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VOL. I.

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1886.

PREFACE.

The impetus given to research of all kinds in the comparatively little-known States of the Malay Peninsula, which was one of the results of the active policy adopted on the West Coast by the Colonial Government of the Straits Settlements in 1874–5, led in 1877 to the formation in Singapore of a Society having for its object the collection and record of scientific information in the Malay Peninsula and Archipelago.

The Royal Asiatic Society having agreed to the affiliation of the new institution, it has been styled "The Straits Branch of the Royal Asiatic Society." Papers communicated to the Society are printed in its half-yearly journal, which now fills the place occupied from 1847 to 1856 by the late Mr. J. R. Logan's "Journal of the Indian Archipelago."

The importance of placing within the reach of local students (often without access to libraries) a knowledge of what has been communicated to the Journals of learned Societies in past years upon subjects having reference to the Malay Archipelago, has induced the Council of the Society (the literature in question being of manageable bulk) to reprint a series of papers, collected from various sources, relating to the Straits Settlements and Eastern Archipelago.

The subject is referred to in the Annual Report of the Council for 1883, as follows :—

"It has been proposed that the Council shall undertake the republication of a selection of papers relating to the Eastern Archipelago from the Journals of the Royal Asiatic Society, the Asiatic Society of Bengal, the Madras Literary Society, &c. &c. Many papers scattered through the volumes of the Proceedings of these and other Societies are of great local interest. Marsden, Raffles, Leyden, Crawfurd and Low, contributed to 'Asiatic Researches;' Newbold's papers on the Malay States, and Cantor's Catalogues of Malayan Animals, Reptiles, and Fishes, are to be found in the 'Journal of the Asiatic Society of Bengal;' a Journey of Logan's through part of the Peninsula is printed in the 'Journal of the Royal Geographical Society.' These and many other papers, if collected and republished, will, it is believed, be eagerly read by residents in the Straits of Malacca, who would never have the opportunity of consulting the files of the Journals in which they originally appeared. The permission of the Asiatic Society of Bengal has been asked for the republication of papers contained in their Journal; and Messrs. Trübner & Co. will undertake the production of two volumes, to begin with."

In the following year the scheme had taken definite shape, and the Council for 1884 reported that—

"The consent of the Asiatic Society of Bengal having been received to the republication of papers relating to Indo-China which have appeared in their Journals, the first series of selections will consist of papers extracted from 'Asiatic Researches' and the 'Journal of the Asiatic Society of Bengal.' These will probably be preceded by a few papers originally published in Dalrymple's 'Oriental Repertory.' The Council have been fortunate enough to secure the co-operation of Dr. Reinhold Rost, Librarian of the India Office, who has consented to edit the reprinted papers in London. It is hoped that two volumes will be brought out during 1885, and it will then rest with the Society whether or

not to extend the scheme and continue to issue, from time to time, as funds may allow, further volumes of selected papers relating to the Far East."

A first instalment, consisting of essays extracted from Dalrymple's "Oriental Repertory," "Asiatic Researches" and the "Journal of the Asiatic Society of Bengal," is now presented to the public. The reprinted essays have been carefully edited by Dr. Reinhold Rost of the India Office, who has added some useful references to modern literature, giving fresh value to papers some of which would otherwise have little beyond antiquarian interest.

W. E. Maxwell,
Honorary Secretary.

Singapore, *Sept.* 1885.

The Reader is requested to note the following *corrigenda:*

Vol. I. p. 26, Note, *for* Articles I. and II. *read* Articles II. and III.
,, p. 105, Note, *for* which is Old Javanese *read* which in Old Javanese.
,, p. 108, Note, l. 6, *for* the former *read* the latter.
,, p. 255, l. 7 from bottom, *for* 63, 176 *read* 63. 176.
,, p. 257, l. 8 from bottom, *for* Kyreen *read* Kareen.
,, p. 295, l. 4 from bottom, *for* new fields *read* rice fields.
,, p. 266, l. 20 from bottom, *for* Kahan *read* Kahan Hill.
,, p. 267, l. 16 from bottom, *for* selix *read* silex.
,, p. 270, l. 17 from bottom, *for* Pakchon *read* Pakchan.
,, p. 298, l. 17 from bottom, *for* samples *read* sample.

EDITORIAL NOTE.

THE foregoing preface fully sets forth the purpose of, and my share in, the present publication. It behoves me now to state, in a few words, the principles by which I have been guided in carrying the work through the press.

The Papers selected from each of the three serials have been given in chronological sequence. They have been reproduced without any alteration beyond the correction of obvious misprints, as in No. XXIV. A certain inconsistency in the spelling of names cannot but be expected in a miscellaneous collection such as this, which covers a period of literary work extending over upwards of fifty years. It is hoped, however, that in doubtful cases a reference to Indices I. and II. may prove of service.

Footnotes and references to such works as were available have been added [in square brackets.] They are necessarily brief, as the space at the editor's disposal was limited. For this reason, J. Crawfurd's "Descriptive Dictionary of the Indian Islands and Adjacent Countries" (1856), which would have had to be quoted almost at every step, and its complement and companion—for Crawfurd does not appear to have drawn from Dutch sources of information—P. J. Veth's "Aardrijkskundig en statistisch woordenboek van Nederlandsch Indië" (3 vols. 1861–69), have not been specially mentioned. But for that limitation, too, Dr. Leyden's famous paper (left unnoticed by his biographer in the

"Encyclopædia Britannica") would have received a larger share of attention, as a higher than a mere historical interest still attaches to it, though eighty years have elapsed since it was written. That paper, the outcome of materials collected in his travels (1804–6) but a few years after his arrival in India, certainly shews throughout, that in that early stage his oriental erudition was more varied than accurate, while, on the other hand, it bears such marks of his linguistic genius as to justify the inference that, had he not been carried off in the prime of his life, after a residence of barely eight years in India, he would have contributed more to advance the scientific study of the languages of S. E. Asia than has been done during the fifty years after his early death in 1811. His collectanea, now in the British Museum—translations, vocabularies, outlines of grammars, philological disquisitions—bear sufficiently ample testimony to his love of linguistic research, his indefatigable industry, and his aptitude for the comparative study of language as a science, to warrant the assertion.

To Major-General G. B. Tremenheere, the editor acknowledges his great obligations not only for his courtesy in pointing out a number of errata which had passed from his original papers into the present reprint, but more especially for the valuable additional note which, as the printing of the second volume was already far advanced when it was received, has been placed as Paper XL. at the end of the work.

R. Rost.

London, *Nov.* 30, 1885.

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I.

SOME ACCOUNT OF QUEDAH

(*Pronounced* KUDDAH).

By MICHAEL TOPPING, Esq., *chiefly from the information of* FRANCIS LIGHT, Esq., *Chief of Prince of Wales Island, or P° Pinang.*

[A. DALRYMPLE'S "Oriental Repertory," London, 1808. Vol. i. pp. 399-402.]

THE country of Quedah extends from Trang, in lat. 7° 30′ N., to Crean, in lat. 5° 18′; in length about 150 miles, in breadth from 20 to 35 miles; but the cultivated lands nowhere exceed 20 miles from the seashore. From Trang to Purlis the sea-coast is sheltered by many islands, and a flat bank lies between them and the main, navigable for small vessels only; the distance between Trang and Purlis being about 24 leagues. The sea-coast itself is low and covered with wood. Inland are many mountains, some of which as you approach Purlis project into the sea. The country abounds in rice, cattle, and timber. Eleven rivers empty themselves into the sea, navigable for prows only, on account of the shallows without, the principal of which are Lingoo and Sittoul, where those vessels are built. Purlis has a deep narrow river, at the entrance of which is a small sandy island, on which stands a fishing village, which is protected by a few pieces of cannon. The bar of the river is very long, with only ten feet water upon it at spring tides. The town is situated four or five miles from this entrance, in a valley of a mile and a half in circumference, encompassed with steep hills. The old king, in his latter days, chose this place for his residence, which occasioned many vessels and people to resort here. Since his death it has sunk into its former obscurity, notwithstanding he bequeathed it to his second son, Toonka Mooda, who still resides

here. Poojil is a small province of Paltany, bordering upon Purlis. The islands Lancavy, or Ladda, and Trocklon,[1] lie west of this port about five leagues. The Great Ladda is inhabited by a race of Malays, who are in general thieves, and commit frequent acts of piracy; these islands are dependent on the Luxamana of Quedah, who governs here absolutely; they are mountainous, have little pasture, and do not yield rice sufficient for the inhabitants. There is exceeding good anchorage-ground on the eastern side of them, of sufficient capacity for the largest fleet, with a plentiful supply of wood and water at hand. On the S.W. side is a small harbour of sufficient depth, but its shores are coral. In a former war the French refitted and masted here, after an engagement with (I believe) Commodore Barnet. The land from Purlis to the mountain Jerry (a coast of twenty leagues in extent) is low and level towards the sea, covered with jungle, which extends between Purlis and Quedah one mile from the shore. To the southward of Quedah the woods grow much broader, and the country is still less cultivated. The principal seaport, called Quedah by strangers, and Qualla Batrang by the natives, lies in 6° N. lat. The river is navigable for vessels of 300 tons, but its entrance is choked up by a flat mud-bank two and a half miles in length, with only nine feet water in spring tides: large ships, lying in five and six fathoms, are four miles from the river's mouth. At the mouth of the river is a small brick fortress, built by a Gentoo, with a few small guns, ill mounted: the greater part of the fort is in ruins, so that the spring tides flow into it. The river is about 300 yards wide; both shores are muddy, and have swampy places, which are covered with jungle. This continues for three miles up the river. Half a mile within the jungle the paddy grounds commence.

Seven miles on the river, from the Qualla, is Allestar, where the king resides. All vessels that pass the bar can go to Allestar: the river is narrow, but deep; the country level, but clear and cultivated, having a fine rich soil. A little above Allestar the ground rises, the river becomes more rapid, and at length unfit for any kind of navigation, except that of small prows; the channel on the eastern side of the island is very narrow, being not fifty feet across.

The king's residence at Allestar is in a very small brick fort, built by his merchant Jomall, about four years ago. The inhabitants near him are composed of Chuliers, Chinese, and Malays.

This place was plundered and burnt in 1770 by the Buggesses, aided by some of the king's own relations, since which it has continued in a very poor state; the only trade left it is with Sangoon, Paltany being destroyed by the Siamese.

Limboon, on the bank of the river, is about four miles from

[1] [This is evidently meant for Trutao (Trotto).]

Allestar. This town is inhabited chiefly by Chuliars. The soil is exceedingly fertile (clay and sand), producing great abundance of fruit and vegetables. The country rises in a gradual ascent; the river is very rapid, with shallows and overfalls, so that prows can only navigate it. A very little above Limboon the prospect opens into an extensive plain, on which are many miles of paddy grounds. The river is here contracted into a very narrow channel, being in some places not more than ten feet across, and is besides so very crooked, and its current so rapid, that only small light prows can make their way up it. During the rainy season this plain is overflowed, which greatly enriches it.

At the commencement of this plain the king is enclosing a place for the purpose of erecting a fort to defend his country against the Siamese. On its eastern boundary the country is covered with forests; some small villages, with their cultivated lands, lying scattered here and there.

The next place of any note is Apabookit, which is about six miles S.E. of Allestar, on a branch of the same river. This place is chiefly inhabited by Chuliar families; the soil is more sandy and light than that of Limboon, but produces abundance of grain. Formerly the course of the river from Qualla Batrang to Allestar was twelve miles in length, but the father of the reigning prince cut through a narrow isthmus in order to shorten the distance five miles, and by degrees the old channel filled up. This work has, however, been of singular disadvantage to the neighbourhood, as it has lessened the quantity of fresh water in the country by giving it an easier communication with the sea. Sea-water is now admitted up to Allestar in the dry season; the bar at the river's mouth is likewise increased, not having a sufficient weight (or perhaps continuance) of current to carry off the mud. The inhabitants of Allestar are obliged to fetch fresh water in boats during the months of March and April, for though well-water is good, they do not in general use it. At the Qualla they are supplied with fresh water entirely by boats for eight months in the year. In August, September, October, and November the river is fresh to its entrance at low water.

Close to the fort runs a creek, which communicates with the river above Limboon. This has been purposely stopped by an artificial mound. Were it opened, vessels might again water at the river's mouth in all seasons of the year.

The entire country of Quedah is exceedingly well-watered and fertile. Twenty-three rivers, all navigable for prows, and some of them for larger vessels, empty themselves into the sea between Trang and Creang. The country to the southward of Quedah River, as far as Qualla Mooda (about ten leagues), is less cultivated than that more northward. At Eang they have the best fruit The principal natives have gardens at this place, to which

they frequently resort (an excursion of six or seven leagues) to feast on dorians and mangostins, which ripen here in the greatest perfection.

Qualla Moorba is a large river, deep and rapid. The water is here always fresh to the sea. The land is high and the bank sandy. The heavy surge which breaks upon this shore during the south-west monsoon has, by opposing the current from the river, formed a dangerous sandbank, extending three miles out to sea, and on which there is only one fathom water. This bank reaches almost as far as Qualla Mooda. Qualla Mooda is a shallow and rapid river, but convenient on account of its communication with the tin-mines. The annual produce here is about a thousand peculs. This small quantity is not, however, owing to the scarcity of ore, but to the want of hands, and to the few people employed being badly paid. The River Prie lies next to Qualla Mooda and opposite Pinang. This place produces a little tin; it has, however, very few inhabitants, and those are of very suspicious character. Crean produces rattans and canes. This is the southern extremity of Quedah, and hence begins Perak. Great numbers of Paltany people have emigrated and come down to Qualla Mooda (it is supposed nearly fifteen thousand). If these people settle there, they will greatly increase the cultivation and benefit Pinang. It is needless to add that the King of Quedah has been advised of the advantages he would experience by having the country opposite Pinang well cultivated, the soil of which is of the richest quality.[1]

II.

REPORT MADE TO THE CHIEF AND COUNCIL OF BALAMBANGAN, BY LIEUT. JAMES BARTON, OF HIS SEVERAL SURVEYS.

[A. Dalrymple's "Oriental Repertory," vol. ii. pp. 9–32.]

Agreeably to an order received from the Secretary, calling upon me for a narrative of my proceedings on the expedition, from the last period I transmitted them to Bombay, which was from the year 1769 to 1772; but as you have likewise expressed a desire for my opinion of Balambangan, I begin from the period of my

[1] [Reprinted in the "Journal of the Indian Archipelago," vol. iv. pp. 42–44. See also Logan's "Notes," *ib.* vol. v. 53–65.]

arrival (the 13th September 1769) in the *Success*, Capt. Trotter; who, I think, has not done justice in his description to Balambangan: or, indeed, how should he, who was only twenty-three days at the place, and ashore but four times? indeed, he would allow me to say it had an harbour, and from the several conversations I had with him, I thought him prejudiced against the expedition.

I now come to the description of Balambangan—not as some people of passage, whose stay has not been more than a month, and have pretended to give descriptions,* but from a survey which I have taken of the island, a residence at it, and the islands adjacent, for the space of four years and six months.

BALAMBANGAN,

DESCRIBED BY

Dalrymple.

"The length is about thirteen miles, but the figure is such, that it is divided into several small districts, almost surrounded with the sea.

"It is in a manner formed into three districts by the two harbours; this points out the most natural division for a particular description of it.

"The southern part, situated between Looc-See-Kooamboo, and the southern extremity of the island, is a small district little more than two and a half miles long, and about one and a quarter broad; it is chiefly steep hills, though not destitute of valleys; most of the hills are clothed with large timber; some of them seem to be cap-

Lieut. James Barton.

"Balambangan is situated N.E. fifteen miles of the north point of Borneo, the southern point in latitude 7° 10′ N., the length of it about fourteen miles, running nearly north-east and south-west, formed in a manner in three distinct parts or districts by the harbours, which strike the eye for a description of each division.

"The southern part, situated between the south harbour and the extremity of the island, is a small district of nearly three miles each way, mostly steep hills interspersed with some valleys, the soil very good, and to appearance fit for cultivation; the land at the southern extremity is not so high, and though equally steep to the

* Opposite to Lieutenant Barton's description of Balambangan is placed a description of that island, published in "A Plan for Extending the Commerce of this Kingdom and of the East India Company," by Alexander Dalrymple, Esq., 1769, 8vo. Mr. Dalrymple was at Balambangan a few days in August 1762; part of two days in January 1763; and in 1764, near it, from July 22 to beginning of September; so that the time he was there did not much exceed a month. It cannot, however, admit of a doubt that very great part of Lieutenant Barton's description is copied from Mr. Dalrymple's.

able of cultivation, others are almost perpendicular rocks. The isthmus on the north is low land, with a single woody hill in the middle of it; the southern part of the island is considerably inferior in altitude to that adjoining to the harbour; this part of the island, lying along the harbours of Seempool and See-Kooamboo, is about a mile long, and half that in breadth; it contains not only the Seempool hills, which are apparently the highest on the island, but also four steep hills, scarcely accessible, named Batopompok; a slip of low land, from the head of Looc-See-Kooambo to Looc-Parang, separates it from the hills on the southern extremity of the island, so that it appears, on a transient view, to be capable of being made, by a proper disposition of works, impregnable at a very small expense."

south-west as the hills at the entrance of the harbour; the isthmus to the northward is low land. The southern extremity of the island is detached from the hills at the entrance of the harbour by a salt lagoon and a river which is at the southern extremity, and to appearance it may be made inaccessible by an able engineer.

"This part of the island is clothed with lofty woods, and is extremely well watered; a copious stream, in its descent from the foot of the Seempool hills to the harbour, forms several pools; the water is extremely fine and clear, and the fall being quick, it might, with very little trouble and expense, be carried into the ships which may lie close to the shore."

Vide p. 18, line 21.

Vide p. 16, line 17.

"This part of the island has better water than any other part, there being a clear and good stream of water running under the rocks of the steep hills at the entrance of the harbour, and several others which I have met with in the higher lands. It has likewise good lofty timber, and a large banyan tree which measures four fathoms round; this part also yields rock-stones, and a soft kind of porous stone which may be serviceable in building any works. I have likewise seen hogs, deer, and the print of the feet of some large kind of cattle.

"The middle district is by much the most extensive; it is situated between the two harbours, and, except the top of Seempool, is perhaps the highest land on the island: the hills are named Damper, they rise with a gentle ascent from Looc-

"The middle district is situated between the two harbours. It is nearly five miles each way, and appears as high as the steep hills to the southward, but has the advantage of rising with a gentle ascent from the south harbour, and descending in the

See-Kooamboo, and leave, towards the north harbour, an extensive plain, with two detached hillocks on it; the one on the point which forms the north harbour, and the other to the westward, adjoining to the opposite coast of the island. This district of Balambangan is about seven and a half miles in extent, and four broad; it seems in general to be very woody, but is probably the best part of the island, as it seems to be free from those ragged hills, which are found in the southern district, and has the advantage over the northern, in the convenient admixture of high and low land."

same manner towards the north, leaving a large plain towards that harbour, with two small hills near it, the one on the point which forms the south entrance, and the other to the north-westward, which bounds the opposite coast. This part of the island is certainly the best land, and has the advantage of the south and north district, by the agreeable mixture of the gentle ascents and descents of the high lands. This part of the island is plentifully watered, with droves of deer and hogs, also large timber, it has likewise another advantage, which is a river, or an arm of the sea, whose entrance is near the middle, between the two harbours, the bar of which has nine feet water on it, and two or three fathoms over it; about a hundred yards up from the bar, it forms a basin, capable of holding a great number of boats and small craft, from which it divides into two branches, one to the north-west, the other to the south-west, having steep hills along the banks of the latter, which fall again in an easy descent towards the southern harbour. The north-west branch runs above two miles up; the south-west I could not determine, on account of the fallen trees across the river, this may be found hereafter very useful, when the island comes to be well inhabited, for the easy conveyance, by water, from either harbour, of goods and necessaries for the inhabitants of the middle district.

"The northern district lies on the east side of the low isthmus at the head of the harbour, it is five miles long and two broad: it is an assemblage of sand-downs with a good mould a-top, intersected with hollows; this part of the island, and the low land of the middle division, are almost entirely a fresh-water marsh; it is the least woody, the trees growing only here and there on the higher grounds; the shrubs are not very thick.

"The northern district lies on the east side of the north harbour, and is about four miles long, and about two broad, and is divided from the former by the isthmus at the head of the harbour; it consists of sand covered with light mould on its surface, and has no rising ground, except one small hillock on the north-east side of the harbour, there are many hollows, or tanks, which abound with water, which may be made paddy plan-

This land is admirably adapted for rice, and when sown with paddy, yielded 220 to 230 fold.*

"The convenience of the port comes now under consideration. Perhaps few islands, with other advantages in any degree corresponding with Balambangan, enjoy one harbour so excellent as either of those this island possesses. They are both land-locked, and capable of admitting the largest ships. The north harbour, though it has many shoals, is capable of containing all the navy of England, in good soundings of clay and mud."

tations, and will, I dare say, produce an hundred-fold; it is the least woody of any; the brushwood, at present, pretty thick.

"I am now come to speak of the excellency of the two harbours which this island possesses, and which few islands can be said to enjoy; they are both land-locked, and capable of admitting the largest ships; the north harbour has many banks across its entrance, likewise within, but it has two principal entrances: the western one has five fathoms water, the eastern one has seven to nine fathoms, and will afford shelter for a vast number of ships, in soft mud and clayey ground, and will admit of vessels being hauled ashore that can lighten to seven feet, but hereafter there may be piers run out on the shoals, that the largest ships may haul alongside, and heave down, and facilitate the landing of merchandise.

"The southern harbour, though much less capacious, would contain a greater number of large ships than will probably ever meet there, and small ones without number. The soundings are so steep that a man may in three and a half fathoms coral cast a hand-lead to the shore at low water, and just without that depth is four fathoms mud; near the watering-place a wharf might be made at a very small expense, to which ships might lay their broadsides. Besides these two harbours, of which an adequate idea may be formed from the plans, there are several others on the island, though inferior to these. Parang is small, but appears to be safe; Toommang,

"Though the southern harbour is smaller, it is equally good, and the land-locked part close under the high hills is steep too, so that ships may careen; the cod of the harbour is shoal water, but exceeding secure for admitting small craft, both harbours may be made defensible, the northern one will take more extensive works, though upon the hill of Gunong Loonong, at the south point, I believe, may be a proper place for a fortification, from the natural situation; but the southern one may be made impregnable by works on the steep hills, and batteries on the low point on the opposite shore, indeed vessels can only sail into this harbour in the north-

* This was the information received from the headman of Banguey.

on the west coast, directly opposite to Looc-See-Kooamboo, is said to be perfectly sheltered from any swell, by shoals which lie off it, and to have good water. On the east coast, opposite to Mangoak, there is also a good harbour, made by shoals. Damper is capacious, but full of banks.

"Balambangan is well supplied with fish; they are excellent in kind, and of great variety; from the many sand-flats on almost every part of the coast, except the southern harbour, no place can be more convenient for hauling the seyne; there is also great variety of shellfish, particularly vast plenty of fine oysters in the southern harbour; upon the banks they find manangky and sea-slugs, or bêche-de-mer, and at all parts of the island plenty of turtle, chiefly the tortoise-shell kind, though it is said the green turtle are in abundance on the back of the island. Wild hogs are in plenty on Balambangan, particularly in the southern parts; there are also some deer, and many peelandook, which are the small animals, called very improperly by the English, hog-deer. The Banguey people say there are no cattle on the island; I thought from the prints of footsteps and dung that there were: some of our people insisted that they heard one low: if any, there are but very few: however, as there are droves of thousands at Sampanmangio, the island may

east monsoon; in the south-west they must warp in, after luffing round the point of Raha Rocks; a boom may be laid across the entrance, and a vessel moored to defend it, which must destroy any boats of an enemy that should attempt to lay warps to get in, they must likewise pass close under the steep hills, that guns erected on these would point down the hatches of any ship, that should attempt to pass, and she not be able to bring a gun to bear to their prejudice. These two harbours abound with fish, and excellent in its kind, and well adapted for hauling the seyne; there are also great plenty of oysters, cockles, and other shellfish.

"There are many deer, hogs, palandooks and vast plenty of fish, turtle, &c. The water in some parts of the island is very clear and good, but in others generally brownish, from the pine trees * which grow near the seaside, within high-water mark, another conveniency is the plenty of good timber of various kinds fit for building, some close to the sea, though the hilly part is the largest; there are also canes and rattans, which may be applied to many uses; cabbage trees, wild areka, neepa in small quantities, and rushes in plenty, which may be useful in thatching temporary habitations; there are also great plenty of stones of different natures; lime, the best to be had from Keema shells and others, of which there is abundance on the shoals.

* These are the agoo, and not the fir-pine.

be easily stocked by transporting the calves. These cattle are what the Sooloos call lissang. From Tawarran, on the north-west coast of Borneo, may be had a breed of goats, for which the southern part of Balambangan is well suited.

"There is on this island great plenty of fine timber close to the sea; the high lands are reckoned to have the largest trees; but on the hill at the point of the south side of the north harbour, amongst many calaotit trees nearly of the same magnitude, I measured one which, as high up as I could reach, was above three fathoms in circumference, and quite straight, without branches for at least seventy or eighty feet; the wood is somewhat reddish and very heavy, it has an agreeable smell, and is fit for many uses.

"The timber on Balambangan is of various kinds; amongst others are naga, tindaloo (which is a species of mahogany), lawawn or poone, bintangal, dongon, malawee, palo-maria or Alexandrian laurel, called dancawn by the natives; ebony, byag or santeekee, the leaf of which is very large, and shaped something like a fig-leaf, the wood is reddish, very light and strong, and therefore fit for oars, masts, or yards, though seldom large enough for lower masts; it has a double bark, the outer thin and dark-coloured; the inner thick, spongy, and red; it is said ropes are made of the bark of young trees. Poollé, as it is called by the Malays, is a light white wood, used for making canoes, the tree growing very large, the Malays also make their coffins of it, as it lasts long under ground. The bark is thick, on the inside a mixture of green and white; it yields a white milk. Towards the roots it spreads out in abutments, which are used for making targets; the grain of the wood is in long flakes; it seems to be very light, but strong. Bark-wood has a bark two inches thick, composed of hard filaments in fret-work, with a soft red spongy substance between, it has a thin brown and green outer bark; the wood is white, and seems to be hard. Agoo, or mobohok, in the leaves, has a great resemblance to fir; the seed also grows in small cones; but it is a solid heavy wood; it is common in almost all the eastern parts of India, and grows even within high-water mark. At Balambangan it is found chiefly upon the north coast, and on the shores of the north harbour, though there are some trees inland.

"Many of the trees on Balambangan are well adapted for masting: the Chinese junks constantly come with pine masts from Amoy to Sooloo; where they leave these, and take in others of the country wood, which they dispose of in China for a high price, being much preferred to the pine masts by the Chinese. Nothing is superior to the palo-maria for knees and crooked timbers. This species, though found at Balambangan, is in much greater plenty on the coasts of Banguey, Sampanmangio, &c. Some of them

are very large : I measured the stem of one near Sampanmangio, above two and three-quarter fathoms in circumference ; the leaves resemble the bay, but are larger ; the flowers are extremely beautiful and odoriferous. The tree yields on incision a gum useful in wounds, and in the Philippines an oil is made of the fruit.

" Besides the abundance of fine timber, there is on Balambangan great plenty of anneebon, or neebon, commonly called by the English the cabbage tree; of this the rafters for covering the black people's houses on the coast of Coromandel are chiefly made. There is also plenty of wild areka ; of neepa, used in all these parts for thatching their houses ; a great variety of rattans and canes, and many small bamboos. The seepeetalla (called by the Malays, kaio-oolar, or snake-wood), is in plenty ; its leaves and root are held of great efficacy against poisons. Kæmpfer, in his 'Amænitates Exoticæ,' recommends it for hydrophobia, and says he has used it successfully in putrid fevers.

" There is a very great abundance of stone in this island ; the hills adjoining to the southern harbour are composed of a species of granite, very hard and ponderous, it rings when struck ; it lies in detached blocks, some very large, others small and easily removed. There is a kind of stone, in cliffs to the sea at Torong-Seebooroongy, in the southern part of the island, soft enough to be penetrated by a sword, though it does not seem to be affected by the sea air. There can be no better lime than that made of the manangky shells and coralines, of which there is abundance on the shoals.

" The soil of Balambangan is very various ; the northern part seems to be a fine white sand bottom covered in some places with a light black mould, in others with a rich fat mud, clear in many places for almost half a mile square, without a bush or tree, and covered with a fine grass growing in patches. Scarce anywhere, in this part, are to be found thick trees, and then only in clumps on the higher grounds ; whence it may be conjectured, this deficiency of wood is owing to the superabundance of water. In many places in the northern district, even on the higher grounds, there are large ponds of fresh water, but all of it brown : some of these high plains are sandy, others marshy and covered with rushes : it is said that in this part of the island the trees shed their leaves in dry seasons, which the natives of Banguey ascribe to the warmth of the soil ; the trees on that island, and on the southern part of Balambangan, do not shed their leaves in this manner. The soil about Seempool Hills is a kind of marly clay ; the water-course is of this substance, though it appears to the eye to be flat beds of rock ; when broken the water is of a milky-white, and continues so for a long time before it becomes clear ; a good soil of this kind is found everywhere among the rocks a-top of the bluff-hills.

"Balambangan, as above observed, is remarkably well supplied with water: the northern part is almost entirely a fresh-water marsh covered with rushes, one species whereof is above a fathom long and almost as large as a man's little finger; but all the water of this part of the island is brown like tea, probably from the roots of these rushes. In severe droughts, which, however, are very uncommon in this quarter, the inhabitants of Banguey come over to Balambangan for their water, the springs here never drying up. Nor are they attended with any noxious quality or ill-taste, notwithstanding the colour; the pools have generally fish in them, which is considered as a criterion of salubrity. The water at Seempool is very clear and soft; it passes over a marly bed, and washes linen remarkably white. Clear water is also found at some other places of the island; but the low land in general has brown. The northern part is over-run with various species of the nepenthes; but whether the abundance of water is derived from thence, or whether they be the consequence of the abundance of water, must be left to the decision of naturalists; however, some caution may be prudent in rooting them up, lest the former should be the case. Besides the nepenthes, some other vegetable substances here yield water. A species of rattan, named toongal, about the size of a man's wrist, yields plenty of very clear water. Another creeper, called bahanoompool, also yields water; it is gummy, but generally clear and good; the creeper must be cut above, or the water retires; these creepers are found even on the tops of the highest hills, entwined with the upper branches of the trees, and hanging down from thence. Those found in moist grounds have most water; those in dry places have little; some of them are larger than a man's leg; they have very rough bark, with deep scores.

"There is also, when the tide is ebbed, good water on the shore of Balambangan, opposite to Calootan, and the country people say there is, to the southward of Sooboorong-y-Dammit, a fresh-water lake close to the shore, though not communicating with the sea. In this lake are many crocodiles.

"It is not easy to determine which of the three districts is most eligible for an establishment. In point of security perhaps the southern is to be preferred; but the hillock named Gunong Loonoong, at the entrance of the north harbour, is capable of being made very defensible, as it is far distant from any other rising ground, and commands the country adjoining: it is situated on a high sandy point, where there is a free circulation of air, and therefore a probability of its being healthy: the point without the hill, being almost half a mile in extent, is sufficiently large for a town, and cannot be approached by ships within gunshot till they have entered the harbour, nor can boats land but there. Perhaps the isthmus between Looc-See-Kooambo and Toommang

would be still preferable, as there is a single hill on it also; but I personally cannot say anything more of it.

"The advantages of Balambangan having been found generally and particularly, so great, it is not necessary to enforce the choice by mentioning inferior considerations. It may not, however, be amiss to observe, that the north-west and north-east coasts of Borneo have good soundings, and though on both sides there are many banks in the offing, the track from the westward home to Balambangan is entirely free from shoals: the winds, from hence to Sooloo and Magindanao, are variable, and the tides pretty regular, except within Banguey, where there is but little. These are very considerable advantages, as facilitating the intercourse with the different districts.

"On a general and particular view, Balambangan is exquisitely adapted for a capital to the Oriental Polynesia as strictly central, both in distance and convenience of access."

"These are the advantages in general respecting Balambangan, but it may not be amiss to mention its situation with respect to its contiguousness to the possessions of the Honourable Company: it being situated at the north point of Borneo, and south of Palawan, it is the most eligible station possible for the inhabitants of the east and west coasts of these islands to bring continual resources of grain, and every other necessary of life. Both the north-east and north-west coasts of Borneo have good soundings along its coasts, and though there are banks in the offing to the westward the track too and from Balambangan is entirely clear from the westward, from several runs across which I have experienced (and others which have run from my observations); the north-east coast has likewise numbers of islands and shoals in the offing, with good soundings and channels both within and without them, with pretty regular tides, which add greatly to the advantage in respect to the intercourse with Sooloo, in the north-east monsoon, by keeping to the southward along shore, the winds are generally variable."

My long residence in these parts naturally calls upon me to give some account of the climate and healthiness of Balambangan, as Captain Trotter and some other people of passage have given accounts which I am certain they could never experience; indeed, they never gave themselves time to consider or look into the cause of the sickness and deaths of the people. But to account for it, in my opinion, in a few words, was the venereal and other disorders which they contracted at Sooloo, where our want of provisions and

other necessary causes obliged us frequently to go; from a desire of still being ashore, they concealed it from the doctor as long as possible, by which means their blood became poisoned with this disease, and at the same time getting drunk with shamshire and other adulterated liquors, in consequence of which debauches they got colds, fluxes, and in short a complication of disorders, not to mention that many had felt the bad effects of Batavia disorders during our stay there at two different times from which, when they returned to Balambangan, they died like rotten sheep, and then it was imputed to the unhealthiness of the climate; but those which kept free from these diseases received no bad effect from the air of Balambangan, evinced, I may say, by myself and others, who had been six months together ashore, and there every month in the year at different times, never had an hour's sickness, or ever enjoyed our healths in greater perfection, and to give a more convincing proof, that I do not conform from what we experienced, but there are now twenty men who have been there these eight months, and never any of them has been sick, and there are people arrived here with scurvy, &c., which have perfectly recovered.

Balambangan is one of the most temperate climates of the East I ever was in, and the air exceeding agreeable and cool, occasioned by the refreshing breezes, except when it is calm, which does not happen often; and I have felt it so cold in the months of December and January that a cloth coat and waistcoat were very acceptable in the morning. Some people who have given out that it rains almost the year round, with thunder and lightning, could not, I am sure, speak from experience, as I have been as long at the island as any person, and never saw any rain for a continuance longer than three or four days, and that but seldom—generally on the shifting of the monsoons, at the full and change of the moon, when it thunders and lightens for a few days, but nothing which I ever saw that could make it an object of attention, or more than in the other parts of India; and out of three months only fifteen days' rain, and this most commonly nothing more than a single refreshing shower, which passes in a squall, the drops generally remarkably large.

I now give a short description of the several places which I have visited on my surveys in those parts, and others which I have had from good authority from the most experienced of the Soolooans.

First, *Banguey* is a fine island, not above a league from the easternmost point of the north harbour of Balambangan; it has a very rich soil, fit, I believe, for producing everything that grows within the tropics. Here are some of the best yams and potatoes I ever eat; there is likewise plantains, limes, and other fruits, and does not want plenty of hogs, deer, and some few fowls. There is also fine timber of various sorts and sizes, neepa, and other

necessaries. It is well watered with fine pure streams. The inhabitants are but few belonging to it, whom we have found to be useful.

Malleeangin, which lies off the south point of Banguey, has good timber for building; likewise hogs and deer; and is well watered.

Balabac we know little of but by report: it is not healthy. The Soolooans get saltpetre there, tortoiseshell, &c. It is said there is plenty of goats, fowls, fruits, and some small quantity of rice. I have likewise been told there is a secure bay on the east side, fit to admit large ships, and plentifully watered.

Peragoa, or *Palawan*.—This is a very unhealthy island by accounts, particularly the south end. The people inhabiting here are for the most part a scaly race, or, as they call them, from the Spanish, Cascados; this they say is owing to the water, and I have never heard it affects their health, or is apt to infect others. There are many of the same caste dispersed about these countries. The Spaniards have for a long time possessed the north part of it, and have got a small fort in the harbour of Tai-Tai, situated in the north-east part; it is not worth a national charge, and I make no doubt, preaching, as it is the least expensive, is the best trade they have. They are also possessed of an island called *Dumaran*,* to the eastward of the north part of Palawan, but I do not find it is of any note for its trade or otherwise. Palawan produces canes, rattans, and some wax; likewise rice. The history of the traditional right of the Soolooans to the island of Palawan and the north part of Borneo,[1] specified in the grant of the Honourable Company's possessions, I shall not discuss at present, being foreign to the purpose, but shall leave it to the geographical descriptions of the countries, as soon as I can get it complete by my further surveys, when it will be more necessary.

Borneo.—Our possessions here extend from Keemanees, on the north-west side, to Towsan Abia on the north-east, divided in a direct line east and west from the above-mentioned places, to the north to Sampan-Mangio. Generally all this country has very rich soil, and lies almost wholly uncultivated and covered with trees, except some spacious fine meadows or savannahs along its coast, or near any towns inland, which are covered with herds of black cattle, hogs, and deer. Nature has bordered those extensive plains upon the seaside by a graceful range of stately trees, and placed within several delightful harbours, as a retreat for their various inhabitants against the heat of the sun.

* The Spaniards have only half of Dumaran; the other half belonged to Sooloo.

[1] [The history of these political changes is given by F. Blumentritt in a pamphlet entitled "Spanien und die Insel Borneo," Vienna, 1882. See also Logan's "Journal of the Indian Archipelago," vol. ii. p. 512.]

Sampan-Mangio and *Malloodoo Bay*, and the country round, abound with the lissang, which are very large and have no flap under their necks like our cattle, with their horns inclined to be crooked like rams; but their flesh is excellent, preferable to anything that you will meet with in India in general. On the eastern coast I have seen large droves straying along the beach; there is likewise hogs, deer, and fowls in plenty.

Pandasan, town and river, is on the north-west coast, about three leagues to the northward of Tampassook, where vessels in the north-east monsoon may run in and lie securely in five and six fathoms water off its mouth, screened by a point of land which forms the mouth of the river, and a shoal without you. The town is about six leagues up the river, where there is some black cattle, goats, hogs, deer, and fowls.

Tampassook, to the southward of the former, contains about two hundred houses; there is vast plenty of refreshments to be had of all kinds, and the bullocks superior to any I have seen in India, although the bar is not passable for days together. The best way to get stock from town would be by swimming the cattle across the river, and walk them up the beach to Pandasan where they could be embarked with great ease; and in the south-west monsoon a vessel may be pretty secure at Abia, about two leagues to the southward of the river, screened by an island of the same name, and for a trifling expense have the cattle brought there by land, and there taken in, so that refreshments may be had in either monsoon.

Abia is the northern entrance into the lake of Kenny Balloo; there is likewise Tawarran, and other entrances along the coast of Borneo, which certainly must be a great advantage with respect to the inland trade. This lake I have heard is nearly one hundred miles in circumference, with great numbers of inhabitants around it; the one river that runs from it flows into a branch of the river Banjar Masseen, which disembogues itself near the southern extremity of Borneo (I have been two or three miles up the entrance of the lake); so that we might receive, in exchange for our commodities, the riches of the remotest parts of this great island of Borneo. The great advantage which must accrue from such an inland navigation, and with so rich an island, must be too obvious to need any comment.

To the southward of Abia there are the towns Amboon, Sulaman, Tawarran, Mancaboong, Potatan (about three hundred pecul of pepper a year), Pangalet, Pappal, Keemanees, &c., which bound the Company's possessions to the southward. In all this part pepper grows in plenty; a regular demand in time might ensure any quantity. There are likewise refreshments to be had at most of these places, but I can say nothing further with certainty.

Bankoka, on Malloodoo Bay, has a few goats, fowls, great

plenty of hogs and deer; it likewise produces the clove-bark. The inhabitants in the bay fish for pearls, which are called cappas: though they are found in great plenty, their colour is not counted so good as those found at Tawee Tawee, from the Tepoy.

Along the north-east coast lie the towns and rivers of Pitan (which has a harbour formed by the island Semadall), Soogoot, and Labook, which countries produce camphor, birds' nests; and the coast being bound with a vast number of islands and shoals the inhabitants get a great quantity of tortoiseshell, balata, &c. There is great variety of fine timber along this coast.

To the eastward of Labook lies the island of Bahalatolis (an island abounding with fine spring water), in latitude 5° 54′ N., which forms the entrance of the bay of Sandakan, a most secure and fine bay, which is near five leagues deep, and has three fine harbours contained within—namely, the harbour of Boolylooko, which lies to the westward; Seegalleyhood, to the south-west; and Doomondoung, to the southward. The two last have rivers of the same name, from which are derived the names of harbours; and were this place as conveniently situated respecting the navigation as Balambangan, it might answer every view that could be expected from that or any other place. It has a good air and a number of islands that supply it with abundance of pure water. There are trees on these islands and the mainland close to the rivers, of vast size, fit for planks or the largest masts, and of excellent kinds too; such as teak, poone, camphor, &c. Those last are of an extraordinary length and thickness, and straight withal. Dammer is found so plenty in the woods and along the shores that vessels may be loaded with it at the expense only of gathering; there are also great plenty of neepas, bamboos, and rattans of various kinds. So far Sandakan would encourage the building of vessels. The water rises nine feet. There are fine stones fit for building, and lime may be had in plenty from the great quantity of shells about the place. Here the Soolooans have got a settlement on the small island of Loobookcaun, near the harbour of Doomondaung: they carry on trade with the inland part of Borneo, and the inhabitants along the great river of Kinabatangan (who are pagans), which have an easy communication by one day's travelling to the river of Seegalleyhood; whereas, were they to come down the great river and along the coast of Borneo, they would be fifteen days, which they accomplish in three the other way. These people I saw at Loobookcaun on my surveys; they are a stout-limbed, well-looking people, and of a whiter complexion by far than those which inhabit the sea-coasts, and I have been informed by the Soolooans, who have been up to visit them at their habitations, tell many surprising things of their manners and customs, which they confirmed when I saw them, which would be too tedious to relate here.

To the eastward lies the rivers of Towsan* Abia (so called from the meeting of many rivers in the Sooloo language), Kinabatangan, Talasam, Soobapoocull, and several others at the eastern point of Borneo, called Unsang; this part of the coast has few or no inhabitants. It is reported that there is gold-dust sifted out of the rivers of Unsang, and the inhabitants who reside on the banks of the rivers Kinabatangan and Talasam find some gold which is washed down from the mountains in the time of the freshes. This part of the coast is clear from banks, and has regular soundings; and I have seen forty head of fine lissang straying along the beach near the mouths of these rivers.

From the island of Tambasan, at the north part of the point of Unsang, you have a view of the mountains Becha Becha and Banga-oo, being part of the Tawee Tawee's, which form the southern extremity of the Sooloo Archipelago, continuing in a chain to the north-east to Basseelan, and from Sooloo another chain from east to west. The situation, produce, &c., of these islands I shall leave to the geographical descriptions. The pearl fishery is their chief value.

Soog or *Sooloo*, the town of the same name, in latitude 6o° N., where the Sultan has his residence. His dominions are on Borneo and the islands which form the archipelago. The road of Sooloo is pretty secure in the ruling monsoons, and is only exposed from west to north-west at the changing of the seasons: I have seldom or ever seen it continue to blow hard long.

Toolyan, lying at the east end of the island, is a fine secure bay for vessels riding in both monsoons.

Your residence at Sooloo, gentlemen, no doubt has given you a sufficient knowledge of the general character of this nation, also of their customs, manners, trade, produce, the nature of the clime, &c., which must render any detail of that kind unnecessary at present; not but what I shall be particular in my geographical description, from my long experience.

Mindanoe, at the north and north-east part, belonging to the Spaniards, down to Samboanga fort, at the south-west part, where they have about two hundred regulars for its defence; and although this garrison is supported at the yearly expense of twenty-five thousand dollars, it renders little or no revenue to the king, nor has it any sort of trade or produce to afford a tolerable livelihood to any other than the governor and chief military officer (who is a major), with the advantage he has of paying and supplying the troops with necessaries.

Mindanoe, the town so called, lies about three leagues up the river Salangan, situated at the southern part of the bay of Tuboe, in latitude 7° 12′ N., having the island of Bangaout lying before its mouth, about six or seven miles to the westward. This place is

* Towsan, I was told, means channel of communication.

the residence of the Sultan, and the late Sultan (Pakee) resigned his authority to a younger brother, who is now in the government, though he is still much respected, and nothing done without his consent. When he was at Sooloo in the year 1770, he seemed very well pleased with our design of settling in those parts, and declared himself much attached to the English, and wished much that they might find his country capable of giving them encouragement to fix there, and have an opportunity of making himself useful to them.

As for its trade, as no foreigners go that way, they get the few things they want from Sooloo at very high prices, and give their wax, rice, and gold in exchange, which are the chief commodities of the country. Slaves may be had at low prices there: those are chiefly Bisayors (inhabitants of the Philippines) generally taken by those people and the Islanos (another distinct race within the country), who have an independent Sultan of their own from that of Mindanoe: they carry on the piracies for all the rest, in the face of the very ports of the Spaniards. The Mindanoes and Soolooans would support an appearance of peace with the Spaniards, although they not only countenance but encourage them in their robberies, giving them a protection in their dominions and purchasing the plunder and captives, whilst there is no other method left to dispose of them; the Mindanoes have many fine galleys which they have taken from the Spaniards.

The bay of Sampinitin lies about two leagues to the northward of the river Salangan, which is the only secure place for a vessel of any burthen to lie in, having from nine to fifteen fathoms water. All the coast of Mindanoe to the southward is mostly steep, having no soundings but very near the shores.

Cagayan Sooloo lies in the latitude of 7° N., about twenty-five leagues to the eastward of Banguey Peak, a most pleasant little island, with some bullocks, goats, yams, fruit, &c. Water is very scarce, except at low water on the south-west side, right abreast of the town (which is also the best place for anchoring), where it may be had springing from under the rocks, and is supplied by a cavern which has a fine spring about sixty or eighty feet below the surface of the earth, lying near two miles within the country.

These are the places which I have been to during my stay in these parts, and I sent a general chart of my surveys to Bombay, and left one in the Secretary's office at Madras, to be forwarded to Europe. Through the hurry of business, I have not been able to finish one now to send by this opportunity, as I could wish, but must defer it till another opportunity; and I must do Mr. Dalrymple the justice to say, that what he has done from his own surveys and observations I found to be just, and may be depended

on; the rest, which he received from intelligence of Bahatol the pilot (who was alive when I arrived at Sooloo), Dattoo Saraphodin, and others, by being acquainted with the same, and able to converse with them, I have received the same accounts from them; and that Mr. Dalrymple has laid it down from his own surveys and their accounts where he had not an opportunity to go. I have made alterations and improvements on my surveys to those places which were laid down from information where Mr. Dalrymple had not been; there wants only the coast of Borneo from Abia to Keemanees, and the island of Palawan surveyed (the only places I have not visited in the Company's possessions), to render the navigation more safe and the survey complete. When this is accomplished I shall then be able to make a set of charts, with directions for the navigation of vessels, with the bearings and distances from place to place, the shoals and soundings, views of the land, and a large scale for the particular harbours, bays, &c. Should I be able to accomplish this to the approbation of my honourable employers and the satisfaction of navigators, I shall think my time well spent.

JAMES BARTON.

BALAMBANGAN, *February* 1, 1774.

N.B.—The spelling of proper names is according to Lieut. Barton's MS.

III.

SUBSTANCE OF A LETTER TO THE COURT OF DIRECTORS

From Mr. JOHN JESSE, *dated July* 20, 1775, *at Borneo Proper.*

[A. DALRYMPLE'S "Oriental Repertory," vol. ii. pp. 1–8.]

As I am the first servant the Company ever had, or even European which for a number of years has visited this part of the island of BORNEO, I have presumed to lay before you every, even the minutest particular, which has occurred to my knowledge worthy your observation, that you may be the better enabled to form a just idea of your connections here, and to judge with precision what measures may hereafter most readily effect the objects you have had in view by an establishment in this quarter.

The Chief and Council of Balambangan, in the beginning of the last year, addressed a letter to the State of Borneo, informing them

of being arrived at Balambangan, and wishes of entering into alliances with them. In consequence of this invitation an ambassador arrived from thence in June, and I had the honour of being appointed to return with him, to open an intercourse there, and to enter into such engagements as might appear most to the Company's advantage.

I arrived here in the month of August, and found them unanimous in their inclination to cultivate the friendship and alliance of the Honourable Company; in consequence thereof, I made it my first care to discover the motives which principally induced them thereto, that I might be the better enabled so to frame my treaty as to keep them dependent in such particulars they most essentially stood in need of, which I then found to be, and have since been confirmed therein, was protection from their piratical neighbours, the Soolos and Mindanaos, and others, who make continual depredations on their coast, by taking advantage of their natural timidity. To relieve them, therefore, in this particular, and to induce them the more readily to consent to my subsequent proposals, I stipulated by one of the articles that (if attacked) the Company should protect them, and having thus gratified them in their principal want, in return I demanded for the Company, agreeably to the tenor of my instructions, the exclusive trade of the pepper; as I well knew it was the grand object they wished to attain, and I therefore also made it my study, to be thoroughly acquainted with every particular relative thereto. I was informed the quantity that year was 4,000 peculs, cultivated solely by a colony of Chinese settled here, and sold to the junks at the rate of 17·2 Spanish dollars per pecul, in China-cloth called congongs, which, for want of any other specie, are become the standard for regulating the price of all commercial commodities at this port. Although I was well convinced it could never answer the Company's purpose to pay so high a price for the pepper, especially where the quantity was so small, I notwithstanding in the Treaty made a point of securing to them the exclusive trade of that article, to be paid for in merchandise at such rates as might indemnify them at present, in the inconvenience of the high price, to the end that it might divert the channel of the junk trade from this to Balambangan (their grand inducement for coming here being thus removed), which, together with my having bound the State to oblige all their dependants to make plantations, whereby the quantity would not only be greatly increased, but from their having no other purchasers, the Company would be enabled to fix such prices as would give ample encouragement to the planters, and soon reimburse the expenses which were necessitated to be borne at the beginning of the undertaking; and the more so as, in consequence of their industry, becoming yearly richer, they would find our protection but the more indispensably necessary.

Things being fixed on this basis—the Englishman and Borneyan becoming thus mutually necessary to each other—I flattered myself the event might have produced a solid and real commercial advantage, as well to the nation as to the Company; and, the more so as from the great probability of the hill people being soon induced also to plant, who, by receiving cloth as the price of their industry, would naturally increase the consumption and render our manufactures with them a necessary of life, these being by far the most numerous and the aborigines of the island. Another advantage accruing therefrom is, that having once connected these people in interest with the Company, and familiarized them to our customs, the inhabitants of the sea-coast would be unable (were they inclined) to obstruct or molest the prosecution of the Company's views. These were the motives which first induced me to secure to the Company, in the treaty with the Borneyans, the exclusive trade to the pepper, although at that time on seemingly disadvantageous terms. How far I may have acted with propriety remains with the Company to determine.

I now come to say something of the characteristics of the different sects of the inhabitants.

The Borneyans, who inhabit the sea-coast, are Mahometans, and, as they say, are originally an emigration from Jehore, but are ignorant of their chronology. They extended their dominions over these coasts: Palawan, Manilla, and other parts of the Philippines; and even Sooloo, as Mr. Dalrymple observes, was formerly a part of this empire. From these extensive conquests, and the unconnected traditions I have had from them, I am inclined to think they were originally a warlike people; but as most other empires, when arrived at a certain pitch of grandeur, have generally declined to nearly their original state, from a want of that vigorous and active government which is so essentially necessary in supporting all acquisitions obtained merely by force of arms, so appears to have been the case with that of Borneo; and I am the more convinced of it from that entire indolence and inactivity I found them immersed in on my arrival, being totally degenerated from that courage and enterprise which seems to have marked the character of their roving ancestors, and deprived of their influence in all their former dominions, situated to the northward of Borneo.

From what I have been led to say relative to this State, it may be seen they are enervated and unwarlike, added to which they seem to be envious of the private property of each other to a great degree. But, on the other hand, I have found them fair in their dealings; cool and deliberate in their resentments, even where the object is in their power; candid in their intentions; strangers to what we call the world, although not deficient in the innate faculty of the understanding, as they seem to have, in

great perfection, such mechanical arts as are met with in these countries, particularly in the foundry of brass cannon, wherein they excel all the Asiatics I have seen on this side, or have heard of on the other.

That they are constant in their attachments I think I may say, from their behaviour subsequent to the unhappy capture of Balambangan, for although threatened by the Sooloos in case they should supply us, and that at a time when many of their boats were trading in the verge of the Sooloo districts, they set them at defiance, and generously afforded such assistance as lay in their power.

With respect to the Idaan, or Mooroots as they are called here, I cannot give any account of their disposition, but from what I have heard from the Borneyans, they are abandoned idolaters. One of their tenets is so strangely inhuman I cannot pass unnoticed, which is, that their future interest depends upon the number of their fellow-creatures they have killed in any engagement, or common disputes, and count their degrees of happiness hereafter to depend on the number of human skulls in their possession ; from which, and the wild disorderly life they lead, unrestrained by any bond of civil society, we ought not to be surprised if they are of a cruel and vindictive disposition. They are as yet near to a state of nature, but have a great share of innate cunning, of which I had a striking instance in the following circumstance :—Two of their principal chiefs, induced from curiosity, came one day to the factory : they plainly told me they came to see a white man, and should judge from my treatment of them then what inducement they might have to cultivate an intercourse with me. Pleased with the prospect, however faint, of having thus met with an instrument through which I might encompass in time what I have ever esteemed my capital object, I endeavoured to ingratiate myself by giving them small presents of different assortments of goods, and expressed a desire to see them again. One only of them shortly afterwards returned with some provisions, which I learnt he had first been endeavouring to sell to the junks, and even then demanded of me such an exorbitant price as I could not think of complying with.

They are represented, however, as industrious in cultivating their paddy plantations and in following such other employments as are known amongst them ; but having no purchaser for their commodity but the Borneyans, who treat them very indifferently, the intercourse, of consequence, is not carried to any extent.

Their arms are long knives and soompitans—a tube of wood about six feet long, through which they blow small arrows poisoned at one end, having at the other a small bit of cork wood just big enough to fill up the hole of the tube, the least touch of which,

where blood is produced, is certain death, unless immediately counteracted by the antidote they make use of.

Their dress at present is nothing more than a girdle or long slip of stuff made of the bark of a certain tree, which turns between the thighs to cover their nudities, one end of which hangs down before, the other behind.

The civil government of Borneo is vested with a Sultan and a Superior Council, which consists of those Pangarans who hold the great offices of the State, such as Bandahara, in whose hands is lodged the whole executive power; De Gadong, or director of the Sultan's household; the Tomongong, or commander-in-chief in their occasional wars; the Pa Mancha, or mediator in disputes; and the Shabander. To assist these are three Orang Kayas, De Gadong, Ivattan, and Shabander. There are many others who hold the title of Pangarans, but who are called to council only on particular matters.

I cannot better convey an idea of this form of government than to say it bears a near resemblance to our ancient feudal system; for although there is more respect paid to the regal power here than in any other Malay country I have been in (for this obvious reason, that the Sultan has entirely the power of appointing the great officers of State, and of course can always influence the public councils), yet, however, each Pangaran has the entire sway over his particular dependants, whose cause they never fail to espouse, even where he may stand in opposition to the sovereign authority.

They have no particular laws against treason. Murder is capitally punished, except in the case where the master kills the slave. Polygamy prevails, as in all other Mahometan countries, but they seldom intermarry with foreigners. The original law, in cases of adultery, required the parties to be instantly strangled, but for want of it being properly enforced, and the difficulty there would be found in punishing such as have a number of adherents, people in power often pass with impunity, whilst, towards the middle and inferior ranks of people, it is extended with the utmost rigour. Theft, according to the degree of the crime, is punished with death or the loss of the right hand. I have found in the course of my transactions with them they have as yet no institutions of a commercial nature, which may be attributed to the want of communication with other nations, the Chinese excepted, who make presents to the headmen in lieu of duties. Those of that nation settled here, reap without molestation the fruits of their industry; but the casual traders suffer many losses from there being no law which obliges the debtor to discharge his debt, and the necessity they are under of complying with every unreasonable request of those of any consideration in the place.

Having thus communicated what I know of the characteristics

and policy of the Borneyans, it will not be improper to observe that from the plenty and goodness of the timber found here the Chinese have been induced to adopt the scheme of building junks and have found it by experience turn out to advantage, although necessitated to bring the workmen and many of the materials from China. One, of the burthen of 7,000 peculs (580 tons), was built this year on the following plan: Two noquedahs [1] of junks, and the captain of the Chinese residing here, entered into a contract, whereby the latter, on the one part, agreed to provide the timber, and the former stipulated to bring the artificers and ironwork from Amoy. The keel was laid in the beginning of March, and she was launched May 28. The entire cost and outfit amounted, as I have been informed by the contracting parties, to no more than 8,500 Spanish dollars; which, after allowing for the profits on their congongs, is not more than 4,250 Spanish dollars.

From hence it may be inferred that should it ever be the Company's intention to establish in these parts a marine, wherein small craft might be wanted, they could be built on easy and advantageous terms; as I have found on inquiry of the noquedahs, there would be no difficulty in procuring artificers from China, by the junks, on very moderate encouragement.

The river of Borneo is navigable far above the town for ships of a very considerable burthen, and the only difficulty lies at the mouth of it, where the channel is very narrow for about a quarter of a mile in length, through which there is not above 17 feet at high water. However, the bottom is soft mud, and the place so completely land-locked, there never can be any surf, and consequently a ship taking the ground is attended with no bad consequences.

My non-acquaintance with marine matters disenables me from judging with precision as to the expediency of making docks here; but from the temporary ones made by the Chinese, wherein they build their junks, and out of which they are floated, I should imagine they might be made with convenience for vessels of 400 tons, and I am rather encouraged in this opinion from the banks of the river being a tough clay, and therefore a good foundation, in which it has the preference above Laboan, the shores there being only a quicksand. The water here flows from 8 to 9 feet, spring tides.

Chimerical are the expectations of finding, in these countries, any people so disinterested as not to be ready to take an advantage which chance may throw in their way, where resolutions are not more biassed by dread than attachment, and how unreasonable it is to expect any success in these parts unless where there is a force sufficient to awe as well as to protect; for

[1] [Nákhodá—Captain.]

although the Chief and Council here seem to think the Borneyans have infringed their agreement by not giving us the whole of the pepper, yet neither have we, on our part, been able to fulfil that of affording them protection, which they have experienced by the loss of their boats, seized by our mutual enemy the Sooloos, to the amount of 20,000 Spanish dollars. This will occasion surprise, as there were not only several vessels on the Balambangan establishment, but likewise two small cruisers sent from Bombay, properly adapted to that purpose: of these one was upset, being ordered out in tempestuous weather to cruise for the ship *Louisa*, then expected; the other sent with the same vessel to keep ahead of her all the way to China, and which lost her passage in returning, being obliged to bear away for Malacca, from whence she is this month arrived. The public service therefore expected to accrue from them has been rendered totally abortive, by being made subservient to private convenience, and the protection of the Company's allies having been thus withdrawn. The Borneyans cannot with justice be accused of want of faith in not scrupulously fulfilling the engagements on their part.[1]

IV.

FORMATION OF THE ESTABLISHMENT ON POOLO PEENANG.

[A. DALRYMPLE'S "Oriental Repertory," vol. ii. pp. 583-600.]

POOLO PEENANG, or PRINCE-WALES ISLAND, having become a subject of much attention, an authentic account of the first formation and progressive improvements of that establishment may be acceptable to the public.

Capt. Francis Light, who had proposed it, and who was appointed by the East India Company's administration in Bengal to the

[1] [For Articles I. and II. compare T. Forrest "Voyage to New Guinea," London, 1779; J. Hunt's "Sketch of Borneo;" and "Some Particulars Relative to Sulu," in "Malayan Miscellanies," Bencoolen, 1820, vol. i. (reprinted in J. H. Moor's "Notices of the Indian Archipelago," Singapore, 1837). Dalton's and Leyden's accounts in the last-named volume. "The Journal of the Indian Archipelago," vol. ii. pp. 498-507. Dalrymple's "Essay towards an Account of Sulu" was reprinted from his "Oriental Repertory" in the same journal, vol. iii. 512-31, 545-567. Keppel's "Voyage of the *Meander*," i. 40 ff. His "Expedition to Borneo," vol. ii. 176. F. W. Burbidge, "The Gardens of the Sun," London. 1880. S. St. John, "Life in the Forests of the Far East," London. 1863. According to W. P. Groeneveldt ("Verhandelingen, Bat. Gen.," vol. xxxix., p. 101 ff.) an intercourse between China and Brunei existed in A.D. 669, and between China and Sulu in 1417.]

charge of forming the establishment, in a letter to my lamented and public-spirited friend the late Mr. Andrew Ross, at Madras, dated September 25, 1786, gives the following account of his proceedings on taking possession, he having antecedently obtained the island from the King of Quedda :—

"I am favoured with yours by the *Valentine*, August 11, and feel much obliged to the Governor and you for so timely an attention.* Capt. Lewin and Capt. Wall came ashore with several gentlemen passengers; as I had not then hoisted the colours I thought this a proper opportunity to take a formal possession. At noon we all assembled under the flagstaff, every gentleman assisting to hoist the British flag. I took possession of the island in the name of His Majesty George III. and for the use of the Honourable East India Company; the artillery and ships firing a royal salute, and the marines three volleys. I named our new acquisition in honour of the Prince of Wales, it being the eve of his birthday; after this we adjourned to celebrate the day. I asked Captains Lewin and Wall to give their opinions with regard to this port in writing, a copy of which I enclose for your perusal; also a certificate of the taking possession of the island, signed by the Company.

"Capt. Simpson came here on the 15th, and stayed a day; the other ships sent their letters ashore, and passed on for China.

"I supplied the ships which stopped here with a bullock each, fish, fowls, ducks, fruit, rattan, and canes, so that they appeared well satisfied.

"I brought here a very small force—100 new-raised marines, totally unacquainted with the use of the musket or military discipline, 15 artillerymen, 30 lascars, Lieut. Grey,† Sergt.-Major Greyg, Sergt. (of artillery) Dons, the Honourable Company's snow *Eliza*, and the *Prince Henry* storeship. The first month passed away quietly, with cutting down trees and clearing away the ground; but before we could get up any defence we had visitors of all kinds, some for curiosity, some for gain, and some for plunder. However, a strict watch and constant attention has prevented any accident, but I am in hourly dread of some mischance, from the ignorance of the people with me, and the envy of our neighbours. A dispute might prove of infinite disadvantage to our new settlement, for in the confusion the innocent might be involved with the guilty, and the report would deter people from coming. All this would be entirely prevented by a little additional force, and one or two officers of discretion.

"The Acheen Noqueda, who cut off poor Bean, is settled at

* Mr. Ross had recommended to the Governor, Sir Archibald Campbell, to direct some of the Company's ships to call at Port Peenang, in their passage to China, as the means of giving countenance to the new settlement.

† Further on he signs himself Gray.

Quedda; five of his prows are here, with betelnut and pepper; to send them away without their having done any fault would hurt our credit, and prevent others from coming, and those being here is not very pleasant.

"A French padré and 100 Christians, small and great, are come from Quedda to settle, besides a number of stragglers. The former inhabitants amounted to 58 men, women, and children, who reside near the foot of the hills about four miles from us; several Chinese are likewise come to ask for ground to build on, and mean to bring their families here. The captains of the ships are anxious to get possession, and employ people every day to clear the woods. I imagine before a year passes we shall have controversies about the division of land.

"I have in stock here, cattle, sheep, hogs, fowls, ducks, and geese, which thrive and breed very fast. The constant supply of poultry and cattle from Quedda will enable us very soon to supply the ships; at present they are much cheaper than at Malacca. I supply the Europeans with bread every day, and, with grindstones, can supply His Majesty's ships, as fuel is plenty and wheat easily got from Bengal."

Report of Captains THOMAS WALL *and* RICHARD LEWIN, Jun.

"The strait which separates the east side of Pinang from the Malay shore appears to be an exceeding safe place for ships to ride at all times of the year, being extremely well sheltered, and very convenient for heaving down and refitting ships which may have occasion for such business. The entrance is on the north side, and the soundings are regular; there is no danger but may be seen. Provisions are plenty. With respect to trade with the Malays, its local situation gives it very great advantages. The establishment of the new settlement under Capt. Light may, we think, be very beneficial to all British ships passing the Straits of Malacca; and the East India Company, at a trivial expense, may perhaps obtain advantages from it equal to those which the Dutch derive from their settlement at Malacca.

(Signed) "THOS. WALL.
"RICHD. LEWIN, Jun.

"Latitude of N. end of Pinang, 5° 28′ N.

"PULO PINANG, *August* 11, 1786."

Act of Possession.

"These are to certify that, agreeable to my orders and instructions from the Honourable Governor-General and Council of

Bengal, I have this day taken possession of this island, called Poolo Peenang, now named The Prince of Wales Island, and hoisted the British colours, in the name of His Majesty George the Third, and for the use of the Honourable English East India Company.—The Eleventh day of August, One Thousand Seven Hundred and Eighty-six, being the eve of the Prince of Wales's birthday.

(Signed) "Francis Light. S.P.T.
"Jas. Gray,
"Lt. Commandant, Marine Corps."

"In presence of the underwritten:

"Geo. Howell, Captain, Artillery.
"Elisha Trapaud, Captain, Engineers.
"Richd. Lewin, Jun., Commander of the Honourable Company's ship *Vansittart.*
"John Beatson.
"George Smith, Merchant.
"Thos. Wall, Commander of the Honourable Company's ship *Valentine.*
"Davd. Prya, Captain, 84th Regiment.
"Js. Magennis, Surgeon of the Honourable Company's ship *Valentine.*
"Jas. Glass, Commander of the *Prince Henry* storeship.
"Wm. Lindsay, Commander of the snow *Speedwell.*
"Jas. Holcombe, First Lieutenant of the Honourable Company's snow *Eliza.*"

Extract of a Letter from Mr. John Fergusson, *at Calcutta, to* A. Ross, Esq., *dated November* 12, 1786.

"Enclosed you have extract of my letter from Captain Light, per *Eliza.* I have reason to believe that this Government will support the new establishment properly; it is talked that they are about sending 500 Sepoys and a few European artillery, in addition to 200 of the former and 20 of the latter already there. This will make it perfectly secure and pretty respectable."

Extract of a Letter from Capt. Francis Light *to* Mr. John Fergusson, *dated Prince of Wales Island, October* 1786.

"We have no violent disorders, and, what is very extraordinary, in the very worst season and amidst new-fallen trees and bushes, we have not had one putrid fever. Our inhabitants increase very fast—Chooliars, Chinese, and Christians; they are already dis-

puting about the ground. every one building as fast as they can. The French padré from Quedda has erected his cross here, and in two months more it will never be believed that this place was never before inhabited. The old inhabitants on the island amount to 58 persons of all ages and sexes; they live about four or five miles from us, near the hills, in a most delightful situation. We are upon a point of sand about 200 yards broad, the sea open to the N.E. and S.E., the main about two miles from us, which, with the distant mountains and islands, affords a most delightful prospect. On the N.W. side from the point extends a beach of fine firm sand, about four miles in length, bending into a small bay, from which runs a river of fine clear water, and ends at a steep point of rocks on the south side; the beach is likewise pleasant and easy, but is interrupted with small creeks, and very soon ends in a jungle. Close to the point is 11 or 12 fathoms; the ships lay within the hail of us. I have erected a fort of neebons, a species of palmyra,* the outside of which is nearly finished; this will defend us against any sudden attack, and there is no fear of their coming in form while we have ships to protect the roads; but whenever they are gone away we may expect a visit. The distance is so small from hence to Sumatra that the prows can come at all seasons. The Acheen Noqueda who cut off Bayne is settled at Quedda; he has sent his prows here with betelnut. I think it proper to keep on good terms with him, and all their rogues, until we are in a state to enforce order. The vessels for Pegu will procure cargoes much easier here than at Acheen; our situation is so centrical that we must possess the greater part of the produce of the straits, in spite of the Dutch; as this is not unknown to them, we must expect every interruption in their power. I can safely affirm that the English have no place in India which can come in competition with this; we only want a sufficient strength here to protect us against the piratical part of the East."

Extract of a Letter from Captain FRANCIS LIGHT *to* Mr. ANDREW ROSS, *dated Fort Cornwallis, December* 28, 1788.

"I have been favoured with yours of August 11 by Captain Corner, who arrived here August 24, and sailed August 30; neither the *Ceres* nor *Cornwallis*, nor any other vessel, called here from Madras. I am sorry to observe we have many enemies, who strive to render us as much injury as they can. I have not yet heard of any plausible reason for their discontent; whatever effect their malice may have in Bengal, they are able to do us

* The neebon, or annebon, is not a species of palmyra, though a palm; it is what is usually called the cabbage-tree (Areca nibung, Mart.).

little hurt here. Our town increases very fast, and with some very creditable families of Chinese, Malabar, and Malays. We have cultivated this year more than 400 acres, and the people are so well satisfied with the produce of their labour that every one is employed in clearing the woods for cultivation. I have not the least doubt but in the space of seven years * that Government will be able to raise a revenue equal to the expense without taxing the trade or distressing the inhabitants.

"I thank you kindly for the offer of *nga melly;* the plant is common here."

Mr. Andrew Ross also sent me a copy of a letter he had received from Captain Francis Light, dated Prince-Wales Island, February 1, 1787, of which the following is an extract:—

"I have been exceedingly ill of a fever, and am now so weak that I cannot write but a few lines at a time.

"When I left Bengal, so much time had elapsed in the preparation that I became doubtful of success. I suspected the Dutch would throw as many obstacles as they could in my way. The great men of Quedda in general were averse to the English settling here. It happened, as I expected, the Dutch had sent an embassy to Quedda, and when I arrived the Laxamana and officers raised so many difficulties that I could hardly obtain permission of the King [of Quedda] to come to the island. In order to begin as peaceably as possible, I signed an agreement that I would give the King [of Quedda] half of the profits arising from the sales of tin, opium, and rattans, until the letters from the Hon. Company should arrive.

"Our inhabitants increase very fast, and did not the Dutch keep a strict watch over the Chinese, most of them would leave Malacca; forty of them had prepared to come in the *Drake,* but were stopped by order of the [Dutch] Government, and not a man is allowed to leave Malacca without giving security he will not go to Peenang.

"A Makau-ship intended to come here, but the Shabandar called the captain aside when he was about to depart, and told him by no means to stop at Peenang, for there were thirty-four prows gone to cut off the settlement. The contempt and derision with which they treat this place, and the mean dirty art they use to prevent people coming here, would dishonour any but a Dutchman.

"Captain Hall, of the *Worcester* (on his passage to China), reached no further than Pedro Branco, when he bore up to Malacca, and intends staying there until May. I wrote to him of a settlement being established here by order of Government;

* N.B.—From the sequel it appears this was the case in three years.

and told him his coming here would be of particular service to this place. The man pretended not to know anything of the matter. The commanders of the country ships entreated him to come, and offered their service to conduct him ; but he said he had no business to obey my orders without the Company's seal. My letter did not contain a single word which could be construed an order.

"We are much distressed for bricks, or brickmakers, as all our buildings at present are of very combustible materials.

"I have received nothing from the Bengal Government since my departure from Calcutta."

By way of completing the series, I shall transcribe a short account given in the introduction to the third number of vol. i., by Mr. Topping, of the state of Prince-Wales Island in 1789 :—

"It must be very satisfactory to the public to see the following account of the trade of that infant settlement, which, although the first hut on the island was built no longer ago than July 1786, has now a spacious town and a colony of nearly 10,000 inhabitants ; from its trade it bears the expenses of the civil and military establishments.

"Although it never can become the emporium of the Oriental Polynesia it may be a very profitable commercial settlement if duly countenanced and protected ; but all infant establishments require so much nursing that I am afraid, in the great concerns on the continent of India, this settlement may be overlooked and neglected.

"*General Review of Imports and Exports at Prince-Wales Island between March and November* 1789.

Exports.

	Value in Spanish dollars.
On ships to China, &c.	294,910
On Malay prows	43,406
285 chests opium sold	94,050
Total	432,366

Imports.

By prows, in these eight months	128,904
By ships, in three months	219,330
By the Hon. Company's opium	59,192
By private opium	16,000
Total	423,426"

Pooloo Peenang, or Prince-Wales Island.

On August 20, 1803, I received the following paper from my friend Sir Joseph Banks, containing the information received from a gentleman then lately arrived from Prince-Wales Island:—

"Through the unremitting zeal and attention of Mr. Christopher Smith, appointed by the Government in India, in the beginning of 1796, to proceed to the eastward and through the Mullucka Islands, for the purpose of collecting the spice plants of various kinds, hitherto sole* natives of these parts, with instructions to forward such as he should be able to procure to Prince-Wales Island; it being thought the most congenial climate for making an experiment on. We are now become masters of every kind of spice-plant, either valuable or uncommon. The most sanguine expectations could scarcely have looked for such a successful issue from the experiment.

"Mr. Smith's known character as a botanist, added to his unwearied attention to the duties of his profession, certainly were grounds for hope, when aided by the warm patronage and support of such a character as the present Governor of our Eastern possessions, Marquis Wellesley, under whose fostering hand every exertion tending to the public good is sure of meeting its reward. We are happy to hear that Mr. Smith, after having had the trouble of collecting, is now appointed sole superintendent of the rearing and bringing to perfection the botanical gardens on Prince-Wales Island.

"The nutmeg and clove trees are in the very highest state of health and perfection for the time they have been there, as is the cinnamon tree. In a very few years we shall not only be able to stock our own markets with all sorts of spice from Prince-Wales Island, but also have the satisfaction of supplying our neighbours at full as cheap a rate as they can purchase elsewhere.

"A spice so much in general use as the black pepper should not be forgotten. The island will, with ease, next year be able to furnish 2000 tons of that article, equal, if not superior, to any produced either on the coast of Malabar or on the island of Sumatra.

"We do not understand that the Company hitherto have purchased any pepper at Prince-Wales Island, which they certainly now ought to do; otherwise the Americans, and other foreigners who procure it there at a moderate rate, will be able to undersell us in our own markets, with the produce of our own settlement.

"Very few spots on the habitable globe are equal to it. A medical gentleman there told the following fact, as a proof of the

* This is a mistake. M. D'Etchevery in 1770, at Geby, got them from Patané, the eastern part of Halamahera, usually called Gilolo: they were first carried to Mauritius, and afterwards to Cayenne and the French West India Islands. M'Cluer also got at Geby, in 1794, "10,000 nutmeg plants of the round kind, with the nuts at their roots."

healthiness of the island: Between February 1802 and February 1803, a space of one year, 800 men were sent into the hospital from various ships arriving there, and convicts from the different settlements, out of which number only the small portion of 16 died, the rest being discharged perfectly recovered.*

"Timber nowhere grows to greater perfection than on this island; one tree, lying on the beach, ready prepared as a mast for a ship, was perfectly straight, without a flaw, measured in length 105 feet.†

"The india-rubber plant is very common on the hills, and requires but very little exertion to prevent our seeking for the rubber out of our own possessions.

"The island has now upwards of 20,000 souls settled on it, and it is daily increasing in population and elegance."

It will be a proper appendage to give a list of the clove, nutmeg, and other valuable plants collected on account of the East India Company, and shipped in the following vessels by Mr. Christopher Smith—viz.:

Ships' Names.	Where landed.	Number of Plants.
Eliza	Pinang	2,518
Aurora	Do.	16,383
Cartier	Cape Good Hope, St. Helena, & Kew	1,170
Stafford	Pinang	4,647
Amboyna	Do.	27,362
Thomas	Do.	16,330
Success Galley	Madras	3,773
Rebecca	Do.	133
Bangalore	Pinang	4,809
Ruby	Do.	4,418
Unicorn	Do.	5,122
Swallow	Do.	1,662
Sylph	Do.	8,270
La Imperieuse	Kew Gardens	78
Bangalore	Pinang	3,505
Expedition	Do.	16,241
Centurion	Madras	118
Orpheus	Kew Gardens	55
Dover Castle	Do.	48
Hunter	Calcutta	265
Commerce	Pinang	21,031
Princess Charlotte	Kew Gardens	79
Queen Charlotte	Pinang	18,501
	Grand total	156,518

* It is to be observed that sick from ships may be generally supposed to be persons affected with scurvy, who are, in the early period of the disease, almost instantaneously recovered by the air and refreshments at land. It is alone from the proportion of deaths in the constant inhabitants of any place that an estimate can be made of its salubrity of climate.

† It, is alleged these sticks, or masts, are not the production of Prince-Wales Island but of Siacca or Sumatra.

Abstract account of the above plants, viz.:

Nutmeg	71,266
Clove	55,264
Variety of rare and valuable	29,988
Total	156,518

"N.B.—Of the above spice plants there are 8,000 nutmeg plants, which he collected at the ancient Moluccas, 4,000 of which were the royal nutmeg, and it was from those islands the clove and nutmeg plants were originally introduced to the Amboina and Banda islands.

"He also shipped off during his residence at the Moluccas 23 lasts and upwards of canary and gomutee seeds."

Extract of a Letter, dated Pinang, November 9, 1805, *per ship "Devaynes."*

"We have been not a little surprised by the very sudden and extensive change in our Government here. On what principle or by what informations they have been induced to do this, the residents here are totally at a loss to guess. As for the island being able to pay the expense is a joke altogether; the trade here is entirely a passing one, and affords a mere brokerage, of course when the duty to be levied on goods, either on the import or export (for the home consumption is nothing worth mentioning) exceeds or equals this brokerage, which it easily may do, our trade must cease, and as it produced the population, and again the cultivation, these two in all probability will not long survive it.*

"The present Governor (Capt. Philip Dundas) seems a very mild and moderate man, and one whom I do not think will rashly commit the welfare of the island to any vague or ideal plan of collecting revenue; I therefore trust much to this, for the continuance of the little consequence this bit of a place has obtained in the world.

"Much seems to be expected at home by shipbuilding here, but we have no teak here, or in the neighbourhood; all comes from Rangoon. The timber we have is much dispersed, and must be collected and brought to the island; every other article required must also be imported, all this must enhance their price, and also render the supply uncertain.

"Those vessels which have already been built here have all

* As pepper is now produced in large quantities, it is not likely the inhabitants would leave it unless the imposts were enormous. A greater danger is from the gaming licences to the Chinese, who require the strict restraint of law to prevent this vice, to which they are very much addicted, but which is strictly prohibited in China to all but the soldiers.

cost very dear, and have been attended with considerable difficulty in procuring the timber for the frames. The plank ought to be teak, as, unless madang, we have not any plank that stands well, and this, the Malays say, is liable to get water-soaked and heavy.

"If the Company confine themselves to making this a place for partial repairs and refitting vessels, together with refreshing their crews, they will find this place fully adequate to this, and a most useful and convenient port of connection between China and India; but if they look for revenue and cheap shipbuilding, I fear they will find themselves sadly mistaken.

"Our tides do not rise, one spring with another, above 8 feet at the highest calculation."

As the most important consideration in the establishment of Prince Wales-Island, as it now stands, is in respect to the marine yard, I have thought it proper to insert the following information from the *Calcutta Monthly Journal* for April and May 1806, as it gives reason to doubt obtaining a supply of teak timber from Pegu; but, on the other hand, it appears that supply may be had in our own territories.

"CALCUTTA, *April* 26, 1806.

"By letters from Rangoon, the *Pearl*, Captain Basden, from Bombay, had arrived. Timber, it is said, was very scarce and high in price."

Calcutta Monthly Journal for May 1806.

"On Monday se'nnight was launched from the yard of Messrs. John Gilmore and Co. a noble ship of nearly 1,200 tons admeasurement; she was named the *Fort William*.

"We understand this ship is destined for the China trade, in the service of the Honourable Company, agreeably to proposals published by the Court of Directors for engaging India-built ships of sufficient dimensions for the regular China trade, in consequence, it is understood, of restrictions which Government has laid on building any more large China ships in England, whose scantling of timber is equal to that of line-of-battle ships, from an apprehended scarcity of such timber for the public service."

Calcutta Monthly Journal for May 1806.

"(From *Bombay Courier*, *April* 26, 1806.)

"On Monday a beautiful little ship, for the service of the Honourable Company's Marine, was launched from the yard in the presence of a concourse of European and native spectators. She was named the *Mercury*.

"This is the second vessel of the same class which has been launched from the dockyard since July last.

"The national consequence of our port becomes every day more sensibly experienced in India, and we trust that its value to the naval interests of our country will be duly appreciated in England.

"In the course of sixteen months the following vessels have been built and repaired in the marine yards, independent of a great number which were refitted afloat:—

BUILT.	REPAIRED.
1 Frigate of 36 guns.	1 Ship of the line 74 guns.
4 Company's cruisers.	1 Do. ,, ,, 64 ,,
	1 Do. ,, ,, 50 ,,
	1 Do. ,, ,, 40 ,,
REBUILT.	1 Do. ,, ,, 36 ,,
1 Frigate of 32 guns.	1 Do. ,, ,, 32 ,,
1 Sloop of war.	1 Do. ,, ,, 18 ,,
1 Merchant ship.	1 Do. ,, ,, 16 ,,
	20 Merchant ships.

"Such has been the essential aid rendered to the navy and commerce of India by the long-established docks of this island, and from this proof of their worth we may better judge of the political magnitude of the works now in progress for the formation of two additional docks, in which the largest ships of the line may be built and repaired.

"Upon this acquisition we cannot sufficiently congratulate ourselves, since the long-contested question of the existence of teak timber in our own provinces (?) is now affirmatively decided, and such arrangements are made as, exclusive of a present ample stock, will secure for years an abundant supply, to the fullest extent of our demand, for building and repairing ships of the largest class.

"This pleasing picture of our resources encourages the confident indulgence of a hope that the teak of British India, manned with hearts of oak of England, will in a short period form the whole of our naval force in climes where Providence has designed that it shall flourish and endure; whilst the western oak, the pride and boast of our country, will be reserved for new triumphs over our foes in Europe."[1]

[1] [See J. Anderson's "Considerations." Capt. Newbold's "British Settlements," vol. i. p. 48 ff. E. Trapaud, "Short Account of the Prince of Wales's Island," London, 1784. "Description of Prince of Wales Island," by Sir Home Popham, London, 1805.; "Short Account of the Settlement of Prince of Wales Island," by Sir George Leith, London, 1804, 4to. J. Low, "On the Soil and Agriculture of Penang," Singapore, 1836. "Notices of Penang" in the "Journal of the Indian Archipelago," second series, vol ii. pp. 182–203; first series, vol. iv. pp. 629–63; v. 1–14; 93–119; 155–172; 189–210; 292–305; 354–66; 400–429; vol. vi. 18–32; 83–93; 143–72; 218–38; 521–44; 618–35, bringing the history down to 1807. Col. J. Low's papers in the same Journal, vol. iii. 599–617; iv. 11–26; 106–118; 360–79. J. Cameron, "Our Tropical Possessions in Malayan India," London, 1865, p. 304 ff.]

V.

THE GOLD OF LIMONG.

By Mr. Macdonald, *with a Specimen of Gold.*

["Asiatic Researches," vol. i. (Calcutta, 1788), p. 336 ff.]

The country of *Limong*,[1] on the island of Sumatra, immediately contiguous to the Presidency of Fort Marlbrough, and between seventy and eighty miles inland, produces the finest gold and gold-dust on that island. The Limong gold merchants repair annually to Marlbrough for the purchase of opium and such other articles as they may be in want of, in exchange for which they give gold of so pure a nature as to contain little or no alloy. The gold is found sometimes in dust, and often lodged in a very hard stone. It is of a whitish colour, and resembles that in which the veins run in the gold mines of Tiltil in Chili. The gold is extracted by beating the compound mass in order to disengage it from the stone, which flies off in splinters and leaves the gold cleared of it. This is the mode used by a rude people, by which a part of the gold must be lost in the splinters of the stone, which fly off in beating the mass. They are totally ignorant of the advantage of grinding it to a gross powder, mixing it with quicksilver, and separating the earthen and stony particles from those of the gold by the action of a stream of water on this paste, carrying off the former and leaving the latter precipitated to the bottom by their greater weight. They are almost entirely ignorant of the principles of assaying and amalgamation, but are extremely expert in separating particles of foreign metals from gold-dust by a very superior acuteness of vision, no doubt arising from experience, and not a peculiar gift. They have people among them who are gold-cleaners by occupation. The gold is found in a species of earth composed of a clayish-red loam. On digging the earth it is found to consist of strata (under the loam of the surface commonly called soil) of irregular-shaped stones of a mouldering nature, mixed with a red clay, and hard pebbles mixed with a pale red clay of a more dense consistency than that of the first stratum. The first stratum extends to a depth of three feet and a half, and the second to somewhat less. The consistency under these strata is formed of either hard rock or of gravel nearly approaching to it. The gold is found mixed with a stone of a hard nature and

[1] [More correctly, Limun.]

capable of sustaining a polish. It is found near the surface, and generally in a soil freest from solid rock.

The merchants who bring the gold for sale are not themselves the finders or gatherers of it, but receive it for merchandize from the Malays inhabiting the interior parts of the country. The native indolence of the Malay disposition prevents them from collecting more than is sufficient to supply the few and simple wants of a race of men as yet unenlightened by civilization and science, and ignorant of the full extent of the advantages of the country inhabited by them. We have not to this hour explored a country which, we have reason to suppose, produces more or as much gold as either Peru or Mexico. This may be attributed partly to the difficulties incident to the undertaking, and partly to a want of curiosity that, indulged, might have been productive of great national and private advantages. The roads leading to this golden country are almost impervious, affording only a scanty path to a single traveller, where whole nights must be passed in the open air, exposed to the malignant influence of a hostile climate, in a country infested by the most ferocious wild beasts. These are circumstances that have hitherto checked curiosity, but perseverance and contrived precaution will surmount the obstacles they furnish, and such discoveries might be made as would amply compensate for the difficulties leading to them. The gold-merchants who come from the neighbouring and less rich countries give us such accounts of the facility of procuring gold as border nearly on the marvellous, and would be altogether incredible if great quantities of that metal produced by them did not in a great measure evince the certainty of their accounts. I have seen an imperfect chart of a part of the interior country, made by an intelligent native on the scale of the rate of his walking, and from the respective situations of the sun in regard to his position. It contained a chain of what he called gold mines, extending in latitude, nearly, not much less than three degrees. This chart is in the possession of Mr. Miller, of the Council of Fort Marlbrough, who did me the favour of explaining it. After making allowances for the licence of a traveller, some credit may be given to this chart, more especially as we are well assured that that part of Sumatra produces large quantities of fine gold. The result of the whole is, that it would be a very laudable object to explore those rich countries, and to establish the working of gold mines in them, as it could be done under a certain prospect of advantage. The expense arising from clearing the country—procuring intelligence, making roads, establishing and forming posts of communication, and of employing professional men—would, undoubtedly, be at first very considerable, but the resulting advantages would defray these, and render it a matter of surprise that a measure attended with such obvious utility had not been adopted at an earlier period.

It is more than probable that Sumatra must have been the Ophir of Solomon's time. This conjecture derives no small force from the word Ophir's being really a Malay substantive of a compound sense, signifying a mountain containing gold. The natives have no oral or written tradition on the subject, excepting that the island has in former times afforded gold for exportation; whether to the eastward or westward remains an uncertainty. We have certain accounts that the vessels that imported this article were long detained, or did not return in much less than a year. It is therefore probable that they wintered, during the violence of the south-west monsoon, either at Ceylon or on the north-east coast, and completed their voyages during the moderate part of the other monsoon.[1]

VI.

ON THREE NATURAL PRODUCTIONS OF SUMATRA.

By John Macdonald, Esq.

["Asiatic Researches," vol. iv. pp. 19-33.]

I.—ON THE CAMPHOR OF SUMATRA.

In answer to some questions put to me by the President of the Asiatic Society, respecting camphor oil, I have the pleasure of giving the solution contained in the following short account. Camphor oil, one of the essential oils, is actually camphor before the operations of Nature on it have reduced it to the concrete form in which it is found in the tree. When Mr. Marsden composed his justly admired History of Sumatra, the prevalent opinion on this subject was, that the oil and the concreted camphor were never found in the same tree. I have the authority of a gentleman (Lieutenant Lewis), well informed on this subject from a residence of many years in the country producing the camphor, to differ from that generally accurate author, by saying that he has seen a tree, three-quarters of a mile from the sea, near Tappanooly, from which three catties (above three pounds) of camphor, and at the same time near two gallons of oil, had been

[1] [See "Jaarboek van het mijnwezen in Nederlandsch Oost-Indië," vol. i. of 1881, p. 91; "Midden-Sumatra," I. ii. p. 183 ff.; II. p. 151 ff.]

procured. If a tree be old and yield oil plentifully, the natives esteem these two circumstances sure indications of its containing a considerable quantity of camphor. Mr. Macquer, in his Chemical Dictionary, has remarked that the nitrous acid dissolves camphor without commotion, that the solution is clear and limpid, and that it is called camphor oil. This affords a proof that the formed camphor is produced from the oil by a natural operation of composition, the decomposition by means of the above solvent reducing the substance to its primary state previous to concretion. The Achinese are reckoned the best judges of camphor, and the oil they collect undergoes a process by distillation, leaving a residuum of inferior camphor. Trees of a certain age only yield camphor. It would seem that a certain time is requisite for maturing the oil to that state when its contained camphor becomes fit for being concreted by the heat of the sun acting on the tree and soil. The camphor-tree is one of the *Enneandria monogynia* of Linnæus,[1] and differs in a small variation in the form of the leaf from the *Arbor Camphorifera Japonica, foliis laurinis, fructu parvo, calyce brevissimo.* The tree very much resembles the bay in leaves. The trunk is thick, the bark of a brownish appearance, and the ramification strong, close, and extended. It is fond of a rich red loam tending to a blackish clay, mixed with a crumbling stone of the colour of marle. It grows principally on the N.W. side of Sumatra, from the line 3° N. nearly. The wood is useful for domestic purposes, being soft and easily worked. It is by many imagined that camphor is produced by a chemical process. This is a mistaken idea, farther than regards the inferior kind arising from the distillation of the oil. I shall give a brief account of the mode of obtaining and preparing it, as practised by the natives of Sumatra, from the time of the establishment of the English on the island. The Sumatrans, previous to their setting out in quest of camphor, assemble on the confines of the country they intend exploring, and discharge a variety of religious duties and ceremonies, calculated, in their opinion, to promote the future success of their undertaking. They enter the woods, and, from experience, soon distinguish such trees as contain camphor. They pierce them, and if they yield oil plentifully, it is presumed they contain concreted camphor, which is found in small whitish flakes, situated perpendicularly in regular veins in and near the centres of the trees. The tree is cut down, divided into junks, and carefully divested of its camphor. When the oil has been drawn off from young trees, the camphor which they afterwards afford is of a less valuable nature, and is termed belly or foot camphor, in proportion to the degree of affinity it bears to head, or the best sort.

[1] [Dryobalanops Camphora Colebr. Filet, No. 7513, gives the indigenous name *Simar bantaiyan.* Others have Marabantayan, Simarabantayan.]

When brought for sale, it is repeatedly soaked and washed in soapy water, to separate from it all heterogeneous and sandy particles that may have adhered to it. When clean, it will sink in water, and be of a white, glossy, smooth appearance, tending to transparency. After it has been washed, it is passed through three sieves of differing textures, so as to be divided into head, belly, and foot camphor; certain proportions of each compose the chests made up for the China market, where they are sold for £350 sterling nearly. The capoor * (a word of Arabic origin) matee, or dead camphor, is carefully separated from the three divisions, by an acuteness of distinction acquired by the eye and hand from habit and attention, and being mixed with the imperfect kind mentioned above, is pounded in a mortar and distributed among proportional quantities of foot camphor. This capoor-matee is sometimes procured by boiling down the thickest part of the oil, or by taking the sediment of the best oil after it has settled at least twenty-four hours. Camphor oil is found to be a sovereign remedy for strains, bruises, and other external pains, from its penetrating quality in entering the pores, and gently agitating the affected parts, so as to quicken the stagnated circulation. The internal (anodyne and diaphoretic) and the external (antispasmodic and sedative) virtues of camphor are well known. The oil is found to possess these in a certain degree, and to be useful in removing the painful spasms of the nerves and tendons by dissipating the surrounding acrid humours. When the oil is used, it must be formed into a liniment, as it would alone occasion pain, from its strength. The oil, applied to sores on horses, has been found very beneficial. In this case it ought to be mixed with the juice of tobacco. Sumatra affords annually from fifteen to twenty peculs ($133\frac{1}{3}$ pounds each) of camphor, and more oil than there is at present a demand for. The Chinese purchase it; and it is not clearly ascertained whether they use it all in China, or make a factitious species of it, by admixture of Japanese camphor, for the Europe market: the latter is generally supposed. It is highly probable that the price of camphor will in process of time rise to an enormous degree, as one tree in three hundred is not found to contain camphor, and when found is immediately cut down; in consequence of which the plant must soon become scarce, and the produce proportionably dear. It is to be hoped that the oil will, in this event, be found by the faculty to possess all the useful qualities of this valuable medicine. I have the satisfaction of accompanying this paper with a specimen, though a small one, of the camphor-wood with a small quantity of the substance in it, the rest having evaporated from length of time. If this account should afford any information to

* *Cáfúr* in Arabic, and *carpúr* in Sanscrit.

the President and Members of the Asiatic Society, my intention will be fully answered.[1]

II.—ON THE CORAL OF SUMATRA.

