

in a vessel, I had instruments and facilities for astronomical observations, which Captain Clapperton, on whom we depend, could not in his land journeys possess.

From the simplicity of the operation, I conclude his latitudes were all by observation, therefore I shall not interfere with them. But as he expressly says in his first journey from Kukah to Sakatù, that his longitudes are by dead reckoning,* and as I have reason to believe that his others were so, I shall take the liberty of considering them all in the same light.

Although we did not visit the same places, and there are consequently no direct means of comparison between our routes, there is fortunately a sort of connecting point at Kulfu, where he gives the bearings and distance of Rabba, at which place I had very good chronometric observations. He says the latter is three days south of the former; therefore carrying back his distances from the latitude of Kulfu, on the meridian of Rabba, we shall have Bussah in longitude $4^{\circ} 42'$ E.

As this differs $1^{\circ} 29'$ from the position of that place on Clapperton's chart, that quantity may be adopted as a correction to all his longitudes. But a portion of this, namely, $51'$, arises from the erroneous position which he assumed for Badagry,† from which place he took his departure; therefore the remainder has arisen, probably from his having over-estimated his distances, an error into which all travellers are liable to fall, and which must increase in proportion to the difficulties and fatigues of the journey. If this principle be admitted, it will be necessary to apply a second correction, in the ratio of the excess of the distance, between the known points Badagry and Bussah. However, as it seems unreasonable to suppose that he always committed an error of equal amount, I would propose to take a mean between the *constant* and the *increasing* corrections. Then the longitudes will be as follow:—

Bussah	$4^{\circ} 42'$ E.
Womba	5 49
Guari	6 26
Zaria	7 4
Bebeji	7 37
Kano	7 44
Sakatù	4 38
Katagúm	9 16
Kukah	12 34

It is impossible to make use of the distances given in itineraries, unless we have some data by which to estimate a day's march. This will vary according to circumstances, and there must be a considerable difference between a Kàfilah journey and that of a

* Denham and Clapperton's 2nd edition, vol. ii. pp. 220 and 251.

† Properly Badaghi.—*Vide* Robertson, notes on Africa, p. 283.

messenger. When the distance is given between cities not very remote, and having from their importance frequent communication, I think the latter ought to be calculated on, and might be taken at twenty-five miles. By adopting this in the distance between Rabba and Kulfu, it would place the latter more to the north, and within the distance of two days of Yáuri, as given by the Landers; otherwise two days would bring Yáuri too much south, and too near Bussah, to agree with the time they took in passing between those cities.

The distance from Bussah to Rabba, the Landers say is seven days by land and four by water. I presume the land journey is through Kulfu.

Both at Sakatù and Yáuri, the distance between these cities is said to be five days. This, if we take the messenger-day of twenty-five miles, will agree very nearly with the position of the former city, by Clapperton's latitude and his corrected longitude, and gives 10·8 miles per day for the distance to Kano, which is, perhaps, enough for horizontal distance, considering that the route is difficult and circuitous. This journey between Sakatù and Kano was performed three times, each in about seventeen days.

On his first expedition, travelling between Bornù and Sakatù, Clapperton takes his departure from a lunar observation* at Kuka; but he neither gives the data, nor mentions his having taken such an observation at that place. Now, as in coming westward, he falls short of the position I have assigned to Kano, by his longitude corrected from Bussah, either he or I must be wrong; but as the estimated distance generally exceeds the true instead of falling short, the presumption is that the lunar observation places Kukah too far to the eastward. It is therefore better, perhaps, to reject it altogether, and assume a position for Kukah, by carrying back his itinerary from the corrected longitude of Kano.

Thus I leave Clapperton's map untouched, with the exception of bringing his longitudes a little more to the westward. The case is very different, however, with respect to Lander's itinerary between Kano and Danrorah, after the unfortunate death of his master. This has been so erroneously laid down, that the latter place falls within thirty-five miles of Fandah, from which he was informed that he was then distant twelve or thirteen days.† This route must, therefore, be altered entirely, which the data enable me to do with considerable precision; and it will be checked by the reported distance of Danrorah from Fandah, and of Jakobah from Dagbòh.

* Denham and Clapperton, vol. ii. p. 251.

† I cannot ascertain how or by whom this itinerary was laid down, but the position of Fandah was not at that time ascertained.

