large portion of the population of the Archipelago, but at the same time afford such abundance of sugar and other tropical produce as to furnish cargoes for many thousand tons of shipping.

The Great Australian Bank.—The remark that has been made with regard to the ranges in the south-eastern part of Asia is equally applicable to Australia, since one of the most marked features in the geography of this continent is the uniformity that exists in the direction followed by all the continuous mountain ranges that have yet been discovered. The Darling range on the W. coast of Australia, the great chain that extends along the N.E. coast, with the range that traverses a portion of South Australia,

and in which metallic ores have lately been found in such abundance, pursue a direction nearly N.N.W. and S.S.E.; and although the ranges on the E. coast of New South Wales vary somewhat upon this point, it is still to so slight a degree as not to require any particular remark. That this rule is also applicable to the lesser ranges is proved, at least as far as the shores are concerned, by all the deep inlets on the coasts of Australia preserving the same general direction, that is, running parallel to the mountain ranges; indeed so generally is this the case, that there is scarcely even a deep bay throughout the entire coast that does not conform to the general rule. The same occurs in Van Diemen's Land; indeed this island must be considered as being a portion of Australia, for, although really insular, being surrounded by water, it is still joined to the continent by a bank of soundings on which there is a depth of from 35 to 40 fathoms.

The great bank which fronts the N. and N.W. coasts of Australia commences near the N.W. cape, and extends in a N.E. direction to New Guinea, where it terminates at the base of the high but narrow mountain range that unites the eastern and western parts of that island, and separates the Banda Sea from the Great Pacific. It is at this point that the edge of the bank is most remote from Australia, the distance to the nearest point of the N. coast being 400 miles. It appears again on the S. coast of New Guinea, near Torres Straits, and extends along the N.E. coast of Australia, the Great Barrier Reefs being on its outer edge.

The Arru islands and New Guinea are thus united to the continent of Australia; and it is rather a singular circumstance that the kangaroo, an animal which was long supposed to be peculiar to Australia, is found both on the Arru islands and on the southern part of New Guinea; and as no specimens have been met with on the northern coasts of the latter island by Forrest and the French navigators who have been there, it seems to exist only on the portion included by the Great Australian Bank.*

* As the circumstance of kangaroos existing in New Guinea and Arru is not generally known, I will here give the authorities on which it rests. The kangaroo was first discovered in New Guinea, in the year 1828, by an expedition sent from Amboyna to explore the S.W. coast, and to found a settlement there. M. Modera, the historian of the voyage, states (p. 124) that they met with several sorts of kangaroos (*vele soorten van kangeroes* of Springhazen), which, with an animal he calls the "*koeskoes*," were the only quadrupeds met with. I am informed that a specimen, or specimens of the kangaroos seen during this expedition, will be found in the museum at Leyden. Lieut. Kolff, of the Dutch navy, was the first who met with the kangaroo at the Arru Islands, but he does not appear to have known what it was. His description is as follows:—"I cannot avoid giving a description of the Pilandok or Arru rabbit, an animal rather larger than the common rabbit, of a grey colour, which, as they grow older, becomes quite grizzly. The fore legs are short; and the hind ones, which resemble those of the hare, have each three toes, provided with strong nails; the head is like that of a weazel. These animals do not run very fast, and when resting they

New Guinea.—The northern part of this island, that is to say the portion lying to the N. and N.W. of the range of mountains already alluded to, partakes of the rugged and broken character of the volcanic islands of the Indian Archipelago, but the south-western part is low and undulating, and we may conclude that it bears a considerable resemblance to the northern coasts of Australia, since the several Dutch navigators who explored the Gulf of Carpentaria, and who were in the habit of coasting this part of New Guinea on their way to Australia, considered them as being portions of the same continent, and they were thus delineated in our maps until Cook passed through Torres Strait and decided the question as to their insularity. A very interesting account of the S.W. coast of New Guinea is given in Modera's "Narrative of the Voyage of the Dutch Corvette 'Triton' in the year 1828," when this coast was explored with a view to forming a settlement; and as it contains information which bears upon this point I would willingly make some extracts, were they not of too great length to be inserted in a paper of so general a nature as this must necessarily be.

The Arru Islands.—This group of islands is situated on the northern verge of the Great Australian Bank, and extend from N. to S. about 100 miles; but as the eastern side of the group has not been explored, its limits in that direction are uncertain. Some of the southern islands are of considerable extent, but those to the N., lying close to the edge of the bank, are rarely more than 5 or 6 miles in circumference. The land is low, being only a few feet above the level of the sea, except in spots where patches of rock rise to the height of about 20 feet, but the lofty trees which cover the face of the country give it the appearance of being much more elevated. Coral reefs extend from the shores of all the islands, and in the eastern parts of the group these are often of great extent. The islands are divided from each other by narrow channels, some of which are of great depth, and in one of these there is said to be a whirlpool of so formidable a description that the natives will not venture to approach it even in their larger vessels. I regret that during my recent visit to these islands my time was so much occupied by inquiries connected

usually sit upright on their hind legs. Their food consists of the leaves of the yam plant and other greens; and they are easily tamed, when they may be suffered to run around the house without their attempting to escape. The flavour of their flesh is very agreeable."—*Voyage of the Dourga (English Translation)*, p. 198.

I was not so fortunate as to meet with any during my visit to the Arru Islands, but from the skin of one that I saw, I judged it to resemble the smaller kind of kangaroo met with on the north coast of Australia; and this opinion was confirmed by a gentleman well acquainted with the Arru Islands, and who was enabled to make the comparison from having also seen the kangaroos of Port Essington.

with the expedition to which I was attached, that I could not ascertain this fact from personal observation. Upon the whole, it is evident that this group has not been left quite untouched by the convulsion which has shaken its neighbours, a circumstance that might naturally be expected from its position on the very edge of the bank, and in the close vicinity of the volcanic chain, the Great Ki Island being only 60 miles distant.

When it is taken into consideration that the primary mountain ranges both in south-eastern Asia and in Australia pursue a precisely similar direction, and that the westernmost Asiatic range, if continued, would strike about the N.W. Cape where the western Australian range commences, while banks extending from both these continents actually approach to within 450 miles of each other, the question naturally arises as to whether these continents were ever united. This inquiry, however, would lead to details of too extensive a nature to be admissible in a paper of this description, and which would belong rather to geology than geography, but it is well deserving of being followed up, since it possesses an interest beyond that which attaches to geographical matters generally; for if it is found that the mountain ranges of Australia are a continuation of those of eastern Asia, we may expect that they will also afford the mineral wealth for which the latter are so celebrated. Our colonies in Australia are now in a condition which would render the discovery of valuable minerals of the very highest importance. The amount of agricultural produce raised in these colonies is considerably above that required, for the consumption of the inhabitants, who are now anxiously looking about the world for a market for their surplus produce, and such a market would be afforded by a population employed in mining operations. We may reasonably expect that mineral wealth is not confined to the district of South Australia. The great range extending the entire length of the N.E. coast is of a very promising description, as is also the range which abuts on the N. coast near the new settlement at Port Essington, and which, if it preserves the same direction which is observed in the other Australian ranges, may be connected with that of South Australia. The Liverpool, Adelaide, and Alligator rivers, the largest yet discovered in Australia, appear to have their sources in this range.

In conclusion, I will venture to suggest that the great banks alluded to in this paper might be introduced into our maps of the Indian Archipelago with very good effect, and if delineated by means of the dotted lines, as in the accompanying outline map, would rather improve their appearance than otherwise, while at the same time they would tend to illustrate to a certain degree the

geological character of these countries. We have ample data from which to define their limits, except at the single point to which I have alluded in this paper, with regard to the S.W. extremity of Celebes.

IV.—*On the Languages of Australia, being an extract of a Dispatch from Captain G. GREY, Governor of South Australia, to Lord Stanley. Communicated by his Lordship.*

I HAVE the honour to transmit to your Lordship an outline map of the continent of Australia, coloured so as to show the districts within which different dialects are spoken on that portion of the southern coast which lies between 115° and 141° E.

Five principal dialects are spoken within this range.

The first is spoken within the district comprehended between the 115th and 125th meridian.*

The second dialect is spoken by the aborigines inhabiting the district lying between 125° and 136° E. This dialect is composed, in a great measure, of the languages which I have, in this dispatch, termed the first and third dialects, and which are spoken by the natives of Western Australia and those of the vicinity of Adelaide respectively.

The third dialect is that spoken by the natives inhabiting the vicinity of Adelaide and the country to the north of it, as far as it has yet been explored.

The fourth dialect is spoken by the tribes inhabiting the banks of the river Murray, as far southward as a point about 30 miles to the north of the junction of that river with Lake Alexandrina; and it extends thence to the northward along the Murray until its junction with the Darling, and from thence to the northward along the latter river as far as we have any acquaintance with its aboriginal tribes. No extensive vocabulary of this dialect has yet been collected, but I trust that in a few months I shall be able to forward one to your Lordship, as two gentlemen are at present engaged on this subject.

The fifth dialect is spoken by the aboriginal tribes inhabiting the shores of Lake Alexandrina, and it extends thence to the northward for about 30 miles along the banks of the Murray, and to the southward and eastward along the coast of Australia in the direction of Port Philip, to as great a distance as we are yet acquainted with the natives. I have on the present occasion

* Vocabularies of this and the two following dialects were previously sent home by Gov. Grey.—ED.

the honour to transmit a vocabulary of this dialect to your Lordship.

From the foregoing description and the accompanying map, your Lordship will perceive that these dialects (which, from their radical and grammatical resemblance, appear all to have had one common origin) have all extended themselves in the direction of the great natural features of the country.

The people speaking the first dialect appear to have extended themselves along the coast-line from the northward and westward. Those speaking the third dialect appear to have come from the northward along Lake Torrens and Spencer's Gulf, and to have spread themselves to the westward until they met the people speaking the first dialect, and from the amalgamation of the two the second dialect appears to have sprung.

The people speaking the fourth dialect appear to have come from the northward down the river Darling and its tributaries, and from thence down the Murray, until they were met by those who spoke the third and fifth dialects.

Those who speak the fifth dialect seem to have come along the coast from the eastward as far as Lake Albert and Lake Alexandrina, and from thence to have spread up the river Murray, until they were met by the other tribes who were coming from the northward.

Those tribes who have spread along the coast-line appear to have migrated with the greatest rapidity, or at all events to have occupied the greatest extent of country.

The only probable means of tracing the direction from which this continent was peopled appears to be that of studying the ranges of the various dialects, and the directions in which they have spread, in the manner I have exhibited on the accompanying map; and as the lapse of every year renders the accomplishment of this object more difficult, I would venture to request your Lordship to endeavour to obtain from the different authorities on this continent, vocabularies of the dialects spoken by the aborigines in the different districts in their vicinity. It would be especially desirable that vocabularies of the languages on the northern coast should be collected; for it is evident that, if one of these dialects should be found to coincide with one of those spoken on the southern coast, then the line of migration from one point to the other might be considered to be very nearly determined. The map which I have now the honour to transmit, and which shows (approximately only) the range of nearly all the southern dialects, affords very strong presumptive evidence that this continent was peopled from the northward, and that the lines of migration were along the coast and the great water drainages of the country.

I think it proper to add, that in all the vocabularies which

I have transmitted from South Australia, one common system of orthography has been adopted; and that the different writers of the vocabularies, having previously agreed upon one common method of representing sounds, has rendered these records much more complete and valuable than they would otherwise have been.

V.—*Some Remarks upon the Freezing of Streams in North America, in connexion with the supposed Congelation of their Sources in High Latitudes.* By ALEXANDER C. ANDERSON, H.H.B.C.S.

At the Newcastle meeting of the British Association, Captain Washington, upon reading Professor Von Baer's communication respecting the frozen ground of Siberia, made allusion to an adventure of the Baron Wrangel's, near Yâkutsk;* and inferred that the members of the Hudson's Bay Company must, in their frequent journeys, have encountered similar adventures, tending to the same conclusion—namely, the freezing of the sources even of considerable streams, in high latitudes, during the winter season.

Though far from seeking to invalidate Baron Wrangel's statement, I cannot but think that the inference deduced from it is incorrect. Circumstances nearly similar (though on a far less conspicuous scale) have occurred to myself and others who are in the habit of travelling during winter in this country; but every instance that I have met with or heard of may, I conceive, be referred to the following simple explanation.