If this paper should be deemed worthy of a place in the Transactions of the Asiatic Society, the insertion I must still consider as an indulgence, and my attempt a proof that I am more anxious than able to increase the general stock of Eastern natural knowledge recorded in the useful annals of the Society. Specimens of coral, for your acceptance and for the illustration of this subject, are now forwarded.

The appearance of Sumatran coral does not altogether correspond with the descriptions of the plant hitherto given.* This induces me to describe such parts as are imperfectly represented. The plant to which the various species of coral belong is one of the Cryptogamiæ of Linnæus, and may be reckoned one of the Herbæ Marinæ of Tournefort, of the Herbæ Imperfectæ of Mr. Ray. It may be reduced to three colours, red, black, and whitish-yellow; the last is the most common in the Eastern seas. It is of a fungous texture, equally hard out of and in its natural element; and its pores are charged with a juice of a milky appearance, in some degree acrid. The bark covers every part of the tree, and contains a number of perforated papillæ terminating in tubes, having two or more holes in each, intended, I imagine, for the admission of the matter affording nutriment to the plant. The internal projections of the papillæ adhere to the particles of sand and stone on which the coral grows, and are the only appearance of roots it exhibits. On examining the internal extremities of these papillæ by means of glasses, some very small ramifications are discovered. These are very easily observed in the papillæ, which are attached to the bark of the root. The tree is said to grow to the height of two feet; I have seen some as high as ten feet. From these and other differences in appearance, I am apt to think that some European and Indian corals are not the same, but species of the same genus. From the very rapid growth of coral on the west coast of Sumatra and in the Eastern seas in general, as will be shown in this paper, there can subsist but little doubt that it is a vegetable substance, though

[1] [Marsden's "History of Sumatra," third edition (1811), p. 149 ff. S. Müller, "Bijdragen tot de kennis van Sumatra" (Leiden, 1846), pp. 17–19. "Tijdschrift voor Indische taal-, land- en volkenkunde," iv. p. 247 f. Yule's Note in his edition of *Marco Polo*, ii. p. 244 ff. O. Mohnike, "Blicke auf das Pflanzen- und Thierleben in den Niederl. Malaienländern" (Münster, 1883), pp. 167, 274. A. H. Bisschop Grevelink, "Planten van Nederlandsch-Indië" (Amsterdam, 1883), p. 451 ff.]

* See the remark at the end of this paper.

there have not been wanting some who have supposed it a fossil formed like crystals and spars, and others, eminent naturalists, who have ranked it among the animal tribes. Boccone discovered that this plant encloses a nutritious juice under its bark; and Count Marsigli remarked and observed its flowers and seeds. I shall here insert Marsigli's accurate experiment, which affords the decision of almost absolute demonstration in favour of coral being a vegetating plant:—"Having steeped some coral fresh gathered in sea-water, he perceived in a short time that the little ruddy tubercles which appeared on the surface of the bark began gradually to unfold, and at length opened into white flowers in the form of stars with eight points, which were sustained by a little calyx, divided in like manner into eight parts. Upon taking the coral out of the water, the flowers immediately closed, and returned into red tubercles as before, which tubercles, being closely squeezed, yielded a sort of milky juice, and upon returning the coral into the water as before, the tubercles in an hour's time opened or flowered afresh; and this was continued for six or eight days, when the buds, or tubercles, ceased to blow any more. In ten or twelve days they became detached from the coral, and sunk to the bottom, in form of little yellow balls. These tubercles, then, according to the analogy of plants, should be the flowers of coral, and the milky viscid juice contained therein, the pollen; accordingly it is held that, when this juice falls on a properly-disposed body, or nidus, a new coral arises therefrom, and the analysis of coral answers precisely to that of other sea-plants, all of them affording a volatile urinous salt, and a thick, blackish, fœtid oil." ("Elementa Chemiæ" of Boerhaave, vol. i. p. 135, note; and "Mém. de l'Acad." an. 1708.)

Whether, after all, the striated papillæ, which are of a stellar figure, and the two or more apertures of which are divided generally into twelve parts, contain an animal, whose labour produces the growth of the coral, or who inhabits the coral for its own immediate satisfaction, is a question that has been much agitated, without affording any certain conclusions. Monsieur de Peyssonnel, after having inquired into and discussed the various arguments for and against coral's being a petrification or a congelation, concludes that it is the work of an insect, which he denominates an Urtica, Purpura, or Polype, that contracts in air, expands in water, and is sensible to touch or the action of an acid. From Marsigli's experiment, as recited above, I think we may safely conclude that Peyssonnel mistook the matter, and supposed a flower an insect; for it is well known that many flowers, on being plunged into an acid, will exhibit signs of contraction and movement. We observe many growing substances which are inhabited by animals, or insects, merely for their convenience, and not to promote the growth of such substances,

which they very frequently, on the contrary, retard. If an animal can be supposed to produce such immense bodies of this substance as I shall have occasion to mention, whence does it derive the prodigious degree of nutriment requisite for the purpose, as it is not found that it quits the centre of its striated habitation? Why do not these *Vermiculi marini* leave cells behind them as they advance the growth of the coral? We find none, but, on the contrary, the surface uniformly smooth and even. As for the external cells, they are the channels that convey nourishment, and correspond to the fibres of plants. It must remain, however, in some degree a doubt, whether these marine productions are zoophytes, produced by the labour of animals, or whether they are produced on a vegetating principle. It will be difficult to bring this matter to the test of modern natural philosophy—viz., experiment; but till such can be made, opinions must be various, though the majority, and apparently (from Marsigli's experiment) the best founded, incline to the belief of corals being produced by vegetation. Having slightly reviewed both sides of this curious question, and having hazarded my own opinion, which can be of little weight, I come now to the intention of troubling the Asiatic Society with these remarks, imperfect as they must appear.

The production of islands on the west coast of Sumatra by the very rapid increase of this wonderful plant, is a remarkable effect of the operations of Nature, hitherto unrecorded in the annals of natural philosophy.[1] Mr. Dalrymple alone has alleged a fact to which this account will add the weight of convincing testimony. In the year 1784 I was directed to survey the coast of the Dutch districts on the west side of the island of Sumatra. During the course of this survey I had occasion to lay down on my charts several shoals, consisting of branched coral, sand, and such heterogeneous matter as they will resist and incorporate with themselves when impelled against them by the action of the seas, winds, tides, or currents. The surfaces of these shoals were at various depths, from one foot to three or more fathoms. They are of a conical form, the base, in proportion to the axis, being small. This shape gives them in general the appearance of trees that figure, such as the poplar, &c. One of the shoals I visited to the south-west of Pooloo Pinang, near Padang, was at that time covered by two feet and a half of water, and could not be distinguished by vessels passing at some distance, but at such time as the winds produced a swell or agitation on it. I passed along this part of the coast in February 1789, very close to this shoal, just four years and seven months after the period at which the survey had been taken, and was not a little astonished to observe a small sandy island, about ten yards in diameter, having

[1] [H. von Rosenberg, "Der Malayische Archipel" (Leipzig, 1878), p. 63 ff.]

a few bushes growing on it, formed on the top of the shoal, which lies nearly in thirty-seven fathoms of water. I could not mistake this shoal, as there was no other contiguous to it, and as my chart, by which I suggest the safest course to run in, then lay before me. In May and September 1789 I had an opportunity in going to and returning from Tappanooly harbour (which I had been directed to survey), to be again on several of the shoals included in my chart of the coasts of the Dutch districts, and, according to my expectations, found the depth of the water on them considerably diminished since the survey had been taken. In March 1790 I was sent for by a gentleman at Fort Marlborough, whose house commanded a view of the sea, to observe the water breaking on two shoals in the roads. This gentleman had resided on the coast near fifteen years, and frequently in this house, without having observed these shoals, which, had they appeared at any former period, must have been remarked, their situation being clearly and distinctly exposed to the daily and immediate observation of the settlement. At the distance of seven miles from Fort Marlborough, nearly in a south-west direction, there is a small island having a few cocoa-nut trees on it. Thirty miles (or it may be twenty-five) distant from this island, one of the northern pepper settlements is situated on a rising ground. The gentleman residing there has informed me that he has always been able to distinguish the masts of vessels lying at anchor near this island, and that he lately twice distinctly, in the proper bearing, observed the trees of the island, but that afterwards, from hazy weather, or some other affection of the atmosphere, he could not perceive the island, or rather the trees on it. Former residents of Laye, the place of observation, have in vain, when using the best glasses, looked for this island, invisible till lately. Such are the stubborn facts, which may be adduced in proof, not only of the very rapid growth of coral, but also of the formation of islands from it as a necessary and observed consequence. The growth of coral alone may not produce this effect; other aiding circumstances may intervene. Boccone and Marsigli have remarked that, when coral meets with stones, coarse sand, or any other substances, it seizes them firmly, and speedily includes them within a strong extension of its close ramifications. These collections in seas, subject to frequent storms and agitations, must be considerable, and promote in no small degree the elevation of islands. Earthquakes are very frequently felt on this island, and on the contiguous ones. Several shocks are sometimes experienced during the course of a month. It is observable that this tremendous phenomenon in its progress undulates the space it moves or travels under, and that the concave parts of these undulations open into fissures, when the motion is violent. It is not improbable but that such openings take place under shoals, or immedi-

ately contiguous to them. In this case, to preserve the equilibrium it seems reasonable to suppose that the surrounding land and substances will rush in, hurried along by the general movement, in a greater quantity, from the degree of momentum impelling them, than what occupied the space of the fissure when at rest. These hiatus take place only on the side of the undulation from which the earthquake proceeds, and the sand on that side, now inclining to rest after having experienced the shock, but still possessing a tendency to move in the direction of the earthquake, will naturally fall into the hiatus opened for its reception before the undulation can reverberate into its original position. Hence the shoal, or island, will be in some degree raised, by an effect similar to that of a lever though by different means. These islands and shoals being further removed than other parts exposed to the shock from the subterraneous or submarine crannies or channels in which the earthquake acts, will of course resist its action more than parts possessing less incumbent weight. The undulations will therefore meet with more resistance, and deposit a greater quantity of sand than in situations resisting less. In the formation of islands from coral and sand, as soon as the sand appears above the surface of the water, birds carry roots and various seeds attached to them for the construction of nests: hence the speedy appearance of bushes and trees. Instead of supposing with some that the numerous islands on this coast have been formed by the violent commotions of nature occasioned by earthquakes, which separated them from the continent, it is more reasonable to suppose their formation on the above principles, and chiefly by coral, more especially when we consider that the depth of water between many of these islands and Sumatra is unfathomable. The numerous clusters of islands in the Eastern seas, from 36° to 16° of E. longitude, are all supported by bases of coral, and surrounded by shoals emerging from the surface, or pushing their conical frusta into a new element. Experience has ascertained the formation of islands from coral; it is not altogether conjecture to suppose that various groups of islands in the great Eastern Archipelago will in process of time become continents or insular tracts or spaces of land. On the coast of Coromandel, in the immediate front of Madras, exposed anchorage has produced, and produces annually, lamentable accidents, attended with much public detriment. The position of a sheltering island in that situation would be an object of national benefit and private safety and advantage. To attempt to effect this a considerable amount of coral might be transported from this coast at no great expense, and sunk with stones and other substances in seven, eight, or eleven fathoms of water. In the course probably of forty or fifty years an island might be formed by the growth of this substance. This is a long period to

look forward to for the benefit of futurity, but from what I have, from my own observation, inserted in this paper, I am convinced of the practicability and success of a scheme which many will treat as chimerical and visionary, while others, more thinking, will see the utility of the design and probability of success, but will be deterred by the difficulty and tediousness which would attend the execution.

Remark by the President.

It seems at length to be settled among naturalists that corals and corallines are the cretaceous habitations of animals, and one of the links in the great chain of nature. The idea of making islands for the protection of ships at anchor is very sublime; but it might be feared that very dangerous reefs of coral would be formed before an isle could appear above the water. An artificial embankment of coral might, perhaps, on some coasts be a powerful barrier against an encroachment of the sea.

III.—ON THE COPPER OF SUMATRA.

I have the satisfaction of laying before the Asiatic Society a specimen of copper-ore, the production of the island of Sumatra. It is found on and in the hills of Mucchy, near the sea, between Annalaboo and Soossoo, to the north of our extreme English settlement of Tappanooly. The soil which generates the ore is a mixed loam, consisting of clay, small stones, and red sand, founded on an undersoil of soft rock intersected with veins of this useful substance. The space affording the ore is considerable, extending above a degree in length, and further east, or into the country, than has been yet ascertained. A considerable quantity of ore is annually collected on the surface of the hills, to which the indolence or ignorance of the inhabitants at present confines their search. Its being found on the surface may probably be ascribed to the efforts of earthquakes, which are very prevalent on this coast and over the island in general. The natives, from inexperience, are incapable of conducting a mine and pursuing a metallic vein. They are content with excavating the ore till their labour is interrupted by the flowing of the water, which soon takes place in a country subject to heavy rains throughout the year. As many of these veins widen as far as they have yet been traced, it is more than probable that these hills contain inexhaustible mines of this metal. The ore, by repeated smeltings and other operations to free it from its sulphur, has been reduced to a metal, and then found to include a considerable proportion of gold. As no part of the world contains a greater quantity of this latter metal than Sumatra in proportion to the area it occupies on the globe,

it is probable that the discovery of gold mines would attend the establishment of copper ones in the hills of Annalaboo. This is so much the more probable, as metalline stones of various kinds, and which the Malays regard as sure indications of a soil affording gold, are found on these hills, independently of the consideration that gold-dust is collected in the immediate neighbourhood, and in the interior country, contiguous to the hills yielding the copper ore. It is singular that the same method of rough-smelting which is practised at Goslar in Germany should be in use among the uncivilized inhabitants of Sumatra. The Sumatran method possesses more ingenuity, and is at the same time more simple. An undemonstrated knowledge of the plainest and most obvious principles of science is congenial to the most rude as well as to the most civilized conceptions, and the advantages which the talents of born genius have conferred on Europe are by no means a conclusive proof of the inferiority of intellect which the fortunate inhabitants of Europe liberally bestow on their less enlightened brethren of the East and West. That "time and chance happen unto all things under the sun" is a truth that amounts to a voluminous disquisition on this subject. But to return. The ore-gatherers choose a level spot of hard clay, which they divide into equidistant points by lines intersecting each other, and laid off equally on two sides of a square. These points, included in the square space, they surround with circles, of which the points are the centres. The circles are inverted bases of cones, excavated to receive the fused metal. The smelting space is now covered with wood, charcoal, and other combustible matters, and the ore is distributed among these admixtures. The melted ore is received into the formed holes, leaving the scoriæ or recrement above. The metal, still requiring many smeltings to render it fit for use, or perfectly malleable and ductile, is taken out in the form of pointed cakes, and sold for twenty Spanish dollars per pecul, or five pounds sterling for $133\frac{1}{3}$ pounds avoirdupois weight. The natives are particularly careful in preventing accidents, for, previously to fusing the ore, they heat the ground to a great degree in order that all the water near the surface may be absorbed or made to exhale, having experienced, I imagine, that copper when in a state of fusion, meeting the smallest quantity of water, will fly in all directions with a force destructive of every vulnerable substance within the sphere of its action. I have been informed that the metal has been eliquated at Madras lately, and found to contain very little appearance of any other but of gold. The useful solvents, aqua fortis, aqua regia, and spirits of salts, readily dissolve the Sumatran copper. A deep green solution is produced in a very short time by the action of the weaker acids on the rough ore. The above method of smelting will separate all coarse, mineral, and heterogeneous

substances from the metal, but will still leave it strongly impregnated with its peculiar mineral earth. The detaching of this mineral earth is the most difficult and expensive operation attending the refinement and purification of copper, it being frequently necessary to add a proportion of another metal to effect it. This consideration will probably prevent a private company from applying for public permission to work these mines, and therefore they must remain in their present state, unless the East India Company will order the experiment to be made from the reports and opinions of such as may be qualified to give them on so interesting a subject. By submitting this short account to the gentlemen of our society, whose useful researches will, I hope, produce permanent national benefit by advancing the knowledge of nature, of science, and of literature, opinions, properly weighed, will be diffused among the public of the advantages that may result from an establishment for working copper-mines on the west coast of Sumatra.[1]

VII.

ON THE TRACES OF THE HINDU LANGUAGE AND LITERATURE EXTANT AMONGST THE MALAYS.

By William Marsden, Esq.

["Asiatic Researches," vol. iv. pp. 223-7.]

The Sanscrit, or ancient language of the Hindus, is a subject so interesting in itself that every discovery which contributes to throw light upon its history or to mark its extent, carries with it a degree of importance. The proofs of its influence in the northern countries of Assam, Nepal, Bootan, and Tibet, as well as in the southern parts of the peninsula of India, are to be found in the works of the missionaries and the researches of this society; but the progress it made in early times amongst the inhabitants of the Eastern islands and countries possessed by the Malays has not, I believe, been pointed out by any writer. My acquaintance with the language of the latter people, together with some attention

[1] ["Tijdschrift voor Nederlandsch Indië," 1869, i. p. 27. "Jaarboek van het Mijnwezen," 1876, ii. p. 76 ff.]

paid to the dialects of India in general, have enabled me to observe that the Malayan is indebted to the Sanscrit for a considerable number of its terms. I have also satisfied myself that the intercourse by which this communication was effected must have taken place in times anterior, probably by many centuries, to the conversion of these people to the Mahometan religion. The language, it is true, abounds at present with Arabic words, which their writers affect to introduce, because this display of literary skill is at the same time a proof of their religious knowledge; but they are generally legal or metaphysical terms borrowed from the Koran and its commentaries, are never expressive of simple ideas, have not been incorporated into the language (a few excepted), and are rarely made use of in conversation. The Hindu words, on the contrary, are such as the progress of civilization must soon have rendered necessary, being frequently expressive of the feelings of the mind or denoting those ordinary modes of thought which result from the social habits of mankind, or from the evils that tend to interrupt them. It is not, however, to be understood that the affinity between these languages is radical, or that the names for the common objects of sense are borrowed from the Sanscrit. The Malayan is a branch or dialect of the wide extended language prevailing throughout the islands of the archipelago to which it gives name,* and those of the South Sea, comprehending between Madagascar on the one side and Easter Island on the other, both inclusive, the space of full two hundred degrees of longitude. This consideration alone is sufficient to give it claim to the highest degree of antiquity, and to originality, as far as that term can be applied. The various dialects of this speech, though they have a wonderful accordance in many essential properties, have experienced those changes which separation, time, and accident produce, and in respect to the purposes of intercourse may be classed into several languages, differing considerably from each other. The marks of cultivation by which the Malayan is distinguished from its ruder neighbours, are to be attributed, in my opinion, to the effects of an early connection that must have subsisted between the inhabitants of this Eastern peninsula and those of the continent of India; but what the nature and circumstances of this connection may have been it is not easy to determine. A spirit of foreign conquest, and still more a zeal for the propagation of their religious tenets, appear incompatible with the genius of the Hindu system, excepting amongst the disciples of Boodh; but I have never discovered in the Malayan customs or opinions any traces of the peculiar institutions of that extraordinary sect.

* The Malay Archipelago may be understood to comprehend the Sunda, Philippine, and Molucca Islands, in the maritime parts of which the Malayan is used as a *lingua franca*.

A commercial intercourse has always subsisted between the manufacturing countries of India and the marts for the produce of the Spice Islands, such as Johor, Singapore, and Malacca, and when the Portuguese, at the commencement of the sixteenth century, first visited these places, they mention with surprise the concourse of foreign vessels assembled there. But independently of other objections that might be raised to the probability of these traders having polished the language of the people whose ports they frequented, or having imparted to them their national literature, it is to be observed that by much the greater proportion of the ships belonging to native merchants which now enter the Straits of Malacca come from the coast of Coromandel, and consequently are navigated by persons who speak the languages prevailing in these parts; whereas it is evident that from the Telinga or the Tamool the Malayan has not received any portion of its improvement, but from the genuine Hinduvee of the northern provinces, prior to its debasement by the mixture of Arabic nouns and the abuse of verbal auxiliaries. If the communication must necessarily be supposed to have its origin in commerce, I should be inclined to consider the people of Guzerat, notwithstanding their distance, as the instructors of the Malays. Their resort to Malacca is particularly noticed by De Barros and other authentic writers, and it is well known that the Hindu language has been preserved with more purity in that than in any other maritime province of India.

The nature of the affinity suggested will sufficiently appear to those who are conversant with the Hindu dialects by the following examples of Sanscrit words, which are at the same time so familiar to the Malays, and so thoroughly incorporated into their vernacular tongue, that their foreign origin is never suspected, although the terms adopted from the Arabs can, with very few exceptions, be immediately pointed out by the most ordinary scholar. It is true that he is assisted in this discrimination by the peculiarities of the Arabic orthography, for the Malays, as well as the Persians and other people who, in consequence of their conversion to the faith of the Koran, employ this alphabet in their writings, do yet reject the use of certain letters, either as superfluous or as not suited to the smoothness of their own sounds, and which therefore appear only in words purely Arabic. The Hinduvee words, on the contrary, being divested of their proper dress, and clothed in common with those originally Malayan, in the adopted Arabic character (with certain judicious modifications) want the same token of their origin, and are more assimilated with the rest of the language.

In this short list of words, taken, with little pains in the selection, from a Malayan dictionary, the departure from the Hinduvee is scarcely more than may arise from a different habit of spelling

them in our letters, unless where it consists in a slight variation of the sense or of the part of speech :—

Sooka. Fond, pleased.
Sooka cheta. Pleasure, joy.
Dooka. Sad.
Bagee. To divide.
Bangsa. Race, family.
Basa. Language.
Bechara. Advice, council, judicial proceeding.
Beejee. Seed.
Boodee. Wisdom, understanding.
Loba. Covetous.
Jaga. To watch.
Pootree. Princess.
Rata. Chariot.
Pernama. Full moon.
Charee. To seek.

An inspection of the characters used by the natives of the islands who have not adopted the Malayan or Arabic mode of writing, will show that in the arrangement of their letters they have taken the Hindu for their guide, and have even preserved the rhythmus terminated by a nasal which so peculiarly distinguishes this from every other system. The aspirated letters, not being required for expressing the sounds of these languages, are omitted, and each division of the series consists therefore of three instead of five. In the Rejang[1] alphabet the order is as follows :—*Ka*, *ga*, *nga* ; *Ta*, *da*, *na* ; *Pa*, *ba*, *ma* ; *Cha*, *ja*, *nia*, &c. (See History of Sumatra, plate.) In the Sanscrit, I need scarcely to observe, the series of consonants begins thus :—*Ka*, *k'ha*, *ga*, *g'ha*, *nga* ; *Cha*, *ch'ha*, *ja*, *j'ha*, *gnya* ; *Ta*, *t'ha*, *da*, *d'ha*, *na*, &c. If other proofs were wanting of the influence of Hindu intercourse in these parts, such conformity alone, in a matter so arbitrary, and which exists equally in other obscure dialects and extends even to the island of Celebes, would be sufficient to establish it. The languages of these islanders have not, however, been enriched by an accession of Hindu words in any degree proportioned to the Malayan which uses the Arabic alphabet ; but the probability is strong that the inhabitants of the Malay Peninsula were in possession of an alphabet on the same model, and were even skilled in composition before the Mahometans introduced their learning and character among them.

But the circumstance which has more immediately struck my attention and given occasion to these remarks, is that of my having met with frequent allusion in their writings to the most celebrated works of the Hindu mythological poets, especially the Mahabharat and the Ramayan. A manuscript now lying before me, which is a species of romance, exhibits in almost every page the marks of the author's acquaintance with Hindu literature and manners. It contains the adventures of two princes who were sent by the king, their father, to obtain for him the possession of an extraordinary self-performing instrument of music, whose

[1] [See the philological portion of *Midden-Sumatra* (Leiden, 1880), by A. L. van Hasselt, iii. 1.]

enchanting air he had heard in a dream. However flimsy this foundation and incoherent the parts of its superstructure, it gives scope to the display of a lively and fertile imagination, much delicate imagery, and pathetic expression of sentiment. The following passages allude unequivocally to well-known personages in the Poorans: "*Terlaloo baeck segala roopa'nia maha-indah separtee pandooa leema*," فندو ليم—"Surpassing good was their whole appearance; most admirable, like unto the five Pandoos." Again: "*Lakoo'nia meng-amok eetoo separtee pandooa leema tatkala eea meng-amok dedalam rayet kooraoo*," كورو—"The manner in which they fought was like that of the five Pandoos when they rushed into the ranks of the Kooroos." These can be no other than the renowned favourites of Krishna, whose brilliant actions and personal accomplishments are the theme of immortal song. The machinery of the Ramayan is interwoven with the story, and this circumstance tends to increase my regret that we possess no translation, even in abstract, of that much-admired poem. The Malayan princes are, like Rama, attended in their wars by apes of extraordinary endowments, who fight with more than human prowess, and overcome the Raksasa, رقساس or hobgoblins who serve under the banners of the adversary. One of the former, whose talents as an ambassador are the subject of panegyric, is said to resemble that diplomatic monkey who was sent by Sree Rama to the King of Langkapooree. The mixture of qualities and actions gravely attributed to them in their double capacity of monkeys and heroes, produces a very ludicrous and amusing effect. Though their ideas are rational, their manners and propensities are faithful to nature. Mention is also made of Bisnoodewa, بسنوديو; of the mountain Maha-meroo, مهامیرو; of the blue lotos سروج growing in the pool Mandoo-ratna, مندورتن; of a lion possessing supernatural powers, Singa-saktee, and elsewhere Singa-rajoon, رجون; who shot arrows at Maharaja Karna, كرن. Some of these latter names I do not recollect to have met with in the notices we have of the Hindu mythology.

These similes and allusions must refer, as in all poetry, to stories with which the readers were presumed to be well acquainted, and seem to imply that translations of the works were formerly in the hands of the Malays. I do not know that such remain amongst them at this day, but my ignorance is no proof of the contrary; for at the time when I had opportunities of making the inquiry, I was uninformed as to the existence of the originals, and the passages above quoted were of course unintelligible to me. They must be sought for in the peninsula of Malacca, or amongst the Menangkabo people in Sumatra. A spirit of investigation is now gone forth, and under the influence of the Asiatic Society, and from the example of its president, we may confidently hope that no region of Oriental literature will be left unexplored.

Since the foregoing paper was written and communicated to a few friends, I have seen a copy of the third volume of the "Asiatic Researches" (just received from Calcutta), and observe that the connection between the Malayan and the Sanscrit has not escaped the notice of the president, whose learned and elegant anniversary discourse points it out (pp. 11 and 12) in a clear and decided manner. The sanction of his authority to my opinion fully reconciles me to the anticipation of a supposed discovery.[1]

VIII.

SOME ACCOUNT OF THE ELASTIC GUM VINE OF PRINCE-WALES ISLAND,

AND OF EXPERIMENTS MADE ON THE MILKY JUICE WHICH IT PRODUCES: WITH HINTS RESPECTING THE USEFUL PURPOSES TO WHICH IT MAY BE APPLIED.

By JAMES HOWISON, Esq.

(*Communicated by* JOHN FLEMING, Esq.)

["Asiatic Researches," vol. v. (1798) pp. 157–165.]

OUR first knowledge of the plant being a native of our island arose from the following accident. In our excursions into the forests, it was found necessary to carry cutlasses for the purpose of clearing our way through the underwood. In one of those an elastic gum vine had been divided, the milk of which drying upon the blade, we were much surprised in finding it possess all the proper-

[1] [Besides the numerous passages in Marsden's other works, in Leyden, Crawfurd, Raffles, Logan, Favre, referred to by Mr. W. E. Maxwell in the exhaustive treatise on the subject in his "Manual of the Malay Language" (1882), pp. 5–32, compare also on the general question of Hindu influence in the Indian Archipelago, Friederich's various articles in the "Verhandelingen van het Bataviaasch genootschap;" Burnell's "South-Indian Palæography" (1878), p. 130 ff.; K. F. Holle's "Oud-en Nieuw-Indische Alphabetten" (Batavia, 1882); J. J. de Hollander's "Maleische taal-en letterkunde" (Breda, 1882), p. 283 ff.; P. J. Veth's "Java" (Haarlem, 1875), I. 410 ff.; Kern's valuable contributions to the "Mededeelingen der Koninglijke Akademie van Wetenschappen" and "Bijdragen tot de taal-, land- en volkenkunde van Nederlandsch Indië;" and the article, "Malay Language and Literature," in the Encyclopædia Britannica. The oldest Sanskrit inscriptions discovered on the east coast of Java and in West Borneo are of the fifth century A.D., while the oldest Kavi inscription dates from the year 840.]

ties of the American caoutchouc. The vine which produces this milk is generally about the thickness of the arm, and almost round, with a strong ash-coloured bark, much cracked, and divided longitudinally; has joints at a small distance from each other, which often send out roots, but seldom branches; runs upon the ground to a great length; and at last rises upon the highest trees into the open air. It is found in the greatest plenty at the foot of the mountains, upon a red clay mixed with sand, in situations completely shaded, and where the mercury in the thermometer will seldom exceed summer heat.

In my numerous attempts to trace this vine to its top, I never succeeded; for, after following it in its different windings, sometimes to a distance of two hundred paces, I lost it, from its ascending among the branches of trees that were inaccessible either from their size or height. On the west coast of Sumatra I understand they have been more successful, Dr. Roxburgh having procured from thence a specimen of the vine in flowers, from which he has classed it, but whose description I have not yet seen.

With us the Malays have found tasting of the milk the best mode of discriminating between the elastic gum vine and those which resemble it in giving out a milky juice, of which we have a great variety, the liquid from the former being much less pungent or corrosive than that obtained from the latter.

The usual method of drawing off the milk is by wounding the bark deeply in different places, from which it runs but slowly, it being full employment for one person to collect a quart in the course of two days. A much more expeditious mode, but ruinous to the vine, is cutting it in lengths of two feet, and placing under both ends vessels to receive the milk. The best is always procured from the oldest vines. From them it is often obtained in a consistence equal to thick cream, and which will yield two-thirds of its own weight in gum.

The chemical properties of this vegetable milk, so far as I have had an opportunity of examining, surprisingly resemble those of animal milk. From its decomposition, in consequence of spontaneous fermentation, or by the addition of acids, a separation takes place between its caseous and serous parts, both of which are very similar to those produced by the same processes from animal milk. An oily or butyrous matter is also one of its component parts, which appears upon the surface of the gum so soon as the latter has attained its solid form. The presence of this considerably impeded the progress of my experiments, as will be seen hereafter.

I was at some trouble in endeavouring to form an extract of this milk so as to approach to the consistence of new butter, by which I hoped to retard its fermentative stage, without depriving it of its useful qualities; but as I had no apparatus for distilling, the

surface of the milk, that was exposed to the air, instantly formed into a solid coat, by which the evaporation was in a great degree prevented. I, however, learned, by collecting the thickened milk from the inside of the coats, and depositing it in a jelly-pot, that, if excluded from the air, it might be preserved in this state for a considerable length of time.

I have kept it in bottles, without any preparation, tolerably good, upwards of one year; for, notwithstanding the fermentation soon takes place, the decomposition in consequence is only partial; and what remains fluid still retains its original properties, although considerably diminished.

Not having seen M. Fourcroy's memoir on Caoutchouc, I could not make trials of the methods proposed by him for preserving the milk unaltered.

In making boots, gloves, and bottles of the elastic gum, I found the following method the best: I first made moulds of wax, as nearly of the size and shape of what they represented as possible; these I hung separately upon pins, about a foot from the ground, by pieces of cord wrought into the wax. I then placed under each a soup-plate, into which I poured as much of the milk as I thought would be sufficient for one coat. Having dipped my fingers in this, I completely covered the moulds one after another, and what dropped into the plates was used as part of the next coat; the first I generally found sufficiently dry in the space of ten minutes, when exposed to the sun, to admit of a second being applied; however, after every second coat, the oily matter before mentioned was in such quantity upon the surface, that, until washed off with soap and water, I found it impossible to apply any more milk with effect, for, if laid on, it kept running and dividing like water upon wax.

Thirty coats I in common found sufficient to give a covering of the thickness of the bottles which come from America. This circumstance may, however, at any time be ascertained, by introducing the finger between the mould and gum, the one very readily separating from the other.

I found the fingers preferable to a brush, or any instrument whatever, for laying on the milk, for the moment a brush was wet with that fluid, the hair became united as one mass. A mode which at first view would appear to have the advantage of all others for ease and expedition in covering clay and wax moulds with the gum—viz., immersing them in the milk, did not at all answer upon trial, that fluid running almost entirely off, although none of the oily matter was present, a certain degree of force seeming necessary to incorporate by friction the milk with the new formed gum.

When, upon examination, I found that the boots and gloves were of the thickness wanted, I turned them over at the top, and

drew them off, as if from the leg or hand, by which I saved the trouble of forming new moulds. Those of the bottles being smallest at the neck, I was under the necessity of dissolving in hot water.

The inside of the boots and gloves which had been in contact with the wax being by far the smoothest, I made the outside. The gloves were now finished, unless cutting their tops even, which was best done with scissors. The boots, however, in their present state, more resembled stockings, having as yet no soles. To supply them with these I poured upon a piece of gunny a proper quantity of milk to give it a thick coat of gum. From this, when dry, I cut pieces sufficiently large to cover the sole of the foot, which, having met with the milk, I applied; first replacing the boot upon the mould to keep it properly extended. By this mode the soles were so firmly joined that no force could afterwards separate them. In the same manner I added heels and straps, when the boots had a very neat appearance. To satisfy myself as to their impermeability to water I stood in a pond up to their tops for the space of fifteen minutes; when, upon pulling them off, I did not find my stockings in the least damp. Indeed, from the nature of the gum, had it been for a period of as many months, the same result was to have been expected.

After being thus far successful I was greatly disappointed in my expectations with regard to their retaining their original shape; for, on wearing them but a few times, they lost much of their first neatness; the contractions of the gum being only equal to about seven-eighths of its extension.

A second disadvantage arose from a circumstance difficult to guard against, which was, that if by any accident the gum should be in the smallest degree weaker in one place than another the effect of extension fell almost entirely on that part, and the consequence was that it soon gave way.

From what I had observed of the advantage gained in substance and uniformity of strength by making use of gunny as a basis for the soles, I was led to suppose that if an elastic cloth, in some degree correspondent to the elasticity of the gum, were used for boots, stockings, gloves, and other articles, where that property was necessary, the defects above mentioned might in a great measure be remedied. I accordingly made my first experiment with Cossimbazar stockings and gloves.

Having drawn them upon the wax moulds, I plunged them into vessels containing the milk, which the cloth greedily absorbed. When taken out they were so completely distended with the gum in solution, that, upon becoming dry by exposure to the air, not only every thread, but every fibre of the cotton had its own distinct envelope, and in consequence was equally capable of resisting the action of foreign bodies as if of solid gum.

The first coat by this method was of such thickness that for stockings or gloves nothing farther was necessary. What were intended for boots required a few more applications of milk with the fingers, and were finished as those made with the gum only.

This mode of giving cloth as a basis I found to be a very great improvement, for, besides the addition of strength received by the gum, the operation was much shortened.

Woven substances that are to be covered with the gum, as also the moulds on which they are to be placed, ought to be considerably larger than the bodies they are afterwards intended to fit, for, being much contracted from the absorption of the milk, little alteration takes place in this diminution in size, even when dry, as about one-third only of the fluid evaporates before the gum acquires its solid form.

Great attention must be paid to prevent one part of the gum coming in contact with another while wet with the milk or its whey; for the instant that takes place, they become inseparably united. But should we ever succeed in having large plantations of our own vine, or in transferring the American tree (which is perhaps more productive) to our possessions, so that milk could be procured in sufficient quantity for the covering of various cloths, which should be done on the spot, and afterwards exported to Europe, then the advantages attending this singular property of the milk would for ever balance its disadvantages. Cloths and coverings of different descriptions might then be made from this gum-cloth, with an expedition so much greater than by the needle, that would at first appear very surprising; the edges of the separate pieces only requiring to be wet with the milk or its whey, and brought into contact, when the article would be finished and fit for use. Should both milk and whey be wanting, a solution of the gum in either can always be obtained, by which the same end would be accomplished.

Of all the cloths upon which I made experiments, nankeen, from the strength and quality of its fabric, appeared the best calculated for coating with the gum. The method I followed in performing this was, to lay the cloth smooth upon a table, pour the milk upon it, and with a ruler to spread it equally. But should this ever be attempted on a larger scale, I would recommend the following plan: to have a cistern for holding the milk a little broader than the cloth to be covered, with a cross bar in the centre, which must reach under the surface of the milk, and two rollers at one end. Having filled the cistern, one end of the piece of cloth is to be passed under the bar, and through between the rollers, the former keeping the cloth immersed in the milk, the latter in pressing out what is superfluous, so that none may be lost. The cloth can be hung up at full length to dry, and the operation repeated until of whatever thickness wanted. For the reasons

above mentioned, care must be taken that one fold does not come in contact with another while wet.

Having observed that most of the patent catheters and bougies, made with a solution of the elastic gum, whether in ether or in the essential oils, had either a disagreeable stickiness, or were too hard to admit of any advantage being derived from the elasticity of the gum, I was induced to make some experiments with the milk towards removing these objections.

From that fluid, by evaporation, I made several large-sized bougies of pure gum, which, from their over-flexibility, were totally useless. I then took some slips of fine cloth covered with the gum, which I rolled up until of a proper size, and which I rendered solid by soaking them in the milk, and then drying them. These possessed more firmness than the former, but in no degree sufficient for the purpose intended. Pieces of strong catgut, coated with the gum, I found to answer better than either.

Besides an effectual clothing for manufacturers employed with the mineral acids, which had been long a desideratum, this substance, under different modifications, might be applied to a number of other useful purposes in life, such as making hats, greatcoats, boots, &c., for sailors, soldiers, fishermen, and every other description of persons, who, from their pursuits, are exposed to wet stockings; for invalids who suffer from damps; bathing-caps, tents, coverings for carriages of all kinds, for roofs of houses, trunks, buoys, &c.

This extraordinary vegetable production, in place of being injured by water, at its usual temperature * is preserved by it. For a knowledge of this circumstance I am indebted to the Chinese. Having some years ago commissioned articles made of the elastic gum from China, I received them in a small jar filled up with water, in which state I have since kept them without observing any signs of decay.

Should it ever be deemed an object to attempt plantations of the elastic gum vine in Bengal, I would recommend the foot of the Chittagong, Rajmahal and Bauglipore hills, as situations where there is every probability of succeeding, being very similar in soil and climate to the places of its growth on Prince-Wales Island. It would, however, be advisable to make the first trial at this settlement, to learn in what way the propagation of the plant might be most successfully conducted. A further experience may also be necessary to ascertain the season when the milk can be procured of the best quality, and in the greatest quantity, with the least detriment to the vine.

* From an account of experiments made with the elastic gum by M. Grosart, inserted in the "Annales de Chimie" for 1791, it appears, that water, when boiling, has a power of partially dissolving the gum so as to render one part capable of being finally joined to another by pressure only.

IX.

A BOTANICAL DESCRIPTION OF URCEOLA ELASTICA, OR CAOUTCHOUC VINE OF SUMATRA AND PULO-PINANG;

WITH AN ACCOUNT OF THE PROPERTIES OF ITS INSPISSATED JUICE, COMPARED WITH THOSE OF THE AMERICAN CAOUTCHOUC.

By William Roxburgh, M.D.

["Asiatic Researches," vol. v. pp. 167–175.]

For the discovery of this useful vine, we are, I believe, indebted to Mr. Howison, late surgeon at Pulo-penang; but it would appear he had no opportunity of determining its botanical character. To Dr. Charles Campbell, of Fort Marlborough, we owe the gratification arising from a knowledge thereof.

About twelve months ago I received from that gentleman, by means of Mr. Fleming, very complete specimens, in full foliage, flower, and fruit. From these I was enabled to reduce it to its class and order in the Linnæan system. It forms a new genus in the class *Pentandria* and order *Monogynia*, and comes in immediately after *Tabernæmontana;* consequently belongs to the thirtieth natural order or class called *Contortæ* by Linnæus in his natural method of classification or arrangement. One of the qualities of the plants of this order is their yielding, on being cut, a juice which is generally milky, and for the most part deemed of a poisonous nature.

The generic name, *Urceola*, which I have given to this plant, is from the structure of the corol, and the specific name from the quality of its thickened juice.

So far as I can find, it does not appear that ever this vine has been taken notice of by any European till now. I have carefully looked over the "Hortus Malabaricus," Rumphius's "Herbarium Amboinense," &c. &c., and figures of Indian plants, without being able to find any one that can with any degree of certainty be referred to. A substance of the same nature, and probably the very same, was discovered in the island of Mauritius, by M. Poivre, and from thence sent to France; but so far as I know, we are still ignorant of the plant that yields it.

The impropriety of giving to caoutchouc the term gum, resin,

or gum-resin, every one seems sensible of, as it possesses qualities totally different from all such substances as are usually arranged under those generic names; yet it still continues, by most authors I have met with, to be denominated elastic resin, or elastic gum. Some term it simply caoutchouc, which I wish may be considered as the generic name of all such concrete vegetable juices (mentioned in this memoir) as possess elasticity, inflammability, and are soluble in the essential oils without the assistance of heat.

In a mere definition it would be improper to state what qualities the object does not possess; consequently it must be understood that this substance is not soluble in the menstruums which usually dissolve resins and gums.

East India Caoutchouc would be a very proper specific name for that of *Urceola elastica*, were there not other trees which yield juices so similar as to come under the same generic character; but as this is really the case, I will apply the name of the tree which yields it for a specific one—*e.g.*, Caoutchouc of *Urceola elastica*, Caoutchouc of *Ficus Indica*, Caoutchouc of *Artocarpus integrifolia*, &c. &c.

DESCRIPTION OF THE PLANT URCEOLA.

PENTANDRIA MONOGYNIA.

General Character.—Calyx beneath five-toothed; corol one-petalled, pitcher-shaped, with its contracted mouth five-toothed; nectary entire, surrounding the germs; follicles two, round, drupacious; seeds numerous, immersed in pulp.

Urceola Elastica.

Shrubby, twining, leaves opposite, oblong, panicles terminal, is a native of Sumatra, Pulo-pinang, &c., Malay countries.

Stem.—Woody, climbing over trees, &c., to a very great extent; young shoots twining, and a little hairy; bark of the old woody parts thick, dark-coloured, considerably uneven; a little scabrous, on which I found several species of moss, particularly large patches of lichen; the wood is white, light, and porous.

Leaves.—Opposite, short-petioled, horizontal, ovate, oblong, pointed, entire, a little scabrous, with a few scattered white hairs on the under side.

Stipules.—None.

Panicles.—Terminal, brachiate, very ramous.

Flowers.—Numerous, minute, of a dull, greenish colour, and hairy on the outside.

Bracts.—Lanceolate, one at each division and subdivision of the panicle.

Calyx.—Perianth, one-leaved, five-toothed, permanent.

Corol.—One petalled, pitcher-shaped, hairy, mouth much contracted, five-toothed, divisions erect, acute, nectary entire, cylindric, embracing the lower two-thirds of the germs.

Stamens.—Filaments five, very short, from the base of the corol. Anthers arrow-shaped, converging, bearing their pollen in two grooves on the inside, near the apex; between these grooves and the insertions of the filaments they are covered with white soft hairs.

Pistil.—Germs two; above the nectary they are very hairy round the margins of their truncated tops. Style single, shorter than the stamens. Stigma ovate, with a circular band, dividing it into two portions of different colours.

Perianth.—Follicles two, round, laterally compressed into the shape of a turnip, wrinkled, leathery, about three inches in their greatest diameters—one-celled, two-valved.

Seeds.—Very numerous, reniform, immersed in firm, fleshy pulp.

From wounds made in the bark of this plant there oozes a milky fluid, which on exposure to the open air separates into an elastic coagulum and watery liquid apparently of no use after the separation takes place. This coagulum is not only like the American caoutchouc or Indian-rubber, but possesses the same properties, as will be seen from the following experiments and observations made on some which had been extracted from the vine about five months ago. A ball of it, now before me, is to my sense totally void of smell; even when cut into is very firm, nearly spherical, measures nine and a half inches in circumference, and weighs seven ounces and a quarter; its colour on the outside is that of American caoutchouc, where fresh cut into of a light brown colour till the action of the air darkens it; throughout there are numerous small cells, filled with a portion of light brown watery liquid above mentioned. This ball, in simply falling from a height of fifteen feet, rebounds about ten or twelve times, the first is from five to seven feet high, the succeeding ones of course lessening by gradation.

This substance is not now soluble in the above-mentioned liquid contained in its cells, although so intimately blended therewith when first drawn from the plant as to render it so thin as to be readily applied to the various purposes to which it is so well adapted when in a fluid state.

From what has been said, it will be evident that this caoutchouc possesses a considerable share of solidity and elasticity in an eminent degree. I compared the last quality with that of American caoutchouc, by taking small slips of each and extending them till they broke; that of Urceola was found capable of bearing a much greater degree of extension (and contraction) than the American; however, this may be owing to the time the respective substances have been drawn from their plants.

The Urceola caoutchouc rubs out the marks of a black lead pencil as readily as the American, and is evidently the substance of which the Chinese make their elastic rings.

It contains much combustible matter, burning entirely away with a clear flame, emitting a considerable deal of dark-coloured smoke, which readily condenses into a large proportion of exceeding fine soot, or lamp-black; at the same time it gives but little smell, and that not disagreeable; the combustion is often so rapid as to cause drops of a black liquid, very like tar, to fall from the burning mass; this is equally inflammable with the rest, and continues when cold in its semi-fluid state, but totally void of elasticity. In America, the caoutchouc is used for torches; ours appears to be equally fit for that purpose. Exposed in a silver spoon to a heat, about equal to that which melts lead or tin, it is reduced into a thick, black, inflammable liquid, such as drops from it during combustion, and is equally deprived of its elastic powers, consequently rendered unfit for those purposes for which its original elasticity rendered it so proper.

It is insoluble in spirits of wine, nor has water any more effect on it, except when assisted by heat, and then it is only softened by it.

Sulphuric acid reduced it into a black, brittle, charcoal-like substance, beginning at the surface of the caoutchouc, and if the pieces are not very thin or small, it requires some days to penetrate to their centre; during the process, the acid is rendered very dark coloured, almost black. If the sulphuric acid is previously diluted with only an equal quantity of water, it does not then appear to have any effect on this substance, nor is the colour of the liquid changed thereby.

Nitric acid reduced it in twelve hours to a soft, yellow, unelastic mass, while the acid is rendered yellow; at the end of two days the caoutchouc had acquired some degree of friability and hardness. The same experiment made on American caoutchouc was attended with similar effects. Muriatic acid had no effect on it.

Sulphuric ether only softened it, and rendered the different minute portions it was cut into easily united, and without any seeming diminution of elasticity.

Nitric ether I did not find a better menstruum than the vitriolic; consequently, if the ether I employed was pure, of which I have some doubt, this substance must differ essentially from that of America, which Berniard reports to be soluble in nitric ether.

Where this substance can be had in a fluid state there is no necessity for dissolving or softening it to render it applicable to the various uses for which it may be required; but where the dry caoutchouc is only procurable, sulphuric ether promises to be a useful medium by which it may be rendered so soft as to be readily formed into a variety of shapes.

Like American caoutchouc, it is soluble in the essential oil of turpentine, and I find it equally so in cajeput oil, an essential oil, said to be obtained from the leaves of *Melaleuca leucadendron*. Both solutions appear perfect, thick, and very glutinous. Spirit of wine, added to the solution in cajeput oil, soon united with the oil and left the caoutchouc floating on the mixture in a soft semi-fluid state, which, on being washed in the same liquor, and exposed to the air, became as firm as before it was dissolved, and retained its elastic powers perfectly; while in the intermediate states between semi-fluid and firm, it could be drawn out into long transparent threads, resembling, in the polish of their surface, the fibres of the tendons of animals; when they broke, the elasticity was so great, that each end instantaneously returned to its respective mass. Through all these stages the least pressure with the finger and thumb united different portions as perfectly as if they never had been separated, and without any clamminess or sticking to the fingers, which renders most of the solutions of caoutchouc so very unfit for the purposes for which they are required. A piece of catgut covered with the half inspissated solution, and rolled between two smooth surfaces, soon acquired a polish and consistence very proper for bougies. Cajeput oil I also found a good menstruum for American caoutchouc, it was as readily separated by the addition of a little spirit of wine, or rum, as the other, and appears equally fit for use, as I covered a piece of catgut with the washed solution as perfectly as with that of Urceola. The only difference I could observe was a little more adhesiveness from its not drying so quickly. The oil of turpentine had greater attraction for the caoutchouc than for the spirit of wine, consequently remained obstinately united to the former, which prevented its being brought into that state of firmness fit for handling which it acquired when cajeput oil was the menstruum.

The cajeput solution employed as a varnish did not dry, but remained moist and clammy, whereas the turpentine solution dried pretty fast.

Expressed oil of olives and linseed proved imperfect menstruums while cold, as the caoutchouc, in several days, was only rendered soft, and the oils viscid; but with a degree of heat equal to that which melts tin, continued for about twenty-five minutes, it was perfectly dissolved, but the solution remained thin and void of elasticity. I also found it soluble in wax and in butter, in the same degree of heat, but still these solutions were without elasticity, or any appearance of being useful.

I shall now conclude what I have to offer on the caoutchouc, or *Urceola elastica*, with observing that some philosophers of eminence have entertained doubts of the American caoutchouc being a simple vegetable substance, and suspect it to be an artificial production, an idea which I hope the above detailed

experiments will help to eradicate, and consequently to restore the histories of that substance by M. De la Condamine and others to that degree of credit to which they seem justly entitled, in support of which it may be further observed that besides *Urceola elastica* there are many other trees, natives of the torrid zone, that yield a milky juice possessing qualities nearly of the same nature as *Artocarpus integrifolia* (common jack tree), *Ficus religiosa et Indica*, *Hippomane biglandulosa*, *Cecropia peltata*, *&c.*

The caoutchouc of *Ficus religiosa*, the Hindus consider the most tenacious vegetable juice they are acquainted with; from it their best bird-lime is prepared. I have examined its qualities, as well as those of *Ficus Indica* and *Artocarpus integrifolia*, by experiments similar to those above related, and found them triflingly elastic when compared with the American and Urceola caoutchoucs, but infinitely more viscid than either; they are also inflammable, though in a less degree, and show nearly the same phenomena when immersed in the mineral acids, solution of caustic alkali, alcohol, fat, and essential oils; but the solution in cajeput oil could not be separated by spirits of wine and collected again like the solutions of the Urceola and American caoutchoucs.[1]

X.

AN ACCOUNT OF THE INHABITANTS OF THE POGGY, OR NASSAU ISLANDS, LYING OFF SUMATRA.

By John Crisp, Esq.

[" Asiatic Researches," vol. vi. pp. 77–91.]

At a period when so many important voyages of discovery have been recently effected, and such various new countries and new races of men made known, the following account will, probably, appear too trivial to excite the attention of either the merchant, the politician, or the philosopher. There is, however, one circumstance respecting the inhabitants of the Nassau, or Poggy Islands, which lie off the west coast of Sumatra, which may be considered as a curious fact in the history of man, and as such, not unworthy

[1] [See on Nos. VIII. and IX., A. H. Bisschop Grevelink, " Planten van Ned. Indië" (1883), p. 385 f.; " Mohnike," l. l. pp. 159–66; James Collins, " Report on the Caoutchouc of Commerce (1872)."]

of notice. From the proximity of these islands to Sumatra, which, in respect to them, may be considered as a continent, we should naturally expect to find their inhabitants to be a set of people originally derived from the Sumatra stock, and look for some affinity in their language and manners; but, to our no small surprise, we find a race of men whose language is totally different, and whose customs and habits of life indicate a very distinct origin, and bear a striking resemblance to those of the inhabitants of the late discovered islands in the great Pacific Ocean. It was a confused idea of this circumstance which first excited my curiosity, and induced a desire to make a more minute inquiry into the history of these people than has hitherto been effected; for, notwithstanding the vicinity of these islands to an English settlement, we, as yet, had but a very imperfect knowledge of the inhabitants. An attempt had been made, between forty and fifty years past, to make a settlement among them, and to introduce the cultivation of pepper, but this design was frustrated by the improper conduct of the person to whom the management of the business was entrusted. The imperfect account which was given of the people by the person appointed to go to the islands on behalf of the India Company, and another not more satisfactory, by Captain Forest, are inserted in Mr. Dalrymple's "India Directory;" and, as far as I knew, these accounts constituted the whole of our knowledge of these islands.

The Nassau, or Poggy Islands, form part of a chain of islands which lie off the whole length of the west coast of Sumatra, at the distance of twenty to thirty leagues; the northern extremity of the northern Poggy lies in latitude 2° 18′ S., and the southern extremity of the southern island in latitude 3° 16′ S. The two are separated from each other by a very narrow passage, called the Strait of See Cockup, in latitude 2° 40′ S. and longitude about 100° 38′ east from Greenwich.

I left Fort Marlborough on the 12th of August, 1792, in a small vessel, and made the southern Poggy on the morning of the 14th; coasting along which we reached the straits of See Cockup, where we came to an anchor at one o'clock the same day.

These straits are about two miles in length, and a quarter of a mile over; they make very safe riding for ships of any size, which lie perfectly secure from every wind, the water being literally as smooth as in a pond. The chief defect, as an harbour, is the great depth of water, there being twenty-five fathoms close in shore, and forty-five fathoms in the mid-channel. While lying at anchor, we could plainly discern the high land of Sumatra. In the straits are scattered several small islands, each of which consists of one immense rock, and which probably was originally connected with the main islands. The face of the country is rough and irregular, consisting of high hills or mountains, of sudden and steep ascent;

and the whole appearance of these islands, in common with Sumatra, bears strong marks of some powerful convulsion of Nature. The mountains are covered with trees to their summits, among which are found several species of excellent timber; the tree called by the Malays, Bintangoor,[1] and which on the other side of India is called Pohoon, abounds here. Of this tree are made masts, and some are found of sufficient dimensions for the lower mast of a first-rate ship of war. During my stay here, which was about a month, I did not discover a single plant which we have not on Sumatra. The sago tree grows in plenty, and constitutes the chief article of food to the inhabitants, who do not cultivate rice; the cocoa nut tree and the bamboo, two most useful plants, are found here in great plenty. They have a variety of fruits, common in these climates, such as mangosteens, pine-apples, plantains, buah, chupah, &c. The woods in their present state are impervious to man; the species of wild animals which inhabit them are but few; the large red deer, some hogs, and several kinds of monkeys are to be found here, but neither buffaloes nor goats; nor are these forests infested, like those of Sumatra, with tigers or any other beast of prey. Of domestic poultry, there is only the common fowl, which probably has been originally brought from Sumatra; but pork and fish constitute the favourite animal food of the natives. Fish are found here in considerable plenty and very good. On the reefs of coral, which extend from the shore, and are frequently dry at low water, are found various kinds of shell fish, but I did not discover any which I had reason to suppose uncommon. The shell of a large species of nautilus, marked like a zebra, is frequently picked up on the shore of these islands, and having been informed that one of these shells with its fish in it would be acceptable at home, I offered the natives their own terms to procure me one, but they all assured me that it was absolutely out of their power to comply with my wishes; that the shell is frequently driven on the shore, but always empty; that it comes from the sea, and is not to be found on the rocks, and that no one on the island had ever seen one of the shells in the state I required.

I found here a species of cockle, the shell of which was enclosed in the most solid kind of coral rock; the aperture of the rock was sufficient to permit the shell of the cockle to open in some degree, but too small to permit removing it without breaking the rock. Having found them of different sizes, and it being a species of the Keemoo which grows to a very large size, it should seem that the cavity of the rock increases as the fish grows. If, according to Mr. Hunter's theory, the animal has a power of absorbing part of its own shell, this power may perhaps extend to the rock which contains it, and whose substance is of a similar nature.

[1] [Bintangor utan, Calophyllum spectabile, "Mohnike," p. 140.]

Near the entrance of the straits of See Cockup on the northern island, are a few houses inhabited by some Malays from Fort Marlborough: the place is called Toongoo. These people reside here for the purpose of building large boats, called Chuneahs, the timber and planks for which are found close at hand. Among these Malays I found one intelligent man, who had resided two years at this place, during which he had acquired a competent knowledge of the language of the natives. I had also brought an interpreter with me who spoke the language tolerably well, and I found one native who had resided some time at Padáng, a Dutch settlement on the west coast of Sumatra, where he had acquired some knowledge of the Malay tongue; by means of these people I was at no loss for communication with the natives, and had an opportunity of having the accounts confirmed by making use of the different interpreters.

The name of Nassau has probably been given to these islands by some Dutch navigator. By the inhabitants themselves they are called Poggy, and the natives are called by the people of Sumatra, Orang Mantawee; this latter is probably from their own language, Mantaoo signifying a man.

After having been two days at an anchor, the natives began to come down from their villages in their canoes, bringing fruit of various kinds, and on invitation they readily came on board. The chief of See Cockup, a village in the straits, was among them, but not distinguished from the rest by dress, or dignity of demeanour. On coming on board the vessel they did not show any signs of apprehension or embarrassment, but expressed a strong degree of curiosity, and a desire to examine everything minutely. We presented them with plates of boiled rice, which they would not touch till it had been previously tasted by one of our own people, after which they eat it to the last grain. This circumstance seemed to indicate the use of poison among them. They behaved while on board with much decorum, and did not show the least disposition for pilfering, but freely asked for what they saw and wished to possess, not expressing, however, any ill-will when they met with a denial. We made them presents of beads, small looking-glasses, Birmingham japanned snuff-boxes, &c., all which were very acceptable, as was also tobacco, of which they appear to be very fond; they use it by smoking. They appear to live in great friendship and harmony with each other, and voluntarily divided among their companions what was given to them.

After having remained some hours on board, during which time they behaved with much quietness, they returned to their village; and after this we were daily visited by many of their canoes, bringing fruit, a few fowls, &c. Several canoes came alongside the vessel with only women in them; they at first expressed some

apprehension at coming on board, but their men, far from showing any disapprobation, rather encouraged them to come into the vessel, and several ventured up the side. When in their canoes, the women use a temporary dress to shield them from the heat of the sun; it is made of the leaves of the plantain tree, of which they form a sort of conical cap, and there is also a broad piece of the leaf fastened round their body, over their breasts, and another piece round their waist. This leaf readily splits, and has the appearance of a coarse fringe. When in their villages, the women, like the men, wear only a small piece of cloth round their middle. Among them we observed some of a very pleasant countenance, with fine expressive eyes. Mr. Best, a military gentleman of the establishment, with whose company I was favoured on this trip, went up to one of their villages, attended only by the Malay interpreter and a Malay servant. He was received with great cordiality and civility, and stayed two nights at their village. Many of the people had never before seen a European, and with much curiosity examined his dress, particularly his shoes.

During a stay of about a month among them I collected the following particulars, respecting their manners and customs, the truth of which I was careful to have confirmed, by making my inquiries of different persons, and by the means of different interpreters.

The inhabitants of the Poggy Islands are but few; they are divided into small tribes, each tribe occupying a small river, and living in one village. On the northern Poggy are seven villages, of which Cockup is the chief; on the southern Poggy are five. The whole number of people on the two islands amount, by the best accounts I could procure, only to 1,400; the inland parts of the islands are uninhabited. Porah, or Fortune island, is inhabited by the same race of people, and is said to contain as many inhabitants as the two Poggys. When we consider the mildness of the climate, the ease with which the inhabitants procure wholesome nutritive food, and the little restraint laid on the communication between the sexes, this paucity of inhabitants seems to indicate that the period when their residence in these islands commenced cannot be very remote. Their houses are built of bamboos and raised on posts; the under part is occupied by poultry and hogs, and, as may be supposed, much filth is collected there. The whole of their clothing consists of a piece of coarse cloth, made of the bark of a tree, worn round the waist, and brought across between the thighs; they wear beads and other ornaments about the neck, of which a small green bead is the most esteemed; though cocoa-nut trees are in such plenty, they have not the use of oil, and their hair, which is black, and might grow long and graceful, is, for want of it, and the use of combs, in general matted and plentifully supplied with vermin, which they pick out and eat—

a filthy custom, but very common among savage people. They have a method of filing or grinding their teeth to a point, which is also in use on Sumatra.

Their stature seldom exceeds five feet and a half, and many among them fall short of this; some of them are extremely well made, with fine turned limbs and expressive countenances; their colour is like that of the Malays, a light brown or copper colour. The custom of tattooing or imprinting figures on the skin is general among them, of which I shall say more presently.

The principal article of their food is sago, which is found in plenty on these islands. The tree when ripe is cut down, and the pith which forms the sago taken out, and the mealy part separated from the fibrous, by maceration and treading it in a large trough continually supplied with fresh water; the meal subsides and is kept in bags made of a kind of rush, and in this state it may be preserved for a considerable time. When they take it from their store for immediate use, some further preparation of washing is necessary, but they do not granulate it. One tree will sometimes yield two hundred pounds of sago; when they cook it, it is put into the hollow joints of a thin bamboo, and roasted over the fire.

Besides this article, they have a variety of nourishing plants, such as the yam, the sweet potato, the plantain, &c. Their animal food consists of fowls, hogs, and fish; shell fish they eat raw. The use of betel, so common in the East, is unknown to them, and I observed in many marks of the scurvy in their mouths.

Their arms consist of a bow and arrows. The bow is made of the Neebong tree, a species of palm, which, when of a proper age, is very strong and elastic; the strings are formed of the entrails of some animal; the arrow is made of a small bamboo or other light wood, headed with brass, or with another piece of wood fixed to the end of the shaft and cut to a point; these arrows, we were told, are sometimes poisoned. Though strangers to the use of feathers to steady the flight of the arrow, they nevertheless discharge it from the bow with much strength and skill. With a mongrel breed of dogs, probably procured originally from Sumatra, they rouse the deer in the woods, which they sometimes kill with their arrows; they also kill monkeys by the same means, and eat their flesh. We observed among them a few who were in possession of creeses or Malay daggers.

Their knowledge of metals is entirely derived from their communication with the inhabitants of Sumatra. They are still strangers to the use of coin of any kind, and a metal coat button would be of equal value in their esteem with a piece of gold or silver coin, either of which would immediately be hung about the neck as an ornament. A sort of iron hatchet or handbill, called

parang, is in much esteem with them, and serves as a standard for the value of various commodities, such as cocoa nuts, coolit coys, poultry, &c.

We were informed that the different tribes of Orang Mantawee who inhabit the Poggy Islands never war with each other; to which account we could readily give credit from the mildness of their disposition. Indeed the friendly footing upon which they appeared to live one with another was a circumstance too striking to escape our notice; during our whole stay with them, and while distributing various presents among them, we never heard a single dispute, nor observed one angry gesture. They, however, informed us that a feud has long subsisted between the inhabitants of the Poggy Islands, and those of some island to the northward, whom they call Sybee.[1] Against these people they sometimes undertake expeditions in their war canoes; but it did not appear that they had engaged in any undertaking of this kind lately. Mr. Best measured one of these war canoes, which was preserved with great care under a shed; the floor of it was twenty-five feet in length, the prow projected twenty-two feet, and the stern eighteen, making the whole length sixty-five feet; the greatest breadth was five feet, and the depth three feet eight inches. For navigating in their rivers and the straits of See Cockup, where the sea is as smooth as glass, they use a small canoe made from a single tree, constructed with great neatness, and the women and young children are extremely expert in the use of the paddle.

The religion of this people, if it can be said that they have any, may truly be called the religion of Nature. A belief of the existence of some powers more than human cannot fail to be excited among the most uncultivated of mankind, from the observations of various striking natural phenomena, such as the diurnal revolution of the sun and moon, thunder and lightning, earthquakes, &c. &c., nor will there ever be wanting among them some of superior talents and cunning who will acquire an influence over weak minds, by assuming to themselves an interest with or a power of controlling those superhuman agents; and such notions constitute the religion of the inhabitants of the Poggys. Sometimes a fowl and sometimes a hog is sacrificed to avert sickness, to appease the wrath of the offended power, or to render it propitious to some projected enterprise; and Mr. Best was informed that omens of good or ill fortune were drawn from certain appearances in the entrails of the victim. But they have no form of religious worship, nor do they appear to have the most distant idea of a future state of rewards and punishments. They do not practise circumcision.

The mode of disposing of their dead bears a resemblance to that of the Otaheitans. Very shortly after death the corpse is carried

[1] [Seibi is a district in the island of Siberut, another of the Mentawei Islands.]

to a certain place appropriated for the purpose, where it is deposited on a sort of stage, called in their language *Rati Aki;* it is dressed with a few beads or such ornaments as the person was accustomed to wear in his lifetime, and after strewing a few leaves over it, the attendants leave the ground, and proceed to the plantation of the deceased, where they fell a few trees of his planting, and return to their homes. The corpse is left to rot, and the bones fall to the ground.

Among a people whose manners are so simple, whose wants are so easily supplied, and whose possessions are so circumscribed, we are not to look for any complex system of jurisprudence; indeed their code of laws may be comprised in a few lines.

Their chiefs are but little distinguished from the community, either by authority or by property, their pre-eminence being chiefly displayed at public entertainments, of which they do the honours. They have no judicial powers; all disputes are settled, and crimes adjudged, by a meeting of the whole village.

Inheritance is by male descent; the house or plantation, the weapons and tools of the father, pass to his male children. Theft, when to a considerable amount, and the criminal is incapable of making restitution, is liable to be punished by death.

Murder is punishable by retaliation; the murderer is delivered to the relations of the deceased, who may put him to death. I was, however, informed these crimes are very rare.

In marriages, the matter is settled between the parents of the young persons, and when agreed upon, the young man goes to the house of the bride, and takes her home: on this occasion a hog is generally killed, and a feast made. Polygamy is not allowed.

In cases of adultery, where the wife is the offender, the injured husband has a right to seize the effects of the paramour, and sometimes punishes his wife by cutting off her hair. When the husband offends, the wife has a right to quit him, and to return to her parent's house; but in this state of separation she is not allowed to marry another; however, in both these cases, the matter is generally made up, and the parties reconciled; and we were informed that instances of their occurrence were very unfrequent. Simple fornication between unmarried persons is neither a crime nor a disgrace; and a young woman is rather liked the better, and more desired in marriage, for having borne a child; sometimes they have two or three, when, upon a marriage taking place, the children are left with the parents of their mother. The state of slavery is unknown to these people.

The custom of tattooing is general throughout these islands. They call it in their language, *teetee.* They begin to imprint these marks on boys of seven years of age, but they only trace at first a few outlines. As they advance in years, and go to war,

they fill up the marks, the right to which depends on having killed an enemy. Such is the account they gave us, and it is probable enough that this custom may originally have been intended as a mark of military distinction; but such original intention cannot at present have place, as the marks are common to every individual, and wars scarce occur once in a generation. The figures imprinted are the same throughout, or the variation, if any, is very trifling, excepting that, in some of the young men, the outline only of the broad mark on the breast is traced, but this is filled up as they grow older. The women have a star imprinted on each shoulder, and generally some small marks on the back of the hands. These marks are imprinted with a pointed instrument, consisting of a brass wire fixed perpendicularly into a piece of stick about eight inches in length: this piece is struck with another small long stick with repeated light strokes. The pigment used for this purpose is made of the smoke collected from a species of resin, which is mixed with water; the operator takes a stem of dried grass, or a fine piece of stick, and dipping the end in the pigment, traces on the skin the outline of the figure, with great steadiness and dexterity; then, dipping the brass point in the same composition, he, with very quick and light strokes, drives it into the skin, tracing the outline before drawn, which leaves an indelible mark. Mr. Best submitted to the operation on his leg, and found it attended with some pain.

Such are the customs and manners of the inhabitants of the Poggy Islands which lie within sight of Sumatra. The many particulars in which they differ from any set of inhabitants of the latter island put it, in my opinion, beyond a doubt that they are of a different origin, but from whence they came it may not be easy, and probably will not be thought of importance, to trace. They have no clear tradition to assist in such an inquiry. When Mr. Best was at their village, on asking from whence they originally came, they told him from the sun, which he understood as signifying from the eastward.

As the sounds which express ideas are arbitrary, and it not being probable that people who have never had communication should hit upon the same sounds to express the same ideas, affinity in language may be considered as one of the surest indications of sameness of origin; but even in judging from this criterion, a variety of circumstances may render us liable to error. I have however subjoined a pretty copious specimen of the language of the Poggy Islands.

But another circumstance, which I think might assist in tracing the origin of these people, is the figures used in tattooing their bodies; for as all the men are marked according to the same pattern nearly, if any people should be discovered among whom this custom prevails, and whose bodies are tattooed generally

with figures of the same kind, it would afford no slight presumption of a common origin.[1]

I had intended to have examined the whole chain of islands which lie off Sumatra, and which are inhabited by very different sets of people, but a number of cross and untoward accidents prevented the accomplishment of my original design.

SPECIMEN OF THE LANGUAGE OF THE POGGY ISLANDS.

One	Sarah	Stone-rock	Bookoo
Two	Dua	Hog	Babooee Sakoko
Three	Telloo	Fowls	Gago
Four	Apat	Bird	Oomale
Five	Leemah	Egg	Ajoloh
Six	Anam	Fish	Eebah
Seven	Peeloo (for Peetoo)	Sun	Chooloo
Eight	Balloo	Moon	Lago
Nine	Seewa	Stars	Panyean
Ten	Pooloo	God	Saraloggye Saneetoo
Twenty	Duah Tarah	Naked	Tocomong
A hundred	Sama Wattoo	To speak	Maneeboo
Mankind	Seree Manooah	Here	Kai
A man	Mantaow	There	Kasau
A woman	Senan Allip	Come	Kai comong
Father	Ookooee	Go	Kainang
Mother	Eenah	Yes	Oho
Head	Ootay	No	Tani
Eyes	Matah	Hard	Makala
Nose	Assak	Soft	Mamama
Hair	Ali	Rough	Mokara
Eye-brows	Cakaloo	Smooth	Malooploop
Eye-lashes	Rapit	Straight	Moipoiroo
Ears	Talinga	Crooked	Tamaipoiroo
Teeth	Chone	Prong or hatchet	Taagla
Tongue	Leelah	Cocoa nut	Toata
Chin	Batela	To fight	Sagack
Belly	Barah	The sea	Koat
Hand	Kavaye	A large boat	Kalaba
Foot	Daray	A canoe	Avauk
Blood	Lorow—Logow	Sour	Malaja
Day	Mancheep	Sweet	Makiki
Night	Geb Geb—Choie Boh	Wood	Loven
Sleep	Mareb	The wind	Roosa
Dead	Mataye Malossay	A bow	Logue
White	Maboolow	An arrow	Rorow
Black	Mapoochoo	Clouds	Boojoot
Good	Seemaroo	Thunder	Salagoo
Fire	Ovange—Bobengang	Lightning	Beela
Water	Jojar	Earthquake	Tataoo
Earth	Polack	A dog	Jojo

[1] [The sketches accompanying this account have here been omitted, as the illustrations given by Rosenberg may now be referred to.]

NAMES OF PERSONS.

NAMES OF MEN.		NAMES OF WOMEN.
Rajah of Cockup	Mengriah	Nangsannee
———————	Goolooh Tarah	Tallee Sheeboo
———————	Marceat	Goryebooh
———————	Jagula Kayoo	Tamaneegal.[1]

XI.

REMARKS ON THE SPECIES OF PEPPER WHICH ARE FOUND ON PRINCE-WALES ISLAND.

By WILLIAM HUNTER, Esq., M.D.

["Asiatic Researches," vol. ix. pp. 383-93.]

HAVING had an opportunity, during a residence of some months at Prince of Wales' Island, to ascertain, partly by observation and partly by inquiry, some particulars which I conceive to be new respecting the culture and preparation of black pepper, the principal staple of that island, I am induced to lay the fruit of my researches before the Asiatic Society. To these I have added a few remarks on the other species which are found on the island. I judged it would not be without utility to add the Oriental names of each species, and in this part of my task, as far as regards the Sanscrit and its derivatives, I am indebted to the liberal assistance of Mr. Colebrooke.

1. *Piper nigrum.*—Lin. sp. 40. Syst. 74. Reich. 1. 75. Willden. 159. Fl. Zeylan. 26. Mat. med. p. 41. Woodv. Med. Bot. 513. t. 187. Camelli de plantis Philip. in Phil. Trans. vol. 24. p. 1773. Loureiro Cochinch. 30. Miller illust. Plenck icon. Miller's Dict. No. 1.

[1] [The Mentawei Islands, to which group North and South Págí belong, were nominally ceded to Holland in 1824, but not incorporated with the Dutch East Indies till the 10th of July, 1864. They have also been described by Marsden, "History of Sumatra," third ed. (1811), pp. 468–73; H. v. Rosenberg, in "Tijdschrift voor de taalkunde," &c. vol. i. pp. 399-440, and in "Der Malayische Archipel," pp. 188–205; "Journal of the Indian Archipelago," vol. ix. pp. 279–305; H. A. Mess, in "Tijdschrift voor Nederlandsch-Indië" (1870), i. pp. 339–63; Bickmore, p. 482 f.; De Hollander, "Land- en volkenkunde van Ned. Oost-Indië," i. pp. 634–43. Many of the words given above do not tally with the much fuller vocabularies supplied by Rosenberg. See also the Batavian "Tijdschrift," vol. xxv. p. 484 ff.]

Black Pepper.—Leaves ovate acuminate, five to seven nerved, smooth; petioles short.

Piper rotundum nigrum.—Pluk. Almag. p. 297. t. 437. f. 1.

Piper rotundifolium nigrum.—Bauhin. pin. 411. Morison, Hist. pl. 3. p. 602. f. 15. t. 1. f. 1. Blackwell, t. 348. Ray, Hist. 1341. Burm. Zeyl. 193.

Lada, alijs *molanga* s. *Piper mas.* Piso, Mant. Arom. p. 180. cum icon.

Molago Codi. Hort. Malab. v. vii. p. 23. t. 12.

Pepper plant.—Marsden, Sumat. p. 105 *et seq.*

Gr.—Πεπερι.

Sans.—*Maricha, Marícha.*

Hind.—*Mirch, Golmirch, Cálimírch.*

Arab.—*Fulful, Filfil.*

Pers.—*Pilpil.*

Malay.—*Ladda.*

The Greek name of this species, from which the name of the genus is taken, has been said to be derived from $\pi\epsilon\pi\tau\omega$, because it is supposed to promote digestion.* But we have it on the authority of Hippocrates that the Greeks received this term from the Persians,† and these undoubtedly had it from the Indians,‡ from whose country they imported the drug itself. In fact, the Persian and Arabic, as well as the Greek and Latin names, are derived from *Pippali*, the Sanscrit denomination of long pepper. The ancients in general, with the single exception of Theophrastus, supposed the black, the white, and the long pepper to be the produce of one plant. Hence, they might naturally enough apply to one species the Indian name of another. Salmasius, who notices this § has fallen, in common with other modern writers,‖ into the opposite error, by supposing the black and white peppers to grow on different plants. Piso appears to be the first who corrected this mistake,¶ and his statement is confirmed by Rheede,** Loureiro,†† and Marsden.‡‡

This plant has been so fully described that I have nothing to add on that head. But as it is the most important article of produce on Prince of Wales' Island, the manner of cultivation pursued there merits a particular detail.

It is propagated by cuttings or suckers. They are generally planted at the distance of about $7\frac{1}{2}$ feet; that is, 100 plants in an úrlong, which is a measure of 80 yards square, nearly equal to

* Scapulæ Lexic. in voce. Alex. Aphr. in præf. l. 1. probl.

† De Morb. Mulier; ed. Fœs. p. 672, l. 14.

‡ Salmas. Plinian. Exercit. in Solin. (Paris 1629, fol.), p. 1026. C.

§ *Ibid.*

‖ Garcia's Hist. Arom. apud Clus. exot. p. 182. [Garcia de Orta, Colloquios (Lisbon, 1872), pp. 171–6.]

¶ Mantissa Aromatica.

** H. M. v. vii. p. 23

†† Fl. Coch. 30.

‡‡ Hist. Sum. 106–117.

$1\frac{1}{3}$ acre. But some experienced cultivators think that the distance should be greater—perhaps nine feet; as the roots would be better nourished, and the produce more abundant.

When a plantation is to be commenced the large timber is cut down by Malays, at the rate of five dollars per úrlong. The remaining labour is performed by Chinese, who dig out the roots, burn them and the trunks, pulverize and level the soil, plant the pepper vines and the trees which are to support them. It is usual to contract with them for making the plantation in this manner, and taking care of it for three years, at the end of which time it is in bearing, at the rate of 225 dollars for 100 plants. The sum is liquidated by instalments, as the contractor requires it to pay his workmen. Something more than one-third is paid in the first year, because the labour is then greatest; but about one-fourth of the whole is generally reserved till the contract is completed, and the plantation delivered over. This does not include the price of the plants or cuttings, which are furnished by the proprietor of the plantation.

The vine is first made to climb on a pole. At the end of ten or twelve months it is detached from the pole to undergo the process called laying down. A circular hole, about eighteen inches in diameter, is dug at one side of the plant. At the bottom of this the plant is carried round in a circle, and the end of it is brought to the tree which is in future to form its support. The depth of the hole in which the vines are laid down varies according to the situation and nature of the soil, and much judgment, to be acquired by practice, is requisite to adapt it to these circumstances. In high and dry situations, the depth must be considerably greater than in those which are low and moist. Too little depth in the former would expose the roots to be parched in dry seasons, and too much in the latter would occasion them to rot from excess of moisture.

The trees used for supporting the pepper vines on Prince of Wales' Island are the *Morinda citrifolia* (*Mankúdo*) and the *Erythrina corallodendron* (*Dadap*). The Chinese planters allege that the pepper supported by the Erythrina thrives better and lasts longer than that supported by the Morinda. One instance I heard quoted in proof of this assertion was a plantation which had been long neglected and overgrown with weeds. When it came to be examined, the vines which had grown on the Morinda were all dead, while those on the Erythrina were still strong and productive. The reason assigned by the planters for this difference is, that the roots of the Erythrina do not spread so much, or penetrate so deep, as those of the Morinda, whence they interfere less with the pepper, and do not draw so much nourishment from the earth.

The Morinda was formerly made to grow with one stem, but

this was not found to afford sufficient spread for the vines. Therefore, when that tree is used, the practice now is to break off the principal stem at the height of about two feet from the ground. This obliges the tree to put out lateral branches at that height. When these have attained the length of about a foot or fifteen inches they are cut off. From their ends arise erect shoots, each of which forms a stem, so that the vine has four or five stems to climb on instead of one.

The vines at three years of age begin to produce, and they are reckoned to be in full bearing at five or six. They continue nearly in the same state for eight years more, or till they are fourteen years old. From that period they are reckoned on the decline; but the planters on Prince of Wales' Island cannot yet judge from experience at what rate, or in how long a time, they decay. Some Chinese, who have cultivated the plant on the Malay coast, say the vines have not arrived at their point of greatest produce till they are fourteen years old; and that from this, gradually declining, they continue bearing till near thirty.

The first year of bearing, or at three years old, the vines do not yield more than half a catti each. But plants kept in good order, when in their prime, will produce three cattis.* A plantation of 3,000 vines at Súngí Clúan,† now in its eleventh year, has been let for three years at seventy picols yearly, or at the rate of $2\frac{1}{3}$ cattis each plant. It must therefore produce as much more as will pay the tenant for his labour and risk. They are generally let for the first five years of bearing, or from three to eight years old, at 160 picols per laksha (10,000) or at 160 cattis for 100 vines.

The vines yield two crops yearly. The first gathering commences in December, after the heavy rains are over, and at the same time the vines have put out new flowers. This first collection may be finished in February. The flowers which spread in December have ripened their seeds in April or May. The second collection then begins, and ends in July. During this time blossoms have expanded, which are to furnish the crop of next December. But, with the most careful cultivators, who gather only the bunches which are fully ripe, these two harvests run so nearly into one another, that the collection is in a manner continued without interruption from December till August, so that there is only an interval of four months in the year, which is the season of the heavy rains.

The bunches are plucked off entire, taking care to pull only those that are ripe. They are thrown into baskets, and allowed to

* A cattí is $1\frac{1}{3}$ lb.

† A district near the southern extremity of the island, of which the soil is found peculiarly favourable to the cultivation of pepper. The oldest vines are in this district.

remain for a day. They are afterwards spread on mats, and trodden with the feet, to separate the fruit from the stalk. The grain is next winnowed, to clear it from the stalks and the lighter grains, and the good heavy grains are spread on mats in the sun to dry for three days. It is calculated that 100 cattís of green pepper with the stalks yield thirty-five cattís of clean and dry pepper. The collection of one day from 46,000 plants of three years old was 5,00 cattís of green, or 175 of dry pepper.

It is usual, as was before noticed, when the plantation is delivered over to the proprietor, at the end of three years, to let it to a Chinese farmer for five years more, as the proprietor is thereby less liable to imposition, the only precaution necessary being to see that the tenant is careful of the vines during the last year, and leaves them in good condition at the expiration of the lease. This is the only way in which a very extensive plantation, or one whereon the proprietor cannot bestow his whole attention, can be managed to advantage. But if the proprietor has time, and is careful and acute, he may render it something more productive by keeping it in his own hands. The labour of cleaning the vines, throwing up earth about the roots, and collecting the produce of the plantation above-mentioned (46,000) plants was performed by sixteen Chinese workmen.

The table at the end of this paper exhibits a calculation of the profits that may be expected in twelve years from a given space of ground planted with pepper, supposing it to sell at ten dollars a picol, which was the price on the field when I was on the island,* and then esteemed very moderate. But I understand it has lately fallen to something between eight and nine dollars.

The whole quantity of pepper produced in that year on the island was estimated at something between 16,000 and 20,000 picols. Taking the medium quantity at twelve dollars, which was the selling price, this article must have amounted to 216,000 dollars. The island pepper is more esteemed than that which comes from the Malay continent and Sumatra, and it sells for about one dollar more per picol. The difference is occasioned by the haste of the Malays to gather the fruit before it is sufficiently ripe.

2. *Piper Betle.*—Lin. sp. 40. Syst. 74. Reich. 1. 75. Willd. 159. Fl. Zeyl. n. 27. Loureiro, Cochinch. 31. Burm. Zeyl. 193. t. 83. f. 2. Morison, Hist. 3. 603. Miller's Dict. No. 2. Leaves obliquely cordate, acuminate, waving, seven-nerved, smooth.

Betele Tambul sive *Betre.* Burm. Zeyl. 46.

Betre, Betelle, Betele, Betle. Bauh. Hist. i. p. 437. Ray. Hist. 1913. Acost. Arom. c. 10. Clus. exot. 176. t. 176. Dale, Pharm. 313.

Beetla Codi. Rheede Mal, 7. p. 29. t. 15. Bulat wæla. Herm. Zeyl. 34. 36. 66.

* In 1802.

Sans.—*Tambuli*, *Parñalatá*, *Nágavalli*.
Hind.—*Támbúl*, *Tamból*, *Nágbél*, *Pán*.
Tamul.—*Vettilay-Chuddi*.[1]
Malay.—*Síri*.

Saumaise has shown at great length, and with considerable strength of argument, that the ancient Greek writers meant this leaf by *Malabathrum*, rather than the leaves of *Laurus Cassia* or *Tez-pat*.* The Arabic and Persian languages have no names for this plant. *Tamból* is borrowed from the Hindí by Persian authors, who name the leaf *Bergitambol*. It is called *Pán* in Hindí, from the Sanscrit *Parna*, a leaf in general; in the same manner as it was known to the Romans under the name of *folium*.† The Indian writers enumerate several varieties of this plant, distinguished by the size, shape, and flavour of the leaf.‡

The Malays reckon five varieties, among which are these three: *Síri Malayo*, *Síri China*, *Síri U'dang*. The specimen of which the leaf is above described was the *Síri China*. The *Síri U'dang* they say has the petioles and nerves red.

Cultivated, but in no great quantity. A larger quantity is imported from the neighbouring coast.

3. *Piper Siriboa*.—Lin. sp. 41. Reich. 1. 76. Willd. 161. Flor. Zeyl. 291. Swartz. obs. 19. Miller, Dict. No. 10.

Siriboa.—Rumph. Amb. 5. p. 340. t. 117.

Betela quem Siri boa vocant. Bont. jav. 91. t. 91. Ray, His. 1913.

Malay.—*Bací*.

The fruit is nearly as long as a finger, and tastes like the Betel leaf, and hence the name; *boa* signifying fruit in the Malay language. It is used as a substitute for Betel, especially at sea, where the fresh leaves cannot be procured.

4. *Piper Chaba*.—H. Leaves alternate, petioled, lance-ovate, oblique at the base, with veins opposite. Spikes leaf-opposed, peduncled, somewhat conical, compact.

Piper Longum Tsjabe.—Rumph. Amb. 5. p. 333. t. 116. f. 1.

[1] [Properly *Verrilei-kkodi*.]

* Salmas. "Exercit. Plin." p. 1070.

† *Ibid.* p. 1071, 1072.

‡ The Makhzan ul Adviyeh, a treatise on Materia Medica, composed by Muhammed Husain, brother to the Nawáb Muhammed Reza Khan, enumerates the following five kinds: *Maghi*, *Cángirí*, *Cáfúrí*, *Sánchí*, *Bengla*. He thus describes the method of treating the leaves, by which they are made tender and acquire a whitish colour:—A quantity of the leaves newly gathered are put into a bag, an earthen pot, or a basket, covered with straw, and placed in a hole dug in the ground. The straw is set on fire, and allowed to burn till the leaves are heated to a certain degree. The fire is then taken away, and the basket left for twenty-four hours in the hole, with a weight laid on it, to press the leaves gently together. It is afterwards exposed to the dews at night in the summer, or in winter kept in a warm place, till the leaves become white and tender.

Malay.—*Chábatádi.*[1]

This species has been generally confounded with *Piper longum;* but a comparison of the figure above quoted from Rumphius, with that of Rheede's *Cattu-tirpali*, H. M. 7. p. 27. t. 14. will clearly evince them to be different.

The *Piper longum* is called in Sanscrit *Pippali*, in Hindí *Pipel*, and in Persian *Pilpili deráz.* The species now under consideration appears to be the same that is called in Sanscrit *Chavicá*, and in Hindí *Chab.* All the Sanscrit medical writers, as well as vocabularies of that language, concur in stating the produce of this plant to be *Gaja pippali* or *Gaj pipel.* This name was, however, assigned to a very different plant examined by Sir William Jones,* the *Tetranthera apetala* of Dr. Roxburgh.† And the fruit of a plant, very different from both, is sold under that name by the native druggists in Calcutta.

5. *Piper Latifolium.*

Fruit like the former. Leaves alternate, deeply cordate, obtuse, nine-nerved.

Mal.—*Gádú* or *Gádúkh.*

The leaves are used as a pot-herb.

Having seen only a small specimen, without fructification, which I know merely by description, I cannot speak with certainty of this species.

[1] [Probably, *Chábe táli.*]

* "Asiat. Res.," v. 4, p. 303. † "Pl. Corom.," No. 147.

TABLE EXHIBITING AN ESTIMATE OF THE EXPENSE AND PRODUCE IN 12 YEARS OF 100 ÚRLONGS PLANTED WITH PEPPER.

	Dr.		*Cr.*		*Balance.*	
	Sp.Dols.	P.	Sp. Dols.	P.	Sp. Dols.	P.
1st year, clearing of heavy timber by Malays, at $5 per úrlong.	500					
To the Chinese contractor, in the course of years, when he engages to deliver the plantation in full bearing, at $225 per 1,000 plants..... 22,500						
Of this in the first year... 8437 50	8437	50			8937	50 Dr.
2nd year, farther payment to contractor 4218 75	4218	75				
Interest of 1st year at 12 per cent.....	1072	50			14,228	75 Dr.
3rd year, in full to contractor 9843 75	9843	75				
22,500 00						
Interest in the 3rd year	1707	45			25,779	95 Dr.
4th year, interest	3093	59				
Supposing the plantation to be let during the first 5 years of bearing at 160 picols per lacsha, this will be 1,600 picols; which may be sold on the ground at $10.....			16,000		12,873	54 Dr.
5th year, interest	1544	82				
5th year's crop			16,000		1581	64 Cr.
6th year, interest			189	80		
6th year's crop...			16,000		17,771	44 Cr.
7th year, interest			2132	57		
7th year's crop.....			16,000		35,904	01 Cr.
8th year, interest			4308	48		
8th year's crop.....			16,000		56,212	49 Cr.
9th year, interest.....			6745	50		
The plants, being now in full vigour, may be let for 4 years more at 2 cattís each plant, or 2,000 picols; which is.....			20,000		82,957	99 Cr.
10th year, interest			9954	96		
10th year's crop			20,000		112,912	95 Cr.
11th year, interest			13,549	55		
11th year's crop			20,000		146,462	50 Cr.
12th year, interest			17,575	50		
12th year's crop			20,000		184,038	— Cr.[1]

[1] [See also (J. Anderson) "Relations of the Government of Prince of Wales Island," &c. (1824), pp. 10 ff. 29, 52; C. L. Blume, "Monographie der Oost-Indische pepersoorten," in "Verhandelingen van het Bataviaasch genootschap," vol. xi. p. 137 ff.; G. J. Filet, "Plantkundig Woordenboek," No. 4824–33; A. H. Bisschop Grevelink, "Planten van Nederlandsch Indië (1883), pp. 428–39; K. W. van Gorkom, "De Indische Cultures (1880), vol. ii. pp. 517–525; F. Jagor, "Singapore" (1866), pp. 62–64.]

XII.

ON THE LANGUAGES AND LITERATURE OF THE INDO-CHINESE NATIONS.

By J. Leyden, M.D.

["Asiatic Researches," vol. x. (1808), pp. 158–289.]

The inhabitants of the regions which lie between India and China, and the greater part of the islanders of the Eastern Sea, though divided into numerous tribes, and equally dissimilar in their languages and manners, may yet with propriety be characterized by the term Indo-Chinese. Situated between India and China, each of which proudly styles itself the most ancient among the nations of the earth, they have contented themselves with more modest claims to antiquity, and professed to borrow from one or other of their neighbours the principal features of their religion, laws and manners. The different periods, however, at which these were adopted in different countries, the various degrees of civilization, and the pre-existing habits on which they were engrafted, have produced a diversity of national characteristics, by which they are not only distinguished from the Indian and Chinese nations, but also from one another, notwithstanding their common mixed origin.

The intercourse of Europeans with the Indo-Chinese nations, though for the first two centuries after the arrival of the Portuguese in the East scarcely inferior to that which was carried on with India or China, was not of such a kind as to furnish us with a very accurate or extensive knowledge of their laws, manners, or literature, and for more than a century it has been rather declining than increasing. Neither, since our late rapid acquisitions in Indian languages and literature, have we obtained any important accessions to our information in this quarter, though both political and literary reasons seem to require them.

The materials of this imperfect sketch were chiefly collected in the course of a voyage which the state of my health caused me to take to the Eastern Isles in 1805, during which I resided some time at Penang, and visited Achi, with some other places on the coast of Sumatra and the Malayan Peninsula. Cultivating an intercourse with a variety of individuals of different Eastern tribes, I availed myself of the facilities which the situation presented, to correct the vague ideas which I had previously entertained con-

cerning their languages, literature, and the filiation of their tribes. Though my information was chiefly collected from native sources, yet it sometimes happened that these were not exactly such as I should have preferred, had better been attainable; and sometimes too, from the indifferent state of my health and other causes, I was not able to avail myself of these sources of information to the extent I could have wished. Feeling myself equally embarrassed by the extent of the subject, the difficulty of the research, and, perhaps I may add in some instances, by the novelty of the investigation, I should have hesitated to lay before the Asiatic Society these imperfect results, had I had any immediate prospect of pursuing the discussion. I do not, however, despair of being able, at no very distant period, to offer some more minute and correct views of several of the subjects treated here in a cursory manner; and at all events I trust this attempt to introduce order and arrangement into a subject at once so extensive and intricate, and to disentangle it from a degree of confusion which seemed almost inextricable, may not be altogether without its use, but may, even where I have failed, serve to point out the proper method of investigation.