Lander went from Bebeji to Kuttup, and returned to Zaria; thus making a triangle, of which the first and last places at the base are known;* and Kuttup, which is three days short of Danrorah, is at the apex. I have very carefully estimated the distances on the routes to and from Kuttup, from the hours which he gives, leaving out of the question his vague courses, and I find, after making proper allowance for winding, they are about 120 miles each: these, therefore, form the legs of an isosceles triangle, and their intersection points out the position of Kuttup. To the remainder of the journey of three days to Danrorah, I have given an analogous direction, which agrees with Lander's reported distance of Fandah, and mine between Dagboh and Jakobah: Danrorah is half a day from the latter place, which lies probably in lat. $9^{\circ} 30' N.$ and long. $9^{\circ} 26' E.$

This corrected map of Lander's journey, viewed conjointly with that of Clapperton, which it nearly joins, reveals a remarkable and highly important feature; namely, the almost uninterrupted continuance of a valley between the lake Chad and Jakobah, in the neighbourhood of which city flows the river Chadda. This leads me to the second part of my subject, the nature of the lake Chad. I approach it with great timidity and caution, as I am aware that very different views of the subject have been hitherto entertained by many able geographers.

Major Rennell was of opinion, that not only the waters which descend from the mountains of the moon, but the outpourings of the mighty Niger, Jalibà, or Kwara, may be evaporated, from the low and extensive morass in which he supposed them to terminate. The hypothesis of Major Rennell, for whose sagacity I entertain the highest veneration, would never have been proposed but for the imperfection of the materials on which he had to work: and the discovery of the outlet of the Kwara or Jalibà completely subverted it, and proved at the same time how vague were the ideas of the Arabian geographers respecting the interior of Africa.

My rejection of that hypothesis therefore will not be deemed presumptuous, especially as so able a geographer as M. Reichard, of Lobenstein,† had, as early as 1802, assigned very strong reasons for supposing that the outlet of the Jalibà would be found in the Bight of Benin. The discovery of the large lake or inland sea by Denham and Clapperton seems at first to support this theory, especially if it has, as the former believed, no outlet; but by giving an approximation of the size of the lake, Denham has shown how small that reservoir is, compared with the volume of water discharged into it. The Caspian, for instance, receiving

* By Clapperton's latitude and longitude.

† Von Zach, *Monatliche Correspondenz*, May, 1802.

the drainings of a comparatively low range of mountains, has a surface of more than 10° by 3° in breadth. The Chad is only about 3° in length, and receives the deluge of tropical rains, from a range 25° in extent, and doubtless higher than the snow-capped mountains of Abyssinia, since the principal branch of the Nile takes its rise in the eastern side of the same lofty range, the Kumri,* or mountains of the moon, or as Sultán Bellò says, *ninety-nine* mountains all of them beginning with the letter F.

It is true the lake Chad is not the only receptacle; we have reports of the lake Fitri, and there are, perhaps, many others: but we may presume from the alluvial nature of the whole of that vast tract, that they are merely inundations of the low land; and even the permanent lakes are but slight depressions of soil, and may have no great depth. In the next place, we have now positive proof of the existence of a large river, the Chadda, flowing from the east, and uniting with the Kwara from the west, which it certainly rivals, if it does not surpass it in magnificence; having much greater average breadth, although I believe the depth in general to be less. This magnitude implies a proportionate length of course, and if it do not pass through the lake Chad, it must have its sources far away to the east, in some of the *ninety-nine* mountains. The Mendefi range seen by Denham is not sufficiently remote or lofty to be the parent of the whole of such a stream; yet it would lie right in its course, especially if the slope on the southern side be as extensive as that on the north, which Denham found to be 100 miles. The mountain may, however, be volcanic, of which there is very great probability:† in that case it may rise abruptly on the south side, from the alluvial or river level, and allow the Chadda to sweep round its base. This course indeed Denham gives it, from the accounts of the natives, but he joins it with the Shari, thus making the stream flow in opposite directions at the same time.

Again, Denham assures us that the water is fresh; he says frequently "it is very sweet and pleasant."‡ Although instances have been given of lakes without outlets being sweet, I doubt if these be well established; and the contrary is certainly the received opinion.

Lastly, the river Chadda is very clear compared with the

* Properly Jibálu-l-Kumra, i. e., the Blue Mountains, though the original name was doubtless Jibálu-l-Kamarí, "the lunar mountains," as the Arabs derived their knowledge of this part of Africa from Ptolemy, who calls the whole range "the mountains of the moon."—(Geogr., p. 115.) S.