But it is first necessary that attention be directed to the process by which the congelation (for it can scarcely be termed freezing) of rapid streams is effected. To this end, wherever the current runs with any considerable velocity, it is first necessary that the stream become choked with drift ice, first formed in the slack water near the banks, and afterwards disengaged and driven away by the current. Dense packs are thus at length formed; and these, being stopped in different parts by the projecting angles of the shore, are soon consolidated by the cold into a firm and stationary mass; with occasional vacancies, however, owing to the unequal obstruction of the packs. These openings, though in process of time their dimensions become much contracted, are kept from closing by the rapidity of the current, even when the cold is very severe. Were it not for the packs formed and ar-

* See 'Narrative of an Expedition to the Polar Sea.' By Admiral F. Von Wrangel. Edited by Lieut.-Col. Sabine, R.A., F.R.S. 2nd edition, p. 36.—Ed.

rested as we have explained, the agitated waters would be maintained open throughout; a fact evinced by the circumstance that, even in very high latitudes, some streams—such as the Bear's Lake River, instanced by Dr. Richardson—are never frozen: not, as that gentleman supposes, on account of their rapidity solely, but simply because their course is too short, as compared with the breadth, to permit a sufficient accumulation of drift-ice to occasion a stoppage. For this reason the upper parts of rivers (setting the consideration of springs apart) are never congealed from side to side above the spot where the accumulation of drift first chokes the passage. Under the concurrent circumstances which I have stated, it may be assumed as a general truth that no stream is too rapid to admit of congelation; and the only observable difference between the most rapid streams and those of more moderate velocity, is that the former present an extremely rugged surface, owing to the forcible protrusion of huge blocks of ice during the first obstruction of the packs; while that of the latter is comparatively level, on account of the smaller degree of force exerted against the component blocks by the current. The existence of these *bourdignons*, as the Canadians term the rugged projections upon the ice, is, I may remark, a very serious impediment to the traveller's progress upon the surface of rapid streams.

To proceed more directly to the point under consideration. The obstruction of the packs in any particular reach of a river necessarily causes a temporary retardation of the current; by which the water in the superior vicinity is raised, for a short period, perhaps 4 or 5 feet, or even more, above its previous level. In some positions the body of ice acquires sufficient firmness before the subsidence of the waters to maintain its position under these circumstances; but this occurs, I am inclined to believe, only upon small streams, or upon the minor channels of large streams. Some of the latter, being filled upon the rise of the water, are again reduced to their previous state of partial or total dryness as soon as the superfluity is drained off by the main channel. Now it is easy to conceive that, in the interim, the accumulation of drift might, in severe weather, be rendered so compact as to maintain its position over a narrow surface at the greatest height to which the water had risen. Possibly, too, under the intense cold of extreme latitudes, a large stream might become in like manner bridged over, and retain its elevated position under the same circumstances. But in all cases of this description which have come under my knowledge, the weight of an unsupported mass of any considerable breadth occasioned it invariably to subside as the waters retired: and, indeed, to judge by analogy from the construction of artificial bridges, it seems to be evident that no

perfectly flat surface of any great breadth can sustain its own weight with no other support than that afforded at the sides.*

Upon small streams, I may add, more especially in mountainous positions, the like effects are sometimes produced by their being frozen at a time when they are flooded by previous thaws, which not unfrequently occur in the autumn. In such cases, as soon as the superfluous waters run off, the ice is found to be in like manner elevated proportionably above the surface: nay, in some instances of extremely insignificant brooks, whose sources are quite superficial, a total desiccation of the waters may ensue. But in ordinary streamlets I never witnessed this to take place.

Under one or the other of these views, may it not be supposed that Baron Wrangel must have chanced to alight either upon a stream circumstanced as that last described, or upon the drained small ana-branch of a larger stream? The latter supposition is the more probable, since the scene of the Baron's adventure is described as a "large river;" a shallow offset of which might, as I trust I have shown, and as I have sometimes witnessed, have been easily drained, either partially or totally, without implying the failure of the usual supply in the main channel, or the congelation of the sources.† This view of the subject, moreover, derives support from the fact that the strength of the ice was evidently insufficient to bear the weight of a loaded horse; and it is therefore scarcely credible that a flat surface of any considerable extent, possessing no greater tenacity than this appears to have had, could have sustained its own unsupported weight. It should be borne in mind, too, that ice from which the water has retired is invariably weaker than that which rests upon the surface, not merely on account of its being deprived of the support afforded by the water, but in point of actual tenacity. Schoolboys at home, for this reason, term it "cat's ice."

Under the impression that this exposition of Baron Wrangel's adventure will tend to discountenance the inference that the sources of streams of any magnitude are affected by the external temperature, I shall hazard some further remarks upon subjects which may be presumed to bear indirect reference to the existence of perpetual ground-ice.

The open spaces occurring upon the frozen surfaces of rivers

* The author is perfectly right, if the surface be indeed *flat*, i. e., horizontal; but large and rapid rivers are known to have a convex surface, and if the icy covering assumes this form, it may, as in the case of what are termed flat arches, bear not only its own weight, but a considerable addition to it without breaking.—Ed.

† I would with much deference suggest that the mere supposition of this congelation involves a physical impossibility; for it ought, perhaps, to be inferred that the subterranean waters, from whatever cause they may be generated, if thus imprisoned, would probably occasion effects equal to those of confined gunpowder, or of a pent-up volcano.

are by the Canadians termed "*mares*;"* a name applied likewise to another variety of these openings, whose origin is in reality very different, though upon superficial observation the two are apt to be confounded. The latter variety is generally—I ought perhaps to say invariably—met with at the outlet of lakes, or at the spot where a tributary enters; and frequently in deep sluggish streams and other positions where the exciting causes similarly prevail. Subaqueous springs are in these (last?) cases the obvious cause. These "*mares*," or pools, though perfectly quiescent, are not affected by the most intense cold, if we except that, upon the protracted continuance of severe weather, their dimensions are somewhat contracted; but upon the relaxation of the cold, they quickly recover their former size. Indeed the "*mares*" occupy a conspicuous place in the natural economy; since Providence, in his bountiful care, has thus secured to the inhabitants of the waters the source of a constant renewal of the atmospheric air—another beautiful exemplification of that adaptation of means to ends which pervades the works of the Creator.

Hence it appears that springs are, in these latitudes, endowed with a certain average degree of temperature, which is adequate under all circumstances to prevent the speedy congelation; and the common hydrostatic law of course secures a constant renewal of the freshly-emitted water at the surface during winter. Unfortunately, owing to my having had the misfortune to break the only thermometer to which I had access, I cannot state with precision the temperature of the springs. In the Rocky Mountains, from lat. 50° to 55°, where the mean annual temperature is comparatively low, the phenomenon is even more conspicuous than in more genial positions lying at a lower level: and in crossing these mountains between the heads of the Athabasca and Frazer's River, at different times, from October to February, of several years, I have witnessed the "*mares*" in their usual condition, whether under the influence of the early frosts, or when subjected to the intense cold of mid-winter. A remark which has also been made by other travellers in more northerly parts.

It may, therefore, be inferred that, if perpetual ground-ice exists in these localities, all streams of any magnitude must have their origin below the frozen stratum; and likewise that the veins of water must possess a considerable degree of heat in their first state, or gush up with a velocity adequate to prevent any material refrigeration during the ascent. On the other hand, any streamlet that ceases to flow during winter must obviously derive its supply from land-springs.

I have been unable to ascertain any point directly connected

* French word signifying a pool.

with the existence of perpetual ground-ice, which doubtless exists in the northern parts of America as well as in Siberia. In Western Caledonia, the most northern position in which I have resided permanently, the mean annual temperature is considerably above the freezing point. Although in a pretty high latitude, it shares, in common with all positions on the W. side of the Rocky Mountains, perfect immunity from protracted cold. In this vicinity, therefore, the ground is never permanently frozen at any depth to which I have had access, either by digging or on inspecting the landslips that are occasionally formed.

VI.—*Notes on African Geography; communicated by Mr. MACQUEEN.*

I. *Visit of Lief Ben Saeid to the Great African Lake.*

LIEF BEN SAEID, apparently a very intelligent man, about forty years of age, and born in Zanzibar, of the Manmoise* tribe, states he has been twice at the Great Lake in Africa, for the purpose of bartering for ivory, and describes his last visit as follows.

He left Zanzibar in the month of September, 1831, and landed at a town called Boramy,† on the African main, situated a little to the southward of the south end of Zanzibar. After remaining there for some days, he left with a caravan, or kafilā, of about five hundred persons. He had about seventy of his own followers; the rest consisted of returning Manmoises. The first day he travelled a distance of about 9 miles, on a plain road, where, at half that distance, they crossed a small river called Mazinga.‡ Putting up at the village of Qua, which is the principality of a tribe called Mazeamoo.§ The next day travelled, about the same distance, to Beonee;|| and the next day to a village called Ma Kunda¶ —during this journey crossed over a hill: next stage arrived at Konjee, and then at Moktanero, near which is a river about 200 yards broad, infested with alligators and hippopotami. The next night slept at Deejamora; the next stage passed under a high range of hills without vegetation, the road being sand, and which has been the case from the time they left the coast; passed Kedonda, and slept at Onegata, where two large rivers join; slept at Datomee. Passing between two high hills at this place there is another tribe called Koto.** Again slept at Zohgomero, where

* Mono-moézi.—Ed.

† The name Mazinga may be correct, but it is nevertheless to be suspected, since the tract described is inhabited by the Mazingea.—Ed.

§ Mozimo.—Ed.

¶ Macunda.—Ed.

† Buro-maji, Buro-water.—Ed.

|| Bióni.—Ed.

** N'cutu.—Ed.

there is a small creek or river; continued travelling for 6 days, through various ranges of hills, through the country of the tribe of Loamby. The next two days passed the town of Kesuŋga; their king is called Keringawarha, who is an usurper; the name of the tribe is Wamefee: * this is all a hilly country. From thence travelled 2 days to Marora; the king's name is Negaboo; the name of the tribe Osagara † (many sold in Zanzibar): at this place there are two rivers which irrigate the country, and food in plenty; there are also numerous running streams from the hills. From Marora in one day reached the Bahar (the river, viz. the Lufigi?): there is a large river, called Matoney, infested with hippopotami; travelled close to the banks of the river for 8 days, through the tribe called Yoaha: ‡ the country is hilly; and we were constantly falling in with villages, at which we slept every evening; when we got to Powaga. Travelled thence, through a plain country, on the banks of the same river for 5 days longer till we reached Osanga; from thence proceeded to Sanga in 3 days, leaving the river Matoney on our left hand, the hills were also all left to the south; and the other part of the country was perfectly level, principally sand and ironstone: thence travelled for 5 days through the tribe of Toomba; the country quite plain, and well populated—during the whole time from leaving the coast had no rain. From Toomba to Jangwera 2 days; thence to Sangara 3 days: no villages or people. Sangara forms the east limit of the Manumuse (Mono-moezi) tribe, and one of the kings lives there; from this to the lake is occupied by the Manumuse (Mono-moezi) tribe, which is under four independent sovereigns: the people are very honest and civil to strangers; no instance has occurred of ill treatment or injury. The road to the lake is plain, without hills. Sangara to Ganda 5 days, quite plain, country well populated, more so than before entering the Manumuse (Mono-moezi) country. Sheep eight for one dollar, bullocks four for one dollar; but they prefer a quarter of a dollar's value of cotton cloth. From Ganda to Shesha 3 days; here is a sultan or king: the appearance of the country as before. Hence to Sanjee 5 days; here another sheik or sultan: at this place there is an abundance of iron-ore—country quite level. From this latter place to Sagosee 2 days, country as before; thence Ogaree 3 days, where there is a very large river called Magrazie, with numerous hippopotami in it. From this place to the Grand Lake is 12 days, through a country called Oha, a plain level country: on the banks of the lake is the great Sultan of the Manumuse (Mono-moezi), whose minister's name is Kegaw; the appearance of the people near the lake is that of the Abyssinians. The whole time from the shore of Africa being 140

* Wamiva.—Ed.

† M'Sagara.—Ed.

‡ Wobaha.—Ed.

days, or $4\frac{1}{2}$ months, on the road; and during which time we travelled 62 days, at about the rate of 9 or 10 English miles daily; but I have no means of ascertaining the exact distance.