The Indo-Chinese nations, at a very early period, seem to have generally embraced the system of Buddha. From the want of original historical documents, we can only conjecture the period at which this event took place in the different regions over which it has extended; but at present it is chiefly confined to the continent. The coasts of the Malayan Pensinula and the greater part of the Eastern Isles are chiefly occupied by the Moslems. The original inhabitants, therefore, being for the most part confined to the interior of these islands, are still very imperfectly known to Europeans, so that it is often impossible to determine whether their religious institutions are most connected with the tenets of Brahma or Buddha, and often to reduce them to any known system. From the names and epithets, however, of some of their deities, even as given in the vulgar and incurious manner of common navigators, it is often easy to discover their connection with the grand features of Hindu superstition; but our notices concerning them are generally too scanty, and our narratives too erroneous, to enable us to classify them with absolute certainty. Such is the difference of Oriental and European manners that the simplest narrator is apt to mingle conjecture with observation, while an absurd affectation of superior sagacity and a disdain of vulgar superstitions and prejudices, often prevent those who have had the opportunity of observation from detailing the most useful pieces of information, or induce them to reject, as anile and useless fables, the mythological narratives which would enable us to determine the origin of a nation or a tribe.

With the exception of the Malays, and perhaps some rude tribes

of mountaineers, the nations who occupy the countries which extend from India to China, profess only one religion, and adhere almost solely to the system of Buddha. In so vast an extent of country some diversity of local institutions is always to be expected; but the spirit of the system and its influence on the manners of the people, in the same state of civilization, is essentially the same from Chatigan to China. This system in its grand features identifies itself with that which prevails in Nepal, Bután, and Tibét, and has extended itself over the immense regions of Chin, Cham, and Japuén, or China, Tartary, and Japan. Though it does not appear that all the nations who occupy this prodigious extent of territory employ the same learned language in the preservation of their sacred books and religious tracts, yet this is the case with the Indo-Chinese nations, who, with the Singhalese, or inhabitants of Ceylon, uniformly employ the Bali or Pali, in the sacred compositions of the Buddhist sect. This language does not exist as a vernacular tongue, but is the language of religion, learning, and science, and appears to have exerted an influence over the vernacular languages of the Indo-Chinese nations, similar to that which the Sanscrit has exhibited among the popular languages of Hindustan and Dekhin.

The Malayan language, and the more original languages of the Eastern Isles, seem in their original formation to have been polysyllabic, like Sanscrit, Pali, and the spoken dialects of India. The modifications which these languages have received from a foreign source, seem for the most part to have been effected rather by the immediate agency of Sanscrit than of Pali, though the influence of this latter is not to be entirely excluded. But several of them have been a second time modified, by the introduction of Arabic, as the language of religion and learning, after the conversion of several of these tribes to the Mahummedan faith.

The vernacular Indo-Chinese languages on the continent seem all to be, in their original structure, either purely monosyllabic, like the spoken languages of China, or they incline so much to this class, that it may be strongly suspected that the few original polysyllables which they contain have either been immediately derived from the Pali, or formed of coalescing monosyllables. These languages are all prodigiously varied by accentuation, like the spoken languages of China, and every foreign modification which they have received seems to have been immediately derived from the Pali.

In the paucity of existing monuments relative to the Indo-Chinese nations, no better method presented itself, either for classing their tribes or laying a foundation for historical researches, than by examining the mutual relation of the several languages which are current among them. This method, when applied on

an extensive scale, is always the surest clue for developing the origin of a nation, and indicating the revolutions to which it may have been subjected, either by foreign conquest or colonization. After the relations of the language itself, the ancient monuments and compositions preserved in it claim our regard ; and I have therefore noted, under their respective heads, such as have come to my knowledge ; premising that my opportunities of procuring this species of information have been very unfavourable, and of examining them, very limited.

The Indo-Chinese languages may be considered in the following order :—

Polysyllabic Languages.

1. Maláyu.
2. Jáwa.
3. Búgís.
4. Bima.
5. Batta.
6. Gála or Tăgála.

Monosyllabic Languages.

7. Rukhéng.
8. Bárma.
9. Môn.
10. T'hay.
11. Khôhmén.
12. Lâw.
13. Anám.

The Learned Language.

14. Pali.

I. *Malayu.*—The Malayu language, so pronounced in the Malaya Peninsula, but by Europeans generally denominated Malay, is used by the numerous and enterprising nation of that name, who are termed Khék by the Siamese, and Măsú by the Barmas.[1] This language, which from its sweetness has been termed the Italian, and from its widely extended use the Hindustáni of the East, though it coincides with the monosyllabic languages in its general construction and analogies, is properly polysyllabic in its form. Having spread itself over a great extent of country, not only in the Malaya Peninsula, but far among the Eastern Isles, and having been propagated by a race more skilled in arms than in letters, it has branched out into almost as many dialects as states, by mixing in different proportions with the native languages of the aboriginal races. This is the circumstance which renders the investigation of the origin and relations of the Malayu language a matter of difficulty, as it becomes necessary to examine the history of the nation, as well as the structure and composition of the language itself. Though used by a nation of comparatively late origin, at least with respect to the principal

[1] [The Burmese word is *Pashú*, which is also used in Karen along with *Pathé*. In both languages *Pathí* is the common term for a Mohammedan. The Siamese word *Khêk* (*Khik* in Shan), is a general term for a stranger, a foreigner, and requires the addition of the determinant *Maláyu* to convey the meaning "a Malay."]

features which it at present presents, the history of this nation is still very obscure, rather, it may be presumed, from the want of investigation than from the want of materials for its illustration. The history of the origin and progress of the Malayu tongue of course partakes of this obscurity; but notwithstanding the great diversity which occurs in the spoken dialects, in the bazaar jargon, or, as the Malays term it, the Basa Dagang, of the several Malay States, the Basa Jawi, or written language of composition, is nearly the same in all; and the popular or vernacular languages are reckoned pure in proportion as they approximate to the written language.

Assuming therefore the Basa Jawi as the standard of comparison, the Malayu language in its present state consists of three principal component parts. The first of these, which is rather the most copious and current in the language of conversation, may perhaps, in the present state of our knowledge, be regarded as original, though it is not only connected with the insular languages, but with some of the monosyllabic, as Bárma[1] and T'hay. The second, which is obviously derived from the Sanscrit, is rather inferior in the number of vocables to the first, though, as far as regards general use, greatly superior to the third part, which is derived from the Arabic. As a spoken language, the Malayu exists in the greatest purity in the tin countries, or the peninsula of Malaya, which is obviously the Temala of Ptolemy. Temala is a regular derivative from the Malay vocable *tema*, which signifies tin, and from this, among other circumstances, we may be permitted to infer the high antiquity of the basis of the Malay language from its giving name to the Cassiterides of the East. The Malayu language is spoken in its greatest purity in the States of Kiddeh or Tanna Say, Perak, Salangór, Killung, Johór, Tringgano, Pahang, and as far as Patani, where it meets the Siamese. Among the western Malays in general it is spoken with more purity than among the more easterly isles, but on the coast of Sumatra, or Pulow Purichu,[2] it is intermixed with the Batta and other original languages. The Menangkábow race, who seem at an early period to have ruled the whole island of Sumatra, whose chief assumes the name of Mahá Rájá of Rájás, and derives his origin from Lankápúra, speak a dialect of Malayu which differs considerably from that of the peninsula;[3] but which seems, as far as I can judge, to coincide in many respects with

[1] [Burmese has no affinity with Malay.]

[2] [According to Van der Tuuk ("Malay Dict.," 1880), Pulo percha, "the gutta-percha island;" according to the Abbé Favre and Prof. Pijnappel, in their Malay Dictionaries, percha is i.q. martya, "the inhabited world." This opinion was first propounded by Van der Tuuk in his "Bataksch Woordenboek" (1861), s.v. *morsa*.]

[3] [On the dialect of Menangkabow, see the third section of "Midden-Sumatra" (Leiden, 1880), part i.

the Jawa or Javanese language. The race have probably derived their origin from Lankápúra in Java. The Malayu dialect of Riyow and Linga seems to be mixed with Javanese, as are those of the Malay States on the island of Java. The dialect of Púntiana and Sambas is purer than that of Borneo or of Banjar; but that of Passír, on the east coast of Borneo, is greatly mixed with the original language of Celebes, or the Búgís. The Malays of Celebes speak a dialect greatly mixed with Búgís, while those of the Moluccas and the more eastern isles have adopted such a multitude of foreign words that their dialect sometimes seems to be quite a different language. The simplicity of structure which the Malayu language possesses, in common with those of the monosyllabic class, greatly facilitates this adoption of foreign terms; and the practice is so prevalent in the more easterly isles, that the term Basa Timor, or the Eastern language, is currently applied to every kind of jargon.

As the Malayu language, from its wide extent and the adventurous spirit of the nation, seems to have exerted in the Eastern Isles a modifying influence similar to that of the Sanscrit in Hindustan and Dekhin, and of the Pali among the Indo-Chinese nations, it becomes necessary to examine it somewhat more particularly, especially as some of the opinions I have been led to adopt concerning it are somewhat different from those which have been entertained by names of great authority.

The Malay language, according to Marsden, whose opinion has been rather admitted than confirmed by Sir W. Jones, is "a branch or dialect of the widely extended language prevailing throughout the islands of the archipelago to which it gives name (which may be understood to comprehend the Sunda, Philippine, and Molucca islands), and those of the South Sea; comprehending, between Madagascar on the one hand and Easter Island on the other, both inclusive, the space of full 200 degrees of longitude. This consideration alone," adds that able author, "is sufficient to give it claim to the highest degree of antiquity, and to originality, so far as that term can be applied. The various dialects of this speech, though they have a wonderful accordance in many essential properties, have experienced those changes which separation, time, and accident produce; and, in respect to the purposes of intercourse, may be classed into several languages, differing considerably from each other."* In another paper, published in the "Archæologia," vol. vi., this able author has successfully exhibited a variety of instances of coincidence, both in sound and signification, between the Malay and several of the Eastern dialects. By attempting to prove too much, however, I apprehend that he has failed essentially. He has pointed out a few coincidences, but has left the mass of the language totally

* "Asiatic Researches," vol. iv.

unaccounted for; and as the few coinciding words may all have been derived from a common source, it is perhaps a more natural inference to conclude that they have all been modified by some general language, than, with Sir W. Jones, to determine that the parent of them all has been the Sanscrit. The same author, in his History of Sumatra, seems inclined to think that the Malay language was indigenous in the Malay Peninsula, from which it extended itself among the Eastern Isles till it became the *lingua franca* of that part of the globe. The author of the description of Siam, in the modern part of the "Universal History," not only assigns a very different origin to the language, but accounts in a very different manner for its uncommon extent. Describing Malacca, he observes: "The Malayan tongue is formed out of the languages of the different nations which resort hither, by selecting the choicest words in each. Hence it is reckoned the most agreeable and elegant in all the Indies, which quality, joined to its use in trade, causes it to be learned by the remotest Eastern people." A language formed according to this ingenious idea of selection might probably be remarkably agreeable and elegant, but it would be still more remarkable as a new phenomenon in the history of nations. It would certainly be a very uncommon occurrence in the history of mankind to discover a nation so choice in matters of abstract sound, and so refined in their organs of hearing, as to take the trouble to learn a copious and unknown language for the mere abstract pleasure of gratifying this delicate sense or appetite for sweet vocalic sounds. Nevertheless, though the author is a little unfortunate in his doctrine of causes, the fact to which he alludes is worthy of attention; for it is not necessary to possess a very minute knowledge of the Malayu language to be able to call its originality in question. It may be safely affirmed that neither the Malay *lingua franca* of commerce nor any of the maritime dialects of Malayu existed previous to the era of Mohammed, in a state similar to that in which they appear at present; and these dialects seem to comprehend all that are usually included under the denomination of the Malayu language.

The Malayu language, in this limited sense, is obviously indebted to two foreign sources for the majority of the vocables which compose it, and these are the Sanscrit and the Arabic.

The connection between the Sanscrit and Malayu was first remarked by Sir W. Jones, and Mr. Marsden has confirmed the fact by about fifteen examples, selected, as he says, with little pains, from a Malay dictionary, which, had he been acquainted with the Sanscrit language, he might with very little labour have extended to fifteen hundred, or perhaps five thousand. Many of the Sanscrit words in the Malayu, as he observes, are such as the progress of civilization must soon have rendered necessary, being

frequently expressive of mental feelings or such modes of thinking as naturally result from the social habits of mankind, or from the evils which tend to interrupt them. Many of the names of the common objects of sensation are also of Sanscrit origin; nevertheless, the simplest part of the Malayu language, and that which is most indispensable to its existence as a distinct tongue, is certainly not derived from the Sanscrit.[1]

With respect to the connection between Arabic and Malayu, Marsden observes that the latter language abounds with Arabic words, which writers affect to introduce because this display of literary skill is at the same time a proof of their religious knowledge. He adds, that these words are generally legal or metaphysical terms, borrowed from the Koran or its commentaries, that they are never expressive of simple ideas, are rarely used in conversation, and, with few exceptions, seem never to have been thoroughly incorporated into the language. This account of the introduction of Arabic into Malayu is unexceptionally just, excepting with respect to the use of Arabic terms in conversation, which is affected by all Malays who have any pretensions to literature. The number of Arabic vocables, too, that have been introduced into Malay compositions, though certainly inferior to those of Sanscrit origin, are considerably more numerous than might be supposed from this statement; or rather, as in Persic and Turkí, it is difficult to assign any bounds to their introduction but the pleasure of the writer. It may also be observed here, that in the Malayu language Arabic plurals are very commonly used as singulars, as often happens in Turkí and other dialects which admit of a mixture of Arabic. Marsden has mentioned another peculiarity, in which the Arabic vocables adopted by the Malayu differ from adopted Sanscrit terms. While the Arabic words retain their peculiar and harsh pronunciation, those of Sanscrit origin are softened down and assimilated with the rest of the language. This observation must likewise be taken with many limitations; for numerous words of Arabic origin are so completely assimilated to the Malayu pronunciation, that they are no longer capable of being recognized, even by a native Arab, unless by attention to their radicals; the *ain* and *ghain* in particular, except in religious terms, are generally converted into *Alif* and *Gaf*, both in writing and pronunciation. It is certain, however, that Arabic words are naturally intractable, and are apt to have a foreign appearance when assumed into any other language, in spite of all modifications. The Arabic is a language so complete in itself, and so peculiar in its structure, that it is as little capable of coalescing neatly with any other language as a curved line with a straight one.

Marsden has likewise hazarded an opinion that the polish which

[1] [See above, p. 55, note.]

the Malayu has derived from Sanscrit or Hinduví, has been obtained immediately from the natives of Guzerat, previous to the debasement of the genuine Hinduví of the northern provinces by the mixture of Arabic nouns and the abuse of verbal auxiliaries. The resort of the people of Guzerat to Malacca, he adds, "is particularly noticed by De Barros and other authentic writers; and it is well known that the Hindu language has been preserved with more purity in that than in any other maritime province of India." To this it is sufficient to answer that the Sanscrit vocables adopted in Malayu and Guzeráti, are generally preserved purer in the former than in the latter; that the Guzeráti has no pretensions to be considered as a pure dialect of Hinduví, but, on the contrary, is one of the very first that was corrupted by a mixture of Arabic, and that long prior to the period mentioned by De Barros. The Bengáli language itself, corrupted in pronunciation as it certainly is, might have been more safely adopted as the medium for the introduction of Sanscrit vocables into Malayu. Many Sanscrit words that are in current use in Bengáli likewise occur in Malayu, with almost the very same pronunciation. Of this it is easy to produce a multitude of instances. The following are such as present themselves spontaneously :—

Bengáli.	*Malayu.*	
Tot'hapi	Tatapi . .	but, however.
Punăh	Pún . . .	farther, again.
Tatkálé	Tatkala . .	then.
Bongsh	Bangsa . .	a race or family.
Kichhu or Kichhi	Kichi . .	a little.
Inggit, a signal	Ingat . .	notice, memory.
Barang, a gift, a thing, a quality .	Barang-barang .	anything.

But it is needless to adduce further instances, as the Malay history and language itself exhibit traces sufficiently clear to direct us to the region with which the Malays had the most frequent intercourse at an early period, and from which their language seems to have received the most considerable modifications, and that is the ancient kingdom of Kalinga. Here I am again under the necessity of dissenting from Marsden's opinion. He says: "It is evident that from the Telinga or the Tamool the Malayan has not received any portion of its improvement." I apprehend that the express reverse of this opinion is evident, for the Malays at this very period know the Coromandel coast by no other name than Tanna Keling, the land of Keling or Kalinga: a multitude of compositions current among them profess to be translations from the Basa-Keling, or Kalinga language; and the Malayu language contains a great number of words that are Tamul, Malayâlam, and Telinga; though neither Sanscrit, Hinduví, nor Guzeráti; and a variety that are only to be found in Telinga, the vernacular language of the Kalinga Desa.

For the same reasons that I infer an ancient intercourse to have subsisted between the Malays and Kalingas, I am induced to think that a very intimate connection subsisted at a very early period between the Malays and Javanese. Not only the proximity of the island of Java and the constant intercourse between the Malays and Javanese point to this connection, but the whole of Malay literature, the state of the language, and the whole series of Malay history confirm it. It is from the Javanese that the Malays profess to have received all their earlier mythological fables, and a great variety of their books profess to be translations from that language. Even in compositions professedly translated from the Keling language the Javanese name of the story is often mentioned, and almost every Sanscrit term that occurs in Malayu is likewise to be found in the Basa Dalam Jawa, the high language of Java, or rather the language of the interior, though a multitude of Sanscrit words current in the Javanese language are not to be found in the Malayu. Besides, many of the Malay States, and those of the greatest antiquity, are known to have been founded by Javanese adventurers anterior to the arrival of the Arabs; and if the historical traditions of the Malays were better known, there are many reasons for supposing that more of them would be found to claim the same origin.

The greater part of the words of Sanscrit origin found in Malayu do not appear to have been introduced through the medium of the Bali. In many instances the Malayu form approaches nearer the pure Sanscrit than even the Bali itself, and many mythological stories exist in Malayu, and mythological characters are introduced in them, that, as far as I have been able to learn, do not occur in Bali compositions at all, nor in any of the Indo-Chinese languages of the continent.

But after assigning the Arabic and Sanscrit vocables to their proper sources, a large proportion of words in the language will still remain unaccounted for; and these, words, too, expressive of the most simple class of our ideas, and the most remarkable objects in nature. This part of the language, which, in comparison of the rest, may be termed native or original, Marsden attributes to what he reckons the original insular language of the South Seas; and this original language, again, Sir W. Jones pronounces a derivative from the Sanscrit. That it is not Sanscrit, a very slender knowledge of the two languages is sufficient to evince; and if this original part should itself turn out to be derived, as I apprehend, from different sources, the idea of an original insular language will fall to the ground. Now there are a variety of reasons for supposing that this part of the Malayu language, which might be imagined the most simple and original, is in reality more corrupted and mixed than those parts which are confessedly derived from a foreign source. Several of the

Malayu terms, which express the most simple and remarkable objects in nature, appear to be only gross auricular corruptions of true regular terms in the more ancient Eastern languages, as Jawa, Búgís, T'hay, and Barma; and many of the simplest objects are not distinguished in Malayu by simple words, but by compound metaphorical and significant terms. The omission of the first syllable in words derived from a foreign language, whether ancient or modern, is a frequent practice in the Malayu language: thus the Sanscrit *Avatara* becomes *Bitara*, and thus *rambulan*, the moon in Javanese, becomes *Búlan* in Malayu; and *Môputi*, which signifies white in Búgís, becomes *puti* in Malayu.[1] Again, the metaphorical term *mata-hari*, which literally signifies the eye of day, is the only native term for the sun; though *Chinkerwala*, a corruption of the Bali term *Chakrawala*, has been adopted in the higher dialect, or poetical style, termed the Basa Dalam. The Malay term *tuhan*, which signifies *the aged*, is used as synonymous with *Allaht'aala*, which they have adopted from the Arabic. A number of T'hay vocables occur in Malayu; but for the most part they are neither expressive of our simplest ideas, nor of the most remarkable objects in nature, excepting perhaps *ku*, the contracted term of *Aku*, I, in Malayu, which is the same in T'hay or Siamese. A variety, however, of important words seem to have been adopted from the Barma language, especially in the verbal auxiliaries; and in most of these instances it may be observed that the Malayu pronunciation coincides better with that of Tavay, or Tinnau, than with that of the Barmas proper. Thus the substantive verbal auxiliary of the present *adda*, seems to be only a modification of the more simple *da* or *dé* of the Barma language, the past *suda* of the Barma *syi-dé*, the auxiliary of the future *jadi* of the Barma *ra-dé*, pronounced *ya-dé* or *ja-dé*; *mâw*, will or may, is a modification of the Barma *mi*, or *minh'*, and the permissive auxiliary *léh* of the Barma *lé*. Of the connection of the Malayu with any of the spoken dialects of China, it is more difficult to speak with accuracy, in the present state of our knowledge. Barrow, and some other authors of reputation, are inclined to attribute the origin of the Malay tribes to the nations of China; and that author observes that many words, in the languages of Sumatra, are similar in sound to Chinese vocables; and that the corresponding words generally express the same idea in both languages. Of the value of this opinion it is not easy to speak in correct terms, for the proper Chinese languages are at least ten in number, and the dialects of Sumatra vary almost as much on a small scale as the dialects of the Chinese; and to jumble together a number of corresponding words in all those dialects, may there-

[1] [*Batára* is more correctly derived from Sanskrit bhaṭṭára. The Javanese has *bulan* and *rĕmbulan*; the latter form has the prefix *ra*, which appears also in *radit*, "sun." The Búgís word for "white" is *púte; má* is a prefix.]

fore be no very difficult task. Some coincidences there certainly are between the Malayu and the Chinese-Mandarin language; thus in the first personal pronoun, *saya* and *gua*, which both signify *I* in Malayu, very nearly coincide with the Chinese *seaò* and *ngo*, which have the same signification;[1] but on the whole these coincidences seem neither very numerous nor important.

The Malayu language is extremely well fitted for being a *lingua franca*, or general medium of communication among the Eastern Isles, by the smoothness and sweetness of its tone, and the simplicity of its structure and construction. Its simple pronouns indicate rank and situation, and are almost as numerous as in Chinese; but the different dialects of the Malayu vary considerably, both in the use of the pronouns and of the verbal auxiliaries. It may also be observed that the more mixed and impure any dialect of Malayu is, it is more verbose, more indefinite in its expressions, and more loaded with useless auxiliaries and epithets, which encumber the language, without adding either elegance, force, or dignity. The beauty and elegance of the Malayu is its simplicity, and the purity of its minor dialects may often be ascertained by this criterion alone.

The literature of the Malays, though the language is well adapted for poetry, is not distinguished by many features of originality. A degree of monotony and repetition occurs in all the compositions of the monosyllabic languages, which has a great tendency to damp the ardour of composition and extinguish poetical fire. The construction of the Malayu is analogous to that of the monosyllabic languages, and there is also considerable similarity in the character of its compositions. The most favourite species of composition among the Malays is the Pantún, a word which is generally translated song, but which perhaps might with more propriety be rendered simile or proverb, as it consists of a simile, proverb, or apophthegm versified, and its application. A Pantún is a rhyming quatrain, and is always restricted to four lines; hence it affects a kind of oracular brevity, which is very difficult to be comprehended by Europeans, who can seldom perceive any connection between the similitude and the application. The Malays allege that the application of the image, maxim, or similitude, is always accurate; but it may be suspected that if one-half of the verse be for the sense, it often happens that the other is only for the rhyme; as in the ancient Welsh triads or triplets, in which there is professedly no connection between the natural image and the moral maxim. These Pantúns the Malays often recite, in alternate contest, for several hours; the preceding Pantún always furnishing the catch-word to that which follows,

[1] [*Sáya* is an abbreviated form of the Sanskrit *sahâya*, "slave," whereas *gua* is a purely Chinese word, *goa* being the pronoun of the first person in the Amoy dialect.]

until one of the parties be silenced or vanquished, or, as the Malays express it, be dead (*suda mati*). Many of these Pantúns bear no inconsiderable resemblances to the Dohras and Kabitás in the ancient Hinduvi and Vraja dialects of Hindustan.

The Sáyer[1] is another species of composition which is analogous to the Persic Mesnevi. Moral poems, resembling the Pendnaméhs of the Persians, didactic works, or descriptive compositions and legendary or heroic narratives, are composed in this measure. The Cheritra or Hikaiat, also denominated Chitra and Kuggawin, from the Javanese, is more generally written in prose, but frequently intermixed with verse, both in the measures of the Sáyer and Pantún. These Cheritras contain the mythological stories current among the Malay tribes, and also fragments of their history, embellished in a poetical manner. The three great sources of all the Malay legends are the Javanese, Keling, and Arabic languages, but in the compositions of later date, the characters and incidents are so mixed that it is not always easy to determine to which of these sources they ought to be referred. There is also one class of stories which the learned Malays term Susupan, I imagine from an ancient dynasty of Javanese princes to whom they relate. Some of these legends also coincide in the general story with those of the Siamese, as the Malay Selimbari with the Siamese Khúnp'hen; and the Hikaiat Shah Murdan with the Siamese Lín-tông.[2] When characters familiar in Sanscrit mythology are introduced into the Malay legends, their adventures are generally transferred by the Malays to the interior of Java; and even Arabian characters are often represented as performing their adventures in the Malay countries. Many of these narratives exist both in prose and verse, and of several there seem to be two editions: one derived immediately from the Javanese language, and which commonly contains a considerable number of Javanese vocables; the other from the Kelíng, which often contains a certain proportion of words more immediately derived from the Sanscrit and Telinga.

Of this latter class are probably the narratives termed Hikaiat Pindawa, or Pandu stories, which seem popular versions, or rather abridgments, of the different parts of the "Mahabh'árata;" some of which, in reality, give the outline of the story as faithfully as the popular abridgments of it, which I have perused in "Mahráta," "Tamul," or "Telinga." I am only acquainted with the following Malay Hikaiats of this class:—"Pindawa Lima," the story of the

[1] [This is the Arabic *sha'ir*. See on the various kinds of Malay poetry, J. J. de Hollander's "Handleiding bij de beoefening der Maleische taal-en letterkunde" (1882), pp. 301–322.]

[2] [See on the Sha'ir Sí Lembári, "Tijdschrift voor Ned. Indië," 1849, vol. i. p. 388. The Hikáyat Sháhi Merdán is better known under its other titles, H. Bikrama Ditya Jaya and H. Indara Jaya. See L. W. C. van den Berg's "Verslag van Maleische, &c., handschriften" (Batavia, 1877), p. 27; and De Hollander's "Handleiding," p. 347.]

five Pandús ; "Pindawa Jaya," the victory of the Pandús ; "Pindawa Berjuddí," the gaming of the Pandús ; "Pindawa Pinjam báli," the Pandús borrowing a palace ; "Pindawa berjewal kapur," the Pandús selling lime. The "Hikaiat Maha Raja Buma of Purichu Nikassan," or account of the contest between Brahma and Vishnu, professes to be translated from the "Keling" of the dramatist Mungakarta Nigára. The "Sah-Sipundia," or history of a Keling Rajah, is probably derived from the same source. The "Hikaiat Sri Rama" is reckoned a Susupan story ; as are the "Kusoma Indra," or history of Indra ; the "Balinta Sena," the "Sah Kóbut," or history of the war with the Apes ; the "Rajah úlar Ninggawong," the "Hikaiat Bida Sari," the "Hikaiat Rjaa Pikermadi," or Vicramaditya Cheritra, the "Hikaiat Derma Rajah," and the "Hikaiat Kalil o Damna," or Malay version of the "Kalil o Damna."

The following are Javanese relations :—The "Hikaiat Chikkil Wunnungputti Rajah of Kirripún, in the interior of Java ;" the "Hikaiat Jarana Tamasa," or the love adventures of a chieftain of Minjapahit in Java, composed by Andika ; the "Kilana Perbujaya Cheritra," or story of a Prince of Kirripún ; the "Misa Perbujaya Cheritra ;" the "Misa Kiamong Cheritra," or history of a Princess of Daha in Java, carried off by Tímúngúng Bapang Chakar Bima, and rescued by Bitara Kala ; the "Jaran Kilinang Cheritra ;" the "Ratu Bader Kisna Cheritra ;" the "Panja Witin," or history of Inu Kurtaputti ; the "Gambar Wira-Putra ;" the "Gambar Sri Ratu Anúm-Aní Malayu," or history of Gambar Sri, Princess of Daha and Rajah Anúm of Malaya ; the "Naga Bisaru," or history of a Princess of Daha, who was transformed into a snake and confined in a lake ; the "Putti Kola Bisnu," or history of Vishnu ; the "Kinta-Buhin," or history of a chief of Banjarkulin in Java ; the "Kilana Jayang Sittru," or history of Radin Jaran Tinanglu ; the "Angling Dermavi Raja-Cheritra," and the "Hikaiat Parang Púting," or history of the hatchet without the handle. To the same source are probably to be referred the following, if they are not purely of Malay composition :—The "Hikaiat Pelandúk Jinaka," or history of the sagacious hogdeer ; the "Hikaiat Búrúng Pinggey," or history of a wonderful bird ; the "Deva Mandû Cheritra ;" the "Sayer Sri Batin ;" the "Hikaiat Bian," and the "Hikaiat Rajah Booda'k."

The following are modifications of Arabic narratives, accommodated, however, to the peculiarities of the Malayu manners and customs :—The "Hikaiat Amir Humda ;" the "Hikaiat Rajah Kheiber," the chief of the Jewish tribe of Kheiber in Arabia ; the "Hikaiat Rajah Hinduk ;" the "Hikaiat Mahummed Hanifah ;" the "Hikaiat Khajeh Maimún ;" the "Hikaiat Eblis ;" the "Hikaiat Rajah Shah Murdan ;" the "Hikaiat Sultan Ibrahim-ibn-Adhem ;" the "Hikaiat Sekunder Dulkhar-

neiní." The Koran is also translated into Malayu in the same paraphrastic manner as into Persic.

There are many Malayu compositions of a historical nature, though they are not so common as the classes that have been enumerated: such as the "Hikaiat Rajah-bangsu," which I have not seen, but which has been described to me as a genealogical history of the Malay Rajahs. The "Hikaiat Malaka," which relates the founding of that city by a Javanese adventurer, the arrival of the Portuguese, and the combats of the Malays with Albuquerque and the other Portuguese commanders. The "Hikaiat Pitrajaya-Putti," or history of an ancient Rajah of Malacca; the "Hikaiat Achí," or history of Achí or Achin in Sumatra; and the "Hikaiat Hang-Tuha," or the adventures of a Malay chief during the reign of the last Rajah of Malacca, and the account of a Malay embassy sent to Mekka and Constantinople, to request assistance against the Portuguese. Such historical narratives are extremely numerous; indeed there is reason to believe that there is one of every State or tribe; and though occasionally embellished by fiction, it is only from them that we can obtain an outline of the Malay history, and of the progress of the nation. The juridical customs or traditions of the Malays have likewise been collected into codes of different antiquity and authority. Among those of the greatest authority are the "Undang Undang," and the "Addat Malayu." The most ancient of these regulations, however, appear to have been adopted from the Javanese and Búgís. Particular States have at different periods composed peculiar regulations; as the "Addat Kiddeh," which were compiled by Rajah Shah Alum, in An. Heg. 1151.[1]

No dramatic compositions in the Malayu language have fallen as yet into my hands, though many of them are said to exist. Scenic exhibitions termed "Wayang-wayang" were till lately very common in the peninsula of Malayu, but are now represented as less frequently exhibited. The subjects of the Malayu dramas are the same as those of their histories and romances, from which, like the dramatic compositions of the Siamese and Chinese, they only differ in assuming the form of dialogue and soliloquy, the progress of the incidents being generally the same.

The following specimens of the Malayu Pantún and Sayer will exhibit the measure of the verse and the style of the composition.

[1] [An account of most of the works above specified, with the titles more correctly given, will be found in Van der Tuuk's description of the Leyden collection, now in the India Office, in "Tijdschrift voor Nederlandsch Indië," 1849, i. pp. 385-400; "Journal of the R. As. Society," N.S., vol. ii. pp. 85–135; "Bijdragen voor de taalkunde," Third Series, vol. i. pp. 409–76; vol. v. pp. 142–78; vol. vi. pp. 96–102; L. W. C. van den Berg, "Verslag van eene verzameling Maleische, &c., handschriften" (Batavia, 1877); and J. J. de Hollander, "Handleiding bij de beoefening der Maleische taal en letterkunde" (Breda, 1882), pp. 308–76.]

The first Pantún is a challenge to engage in a poetical contest. The rest exhibit the peculiar images introduced, and the manner of presenting them in the Pantún :—

Tuan bulu, saya tumíang
Marileh kita berkiler taji
Tuan sapulu, saya súmbilan
Marileh kita bersindír-nyani.

You are a bamboo and I am but a slender twig,
Yet come on, let us sharpen our weapons ;
You are as ten, and I am only as nine,
Yet come, let us contend in ironical verse.

Boah dalima berpangsu pangsu
Sama juga bijinya merah
Jangan tuan berpilis bangsu
Sama juga daranya merah.

The pomegranate has many partitions,
But the seed is equally red in them all :
Do not give an undue preference to a race of men,
For the blood is equally red in them all.

Boah mamplum deri Pataní
Masa sabiji de kulum rúsa
Tuan Islam saya Nasrani
Sama sama menangung dúsa.

Of all the mangoes of Pataní,
A ripe one is but a mouthful to a stag ;
You are a Moslem and I a Christian,
But we must equally bear our own faults.

Batang padi jangan de rúrút
Kalu de rúrút rúsak batangnya
Hati muda jangan de túrút
Kalu de túrút rúsak badanya.

Shake not the rice stalk,
If you shake it the stalk is ruined ;
Do not yield to youthful inclination,
If you yield your person is ruined.

Siri kúning deri Pataní
Pinang muda deri Maláka
Puti kúning anak Nasrani
Itu membawa badan chilaka.

The yellow betel-leaf of Pataní,
The fresh betel-nut of Malacca,
A white yellow Christian damsel,
Bring a person to total ruin.

The following passage of the "Sélimbari" is given as a specimen of the Sayer verse, in which the Malay romances and moral poems are generally composed. In both measure and style they exhibit considerable resemblance to the ancient English and French

romances; there is little variety of pause or accent, and the line consists indifferently of eight or nine syllables, one long syllable being reckoned equivalent to two short:—

Tatkala tuan lankah de natang
Mata mamandang separti bintang
Chahianya limpah gilang gumilang
Teadalah abang dapat mamandang
Pipinya bagei paü de lalang
Bersambút dangan lehernya jinjang
Paras separti gumbar dan wayang
Barang de makan berbayang bayang
Dahinya bagei sahari búlan
Keningnya bentúk bagei detelan
Lalu de ambil jadikan túlan
Mamákei chinchin permata Sélun
Changgeynya panjang berkílat kílat
Separti mutiara sudah terikat
Pinggangnya ramping terlalu chantík
Leher laksana gumbar delarik
Mangluarkan kata yang patáh cherdik
Bibirnya bagei patey chicharík
Teada mamáki laku bersaja
Giginya itam bakas berbaja
Chantik molik gilang de Raja
Bersúnting kútum búnga Seraja,
Parasnya elók búkan kapalang
Antahkan jiwa garangan hilang
Kapada mata sudah terpandang
Teadalah dapat kumbali pulang.[1]

When my mistress looks forth from her window,
Her eye sparkling like a star,
Its brilliant rays glancing and glittering,
Her elder brother cannot support its lustre;
Like the red mango is the hue of her cheek,
Becoming her tapering neck,
Traversed with shadows whenever she swallows;
Her features like those of a statue or scenic figure,
Her forehead like the new moon in its first day,
Her eyebrows curved, so fair I could devour her,
Long has she been chosen to be my mistress.
Wearing a ring set with the gems of Ceylon,
Her long nails shining like lightning,
Transparent as a string of pearls,
Her waist slender and extremely elegant,
Her neck turned like a polished statue,
Eloquent in the enunciation of her words,
Her parting like the crimson red wood
Not by dress, but by herself adorned;
Black are her teeth stained with baja powder
Graceful, slender, appearing like a queen,
Her locks adorned with the Seraja flowers,
Her features beautiful with no defect of symmetry.

[1] [This extract is not to be found in Leyden's own copy of Sí Lembári, now in the India Office Library, No. 2609.]

My soul is often fluttering ready to depart,
Glancing eagerly forth from my eyes,
And quite unable to return to its station.

The character generally used by the Malays is a modification of the Arabic; and in addition to the proper Arabic alphabet the Malayu uses six letters, of which one is the Persic *ché*, a second the slurred *dal* of the Hindustani; two more correspond in power to the Persic and Hindustani *pa* and *ga*, but are written of a different form; and the remaining two, *nga* and *nya*, are peculiar in form, but correspond to the nasals of the first and second series of the Deva-Nagari alphabet. The Malays of Java, however, often use the Javanese character to express their own language, as those of Celebes do the Búgís. In the Moluccas, the Latin character has obtained some degree of currency even among the Malays, and is sometimes used by them to express the Malayu language.

The Malayu language was one of the first cultivated in the East by Europeans. The first attempt[1] to form a grammar or dictionary of it, as far as I know, was made by David Haex, who published in Malayu and Dutch a vocabulary, with some grammatical observations. At the request of Cardinal Barberini, the Dutch was rendered into Latin, and published with the Propaganda types at Rome in 1631, under the title of *Dictionarium Malaico-Latinum et Latino-Malaicum, operâ et studio* Davidis Haex. This is a work of some merit, but seems to have been composed in the Moluccas, and inclines to the Basa Timor, or eastern dialect of the Malayu. The author has given a short list of Tarnata and Portuguese words that have been adopted into Malayu, and some useful observations on the phraseology. Professor Thunberg, probably by mistake, mentions this work as published in 1707. It seems to have served among the Dutch as a basis for similar compilations. The *Malaica Collectanea Vocabularia*, or Collection of Vocabularies, was printed at Batavia in 1707–8, in two vols. 4to; and the *Dictionarium ofte Woord ende Spraak bock in de Dutsche en de Maleysche Tale* at the same place in 1708, 4to. A *Maleische Spraak-kunst*, or Malay Grammar, was published by George Hendric Werndly at Amsterdam in 1726, 8vo. A *Nieuwe Woordenschaft in Neder-Duitsch, Maleisch en Portugeesch*, was also published at Batavia in 8vo, 1780. The English have also contributed their share to the cultivation of this language. Bowrey's Grammar and Dictionary of the Malay language were published at London in 1701, in 4to, after the author had passed nineteen years in trading among the Eastern Isles. This is a work of great merit and labour, and though the

[1] [On the earlier Grammar and Dictionary by F. de Houtman (1603), see an article by Dr. Wijnmalen, in "Actes du Sixième Congrès International des Orientalistes" (Leiden, 1885), iv. partie, sect. 5, pp. 303–13.]

English character only is used, yet the pronunciation and the signification of words are generally given with great accuracy. Bowrey, however, had the assistance of the two eminent orientalists, Hyde and Marshall, in its composition, both of whom were excellently skilled in the language. In 1801 was published at London "A Dictionary of the Malay Tongue, to which is prefixed a Grammar of that Language," by James Howison, M.D. The author founds his claims on a ten years' acquaintance with the Malays and their language. From the scarcity of Bowrey's work, I have not been able to compare it with the publication of Dr. Howison, but I suspect the additions of the latter to be neither numerous nor important. One improvement he has attempted, and it is the following:—"In giving the Malay words in the Arabic character," says he, "we have followed the excellent example of Richardson and Gilchrist in their Persian and Hindoostanee Dictionaries, and it is, in fact, the character used by the Malays themselves." But had Dr. Howison been acquainted with the Malay orthography, he would have perceived that this barbarous mode of converting the English character into the Persic could be of no possible utility either to an European or an Asiatic. The Malayu has an established orthography, like the Arabic, Persic, and Hindoostani; and this established orthography of Malay MSS. he has violated repeatedly in every page, not only by spelling the Malay words in a mode never used among the Malays themselves, but by omitting all their peculiar characters, and by using some Persic characters, as *pa* and *ga*, with which the Malays are unacquainted altogether. A short Vocabulary, English and Malayo, with grammar rules for the attainment of the Malayo language, was published at Calcutta in 1798. The rules differ little from those which appear in Howison's Grammar, prefixed to his Dictionary, and the Vocabulary generally coincides with it in the explanation of words, which are not very numerous. Besides these works which have been printed, many Vocabularies and Dictionaries exist in MSS. in Dutch, English, and Portuguese, and of these several are in my possession. Reland, in his *Dissertatio de Linguis Insularum Orientalium*, mentions a large MS. Dictionary which he had consulted, composed by Leidekker, a Dutch clergyman in Batavia, from which he has selected a specimen of the language. Several smaller Vocabularies of Malayu have been published, chiefly by voyagers and travellers, with various degrees of accuracy. Being generally constructed in a very hurried manner, by persons devoid of a radical knowledge of the language, and often, as may be presumed, under the necessity of expressing their questions by a mixture of signs, they generally abound in very ludicrous errors and risible mistakes. Of this kind many instances might easily be selected from Labillardière's Malay Vocabulary; nor is that published by Professor Thunberg, in his Travels, entirely free from them.

Besides, they are generally mixed with a variety of *lingua franca* and other Eastern words that are never received in correct Malayu.[1]

The sacred Scriptures, at an early period, began to be translated into the Malayu language. The Gospels of Matthew and Mark were first published in the Malayu language and Arabic character at Enkhausen, in 1629, in 4to, according to the version of Alb. Corn. Ruyl, and accompanied with the Dutch version. A second edition was published at Amsterdam in 1638. The Gospels of Luke and John were published in Malayu at Amsterdam in 1646, according to the version of John Van Hazel. Van Hazel and Just. Heurn, in 1648, published *Psalmi quinquaginta priores, Malaicé et Belgicé.* The four Gospels were republished, more correctly, with a version of the Acts of the Apostles, by Just. Heurn, at Amsterdam, in 4to, 1651. Genesis was published in Malay at Amsterdam in 1662, according to the version of Dan. Brouwer; and the New Testament, by the same author, in 1668. A second edition of Genesis was published in 1687. The four Evangelists and the Acts of the Apostles were published, in the Malayu tongue, at Oxford, in 1677, in 4to., and reprinted in 1704. Both editions are in the Roman character, and though Heurn's version was followed, yet the first edition had the advantage of being superintended by the learned Hyde, who has prefixed to it a dissertation on the dialects of the Malay, and the method to be employed in studying the language. The Psalms, or *Psalterium lingua Malaica et Belgica*, was published by Van Hasel and Heurn at Amsterdam in 1689. The *Psalterium Malaice* was published at Amsterdam in 1735, with musical notes.[2] A complete version of the Bible was published at Amsterdam, in Roman characters, in 1733, and this version was again published in the Arabic character, with the addition of the Malay peculiar letters, at Batavia, in 5 vols. 8vo, 1758, under the direction of Jacob Mossel, Governor-General of the Dutch possessions in the East Indies. The persons who superintended the edition were Johan. Mauritz Mohr and Herm. Petrus Van de Werth. A Malay Catechism was also composed by Gustavus William Baron Van Imhoff, and printed at Batavia in 1746. This version of the Bible is composed in the idiom of Batavia and Malacca, and I have heard it objected that it is not very intelligible in Sumatra and other Malay countries; but I regard it as quite impossible to form a Malayu version which would be approved in point of style in every Malay country at the same time, for so great is the diversity in point of style between the Javanese-Malayu and the Arabic-Malayu, that even in the same country those who are proficients in the one are often scarcely able to understand the other.

[1] [See G. H. Werndly's "Maleische Spraakkunst" (Amsterdam, 1736), pp. 276–307; G. K. Niemann, in "Bijdragen," Third Series, vol. i. p. 113 ff. and p. 333 ff.]

[2] [Werndly, l. l. pp. 229–76.]

II. *Jawa.*—The Jawa or Javanese language is admitted by the Malays to be that of a more ancient nation than themselves, and at no very distant period seems to have been current through the whole extent of Java. The island of Java was formerly subject to a single sovereign, bearing the title of Ratu Agong, or Susuhunang, of the Susupún race, who generally held his court at Kiripún, Suryakarta. The nation was brave, enterprising, and populous, and before the introduction of the Mahummedan religion, about the year A.C. 1400, their power was supreme in the Eastern seas, and they extended their conquests to Sumatra, Borneo, and even as far as the Moluccas. Their voyages often rivalled the celebrated Argonautic expedition in the spirit of adventure. They became known to Europeans only in the decline of their power; yet it was still so formidable as repeatedly to shake the authority of the Portuguese in Malacca itself; and one of the dependent princes of Java was able to fit out a fleet of thirty large vessels, the admiral of which was so strongly built as to be reckoned at that period cannon-proof. The Jawa language is subdivided into a great number of dialects, all of which may be respectively classed under the heads of Basa-dalam and Basa-luar, the interior or high language, and the exterior or vulgar language of the coasts.[1] Both of these differ considerably from the Malayu, which has adopted a multitude of terms from the Basa-luar Jawa, or coast language of Jawa, compared even with which the Malayu language appears to be a corrupt derivative. The language of the interior, however, or the Basa-dalam Jawa, has a close and intimate connection with Sanscrit, and expresses the simplest objects and ideas by vocables which seem to differ no farther from the Sanskrit than in the corrupt pronunciation necessarily produced by the use of a less perfect alphabet. The only Javanese that I have met who could speak the Basa-dalam Jawa was not able to write the character; yet I perceived, in forming a short radical vocabulary, that he used many Sanscrit words for common objects which are not in use in any dialect of Malayu.

The alphabet of Jawa is peculiar, and has no resemblance in the order of position to the Devanagari. The number of characters is twenty, and these are varied by four vowels, e, i, u, o; but the real number of vocalic sounds is considerably greater. The Javanese character is written from right to left. The alphabet has been exhibited with considerable accuracy by Le Brun, and also by Reland; and it appears to have attracted the attention of the learned Hyde, as an *Alphabetum Bantamense* was found among his posthumous papers, which had been written for him by the ambassador of the King of Bantam.

Various ancient inscriptions and monuments are said to exist in

[1] [The import of these Malay terms has been misunderstood. The *Basa-krama* and *Basa-ngoko* of Javanese are evidently intended.]

the interior of Java, one of which was seen by Thunberg at Paditúlis, near the blue mountains in the interior of the island, which consisted of eight lines and a half, engraved on a stone pillar about two feet in breadth. The characters seemed to him to be written from right to left, and no person had been able to decipher them.

The dialects of Bagelén and Súnda, in Java, are said to be very distinct from the Javanese proper; and from the first of them the language of Súlú is supposed to be derived. This point, however, I have not been able to investigate in a satisfactory manner.

The literature of the Javanese is similar to that of the Malays, to which it seems to have given origin. Their Kuggawins[1] of Cheritras contain their mythology and the adventures of their ancient heroes, and exhibit them in a style which has no inconsiderable resemblance to that of the Hindu Puránas. The Javanese laws are arranged in codes of considerable antiquity, and celebrated among all the Eastern Islands.

The Jawa or Javanese language does not appear to have been regularly cultivated by Europeans, though some of the outlines of their mythological stories have been published in the Transactions of the Asiatic Society in Batavia, as well as some vocabularies of the Jawa language. In the Dutch work entitled "Begin en voortgang der Oostind. Compagnie," or the rise and progress of the East India Company, a comparative view is exhibited of the Javanese and Malayu languages.[2] The Mahummedans have translated the Koran into Javanese.[3]

The Bali and Madura languages, spoken by the inhabitants of the isles of the same name, appear, from the best information I could procure, to be dialects of Javanese. The greater part of the inhabitants profess the ancient religion of their ancestors, resemble the Hindus in their appearance, wear the Hindu marks on their forehead, and the women burn themselves with their deceased husbands, according to the practice of the Hindus. Like the unconverted Javanese, they are peculiarly addicted to the worship of Indra, Surya, and Vishnu; but being neither in possession of their original religious books, nor of the extracts from them which have been adduced in the Transactions of the Batavian Society, I forbear to dilate on this topic at present.[4]

[1] [The technical term here meant is *Kĕkawin*, which is Old Javanese, and Balinese means a poem not in rhymes, but the metre of which is regulated by long and short syllables, the substance being an adaptation from a Sanskrit original. See Van der Tuuk in "Journal of the R. Asiatic Society," N.S., vol. xiii., p. 42.]

[2] [Published at Amsterdam, in two volumes, in 1646.]

[3] [See "Bijdragen," Second Series, vol. vi. p. 314, ff.]

[4] [Of the numerous books now available for the study of Javanese, both ancient and modern, Sundanese, Madurese, Balinese, it will suffice to mention Kern's and Van der Tuuk's articles on Kawi, C. F. Winter's "Kawi-Javaansch

III. *Búgís.*—The Búgís may be reckoned the original language of the island of Celebes, in the same manner as the Javanese is that of the island of Java. This ancient, brave, and martial nation also became known to Europeans only in their decline, but there are a variety of circumstances relative to them which incline me to regard them as probably more ancient in the Eastern seas than even the Javanese. In courage, enterprise, fidelity, and even fair dealing in commerce, they are placed at the head of all the *orang timor*, or Eastern men, even by the testimony of the Malays and Javanese themselves, and to compare to them either the Chinese or the continental Indo-Chinese nations were to compare an ass, caparisoned in stiff and gilded trappings, to a generous courser. The nation to which the Búgís exhibit the greatest resemblance is the Japanese, but I have not been able to discover that the same similarity exists between their respective languages which appears in their natural characters.

The island of Celebes was formerly divided into seven principalities, which were all united under an elective and limited sovereign. In this state the island was the centre of Eastern commerce, and extended its conquests on the one hand as far as the island of Bali, and on the other beyond the Moluccas. The Búgís language was assiduously cultivated, and their ancient mythology, traditions, laws, and history, preserved in books, the greater part of which are still extant, especially in the interior, among the tribes who still adhere to their ancient religion. On the sea-coast the Mahummedan religion prevails, and their books resemble more the later Cheritras of the Malays. In 1603 the Mungkásar Rajah, with the whole Mungkásar nation, by one of the most singular revolutions on record, renounced their ancient religion, and not only adopted Islamism, but compelled a number of the inferior States to imitate their example.

The Búgís language, on the coasts, is much mixed with the eastern Malayu, and is found pure only in the ancient books and in the interior of Celebes. It exhibits strong features of originality in its vocables, but resembles the Malayu and Tágála in its construction. With Malayu, Javanese, and Tágála it exhibits many coincidences, but it contains, in its original state, almost no words

Woordenboek" (Batavia, 1880); for Javanese, the grammars by Favre (Paris, 1866), P. Jansz (Samarang, 1879), and T. Roorda (Amsterdam, 1882); and the dictionaries by P. Jansz (1876–77), Favre (1870), and the new edition, by A. C. Vreede, of Roorda's work (1885); for Sundanese, the grammars by S. Coolsma (Batavia, 1873), Grashuis (Leiden, 1882), and H. J. Oosting (Amsterdam, 1884), and the Dictionaries by Oosting (Batavia, 1879) and Coolsma (Leiden, 1885); for Madurese, A. C. Vreede's "Handleiding" (2 parts; Leiden, 1874–76) and another by Stockmans and Marinissen (Surabaya, 1880). Lastly, for Balinese we have the Grammar and Dictionary by R. van Eck (Utrecht, 1876), and anticipate more comprehensive works from Dr. Van der Tuuk.]

of Sanscrit origin. With the ancient Ternata or Molucca language it also exhibits some coincidences, but as I have had no favourable opportunity of studying the Búgís, and none at all of examining the Ternata, with any degree of accuracy, I cannot pretend to determine the nature of this connection. Compared with the Malayu or Javanese, it has certainly more the air of an original than of a derivative tongue.

The Búgís alphabet consists of twenty-two letters, which are varied by the six vocalic sounds, a, u, i, e, o, úng. The form of the character is peculiar, though it appears to belong to the same class as the Batta and Tăgála. The power of the characters coincides nearly with that of the Javanese letters, though they differ a little both in number and in the order of arrangement. The form of the Búgís character seems not only to differ considerably in different states, but the alphabet also varies in the number and order of the letters. This proceeds from the adoption or rejection of the double consonants, which, though used in ancient and classical compositions, are seldom or never employed in letter-writing or common business; and hence, when a Búgís writes down his alphabet, it may vary in the number of the characters from seventeen to twenty-two. The only Búgís alphabet, printed or engraved, with which I am acquainted, is that which is given by Forrest in a corner of one of the maps of his "Voyage to the Mergui Archipelago." The letters are not formed according to the common round Búgís hand, but sharp-angled, like the Rejang and Batta character; but in other respects it is sufficiently correct. The Búgís character is also employed frequently in writing Malayu compositions.

The language of the ancient Búgís compositions displays little diversity of dialect, but considerable variety exists in the language of conversation in the different Búgís States. The dialect of Mungkásar or Macassar, the bravest and most renowned of the Búgís tribes, differs considerably from the Búgís proper; but the dialects of Lúbú, Enrékang, Mandar, and especially Tă-Rajja,[1] seem almost to be different languages.

The Búgís language has never been regularly cultivated by Europeans, though the Dutch have formed abridgments of some of the historical relations in which it abounds. I have formed a short radical vocabulary of both the Búgís and Mungkasar, but cannot consider it as pure and unmixed, being derived from inhabitants of the coast, though some of them were very intelligent, and tinctured with their peculiar learning. From the same source I obtained the following list of the most popular Búgís compositions:—

[1] [More correctly, Luwu, Enrekan, Mandhar, and Toraja. The language generally spoken in these districts is Alfuru.]

1. Nama Sagúni
2. Batára Guru
3. Guru De Sillang
4. Tojorisúmpa
5. Lasini Léléh
6. Batára Latoh
7. Oputolaga
8. Araulangi
9. Panori Tawgéh
10. Lajiri-hoi
11. Jamuri China
12. Laurupoysi
13. Rotun Nari-Tatta, Datu Nagima
14. Lamaputoda-Turipo
15. Latum Mullurung
16. Lauhdun-Reö
17. Lapa Bichara Lari Sindénaré
18. Gutupatalotopalaguna
19. Lappang Ngarisang
20. Opu-Sangmuda
21. Opula-Maru-Datu-na-Sopéng
22. Látu-gétána Paju Limpoy
23. Sawira Gading
24. Adewata
25. Rotun Dilíwung
26. Data Pamúsu
27. Lanaga Ladúng
28. Rotun-risosú
29. La-galigo
30. Tobala Onji
31. Radaöng Labeh
32. Lamada Romang
33. Palawago
34. Lawaju-Langi
35. Lamapa-puli
36. Datu-Mówunléh
37. Lalúmpang Méga
38. Lasawúng-Langi
39. Rotan di Papang
40. Aji Lédéh
41. Lamapang Aniro
42. Latan-nari-jivi
43. Bayapágúli
44. Latupu Sallau
45. Latúpúgulla
46. Latan nari Pulang
47. Satya-bonga
48. Lasatúng-pugé
49. La-galigo Tokolinghéng
50. Latan naroági
51. Datula-Kila
52. Lapanadora
53. Rotan di timang toan laniú [1]

The greater part of the compositions here enumerated celebrate the deeds of their national heroes. But besides these, the "Addat," or codes of Búgís law, are of considerable antiquity, particularly those of Gua, Waju, Boni, and Mandar, and of great repute among the Eastern tribes. Several of them are translated into Malayu and Javanese. The Koran is also translated into the Búgís language.

The Búgís songs and romances are famous among all the islands of the East, and, as far as I can judge from a very limited knowledge of them, equally excel in force of thought and fluency of versification. The use of rhyme is much less frequent than among the Malays. The melody of the verse depends upon the rhythm, and the measure in the historical poems has often considerable similarity to some of the specimens of Sanscrit verse. The following lines are given as a specimen from the "Wépaléteï," the only Búgís story in my possession :—

[1] [No attempt has been made to check this list, as the descriptive catalogues of the extensive Bugis and Makassar literature, by Dr. B. F. Matthes (1875, 1881, 1883), and some valuable contributions, by Professor K. G. Niemann, to the "Bijdragen," may now be consulted. To the former we owe also Grammars, Dictionaries, and Chrestomathies, both of the Bugis and Makassar languages; while the former has brought out a treatise on the Alfuru dialect spoken in the Minahassa (Rotterdam, 1866), and a comparative Dictionary of eight Alfuru dialects, in the "Bijdragen," Third Series, vols. iv. and v.]

Narétélangi napapabaja natokúnruna Wépaléteï
Lalo saliwang pasisi aji rito matindro sésimpangi
Rittomapiddang sisulingi matduadua mua kakana
Wemapamaï natijinruna lalu saliwang rúrúpanimpa
Lakunatillum tirrimakudda Wullirijáwa tó Sepengi
Jillokasawa kakapamaï lúmpuna China tujuna Sabang
Naranrukië Lajutenío sesumangutnah Passaüngé
Mabaliada wemapamaï richinaruna kuëm muă
Megama katu tudangpaliuna linna samanna tuributili
Lolangungé turipasabi ujutanai tádillerlé
Muarinilí aülaün patalutuna lolangungé.

"In the morning twilight, when the day began to dawn, awaked Wépaléteï, and went out of the palace, stepping carefully over those who were sleeping in regular rows and those who were reposing irregularly, where her elder brothers were sleeping two by two, and along with her went out Pamai, her nurse and attendant. Wullirijawa, of Sopéing, went forth, and having opened the beautifully formed window, began to express her grief: 'Oh! my elder sister, Pamai, point out to me the situation of China (a district in Celebes), and show me in what direction Sabang lies, where Passaünge dwells, the brother of Lajú Tenió.' Pamai answered: 'See how beautifully the floating clouds rest on the stately trees of China, as if they had been arranged by art. How beautiful are the lawns, which seem as if the earth had of her own accord accommodated herself to the request of man. How graceful wave the trees, with their foliage to the view, and the golden bamboos which enclose the lawns!'"

The Búgís songs are very numerous. Some of them are short proverbial maxims versified, and display considerable force of both thought and language, but I have not met with any which exhibit the peculiar character of the Malayu Pantún. They, however, exhibit many traits of the peculiar manners of the Búgís tribes. In the following specimens the first alludes to a very common mode of punishing cowardice in Celebes, the second to the practice of poisoning weapons, and the last is a brief dialogue between a lover, going to battle, and his mistress, who presents him with her betel-box as a parting token :—

Tikkungi talaséï joa maliäí
Tapasilaséï andraguru maliäí
Corripe militem segnem, castra,
Immo ducem timidum castrato.
Tillu ritumati balubalu rilléléang
Ria paserakané lanru tojirru
Túmera ritirilébu dadi aju ta Sangala.

There are three articles exposed to sale
In the clash of combat—the temper of the lance—
The form of the bullet—and the gum of the poison tree of Sangala.

Eja rípalínrûng ajamu marakka silla
Rikóä biritta poli riälapi sía

Raja-Túmpa rikapéku muïnappa rínnawatíng—
Tilla returona salina lopalopaku
Sapahna rikko otáko tíndria pauwa
Timmúnroä parúparúng tíndria kampulajangang.

Eja! object of my secret affections, be not easily moved to grieve,
Whatever news arrive from the battle, till you see
My kris Raja Tumpa taken from my girdle, be then grieve for the dead—
There are three prohibitions in my betel-box, with which you must conform:
They are wrapt up in the folds of the betel-leaf—talk not in the time of action—
Loiter not idly within your tent—skulk not as you advance on the foe.

The Mangkasar poetry is characterized by the same features as the Búgís, and their national wars with the Dutch are said to be a favourite topic among the poets of that race. The following specimen, which is a poetical challenge, alludes to the diversion of cock-fighting, the favourite amusement of the nation :—

Kérimi jangang riwaya bija jangang sundawa
Naimiunné búngasa tinumbukkéya—
Bukki tonja kontasilla púna inukké núrúntu
Tinumbukkéya bára éyapún nisillung.

Where is that courageous cock, that true game-cock, trained to combat—
For here is his match, full of youthful spirit, yet unconquered—
Let him then enter the lists with me, if he would be conquered;
Hitherto invincible, if I am ever conquered, it will be now.

IV. *Bima.*—The Bima language is used in the independent State of Bima, which includes the eastern part of Sumbawa and the western part of the island Endé, which was childishly denominated Flores by the early Portuguese navigators, and after them by succeeding voyagers and geographers. If my information is correct, the Bima language extends over the greater part of the island Endé. The Bima language is related in some respects to Búgís and Javanese, and on the coast is mixed with Malayu; but nevertheless it has strong pretensions to originality in its pronouns, verbal auxiliaries, and simple names of objects. In those instances in which it exhibits a relation to the Búgís, it seems to be more closely connected with the Mangkasar than the Búgís proper, and yet in sentences the difference is striking, as in the following example: "Where is the house of the Rajah?" *Bikey kuassi rumata sangngaji* (Bima), *Kéré tujuna embana kérayéng* (Mangk.). The sun in Bima is termed *Mata-liro*, in Mangkasar *Matulo*, in Búgís *Mataso*. A man, in Malay *orang*, is in Mungkasar and Búgís *taü*, and in Bima ditto. The dialect of Sumbawa, which prevails in the districts of the island of that name which are not

[1] [The difference lies only in the variety of expressions for "day," *liro*, *allo*, *ässo*, joined to *mata*, "eye."]

subject to the Sultan of Bima, is of a more mixed character, and though it appears to contain many original vocables, yet the mass of the language seems derived from other sources, as Bima, Javanese, and Búgís. Neither the Bima nor the Sumbawa have any peculiar character, but use indifferently the Búgís or Malayu. I attempted to investigate the relations of both of these languages by forming comparative vocabularies of radical words, but not being able to procure any compositions in either of them, I do not flatter myself with having been able to obtain the purest native terms in every instance.

Specimen of the Búgís, Mangkásar, Bima, and Sumbawa Languages.

	Búgís.	*Mangkásar.*	*Bima.*	*Sumbawa.*
I	iĕ	inukké	nahu	úk, kaji
	iyo	iyo	lamada	déya
we	ídi	ikaté	íta	kita
thou	mu	ikau	angomi	mu
you	iko	ikau-ngásing	gomi	kau
he	eä neä	yenjo	seä	iya
they	eämanúng	yangasing	do édé	jija taünan
this	iäé	yeïnné	aké	ta
that	yero, yetu	anjoreng	édé	to
who	iga, niga	inai	choété	saí
what	aga	apa	au	kompo
where	pegi	kemi	benchi	mépo
when	siana	ungapana	bunéëi	pidan
which	kéga	kerayéng	mabe	sangmépo
is	unka	nia	wara	adda
will	mélo	eroko	né	roa
can	makúlêh	kúlégi	vau	bau
sun	mataso	matalo	mataliro	matahari
moon	ulúng	búlun	wúra	búlun
star	vitóing	bintoéng	tara	bíntang
wind	anging	angi	angi	angin
rain	bosi	bosi	ura	újin
day	aso	alo	liro	ano
night	wunni	bungī	aimangadi	anopotang
morning	élé	beribasa	aimasidi	anosiop
evening	arawéng	karvéng	aimumbiyang	anoravi
year	taúng	taung	baä	teró
earth	tana	bútta	dana	bumi
water	uwaï	jéné	oi	aik
sea	tási	tamparang	moti	lét
river	salók	binanga	nanga	pungbŭrang
wave	bomba	bombang	balúmba	omak
sand	kasi	kasi	sarei	garsék
mountain	búlúk	monchong	doro	olat
fire	api	pépé	afi	api
stone	batú	batú	watû	batú
gold	ulawúng	bulayeng	másanganga	bulayéng
silver	saláka	saláka	saláka	saláka
salt	păjé	chéla	síya	síra
iron	bissi	basi	besi	bosi
lead	túmera	túmbéra	tumbinga	tima

	Búgis.	*Mangkásar.*	*Bima.*	*Sumbawa.*
brass	túmbaga	túmbaga	romba	tomaga
white	maputi	kébok	lanta	puti
black	malôtong	leling	meë	písak
red	machillah	eja	kala	mérag
yellow	maüni	kuni	moncha	kúnin
green	monchombúlo	ijow	awa	ijow
blue	magaü	gau	kolúbu	kolau
fish	balé	júku	londé	ampa
fowl	manu	jangang	janga	ayam
bird	manu-manu	jangang-jangang	nasi	piyo
tiger	machang	machang	machan	machan
serpent	ula	ulara	sawa	ula
sheep	bembé	bembé	béë	badésa [1]

This specimen of a comparative vocabulary will convey some idea of the actual state of these languages, and of the actual variety which subsists in the language of conversation, especially on the coasts and maritime districts. Many of the words which occur in one language are also found in others, though generally with some difference of pronunciation, and sometimes in an oblique sense. Frequently too, besides the terms which I have selected, which are only those of current use, several other words of the same signification might be found within the compass of the language. Thus, instead of *anging*, wind, in the high Búgís, *salarang* occurs in this signification; and instead of *saláka*, silver, *bulémata* occurs in the high Mangkasar dialect.[2] In the same manner, the personal pronouns in Búgís terminate their plurals in *manang*, and in Mangkásar in *ngasing*, both of which signify all. Thus, (Búg.) *idimanang*, (Mang.) *ikuttengásing*, we all; (Búg.) *ikomanang*, (Mang.) *ikaüngásing*, you all; (Búg.) *eämanang*, (Mang.) *yenjo yangngasing*, they all. It is worthy of observation that the Udia language, spoken in Orissa, forms the plural of its personal pronouns by the addition of the particle *mané*, or *manang*, like the Búgís. Thus, in Udia, *umbhémáne*, *tumbhemáne*, *sémáné* or *émáné*, signify we, ye, they.[3]

V. *Batta.*—The Batta language, which I regard as the most ancient language of Sumatra, is used by the Batta tribes, who chiefly occupy the centre of that island. The singularity of their

[1] [A brief comparative table of Nias, Batta, Bima, and Lampong words is to be found in vol. ii. of the "Malayan Miscellanies" (Bencoolen, 1822); of Bugis, Makassar, Mandhar, Buton, Sasak, Bima, Sumbáwa, Temoora, and Ende words in Raffles' "Java," vol. ii. pp. cxcviii. and cxcix.; but the most extensive vocabulary of Malay, Sumbava, Sangar, and Bima, is given by Zollinger, in "Verhandelingen van het Bat. Gen." vol. xxiii.]

[2] [*Buléng* means "gold," in Makassar (*uláwang* in Bugis), *buléng-mata* is lit. unripe gold—*i.e.* gold of inferior kind.]

[3] [This is obviously a casual coincidence, the pronominals, *mánang* and *ngáseng*, "all," having nothing to do with the Uriya termination, *mánan*, "measure."]

manners, and in particular the horrid custom of anthropophagy, practised by a nation in other respects more civilized than the Malays by whom they are surrounded, has attracted the attention of Europeans from the time of the earliest voyagers to our own times, but no very satisfactory account has ever been given of them as a nation. The best description of them is certainly given by Marsden in his history of Sumatra; but even that is very imperfect and superficial, and at variance in some respects with the information I received from individuals of the nation. Marsden confines their cannibalism to two cases—that of persons condemned for crimes, and that of prisoners of war; but they themselves declare that they frequently eat their own relations when aged and infirm, and that, not so much to gratify their appetite, as to perform a pious ceremony. Thus, when a man becomes infirm and weary of the world, he is said to invite his own children to eat him in the season when salt and limes are cheapest. He then ascends a tree, round which his friends and offspring assemble, and as they shake the tree, join in a funeral dirge, the import of which is, "The season is come, the fruit is ripe, and it must descend." The victim descends, and those that are nearest and dearest to him deprive him of life, and devour his remains in a solemn banquet. This account is certainly more likely to excite incredulity than the account of Marsden, but it is the account of some of the Battas themselves, as well as that of the Malays in their vicinity.[1] This inhuman custom is not, however, without a precedent in history, for Herodotus positively asserts that the Paday, or Padaioi, about 500 years before our era, were not only addicted to the eating of raw flesh, but accustomed to kill and eat their relations when they grew old. Now, it is curious that Batta or Batay, for the name is written both ways, seems to be the very word which in Greek is rendered Padaioi, the letter *p* being almost always pronounced *b* among several of the Indo-Chinese nations, as in the word Pali, which is almost always pronounced Bali. The following is the account which Herodotus gives us of the Paday, or Padaioi:—"Another Indian nation, who dwell to the eastward of these (the Indian Ichthyophagi), are of nomadic habits, and eat raw flesh. They are called Paday, and are said to practise such customs as the following. Whoever of the community, be it man or woman, happens to fall sick, his most familiar friends, if it is a man, kill him; saying, that by his pining in sickness his flesh will be spoiled for them; and though he deny that he is sick, they do not attend to him, but

[1] [Compare Bickmore, l. l. p. 446; J. J. de Hollander, "Land-en volkenkunde," vol. i. pp. 794–6; J. J. Willer in "Tijdschrift voor Nederl. Indië," viii., pt. 2, pp. 344–8; Junghuhn, "Battaländer," vol. ii. pp. 155–64; Schreiber, "Die Battas in ihrem Verhältniss zu den Malaien von Sumatra," (1874), p. 42; and Yule's "Marco Polo," vol. ii. pp. 231, 40, 41.]

put him to death and feast on him. When a woman falls sick she is treated in like manner by her most intimate female associates. They also sacrifice and feast on him who arrives at old age, and this is the reason that so few of them ever attain it, for they kill every one who falls sick before that period."* This account of Herodotus certainly corresponds very minutely with the customs attributed to the Batta race, and renders it probable that this modern nation derive their origin from the ancient Paday or Batay. Neither is it more incredible that the Battas should eat human flesh as a religious ceremony, than that anthropophagy should be practised by the class of mendicants termed Agóra Punt'h in Bengal, and other parts of India, which is a fact that cannot easily be called in question. It is surprising that this singular custom has received so little investigation.

The names of the different Batta tribes of whom I have been able to hear are the following:

1. Batta Sebalúngú.
2. Batta Padembanin.
3. Batta Kwalu.
4. Batta Pannay.
5. Batta Toiu.
6. Batta Bila.
7. Batta Kurúlang.
8. Batta Sipagabu.

In many of the Batta customs considerable similarity to those of the Nairs of Malabar may be traced, as in the law of inheritance, according to which it is not the son, but the nephew, that succeeds.[1]

The Batta language has considerable claims to originality, though it is not only connected with the Malayu, but also with the Búgís and Bima languages. In point of construction it is equally simple as the Malayu, but it is with the Búgís that it seems to have the most intimate connection.[2] Indeed, the manners of the aboriginal Búgís are supposed to have exhibited no small resemblance to the peculiar customs of the Batta nation; for the Rajja or Tă-Rajja tribe, in the central parts of the island Celebes, are said still to eat their prisoners of war. The Batta language is the chief source of that diversity of dialect which is discoverable in the languages of Sumatra. The Răjang or Rejang dialect is formed by the mixture of the Batta and Malayu; the Lampúng by mixing Malay and Batta with a proportion of Javanese. The Karrows, who are subject to Achi or Achin, use only a slight variation of the Batta language; while the language of Achi proper consists of a mixture of Malayu and Batta, with all the jargons used by the Moslems of the East, whether Hindustani, Arab-Tamul, or Mápilla. The Achinese resemble the Mápillas

* Herodotus, lib. iii. s. 99.

[1] [This is not borne out by the existing Batta laws.].

[2] [According to Van der Tuuk ("Tobasche Spraakkunst," p. vi.), the Batta language shews traces of affinity with the Kawi and Tagala; according to Schreiber (l. l. p. 23), with the Malay.]

of Malabar more than any other tribe of Malays; they have long been connected with them as a people, and use many Malabar terms currently in their language. The dialects of Néas[1] and the Poggy islands, the inhabitants of the latter of which are termed Mantaway by the Malays, have perhaps greater pretensions to originality than any of the dialects of Sumatra, but resemble the Batta more than any other dialect. Hence it may be suspected that if we were acquainted with the books of the Battas, and knew the full extent of their language in all its variety of expression, elliptic phrases, and obsolete words, the coincidence would be still more striking. There is probably, too, some diversity of expression in these dialects, even in their present state, for in forming a short radical vocabulary of the Néas language, I found it differed considerably in some instances from the specimen published by Marsden in the sixth volume of the "Archæologia."

The Batta language has been cultivated by writing from the earliest times, and numerous books are said to exist in it. I have only been able, however, to procure the names of the following:—

1. Siva Marangaja.
2. Siva-Jarang-Mundopa.
3. Raja Isiri.
4. Malamdeva.[2]

The Batta alphabet is peculiar both in the form of its characters and in the order of their arrangement. It consists of nineteen letters, each of which is variable by six vocalic sounds like the Búgís. In the power of the letters it nearly corresponds with the Búgís and Javanese alphabets, the difference between all these being extremely trifling, consisting solely in one of them expressing two cognate sounds by one character, or adding a new character, or the modification of a character, to express a double consonant of frequent recurrence. But the Batta character has another peculiarity: it is written neither from right to left, nor from left to right, nor from top to bottom, but in a manner directly opposite to that of the Chinese, from the bottom to the top of the line, as the Mexicans are said to have arranged their hieroglyphics.[3] The material for writing is a bamboo or the branch of a tree, and the instrument for writing, the point of a kris; consequently their native forests always furnish them with materials in abundance, and instead of our pages and volumes, they have their bamboos and literary faggots. Marsden has given a tolerably correct Batta alphabet in his History of Sumatra, but instead of placing the

[1] [On the Nias language see the "Tijdschrift voor de taalkunde," vol. xxviii. pp. 93 ff.; and "Verhandelingen van het Bat. Gen," vol. xxx. pp. 61–84.]

[2] [On the literature of the Battas, see the valuable article by G. K. Niemann in "Bijdragen," third series, vol. i. pp. 245–303; and Van der Tuuk's "Bataksch Leesboek" (1860–62), vol. iv.]

[3] [According to Van der Tuuk, Batta is written from left to right ("Tobasche Spraakkunst," § 1). It has three dialects—Toba, Mandailing, and Dairi—which have again various subdivisions.]

characters in a perpendicular line, he has arranged them horizontally, which conveys an erroneous idea of their natural form. The Battas sometimes read their bamboos horizontally instead of perpendicularly, as the Chinese and Japanese do their books; but the Chinese consider the correct mode of reading to be from the top to the bottom of the page, and the Battas from the bottom to the top. The lines at the top of a Chinese page are always regular, and if a line terminates in the middle of a page, the blank space is towards the bottom. Now, the Battas sometimes write on growing trees, and in this case, if a blank space occurs, it is towards the top of the division, a circumstance which determines what they consider as the natural position of their characters. The Batta characters, when arranged in their proper position, have considerable analogy to the Búgís and Tăgála. The Lampúng and Răjang characters coincide in power with those of the Batta, though the arrangement is different, and so far from being considered as original alphabets, they are only regarded, as far as I could learn, by the Battas, as different forms of the same character. Indeed, the greater part of the differences they exhibit in form may be fairly attributed to the different materials on which they write, and the different manner of writing; while the diversity in the number and arrangement of the letters may be referred to the same causes which have produced a similar variety in the Búgís alphabet.

VI. *Tăgála.*—The Tăgála, or rather Tă-Gála, or the Gála language, is among the Philippines what the Malayu is in the Malay islands, or the Hindustani in Hindustan proper. A Spanish missionary, who possessed a minute knowledge of this language, has declared that "the Tăgála possesses the combined advantages of the four principal languages in the world. It is mysterious as the Hebrew; it has articles for nouns, both appellative and proper, like the Greek; it is elegant and copious as the Latin; and equal to the Italian as the language of compliment or business." To examine rigorously the justness of this eulogium is foreign to my purpose; it is necessary only to state that it is considered by those who have studied it with most attention as the radical language, from which the greater part, if not all, the dialects of the Philippines are derived. A missionary who had resided eighteen years in these islands, and whose account of them has been translated from the Spanish, and printed by Thevenot in the second part of his "Relations de divers Voyages Curieuses," Paris, 1664, declares that, though every district has its particular dialect, yet that these have all some relation to each other, such as subsists among the Lombard, Sicilian, and Tuscan dialects. There are six dialects of this kind in the island of Manila, and two in Oton.[1] Some of

[1] [Manila and Oton are the old names of Luzon and Panay respectively. There is no foundation for the spelling Tă-Gála.]

these are current in several islands, but the most general are the Tăgála and Bisáya, the last of which is very gross and barbarous, but the other more refined and polished. The opinion of this missionary is confirmed by Fra. Gaspar de San Augustin, who asserts that all these particular tongues are dialects of one general language, in the same manner as the Attic, Ionic, and Æolic are all dialects of Greek, or as the Italian, Spanish, Portugese, and French are all derivatives from the Latin.

The Tăgála language has been cultivated only by the Spanish missionaries. The Tăgála grammar of Fra. Gaspar de San Augustin, which has passed through two editions, was printed in 1703, and again in 1787. In his preface he requests those who are desirous of more numerous examples in the language to have recourse to other grammars, especially to that of Fra. Francisco de San Joseph, who is elsewhere called the Demosthenes of the Tăgála language.[1]

A confessional by the same author, in Spanish and Tăgála, was published in 1713, and republished with the second edition of his grammar. In 1627, Fra. Alphonso â St. Anna published his "Explicacion de la Doctrina Christiana en lingua Tăgála," and besides these, many other religious compositions, both in prose and verse, have been published by the missionaries.

The Tăgála alphabet consists of seventeen letters, three of which are vowels and fourteen consonants. It is of the same class as the Búgís and Batta alphabets, and resembles them much in form, and it is probably from some idea of this similarity that Fra. Gaspar de San Augustin asserts that the Tăgála characters were derived from the Malays.[2] The Tăgála character is as difficult to read as it is easy to write. It is written with an iron style on bamboos and palm leaves, and the Spanish missionaries assert that the ancient mode of writing was from top to bottom, like the Chinese. From the circumstance of their writing with an iron

[1] [A goodly list of books bearing on and relating to the Philippine languages is given by F. Blumentritt, in his "Bibliotheca Philippina," 1882), pp. 83-7; to which may now be added the Tagala grammars by J. Minguella (1878) and J. H. Campomanes (1872); the Bisaya grammar by R. Z. de San Joaquin (1871), that of the Panay dialect by R. Lozano (1876), and that of the Cebu dialect by T. Olleros (1869); and the Arte de la lengua Pangasinana by M. Pellicer (1862). A comparative sketch of the Tagala, Bisaya, and Bicol languages is given by Montano in his "Rapport sur une mission aux îles Philippines et en Malaisie" (1885), pp. 118–150.]

[2] [The various alphabets once used for writing Tagala, Bisaya, Ilocano, Pangasinan and Pampango appear to be now obsolete. They are given by T. H. Pardo de Tavera in his "Contribucion para el estudio de los antiguos alfabetos filipinos" (1884). Kern, in his criticism of this essay ("Bijdragen," Fourth Series, vol. x. pp. 56–72), supports the view he had put forth in a former paper (1882) concerning the derivation of these alphabets from the Old-Malay alphabet of Sumatra, to which also the Makassar and Bugis are traceable. It may also be noted that in the Tagala grammar of T. Ortiz (Sampaloc, 1740), pp. 120, 21, a full syllabary of the alphabet is contained.]

style on bamboos, and from the resemblance of the letters to the Batta character, I should rather imagine that the ancient Tăgála mode of writing was from the bottom to the top. The Tăgála characters are still used in Comintan, and in general among the Tăgálas who have not embraced Christianity; and even by the Christian converts they are still preferred in epistolary correspondence, though the contrary has been insinuated by some of the missionaries, who allege that the Roman alphabet was eagerly adopted, on account of its being more easily read.

The Tăgála language, with a considerable number of peculiar vocables and great singularity of idiom, is nevertheless to be considered as a cognate language with Malayu, Búgís, and Javanese. Few languages, on a cursory examination, present a greater appearance of originality than the Tăgála. Though a multitude of its terms agree precisely with those of the languages just enumerated, though the more simple idioms are precisely the same, and though the nouns have neither, properly speaking, genders, numbers, nor cases, nor the verbs, moods, tenses, or persons, yet the idioms are rendered so complex, and the simple terms are so much metamorphosed by a variety of the most simple artifices, that it becomes quite impossible for a person who understands all the original words in a sentence either to recognize them individually, or comprehend the meaning of the whole. In illustrating, therefore, the mechanism of language, few languages are more instructive than the Tăgála. The artifices which it chiefly employs are the prefixing or postfixing to simple vocables certain particles, which are again combined and coalesce with others; and the complete or partial repetition of terms in this reduplication may again be combined with other particles.

The Tăgála forms the plurals of nouns by the word *manga*, as the Malays by *bányak*, both of which signify *many*, and seem to be the very same word, as the *m* and *b* are often pronounced in such an indistinct manner in the Indo-Chinese languages that they seem neither to correspond exactly to our *m* nor our *b*, but to an intermediate sound. To proper names the Tăgála prefixes the particle *si*, and *ang* to appellative nouns. The first of these corresponds to the Malayu *sa* and the latter to *yang*, both of which are frequently used in Malayu in the same manner; but the Tăgála combines both these with the particles *nya* and *ka*, the first of which signifies *of it*, and the latter *to;* and thus they form *sina*, *kana*, *nina*, *nang*, which (except the last, which is only a different mode of writing the Malayu *nyang*, of these, who) scarcely occur in Malayu. The plural of nouns in Malayu is sometimes formed by the repetition of the singular, and sometimes this repetition is not complete, but consists only of the first syllable or syllables. This also occurs in the Tăgála, in which language *banal*, the Malayu *banar*, signifies just, true; and *tavo*

signifies a man, corresponding with the Búgís *tau*. A just man, in Tăgála, is therefore *ang banal na tavo*, or, by the addition of another particle and altering the position of the words, *ang tauong banal*. Now, if we substitute the Malayu word *orang* for the Búgís and Tăgála term *tau* or *tavo*, we may render both these sentences thus: *yang orang yang benar*, and *yang benarnya orang*. In the plural, to signify just men, the Tăgála gives *ang manga tauong babanal*, to which the corresponding Malayu phrase is *yang banyák orang yang babenar;* or again in Tăgála, *ang babanalna manga tavo*, to which the corresponding Malayu is *yang babenarnya banyak orang*.[1]

The simple pronouns, which vary so much in all the dialects of the Eastern Seas, are nearly the same in Tăgála and Malayu, though it is not very easy to recognize them in the former language when combined with particles. Thus in the first person *ako*, *ko*, *kita*, *kami*, are pure Malayu; and in the second person, *mu* corresponds equally with *mo*, while *ikao* and *iyo* seem to be only trivial variations of the Malayu *angkau* and *ayo*. In the third person *siya* is only a variety of *sa yáa*, like *siappa* for *sa-appa*, who, in Malayu; while *niya*, of him, his, is pure Malayu; as are *itu*, that, and *nin*, of this; while *yan*, this, and *yain*, that,[2] correspond to *ini* and *anu*. It is, however, chiefly in the verb that the peculiar character of the Tăgála language displays itself. The substantive verb is generally omitted altogether, and its meaning is denoted by implication, or the position of the words in a sentence. Sometimes, however, it is expressed by the article *ay*, the contraction of the Malayu *adda*, as *Sino ang masipag?* "Who is diligent?" or rather, "Who is he who is diligent?" *Ang masipag ay si Jagula*, "It is Jagula that is diligent," or literally, "He who is diligent is one Jagula."

The Tăgála verbs being only names of actions or states of existence, they cannot properly be said to be either active or passive, neither have they any persons, numbers or moods; all these being expressed by particles prefixed or postfixed to the radical word. The principal particles employed in modifying the Tăgála verbs are also common to the Malayu language. The Tăgála particles are *na*, *nag*, *mag*, *pag*, *umgm*, *y*, *an*, *ín;* those which correspond to them in Malayu are *na*, *nyang*, *meng* or *mé*, *peng*, *yangmeng*, *yang*, *an*, *ahin*. Their significations are radically the same, nor do they differ essentially in their simple application; but in the variety of modes according to which these particles may be combined with the verb, in its simple form, in its redupli-

[1] [Apart from the author's imperfect acquaintance with Malay, as appears from these examples, his comparing but two languages of the group, irrespective of its other members, would now scarcely be considered likely to lead to a satisfactory result. Van der Tuuk, Kern, Fr. Müller, and Brandes, have led the way to a more systematic intercomparison of these languages.]

[2] [For *nin* read *niri*, for *yan—yari*, and for *yain—yaon*.]

cate form, in its semi-reduplicate form, and the variety of transpositions of letters and the changes of one letter for another, *euphoniæ gratia*, which all these combinations give occasion to; in all these the Tăgála is infinitely superior to the Malayu, if there is any merit in a superiority which consists in greater intricacy. The changes which occur in Malayu are few and obvious; in Tăgála they are digested into an extensive and complex system, in which perfect familiarity with every form that the word can assume, not only by the addition of particles, but by the interchange of letters, is necessary to enable a person to detect the radical, which is often more disguised than in the most complex Arabic derivatives. Thus in Tăgála the root *tolog* signifies to sleep; *natalog ako*, I slept; *natotolog ako*, I am sleeping; *matalog*, sleep; *matotolog ako*, I will sleep; *katolog*, *pagkatolog*, and *pagkakatolog*, sleeping; *natotologpa ako*, I slept or was sleeping; *ang natotolog*, the sleeper; *ang matotolog*, the person who is to sleep; *nakatolog ako*, I had slept; *natologan*, the having been asleep; *natotologan*, the being asleep; *katologan* and *katotologan*, the being asleep, or act of sleeping, or the sleeping-place; and for the plural *nangatologan*, *nangatotologan*, *pangatologan*, *pangatotologan*, &c., the particles *na*, *ma* and *pa* becoming *nanga*, *manga* and *panga* in the plural. This is an instance in which the changes of the radical word are very obvious; in the following they are less so:—*Buhat*, to lift; *bungmuhat*, *bungmubuhat*, *bumuhat*, *bubuhat*, *pagbuhat*, *nakabuhat*, *nabuhat*, *binuhat*, *binubuhat*, *buhatin*, *bubuhatin*, *nagpabuhat*, *nagpapabuhat*, *magpabuhat*, *magpapabuhat*, *pagpabuhat*, *pagpapabuhat*, *pinabuhat*, *pinababuhat*, *muhat*, *namuhat*, *namumahat*, *mamuhat*, *mamumuhat*, *pinamuhat*, *pinamamuhat*, *pamuhatin*, *pamumuhatin*. The addition of a greater number of particles would still produce a considerable number of additional metamorphoses, in which it would be very difficult to recognize the original radical *buhat;* but these may suffice to show the genius of the language; and they will also tend to show the extreme danger that any etymologist or grammarian incurs who presumes to treat of one of the Eastern languages without a radical knowledge of it, and even, in some degree, of its cognate dialects.[1]

The greatest defects of Fra. Gaspar de S. Augustin's Tăgála grammar proceed from his not having comprehended sufficiently the original simplicity of the dialect, nor even the simple artifice by which the greater part of these changes have been effected;

[1] [A comparative view of the Malayan languages, of which the Tagala is justly considered as the type, is given by Fr. Müller in his "Grundriss der Sprachwissenschaft" (1880), section ii. part ii. pp. 87–158. Fr. J. M. F. de Cuevas gives in the appendix to his excellent "Arte de la lengua Ybanág," a language spoken in the N.E. parts of the island of Luzon, tables exhibiting the various derivatives into which a root-word may branch off.]

and from having composed his grammar on European principles, without attending uniformly to the peculiar character of the language.

With respect to the original literature of the Tăgálas the accounts of the Spanish missionaries are rather discordant. Sometimes they represent them as totally devoid of histories and books of science, and sometimes they represent them as in possession of many historical poems ; not considering that almost the whole body of Eastern history must be gleaned from poetical tradition. It, however, appears clearly enough, from their own accounts, that the ancient religious traditions of the Tăgála race, their genealogies, and the feats of their gods and heroes, are carefully preserved in historical poems and songs, which in their youth they carefully commit to memory, and are accustomed to recite during labour and long voyages, but particularly at their festivals and solemn lamentations for the dead. These original memorials of the race, the missionaries have with pious care attempted to extirpate, and have employed themselves sedulously in composing religious tracts, both in prose and verse, in the Tăgála, with the hope of supplanting the remains of national and pagan antiquity. Many psalms and hymns, and even some of the Greek dramas composed by Dionysius Areopagita, have in this manner been translated into the Tăgála language. Among this brood of Tăgála poets the names of Fra. Antonio de S. Gregorio, of Fra. Alonso de S. Ana, and of Fra. Pablo Clain, the translator of Kempis into Tăgála, are celebrated ; but the most illustrious of them all, says the reverend father Gaspar de S. Augustin, is Fra. Pedro de Herrera, the very Horace of the Tăgála language, as appears by his book of "Postrimerias." With the original Tăgála poetry I am unacquainted, and I believe no specimen of it has been hitherto published. S. Augustin in his grammar treats, indeed, of Tăgála poetry, but he piously confines his examples to the works of his ghostly brethren. He observes that the Tăgála verse is only regulated by the rhythm of the syllables and the similarity of the vowels in the close. This similarity of the terminating vowels does not amount to regular rhyme, for the consonants may be totally different, though the vowels are similar, as in the Spanish rhymes termed *Asonantes*. Thus *laglag* and *taltal súl*, and *cahuy silip* and *bukkir*, however imperfect as rhymes, are all that is required in the terminations of Tăgála verse. The Tăgála metres, adds the same author, are rather lyric than heroic, and he adduces specimens of several Latin and Castilian measures, imitated in that language, besides a legitimate sonnet, addressed to himself, on publishing his Tăgála grammar, by Fra. Joseph de el Valle. The following specimen, from the Tăgála version of one of the dramas of Dionysius Areopagita, is an imitation of the comic verse of Terence :—

Dito sa dakkilang kaharian nang Grecia
Ay itong bayannang Athenas lalo, at mona
Sa ibang manga bayang na sasakop baga
Hangan saona, at magpangayon pa.[1]

Besides the Tăgála nation, there are several other races which inhabit these islands who differ considerably from each other in features, language, and the various relations of the social state; but concerning them it is more difficult to speak with any degree of certainty. Such are the Pampangos, who reside to the north of Manilla; the Bisáyas, who are generally diffused over the Philippines; and the painted race, termed by the Spaniards Pintados, who are by some reckoned a branch of the Bisáya nation,[2] and allied to the Tăgála and Búgís races, while by others they are supposed to be of the same origin as the Haraforas.

Of the Bisáya language I have seen some lists of words. It appears to be either mixed with Tăgála or derived from the same source; but it is seldom possible to judge of any of the Eastern languages from a few straggling specimens, formed in the hurried, inaccurate, and incurious manner in which these are generally collected. For this reason I shall offer no observations on the Pampango language, of which I have also seen specimens; on the Biaju, Tirún, or Idán languages of Borneo; nor on the Harafora, or the Papua languages of the Eastern Isles. The Súlú tongue is a very mixed dialect, but is derived chiefly from the Malayu, Javanese, and Tăgála.[3] Forrest, however, is inclined to refer its peculiarities to the Bisáya. The language of Meiindenow, or Magindano,[4] which nearly coincides with the Lanún dialect, is also a compound of Malayu, Búgís, and Tăgála, with a certain proportion of the ancient Tarnata or Molucca language, which seems to have been an original tongue. The Biaju language is reckoned original, but it has no written character. The Biajus are of two races: the one is settled on Borneo, and is a rude but warlike and industrious nation, who reckon themselves the original possessors of the island of Borneo; the other is a species of sea-gipsies, or itinerant

[1] [S. de Mas, in his "Estado de las Islas Filipinas" (1843), vol. i. Pobl., pp. 114–16, says, that before the advent of the Spaniards, Tagala poetry consisted only of love songs. F. J. de Moya y Jimenez mentions in his work "Les Islas Filipinas en 1882," p. 235, a Diccionario poetico tagalo published about the middle of last century.]

[2] [F. Blumentritt, "Ethnographie der Philippinen" (1882), p. 46.]

[3] [According to Montano, who gives a sketch of the Sulu language (Rapport, pp. 153–5), the area over which it is spoken extends to Mindanao, Palawan, Balabac, Basilan, the Sulu archipelago, and the north of Borneo. See also the vocabulary and phrases communicated by Dr. A. B. Meyer to the "Tijdschrift voor de taalkunde," vol. xx. pp. 449 ff.]