† The corrected position of the highest point of the Mendefi range falls exactly on the line of the volcanic elevations in the Atlantic of St. Helena, Anno-Bom, St. Thomas's, Fernando Po, and Camaroons Mountain, an extent of more than 1500 miles.

‡ Denham and Clapperton, vol. i. p. 64.

Kwara. This is rarely the case with mountain streams; but as with the Rhône, the Rhine, &c., &c., it is always the consequence of having passed through a lake, where the almost stagnant waters have time and space to deposit the *débris* from the mountainous regions, with which they were charged. Indeed the Chadda was so clear, that the men drank its water from alongside, after letting it stand a little while; it was remarkably "sweet and pleasant." While in the Kwara we drank the water which had been suffered to cool and settle in the boiler. The Chadda began to rise a little earlier in the season than the Kwara, but this must be the case whether it pass through the lake or not, since it must have its feeders in the Kumri mountains, many degrees to the south of the sources of its rival, and therefore must begin to fill a little sooner and faster, but not much, otherwise the rivers would have different levels at their confluence.

If the fact mentioned by Mr. Laird, that the water of the Chadda is colder than that of the Kwara, was the result of comparative experiment, and not depending on the fallacious evidence of the senses, I cannot admit it to be a proof that the whole stream is direct from the mountains, without having been delayed in its course by being spread into a lake.

I made experiments in the Kwara only, but my self-registering thermometer failed, as the quicksilver passed the index every time. This however was sufficient to prove that the water at the bottom was at a much lower temperature than at the surface.

These are the circumstances which have led me to the belief of the identity of the Chad and the Chadda, or more explicitly, of the lake and river. I shall, I trust, bring forward some strong evidence in my support, and will honestly state the arguments on the opposite side of the question, as they appear principally in Denham's assertion, and the implied belief of Clapperton. They however were pre-occupied with one idea, and thus easily satisfied themselves that they had proved it. I thought at the outset of this inquiry, that I should be able merely to bring forward some plausible reasons in support of my opinion, but as I advance, I find the evidence crowding so closely on me, that I hope to be able to prove, not only that the alluvial or river level can be traced from the lake Chad, nearly to the part of the Chadda which I was able to reach; but that with a few breaks, I can show the continuity of the river for nearly the whole of that distance.

The similarity of the names has led others, as well as myself, to look to the Shari* of Denham as the outlet of the lake, notwith-

* Shâri, if Arabic, would signify glittering, an epithet often applied to a large body of water; but the name may be a Bornuese word, and it may have been incorrectly expressed.—S.

standing his assertion to the contrary, and I confess I began this inquiry, with the hope of finding in his description some circumstances from which I might draw a fair presumption of the possibility of his having been mistaken in the direction of the current of that river. Those who know the difficulties under which travellers in general labour, and how truly they are multiplied an hundred-fold to the African traveller, will not be surprised at my imagining him to have fallen into such an error. For myself, if I succeed in proving my proposition, I shall consider that I have made a greater discovery in Africa within my closet, than while personally labouring on the spot.

The consequence, however, of an attentive reading of the account, which I had in some measure forgotten, was, that I very soon perceived the necessity of abandoning all idea of drawing off the water of the lake by that channel. Nothing can be more conclusive or circumstantial than Denham's description. He saw the river and crossed it at several points, and not only assures us that the current runs past Loggùn and Showi with considerable rapidity *towards* the lake, but having gone *with* the stream in a canoe as far as its entrance to "that sea of fresh water," he speaks of the difficulty of paddling *against* the current on his way back.* He also describes the water as discharging itself by several branches, and that it consequently forms a *Delta*.

We have also a confirmation of the northerly course of this river, from the account received at Sakatù by Clapperton; who was told that it is only four feet deep above Loggùn, before it is joined by the Asha, which comes from the east through Bagermi.† The Shari doubtless has its origin in the Mendefi range to the south-west.

Having thus disposed of the Shari, I feared that I should be obliged to give up the tribute of the ninety-nine mountains to the effect of the sun's rays, very much wondering nevertheless, how he would dispose of such a vast body of water, if once raised into vapour, except by letting it fall again on the surface of the lake in the shape of dews; and every one knows the dampness of the African climate, which causes the finest steel to rust in a very short time.