The extent of the Manumuse (Mono-moezi) country is about 2 months from N. to S., and from E. to W. $1\frac{1}{2}$ month. In standing on the banks of the lake it can be seen across, in the same manner as from Zanzibar to the main (which is 24 English miles). Several islands were observable in it. On leaving the African coast we travelled in a direction for the first month about two points S. of where the sun sets, and afterwards continued to travel exactly in the direction of the setting sun.

The river called Magrazie takes its origin from the lake, and disembogues itself into the sea between the rivers Lindy and Keelwa; and I am sure the rivers Lindy and Masoryre are branches from it. Across the lake there is a great trade of ivory, oil of a red colour, and slaves like those of Nubia. There is a trade carried on from the W. bank of the lake to the W. coast; it consists of white and blue cotton cloths, and some broad-cloths, which are bartered for ivory. The time taken to reach the W. coast from the lake is about 6 months. For two trassalors* of beads you get four of ivory; the beads costing about five dollars per trassala.

Never heard of the dwarf human species spoken of: the people near the lake are fairer than those near the coast. There is a great sea or swell on the lake when the wind blows fresh: and it is well known by all the people there that the river which goes through Egypt takes its source and origin from the lake. The banks of the lake are composed of sand-hills, thrown up by the waves; the water is very deep, with great quantities of fish. On the W. side of the lake the name of the tribe is Yoah; they are circumcised, and call themselves Mohammedans. Some of the boats are 6 fathoms long, very narrow, and without sails. The Manumuse (Mono-moezi) are pagans; and both sexes go nearly naked. Near the lake, and through the Mono-moezi country there are no horses or camels, but plenty of asses and a few elephants. In travelling in the country from the E. side to the lake there is no danger; and from the W., by paying a little to the different sultans, they would forward you with the greatest safety. During the whole distance the people with the caravan were healthy; they got plenty of good and cheap food and water. The houses on the road and at the lake are made of wood, and thatched with grass; no upper stories, nor is there any chimney. Dogs are very numerous and troublesome, some of a very large kind.

* Ferisalah, 1 farsalah = 20 rotl.—Ed.

Does not know in what direction the great body of the lake extends, but thinks to the westward of S.

N. B.—The Masogra river, here * mentioned, is no doubt the Luffia or Cuavo, but named the Masogre or Masagora,† from the country of this name, which country is situated in $7^{\circ} 25'$ S. lat., and betwixt 36° and 37° E. long.

II. Information obtained from Thomas Wogga, an African.

THIS man is at present in this country: he had been previously, fourteen or fifteen years, on board of a British man-of-war; and liberated from slavery about the year 1815 or 1816. He is a native of a country which he calls Kimcoul; and which, as far as the accounts which he gives are correct, must be situated near the sources of the Tshadda, in about 10° N. and 18° to 19° E. He was exactly 68 days actually travelling from thence to Calabar, and always in the direction of the setting sun. From the rate at which he travelled, and the time occupied, he must have made good at least 10 geographical miles daily, if not more. He states that Donga was 6 days' journey, on foot, eastward from his country; that he had been there, his country having been engaged in war with the people of that district; that there were plenty of rivers, great and small, in the country of Donga; that they were not the same as the river in his country, but ran in an opposite, or rather in a southerly and westerly direction. He was very closely questioned about his knowledge of this place, and he always adhered to the statement that he knew it perfectly. He also stated that he had heard of a country called Ferttee, to the eastward of his country and of Donga. He gave the name of every place or town at which he halted in his journey to the coast. Gold and silver were abundant in Ferttee.

In his country, he says, there is a great river called Ayah, broader than the Thames. It comes from the E., and runs to the W. or the setting sun. Its course from his country passed first through a place called Komse, second Mongell, third Pambe, and fourth Mondell. In his way westward he passed several rivers, but all smaller, except one about midway; and they all ran in the direction of and to join the Great River. This river is joined on both sides by small streams. During the dry season the Great River is about 3 feet deep. There are no canoes on the Great River: the people either swim across it or pass it on rafts. During the rainy season there is plenty of hail; the children pick it up and put it in their mouths as amusement, as it makes them feel cold: it lies three or four hours on the ground before melting. Plenty of

* Where?—Ed.

† The name here intended is M'Sagara, in about 8° S. and 35° E.—Ed.

hills, some of them so high as to be always white with snow or hail. Rain sometimes incessant throughout the year; sometimes dry. Old people make rain fall—make fires and offerings to bring it. Many shooting-stars or comets: these run like serpents, and explode. This takes place before the kings die. Thunder and lightning very heavy, and very frequent. There are plenty of elephants and monkeys; the monkeys do no hard work. There are plenty of cows and horses, but these are never employed in work. There are plenty of sheep, goats, and tiger-cats. There is also plenty of fish in the rivers: both men and women catch them in nets; these nets are made of a kind of grass or hemp. There are plenty of crocodiles and alligators; the people eat them, and also the guana: sometimes the crocodile kills people in the river. There are plenty of large trees and plenty of brush. The houses are made round; they are built of mud, thatched all over, and have small fire-places. They have plenty of fowls. Each kind of stock live separately. They have plenty of Guinea corn and Indian corn; plenty of yams and sweet potatoes of a description resembling beet-root.

They have as many wives as they like: the king has ten, or more. They have many slaves, which are either bought or taken in war. There are also plenty of yellow and brown people—God made them as well as the blacks: the brown or red coloured people come with camels to buy slaves, &c.; these red people bring the camels in order to carry themselves and their goods. His country made war with different nations—one called Koome, another Korre, a third Komante, and a fourth Juke: the latter are marked like the New Zealanders. All these nations are black, and speak different languages. In his country they make images of wood and worship them: they also pray to stones. The common people build their images of clay. They also build a large image with stone; this image only the king and courtiers worship: they make him like a man, with a hole in one side in order to give him victuals to eat, consisting of flesh, fowls, &c.

Thomas Wogga is of a deep black colour, but without any of the real negro countenance, such as the flat nose, thick lips, &c. He is now considerably advanced in years, but when young must have been a good-looking man. His country marks are numerous and full. He describes the general features of his own county, and of those through which he travelled, with considerable clearness; but, like every other African black, he can give no explanation about names of places which are known to us from other quarters, or of geographical bearings and distances, with any precision, except as from E. to W., or from the rising to the setting sun, or by the sun being to the N. or the S. of the road.

The following is a more particular description of his route:—

	Days.
Kimcoul to Uppe . . .	1
Uppe to Auzilliga . . .	1
Auzilliga to Ocoom . . .	7 (long journeys.)
Ocoom to Mousookko . . .	4
Mousookko to Ungwa . . .	6
Ungwa to Uvangah . . .	30 (constant travel.)
Uvangah to Umblisse . . .	9
Umblisse to New Calabar . . .	10

Total . 68 days.

Uppe is 1 day from the great river Ayah. At Auzilliga there is a considerable river, but smaller than the Ayah: it runs westward to join the latter. At Ocoom there is a river, called Moniah, not so large as the Ayah. Ocoom is N. of the large river, and not far from it. Ocoom River not far from Great River. Plenty of yams and tobacco at Ocoom. There is no river at Monsookko, but plenty of water from springs. The women here have very large heads. There are large hills here, but not so large as those in his country. Plenty of brush. Ungwa is a large town, with a river 20 yards broad, but deep. There is no river at Uvangah: it is a large town, with plenty of bush in it and around it; there are many hills in its vicinity, some large and some small. Between Ungwa and Uvangah one river, not fordable; swam across it. No river from Uvangah to Umblisse; but the country is hilly, with plenty of water from springs and rivulets. From Umblisse to New Calabar the country is flat. In these journeys the people of the caravan carried each yams for their food.

I N D E X.

- ARDU-L KIRI, 158, *et seq.*
 Abyssinia, 187, 212, 234.
 Achadas, plain of, 276, 277.
 Achelunda, or O-calunga, lake, 186, 203.
 Achilles, race-course of, 354.
 Adelaide, river, 364.
 Aden, gulf of, 145, 149, 151, 156.
 Ad ibn Aus ibn Irem ibn Sham ibn
 Nûh (Noah), tribe, 112.
 Adjarah-Sû, river, 297.
 Agoa Azeda, 278.
 — Feuca, 278.
 — de Pao, 281.
 Agows, or Agaghis or Giagas, of Abys-
 sinia, 189.
 Ajuricaba, a chief, 96.
 Akil, the family of, 121.
 Alacranes, islands, 237.
 Alagoa, 275.
 Albert, lake, 164, 182, 183.
 Alligator, river, 364.
 Alum Hill, 343.
 Amazons, 65.
 Ambios, tribe, 189, 193, 195.
 America, freezing of streams in North,
 367, *et seq.*
 Amessa, river, 349, 350.
 Andad, 118.
 Angas, Mr. G. F., 161, 170, 172.
 Angola, 186, 187.
 Angra Frio, 217.
 Annamaboe, 347.
 Antonio, cape, 326.
 Anziki, people, 187, 188.
 Aramatau, river, 76, 88.
 Arawaaks, tribe, 84.
 Archipelago, Indian, 358, 359.
 Aripai, river, 6.
 Arroyo de Cheltepec, 249.
 — Jaboncillo, 251, 256.
 — Palencio, 255.
 — Paula, 248.
 — Meluco, 256, 257.
 — del Trapiche, 245, 248.
 Arru, islands, 362.
 Arsafah, 350.
 Arthur, Messrs., 174.
 Artoin, 300, *et seq.*
 Aruangoa, river, 197, 226, 227, 228,
 232, 233.
 Athabasca, river, 370.
 Atondo, or Wotondui, kingdom of, 196.
 Atornis, tribe, 26.
 Atumba, 207.
 Australia, 358.
 —, dialects of, 365, *et seq.*
 Australian bank, 361, 362, 363.
 — ranges, 364.
 Auxilliga, 376.
 Awaricuru, river, 6.
 Awarre-tequi, mountain, 14.
 Ayah, river, 373, 374.
 Azores, the, 258.
 Bab-el-Mandeh, straits of, 150, 154.
 Bacasacala, river, 219, 220, 222.
 Balat, or Belat, winds, 147.
 Ba-l Haff, 152.
 Banca, island, 360.
 Banda, sea, 362.
 Bander Gingère, 127.
 — Hattab, 106.
 — Nus, 129.
 — Risut, 116.
 — Sherdebat, 133.
 — Zegirah, 142.
 Barakuty, tribe, 84.
 Barker, mount, 183.
 Barrendowen, 325, 326.
 Bartolomeo, peak of, 280.
 Batûm, 296.
 Baudin, 167.
 Bay of Espiritu Santo, 236.
 — Galveston, 236, 237.
 — Hajarah, 144.
 — Jinzerah, 126.
 — of Navigators, 311.
 Bear's Lake river, 368.
 Beit Ahmed, sub-tribe, 111.
 — Alyan, *id.*, 111.
 — Arfat, *id.*, 111.
 — Efrîr, *id.*, 111.
 — Hushî, *id.*, 111.
 — Jeizat, *id.*, 111.
 — Kaishat, *id.*, 111.
 — Osman, *id.*, 111.
 — Safaî, *id.*, 111.
 — Zehad, *id.*, 111.
 Belengi, river, 221.
 Benguela, 192.
 Benomotapa, 185.
 Benson, mount, 170, 183, 184.

Beonee, 371.
 Berberah, 151.
 Bernouilli, cape, 167, 169, 183, 184.
 • Besser, 204.
 Billiton, island, 360.
 Bir Inkiliz, 135.
 Black Sea, 352.
 Bligh, Captain, 37.
 Bomba, territory, 216.
 Bonney, Mr., 160, 169, 172, 177.
 Bonney's Creek, 183.
 — lake, 172, 184.
 — waterholes, 164.
 Boppol, mountain, 313.
 Boramy, 371.
 Borneo, island, 358, 360, 361.
 Borysthenes, 352, 354, 355, 356.
 Botchka, 299.
 Boug, river, 352, 353.
 Boyne, river, 321.
 Boyuni, 506.
 Bracefelt's Head, 312.
 Brady's Island, 310.
 Bremer, river, 163.
 Bridgewater, cape, 175.
 Brisbane, river, 307, 310, 316.
 — town, 307.
 Brothers, islands, 151.
 Brown's Cape, 313.
 — Head, 312.
 Bue, river, 227.
 Buey, Isla del, 245.
 Buradi, bird, 9.
 Burnt Island, 145, 151.
 Burumaji, 206, 207, 231.
 Burr, Mr. T., 160.
 Burukutau, mountain, 12, 14, 15.
 Butua, kingdom of, 196.
 Cabombo, 225.
 Cagintrigi, river, 218.
 Cahaber, plain, 296.
 Calabar, 373.
 Calalimo, valley of the, 218.
 Caldeiras, the, 270, 278.
 Caledonia, Western, 371.
 Callau-callau, bird, 10.
 Camboja, 360.
 Cambojan range, 360.
 Campeche, 236, 237.
 Camu, river, 63.
 Canal Creek, 306.
 Candelaria, 273, 274.
 Cannegoa, river, 231.
 Canning Downs, 305.
 Canuku, mountains, 6.
 Cape Antonio, 236.
 — Bridgewater, 175.
 — Catoche, 236.
 — Coast, 347.
 — of Good Hope, 192.
 — Guardafui, 158.