[4] [*I.e.*, Mindanao. The various languages spoken in that island have but recently been investigated. See A. B. Meyer, l. l. pp. 442–49; A. Schadenberg in "Zeitschrift für Ethnologie," vol. xvii. (1885), pp. 33–36; Montano, l. l. pp. 155–87.]

fishermen, who live in small covered boats, and enjoy a perpetual summer on the Eastern Ocean, shifting to leeward, from island to island, with the variations of the monsoon. In some of their customs this singular race resemble the natives of the Maldive Islands.[1] The Maldivians annually launch a small bark, loaded with perfumes, gums, flowers, and odoriferous wood, and turn it adrift at the mercy of the winds and waves, as an offering to the spirit of the winds; and sometimes similar offerings are made to the spirit whom they term the King of the Sea. In like manner the Biajús perform their offering to the god of evil, launching a small bark loaded with all the sins and misfortunes of the nation, which are imagined to fall on the unhappy crew that may be so unlucky as first to meet with it.

The Tirún or Tedong tribes live chiefly on the N.E. coast of Borneo, and are reckoned a savage and piratical race, addicted to eating the flesh of their enemies. With their language I am totally unacquainted, but it is reckoned peculiar. It is very probable, however, that they are only a tribe of Idán, whom, again, I imagine to be only a race of Haraforas or Alfoërs, as they are termed by the Dutch, who seem to be the most ancient and original race of all the Eastern Islands, excepting perhaps the Papuas. The Idán are sometimes termed Marút; they are certainly the original inhabitants of Borneo, and resemble the Haraforas equally in stature, agility, colour, and manners. The Haraforas are indigenous in almost all the Eastern Isles, and are sometimes found on the same island with the Papuas or Oriental negroes. They are often lighter in colour than the Muhammedan races, and generally excel them in strength and activity. They are universally rude and unlettered, and where they have not been reduced to the state of slaves of the soil, their manners have a general resemblance. In their manners the most singular feature is the necessity imposed on every person of some time in his life imbruing his hands in human blood, and in general among all their tribes, as well as the Idán, no person is permitted to marry till he can show the skull of a man whom he has slaughtered. They eat the flesh of their enemies, like the Battas, and drink out of their skulls, and the ornaments of their houses are human skulls and teeth, which are consequently in great request among them, as formerly in Sumatra, the ancient inhabitants of which are said to have originally had no other money than the skulls of their enemies. The Haraforas are found in all the Moluccas, in Celebes, the Philippines, and Magindano, where they are termed Subano, or Manubo; and the ferocious race mentioned by Marsden, who live inland from Samanka, in Sumatra, and are accustomed to

[1] [A. Gray, "The Maldive Islands," in Journal R. Asiat. Soc., N.S., vol. x. pp. 173–209; H. C. P. Bell's Report in "Ceylon Sessional Papers for 1881," No. XLIII.]

atone their own faults by offering the heads of strangers to the chiefs of their villages, are probably of the same description.

The Papuas, termed by themselves Igoloté,[1] but by the Spaniards of the Philippines, *negritos del monte*, from their colour and woolly hair, are the second race of aborigines in the Eastern Isles, in several of which they are still to be found, and in all of which they seem to have originally existed. Some of their divisions have formed small savage states, and made some advances towards civilization; but the greater part of them, even with the example of more civilized races before their eyes, have betrayed no symptoms either of a taste or capacity for improvement, and continue in their primitive state of nakedness, sleeping on trees, devoid of houses or clothing, and subsisting on the spontaneous products of the forest, or the precarious success of their hunting and fishing. The natives of the Andaman Isles seem to be of this race, as also the black mountaineer tribes of the Malay Peninsula—termed at Kiddeh, Samang; at Perak and in the Malay countries to the N.W. of Kiddeh, Bila; while to the southward of Pera'k, and through the Straits of Malacca, to the eastward, they are termed Dayak. The Papuas, or Oriental negroes, seem to be all divided into very small states, or rather societies, very little connected with each other. Hence their language is broken into a multitude of dialects, which in process of time, by separation, accident, and oral corruption, have nearly lost all resemblance. The Malays of the Peninsula consider the language of the blacks of the hills as a mere jargon, which can only be compared to the chattering of large birds; and the Papua dialects in many of the Eastern Isles are generally viewed in the same light.

The Arabs, in their early voyages, appear to have frequently encountered the Papuas, whom they describe in the most frightful colours, and constantly represent as cannibals. They are mentioned by the travellers Ibn Wahab and Abu-Zeïd, in the "Silsilet-al-Tuarikh," translated by Renaudot, and nearly the same accounts seem to be repeated by Masudi, Yakut and Ibn al Wardi. The following passage, which gives the name of one of the tribes, is adduced from the Persic treatise termed "Seir ul Ahlim," the author of which appears to have visited the Eastern Islands. After mentioning the great island of camphor, probably Borneo, he adds: "Beyond this are other islands of different sizes, among which there is one of considerable extent, inhabited by a race of blacks termed Kahálut, who resemble brutes in form, and when

[1] [There is here a confusion of Igorrotes and Negritos. On the former, see F. Blumentritt, "Ethnographie," p. 24 ff.; on the latter, also called Aëtas, ib. pp. 3–9. Vocabularies are given by A. B. Meyer, l. l. pp. 462–5, and A. Schadenberg, l. l. vol. xii. (1880), pp. 166–74; Montano, l. l. Kern, in the "Bijdragen," Fourth Series, vol. vi. pp. 243–64, claims for their language a thoroughly Philippine character, with certain admixtures from more remote members of the family.]

they can seize on a person they kill and eat him. Of this practice I have had experience, having escaped only by throwing myself into the sea; as the saying is, 'When you are going to be slain, throw yourself into the sea, and perhaps you may survive.' Even so it happened to me, for getting on the trunk of a large tree, I kept my hold for three days, when I was thrown by the force of the winds and waves on a desert shore, and after enduring much hunger and thirst, reached at last an inhabited country."

The tribes of the Eastern Islands exhibit a variety of singular and interesting appearances, not only in the civil and political, but also in the natural and moral history of man. If some of them appear in a naked and primitive state of barbarism, in others the vestiges of ancient art and science indicate that they have suffered a relapse from a prior state of civilization. This is particularly obvious among the Malay, Javanese, Batta, and Búgís tribes, among whom the polished style and elevated sentiments of many of their compositions, and their dexterity in some of the arts, especially the compounding and working of metals, form a singular contrast with the neglect of personal morality and the relaxation of all the bonds of society; while ancient and wise regulations are in a great measure superseded by the most absurd and barbarous usages. Among the most barbarous of the Harafora and Papua races there are some who, whether male or female, use no species of clothing whatsoever, and consequently exhibit few traces of that modesty which is supposed to be innate in the human species. The same phenomenon, whether natural or produced by situation, is exhibited among the Biajus, the families of whom live constantly together on the sea in small boats. Vestiges of cannibalism appear to exist among the greater part of the rude tribes in the Eastern Isles, but the Battas of Sumatra, who are superior to the Malays in the knowledge of the arts and letters, have likewise preserved it; as well as the Tabúnka tribe in Celebes. Of many of the most absurd, unnatural, and barbarous of their usages, it is obviously impossible to form a just opinion in the present state of our knowledge, as we are totally ignorant of the spirit of them, and of the system of opinions with which they are connected. Some of them may find a parallel in India and China; and it may be observed that both the Indian and the Indo-Chinese monuments contain many allusions to a state of society and manners on the continent similar to that which subsists among the most barbarous of the tribes of the Eastern Isles. Perhaps, too, we shall be disposed to regard with some degree of complacency the most absurd and the most illiberal portions of the religious systems of Brahma and Buddha, if we consider the dreadful superstitions that they probably supplanted, and the brutal state of savage existence which they exchanged for civil polity and social order. The Vanaras of

Hanúman are reckoned a tribe of mountaineers, even by many of the Hindus. The barbarous but brave and active Idán of Borneo are termed Marút, which is the Sanscrit name of the forty-nine regents of the winds, and companions of Indra. The standard of the Battas is a horse's head with a flowing mane, which seems to indicate a connection with the Hanagrivas of Sanscrit history. In the present state of our knowledge of these tribes, however, it is not conjecture, but rigid and accurate description that is required; and in the present instance it is not my object to consider their civil, political, or moral relations, unless as far as these affect the philological investigation of their languages and literature. As the chief utility that results from the examination of some of these ruder dialects is to enable us to ascertain the limits of languages more interesting and important, perhaps it may be thought that great minuteness would be misapplied on objects of such secondary importance. It must, however, be recollected that success in important researches often depends on the accuracy with which inferior investigations have been conducted; that in commencing an investigation it is not always easy to predict what will ultimately prove of superior or inferior importance; and that at all events it is safer to bestow too much attention than too little on what must be the basis of historical investigation. In all such inquiries I therefore do not hesitate to adopt the sentiment of the learned Le Long, that "truth is so interesting and satisfactory when perceived that no pains should be spared to discover it, even in the smallest matters."

VII. *Rukhéng.*—The Rukhéng is the first of that singular class of Indo-Chinese languages which may be properly termed monosyllabic, from the mass of their radical words consisting of monosyllables, like the spoken dialects of China. These monosyllables are subjected to great variety of accent and intonation in almost every instance, and require an accuracy of pronunciation, and a delicacy of ear in speaking and comprehending them, far beyond what is requisite in the languages of Europe, or even in the polysyllabic languages of Asia. The Indo-Chinese languages of the monosyllabic class borrow a considerable variety of terms from the Pali or Bali, which exists among them as the language of learning and science; but in adopting these polysyllables they accommodate them to their peculiar enunciation by pronouncing every syllable as a distinct word. The Rukhéng is the language of the original inhabitants of Arakan, who adhere to the tenets of Buddha. Forming in ancient times a part of the empire of Magadha, from which they seem to have derived the name of Mug[1] or Mauga, by which they are generally termed by the inhabitants

[1] [Sir A. Phayre's "History of Burma" (1883), pp. 47, 48, 172.]

of Bengal, and being from their situation more immediately connected with India, their language is by no means purely monosyllabic, but forms, as it were, the connecting link between the polysyllabic and monosyllabic languages. The Rukhéng race is admitted to be of the same radical stock as the Barmas or Birmans, and is understood to have greatly preceded that nation in civilization. The Barmas indeed derive their own origin from the Rukhéng,[1] whom they generally denominate Bárma kyí, or the great Barmas, and they consider the Rukhéng as the most ancient and original dialect of the Barma language. This idea is certainly correct, and it may be added that the Rukhéng orthography and pronunciation are neither so defective nor so much corrupted as the Barma, and that consequently, in tracing the history of the language, the Rukhéng is of much greater utility to the philologist. In another respect the language may be considered as purer; until their late conquest by the Barmas the tribes of Rukhéng seem for a long period to have retained their independence, while the proper Barma tribes have suffered various revolutions. Hence the Rukhéng retains more of its ancient form, and is less corrupted by foreign mixtures. The modifications, therefore, which it has received are chiefly derived from the Pali or Balí, which was cultivated in the country as the learned language, and contained all their sacred books. The Rukhéng has accordingly adopted Balí words and phrases more copiously than the Barma, and has also preserved them in a greater state of orthographical purity. The pronunciation of the Rukhéng is perhaps broader and grosser, but more articulate, than the Barma; in particular it strongly affects the use of the letter *r*, which the Barmas generally convert into *y* in their pronunciation. Such, however, is the difference of pronunciation between the two nations, that even in sentences where the words are nearly the same they are not easily intelligible to each other.

The Rukhéng alphabet coincides accurately with the Devanagari system of characters in its arrangement, and very nearly in the power of the particular letters. The only variation of importance is the expression of both the acute and grave accent of the vowels, as well as their common sound, in certain cases. This provision, however, does not extend to all the vocalic sounds in the Rukhéng alphabet, but only to those sounds of this species which are of most general use. A similar contrivance for the expression of accent occurs in all the alphabets of the monosyllabic languages, but varies in extent according to the exigencies of a particular language. Thus in Rukhéng, after the

[1] [On the origin of the word "Rakheing," see the same in the "Journal of the As. Soc. of Bengal," vol. xiv. p. 24; and on the two essential points of difference between Arracanese and Burmese, C. J. F. S. Forbes' "Comparative Grammar of the Languages of Further India" (1881), pp. 57-60.]

simple alphabet follow the combinations of the simple letters with *wa*, *ya*, *ra*, and of *h* preceding them. Then follow some triple combinations of the same letters, after which are exhibited the common forms of syllables which terminate in a consonant, as *ak*, *ang*, *aích*, *a't*, *a'p*, and others of a similar kind; and finally the varieties of accent, as acute and grave, are presented, in those vowels and nasals which are chiefly subject to be influenced by them.

The Rukhéng character has considerable similarity to the Barma in the greater part of its letters. The following simple characters, however, *g'ha*, *ja*, *j'ha*, *nya*, *ta*, *t'ha*, *da*, *d'ha*, *na*, *'d'ha*, *ra*, *lla*, as well as some of the more complex combinations, differ greatly from the respective forms of these characters in the Barma alphabet, and exhibit considerable resemblance to some of the ancient Canara characters. The Rukhéng simple alphabet is exhibited with considerable correctness by Capt. J. Towers in the fifth volume of the "Asiatic Researches," though many of his particular observations, as well as general views, are far from being accurate, chiefly, it may be presumed, from the novelty of the investigation.

The Rukhéng language, in the simplicity of its structure and expression, has great analogy to the Malayu. It has properly no numbers, cases, nor flections in its nouns; nor conjugations, moods, tenses, or persons in its verbs. Many words have a substantive, adjective, or verbal signification, according to their position in a sentence; but in general the names of objects, qualities, and actions, are sufficiently distinct from each other. The plurals of nouns are formed by numerals, or words expressive of plurality, as *lú*, a man, *lú-súng-rawk*, three men, *lú ákúng*, many men, *lú ákúng-lúng*, all men; *mímma*, a woman, *mímma akúng-su*, many women. Comparisons are made by particles expressive of number or quantity, such as *mya*, or *mrét-té*, much; *akré* and *hlaré*, very; *prét*, less, under; *akúng*, many. Cases are expressed by particles equivalent to the prepositions or postpositions of other languages, or by juxtaposition, which has often the force of the genitive in the Rukhéng language. Thus, a man's hand may be expressed indifferently by *lú-lák*, *lú-hma-lak*, or *lú-chwá-lák*.

The simple pronouns are *nga*, I; *ko* or *móng*, thou; and *yang-su*, he; the plurals of which are formed by the addition of *ro:* as *nga-ro*, we; *mong-ro*, ye; *yang-su-ro*, they. But in addition to these simple pronouns there are various others which indicate rank and situation, as in Malayu, Chinese, and the monosyllabic languages in general, which have all of them paid peculiar attention to the language of ceremony in addressing superiors, inferiors, and equals. These ceremonial forms in Rukhéng are sometimes formed by particles added to the simple pronouns, and sometimes they are significant terms, such as servant, lord, highness, majesty, used

pronominally, or rather in an absolute sense, without any expressed pronominal adjuncts; as in addressing a superior, when the terms *asyang*, lord, sir; *sak'hang*, highness; *khang-părá*, majesty; are employed.

The pronouns in common use in Rukhéng, according to this variety of ceremonial forms, may be thus exhibited:—

I, we	*thou, ye*	*he, they*
nga	kó	dang
nga-ro	móng	yang-su
nga-ro-hma	nang	yang-su-ro
kyĕwéng	awey	su-ro
akyĕwéng	mong-hma	
akyĕwéng-hma	mong-ro	
akyĕwéng-ró	mong-ro-hma	
akyĕwéng-ro-hma	nang-ro	
akyĕwéng-tza-ré	nang-hma	
akyeweng tz'hang-ré-ro	nang-ro-hma	
	awey-ro	
	awey-hma	
	awey-ro-hma	

To explain the particular instances in which each of these pronominal terms is used is not consistent with my present object, which is only to present a general outline of the structure of the language.

The moods and tenses of the verbs are in like manner expressed by means of particles or significant words, like our auxiliary verbs. Such are *si*, *hi-ré*, and *le-bi*, is; *bri* and *lé yákk*, is, been; *bri-ré* and *bri-kha-ré*, was; *myí*, will; *ra* and *ra-mé*, may, can; *yaung*, let, permit; *hi-sua*, been. The position of these particles in a sentence is often, however, a matter of considerable difficulty, and is one of the circumstances in which the elegance of style chiefly consists. The style chiefly affected in Rukhéng composition is a species of measured prose regulated by accent and the parallelism of the members of a sentence. Rhyme, however, is not required either in the terminating consonants or vowels, though it frequently occurs from the structure of the language. The general form of this measure seems to be four long syllables, each of which, however, is convertible into two short ones, or may have a short one interpolated before or after it. Thus, the passage adduced by Captain Towers from the "Manú Saingwan," as a specimen of his system of orthography, in his "Observations on the Alphabetical System of the Language of Awa and Rac'hain," may be arranged—

Maha sámăta
Man grí chak-kráwălá
San'khra prain brain
Tain dain pi' tá
Tain-kha hnaik ch'hauñ
Khré sō tăchhé
Shai'ch pá só T'hám-mă-sát
Chaga do go &c.

Sometimes, however, more complicated measures are employed in Rukhéng composition, in imitation of those which occur in

Balí. Many interesting works are represented to exist in the Rukhéng language, but the greater part of them are translations from the Balí. The "Tillawer Cherita" is said to contain the historical traditions of the Rukhéng nation; the "Karik," composed by Anguli-Mala, and the "T'hamma-sat," or "Dherma Sastra," contain their system of religious observances and code of laws. The following is a list of the most popular Rukhéng compositions:—

1. Raja-búntza
2. Raja-wongtza
3. Témi
4. Némi
5. Janaka
6. Suwanna-asyang
7. Bhuridat
8. Tzaingdá-gúngma
9. Sada-shyei'ch-chaung
10. Mahó
11. Uni-nga-gyaing
12. So'p-soung-gyéng
13. Bhuridat-kapyá
14. Bo-thi-hmain-déi
15. Wé-saing-dara
16. Saing-we-ra
17. Krauk-ché
18. Nara-cho
19. Athi'k-bala
20. Abhi-dam-ma
21. K'hunei'ch-kyéng
22. Para-ma-saing-gou'k-kyéng
23. Maha-Raga-t'ha-kyéng
24. Sapa-kyéng
25. T'ham-ma-sat-kweing-khya
26. T'ham-ma-sat-kra'k-ru
27. T'ham-ma-sat-Manú
28. T'ham-ma-sat-krudaing
29. Logasara
30. Sa-bri-hla
31. Taing-t,haü
32. Radana-hrwé-khri
33. Radana-paing-gúng
34. Radana-paddaing
35. Radana-kweing-khya
36. Radana-powng-khyowk
37. Ba-na't-sa
38. Kraing-ma-tei'ch-p'hak-powng-wat'hu
39. Nga-tzí-săda-pring-do
40. Ga'p-p'ha-kyéng
41. Lakhana-di-ba
42. Noma-kapya
43. Nga-chaing-braing
44. Rama-wut'hú-cha
45. Bramasara
46. Bud-dho-wa-da
47. Péda-sow't
48. Mungăla-sow't
49. Khunei'ch-ra'k
50. Khunei'ch-ra'k-parei'p
51. Patha-wi-jéya
52. Sa-gra-ú ch'howng
53. Lé-keweng-u-ch'howng
54. Sit-t'ha-da-nú
55. Sat-powng
56. Sat-yéng
57. Sat-hnĕwaing
58. Sa-hrwé-k'hé
59. Moé-tó-krang-cha
60. Gu-waing-podi-mowng-cha
61. Hi-tó-padé-sa
62. Noma-ko-ga-tha
63. Tăché-hnei'ch-ra-si
64. Khowng-gri
65. Khowng-láp
66. Khowng-ngé
67. Tă-hnaung-gra
68. Mé-t'haung-gra
69. Su-mé-t'ha
70. Rewatta-cha
71. Aswa-pida
72. Prowng-bra
73. Owng-pa-di-cha
74. Paing-pru-cha
75. Uga
76. Mowng-chwa-cha
77. Cho-ré
78. Ya't-ré
79. Lúng-di-cha

From this list it is evident that the subjects of some of these works are the adventures of characters well known in Sanscrit mythology, as the "Rama Wut'hu," or history of Rama; the "Budd'ho-wa-da," or history of the Avatar Buddha. Others of them seem to be only Rukhéng versions of well-known Sanscrit compositions, as the "Hi-to-pa-désa," or "Hitopadesa;" the

"T'ham-ma-sat-Manu," or "Dherma-sastra," of Menu. The "Suwanna-Asyang" is the popular story of Suvarna Sringi, or the golden cow, formed by the Bráhman Sumbukara Misra, and presented to Raja Mukúnda Deva Gajapati. The "Bhuridat" is the history of Raja Bhuridatta of Magadha, mentioned in the "Maha Bharata," and the "Bhuridat-kapya," or "Bhuridutta-kavya" is a poem on the same subject. The Raja-buntza" is the Rukhéng edition of the "Raja Vamsavali;" the "Raja-Wongtza" is a different work on the same subject; and the "Pat'ha-wi-jéya" seems to be the "Prit'thu-vijeya." Of the modifications they have received in the process of translation I have hitherto had little opportunity of judging, but as far as I have been able to investigate the subject, not only the style, but the incidents and progress of the Sanscrit narration is generally altered, to render them more illustrative of the ascetic doctrines of the Buddhist sect, such as the guilt of killing animals, even accidentally, and the perfection acquired by Rishis in solitary retirement by means of sublime penance and meditation.

The Rukhéng language has never been cultivated by Europeans; the observations on its alphabetical system by Captain Towers, and the short specimen of its vocables in Dr. F. Buchanan's "Comparative Vocabulary of some of the Languages spoken in the Burma Empire," both in the fifth vol. of the "Asiatic Researches," being all that has been published concerning it in any European language. The specimen given by Dr. F. Buchanan only varies from the Barma in seven words out of fifty, and these are only varieties of pronunciation, excepting *looshee*, a child, which is also Barma, and *mateinay*, which seems to be an error, as it does not signify "to sit" either in Rukhéng or Barma, but literally "does not stand," the proper Rukhéng term being *ra't chowk*. The words in the vocabulary certainly exist in Rukhéng as well as in Barma, but in some instances different words are in more general use in the former, as *ahri*, long, instead of *shé*, and *po-mro-naing-grong*, beast, instead of *taritzan*. The Rukhéng pronunciation sometimes, too, is modified by the Burma, and the letter *r* is almost always omitted in the specimen, though it is a distinguishing characteristic of the Rukhéng pronunciation. Thus, the Rukhéng requires *mri gri*, earth, instead of *myegyee*, in the specimen; *kri*, great, instead of *kyee; krephamó*, foot, instead of *kiæpamo; krow'k*, six, instead of *kiouk; kray*, a star, instead of *kyay;* and *ne*, the sun, instead of *nay*. These errors, however, are not to be attributed to Dr. F. Buchanan, nor detract in the least from the merit of his exertions in commencing the investigation; they evidently proceed from the inaccuracy, hurry, and indistinct pronunciation of his Barma assistants, and in his situation were perhaps not to be avoided, unless by attending to the native orthography.

Dr. F. Buchanan has also exhibited comparative specimens of two mixed dialects spoken in Arakan; the first termed Ruïnga, spoken by the Moslems of the country, and consisting of a mixture of Arabic, Hindi, and Rukhéng; the second, termed Rusán, used by the Hindus of Arakan, who adhere to the system of Brahma, and formed by a large proportion of corrupted Sanscrit and Bengali, united to a comparatively small portion of Rukhéng. The dialect of the province of Yo, as it is pronounced by the Barmas, and Ro as it is termed by the Rukhéng, is only a slight variation of the Rukhéng, which it approaches much nearer than the Barma. The range of mountains to the north and east of Rukhéng is inhabited by a race termed Khéng[1] by the Rukhéng and Barma tribes, or, as it is written by Dr. F. Buchanan, Kiayn, but who term themselves Kolún, and whose language is peculiar, having little or no affinity to either Rukhéng or Barma. From the two names, Ro and Khéng, the name of Rukhéng is generally derived; but the national name of the Rukhéng race is Ma-rum-ma, which seems to be only a corruption of Maha-Varma, Varma being an epithet generally assumed by the tribes of Kshatriya extraction. The inhabitants of the mountains between Rukhéng and Chatigan are termed Sa-mowng-syang by the Rukhéng tribes, and are asserted to speak a different language. They are probably only a division of the Khéng, or Kolún. Whether these are the same with the Kúkís, who inhabit the high ranges of hills to the N.E. of Chatigan, I have not been able to determine. In the able and curious description of this singular race given by J. Macrae, Esq., in the seventh volume of the "Asiatic Researches," the languages of the Kúkí and Mug or Rukhéng races, are said to be so intimately connected as to be mutually intelligible. That the two adjacent tribes should be mutually able to understand each other is very probable; but that their respective languages are connected in this instance, I apprehend to be very dubious; for in a specimen of above 500 radical terms of the Kúkí, which I owe to that gentleman's politeness, I find very few which are similar to the corresponding Rukhéng, or that were understood by an intelligent native of Arakan. The subject, however, requires further investigation, and there seems to be no person better qualified than Mr. Macrae for prosecuting the inquiry, both by his abilities and his situation.

VIII. *Barma.*—The Barma language is used by the great and

[1] [According to Col. G. E. Fryer ("Journal As. Soc. of Bengal" for 1875, p. 46), the Khyengs call themselves Hiou or Shou. See also the "British Burma Gazetteer" (1880), vol. i. p. 184; and Col. Horace Browne's "Statistical and Historical Account of Thayet-myo" (1874). Forchhammer, who calls them Chins, has translated from the Burmese the code of their Customary Law, with valuable notes (1884), and has given an account of the language in his "Notes on the Languages and Dialects spoken in Br. Burma," pp. 6–8.]

powerful nation of the Barmas. The name of this nation has been written differently by almost as many authors as have mentioned it, while no person seems to have thought it worth his while to inquire how the Barmas wrote their own name. This they constantly write *Barma*, though from affecting an indistinct pronunciation they often term themselves *Byamma*, *Bomma*, and *Myamma*, which are only vocal corruptions of the written name. Amadutius, however, in his preface to the "Alphabetum Barmanum seu Bomanum," with equal ignorance and confidence, denies flatly that any nation, country, city, or language exists, which by the natives themselves is denominated Barma. This name he asserts to have been introduced solely by the ignorance and vicious pronunciation of Europeans, "since," says he, "by the analogy of the language the nation is denominated Bomah, the great nation, from *bo*, the head, a chief, and *mah*, a man. This silly vapouring etymology is, however, entirely averse to the established orthography of the Barmas themselves, and only worthy of P. Paulinus or a modern Frenchman.[1]

The Barma language,[2] like the Rukhéng, in its original state, appears to be purely monosyllabic, but it has borrowed freely from the Balí, and in imitation apparently of that language it has sometimes formed words of some length by the coalescing of its original monosyllables. Being completely devoid of every species of flection, whether in nouns, pronouns, or verbs, its construction is extremely simple, and depends almost solely on the principle of juxtaposition, like its cognate dialect the Rukhéng, which it resembles in structure. Its pronouns and particles are peculiar, its idioms few and simple, and its metaphors of the most obvious kind; but it is copious in terms expressive of rank or dignity, and the rank of the speaker is characterized by the language he uses.

The Barma alphabet corresponds to the Balí, and is regulated by the same principles of accentuation. In point of form it has considerable resemblance to the Canara, Singala, and Telinga alphabets, but is rather more simple in the formation of the character. Carpanius, in his "Alphabetum Barmanum seu Bomanum," is inclined to derive the Barma character immediately from the square Balí, used in Java, and both of them from the Hebrew through the medium of the Persic. Amadutius, improving on this idea, or rather adopting that of Bayer, seems to be desirous of deducing both, as well as the Malabar or Malayalam, from the Armenian, a character to which they have scarcely the

[1] [See "Br. Burma Gazetteer," vol. i. pp. 141–3.]

[2] [Schiefner was the first to establish, on sound philological grounds, the affinity of Tibetan and Burmese. See his articles, entitled "Tibetische Studien" contributed to the "Bulletin" of the St. Petersburg Academy, in 1851, 1856, 1864, 1877.]

remotest resemblance, and the origin of which is itself involved in great obscurity.[1]

The character of the Barma language has a very considerable effect on the style of the compositions it contains. Repetitions of the same turn and expression are rather affected than shunned, and a kind of naked strength and simplicity of phrase, with short sentences pregnant with meaning, are the greatest beauties which the language admits of. "The Bomans," says Carpanius, "in their poetry are more careful of preserving similar terminations than an equal number of syllables, and use this style particularly in treating of religious subjects." The fact, however, is, that the similarity of termination is neither sought nor shunned, but recurs from the genius of the language very frequently. The style of the principal Barma compositions is a species of measured prose, regulated almost solely by the accent, as in the Rukhéng, the different dialects of Chinese and the other monosyllabic languages. The tone of polished conversation requires an approximation to this style of composition. The verb is generally placed in the close of the sentence, and the defect of conjunctive particles to connect the different members of a sentence renders a considerable degree of repetition absolutely necessary to prevent confusion.

The Barma language has been highly cultivated in composition, and contains numerous works in religion and science, besides numerous books on astrology, mythology, medicine, and law, in the latter of which the most important is the "Dam-ma-Sat kyee," or great system of justice, with the constitutions of the Barma princes.[2] The Barmas are asserted by Dr. Buchanan to possess numerous historical works relative to the different dynasties of their princes, the most celebrated of which is the Maha-raja-Wayngee. "These people," says he, "have also translated histories of the Chinese and Siamese, and of the kingdoms of Kathee, Koshan-pyee, Pagoo, Saymmay, and Laynzayn." On the importance of such works, supposing them to be strictly of an historical nature, it is needless to dilate. It appears probable, however, that many of them may resemble the Hindú Cheritrás. The Barmas possess numerous smaller poems and songs, and even *natakas*, which may probably be derived from Sanscrit tradition, as the adventures of Rama in

[1] [On the Burmese alphabet, see C. J. F. S. Forbes, l. l. pp. 95–98; I. Taylor, "The Alphabet," vol. ii. p. 345. According to Forchhammer, it was derived from the Talaing about 600 years ago: Introduction to "Wagaru," p. 5.]

[2] [There being no distinction between Rakhaing and Burmese literature, the two lists might have been amalgamated in one. No attempt has been made in either list at verifying and correcting the titles. On Burmese literature, see Sangermano, "The Burmese Empire," section xx.; Forchhammer's "Report on Literary Work" (Rangoon, 1882); and on the law literature, his prize essay, "On the Sources and Development of Burmese Law," prefixed to his edition of "Wagaru" (Rangoon, 1885).]

Lanka are favourite topics in their dramas. The following are some of the most popular works in the Barma language, and several of them, I find, exist equally in the Rukhéng, Siamese, and Malayu. Some of them are purely mythological, but others are Cheritrás of the historical class.

1. Jina-Mana
2. Nunda-Jina
3. Nundaguma
4. Chundaguma
5. Narada
6. Temi
7. Nemi
8. D'hammapada
9. Namagara
10. Logasara
11. Loganit'hi
12. Maho-Sut'ha
13. Wesundura, or Story of Rajah Vésundara
14. Paramik'han
15. Chudongk'han
16. Bungk'han
17. Kado-k'han
18. Chatu Damasara
19. Sangwara, termed in Siamese the Sut'hon
20. Bhuridat
21. Kinara-pyeu, or account of the celestial Kinara
22. Malinméng Wut'hu, or History of Rajah Malin
23. Jinaka, or History of Rajah Jinaka, denominated in Siamese Maha-Chinók
24. Yuwají, termed in Rukhéng Ruari
25. Swipri-wéng-khan
26. To-twék-k'han
27. Mnnigungsala
28. Anusasana
29. Suan-nashan
30. Wit'hora
31. Kagileinga
32. Sada-syi'ch-chaung
33. Anaga-atwéng
34. Ngare-khan or description of Naraka
35. Attagatt-lénga
36. Hmát-chow bóng

The Barma language has some variety of pronunciation in the different provinces of that empire. The dialect of the Yô, situated on the east of the Arakan mountains, has been already noticed. The Tanéngsári, or language of the inhabitants of the Tanaserim district, denominated Tinnaw by the Siamese, also differs considerably from the common Barma. The Tanéngsári certainly have many peculiarities of expression, and many words in common use among them are at present obsolete among the Barmas of Ava; but the majority of them are to be found in the Barma writings, and the Tanéngsári are therefore reckoned to use an obsolete dialect rather than a peculiar language, I have already mentioned in what respects the Barma and Rukhéng are related to each other. The following comparative list of terms will show more particularly the extent of their difference in current use:—

	Rukhéng.	*Barma.*
Month	khanang	piját
back	nau-kúng	naó
knee	pa-chhei'ch-tú	du
bone	aro	ayo
heart	alúng	na-towng
seeing	mrang-ré sú	myang-su-ha
smell	kaing-ré	chan-jan

	Rukhéng.	*Barma.*
touch	pait-té	seing-su-ha, thí
trouble	ma-ré	khék
strength	akri	akyan
marriage	maya-ni-chá'p-té	lék-t'hat-gya
life	ahrang	asyang
circle	apawk	akwéng
storm	mukri	moseik
hail	mu-gyowk	mo-si
morning	mă-sowk-tha, nyí-ga	mă-neik
evening	nya-ja	nya-né, né-é
sea	mreik	péng-lé
dust	mré-moh	amóng, myé-mong
mud	ta-mai	suin
fire	míng	mi
length	hré	shi
ditch	mroung	kewng
gold	hruí	sué
silver	muë	ngoé
horse	mrang	miyin
fowl	krak	kyiak
cock	krak-p'ha	kyiak-t'hí
hen	krak-ma	kyiak-ma
snake	mrui	myewé
sail	rowak	yewék
bed	săloëng	kadeng
tailor	ang-gí-dap	khyowk-sama
white	aprú	pyú
hard	kyang	má
vegetable	haung-sei'ch ruakk	heing-ewék
first	ayenga ăkha	{ayeng-su-ha {ayeng-da-ha
second	hnei'ch-khu-chowng	hnei'ch-khu-su-ha
I	akyeweng-hma	kyewen-noú'p
we	akyeweng-ro-hma	kyewen-do
thou	mong	méng
you	mong-ro	méng-do
he	yang-su	su
they	yang-su-ro	su-do
this	dé-ga	di-ha
that	t'ho-ga	ho-ha
who	ăsu	bélú
what	jàma	baha
which	ăsu	bésú, béha
if	t'ho-shyang	hléang
though	la-lá't-hléukk	phye'ch-hleang
about	le'khi-gra't-me	pát
many	akúng	apóng
perhaps	kaing-ra-bya	kán-hné
yes	how't-payak	hou't-ké
no	ma-hí	ma-si
is	hí	si
was	bri	pyi
has been	hi-yak	si-bi
I ought to do it	akyeweng-louk-kowng-yak	kewen-noú'p-louk-gowng-de
I will do it	akyeweng-ro-hma louk-ra-ré[1]	kewen-noú'p louk-ya-dé

[1] [A trustworthy vocabulary of Hill Arracanese is given by Col. T. Lewin, in his "Hill Tracts of Chittagong" (Calcutta, 1869), pp. 146–51.]

The Barma affects a more delicate but at the same time inarticulate pronunciation than the Rukhéng, and less conformable to the actual orthography of the language. This is particularly obvious in the conversion of *ra* into *ya* in Barma; but the Rukhéng itself is not devoid of its peculiarities, among which may be mentioned the conversion of *sha* into *ha*. Thus the word which is written *shré* in both languages, is in Barma pronounced *syi*, and in Rukhéng *hrí*.

The specimens which Dr. Buchanan has exhibited of the languages of the Kariéng or Karayn, as he writes it, and of the Kiayn (which seems to be the same word softened in the pronunciation), the rude tribe which denominates itself Kolún certainly show considerable analogy to exist between these dialects and the Barma proper.[1] Some Barma words seem likewise to be discoverable in the specimen he has given of the language of the Moitay, or inhabitants of Kassay, as *mee*, fire, *nga*, fish; and more copious and correct vocabularies, with a more exact orthography, would probably exhibit a more intimate connection; but a certain degree of acquaintance with the grammatical principles of every language, and with its alphabet and orthography, if a written one, is absolutely necessary to give any philological value to a specimen of its words. The inhabitants of the Nikobar Islands are sometimes represented by those who have visited them as speaking a language which is radically Barma, while by others it is reckoned Malayu. If Fontana's short vocabulary, "Asiatic Researches," vol. iii., can be depended on, the Nikobar language seems to have very little connection with either the one or the other, as it does not appear to contain above two or three words which can with certainty be referred to either of them.[2]

The Barma language has been little cultivated by Europeans, excepting the Catholic missionaries. The "Alphabetum Barmanum," digested by Carpanius, was published at Rome in 1776. Carpanius mentions in his preliminary dissertation that at that period a grammar and vocabulary of the Barma language had been prepared by P. Joh. Maria Percoto, Bishop of Méssola, which seems never to have been published. In the preface to the same work Amadutius mentions that the Gospel of St. Matthew and the Epistles of St. Paul had been rendered into the Barma language, together with the "Evangelia dierum omnium Dominicalium," "Epistola Dogmatica, et Dialogus inter Missionarium et Talapoinum." P. Paulinus also mentions among the

[1] [This will now scarcely be found to apply to Karen any more than to Kassia.]

[2] [This is borne out by the materials supplied by the late F. A. de Roepstorff—viz., "A Dictionary of the Nancowry Dialect of the Nicobarese Language" (Calcutta, 1884), and "The Gospel of Matthew in Nicobarese, with Critical Notes" (1884).

Borgian MSS. a dialogue between a savage Khien and an ex-Talapoin, written in the Italian language by D. Cajetanus Mantegatius, the object of which is to expose the doctrine of the Talapoins, as contained in the books of the Barmas. Khien seems to be the name of the rude tribe termed Khéng by Moslem writers, and Kiayn by Dr. Buchanan; and the work itself, the translation of a composition circulated among the converted Barmas by the Catholic missionaries. The Talapoins seem, however, to have retaliated on the missionaries; and Dr. F. Buchanan has printed Vincentius Sangermano's translation of "A View of the Religion of Godama," composed by Atuli Zarado, for the express purpose of converting the Christians, in which the English, Dutch, Armenians, and other nations are exhorted to adore Godama, the true God; to adore also his law and his priests, to be solicitous in the giving of alms, and in the observance of Sila, and in performing Bavana.[1]

IX. *Môn.*—The Môn language is still used by the original inhabitants of Pegu, who denominate themselves Môn, though by the Barmas they are termed Taleing, and by the Siamese, Ming-môn. This language has never been cultivated by Europeans, and the only specimen of it known to me is that printed by Dr. F. Buchanan, "Asiatic Researches," vol. v. It seems to be quite original, and is said by the Barmas and Siamese to have no affinity with either of their languages. I have met no learned men of the race, nor have had any opportunity of cultivating the language; but I have been informed by a Talapoin that they possess many ancient histories in this language, which is not impossible, as they seem to have attained civilization at a more early period than the Barmas, and though now reduced, to have been formerly a great and potent nation. In the early Portuguese histories they are denominated the Pandálús of Môn, and they are supposed to have founded the ancient Kalaminham empire at a very early period. The name Kalaminham, mentioned by the Portuguese, is probably connected with the Siamese name of the nation, Ming-môn. The Môn alphabet, if I can depend on the specimens of the character shown me by a Barman of some learning, is only a slight variety of the Barma-Balí, with which it corresponds in the power and arrangement as well as the form of the characters. I have, however, had little opportunity of investigating this subject, and expecting to have visited Pegu, did not avail myself of that opportunity to the fullest extent. The examination of the Môn character and language has no

[1] [Though the dictionaries of A. Judson and the grammars of F. Carey, Judson, Latter, and Chase are now available, and though hundreds of volumes in Burmese have been printed, no scientific philological work on the language has yet been attempted.]

peculiar difficulty, and may be easily accomplished by the first literary inquirer who may visit Pegu; and I still indulge the hope that my future inquiries may be attended with success in investigating their relations.[1]

X. *Thay.*—The Thay language is that which is used by the Siamese, who in their own tongue assume this name as their national appellation. By the Barmas they are denominated Syan,[2] from whence the Portuguese seem to have borrowed their Siam and Siaom, from whom the other nations of Europe have adopted the term. La Loubere, who visited Siam in 1687–8 as envoy extraordinary from the French monarch, has given incomparably the most accurate account that has ever been exhibited of this nation, formerly reckoned the most polished of Eastern India. He divides them into two races, the Tai and the Tai Yai. The latter nation, he adds, are reckoned savages, though the most ancient. Their name signifies literally the Great Tai, and in order to distinguish themselves from this nation, the ruling race in modern Siam assume the name of Tai-noë, the Little Tai. Dr. F. Buchanan, however, on the authority of the information he received in the Barma dominions, divides the Siamese race into many states, and gives a specimen of the vocables of three dialects. This brief vocabulary, with La Loubere's observations on the Siamese language and "The Maxims of the Talapoins," translated out of Siamese by the catholic missionaries, which he has published in his "Historical Relation of the Kingdom of Siam," constitute all that has been published respecting the language or literature of this nation in any European tongue. The result of my own inquiries certainly coincides more directly with La Loubere's information than with that received by Dr. F. Buchanan. All the intelligent Siamese whom I have met, and among these were Talapoins both of the Tai and the Tai-yai race, agree in asserting that the Siamese nation, properly so called, consists of two tribes, the T'hay and the T'hay-j'hay, for so the

[1] [On the Talaing, the oldest literary vernacular of Further India, see C. J. F. S. Forbes, l. l. pp. 29–51, 130–56; "British Burma Gazetteer," vol. i. pp. 153–62; I. Forchhammer, "Notes on the Languages and Dialects spoken in British Burma" (1884), pp. 3–5; and J. M. Haswell's "Grammatical Notes and Vocabulary of the Peguan Language" (1874). Forchhammer, in his Report, gives the titles of more than fifty Talaing works.]

[2] [In Burmese, the word *rham:* (pronounced *shan*) applies only to a Shan, whereas a Siamese is called *Yodhayâ*, from Ayuthya, the ancient capital of Siam. Though in Siamese the terms síyem (now obsolete) and sayám—both traceable to Sanskrit śyâma—occur, the proper denomination of a Siamese is Thai. In Shan the slight distinction is made that Tai means a Shan, Thai a Siamese. Evidently, one name, whether Shan or Tai, was originally used for both Shans and Siamese. The legendary accounts concerning the origin of the Siamese are given by A. Bastian, "Reisen in Siam" (1867), pp. 431–43. Compare also Cushing's "Shan Grammar" (1871), Introduction.]

names are properly written. Of these the most ancient are the T'hay-j'hay, formerly famous for their learning and the power of their empire. It is added that many monuments of this ancient race exist in the kingdom of Siam, and I was informed, in particular, that in the vicinity of Ligór, about five days' journey from Trang, there are various ancient inscriptions on stone among the ruins of a very ancient temple which are attributed to the T'hay-j'hay, but which no person among the modern T'hay is able to decipher. The T'hay language, or Siamese, as it is written by these two races, does not differ essentially; but the spoken dialect among the T'hay-j'hay is much more strongly accented than among the T'hay proper, or the present ruling race of Siam. The T'hay-j'hay inhabit the country between the Me-nam and the Me-kon, or river of Cambodia; but the T'hay for the most part inhabit on the west of the Me-nam, or between that river and the frontiers of the Tinnaw, Môn, and Barma nations. As to the Tai-loong, of whose vocabulary Dr. Buchanan has given a specimen, all the Siamese that I have met, though they admit that a district is denominated by this appellation, unanimously deny that there is either a race of men or a dialect of the language which bears this name. The words themselves which Dr. F. Buchanan adduces as specimens either of the Tai-loong or the Tai-yay are pure T'hay whenever they are not auricular corruptions of pronunciation or words of different meaning, introduced apparently by the interpreter's misapprehension of the sense required to be expressed. Having myself been frequently exposed to similar misapprehensions, and knowing from experience the difficulty of avoiding it, especially in languages in which not only the signification varies with such delicate shades of pronunciation as are almost undistinguishable to an European ear, but the train of ideas themselves is regulated by such a subtle and as it were hieroglyphical set of principles, I am far from insinuating any carelessness in Dr. F. Buchanan, whose comparative vocabulary is the first attempt to classify these languages, but I am attempting to account for the mistakes into which he seems to have been inevitably led by the misapprehension of his interpreters. Thus *moo* signifies the hand in T'hay; and *paw-moo*, which he exhibits as the Tai-loong variation, is only *já-mú*, the palm of the hand, in the proper language; *kén*, which he writes *kayn*, signifies the arm in T'hay or Siamese proper; and in the same language *komooee*, which he gives as the Tai-yay synonym, signifies the lower part of the arm from the elbow to the wrist; and *moo*, the Tai-loong synonym, signifies the hand. *Tin* signifies the leg in Siamese; but *naung*, which he gives as the Tai-nay, signifies the skin; and *koteen*, the Tai-yay synonym, the joints of the leg. In the same manner *langteen*, which he gives as the Tai-nay or common Siamese for foot, signifies literally the upper part of the foot; and

swateen, the Tai-yay synonym, appears to be a mispronunciation of *fatín*, the under part of the foot. *Satt* signifies a beast or animal; and *nook*, the Tai-yay synonym, is only a mispronunciation of *nôk*, a bird, as are *noup* and *naut*, the Tai-nay and Tai-yay words which are given to signify a bird. *Pawk* signifies the mouth; but *tsop*, given as the Tai-yay synonym, is a mispronunciation of *tsot*, to drink. *San* signifies short; but *lot*, the Tai-yay synonym, signifies child, and *unlot*, the Tai-loong synonym, one child. *Yoon* signifies to stand; but *loot-sook*, the Tai-yay synonym mispronounced, signifies to rise up; and *peinung*, the Tai-loong synonym, go sit. *Seeza*, the head, is not Siamese but Balí; and the Tay-yay synonym *ho*, and the Tai-loong *hoo* are only mispronunciations of the proper T'hay term *hua*. It may be proper also to observe here that Dr. F. Buchanan has printed Tay-nay instead of the Tai-noë of La Loubere, which signifies little Siamese; whereas Tay-nay cannot possibly signify little Siamese, but only chief Siamese; the true meaning of *nay* being chief or head. It is a term of similar import with *nayen*, *nayer*, and *nayenmar*, used in Malabar as the appellation of the military caste, or *nayaka* in Sanscrit.

The T'hay or Siamese language appears to be in a great measure original, and is more purely monosyllabic and more powerfully accented than any of the Indo-Chinese languages already mentioned.[1] It certainly is connected in some degree with some of the Chinese dialects, especially the Mandarin or Court language, with which its numerals as well as some other terms coincide, but these are not very numerous. It borrows words freely from the Balí, but contracts and disguises more the terms which it adopts than either the Rukhéng or the Barma. In its finely modulated intonations of sound, in its expression of the rank of the speaker by the simple pronouns which he uses, in the copiousness of the language of civility, and the mode of expressing esteem and adulation, this language resembles the Chinese dialects, with which also it coincides more nearly in construction than either Barma or Rukhéng. Its construction is simple and inartificial, depending almost solely on the principle of juxtaposition. Relative pronouns are not in the language; the nominative regularly precedes the verb, and the verb precedes the case which it governs. When two substantives come together the last of them is for the most part supposed to be in the genitive. This

[1] [Fr. Müller, l. l. vol. ii. part 2, pp. 367–76; I. Forchhammer, in "The Indian Antiquary," vol. xi. pp. 177–89; W. Schott, "Ueber die indo-chines. Sprachen" (1856); E. Kuhn, "Ueber Herkunft und Sprache der transgangetischen Völker" (1883). For the study of Siamese, the grammar and dictionary (1850–1854) of Bishop Pallegoix and a grammar by L. Ewald (1881) are now available; and for that of its sister language, Shan, a grammar (1871), handbook (1880), and dictionary (1881) by J. N. Cushing. An attempt at an analytical account of the Siamese language was made by A. Bastian in his "Sprachvergleichende Studien" (1870), pp. 191–226.]

idiom is consonant to the Malayu, though not to the Barma or Rukhéng, in which, as in English, the first substantive has a possessive signification. Thus the phrase a man's head is expressed in Barma and Rukhéng by *lú-k'haung*, which is literally man-head; but in Siamese it is *kua-khon*, and in Malayu *kapala orang*, both of which are literally head-man. A similar difference occurs in the position of the accusative with an active verb, which case in Barma and Malayu generally precedes the verb, as *tummaing chá*, literally rice eat; but in Siamese follows it as *kén káw*, literally eat rice; which corresponds to the Malayu *makan-nasi*. The adjective generally follows the substantive, and the adverb the word which it modifies, whether adjective or verb. Whenever the name of an animal, and in general when that of a species or class is mentioned, the generic or more general name of the genus to which it belongs, is repeated with it, as often happens in the other monosyllabic languages as well as in Malayu. In the position of the adverbial particle the Malayu often differs from the Siamese, as *mana pargi*, literally where go, but in Siamese *pai hněi*, go where. The Siamese composition is also, like that of the Barma, a species of measured prose regulated solely by the accent and the parallelism of the members of the sentence, but in the recitative the Siamese approaches more nearly to the Chinese mode of recitation, and becomes a kind of chaunt, which different Brahmans have assured me is very similar to the mode of chaunting the "Samaveda."

The T'hay coincides occasionally, even in simple terms, both with the Barma and Malayu; but these terms bear so small a proportion to the mass of the language that they seem rather the effect of accident or mixture than of original connection. The following are some of these coincidences which present themselves spontaneously :—

	T'hay.	*Barma.*
river	klong	kyóng or krong
elephant	chang	ch'heng
saw	lŭei	lúa
finger	nyew	nyo
to	ka	ga
self	éng	eng

	T'hay.	*Malayu.*
I	ku	aku and ku
this	ni	ini
that	nunn	inún
lock	kaché	kunchi
dagger	krít	krís
open	bùk	búka
to	ka	ka
come	ma	mari

The T'hai or Siamese alphabet differs considerably in the power of its characters from the Balí, though it not only has a general resemblance to it in point of form, but also in the arrangement of the characters. The vowels, which are twenty in number, are not represented by separate characters, but by the character corresponding to the short *ăkar* variously accented, excepting the vocalic *ru* and *lu*, which are only variations of the *r* and *l* consonants. The consonants are thirty-seven in number, and are not arranged by the series of

five, like the Deva-nagari and Balí; but the first series, *ka*, consists of seven letters; the second series, *cha*, of six; the third series, *ta* or *da*, of six; the fourth series, *ba* or *pa*, of eight; the fifth series, *ja*, of four; and the last series, *sa*, of six, including the vocalic *ăkar*, though two of them are not in common use. Each of these letters is varied by sixteen simple accentuations and by thirty-six complex ones. The letters *ka*, *nga*, *ta* or *da*, *na*, *ma*, *ba* or *pa*, are also final consonants. Hence it is easy to perceive the near approximation of the Siamese to the delicacy of the Chinese accentuation, while in other respects the alphabet is considerably more perfect than in the Mandarin or Court language of the Chinese, which has neither the same variety of consonants nor admits so many in the close of a syllable. The Siamese pronunciation, even of consonants, corresponds very imperfectly to the European mode: *r* and *l* are generally pronounced *n* in the close of a syllable; *h* is often prefixed to a consonant, but from the total suspension of voice in pronouncing syllables which terminate in a consonant no aspiration can be pronounced after them; *ma* and *ba*, *tya* and *chya*, are often difficult to be distinguished in pronunciation, as are *ya* and *ja*, *kyé* and *chyé*, with other combinations. From this circumstance many combinations of letters are pronounced in a manner somewhat different from that in which they are written.

The first European who attempted the study of Siamese literature was the learned Gervase, but his lucubrations have never been published. The learned and indefatigable Hyde procured from the Siamese ambassador at London an imperfect copy of the Siamese alphabet, which has been published by Greg. Sharpe in the "Syntagma Dissertationum," 1767. It is inferior to La Loubere's alphabet in accuracy, though it contains a greater number of compound characters. La Loubere's alphabet contains three forms of the *sa*, corresponding to the Nagari; but the *sha* and *sh'ha*, being disused in common pronunciation, are commonly omitted both in the alphabet and in modern MSS.

The Siamese or T'hay language contains a great variety of compositions of every species.[1] Their poems and songs are very numerous, as are their Cheritrás, or historical and mythological fables. Many of the Siamese princes have been celebrated for their poetical powers, and several of their historical and moral compositions are still preserved. In all their compositions they either affect a plain, simple narrative, or an unconnected and abrupt style of short, pithy sentences, of much meaning. Their books of medicine are reckoned of considerable antiquity. Both in science and poetry those who affect learning and elegance of composition sprinkle their style copiously with Balí. The laws of

[1] [See Pallegoix, "Grammatica Linguæ Thai," pp. 172-80.]

Siam are celebrated all over the East, and La Loubere has mentioned three works of superior reputation, the "Pra-Tam-non," the "Pra-Tam-Ra," and the "Pra-Raja-Kam-manot." Of these, the first is a collection of the institutions of the ancient kings of Siam; the second is the constitutional code of the kingdom, and contains the names, functions, and prerogatives, of all the officers; the third, which is about 150 years old, contains additional regulations. Of these, the first is the most celebrated and the most deserving the attention of Europeans.

The Siamese histories of the T'hay dynasty detail with much minuteness and great exaggeration the events which have occurred in Siam and the adjacent states and countries during the last 1,000 years. They also detail the events of 400 years previous to that period with less precision, from the building of the city Nakhón. The records, however, of the T'hay-j'hay dynasty are supposed still to exist, and perhaps it may yet be possible to glean a few grains of pure historic gold from the sands which glitter in the long valleys of the Mé-nam and Mé-kon.

The Cheritrás or romantic fictions of the Siamese, are very numerous, and the personages introduced, with the exception of Rama and the characters of the Ramayan, have seldom much similarity to those of the Brahméns. The following are some of the most popular among the T'hay, several of which contain the same stories and incidents as those which are current among the Rukhéng, Barma, and Malayu nations.

1. Rámá-kién
2. Rádin
3. Sum-mut-ta-kó-dóm
4. Wét-jă-sun-dón
5. Worawóng
6. Un-narút
7. Mahó-sót
8. Mélăy
9. Chátri
10. Chalăwán
11. P'húm-hóm
12. Pra-t'hóm
13. Su-t'hon
14. Pok'ha-wád-di
15. Téng-ón
16. Lín-t'hóng
17. Nok-k'húm
18. P'ha-nón-són-păjá
19. Mak-kali-p'hon
20. Súm-p'han-sit
21. Sŭan-na-hong
22. Prang-t'hong
23. Nang-síp-song
24. Ramá
25. Chumpá-t'hong
26. Lúk-sŭa-kó
27. P'hím-swan
28. Păja-p'hali
29. T'hàw-krúng-són
30. Khun-p'hen
31. Trei-wóng
32. Chin-narat
33. P'howit'hàt
34. Su-t'hin
35. Hŏi-sang
36. Sang-sin-chay
37. Woranút
38. Chitra-kán
39. Nang-ŭt'hay
40. Mahá-Chinók
41. Mlék-t'hòng

In the general characteristics of style and manner these Cheritrás resemble those of the Rukhéng, Barma, and Malayu tribes, and exhibit the peculiar manners of the Indo-Chinese nations, as well as the peculiar features of their mythology. The

"Rámá-kién" seems to be a Siamese version of the Ramayan, and relates the adventures of Prám or Pra-Ram, and his brother Pra-Lák or Lakshmana, and their wars with Totsă-kan or Dushakant'ha (which is one of the names of Ravana), who carried off Nang Séda or Síta. This narrative corresponds, as far as I have been able to learn, with the Sanscrit poem, and almost all its incidents have been converted into Natakas for representation by the Siamese, in the same manner as the Barmas have employed the incidents of the Yama-méng or Barma-Ramayan. Rádín is the Siamese translation of a Javanese story. "Sum-mut-ta kó-dóm" is the history of Somonakodom, abridged from the Balí. The "Wét-jă-sun-dón" is the history of a Rajah who becomes an ascetic of the forest, being struck with a fit of devotion at the sight of a withered mango-tree as he was walking in his garden. "Worawóng" is the history of an unfortunate Rajah who fell in love with a lady, and was slain by an enchanted spear which guarded her, one night as he was escalading the window of his mistress. This is also a subject of dramatic representation. "Mahó-sót" contains the wars of Maha-sot with Chor-ni, and is the same as the Barma "Maho-Sut'ha." "Un-narút" narrates the story of Anírud'ha, the grandson of Krishna. "Mélăy" relates the benefits of Malăy, the being whose office is to relieve the torments of Naraka. "Chalawăn" contains the history of a destructive alligator who falls in love with a princess, whom he carries off to his recess in the ocean, and the account of her rescue. "Phúm-hóm" is the history of another princess of whom an elephant was enamoured, and her rescue. "Pra-t'hóm" is a mythological account of the origin of the universe, according to the principles of the Buddhist sect. "Nok-k'húm" is the mythological account of the celebrated Hamsa. "Pok'ha-wád-di" is the history of Bhagavati. "P'ha-nón-són-păjá" contains the instructions of the sagacious ape P'ha-non. The "Mak-kali-p'hon," the adventures of the son of a chief who possessed a wonderful cow, resembling the Sanscrit Kamad'henu. "Súm-p'han-sit," a book of moral instructions. "Prang-t'hong" relates the adventures of the persons who went to the land of the Rakshasas in search of the fruit Prang-t'hong, for which a certain princess had longed when pregnant, the obtaining of the fruit on condition that the child of which the princess was pregnant should be presented to the Rakshasa; the carrying off of the child by the Rakshasa, and her return to her parents when grown up. The Lúk-sŭa-kó" relates the friendship between the tiger and the bull, and their being afterwards metamorphosed into men by a certain Rishí. "Păja-p'hali" relates the adventures of Vali, the brother of Sugrivá. The "Hŏi-sang" relates the adventures of the prince who was born in a chank-shell, and remained in it till he arrived at maturity. The "Sang-sin-chay" is the account

of a hero who was born with a chank and an arrow in his hand, with which, and mounted on a lion, he accomplished many adventures among the Rakshasas and Girgásis, Yakshas or Yák, as they are termed by the Siamese. The "Woranút" relates the adventures of the twin brothers Woranút and Woranét. "Nangŭt'hay" relates the adventures of a Naga princess who was carried off by a Rajah. Some of the fictions exhibit a wild and singular style of fabling with which we are little acquainted; but the greater part are obviously derived from the Sanscrit through the Balí.

The T'hay exhibits considerable variety of measures in composition, and frequently introduces several of them in the same work, in the same manner as is frequently done in Brij, Punjabi, and Sik'h compositions. The most frequent measure, however, among the T'hay, as among the Rukhéng and Barma, seems to be that denominated Râp, which consists of four long syllables, but admits occasionally of one or more intercallary short ones; the Já-ni, which consists of five syllables, the Chabang of six, the Pat'hamang of seven, the Jésuntá of eight, are also frequently employed.

The following specimen of T'hay is taken from the beginning of the "Mahá Chinók," a work in which the greater part of these are introduced.

Description of Mait'hila.

Jang mi múung núng
Jay kwàng trăhúng
Chu Mít t'hín là
Tháw p'hu suwoi rât
Krop krong para
Song nam maha
Chinok p'homi
Som det p'homi
Krong se narát
Pin chá nan ma
Bo mi an arái
Ké rat prachá
T'haw krong para
Pin cháw p'hen din
K'haw mák plá-t'hok
Bomi p'hai rók
Bibĭin p'ho min
Pinsúk kă priăm pri
Múung Pra Narin
T'haw krong p'hen din
Súkă sém pră chá

Lok'ha-ma k'hài
Wanit t'hang lài
Chai rŭa pai ma
Bo mi satru
Bibĭin prăchá
Prat'het naná
Jom ma thuk múŭng
Chin, Cham, Pram, Láw
Ming-môn, Tin-náw
Map mai nong núŭng
P'hărang phang-ka
Ma kha t'húk múŭng
Khék môn nong núŭng
Ma múŭng ka kai
Kúla P'hrang-sét
Chín Cham Pram-T'het
Chong sakk Naláy
Jupún Chinhó
Aw sín ma k'hái
Ni nún lŭă lay

"There was a certain country, powerful and of great extent, termed Mithinla (Mait'hila). In this country a certain Rajah exercised the sovereign authority, named Maha Chinok (Janaka), overshadowing his people like the spreading banyan tree. For a long series of years he ruled this country, while none was able to injure it, or subject it to foreign authority. Rice was abundant, and of a cheap price; no disease prevailed, and no discontent against the sovereign,

and the inhabitants enjoyed every pleasure, as in the region of Pra-Narayen. The sovereign of the country diffused joy over the face of the land, among the natives, while merchants resorted thither in fleets of ships, constantly going and coming; and as there was no disturbance in the land, the inhabitants of every country frequented it; the Chin (Chinese), the Chám (the Chinese Tartars), the Pram (Brahméns), the Ming-Môn (Môns of Pegu), the Tinnaw (Barmas of Tenaserim), all of them in innumerable multitudes; also the Franks of Europe came thither to traffic, the Khék (Malays), the Kúla (Chulias), the Phrangset (French), the Pram-t'hét (Kelings or Hindús of Kalinga), the Chong-sakk and Na-Lay (Caffree tribes, with stained skins and tatooed faces), the Jipun (Japanese), and the Chinho (Tonkinese), resorted thither with goods, to buy and sell, constantly in great multitudes."

The "Mahá Chinók" of the Siamese seems to be a popular account of Raja Janaka, of Mait'hila, derived from the Ramayan; but it is evident, if the text can be considered as correct, that the work has been either interpolated or modernized, from the mention of the Franks and the French.[1]

The following specimens of Rukhéng and Barma will indicate the similarity of style and measure which prevails in all the monosyllabic languages.

The specimen of the Rukhéng is taken from the Nga-chaing-braing.

The Birth of Gautama.

O-lé lé sangkhyé hna
Kaing b'ha ta saing
Two'k kyíng tsúng bowng
Pri bri syowng-hma
Pará tzú gó
Lo rui towng thi
Alúng sú mré'p
Syang Theik-d'hat ga
Né hmát pro ra
Dowk thi da hnei'ch
Khyaing sa sukha
Tzaing lé sa dé
O tzeng lé bri sô
Dewa nát-tzei'ch
Ahnei'ch mroung krá
Tzaing bri chwa hma
Sei'ch-tza lé ba
Tará tzu si
Pri kha-ni-wé
Pri gri sa hla
Ka pila hnei'ch
Khrei'ch pha Thowk tó
Médó boûng hi
Siri maha
Maya waing t'hé
Amri thaing d'hé
Tsŭwé lé ti
O thaing dé tsŭwé bri
Mré gri kreit krak

Aup t'hak akowng
Lat lat towng é
O thaing dé tsuwé t'ha
Tsé la waing hnik
Paik towng bri tho
Piang é nan hmon
Ahlueng tu pró
Angarang to hneik
Mi tso maya
Uyein sa go
Lé la tan di
O lé lát bri so
U yéng t'hé doang
Ko wat krang ruć
Pra jang ron mra
Ni ma hla ni
Gotami hna
Mă pri rat léăt
Lé krang shéat ruwé
Prang thak hnan moang
Ahluang tu pro
Angarang to hneik
Mi tso maya
Tháing kha ngewéh khak
Káing hléăk lék tsuwé
Amré rat né
Thowng lu chwa go
Phwa hléang lé i

[1] [See, further, the article on Siamese literature by Capt. J. Low, in "Asiatic Researches," vol. xx. pp. 338–92.]

When one hundred thousand revolutions of the world were completed, each occupying four Sankhyas, then the devout worshipper obtained the object of earnest desire ; and the sublime Thik D'hat (Sidd'hart'ha), who is acquainted with the secrets of futurity, obtained supreme felicity, tranquillity devoid of care, and self-absorption. After the pure Deva Nat'ha had passed numerous ages in the possession of supreme felicity, meditating on the four laws of truth, when the period of the divine favour was nearly completed, in the excellent and populous region of Kapila, Suk-tó (Sùdd-hódana) became his beloved father, and Sri Maha Maya, his venerable mother, became pregnant of a perfect conception. When this conception took place, the strong earth was agitated upwards and downwards, trembling and shaking. After ten months' pregnancy, supporting her swelling womb with her hand, his mother Maya was walking for recreation in a deep forest of Angarang trees, diffusing around an exquisite odour. Walking up and down in a pleasant garden, reciting the divine names on her rosary, and radiating in brilliant beauty, and accompanied by two younger sisters of the same complexion, unable any longer to support the burden of Gotama (Gautama), she leaned on the shoulder of her two younger sisters. Within a deep forest, in a grove of Angarang trees, which diffused around an exquisite odour, his mother Maya, firmly grasping the branches with her hands, and standing erect on her feet, brought forth the deity Gotama.

Theik-dhat, or Thík-dhat, is the Barma mode of pronouncing Sid'hata, as it is written, which is the Balí corruption of Sidd'har-t'ha. According to this analogy, Budd'ha is pronounced Búgda, and Sudd'ho, the contraction of Sùdd'hodana, Suk-to, and sometimes Sug-do.

The following specimen of Barma verse is taken from the Chatu Damasara, as it is termed in Pali, which is denominated the Ko-Khán in Barma:—

Description of Varanasi.

Baranasi	Hné lóng makyan
Pyi gyi pyi hu	Kyéng dan mwé nyek
Kyó-niy lú-bó	Myék sék niba
We-niy kosi	Peng ga néng t'hek
Năgo k'haing-gaing	Hní'ch chek mŭshíh
Hwún hwún di	Khan khi sí nyín
Baranasi	P'hyeang bé pyo t'hu
Chông ji pyo wa	Lú ahwon hné
T'ho pyi ma hneik	Machan kyéăng hmu
Dana-ma-mé	Leik hléo pyew sa
Chawng lé sadéng	Ché khu hneik chán
Meng i tang khúĭn	Raja t'han dúéng
Chúĭn gyé han li	Ta éng makhyo
Khyiuk suin pyo byo	Kyé ju do gyowng
Hna myo mé hlyéang	Sépo pyéng gyĕwin
Hmya hné chéng ĕwé	Myet lé thuĭn só
Wan dúéng p'hyong tan	Ku-san hlé deĭk
Makouk yúĭn di	Pyiuk la so kha
Ta khúĭn ha ga	Ko gwé ya hlien
Hnei'ch kwa maswé	Hman chua chéng chei'ch
Myew chwé khyé'ch so	Phyeit pé so la
Húleng kacha	Néng ngan sa do
Hloup shya maneyng	Myo ba ché yú
Kyan k'heng myé chông	Chéng yé hu-sa
Ti di sóng ewé	Yé tu khyan p'hyeng

Tóng lé khyéng hma
Pyowk keng ché khyéng
Bowng mi kéng ewé
Mwoi shéang lan-owng
Sín myan chông si
Swé tawng nan pûéng
Cho yan hlueng ga
Meik myiang ko yo
Sívé khyi ko sa
Mito ketu

Hmat takhu phyiĕng
Esukari
Kyo hlueng nyi hliép
B'hông cheit ta hmu
Khát sin lu-do
Up'hyu u nék
Sowng teík tweik si
Hwan teik pyi byi
Hlyéan hlyéan di

Baranasi (Benares) was a beautiful and extensive region, inhabited by a race superior to every other, whether far or near, living fortunate and happy. Baranasi was in every respect an admirable country, possessing everything desirable, for in that kingdom prevailed the practice of charitable donation and the performance of ascetic duties. So generous was the heart of the Rajah that he gave in charitable donations the whole amount of his revenue. Devoid of every selfish desire, his mind was onefold, like the point of an arrow. Free from evil inclination, onefold and not double in his speech. Affectionate to all his relations, and beloved of them; remaining firm as a massy roof-beam, no one could prevent or shake his purpose; never deviating from veracity, undivided in heart, excellent in his whole conduct, and his heart devoid of angry passion. Under his sway existed no violence, restraining the desire of his own eyes. Such was his universal character.

Performing no wicked action and rendering all his people happy, he neglected none of the ten commandments in the practice of general benevolence. Like a bank of sand, which rises up into an island far at sea, and when the passing ships are wrecked, affording a sure and safe refuge to the mariner. Thus it was that he aided his subjects, who were sinking overwhelmed in misfortune; and thus those who were shivering under the chilling cold (of distress) were revived by approaching the genial flame of authority. Like the motion of a serpent, cautious in his conduct. His palace was splendid as a mountain of gold; in his presence no enemy durst present himself. Sivakara Kasa Mitra Kétu, with his mind fixed on one object, Yesukari far celebrated; such was his regal state, that the whole human race, whether white or black, in ten thousand regions, lived in joy and happiness under his sway.

It is difficult to determine from the Barma text the true name of this sovereign of Benares; but several names in some degree similar, as Mitréya and Ketumat, occur in a Pauranic list of the Rajas of Benares descended from Divodasa, which was pointed out to me by Mr. Colebrooke, of whose notices I have frequently had occasion to avail myself.

XI. *K'hôhmén*.[1]—The K'hôhmén language is used by a nation of that name, who reside on the Mé-kón, or river of Kam-bú-chá't,

[1] [This is the Siamese pronunciation of *K'hmêr*, the name of the Cambodian language. This language is a member of the Mon-Anam family. Much has been done by the French in furtherance of its study: G. Janneau, "Manuel pratique de langue Cambodgienne" (1870); E. Aymonier, "Vocabulaire Camb.-Français" (1874); "Cours de Cambodgien" (1875); M. Moura, "Vocab. Fr.-Camb. et Camb.-Fr." (1878); E. Aymonier, "Dictionnaire Khmêr-Français" (1878); Mouhot, "Travels in Indo-China" (1864), vol. ii. pp. 207–40; Garnier, "Voyage d'Exploration en Indo-Chine" (1873), vol. ii. pp. 498–517, gives Comparative Vocabularies. See also J. Moura, "Le Royaume du Cambodge" (1883), vol. i. pp. 300 ff., 440–47.]

or Cambója. It has never been cultivated by Europeans, and I have had no opportunity of examining it. The Siamese, from whom I received my information, assured me that it was entirely different from either the T'hay or the Júan, or language of Cochin China. The K'hóhmén are reckoned an ancient and loyal people, and were formerly subdued by the T'hay-j'hay, or ancient Siamese race. The modern T'hay, or Siamese, still denominate the Balí character, *Nangsu Khôm*, or the K'hôhmén letter, from this nation. They are not, however, supposed to have existed as a polished nation so early as the Lâw, but are believed to derive their origin from the warlike race of mountaineers named Khô, the Gueos of the early Portugese historians, who are still represented as practising their ancient customs, of eating human flesh and painting and tatooing their bodies. De Barros, however, seems to represent the language of the K'hôhmén as different from that of Camboja, though the Siamese do not distinguish them. "There are two kingdoms," says he, "adjacent to each other, and both of them maritime, which have each a peculiar language; the first is termed Como, and the second Camboja." (*Decad.* iii. lib. 2, c. 5.)

XII. *Láw.*—The Láw language is used by the inland nation of that name, who are generally termed, after the Portuguese writers, *Láo*, and in the plural, *Láos*, from their consisting of different races. Their language, De Barros observes, is peculiar, and the Siamese assert that it is different from the T'hay. It has never been cultivated by Europeans, very few of whom, besides Alexander De Rhodes, have ever visited the country. According to Kœmpfer ("History of Japan," p. 26), the Láw nation do not differ much from the Siamese either in language or writing,[1] except that they are unable to pronounce the letters *l* and *r*, and this opinion I am much inclined to adopt, though I have had no favourable opportunity of investigating the subject. If, however, I may be allowed to judge from the specimens of the Láw language which I have been able to procure from Siamese and Barmas, it appears to bear the same relation to the T'hay, or Siamese, that the Ruk'héng does to the Barma. With the T'hay-j'hay it accords more fully than with the T'hay proper, and in adopting Pali terms it adheres more accurately to the Pali orthography than either of them. The following short list of words and phrases will convey some idea of the difference which subsists between the T'hay and the Láw. As the T'hay-j'hay approaches the Láw more nearly than the T'hay, when that dialect uses peculiar terms I have pre-

[1] [The Lao, closely akin to Thai, has two sets of characters, both very different from the Siamese; see Bastian in "Journal R. As. Soc.," N.S., vol. iii. A Vocabulary of Moï words is given by Gautier in "Excursions et Reconnaissances," part 14, pp. 238–43, where is also mentioned a MS. dictionary of the dialect by P. Azemar, missionary at Brelam.]

ferred adducing them, for the sake of comparison. Where the Láw and the T'hay agree in the radical, an apparent diversity is often produced by the conversion of the *l* and *r* into *h* or *d*.

	Láw.	*T'hay.*
call	hông	ríukk
talk	fú	phút
warm	hón	ron
very warm	hón ala	ron uk
not know	bo-hu	mai ru
do you see?	cháw han ka	nai hén rú
many	meng	mák
sea	mésămút	thălé
wave	sông	klún
river	không	klóng
number	ân	rap
gold	khăm	thông-kham, thông
lead	tông	tăkúa
do	peng, jia	t'ham, jia
book	pap	sabút
matchlock	sénat	pùn
far off	kăi	klái
handsome	lau	ngám
weary	ít	núëy
hated	chă	kléít
sing	so	khap
grieve	hái	rong
give	hún	hŭi
approach	hôt	thŭng
market	kât	tălát
shut	tút	pít
flesh	chín	nŭa
blood	huit	luit
fight	hop	rop
craft	khilái	lúang
stand	hŭn	jùn
lamp	kat'híp	tă-kiang
how is it done?	peng jang húdé	t'ham jang arai
how many?	táw dai	taw rái
moon	p'ha chan	pra-chan
woman	mé jing	pu-jing
man	pho-chay	phu-chay
country	wiyung	muang
house	hŭin	rùin
who	phai	krai, or kai
what	basandé	arai
go there	pai-pún	pai-nún
come here	mà-phé	ma-ni
fort	tapp	k'hái
elder brother	ay	pi-pach-ay
elder sister	üei	pi-pu-jing
mother	ïmé	mé
I	ku	k'hà
I (honorific)	kha	di-chan
we	hôw	râu

It is from this nation that both Siamese and Barmas allege that they derive their religion, laws, and institutions. It is in the

country of Láw that all the celebrated founders of the religion of Budd'ha are represented to have left their most remarkable vestiges. Ceylon boasts the sacred traces of the left foot of Budd'ha on the top of the mountain Amála-Sri-padi, or Adam's Peak. Siam exhibits traces of the right foot on the top of the golden mountain, Swa-na-bapato. Other traces of the sacred steps are sparingly scattered over Pegu, Ava, and Arakan; but it is among the Láos that all the vestiges of the founders of this religion seem to be concentered, and whither devotees repair to worship at the traces of the sacred steps of Pra-Ku-ku-són, Pra-Kôn-nă-kôn, Pra-Put-t'ha-Kat-sop, and Pra-Sa-mút-ta-ko-dom. These Siamese names of the four Budd'has seem to correspond to the Barma Kaukasan, Gonagom, Kasyapa, and Gotama, the Singhala, Kakusañda, Konagam, Kasyapa, and Gautama. There can be no doubt, however, from the order of the names, but that they are the four last Budd'has in the list given by Hémachandra Achárya, in the "Abhid'hana Chintámani," under the following Sanscrit appellations, from which all these Siamese, Barma, and Sing'hala names seem to be only Bali corruptions. The Sanscrit names are *Krudruch'hunda*, *Kan'-chana*, *Kásyapa*, and *Sákyasinha*.[1] The language of Láw is represented as abounding in books, especially translations from the Balí, and if the antiquity of the nation can be depended on, they must be extremely interesting, from the situation of the country between China and the other Indo-Chinese nations. The Láw nation consists, like the Siamese, of two different races of people, denominated in Siamese, *Chieng-mâi* and *Lan-chang*, which are said by Kœmpfer to be the names of their chief cities. The first of these are termed by the Barmas, *Yún*, and the second, *Lain-sain*.[2] De Barros adds a third tribe, which he denominates *Chan cray*. In their general appearance the Láw resembles the Món.

XIII. *Anam*.—The Anam language is that of Cochin China and Tonkin. It is represented by the Catholic missionaries to be likewise generally used in Champa and Kau-bang; but their assertions must be taken with some limitation when they add Láw, Cambója and Siam. The Anam language, as well as the nation, is often denominated the Júan by the Malays and Siamese. It has always been more cultivated by the Catholic missionaries than any other of the Indo-Chinese languages, though these fathers may, with some degree of propriety, affect

[1] [Krakuchchhanda, Kânchana, Kâśyapa, Sâkyasinha. Hemachandra, v. 236.]

[2] [There is evidently some confusion in these terms. The word *lao* to designate a Lao man is Siamese, and appears to have thence passed into Burmese (*lo*): whereas the Shans call a Lao man *yun*. In Siamese *yuen* (written *yawan*) means an Annamite.]

the title of "multiplicis idiomatis propagatores." So early as 1651 the Propaganda Society published at Rome the "Dictionarium Annamiticum Lusitanum et Latinum," compiled by the Jesuit Alexander de Rhodes, after twelve years' residence in Cochin China and Tonkin, where he had studied under P. Francisco de Pina, the first who acquired skill and facility in that language. In composing his Dictionary he had also the advantage of employing the materials collected by P. Gaspar de Amaral and P. Antonio Barbosa, the first of whom had made some progress in preparing an Anam and Portuguese Dictionary, and the second in compiling one in Portuguese and Anam. This dictionary is printed wholly in the Latin character, as the author considered the Anam character too difficult to be useful. It is accompanied by a short grammatical sketch of the Anam language, entitled, "Linguæ Annamiticæ seu Tunchinensis brevis Declaratio." Though I have never met with a learned Cochin Chinese, I have seen several persons who could speak the vulgar language by rote, and have paid sufficient attention to it to perceive that the Dictionary of De Rhodes is a work of very great merit, though certainly susceptible both of additions and emendations. A new edition of it would be a work of great utility if our relations with Cochin China should ever become more intimate or important: a circumstance by no means unlikely from the formidable aspect which that kingdom has lately assumed among the more easterly nations. The principal defect of the work is its representing very imperfectly the Anam pronunciation; a defect unfortunately very difficult to be remedied, as the Anam language contains many sounds which correspond very little to those of any European language, and respecting which a grammarian might be tempted to say, with the devout missionary Didacus Collado, when treating of the pronunciation of a Japanese letter, "*Quando litera tç in aliquo vocabulo fuerit* (*quod est valde frequens*) *orare debet discipulus Deum, ut ei venas pronuntiationis aperiat*" ("Prolog. in arte Grammat. Japonic. ling.," p. 4).[1] De Rhodes also published at Rome, in 1652, a catechism for the use of his Anam converts, in Anam and Latin.

From the vicinity of the Chinese to the Anam nation, and the intimate connection that has at different periods subsisted between their countries, the Chinese character, as well as literature, has been introduced into both Tonkin and Cochin China. Chinese

[1] [The Annamese and Latin Dictionary compiled by J. Pigneaux was edited, with a Grammar of the language, by J. L. Taberd at Singapore in 1838. A new edition of this work, by J. S. Theurel, appeared at Ninhphú in 1877. A Latin and Annamese Dictionary by H. Ravier was published in 1880; an Annamese and French Dict. and an Annamese Grammar, both by J. M. J., were brought out at Tân Dinh in 1877 and 1878; and a Grammar by J. B. Truong-vinh-ky came out at Saigon in 1884. There is a Chair for Annamese in Paris. See also C. J. F. S. Forbes, l. l. pp. 99–156.]

literature is greatly affected by all who pretend to distinction in learning in these countries; and in the language of Anam the Chinese characters are denominated Chúw.[1] But besides this another species of character is in general use, and commonly employed in matters of business and private affairs, which is constructed on a principle entirely different; and though its letters are numerous, they bear no proportion to the Chinese signs, and according to De Rhodes they are unintelligible to the Chinese and those who are unacquainted with the Anam language. These characters in the Anam language are termed Nôm. What relation they bear to the Bali characters I have not been able to determine accurately, though I suspect they will be found to be connected with that or the T'hay alphabet. It is perfectly certain, however, that they have no connection with the proper Chinese character. I have been informed by an intelligent Chinese who had resided some time in both Siam and Cochin China, that the proper Anam character greatly resembles that of the Siamese. The missionary Borri says that the Cochin Chinese, in harangues, letters, memorials, petitions, "and such things as do not belong to printed books, for these of necessity must be in Chinese characters," generally employ about three thousand characters, which they find sufficient to express their meaning. If the compound characters and contractions of the Siamese be included in their alphabet they would nearly amount to this number.

The Chinese character forms in reality an abstract philosophical language, such as has long been the theme of speculation in Europe, though it is generally regarded as an absurd and impossible reverie. It is not indicative of sounds, but of real objects and ideas; and consequently it is read and understood by at least twenty different nations, who would scarcely understand a word of one another's oral language, and would all use different words to express the same meaning. The only European characters analogous to the Chinese symbolical written language are our numeral, algebraical, astronomical, and chemical signs, which are constructed on the same abstract principles. The Chinese, however, sometimes contrive to make these singular characters perform a double office, and express sounds as well as ideas; as when they write down English names, which another person can pronounce with great accuracy. As far as I have been able to learn, however, this can only be accomplished by persons who use the same spoken language.

The Anam language is simple, original, and monosyllabic. What relations it may possibly bear to some of the spoken mono-

[1] [In addition to the Chu-nhu and Chu-nôm, the Roman character, Chu-quoc-ngu, may be mentioned, which appears to be now largely used, as it is in Malayan countries under English or Dutch sway.—The Chinese characters superseded the Indian alphabetical writing in the sixth century A.D.]

syllabic languages of China, to the Man-chèw-Tartar, to the Korean, Formosan, Likyu, or rather Riu-kiu languages, I cannot possibly pretend to determine; but it certainly has very little affinity to the Mandarin or Court language of China, which is properly termed Khuan; to the Kông-tông, or language of Canton; to the copious polysyllabic and inflected Japanese; or to any of the other Indo-Chinese languages.

It is certainly possible to find several Anam vocables which coincide both in sound and signification with words in the Khuan or Mandarin Chinese, and also in the Kông-tông, as well as others, which closely resemble T'hay or Siamese vocables; but nevertheless all the essential parts of the Anam language are original and unconnected with any of the other monosyllabic languages of which I have any knowledge. Barrow, an authority of some weight, in his "Voyage to Cochin China," seems to consider the Anam as a derivative from the Chinese, "because it is constructed on the same principle" (p. 301). "The spoken language," he observes, "has undergone a very considerable change, which is the less surprising, as the inhabitants of the northern and southern provinces of China are unintelligible to each other; but though it has been altered it does not appear to have received any improvement, neither from additions of their own nor from the introduction of foreign words" (p. 322). The precise meaning of this sentence I confess I do not understand. The mass of the Anam language, whether nouns, verbs, or significant particles, is totally different from that spoken Chinese language with which he has compared it; and he himself admits "that it is so much changed from the original as to be nearly, if not wholly, unintelligible to a Chinese." The Anam nation employ several sounds and letters which are incapable of being pronounced by a Chinese, such as *b*, *d*, and *r*. The particles which form the cement or construction of the language are also different; and in addition to all these, the Anam language has a peculiar character of its own, which is not understood by the Chinese. It is difficult after this to conceive what similarity exists between the Chinese and Anam, unless that they are both monosyllabic languages, and that the signification of terms is regulated in a great measure by their accentuation. But though the same monosyllables occur, and though they are also accented frequently in a similar manner, yet even in this case the signification of these monosyllables is for the most part totally different. In the syntax or construction of the two languages there is also a very great difference, for in almost all the instances in which the Barma language differs in construction from the Malayu, T'hay, and Anam, the Chinese agrees with the Barma and differs from the three others. Thus, when two substantives follow each other in Chinese and Barma, the first is in the genitive or oblique case;

whereas, in Malayu, T'hay, and Anam, the second is in the oblique case. Sometimes, too, the Chinese order of arrangement differs equally from them all. Thus, in Chinese the adjective generally precedes the substantive, whereas it follows it in Malayu, Barma,[1] T'hay, and Anam. It must be observed, however, that when the term Chinese is applied to the spoken languages of China, it is used in a very wide signification, unless some particular province be specified. The Chinese colloquial languages appear to be more numerous than the Indo-Chinese tongues, and equally unconnected with each other. Barrow himself declares that scarcely two provinces in China have the same oral language ("Travels in China," p. 244). While the nature of the Chinese character is still so imperfectly understood, it is not surprising that the investigation of the spoken languages of China has been totally neglected. In the course of some inquiries that I made among the Chinese of Penang, I found that four or five languages were current among them which were totally distinct from each other, and the names of several others were mentioned. I was informed that the principal Chinese languages were ten in number; but I have found that considerable variety occurred in the enumeration of their names, and suspect that they are considerably more numerous in reality. The following is one of the lists I received of these ten languages, but I have since been informed that it relates only to those which are spoken in the southern and western provinces.

1. Kông
2. Wáy
3. Nâm
4. Chéw
5. Séw
6. Lŭi
7. Limm
8. Khunn
9. Síw
10. Kunng

Of these, as has been stated, the first is represented as the language of Canton, and the eighth as the Mandarin language, or that which prevails in Pekin. To this list may be added the following:—

11. Hyong-san
12. Sun-tukk
13. Nam-hói
14. Pún-ngi
15. Tông-khún
16. Fo-khín

The last of these is denominated Chin-Chew by the Chinese of Macao; but the language spoken in Macao itself is the Hyang-Son. This enumeration, however, is extremely imperfect; nor have I been able to determine which of them are to be accounted original languages and which dialects.[2] Neither, without particular investigation, is it possible to ascertain whether the Anam language

[1] [Not in Burmese.]

[2] [On the dialects of the Chinese language see G. von der Gabelentz's "Chinesische Grammatik" (1881), pp. 13–16, 34–41.]

may not be included in this enumeration, though I am rather inclined to the contrary opinion.

The Anam language has neither genders, numbers, nor cases; moods, tenses, nor conjugations; all these are supplied by the use of particles and the juxtaposition of words, as in the other monosyllabic languages. The same word has often the signification of both a noun and a verb, and its particular use in such a case is to be determined by the context and the collocation of words in the sentence. The principles of collocation in sentences are equally simple as in the other monosyllabic languages. The adjective generally follows the substantive, as in Malayu, Barma, and T'hay; but when two substances come together the last of them is in the oblique case, as in Malayu and T'hay, but contrary to the Barma order of arrangement. Thus the phrase "the master of the house" is in the Anam language *chúa nyá:* but *nyà chúa* signifies "the house of the master." In Malayu these two phrases are rendered by *túan ruma*, and *ruma túan;* and in T'hay by *chàn rún*, *rún chàn*; but the Barma follows a different order, and renders them by *ín-sak'héng*, *sak'heng ín*, where *ín* signifies house, and *sak'héng*, master. The substantive verb is often omitted as being reckoned inherent in adjectives, especially when preceded by the demonstrative pronouns. Thus *núi này kaw*, "this mountain high"—*i.e.*, is high—the assertion being implied. The nominative precedes the verb, the preposition the word which it presides over, the adverb adheres to the word which it modifies, the relative is wanting altogether, copulative conjunctions are generally omitted, and the peculiar modes of expression in the Anam idiom are chiefly such as result from the manners and habits of the people. The moods and tenses of verbs are formed by significant particles, as in the other monosyllabic languages. As the Anam nation are equally formal and ceremonious as the Chinese in their phrases of urbanity, and equally accurate in marking, with a minute and tedious precision, the degrees of respect and honour due to every person in the several relations of stranger, acquaintance, neighbour, relation, parent, magistrate, and all the several degrees of magistracy and office, a great deal of the idiom of the language consists in the different modes of expressing the respective relations subsisting between the speaker and the person addressed; hence originates the number of personal pronouns expressive of these relations, as well as numerous circumlocutory forms of expression; the genius of both the Anam and the Chinese language requiring that as often as possible appellative nouns, and names of office, dignity, relationship, or consanguinity, should be substituted instead of the simple personal pronouns. Thus, a husband addressing his wife and using the pronoun I, instead of saying *taw*, *ta*, or *qua*, any of which has the signification of the simple pronoun I, ought

to say *anh*, which signifies elder brother; and his wife, on the other hand, ought either to denominate herself *tôi*, handmaid, or *ếng*, younger sister. A woman, in like manner, addressing herself kindly to another, who is either younger in years or inferior in rank, ought always to denominate herself elder sister; a husband, addressing his wife in polite terms, ought always to term her younger sister; and in general, speaking to a young woman, she should use the same expression; but an old woman he ought to term *bau*, or aunt. A lover addressing his mistress terms her younger sister, while she in return terms him elder brother. A son, addressing his father, ought not even to term him *cha*, father; but *anh*, father's elder brother; *chu*, father's younger brother; or *cau*, mother's brother. In a similar manner, addressing his mother, he ought not to term her *mé*, mother; but either *cô*, father's sister, or *di*, mother's sister.[1] It is easy to perceive that this minute accuracy of phraseology must have occasioned great trouble to the Catholic missionaries in rendering portions of Scripture into the Anam language; accordingly we find that they were extremely distressed about the propriety of the terms to be used whenever God the Father, Jesus Christ, the Holy Ghost, or the Virgin Mary were to be introduced as interlocutors, and dismally puzzled whether the Virgin ought to denominate herself *tôi*, handmaid, or *mé*, mother, in addressing her Son Jesus Christ; as a very trivial change of phraseology, in a language so delicate in its shades and distinctions, might have given origin to the most dangerous heresy.

The accents in the Anam tongue are of such indispensable utility that they have been very properly termed the soul of the language, while the primary monosyllables, varied by accent, have been made to represent its body. Conversation is a species of chaunt or recitative, as in the Chinese dialects and the other monosyllabic languages, which has at first a very ludicrous effect to an ear unaccustomed to it. The intonation or accent[2] of the Anam struck me as entirely similar to Chinese, though Borri, the Catholic missionary, to whom it was familiar, pronounces it softer and sweeter, more harmonious and copious in both its tones and accents. He adds that every word expresses a variety of significations according to the diversity of accents with which it is pronounced; so that to converse in it correctly a person ought to understand the grounds of music. That he ought to have an ear of the most delicate sensibility is indisputable; and as this can never prevail very equally in a numerous nation, this variety of

[1] [It should be noted that *anh* only means (the speaker's) elder brother, *em* (not *eng*) his younger brother or sister, *bà* (not *bau*) grandmother, *cô* father's younger sister.]

[2] [On the various intonations which mark the pronunciation in the provinces of Huế, Quáng, and Tonquin, see T. V. Ky's grammar, pp. 4–6.]

accent gives rise to such diversity of dialect that through the whole Anam region every considerable village or district has as it were a different language, and is often obliged to have recourse to the written character for communication with the districts in its vicinity.

Borri affirms that the sacred books of the Anam nation are termed "Sék King," while those relative to civil subjects are denominated "Sék-Chúw." He adds that the first treat of the creation of the world, the nature of mind, the different classes of intelligent beings, morals, and metaphysical theology; but both these classes of books seem rather to refer to Chinese literature than to that which is peculiarly Anam, for *Sék* signifies only book, Chúw is the name applied to the Chinese character, and "King" is the name of the books first put into the hands of the students of Chinese literature. Numerous Tru-yèn or Cheritrás, however, are known to exist in the Anam language, and form the subject of their dramatic representations, in which the Anam nation are not inferior to the Chinese.

The ancient code of Tonkin laws possessed great celebrity, and was highly venerated previous to the late conquest of that country by the Cochin Chinese. It is represented by the missionary Le Roy as composed in the most elevated style of Chinese, and full of uncommon modes of expression. He also mentions that it was printed with an Anam translation, composed by an ancient Tonkin mandarin.[1]

The Anam style is sometimes highly bold and figurative, and attains a degree of animation which is not very common among the Indo-Chinese nations of the continent.[2] If the French version can be depended on, we need only refer in proof of this to the manifesto issued by the usurper Quang-trung in 1790, to quiet the minds of his subjects, alarmed at the reports of the prowess of the French auxiliaries, who aided the first efforts of the present monarch for the recovery of his throne. "Be not so credulous as to listen to what they say of the Europeans. What superior ability should that race be possessed of? They have all the eyes of green serpents, and we ought only to regard them as floating corpses, cast on our shores by the seas of the North." ("Nouvelles des Missions Orientales," p. 144.)

The religion of the Anam nation is a modification of the Budd'hist system, nearly resembling that which prevails in China. Many local and peculiar superstitions,[3] however, are blended with

[1] [A French translation, by M. Philastre, was published in 1876. See also E. Villard, "Etude sur le droit pénal annamite" in "Excursions et Reconnaissances," No. 13, pp. 73–167.]

[2] [On Annamese literature see an able article by E. Villard in the same serial, No. 12, pp. 446–91.]