However, a new light broke in upon me in the course of my investigation. Soon after the first arrival of the travellers on the borders of the lake, they came, says Denham, "to a very considerable stream called the Yeú; in some parts more than fifty yards wide, with a fine hard sandy bottom, and banks nearly perpendicular; and with a strong current running three miles and a half to the eastward. As I expected, every one of the Arabs said this was the Nile, and that it ran into the great water the

* Denham, vol. ii. p. 6 and 7.

† Clapperton, vol. i. p. 30.

Chad. It is sometimes double the width and a great deal deeper. The air from a running stream of CLEAR water, and the freshness it imparted to all around, was such a relief, after a march through sandy deserts, that both man and beast were in a manner renovated by its effects. The men, and even the women, bathed and washed, and the negroes swam all the horses." The principal feature in this description is the *clearness* of the water. It struck me very forcibly as an anomaly, although he says also that the Shari was clear at its embouchure; but this is incompatible with the formation of a Delta, and of the fact which he relates of its bearing on its bosom floating islands, &c., and I supposed this must be the outlet I sought for; upon very alight grounds it may be thought, but I must request that judgment may be suspended, while I lead up to my hypothesis, by referring to the authority of travellers from all parts of the continent, and in all times, up to our own enterprising countrymen, who have trodden the very ground. If I were to quote all the writers who throw light on this interesting question, I should swell my paper unnecessarily, since it has been already done by far abler hands. It will be sufficient for my purpose if I observe, that the accounts of the ancients of a great central river, traversing Africa from the west, were confounded with those of the Arabian geographers of the middle ages, who all spoke of a large river flowing from the east. They were considered as identical; but the ocular testimony of Mungo Park having been received as confirmation of that of Herodotus, it was immediately concluded that Africa could not be traversed otherwise than from west to east; and the Arabians were thrown into discredit. Deceived by the generic terms applied to both the rivers of the negroes,—by the transmission of the description through the natives, who doubtless consider the direction of rivers with reference to their own journeys, and independently of the current,—and by the universal belief of the communication with some great central lake, these accounts have been considered as relating to one and the same river, until the discovery of an intermediate outlet has shown the possibility of the continent's being traversed by streams from opposite sources.

Justice, however, has not been sufficiently done to the Arabian writers; and I hope to be able to prove, that their account of the eastern *Nil el 'Abid*, or river of the Negroes, is nearer to the truth than has been generally imagined.

Idrisi,* Abulfeda, Leo Africanus, &c., all speak of the westerly course of this river. The former† says that it forms an island at all times of the year, 300 miles long by 150 in breadth, which is

* Jaubert's Idrisi, p. 13.

† Jaubert's Idrisi, p. 18; also Major Rennell, in the Proceedings of the African Society.

inundated during the rainy season; consequently, the whole of that tract is alluvial, and agrees remarkably well with Clapperton's description of it.*

They all show the drainage of the western side of the mountains, where the Nile of Egypt has its source, by a large river flowing to the westward, and communicating with the river of Tumbuktù; though their reports are vitiated by having put forth their opinion that there was also communication with the river of Egypt. Still they may have been misunderstood from the application of the generic term Nil to the three streams.

Modern discovery has proved them in the main to be right. While Mr. Lucas was collecting information in Africa from the Sherif Imhammed, a native of Fezzan, relative to the countries of Sudán, Bornù, and Kashnah, with which he was said to be perfectly well acquainted, information equally valuable was obtained in England from Ben Ali, a native of Marocco, of the same countries, which he also had visited. As they agree in the most important particulars, they may be taken as very good authority.

In speaking of the great river which in Arabic is sometimes called Nil el Kibir, or the Great Nile, and sometimes Nil el 'Abid, or the Nile of the Slaves, they say,† “ Its rise and termination are unknown, but its course is *from east to west*. So great is the rapidity with which it traverses the empire of Kashnah that no vessel can ascend its stream; and such is the want of skill, or such the absence of commercial inducements among the inhabitants of its borders, that even with the current neither boats nor vessels are seen to navigate.‡ In one place, indeed, the traveller finds accommodation for the passage of himself and his goods, but even then, though the ferrymen, by the indulgence of the Sultan of Kashnah, are exempted from all taxes, the boat which conveys the merchandise is nothing more than an ill-constructed raft, &c.” “ The depth of the stream, which is more than 100 miles to the south of the city of Kashna, the capital of the empire of that name, is estimated at twenty-three or twenty-four feet English. Its width is such that at the island of Gongo,§ where the ferrymen reside, the sound of the loudest voice from the northern shore is scarcely heard.”