Cape Isolette, 142, 143.
 — de Joffa, 184.
 — Martin, 172, 184.
 — Moreton, 310.
 — Lannes, 172, 184.
 — St. Anthony, 157.
 Capellas, 273.
 Caphiuin, streamlet, 52, 58, 64.
 Caphu, river, 52, 65.
 Caramuzin, mountain, 59.
 Carawayanna, tribe, 84.
 Carcinitis, 354.
 Caribs, 97.
 Carmen, Isla del, 244.
 Carribean Sea, 238.
 Carucige, river, 225, 227.
 Casandarara, 207.
 Casasi, river, 216.
 Cassangi, 214, 215, 231.
 Catanga country, 225.
 Cataract, Sir Walter Raleigh's, 90.
 Catini, 206.
 Catoche, cape, 236.
 Catoruta, river, 219, 221, 222, 232.
 Catuan-uru, river, 14.
 Cavoli, 206.
 Cavula-ncungo, river, 231.
 Cazala, river, 218.
 Cecil Plains, 310.
 Celebes, islands, 360, 361.
 Cherim, river, 194, 195.
 Chersonesus, 353.
 Chicarongo, 190.
 Chicati, river, 256.
 Chilapa, river, 248, 251, 252.
 Chilapilla, 249.
 Chillepec river, 245, 246.
 Chire, the, river, 197, 198.
 Cimmerian Bosphorus, 353.
 Coal on the Monteruma river, 240.
 Cobourg Peninsula, 359.
 Cocoipetyans, tribe, 78.
 Cojinicuil, river, 252, 256.
 Cola, or Angola, 225.
 Comoro Islands, 232.
 Compass, variation of, on the coast of Arabia, 151, *et seq.*
 Conda Irungo, mountain, 221.
 Condamine, river, 305, 308, 321, 323, 324.
 Condoha, stream, 208, 209.
 Congo, 186, 187, 192.
 Coorong, river, 164.
 Coppermine River, 333.
 Cora, 506.
 Corentyne, the great cataracts of, 100.
 Corona, cataract, 17.
 Crimea, 353.
 Cruttenden, Lieut., 107, 110.
 Cuama, river, 185, 188, 189, 191.
 Cuaro, Cuavi, or Quavi, river, 188, 373.
 Cuba, 236.

- Cuba Sea, 238.
 Cunningham Gap, 305.
 Curassawaka, 12.
 Curia Muna Bay, 126, 131.
 — Islands, 128.
 Curiau, river, 67.
 Curitani, river, 78.
 Curnajair, fall, 14.
 Currents on the Somali and Arabian
 coasts, 149.
 Cursatu, mountains, 15.
 Curuni, river, 78, 89.
 Curutoka, stream, 4.
 Curuwaini, river, 78.
 Cutari, river, 78, 85, 88.
 Cutatarua, cataract, 17.
 Cuyuwini, river, 39.

 D'Acunha, 96.
 Dampal, 300.
 Danish Acra, 350.
 Darling Downs, the, 305, 325.
 — range, 361.
 — river, 327, 330, *et seq.*
 Darura, river, 52.
 Datornee, 371.
 Daurai, settlement, 33.
 Dialects of Australia, 365, *et seq.*
 Diriz, 119.
 Dease's Branch, stream, 341.
 Dejamora, 371.
 Dembos, 200.
 Denkareko, people, 203.
 Devil's Punch-bowl, 173.
 Dhafar, 111, 116, 119, 122.
 Dnieper, 351, *et seq.*
 Dnieprovskoi, 357.
 Dniester, 352, 353.
 Docklopau, mountain, 18.
 Dohité, river, 33.
 Donga, 373.
 Dotumi, 206.
 Drios, tribe, 84, *et seq.*
 Dwewé, mountains of, 207.

 Eales's Station, 324.
 Ebanda, 212.
 Eischalli Tuna, 26, 27.
 Eliza Lake, 171.
 El Jaizer, 115.
 El Pozo Grande, 255.
 Embacca, 215.
 Encrucijada, the, 253.
 Erekh Er-rahib, 137.
 Erekh Frahunt, 137.
 Erghi, 297.
 Escobas, Rancho de, 248.
 Espiritu Santo, river, 185.
 — bay of, 236.
 Essequibo, river, 40.
 Ruxine, 353.

 Fertak, mount, 113, 157.
 Fayal da Leira, 271.
 Feiteiras, 272, 273.
 Ferttee, 373.
 Flinders, 167.
 Fort Good Hope, 335.
 Four-peaked Rock, 134.
 Frome, lake, 192.
 Frankincense country, 128.
 Frazer's Islands, 313.
 — River, 370.
 Frederick William's Cataract, 94.
 Frontera, 254, 257.
 Fumas, 200.
 Furnas, hot springs of, 270, 271, 272,
 275, 281.
 — valley, 277.

 Gallas, nation, 189.
 Galveston, Bay of, 236.
 Gambier, mount, 165, 172, 176, 184.
 Ganda, 372.
 Gangedes, nation, 189.
 George, lake, 171.
 Georgetown, 102.
 Gerrhus, river, 353, 354, 356, 357.
 Gharrah Bedouins, 129, *et seq.*
 Ghazir, 137.
 Ghubbet Curyan Muryan, 133.
 — el-Dhum, 130, 131, 132.
 — er-rahib, 135, 138.
 — Hasiah, 143.
 Giles, Mr., 182.
 Gillolo, 361.
 Gisborne, Mr., 165, 170, 172, 177, 178.
 Glenelg, river, 161, 164.
 Grand Lake, 372.
 Great Asiatic Bank, 361.
 — Barrier Reefs, 362.
 — Ox Island, 245.
 — River, 373, 374.
 Guarava, or Learava, river, 222.
 Guardafui, cape, 158, *et seq.*
 Guichen, bay, 170, 171, 180, 183.
 Guidaru, river, 31, 33.
 Guindes, nation, 189.
 Gulf of Mexico, 236, *et seq.*

 Haffer, 118.
 Haining, Capt., 2.
 Hajarab, bay, 144.
 Hasek, 129.
 Hasiki, island, 140.
 Haswell, 113.
 Hatil Dereh, Sú, river, 300.
 Hau, 116.
 Hawdon, lake, 170, 171, 179.
 Hebba, 298.
 Hemoaura, lake, 194, 195.
 Henty, Mr., 175.
 Herries' Range, 305, 306.

- Hiabengi, or Hianbigi, or Zambezi, river, 227, 229.
 High Brother, island, 153.
 •Hodgson's Station, 305, 323.
 Honicuri, hill, 51.
 Hullaniyah, 134.
 Hulton, Dr., 107, 110.
 Hungry Flat, 325.
 Hypacryis, river, 353, 354, 356.
 Hypanis, river, 353.

 Ibn Batutah, 129.
 Imam of Muskat, 122.
 Imbies, or Zimbab, 193.
 Indian Archipelago, 358, 359.
 Ingomanger, 204.
 Inhambane, 211, 212.
 Inoceta, 248.
 Irem Dhatu-l-imad, palace, 112.
 Iriau, river, 75, 88.
 Isabella, vessel, 171.
 Isla del Buey, 245.
 — Carmen, 244.
 Isle of Bourbon, 232.
 Isolette, cape, 142.
 Ister, river, 353, 356.
 Istria, 352.
 Itchkaleh Sé, river, 300.

 Jagas, nation, 189, 192, 200.
 Jangwera, 372.
 Jáco, country, 198.
 Japan, 361.
 Jartet, or Jadet, fort, 116.
 Jardine, Lieut., I.N., 127, 160.
 Java, 228, 359, 360, 361.
 Jawani, 123.
 Jebel Ali, 124.
 — Dekan, 124.
 — Habarid, 131.
 — Jan, 157.
 — Kinkeri, 127.
 — Saffan, 144.
 Jenabi, tribe, 132.
 Jenicale, 353.
 Jezirat, Hasan, 154.
 — Hullaniyah, island, 135.
 — Kibliyah, 133.
 Jezzaz, 132.
 Jimba, 305, 306, 308, 321, *et seq.*
 Jinzerah, bay, 126.
 Joffa, Cape de, 184.
 Joliffe's Beard, 316.
 Jombo, river, 216.
 Jeruk, river, 297, *et seq.*
 Jowari, 116.
 Jowasimi pirates, 136.
 Juke, nation, 373.

 Kabai skitsa, 51.
 Kadapha, 299.
 Kadifat, 113.

 Kaïs ibn Omar, 116.
 Kaïs ibn Osman, 116.
 Kalantchak, 354.
 Kamaikariba, river, 17.
 Kamtschatka, 361.
 Kara Dereh Sé, torrent, 299.
 Karamatahura, fall, 61.
 Kaset el Wadi, 135.
 Kedonda, 371.
 Kedéji, river, 206.
 Keelwa, river, 373.
 Kelnigo, river, 199, 232.
 Kenukawai, hill, 52.
 Kersah, 113.
 Kertch, 353.
 Keshin, bay, 106, 110.
 Kesid, 113.
 Kesunga, 372.
 Ketia-una, hill, 52.
 Kewáha, 206.
 Khalfan family, 137.
 Khor Jeramah, 144.
 Ki Island, 364.
 Kidonde, 206.
 Kilwa, 187, 191, 192, 201, 234.
 Kimcoul, country, 373.
 Kingani, river, 206.
 Kinbourn, 354.
 Kirimanjara, mountain, 213.
 Kirzawet, island, 138.
 Kitupe, stream, 199.
 Kizil Toprak, 297.
 Kolousir, 151, 158.
 Komanti, nation, 373.
 Komse, 373.
 Konjee, 371.
 Koome, nation, 373.
 Korre, nation, 373.
 Kosa Djarilgatch, 352.
 — Tendra, 352.
 Koto, 371.
 Kubbat Sheikh ibn Ali, 124.
 — Sheikh Hidrus, 124.
 Kuiraton, 12.
 Kundanama, river, 89.
 Kungombe, town, 199.
 Kurile, islands, 361.

 Lacépède, bay, 167.
 La Frontera, 245, 246, 247.
 Lagoa Secca, 271, 277.
 Laguna, 236.
 — del Carpintero, 238.
 — de Terminos, 244, 248.
 — del Viento, 251.
 Laidley's Ponds, 331, 332.
 Lake Albert, 164, 182, 183.
 — Bonney, 172, 184.
 — Eliza, 171.
 — Frome, 172.
 — George, 171.
 — Hawden, 170, 171, 179, 183.