[3] [See a series of articles, by M. Landes, on Annamese customs and superstitions in "Excursions et Reconnaissances," Nos. 6, 7, 8, and 14.]

it, such as the worship of the dog and tiger, to the first of which human excrement, and to the second human flesh, is offered. Traces of this worship are found among the mountaineers on the borders of India, as well as in the proper Indo-Chinese countries. Thus the tiger is worshipped by the Hajin tribe, in the vicinity of the Garrows or Garudás.

The Quan-tô, an ancient race, as the name signifies, who inhabit Kaubang, or the mountainous range which divides the Anam countries from China, regard themselves as the original inhabitants of Tonkin and Cochin China, and consider the Anam as a Chinese colony. The Quan-to have a peculiar language, and write with a style on the leaves of a plant termed in Anam *jiwa*. The Mói and Múòng are also mountaineer tribes, who speak languages different from the Anam, but it is hitherto unknown whether they are original races or only branches of the Quan-to.

The following comparative vocabulary of the Barma, T'hay, and Anam languages, with the Kong dialect of the Chinese, will convey some idea of their mutual relations and differences. A few Rukhéng variations are also exhibited in the Barma column, with the initial R. prefixed.

	Barma.	*T'hay.*	*Anam.*	*Kong-Chinese.*
God	prá yieng	pra-cháw	chúa	sunn, t'hien-chí
heaven	nip-ban	săwan	t'hién	t'hien
the earth	kam-ba	pi-p'hop	'dia	t'hien-ha
earth	myé, R. mré	dín	'dat	ti
air	lé	lŏm	phú-jyó	húng
water	yé, R. ré	nam	nák, nuwok, thuy	sói
fire	mí, R. meing	sài	lúwa, hóa	fôö
sun	né	tawàn	nyít, mât-bloei	thai-yong,ngùt
moon	lă	duin	nguyit, mât-blang	ngùit
star	kyi, R. kri	dàw	saw, tinh	tin-súng
sky	mó	sâ	bloei	mun-t'hien
sea	peng-lé	tă-lê	bé, bién, hăi	hŏë
river	k'hyong, R. kh'rôn	klong	sû	hó
animal	tareich-chan	săt	thu	chhôk-lói
bird	hngék	nók	ching	chhéok-chay
fish	ngâ	plâ	ka	ngù
plant	apéng	tón	thúw	ch'háw
tree	apéng gyi	tón-mái	sang	sú, sút
leaf	ayéwék	băi	lá	hyep
hill	towng	p'hu-khaw	núi	san
plain	lé-bieng	t'hung	'dów, nu	phéng
stone	kyíowk	hín	'dá	syŭk, liĕ
gold	swé	t'hòng	wáng	kumm
silver	ngwé	ngùn	bak	ngúnn
brass	kyé	t'hòng-k'ham	t'haw	t'hóng
iron	san	lék	thiet, săt	thit
tin	khé	tă kóă	thiek	syăk

	Barma	*Thay*	*Anam*	*Kong-Chinese*
rice	ch'han	ká-săn	gàw, lúa, kŏem	mây
egg	ú	khài	tlueng	ch'hônn
day	nĕ	wán	ngày	yat
night	nya	k'hún	'đêm	man
evening	nya-né	kham	ban-hom	vâ
morning	manék	cháw	sang-nyay	chew
month	la	dúin	thang	yuĕ, ngùit
year	neit	pí	nien, nam, tuë, tuôí	nín
man	lu	khŏn	ngúwói	yun
man	yowk-kya	pacháy	nam	nan-yun
woman	mim-ma	paning	núw	nyu-yun
father	p'haé	p'hó	cha	hù, fú
mother	maé	mé	mé	mu
husband	léng	p'húwă	chàw, phu	law h'hung
wife	maya	miya	vwó, t'he	láw-p'ho
son	sa	lok pachay	kon-blai	chí
daughter	sa-mi	lok paning	kon-gai	ngúë
elder brother	ako	p'hi-pachay	anh	akko
younger do.	nyi	nong pachay	éng	tí
elder sister	umma	pi păjing	chi	amui
younger do.	nyi-ma	nong-păning	éng	moéi
friend	sang-é-gyien	klù	nghía	púng-yôw
enemy	yan-su	satrú	nghéich, thu	tzow-yun
head	gowng	huă	thù, 'dâu	thôw
face	hmiek-na	ná	mat, may, màt	miën
eye	hmiek-chei'ch	tá	nyan, mŏk, mát kon-mát	ngăn
nose	nakhaung	tămúk	múi	pi
ear	na	hu	tái	ngí
mouth	pajat	pâk	khau, mieng, lômieng	how
tooth	swa	fan	răng	ngá
tongue	sha	lín	luwoi	li
hand	lék	mù	tay	sŏw
foot	khyé	tín	chên	khúok
belly	wún	p'húng, thóng	deà, bâw	t'hú
back	kyó	lang	kât	püi-hów
skin	ayé, sayé, R. aré, saré	nang	dĕa	phi
bone	ayo, R. aro	kădúk	kôt, shwang-kôt	ka
flesh	asa	nùă	thit	héwŭk
blood	swè	lŭit	máu tiet	hit
milk	no-yé	nám-nóm	suwa	nín
eat	chá	kín	an	kiĕ
drink	sók	kín-nám	üông	yûm
stand	mat-tat	jùn	'duĕng	khi
sit	t'haing	náng	ngôi	cho
sleep	ít	nón	ngú	mi
strike	yeik	ti	'dam, 'danh	wat
kill	sat-pi'ch	k'ha	jiet, sat	sat
red	ani	déng	'do, tham	húng
green	acheing	k'héow	shanh	lok
yellow	awá	lùang	hoa ka, vang	wóng
white	ap'hyu	kháw	tlang, bak	pâk
black	anék	dam	tham, ak	húkk
one	tít	núng	mot	yútt

	Barma	*Thay*	*Anam*	*Kong-Chinese*
two	hnít	sông	hui	ni
three	sông	sám	teng	sam
four	lé	si	bon	si
five	nga	ha	lang	úng
six	khyowk	hŏk	lak	lok
seven	khuhnich	chét	bai	chhat
eight	shyít	pét	tang	pat
nine	kó	kàw	chin	kow
ten	tă ché	síp	tap	sap
hundred	tă rá	rôi	klang	pák
thousand	tă t'hawng	p'hán	kin	chin
I	kyewin-nou'p	k'há	tôi, táu, ta, kwa	ngo, nga
we	kyewin-nou'p-do	ráu	chúng-toi, moi-toi	nga-té
thou	méng	mùng	bâi, mâi, ngú-woi	ní
ye	maung, meng-do	sú	chúng-bái, moi-bái	ni-tè
he	dén	măn	nó	k'hi, t'ha
they	den-do	măn arái	chúng-nó	k'hi-té, t'ha-té
who	bédu, bélu	kăi	ai	nāko
what	bahá	arái	nào	méyă
which	bédéng	anei	nào (placed after a word)	nāko
all	alúng	t'hang-phé, thang-mót	kak	túti
many	apowng	māk	deù, nyeù	tó
few	cheich-cha-gulé	hit, nit	bé, dó, nyó	tuk, shaw
any, some	tăkhyo	kái kái	ko-ai	yów
above	at'hék	bŏn	tlen	shyang
under	awk	tái, láng	chuéng	há
in	at'hé	nay	oei, tlâw	li, ín
without	pyieng	nók	vo, cháng-ko, ngöaï	ngoi, waí
to	ko, go	ké	cho	ni, ù
from	ka, ga	té	boei	tzong
this	di-hu	ni	nây	téko
that	ho-hu	nun	ey, nò	koko
there	ho hma	tino	bên-nò	nuné
here	di hma	tíní	bên-nây	koné
before	shyé	na	tluwók	sín
behind	nawk	t'hi láng	sáu	hôw

XIV. *Pali.*—The Pali language among the Indo-Chinese nations occupies the same place which Sanscrit holds among the Hindús, or Arabic among the followers of Islam. Throughout the greater part of the maritime countries which lie between India and China, it is the language of religion, law, literature, and science, and has had an extensive influence in modifying the vernacular languages of these regions. The name of this language, though commonly pronounced Balí, is more generally written Palí, but both forms are occasionally used. As the origin of the word is still very obscure, it is difficult to determine which is the more correct orthography. If, however, we could venture to identify the term with the Báhlika b'hasha, which in the "Sahítya

Dérpana of Víswanátha" is enumerated as one of the languages proper to be used by certain characters in dramatic works, the latter ought to be considered as the more correct. La Loubère, on the authority of D'Herbelot, has stated (tom. i. p. 442) that the ancient Persic language was termed Pahalevi (Pahlaví), and that the Persians do not distinguish in writing between Pahalí and Bahalí. This conjecture would be confirmed by the identity of the terms Balí and Báhlika b'hasha, were it to be established; for no doubt can be entertained that in Sanscrit geography the epithet Báhlika is applied to a northern Indo-Persic region, probably corresponding to Bálkh Bámiyan. Among the Indo-Chinese nations the Balí is frequently denominated Lanka-basa, or the language of Lanka and Magata, or, as it is often pronounced, Mungata, a term which seems to correspond with the Sanscrit Magad'hi, which, in many of the Vyakaranas, is enumerated as one of the dialects proper to be used by certain characters introduced in Natakas or Hindú dramas. According to Kœmpfer, the Balí, in the Khom language and by the inhabitants of Pegu, was termed "Maccata-pasa," or Magad'hi b'hasha, as we may safely venture to render it. P. Paulinus, however, applies this term inaccurately to the square Balí character instead of the language ("Mus. Borg." p. 1).

This language, notwithstanding its extensive use among so many nations and the degree of cultivation which it has received from the different tribes by whom it is employed, has hitherto attracted little attention among Europeans. The indefatigable Kœmpfer, in his "Amœnitates Exoticæ," has very imperfectly exhibited the Balí alphabet. La Loubère had previously published it more correctly according to the form employed among the Siamese: his Balí alphabet is repeated in the French Encyclopædia; and Carpanius, in his "Alphabetum Barmanum," has exhibited the simple letters according to the square form employed by the Barmas. La Loubère, in his "Historical Relation of Siam," has published "The Life of Thevetat," said to be translated from the Balí, with a fragment termed "An Explanation of the Patimouc, or Text of the Vinac." P. Paulinus à S. Bartholomæo, in his "Museum Borgianum," has, in his usual petulant, inaccurate, and desultory manner, exhibited some confused notices concerning the "Bidagat," the "Padi-mauka," the "Kammuva," and a "Compendium of the Barman Laws," composed in the Palí language. Dr. F. Buchanan, in his "Essay on the Religion and Literature of the Barmas" ("Asiat. Research." vol. vi.), has published a translation of the "Kammua," executed from the Latin version of Vincentio Sangermano, which differs considerably from the notices concerning that work published by P. Paulinus, according to whom, in 1776, an Italian translation of it was made in Pegu at the instance of Cardinal Borgia. Whether any of these versions

have been made directly from the Palí or only through the medium of a Barma or Siamese version is at least very dubious; but the enumeration may suffice to show how far the attention of Europeans has been turned to this language. It would appear that the learned La Croze, in his epistolary correspondence, has also treated concerning the relations and affinities of the Palí, but I have had no opportunity of consulting the collection of his letters. P. Paulinus, in his coarse, acrimonious, and offensive way, has also obtruded on the public some conjectures concerning it, but the publication of his "Vyacarana, seu locupletissima Samscrdamicæ linguæ Institutio," Romæ 1804, has given a death-blow to his vaunted pretensions to profound oriental learning, and shown, as was previously suspected, that he was incapable of accurately distinguishing Sanscrit from the vernacular languages of India.*

The Balí alphabet seems in its origin to be a derivative from the Deva-nagari, though it has not only acquired considerable difference of form, but has also been modified to a certain degree in the power of the letters by the monosyllabic pronunciation of

* The philological merits or demerits of P. Paulinus form no part of the proper subject of this essay; he is only mentioned here for the purpose of disclaiming his critical authority, when placed, as it has frequently been by European writers, in competition with such authorities in Hindú literature as Sir W. Jones or Mr. Colebrooke. In his "Museum Borgianum" he has mistaken a specimen of Malayu for Bengali; but this is nothing to what occurs in his Sanscrit Grammar. The same blunder has been made before him by the polyglott "Oratio Dominica;" but the following are his own. A numerous class of Sanscrit nouns form the fifth case in *at;* in Tamul and Malayálam, however, a case of similar import terminates in *al*, and this case, which belongs to these vernacular languages, but never to Sanscrit, has P. Paulinus uniformly substituted in his Sanscrit Grammar in the place of the regular Sanscrit flection in *at*. This substitution of the letter *l* for *t* is not confined to those instances only in which the analogous flections of a vernacular language may be supposed to have led to the error; it occurs in numerous instances in which the Sanscrit and popular dialects coincide in using the letter *t*, and which must therefore be considered as the blunders of absolute ignorance. Thus, in the names of the tenses of the Sanscrit verb, he gives *lal* for *lat*, *lol* for *lót*, *lil* for *lid*, and *lul* for *lúd*. A blunder similar to that which occurs in the fifth case of nouns runs through a variety of the flections of the Sanscrit verb. Thus, he gives *abhaval* for *ab'havat*, *bhavatal* for *b'havatat*, *bhavel* for *b'havet*, *bhuyal* for *b'huyat*, *abhul* for *ab'hút*, *abhavishyal* for *ab'havishyat;* but the whole work swarms with similar errors. What should we think of a Latin grammarian who should falsify the ablative case in nouns, and misrepresent the third person singular in verbs? Yet this is nothing more than what has been done by the redoubted P. Paulinus, whom the learned Sylvestre de Sacy terms "un des écrivains les plus tranchans et les plus dédaigneux;" and he has not only erred in the particular instances which he has adduced in his Grammar, but he has also laid down rules to justify his errors as in his rules for the permutation of the letter *l* into *t*, *d*, *dh*, &c. All his other works that have fallen into my hands equally abound in error, arrogance, and ignorance. Equally superficial, inaccurate, and virulent in his invective, a critic of his own stamp would be tempted to retort on him his own quotation from Ennius—

"Simia quam similis turpissima bestia vobis."

the Indo-Chinese nations. It has dropped in common use some letters entirely, and accented others in a manner similar to the Udátta, Anudátta, and Swarita tones, in the system of accentuation used in chanting Mantrás, and in reciting the Vedas themselves. Thus it has dropped both the palatal and celebral *sh* of the Deva-nagari, as well as the double consonant *ksh*, though the two first are still retained in the more correct alphabets. Instead of pronouncing the first series of letters *ka k'ha, ga g'ha, nga*, it recites them *ka k'ha, ka gắha, nga*; pronouncing *ka* thrice—first, in its natural tone; secondly, softly accented in treble, as if with the tone *udátta*; and thirdly, in a deep bass tone, like the *anudátta* of the Samavedá Brahméns; *gắha* or *ga* is only recited once, and that slightly accented; while *nga* suffers no alteration. A similar alteration occurs in the second series, *cha*, and the fifth series, *pa*. The vowels are generally presented in the same order as the Deva-nagari, but by a similar mode of accentuation eighteen are sometimes employed. The peculiarities of this pronunciation are, however, more closely adhered to by the T'hay or Siamese than by the Barma and Rukhéng nations, whose languages are neither so powerfully accented nor so monosyllabic as the T'hay.

The form of the Balí character varies essentially among the different nations by whom it is used. The square Balí character, employed by the Barmas, differs much from that which is used among the Siamese, and approaches nearer the form of the Barma character. The Siamese Balí character is termed by the Siamese, Nangsu Khôm, the Khom or Khohmén character having, according to their own tradition, derived it from that nation. The square Barma character seems to coincide with the Balí character of Lanka or Ceylon, though in that island Balí compositions are frequently written in the proper Singhala character. Of the character used in Law, Champa, and Anam, I have had no opportunity of judging. Carpanius in his "Alphabetum Barmanun," p. 37, asserts that La Loubère in his "Historical Relation of Siam," has mistaken the Barma and Law characters for the Balí; and Sir W. Jones, in his eighth anniversary discourse, if I understand him, affirms the same thing, on the authority of a native of Arakan. The fact, however, is, that La Loubère's alphabet, though imperfect, as the vowels are omitted and the powers of several letters inaccurately expressed, is the real Balí alphabet of the Siamese, and that which I have found in use among the Talapoins, both of the T'hay and the T'hay-j'hay race, however it may differ from the Balí in use among the Barma and Rukhéng nations. This character, however, when correctly written, is not round like the proper Barma character, but formed by a number of minute strokes placed in an angular position, like the Singhala Pushpákshara, or flower-character. Indeed, on comparing the

two characters, the square Barma-Balí character will be found to approach nearer the proper Barma character than the Balí of Siam.

The Balí is an ancient dialect of Sanscrit, which sometimes approaches very near the original. When allowance is made for the regular interchange of certain letters, the elision of harsh consonants, and the contraction of similar syllables, all the vocables which occur in its ancient books seem to be purely Sanscrit. In Cheritrás and later compositions, however, some words of the popular languages of the country sometimes insinuate themselves, in the same manner as Tamul, Telinga, and Canara vocables occasionally occur in the later Sanscrit compositions of the Dekhin. The Balí, while it retains almost the whole extent of Sanscrit flexions, both in nouns and verbs, nevertheless employs this variety rather sparingly in composition, and affects the frequent introduction of the preterite participle, and the use of impersonal verbs. It also uses the cases of nouns in a more indeterminate manner than the Sanscrit, and often confounds the active, neuter, and passive tenses of verbs. Like other derivative dialects, it occasionally uses Sanscrit nouns and particles in an oblique sense; but notwithstanding all these circumstances, it approaches much nearer the pure Sanscrit than any other dialect, and exhibits a close affinity to the Prákrit and the Zend.[1]

These three dialects, the Prákrit, the Balí, and the Zend, are probably the most ancient derivatives from the Sanscrit. The great mass of vocables in all the three, and even the forms of flexion, both in verbs and nouns, are derived from the Sanscrit, according to regular laws of elision, contraction, and permutation of letters. Sometimes in pursuing these analogies, they nearly coincide; sometimes they differ considerably; sometimes one, and sometimes another of them approaches nearest to the original Sanscrit. Their connection with this parent language was perceived and pointed out by Sir W. Jones, and has also been alluded to by P. Paulinus, who derives his information concerning the Balí from Carpanius and Mantegatius. The fate of these three languages is also in some degree similar. The Prákrit is the language which contains the greater part of the sacred books of the Jainas; the Balí is equally revered among the followers of Buddha; while the Zend, or sacred language of ancient Iran, has long enjoyed a similar rank among the Parsís, or worshippers of fire, and been the depositary of the sacred books of Zoroaster. It is perhaps, however, more accurate to consider all the three rather as different dialects of the same derivative language than as different languages; and conformably to this idea, the Balí itself may be reckoned a dialect of Prákrit. The term Prákrit,

[1] [Compare now the conspectus of the *Pali* language and literature in the "Encyclopædia Britannica," *s.v.*]

both in books and in common use among the Brahméns, is employed with some degree of latitude. Sometimes the term is confined to a particular dialect, employed by the Jainas as the language of religion and science, and appropriated to females and respectable characters of an inferior class in dramas. Sometimes it includes all the dialects derived immediately from the Sanscrit, whether denominated Prákrit, Mágad'hí, Súraséni, Pais'achí, or Apábhranśa; and sometimes it is even extended to the Désab'háshás, or popular tongues of India, as Mahrásht, or Mahratta, Canara, Telinga, Udia, and Bengáli. According to the extended use of the term Prákrit, it may certainly include both Balí and Zend; and if more extensive research should justify the idea derived from an imperfect investigation, I apprehend that the Balí may be identified with the Mágadhí, and the Zend with the Súraséni, of Sanscrit authors.

These three dialects, the Prákrit, Balí, and Zend, have been regularly cultivated and fixed by composition. The same laws of derivation are applicable to the formation of all the three; but yet there is often considerable diversity in the forms which particular words assume, as appears from the following comparative specimen:—

	Sanscrit.	*Prákrit.*	*Balí.*	*Zend.*
man	purushah	puriso	burutsa	neôoroscho
woman	strí	trí	it'hi	strée
daughter	putrí	puí	butri	pothré
wife	b'harya	bhariá	p'hiriya	peéré
		bhaja		perena
father	pitá	piá	pita	fedré
		piăró		
mother	matá	maá	matta	maté
		maăró		
wind	váyuh	baú	vayo	vato
fire	agnih	aggih	ak hi	atéré
horse	aśwah	ásó	atsa	aspo
			acha	aspahó
hog	śúkarah	suaró	sukaro	soubaré
dog	śwá, śwánam	sunău	sunak'ha	sunish
				sepa
buffalo	mahishah	mahisó	mahingsa	mesha
hand	hastah	hattó	hasti	zesté
sun	suryah	suró	suriya	houeré
	ravih	rai	ravé	recoué
tiger	vyagrah	bag'hó	p'hayagho	azra
				vuzra
tree	vrukshah	rukhó	rukha	orot'hé
		vuch'hah		
village	grámam	gámam	khaman	gueoué
		gáü		
the *lingum*	lingam	linkam	lankan	henghâmé
mountain	parvatah	pabbau	bapato	berezoeté
		paüta		
world	prit'hiví	pahaví	pattwé	peété

	Sánscrit.	*Prákrit.*	*Balí.*	*Zend.*
forest	aranyam	rannam	aranja	heramn
he enters	pravishatí	pavaishaï	pawisi	freescheté
they will come	ágamishyantí	ágamihiï	akamisanti	aoontiâo
he makes	karoti	karoi	karoti	kereté
he is	asti	atti achi asai	hathi	asté
seven	saptan	sattó	sapta	hapté
heaven	swargah	saggó	saggó	spérézé[1]

In this specimen the Prákrit words are selected from the "Manórama Vritti" of B'hamaha, and the "Prákritalankes' warah" of Vidyá Vinó-d'ha; the Balí are taken at random from the "Kumárá-Bap," "Chitamnán," and "Hatamnán"; and the Zend from the vocabularies of Anquetil du Perron, whose orthography, since I have not been able to procure the original Zend, has been preserved, however inaccurate, in preference to conjectural emendation; though I am convinced that an orthography more conformable to the original would render the connection of Zend with its cognate dialects more apparent.

Specimen of Balí from the Hatamnán.

Saggé kámécharupé giri-śik'hara-gaté chántalikk'hé vimáné dipé rat'hé-cha gamé taruvanagahané géhavat'hamhí k'hétté.

B'hummá cháyàntu deva: jala-t'hala-visamé yakha-gandabba-naga tit'han-támantikéyám munivara-vachanam sádavo mé sunantu.

D'hammassa-vanakáló-ayum bhaddantá namótassa-B'hagavató Arhattó śamma sambuddassa.

Yésantá-santachitta-tisarano-saraná éta-lókantarévá bhummá-bhummá-cha dévá guna-gana-gahaná d'háyatá sabbakálam été áyántu dévá varakanakamaé méru-rájé vasantó.

Santósahétum munivaravachanam sótam maggam sammaggam sabbésú chakkaválésú yakhá dévá-cha bramhanó.

Which may be thus restored into Sanscrit without the radical change of a single word[2]:—

Swargé kámécharúpé girišikharagaté chántarikshé vimáné dipé ráshtré grámé taruvanagahané grihavatihi kshétré.

Bhúmau cháyántu dévá jalast'hala-vishamé yaksha-gandharva-nágás tist'-hantám antiképám munivaravachanam sád'havó mé śrinvantu.

Dhermaśravanakálóyum b'hanyantam: namastasya B'hagavató Arható-samyak sambudd'hasma.

Yésantah śánta-chitta trisarana śaraná ihalókóttarévá b'humau ab'humaucha,

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[1] [These lists were compiled some 78 years ago, before the real nature and linguistic position of Zend had been discovered. See, on this subject, now, the article on the Persian language in the "Encyclopædia Britannica." The Pali words, even where they are otherwise correct, show in their transliteration the Siamese pronunciation.]

[2] [This first attempt at restoring Pali into Sanscrit has been left unnoticed by all who have written on the history of Pali studies.]

dévá gunaganagrahaná d'hayantah servakálam : été áyántu dévā varakanakamaé mérurājé vasantah.

Santóshahétum munivaravachanam śrótum agré samagram servéshu chakravaléshu yakshá dévascha brámhanah.

The Devas frequent Swurga, Kamarupa, the mountain tops, and atmosphere, in their cars, and on earth, they visit the Dwipas, the fields, cities, recesses of forests, habitations, and sacred places. In inaccessible places, by land or water, the Yakshas, Gandhervas and Nagas reside, in the vicinity of waters. Listen to me, ye devotees, while I recite the words of the Munivaras ; this is the time for hearing sacred things. (The devotees reply :) Say on. (The speaker proceeds :) Reverence to Bhagavata Arhata, the all-comprehending. Those who hear shall become pure of mind, and Trisaraná shall protect them both in this and other worlds ; the Devas, earthly and unearthly, possessed of various qualities, constantly present themselves to their thoughts, and the Devas who reside on Meru, the chief of mountains, of pure gold, frequent them. In the full and perfect hearing of the words of the Munivaras, the Yakshas, Devas, and Bramhanas delight above all else.

This specimen may serve in some degree to illustrate the relation which the Balí bears to its parent Sanscrit. The passage is chosen at random, but considerable portions of Balí have been subjected to the same process with a similar result ; and I am satisfied that it applies equally to Prákrit and Zend, though words of an origin foreign to Sanscrit may occasionally be expected to occur in all the three dialects.

After having thus briefly stated the origin of both the Balí language and written character, I should, in conformity to the plan which has been followed in this rapid sketch, proceed to the illustration of its characteristic structure and grammatical peculiarities, with the relations which it bears to Prákrit and Zend ; but these, with a view of Balí literature, and its influence as a learned language on the vernacular Indo-Chinese tongues, I reserve for the subject of another essay. The politeness and literary zeal of Mr. Colebrooke have furnished me with ample facilities of investigating the Prákrit in all its variety of dialects ; but the paucity of my original materials in Balí, and the total want of MSS. in Zend, have hitherto prevented me from giving the subject so full an investigation as its importance requires ; but if the necessary materials can be procured, I hope to be soon able to submit to the Asiatic Society the result of my inquiries. Of the Balí language, different Kóshas and Vyákarnas are known to exist, and several of them are to be procured in Ceylon, as the "Balí 'Sabdamala," "Balavatara," "Nigandu," and "Nigandu Sana." Of the Zend, various alphabets and vocabularies, as well as original compositions, are extant, but no set of grammatical forms with which we are acquainted. The learned Tychsen, in his dissertation "De Cuneatis Inscriptionibus Persepolitanis," 1798, recommends earnestly to the Asiatic Society to form grammars and lexicons of the Zend and Pahlavi, and this must undoubtedly be performed if ever the subject be accurately investigated, for as yet we are imperfectly acquainted even with the true arrangement of the Zend

alphabet, though it is probably the origin of the ancient Kufic character, if not the actual Himyaric character itself. I have at present little doubt that the character of the ancient Zend, or, as it is termed, according to Anquetil du Perron's orthography, *Azieanté*, is derived from the Déva-nágari; for that author himself admits that the vowels coincide with the Guzeratti, and hints that in some alphabets the consonants also have a similar arrangement. Numerous circumstances likewise lead us to conjecture that if ever the Persepolitan inscriptions in the Arrow character are deciphered, it will be on the principles of this alphabet. Niebuhr has stated, from actual observation, that the characters of these inscriptions are certainly written from left to right, like the Devanagari and the alphabets derived from it. If this authority can be depended on, it completely sets aside every attempt to explain them by any alphabet written from the right hand to the left. A subject, however, like the Arrow character, concerning which there are almost as many opinions as authors who have engaged in the discussion, can never be illustrated by mere conjectures, however ingenious or plausible.*

* In revising the sheets of this essay I perceive that several omissions have occurred from the number and nature of the various materials employed, and the difficulty of classing them in the proper order of arrangement. The following additions are therefore subjoined.

To the notices concerning Malay compositions the following may be added :—

1. "Asál agáma Islam," or the principles of the Islam faith.
2. "Idlal agáma Islam," explanation of the Islamic worship.
3. "Idlalu'l fikeh," explanation of the law of Islam.
4. Makóta segála Raja.
5. Pasiru'l Korán.
6. Hasíd Imam ul Mumenín.
7. Hikaiat Mi'raj Nabi Mahummed.
8. Hikaiat Nabi Mahummed.
9. Hikaiat Nabi Músa.
10. Hikaiat Nabi Yúsuf.
11. Hikaiat deripada kajadiaïn Mir Mahummed.
12. Húkam Islam.
13. Húkam Khaj.
14. Húkam Kanún.
15. Elmu Fikeh.
16. Elmu Falak.
17. Kítabu'l Faraid.
18. Kitab ul Allah.
19. Sijihu'l Huseínu'l Káshefí.
20. Samar adayínu'l Islam.
21. Mirat al Múminin.
22. Marifat ul Islam, or Punganál agáma Islam.
23. Permáta marifat Allah
24. Reazu'l Iehafi.
25. Ruein parungan.
26. Núr Mahummed.
27. Cheritra deripada Suliman.
28. Cheritra deripada al Omar.
29. Cheritra Raja Dewa Ahmud.
30. Cheritra Kobat Leila Indara.
31. Humsah penchurí.
32. Hikaiat segála Súsuhúnan.
33. Hikaiat Misa Túmon panji Wila Kasúma.
34. Hikaiat Misa Gomitar.
35. Hikaiat Jaran Kolina.
36. Hikaiat Chahaju Langarei.
37. Silsilitu'l Salátin, or, Penúrunan segála Raja.
38. Hikaiat Ambon.
39. Hikaiat Achi.
40. Hikaiat Bayan.
41. Hikaiat Baktiyar.
42. Hikaiat Tana Hitum.
43. Hikaiat Jowhar Manikam.
44. Hikaiat Datu perjanga.
45. Hikaiat Dewa Raja.
46. Hikaiat Raja Bosman dan Lokman.

47. Hikaiat Raja Tambik baja.
48. Hikaiat Raja Suliman.
49. Hikaiat Rajah ul Ajam o Azbah.
50. Hikaiat Raja Kirripun.
51. Hikaiat Raja Kambáyu.
52. Hikaiat Raja Nila Datu Kawaja.
53. Hikaiat Runga Rari.
54. Hikaiat Isma Jatim.
55. Hikaiat Abdullah ibn ul Omar.

In addition to the list of Barma compositions, the following names of twelve popular works may be mentioned :—

1. Wi bădo
2. Wi béng
3. Padi muk
4. Néwa
5. Nyáwa
6. Séng-gyó
7. Wi-miy
8. Siho namakara
9. Namosara Lénga
10. Yadana sui-gyaing
11. Tong-úchó
12. Yédana Rasi

The following additional notices and corrections of names refer to the list of Barma compositions given under the article "Barma," according to the respective numbers :—

1. "Jainda Mana Bikhu," an account of the female ascetic Jainda Mana.
2. "Nunda Jaina," the history of a Deva, also named Anunda.
6. "Témi," the religious institutes of Temi.
7. "Némi," another of the ten great religious books of the Buddhists, which are recited in the following order :—1. Témi ; 2. Némi ; 3. Janaka ; 4. Sawan Nasyan ; 5. B'huridat ; 6. Maho sot'ha ; 7. Samata ; 8. Wit'hora ; 9. Chanda Gúngma ; 10. Wesundara. Besides these, the two following works are of great authority :—
   The "Paréik-gyí," which is the Barma Hatamnán.
   "Pat'ham," which is the book of their mythology, revealed by Mya Chewa-para.
8. "Dherma pat'há," a book on justice.
9. "Namagara," a ritual of prayers.
10. "Logasara" and "Loganithi," moral treatises.
14. "Paramikhan," account of Samata and T'hik D'hat.
16. "Bongkhan," the adventures of Nemi.
17. "Kado-khan," a religious work on the expiation of crimes.
26. "To-twek-khan," the same work as the "Rukhéng Nga-chang bráng."
28. "Anusasana," a small book for children, like the "Tamul Atisúdi," and other compositions of Avyár.
30. "Attagat-Lénga," the Bídagat.
36. "Hmat-chew-Bong," a system of morality.

XIII.

SOME ACCOUNT OF AN ORANG OUTANG OF REMARKABLE HEIGHT FOUND ON THE ISLAND OF SUMATRA;

TOGETHER WITH A DESCRIPTION OF CERTAIN REMAINS OF THIS ANIMAL PRESENTED TO THE ASIATIC SOCIETY BY CAPT. CORNFOOT, AND AT PRESENT CONTAINED IN ITS MUSEUM.

By CLARKE ABEL, M.D., F.R.S., &c. &c., *and Member of the Asiatic Society of Calcutta.*

["Asiatic Researches," vol. xv. (1825), pp. 489-98.]

IN the paper which I had the honour of reading to the Asiatic Society on the evening of the 5th of January last, I endeavoured to be as comprehensive as possible in relation to the published histories of large man-like apes, and to the many speculations of philosophers respecting them, and in order the better to accomplish my purpose I divided my subject under the following heads:—First, I gave an account of what particulars I had been able to collect of the circumstances which attended the capture of the Sumatra animal; secondly, I gave the amplest description in my power of its different remains as they were before the Society; thirdly, I adduced a description of Wurmb's animal as described in the "Batavian Transactions," for the purpose of showing its identity with the Sumatra orang-outang; fourthly, I brought forward a description of the small orang-outang of Borneo, for the purpose of showing its relationship to the two former animals, and for the better examining the opinion of Baron Cuvier, that it is only the young one of Wurmb's and consequently of the Sumatra animal; and lastly, I quoted some notices of very large man-like apes contained in the works of the older travellers, and attempted to determine to which of these the Sumatra orang should be referred. The essay which I read to the Society was prepared in haste and from imperfect materials, and although it might perhaps be suited to its principal object, that of exciting inquiry, it was certainly unfit for publication. For this reason, and because those who are likely to be chiefly interested in this communication will be better satisfied with facts than opinions, I shall at present limit myself to an account of those particulars of the appearance of

the animal when alive which are best authenticated, and of the circumstances that attended his capture, as they have been collected from the persons who took him; and conclude with a description of such parts of his body as are preserved in the museum of the Asiatic Society.

Capture of the Animal.

The following short history of the circumstances under which the animal was found, and of the mode of taking him, is drawn up from accounts which were furnished to me, either directly or indirectly, by persons concerned in his capture. A boat party, under the command of Messrs. Craygyman and Fish, officers of the brig *Mary Anne Sophia*, having landed to procure water at a place called Ramboom, near Touraman, on the north-west coast of Sumatra, on a spot where there was much cultivated ground and but few trees, discovered on one of these a gigantic animal of the monkey tribe. On the approach of the party he came to the ground, and when pursued sought refuge in another tree at some distance, exhibiting as he moved the appearance of a tall manlike figure covered with shining brown hair, walking erect with a waddling gait, but sometimes accelerating his motion with his hands, and occasionally impelling himself forward with the bough of a tree. His motion on the ground was plainly not his natural mode of progression, for, even when assisted by his hands or a stick, it was slow and vacillating; it was necessary to see him amongst trees in order to estimate his agility and strength. On being driven to a small clump, he gained by one spring a very lofty branch, and bounded from one branch to another with the ease and alacrity of a common monkey. Had the country been covered with wood, it would have been almost impossible to prevent his escape, as his mode of travelling from one tree to another is described to be as rapid as the progress of a swift horse. Even amidst the few trees that were on the spot his movements were so quick that it was very difficult to obtain a settled aim, and it was only by cutting down one tree after another that his pursuers, by confining him within a very limited range, were enabled to destroy him by several successive shots, some of which penetrated his body and wounded his viscera. Having received five balls, his exertions relaxed, and reclining exhausted on one of the branches of a tree, he vomited a considerable quantity of blood. The ammunition of the hunters being by this time expended, they were obliged to fell the tree in order to obtain him, and did this in full confidence that his power was so far gone that they could secure him without trouble, but were astonished as the tree was falling to see him effect his retreat to another with apparently undiminished vigour. In fact, they were obliged to

cut down all the trees before they could drive him to combat his enemies on the ground, against whom he still exhibited surprising strength and agility, though he was at length overpowered by numbers, and destroyed by the thrusts of spears and the blows of stones and other missiles. When nearly in a dying state he seized a spear made of a supple wood, which would have withstood the strength of the stoutest man, and shivered it in pieces; in the words of the narrator, he broke it as if it had been a carrot. It is stated by those who aided in his death that the human-like expression of his countenance, and piteous manner of placing his hands over his wounds, distressed their feelings, and almost made them question the nature of the act they were committing. When dead, both natives and Europeans contemplated his figure with amazement. His stature at the lowest computation was upwards of six feet, at the highest it was nearly eight, but it will afterwards be seen that it was probably about seven. In the following description, which I give in the words of my informant, many of my readers will detect some of those external conformations which distinguish the young Eastern orang-outangs which have been seen in Europe. The only part of the description in which the imagination seems to have injured the fidelity of the portrait regards the prominence of the nose and size of the eyes, neither of which are verified by the integuments of the animal's head. "The animal was nearly eight feet high, and had a well-proportioned body, with a fine, broad, expanded chest and narrow waist. His head also was in due proportion to his body; the eyes were large, the nose prominent, and the mouth much more capacious than the mouth of man. His chin was fringed from the extremity of one ear to the other with a beard that curled neatly on each side, and formed altogether an ornamental rather than a frightful appendage to his visage. His arms were very long, even in proportion to his height and in relation to the arms of men; but his legs were in some respects much shorter. His organs of generation were not very conspicuous, but seemed to be small in proportion to his size. The hair of his coat was smooth and glossy when he was first killed, and his teeth and appearance altogether indicated that he was young and in the full possession of his physical powers. Upon the whole," adds his biographer, "he was a wonderful beast to behold, and there was more in him to excite amazement than fear."

That this animal showed great tenacity of life is evident from his surviving so many dreadful wounds, and his peculiarity in this respect seems to have been a subject of intense surprise to all his assailants. In reference to this point it may be proper to remark, that after he had been carried on board ship and was hauled up for the purpose of being skinned, the first stroke of the knife on the skin of the arm produced an instantaneous vibration of its

muscles, followed by a convulsive contraction of the whole member. A like quivering of the muscles occurred when the knife was applied to the skin of the back, and so impressed Capt. Cornfoot with a persuasion that the animal retained his sensibility, that he ordered the process of skinning to stop till the head had been removed.

It seems probable that this animal had travelled some distance to the place where he was found, as his legs were covered with mud up to the knees, and he was considered as great a prodigy by the natives as by the Europeans. They had never before met with an animal like him, although they lived within two days' journey of one of the vast and almost impenetrable forests of Sumatra. They seemed to think that his appearance accounted for many strange noises, resembling screams and shouts, and various sounds, which they could neither attribute to the roar of the tiger nor to the voice of any other beast with which they were familiar. What capability the great orang-outang may possess of uttering such sounds does not appear, but this belief of the Malays may lead to the capture of other individuals of his species, and to the discovery of more interesting particulars of his conformation and habits.

The only material discrepancy which I can detect in the different accounts which have been given of this animal regards his height, which in some of them is vaguely stated as from above six feet to nearly eight. Capt. Cornfoot, however, who favoured me with a verbal description of the animal when brought on board his ship, stated that "he was a full head taller than any man on board, measuring seven feet in what might be called his ordinary standing posture, and eight feet when suspended for the purpose of being skinned."

The following measurements, which I have carefully made, of different parts of the animal in the Society's museum, go far to determine this point, and are entirely in favour of Capt. Cornfoot's accuracy. The skin of the body of the animal, dried and shrivelled as it is, measures in a straight line, from the top of the shoulder to the part where the ankle has been removed, 5 feet 10 inches; the *perpendicular* length of the neck as it is in the preparation, $3\frac{1}{2}$ inches; the length of the head from the top of the forehead to the end of the chin, 9 inches; and the length of the skin still attached to the foot from its line of separation from the leg, 8 inches: we thus obtain 7 feet $6\frac{1}{2}$ inches as the approximate height of the animal. The natural bending posture of the ape tribe would obviously diminish the height of the standing posture in the living animal, and probably reduce it to Capt. Cornfoot's measurement of 7 feet, whilst the stretching that would take place when the animal was extended for dissection might as obviously increase his length to 8 feet.

Description of the Remains of the Animal.

Head.—The face of this animal, with the exception of the beard, is nearly bare, a few straggling short downy hairs being alone scattered over it, and is of a dark lead colour. The eyes are small in relation to those of man, and are about an inch apart; the eyelids are well fringed with lashes. The ears are one and a half inches in length, and barely an inch in breadth, are closely applied to the head, and resemble those of man, with the exception of wanting the lower lobe. The nose is scarcely raised above the level of the face, and is chiefly distinguished by two nostrils. three-fourths of an inch in breadth, placed obliquely side by side, The mouth projects considerably in a mammillary form, and its opening is very large; when closed the lips appear narrow, but are in reality half an inch in thickness. The hair of the head is of a reddish-brown, grows from behind forwards, and is five inches in length. The beard is handsome, and appears to have been curly in the animal's lifetime, and approaches to a chestnut colour; it is about three inches long, springing very gracefully from the upper lip near the angles of the mouth in the form of mustachios, whence descending it mixes with that of the chin, the whole having at present a very wavy aspect. The face of the animal is much wrinkled.

Hands.—The palms of the hands are very long, are quite naked from the wrists, and are of the colour of the face. Their backs, to the last joint of the fingers, are covered with hair, which inclines a little backwards towards the wrists, and then turns directly upwards. All the fingers have nails, which are strong, convex, and of a black colour; the thumb reaches to the first joint of the fore-finger.

Feet.—The feet are covered on the back with long brown hair to the last joint of the toes; the great toe is set on nearly at right angles to the foot, and is relatively very short. The original colour of the palms of the hands and soles of the feet is somewhat uncertain, in consequence of the effect of the spirit in which they have been preserved.

Skin.—The skin itself is of a dark leaden colour. The hair is of a brownish red, but when observed at some distance, has a dull, and in some places an almost black appearance, but in a strong light it is of a light red. It is in all parts very long; on the fore-arm it is directed upwards; on the upper-arm its general direction is downwards, but from its length it hangs shaggy below the arm; from the shoulders it hangs in large and long massy tufts, which in continuation with the long hair on the back seem to form one long mass to the very centre of the body. About the flanks the hair is equally long, and in the living animal must have descended below the thighs and nates. On the limits, how-

ever, of the lateral termination of the skin, which must have covered the chest and belly, it is scanty, and gives the impression that these parts must have been comparatively bare. Round the upper part of the back it is also much thinner than elsewhere, and small tufts at the junction of the skin with the neck are curled abruptly upwards, corresponding with the direction of the hair at the back of the head.

In the dimensions which I am about to give of the skin I have stated that it measures, from one extremity of the arm to another, 5 feet 8 inches; to this is to be added 15 inches on each side for the hands and wrists, which will render the whole span of the animal equal to 8 feet 2 inches.

The following are the measurements which I have made of the different parts:—

Face.

	Inches.
Length of the forehead from the commencement of the hair to a point between the eyes	4½
From between the eyes to the end of the nose	1½
From the end of the nose to the mouth	3
From the mouth to the setting on of the neck	4½
Circumference of the mouth	6

Skin.

	Ft.	in.
Greatest breadth about the centre of the skin	3	2
Greatest length down the centre of the back	3	2
Length from the extremity of one arm where it is separated from the wrist to the other	5	8
Breadth of the skin from the situation of the os coccygis to the setting-on of the thigh	1	4
Across the middle of the thigh	1	0
Greatest length of the hair on the shoulders and back	0	10

MEASUREMENT OF HANDS AND FEET.

Front Measurement of Hand.

Length of hand from the end of the middle finger to the wrist in a right line	1	0
Circumference of hand over the knuckles	0	11
Length of palm from the wrist	0	6½
,, middle finger	0	5¼
,, fore finger	0	4¾
,, little finger	0	4¼
,, ring finger	0	5
,, thumb	0	2½

Back Measurement of Hand.

Length of ring finger	0	6¾
,, middle finger	0	6¾
,, little finger	0	5¾
,, fore finger	0	6
,, thumb	0	4

Front Measurement of the Feet.

	Ft.	In.
Length from the end of the heel to the end of the middle toe	1	2
Length of sole of the foot	0	$9\frac{3}{4}$
,, middle toe	0	$4\frac{1}{4}$
,, ring toe	0	$4\frac{1}{2}$
,, little toe	0	$3\frac{1}{2}$
,, fore toe	0	$3\frac{3}{4}$
,, great toe	0	$2\frac{3}{4}$
Circumference over the knuckles of the toes	0	$9\frac{3}{4}$

Back Measurement.

Length of middle toe	0	6
,, fore toe	0	$5\frac{1}{2}$
,, ring toe	0	6
,, little toe	0	5
,, great toe	0	$4\frac{1}{2}$

Measurement of the Lower Jaw.

Circumference of the jaw round the chin	0	$11\frac{1}{2}$
Length of the ramus from the head of the jaw to its base	0	4
Breadth of the ramus or ascending portion of the jaw at a level with the teeth	0	$2\frac{1}{3}$
Depth of the jaw at the symphysis menti	0	$2\frac{1}{2}$

MEASUREMENT OF THE TEETH.

Number of Teeth, 32—namely, 2 canine, 10 grinders, and 4 incisive teeth in each jaw.

Canine Teeth.

	Inches.
Whole length of lower canine teeth	2·7
Greatest length of fang	2
Smallest ditto	1·6
Greatest length of the enamel or exposed part of the teeth	1·1
Part exceeding the other teeth in length	·4
Lateral breadth measured on a level with the jaw	·6
Breadth from before inwards	·7

Incisive Teeth.

Whole length of the lateral	1·5
Of enamel exposed	·7
Breadth of cutting surface	·4
Ditto of central teeth	·4

The front teeth of the upper jaw greatly resemble those of the lower, with the exception of the middle incisive teeth, which are twice the width of the lateral ones.[1]

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[1] [Von Rosenberg, "Der malayische Archipel," p. 99; Wallace, "The Malay Archipelago," pp. 40-64, 134; "Midden-Sumatra," part iv., 3, p. 5; O. Mohnike, "Pflanzen- und Thierleben in den Niederländischen Malaienländern" (1883), pp. 338-74.]

XIV.

OBSERVATIONS ON THE GEOLOGICAL APPEARANCES AND GENERAL FEATURES OF PORTIONS OF THE MALAYAN PENINSULA,

AND OF THE COUNTRIES LYING BETWIXT IT AND 18° NORTH LATITUDE.

By Captain James Low, *of the Madras Army*.

["Asiatic Researches," vol. xviii. (1833), pp. 128–62.]

It is with extreme diffidence that I venture on this subject, as it is one which cannot be fully elucidated without a much more extensive research than I have had it in my power to make, and a higher degree of geological knowledge than I possess.

Since, however, the countries alluded to have not hitherto been geologically described, and as political circumstances preclude British research from a wide portion of these interesting regions, the Society will, I trust, receive with indulgence the results of my personal investigation.

The grand general features of the Indo-Chinese regions seem to be alternate ranges of hills stretching nearly north and south, and conforming occasionally to the general direction of peninsular tracts, and of valleys of various breadth, through which flow large rivers.

The principal ranges are, that which divides Asam from Ava, then the Siamese and Ava range, next the Siamese and Cambojan, and again the Cambojan and Anam range. The continuity of these appears to be most liable to interruptions as they approach the south, and none of them, as far as my information extends, can be compared in height to the secondary ranges of those lofty Himalayan mountains, from which they are evidently offsets. The broadest valley seems to be that of Ava, and the narrowest the Cambojan one. The general inclination to the south of the whole of the regions lying betwixt Bengal and the sea of Kamtchatka is apparent from the course of the rivers being in that direction. From regions contiguous to the sources of these rivers, the tide of population which overspread the southern plains appears to have flowed, a position which might be illustrated by the affinities of languages.

The Indo-Chinese ranges are, in so far as we yet know, covered

by deep forests. It is only therefore in the ravines, formed by torrents, and on the face of an occasional precipice, that their structure can be conjectured; and these facilities are available at but a very few points, owing to the wildness of the countries in which they occur, and of the barbarous hordes which roam over them.

I will begin with that part of the Malayan Peninsula lying in about 4° S. latitude, and keeping on the west coast. This point is in the Perak country, which is governed by an independent Malayan chief in alliance with the British. From this last circumstance we may hope in time to gain a more perfect acquaintance with its geological peculiarities.

Close to the entrance of the Perak river are the Bountin Islands, hilly, with rocky shores. Granite seems to be here the prevailing rock. The plains of Perak are chiefly alluvial, up to the line where a marked ascent towards the central range is discernible, and which may perhaps be averaged at fifteen miles from the sea. The range in question is a portion of the great north and south one, which divides the Malayan Peninsula longitudinally. The rivers to the eastward of it consequently disembogue themselves into the Gulf of Siam, while those to the westward enter the Bay of Bengal and the Malacca Straits. This range, generally considered, lies nearer to the west than to the east coast of the peninsula. Where it bounds Perak on the east, it is both lofty and, in so far as observed, continuous. Gold has been found in the beds of some of the mountain torrents which join the Perak river. From specimens of ores of gold, found in the hills east of Malacca, it would seem that the matrix is most frequently quartz. That the Malacca Peninsula was the golden Chersonese of the ancients cannot now be proved, but it yields at this day gold in sufficient abundance to render this position probable. The granite formation appears to predominate amongst the Perak hills, and in it are found the veins of tin from which the Dutch formerly derived much profit, and which now yields valuable supplies of that metal. The mines must be very rich, since even at this period the native workman seldom digs above ten or twelve feet below the surface, and often contents himself with merely washing the soil taken from the beds of rivulets and separating the oxide of the metal in the shape of a black sand. The oxide of antimony is also obtained in large quantities amongst the hills, but my specimens being pure I cannot specify the rocks with which they are associated. Lime is also, according to native formation, obtained, but its nature and locality have not been ascertained. From some native accounts also it seems not improbable that coal will be discovered in this track. Perak is a fine country, watered by a river of a very picturesque nature, and it contains a considerable population of Chinese and Malays. From Perak, northward to Penang, the

coast is level, with a few detached hills, not characterized by any peculiar feature which might contrast them with those we have been describing. Penang, it is well known, exhibits an almost exclusive granite formation. The granite is for the most part grey, and decomposable, generally flaking off by exposure. It protrudes at the summit of the hills, and may be found lining their base. Mica occurs occasionally in pretty large masses, and white quartz, regularly crystallized, is found sparingly. On the shores of several of the small islands lying off it on the south-east, conglomerate, tinged with oxide of iron, is found, as well as the usual granite.

That part of the great peninsular range in the latitude of Penang is much broken, but many of the hills are of considerable height. The loftiest one, visible from Penang, may perhaps be stated at four thousand feet. They are almost all rich in ores of tin, and were European scientific men to be permitted to explore them, we might expect to derive interesting results from their labours. A table-land, of considerable elevation and covered with grass, is reported to be about north-east of Penang, in the centre of the great range. The jealousy shown by the Siamese has hitherto prevented me from visiting it. Marble is reported to be found in this direction, but no specimens have been obtained. The Malayan inhabitants are all friendly to the British.

That portion of the Kedda coast facing Penang has evidently in many parts been rescued from the sea. The period when this happened is not traditionally known, although it is conjectured that it is not very remote—mounds of sea-shells are found about two miles inland. There are detached hills on this part of the coast which contain tin.

The Kedda Peak (termed by the natives Gúnong Cherai) is an object of considerable geological as well as geographical interest. Its height has not been correctly ascertained. It may perhaps be stated at three thousand feet at least above the level of the sea, which washes part of its base.

The summit has not been reached, as far as I am aware, by any European, although perfectly practicable. This has been greatly owing to the jealousy of the Siamese. From specimens of rocks and ores brought from this hill by intelligent natives who were sent by me to explore it, I am enabled to state with some measure of confidence that it principally consists of the usual granite of this coast. On the sea face is a cliff washed by a waterfall, where large crystals of white quartz are got—similar crystals were brought to me from a spot near the peak. The summit is a granite rock, with a flat termination of a few square yards, bare of vegetation and accessible with difficulty. This mountain contains gold, and tin ore was formerly obtained in large quantities on it. Various ores of iron were brought to me from it, and it is probable that

many other valuable minerals may yet be found there. This mountain abounds with all the valuable woods of this coast, amongst which are several kinds of fir. The inclination of the hill is apparently to the east, and there is a very remarkable break (of six or seven hundred feet, judging by the eye and telescope at the distance of ten miles) in the rock, east of the peak, which may have been caused by an earthquake.

The latter phenomenon, it may be remarked, is not followed by such violent effects on this coast as on the island of Sumatra and on Java. The existence, however, of hot springs in various parts of the central range indicates the prevalence of mineral substances, of which specimens have not yet been obtained.

Advancing northwards from Gunong Cherai, and passing the mouth of the Kedda river, which takes its rise in the central range and fertilizes an extensive track of rich soil, the first object which attracts the attention is the Elephant Rock, a short distance north from Kedda. It is a dark mass of granite seemingly, and it shoots very abruptly out of the forests to the height perhaps of four hundred feet.

The coast continues low to the northward of this point. Turning to the Laueang Islands, we find granite still prevailing; but here in the "bird-nest rocks" we are enabled to note the southern termination in this line of the limestone formation which has been traced by me up to the northern boundary of the Martaban province. I have no doubt that detached lime rocks abound in the central range, but they are not connected with this formation in so far as we yet know. The first decided indication of the presence of lime was observed in a perforated rock lying off the N.E. side of Pulo Trotto.

The calcareous rock is here much tinged by oxide of iron, and mixed up with different earthy substances. The strata are inclined to the west at an angle of about 30°.

Several miles north of this point, the Trang rocks begin. The first of these was visited by me, but it merits much narrower inspection than time permitted me to make.

It is a huge mass of heterogeneous rock rising out of the sea to the height of about three hundred feet. Its shape approaches to an oblong square, and it is rendered inaccessible by cliffs. The whole seems inclined at a slight angle to the south.

From the decomposing nature of the surface it would be no easy task to arrive at a speedy conclusion respecting its whole structure. It appeared to me to rest on a granitic base, covered by various admixtures. The superincumbent mass is heterogeneous. Limestone in various stages, veins of quartz and ores of iron are most prominent; calcareous incrustations line the hollows of the cliffs, where also the agaric mineral abounds; and the cliffs are in some places curiously marked by broad vertical ribbon-like streaks,

varying in colour according to the strata from which the water containing the colouring matter has flowed—white, black, and dark bluish, and slate colours, are most frequent. At the south end, about half-way up the cliff, there are magnificent natural arches. The grotesque calcareous stalactites, which depend just over the entrances to these, give them as a whole the aspect of a decayed Gothic ruin.

A cavern has been formed quite through the north end of the rock, by the action of the sea below and the gradual decay of the structure above. Stalactites here abound.

Our boat carried us into the centre of this cave; it is gloomy, but the roof is perhaps fifty feet high, and dome-shaped though rugged. Here were observed flimsy ladders of flexible cane, stretched betwixt projections of the rock, and on emerging from the cavern similar ladders were observed to have been arranged up the face of the cliff in a zig-zag manner; here fastened to a jutting point of rock, there reeved through a perforated angle. These had been thus placed by adventurous Malays in quest of the edible birds' nests. Their trade is more dangerous than that of the samphire gatherer or the Hebridean birder, but it is more profitable than either. Several of the birds' nest islands in this line have been so tortuously hollowed out by the slow operation of ages, that previous to going in, the nester fastens to the entrance the end of the clew he takes with him, that he may not lose his way. On these occasions they use dammer torches. The eye of the swallow which builds these nests must be peculiarly formed to enable it to work and nestle in such a labyrinth where total darkness prevails.

A pocket compass was placed close to that part of the cliff which seemed most strongly impregnated with iron, but it was not affected.

Near and to the north of this rock is a very rocky island termed Ka Pesa by the Siamese, because in their legends it is related that an undutiful son, having denied assistance to his parents out of the profits of a successful voyage, the gods sent a storm which drove his vessel to sea, where it was transformed into this rock.

The general structure nearly corresponds with that of the rock just noticed, but it has a most singular aspect from a series of peaks which rise from it—bleak and striated, and which on a near approach resemble the chimneys of glass manufactories. The geological features of this island may be best seen at the north end, where large masses have fallen from the cliffs. Here granular magnetic iron ore, imbedded in a calcareous and micaceous gangue, was found in considerable quantity. A nearly similar sort of iron ore abounds on the high ground on the mainland at the entrance of the Trang river.

These rocky islands are adorned by numerous beautifully flowering shrubs and trees, and are frequented by the white sea pigeon (Columba delmaris) and by birds of passage. A coarse coral bottom prevails around each, but the depth suddenly increases at the distance of two or three hundred feet from the shore; oysters are abundant. At the north side of the narrow entrance to Trang harbour, in N. lat. 7° 20′, is a remarkable calcareous rock with several caverns in it. The carbonate of lime, in conglomerated masses or in stalactites, is here much purer than that found amongst the islands just described. Several of the stalactitic masses are bell or fungus-shaped, the apex upwards, and when struck are found to be remarkably sonorous. These are all tinged with iron.

Pulo Tilibon, which forms the northern side, exhibits granite and ironstone with veins of quartz in it. From all that I have seen, it should seem that the lime formation becomes more compact and pure as it is followed in a northern direction.

The rock in question contains a detached portion, having a stratified appearance, and inclining to the S.E. at an angle of about 35°. In one of its caves were observed twelve human skulls laid out in a row. They were those, the Siamese said, of Burmans, who were slain in those wars when they attacked and destroyed Tilibon. Part of the stockade which surrounded the town was yet standing when I visited the spot in 1824, about fourteen years after its destruction. The thick planks or beams were quite sound and very hard. The tree from which these durable walls had been obtained is the Mai-ke-um of the Siamese, and the Kayú-gittah of the Malays.

The Trang river is broad, with a high ridge running at right angles to it on the west side of the entrance. Granite rocks here protrude through the soil, which is red and ferruginous. The shore is overspread with lumps of micaceous iron glance, very fusible. The iron is in small rounded particles—black, but yielding a reddish streak, and when reduced to powder, adhering to the magnet. The matrix is a brown ochre, which soils the fingers. The quartz which is found imbedded in the granite of this coast is generally very lamellar, and the plates transparent. There are several hills discernible from this place, but little information was obtained regarding the great range. The young Rajah of Ligor informed me that the pass betwixt the hills is difficult, but as he rode his elephant the whole way on several occasions, his account is no doubt exaggerated.

Most of the small islands lying betwixt Trang and Junk-ceylon seem for the greatest part composed of granite. It prevails in the latter island, and here again tin appears in proximity to or interspersed in it and its débris.

A range of hills, the highest of which I believe will not be found

to exceed one thousand feet, stretches longitudinally through the island, with one large break in the middle. The island was probably once joined to the mainland, since the Papra Strait, which separates the two, is narrow and rocky. The island, when I visited the interior in 1824, had a population of six thousand souls (Siamese).

The tin formation seems to run in a continuous line from the southern extremity of the peninsula up to about 15° N. latitude. Beyond this point neither Burmans nor Siamese have discovered any mines. But as the countries lying on both sides of the great belt of mountains are perhaps, to a distance of twenty miles respectively from the skirts of the latter, inhabited by wild tribes of Karians, uninterested in the search for this metal only, it is probable that tin does exist in these latitudes. It shows itself again in Thampè, one of the provinces of the Shán, as the Burmans term the inhabitants, and lying, if I can depend on the distances given to me by natives of the country, in about 20° N. lat., and long. 99° 100′. The natives call themselves Plau. They are shorter in stature than the Burmans, and the features partake much of those of the Chinese.

There the tin-ore occurs in beds of streams mixed with sand. The natives do not dig mines to get at it, owing perhaps to its being of little value at such a distance from the coast. They have, however, by their own accounts, valuable lead-ores which they reach by deep shafts.

In Captain Forrest's time, when Junk-ceylon was visited by numerous native traders, the mines yielded an average annual quantity of five hundred tons of tin. But as the population has been reduced to about six thousand souls, and as the Siamese have mines closer to their capital, a very small supply only is now taken from the island. Perhaps it may be rated at one hundred baharas of 446 lbs. average each. A Chinese smelter informed me that he could afford to produce tin at a cost of one-half at the utmost of the market rate. The miners dig pits of from twelve to twenty feet deep, but seldom venture a lateral shaft. The ore is generally in round or oblong masses, with well-defined crystals and in a matrix of quartz, or bedded in masses resembling half-decomposed granite, yet of considerable hardness.

The furnace in which the pounded ore is smelted is made of a compact of clays and earths, is oblong in shape, and about three feet high. Alternate layers of ore and charcoal are put into it, and the usual horizontal tube bellows of the Chinese is kept incessantly at work during four complete days (of twenty-four hours) and one night, when the furnace is cleansed. After some hours' labour the tin makes its appearance, and is run into moulds, and the furnace is fed with more ore and fuel.

The Bay of Phúnga, which stretches N.E. of Junk-ceylon, is

remarkable for the magnificent rocks with which it is studded. At the distance of ten miles they appear like huge artificial pyramids, but on a nearer approach their outlines change to columnar or massive. The principal rocks occupy a line of about ten miles in a north and south direction. The northern extremity lies behind the town and valley of Phúnga; the southern rests in the sea, about four miles from the mouth of the Phúnga river. Their direction therefore is nearly that of the Trang rocks. The part of the range lying in the sea consists of numerous detached rocks of different elevations and mostly inaccessible. The height does not in any instance, I should state, exceed five hundred feet, and seldom falls short of two hundred. One of them has a very columnar aspect, which might lead a distant spectator to suppose it was basaltic. They are all, however, chiefly composed of, I suppose, primary limestone, and, like the rocks which have been already described, exhibit no traces of organic remains. Some of the specimens of stalactite which have been presented to the Society were taken from one of a series of grottos in and near the base of one of the Phúnga rocks. These caverns are about six feet above high-water mark. The roofs are low and seldom exceed ten feet in height, and they look as if supported by the natural pillars of spar which have been gradually formed by filtration from the top. Several of the stalactites have barely reached the floor, others touch the floor, and a double formation is going on. The sides of the grottos are lined with the same calcareous spar.

There is an insulated rock near this spot which is perforated by a grand natural tunnel. To the top of the arch the height is about twenty feet, and grotesque-shaped stalactites depend from above the entrance from the roof. A boat can get within the arch.

The valley of Phúnga is about three miles long by one on an average in breadth, being oval-shaped and widest near the sea. It is hemmed in to east and west by rocks and hills. Those on the west are least abrupt and seem mostly granitic; those on the east have a very picturesque appearance, and where the river washes their base present perpendicular cliffs of four and five hundred feet. They are even more purely calcareous than the rocks at sea, for many look at a short distance as if formed of chalk. This they owe to the agaric mineral. Tin abounds in the granitic hills in the vicinity of this valley. The great hill range of the peninsula was not observed from this point owing to the intervening rocks; but the Siamese chief informed me that it must be crossed in the route thence to the opposite coast of the peninsula. No information could be expected from him as to the rocks associated there. The population here is about eight thousand souls, including six hundred Chinese and about one hundred Siamese priests of all ages.

Passing to the northward of Junk-ceylon the coast is bold for the distance of a degree, and lying about thirty miles off this line are numerous calcareous perforated rocks, frequented by the edible birds'-nest gatherers.

From all accounts obtained from native travellers—from personal observation when sailing up the coast, and with reference to the narrowness of this part of the peninsula—it has appeared to me that the great central range is here of less width than at any other point. But I cannot admit that this circumstance, as some have imagined, should give any colour to the supposition that any internal navigation is or could be rendered practicable betwixt the Bay of Bengal and the Gulf of Siam. I have before me native plans in which the hills are laid down as continuous. At any rate, the inclination of the countries towards the Gulf of Siam on the one side and the Bay of Bengal on the other, is so great as to prevent the rivers which flow over them from being navigable to good-sized boats, beyond perhaps ten or twelve miles from their mouths.

The sources of two rivers may indeed lie within a few miles of each other on opposite sides of a hill or a range, yet the spot where they respectively lose the name of mountain torrents and become navigable, may be very widely asunder. It is true that by running up the Kra or any other stream in a boat, a traveller may get within two or three days' march of the place of embarkation on a river on the opposite coast; and this is all that can, with our present information, be admitted. All the rivers on this coast are wide and some are deep at their mouths, but, with the exception of the Tenaserim and Tavoy rivers, which incline to the northward and avoid the hills, they suddenly contract and grow shallow. Tin abounds betwixt Junk-ceylon and Mergui.

The coast of Tenaserim, from 10° to 12° 30′ N., is shut out from the ocean by high and generally rocky islands.

Those which form the west side of Forrest's Straits up to the N. point of Domel, in 11° 3′ N. (instead of 11° 21′ as he gave it), are well wooded and are chiefly composed of granite. Domel is a fine island, twenty miles in length by twelve or thereabouts in breadth, with a rocky coast. On sailing past a spot described and sketched in Forrest's work, and at which he mentions having taken in marble ballast, I could only find a great quantity of large smooth boulders of quartz, which had been associated with slate; for upon inspection of the coast, thick strata of soft black slate, with veins of quartz, were discovered. The slate had in some places an admixture of iron ore.

In coasting Domel the hills on the mainland are distinctly perceivable. The highest point was conjectured to be about three thousand feet high. These hills belong to the great range in all

probability. The highest peak of St. Matthew's Island may be nearly as high.

All the islands in this chain examined show bold coasts towards the sea.

There is a considerable opening north of Domel, where a distinct archipelago of bleak and rocky islands begins and stretches north and south. The belt is formed of four or five parallel rows of islands, and may be twenty miles in breadth. They are not laid down in the charts. A vessel I sailed in passed through amongst them in coasting, and as the numerous dangerous rocks with which this hitherto unexplored track abounds rendered it necessary to anchor frequently, I had opportunities of visiting many of the islands. The channels are for the most part deep, and a vessel of two or three hundred tons can scarcely find anchorage near many of the islands when within half a cable's length of them.

Their formation is primitive. The granite is occasionally associated with black schistose strata or sandy slate. The specimen produced was taken from a vertical stratum of exceedingly indurated schist tinged by oxide of iron. Lime rock was not observed to prevail; but several of the islands seem heterogeneously composed. Occasionally quartz, white and tabular, was seen to pervade in broad veins the granitic rocks.

Several "birds' nest" rocks are scattered amongst this group, and it may be inferred that they are calcareous. Pearl-oysters are occasionally picked up; the pearls got from them are seldom of much value. If pearl beds of any desirable extent do exist, the practice of diving for them, as at Ceylon, might be applied with advantage. The whole of the islands noticed are destitute of any fixed population; but there is a tribe, termed Chalome and Pase, the families of which rove about collecting the birds' nests, the dammer, the bêche-de-mer, conch slugs, wax, scented woods, and other products of the islands. They live in covered boats, and appear inoffensive, readily bartering the above articles for such merchandise as the Burmans bring to them.

The Siamese appear to exert very little if any control over these islands. Their part of the coast terminates at Pak Chau, a river of no consequence further than that it forms, according to Siamese opinion, the southern boundary of the British possessions in this quarter.

Leaving this coast for a space, I will now cross the peninsula, and endeavour to give as brief an account of such geological and mineralogical notices as I have been able to obtain respecting Siam.

The sea which washes the shores of the peninsula on the east side is studded with numerous islands, bold, and for the most part rocky. The edible birds' nests being here procurable from

the caves, it is probable that lime abounds in the rocks. Along the shores of the Chúmphan and Chanja districts, ferruginous strata are prevalent, and loadstone is said to be procured from them.

At Ban-taphan-nae, nearly in the latitude of Mergui, are the only gold mines now worked in Siam. The gold is either in the shape of dust or found in a reddish earthy matrix. To get this last kind of ore, pits of no great depth are dug. The ore is merely submitted to the agency of fire. It is not believed that these mines yield annually more gold than would be valued at perhaps about 15,000 rupees. But as the miners (about from two to three hundred, it is understood) only mine during three months in the year, and as they go very clumsily and unskilfully to work, the real value of these mines remains unknown.

A diligent author,* who visited Siam, observes of the Siamese that "neither their mines of tin, nor those of copper, lead, and gold, have experienced the benefits of the industry and intelligence of the Chinese."

Previous to opening a mine the Siamese propitiate the spirits of the ground and of the stream by the sacrifice of cattle and poultry, and by offering up these and fruits on temporary altars. This custom is equally observed by Chinese and Malayan miners on opening gold or tin mines. With respect to the Siamese, the practice is a direct breach of the primary ordinance of their faith, "not to kill that which has life," and points to a period when they worshipped *genii loci*, and other imaginary Dewtas. Cornelians are found, it is said, on this coast.

Proceeding northward till within about a day's coasting of the Siam river, a hill termed K'hau Deng, or "the red hill," appears on a point of land. The coast is covered with ferruginous earths and strata, but of these no specimens have been obtained. Close to this place, and stretching for the distance of ten or twelve miles northward of it, is a very remarkable range of pyramidal hills and rocks, termed by the Siamese "Sam sae yat," or "the three hundred peaks." They vary in height from a hundred feet to perhaps twelve hundred feet; some rise from the sea, others are scattered on the mainland.

This account I give from native information, although European navigators have incidentally alluded to them. They take from hence a kind of hone (perhaps an iron ore), varying in colour from black to white. The valley of Siam is chiefly alluvial within the scope of the annual inundations of its river. The first rocky formation of any consequence northward of Bankok, the capital, is at Prabát, three days by water, north-east of the old capital, and where there is a famous impression of a foot of Buddha. The

* Mr. Craufurd.

Siamese priests have long imposed this sculpture on their followers, who never doubt their assertion that the legislator alluded to stamped the impression with his own foot.

This Prabát has been made on the solid rock (a granite, if my information is correct), which protrudes at top, and a stair has been cut out of the rock to ascend by. A copper ore is said to be found on the flat grounds near this place. About fifteen or sixteen miles above Prabát there is a low hill called Phra Chauja, where granite, from my information, prevails, and where the natives fancy they can trace on the face of a rock the lineaments of Buddha. Iron ores are found here. At Napphabúrí, on the south of the road to Laos, large quantities of a very white argillaceous earth are obtained, and red ores of sulphur are said to be brought from this quarter. At Khorát they use, it is said, a plum-pudding stone, or breccia, for building; and at Napphabúrí, in this quarter, they find yellow, red, and white ores of arsenic (realgar?), a metal which enters largely into the Siamese pharmacopœia. The range of hills stretching N.E. from a point in about N. lat. 16° on the east bank of the river of Siam, yields ore of iron in great abundance; and the Chinese have therefore established a large party at T'hasúng, a town lying on a branch of the river. They manufacture various coarse articles of cutlery, which are rejected by the Siamese themselves in favour of foreign importations of that metal. Iron mines exist also at Sokkothai, higher up the river. The range of hills dividing Siam from South Laos is continuous, according to every account I have received from native travellers, who invariably go most of the journey by land. They affirm that there is no water communication across the country, so that the river Anam laid down by some geographers* appears to have no existence.

The Me Nam, or great river of Siam, has been traced by me, in native maps obtained from people of Laos, up to about 21° N. lat., where are high hills abounding in hot springs. P'hokhau Lo-ang Prabang, a hill many days to the northward of Laochág, in the south of Laos, yields, it is said, gold and precious stones. It may be the Mohany Leng of Du Halde, where, he observes, were to be found "gold, silver, copper, tin, and red sulphur." At Chantabún, on the east coast of the Gulf of Siam, granite is believed to be the prevailing rock, and quartz-crystals, Ceylon diamond, and coarse rubies, cat's eyes, and other precious stones are collected, it is reported, in the vicinity. Steatite is found in Ligor.

We now return to Tenaserim. The high islands fronting Mergui are, I think, of primitive granite; and King's Island, with most of

* Pinkerton and others.

the lesser islands in its neighbourhood, presents bold granite cliffs to the sea.[1]

The hill on which the town stands consists of granite, decomposed at the surface, with much quartz interspersed in veins. The ochry appearance of the soil in some places indicates the presence of iron, and tin ore is found in the streams at the base of the hill; lead ore is reported to exist in the upper parts of this province. The rocks on the island forming the west side of the harbour are strongly impregnated with oxide of iron. In the vicinity of the town argillaceous petrifactions are found. The clay contains some lime; but no marks are discernible near Mergui of lime rocks: some petrified crabs were obtained. The province of Mergui, or Tamau, abounds with tin ore, especially to the southward.

The sea northward to Tavoy is pretty free of islands. Grey granite is the prevailing primitive rock throughout the province of Tavoy.

There is a low range of hills which stretches north and south, close along shore, and shuts from the sea a great portion of the province; nearly opposite to the town of Tavai, on the west bank of the river at Kamau, is an elevated ridge of several miles in length, which is almost wholly composed of ironstone of different degrees of compactness. On the surface the soil and gravel are reddish; but on a high part of the ridge is a rock very hard and fine-grained, but not striated, and of a blackish colour. It is strongly impregnated with iron, and so magnetic that a piece newly detached, and of a pound in weight, held a piece of iron nine grains in weight in suspension. It was with much difficulty that a few specimens could be taken off with an iron crow. This rock might, from its black appearance, be supposed of meteoric origin. But it is evidently connected with the ferruginous strata beneath, and seems not to contain any nickel.

Tavoy is a very hilly province. The first range connected with the great centre belt lies about ten miles east from the town. Hence to the main range there is a succession of north and south ranges, gradually increasing in height and having very narrow valleys betwixt them. Through these valleys flow rapid streams, which, after pursuing the direction of the valleys to various distances, find outlets, and then turning westward flow through level tracks until they reach the sea. The route to the Nay Dáng Pass into Siam lies about north-east from Tavoy. I performed the

[1] ["British Burma Gazetteer" (1879), vol. i. pp. 46 ff.; ii. pp. 383–400. E. O'Riley, "Notes on the Geological and Geographical Characteristics of the Tenasserim Provinces," and "On the Metalliferous Deposits and Mineral Productions of the Ten. Pr.," in "Journal of the Indian Archipelago," vol. iii. pp. 386-401 and 724-43.]

journey to the summit of the pass in 1825, and on foot, as the road is impassable either to elephants or horses. Indeed the only paths in some places are the beds of mountain torrents. A dense jungle covers the face of the country, precluding the probability of satisfactorily pursuing geological pursuits. The tin mines lying three miles off the route were visited by me. They do not here deserve that title, as the Tavoyers merely wash the sand of the streams and collect the fine black particles of ore. The temperature of the air is found to be about 64° or 65° until eight or nine o'clock, and that of the water 68° (Fahrenheit's thermometer), so that the workmen never begin their labour until that hour. As the population does not extend beyond the first range of hills, and the mines are buried in the forest far beyond these, the men are exposed to the attacks of elephants and other wild beasts which here abound.

Other mines of tin lie on the southern coast below Tavoy, and a meagre, black, and slightly sparkling ore of antimony has been obtained from the province, but its locality I am not aware of.

Frequent vertical or inclining strata of hard slate and sandy slate are found at intervals to lie across the path; but wherever a bold cliff appears scarcely anything except granite is visible.

At Laukyen, fifteen miles north-east from Tavoy (a halting-place or circular cleared space of the forest), and lying a few hundred yards on the east of the route, my guides showed me a hot spring in the almost dry bed of a torrent.

The adjacent strata were, after many hours' labour, laid bare, and specimens were taken from the spot where the water bubbled up. The rock appears to be a transition slate, passing into limestone (for it effervesces slightly with an acid) and having thin films of pyrites betwixt the cubical portions which compose it. The water raised the thermometer to 144°. The gas which escaped was not inflammable. The pebbles around were incrusted with a calcareous salt. The water has no peculiar taste. There is a mound on the eastward of the spring, but no volcanic indications were perceived in any direction.

The great Tenaserim river was crossed in this route in a track where either perpendicular cliffs of granite or wooded hills hem it in on both sides. Its bed is strewed with large blocks of the same primitive rock. By leaping and stepping from one to the other of these, we crossed to the east bank. The breadth is here, as far as I can recollect (in the absence of my notes), about thirty yards. It is quite impassable in the rainy season. From the appearance of the stream here I should be inclined to fix its source somewhere about 15° 30′ north. The road distance to the top of the Nayé Dáng Pass is about sixty miles; in a direct line it is about fifty miles. It was found impossible to march early in

the morning owing to heavy dews and mist, and the whole day was often employed in getting over ten or twelve miles—so difficult was the march rendered by the necessity of crossing (often twenty miles in a day) mountain torrents and the streams they feed, and of ascending rugged beds of streams and ravines, where the guides were not unfrequently at fault. A considerable tract of table land was passed over during the route. The average temperature of Fahrenheit's thermometer* was at sunrise 64°, and at mid-day 74°; but it was often 72° at the former period, and 69° or 70° at the latter.

The rocks at the pass could not be well examined, owing to the thick jungle, but the surface is evidently a decomposing granite. From this elevation, which I am not inclined to rate higher than three thousand feet, four very distinct and higher ranges of hills were seen within the Siamese frontier on the east, while the lesser ranges on the Tavoy side could be easily traced.

From the view here obtained I feel disposed to allow forty miles at the least for the breadth of the whole space in this latitude, occupied by hills. The ranges are as nearly as may be parallel to each other.

In my overland route to Yé, the surface was rarely found to exhibit any other than the granite formation—quartz was occasionally abuudant.

At En-bieu, near Kalíng Aung, on the left of the road, and in the middle of a circular level spot in the jungle, is a curious hot well. It was found to be quite marshy all around, although it was visited in the hottest period of the year. It was not without difficulty that it could be reached near enough for examination, both from the heat underfoot and the treacherous nature of the soil.

The well is about forty feet in diameter. By throwing a bottle attached to a rope, allowing it to fill and grow heated, and pulling it suddenly back, the temperature was found to be 104° of Fahrenheit; but 4° more may be allowed for accidents. Not a rock or pebble could be seen near the well. A bleak on the surface, angular, sharp, and disintegrated, scraggy granitic rock lies a short distance to the northward of it.

The water has not been examined by tests. From this hot fountain down to the stockaded town of Yé, in the small province of that name, the country falls rapidly (to the south). A few detached hills are perceived at intervals, and on the east of the route a low granitic range stretches northwards, resting on the south at Tavoy Point, and to the north in Martaban province.

The low hill, on which the stockaded town of Yé stands, exhibits no peculiar features to attract a geologist—granite decomposed at the surface is most prevalent, I believe.

* The month was one of the dry ones.

On the route from Yé to Martaban I perceived in the dry beds of rivers massive strata of striated clay slate of a fawn colour. These strata are either vertical or dip at a considerable angle—Martaban and the adjoining countries would well reward the labours of a geologist. As the Burman war was being carried on, when the former was visited by me, it was not without the imminent risk of being cut off, or of being made a prisoner by the enemy, then encamped on the north side of the river, that I was enabled to explore the country up to about north latitude 18° 20′.

A hasty geographical sketch of this province may not here be altogether irrelevant, for, without some idea of the localities of a country, the future geological traveller may find his plans prove abortive.[1]

Martaban is bounded on the north by a branch of the great central range of hills dividing it from Siam. On the south it merges into the district of Yé, being divided from it by the Balamein, a narrow stream. On the east the Siamese range presents a very formidable barrier, showing at intervals peaks of considerable elevation. The highest of these was conjectured to be about five thousand feet in height. Across this wall there is only one good pass, that termed Pra-song-chú by the Burmans, and Phra Chedu-sam-ong by the Siamese, "the pass of the three Pagodas," and lying in latitude 15° 18′ N., longitude 98° 22′ 15″ E. according to Captain Grant's observation after the peace. Another but difficult pass lies directly north of Martaban. On the west it is partly bounded by the sea and partly by the provinces of Chetáng and Thám Pagú. It may be computed to contain about twelve thousand square miles.

The principal river is the Krúng Mautama (of the Peguers), or Sanlún (of the Burmans), which rises in a range of mountains to the north-west of Che-ang Mai in Laos, passes within two or three days' march of that capital, and after a turbulent course, apparently betwixt two of the inferior ranges of the great belt, disgorges itself with impetuosity on the plain just above the island of Ka Kayet, in about 18° 20′ north latitude. It is joined at the Ka Kayet stockade by the Yúnzalen river, which flows from the Haphún hills, lying in a north-west direction from hence, and which I believe to be the same which I observed from the great Shui Madú temple at Pegu, to bear as follows: the northern extreme N.N.E.; southern extreme E., ½ a part south, and about forty miles distant. But the stream was found by me to have a bar of granite across, about eight or ten miles beyond the stockade, and not to be navigable to the smallest canoes. Hence it rolls more quietly on till it disembogues itself into the sea at the Khyet Khamí Pagoda. Opposite to Martaban it may be about a mile in width.

[1] ["Br. Burma Gazetteer," vol. ii. pp. 32 ff.]

The other rivers which swell it are the Dáng Damí Kyáng, which joins it at Mahi Phrá Pagoda ; the Gyén Kyáng, which falls into it at Phrá Pyú, or the "White Pagoda;" the Attarám, or Attiyán river, which enters it nearly opposite to the town of Martaban ; the Wakrú Kyáng, which disembogues near the Kyét Khamí Pagoda ; and the Dáng Wein Kyáng, which pours itself into the Gulf of Martaban. These are all navigable far inland by large boats.

The chief hills within the province are part of the Tavai range, with its branches—one of which is divided by the Sanlún river at Malamein. It runs in low broken hills, about fifty miles north of the town of Martaban, and joins the Jeu Kyét mountains ; next a short range running across one of the upper branches of the Attarám (or Attiyán) river ; the Jeu Kyét Phra-táng, a high-peaked hill, fifteen or twenty miles to the westward of the town ; the Jogabeu-táng to the northward, and the two insulated hills called Dáng Dámí and Majin.

The numerous detached and insulated rocky hills which are scattered over the plains, and the many islands which stud the expanded Sanlún, together with the dark and towering Siamese hills in the background, produce scenery of a very impressive kind.

The ranges of hills in this province betray granite as their chief ingredient. But the detached and very abrupt rocks and hills, of elevations of from two hundred feet to eight hundred feet, which shoot up from the plain, have, in so far as examined by me, been found to be invariably composed of limestone. The limestone is in various stages, from an earthy and gritty kind up to hard marble, and the cliffs on several of them have the same marked features which the Trang and Phúnga rocks display ; being streaked with red, brown, and white, and evidently suffering a rapid decomposition. The plains on which these are based are covered generally by an alluvial soil, but in some places it is dark and porous, like the cotton ground of India. The substratum in the lower parts is commonly a stiff clay, but towards the Siamese range the soil becomes more friable, tinged with oxide of iron, or mixed with débris of rocks, and resting on gravel in large round masses. Here on the banks and on the low islands the Khyén tribes cultivate cotton, indigo, tobacco, and pulses. Potters' earth is obtained in abundance near Martaban. Of this, most of the utensils known by the name of Pegu jars, were formerly made.

On the low range of hills on which Martaban stands, granite perhaps predominates. But at the town many slaty and sandy strata, having an inclination of about 30°, here tinged with oxide of iron, there intermixed with slightly calcareous and other matters, and quartz, are observable. At Malamein a breccia is found, which has been used in the construction of the pagoda there. This substance hardens so much by exposure that it will last for ages, as it

has here done. On the high grounds, which occasionally flank the river, the surface is tinged red by iron ores.

About fifty miles by water up the Attarám river, and within about two miles of its eastern bank, stands Seinle-dáng, one of the singular limestone rocks just alluded to. About mid-day, betwixt it and the river, and on a swampy plain slightly inclined to the river, I was gratified by discovering a singular hot fountain (for it is of too peculiar a nature to be merely termed a spring). The Burmans call it "Ye-bú" ("hot water"). The orifice is nearly a circle, the diameter of which is about thirty feet. The rim is of earth, and only raised about a foot above the surface of the water. Not having been prepared for such an interesting object, I had not provided myself with a line; but the depth is no doubt very considerable. The water was so clear that the green calcareous rocks which project from the sides were quite distinct at a depth of twenty feet at least. A strong bubbling appears near the middle. A thermometer propended from a bamboo was dropped into the water, and after a space quickly withdrawn. An allowance of two degrees being made for loss of heat in the removal, the temperature by Fahrenheit's thermometer was found to be 136°, which is 12° hotter than the Bath waters.

Had any volcanic indications been observed in the vicinity, the circular formation of this well might have induced the belief that it had once been a crater. A visitor to this place ought to approach it with caution—since part of the water near the edge is covered with weeds, which so resemble the surface of the bank that a person might unthinkingly step on them to his inevitable destruction. He would faint instantly from the heat, and sink. Although the wells on the plains were all nearly dry at the period when this fountain was visited,* yet it discharged twenty gallons on the least computation in a minute, and towards the east side. The leaves and branches which had fallen near were incrusted with a calcareous deposit, and the bottom of the rivulet was covered with a flaky calcareous substance. No specimen could be obtained of the rock, as it lies far below the surface; but from the greenish hue perceived in it, we may suppose it to partake of the nature of the specimens brought from Lankyen hot spring in Tavoy. I drank some of the water and was not afterwards sensible of any peculiar effect from it. Upon subsequently examining it with the obliging assistance of a medical gentleman† at Martaban, it was found to be a chalybeate, and to contain lime in combination with some other earth or earths. The tests are enumerated below.‡

* I was favoured on this occasion with the company of Lieutenant George, M.N.I., and Mr. Adams, of the Marine Service.

† Mr. Brown, A.S., M.N.I.

‡ 1st. Tincture of catechu precipitates a dark brown substance; hence the presence of iron is inferred.

This fountain lies on the route to Siam, and from many cocoa-nut trees scattered about, it is evident that though now a jungle, the plain once supported a numerous population. Near Yé, on the sea-shore, there is a pond to which the Burmans ascribe marvellous virtues. It is said to grow quite red occasionally. Probably iron ores are abundant there.

Betwixt this place and Malamein, on the east bank of the same river, stands the very majestic lime rock Phabaptaung, the base of which is washed by the stream. It has been perforated quite through by a rivulet. The limestone composing it takes a fine polish, and large stalactites depend from the roof of the grand arch overhead. It, like the rest of the rocks examined, shows no traces of organic remains.

In rowing up the Sanlún, or main river, the first objects which attracted my attention were the Krúkla-taung rocks, being a continuation of the great lime formation. The river at one spot is hemmed in betwixt two rocks, and being thus narrowed rushes through with considerable impetuosity. The rock on the north-west bank overhangs its base, the latter being washed by the river. On a sharp and one should suppose almost inaccessible pinnacle, a small pagoda has been built, producing a pleasing effect to the eye of a distant observer.

The cliff I conjectured to be two hundred and fifty feet high. On that front facing the river some niches have been cut in a pyramidal space, and in these stand many painted and gilt alabaster images of Buddha. A narrow opening leads into a magnificent cave, which has been dedicated to Buddha, since many large wooden and alabaster images of that deified mortal were found arranged in rows along the sides of it; the wooden images were mostly decayed through age, and had tumbled on the floor. The rock consists of a grey and hard limestone. The cave bears no marks of having been a work of art. The Burman priests, who inhabit a village on the opposite bank, could not afford me any information respecting it. No inscription was discovered on the rock. It is rather a singular circumstance that no Balí or other inscriptions on stone of any antiquity have been discovered in the Indo-Chinese countries; and it is the more particularly so as regards Burma, where the natives have (with reference to their semi-barbarous state) attained to a very respectable degree of pro-

2nd. It does not blacken paper dipped in a solution of lead.

3rd. No precipitate is caused by dropping into the water a solution of nitrate of silver.

4th. When mixed with a solution of turmeric (in equal proportions), no sensible change of colour is induced.

5th. When mixed with an equal quantity of lime-water, a light white precipitate is formed, which does not effervesce with muriatic acid.

6th. The concretion found on the leaves and common pebbles effervesces strongly with muriatic acid, indicating the presence of lime in the water.

ficiency in sculpture. The bells of their temples have generally inscribed on them some pious sentences, and the name and titles of the person who bestowed them.

The only inscription observed by me was that which Alongphra, or Alompra, caused to be engraved on a marble slab which stands under a shed at the great Shui Madu temple at Pegu. It records his valorous exploits and pious disposition. The alabaster of which the Burmans form their images is only procurable within the proper Ava territory. The Prapatha, or Prabát, is an engraving often found on granite slabs at temples, and is intended to represent an impression of a foot of Buddha. They contain many emblems, most of which are obscure, and only to be made out by the help of a Phúngí, or priest of Buddha. The Martaban Phúngis could not inform me when Buddhism was introduced into Martaban; but from several circumstances it should seem that the country was only settled about A.D. 1286. From an attentive examination of such Balí MSS. as have come into my possession, I am quite disposed to conclude that the Buddhist religion reached the Indo-Chinese nations progressively from Ceylon; and that the Balí language, as now used amongst them, however varied the alphabets may be in which it is written, is identically the same with that employed by the Cingalese priests of Ceylon. This last approaches so very closely to the Pracrit that it becomes doubtful which is the elder language of the two. A comparison betwixt them would show which is the direct derivative from the Sanscrit.

Above the rocks described the river flows through a rich alluvial country, thinly inhabited by tribes of Khyens, or Karians. These people carry on a bartering trade with the traders of Martaban. They treated me with as much hospitality as their situation admitted of. They are generally a fine race of people—athletic, and of much fairer complexions than the Peguers and Burmans. Their whole deportment favourably contrasts with that of these two races.

They live independently, keep dogs for the chase, cultivate cotton, weave it into cloth, and dye it with indigo raised by themselves, and they are very comfortably housed. They change their ground every two or three years. I met a whole tribe in rapid progress down the river. They gave as a reason that the cholera (which seems from time immemorial to have prevailed in the jungly parts of these regions) had swept off so many persons that they had been obliged to abandon their village and seek a new abode. Opposite the small Khyen village of Míchantaung, which lies on an island, is a singular rocky hill; the base of which is washed by the river. It may be six hundred feet high, and it has a black and scorched appearance. It is almost bare of grass, and there are only a few trees on it. These grow in the hollows and

crevices. It might be taken for basalt or granite at a short distance, but on a close inspection is found to consist of a black limestone, breaking off into cubical fragments. The ascent is abrupt and difficult, and the tread of the feet is succeeded by a hollow sound as if the hill was but one vast catacomb. Several pits, having circular orifices and of about three feet in diameter, were observed in the ascent. They are of considerable depth, for stones thrown into them were heard for about twelve seconds rebounding in their descent to the bottom. On looking down these I noticed large fungus-shaped stalactitic masses hanging from the sides. Near the summit of the hill, the ridges of the rock are so angular and sharp that scarcely one of my people escaped being badly wounded in their feet.

From the top a most pleasing and extensive view was obtained of the surrounding country, and the bearings of remarkable objects were taken. On a bleak ridge, about two hundred yards from where we were, a wild sheep or goat was observed. This animal's colour is nearly black, and the hair shaggy. Several balls were fired at it without effect. The natives said that this species was only occasionally to be met with; but as they had never seen a sheep it could not be ascertained from their accounts whether the animal we saw was of the goat or sheep tribe. I may here observe generally that the wild animals and birds found in the countries we have just been going over are chiefly the following: elephants, which are very numerous; the rhinoceros, which Malays, Burmans, and Siamese dread more than they do the elephant, owing to its savage temper; the bison, which is found of a very large size in Thedda, the head being of a fawn colour; the wild ox, of the size of a large buffalo, and also a species resembling in every respect the domestic ox; the buffalo, the royal tiger, the leopard, bears (but very rarely seen), tiger-cats, about the size of a fox; leopard-cats, having very beautiful coats and being about the size of a common cat, but more slimly formed; the fox-cat, with tiger stripes, and which is destructive to poultry—this animal lives in dens, but it climbs trees in search of prey.

The elk and various kinds of deer are abundant. Baboons, asses, sloths, opossums, flying and other squirrels, chameleons and other varieties of the lizard tribe, various species of the tortoise, alligators, and guanas, are very numerous. In Tavoy the natives keep packs of large dogs, with which they run down deer. These dogs run by sight, and they are regularly kennelled. The breed seems peculiar. I observed a dog at a remote village in that province equal in size to a Newfoundland dog.

Wolves, or wild dogs (for I had no opportunity of judging which), are found in the forests. No jackals or common foxes have yet been discovered, and it is believed that they do not exist below the latitude of 19° north. Many kinds of tortoises, as

before observed, and river turtle, were seen by me. The natives, especially the Karians, train dogs to search for them, as they form often a chief article of their food.

The birds are—white sea-eagles, white land-eagles, hawks of various species, vultures, and kites.

The peafowl here exhibits a brilliancy of plumage which far excels that of the Indian one. It is also a larger bird. There are at the least four elegant varieties of the pheasant tribe; also quails in abundance, and several kinds of partridges, of which the green, with a red tuft, and the blue, are most conspicuous. There is likewise a jungle cock, having a rich blue and reddish plumage, and nearly twice the size of the common jungle fowl. He is well armed with two long spurs on each leg. Pelicans and the usual tropical water-fowl abound. A perfect species of duck, having a blackish back and whitish breast, and the weight of which is nearly double that of the common duck, is very common.