“ Having passed the stream, the face of the country, and with it, the mode of travelling are changed. High mountains and

* Denham and Clapperton, vol. i. p. 81.

† Mr. Lucas's communications, Proceedings of the African Association, vol. i. p. 123.

‡ This is precisely the case on the Chadda at the present day; but Denham says that in the former Sultan's time there were many canoes trafficking on the river Yéú near Kabuhari.

§ Gongo or Gondo means island in the Hausa language.

narrow valleys, extensive woods and miry roads, succeed to the vast plains and sandy soils of the Zahara* and its neighbouring kingdoms. No camels are found; their place is supplied by small horses, asses, and mules."† The country of Kashnah, properly speaking, "is bounded on the north by the mountains of Eyre,‡ and by one of the districts of the great Zahara; on the south by the (great river) Niger, and on the east by the empire of Bornù and the kingdom of Zamphara.§ The capital is five days north of the Niger."||

Hornemann's notices are pretty correct, except that he considers that there is but one stream, having in all its course a current running in the same direction as that of the river of Tumbuktù, or from west to east. He says,¶ "The river which was seen by Mr. Park waters Nyffe and Cabi, where it is called Gulbi, and in Haussa Gaora, (Kwara), runs eastward into these districts of Bornù, where it takes the name of Zad; all these names mean the *great water*. It is a very large river. The breadth of the Zad was given me for one mile, others said two, but in the rainy season the breadth is said to be a day's journey (*i. e.* eight hours). The Bidumas** always keep in the middle of the stream. They are a very savage, heathenish nation."

Hornemann's distance from Kashnah to Bornù, 330 miles, agrees very well with Clapperton's.†† His supposition of the east-erly current may be explained from his considering it to be a continuation of the river of Tumbuktù; and as I said before, from the probability that his native informant referred to the trending of its banks in the same direction as his journey, rather than to the course of its current.

In the Journal of the Arts and Sciences for 1823, an account is given by an officer at Sierra Leone (Major Laing), of the journey of a Mohammedan named Mohammed Misrah,‡‡ from Alexandria through Súdán and the countries in question. His testimony is of a varied nature, making both for and against my hypothesis, although it can have but little weight either way.

* Šahrí, *i. e.*, Desert.—S.

† Lucas's information, Proc. Afr. Ass., vol. i. p. 118. Idrísí, p. 15, says they have camels in the country of Lemlem.

‡ Eyres, *i. e.*, Aurás, the mountains on the south side of Fezzan.

§ Zanfárah of Idrísí.—S.

|| The sheriff does not describe the western limit, but it is evident that it ought to be Zamfara, and the word is misplaced, as, according to Clapperton, Zamfara, of which Zirmi is the capital, lies to the west of Kashnah.

¶ Hornemann's notices, Proc. Afr. Ass., vol. ii., p. 201.

** Bidoomahs of Denham and Clapperton.

†† Clapperton was thirty-six days one way and thirty-seven the other between Kuka and Kano; Idrísí gives thirty-six days as the distance between Kauga and Ghanah. But in countries where the frequent wars cause not only the destruction of cities but the depopulation of whole districts, names are probably of little duration, or may be as migratory as the inhabitants.

‡‡ Probably Misr, *i. e.*, Egyptian.

He says, that he had conversed with people who had travelled from Nufi to Sennár, along the banks of a very broad river, which frequently overflows its banks, inundating the country to an immense extent; but he positively believes this river to be a link of communication between the Niger and the Nile, calling it the *Bahr el 'Abid*. He asserts, on the other hand, that he has made the circuit of the lake Fitri, which he declares has no outlet, although it receives a large river 400 yards wide at its embouchure. He says, at the distance of ten days south from Bornù, the *Jalibà* flows through the *Kafir** country, where it is known by another name; that there is no river of any consequence within that distance of Bornù, although he must have passed the *Asha*, the *Shari*, and subsequently the *Yéú*. His accounts of distances prove that his memory was not always faithful. From Bornù *Birini* to Kano, he gives only ten days; *Idrisi* gives thirty-six, as well as *Clapperton*, and *Hornemann* says 330 miles. *Mohammed's* testimony is therefore entitled to little credence in the details, although it is evident he had travelled through the countries he describes. There is something like evidence to be gleaned from *Sultán Bellò's* almost unintelligible account of the countries of *Súdán*, given in the Appendix to *Clapperton's* journal.† The river *Baku* is described as larger than the *Kwara*. The relative positions of the rivers are, the *Kwara* in the west, the *Kaduna* in the centre, and the *Baku* or *Jaku*‡ to the east. The people of *Nifi* are said to have come originally from *Kashnah*, and their prince from *Atághér*. "He first conquered the territory of *Beni*, from the river called *Bakú* to that which is named *Kaduna*, &c.; he then embarked on the *Kwara*, &c." Mention is made of an eastern *Kwara*, and again, "the river of *Kwara* runs through mountains &c., and issues from the mountains of the moon, &c." This is a very consistent description of a river, such as I have attempted to trace from the lake *Chad*: the river *Chadda* in fact, which like the *Baku*, is larger than the *Kwara*.