- Lake of Tamiagua, 241.
 — Victoria, 163, 184.
 Lannes, cape, 172.
 Laos, 360.
 Laochoo, 361.
 Lavuma, river, 213.
 Leban, 106.
 Lelunda, or Lelongo, river, 186, note.
 Limestone, creek, 307.
 Lindy, river, 373.
 Linfee, or Loffih, river, 208.
 Lesal, 236.
 Liverpool, river, 364.
 Livuma, river, 199, 204, 205, 210, 232, 233.
 Loamby, tribe, 372.
 Loanda, 215, 231, 232.
 Loena, or Roena, river, 233.
 Loffih, or Loffia, or Lufiji, river, 210.
 Lord Stanley's Cataract, 97.
 Los Tres Brazos, 248.
 Louisiade Archipelago, 361.
 Lualaba, river, 219, 220, 222.
 Luapula, river, 220, *et seq.*
 Luarava, river, 222.
 Lubanzenge, river, 227, 228.
 Lubilaje, river, 218.
 Luburi, river, 218, 219, 223.
 Lucenda, 202, 214, 221, 222, 224, 231, 232.
 Lucosi, people, 206.
 Lufiji, river, 203 to 213, 232, 234, 372.
 Luffa, river, 373.
 Lufula, river, 219, 222.
 Luigila, river, 219.
 Luilhim, 201.
 Luiza, river, 218.
 Lukelingo, 199, 201, 233, 234.
 Lulica, river, 218, 219.
 Lutipuca, river, 221.
 Luviri, river, 220, *et seq.*
 Mabungo, people, 199.
 Macabires, tribe, 189, 193.
 Mackenzie, river, 341.
 Machinga, 227, 230.
 Macúa, nations of the, 191.
 McGrath, Mr., 164.
 M'Pheraon, river, 337.
 Maghul Ispir, 297.
 Magozi, river, 209, 210.
 Magrazie, 372, 373.
 Mahrab, tribe, 111.
 Maipurishianuas, tribe, 84.
 Majhal, 297.
 Majisima, 206.
 Makallah, 146, 149.
 Makatin, 152.
 Makoko, 188.
 Makunda, 371.
 Malay Peninsula, 360.
 Mannos, 35.
 Manes, nation, 189.
 Manjava-matope, or Chire river, 198.
 Manmoise, 371.
 Mantatizi, people, 189.
 Mantu, people, 204.
 Manumuse, Monomoezi, 372, 373.
 Mangissa, river, 185.
 Maopityana, tribe, 49, 52, *et seq.*
 Maradat, 298, 303.
 Maravi, people, 200, 201, 202.
 —, territory of the, 197.
 Marengue, 227.
 Maria, vessel, 164.
 Maroon negroes, 86, *et seq.*
 Marora, 372.
 Maroro, river, 206, 209.
 Marowini, river, 89.
 Marorer, or Maroro, 208.
 Martin, cape, 172, 184.
 Masimba, tribe, 191, 192.
 Masogra, river, 373.
 Masoryre, river, 373.
 Massi, 194.
 Matoney, river, 207, 372.
 Matuizi, river, 199.
 Matziendacia, hills, 14.
 Mawunna-meketsiba, hillocks, 15.
 Mazeamoo, tribe, 371.
 Mazingia, people, 203, 206.
 — river, 371.
 M'Biza, Moviza, 193.
 M'bungo, river, 199.
 Melinda, 191, 192, 193.
 Ménéruan, river, 14.
 Merbat, or Morbat, 123.
 Meremengáo, people, 212.
 Merkuvet, 299.
 Mexico, Gulf of, 236.
 Meyim, 152.
 M'gaita, 206.
 Milúas, 200, 215, 231.
 Miruvet, 297.
 Misenat, 111.
 Mississippi, 236.
 Mirjao, or Mujáo, people, 199, 201.
 Mootis, 353.
 Moktanero, 371.
 Mokundi, 506.
 Mombasa, 187, 190 to 193, 212.
 Mondell, 373.
 Monemugi, empire, 187, 192, 195.
 Monfia, island, 203.
 Mongell, 373.
 Moniah, river, 374.
 Monobocola, river, 316.
 Monomoezi, people, 200 to 234.
 Monomotapa, 186 to 189, 196, 211.
 Monte Volcam, 270.
 Monteguma, river, 239, *et seq.*
 Morard-de Gallas, cap, 167.
 Moravi, 194.
 Morbat, 118 to 127, 148.

- Morembala, mountains of, 198, 201, 232.
 Morisuro, 228, 232, 234.
 Mororo, 206, 207.
 Morouchidore, or Swan River, 311.
 Moseirah, island, 128, 143.
 Mosteyros, 270, 271, 273, 274.
 Mount Barker, 183.
 ——— Benson, 170, 183, 184.
 ——— Bryan, 331.
 ——— Burr, range, 176.
 ——— St. Gabriel, 244.
 ——— Gambier, 165, 172, 176, 184.
 ——— Mitchell, 305.
 ——— Muirhead, 171, 176, 184.
 ——— Schanck, 172, 174, 175, 187.
 Mouva, lagoon, 233.
 ——— river, 221, 222, 224, 227.
 Moviza, 193 to 227.
 Mozambique, 232, 233.
 ——— channel, 150.
 ——— winds, 195.
 M'sagara, country of the, 201, 208, 212.
 M'sarara, 212.
 Muachi, 221.
 Muagi, 225.
 Mucaranga, 200, 211 to 213, 234.
 Mucari, factory, 214, 215, 216, 231.
 Mucomango, people, 200, 201.
 Muchiva, people, 205.
 Mucuregi, river, 226.
 Mufiva, or Mufira, river, 222.
 Muggore, 204.
 Muirhead, mount, 171, 176, 184.
 Muloudwezi, river, 199.
 Mumbos, people, 190, 191.
 Mundoca, tribe, 209.
 Mun'yassi, people, 200.
 Murghur Su, river, 300.
 Murray, river, 161, 163, 182 to 184.
 ———, valley of the, 328, 332.
 Murupua, empire, 234.
 ——— nation, 200.
 Murusura, river, 195, 197, 200 to 202.
 Muzimbas, people, 190, 191.
 Muzimbazos, traders, 197.
 Musumbu Acalunga, 217.
 M'wana-M'wéni, 211.
 Narrows of the Mackenzie, 343.
 Natunas, islands, 360.
 Neuto, 205, 206.
 Nearsder, river, 204.
 Neasse, or N'yassi, lake, 205.
 Nebi Saleh ibn Hud, 129.
 New Amsterdam, 102.
 ——— Calabar, 374.
 ——— Caledonia, island, 361.
 ——— Guinea, 361, 362, 363.
 ——— Orleans, 236.
 ——— Zealand, 361.
 Niger, 268.
 Nile, 185 to 188.
 Nimeamaye, or Monemugi, 188.
 N'jesa, 232, 233.
 ——— mountain, 199, 205.
 Norfolk Island, 361.
 N'yassi, lake, 185, 199, 201, 202, 210, 232 to 234.
 Oaxaca, 258.
 Ocanga, 212.
 Ocoom, 374.
 Ogara, 207.
 Ogaree, 372.
 Ogunda, 207.
 Oha, 207, 212, 231, 232, 372.
 Olbia, 352, 356, 357.
 Omana Khan, 300.
 Omboli, 297.
 Onanguira, 207.
 Onambeira, 212.
 Onegata, 371.
 Onoro, river, 50.
 Oranga, or O-r'wanga, or Ruenga, 207, 212.
 Orange River, 189.
 Osanga, 372.
 Osagara, tribe, 372.
 Osagosi, 207.
 Osenga, 207.
 Oshisha, 207.
 Osowi, 212.
 Ouro, or salt-pond, 349.
 Ovinza, kingdom, 212.
 Oyi, kingdom, 212.
 Ozy, river, 205, 210.
 Padamo, river, 62, 89.
 Paiwori, feast, 43.
 Pajaros, river, 248.
 Palawan, island, 361.
 Palinurus, shoal, 150.
 Palisada, river, 248.
 Palmas, point, 236.
 Pambe, 373.
 Panuco, 239, *et seq.*
 Panticapes, river, 353 to 355.
 Paratawai, mountain, 14.
 Paruaaku, portage, 15.
 Patta, 196.
 Peak of Minhali, 152, 153, *et seq.*
 Peel Downs, 305.
 ——— River, 334, 339.
 Penguin Island, 184.
 Pepumdi Songo, 216.
 Perekop, gulf of, 354, 357.
 Perim, island, 152, 153, *et seq.*
 Persian Gulf, 149.
 Petrie's Head, 311.
 Philippines, 361.
 Pial, 248.
 Pianghottos, tribe, 69, *et seq.*
 Pico Alto, mountains, 260, 261, 263, 273.
 ——— de Carvao, 273.

- Pico da Cruz, 274.
 — do Fogo, 271, 274, 275.
 — da Pedra, 274, 275, 276.
 — da Vasa, 280, 281.
 Pilot Rock, 154.
 Pine-apples, 42.
 Pirara, 1, 2, 6.
 Plants of St. Michael's, 282.
 Point Malbusco, 264.
 — Palmas, 236.
 — Ponta, 203, 206, 231.
 — Xicalengo, 244.
 Polongo, 215.
 Pombo, 188.
 Ponta Delgada, 268, 271, 272, 273, 274.
 Pontus, 352.
 Popham, Sir Home, 153.
 Port Essington, 364.
 Povoação, 271.
 Powaga, 206, 207, 372.
 Prester John, 234.
 Prim, river, 131.
 Prince of Denmark, vessel, 171.
 Pruth, river, 352.
 Pueblo Viejo, 239.
 Pulo Condor, island, 360.
 Punta or Ponta Delgada, 268 to 271.
 Purunaru, river, 18.

 Qua, 371.
 Quango, or Quanza, or Quasi, river, 214,
 216, 217, 232.
 Quanza, river, 186, 196, 203, 217.
 Quatatta, river, 6.
 Quavi, or River of Kilwa, 195, 203, 210,
 211.
 Quenturas, 278.
 Querimba islands, 232.
 — river, 195.
 Qugila, marsh, 219, 220.
 Quibonda, 219.
 Quichinga, territory, 225, 226.
 Quigila, 223, 225.
 Quilimane, 229, 230, 232.
 — river, 198.
 Quindonga, islands, 217.
 Quoin Hill, 155.

 Rabo de Peixe, 270.
 Ramazan, feast of, 120.
 Ramirez, island of, 241.
 Rancho de Escobas, 248.
 — de Magane, 253.
 Rapid Bay tribe, 181.
 Rapta, river, 189.
 Ras Aghrib, 106.
 — el Ahmar, 116.
 — Akamnis, or Aknis, 144.
 — Arab, 157.
 — Ascir, 147, 150, 151.
 — Bir Resas, 143.
 — Derkah, 106, 110, 112.

 Ras Fartak, 113, 114.
 — el Hadd, 144.
 — Hasek, 130.
 — Hattab, 106.
 — Huttan, 129, 130.
 — Isolette, 150.
 — Jei, 143.
 — Jezirah, 142.
 — Karwan, 132, 147.
 — el Khabbah, 143, 144.
 — Khasaim, 140, 142.
 — Markaz, 142.
 — Minji, 132.
 — Montejib, 131, 132.
 — Nás, 116, 127, 128.
 — Rehmat, 146.
 — Riyamat, 146.
 — Ruus, 143.
 — Samhal, 130.
 — Samhor, 129.
 — Saukiriah, 140.
 — Sejir, 111, 115, 116, 147.
 — Sharwein, 106, 110.
 — Shatt, 137.
 — Sheikh Alf, 153.
 — Shuwamiyah, 132.
 — Sijan, 153, 154.
 — Yul, 116.
 Rat River, 338, 341.
 Red Sea, 150, 151, 154, *et seq.*
 Rejjat Jezzaz, 140, 141.
 Relva, 273.
 Rennie, Mr., 108.
 — Lieut., 158.
 Reu, river, 218.
 Ribiera Grande, 270, 276, 281.
 — Quenti, 277, 280.
 Riguru, 206.
 Risuro Grande, river, 228.
 Rivoli Bay, 171, 172, 183.
 Robat, 118.
 Rocky Mountains, 370.
 Rodondo, island, 138.
 Roena, river, 233.
 Rofoi, or Rufua, river, 222.
 Rohambi, people, 206.
 Ropele, river, 218.
 Ropoeje, river, 218.
 Rosto de Caen, 270.
 — de Cao, 271.
 Ross's Creek, 167, 168.
 Rouenga, people of, 194.
 Ruapura, river, 222.
 Rufua, river, 222.
 Ruguru, people, 204.
 Rupununi, first fall of, 6.
 Russell's Cap, 314.
 Ruvu, 206, 506.
 Ruru-ruru, fall, 14.

 Sabrina Island, 273.
 Saeraeri, mountains, 15.