Leaving the Míchan-táng and proceeding up the Sanlún river, the low rocks observed on the banks exhibit coarse black limestone. The high cliffs further removed show the more advanced stage of the lime formation. At Ka Kayet stockade, close to the hills, the granite again begins; and here were found scattered about smooth quartz and other pebbles of several pounds in weight, which had been used after their ammunition had failed by the Burman garrison when defending themselves from the attacks of the Siamese. Baskets full of these pebbles were arranged along the palisade inside. Several specimens of regularly crystallized quartz were here picked up.

The "Khyen Ní," or "Red Karians," who inhabit the jungly hilly tract stretching from this place in a northerly direction are of a very savage and warlike disposition. They use thick buffalo-hide for armour, and fight with spears and poisoned arrows. The climate of this province is temperate. At Martaban during the rainy season, which is not the coldest, the following average was taken from a series of notes on the state of the thermometer:—

	Average of Fahr. ther. 7 A.M.	4 P.M.
Fifteen days in May	78	82
Twenty-five days in June	72	73
Forty-two days, from 1st July to 14th August	77	80

The geology of Ava is little known, nor has any one of the many who accompanied the troops up the Irawadí favoured the world with a connected sketch of the rocks observed on its banks. That the lime formation will be found to extend up to Asam there is every reason to believe from the accounts received, and since it is known that carbonate of lime in shape of the finest marble, and also alabaster in a pure state, are very common in the country, thus countenancing the position taken up in another part

of this paper, that the lime formation gradually becomes more compact and pure as it bends to the north. Dr. Hamilton observes that "at Prin he saw part of the chain of hills which forms the northern boundary of Pegu, and that there sandstone and limestone were observed in flags. In Thaumpe, a Shan district, they have lead, iron, tin—some silver it is said, and limestone.

From all that has been here stated it should seem that granite forms the basis of all the continuous ranges of hills on the coast I have described; that a bold and marked lime formation runs parallel to these ranges, but that this is occasionally interrupted, as far as can be judged of from an examination merely of the surface; that schist is of very frequent occurrence; and that tin, in shape of an oxide, and invariably associated with the granitic hills, or formed in their vicinity (and supposed to extend up to N. lat. 20°, if not beyond it), and iron in various states of combination, are the principal metals throughout this wide range.

I have only now, in conclusion, to express a hope that this rapid and very imperfect geological outline may at some future period be filled up by a more able hand than mine.

XV.

SHORT SKETCH OF THE GEOLOGY OF PULO PINANG AND THE NEIGHBOURING ISLANDS.

By T. Ward, Esq., *Assistant Surgeon, Madras Establishment.*

["Asiatic Researches," vol. xviii. (1833), part 2, pp. 149–168.]

The geographical situation, the extent and general appearance of Prince-Wales Island are well known, and it will not be necessary to dwell upon them here, more especially as they are included in the accompanying map.[1]

Pinang may be described as being formed of a group of hills occupying about two-thirds of its extent, running through its centre from north to south, and having a plain on its eastern and western sides. The hills, thickly covered with lofty forests on all sides, seem at first sight so irregularly grouped as to defy all

[1] [As the map, together with the sections, has been reproduced in the first volume of Newbold's "British Settlements in the Straits of Malacca," a work generally accessible, it has not been thought necessary to give it here.]

arrangement; but on more accurate examination they may be divided into three principal chains, commencing at the north, gradually approaching towards the south, where they form one narrow barrier between the two sides of the island, branching off at last along its southern extremity at right angles east and west. The middle chain, including the western hill and Mount Elvira, is that of greatest elevation, being about two thousand five hundred feet above the level of the sea. They are all loftiest towards the north, decreasing gradually as they advance southward. Between the terminations of the chains towards the north are deep bays and sloping valleys filled with alluvial deposit. The greatest diameter of each hill is from north to south. The general outline is rather blunt and ridged, presenting no very bold peaks or points. Some of the lower hills are obtusely conical. Besides the principal groups above described, there runs a small chain parallel to the east coast of the island behind the nutmeg plantations at Glugor, of an elevation varying from six hundred to eight hundred feet, uniting with the great range near its southern extremity. There are also some isolated hills along the coast, the principal of which are Mount Erskine, Mount Olivia, and Mount Albina.

The valleys are not deep; few of them have very abrupt, and none precipitous sides. The whole group, or rather series of chains, is so closely covered with forest that not a bare spot is visible, except where the industry of man has been exerted. The height is not sufficiently great to produce much effect upon the nature of the vegetation; but small as it comparatively is towards the summits, the palms and ferns increase in number, and the forest in general becomes more stunted, though even on the highest point are to be seen some magnificent timber trees. An arborescent fern of great beauty, rising to the height of from fifteen to twenty feet, is met with only on the great hill at a considerable elevation.

The soil of the hills is a reddish light sandy clay from the decomposition of the granite composing them, the process of which may be seen going on wherever roads have been cut below the surface. It is seldom more than eight feet in depth, most frequently less, and the vegetable mould above it is from six to twelve inches. There is little gravel and no fragments, except occasionally of quartz, probably from exposed veins.

The whole of the group of hills, and indeed every rocky or elevated part of Pinang, is composed of granite. No other mountain rock occurs in immediate connection with it. It varies in grain, in colour, and occasionally in the proportion of its ingredients. It is everywhere traversed by veins of quartz and quartz-rock, which are often of large size. Commencing at Fort Cornwallis and going round the island, first to the north, we find the

following varieties:—At Pulo Ticoose Point, where the beach is rocky and composed of immense fragments, it is of a fine grain and grey colour, as in specimen No. 54. At Batu Feringí, where a small stream forms a magnificent waterfall and a great mass of rock is exposed, the granite, of rather coarse grain (No. 1*), is traversed by a vein of quartz rock (No. 2) resembling primitive sandstone, very hard and from two feet to two and half feet in breadth. In it the stream has formed numerous tube-like cells, some of them two or three feet deep. I have seen some fine specimens of colourless rock-crystal containing crystals of schorl, which were collected here, but I had not the good fortune to meet with any on my visits. At the east point of Tuloh Bohang the granite is grey and coarse-grained (No. 3). At the west point of it it is of a fine grain, and of a slightly greenish colour. On the beach, to the west of Kúcha Múka, a small village on the north side of the island, among the rolled masses of granite, are some with beautiful veins and imbedded crystals of quartz, and prismatic crystals and amorphous portions of hornblende? (No. 5). Specimens of these, of good size, were with difficulty broken off; and indeed, to show them in perfection, it would be requisite to carry away the rolled masses entire. No. 6 is a specimen of the granite found opposite Saddle Island, of moderately fine grain, and containing a large proportion of mica. On the south-west, the granite, containing a large proportion of felspar and quartz, is nearly of a whitish colour (No. 16). At night, from reflecting the moon's rays, it is observed to glisten at the distance of more than a mile. Imbedded in it we found a globule of fine-grained black granite containing abundance of mica (No 17). The whole of the south side of the island is composed of a coarse brownish granite (No. 18). On the south-east point, opposite Pulo Rimau, it occurs again of a grey colour (No. 19). These different varieties, found along the coast, occur also in the body of the mountains, and it has therefore been considered unnecessary to transmit specimens taken from the interior.

The east and south-west plains† are entirely of alluvial formation, probably in great measure formed by the detritus of the mountains washed down and collected through the lapse of ages. At first sight, of the east plain particularly, which juts in a triangular form into the narrow strait between the island and the Quedah coast, and on which are built George Town, the Fort, the various public buildings, and the habitations of the English residents, the geologist is impressed with the idea that the sea

* The figures throughout refer to the numbers of the specimens herewith sent.

† Some of the following remarks on the plains, rivulets, water, &c., have already appeared in my "Contributions to the Medical Topography of Prince of Wales' Island," printed by the Pinang Government.

must have at one time covered it and washed the base of the mountains. This is confirmed in some measure by the phenomena observable on the opposite shore of Quedah, where Captain Low has traced the successive deposits of alluvial matter for several miles inland, and the gradual retirement of the ocean indicated by ridges running parallel to the present line of coast. The process of conversion of such a hard material as granite into alluvial matter is distinctly seen on the road to the Great Hill in the small valley between Mount Olivia and the Highlands of Scotland. The precipitous bank, about sixty or seventy feet in height, presents a mass of red clayey sand, used generally in lieu of gravel for repairing the roads, which is merely decomposed granite as seen in specimens Nos. 55 and 56, taken from the spot. Notwithstanding this alluvial origin, no organic remains, not even shells, have been found hitherto imbedded in any part of the valley. Query—may not this be accounted for by the small number of animals which inhabit the island, and by the paucity of shells now in existence along the coast? The indigenous animals are principally birds and insects, and on two tours round the island I did not discover in all one hundred shells on any part of it.

The soil of the valley is various. Near the point it is sandy, with a surface of about four inches of vegetable mould from decayed leaves and branches of trees. In advancing about a mile into the interior the ground begins to rise, and the superficial stratum is also a light vegetable mould, about a foot in thickness, resting on the sand. Near the foot of the mountains the soil becomes rich in many places, and beds of white clay resembling fullers' earth are found here and there, more especially in Pulo Ticoose Bay. In those parts of the island near the sea-coast, which are generally overflowed and thickly covered with mangrove (*Rhizophora*), the soil for a foot in thickness is a rich black mould. Throughout the island it is light, and in most parts is composed of clay, with a large portion of sand, which renders it very porous.

Water, generally speaking of good quality, is to be had in almost every part of the island by digging a few feet below the surface. In some places it is slightly brackish; in others it is tainted by passing over the decayed roots or leaves or branches of trees; and sometimes it is mixed with the clayey particles of the soil over which it runs. There is no large river in the island; the several rills from the mountains collect into two or three rivulets which traverse the valley in different directions. Their beds are sandy; the water pure as crystal, and of excellent quality, unimpregnated with any deleterious ingredient. I am not aware of the existence of any mineral water in the island.

Stream tin has been found near Amee's mills, at the east foot of

the great hill, and at Batu Feringhee, on the north side of the island, washed down from the containing veins, which have not yet been discovered. Indeed, the immense mass of vegetation, which so closely covers the island that scarcely an exposed portion of rock can be found, renders it extremely difficult to trace them. At both of the above-mentioned places the tin was collected for some time, but the works were given up, as the quantity was not sufficient to cover their expense.

Round the island are extensive mud-banks, which on the north and east sides especially are left uncovered at low water. On the north-east side of the tongue of land forming the valley, from Pulo Ticoose Point to Fort Cornwallis, extensive changes have taken place within the last twenty years. Between the outworks of the fort and the beach there was formerly a space of about one hundred yards occupied by a row of cocoanuts, and a walk along the beach. Now the sea washes the very walls, which are in part destroyed by its encroachments. The houses on the beach also for some distance are endangered by the same circumstance; the banks have been rapidly diminishing, and the strongest bulwarks of stakes and stones are necessary for their protection. In Pulo Ticoose Bay, on the contrary, the sea has been retiring; the mud-bank is daily increasing, and the mangrove has been gradually extending itself. It is too likely that some years hence the bay may be entirely filled up. These changes are probably owing to the tides setting in strongly from the northward and westward. Pulo Ticoose Point protects the bay from their action, which is exerted in full force upon the fort point, or Tanjong, as it is called by the natives.

The sand along the coast round the island is generally whitish and pure; in some places, however, more particularly on the north side, it is nearly black from the intermixture of numerous small particles of mica.

So much for Pinang itself. We now proceed to the neighbouring islands, commencing with those to the northward.

I. Pulo Ticoose, or Rat Island, is merely a barren rock of white granite, with a few large canes. It is about a mile from the north-east point of Pinang, is of small extent, and offers no geological phenomena of any interest.

II. The Boontings are four small islands to the north of Pinang, arranged in a semi-circular form, the nearest being about fourteen miles, the farthest about twenty-five from Fort Cornwallis. The most remote one, from a fanciful resemblance to a *femme enceinte* lying on her back, has received from the natives the name of Boonting, a Malay word signifying "pregnant." In connection with this idea the other islets have derived their appellations. That nearest Pinang is called Beedan, or "the midwife;" the name of the next is Panghil, or the messenger sent to call

her; and behind it is Sonsong, or the companion of the messenger.

(1) Pulo Beedan, or Bidan, is about a mile in length and three-fourths of a mile in breadth, of an elliptical shape, with a bay on its southern side. It is thickly wooded, the trees as usual coming in most places down to the water's edge. It may be noticed here, once for all, that this circumstance offers an obstacle to the complete investigation of the geological structure of the island round Pinang, as it does of Pinang itself in some measure. The interior cannot be penetrated, and were it even possible to do so, the closeness of vegetation would shut out all view of the rocks. The observations are thus necessarily limited in most instances to the coast. The beach, on Pulo Bidan, near the south-east point, is composed of an argillaceous rock resembling greywacke, both lamellar and conglomerate, irregularly intermixed (Nos. 41, 42). This seems to dip at a considerable angle to the west; it is entirely covered at high water by the sea, and the outgoings or crop of the strata form sharp ridges more or less elevated. Rolled masses of ironstone (No. 43) are found on it of various sizes. On the argillaceous rock rests a mass of limestone stratified, the strata dipping to the south-west at an angle of 45°. It is of a bluish-grey colour (No. 40), and at first sight seems to have a slaty texture. The colour of some of the strata is nearly black. They are everywhere traversed by veins of quartz and calcareous spar, irregularly intermingled. The whole island seems to be composed of the same material.

(2) Pulo Panghil is a small rather elevated island, about two miles to the northward of the preceding, and celebrated for its turtles, which lay their eggs in the sandy points and bays. The coast is covered with smooth round stones of argillaceous matter, probably rolled over from Pulo Sonsong; but the body of the island is composed of the same kind of limestone as Pulo Bidan (No. 45). In Turtle Bay, at the distance of ten or twelve yards from the main body of the island, some isolated strata of grey marble* (No. 44) of fine grain, and highly crystallized, dip at an angle of little less than 45° to the westward.

(3) Pulo Sonsong is about three miles to the northward of Pulo Panghil; a mile and a half in length and about one broad at its southern extremity. At the landing-place, a small sandy point, we observed some masses of coral rock close to the beach; and the whole coast was covered with broken pieces of white coral thrown up by the waves. The island is rocky and bold all round, and as usual thickly covered with wood. The rock

* This is well adapted for architectural purposes, and is fully equal to that brought from China at considerable expense. I am not aware that its existence in the neighbourhood was known heretofore.

(Nos. 46 and 47) is entirely argillaceous, running in regular strata at an angle of more than 65°, and dipping to the eastward. On the beach it presents more of the schistose or lamellar structure (No. 46), and is everywhere traversed by veins of quartz (No. 49), with a coating of a black substance (metallic?). On the south and east sides, and apparently forming the lower strata of the island, the rock is of a reddish colour and soft (No. 47). On the west side, which is particularly bold and precipitous, it is of a bluish-grey colour, soft and silky in some places, presenting the slaty texture (No. 48), but not splitting into thin lamellæ as regular clay-slate does. On this side are numerous caves; and the precipices crowned with lofty trees, the immense fragments of rock, the dashing of the waves against them, and the hollow sound of the water rushing into the caverns, have all an imposing effect on the observer.

(4) Pulo Boonting, about four miles north of Pulo Sonsong, is of nearly oval shape, thickly covered with wood, about one a half mile long and one in breadth at its broadest part. It is precipitous only on its north-west side; in all other places the forest comes close down to the shore. There is the channel of a mountain torrent on the north side choked up with large fragments of rock, at the foot of which is a spring of excellent water. The rocks are entirely granitic, the felspar of the granite being in a state of decomposition (No. 50). Large veins of quartz, in some places highly crystallized, traverse them in all directions (No. 51). Among the rolled masses of the channel above mentioned are specimens of a greener granite approaching to primitive greenstone (No. 52); and on the beach were found a few pieces of black limestone (No. 53), probably conveyed from Pulo Beedan or Sonsong.

Round the whole of the Boontings the sea is beautifully clear, and the coral beds are distinctly visible at a considerable distance below the surface of the water. The only one inhabited is Pulo Bidan, in which live, in huts of miserable construction, about twenty Malays engaged in catching and drying fish for the Pinang market. In sailing round these islands we had a magnificent view of Quedah peak, or Gunong-jirai, on the mainland, which rises to the supposed height of five thousand feet. Its composition, I am informed, is entirely granitic; its outlines are bold, sharp and pointed; the sides are steep, rising rapidly from the base; and it presents one immense dense mass of vegetation, unbroken save here and there by a few precipitous white crags. By the aid of the glass we discovered the channel of a mountain torrent, which, in the rainy season must form splendid cascades in its course. It has never been ascended by Europeans, and so great is the jealousy of the Siamese Government, in whose territories it is, that it is not likely it ever will be. The whole of the coast below it seems one

flat uncultivated plain covered with mangrove, extending a considerable way inland.

III. Pigeon Island, situated near the southern extremity of the west side of Pulo Pinang, is of small size and thickly covered with jungle. The rocks at the base, from the action of water, present some most fantastic forms; now like a huge wall standing apart from the rest; now like a martello tower; and sometimes like a piece of Hindu sculpture from Mahabalipúram, or the caves of Elora. It is entirely composed of coarse grey granite, with a large proportion of mica (No. 6).

IV. Saddle Island, or Pulo Kundit, about two miles distant from the south-west point of Pinang, is about two miles in circumference, being three-fourths of a mile long and one-fourth broad. Like all the other islets we visited, it is thickly covered with jungle and a few forest trees. On its north side these approach within a few feet of the water. The south and west sides are bold and rocky, the rock in some places being nearly perpendicular, and on the west side there is a deep bay where several prows might lurk in safety. All round are numerous caves and cave-like fissures into which the sea rushes with a hollow sound. The constant action of the water has so much worn the rocks close to the edge, that they present at first sight the appearance of lava. At low-water mark a great quantity of coarse coral is to be found, which is collected and removed by the lime-burners in lieu of limestone. The geological structure of the island resembles that of Pulo Sonsong, formerly described. It is a mass of argillaceous schist of various colours, according to the greater or less action of the weather, but principally grey, bluish, and red; amorphous in many places, but presenting a laminar and even fissile slaty texture in some, especially on the east side. It is distinctly stratified throughout, the strata running north-west and south-east at an angle of about sixty degrees. Near the beach on the east side the out-croppings of the strata, as on Pulo Sonsong, form sharp ridges; the rock is soft and of a reddish colour (No. 8), traversed by veins of quartz and of a metallic matter (?). In some places the veins appear to be of quartz, mica, and chlorite blended together (No. 9). The body of the rock on this side, above the red material, is an amorphous greywacke-looking substance, resembling old sandstone (No. 7). Above this again is the more slaty-looking rock (No. 12), resembling clay-slate. On the south-east side it seems entirely composed of the red argillaceous rock above mentioned (Nos. 10 and 11). On the south-west and west sides of the island, from the precipitous nature of the coast, the structure is easily noticed. The rock is entirely like clay-slate (No. 12), presenting more or less of the laminar structure, slaty in some places, as marked in No. 15. In some parts there is a bending in the strata similar to that some-

times observed in gneiss; thus the rock is traversed by veins of quartz of about three inches in breadth (No. 13), and of a substance like ironstone (No. 14) which also runs in thin laminar beds through the slates. In the rolled masses, near the beach on the east side, are observed portions of indurated clay, tinged with chlorite.

V. Pulo Rimau is situated at the south-east corner of Pinang, from which it is distant about three-quarters of a mile. It is of an oblong shape, about a mile in length and one-third of a mile in breadth; bold and rocky except on the north side; covered as usual with wood, and composed entirely of grey granite of a fine grain (No. 20). On the south side the rocks are rather fantastically shaped. One at a distance exactly resembles the gable of a house. They were all exceedingly hard, and with a good-sized hammer I could with difficulty break off specimens of proper size. Near the centre of the south side of the island a curious appearance presents itself. Veins of from one and a half to two feet in breadth of quartz rock (Nos. 22 and 23) traverse the granite in different directions. The walls of the veins are of a red colour and finely crystallized (No. 24). The granite is more compact and finer-grained, as if compressed by the quartz rock while in a semi-fluid state. Veins of red granite and bed-like masses of it are observed in the neighbourhood (No. 21). In the old stockade on the north side we saw a rolled mass of primitive greenstone (No. 25), probably part of the ballast of some vessel, as none like it is to be found *in situ* near Pinang.

VI. Pulo Jerajah is the largest and loftiest of the islands round Pinang, from the east coast of which it is distant about three-quarters of a mile. It is about two and a half miles in length, and nearly a mile in breadth at its broadest part. Its greatest height is at its north end, where the hill is between three hundred and four hundred feet above the level of the sea. It is entirely composed of fine grey granite with a small proportion of mica, and is of no interest in a geological point of view. The soil is a fine red clay, and the trees grow to a great height with remarkably luxuriant foliage.

VII. Pulo Kra. Two islands close to the main land of the Malayan Peninsula, near Batta Kawang, are so named; they are separated from each other by a narrow channel. Each is about a mile long and about four hundred yards in breadth, rather lofty and thickly covered with wood. Their geological structure resembles that of Saddle Island above described, distant from them fully thirteen miles, with Pulo Rimau, of granite formation, between them. The principal rock of the northernmost Pulo Kra is a kind of argillaceous schist, which is of a laminar structure, and disposed in strata dipping at an angle of about forty-five degrees to the south-east; traversed by veins of quartz with

a crust, apparently of metallic matter, running down in long black perpendicular lines along the face of the rock, occasionally crossing each other in a network fashion. It is of various colours and consistency, probably as it has been more or less subjected to the action of the weather. It is sometimes greyish white (Nos. 27, 28 and 31), sometimes reddish (No. 30), sometimes blue, more or less deep (Nos. 26 and 29). Everywhere it presents the laminar structure, and splits into tables when struck with the hammer. The veins vary from half an inch to one and a half inch in thickness, and the quartz in them seems to be broken in pieces, between which is observed a metallic (?) crust (Nos. 32 and 33). The beach is stony and clayey, different from that of the granite island, which we invariably found either rocky, sandy, or gravelly. At low-water mark the quartz veins form a curious cancellated appearance. The softer rock between them having been destroyed by the action of the water, they rise in sharp lines considerably above the level of the clay, and are in some places scarcely passable without danger of having the feet cut or bruised. Beds and rolled masses of ironstone were seen along the coast, near the north-west corner more especially; the former dipping at an angle of about 52°. The rolled masses are of considerable size, some being twelve or fourteen feet high and as many in breadth, looking at first sight like volcanic rocks from their burnt and cancellated appearance. They are formed of a kind of jaspery iron-ore containing numerous drusy cavities, coated with semi-globular crusts of chalcedony and yellow ochre, some of the specimens of which are very beautiful (No. 34). The specific gravity of it is 3,000. It strongly resembles in all its characters the mineral substance described and figured by Mr. Sowerby in the fifth volume of his "British Mineralogy," page 173, tab. 494, under the name of "Burnt Rock." No. 35 represents another ore of iron of specific gravity 3,640, found also in rolled masses on the coast, from which that valuable metal might be obtained in abundance. In some places, by the action of the water, the softer ironstone has been converted into a fine yellow ochre, which might be used in painting. The whole of the west side of north Pulo Kra is rather bold and rocky, in some places even precipitous; and here and there are deep caves. Along the shore are found numerous sea slugs, or Holothuriæ, and the beautifully polished and variegated Cypræa shell, besides coral and sponges of various kinds. Near the centre of this side, about one hundred yards from the shore, is a small detached rock, resembling at a distance the ruins of an Indian pagoda, entirely composed of a soft red clay impregnated with iron (No. 37), similar to what is called Gerú by the natives of India, and which, like it, might be used as a coarse paint. The lowest stratum of the southernmost Pulo Kra is a very hard compound

rock, which for want of a better appellation I have called grey-wacke, composed seemingly of quartz and felspar, very compact and of a blackish-blue colour, traversed by numerous veins of quartz, large and small, in every direction (No. 38). The upper rock is the same argillaceous schist as that composing the northern-most. This structure is well seen at the south-west point of the island.

Batta Kawang, on the mainland, less than a mile across from Pulo Kra, is composed entirely of granite. It is a hill about two hundred and fifty or three hundred feet high. Behind it are extensive sugar plantations. The soil is a fine rich clay mixed with sand. On the east side of the hill beds of potter's clay occur, from which the coarse conical pots used in the manufacture of sugar are made. The small hills along the coast of the main-land opposite Pinang are, I understand, entirely composed of granite. On this subject, however, I shall not enlarge, as Captain Low has already published an account of their structure in the first volume of the "Transactions of the Physical Class." For the most part the ground is alluvial, and, as stated by Mr. Fin-layson in his account of the Mission to Siam, in some places resembles peat-moss.

Such were the observations which I made on two tours round this island, in which every part described was carefully and minutely examined. Specimens of the rocks accompany, which speak for themselves. I am unwilling to obtrude my crude remarks on the Society, but I think the formation round Pinang will be found entirely primitive, though some of the rocks have very little of the appearance of that class. The total absence of organic remains of any kind, the great inclination of the strata, and their immediate connection with granite, I think, led to this conclusion. The accompanying geological sections will exhibit at one view the succession and arrangement of the strata. In the direction south and north from Pulo Rimau to Pulo Boonting, a distance of thirty-five miles, we first find granite, then limestone resting on argillaceous rock, then argillaceous schist, and again granite. In the direction from west to east, from Saddle Island to Batta Kawang, a distance of fourteen miles, we find argillaceous schist, then granite, then argillaceous schist, and again granite.

Should the investigation not prove valuable in a geological point of view, it has at least extended our knowledge of the resources of Pinang by the discovery of the existence of two valuable mineral substances—limestone, including marble and iron ore, which, should this station ever recover its former importance in commerce, may be of considerable utility.

PINANG, *October* 18, 1831.

SUPPLEMENTARY NOTE ON THE GEOLOGY OF THE ELEPHANT ROCK, IN THE QUEDAH COUNTRY.

During a visit which I made in November last to the capital of Quedah I had an opportunity of examining a remarkable rock, called by the natives Gunong Giriyan, but better known by the name of "the Elephant," given to it by navigators, by whom it is reckoned an excellent landmark. As it has not been hitherto described, and as it is in some measure connected with my former paper, I hope the following brief description of it may not be uninteresting to the Society.[1]

The country north of Quedah peak is an immense plain nearly level with the sea, covered near the coast with rising mangrove, with a very gentle elevation, and bounded to the east by a small chain of hills about from sixteen to twenty miles inland. The breadth of the belt of mangrove along the coast varies from half a mile to a mile. This is succeeded by a narrower one of ataps, behind which the country is richly cultivated, laid out in rice grounds, broken every two or three miles by natural boundaries of forest left most probably when it was originally cleared. The soil is a rich whitish clay mixed with sand. From the above described plain, at a distance of about six miles from the sea, and about twenty-four in a northerly direction from the northernmost Pulo Boonting, rises abruptly the Elephant rock; no hill or other elevated spot being within several miles of it. It is of an oblong shape, apparently about a mile in length from north-west to south-east, and half a mile in breadth, presenting on every side bold and craggy precipices between three and four hundred feet in height; lofty columnar and needle-like masses being here and there detached from the main body and shooting up like the spires or turrets of a cathedral. The top is closely covered with wood, which also rises in some places half-way up the precipice, showing the grey or purplish rocks in contrast with the foliage, and adding much to its beautiful and romantic appearance. The ground in its immediate neighbourhood is a complete swamp, in which grow a variety of marsh plants which were at this time in flower. A belt of cocoanuts, plantain, betel-nut, and fruit trees of various kinds extends all round it, and conceals the huts of the Malays, which appear to be numerous. A deep ditch, either artificial or natural, surrounds the whole, and renders the approach to the rock extremely difficult even to elephants, with which the Rajah of Ligore has kindly furnished us.

It was the object of our guides to show us the caves with which the rock abounds, and which when Quedah was of greater

[1] [Newbold, l. l. vol. i. p. 403.]

consequence than it now is made it a place of common resort for the natives, more especially the Chuliah visitors, who seemed to have looked upon it with some degree of religious veneration. We succeeded in crossing the ditch, the elephant sometimes being nearly up to the howdah in mud, and having passed through the cocoanut grove found ourselves near one of the caves. It was not deep, and was formed merely by the overhanging of the rock. We knocked off some specimens here, and found it to be lime-stone, close-grained, of a dark smoke-grey colour (No. 1). In some places the grain was coarser, the colour deeper; sometimes brownish with minute veins of calcareous spar running through it (No. 2). Numerous stalactitical masses of a dirty white colour and of immense size hung from the face of the rock and from the roof of the cave, and when struck with a hammer gave out a peculiar hollow ringing sound—specimens of which will be found in No. 3 of the series.

Near to this cave there is another, not very deep but of immense size, the light penetrating at top through an opening apparently half-way up the precipice. Between these two, extending along the base of the rock for some distance, rising a few feet above the surface of the soil, and resting on the limestone, is a bed of reddish-yellow cellular calcareous breccia, containing small angular portions of a deep red argillaceous substance resembling that composing Pulo Sonsong formerly described, along with small shells and pieces of coral (Nos. 4, 5, and 6). In No. 4, near the label, is a distinct impression of a fossil shell, apparently a species of cirrus (?), and on attentive examination with a magnifier others much smaller are readily discovered. We saw the breccia only in this spot; but as we found it impossible from the swampy nature of the soil to walk along the base of the precipice it may exist in other places which we did not visit.

The third cave we came to is somewhat further to the north-ward. It is of splendid extent, apparently one hundred and fifty or two hundred feet in height. The entrance is low, but we ascended a steep slippery road covered with brown calcareous earth, about sixty or seventy feet, at the top of which are numerous stalagmites, one in particular of a large size, perfectly white and resembling at a distance a full-length marble statue standing on a pedestal. The top of one of a smaller size forms No. 7 of the series. From this point the cave branches off in several directions. The torches cast a lurid glare over the nearer walls, occasionally showing stalactites hanging from the roof; but the darkness of the more distant passages was impenetrable. So far as we could see, the roof and sides were very irregular, the latter being rugged and precipitous.

The fourth cave is situated apparently at the north-west end of the rock. I say apparently, for not having a compass with us we

were obliged to guess in what direction we went, and on that account I cannot be so correct as I could have wished to be. In our way to it, at the foot of a detached limestone rock at an elevation of from eight to ten feet above the level of the surrounding plain, we found a mass of shells, principally cockles, oysters, and a larger kind of mussel, connected together by calcareous matter, the interstices being filled with soft earth containing numerous smaller shells (specimens 8 and 9). The mass was of irregular shape, between three and four feet square, and about the same in thickness, perfectly superficial, and not connected in any way with the rocks near it. No appearance of strata of shells was discovered in the neighbourhood. It will rest with better geologists than myself to determine whether these are to be considered of a fossil nature, and in this inquiry the nature of the small shells embedded in the soft earth may be of material use. Leaving the shells, we ascended about thirty feet among large loose fragments of limestone of the same nature as No. 1, and by a small opening in the rock entered a dark and spacious cave, which as the eye became gradually accustomed to the change from the previous glare of sunshine, and distinguished the surrounding objects, appeared to us like a splendid Gothic cathedral in ruins. The walls are worn smooth as if by the action of water, and covered with a white chalky coating. The roof is dome-like. The stalactitic masses form numerous fretworks, with arched window-like apertures. There are numerous chambers too, and lofty perpendicular passages, some of them admitting light at top, communicating with each other and producing a pleasant effect when illuminated from within by torches. In places water is dripping constantly from the roof, but few stalagmites are formed. The floor is nearly level, covered with a brown calcareous earth and with portions of calc-tuff (No. 10). No. 11 is a specimen of the calcareous sinter from some of the stalactitic masses.

No sculpture or inscription of any kind was found in the caves. A tradition exists among the natives of the country that it was at one time surrounded by the sea, and from its general appearance, from the existence of fossil shells in the breccia, and the low nature of the surrounding country, I am inclined to believe that such was the case, and that at no very distant period. It may be remarked also that it strongly resembles the description of the limestone rocks on the Tenasserim coast given by Captain Low.

During the same tour I had an opportunity also of visiting the nearest range of small hills before mentioned as running parallel with the coast, about sixteen miles inland and about three miles to the eastward of Alu Ganuh, the then residence of the Rajah of Ligore. They are so thickly covered with wood that it is scarcely possible to examine their geological structure. In a few

places, however, portions of rock jutted out above the surface, and were found to be formed of a fine kind of sandstone, of which probably the whole range is composed.

XVI.

CLIMATE OF SINGAPORE.

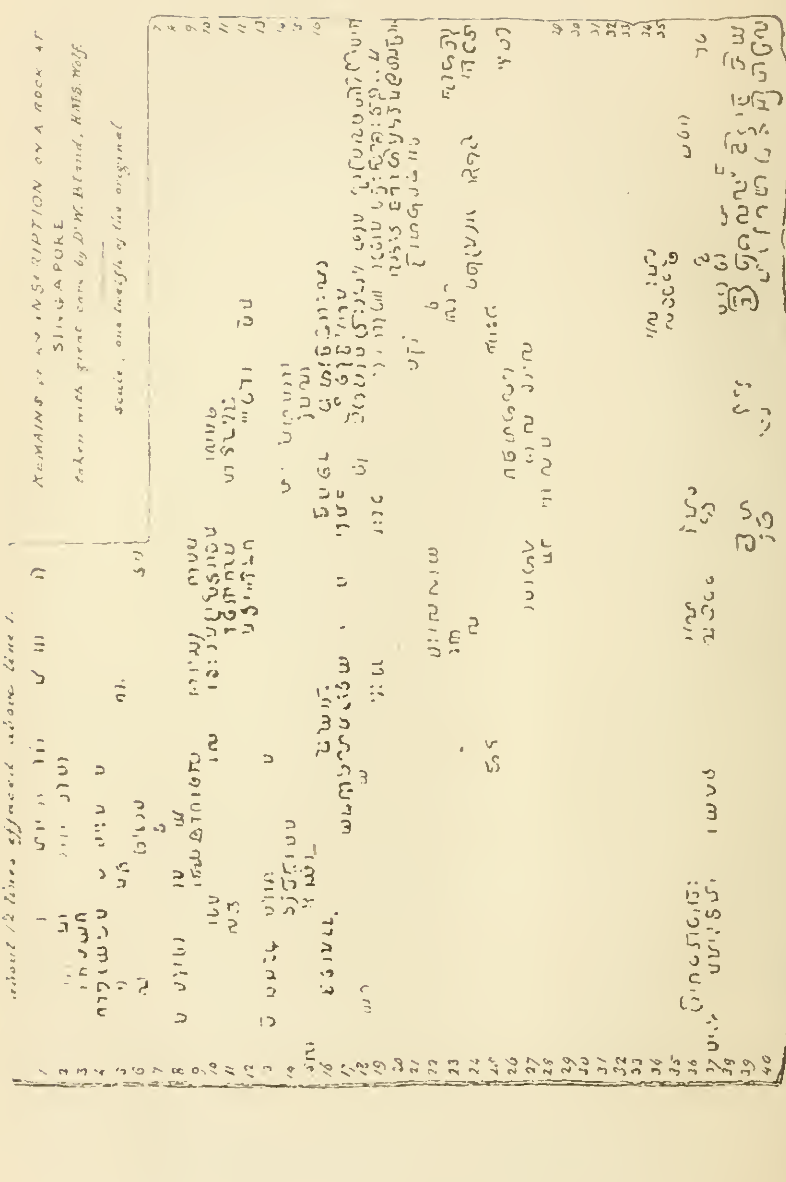
["Journal of the Asiatic Society of Bengal," vol. ii. (1833), pp. 428–31.]

THE following abstract tables of the thermometrical and barometrical range for six years at Singapore were drawn up by Captain C. E. Davis from his own daily observations, and were presented to the Asiatic Society in the year 1827. The barometer is not corrected to the freezing-point, neither are the hours selected capable of showing the diurnal oscillations of the pressure; but in all other respects the tables are very regular, and form a valuable addition to our meteorological information.

1820.	Barometer.									Thermometer.								
	Average of the Month.			Greatest Range.			Least Range.			Average of the Month.			Greatest Range.			Least Range.		
	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.
January . .	29·88	29·92	29·88	29·90	29·94	26·90	29·86	29·90	29·86	74·1	81·2	77·3	76·	85·	83·	72·	73·	72·
February . .	29·87	29·90	29·87	29·92	29·95	29·95	29·82	29·85	29·80	74·4	81·7	78·8	76·	86·	84·	72·	76·	74·
March . . .	29·90	29·89	29·87	29·99	29·95	29·95	29·82	29·84	29·80	74·8	82·9	80·6	76·	86·	83·	72·	75·	75·
April . . .	29·89	29·98	29·87	29·96	30·01	29·93	29·82	29·84	29·81	75·6	84·6	82·2	77·	86·	85·	74·	80·	78·
May . . .	29·88	29·89	29·84	29·98	29·98	29·93	29·78	29·78	29·75	76·6	85·4	84·	82·	88·	87·	73·	80·	78·
June . . .	29·90	29·92	29·86	29·97	29·98	29·94	29·83	29·86	29·83	76·2	86·	84·	78·	87·	85·	73·	74·	75·
July . . .	29·90	29·91	29·89	29·97	29·98	29·95	29·83	29·85	29·82	75·5	82·1	81·2	78·	86·	85·	73·	76·	76·
August . .	29·90	29·93	29·90	29·96	29·99	29·98	29·85	29·86	29·83	76·6	82·2	81·8	82·	88·	85·	73·	74·	76·
September .	29·93	29·95	29·91	29·98	30·01	29·95	29·88	29·90	29·88	76·1	82·5	81·4	80·	87·	85·	74·	77·	76·
October . .	29·92	29·94	29·89	29·97	30·01	29·94	29·87	29·87	29·85	75·8	83·	81·9	79·	87·	88·	74·	78·	75·
November .	29·87	29·91	29·86	29·94	29·98	29·94	29·81	29·85	29·78	75·	82·8	80·1	77·	86·	86·	72·	76·	75·
December .	29·88	29·94	29·90	29·94	29·99	29·98	29·83	29·89	29·83	74·9	80·2	78·2	77·	85·	83·	72·	75·	74·
Ann. aver.	29·90	29·92	29·88	29·95	29·98	29·98	29·83	29·85	29·82	75·7	82·8	80·9	87·1	86·4	84·1	73·	75·3	75·3
January 1821.	29·98	29·96	29·91	30·02	30·05	30·00	29·83	29·86	29·83	73·5	80·	77·9	75·	84·5	82·	70·5	73·5	72·5
February . .	29·98	29·99	29·94	30·04	30·06	30·05	29·91	29·91	29·82	74·5	83·5	80·8	76·	85·	84·	73·	81·	77·
March . . .	29·93	29·97	29·91	29·99	30·01	29·96	29·83	29·92	29·84	75·	83·9	81·8	78·	87·	84·	72·	79·	75·
April . . .	29·98	29·96	29·92	29·96	30·00	29·92	29·87	29·90	29·83	77·	82·1	80·3	78·	87·	85·	74·	77·	80·
May . . .	29·98	29·92	29·88	29·94	29·96	29·94	29·80	29·86	29·80	77·8	85·6	83·2	83·	89·	86·	75·	77·	79·
June . . .	29·88	29·98	29·94	30·00	30·03	29·99	29·87	29·91	29·87	77·4	84·8	83·6	82·	88·	86·	74·	79·	80·
July . . .	29·95	29·91	29·85	29·96	29·99	29·94	29·86	29·86	29·82	78·6	83·9	83·3	82·	88·	88·	75·	77·	78·
August . .	29·91	29·94	29·90	29·98	30·01	29·97	29·84	29·84	29·84	76·2	84·2	83·6	82·	88·	85·	75·	78·	78·
September .	29·93	29·95	29·89	29·98	30·03	29·97	29·84	29 87	29·84	74·5	83·5	82·5	82·	88·	87·	75·	78·	79·
October . .	29·91	29·97	29·91	30·00	30·03	29·96	29·88	29·88	29·85	77·2	83·6	82·7	82·	88·	86·	75·	77·	79·
November .	29·91	29·95	29·96	29·96	30·00	29·98	29·85	29·90	29·84	76·6	83·9	82·	79·	86·	85·	74·	78·	77·
December .	29·92	29·94	29·86	29·98	29·99	29·94	29·83	29·88	29·83	75·6	82·7	80·5	78·	86·	85·	74·	76·	76·
Ann. aver.	29·93	29·95	29·91	29·98	30·01	29·97	29·85	29·88	29·83	76·4	83·5	81·9	79·	87·	85·	73·8	77·6	77·6

1822.	Barometer.									Thermometer.								
	Average of the Month.			Greatest Range.			Least Range.			Average of the Month.			Greatest Range.			Least Range.		
	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.
January . .	29·94	29·97	29·92	29·99	30·00	29·99	29·88	29·88	29·82	75·5	82·9	81·	77·	86·5	86·	73·	75·	74·
February .	29·92	29·93	29·91	29·98	30·04	29·98	29·85	29·88	29·82	75·7	84·4	82·	77·	86·5	86·	73·	78·	78·
March . . .	29·96	29·97	29·92	30·02	30·05	29·99	29·90	29·91	29·87	76·	84·4	82·	77·	89·	85·	74·	77·	78·
April . . .	29·93	29·96	29·90	30·00	30·04	29·96	29·88	29·91	29·84	76·4	85·	82·6	78·	87·	86·5	73·	81·	80·
May . . .	29·89	29·91	29·85	29·99	30·03	29·94	29·80	29·77	29·78	75·5	85·3	83·6	84·	88·5	87·	76·	80·	79·5
June . . .	29 90	29·92	29·89	29·97	29·99	29 95	29·80	29·77	29·78	78·4	84·6	83·3	83·	88·	87·	74·	77·	74·5
July . . .	29·91	29·92	29·88	29·97	29·99	29·96	29·86	29·88	29·81	77·8	86·6	81·2	83·	89·	87·	75·	76·	76·
August . .	29·91	29·93	29·88	29·99	29·99	29·94	29·85	29·88	29·82	76·6	82·2	85·4	81·	87·	86·	72·	77·	79·
September .	29·90	29·92	22·87	29·98	29·99	29·95	29·84	29·87	29·81	76·9	84·4	84·	80·	88·	86·	75·	75·	79·
October . .	29·90	29·93	29·91	29·95	29·98	29·97	29·84	29·85	29·83	77·	84·9	82·9	80·	89·	86·	73·	80·	79·
November .	29·91	29·93	29·89	29·94	29·97	29·94	29·87	29·88	29·84	76·2	83·5	82·5	78·	88·	85·	74·	78·	77·
December .	29·89	29·91	29·86	29·98	29·99	29·92	29·83	29·85	29·80	75·1	80·6	79·3	78·	85·	84·	73·	73·	74·
Ann. aver.	29·91	29·93	29·89	29·98	30·00	29·96	29·85	29·86	29·82	76·4	84·0	82·5	79·1	87·6	85·9	73·8	77·2	77·3
January 1823.	29·95	29·97	29·92	30·06	30·06	29·99	29·89	28·84	29·86	74·2	81·	79·2	76·	85·	83·	72·	76·	74·
February . .	29·95	29·97	29·93	30·02	30·07	29·99	29·88	29·86	29·83	74·2	82·3	80·1	76·	86·	84·	72·	74·	76·
March . . .	29·88	29·95	29·89	29·99	30·00	29·95	29·87	29·88	29·83	73·3	84·6	81·4	78·	87·	84·	74·	79·	78·
April . . .	29·91	29·91	29·85	29·95	29·96	29·90	29·85	29·87	29·84	76·1	84·8	82·3	78·	87·	85·	72·	79·	78·
May . . .	29·87	29·90	29·86	29·91	29·95	29·91	29·84	29·86	29·81	77·3	83·8	82·5	79·	87·	86·	75·	81·	78·
June . . .	29·88	29·90	29·87	29·94	29·97	29·91	29·81	29·83	29·81	77·4	84·	83·1	82·	87·	86·	75·	78·	81·
July . . .	29·89	29·90	29 84	29·92	29·95	29·91	29·83	27·83	29·80	76·7	84·8	83·9	81·	88·	86·	74·	79·	81·
August . .	29·90	29·91	29·88	29·94	29·96	29·91	29·85	29·85	29·83	77·7	83·5	82·7	81·	87·	85·	75·	78·	77·
September .	29·91	29·94	29·88	29·96	29·97	29·92	29·87	29·89	29·84	77·3	84·9	83·8	81·	88·	86·	75·	76·	76·
October . .	29·92	29·93	29·90	29·99	29·99	29·93	29·85	29·85	29·82	76·5	83·6	82·8	82·	86·	86·	74·	78·	79·
November .	29·91	29·93	29·90	29·96	29·98	29·98	29·85	29·88	29·85	75·7	82·3	80·6	78·	88·	88·	74·	77·	76·
December .	29·95	29·96	29·92	29·99	30·03	29·98	29·89	29·90	29·85	75·5	83·6	81·3	76·	85·	86·	73·	81·	73·
Ann. aver.	29·91	29·93	29·88	29·97	29·99	29·94	29·87	29·87	29·83	75·9	83·7	82·1	79·	86·9	85·4	73·7	78·	77·6

1824.	Barometer.									Thermometer.								
	Average of the Month.			Greatest Range.			Least Range.			Average of the Month.			Greatest Range.			Least Range.		
	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.	6 A.M.	Noon.	6 P.M.
January . .	29·99	30·00	29·97	30·09	30·10	30·09	29·87	29·88	29·85	75·4	83·3	80·3	77·	87·	85·	72·	77·	77·
February . .	29·95	29·96	29·94	30·03	30·00	29·97	29·87	29·90	29·90	76·3	83·9	81·6	78·	88·	84·	74·	80·	78·
March . . .	29·94	29·96	29·90	30·08	30·09	30·04	29·88	29·91	29·86	77·6	84·2	80·3	80·	86·	85·	74·	79·	81·
April . . .	29·90	29·94	29·88	29·97	30·02	29·95	29·85	29·86	29·82	78·9	84·5	83·2	81·	88·	89·	76·	78·	78·
May . . .	29·88	29·92	29·90	29·94	29·97	29·92	29·83	29·85	29·81	77·7	83·1	82·8	83·	86·	85·	74·	76·	81·
June . . .	29·89	29·90	29·84	29·93	29·96	29·95	29·88	29·82	29·80	79·1	84·5	83·4	82·	86·	86·	74·	80·	78·
July . . .	29·92	29·93	29·98	29·98	30·00	29·95	29·80	29·88	29·86	80·	84·9	86·4	83·	87·	86·	76·	80·	80·
August . .	29·84	29·90	29·90	29·96	30·00	29·98	29·87	29·87	29·87	79·4	84·5	83·7	82·	88·	86·	75·	77·	77·
September .	29·92	29·95	29·90	29·98	29·99	29·95	29·87	29·90	29·86	77·3	84·3	83·8	82·	88·	87·	74·	76·	79·
October . .	29·91	29·93	29·89	29·97	29·99	29·94	29·87	29·87	29·85	76·6	84·3	83·1	78·	87·	86·	74·	79·	78·
November .	29·91	29·93	29·89	29·95	30·00	29·95	29·83	29·85	29·81	76·4	82·5	81·6	82·	86·	85·	73·	79·	76·
December .	29·97	29·96	29·92	30·00	30·03	29·99	29·90	29·92	29·89	75·3	80·2	79·8	78·	84·	83·	73·	75·	77·
Ann. aver.	29·91	29·94	29·90	29·99	30·06	29·97	29·85	29·87	29·84	77·7	84·	82·7	80·7	87·	85·8	74·2	78·2	78·2
January 1825.	29·94	29·95	29·92	30·03	30·06	29·99	29·90	29·90	29·87	75·1	80·9	79·9	77·	86·	83·	72·	75·	74·
February . .	29·96	29·99	29·93	30·02	30·04	30·00	29·88	29·91	29·87	86·2	85·2	79·8	79·	87·	85·	74·	82·	78·
March . . .	29·91	29·93	29·89	29·97	29·99	29·97	29·83	29·85	29·83	76·5	84·6	83·6	80·	88·	86·	73·	76·	79·
April . . .	29·91	29·94	29·88	29·99	29·99	29·95	29·85	29·87	29·82	77·2	84·6	83·7	81·	87·	87·	73·	80·	79·
May . . .	29·88	29·91	29·87	29·94	29·99	29·91	29·83	29·84	29·82	77·6	84·7	83·7	81·	87·	86·	75·	78·	80·
June . . .	29·89	29·91	29·88	29·98	29·97	29·97	29·80	29·86	29·82	79·9	84·3	84·1	84·	88·	87·	75·	77·	77·
July . . .	29·88	29·85	29·87	29·95	29·96	29·92	29·82	29·83	29·83	76·6	82·9	82·6	82·	88·	85·	73·	78·	77·
August . .	29·91	29·93	29·91	29·95	29·99	29·95	29·85	29·88	29·84	76·5	82·2	81·4	81·	87·	85·	75·	78·	78·
September .	29·92	29·98	29·91	29·99	30·03	29·98	29·85	29·87	29·83	77·6	83·3	80·6	82·	87·	85·	74·	76·	77·
October . .	29·91	29·93	29·90	29·96	29·97	29·95	29·83	29·88	29·80	76·8	83·6	83·5	79·	88·	86·	75·	76·	79·
November .	29·97	29·89	29·87	29·91	29·95	29·93	29·80	29·83	29·80	76·6	84·3	82·9	79·	86·	86·	71·	80·	79·
December .	29·88	29·90	29·88	29·94	30·00	29·98	29·82	29·85	29·82	75·7	81·7	80·8	78·	85·	86·	73·	75·	75·
Ann. aver.	29·90	29·92	29·89	29·97	29·99	29·95	29·84	29·86	29·83	76·8	83·6	82·2	80·2	87·	85·6	73·6	77·6	77·6


REMAINS OF AN INSCRIPTION ON A ROCK AT SINGAPORE
taken with great care by Dr. W. Bland, H.M.S. Wolf.
Scale, one twelfth of the original
about 12 lines effaced above line 1.
J. Prinsep lithog.

XVII.

INSCRIPTION ON THE JETTY AT SINGAPORE.

["Journal of the Asiatic Society of Bengal," vol. vi. (1837), pp. 680–82.]

Numerous have been the inquiries about this inscription—numerous have been the attempts to procure a copy of it from some of the constant visitors to the Straits for amusement or the benefit of their health. By some I was assured that the letters were evidently European and the inscription merely a Dutch record. Others insisted that the character was precisely that of the Delhi pillar, or that of Tibet; while the last friend, Lieutenant C. Mackenzie, who kindly undertook the commission, gave it up in despair at its very decayed state, which seemed utterly beyond the power of the antiquarian, and in this he was quite right. Nevertheless a few letters still remain, enough to aid in determining at least the type and the language, and therefore the learned will be glad to learn that Dr. William Bland, of H.M.S. *Wolf*, has at length conquered all the discouraging difficulties of the task, and has enabled me now to present a very accurate facsimile of all that remains any way perceptible on the surface of the rocky fragment at Singapore.

The following note from himself fully explains the care and the method adopted for taking off the letters, and I have nothing to add to it but my concurrence in his opinion that the character is the Pálí, and that the purport therefore is most probably to record the extension of the Buddhist faith to that remarkable point of the Malay Peninsula. I cannot venture to put together any connected sentences or even words, but some of the letters—the *g*, *l*, *h*, *p*, *s*, *y*, &c.—can be readily recognised, as well as many of the vowel marks:—

"On a tongue of land forming the termination of the right bank of the river at Singapore, now called Artillery Point, stands a stone or rock of coarse red sandstone, about ten feet high, from two to five feet thick, and about nine or ten feet in length, somewhat wedge-shaped, with weather-worn cells. The face sloping to the south-east at an angle of 76° has been smoothed down in the form of an irregular square, presenting a space of about thirty-two square feet, having a raised edge all round.

"On this surface an inscription has originally been cut, of about fifty lines, but the characters are so obliterated by the weather

that the greater part of them are illegible. Still, there are many left which are plain enough, more particularly those at the lower right-hand corner, where the raised edge of the stone has in some measure protected them.

"Having frequently made pilgrimages to this rock, and as often regretted that its present weather-worn condition hid from us a tale of 'the days of other years,' I determined, if it were possible, to save a few letters, could they be satisfactorily made out, to tell us something, however small, of the language or the people who inscribed it, and hence eke out our limited and obscure knowledge of the Malayan Peninsula.

"These considerations, however strong, were very apt to give way when it was almost universally known that many had attempted to decipher the writing in question, and had failed to make anything of it, among whom was one of great eminence and perseverance, the late Sir S. Raffles. Courage was nevertheless taken, and with the assistance of a clever native writer, to work we went, and the following method was adopted to insure correctness.

"A learned friend of mine suggested that well-made and soft dough ought to be tried, for even schoolboys used it for taking impressions from seals; it was tried accordingly, and found to answer well; and when the impression of one character was taken and copied, the letter itself in the stone was painted exactly over with white lead, as far as the eye could make it out, when the character was copied a second time, and if the two agreed, it was considered as nearly correct as possible, and although this was done to all the characters, it was more particularly attended to in the more obscure ones, for the letters marked in the facsimile with more strength could readily be copied by the eye.

"There is another thing worthy of being noticed, which is, that after a few days' work we discovered that when the sun was descending in the west, a palpable shadow was thrown into the letter, from which great assistance was derived. No doubtful letter has been admitted in the facsimile sent for your supervision, and it may be fairly doubted whether you will ever get a better or more honest copy.

As to the character in which the inscription is written, speaking from a very limited knowledge of the subject, my opinion the very first day was, that it is in the ancient Ceylonese, or Pálí; but as you have lately, with great perseverance and deserved success, made plain inscriptions hitherto perfectly a dead letter, I have great hopes you will be able to make something out of this celebrated stone of Singapore.

"I may as well mention that tradition among the Malays points to Telinga and Ceylon as its origin, which may be seen more at length in Leyden's 'Malayan Annals.'

"W. Bland."

XVIII.

EXTRACT OF A LETTER FROM COL. J. LOW.

["Journal of the Asiatic Society of Bengal," vol. xvii. (1848), pp. 232–34.]

PENANG, *Jan.* 10, 1848.

I MAY mention that on a cursory glance at the alphabet which you have kindly copied for me, I find several letters which I think I shall be able to identify with others in the inscriptions here. I could not manage with ink, and at last took the rather tedious and toilsome process of copying by rule and compass.

The first inscription which I found was so copied and forwarded to the late Mr. J. Prinsep shortly before his lamented death, so that it is probably amongst other inscriptions (unpublished) lying in your library.* He replied, saying he should like to have a facsimile, but I don't think any one could have been more correct than the one I sent. He, however, lithographed the inscription with the Khulsa, which is in the face of the stone, which was apparently formerly the top of a pillar. He said it was in the Sanskrit, not Pali; the style of the letter nearly that of the Allahabad No. 2. Is not that a transition Pali? I have on the other side of the water a copy of the "Journal" containing two Allahabad inscriptions; but the last inscription which I discovered and copied, about a year ago, is in a character somewhat older, I presume. However, I have been floundering in the dark for want of the "Journals" containing the labours of Prinsep, Wathen, &c. I will send you copies of both of these inscriptions, and, if I can manage it, of one upon a coin which I found a few months ago, but which our chief Bráhman of the temple cannot decipher. I have proved beyond doubt that there was a Hindu colony settled in Province Wellesley and Keddah, and I think it had been preceded by a Buddhist population. But I have not yet closed my researches, which have here to be conducted under many disadvantages (beyond our boundary), such as almost impervious jungles, a population who will afford no assistance whatever, and Siamese jealousy. I am engaged on, and have nearly finished, a paper for the "Journal" of the Indian Archipelago, on subjects relating more to our section of the globe than to India. But I have MSS. on my shelves which I hope to be able to send, I

* We fear not. We have searched diligently and found none but such as have been published. —EDS.

will not promise very soon, to your "Journal." I have been trying to get some Pali scholar among the Buddhist priests to assist me in explaining some MSS. in that language; but they are a sadly ignorant set, and, even as regards their own Deity and his holy places, they are obliged to confess that I know more than they do, and that is not a great deal either.

I have little hope that the archæological field of Sumatra will soon be laid open. It is a sealed book. We only now want to have a collection of all the ancient inscriptions extant to the eastward, to decide, on Prinsep's system, the various periods when Buddhists and Hindus migrated there. It seems to me at present that most if not all of these came from Orissa or Kalinga. I cannot get Mr. Stirling's "Orissa." These and the deficient pages of the "Journal" will be highly acceptable when procurable.

XIX.

INSCRIPTION AT SINGAPORE.

["Journal of the Asiatic Society of Bengal," vol. xvii. (1848), pp. 154 f.]

In the sixth volume of the "Journal," p. 680, there is an interesting account of an ancient and much weather-worn inscription on a rock at the jetty of Singapore. A facsimile was prepared by Dr. Bland, of H.M.S. *Wolf*, and forwarded by him to James Prinsep, who pronounced the character to be Pali, and though unable to connect sentences or even words, easily recognized many of the letters, and conjectured the inscription to record the extension of Buddhism to the Malayan promontory. On learning from Dr. Montgomerie that this rock had been blasted some years ago, I ventured to solicit the present governor, the Hon. Colonel Butterworth, C.B., to secure any legible fragments that might yet exist, and have since received his kind promise to forward such to the museum of the Society, where I trust the practised eyes of our antiquarians may yet decipher enough of the legend to determine its purport. Colonel Butterworth observes: "The only remaining portion of the stone you mention, except what Colonel Low may have, I found lying in the verandah of the Treasury at Singapore, where it was used as a seat by the Sepoys of the guard and persons in waiting to transact business. I lost no time in sending it to my house, but, alas! not before the inscription was nearly erased. Such as the fragment was

then, however—*i.e.*, in 1843—it is now; for I have preserved the stone with much care, and shall have much pleasure in sending it for your museum, having failed to establish one, as I hoped to have done, in Singapore. I am happy in thus far meeting your wishes, and in assuring you that I shall always be ready to forward the views of the Asiatic Society."

XX.

AN ACCOUNT OF SEVERAL INSCRIPTIONS FOUND IN PROVINCE WELLESLEY, ON THE PENINSULA OF MALACCA.

By Lieut.-Col. JAMES LOW, M.A.S.B. *and* C.M.R.A.S.

["Journal of the Asiatic Society of Bengal," vol. xvii. (1848), part ii. pp. 62–66.]

(*A.*) Consists of a group of seven inscriptions now extant on the rather weather-worn and sloping side of a granite rock, at a place called Tokoon, lying near to the centre of the province, or almost directly east of Penang town. The whole probably appertain to one period and the same subject.

The rock was pointed out several years ago to Mr. Thomson, the Government Surveyor, by some Malays, but he examined it hastily, as it was covered with jungle and long grass, and it was not until a considerable time had elapsed that I accidentally learned from him of its existence. I had before this passed for years consecutively close to the spot, yet such was the apathy of the villagers, or their ignorance, that no hint was given me about the rock, and this induces me to mention that owing to this indifference, and to the suspicious conduct of the native chiefs, I have been left almost entirely to rely on my personal research, and that of persons trained by me for the purpose, when endeavouring during the past twelve or fourteen years to penetrate through the darkness which shut out from common view the archæology of the countries around me.

I had some difficulty in reaching Tokoon, although mounted on my elephant, owing to several almost impassable jheels, or payas, as they are here termed. My people had built a small hut of

jungle-wood and palm leaves, and after assuring myself of the value of the inscriptions, men were set to clear away the jungle and to dig up the ground to some distance around the rock. But I was disappointed in my expectation of finding ruins and other marks of temples and an ancient population.

The inscriptions were copied by me with the utmost care, the task having occupied the greatest portion of the mornings and evenings of three days.

I did not attempt to make a facsimile, as I had no proper materials, and had not succeeded with Capt. Kittoe's plan; but I can safely say that the approach to a facsimile is perhaps as near as it would be possible to make it. The letters are very, indeed unusually, large and thick for ancient inscriptions, but this peculiarity rendered the task comparatively easy. Finely powdered and very dry chalk was cast loosely over the inscription until all the letters were filled. The chalk was then brushed off the surface of the stone with a bunch of feathers, and thus the lines of words became clear and legible.

The length of the largest inscription is that of the paper on which it has been copied, and as now forwarded (about ten feet).

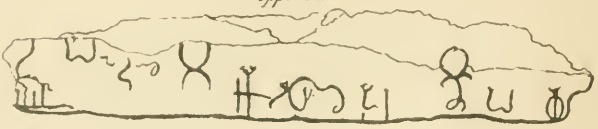
That the style of letter is of Indian origin seems to me quite obvious, but it contrasts a good deal with the inscription *B*. (fig.—.) Our Brahman and Buddhist priests here are so stupid that I have not been able to derive any assistance from them, and although I can trace some of the letters, I think, to inscriptions published in the Journal of the Asiatic Society of Bengal, I have not ventured to attempt the deciphering of them.

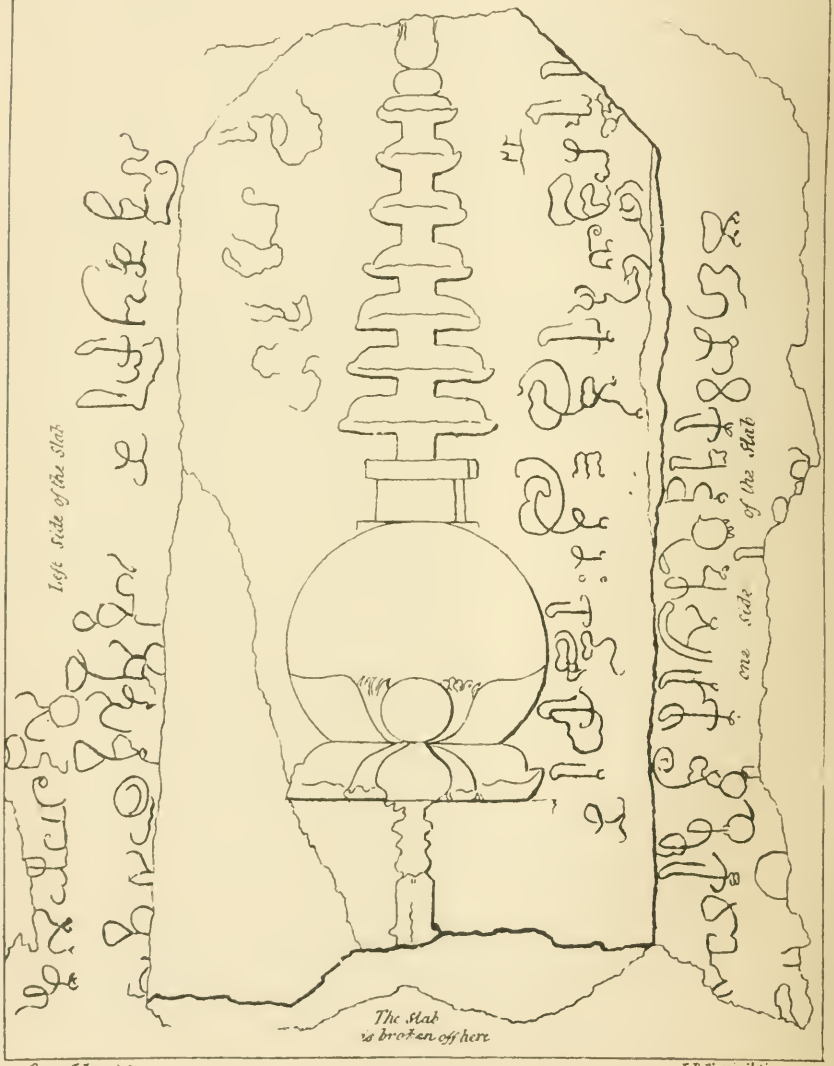
(*B*.) I discovered this inscription while engaged in excavating some old ruins on a sandy side in the northern district of this province. It has been engraved on a sort of slate, and seems to form part only of a much larger inscription, for that portion of the stone which I have got appears to have been the upper portion of one of those pillars which are set up in the areas of Buddhist temples. I have the pleasure of forwarding a facsimile of this record made with *clay*, which is perhaps a novel mode. The clay was fine potters' earth and sand well beaten up along with chopped gunnee bag-cloth. The stone was oiled, and the clay was pressed on it, and afterwards dried in the shade.

The copy was made by me in the following manner:—Finely pulverized and dry brick-dust was (as the chalk was in the former instance, the stone being then blackish), thrown over the face of the stone, and then lightly brushed off with feathers. The letters now appeared sharp and distinct; over these were pasted (with wafers at the edges) a sheet or slips of the "stylographic manifold writer paper," and the letters were lightly impressed on this paper with a soft pencil, and when the sheet was removed any slight omissions were filled in.

Copy of an Inscription on a Stone found near the ruins of a Buddhist Temple in Province Wellesley, Malayan Pen.ª

Upper Side





Capt. J. Low del.

J. B. Norris lith.

I have in vain tried to discover the remaining portion of the stone.

I may observe that a copy of this inscription was, so far back as 1836, forwarded by me to the late lamented James Prinsep, who in his reply observes :—"I see it is legible enough. Thus, on the right-hand side of the stone the following letters are "Ma ha ta vika Buddha na ra kta vritti kanaya vrinni." On the left side, "Sarova smin sarova tha sarova sidvaya cha santa." On the body next to the Kulsa, "Va na tarchchaya tti karmma janchana kan me karino." If I had the facsimile instead of a copy I would have handed you the meaning at once. It is Sanscrit, not Pali, as we see by the *karmma*. The style of letter is nearly that of the Allahabad No. 2. Compare with the Hala Canara, published a few months ago."—June 13, 1837.

As I have not been able to get the numbers of the Journal for the above year, I cannot refer to this Hala Canara record ; I may, however, observe that although I have satisfied myself that the Sivaic worship prevailed on this coast somewhere about the thirteenth century, still I have reason to believe that the Buddhist religion was co-existent, or at least contemporaneous with it. Indeed, a mysterious kind of connection seems to have existed betwixt Buddhism and the cult of Siva, which it would be desirable to have traced to its beginning. To me it seems that the period most probably was that when schismatic Buddhists had already overstepped the mere boundary of ratiocination, and had fairly reconciled the two religions, at least for a while, and until the time when Buddhism was discarded altogether. The occurrence of the word Buddha in the inscription points to his worship, and the spire in the centre is the seven-tiered one of the Indo-Chinese Dagopas.

I have not by any means closed my researches, the obstacles to these, as I have elsewhere observed, being numerous ; so that further archæological discoveries may possibly yet be made.

(*C.*) Are Sanscrit verses out of some book on religion, in alto-relievo, on the bottom and four sides of a brazen ornamented dish which was found by me amid some ruins of ancient temples in province Wellesley. They were copied by a man of the Brahmanical tribe.

(*D.*) Are impressions taken from two apparently Deva Nagri letters, imprinted on a large brick which I found in one of the ruins.

(*E.*) Are two coins, one of copper and the other of some mixed metal, which last decrepitates on being submitted to the blowpipe.*

I found one of these in the Keddah country, close to the British frontier, and in the bed of a clear stream. My attention was

* These two coins contain exactly similar impressions.

attracted by quantities of broken pottery there; and after my people, about twenty in number, had laboured for several days in sifting and searching, I picked two or three coins *myself* out of one of the baskets, a circumstance which I am induced to mention in order to obviate any doubt which might arise regarding their genuineness. I visited the place a few months ago for a second search, but found no more coins.

The second coin was found by me under the foundation of the ruins of a small brick building; this last not, however, appearing above the surface of the ground. The spot is in the northern part of the province. There were several hundreds of these coins in a metallic cup. From the emblems on them I consider them Buddhist coins.

The figure on the coin I have conjectured to be that of some Hindu deity. But the chief priest of the Hindu temple at Penang insists that it represents a king. I cannot make out the obverse.

While about to close these notes the Journal of the Society for February last has reached me. In this number I observe * that inquiries have been made regarding the inscription at Singapore described in the Journal, vol. vi. p. 680, and that the Hon. Colonel Butterworth, C.B., supposes that I may have some portions of the stone on which it was engraved.

I was an unwilling and pained witness to the demolition of that memorial of long past ages, my petition to have it spared being met by the reply that it was in the way of some projected bungalow. On the explosion taking place, I crossed the river from my office and selected such fragments as had letters on them. The Hon. the Governor, Mr. Bonham, sent to ask me to preserve a piece for him, and this is the portion alluded to by Col. Butterworth.

As the fragments were very bulky, I had them, at considerable cost, gradually chiselled by a Chinese into the shape of slabs; but they are still ponderous. It happens, however, that the smaller fragments only contain the most legible (if the term is even here really applicable) parts of the inscription, the rest being nearly quite obliterated, and I have therefore selected them to be presented to the Society. It seems to me that this Singapore inscription (to which I have alluded in a paper presently to appear in the Journal of the Eastern Archipelago) may probably date from an early century of our era, and I would merely here suggest that any one who may set about deciphering it may derive assistance by adverting to inscriptions which may have been discovered at the ancient Bijanagara in Orissa, or Cuttack, or, wider still, along the coast of central Kalinga.

* Page 222.

XXI.

NOTE ON THE INSCRIPTIONS FROM SINGAPORE AND PROVINCE WELLESLEY.

FORWARDED BY THE HON. COL. BUTTERWORTH, C.B., AND COL. J. LOW.

By J. W. LAIDLAY.

["Journal of the Asiatic Society of Bengal," vol. xvii. (1848), part ii. pp. 66–72.]

THE great interest expressed by the late James Prinsep and other antiquarians in the remarkable inscription at Singapore induced me, as mentioned in a former number of this Journal, to apply to the present esteemed Governor of the Straits Settlements, the Hon. Col. Butterworth, C.B., to secure for the Society's Museum any fragments that might remain after the Gothic exploit alluded to by Col. Low; a request he was pleased very kindly and promptly to comply with. Since then Col. Low has forwarded several other pieces, and though in possession of but a small portion of the original inscription, and that evidently not the most legible, I felt bound, in justice to the obliging donors, to bestow some labour in attempting to decipher at least its character.

In his brief notice of this inscription (J. A. S. vol. vi. p. 680) Mr. Prinsep remarks: "Numerous have been the enquiries about this inscription; numerous have been the attempts to procure a copy of it from some of the constant visitors to the Straits for amusement or the benefit of their health. By some I was assured that the letters were evidently European, and the inscription merely a Dutch record. Others insisted that the character was precisely that of the Delhi pillar, or that of Tibet; while the last friend, Lieut. C. Mackenzie, who kindly undertook the commission, gave it up in despair at its very decayed state, which seemed utterly beyond the power of the antiquarian; and in this he was quite right. Nevertheless, a few letters still remain, enough to aid in determining at least the type and the language, and therefore the learned will be glad to learn that Dr. William Bland, of H.M.S. *Wolf*, has at length conquered all the discouraging difficulties of the task, and has enabled me now to present a very accurate facsimile of all that remains any way perceptible on the surface of the rocky fragment at Singapore. The following note fully explains

the care and the method adopted for taking off the letters, and I have nothing to add to it but my concurrence in his opinion that the character is the Pali, and that the purport therefore is most probably to record the extension of the Buddhist faith to that remarkable point of the Malayan Peninsula. I cannot venture to put together any connected sentences or even words, but some of the letters—the *g*, *l*, *h*, *p*, *s*, *y*, &c.—can be readily recognized, as well as many of the vowel marks."

The condition of the inscription was indeed far worse than I supposed, and seemed to preclude all hope of deciphering the characters. By a fortunate expedient, however, and by very patient study, I have been able to make out sufficient to determine its language and probable date with tolerable certainty. The method I adopted, and which may be useful in similar cases to others, was to strew finely powdered charcoal* over the surface of the stone, and sweep it gently to and fro with a feather, so as to fill up all the depressions, the very slightest of which was thus rendered remarkably distinct by the powerful contrast of colour. By this means, and by studying the characters in different lights, I have succeeded in deciphering so much of three of the fragments as is depicted in Plate III.

It will be seen from the plate that though many of the characters resemble the square Pali in form, and hence misled Prinsep to conclude that the inscription was in the Pali language, yet others, and these amongst the most distinct, bear no resemblance whatever to that type. We may safely infer, therefore, that the language is not Pali; an inference in which I am borne out by Mr. Ratna Pala, whose knowledge of that language renders his opinion conclusive. As the character could not be identified with that of any of the published Singalese inscriptions, I was induced to compare it with the alphabets of the Archipelago, and I find it to be identical with the Kawi, or ancient sacred and classical language of the Javanese, specimens of which may be found in Wilhelm von Humboldt's "Ueber die Kawi Sprache," vol. ii., and in Sir S. Raffles' "History of Java." We have also in our museum a very fine inscription in that character, which has been taken by many for a peculiar form of Sanskrita. With the alphabet of this language, as gathered from similar inscriptions, I can identify all, or nearly all, of the characters; but of course no clue to the purport of the inscription can be obtained without some knowledge of the language itself.

Fig. 1 seems to have been from the upper part of the inscription, and is entirely omitted in Prinsep's lithograph as *effaced*. Figs. 2 and 3 I cannot identify with any portion of Prinsep's plate, much on the right hand side of which seems to have been

* Animal charcoal is better than vegetable, as being specifically heavier.

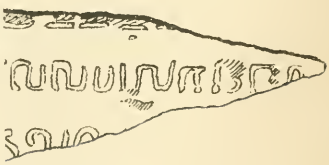


Fig 1

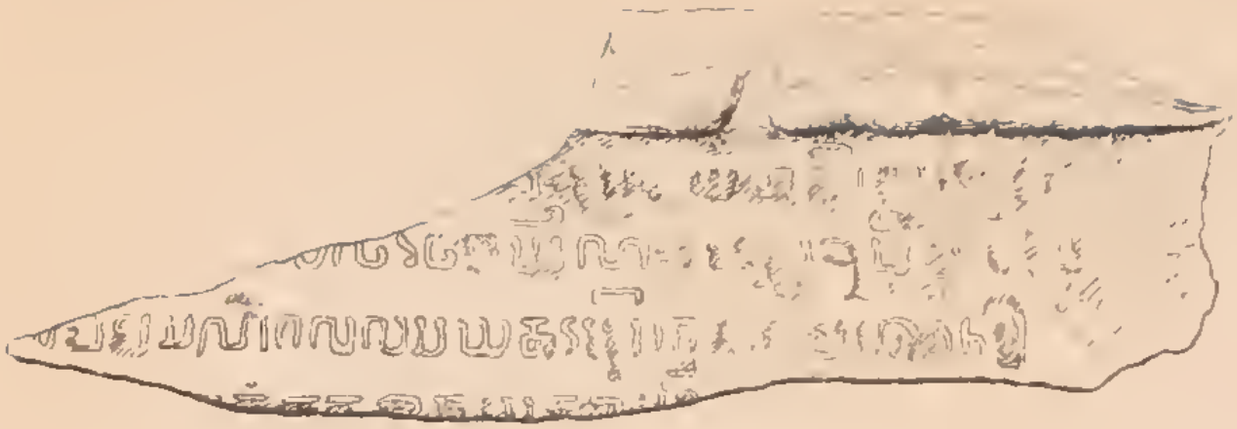


Fig 2

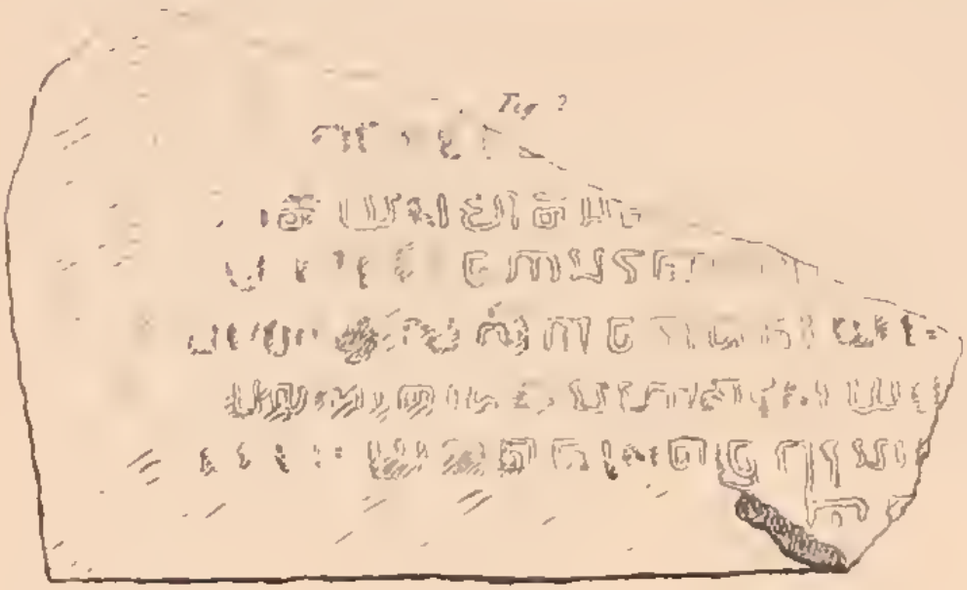
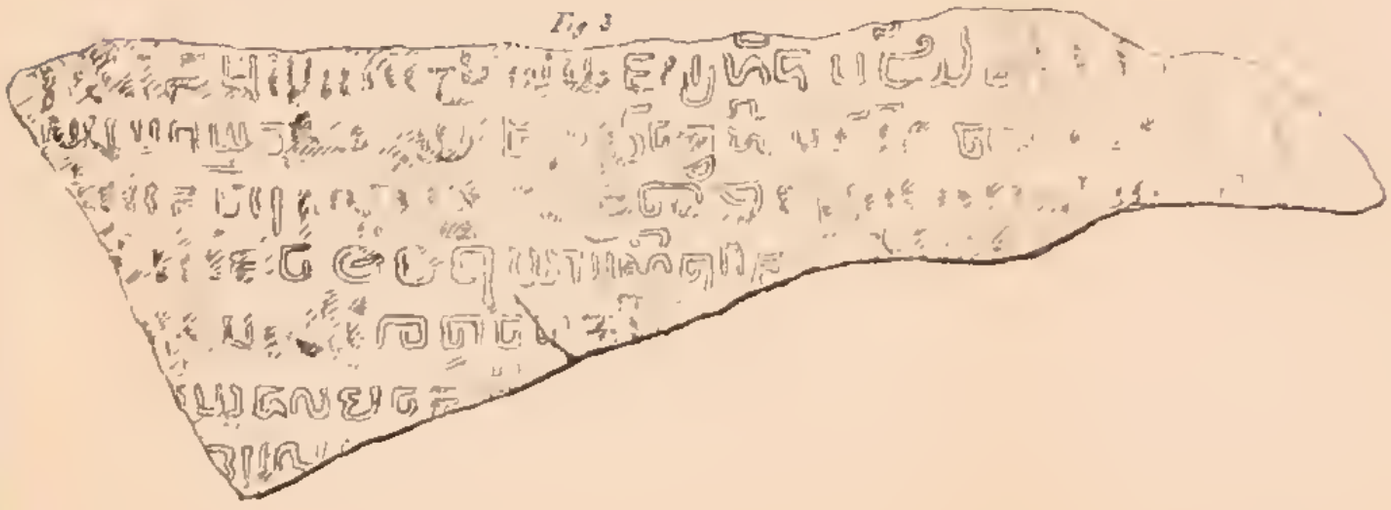


Fig 3



so distinct that I make no doubt, had that portion been available, we might have easily transcribed continuous sentences.

The much larger fragment forwarded by Col. Butterworth still remains to be deciphered, but I confess I feel little inclination for that barren labour until there appears some probability of the language being translated. Meanwhile we may conjecture with probability that the inscription is a record of some Javanese triumph at a period anterior to the conversion of the Malays to Muhammadanism, and the following notice of this monument in a work entitled "The Malayan Peninsula," by Capt. Begbie, Madras Artillery, may assist us in approximating its era :—

"The principal curiosity of Singapore is a large stone at the point of the river, the one face of which has been sloped and smoothed, and upon which several lines of engraven characters are still visible. The rock being, however, of a schistose and porous nature, the inscription is illegible. It is said that Sir Stamford Raffles endeavoured, by the application of powerful acids,* to bring out the characters with the view of deciphering them, but the result was unsuccessful. Where such an eminent person has failed, it may be thought presumptuous in me to hazard a conjecture on the subject of the language in which the inscription was penned, but I may perhaps be permitted to make an attempt to throw some light upon a subject so confessedly obscure. Resorting to the Malayan annals, which, clouded as they undoubtedly are by fable and allegory, yet contain many a valuable piece of information, we find therein mention made of three remarkable stones at Singhapura. (I omit the legends attached to the first two as altogether inapplicable here.) The third, though first in order of record, I have reserved for the last to be brought forward, because I am inclined to think that the evidence is fully presumptive in favour of its being the stone now visible at Singapore : it is to be met with at pages 62 and 63 of the Annals.

"The preceding pages inform us that in the reign of Sri Raja Vicrama there was a redoubtable champion of the name of Badang. Several remarkable feats of strength are recorded of him, but I will merely select the one in point. The fame of Badang having reached the land of Kling, the rajah of that country despatched a champion named Nadi Vijaya Vikrama to try his strength with him, staking seven ships on the issue of the contest. After a few trials of their relative powers, Badang pointed to a huge stone lying before the rajah's hall, and asked his opponent to lift it, and to allow their claims to be decided by the greatest strength displayed in this feat. The Kling champion assented, and after several failures, succeeded in raising it as high as his knee, after which he immediately let it fall. The story then says that Badang,

* The stone is a hard siliceous sandstone, upon which this process, if ever adopted, would have no effect.

having taken up the stone, poised it easily several times, and then threw it out into the mouth of the river; and this is the rock which is at this day visible at the point of Singhapura, or Tanjong Singhapura.

"After some other recitals, the annals state that "after a long time, Badang also died, and was buried at the point of the Straits of Singhapura, and when the tidings of his death reached the land of Kling, the rajah sent two stone pillars to be raised over his grave as a monument, and these are the pillars which are still at the point of the bay.

"Now, the first two instances are totally destitute of presumptive evidence; the last is, on the contrary, full of it. At the mouth of the river there is a large rock which is concealed at high water, and on which a post was erected four or five years ago by, I believe, Captain Jackson, of the Bengal Artillery, to warn boats of the danger; this is the rock fabled to have been hurled by Badang. He is said to have been buried at the point of the Straits of Singhapura, the scene of this wonderful exploit; and there, the very spot where this record is to be still seen, the rajah of Kling, who had been so serious a loser by it, ordered his monument to be erected." (See pages 355–358.)

In this idle legend it is by no means improbable that the name of the reigning prince is preserved, although the attendant circumstances are altogether fabulous. The kingdom of Singhapura was founded, according to Malayan accounts, in A.D. 1160, and from that time up to 1250, when the whole of the peninsula was converted to Muhammadanism, was subject to frequent invasions from the Javanese. The Rajah Vikrama mentioned in the foregoing extract reigned from A.D. 1223 to 1236, and his era is very likely that also of the inscription. At all events, we may be certain that the present inscription is not less, and cannot be much more, than 600 years old. Its preservation for so long a period may be ascribed in a great measure to its protection from the action of the weather by the tropical vegetation which concealed it, perhaps for centuries. "You remember," writes Dr. Montgomerie, "the situation of it on the rocky point on the south side of the entrance of the Singapore Creek. That point was covered with forest trees and jungle in 1819, and the stone was brought to notice by some Bengal clashees who were employed by Capt. Flint, R.N. (the first Master Attendant); the men on discovering the inscription were very much frightened, and could not be induced to go on with the clearing, which, if I recollect right, was completed by Chinese under the stimulus of high wages. What a pity it is that those who authorized the destruction of the ancient relic were not prevented by some such wholesome superstition!"

Of the remaining inscriptions furnished by Col. Low, the first set (*A.*) are in Pali, and are represented in figs. 1 to 7 of Plate IV.

On a Brick

XXI.

Figs. 1 and 2 seem to form a continuous sentence, सर्व्व अकामस्य लिपुष मठयसि तु मेने रमौनिभ (स्य) राजिन श (?) ठस (?) निश (?) of which Babu Rajendralal Mittra has been good enough to supply the following Sanscrit and English version.

सर्व्वं मकामस्य रिपु म्मठयति तु मेने रमौनिभस्य राज्ञः शठमनिशं

Translation.

"I acknowledge the enemies of the contented king Ramaunibha and the wicked are ever afflicted."

The inscriptions marked (*B.*) were published by Prinsep in the fourth volume of the Journal from Col. Low's own facsimiles, but without any attempt to translate them. The drawings, and especially the admirable clay impressions sent, enable us to decipher the character without any difficulty, and to supply a correct facsimile of the original. This method of taking impressions has, I believe, been employed by Capt. Kittoe also. It answers admirably, and though it represents the characters inverted, this inconvenience is met by observing their reflection in a looking-glass. The subjoined versions are likewise supplied by Babu Rajendralal:—

Fig. 8:—

महानामिकबुद्धगुप्तस्य उक्तम्मन्निकठस्य।

"*This is* said by Mannikatha, the protector of all great Buddhas."

Fig. 9:—

सर्व्वेणायुःकारेण सर्व्वेम्मिन्सर्व्वथा सर्व्वसिद्धयो काश्यन्तः।

"In every form of life knowledge becomes manifest everywhere and in every way."

Fig. 10:—

रजोनर्म्मयनिकर्म्म जन्मनःकर्म्मकारणं।

"(That) Karma (religious action originating in the hope of recompense) which sports with passion, is the cause of transmigration."

Fig. 11 is mutilated and unintelligible.

Of the monograms upon the Tokoon rock and upon bricks we can make nothing, but we give facsimiles of them in the plate.

The Sanscrit lines (*C.*) on the brass ornamented dish are as follows:—

संवत १३९९

महाश्रमण।

"Samvat, 1399."

"Mahá Sramana" (repeated four times on the sides of the dish).

स च श्री
दशवलवीरगु
रसम्प्रदायवीर
वरवादमहा
श्रमण ।

"Sri Mahá Sramana is acknowledged to be the mightiest of the mighty sect of Sri Dasavala" (a name of Buddha).

The copper coin is much corroded, but is easily recognized as ancient Ceylonese. The inscription श्रीमत्साहसमल्ल, Srimat Sahasa Malla, is legible enough, and enables us to identify the coin with one published by Prinsep in pl. xx. vol. vi. of the Journal. This prince reigned, according to the late Mr. Turnour, from A.D. 1200 to 1230, and his coins are, I believe, pretty numerous.

XXII.

ON AN INSCRIPTION FROM KEDDAH.

By Lieut.-Col. Low.

["Journal of the Asiatic Society of Bengal," vol. xviii. (1849), part i. pp. 247–249.]

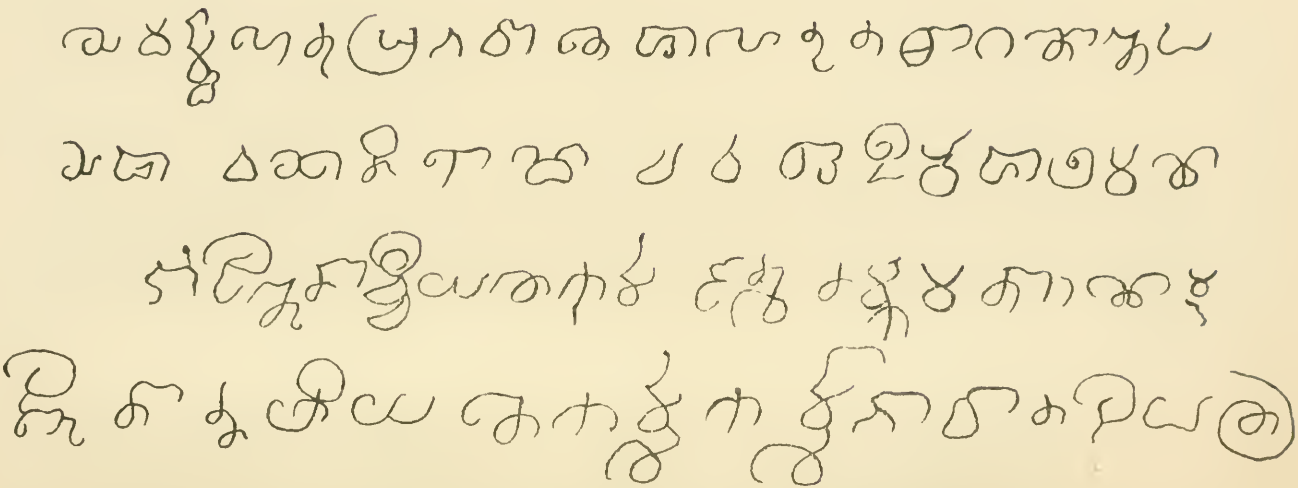
I HAVE the pleasure to forward to you, to be presented to the Asiatic Society, a facsimile of another inscription, in the same character apparently as that in which one of the inscriptions lately transmitted to you by me was couched, and which I found very lately, and after that last had been forwarded.

It may not, however, be of much importance, and I apprehend may prove but some religious text of the Buddhists or some other sects. It was lying under the centre of the foundation of a ruin of an ancient brick building in Keddah, near Bukit Murriam. This building had been very small, not more than 10 or 12 feet square. When I raised the slab of stone it was coated with a tenacious film of carbonate of lime, produced by the coral stones of the foundation having decomposed. The stone being a sort of slate, this has enabled me to bring out all the letters (a few only being at first visible) by the application of nitric acid. The inscription is in perfect preservation.

I have the pleasure also to send another piece of the Singapore

Pl. X.

INSCRIPTION FOUND AT KEDDAH BY LIEUT. COLONEL LOW



J W L

stone; there are several ponderous masses remaining, but that part of the inscription which is on them is the most defaced. I will try, however, when I have leisure, to copy such parts as are at all capable of being taken off, but the stone is so rough that this will be difficult to accomplish.

Note on the Foregoing.

Col. Low's inscription possesses, I think, sufficient interest to warrant the insertion of a reduced facsimile in the Journal, and I give it accordingly in Plate X. There is no difficulty in recognising in the first two lines the well-known formula *Ye dharmmâ hetu prabhavá*, &c.; but, if I am not mistaken, it is in a form of the Sanskrit alphabet much older than any in which it has been discovered elsewhere. We have in the Museum—thanks to the zeal of Capt. Kittoe—a goodly assortment of Buddhist sculptures from Behar, containing these verses, mostly in the Kutila modification of the Sanskrit character, which belongs to the tenth century of the Christian era; while that of Col. Low's inscription corresponds very closely with the alphabet assigned to the fifth century in Prinsep's palæographic table (J. A. S. vol. vii. pl. xiii.).

Another point of interest in Col. Low's inscription is the substitution of a different couplet for that which usually follows the lines above alluded to. Mr. Hodgson long ago remarked * that there is no necessary connection between the two couplets; and Prinsep stated,† on the authority of Ratna Pála, that another series of verses follows the *Ye dharmmâ*, &c., in the daily service of the temples in Ceylon. In the expectation that the lines in Col. Low's inscription would prove to be those of the Ceylon ritual, I sent for Ratna Pàla and showed him my transcription; but he seemed to have forgotten all about the matter, aud was unable to supply me from memory with the verses referred to, or to recognise their identity with those of the inscription.

The subjoined is a transcript of the verses in the Deva-nagari character:—

ये धर्म्मा हेतुप्रभवा तेषां हेतु तथागता
तेषां च यो निरोध एवं वादी महाश्रमण
पापनोचीयते कर्म्म जन्मनां कर्म्म कारणां
ज्ञानान्न क्रियते कर्म्म कर्म्मभावे न लीयते

"Whatever moral actions arise from cause, the cause of them has been explained by Tathagata. What is the check to these actions is thus set forth by the great Sramana. Vice promotes action, and action is the cause of transmigration. He who, through knowledge, performs no action, is not subject to its effects."

* J. A. S. vol. iv. p. 211. † *Ibid.* p. 138.

It will be observed that the first line of the latter couplet is identical with one in an inscription from the same neighbourhood published in the July number of the last volume of the Journal.

On the subject of the doctrine here propounded Rájendralál hands me the following note:

"This is but another version of the maxim inculcated by Krishna and other Vedantic preachers on the uselessness of Karma (religious action originating in the hope of recompense) as a means of salvation. The Hindu sages, however, maintain "rajoguna" (the quality of passion) and not "tamas" (darkness or vice) to be the cause of transmigration; but as the consequences of both rajas and tamas are borne in inferior states of existence, which necessarily imply repeated birth, the disagreement is not of any great importance.

"J. W. L."