Thus we have very strong presumptive evidence from the Arabian geographers and from native travellers, of the existence of an immense river, running through the countries of *Bornù*, *Wankarah*, and *Haussa*, &c., "100 miles south of the empire of *Kashnah*;" with almost unvarying assertions of its course being from the east towards the west, and having its sources in the same mountains which gave birth to the *Bahr el Abyad*, its origin being clearly pointed out by *Mr. Brown* as the *Misselád*. In *Súdán* it is not a mere mountain torrent, but a mighty stream, at the common river or alluvial level, which is proved by its overflowing its banks for more than 300 miles. If this stream flows

* *Kafir*, i. e., Infidel.
VOL. VIII.

† Pages 339, 340.

‡ The *Girkwa* of *Clapperton* (?).
Y

from the east, it cannot terminate in Wankarah, since, according to Idrisi, it retires to its bed after the inundations, and is a river at all times.* Neither if it flow *towards* the east, can it have its sources in the mountains to the west, which have but little elevation, and could not furnish such a stream. Still less can it flow in the region of the south, distinct from the Chadda, by which that region is known to be occupied. It only remains to examine the more important information which we derive from those who have gone over the very ground, who have travelled on the banks, and who have crossed and recrossed the river in question, at many points of its course between Bornù and Hausa, and even to the basin of the river Chadda, and if by their means, leaving out for the present their opinion of the direction of the current, I can trace the continuity of the river level, I think no one will deny the identity of the streams.

In the month of December Dr. Qudney and Captain Clapperton commenced a journey into Sudán from Kukah, having joined a káfilah of twenty-seven Arabs and fifty Bornuese.

The low country was still inundated by the overflowing of the Yeú; although the river had fallen about six feet.† In what Clapperton calls temporary rivers, formed by the overflowing of the Yeú during the wet season, there was still a considerable body of water, running at the rate of two or three knots.‡ We may imagine the main stream to be of great magnitude, when it required a whole day, and considerable difficulty, for the káfilah to cross what is described as an inferior or "temporary" branch. It must have been deep, as they were obliged at Dammasak to cross on rafts,§ made of bundles of reeds laid on two poles; and the camels swam over. They continued "*winding* along the banks of the river, or occasionally cutting off a bend by a cross-path." Near the lake Tumbum, the country to the S.W. as far as the eye could reach, was a dismal swamp.|| Skirting this the travellers arrived at Bede-guna, near the swollen river they had crossed on rafts at Dammasak. The country S.E. and S.W.¶ was an entire swamp. The lake Zumbum is twelve miles S.S.W. from Bede-guna. From this place they continued to travel over a *level* country, sometimes by the borders of the Yeú; which at one place is ** said to be 150 yards wide, but nearly dry. "Its waters were dull and sluggish as far as we observed; and during the middle of the dry season, the naked channel and a few pools

* Idrisi, p. 18.

† Denham and Clapperton, vol. ii. p. 188.

‡ He does not say in which direction.

§ As described by Imhammed, Proc. Afr. Ass., vol. i. p. 123.

|| Ibid., vol. ii. p. 199.

¶ In this direction Idrisi places the town of Gharbí at the foot of a mountain and on the bank of the Nile.

** Ibid., vol. ii. p. 210.

of water, sometimes far apart, are all that remain of the river." "This may be taken as a fair average breadth *downwards* as far as the lake, where however the depth seemed considerably increased."* This is within a quarter of a mile of the city of Katagúm.