- Saghar, 113.
 Sagosee, 372.
 Sagozi, 208.
 Salf, 113, 114.
 Saint Lorenzo, 264.
 Sallalah, 118.
 Salt Creek, 165, 182, 183.
 Salt's Rocks, 157, *et seq.*
 Samarang, 360.
 Sanders, Lieut., 108, 158.
 Sandy or Frazer's Island, 313, 314.
 Sanga, 207.
 San Gabriel, 244.
 Sangrada, 372.
 Sanjee, 372.
 San Juan Bautista, 249, 250.
 — Pedro, river, 244.
 — el Chiquito, 248.
 Santa Ana de Tamaulipas, 238.
 — Barbara, 264.
 Santo Espirito, 264.
 Saracta, fall, 18.
 Sardia, 356.
 Schanck, mount, 172, 174, 175, 184.
 Schomburgk's expedition, its results, 102.
 Sihut, 105.
 Scythia, 355, 356.
 Scythians, 354, 355.
 Sellah, 128.
 Sette Cidades, mountains, 270, 271, 276, 281.
 —, valley of, 273, 276, 280.
 Sena, 190 to 196, 229, 230.
 Serra da Agoa de Pao, mountain, 269, 270, 275, 280.
 — Gorda, mountain, 269, 274, 275.
 Sheddad ibn Ad, 112.
 Shemshan, mountain, 146.
 Sherbert, Mr., 172.
 Shesha, 372.
 Sierra Acarai, 35.
 Singapore, 359.
 Singoser, or Sagozi, 208.
 Simpson, river, 337.
 Sipariwini, river, 91.
 Sir Home Popham, 153.
 Sir Walter Raleigh's Cataract, 90.
 Slave Lake, 343.
 Small Cramantine, 347.
 Smith, Mr., 108, 117.
 Socotra, 148, 151.
 Sodah, island, 139.
 Sofalah, 186.
 Sokotrah, 107.
 Somali, coast, 150.
 South Australia, 361, 364.
 Southey, Dr., 96.
 Spencer's Gulf, 166.
 St. Anthony, cape, 157.
 St. George, peak of, 280.
 St. Gabriel, mounts, 244.
 St. Mary's island, 260.
 St. Michael's, island, 268.
 Stuart River, 326.
 Suangara, 207.
 Subhan, mountain range, 117, 127, 148.
 Sugar-cane, 36.
 Suk Hasek, plain of, 130.
 Sultan Ahmed, 108.
 — Omar ibn Tawari, 108.
 Sumatra, island, 358, 360, 361.
 Sungwi, 506.
 Surabaya, 360.
 Sur Creek, 145.
 Susa, 356.
 Suwaru-auro, 15.
 Swaha, river, 206, 207, 208, 212.
 Tabasco, 249, 250.
 — river, 244, *et seq.*
 Tabasquillo, river, 248.
 Tahl Farun, 151, 157, *et seq.*
 Tamaridah, 151.
 Tamaulipas, Santa Ana de, 238.
 Tamesi, river, 240.
 Tamiagua, lake and town of, 241, 242.
 Tampico, 238, *et seq.*
 — el Alto, 239, 241.
 Tanais, river, 353, 356.
 Tanga, country, 224, 225.
 Tanquiño, bay of, 241.
 —, bar of, 242.
 Tanquirra, 204.
 Tapanoni, river, 89.
 Taurais, tribe, 26.
 Tauri, the, 353.
 Taurica, or Crimea, 353, 355.
 Tarucupani, mountain, 14, 15.
 Tarumas, tribe, 35, 45, 55.
 Tchadda, 373.
 Tehamah, 117, 118.
 Tepetitán, river and town, 254, 255, 257.
 Tete, 190, 193, 225, 229 to 234.
 Timor, island, 358, 359.
 Thagah, 119.
 Thakah, 123.
 Thamud and 'A'd, tribes, 130.
 Thousand Isles, rapids of the, 93.
 Toomba, tribe, 372.
 Tongalaza, nation, 225.
 Topala, 240.
 Torno del Diablo, 249.
 Torres Straits, 362.
 Tortugas, the, 237.
 Trekutara-tepan, fall, 14.
 Tremetre, fall, 14.
 Trombetas, river, 52.
 Tuari Yemori, 96.
 Tuarutu, mountains, 28.
 Tumbadero, 255, 257.
 Tunayanna, tribe, 84.
 Tuspan, river and town, 241, 242, 243.
 Tyrras, river, 352, 353.

- Umblisse, 374.
 Ungwa, 374.
 Urana, river, 44.
 Usamasinta, river, 248.
 Uwangah, 374.
 Uwiga, fall, 58, 63.

 Van Diemen's Land, 362.
 Varundas, or Varoondas, nation, 223.
 Vera Cruz, 237, 238, 240.
 Victoria, lake, 184.
 Villa Franca, 270, 276, 277.
 — Hermosa de San Juan Bautista, 249.
 — do Porto, 261, 264.
 Volta, river, 346.

 Wadi Dhafir, 127.
 — Hasek, 130.
 — Kerbrat, 113.
 — Masilah, 105.
 — Rekot, 131.
 Wai-ipukari, 2.
 Waipopo, river, 18.
 Wamafee, 372.
 Wamaru Serrika, cataract, 59.
 Wambat, range, 166, 183.
 Wampuna, river, 28.
 Wanamu, streamlet, 52, 64, 66, 84.
 Wangarah, Wingara, or Winjara, 208.
 Wanyka, 212.
 Warren Indians, 44, 84.
 Waruwau, river, 21.
 Wassina, 191.
 Watawarai, 6.
 Watershed, between the basins of the
 Essequibo and Amazons, 51.
 Watondui, kingdom of, 196.
 Watu Ticaba, 22.
 Weather, table of the, off the Curia Muria
 Islands, 148.
 Weel-yu-rurrah, 331.
 Wellington, 182.
 Well-rock, 134.

 Wellsted, Lieut., 107, 110.
 Western Caledonia, 371.
 Wide Bay, 313.
 Winds and weather in Gulf of Aden, 145.
 Wingara, people, 204.
 Witzapai, river, 15.
 Wohaha, 212.
 — country, 206.
 — people, 204.
 Wood, Mr., 165.
 Woyawais, tribe, 84.

 Xeva, territory of the, 231.

 Yoaha, tribe, 372, 373.
 Yiatzo, hill, 51.
 Youd, Mr. 2.
 Yucawari, mountain, 58.

 Zaire, river, 185, 186, 189, 217, 234.
 Zambezi, the New, river, 233.
 — river, 188, 190, 191, 197, 198,
 228, 229, 234.
 Zanganyika, tribe, 213.
 Zanzibar, 225.
 Zaramu, people, 206.
 Zébé, or Ziwa, 203.
 Zeila, 157.
 Zembere, or Zambéze, river, 185.
 Zembre, or Zambre, river, 186.
 Zibi, cataract, 67.
 Zibingaatzacko, mountain, 51.
 Zimbas, or Zumbas, nation, 189, 191.
 Zituret, 300.
 Ziwa, 202, 208.
 Zohgomero, 371.
 Zumbas, or Zimbas, nation, 189.
 Zumbo, 197.
 Zugda, 205.
 Zungomero, 206.
 Zuwarhah, hill, 208.
 — lake, 209.

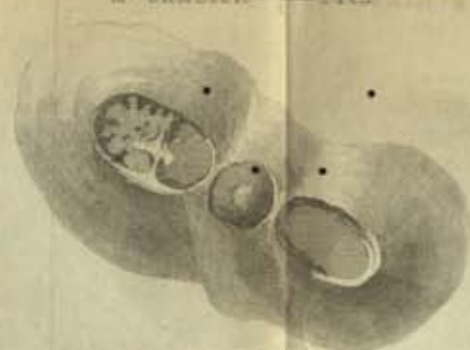
ERRATA.

- Page lxi., line 1,—*erase* “cession of its first discoverers the French,” and
add “priority both of discovery and settlement.”
- „ line 2 from bottom,—*for* De Morgan *read* O’Gorman.
- „ line 4 from bottom,—*for* Moreau *read* Moro.
- „ line 9 from bottom,—*for* Cuazacualco *read* Coatzacoalcas.
- „ lxx., line 1 from top,—*for* Gulf of Mexico *read* Pacific.
- „ lxxix., line 12 from top,—*for* geology *read* geodesy.
- „ cvii., line 17 from top,—*for* Sim *read* Six.
- „ 95, line 9 from top,—*for* N. *read* S.
- „ 152, line 10 from bottom,—*delete* $\frac{1}{2}$.
- „ 153, line 1 of note,—*for* peak *read* teak.
- „ 159, line 12,—*read* S. $21^{\circ} 50'$ W. $16'$. . . $0^{\circ} 6' 11''$.
 line 13,—*read* $52^{\circ} 6' 27''$.
 line 14,—*read* S. $43^{\circ} 42'$ E. $20'$. . . $0^{\circ} 14' 8''$.
 line 15,—*read* $52^{\circ} 26' 41''$.
 line 18,—*for* 48 miles *read* 49 miles.
- „ 161, line 21,—*for* Angus *read* Angas.
- „ 181, line 4,—*for* 40 miles *read* 4 miles.
- „ 183, line 25,—*for* 20 miles *read* 25 miles.

M^t Schanck, looking across one of the Coral Basins and Arundel Station.
From a sketch made on the spot by G. F. Angus.



*S.E. Extremity
of*
SOUTH AUSTRALIA,
*to illustrate
Governor G. Grey's
Expedition.*
1844.

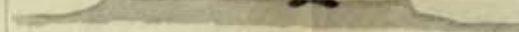


Scale
0 100 200 300 400 Yds

Section



Elevation



Q	1970	1971	1972	1973
1	100	100	100	100
2	100	100	100	100
3	100	100	100	100
4	100	100	100	100
5	100	100	100	100
6	100	100	100	100
7	100	100	100	100
8	100	100	100	100
9	100	100	100	100
10	100	100	100	100
11	100	100	100	100
12	100	100	100	100
13	100	100	100	100
14	100	100	100	100
15	100	100	100	100
16	100	100	100	100
17	100	100	100	100
18	100	100	100	100
19	100	100	100	100
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78	100	100	100	100
79	100	100	100	100
8				