[Professor Kern, of Leiden, who has made the Sanskrit inscriptions found in the peninsula of Malacca the subject of a searching investigation, in a paper printed in the "Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen," Afdeeling Letterkunde, 3de Reeks, Deel I (1883), restores the Keddah inscription as follows:—

Ye dharmmâ hetuprabhavâ teshâ(ṃ) hetu(ṃ) Tathâgato (hy avadat?)
yeshâ(ṃ) ca yo nirodho eva(ṃ)vâdî Mahâçramaṇa(ḥ)
ajñânâc ciyate karma janmanaḥ karma kâraṇam
jñânân na kriyate karmma karmâbhâvâ(n) na jâyate.

Of the second couplet—the first being the well-known Buddhistic formula—he proposes the following translation:—"Through ignorance, *karma* (*i.e.*, the sum of good and bad actions which is the cause of a man's being subject to constant transmigration) is accumulated; *karma* is the cause that man is born again. From knowledge it arises that man no longer produces *karma*, and it follows from the absence of *karma* that man is not born again."

The first part of the second couplet appears also in the inscription in Province Wellesley, which, besides, contains the words, "Mahânâvika Buddhaguptasya Raktamṛittikâvâsa (sya dânam)," (the gift of) the great ship-owner Buddhagupta, an inhabitant at Raktamṛittikâ, or Red-earth, which place Kern identifies with a seaport of that name on the Siamese coast, mentioned by Groeneveldt in "Verhandelingen van het Bat. Gen." vol. xxxix. pt. i. pp. 82, 101, 122. Though both inscriptions differ from one another in their type, he is inclined to assign both of them to about the year 400 A.D. The other inscriptions are too fragmentary to yield any palpable result. Kern sees no objection to the estimate which Capt. Begbie has above given concerning their comparatively late date.

These inscriptions confirm in a remarkable manner the conclusions to which the recent decipherments, by Barth, Bergaigne, Senart, and Kern, of the Cambodian inscriptions, inevitably tend—viz., that Buddhism came to the peninsula and Camboja, not from Ceylon, but from regions on the coasts of India where the so-called northern type of that religion was current.]

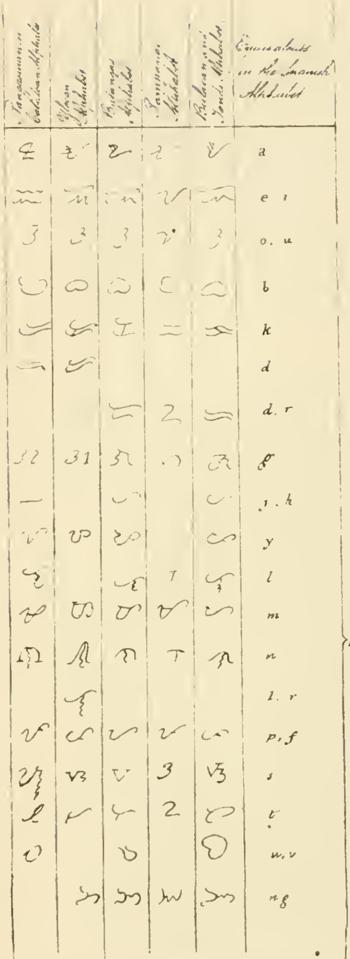


Fig 1.

A consonant with a dot above it ends in i (English ee) thus ⁢ is read bi (English bee). If the dot is below it ends in o. Thus ⁢ is read bo. This sign at the end of a word (‖) signifies n, m, l &c.

Fig 2

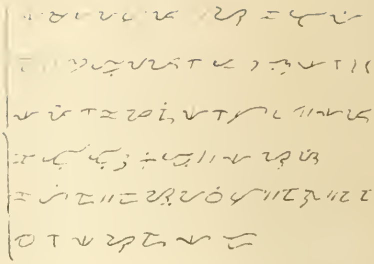


Fig 3

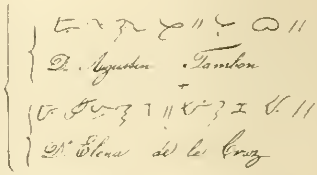


Fig 4

XXIII.

A NOTICE OF THE ALPHABETS OF THE PHILIPPINE ISLANDS.

Translated from the "Informe sobre el Estado de las Islas Filipinas," of Don Sinibaldo de Mas (*Madrid, January* 1843. *Vol. I. p.* 25) *by* Henry Piddington, *Sub-Secretary, Asiatic Society.*

WITH A PLATE.

["Journal of the Asiatic Society of Bengal," vol. xiv. p. 603.]

The Indians were not strangers to the art of reading and writing. I give (fig. 1 of the annexed plate) some alphabets of different provinces which I have procured. It will be seen at once that they have all a common origin, or rather that they are one and the same. The little communication amongst these people for many years or ages, introduced alterations in their caligraphy as in their language, which was also probably at first but one stock.

Father Juan Francisco de San Antonio says that they write like the Chinese, in perpendicular lines, and this error was copied by Father Martinez Zuniga, M. Le Gentil, and others who have written on the Philippines. Nevertheless, by documents which I have had in my possession, particularly from the archives of the convent of St. Augustin in Manilla, I have ascertained that it is read from left to right, like our own. In fig. 2 is represented a fragment of a transfer of landed property, written in Bulacan in 1652, on Chinese writing-paper.

And in fig. 3, two signatures, with their equivalent renderings of the names, in our characters. To this same family of written characters would appear to belong (fig. 4) an inscription cut on a plank, which was found in 1837, by a detachment of troops, in the mountains inhabited by the savage tribes called Igorrotes.

But withal, no books nor any kind of literature in this character are to be met with, except a few amatory verses written in a highly hyperbolical style, and hardly intelligible. It would appear that their letters partook of this Oriental redundancy.[1]

[1] [See above, p. 117, note 2.]

XXIV.

SUCCINCT REVIEW OF THE OBSERVATIONS OF THE TIDES IN THE INDIAN ARCHIPELAGO.

MADE DURING THE YEAR 1839 BY ORDER OF HIS EXCELLENCY THE GOVERNOR-GENERAL OF HIS NETHERLANDISH MAJESTY'S POSSESSIONS, 20TH OCTOBER 1838. NO. 3.

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[THIS interesting report was transmitted to the Asiatic Society by the Society of Arts at Batavia. It has been translated for the Journal from the original Dutch by my friend Dr. Röer.]

The tides have been observed at Pulo Chinco, on the west coast of Sumatra, to the southward of Padang, from February 10, 1839, to January 1, 1840, being ten months and three-quarters, by the naval lieutenants of the second class, G. J. Fabricius and J. de Hoon.

At Muntok, on Borneo, from January 15, 1839, to January 1, 1840, being eleven months and a half, by the naval lieutenant of the second class, P. C. Keuchenius.

On the island Onrust, near Batavia, from January 1, 1839, to January 1, 1840, being twelve months, by the naval lieutenant of the first class, Director of Onrust, J. Sigtorel.

At Tagal, on the north coast of Java, from January 1, 1839, to January 1, 1840, being twelve months, by the naval lieutenant of the second class, F. J. E. Van Gorcum.

At Klampies, on the north coast of Madura, from February 10, 1839, to January 1, 1840, being eleven months and three-quarters, by the naval lieutenants of the second class, J. A. K. Van Hasfelt and J. Van Gool.

At Chilichap, on the south coast of Java, from January 1, 1839, to January 1, 1840, being twelve months, by the naval lieutenant of the second class, J. A. G. Rietoeld.

To these have been added some less complete observations on Amboyna, from March 23, 1839, to January 1, 1840, being nine months and a quarter, by the master, J. Keeutebol, and the naval lieutenants of the second class, J. A. Kieffer and J. A. W. High.

At Japara, from the commencement of May 1835 to the close of December 1839, by the assistant resident of Japara, Winkelman.

Also on the Coriman Islands, from July 18, 1838, to April 1839, by deputy of the civil service, Michalosske.

These two latter observations were forwarded by the favour of the Batavian Society of Arts and Sciences, which had already previously made (at the request of Prof. Whewell, Trinity College, Cambridge) some communications with regard to the tides in this archipelago, to the Asiatic Society in Calcutta; besides these, there were some observations made at Macassar in the year 1840, by the master in the navy, E. Lagto, after they had been finished at the other stations.

These observations furnish the following results concerning the respective stations.

At Pulo Chinco, west coast of Sumatra.

The course of the flood tide and the rise of the water on the coast was observed to run from N.E. to S.W., closely following the direction of the coast.

The ebb tide ran in the opposite direction, and though both were very trifling, not exceeding a quarter of a mile, yet the force of the ebb generally exceeded that of the flood, though neither were sensibly influenced by the wind.

The tides were, however, very regular. The mean duration was about six hours and a quarter, so that, as usual, there were two tides in a day.

At new and full moon the high water was generally between 5h. 30m. and 6h. 30m.—viz.:

At new moon,	A.M. at 6h.	24m.
	P.M. at 6	30
At full moon,	A.M. at 5	28
	P.M. at 5	35

average time about 6·00, and the time of flood tide during the other days followed the common rule, dependent upon the moon's passing the meridian, according to which, though not always with the same regularity, the tide came in every day generally about three-quarters of an hour later; or rather, in the course of a fortnight the variation amounted to twelve hours. If, then, six hours be supposed as mean number, it was almost always flood tide when the moon was in the horizon.

From the time of high water to the time when it again turns to ebb, as is here noticed, we may be allowed to fix 5h. 30m. as the mean number.

The mean rise and fall was about		ebb . . .	0	78
The greatest	ditto	ditto	1	49
The smallest	ditto	ditto	0	6

The difference in the elevation of the succeeding tides is remarkable—viz., a greater rise and a smaller one were perceived to take place alternately, and in the same manner also the ebb tides.* This alternation of flow and ebb, which is very regular, may here, after be shown to be in connection with the moon's decrease, though perhaps more so at this place than at the other stations of the archipelago.

The greatest difference between high and low water, as well as the highest rise, occurred in October and November, and generally in the months when the west monsoon prevails.

At Chilichap, south coast of Java.

On the south coast of Java the tides were most regular in all respects; consequently the observations made upon them are best adapted to furnish a general rule.

The course of the flood tide was to the west into the outlet, and followed the direction of its shore. The ebb tide ran in an opposite course. In the westernly passage or creek of Segara Anakon the tides had a course quite the reverse; here the streams met, consequently the rise and fall took place without stream. In general the stream appears to run, at least in the east monsoon, along the coast to the east, at the rate of half a mile in four hours. In the straits of Chilichap, in the west monsoon, the ebb and flood tides ran at the rate of two and three miles, and in the east monsoon at five and five and a half miles. The tides evidently follow here, as well as at Pulo Chinco, the common rule. The mean duration of rise and fall was about six hours and a half, and this took place with much regularity, two tides in one day; but also smaller rises and falls between the usual ones have been sometimes noticed, amounting to 0·20 ebb. The duration of still water is here very regular for ten or fifteen minutes after high and low water. The ebbs and floods are about equal in force and duration. At new and full moon the mean time of the flood tide was between eight and nine hours—viz.:

At new moon at	9h. 18M.	P.M.
and at	8 53	A.M.
At full moon at	8 45	P.M.
and at	8 19	A.M.
Average of the time	8 48	

and therefore, as the time of flood tide is noticed to the moment when the water again commences to decrease, we may fix here, as mean number, 8h. 30m., considering that here also the period of the flood tide during the fortnight passed the space of 12h.

* A nautical friend has pointed out that night tides are generally the highest, thus giving an alternation.

At this station was observed the same remarkable fact as at Pulo Chinco, that at new moon it was high water an hour later than at full moon.

The mean rise and fall of the water was 1·25 ebb.
the greatest 2·42
the smallest 0·10.

The greatest difference in the rise and fall of the tide took place some days after the new and full moon, not, however, exceeding 2·63 ebb. The highest water mark was observed in the east monsoon.

The difference of the rise and fall of the succeeding tides is here very notable, and appears more than elsewhere to be in connection with the decrease of the moon. The morning and evening tides are different, especially at the decrease of the moon, while they were about equal at the time of the moon's passing the equator.

At Amboyna.

Although the streams in the bay are not strong, and sometimes only run from two miles to two and a half, and the turns of the tide very irregularly take place, we may state that the stream of the flood tide in the east monsoon runs into the bay along the northern coast to the E., and runs out along the southern coast to the S.W. The opposite course takes place in the west monsoon, while in the middle of the bay little or no stream is observed.

The duration of the rise and fall of the water is here very regular—about six hours and a quarter; so that the flood occurs about twice a day, and in a fortnight loses about twelve hours.

At new moon the mean time of high water was about

	A.M.	oh.	34m.
	P.M.	0	46
At full moon,	A.M.	0	06
	P.M.	0	38
Average of time		0	30 or 33m.

The month of December makes an exception to this, and might encourage the supposition of another mean number during the west monsoon, unless the observations made in that month exhibited a want of accuracy, on account of which they are not to be relied on.

At new moon here also, as well as at Chilichap and Pulo Chinco, the flood tide appears to come in always later than at full moon.

The mean rise and fall was about . . . . 1·14 ebb.
The greatest ditto ditto . . . . 2·50 ebb.

The smallest rise observed at several places was scarcely perceptible. A small rise was alternately taking place with a great

one, and the same occurred with the fall. The difference of the succeeding rises and falls is here likewise deserving notice. The greatest difference between high and low water took place in April and July.

The highest water mark was in April, November, and December. These remarks are made on observations taken during the period from April to December, and especially during the east monsoon.

At Klampies, on the northern coast of Madura.

It appears from the observations that were made that there was no flood or ebb stream perceptible during the east monsoon, and in the month of May the stream had always during the day a westerly direction, with the velocity from two miles to two and a half, while at night little or no stream was observed; it sometimes likewise ran to the east; the month of July forming the only exception to this, when in the night also the stream ran to the west, with a force of about two to three miles. In this monsoon the water is generally falling during the day, and the stream then strongest, while during the night the water is generally rising; the stream, however, has little force.

These facts suggest the inference, that if ebb and flood tides here actually exist, the ebb tide has a westerly direction, while the flood runs to the east; this latter, however, is almost annihilated by easterly winds. In the west monsoon the stream runs to the east with little force, and the water rises during the day; the flood stream should accordingly run in this season to the east; but then at night scarcely any stream is perceived, and the ebb tide which then runs was observed to be annihilated by the westerly winds.

East Monsoon.		*West Monsoon.*	
	⟵ Wind E.		⟶ Wind W.
During the day fallg. ⟵	Stream during the day or ebb.	During day ⟶	Stream during the day flood.
Night rising ⟵	Stream during the night or flood.	Night fallg. ⟶	Stream during the night ebb.

The mean duration of the rise and fall of the water is during the whole year eleven and a half to twelve and a half, so that here ebb and flood occur only once in the same day; nevertheless, it appears that here often little rises and falls, or those called short tides, have obtained alternately with them. It is worth noticing that during a certain period the flood tide always took place before noon, and during the remainder of the year in the evening —namely, in May, June and July the time of flood tide was daily in the morning about nine o'clock and one o'clock in the afternoon, without regular yet constant retardation; this period from

time to time suddenly shifting to an interval of six hours. In the first half of August this period occurred between half-past seven and half-past eleven A.M.; in the latter part of the same month between half-past five and eleven A.M.; in September between one o'clock and half-past ten A.M.; in October between midnight and six o'clock A.M.; in the latter days of November between nine o'clock A.M. and midnight; in February between three, half-past three, and half-past eleven o'clock P.M.; and so on, until in May this period again occurred before noon.

Thus it can be proved that in the east monsoon the flood tide took place always before noon, and therefore the fall of the water and also the ebb was during the day; and in the west monsoon after noon, so that the fall of the water and also the ebb were in the night, while the opposite was observed with regard to high water and the flood tide, as the mean interval from the period of the one flood tide to that of the next was about twelve or thirteen. The succeeding tides, or the duration of that of the rise and fall, generally decreased in an inverted arithmetical progression from between nine to fifteen hours; the difference between the rise and the succeeding fall of the water was most remarkable at new and full moon. There has been a single instance in which the duration of the fall did not exceed an hour, while again a rising of three-quarters of an hour has been observed.

The sum of the two succeeding tides, or the duration of the rise of the water and the succeeding fall, always amounted to somewhat more than twenty-four hours.

This was not the case as regards the height of the tide and of the succeeding fall, which was almost constantly equal.

Here also, as elsewhere, it is notable that a great rise and fall occurs alternately with a small one, and the difference in the rise and fall decreases till no longer perceptible, when it again increases; which phenomenon must (at least at the first glance) be accounted for as the effect of a powerful cause—as, for instance, the decrease of the moon, as has been already done.

The common rules are here also not sufficient to calculate the time of high water. It also deserves notice that at new and full moon the flood tide generally, excepting some instances in October and April, came in between eight and ten o'clock—viz., the morning, when the aforesaid periods in which, according to the season of the year, the flood tide must take place, corresponded with the morning, that is in the east monsoon, and in the evening, when the converse took place, that is in the west monsoon.

The flood of eight or ten o'clock, whether in the morning or in the evening, took place in almost all periods, as above mentioned.

The period of the flood tide at new and full moon cannot, however, be averaged or used to calculate the mean time of high water for another day.

The mean rise and fall of the water was . .	1·12 ebb.
The greatest	2·13
The smallest	0·11

The greatest difference between high and low water occurred in May, June, and December, after new and full moon, though this by no means was always the case.

The highest water-mark was likewise observed about this period.

At Tagal, on the north coast of Java.

It appears that here also, as at Klampies, no streams of ebb and flood, strictly speaking, are to be found, the tides generally being very irregular, and the streams, which seem to be dependent on the wind, at most amounting to a quarter or half a mile.

The duration of the rise and fall has a singular course. In January it is sometimes six hours, so that there accordingly flood and ebb tides occur generally twice in a day; and only one rise and fall of much longer duration than ordinarily is perceived at new and full moon. In the succeeding months these longer tides repeatedly occur after new and full moon, so that at this period, for several succeeding days, the flood tide comes in but once a day, and thus also the ebb, and the duration of the rise and fall of the water, is respectively twelve hours. In May, about new and full moon, they continue for eight days, and likewise the whole month of June the duration of the ebb and flood tide is respectively twelve hours; so that there is but one flood and ebb tide during the day.

Then, again, in July, at new and full moon, there are tides of about six hours' duration, so that two tides again occur in a day.

In August and September the number of days when short tides are perceived is increasing. In October the duration of all tides is about six hours, and in November and December, at new and full moon, they again come in some long rises and falls.

At the period of the change from these common or short tides (of about six hours) to the long ones (of about twelve), a great rise and fall generally is alternate with a small one, and it is a remarkable fact that these smaller rises and falls gradually decrease until they entirely disappear, and only one rise and fall takes place in the twenty-four hours.

The reverse was the case on the change from long tides to the common or shorter ones.

The same also appears to happen as regards the time of rise and fall, though in a less striking degree.

The time of flood and ebb tide is here likewise very uncertain. It may, however, be stated, that at new and full moon the ebb tide comes in about three o'clock in the morning, while it is more

regular with regard to the flood tide, and it is therefore impossible to calculate with exactness the other days' re-appearance of ebb and flood tide at Tagal.

The mean rise and fall during the year was . .	0·50 ebb.
The greatest	0·97
The smallest	0·04

The greatest difference between high and low water was observed in the west monsoon, and scarcely ever at new or full moon; so that there accordingly existed no real spring tide: it never exceeded the fall by 1·03 ebb.

The highest water-mark, on the other hand, was in the east monsoon, especially in the months of May and June.

The difference in the rise and fall of the succeeding tides is here, as well as at the other stations, deserving notice; and though the equality of the succeeding rise and falls evidently depends upon certain rules, yet it is not to be traced, at the first glance at least, to the decrease of the moon.

The monsoons, and likewise the stand of the sun's solstice probably exercise a more than common influence on these tides at Onrust, near Batavia. No stream of ebb and flood, properly speaking, was observed any more than at Tagal or Klampies; the stream which runs cannot be subjected to any certain rule, nor does the rise and fall of the water proceed with regularity. The stream in all directions is much influenced by the wind, and is very trifling, seldom exceeding one mile to one mile and a half.

According to the observations that have been made, the duration of the rise and fall of the water in December, January, and February was about twelve hours; so that there is in one day only once high water and once low; sometimes, however, the water is longer flowing than ebbing.

In March, for some succeeding days, smaller tides were observed between them, which being of very unequal duration ordinarily, were alternating in a short rise succeeding a long one, and *vice versa*. The recurrence of these small tides, which first appeared twice or thrice in the month, may perhaps be brought into connection with the age of the moon; the number of days they continued decreased about July and August, though sometimes a short tide of one or two hours occurred; with these exceptions, there was high and low water only once in twenty-four hours.

In the latter days of August, the number of days when the short tide comes in, it increases so that almost the whole month, as well as in September, two tides took place in the same day, though of a very irregular duration; then the number of days when the short tides were observed again decreased, occurring only twice or thrice in the month; till in December long tides

almost always return, so that in this month there is only ebb tide each day.

However, supposing in January and February the short tides have been overlooked, which is not impossible, as the character of these was not known at the commencement of the observations, or we should be able to assign a reason that in July and December long tides, and in September and February short tides take place, as well as between these months, the number of days when short tides obtain decreases and increases; something similar to this has been observed at Tagal; but the period of long and short tides does not correspond.

There is no peculiarity concerning the difference of the succeeding tides; but we must not omit to notice that there, as well as at Klampies, in December, January, and February, flood tide always comes in before noon, and this period is successively retarded; the flood tide being observed during May in the night; during June in the evening; during July and August in the afternoon; in September before and after noon; in October and November in those days where only one tide in one day took place before noon. It is evident from these facts that during the east monsoon the flood tide comes in the afternoon and in the evening; while during the west monsoon it was before noon, and in the morning just the reverse of what has been observed at Klampies.

The period of the flood tide at new and full moon, however irregular it may be in the interval between them, is always about ten o'clock (or between 9h. 30m. and 10h. 45m.) P.M., from March to December—that is, in the east monsoon; and at A.M. from September to March in the west monsoon, a singular correspondence with the observations at Klampies. It is evident that on account of the regularity of the tides this period cannot be used as a mean number to calculate the period of the flood tide for other days.

The mean rise and fall was	0·67 ebb.
The greatest	1·32
The smallest	0·02

The greatest difference between high and low water took place in the west monsoon, and then especially at new and full moon in the other parts of the year. The position of the moon was not observed having any reference to the water-mark. The highest water-mark was also in the west monsoon, and especially in December.

At Muntok, in the Straits of Borneo.

At this place a decided stream of ebb and flood took place, and the observations seem therefore most fit to establish on them a general rule for the tides within the archipelago, and the short

or middle tides. The flood stream at Muntok runs six or eight hours in a day to the S.E. with a velocity of quarter, half, and sometimes of one and a half mile, while the ebb stream runs sixteen or eighteen hours every day, at the rate of one or two miles to W. by N. and W.N.W. The turn of the streams was not regular, nor to be brought into connection with the rise and fall of the tide. In August an ebb was even observed lasting more than thirty-eight hours, while the water in the meantime rises twice.

After the monsoons the common duration of the rise generally is ten hours, and that of the fall 14·30; afterwards, at the first and last quarters of the moon, ebbs and floods, or the so-called short tides, take place in one day, which last about six hours, or rather the mean duration of two rises is about 11·30, and that of two falls 12·35.

The short tides ordinarily appear at a certain suspension of the fall or rise in the ebb and flood tide, called by the natives *pasang kechil*. Should these tides amount to two ebbs and two floods in a day, they are called by the natives *pasang onok;* while ebb and flood, which run for a longer time, and precede the common tides of ebb and flood of twenty-four hours' duration, bear the name of *pasang ma.*

On the contrary, during the change of the monsoons—that is, during April, May, October, and November—these middle tides run at new and full moon; and here also, as at Onrust, flood tide occurs during the west monsoon, in the afternoon and in the evening, and at new and full moon at 8h. 30m.

During these months when at new and full moon short tides were running, the high water generally came in about 6h. 50m. in the morning, and at about 7h. 10m. in the evening. However, these numbers cannot exhibit a mean number, nor give a direction to calculate the high water of the other days, although the time of the flood tide, however irregular, seems daily to come in later, being retarded twelve hours in a fortnight, while this time on the appearance of the short tides has a most irregular course.

The natives foretell sometimes very exactly the return of the small and short tides.

The greatest rise and fall was	4·26 ebb.
The smallest	0·07
The mean	2·17

The greatest difference between high and low water was at full moon in December, June, and May and in general when the monsoons had passed; while the difference during the months while the monsoons changed was less perceptible.

The greatest rises and falls often took place at new and full moon, though by no means always.

The highest water-mark was also observed when the monsoons

were in their full force. Besides, it deserves notice that during the period when flood and ebb tide came in only once a day—that is, during the common long tides—the rises and falls following each other successively increase and decrease; while when two tides or middle tides occur in a day, the succeeding rises are alternately great and small, and thus also the falls, while the difference in the quantum of two succeeding rises probably depends on the decrease of the moon.

At Corimon, Java.

An ebb and flood tide is here even less perceptible than at other stations. It appears, however, from the observations that were made, that here, as at Klampies, on the north coast of Madura, the stream runs especially with the rising water to the east, and with the falling water to the west; in the east monsoon in the night, in the west monsoon in the day time.

The tides are very irregular, there being only once in a day flood and ebb tide, and sometimes of the duration of from nine to fifteen hours.

The period of the flood tide has here, as at Klampies and Onrust, a general though regular retardation—viz., in the east monsoon, as at Klampies, the high water comes in before noon and in the morning; in September early in the morning; in October, November, and December, in the night; during the west monsoon in the night and in the evening; in April in the afternoon; while this period is most irregular during the turning months.

The mean rise and fall was	1·25 ebb.
The greatest	2·03

The highest water-mark is in April, and generally the 21st and 22nd of the month.

At Japara.

No ebb and flood stream properly speaking, and the whole course of the tides very irregular. With the rising water a stream was generally observed having an easterly direction; high water only once in the same day. Here also the period of the flood tide appears to undergo a general though indefinite annual retardation—viz., the flood tides during the months of May and June take place after noon and at noon; the ebb tide in the morning and about midnight.

In July, August, and September they take place successively earlier, so that the high water comes in October about half-past five o'clock in the morning; in December about half-past one in the morning; and during the west monsoon in the night and in

the evening ; and consecutively the flood tides again occur in the afternoon. The period of ebb and flood tides at new and full moon is very irregular.

The mean rise and fall is . . . . . 1·31
The greatest . . . . . 2·00

The highest water-mark was observed in October.

At Macassar.

According to some observations of a later date transmitted to us—viz., during the three first months of 1840—the tides are very irregular, having a close correspondence with the tides on the Javanese sea.

The flood tide, though with little force, runs to the N.E. and N.N.E., the ebb tide to the S.W. and S.S.W., either stream much dependent on the wind.

During the full strength of the monsoons there appears long tides to prevail, being only one flood and one ebb tide in twenty-four hours ; and as at Muntok and Onrust during the change of the monsoons periodically, returning short tides took place twice in a day ; and during this period they were all short tides of about six hours. At new and full moon the flood tide comes in at about 6h. 20m. There is no daily retardation of the flood tide. It appears, as at Klampies, on the north coast of Madura, that during the west monsoon the high water takes place in the afternoon, and most likely the converse during the east monsoon.

A mean number cannot be obtained here.

The highest rise was during the 3 first months of 1840, 1·60 ebb.
The mean. . . . . 0·75

If we then compare the course of the tides at the different stations, there is evidently observed a sensible difference at the tides without the archipelago—viz., of those on the west coast of Sumatra and on the south coast of Java and of Amboyna, from those within the Javanese sea. Here we are able to fix a certain mean number, by means of which the time of high water is to be calculated, totally different from the course of the tides within the Javanese sea.

The former it appears follow the well-known rules of the tides ; there is twice in the day ebb and twice flood tide, and two tides take place in the space of somewhat more than twenty-four hours in the whole, depending on the moon's passing the meridian.

Here we are able to fix a certain mean number, by means of which the time of high water is to be calculated beforehand, totally different from the course of the tides within the Javanese sea, which cannot be traced to the common rules ; they rather are

GENERAL TABLE OF THE TIDES IN THE EAST INDIAN

Station.	Flood Tide at Full and Change.	Duration of the Rise and Fall of the Water, or of the Ebb and Flood Tide.	Greatest Rise and Fall of the Water.
Pulo Chinco.	6h. 0m. 0s. Mean number, 5h. 30m. 0s.	Two tides in 24 hours, that is twice flood-tide and twice ebb; flood and ebb-tide about 6¼ hours.	Ebb. 1·50
Chilichap.	8h. 48m. 0s. Mean number, 8h. 30m. 0s.	Two tides in 24 hours, that is twice flood-tide and twice ebb; flood and ebb about 6¼ hours.	2·63
Fort Victoria at Amboyna.	0h. 33m. 0s. Mean number, 0h. 30m. 0s.	Two tides in 24 hours—viz., twice flood and twice ebb tide; flood and ebb tide about 6¼ hours.	2·50
Muntok.	After the monsoons 8h. 30m., in the months when the monsoons change about 7h.	During the power of the monsoons generally one tide in 24 hours—viz., the rise of the water 14h. 30m., and the fall 10h.; two tides in 24 hours during the months when the monsoons change; between both on the return of certain periods; whether at quarter or at full moons the opposite course took place, and especially at the change from the long tides to short ones, and vice versâ.	4·27
Onrust.	In the east monsoon, about 10h. P.M., or in the evening; in west monsoon, about 10h. A.M., or in the morning.	During the full power of the monsoons generally one tide in 24 hours—the rise and fall about 12h.; two tides in 24 hours in the months when the monsoons change; between both on the return of certain periods; whether at new and full or at quarter, the opposite course took place at the change from the long tides to the short, and vice versâ.	1·32
Tagal.	Very irregular.	Generally one tide in 24 hours during the east monsoons; two tides in 24 hours during the west monsoons; between both at certain periods; at new and full moon the opposite course took place, especially at the change from the long tides to the short ones, and vice versâ—that is, in the months when the monsoons change.	1·03
Klampies.	East monsoons 9h. to 10h. A.M., or in the morning; in the west monsoons 9h. to 10h. P.M., or in the evening.	One tide in 24 hours; ebb and flood tide from 9 to 15 hours; there were no exact observations made concerning the existence of short tides.	2·13
Japara.	Very irregular.	One tide in 24 hours—from 8h. to 16 hours; short tides were not observed.	2·00
Cerimon, Java.	East monsoons 8h. P.M.; in the west monsoons, about 8h. A.M.	One tide in 24 hours—from 9h. to 15h.; short tides were not observed.	2·03

N.B.—The mean rise and fall are here the average of the extremes, and the greatest rise and fall month be taken, it is somewhat less. If the average of the mean rise and fall of every month be

Order.

E. LUCAS,
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ARCHIPELAGO, ON OBSERVATIONS TAKEN IN THE YEAR 1839.

Mean Rise and Fall of the Water.	Flood.		Ebb.		Remarks.
	Direction.	Velocity.	Direction.	Velocity.	
Ebb. 0·78	N.E. E.S.E.	Mile ¾ Little.	To the S.W. W.S.W. South.	Mile ¾ Great.	The tides regularly lose 12 hours in a fortnight; the flood along the coast runs to N.W., the ebb to S.E.
1·25	W.	2½ to 4½.	To the East.	2½ to 5½.	The tides regularly lose 12 hours in a fortnight; the stream along the coast runs to the east during the east monsoon.
1·14	In the E. monsoon to the S.W.; in the W. monsoon to the N.E.	Little to 2¾.	In the E. monsoon to the N.E.; in the W. monsoon to the S.W.	Little to 2¼.	The tides regularly lose 12 hours in a fortnight; ebb and flood run in an opposite direction along the north coast of the bay.
2·16	During 6h. or 8h. E.S.E.	¼ to 1½.	During 16h. or 18h. W.N.W.	2	During the east monsoon it is always high water at 2 P.M. or in the evening; during the west monsoon, A.M., or in the morning.
0·67	Properly speaking, there is no ebb and flood tide stream.				During the east monsoon it is always high water at P.M., or in the evening; during the west monsoon at A.M., or in the morning.
0·50	Idem.				
1·12	Idem. The stream generally runs to the eastward on the rise, and westward on the fall.				During the east monsoon it is flood-tide always in the morning, and in the west monsoon in the evening.
1·31	Idem. In the rise the stream generally runs easterly, but it is very irregular.				During the east monsoon the flood-tide comes in the morning, and in the west monsoon in the evening.
1·23	Idem. On the rise the stream generally runs easterly, and on the fall westerly.				During the east monsoon the flood-tide comes in the evening; during the west monsoon in the morning.

must be so taken in an absolute sense. If, however, the average of the greatest rise and fall of every taken, it becomes somewhat more.

By order of the Admiral of the Navy in East India, and Inspector of the Navy.

W. DE CONSTANT REBECQUE,
Adjutant and Naval Lieutenant.

governed by the locality, the position of the sun, and the monsoons depend on it.

We may, however, state that in the Javanese sea high water is only once a day, and that besides these, long tides, or rather rises and falls, which of more or less duration last together somewhat more than twenty-four hours. Small or short tides prevail, whose very regular return depends on several causes, especially on the monsoons and the sun's solstice. They may perhaps be subjected to a certain rule, because the natives of this archipelago are able often to foretell with great exactness the return of the small tides.

Although (notwithstanding the irregular return of the hour of high water) at new and full moon at the same place the tides generally return at the same hour, yet these cannot be fixed a mean number for the different stations upon this sea.

In general, annually (although irregular) retardation of the daily period of the high water, which appears also to depend on the sun's solstice like the short or middle tides, is a singular character of the Javanese sea, or perhaps of all seas situated within an archipelago.

Besides, it must be noticed that the streams are still more irregular than the rise and fall of the water, and much depends on the prevailing winds.

Order.

E. Lucas,

Rear Admiral, Commander of H. M. Navy in East India, and Inspector of the Navy.

By order of the Rear Admiral, Commander of His Majesty's Navy in East India, and Inspector of the Navy.

W. De Constant Rebecque,

Adjutant and Naval Lieutenant.

XXV.

REPORT ON THE TIN OF THE PROVINCE OF MERGUI.

By Captain G. B. Tremenheere, *Executive Engineer, Tenasserim Division.*

["Journal of the Asiatic Society of Bengal," vol. x. pp. 845–851.]

1. The tin of this province has not been sought for since the Burmese took possession of the country from their Siamese neighbours. Under the rule of the latter, or during the period at which Tenasserim was an independent State, extensive works for tin were carried on. It occurs chiefly in the beds and banks of streams issuing from the primitive mountains, which form the principal feature of this peninsula; portions of the banks of streams in which it is found are in some instances riveted with rough stone work, to confine the water for washing operations; and the ground on either side, for many miles along their course, is penetrated by innumerable pits from eight to ten and twelve feet deep. Traces of the work of many thousands of men are evident in several places. These pits are not connected with one another, but seem to have been sunk by separate small parties of men, to whom probably definite tasks were assigned, with a view of tracing the tin ground, and of extracting the gravel with which the tin is mixed.

Their variable depth and the amount of labour expended on them is a tolerable indication of the success with which this has been pursued, and of the places in which ground might be again perhaps opened with advantage.

2. The streams themselves are rich in tin, which may be collected from their beds in considerable quantities. The process by which it has been deposited for long periods, and for many miles along the line of valleys through which they flow, appears to be in active operation at the present day. Crystals of the peroxide of tin washed down by the rivers, and deposited with sand gravel in their beds, may, by changes of the river's course during the freshes, be quickly covered with a few feet of gravel and soil. The older deposits have, as far as my observation extends at present, the same alluvial character, and it would be well in future operations to have regard to the levels in which the streams may have formerly run.

The first of these localities which attracted my attention was the Thengdon river, issuing from the primitive mountains in the immediate neighbourhood of the coal mine on the Great Tenasserim river. I visited this river in the course of my survey of the coal basin, and found pits in great number along its banks, of the existence of which I had been previously informed, though the object for which they had been dug was not known to my informant. On washing some of the gravel from the bottom of one of the pits, a small quantity of tin was found.

3. A Shan was subsequently sent there, and collected 11,889 grains of tin of the native peroxide in the course of an hour and a half. Specimen No. 1, which is equivalent to 19 ounces and 198 grains of pure tin.

4. After leaving the vicinity of the coal mine, I proceeded down the river, and was accompanied by the Shan, who had been employed in tin-works in the Straits, and to whom several tin streams in the Mergui province were known. These are situated chiefly on the Little Tenasserim river, into which they empty themselves. The first and most accessible is the Thabawlick, which unites with the Thakiet three miles above the junction of the latter with the little Tenasserim. The mouth of the Thakiet is eleven miles from the town of Tenasserim.

5. The access to this tin ground is by land in the dry season. Landing at the village of Thakiet, I proceeded on foot eight miles, and reached the Thabawlick.

6. The intervening ground is for the most part flat. After passing a marsh of some extent there is a low ridge of hills, which presents, however, no obstacle to land carriage of any description. The face of the country is, as usual, except in marshy places, thickly covered with jungle trees; but the wild elephants' tracks are open and convenient. During the monsoon, boats carrying 100 bags of rice, can ascend the Thabawlick to the place alluded to in one day. The tide is felt about six miles from its mouth.

7. Having arrived at the spot at a point known to my guide, and at which he had the previous year stationed himself for a few months for the purpose of collecting tin, I found numerous pits and old cuttings from which tin had been formerly obtained. It is found in layers of gravel immediately beneath the soil. The surface is undulating, and during the wet season streams of water could have been conveniently conducted near the excavations for the purpose of washing the gravel.

8. The guide stated that crystals of tin could be in this manner separated by the hand without the usual aid of the washing-trough. The rains not being at that time sufficiently advanced for that purpose, I did not succeed in obtaining any tin from the pits. The line of deposit of the richest stanniferous gravel has been probably influenced by many causes, and the chances of finding

it are much the same as those to which other undertakings of this nature are subject. A few trials, however, across the low ground through which the hill streams pass, would enable the speculator to follow its course.

9. The time of the tin-washer was, I found, much better occupied in seeking for tin in the bed of the river. He was assisted by one man, who disturbed the sand and gravel with his feet to as great a depth as he could thus accomplish, when a conical and shallow trough, about two feet in diameter and ten inches deep, was filled with the same, and washed in the stream by a circular motion, so as to get rid of the gravel and lighter particles, leaving the crystals of tin to collect, by their gravity, on the apex of the hollow trough. Each filling and washing occupied on an average six minutes.

One washing produced 1,041 grains of native peroxide of tin in six minutes.

Specimen No. 2, equivalent to 1 oz. 335 grains of pure tin.
One ditto ditto 1,265 ditto.
Specimen No. 3, equivalent to 2 oz. 31 grains of pure tin.
One ditto ditto 1,785 ditto
Specimen No. 4, equivalent to 2 oz. 430 grains of pure tin.
One hour's work apart from the above, 8,166 grains of pure tin.
Specimen No. 5, equivalent to 13 oz. 160 grains of pure tin.
Total of half a day's work, including the above, 25,406 grains, equivalent to 2 lb. 9 oz. 232 grains of pure tin.
Specimen No. 6 contains of the latter 13 oz. 149 grains.
The price of labour in this province is 6 annas per day.

10. The produce of a day's labour of two men would be, according to the above trial, equivalent to 5 lb. 2 oz. 464 grains of pure tin, at the cost of 12 annas, exclusive of the expenses of reduction to the metallic state. This process, from the pure state of the mineral, is extremely simple and inexpensive. The tin collected in the trough would require one more washing to remove particles of sand, &c., and charcoal is the only fuel required for its reduction.

The pieces or ingots of tin in the shape of the frustrum of a cone (specimens Nos. 7 and 8), which are manufactured at the Rehgnon mines, on the Pak Chum river to the southward, and exchanged there for goods at 4 annas each, weigh 1 lb. 2 oz. 383 grains; and their value at Mergui, where the average price of tin is 85 rupees per 100 viss, of 365 lbs. 4 annas 4 pie. The value, therefore, of 5 lbs. 2 oz. 464 grains, or the day's work of two men, would be 1 rupee 8 annas 4 pie. The cost of collecting being 12 annas, leaves 12 annas and 4 pie for the cost of the reducing process, and for profit on the labour of two men.

11. On the morning after reaching the Thabawlick I traced the tin ground for a mile in a N.N.E. direction. The pits are in some parts more abundant than in others, and I was informed that they occurred and were thickly scattered throughout the entire course of the river between that point and the hills from which it issued, at the distance of an entire day's journey, if the windings of the river are followed.

12. The pits have not been worked since the Burmese took possession of the country. At the head of the stream there are said to be the remains of bunds constructed for distributing water for washing the tin, and the posts of a house still standing, which is supposed to have been occupied by a Siamese superintendent of the work there carried on.

The season was too far advanced to enable me to prosecute my inquiries towards the hills on this occasion, and my attention was therefore confined to the spot from which I obtained the results detailed above.

13. Four other rivers emptying themselves into the lesser Tenasserim are said to produce tin, but none are so accessible as the Thabawlick.

The following are the names of these streams, with their distances from the Thakiet river:—

The Khamoungtang river, one day by the little Tenasserim, and one march inland.

Engdaw river, no road through the jungle.

Kyeng river, two days by the river, and two days inland.

Thapyn river, three days by the river, and one march inland.

From the Khamoungtang specimen No. 9, weighing 2,890 grains, was collected in ten washings, but I did not visit the place myself.

The size of the tin is larger than that collected in other places, though the produce is not equal in quantity.

14. After returning to Tenasserim I visited Loundoungin river, where tin was said to exist, but it turned out to be Wolfran sand, which had been washed down from the adjoining slate mountains, and was lying on the surface of the sandy bed of the stream.

15. In proceeding down the great Tenasserim river towards Mergui, I halted at Moetong for the purpose of visiting a tin ground which was said to exist near the range of hills to the N.E., skirting the open plain in which this place is situated. On penetrating to the hill itself I found it to consist exclusively of granite, with not a trace of another rock of any description. The dry beds of the water-courses consisted of granitic sand alone.

There were many excavations for tin on the face of the hill. Several loads of gravel from the bottom of the pits and from the beds of the water-courses were carried to the river and washed, but the out-turn of tin was very small. There is no water within convenient reach.

16. The next spot visited was Kahan, a small hill near the Zedavoun Pagoda, on the right bank of the great Tenasserim river, eleven miles from Mergui. The tin occurs here under conditions differing much from that of the localities above mentioned.

Kahan itself is the highest portion of a low ridge of hills, not more than 200 feet above the level of the river; it is composed of a soft, friable, white sandstone rock, the upper portions of which are decomposed and irregular. The surface gravel does not contain tin. It is found in the crystallized form, interspersed in decomposed granite, forming a vein about three feet wide, which is enclosed by the white sandstone rock, and dips down at a high angle with the horizon. Specimen No. 10, if its form be preserved, illustrates well the tin crystals imbedded in the decomposed granite, which are easily detached from the matrix. The specimen No. 11, from the same vein, of a yellow colour, is considered the surest indication of the presence of the mineral, and lies below the white, No. 10. Large scales of chlorite occur with it, which, as they are generally found where the tin is most abundant, is called by the natives the mother of tin. The face of the hill is in one spot scattered over with these, which appear to have been brought down from the vein with other matter from which the tin has been separated by the usual mode of washing. It will be noticed that the granite is completely decomposed, and that the crystals would be easily separated by washing. No tin has been raised here since the country came into our possession, but the locality has been known. It was worked during the Burmese rule, and valued as supplying the richest ore of tin. A Burmese residing near the spot pointed out the place where his operations ceased. He had followed the direction of the vein alluded to as well as he was able, and had driven a gallery underground in an inclined direction upwards, till the bank above fell in, when the mine was abandoned. He stated that he had procured considerable quantities of tin daily, and that he often found it in large masses mixed with the yellow ground above mentioned. Arriving at the spot where his work had terminated, I set people to excavate, and find, if possible, the vein which had been described. It was reached after about two hours' digging, at the depth of five feet from the surface of the cut in the hill in which we stood. In about a quarter of an hour a few baskets of the decomposed granite were removed down the hill, from which 3,900 grains of the crystallized peroxide of tin, equal to 63,176 grains of pure tin, specimen No. 12, were collected; and the next day 23,400 grains, equal to 2 lbs. 6 oz. and 100 grains of pure tin, were found in the same manner by one man's labour in excavating, one carrying down to the water, and a third washing.

17. This locality appears to be of very promising description, and I have little doubt that if the work were aided by ordinary

skill and means, that a tin mine here would be productive. A vein of tin is in fact exposed to the day, and would only require for a considerable period of work the precaution of well-supported galleries and shafts to allow of its contents being easily extracted.

The Kahan hill is, I conceive, an indication of a valuable repository of tin. It is but a quarter of a mile from the creek communicating with the river, which is accessible to any boats. Its proximity to Mergui offers also great facility for the procuring of labour and supplies.

18. The localities, therefore, which appear to hold out the best prospects for tin, are: first, for stream tin, the Thabawlick river and the Thengdon river; and for mine tin, the Kohan hill. They all produce tin of the same nature and quality—viz., crystals of the native peroxide, being a combination of oxygen and tin only.

19. No difficulty would be found in procuring labour from Mergui for carrying on tin-works at either of these places.

20. The location of the coal mine on the great Tenasserim river has given rise to much additional cultivation along the banks of that river, where there are many Kareen villages, from which parties on the Thengdon could be supplied. Fruit trees, not indigenous to the place, and other traces of a considerable population having once occupied its banks, are observable on this river. The banks of the little Tenasserim are thinly occupied by Siamese villages. The country in this direction, except near the banks of the river, is utterly unpeopled, and appears always to have been so.

21. Communication by water from the Thakiet to the Thabawlick tin ground is not open in the dry season, but the distance by land is short. The produce of two lines of country, that of the vicinity of the great and little Tenasserim rivers, passes the town of Tenasserim at the junction of these rivers, only eleven miles from the Thakiet, and no difficulty in procuring subsistence for working parties on the Thabawlick need be apprehended.

(Signed) G. B. TREMENHEERE, *Capt.*,
Executive Engineer, Tenasserim Division.[1]

MOULMAIN, *August* 31, 1841.

[1] [See "British Burma Gazetteer," vol. i. pp. 53. 59.]

XXVI.

REPORT ON THE MANGANESE OF THE MERGUI PROVINCE.

By Captain G. B. Tremenheere.

["Journal of the Asiatic Society of Bengal," vol. x. pp. 852, 853.]

1. During my stay at the Tenasserim coal basin, a piece of manganese ore (black wad) of good quality was brought to me by a Kyreen, who stated that it had been found accidentally in the bank of a stream called the Thuggoo, which enters the great Tenasserim seventeen miles below the coal site. Subsequently several other pieces of the same ore were brought by Mr. T. A. Corbin, assistant to the Commissioner, from the Therabuen river, five miles above the Thuggoo, and from an intermediate spot, the locality of which had been previously known, and had been, I believe, originally pointed out by Lieut. Glover, of the Madras army.

2. In proceeding down the river I visited these spots, and found at each that a valuable bed of manganese ore existed close to the surface of the country. It had been apparently cut through by the action of the streams and river before mentioned, leaving a section of the bed of ore in their banks covered only by the débris of the banks themselves. Large quantities might have been carried away, but a few hand specimens only were taken, which sufficiently show the nature of the deposit, and are fair samples of what might be easily collected.

3. The best specimens, Nos. 1 and 2, are from the Thuggoo river and the bank of the great Tennasserim. That of the Tenasserim did not appear to be at the surface of so pure a quality, but the existence of the bed being known, it is perhaps premature to pronounce it an inferior ore, from the examination of the specimens taken from a hole extending not two feet into the bank. No. 5 is a portion of manganese rock projecting into the great Tenasserim river, near the mouth of the Therabuen stream.

4. For the localities above mentioned I must refer to the sketch accompanying my report on the tin of this province recently forwarded.[1]

5. Of the extent of these manganese beds it is difficult to pronounce. The face of the country in which they are situated is flat, thickly overspread with soil, and with the densest jungle. It is not, as far as I could perceive, intersected by many streams which would afford the means of tracing the mineral deposit. The great Tenasserim river has passed through the manganese

[1] [This sketch and those referred to on p. 262 have not been reproduced.]

bed in one spot two and a half miles removed from two other points at which it occurs to the north and south, at both of which it is likewise discovered near the surface by the action of the streams Thuggoo and Therabuen, the probability therefore is, that it is an horizontal deposit, covering many square miles. But without indulging in conjecture, there is sufficient at the localities referred to, to indicate large quantities of manganese ore, which could be collected by penetrating through the soil lying above it, and immediately near the spots in which it is now exposed to the day.

It occurs in the form of the black oxide, and is the manganese of commerce. It is largely consumed in Europe in the preparation of bleaching compounds, and when pure is valuable to the manufacturers of glass.

The soft black ore, No. 1, is a hydrate of the peroxide of manganese, known under the name of wad. It contains of water two equivalents, or 9 per cent.

Iron, 1·96 grains by analysis.

Its specific gravity is 1·47.

The specific gravity of the grey peroxide No. 4 is 2·46.[1]

(Signed) G. B. TREMENHEERE, *Capt.*
Executive Engineer, Tenasserim Division.

MOULMAIN, *September* 11, 1841.

XXVII.

PARAGRAPHS TO BE ADDED TO CAPT. G. B. TREMENHEERE'S REPORT ON THE TIN OF MERGUI.

COMMUNICATED TO THE ASIATIC SOCIETY THROUGH THE SECRETARIAT OF THE GENERAL DEPARTMENT.

["Journal of the Asiatic Society of Bengal," vol. xi. pp. 24, 289.]

OF the existence of tin in considerable quantities in the province of Mergui there cannot, from the facts above stated, be much question; and from the trial of the produce of one man's labour, in a given time, there appears to be sufficient to justify every expectation of a profitable employment of labour on an extensive scale.

[1] ["British Burma Gazetteer," vol. i. p. 64; ii. p. 398. "Journal of the Indian Archipelago," vol. iii. p. 733.]

The places at which the trials were made were not selected as the best from previous information, but were arrived at more by accident than design, and the stanniferous gravel and sand collected where the bed was tolerably level, stream slack, and where the greatest deposit appeared to have recently occurred.

No part of the bed of the Thabawlick which was examined was found wholly destitute of tin, and it is reasonable to conclude that the ore exists in numerous spots, especially in the vicinity of the hills from which the streams arise, in far greater abundance than is shown above.

The results, therefore, which are given in detail, can only be considered rough approximations to the quantity of tin these streams would afford, and to the probable out-turn with an establishment properly superintended. Much economy in labour might be effected in collecting the sand and gravel for the washers, but no better mode could, I think, be adopted in separating the tin in the first instance than by people accustomed to work with the flat, conical-shaped troughs before described. The quantity obtainable would fully repay the employment of men in this operation.

The tin, as produced by the washers, should be placed on sloping boards, and water conducted over it from a trough pierced with holes for the purpose, in order to get rid of foreign particles; and it would then, after being finely pounded, be ready for smelting. Of all metals, tin is in this process the least troublesome after the ore is freed from the earthy and silicious particles with which in other countries it is often mixed.

The crystallized form in which it here occurs renders its separation extremely easy, and the whole process of stamping and dressing, which in England are tedious and expensive, can thus be dispensed with. No arsenic or sulphur being mixed with the ore, it need not be roasted before it is placed in the smelting furnace.

It would thus appear that the tin of the Mergui province offers no ordinary inducement to the outlay of capital, without much of the risk, uncertainty, and large previous outlay usually attending mining adventures.

G. B. Tremenheere, *Capt.*
Supt. of Forests, Tenasserim Province.

XXVIII.

SECOND REPORT ON THE TIN OF MERGUI.

By Capt. G. B. Tremenheere, F.R.S., *Executive Engineer, Tenasserim Division.*

["Journal of the Asiatic Society of Bengal," vol. xi. pp. 839-852.]

No. 3373.

From the Military Board

To the Hon. W. W. Bird, *Deputy Governor of Bengal.*

Fort William, *1st October* 1842.

Honourable Sir,—In continuation of our letter No. 3403, dated the 16th October 1841, we have the honour to submit in original Captain Tremenheere's letter, No. 183, dated the 27th August last, together with his second report on the tin of Mergui, and to recommend that a copy of this report, and also of the one forwarded with our letter above alluded to, with the specimens of tin, may be transmitted to the authorities in England, or to Professor Royle.

2nd. The Superintending Engineer has reported to us that he has received from Captain Tremenheere three more boxes of specimens. These we have called for, and when received in this office they shall also be forwarded to Government.

We have, &c.,

(Signed) J. H. Patton, *Chief Magistrate.*
J. Cheape, *Lieutenant-Colonel.*
T. M. Taylor, *Lieutenant-Colonel.*
A. Irvine, *Major.*

No. 183.

To Major R. Fitzgerald,

Superintending Engineer, South-east Provinces, Fort William.

Sir, — I have the honour to forward by the H.C. steamer *Enterprise* my second report on the tin of the Mergui Province, and to advise you of the despatch by the same opportunity of three boxes of specimens, the contents of which are enumerated in the report.

2. I have also to report that, on my return from Mergui, I despatched by the ship *Ann Ranken*, direct to London, a box of specimens of the Kahan tin-ore to Professor J. F. Royle, at the East India House, and forwarded by the overland mail to that gentleman a short account of the locality, and of the additional information I had collected on the subject on my second visit to Mergui.

3. Having consulted with Mr. Blundell, commissioner, as to the best mode of disposing of the cleaned tin-ore which had been received from Kahan and another locality, he was of opinion that, as it is desirable that the produce of the tin localities of the Mergui province should as soon as possible become known to English capitalists and adventurers, it would be useful to send the sample already collected, consisting of 229 viss, or 7 cwt. 51 lbs., of ore from Yahmon direct to the India House, to Professor J. F. Royle, who will take the orders of the Honourable Court of Directors in regard to its eventual disposal. The quantity, therefore, 12 cwt. 38 lbs. in all, was shipped on the 11th instant on board the *Jupiter*, Captain T. Longridge, which has sailed for England direct. Mr. Sutherland, local agent of Messrs. Cockerell and Co., to whom this ship was consigned at this port, has most obligingly procured freight for ten boxes containing the ore and specimens on board the *Jupiter*, free from all charges.

I trust the Military Board will approve of the steps which have been taken.

4. In consequence of the inferiority of the Yahmon ore, its collection from that spot has been stopped by the commissioner; but there are at present 118 viss of the Kahan ore at Moulmain which await instructions, and more may be expected, as well as a sample of the Thabawlick tin, the most productive stream visited by me last year.

5. I beg to propose that this, as well as any further samples that may be procured, be sent in like manner to the India House, when Professor J. F. Royle will, with the consent of the Court, bring the subject to the notice of private speculators or others who may be interested on the subject. The produce of the metal from the Kahan ore already sent will, I should think, repay the expenses which Mr. Corbin, the assistant commissioner, has incurred in procuring it.

The report has been submitted to Mr. Blundell.

I have, &c.

(Signed) G. B. TREMENHEERE, *Capt.*
Ex. Engr. Tenasserim Div.

P.S.—If it should be thought advisable to send a copy of the accompanying report to Professor Royle, it would afford better

information than I was able to give in my hurried communication of May last, alluded to in the second paragraph of this letter.

(Signed) G. B. TREMENHEERE, *Captain.*

Received from the Military Board by Order of Government, for the Museum of Economic Geology of India.

Having in the sixteenth and seventeenth paragraphs of my first report, of August 31 last, directed attention to a rich deposit of tin existing at Kahan, on the Tenasserim river, a few miles from Mergui, I have now to add the following information which has been since collected respecting this locality. Experimental operations have been in progress there since the end of April last, by order of the commissioner and under the direction of Mr. Corbin, assistant to the commissioner at Mergui, with a view to ascertain the value of the spot for mining purposes, and I am happy to have it in my power to state that these have been attended with complete success. More than eight hundredweight (8 cwt.) of clean ore of the pure oxide of tin ready for smelting has been collected by a gang of convicts, and was despatched from Mergui on July 18; this has been received at Moulmain, together with some bulky specimens from the same hill of macled crystals of tin or quartz, which in weight and in size of the crystals surpass anything I have seen in Cornwall or in cabinets elsewhere.

2. In the early part of May I proceeded to Mergui on the steamer *Ganges*, and on the 10th of that month visited Kahan in company with Mr. Blundell and Mr. Corbin. The survey of the hill, plan of which is forwarded herewith, was made on the following day. It will be seen therein, and by the portion of the map on the same sheet, copied from Captain Lloyd's survey of the coast, that Kahan is one of several small detached hills upon what may be termed the island of Mergui, formed by two branches of the Tenasserim, one of which debouches a few miles to the north of Mergui and the other to the south, which is divided near the sea into numerous channels by flat mangrove ground. The general surface of the island itself is of level alluvial soil, from which these small isolated hills rise abruptly unconnected with each other, and detached entirely from the high granite and slate ranges which stretch along the peninsula. Except a small connected group at the town of Mergui, these have all the same exterior character, but Kahan is the only one in which tin has been found *in situ*. It occurs here imbedded in decomposed granite, consisting of a large proportion of felspar completely decomposed, termed kaolin or china-clay, with quartz and mica,

tinworks under the Burmese Government, and Mr. Corbin has

Plan of the Tahan hill near Mergui
Shewing the position of the vein of Tin
and its probable direction **BAC** *May 1842.*

From Captain Lloyds Survey
Shewing the relative situations of Mergui & Tahan
distant by the river 11 Miles S.E.

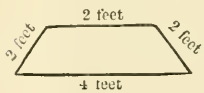
which appear to be its only constituents. A soft red sandstone is in immediate contact with the granite.

3. Along the same line of coast, in the southern part of the Malayan peninsula, in the provinces of Malacca and Johore for instance, the tin localities are similarly situated in small detached hills, having no apparent connection with the main ranges, and the ore is procured from a mixture of quartz, gravel, and china-clay, which in description very much resembles the surface soils at Kahan. At Mergui there is evidence of the destruction and denudation of granite hills, and of a considerable wash and deposit of débris from the eastward towards the coast. The small cantonment there stands on the highest of a group, composed entirely of rounded fragments of quartz and sandstone, identical with that which touches the bed of decomposed granite at Kahan, with scales of mica, white felspathic clay, likewise containing tin, which has been washed out of the gravels near the town, and from similar gravel hillocks in the neighbourhood which fringe the sea-border. Localities of stream tin near the coast south of the mouths of the Tenasserim are becoming known, and last year I penetrated to a range of hills about twenty miles from the coast, consisting exclusively of granite, from the débris of which tin was obtained. I am for this reason inclined to think that many of the small isolated hills before mentioned, as well as others in the low ground to the southward, will be found to consist, like Kahan, of nuclei of granite containing tin, which have resisted the course of events, and have been left like islands in the alluvial plain between the high ranges and the sea.

4. The Kahan hill is 1,921 yards in circuit at base, having a general direction of north-east and south-west; its highest points, C and F, are not more than 150 feet above the level of the surrounding rice-fields. There has been more abrasion and the slope is more gradual on the eastern slope of the hill than on the west; the débris on the east slope being evidently from the disintegration of the granite and adjoining sandstone rock, from which the tin may at this day be plentifully procured a few feet below the surface. Some very rich specimens of the mineral were taken from a pit dug by the convicts about five feet deep at the point C in the plan. This face of the hill, as well as the north-east and south-west extremities near the base, have been dug into pits by the Burmese in former periods, and washed for tin in several places. Near the two last points there are distinct traces of tanks which have been used for washing and separating the ore; the ground is seen there and along the eastern slope strewed with glittering plates of mica nearly an inch square, and covered with remains of the soft granitic matrix from which the ore has been extracted. A few persons now at Mergui were engaged here in tinworks under the Burmese Government, and Mr. Corbin has

ascertained from them, that those who understood the work and laboured ten hours a day collected one and a half viss of clean ore per man; but a very rich vein was not unfrequently met with from which more than double that quantity could be obtained in the same time. No machinery was used, and the tin was procured by surface workings only. The produce, or clean peroxide of tin was sold on the spot at the rate of five or five and a half ticals of silver for ten viss of ore, which yielded on an average seventy per cent. of metal. The metal was at that period selling in the bazaar at 100 ticals of silver for 100 viss of tin. There are 100 ticals in a viss, and 100 viss = 363 lbs. avoirdupois.

5. On arriving at Kahan we found that the working party had reopened the bed of ore at the spot at which I found it last year, on the east face of the hill, marked A in the plan. At this spot, which is fifty-five feet above the level of the rice-fields and 600 feet horizontal distance from the foot of the slope, a pit twelve feet deep had been dug, the lower part of which was sufficiently roomy to allow a man to work easily with a pickaxe. The pit was an irregular four-sided figure of the following shape and dimensions, the three short sides being innermost next the vein, and apparently comprising its total thickness at that point as far as could then be ascertained. All the three sides and the entire depth of the pit consisted of decomposed granite full of small bunches and strings of tin ore of varying length and thickness, composed of crystals of the pure oxide of tin, aggregated loosely together, and easily separable from the matrix in which it is imbedded. This is extremely soft and friable, and I was able, with the sharp edge of a Burman "daw," to cut down the sides of a pit, and expose fresh bunches of ore at every stroke. It is also remarkable for the large scales and crystals of mica it contains, the plates of which are readily separated, and for the abundance and whiteness of the kaolin, or decomposed felspar, of which the mass is chiefly composed, and to which the quartz appears to bear but a small proportion. Red sandstone touches this decomposed granite, and in the pit alluded to looks like the enclosing rock of a vein which is only slightly inclined from the vertical. A good sample of the ore has been collected here, and some rich specimens showing it in the matrix as taken from the pit.



6. The convicts had also been employed sinking pits near the base of the hill in other places, and had succeeded in obtaining at the north-east extremity, at the point C, some very rich specimens of the ore, embedded in material similar to that above mentioned, angular as before, and apparently from another part of the vein, or very near it. This was afterwards placed beyond much question, for at the point B at the south-west extremity of

the hill, and 280 feet from A, but on the reverse slope, the vein was again exposed to the day by a few hours' digging, and tin collected while we were there. This point is 43 feet above the level of the new fields on the west, at 550 feet horizontal distance from them, and the Burmese had worked there about twenty years ago, as was apparent by the washing tank, situated on the level ground near it. It will be observed on the plan that the points A, B, C, turn out to be in a direct line; A and B correspond very closely both in substance and in elevation, and are doubtless part of the same vein, or mass of tin-bearing rock; and it seems probable that this will be found to extend near the surface along the whole length of the hill, or 600 yards, accessible by mere pit digging, or by a straight gallery throughout its whole extent. It has been seen in thickness three and a-half feet, and in depth twelve feet; but its entire breadth and depth is, in the present stage of the workings, involved in some uncertainty, and can only be ascertained by mining operations systematically conducted. The upper decomposed portions of granite which have been exposed to view at the surface, appear but indications of a most valuable repository of tin. The sandstone in contact with it is highly inclined to the horizon and holds no water, but this is procurable within three or four feet of the surface at the base of the hill, and could be easily raised for washing the ore by means of a Chinese wheel, or by the chain and rag pump, or by any simple process. The hill itself is not ten minutes' walk from the main river, and a tidal creek touches its south-west extremity near B, and another the north-east at C, by either of which the produce of a mine can be carried away at high water. The northernmost creek is accessible by large boats to within 300 yards of the base of the hill.

7. On June the 15th Mr. Corbin writes that two pits had been sunk to the depth of 18 feet on the ridge to the left of the small pagoda, between the points B and A, in which the stratum was found to be very thick and rich in tin. A pit near the pagoda itself has been sunk to nearly the same depth, and a very good thick stratum of tin soil found. Another on the east face, half-way down the slope from A, where work had been formerly carried on, had also produced some very good ore; but as the ground had been much burrowed in former times, the surface soil was not very safe. Mr. Corbin, on the above date, despatched to Moulmain 80 viss of the clean ore, which has been since received. On the 18th July this gentleman informed me that, owing to heavy and incessant rain for fifteen or twenty days successively, the whole of the pits, having no artificial support, had fallen in, before which, however, 170 viss more of cleaned ore had been collected, as well as the large specimens before alluded to. These are specimens of great weight and richness, consisting of large

macled crystals of tin on quartz, and contain more tin in proportion to their bulk than any specimens I have before seen. The largest, which measured about 14 inches square by 12 deep, was so heavy as to require some exertion to hold it steadily in both hands. Mr. Corbin had directed the whole of the upper soil at the pits on the ridge between B and A to be removed, and the convicts are still engaged in collecting tin from them. The stratum of tin soil, he says, is exceedingly thick here; he has ascertained it to be upwards of 12 feet. It is found, Mr. Corbin states, immediately "below the sandstone rock, and consists principally of quartz and mica, with apparently a small proportion of the sandstone, giving it a reddish colour. In some spots where the mica predominates it appears dark yellow; in this the ore is found scattered in masses, but lower down it assumes the general form of whitish clay, where the ore is very little seen but in washing. The hill in this neighbourhood was in former days much burrowed, a pit with short galleries being met within a very few feet.

The following is a list of specimens accompanying this report, which are illustrative of the produce of the Kahan :—

No. 1.—A box containing about twenty-one viss of clean ore of the native peroxide of tin.

No. 2.—Specimens of various sizes, not selected for their richness, but showing the mode of occurrence of the tin ore in small strings and bunches, imbedded in the matrix of decomposed granite; some of these consist of nearly pure kaolin or soft felspar, in others mica and quartz predominate.

No. 3.—Specimens of pure kaolin, from the upper part of the excavations at A and B.

No. 4.—Specimens of macled crystals of peroxide of tin or quartz taken from a pit D, between B and A. With this, several similar and larger pieces were found in the loose soil at the bottom of what was apparently an old Burmese shaft, and though Mr. Corbin writes, on the 9th of August, that no more had been met with, it appears from the extreme richness of the specimens to be a valuable indication of what may be found at greater depths than have been hitherto penetrated. They existed probably in a cavity of the granite mass, before it was disintegrated by atmospheric causes, and wherein the large crystals of quartz and tin were deposited.

8. Ore rich in tin has now been found at seven different parts of the hill, chiefly in the line B A C, but near A, at more than 100 feet to the east of this direction; and Mr. Blundell, who has just returned from Mergui, informs me that Mr. Corbin is pursuing his excavations to the westward of this line, towards the highest part of the hill, and that the farther they proceed in this direction, the richer the ore becomes. This is scarcely, therefore, the

character of a vein of ore, but may be more properly termed a bed of decomposed granite, containing tin in great abundance, in small bunches and strings throughout.

9. The mode of occurrence of the ore here more nearly resembles that of Banca than any of which I am informed. The matrix in which tin is found at the latter, is said to be somewhat harder than that of Kahan, and to require pounding or stamping before it can be separated effectually; but the situation of the ores are, I understand, very similar. Mr. O'Reilly, a gentleman now residing at Amherst, was permitted by the Dutch authorities a few years ago to visit the Banca mines, and has described to me that the matrix and ore are there dug out of pits in the face of a hill not 300 feet high, and that after being pounded it is brought within the action of a stream of water, which is led from wells and a small spring on the higher levels. No machinery is used, but the Chinese miners penetrate after a time to a bed of solid selix, where the tin is lost altogether. Mr. O'Reilly has seen the specimens and samples of tin from Kahan, and pronounces them fully equal to Banca tin, and that the grain has precisely the same glittering appearance when held to the light by which the Chinese miners distinguish good ores.

10. In addition to the sample of eight cwt. of clean ore collected at Kahan, 176 viss, or more than five cwt. have been received from near Yahmon, a conical and isolated hill in the Nunklai district, on the opposite or south side of the Tenasserim, and about a day's journey by water from Kahan, bearing south-south-east from Mergui, distant about twenty miles. The ore is found here as stream tin, in tidal creeks, about three miles from the hill, its colour darker than that of Kahan, being nearly black, which is caused by a mixture of Wolfram sand, or tungstate of iron.

11. Of this locality Mr. Corbin writes to Mr. Blundell on the 24th of April:—"The following morning we proceeded from Kahan to Yahmon in the Nonklai district, where we arrived at 5 p.m., it having taken four and a half hours' hard pulling to get there from the Kywai Kuran village, and examined one of the localities (that which had been worked during the Burmese Government); here the soil was rich in ore. The next morning we visited another place in a different nullah, a short distance from the former, where also the tin appeared to abound; but the Chinese objected to the two last spots, in consequence of the want of a command of running water, for they make a decided objection to wash out the soil by hand. Of the three places, they gave the preference to Kahan; one of their reasons in favour of this was its propinquity to the town and the main river for procuring their supplies. The tide flows to both of the Yahmon sites where the nullahs appear to terminate, and during the spring tides the water recedes to a considerable distance from where I

landed, leaving the nullahs dry at this season; their sides are muddy, but in the middle is a small clear gravelly space in which tin ore is found. The Chinamen say this ore is precisely of the same description as that of Kahan, but from the accounts of the natives it always sold at ten per cent. less.

This inferiority, which is marked by its selling price, is owing to the mixture of Wolfram sand before mentioned, which from being very nearly of the same specific gravity as tin, is difficult to separate. It has likewise a strong sulphureous smell, and would require to be roasted before it is put in the smelting furnace. The presence of tungstate of iron with stream tin in the Mergui Province is very common; it has apparently an extensive distribution in some of the minor ranges near the sea, and becomes mixed with the tin in the beds of streams, after both are detached from their original sites. Nearly all the specimens of ore brought by Mr. Corbin last year from the Malewan, on the Packhan river, contain it in such abundance as would most likely interfere materially with the profitable working of tin in many of those localities. It was not present with the stream tin procured last year from the Thabawlick, the Thengdon, and other rivers east of the town of Tenasserim.

12. Two hundred viss of the Yahmon tin-ore, in addition to what has been already mentioned, is expected by the next opportunity from Mergui, as well as a sample from the Thabawlick river, which I visited and reported on last year. Some Malays have been there collecting the ore, and have agreed to supply it at half the selling price of smelted tin, or about forty-five rupees per 100 viss.

An analysis of the Yahmon ore gave per cent.—

Of metallic iron	4·69
„ tungstic acid	29·46
„ sulphur	1·37
Earthy residue and tin not examined .	64·48
	100·00

The Kahan ore gave on analysis 0·91 per cent. of metallic iron only, and is believed to be free from the tungstate of iron and sulphur.

13. No accurate statement can be made of the probable cost of obtaining the cleaned ore at Kahan from the outlay which has been lately incurred. Convicts alone, who were before quite unaccustomed to the work, have been employed, and for this labour no cost appears. Chinese labourers, who understand the process of washing and smelting, are to be procured in any numbers, and many who have heard that enquiries have been lately on foot concerning tin have come already from Tacopah to Mergui in search

of work. They arrive in poverty, and are glad to accept the wages of common coolies in plantation work, &c., till better employment is to be had. Advances of money for subsistence, and to enable them to make the requisite preparations for getting the ore, both in tools, wheelwork, troughs, &c., are only necessary for commencing operations to any extent at Kahan, or at any of the most available sites of stream tin. The wages of Chinese miners in the peninsula are said to be from five to eight dollars per month; but they would be found ready to stipulate for the payment of their labour by a certain fixed proportion of the produce. At the Dutch mines I am told they are remunerated by forty per cent. of the actual produce, the remaining sixty being the clear profit and property of Government, which has been found at Banca and in the Straits to be the best mode of paying them. They are in mining operations, as well as in common labour, more skilful and industrious than any class in the East which I am acquainted with. By rule 4th, concerning grants of waste forest and jungle land, published at Moulmain on 10th May 1841, a tax not exceeding ten per cent. is leviable on the part of Government on the gross produce of mines worked within the limits of any grant.

The freight of tin from Mergui to Penang with the present craft (China junks), plying between the two places, would be two rupees four annas per 100 viss of 365 lbs. Freight from Penang to China by the Penang price current of April last was 55 to 65 cents per picul. To Whampoa about 50 cents more than to Lintin.

From Penang to Calcutta, eight annas to one rupee per picul.
„ „ to Bombay, ten annas to one rupee „
„ „ to London, £1 per ton of 20 cwt.

The freight of the metal from Mergui to London, viâ Penang, may be taken at *2s. 6d.* per cwt.

14. The annual produce of the Banca mines was stated by Sir S. Raffles in 1827 to be 30,000 piculs, but owing to the substitution of late years of Chinese workmen throughout, to whom the mines are farmed, for the less productive labour of the natives, the out-turn has been since nearly doubled. Mr. O'Reilly informs me that in 1841 the actual produce was 54,000 piculs, but a considerable reduction in the amount obtained from the Malayan peninsula, south or Junk Ceylon, has taken place within this period, chiefly owing to dissensions amongst the petty chiefs on the east coast. In 1835, 34,600 piculs were assigned by Ensign Newbold as the annual produce of these states, but the total amount from thence may now, I understand, be estimated at about 22,000 piculs, and from Banca,

54,000

76,000 piculs, or 4,523 tons.

In this most extensive tin region, comprising the whole of the Malayan peninsula, the most extensive known repository of this metal, there is sufficient evidence collected that many convenient and valuable localities exist within the limits of our own territory. The northernmost point at which it is known in the Tenasserim provinces is amongst the highest ranges near Tavoy, where in the Tounq-byouk valley it has been seen by the Rev. Mr. Mason, and traces of former works observed above Kaboung and on the Talinqguwa, twenty miles north of Tavoy. A specimen of very small grained tin from this locality has been recently brought from Tavoy by Mr. Blundell. It was washed out of alluvial soil, and stated to occur more plentifully and sometimes in pieces at greater depths. The locality is said to be near granite hills, and from the occurrence of tin with the alluvial soils, it exists probably in great abundance in the hills themselves. To the northward of this I have not heard of it, but in Karreenee, the country of the red Kareans, on the Burmese side of the Salween river, in 18 north latitude, the metal has been obtained by Captain Warwick from the natives at the rate of about twenty-five rupees per 100 viss, who states that a considerable quantity of tin is obtainable there at that cost by indirect barter, for beads, broad cloth, and coloured cottons. It appears by a good specimen of rolled tin stone in the possession of a native at Mergui, which Mr. Blundell has shown me, that near the head of the Palouk river, about thirty miles north of Mergui, tin ore exists, and the specimen exhibits tin interspersed in a rock very much resembling the ore of the Cornish mines. The existence of tin in the Palouk river was known, and the late Dr. Helfer proceeded on one occasion to examine it, but owing to indisposition was obliged to return without effecting his purpose. Between the neighbourhood of Mergui and the Pakchou river, our southern boundary, it also occurs at Bokpyeen, and in many streams near the coast, but has not been much sought for, as this part of the province is an uninterrupted jungle, with scarcely any inhabitants.

15. All the tin sites in the Mergui province are believed to be healthy. Kahan is situated on the bank of a large river, where it is more than a mile broad, and a few miles only from the sea; while the spot itself is open, and the level ground entirely free from jungle. The coal mine lately worked on the Tenasserim river, sixty-four miles from Mergui, is farther inland than any of the tin localities yet known, and the country around is clothed with jungle to the summits of the highest hills; the parties of convicts employed there from December 1840 to October 1841 were not subjected to any remarkable degree of sickness, if their daily employment at hard labour and consequent exposure is taken into consideration. The European overseers and mechanics under Lieut. Hutchinson were perfectly healthy, and the following table

represents the proportion per cent. of native convicts reported sick at Mergui for nineteen months successively, compared with the proportion at the coal mine during the same period.

		Proportions per cent. reported sick during the month at Mergui.	Proportions per cent. reported sick during the month in the jungles.		Remarks.
April . . .	1840	$10\frac{5}{17}$	$24\frac{4}{16}$	1840	The number of convicts from which these proportions were determined varied at Mergui from 136 to 230, and in the jungles from 94 to 204.
May	,,	20	$21\frac{123}{137}$	,,	
June	,,	$26\frac{6}{7}$	$27\frac{1}{137}$	,,	
July	,,	20	$24\frac{2}{5}$	,,	
August . . .	,,	$15\frac{35}{61}$	$12\frac{16}{57}$	,,	
September . .	,,	$11\frac{1}{59}$	$27\frac{87}{89}$	,,	
October . .	,,	$11\frac{25}{91}$	$18\frac{1}{3}$	,,	
November . .	,,	$14\frac{11}{81}$	$28\frac{34}{97}$	,,	
December . .	,,	$16\frac{4}{37}$	$35\frac{74}{111}$	,,	
January . . .	1841	$6\frac{15}{74}$	$11\frac{167}{553}$	1841	
February . .	,,	$3\frac{59}{417}$	$16\frac{1}{2}$	,,	
March . . .	,,	$9\frac{43}{73}$	$16\frac{16}{49}$	,,	
April . . .	,,	$7\frac{27}{59}$	$26\frac{182}{192}$	,,	
May	,,	$8\frac{13}{39}$	20	,,	
June	,,	$14\frac{21}{117}$	$27\frac{6}{17}$	,,	
July	,,	$7\frac{39}{73}$	$9\frac{99}{189}$	,,	
August . . .	,,	$9\frac{3}{8}$	$16\frac{8}{87}$	,,	
September . .	,,	$13\frac{53}{219}$	$8\frac{76}{103}$	,,	
October . .	,,	$8\frac{16}{93}$	$6\frac{18}{47}$	,,	

The receipts of tin ore up to this date are—

From Kahan, corresponding with sample No. 1.				
,,	despatched from Mergui,	15th June	80 viss	
,,	ditto	ditto	18th July	177 ,,
,,	ditto	ditto	17th Augt.	118 ,,
	Total		375 viss, or 12 cwt. 24 lb.	
From Yahmon, corresponding with sample, No. 2.				
,,	despatched from Mergui,	18th July	166 viss, or 5 cwt. 15 lb.	
	Total from both places		541 viss, or 17 cwt. 69 lb.	

(Signed) G. B. TREMENHEERE,
Capt. Bengal Engr. Ex. Engr. Ten. Div.
(True copies)
H. V. BAYLEY,
Depy. Secy. to the Govt. of Bengal.

MOULMEIN,
27th August 1842.

We have lost no time in giving this valuable report and its plan to the public, and we should add here, that the specimens have been divided ; a part having been sent home to the Hon. the Court of Directors, and a part retained for the Museum of Economic Geology.—ED.

XXIX.

ANALYSIS OF IRON ORES FROM TAVOY AND MERGUI, AND OF LIMESTONE FROM MERGUI.

By Dr. A. Ure, *London*.

Communicated for the Museum Economic Geology of India by E. A. Blundell, Esq., *Commissioner, Tenasserim Provinces*.

["Journal of the Asiatic Society of Bengal," vol. xii. pp. 236–239.]

On the right bank of the Tavoy river, opposite the town of Tavoy, runs a range of low hills at a distance from the river varying from one and a half to three miles, formed apparently of magnetic iron ore. The range extends a distance of five or six miles. At about its northern extremity, on the summit of a hill about 150 feet in height, is found the large projecting rock mentioned in page 28 of Dr. Helfer's second report. This rock is about one and a half mile distant in a direct line to the bank of the river, to a spot itself distant about three miles north of the town of Tavoy. This rock is highly magnetic on its northern side. (According to the expression of the natives, it is alive on its northern and dead on its southern side.) The hill appears entirely formed of this ore, and at the bottom of it are to be found the rolled masses of from two to twenty lbs. mentioned by Dr. Helfer. Between the hill and the river are rice fields, through which runs a small nullah, and having between the hill and the fields about a quarter of a mile of high ground well adapted for buildings, and on which high ground are found the rolled masses or boulders above alluded to. The nullah can convey boats of three to four tons half-way through the rice fields. The same description answers for the whole extent of the range of low iron hills, having here and there small nullahs communicating with the river. This ore was once worked by the Burmese during the time of an expedition against Siam, for iron to make swords, knives, spears, and other weapons. People were sent from Ava to smelt it, but the process appears unknown to the Tavoyers. There are still to be seen the pits in which it was smelted, with the scoriæ around the edges. The quantity of the ore appears inexhaustible.

Limestone is procurable in the province, and no doubt many localities of it will be discovered. The only one yet properly ascertained exists about fifteen miles to the eastward of Tavoy, accessible by water to within a distance of two miles by small boats of half a ton burthen. Between the locality and the stream

the land is level and high, affording facility for a road. The quantity is abundant.

Charcoal may be made with ease, owing to the abundance of excellent wood in the country adapted to it.

No. 1.—Pieces of ore knocked off the large rock mentioned by Dr. Helfer in page 28 of his report.

No. 2.—Pieces of ore dug up in the neighbourhood of the above large rock.

No. 3.—Rolled masses of iron ore picked up on the high ground, between the hill and the rice field.

Mergui.—About ten miles S.W. of the town of Mergui is an island, comprising a hill about 200 feet in height, formed apparently of iron ore. The island is perfectly accessible to boats of every description, and you land on large masses of rock, which prove to be the iron ore from which the soil has been washed away. The hill rising abruptly from the water, may be about a mile in circumference, and is wholly formed of the ore, having a rich bed of soil. A similar island, equally accessible, is formed about four miles to the southward of the one above mentioned. It is not known that this ore has ever been worked, and the process seems unknown to the people of Mergui.

Limestone is found in several accessible localities on the main branch of the Tenasserim river, not far above the old town of that name. Specimens accompany the iron ore.

No. 1.—Boulders of iron ore picked up at the landing-places of the island above mentioned,

No. 2.—Pieces knocked off large masses at landing-place.

No. 3.—Pieces dug up on the hill.

No. 4.—Specimens of limestone.

LONDON, 13 CHARLOTTE STREET, BEDFORD SQUARE,
26th Nov. 1842.

I have now the pleasure of handing you the details of my examination and analysis of the several ores of iron and the limestones from Tavoy and Mergui, with which I have been almost constantly occupied during the last fortnight.

1st. Compact magnetic iron ore.—Tavoy No. 1.

Colour iron black with a metallic glimmer; fracture fine grained; possesses magnetic polarity; specific gravity, 3·511; compared to water = 1,000.

It yields in analysis the following constituents:—

Peroxide of iron	86·5	equivalent to 60·55 metal.
Silica with a trace of phosphate of lime . . .	3·5	
Water	10·0	
	100·0	

It contains no manganese or titanium.

2nd. Compact magnetic iron ore.—Tavoy No. 4.

External and magnetic characters as above.

Specific gravity, 3·462.

It yields in analysis—

Peroxide of iron	86·0	equal to 60·2 metal.
Silica, with a trace of phosphate of lime. . . .	0·9	
Water	13·1	
	100·0	

It contains neither manganese nor titanium.

3rd. Tavoy ore No. 2.—External characters as above.

Specific gravity, 4·369

4th. Tavoy ore No. 3.—Characters as above, as to aspect and magnetism.

Specific gravity, 4·100.

The two latter samples are even richer than the former, as is evinced by the specific gravity, but they are all quite rich enough and pure enough for making the best quality of bar-iron and steel.

I instituted two elaborate sets of experiments in search of titanium, which, when present in any notable quantity in iron ores, renders the iron made from them red-hot, but I found none in the above ores. In the first set of experiments I treated the ore as follows:—I added to its solution in nitro-muriatic acid so much tartaric acid as to render all the oxides unprecipitable by ammonia. I next added ammonia in excess, and afterwards hydro-sulphuret of ammonia, which throws down all the metals except titanium. The whole being thrown upon a filter, afforded a colourless liquid, which evaporated to dryness, and carefully ignited in a platinum cup, left no trace of titanic acid, which it would have done had any of that metal existed in the ore.

The second set of experiments for titanium consisted in transmitting sulphuretted hydrogen in excess through the nitro-muriatic solution of the ore, in then adding ammonia in excess, the effect of which is to precipitate both the iron and titanium. But the precipitate when digested with sulphurous acid, has its iron dissolved, while the titanic acid will remain undissolved as a white powder. By this means also no distinct evidence of titanium could be obtained.

5th. The limestone from Tavoy has a specific gravity of 2·7, and is a perfectly pure, semi-crystalline carbonate of lime, akin to statuary marble. It is well adapted to act as a flux in the smelting of iron.

The three samples of iron ores from Mergui are brown hema-

tites, and from their density will afford good iron in the smelting furnace.

6th. Mergui ironstone No. 1, specific gravity, 3·37.
7th. Ditto No. 2, ditto 3·18.
8th. Ditto No. 3, ditto 3·32.

The limestone of Mergui has a specific gravity of 2·7 ; it is a pure calcareous carbonate. I analysed both the limestones.[1]

I am, dear Sir,

Yours truly,

(Signed) ANDREW URE.

XXX.

REPORT OF A VISIT TO THE PAKCHAN RIVER, AND OF SOME TIN LOCALITIES IN THE SOUTHERN PORTION OF THE TENASSERIM PROVINCES.

By Capt. G. B. TREMENHEERE, F.G.S., *Executive Engineer, Tenasserim Provinces.*

WITH A MAP AND SECTION OF THE PENINSULA.

["Journal of the Asiatic Society of Bengal," vol. xii. pp. 523–534.]

1. THE boundary between our provinces and the Siamese territory at the south and western extremity of Tenasserim has never been distinctly defined.

After a correspondence with the Court of Bangkok, it had been arranged that an agent on their part should meet Mr. Commissioner Blundell on the Pakchan river on March 1, where evidence was to be heard on both sides, and the question finally settled. The departure of the commissioner from Maulmain was unavoidably delayed till March 4. At Mr. Blundell's request, I formed one of his party in the H.C. steamer *Hoogly*, and touching at Amherst and Mergui, entered the Pakchan river on March 10.

2. The entrance is about two miles wide, affording ample room and deep water for the admission of ships of the largest burthen. The numerous islands which range along either shore of this fine river, and the bold hilly country beyond, afford views which would be thought picturesque in any country. For the

[1] ["British Burma Gazetteer," vol. i. pp. 36-66 ; ii. 388.]

first ten miles it is very slightly contracted in breadth, and has little of the character of a river, but of a capacious inlet of the sea. To this distance we carried not less than four fathom water, but for the most part six and seven. After proceeding thus far, we turned into the Malewan river, and anchored at about one and a half mile in a north-west direction, for the purpose of communicating with the British settlement of that name. The next day, proceeding eight miles higher up the main river, we anchored in three fathoms abreast the confluence of the great Kaman river, beyond which, the river being much contracted by sandbanks, the steamer could not proceed. From thence we moved in boats, and arrived at Pakchan in eight hours—the distance, as surveyed by Captain R. Ross, commanding the *Hoogly*, being thirty miles. The river narrows gradually, and from the great Kaman passes through level country; approaching Pakchan, hills again appear, and it becomes very tortuous, at which spot it is about fifty yards broad, with a rise and fall of tide of eight feet at the springs.

3. The governor of Pakchan, a Chinaman, informed Mr. Blundell that the chief of Peechapooree, who had been deputed by the Siam Government to meet him, had arrived at Pakchan punctually on March 1; after waiting ten days, he had retired to Chimpohun, on the plain of the east side of the peninsula. It was therefore determined that Dr. Richardson, assistant to the commissioner, should go to the chief and invite his return to the projected conference. Accordingly, Dr. Richardson and myself, with a few of our own followers, commenced our journey on foot a little after five A.M., the prospect of crossing the peninsula being an object of peculiar interest.

Following generally the course of a small stream called the Kraa, which joins the main river at Pakchan, we proceeded by a good and clear road of ten to fifteen feet wide through the jungle towards the Kraa Pass, distant three miles in a north-east direction. The road here turns to the south of east, and the pass, which is not intricate, leads for some distance along the bed of the rivulet, and terminates to the south-east at six and five-sixth miles from Pakchan. Here the greatest altitude is attained between the valley of the Pakchan and the alluvial plains on the east side of the peninsula, for soon after, at 8.7 A.M., we came upon the waters of the Chimpohun, running in an easterly direction towards the Gulf of Siam; the country then begins to slope gradually to the east. At 8.37 A.M. we halted two hours for refreshment by the side of the Chimpohun, at a spot where there are three or four houses, having the name of Bantapakchan. We here observed a canoe, which can be floated to Chimpohun during the rains, and if necessary to the gulf itself. From thence the road continues good. It crosses the Chimpohun very frequently, besides many dry ravines which communicate

with it; the banks of these, where crossed by the road, have not more than thirty or thirty-five feet of abrupt declivity, the rest of the ground being very regular, and partaking of the general slope of the country. At 3 P.M., having walked seventeen and a half miles, we fell in with an elephant, and inducing the driver to take us on, were relieved from further personal exertion. The first eight miles of the eastern slope of the pass have the greatest fall, after which the descent is easy till we reach the alluvial plain of Chimpohun. Nearing this plain, at 5 P.M. we observed the influence of the tide in the river, and at 5.30 reached Chimpohun. The plain is covered with rice-fields, bearing signs of abundant crops, as far as could be observed, on all sides, and is bounded by a range of hills bending in a curved direction to the south-east. Some of these, near the plain, have much the same isolated and abrupt character as the limestone hills near Maulmain. After half an hour's delay, the headman forwarded us on fresh elephants to the camp of the chief, which we found at Tasapaow, three and a half miles distant further east, and reached it at 8 P.M., the entire distance between Pakchan and Tasapaow being nearly twenty-eight miles.

4. We were here hospitably treated, and visited the chief early the following morning. After a slight dinner, Dr. Richardson succeeded in inducing him to return and confer with Mr. Blundell, whom he expressed himself anxious to meet. His encampment was on the right bank of the Chimpohun, where the river is about 180 yards broad, running through a level country over a sandy bed free from obstructions, and with a rise and fall of tide of about six feet at the springs. The depth of water at 8 A.M. on March 13 was six feet, with a rising tide. It communicates directly with the Gulf of Siam, from which, by the best information, we were distant five miles. A sea-going boat of about thirty tons was under a shed at this spot; but junks trading on the Siam coast do not pass beyond Tayang, a town four miles east of Tasapaow and within a mile of the sea. Time would not admit of our going to the coast, as Mr. Blundell and the rest of the party were expecting our speedy return to Pakchan. The distance of Tasapaow from the sea, as above given, may I think be relied on, having been obtained from one of our own people, who had formerly resided some time at Chimpohun. The protraction of my route also, with these five miles added, makes the east coast of the peninsula correspond, within one mile short, with its longitude by Horsburgh's chart. The distance therefore between Pakchan and the coast of the Gulf of Siam is thirty-two miles, and the entire breadth of the peninsula at this point from the Bay of Bengal to the Gulf is as nearly as possible sixty miles.

5. After receiving the chief's return visit, elephants were provided to take us back to Pakchan. We started at 11 A.M., and

halted for the night on the Chimpohun river at a shed about half-way, named Tacumlae, and reached Pakchan the next day, March 14, at 2 P.M. On the way back I paid particular attention to the inclination of the country, with a view of forming a probable estimate of the elevation of the top of the Kraa Pass, where the head waters of the Kraa and the Chimpohun rise, and I am of opinion that the difference of level between that point and the plains at Chimpohun and Pakchan does not exceed 450 feet. Along the entire route between these two places, or twenty-three miles, running water was crossed thirty-two times, besides which there are numerous dry nullahs before mentioned, which would be occasionally unfordable during the rains.

The road is never more than 100 feet above the bed of the river course; it has an easy slope, and except at the crossings of the streams and nullahs is now passable by guns; but no part of the road would during the dry season present any difficulty to the passage of an army.

6. Some speculations having appeared lately in the columns of the *Maulmain Chronicle*, on the practicability of carrying a canal across the isthmus of Kraa, whereby ships might pass by a short route to India and China, instead of round the Malayan peninsula, I am induced to offer some observations, under the idea that inquiries on the subject might probably be made at some future period.

From the tidal waters of the Pakchan flowing westward to the Bay of Bengal, to those of the Chimpohun running eastward to the Gulf of Siam, I paid as much attention to the slopes and facilities for such a work as the nature of our journey allowed, and while no work of this description, where the physical difficulties are not absolutely insurmountable, ought perhaps to be pronounced impracticable, I have no hesitation in saying that the scheme alluded to is not in my opinion reasonably practicable.

On a rough estimate, I assume 450 feet as the greatest rise of ground between the two seas, and if we suppose the line of road to be 100 feet above the level of the bed of the water-courses of the pass as they now exist, and deduct that from the above, it will leave 350 feet of excavation, chiefly in solid rock, to be effected at the head of the pass, to which the depth of the ship channel would remain to be added.