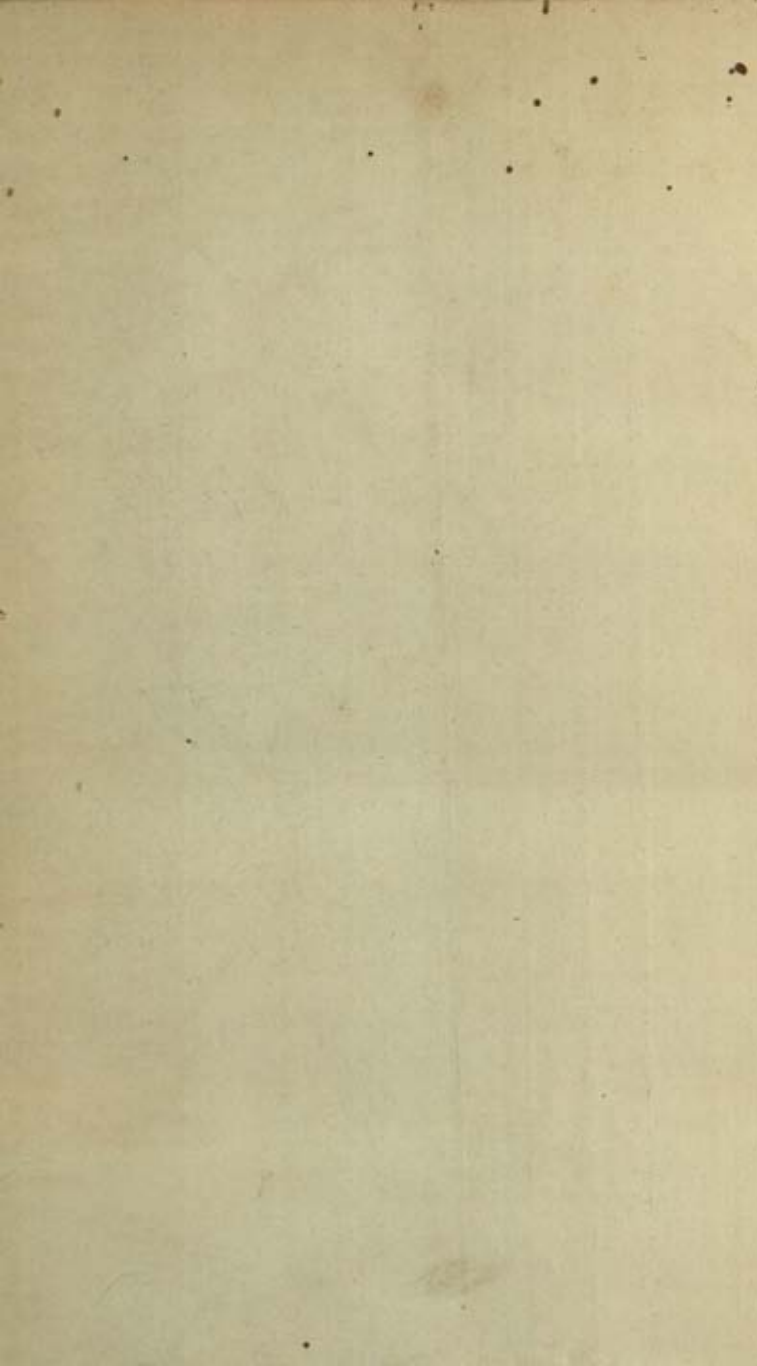
Section



Elevation

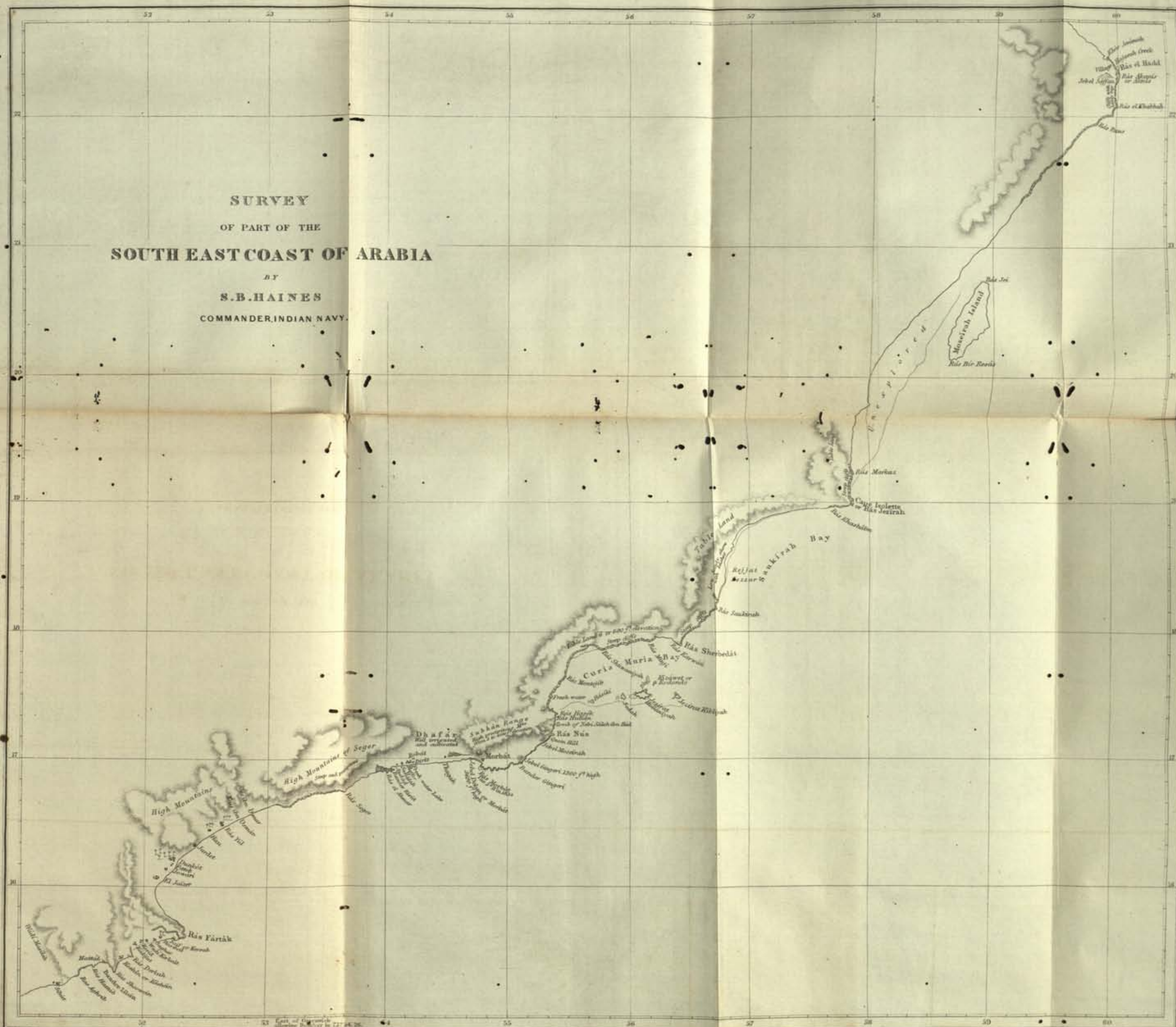


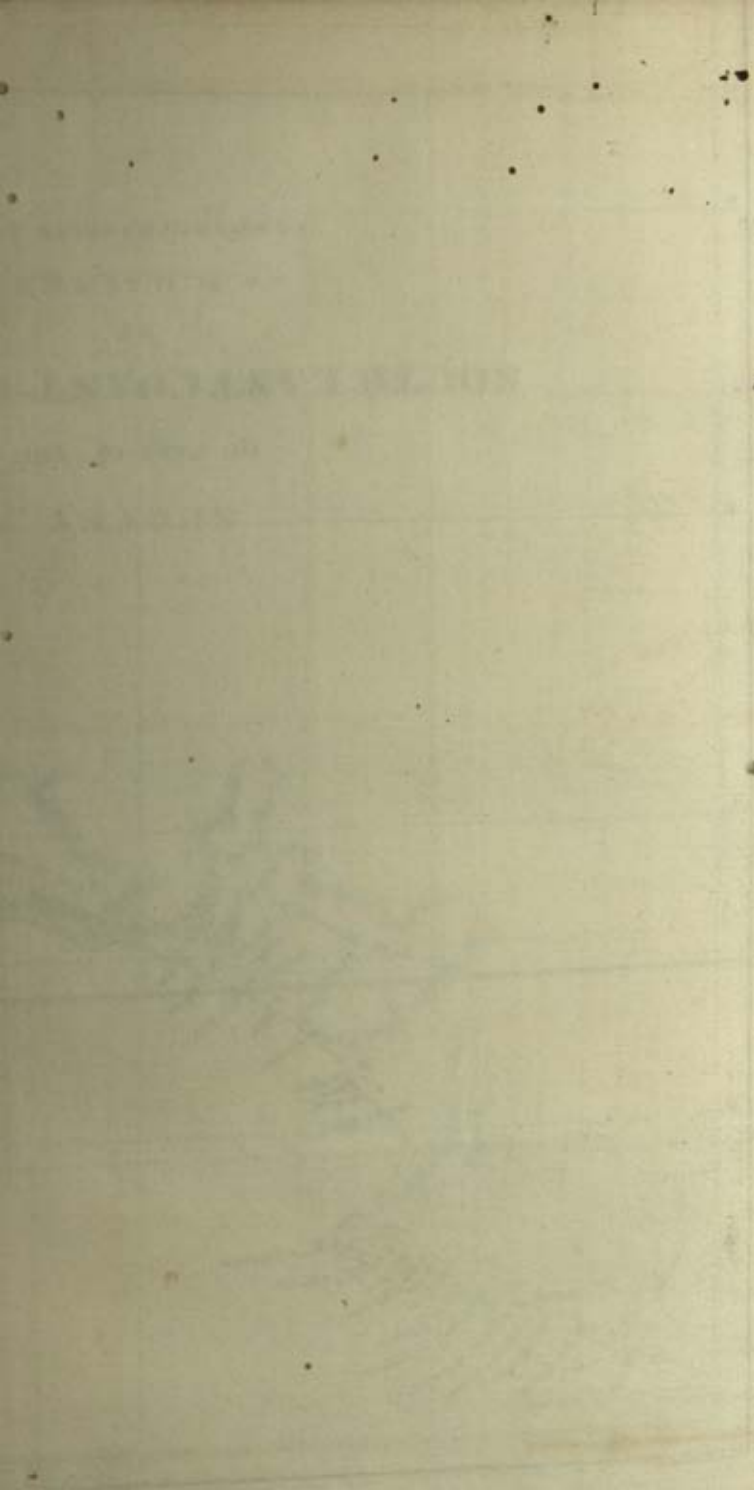




SURVEY
OF PART OF THE
SOUTH EAST COAST OF ARABIA

BY
S.B. HAINES
COMMANDER, INDIAN NAVY.





1851

ON THE GREAT LINE OF ROUTE

WITH THE COUNTRY BETWEEN THE

ALABAMA RIVER

THE LINE OF ROUTE

NEARBY THE COUNTRY

IN 1851

AND THE KENTUCKY

AS THE DISTRICT OF KENTUCKY

1851

IN 1851

*Track of the Zante 1872 Tons / O.M. & Survey of M. Masters 1842
Surveyed by M. Hoffman of Liverpool 1843.*

*Track of the Zante 1872 Tons / O.M. & Survey of M. Masters 1842
Surveyed by M. Hoffman of Liverpool 1843.*





The
ISLAND OF ST. MARY'S
(Azores)

1845.

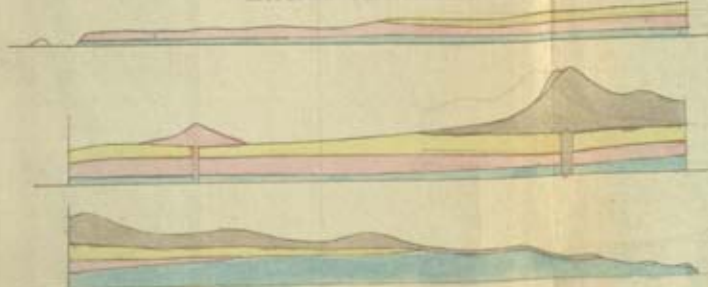


General Section from West to East

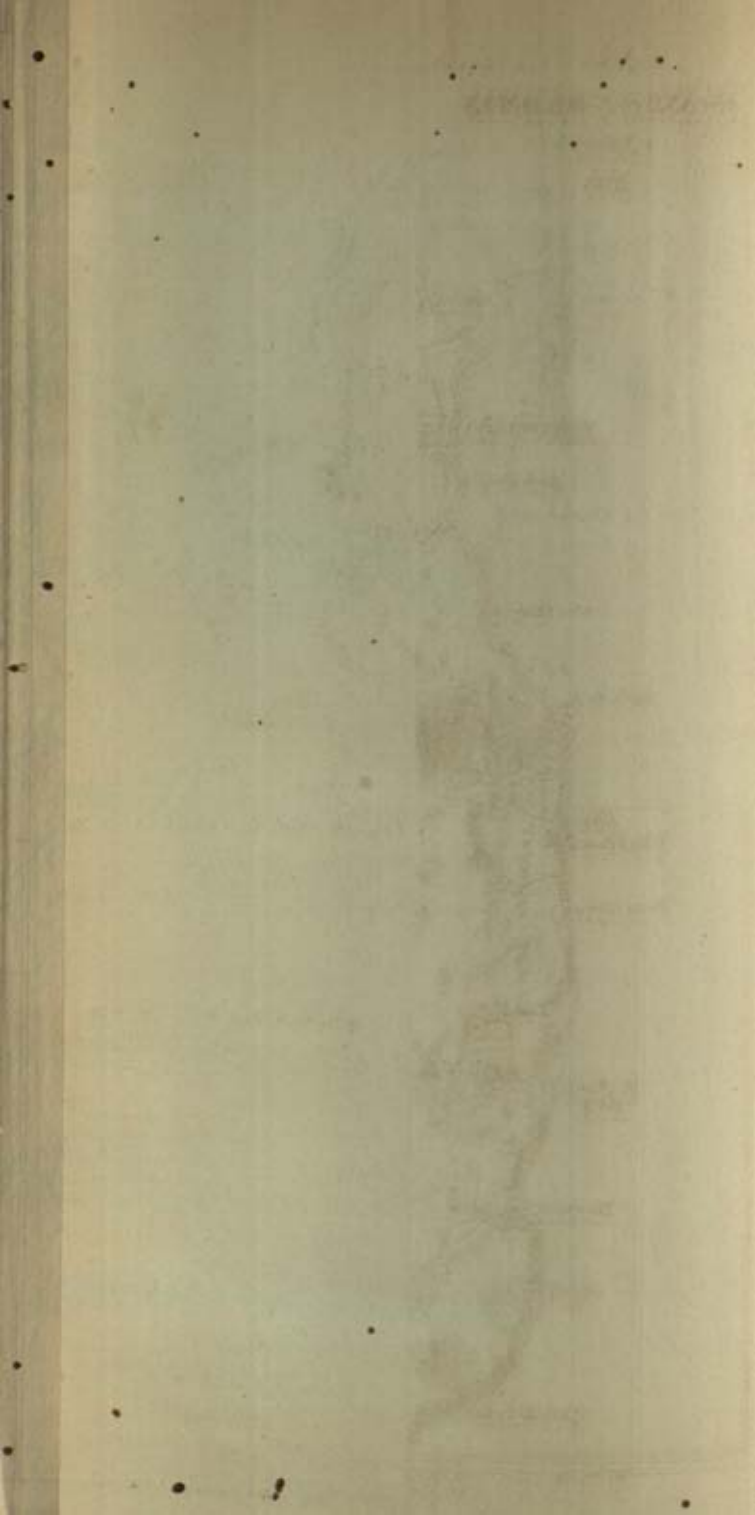
Scale of Miles



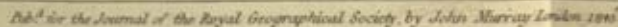
Presumed Succession of Beds.



- Basalt
- Amalgamoid
- Calcareous
- Porphyry



1845.



Sketch
to illustrate
MR. RUSSELL'S PAPER.
1845.

The details of the Darling Downs are from a sketch communicated by Mr Henry Russell







EXHIBIT 100-100000

100-100000

100-100000

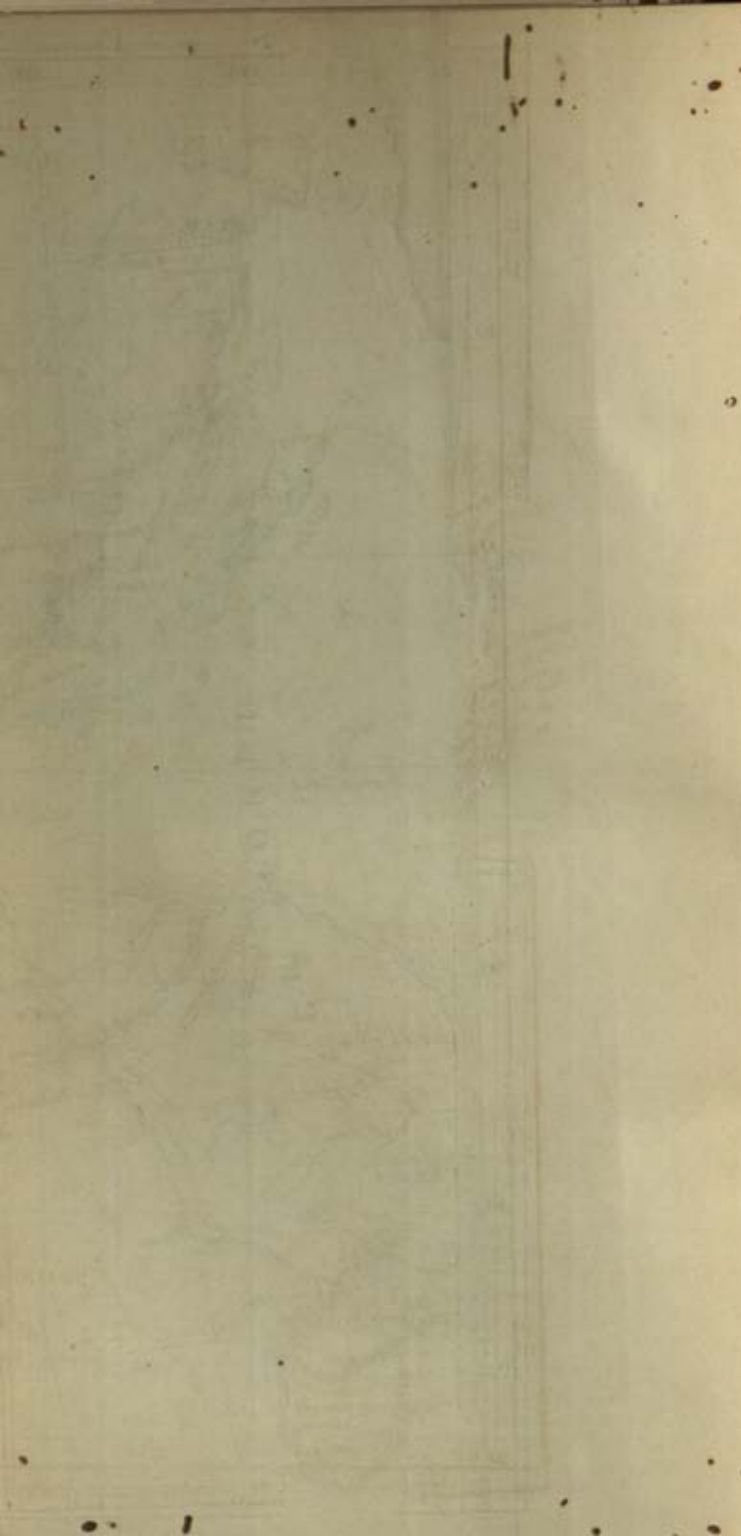
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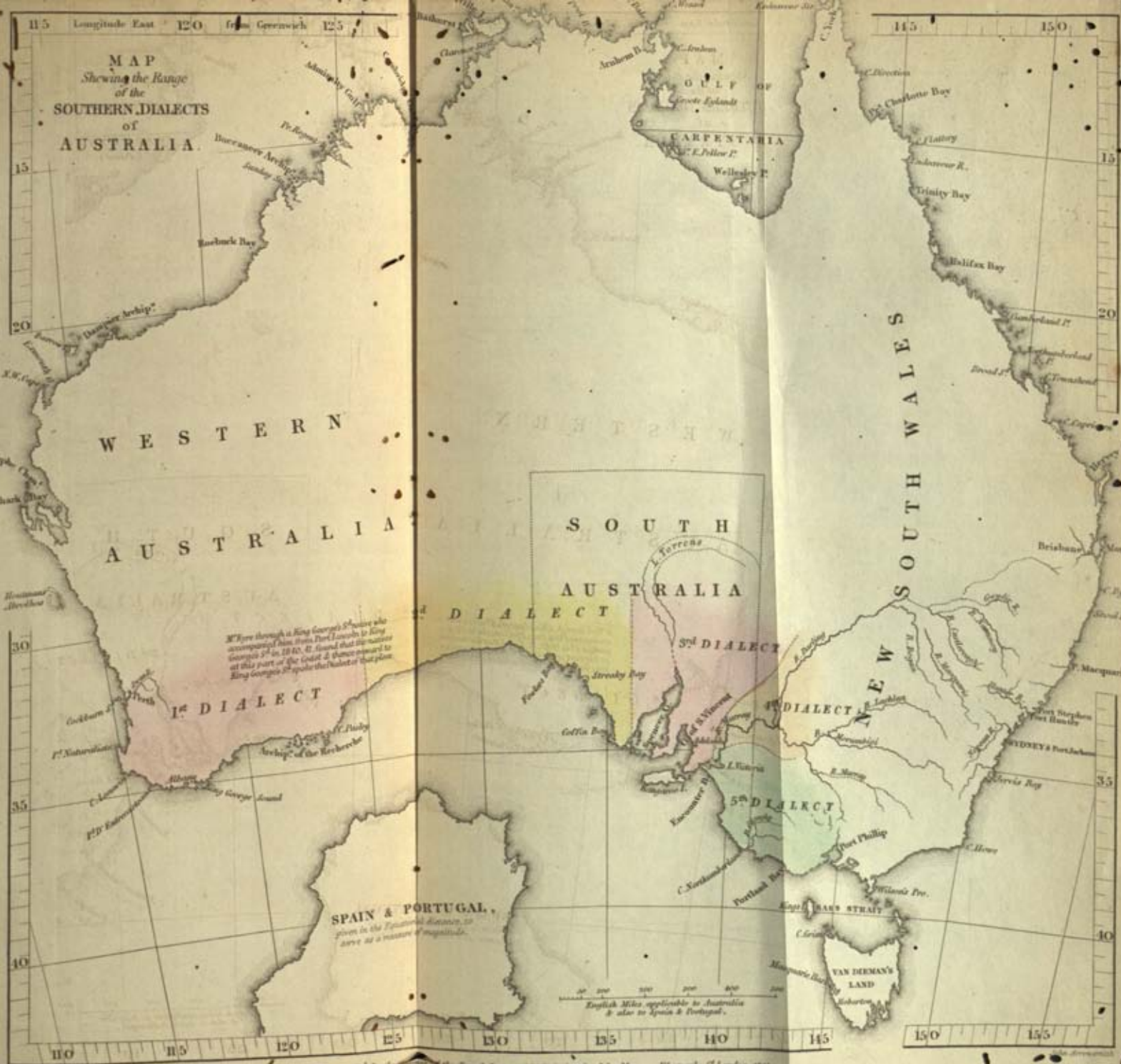
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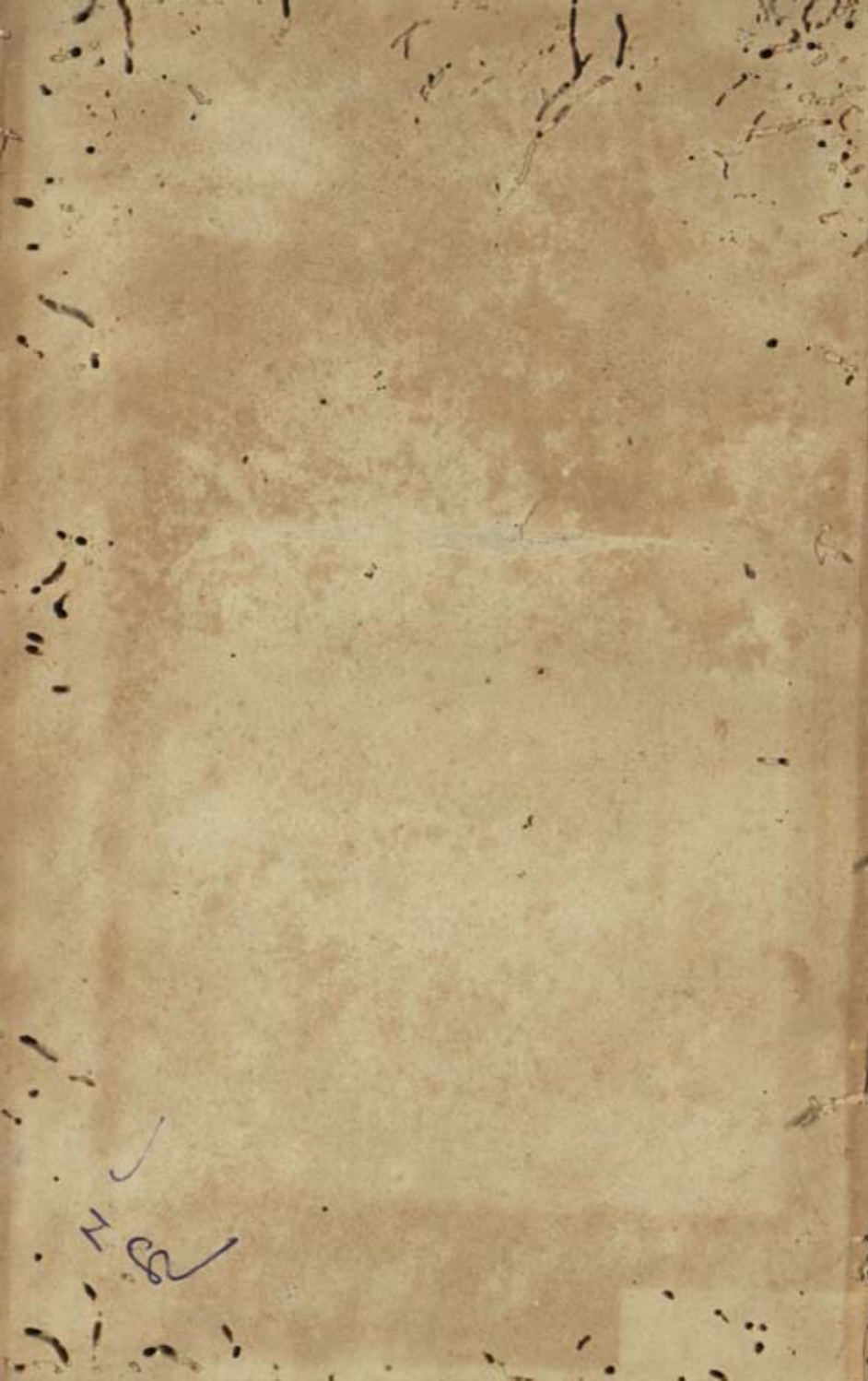












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