As no ships come higher up than the second anchorage of the Hooghly, or twenty-five miles in a direct line below Pakchan, the length of the canal would be increased by that distance, as well, in all probability, by the five miles beyond Tasapaow, as the rivers on that side of the peninsula are known to be generally obstructed by bars of sand. Both the Kraa and Chimpohun rivers are very small streams at this season, running over rocky beds, and no supply of fresh water could, I think, be depended on from

Approximate Section of ground shewing the lowest existing level between Pakchan and the Gulf of Siam distance 32 miles
The scale for heights and distances is the same

either, to feed such a canal, or that would be sufficient at any period of the year to supply the loss by absorption and evaporation. An approximate section of the ground is given on the accompanying plan, by which it will appear that the probable cutting for such a canal, supposing its width 100 feet and of rectangular form, would be on the lowest calculation as follows :—

	Length.	*Breadth.*	*Depth.*		*Cubic Feet.*
From the Great Kawan River to Pakchan . . .	25 miles	+ 100 feet	+ 60 feet	=	870,000,000
From Pakchan to top of Kraa Pass	6¾ ,,	+ 100 ,,	+ 380 ,, ÷ 2	=	685,520,000
From top of pass to a spring marked in the map . . .	16 ,,	+ 100 ,,	+ 380 ,, ÷ 2	=	1,605,120,000
From the spring to Tasapaow	5 ,,	+ 100 ,,	+ 180 ,,	=	264,000,000
From Tasapaow to the gulf .	5 ,,	+ 100 ,,	+ 50 ,,	=	132,000,000
					3,556,640,000 { Solid feet of excavation

which, supposing that one man excavated during the entire work twenty cubic feet per day, and placed it where it was eventually to remain, and that one man's labour is there worth one rupee per day, would cost eighteen millions sterling.[1]

7. Having remained at Pakchan during the 15th for the purpose of the conference between the Siam chief and Mr. Blundell, which took place on the morning of that day, we left the place the same evening, and rejoined the steamer again in eight hours. On the 16th we dropped down to our first anchorage, and on the same day visited the settlement of Malewan,[2] which is on a branch of the Malewan about seven miles from its junction with the Pakchan. On the flood tide junks of twenty or thirty tons can approach it: but at low tide there is no water to float the smallest canoe.

Malewan is but a recent settlement, and is particularly interesting as being the only spot in these provinces where people have located themselves for the purpose of collecting tin. Although inhabited only for three years, there are already about 100 Chinese, 160 Malays, and about as many Siamese on the spot; more than 500 in all, including women and children. The surface of the country is pleasingly undulated, having a range of high hills between it and the sea. It possesses a rich moist soil, highly favourable to cultivation. The sugar-cane shown to us was of large size, and the areca tree, which in other parts of Tenasserim does not fruit till the seventh or eighth year, was seen here in flower after being three years in the ground. Two heavy falls of rain occurred while we were in this neighbourhood, and it would

[1] [With this opinion as to the impracticability of a canal across the isthmus agrees also that of Commander A. J. Loftus; see his "Notes of a Journey across the Isthmus of Kra" (Singapore, 1883).]

[2] [For a more recent description of Ma-lee-won, see "British Burma Gazetteer," vol. ii. pp. 350 f.]

appear that its climate, more resembling that of Penang than any other part of our coast, would be well adapted, with the advantages of soil before mentioned, to the cultivation of nutmegs, spices, &c.

8. The Siamese and Malays are occupied principally in clearing for cultivation, and the Chinese are the principal adventurers in tin. The head Chinaman has established a store of provisions, consisting of every description of supply suited to the wants of the people about him, which he exchanges for tin ore to those who may be industrious enough to collect it. Of this he had three or four tons on hand, from which sample A was taken. It is precisely similar to specimens I have forwarded on other occasions, and consists of pure peroxide of tin, collected by washing from the beds of streams in that neighbourhood.

On the 17th I proceeded to a spot which one of the Chinamen had fixed on for a stream work, and reached it after walking between four and five miles.

The stream is one of the tributaries of the Malewan, marked No. 1 in the plan. Their principal work was not on the main stream, the course of which we had followed to reach the place, but on a small branch, which then afforded water scarcely sufficient to clean and exhibit a sample of the ore dug out with its sand and gravels before me. This tin soil consisted of fine grey sand, mixed with quartz and granite pebbles, and was taken from near the surface of the bed of the water-course; it was not here more than eighteen inches deep, for as soon as the iron pick with which it was loosened penetrated to the clay, they seemed assured there was no tin below. The subsoil all around is said to contain tin, the deposit of former periods, and in some of their excavations I observed soil precisely similar to that from which tin was washed on the lower levels. From its occurrence so near the surface in existing water-courses, which from their slope must become rapids during the rains, I infer that tin must be washed down from its source in considerable quantities every year.

The trough used for washing is circular, about eighteen inches in diameter and six inches deep, in which the sand and gravel is piled and washed, as before described, by a rotary motion of the hand. Specimens of the soil and of the produce of separate washings are sent, numbered 1. During the dry season little or nothing is done in collecting tin, but preparations only are made by trenching for considerable distances along the brow or down the slopes of the adjacent hill, to obtain a fall of water during the rains. Under this the soil is collected, when the sand and pebbles are washed away, leaving the tin behind. Some of these trenches were from ten to twelve feet deep, and one of about three feet deep was nearly two hundred yards in length. The fall so obtained saves the laborious process of washing with the trough

in a stooping position, which is irksome to the men, but which women and children are said to perform with greater ease.

9. The next day I went again in a northerly direction five miles, to visit three other localities, where other parties of Chinamen were engaged in similar works. At each of these places there were from eight to twelve men employed in preparations for work during the ensuing rains. The surface soil is a rich red mould, the subsoil of the same grey sand and quartz pebbles as before, with abundance of tin intermixed, and rests upon granite.

The three spots visited this day have all the same character ; from the first the separate washings were less productive than from the other two, but at these the quantity produced each time surprised me, and drew forth an exclamation of pleasure from the Chinese engaged in collecting it for my inspection. The greatest quantity of clean ore obtained from one troughful of soil was 2,078 grains, while the average was 1,235 and 855 grains. The time occupied in each washing is from five to six minutes.

They stated that in the rains one man would earn four rupees worth of tin per day. These small parties appeared full of energy and determination to make the most of the advantages before them. About their houses, situated in small clearances in the midst of the jungle, there was an appearance of comfort and cleanliness not often seen on this coast, while their good nature and hospitality is unbounded.

10. The prevailing rock around them is granite, which is seen *in situ* in several places, cropping out of the soil from the beds of the stream and in the cuttings before mentioned, where I observed it was a good deal decomposed. I do not find on examination that in any instance the tin exists interspersed in the granite, but have every reason to confirm the opinion expressed in former reports of its occurrence in the fissures and cavities of the rock from which it has been removed by disintegration of the enclosing substance. None of the Chinamen have, as far as I could ascertain, penetrated to the principal granite hills, but are content with what they find in the streams at a distance from the source whence the tin proceeds. There doubtless it exists in veins or *vugs*, or cavities, in abundance. The metal being found so near the surface of the present water-courses, the causes which have distributed a rich layer of tin soil in and around them are assuredly still in action. Fresh veins or cavities loaded with the crystallized mineral are thus becoming constantly exposed to the decomposing effects of the weather, and are therefore to be found by mining at very moderate depths. The stream works described will form, perhaps for long periods, profitable employment to Chinese adventurers, whose system of collection is that to which the Siamese and Malays are accustomed. These productive streams are, however, but the index of what is to be found elsewhere, and if these

localities ever attract the European capitalist, of whose notice I believe them to be well worthy, the proper sphere for the scientific miner should be in the hills themselves. There, if a little cautious investigation were previously made by practised men in search of a spot for mining operations, the use of the common horse whim, or the most ordinary draining apparatus, would in my opinion, in the course of a very short time, discover veins which it would be very profitable to follow out with more complete and expensive apparatus.

11. After my return from the tinworks we left Malewan, and proceeding next day down the river, anchored at the mouth of the Rhenong river for the purpose of visiting the Siamese tinworks and smelting establishment on the southern or Siamese side of the Pakchan. This tidal creek is nearly dry at low water, but small junks come up with the flood; it narrows considerably at three miles from its entrance, and is very circuitous; after three hours' pull in a boat in a S.E. direction, we reached the settlement of Rhenong.

The leading people here are Chinese, who have a high-fenced enclosure about eighty yards square, one side of which is occupied by the smelting establishment. A few women were employed in sifting tin ore* through a fine sieve. Only one furnace or large crucible about four feet high, of conical form, and three feet diameter at top, formed of baked clay, appeared to be in use; this was well worn, and a new one was there ready to replace it. One pounding or stamping machine, with a tilting bar worked by the foot, the Chinese bellows, and heaps of charcoal, were all the apparatus visible. No tin is collected except during the rains, and the village did not contain more than fifty families in all.

The duty said to be paid to Siam by the Chinaman is six tons of smelted tin per annum, for which he enjoys an entire monopoly. The collectors of the ore are paid a nominal price of two dollars for eighteen viss of ore, but as the payment is made by small ingots of tin, the only currency in use, the actual value received by workmen, according to the present selling price of the metal, is eight rupees per hundred viss of ore, the same quantity being at Mergui worth forty rupees. It appeared from the information we were able to collect of the reported arrivals of junks at Rhenong for cargoes of tin, that not more than from sixty to seventy tons are produced per annum. The spot itself having a bold range of granite hills near, with level rice ground between it and the stream, has a very pleasing appearance. A few women were engaged in collecting tin ore in a clear stream running over granite boulders, within a few minutes' walk of the place, and the produce of several separate washings from the trough was taken and noted, the result

* Specimen B.

of which, compared to those of Malewan, &c., will be found below.* Their principal stream works are a day's journey distant towards the hills, which we could not visit.

12. With the falling tide we rejoined the steamer, and soon after stood between the islands to the northward towards Bokpyen,[1] one of our own settlements, and visited some of the islands on our way. The most remarkable of these are the bird's nest rocks, of which we inspected two, the Turrets and the Elephants; they consist of fine picturesque masses of limestone rock, which stand boldly up, and present a perpendicular wall to the sea, with deep water all round them. The edible nests of the small martin, so much prized in China as to sell sometimes for more than their weight in silver, are found on the sides of chimney-like cavities, which extend from the summit of the rock more than 200 feet above the sea, having a small cavernous opening, with room enough only to admit a boat at low water.

13. Bokpyen, which is marked in Captain Lloyd's chart, though not included in the sketch herewith, is a neat and flourishing village, containing about 98 houses, or 400 inhabitants in all. They are chiefly of Malay extraction, and occupied in the cultivation of rice, the collection of rattans, fishing, &c. The Bokpyen river produces tin, and during the Siamese rule large tinworks are said to have existed. A channel for running water, the remains of which are now traceable, is reported to have extended over a considerable distance by aqueducts and cuttings, which is presumptive evidence of the abundance of tin in the neighbouring hills. Little or none is collected now. One man brought us a very good sample in a bamboo; from this he said he had sifted the fine grained tin, which he had either sold or smelted, and, not knowing what to do with the large pieces, had kept them.† These were lumps of pure peroxide of tin, measuring from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch, without any quartz or earthy matter adhering, and this he called "refuse tin," which was no use to him—a fair sample of the ignorance with which tinworking is conducted in these localities.

14. The following is a comparative statement of the produce of separate washings from a troughful of tin-soil, each washing occupying five minutes in filling from the bed of the stream and cleaning, as exhibited by the specimens sent and numbered :—

* Specimen No. 5.

[1] [This is the place called Bhootpyeng in the "British Burma Gazetteer," vol. ii. p. 131.]

† Specimen C.

Locality Malewan, No. 1.		Weight of separate Washings in Grains Troy.	Average of each in Grains Troy.	Average of the whole in Grains Troy.
		326		
		404		
	*	320		
	*	327		
		177		
		157		
		163		
		143	252	
Malewan, No. 2 . . .	*	297		
		93		
	*	448		
		120		
		177		
		472		
		180	555	
Malewan, No. 3 . . .		534		
	*	1,499		
	*	1,100		
		2,078		
		1,024		
		1,173	1,235	
Malewan, No. 4 . . .		1,076		
		503		
	*	1,142		
	*	698	855	650
Rehnong, No. 5 . . .		1,081		
		371		
	*	991		
	*	653		
		542		
		555	699	699
Bokpyen, No. 6 . . .		373		
		263		
		319		
		227		
		464		
		1,011		
	*	381	434	434

A good specimen collected at Bokpyen, by two men in about twenty minutes, weighed 2,040 grains. The specimens marked by an asterisk are sent in duplicate with this report.[1]

G. B. TREMENHEERE, *Capt.*

Executive Engineer, Tenasserim Division.

MAULMAIN, *April* 8, 1843.

[1] ["Journal of the Indian Archipelago," vol. iii. pp. 376-401, 724-743.]

XXXI.

REPORT ON A ROUTE FROM THE MOUTH OF THE PAKCHAN TO KRAU, AND THENCE ACROSS THE ISTHMUS OF KRAU TO THE GULF OF SIAM.[1]

By Captain ALEXANDER FRASER, *Bengal Engineers, and* Captain J. G. FORLONG, *Ex. Engineer, T. and M. Provinces.*

["Journal of the Asiatic Society of Bengal," vol. xxxi. pp. 347–362.]

From Captain A. FRASER, *Bengal Engineers, to* Lieutenant-Colonel A. FYTCHE, *Commissioner M. and T. Provinces.*

TAVOY, *26th April* 1861.

SIR,—I have the honour to forward to you the enclosed report, with plans, &c., as per margin, of a journey made by Captain Forlong and myself up the Pakchan river and across the Isthmus of Krau to the Gulf of Siam.

No one can be better aware than yourself of the good which would accrue to the provinces of Pegu and Tenasserim by the free importation of Chinese labour by the route recommended, and we therefore submit this report to you. As, further, the matter involves other and far more important than local interests, we recommend that the report be forwarded to the Government of India, as one worthy of immediate and attentive consideration, with such remarks as your complete knowledge of the general and local bearings of the subject may deem expedient.

We would beg to bring to your notice the great civility and kindness with which we were received by the chief civil authority, Tacompa, in the Siamese territory.

I have, &c.,

(Signed) A. FRASER, *Captain, Bengal Engineers.*

1. The steamer *Nemesis*, with Lt.-Col. A. Fytche, commissioner, T. and M. provinces, on board, anchored about fifteen miles up the river Pakchan, in five or six fathoms of water. Banks steep and densely wooded, with a stream running between them of (here) about a mile in breadth.

2. Opening into the Mergui archipelago, opposite the south end of St. Matthew's Island, there are some six fathoms of water

[1] [Reprinted as an Appendix to Commander A. J. Loftus' "Notes of a Journey across the Isthmus of Kra" (Singapore, 1883).]

at low water over the bar at the mouth, though vessels coming from the north, inside the island, have to run some little way southerly to avoid an extensive spit of sand which runs partly across the entrance to the river.

3. On the north side, the right or British bank of the stream, are the tin mines of Malewoon, which are, we believe, workable to any extent to which money and labour are procurable. On the other side are the tin mines of Rahnong, worked by the Siamese Government.

4. Collecting on the evening of the 31st March all the instruments necessary for a rough survey, a perambulator, compass, and aneroid, we left the steamer in a native boat with a flood tide, and proceeded up this river, which forms the boundary between the British possessions in these provinces and the Siamese territories. A fog came on, and we were obliged to anchor for some time. We arrived, however, at Krau, by 4 P.M. of the 1st April.

5. Krau is a Shan village of some fifty houses with a few Chinese inhabitants. The civil authority was absent attending his superior at Tsoompeon, the chief place of the district, and where a Woondouk, a functionary equal in authority to our deputy-commissioner, resided.

6. At Krau we rested the night in a good zayat, which had been prepared for the aforesaid chief civil authority, who visits periodically his district on this the western side of his Majesty of Bankok's southern dominions. We had some difficulty in procuring means of locomotion, in consequence of there being no one to give orders upon our wishes, but just as we were starting the next morning (2nd April), with some four or five coolies we had managed to procure, an elephant made its appearance, and we were enabled to proceed a little more comfortably than we had anticipated.

7. We commenced on the 2nd April a route survey across a country which we believe is quite unknown to and has never been traversed by Europeans. There is a good level cleared road for the first two miles, and to the third mile it rises and passes along the right bank of the Krau river. The forest on each side contained bamboos and trees, as mentioned in the plan. Up to a little short of the eighth mile the road follows the course of the Krau river, and is difficult—we had to wade for a mile through the stream, which was not, however, more than ankle deep, but falling every now and then over rocks, with banks about twenty or thirty feet high, and forty feet apart. At this time the rain commenced, and fell with little intermission till we returned to Krau.

8. At the eighth mile we arrived at the watershed of the country, a small grassy plain. The Krau river runs hence west to join the Pakchan at Krau; and a quarter of a mile further on, a river

called the Bankren, joining the Tsoompeon at Tasan (1½ mile), flows to the Gulf of Siam on the east.

9. At Tasan is another zayat similar to that at Krau, with a few houses and dry cultivation. We continued to cross and recross the Tsoompeon river to the tenth mile. At 15½ miles, after crossing tributaries of small breadth but with steep banks, we got again to the Tsoompeon, where it was some 200 feet wide, but of little depth. The jungle remained of the same character, and the nature of the country, as the path descended to the plains passing through low but steep hills, was very similar to that in the ascent from Krau to Tasan.

10. At 17½ miles we got to Apay, another zayat, and were glad to rest for the night, for, in addition to the walking over very rough ground and for miles through the rivers, wet throughout, the rain had brought out the leeches, which attacked us most unmercifully. The first indication of their attacks was finding our trousers covered with blood. Our last resource was to tie the trousers round the ankles so as to prevent them getting inside, but even then, unless some one was looking after us while engaged in taking angles or reading the perambulator, if we stood still for any time, we found them lodge in our necks. The amount of blood these creatures take from one before becoming aware of it is really exhausting, and it is therefore desirable to warn others.

11. The night was fine, the rain was reserved till daylight for our special benefit; crossed a tolerably sized (80 feet) river just beyond Apay, and another at the twentieth mile, a tributary of the Tsoompeon. We came to the end of the hills at the twenty-second mile, and entered upon a fine open country, with patches of jungle and garden and paddy lands, capable of any amount of cultivation.

At the twenty-second mile the hills stretched away to the southward, and seemed to run east, parallel with our course, about a mile and a half to the northward, and, as we fancied, along the left bank of the Tsoompeon river.

At the twenty-third and twenty-fifth miles, crossed another river of 120 feet in breadth, the margin of which was much cultivated, and we continued along (about half a mile from) the left bank of this river, which seems to be the Pah-Klong, joining the Tsoompeon near its mouth, to the twenty-ninth mile, after which, at a distance of thirty miles from Krau, we recrossed the Tsoompeon where it is about 200 feet broad, and arrived at the residence of the chief civil authority of this district, who received us most kindly at about noon of the 3rd April.

12. Tsoompeon is a large place of some four or five hundred houses, with a water communication of twenty miles with the Gulf of Siam. We thought of continuing our journey down the stream the same day, but the heavy rain that fell was even more persuasive

than the kind and polite old governor, who, as soon as we had made up our minds to remain till next morning, placed everything that weary travellers could require at our disposal, and ordered boats to be in readiness for us at 2 A.M. (4th April), when the ebb made. There is a rise and fall of tide here of about six feet.

13. Started at 2 A.M. of the 4th of April, and proceeded down a very winding stream to the mouth of the river, opening into the Gulf of Siam, where we arrived at $5\frac{1}{2}$ A.M., or in about three and a half hours, having the tide with us. Here we landed and found a fine villa, in some disrepair; this was said to be the king's residence when he came to this part of his dominions. His steamers were said to come in two days from Bankok, and fuel (billets of wood) in quantities (about 20,000 pieces) was collected. There was a schooner of about 150 tons lying off the shore at about fifty yards distance, in five fathoms of water, but there is a bar, above where the schooner lay, across the mouth of the river Tsoompeon, with only one and a half fathom over it at low water. There would be no difficulty in making wharves for large ships, and, so far as we could observe, there would be no difficulty in making roads from Tsoompeon to this place. We found storehouses here, with a couple of 32-pounder carronades, belonging, as we supposed, to the king's steamers, though we asked no questions about them. From the general appearance of the buildings, &c., we think it is a place not open to severe storms or heavy sea. This is confirmed by an extract from Commander Richards' "Gulf of Siam," taken from the Bankok calendar, stating that "heavy gales are unknown in the gulf." With a view of establishing a communication across the Isthmus of Krau, it would be necessary accurately to determine several points which would render such communication practicable with reference to the Gulf of Siam, as we had ascertained with regard to our own side; this the time and commissariat at our disposal prevented us doing satisfactorily, and we did not wish to exhibit a curiosity by asking too many questions, which might have proved offensive to a friendly power. We made the distance from Tsoompeon to the seashore, twenty-one miles, making the total distance from Krau to the shore of the gulf about fifty miles.

14. At $7\frac{1}{2}$ P.M., 4th April, we returned to Tsoompeon, surveying the river roughly; we passed Tayoung, about four miles from the mouth, a short distance up a creek which here falls into the Tsoompeon; we were told that two vessels of some 200 tons were loading there. Tayoung is large, said to consist of some 200 houses. We had not time to land, as we wished to get back to Apay this night.

15. We arrived at Tsoompeon at $10\frac{1}{2}$ A.M., and after much civility, which we hereby acknowledge, from Payar Teet, the

governor, who provided us with two more elephants, we started on our return through heavy rain. Slept at Apay this night (4th April). Got to Krau the next day, 5th, at 4 P.M., passing through the streams, which had swollen a little from the heavy rain, the commencement of the monsoon. Went straight on board our boat, tested the correctness of the survey of the Pakchan (hereto annexed), said to have been executed by an officer of the *Ganges* steamer, which some fifteen years ago was employed in conveying Captain Durand on an expedition up this river to settle a boundary question. Anchored for the night; arrived next day at noon on board the *Nemesis*.

15½. On the route from Krau to Tsoompeon we were struck with a remarkable change of geological features. We had observed, as we emerged on the plains of Tsoompeon, very marked-looking abrupt hills, which, being accustomed to such in the limestone islands of the Mergui Archipelago, we concluded were of the same group, but on closer examination they turned out to be sedimentary rocks of either the secondary or primary series; Captain Forlong inclines to think the latter, and to be closely allied to the old red sandstone group: the dip was N.E. by N. We were unable to collect specimens worthy of being forwarded. All the islands of the gulf that we could see seemed of the same formation, worn into smooth rounded tops, but with perpendicular sides, some of the layers were as fine as thread, although generally half an inch thick,* all abounded in pebbles, and what Captain Forlong believes to be minute fossils. The rocks across the pass were mostly a quartzose sandstone.

16. It seemed, from our survey of the route, so manifest that a communication might be established with little comparative expense across this narrow neck of land, thus connecting the Bay of Bengal with the China Sea by a route which would avoid the long, dangerous, and circuitous passage by the Straits of Malacca, that we thought it worth while to enter into a few calculations by which might be shown in figures the comparative advantages of the two routes. The following is the result, one which, to our minds, makes a further examination of the Isthmus of Krau worthy of immediate consideration by our Government in communication with that of Siam, as likely to prove of advantage to each, and of enormous value to commerce and the travelling world in general. It would relieve the commercial world to a great extent of the enormous steam charges which keep up the prices of the goods which form the staples of trade between Europe, India, and China, and which render travelling almost prohibited, and it would open up a new and interesting country to the geologist and the botanist, and introduce a hardy and hard-working population (the Chinese)

[* *Sic ex conject.* The copy received has "¼ thick."—EDS.]

into provinces which contain mineral wealth in known and unknown quantities; wealth which merely requires labour to develop to any extent, and in search of which the Chinese even now find their weary way, but who would then come in large numbers, especially as the new treaty allows them to emigrate with their families. Much and valuable information regarding the great mineral wealth of these provinces may be found in some interesting papers by Colonel Tremenheere, Bengal Engineers, and Professors Helfer and Oldham.

17. The Tables annexed, I., II., and III., show the economy of fuel, establishment, and time which would be arrived at by establishing easy communication across the isthmus. A canal we consider out of the question. A railroad is not only quite practicable, but likely to cost less per mile than any other in India.

1st. Table I. exhibits the costs of the present line of steamers per month, without taking into consideration the expenses of idle vessels, or any incidental expenses whatever, merely the cost of fuel and establishment per trip for running steamers, as kept up by the P. and O. Company from Ceylon, viâ Singapore to Hong-Kong . . . . . Rs. 39,700 0 0

Table II. the cost of ditto (kept up, we believe, by Messrs. Apcar & Co.), direct from Calcutta to Hong-Kong viâ Singapore . . . 40,200 0 0

Table III. the ditto of ditto, kept up by C. and B. S. N. Company, from Calcutta to Maulmein viâ Akyab and Rangoon 11,900 0 0

Total cost of present arrangement per month Rs. 91,800 0 0

2nd. Table I. shows again the cost of a line running from Ceylon to Krau and from Gulf of Siam (Tayoung) to Hong-Kong . . . . Rs. 32,900 0 0

Table II. the cost of a line from Calcutta viâ Akyab, Rangoon, Maulmein, Tavoy, Mergui, and Siam, and thence per China line to Hong-Kong 17,300 0 0

Total cost of two lines which would answer all the purposes of the present three lines . Rs. 50,200 0 0

3rd. The saving therefore which would be derived by commerce and the travelling world, by establishing a communication across the Isthmus of Krau (provided it be quick and efficient), by the mere calculation of saving of fuel and establishment of running steamers, will be represented by the sum of Rs. (91,800 – 50,200

=) 41,600 per mensem, or Rs. 499,200 per annum; which sum, at 5 per cent., would give a capital of 100 lakhs, or one million sterling.

4th. The tables do not show, however, the vast further saving which would accrue by running two lines of steamers, instead of three, in the Bay of Bengal, and one line instead of two on the China side of the Siamese and Malay Peninsula; the reduction of the number of steamers, the saving thereby of steamers lying idle while not running, the concentration of coal depôts, and many other incidental expenses which of course increase according to the number of lines running.

5th. The tables again do not show what a vastly more profitable undertaking it would be to run one through line from Calcutta viâ Akyab, and Rangoon to the Pakchan and thence to China, instead of one with a terminus inland at Maulmein, getting no traffic as compared with that which would open up to the through line, and another line direct from Calcutta to China, only touching at the Straits Settlements.

6th. The twelve millions trade (if positive, but which is probably only a transit trade) of Singapore, Malacca, and Penang, and the fourteen and a quarter millions of Netherlands-India, could easily command a steamer of its own, to run alternately on either side of the Malayan Peninsula, communicating with Krau on the one side for the Bay of Bengal, and Tayoung on the Gulf of Siam, on the other for China and Europe, as shown by dotted green lines on the general sketch map. It may occur to some that the cost of this steamer should be deducted from the saving calculated in the third clause. We think not, but there is much more than sufficient for it; and we may place this cost against that of the other private steamers between Calcutta and Hong-Kong viâ Singapore, not included in our calculations.

7th. From Point de Galle to the five-fathom anchorage in the Pakchan river, and from Tayoung, in the Gulf of Siam, to Hong-Kong, Table I. shows to be 281 hours' steam (more or less does not matter for calculation, as the same rate of steaming is taken for all), while the route viâ Singapore is shown to be 337 hours' steam. We calculate, as hereafter shown, that the passage across the Isthmus of Krau would not ordinarily occupy more than twelve hours, with a liberal allowance of time.

We have therefore a difference of time in favour of the Krau route [337 + 12; 281 + 12] of 56 hours. This is of much importance when we hold in view the costly nature of the produce and goods conveyed. It has also long been a desideratum to have a weekly communication with England, but the immense cost of putting on four steamers per month from Calcutta to Aden has hitherto, we suppose, deterred the P. and O. Co., as they would thereby obtain no extra trade.

But supposing the communication through Krau established, the extra trade that would be brought by the extension of the line of P. and O. Co.'s vessels to Krau would pay for an extra steamer between Point de Galle and Aden, by means of which, by making it meet the Bombay mail at Aden by bi-monthly steamers from Ceylon viâ Krau, the communication between England and Calcutta would be weekly; twice per month by the P. and O. Co.'s line viâ Point de Galle and Madras, and twice by the vessels viâ Krau to Calcutta; thus providing for the whole of the eastern coast of the Bay of Bengal viâ Krau, as the P. and O. Co. does for its western coast via Madras. The time from Ceylon to Calcutta viâ Krau (by the direct steamer as hereafter mentioned) would be as follows:—

Ceylon to Krau	126	hours
Krau to Calcutta	102	,,
Or $9\frac{1}{2}$ days =	228	,,

Nearly as quick as the route viâ Madras.

8th. By Table II., including three hours' stoppage at Akyab, twelve at Rangoon, twelve at Maulmein, three at Tavoy (Mamoogan), without going up the river, and three at Mergui (the trade of the two latter places being about five lakhs), the number of hours between Calcutta and Krau by those places is shown to be (143 + 33) 176; while the further progress to China from Tayoung would be about 153 hours, or with twelve hours across the Isthmus of Krau, a total distance of (143 + 33 + 12 + 153) 341 hours. The direct line of China steamers touching at Singapore would probably delay, ordinarily, six hours at Penang and twelve at Singapore; this added to the steam distance gives 360 hours, making a difference in point of time in favour of the Krau route viâ Akyab of nineteen hours, while the latter picks up all the trade. The valuable goods (opium especially) and the mail from England might be sent by a single steamer running twice a month to and from Calcutta to Krau. The cost of this steamer is shown in Table IV., and the capital for construction of railroad would be reduced to £700,000; much more than sufficient, however. This arrangement of running a steamer direct to Krau from Calcutta would beat the direct line to China viâ Singapore by ninety-three hours, as follows:—

From Calcutta to Krau	102	hours
,, Krau to Tayoung	12	,,
,, Tayoung to Hong-Kong	153	,,
Total	267	,,

From Calcutta to Singapore	179	hours
Stoppages	18	„
Hong-Kong	163	„
Total	360	„

Difference, 93 hours,

and would give a regular weekly communication with Calcutta as shown in last paragraph; while the line running viâ Akyab gives to the eastern coast of the Bay of Bengal all the advantages of early communication with home which its western coast enjoys viâ Madras. But the steamers viâ Akyab should not have to go up the Rangoon and Maulmein rivers, by which means other twelve hours would be saved; making a total saving, even after touching at all the four posts (for Mergui would probably be moved to the Pakchan) of (19 + 3 + 12) 34 hours over the Singapore line. Elephant Point and Amherst Point should be the respective posts of call for Rangoon and Maulmein, with telegraphic communication between those places and the capitals of Pegu and the Martaban and Tenasserim provinces.

9th. All the trade between Maulmein and the Straits, for which there is no better mode of carriage than junks and kattoos, and all the tin found on both sides of the Pakchan, in the Lenya river, and indeed all along the coast up to Yeh, and which only requires capital and labour to develop to any extent, would be picked up at Krau, while the labour for the tin mines of the Pakchan, and possibly for the coal mines of Mergui, could be imported direct from China. All the 1½ million of the Bankok trade, and that of the Malayan Peninsula, on the eastern and western sides, would be intercepted at Tayoung and Krau; also all adjuncts, which none of the present lines of steamers obtain, but which would go far to make them pay. Between Maulmein and Krau, where the coast is profusely wooded, wood-fuel might be used to increase profits or decrease expenses, should it take any time to develop the trade carried on between Maulmein and Singapore. The cost of burning wood on this coast, as compared with that of coal, is as 1 to 10, taking the wood as Rs. 10 per 1,000 billets, and coal at Rs. 25.4 per ton, and assuming that 250 billets, 4 feet long by 4 inches diameter, equal one hour's steam, or one ton of coal.

18. It would answer no useful purpose to go into all the figures necessary to establish even an approximate idea of the greater profit that would be assured to commerce and to steam companies by adopting the new lines herein proposed instead of the present lines. It was only necessary to take three items—fuel establishment and time of actual running steamers—to prove our position, and if we can show that by the saving of the two first of these items we can establish communication across the Isthmus of

Krau, which shall also beat all present lines in point of the third and most valuable item, time, we think it unnecessary to examine into the contingent saving which, to any one who will give intelligent consideration to them, will manifestly appear enormous.

19. In the third clause of the seventeenth paragraph we have shown the saving in fuel and establishment of running steamers to be five lakhs per annum, representing a capital of one million sterling. Can the communication by Krau be established within this sum? If so, all the contingent savings and gain in time go to the profit of trade, as well as any difference between the cost of the said communication and the keeping of it up. Our consideration of the subject of the communication across the Isthmus of Krau has brought us to the following conclusions :—

1st. That there should be two or three tug steamers with long flat-bottomed boats to carry goods and passengers from the five-fathom anchorage of the large steamers, twenty-six miles up the river Pakchan, as shown in the sketch map of the isthmus by the dotted green line, in which distance the river is nowhere less than one fathom at dead low water spring tides. There is a rise and fall of eight feet. Time, three hours' towing.

2nd. At this point (see plan) opposite Namoy river, a railway terminus and hotel whence a railway will proceed (leaving Krau to the north) by Tasan to Tsoompeon on the shore of the Gulf of Siam, distance fifty miles. Time, three hours.

3rd. Allow other six hours for discharging in the Pakchan and loading at Tayoung on the Siam side (where there should be another railway terminus and hotel), total time twelve hours, which is more than that required by the P. and O. Co. at Suez, on whose arrangements we will suggest further improvements.

4th. There need be only one station in the centre of the line where the rail should be double on either side for the distance of about one mile, to allow of trains passing; the remainder of the line may be single, as the Suez line.

5th. The boats of eight or ten tons for the river service should form the bodies of the carriages for the railroad service, patent slips being formed at the Krau terminus, and if necessary also on the Gulf of Siam shore, up which the loaded boats may be dragged on their own wheels, which could form the slip cradles, and the boats could be tacked on to the engine and proceed to the other side without any delay. The arrangement of the boats for goods and passengers is a matter of detail easily managed. There is no reason why a carriage should not be in the form of a boat, especially when time is saved in loading and expense in rolling stock. These boats would be at the anchorage ready for the steamers as they come in from the mouth, when loaded would be towed up to the railway terminus, dragged up the slips, and taken off at once per rail to Tayoung, where there should be a wharf

for the China steamers to lie alongside if there be water enough; if not, the carriage should be launched at once on to the sea and sent to the steamers.

6th. We would here observe again that our survey was rough, that we merely passed along the native line (which is well defined, but in many places in the beds of rivers) with perambulator, compass, and aneroid; that our aneroid showed no height above the sea of more than seventy-five feet; and that our route presented no obstacle of engineering difficulty beyond dips to nullahs, ordinarily twenty or thirty feet wide, with some three or four rivers from one to two hundred feet wide. A careful survey would be necessary.

7th. We would, however, recommend very little masonry, though lime and fuel for bricks are in abundance; but the vast and inexhaustible forests through which the line passes are full of timber suitable for sleepers, for bridges, for stations and wharfs, and for fuel for the locomotives; all that would be required from England would be plant, permanent way, and rolling stock, the labour for the work being procurable from China to any amount.

8th. We will double what, in our own somewhat experienced minds, would be the cost of such a railroad across the isthmus, and put down the amount at £5,000 per mile, including stations, wharfs, hotels, coal-sheds, &c., and rolling stock for fifty miles of rail £250,000. For the river service three tug steamers, with all the advantages of disconnecting engines, towing with a single hawser, &c., which the Thames tugs possess, at £15,000 each, equal to 45,000

Twelve coal barges at £800	9,000
Rolling stock, 50 miles	250,000
Contingencies at 50 per cent., including buoying river	27,300
Total	£331,900

Or say one-third of a million sterling. But there is the interest on a capital of one million of money saved every year in fuel and establishment of running steamers alone. Surely it must be worth while expending such a capital in establishing this communication.

20. We therefore think that, without reference to the dangerous navigation, the Straits line should be abandoned as a communication between India and Europe and China, as the old Cape of Good Hope line was abandoned for the Suez line. Considering, however, the difficulties of the Straits navigation, and peculiarity of the China Sea, the steamers would probably do all the work and beat sailing vessels off the field, which they cannot do now because the present charges upon steamers are so heavy; this will be modified by adopting the Krau route.

21. The extra service required to give a weekly mail to Calcutta by a single extra steamer running twice a month between Aden and Point de Galle might be well undertaken by the P. and O. Co., as well as the whole service (by a lower class of steamers, however, on the China side than is at present employed) between Ceylon and Krau, and Gulf of Siam and Hong-Kong. The companies running the direct lines of steamers between Calcutta and Hong-Kong viâ Singapore, and the line between Calcutta viâ Akyab, &c., and Maulmein, might, advantageously to themselves and to the public, amalgamate, and run one steamer twice a month direct to Krau to meet the China and Europe steamers returning direct to Calcutta; two from Calcutta viâ Akyab, Rangoon, and Maulmein to Krau, returning viâ those ports. The railway should be a separate company, and there should be a condition in their contract which would scarcely require a guarantee to that effect.

22. With these arrangements carried out we may incidentally mention that the telegraph, instead of being submarine from Rangoon, should be carried along the coast from Maulmein, with a junction with the railway telegraph at Krau, and also a junction with the Rangoon and Tongoo telegraph at Sittang; thus giving another line of telegraph communication with Calcutta, by which English news and China news may be transmitted from Krau.

23. The arrangement which might be made with the Government of Siam, for the grant of land, &c., has not formed a subject for our discussion, as with the present liberal-minded and far-seeing monarch on the throne of Bankok, to whom the advantages which must result to himself and his people by carrying out this project will be at once obvious, we see no difficulty on this point.

24. We have thus laboured to prove, and we think have done so satisfactorily, that as a mere speculation the construction of a railway across the Isthmus of Krau will be profitable; that the communication may be established for a third of the capital the interest of which is now being expended yearly on mere fuel and establishment of running steamers, and that a vast amount of time will be saved over present routes. Of the political bearing of the subject we have said nothing, but, holding in view that the line from Ceylon to Cochin China is nearly straight, we are convinced that, if Great Britain does not take it in hand, France must, with every chance of a profitable opposition to the P. and O. Co. in their line with Europe to Calcutta viâ Madras.

ALEX. FRASER,
Captain, Bengal Engineers.
J. G. FORLONG,
Captain, F.R.S.E.,
Ex. Engineer, Tenasserim Provinces.

TABLE OF GREAT SEA ROUTES FROM CEYLON TO CHINA AND CALCUTTA, AND *VICE VERSA*.

(See Report on the communication by the Isthmus of Krau by Captains Fraser and Forlong.)

Dated TAVOY, *26th April* 1861.

Tables.	Routes. Two Steamers starting per month on all Lines.	Distance in Miles.									No. of Hours' Steam.	No. of Tons Coal burnt.	Cost of Fuel.	Cost of Establishment.	Total Cost of Steamer per Trip.	Cost of Four Trips per Month.	Saving.	
		Singapore.	Akyab.	Rangoon.	Maulmein.	Tavoy.	Mergui.	Krau.	Hong-Kong.	Total.							Cost per Month.	Time per Trip.
																	Rupees.	Hours.
I.	Ceylon viâ Singapore to Hong-Kong	1,570	...	...	...	...	...	...	1,470	3,040	337	337	8,425	1,500	9,925	39,700	...	
	Ceylon viâ Krau to Hong-Kong	...	...	...	...	...	...	1,150	1,380	2,530	281	281	7,025	1,200	8,225	32,900	6,800	56
II.	Calcutta viâ Singapore to China	1,610	...	...	...	...	...	...	1,470	3,080	342	342	8,550	1,500	10,050	40,200	...	
	Calcutta viâ Akyab, Rangoon, Maulmein, Tavoy, Mergui and Krau . . .	...	280	480	120	150	110	150	...	1,290	143	143	3,575	750	4,325	17,300	22,900	19*
III.	Calcutta viâ Akyab and Rangoon to Maulmein .	...	280	480	120	...	...	...	...	880	98	98	2,450	525	2,975	11,900	11,900	
															Total saving per Month . . . . . Rs.		41,600 12	A
		(See 3rd clause, par. 17, of Report)													,, ,, Annum . . . . . ,,		5,00,000	Five lakhs
IV.	Calcutta to Krau direct, one Steamer twice per month	...	...	...	...	...	...	920	...	920	102	102	2,550	450	3,000	12,000	29,600 12	39 hours. * *
															Saving per annum after deduction of cost of above line from saving A (see 8th clause, par. 19) . .		3,50,000	3½ lakhs

* By leaving out Mergui, and establishing communication between Rangoon and Elephant Point, and Amherst and Maulmein, the saving of 19 hours may be increased to 34 hours (see 8th clause, 17th par. of Report).

(Signed) ALEX. FRASER,
Bengal Engineers.

(Signed) J. G. FORLONG,
Ex. Engineer T. and M. P.

XXXII.

REPORT, &c., FROM CAPT. G. B. TREMENHEERE, EXECUTIVE ENGINEER, TENASSERIM DIVISION, TO THE OFFICER IN CHARGE OF THE OFFICE OF SUPERINTENDING ENGINEER, SOUTH-EASTERN PROVINCES.

WITH INFORMATION CONCERNING THE PRICE OF TIN ORE OF MERGUI, IN REFERENCE TO EXTRACT FROM A DESPATCH FROM THE HON. COURT OF DIRECTORS, DATED 25TH OCTOBER 1843, NO. 20.

Communicated by the Government of India.

["Journal of the Asiatic Society of Bengal," vol. xiv. pp. 329-332.]

SIR,—Agreeably to instructions conveyed in your letter, No. 3018, of 7th February last, I have the honour to subjoin such information as I have been able to obtain concerning the probable cost of the tin ore of Mergui.

2. With the view of ascertaining its value in the home market, I transmitted, about the period of my first report on the tin of this province, a box of average samples of the ore to a smelting establishment in Cornwall (Messrs. Bolitho and Co.), having extensive connection with the tin mines of that county. In April 1843 Mr. Thomas Bolitho informed me that "the samples of once-washed ore produces about 70 per cent. of tin, and the twice-washed yields nearly 75 per cent. The metal is very good, being almost free from alloy; some of the samples which have been sent to me from the Malayan Peninsula contain titanium.

"The ore appears to separate from the matrix very easily.

"The consumption of tin throughout the world increases so slowly, and the supply at present being more than equal to the demand, there is little inducement to speculate in tin mines.

"The produce of Cornwall is 6,000 tons per annum, and we calculate that the quantity produced at Java, together with what is raised in the Malayan Peninsula, will rather exceed the produce of Cornwall. The average price of tin in Cornwall has been about 72*s.* per cwt., but it is now as low as 56*s.*, which is the present price of the best Straits tin, and tin mines are suffering greatly from the depreciation in the value of their metal.

"It may serve for your guidance to know that at this moment

tin ore of the description of the sample twice washed would fetch in England about £46 per ton."

3. The following calculations of the probable result of a shipment of tin ore, and of the metal, have been obligingly made for me by two mercantile gentlemen of Maulmain. They are based on the lowest prices, which, according to Mr. Bolitho, were obtainable in the market in April 1843, and show a probable profit on tin ore of 7*s.* 8*d.* per cwt.; but a loss on the shipment of the metal of 12*s.* 4*d.* per cwt. in one case, and 4*s.* 9*d.* per cwt. in the other.

July 1843.—Tin ore from Maulmain purchased at 45 rupees per hundred viss, equal to 365 lbs.

	£	*s.*	*d.*	£	*s.*	*d.*
Rs. 45 % viss = per cwt. Rs. 14, or				1	8	0
Charges.						
Duty	0	3	0			
Stout boxes and shipping charges in Maulmain	0	1	0			
Freight home £2 per ton	0	2	0			
Insurance, 2½ % on 40*s.*	0	1	0			
Commission and London charges, 56 %	0	2	2			
Interest commission, 5 % on purchase	0	1	2			
				0	10	4
				1	18	4
Sale price, per Mr. Bolitho				2	6	0
Leaves a profit per cwt.				0	7	8

July 1843.—Tin from Maulmain purchased at 77 rupees per hundred viss.

	£	*s.*	*d.*	£	*s.*	*d.*
Rs. 77 % viss = Rs. 23.14, or per cwt.				2	7	9
Charges:—						
Duty	0	10	0			
In Maulmain shipping, &c., per cwt.	0	0	6			
Insurance, 2½ % or 6 %	0	1	6			
London charges, viz.—commission, 2½ %; warehouse and dock dues, 1½ %; other incidental expenses, 1½ % = 5½ %	0	3	3			
Interest on Purchase:—						
Six months at 5 %	0	2	4			
Freight at £3 per ton	0	3	0			
				1	0	7
				3	8	4
Sale price, per Mr. Bolitho				2	16	0
Leaving a loss of per cwt.				0	12	4

Another calculation of November 1844:—

	R.	*A.*	*P.*
Usual cost of tin in Maulmain, Rs. 77–8 per 365 lbs. on Rs. . . . . per cwt.	23	5	2
Freight to England at £1 10*s.* per ton	0	12	0
Duty at 10*s.*	5	0	0
Shipping charges here and in London	0	8	0
Commission in London at 2½ %	0	13	0
	30	6	2

	£	*s.*	*d.*
Or	3	0	9
Assumed price in London	2	16	0
Leaving a loss per cwt. of	0	4	9

4. The assumed rate for the ore at Maulmain, 45 rupees per 365 lbs., would be I think subject to a reduction; but that for the metal is probably the lowest average. It will be observed also that the London price of 56*s.* per cwt. is taken at a period of great depression in the value of the article, which had averaged 72*s.* per cwt.; but it would nevertheless appear that to send it to England in the state of clean ore would be by far the safest investment.

5. Many localities in the Mergui province, in which the ore exists abundantly, have been already described and publicly made known; but little or no attention has been given to the subject by merchants of Maulmain. Their business consists principally in timber, piece goods, and hardware, and they have no inclination to embark in mining speculations. A small shipment of ore, being part of about 2½ tons collected by convicts and others at the Government expense, was made to England by Messrs. Bilton and Co. of Maulmain; but the quantity was so small that no result has been made known by their home correspondent. At Malewan, on the Pakchan River, at the southern extremity of Tenasserim, between one and two hundred active Chinamen are engaged in collecting the ore in the streams described in my third report of April 8, 1843 ("Journal As. Soc." vol. xii. p. 523). They have been very successful, but there is so little communication with that part of the coast that no accurate statement of the result of their annual labours can be obtained. They convert it into metal, which comes with Tacopah and other tin into the Maulmain market.

6. Other localities equally productive and available to the private speculator have been indicated in former reports, and more are becoming known. A specimen recently obtained by E. O'Riley, Esq., from Henzai, north of Tavoy, is forwarded. It

is said to be plentiful there; but, without multiplying instances, sufficient evidence has been recorded of the existence in the Tenasserim provinces of rich stores of the ore of this useful metal, and it has been also shown that there is no obstacle to its profitable production.

Mining or other operations of this nature, supported by the Government, have generally proved unsuccessful in India; but the time may perhaps arrive when the attention of private capitalists may be turned in this direction.

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Ex. Engineer, Tenasserim Provinces.

XXXIII.

REMARKS ON THE DIFFERENT SPECIES OF ORANG-UTAN.

By E. BLYTH, Esq.

["Journal of the Asiatic Society of Bengal," vol. xxii. pp. 369-82.]

To Mr. W. W. Nicholls, of Sarawak, the Society is indebted for the nearly perfect skeleton of an adult wild Orang-utan, of the peculiar species known to the inhabitants of Borneo, according to Sir James Brooke, by the name *Mias Pappan;* and which, together with other skulls and skeletons of adult Orangs in our museum, and the exquisite lithographs of others, again, published by Professor Owen, fully bears out the opinion of Sir J. Brooke, expressed in a letter to the Zoological Society, and published in the "Proceedings" of that Society for 1841, p. 55, of the existence of three distinct species of Orang-utan in Borneo.

Professor Owen had previously distinguished his PITHECUS MORIO (*Mias kassar* of Brooke) from the great Orang then known to him, from specimens to which I had the pleasure of first calling his attention, and which are admirably figured in the "Transactions of the Zoological Society," vol. ii. pl. xxx. to xxxiv. inclusive; and from certain differences observable in skulls of great Orangs compared and figured by him, believed or known respectively to be from Borneo or Sumatra, the same zoologist has indicated what appeared to him to be at least local varieties, one proper to each of those islands, and he applies the names P. ABELII to that

of Sumatra and P. Wurmbii to that of Borneo, of course under the impression that the great Sumatran Orang referred to was identical with that described by Dr. Clarke Abel from Sumatra, in "As. Res." xv. 489.

A huge skull of an adult male Orang, undoubtedly from Borneo, is figured in "Trans. Zool. Soc." ii. pl. xxxi. and xxxii.; and that of an adult female (?), said to be from Sumatra, in the same work, vol. i. pl. liii. and liv. The differences between these skulls are considerable; and they are to some extent borne out in a huge male skull marked from Sumatra, and in an aged female skull marked from Borneo, in this Society's Museum.* In both of the latter, however, the characters are throughout intermediate. The zygomatic suture of the Sumatran male begins even anteriorly to that of Prof. Owen's Bornean male. The symphysis menti in both is equally developed: the supraorbital ridges, however, are much more prominent in the male from Sumatra, as in Prof. Owen's Sumatran female; but in our aged Bornean female skull they are considerably more developed, proportionally, than in Mr. Owen's Bornean male. In both of Mr. Owen's specimens the palate is represented as contracted posteriorly, between the last molars on each side, to $1\frac{1}{2}$ in. (or rather more in the Sumatran female). In our Sumatran male the distance is fully $1\frac{3}{4}$ in., and in the Bornean female $1\frac{5}{8}$ in. I can come to no other conclusion than that all represent individual varieties of one species, having perhaps a tendency to exhibit the local variation which Prof. Owen has indicated.

The same naturalist adds: "The Bornean Pongo, if we may judge from the few specimens undoubtedly from that locality which exist in the museums of this country, is clothed with loose, long hair of a deep fuscous colour, approaching in some parts to black; the Sumatran Pongo is covered with loose long hair of a reddish-brown colour. The adult male of the Bornean species has the countenance disfigured by large dermal callosities upon the cheek-bones. These do not exist in either sex of the Sumatran species." It is worthy of note that the term *species* is here bestowed, probably from the remarkable difference implied by the last-mentioned character. The fully adult Sumatran male described by Dr. Clarke Abel, however, and the skin of which is still in this Society's museum, possesses the cheek callosities, less developed, however, than in the Bornean male figured by Prof. Temminck.

Sir J. Brooke, in his highly interesting letter already referred to, besides pointing out the distinctions of two of his three species of Bornean Orangs from personal observation of the living or freshly

* Presented by Major Gregory in 1838 (*vide* "J. A. S." vii. 669); the Sumatran male skull, however, having been for some years reserved.

killed animals, wild and tame, remarks that the skulls also examined by him may be divided into three distinct sorts.

"The first presents two ridges, one rising from each frontal bone, which, joining on the top of the head, form an elevated crest, which runs backward to the cerebral portion of the skull." To this may accordingly be referred the P. WURMBII and the P. ABELII of Owen, and, it would seem, all the adult skeletons at present in Europe without described exception.* It would appear that neither sex has the cheek callosities at any age; and the colour of the hair is said to be darker than in others. This description corresponds with the appearance of an enormous female Orang-utan that was exhibited some years ago in Calcutta (*vide* "J. A. S." xvi. note to p. 729); and the animal is the *Mias Rambi* of Sir J. Brooke.

The same observer continues: "The second variety [of skull] is the SIMIA MORIO, and nothing need be added to Mr. Owen's account, save that it presents no ridge whatever beyond the frontal part of the head. No. 9 in the collection is that of an adult male. . . . . There are many other skulls of the SIMIA MORIO which nearly coincide with this suite, and this suite so entirely coincides through the different stages of age, one with another, that no doubt can exist of the SIMIA MORIO being a distinct species. The different character of the skull, its small size and small teeth, put the matter beyond doubt, and completely establish Mr. Owen's acute and triumphant argument, drawn from a single specimen."

Of PITHECUS MORIO our museum contains a skeleton (minus most of the bones of the hands and feet) of an aged female, presented by R. W. G. Frith, Esq., in 1836.† It had died in Calcutta, and the skin containing the bones of the hands and feet had been unfortunately thrown away when Mr. Frith secured the body for the Society's museum. A few of the digital bones, however, were recovered. Comparing the skull of this specimen with that figured by Prof. Owen ("Trans. Zool. Soc." ii. pl. xxxiii. and xxxiv.), I incline to infer that Mr. Owen's specimen is the skull of a male animal, chiefly from the greater depth of the alveoli: the longitudinal extent of grinding surface of the series of upper molars (bicuspids included) is exactly 2 in., as also in another skull of an adult female to be presently noticed, and 2 in. 2 l. in that figured by Prof. Owen. Lastly, the zygomatic arch of our aged female skull is much more slender than that of either of the others.

* Unless, perhaps, that of an adolescent female in the Museum of the Royal College of Surgeons, London.

† *Vide* "J. A. S." v. 833, where mentioned as "the Sumatran Orang-utan." She was one, however, of a pair purchased by our joint-secretary, Mr. Grote, at Singapore; and this gentleman informs me—"They were not from Sumatra, but from Borneo. At least I am pretty sure that my memory does not deceive me on this point."

We have also another and complete skeleton of an adolescent female, which lived twelve years in Calcutta in the possession of J. Apcar, Esq., and was very young when he received it. The last molars above and below had just pierced the gums. The skin of this individual is mounted in our museum, possessing hair of a very dark colour on the crown, back, and arms. Having passed its life in close captivity, with nought to call forth the vigorous action of its muscles, their development with that of the osseous system generally would seem to have been considerably affected, and the skull retains a remarkably juvenile (which in this case means *anthropoid)* expression, contrasting greatly with that of our other and aged female skull already noticed. But making every allowance for difference of age and a life of close imprisonment, and the other specimen had in all probability been captured when fully adult, there remain some extraordinary discrepancies, which probably indicate a further specifical distinctness. All the bones of the aged animal are more robust than those of the other; but while the leg-bones and the humeri of the two are of the same length, or at all events the humerus of the aged animal does not exceed by $\frac{1}{4}$ in. that of the adolescent, the radius of the aged specimen is 2 in. longer than that of the other.

The differences in the form of the skull are very considerable. The younger individual has the face conspicuously shorter and broader, with circular orbital cavities, while those of the aged animal are perpendicularly oblong. The vertical span of the orbital cavity is $1\frac{1}{2}$ in. in the aged specimen, $1\frac{3}{8}$ in. in the other; horizontal span of the same, $1\frac{1}{4}$ in. in the former, $1\frac{3}{8}$ in. in the latter. In the younger individual the orbital process of the frontal and that of the malar bones form together a projecting angle where united by the suture; in the other they do not angulate at all. Extreme breadth of bony orbits in the adolescent specimen, 4 in.; in the other, $3\frac{3}{4}$ in. The zygoma of the aged individual, as before remarked, is much more slender than in the skull figured by Prof. Owen; in the younger the malar portion of the zygoma is even broader than in Mr. Owen's specimen. The nasal orifice of the aged skull is much larger than that of the other. The development of the alveolar portion of the jaws is also much greater in the aged animal; whence the chin slopes but little, whilst in the other it slopes excessively. In the aged specimen the ramus or ascending portion of the lower jaw turns abruptly at a right angle with the alveolar portion, and the coronoid process is little developed, and does not rise to a level with the zygomatic arch; in the young specimen the form is more as in Mr. Owen's figure, though less angulated. In this adolescent skull the intermaxillary bones continue strongly demarcated.

It remains for future observation of additional specimens to determine whether the differences here indicated denote a

diversity of species, or whether they may be referred to extraordinary individual variation.*

"The third distinction of the skulls," continues Sir J. Brooke, "is, that the ridges rising from the frontal bones do not meet, but converge towards the top of the head, and again diverge towards the posterior portion of the skull. These ridges are less elevated than in the first-mentioned skulls, but the size of the adult skulls is equal, and both present specimens of aged animals." A wild adult male killed by himself, with huge cheek callosities, proved to possess this form of skull; but Sir J. Brooke erroneously assigns the animal to PITHECUS WURMBII apud Owen, in which, as we have seen, the lamdoidal crests unite upon the crown as they also do in his P. ABELII (here regarded as a mere variety of the same species): whereas the Bornean animal of Van Wurmb and the Sumatran animal of Dr. Clarke Abel were of the present race distinguished by the ugly cheek callosities, and to which no special name has been assigned, as the appellations *intended for them* have been attached respectively to Bornean and Sumatran examples of the *Mias Rambi*.

The Bornean species, with double-crested skull and huge cheek callosities, is the *Mias Pappan* of Sir J. Brooke, or rather of the native Dyaks; and Sir J. Brooke remarks of it (not at that time having seen a female), that "both Malays and Dyaks are positive that the female of the *Mias Pappan* has cheek callosities, the same as the male;" and from his own observation he adds that the *Mias Kassar* has no cheek callosities in either sex; whereas some young *Pappans* he had shipped, "(one of them *not a year old*, with two first molars), show them prominently." † For a figure of the adult male of the *Mias Pappan* of Borneo, and series of plates illustrative of its anatomy, *vide* the great Dutch work of Dr. S. Müller and Professor Temminck; but unfortunately they give no representation of the bony crests upon the skull.

Of the long celebrated specimen of a large Orang-utan procured

* I had recently the opportunity of observing a nearly grown living male of what I considered to be PITHECUS MORIO. It had no cheek callosities, and had not developed its hindermost *molares*. This animal was taken in the *Hindustan* steamer for Suez, and is, I think, a larger Orang than has hitherto been seen alive in Europe. Before reaching Madras, it escaped from its cage and found its way into the saloon, where it would appear to have been recaptured with some difficulty, and to have severely bitten two of its captors. In its cage it seemed quiet and good-tempered, and I handled it freely; but could not get to see it to much advantage. It appeared to resemble much the adolescent female above described, but was smaller, with larger face, and the expression was as distinctly masculine in the one as feminine in the other.

† Mr. Nicholls states in a letter that "both sexes of the *Mias Pappan* have immense cheek callosities: a full-grown female was lately killed at Samaratan, the callosities of which extended as low down as the breasts. [Here the *tracheal sac* must be referred to!] The *Mias Rambi* is without any callosities, and is, I think, covered with longer fur than the *M. Pappan* has."

by Capt. Cornfoot in Sumatra, and described by Dr. Clarke Abel in the "Asiatic Researches," vol. xv. p. 489, we still possess the skin minus the right hand and right foot, and of its osteology only the lower jaw and the bones contained in the dried left hand and left foot. It is by no means a specimen of the largest size, as long ago shown by Dr. Harwood in "Lin. Trans." xv. 472 ;* but the teeth and appearance of the jaw prove it to be fully grown, and the third inferior true molar is scarcely less abraded than the penultimate. This lower jaw is remarkable (especially as being that of a mature male animal) for the small antero-posterior diameter of its ramus or ascending portion, as distinguished from the alveolar portion, and also for the small size of the condyle. *Vide* figures in "As. Res." xv. pl. iv., and (half-size) in "J. A. S." vi. pl. xviii. ; and compare these with the representations now given of the lower jaws of other Orangs, and especially with that of the great Sumatran skull of a female *Mias Rambi* figured by Prof. Owen in "Trans. Zool. Soc." i. pl. liii. Its greatest antero-posterior diameter (on a plane with the molars) is $2\frac{1}{4}$ in. only, that of a female (?) *Pappan* from Borneo is $2\frac{3}{4}$ in., of a Bornean female *Rambi* $2\frac{5}{8}$ in., of a Sumatran male *Rambi* $2\frac{3}{4}$ in., and of Prof. Owen's Bornean male the same, and of his Sumatran female $2\frac{7}{8}$ in. Yet all the teeth are somewhat larger than in the Bornean female (?) *Pappan*, and equal those of our great Sumatran male *Rambi*. The hands and feet also are larger than those of our female (?) *Pappan* from Borneo. There are no materials for extending the comparison ; but it may be remarked of Dr. Clarke Abel's specimen that (as before asserted) it has distinct cheek callosities, though seemingly less developed than in Dr. S. Müller's figure. The beard, however, is scarcely less grown ; but the general colour of the hair is much darker, and more of a maronne-red, inclining to ferruginous upon the crown, and the beard is bright ferruginous, contrasting strongly with the rest.† I incline to consider it identical with the *Mias Pappan* of Borneo, notwithstanding the comparative feebleness of the ramus of the lower jaw in this particular specimen ; and I suggest that the old name PITHECUS SATYRUS be now restricted to this species, and justly or with peculiar justice, as Sir J. Brooke remarks in his letter, "from the ugly face and disgusting callosities."‡

* Dr. Harwood gives the length of the feet of a Bornean Orang described by him as $15\frac{1}{4}$ inches : the dried foot of Dr. Abel's specimen (containing the bones) measures 13 inches.

† This specimen is remarkable for having a well-developed unguinal phalanx and nail to the hallux ; a character of rare occurrence in the genus, and exhibited by no other specimen in the Society's collection.

‡ As the *Rambi* is neither Wurmb's nor Abel's animal, the names WURMBII and ABELII are unsuitable for it, and had better be disused ; while, as Raja Brooke was the first to discriminate it from the *Pappan*, I would suggest that it now bear the designation of PITHECUS BROOKEI. Should the second small

The nearly perfect skeleton now presented to the Society by Mr. Nicholls is that of a fully mature Bornean female (?) of the *Mias Pappan*, in which the strongly developed lamdoidal ridges of the skull do not unite upon the vertex to form a single sagittal crest, but continue an inch apart where most approximated. The size of the skull is fully equal, or even somewhat superior, to that of our aged female skull of a *Mias Rambi* from Borneo; but is inferior to that of our Sumatran male of the *Mias Rambi*. The skull is perfect, except that part of the face appears to have been shot away—viz., the uppermost portion of the right superior maxillary from the orbit to the nasal orifice, with parts of the adjacent malar, lachrymal, and nasal bones of the same side; and the supra-orbital ridge of the left frontal is diseased, with portions of bone exfoliating away. The vertebral column is complete, excepting the two last small coccygeal bones. The ribs and sternal series are also complete, and the great bones of the limbs; but many of the smaller bones of the latter are unfortunately missing. Thus, of the right hand there are wanting the scaphoid and the five unguinal phalanges. Of the left hand there also are wanting the five unguinal phalanges, the medial thumb-phalanx, and the cuneiform bone of the wrist. Of the right foot are wanting the os calcis astragalus and navicular bone, four unguinal phalanges (the terminal phalanx of the hallux remaining), the penultimate phalanx of the finger-toe next to the hallux, and the penultimate and ante-penultimate phalanges of that farthest from the hallux, corresponding to the human little toe. And of the left foot there are only the astragalus, and the digital bones, excepting the metatarsal of the digit next to the hallux, and the unguinal phalanges of the outer three toes.* The patellæ are also lost.

This valuable skeleton affords us the means of demonstrating, from adult specimens in our museum, the existence of the three species of Bornean Orang-utan indicated by Sir J. Brooke; and most probably we possess a fourth in the mounted skin and complete skeleton of the adolescent female, resembling PITHECUS MORIO in size, but having a much shorter fore-arm and more anthropoid conformation of skull. We have also (provisionally) identified Dr. Clarke Abel's Sumatran Orang-utan with the *Mias Pappan* of Borneo, to which the specific name SATYRUS is here proposed to be restricted; and we have referred Prof. Owen's

Orang also prove a good species, the name OWENII bestowed on it would be a fitting compliment to the eminent zoologist who has devoted so much attention to the study of the great anthropoid apes.

* Accordingly, but one unguinal phalanx remains, which articulates with the digit next to the hallux of the left foot. The terminal phalanx of each hallux exhibits a peculiar structure, and represents the ordinary penultimate (and not the unguinal) phalanx; so that this Bornean *Pappan* differs herein from Abel's Sumatran *Pappan*, which possessed a well-developed unguinal phalanx and nail to the opposable hallux or great toe.

P. Wurmbii and P. Abelii to the *Mias Rambi* of Borneo, which also should therefore be common to the two islands. The small P. morio, so far as hitherto known, is peculiar to Borneo; and it now remains to ascertain whether there be not two small species confounded under this, two small as well as two large species of these animals. It is only recently that a great and a small species of Chimpanzee have likewise been discriminated and completely established by Prof. Owen and Dr. Kneeland.*

The three Bornean species of Orang of Sir J. Brooke (at least two of which would appear likewise to inhabit Sumatra) are more different from each other in the appearance of the adult skull than the lion, tiger, and leopard are among cats; yet with the exception of the bony ridges, which in the morio are merely indicated (exhibiting the direction which they assume in the *Mias Pappan*), I have been unable to detect any difference of structure between the skulls of the two great species which may denote other than slight individual variation. In general, the form and size of our *Mias Pappan* skull are intermediate to those of our (Sumatran) male and (Bornean) female *Mias Rambi* skulls; and the nasal orifice of the former is comparatively small. But how slight is the difference between the skulls even of the lion and tiger among cats—confined to a straighter profile on the part of the lion, and to the fact that the nasals extend back beyond the suture of the maxillaries in the tiger skull, while they fall short of that suture in the lion skull! †

* *Vide* "Trans. Zool. Soc." iii. 381, and "Ann. Mag. N. H.," July 1852, p. 23 *et seq.*

† An analogous diversity perhaps exists in the skulls of the *Mias Rambi* and *Mias Pappan*, which, if it prove constant, will be of service in enabling us to determine to which of these species immature skulls showing large permanent molars should be referred. In our adult male and female *Mias Rambi* heads, and also in one juvenile skull taken from a stuffed specimen of a half-grown male without a sign of cheek callosities in our museum, the united nasal bones extend upward to the summit of the glabella between the supraorbital ridges; whereas in our *Mias Pappan* skull, and also in both (species?) of our *Mias Kassar*, the united nasal bones extend upward but little beyond the maxillary suture, and the same in three immature skulls with large permanent molars in course of development, which should therefore represent the young of the *Mias Pappan*.

It remains, however, to ascertain how far this distinction may prove constant. We have in all five stuffed specimens of Orangs, viz.:—1. Dr. Clarke Abel's Sumatran male *Pappan*; 2. Mr. Apcar's adolescent female *Kassar (?)* with short fore-arm; 3. A young female *Kassar (?)* with small permanent grinders appearing, and similar proportion of arm and fore-arm to last; 4. A very young *Mias —— (?)*; and 5. The young male *Mias Rambi (?)* before referred to. Colour of No. 5, a darkish ferruginous, deepest on the crown, paler and more rufous on the shoulders and back, and also the whiskers; hands and feet small, as in the *Mias Kassar*. Colour of No. 3, a lightish ferruginous, deepening on the arms, and darkest on the crown and between the shoulders. It would seem that the various species, however distinct in form of skull, are not to be very readily distinguished when prepared as stuffed specimens, unless, indeed, we had *adults* of each for comparison.

From the form of the pelvis, and from the inferior longitudinal extent of the molar series as compared with that of the lower jaw of Dr. Clarke Abel's Sumatran male *Pappan*, also from the inferior size of the hand and foot as compared with these members in Dr. Abel's specimen, I have considered the skeleton of a *Pappan* now presented by Mr. Nicholls to be that of a female animal; but not without considerable hesitation.* We have no male pelvis of an adult Orang for comparison; but two of undoubted females of the small species, and one of these (that of the animal which passed its life in close captivity) is singularly narrow, and probably differs little from a male pelvis. The skeletons of adult *Mias Rambi* and of adult of the small Chimpanzee figured by Prof. Owen in the first volume of the "Transactions of the Zoological Society," are also those of females; and Mr. Owen gives 5 in. 5 l. as the antero-posterior diameter, and 4 in. as the transverse diameter of the pelvic aperture of his adult female *Mias Rambi*, the corresponding diameters of the pelvic aperture of our *Mias Pappan* being 5 in. and 4 in., in our aged female *Mias Kassar* $4\frac{1}{2}$ and $3\frac{1}{2}$ in., and in our adolescent female with the comparatively short fore-arms $4\frac{1}{2}$ and $2\frac{1}{2}$ in. (!); which last are probably the permanent male proportions, to which I suppose Dr. Kneeland refers when he mentions "the narrow elongated shape of the Orang's pelvis." †

XXXIV.

FURTHER REMARKS ON THE DIFFERENT SPECIES OF ORANG-UTAN.

By Edward Blyth, Esq.

["Journal of the Asiatic Society of Bengal," vol. xxiv. pp. 518–528.]

Our museum having received from Sir James Brooke, of Sarawák, the superb donation of seven skeletons of large adult Orang-utans, I hasten to communicate the results of my examination of them, as a sequel to my former memoir on the genus published in the twenty-second volume of the Society's Journal.

Of these seven skeletons, five are referable to the *Mias Rambi* of Sir J. Brooke; although one of them (a small but full-grown female) is marked by himself *M. Pappan;* and another is sent

* Mr. Nicholls states in a letter: "I obtained the skeleton which I sent, through others, and therefore cannot be certain about its sex; but, if I remember right, it was given me as that of a male *Pappan*, full grown, but not aged, and with a very broad face."

† "Ann. Mag. N. H.," July 1852, p. 27.

by the new name *M. Chapin*, which is also that of an old female animal, remarkable for its extraordinarily large and vertically elongated orbits. It is probable that this alleged *Chapin* merely represents an individual variation; and Sir J. Brooke states, in his letter announcing the presentation, that some of these skeletons had been labelled by him with the names specified by natives, who accordingly (as may be supposed in such a case) are not particularly conversant with the osteological distinctions of the different species.

The sixth skeleton is that of an old female of the *Mias Pappan*, with double-crested skull like that of the *male* figured in illustration of my former memoir. It even exceeds that male in size, but the skull is smaller; and the sexual distinctions of the two are unmistakable. In this female the epiphyses of the limb-bones, scapulæ, ilia, &c., are thoroughly anchylosed, denoting completion of growth; even the symphyses pubis is united (with much irregular deposition of bone externally), and the sacro-iliac symphysis on the right side only. In no other of our Orang skeletons are the two latter symphyses united. Our male *Pappan* had not quite completed his growth, for some of the epiphyses are loose, and others are but partially soldered; those of the humeri are fixed and semi-anchylosed, as are also those of the left radius and ulna; but the epiphyses of the right radius and ulna are detached; those of the scapulæ and ilia are fixed but slightly, and those of the ischia more extensively. This animal had therefore (as will be attempted to be shown presently) not completed its full growth, the female being much more advanced in age, with its teeth proportionally worn down. On comparison of the skulls of the two sexes, that of the female is seen to be smaller, with the maxillæ less protruded, increasing the facial angle from 32° to 35°; the zygomatic arch is much less robust; and the longitudinal grinding surface of the upper molars less by $\frac{3}{16}$ in., while that of the lower molars is less by $\frac{1}{4}$ in. than in the youthful male presented by Mr. Nicholls, and by $\frac{7}{16}$ in. than in Dr. Clarke Abel's Sumatran male. In the form of the ascending ramus of the lower jaw this female specimen more nearly resembles the Sumatran male referred to than any other of our numerous specimens; but the condyle is considerably larger; and, as compared with Mr. Nicholls' Bornean male, the antero-posterior diameter of the ascending angle is much less; being in the Bornean male (on a level with the surface of the grinders), $2\frac{5}{8}$ in., in Abel's Sumatran male but $2\frac{1}{4}$ in., and in Sir J. Brooke's Bornean female $2\frac{1}{2}$ in. Lastly, this Bornean female presents the very extraordinary anomaly (throughout the series of placental mammalia) of a fourth true molar above and below, though on the left side only, that of the upper jaw being of small size and round form, its crown scarcely exceeding that of an upper false molar of *Macacus rhesus*, and it is placed posteriorly

to the ordinary last true molar on a line with its outer surface, that tooth having been pressed a little inward; in the lower jaw the accessory fourth true molar is very little smaller than the normal molars; and it projects from the internal margin of the anterior surface of the ascending angle of the jaw, its crown being directed obliquely inwards much more than forwards or upwards; as a functional tooth it must therefore have been almost useless, though the outer or upper margin of its crown is a little worn down by attrition, as is also the outer cusp of the small accessory molar above. This old female Pappan had been badly wounded in its day, having had its left humerus severely fractured, and the fibula of that side also broken, the fractured bones having healed; the unset humerus, however, in an extraordinary manner exhibiting two large and deep perforations in the great lumpy mass of united bone where suppuration had ensued, and large shot had probably been ultimately discharged from the orifices.

The seventh skeleton is that of a species altogether distinct and new. Although that of a large old male, with the cranial sutures much obliterated, and the anchylosis of the epiphyses of its limb-bones complete, it is very remarkable for the comparatively slight protrusion of the jaws, and the consequently increased facial angle; apparently, however, to a greater extent than really, from the flatness of the face, the unusually slight protrusion of the sockets of the upper incisors, and, above all, the elevation of the condyle of the lower jaw raising so considerably the occipital portion of the skull and consequently the auditory orifice. The facial angle does not actually exceed $32\frac{1}{2}^\circ$; while in the two *Rambis* (male and female) figured in my former memoir it is as low as 30° (this being also Professor Owen's estimate of his adult skulls of the *Rambi*). The zygomata (or cheek-bones) are unusually prominent. The canines, incisors, and the first three upper molars on each side are exceedingly much worn down by attrition, the canines even to a level with the other teeth; but the circumference of these canines, especially in the lower jaw, is conspicuously less than in males and even large females of the *Rambi* and *Pappan*, though they are proportionally larger than in the *Kassar*. It is further remarkable that the frontal ridges of the skull, instead of uniting upon the vertex to form a single sagittal crest (as in the *Rambi*), or continuing separate and well apart throughout (as in the *Pappan*), approach to contact upon the vertex, but without uniting, which is very likely to prove a constant and specifical distinction, as the present old male shows much irregular deposition of bone externally to its contiguously double sagittal crest. The long bones of the limbs, though fully as stout as in the *Rambi* and *Pappan*, and about twice as stout as those of our old female *Kassar*, yet probably do not exceed the corresponding bones of the full-grown male *Kassar* in length, being very much shorter than those of the adult *Rambi* and

Pappan; and this remarkable brevity of limb, combined with the conspicuous differences in the skull and sundry other distinctions, can scarcely be considered otherwise than as indicative of specifical peculiarity.

Of the five *Rambis* sent, there is unfortunately no specimen of a male of the largest size comparable to that of which the skull is described in my former memoir; but there are two large full-grown females (including that ticketed *Mias Chapin*), and also a full-grown female of smaller dimensions (which was labelled *M. Pappan*); with a male of superior age and stature to the male *Pappan* presented formerly by Mr. Nicholls; and also a young male with the last molars brought into wear, but which, nevertheless, had not nearly attained its full growth, which bade fair to rival that of the gigantic Sumatran male already noticed.

The specimen to which the name *Mias Chapin* was attached, appears (as already mentioned) to be a large old female *Rambi*, very remarkable for the enormous size and vertically elongated form of its orbital cavities, which measure 2 in. by nearly $1\frac{3}{4}$ in. across. Its skull is larger, though less massive, than that of the female *Rambi* figured in my former memoir: the muzzle is conspicuously more slender, measuring but $2\frac{5}{8}$ in. in greatest width (outside the canines), instead of $2\frac{7}{8}$ in.; and whereas the coronoid process of the lower jaw in the former specimen is smaller and about on a level with the condyle, in the present example (labelled *Chapin*) the posterior or condyle process is unusually prolonged, and raises the skull (with lower jaw *in situ*) so remarkably that, placing it on a level surface together with the other skull noticed, the zygoma of the so-called *Chapin* not only overlaps that of the other, but its lower edge is about $\frac{1}{16}$ in. higher than the upper edge of the zygoma of the other specimen;* the nasal bones, which in the other are united and ascend to the very summit of the glabella, in this skull continue separate, and reach only to the lower portion of the glabella. This skeleton is very deficient, wanting the sacrum and most of the bones of the hands and feet; but all of the long bones are present, with the shoulder-blades and rest of the pelvis; the epiphyses being completely soldered. The limb-bones are even rather longer than in the great female *Pappan*, and in fact exceed in length those of any other of our full-grown specimens; the humerus measuring 15 in., the ulna (to tip of styloid process) $15\frac{3}{4}$ in., femur $11\frac{1}{2}$ in., and tibia $10\frac{1}{8}$ in., circumference of middle of trunk of humerus $3\frac{1}{4}$ in., and of femur $2\frac{7}{8}$ in. The few digital bones seem to accord in dimensions with the corresponding bones of our male *Pappan*. The extreme length of the scapula is $8\frac{7}{8}$ in., and of pelvis $10\frac{7}{8}$ in., clavicle 8 in. This

* In Prof. Owen's figure of a female *Rambi* skull ("Zool. Trans.," i. pl. xxxv.), the condyle process is similarly elongated.

specimen is marked as having been procured in Sadong (in Borneo).

The next specimen, which was erroneously marked *Pappan*, we consider to be a small female *Rambi*, though fully mature and even old, as shown by the almost complete obliteration of the cranial sutures, the anchylosis of the various epiphyses, and the amount of attrition of all the teeth. The cranial ridges are very small; and the sagittal crest is hardly at all raised, but nevertheless exhibits a tendency to rise along the median line of the skull, between the frontal ridges which converge from the temples, and to be prolonged in front, anterior to the convergence of the latter, which takes place unusually far back; the nasal bones are united and singularly minute, actually not rising so high as the wide part of the orbital cavities; and the latter are small and circular, measuring barely $1\frac{3}{8}$ in. every way. The skull considerably resembles that of the female *Rambi* formerly figured, only that the sagittal crest is so much smaller; the zygomata being also more raised (in consequence of the greater prolongation of the condyle process of the lower jaw); and the orbits are smaller and more circular, and surmounted by much slighter ridges: consequently the face is flatter, and the sockets of the incisors are also less protruded. The skeleton is unfortunately very imperfect, wanting most of the bones of the hands and feet, and one tibia and fibula; a portion of the lower jaw, with the canine, first premolar, and part of the second, is also lost; but the other long bones are present, and the pelvis is complete. Length of humerus but $13\frac{1}{2}$ in., of ulna $13\frac{7}{8}$ in., of femur $10\frac{3}{8}$ in., and of tibia 9 in.; circumference of middle of humerus $2\frac{7}{8}$ in., and of femur $2\frac{3}{4}$ in., metacarpal bone of middle finger $3\frac{13}{16}$ in., metatarsal of corresponding toe $3\frac{3}{4}$ in., os calcis 2 in. Total length of scapula (with acromion) $1\frac{1}{8}$ in., and of pelvis $9\frac{7}{8}$ in.; extreme breadth apart of the ilia (or hips) $10\frac{7}{8}$ in., clavicle $6\frac{3}{8}$ in. This specimen also is marked from Sadong, in Borneo.

The third female *Rambi* is of large size and fully mature, with the various epiphyses well soldered; but it has even less trace of sagittal crest than the last; the frontal ridges meeting as far back upon the skull, but not quite uniting, and a small mesial ridge rising between them above the vertex; the orbits are moderately large and a little elongated vertically, measuring $1\frac{5}{8}$ by $1\frac{1}{2}$ in.; and the nasal bones are united and ascend a little into the glabella. Size about that of the first specimen (marked *Chapin*), but the muzzle rather broader, or $2\frac{11}{16}$ in. This specimen is nearly perfect, but the face is disfigured by a bullet which had knocked away the inner half of the right orbit and a tolerably large piece from the occiput, which fragments are lost. Length of humerus $14\frac{3}{4}$ in., ulna $15\frac{1}{4}$ in., femur $11\frac{5}{8}$ in., tibia $10\frac{1}{8}$ in.; circumference of middle of trunk of humerus 3 in., and of femur

$2\frac{3}{4}$ in.; metacarpal bone of second or middle finger $4\frac{5}{16}$ in., first phalanx of ditto $3\frac{1}{16}$ in., second phalanx $1\frac{11}{16}$ in.; metacarpal bone of thumb $2\frac{1}{8}$ in., first phalanx of ditto $1\frac{13}{16}$ in.; metartarsal bone of middle toe $3\frac{13}{16}$ in., first phalanx of ditto $3\frac{1}{8}$ in., second phalanx $1\frac{3}{4}$ in.; metatarsal bone of hallux $2\frac{1}{16}$ in., first phalanx of ditto $1\frac{3}{16}$ in., and unguinal (!) $\frac{11}{16}$ in.; total length of scapula $9\frac{1}{4}$ in., clavicle $7\frac{5}{8}$ in., extreme left of pelvis $11\frac{1}{4}$ in., and extreme breadth of ilia 12 in.

The two remaining *Rambis* are males, and the first to be noticed is a young animal, whose skull had obviously not attained its full dimensions, though the last true molars had been brought into wear; but the general massiveness of this skull indicates that the animal would probably have become a male of the largest size. The sagittal crest had begun to rise on a grand scale, and the frontal ridges converge directly to it, although these are scarcely indicated for $\frac{3}{4}$ in. before their junction. The teeth are more crowded than in the full-grown animal; the interspace between the upper canine and outer incisor, which in our large Sumatran male is $\frac{3}{8}$ in., being scarcely $\frac{1}{4}$ in.; and the first false molar, instead of being completely posterior to the canine, advances considerably on its outer surface posteriorly; in the lower jaw, also there is a bony interspace between the canine and first false molar in the large mature male, but not in the adolescent male; nasals partially anchylosed, and continued upward to the lower part of the glabella; epiphyses of the humeri considerably anchylosed, and also those of the tibiæ and fibulæ, but not of the radii and ulnæ. This skeleton also is tolerably complete. Length of humerus $14\frac{3}{8}$ in., of ulna $13\frac{3}{4}$ in., of femur 10 in., and of tibia 9 in.; circumference of middle of trunk of humerus $2\frac{15}{16}$ in., and of femur $2\frac{1}{16}$ in.; metacarpal bone of middle finger (the epiphyses beginning to anchylose) $3\frac{3}{4}$ in., first phalanx of ditto $2\frac{7}{8}$ in., second phalanx $1\frac{7}{16}$ in.; metacarpal of thumb $1\frac{7}{8}$ in.; metatarsal of middle toe $3\frac{9}{16}$ in., first phalanx of ditto $2\frac{3}{4}$ in., second $1\frac{5}{8}$ in.; metatarsal of hallux $1\frac{7}{8}$ in., clavicle $6\frac{1}{8}$ in.; extreme length of scapula (minus epiphysis) $7\frac{1}{2}$ in., of pelvis (with ischial but not iliar epiphysis) $9\frac{3}{4}$ in.; and extreme breadth at the hips, $10\frac{1}{8}$ in.

The next is a mature male, but certainly not of the largest dimensions, being about the size of the great females already described, and not otherwise recognizable from them than by the general massiveness of the skull (which is remarked at the first glance), and less conspicuously than usual in the present instance, by the form of the pelvis. The superciliary ridges are much broader than in any female skull, and the zygomata equally robust; the sagittal crest is also broad and well developed, nasals distinct and reaching up to the lower part of the glabella. Skeleton tolerably complete, wanting most of the unguinal phalanges and

some other small bones. Length of humerus $14\frac{3}{4}$ in., of ulna (with loose epiphysis) $15\frac{1}{8}$ in., of femur $11\frac{1}{8}$ in., tibia $9\frac{7}{8}$ in.; circumference of middle of trunk of humerus $3\frac{1}{8}$ in., and of femur $2\frac{3}{4}$ in.; metacarpal bone of middle finger $4\frac{1}{4}$ in., first phalanx of ditto $3\frac{1}{16}$ in., second phalanx $1\frac{11}{16}$ in.; metacarpal of thumb $1\frac{3}{16}$ in., first phalanx $1\frac{1}{8}$ in.; metatarsal of middle toe $4\frac{1}{8}$ in., first phalanx of ditto $2\frac{15}{16}$ in., second phalanx $1\frac{11}{16}$ in.; metatarsal of hallux $2\frac{1}{16}$ in., clavicle $7\frac{1}{4}$ in., scapula $8\frac{3}{8}$ in.; pelvis, $10\frac{3}{4}$ in. in extreme length, and $11\frac{3}{4}$ in. broad at the hips. This specimen was marked *Mias Rambi* by Sir J. Brooke, and is also from Sadong, in Borneo, the three skeletons received from Sadong having unfortunately been prepared by interment in the ground, and the present being the most complete of them, and otherwise the least injured.

We now come to the female *Pappan* already noticed, which though of greater size than the male described on a former occasion, with considerably longer and broader pelvis, has nevertheless a smaller skull, less prominently developed jaws, and conspicuously smaller teeth; the zygomatic arch is shorter and a little weaker than in the male; but the superciliary ridges and width of the bony orbits are much the same, and in fact there is little further difference between the two skulls; the bony crests on the vertex are less prominent in the female, and they approach to within $\frac{3}{4}$ in. of each other; whereas in the male they remain 1 in. apart where most approximated; length of base of skull, from between the middle incisors to the anterior margin of the occipital foramen, $6\frac{7}{8}$ in. in the male, and $6\frac{1}{8}$ in. in the female; breadth of zygomata apart $6\frac{5}{8}$ in. in both. This skeleton is also nearly perfect. Length of humerus 15 in., of ulna $15\frac{5}{8}$ in., femur $11\frac{1}{8}$ in., tibia $10\frac{3}{8}$ in., circumference of middle of trunk of humerus $3\frac{1}{4}$ in., of femur 3 in., metacarpal bone of middle finger $4\frac{1}{3}$ in., first phalanx $3\frac{1}{8}$ in., second $1\frac{13}{16}$ in., metacarpal bone of one thumb 2 in., of the other somewhat less, and bearing a very short first phalanx, only $\frac{7}{8}$ in.; metatarsal bone of middle toe 4 in., first phalanx 3 in., second $1\frac{3}{8}$ in.; metatarsal of hallux $2\frac{1}{8}$ in., clavicle $7\frac{1}{4}$ in., scapula $8\frac{1}{2}$ in. in extreme length, and pelvis $10\frac{5}{8}$ in. long, and $11\frac{3}{4}$ in. broad at the hips.

Lastly, we arrive at the new species, which may be designated PITHECUS CURTUS. It is perhaps the genuine *Mias Chapin* of the Dyaks. The specimen is decidedly male, and well advanced in years; and the skull has a more anthropoid appearance than that of any other Orang known. This chiefly results from the much reduced prolongation of the muzzle, while the cheek-bones project remarkably, giving a sort of Kalmuk expression to the skull! The absolute projection of the maxilla, in a horizontal line carried from the lower margin of the orbital ring, is in our large Sumatran male *Rambi* skull fully 3 in.; in the male *Pappan*

it is about the same; in the female *Pappan* $2\frac{1}{2}$ in.; in the old female *Kassar* (a much smaller animal) about $2\frac{1}{4}$ in.; and in the great male CURTUS barely 2 in.! Extreme breadth of zygomata 7 in.; height of the skull, with lower jaw *in situ*, 11 in.; length, in a straight line, from the summit of orbital cavity to between the incisors, $4\frac{1}{4}$ in. (the same measurement being in the male *Rambi* $5\frac{1}{8}$ in., and in the male *Pappan* $4\frac{5}{8}$ in.); length from occipital foramen to base of upper incisors 6 in. (in the male *Rambi* $7\frac{1}{8}$ in., and male *Pappan* $6\frac{7}{8}$ in.); length of bony palate 3 in. (in the others $3\frac{7}{8}$ in. and $3\frac{3}{8}$ in.); orbital cavities $1\frac{5}{8}$ by $1\frac{1}{2}$ in. across; extreme width of bony orbits apart externally 5 in.; extreme breadth of ascending ramus of lower jaw $3\frac{7}{8}$ in.; height of the condyle $4\frac{3}{8}$ in.; length of grinding surface of the upper molars $2\frac{1}{16}$ in. The skeleton is fortunately nearly perfect. Extreme length of humerus $13\frac{1}{4}$ in., ulna $14\frac{3}{16}$ in., femur $10\frac{3}{16}$ in., tibia $9\frac{3}{8}$ in.; circumference of middle of trunk of humerus $3\frac{1}{4}$ in., of femur $2\frac{7}{8}$ in. (length and circumference of humerus of old female *Kassar* $12\frac{3}{4}$ and $2\frac{1}{4}$ in.; ditto of femur $9\frac{7}{8}$ in. and $2\frac{1}{4}$ in.); length of metacarpal bone of middle finger $3\frac{7}{8}$ in., first phalanx of ditto $2\frac{15}{16}$ in., second $1\frac{15}{16}$ in.; metacarpal bone of thumb $2\frac{1}{16}$ in., first phalanx $1\frac{1}{8}$ in.; metatarsal bone of middle toe $3\frac{11}{16}$ in., first phalanx $2\frac{3}{4}$ in., second $1\frac{5}{8}$ in.; metatarsal bone of hallux 2 in.; clavicle $6\frac{7}{8}$ in.; extreme length of scapula $8\frac{3}{4}$ in., of pelvis $10\frac{1}{8}$ in.; and breadth at the hips 11 in. Length of the vertebral column, from atlas to sacrum, measured internally, $16\frac{1}{4}$ in.; in the scarcely full-grown male *Pappan* $17\frac{1}{2}$ in., and in the old female *Kassar* $15\frac{1}{4}$ in.; axis-vertebra soldered to the next. As compared with the *Rambi* and *Pappan*, the metacarpals and metatarsals are shorter, and the first phalanges of the fingers and toes are longer.*

With the grand series of skulls and skeletons of adult Orang-utans now subjected to examination, amounting to twelve in all (viz., three males and four females of PITHECUS BROOKEI or *Mias Rambi*, one male and one old female of P. SATYRUS or *M. Pappan*, one old male of P. CURTUS or *M. Chapin* (?), an old female of the P. MORIO or *M. Kassar*, and the adolescent female with short forearms, provisionally designated P. OWENII, in addition to Professor

* A friend who has resided long in Borneo, and has examined numerous skulls of Orang-utans (including those which have passed through the hands of Sir J. Brooke), informs me that he has remarked that, in the adult and aged specimens of the *Rambi* and *Pappan*, the canines are always perfect; whereas in those of the small *Kassar* they are as regularly broken or worn down to about a level with the incisors. This remark is borne out by the series of skulls now under examination. The canines are long and unbroken in all the specimens of the *Rambi* and *Pappan*, and are ground down in the old female *Kassar*, and also in the old male P. CURTUS; denoting probably a difference of food. Moreover, the same gentleman informs me that different species of these animals do not appear to inhabit the same district, and he thinks that the P. OWENII represents in the southern part of the great island the P. MORIO of the northern part.

Owen's excellent lithographs of the male *Kassar* and of male and female *Rambi* in the "Trans. Zool. Soc.," vols. i. and ii.), the observer is first struck with the very obvious and conspicuous distinctness of the comparatively puny *Mias Kassar*, and of the adolescent small skeleton, from all the rest. The next glance suffices to separate the *Rambi*, *Pappan*, and P. CURTUS, the last being quite as thoroughly distinguished apart by the *tout ensemble* of its appearance as the *Pappan* is by its conspicuously double-crested vertex. I should think that no zoologist, accustomed to the discrimination of specifical characters, would hesitate, with the present series of skulls before him, to acknowledge the distinctness of each of these three; but such an observer would ponder for a while over the remarkable female *Rambi* skull with enormous and vertically oblong orbits, and would doubtless hesitate in regarding it as specifically identical with the old female *Rambi* of small size, so great is the contrast between them. Presuming, however, that he arrived at the conclusion here ventured upon, it still follows that the *Rambi* is subject to an extraordinary amount of variation for a wild animal; and this, although it may not invalidate the opinion of its distinctness from the *Pappan* and P. CURTUS, nevertheless prompts a reconsideration of the grounds for the view formerly expressed with regard to the specifical distinctness of the small specimen having short fore-arms. From the detached state of the epiphyses of its limb-bones it is certain that that specimen was not full-grown; and as those of the ulnæ, at least (as shown by the skeleton of the adult male *Rambi*, and also by that of the male *Pappan*), are the last to become anchylosed, it should follow that the fore-arm continues to increase in length after the upper arm and the leg had ceased to grow; but the difference is still too great to be thus accounted for satisfactorily, and upon re-comparison of this specimen with the undoubtedly aged female *Kassar*, I deem it prudent to await the further evidence which Sir J. Brooke has kindly promised that he would endeavour to procure and send, before venturing to confirm or modify my previously expressed opinion on the subject.

This fact would appear certain, that the partial anchylosis of the epiphyses of the limb-bones does not rigorously denote cessation of growth, unless the female Orangs attain to greater stature than the males, which is most unlikely. It would seem rather that, as the earthy salts are continuously absorbed and re-deposited, some continuance of extension supervenes, until finally checked and stopped by the considerably increased deposition of bone. The skull also continues long to increase in size after the last true molars have been brought into use.

As regards the sexual distinction, a practised eye discerns it readily in the adult skull by its superior general massiveness in

the male; and in the skeleton the larger and broader pelvis of course denotes the female animal, combined with a proportionally smaller and less robust skull than in the other sex. There is no reason to doubt the correct determination of sex in any one of the specimens here noticed.

The occasional but rare occurrence of the unguinal phalanx to the hallux or great toe would seem to be proper to no particular sex or species; for it exists in our male *Pappan* from Sumatra, and in our female *Rambi* from Borneo.

It now remains to connect the osteological with the external characters of the different species; to determine the stature attained by the largest males of the *Rambi*, *Pappan*, and also *Kassar*, to obtain further information of the PITHECUS CURTUS, and to verify or otherwise the P. OWENII. With the powerful aid of the accomplished Raja of Sarawák, we trust to be enabled ere long to resolve these various problems.

END OF VOL. I.

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