After leaving this, the road was along a large swamp to the south, and a branch was twice passed which Clapperton calls the Shashum, a narrow stream falling into the Yeú: I imagine it, however, to be another sub-division of its waters. By Clapperton's map a large arm branches off at Old Birni, and passes Bede-guna; where it is said not to dry up throughout the whole year.† Another arm branches to the south at Katagúm; thus completely answering to the description of Idrisi, that the river surrounds and intersects the country of Wankarah.

A day's journey further, Clapperton says, "Since leaving the wells of Beere-Kashifery on the southern borders of the great desert, we had not met with rocks, or even pebbles; till now, the very channels of the rivers being destitute of stones; the whole country consisting of soft alluvial clay."‡ He now (at Katungwa) saw a range of low rocky hills stretching nearly south-west, called in the Hausa language Dushi, or the rocks. Zangeia is situated near the extremity of this range. "The prospect to the south is bounded by high blue mountains." After this our traveller found the country diversified by hill and dale. A range of hills south-west, called Dull, about 600 or 700 feet high, running nearly north and south. Some rocky streams, the Girkwa and Sokwa, rising in these mountains, are passed before arriving at Kano; which I conjecture from the context to be on an elevated plain. After this place, Zangeia, he passed over a range of hills or mountains separating the basin of the Yeú from those of Guber and Guari, where it is not to our purpose to follow him; thus far, however, he had been travelling on an uninterrupted alluvial level, overflowed and intersected in many places by a large river. It is fortunate that very near this spot, Lander passed in an endeavour to reach Fandah, after the death of his master; and on his return to Zaria, from within half a day of Jakobah, he also traced an extensive alluvial level, occupied by a large river or rivers. This level or valley is clearly defined by the mountains of Zaria and Guari on the west, and on the east by the blue mountains seen by Clapperton and Lander. But to explain this clearly, it will be better to commence with his itinerary at Bebeji;§ which I have before mentioned as a known starting point. After passing the hills which Clapperton in his first journey calls Dushi, a generic term, and in his second Nora, on the third day he

* Denham and Clapperton, vol. ii. p. 222.

† Vol. ii. p. 203.

‡ Vol. ii. p. 231.

§ Page 288.

crossed a large river, and two small ones, running westerly, near Karifo.* His route then was at the base of a long range of mountains stretching southerly, the blue mountains which Clapperton saw to the south at Zangeia. He marched continually over rocky and hilly ground until he reached Kuttup, crossing several large streams† running to the westward, one of which he calls the Kudúnia. After leaving Kuttup,‡ he crossed a large river, the Rari, flowing to the south-east, then traversing the rocky ridge on the opposite side of the valley, he arrived at Danrorah. From one of these heights, he had the prospect of an extensive plain, of several days' journey before him. Here he was obliged to turn back, but he obtained a sort of connecting point, for he was told that the city of Jakobah was at the foot of a large hill, which he saw at the distance of half a day to the eastward.§ On his return he does not mention the passage of the river Rari again, but he must have crossed it as he re-visited Kuttup. This city he describes as situated in a beautiful plain. From thence he took a route more to the westward, and at a regular ferry he re-crossed the Kudúnia, or a river so much broader, and deeper, and more rapid, than he saw before, that he had great difficulty in passing it.|| Continuing to travel in a *plain*, he crossed and re-crossed a large "*noble*" river running to the south;¶ and after passing the town of Eggebee, the situation of which in a beautiful and *extensive plain* he describes with very glowing colours, he arrives at the city of Zaria, which is situated on the north-east side of the mountain pass from Nufi; the range which separates the valley of Wankarah** from that of Guari and Koton Kora. On the west a part of the same elevation he also saw at Accoran.††

Here is the alluvial level, clearly traced in the return from Kuttup all the way to Eggebee, where the plain, extending "many miles," may easily be supposed to reach Karifo,‡‡ from which it cannot be very *many miles*. The course of a "*noble, deep, broad, and rapid river*," has also been marked out; having been crossed and re-crossed in such a manner as to leave no doubt of its identity. Since they flow in the same alluvial level I presume there will be no difficulty in joining the "*westerly streams*," crossed near Karifo with the "*noble*" southerly river,

* Clapperton's Second Expedition, p. 289.

† These must be tributaries from the Mandara range.

‡ Page 296.

§ Page 297. This resembles Idris's description of Mellel, in the Lemlem country. Lander says Jakobah is the capital of the Yem Yem country.

|| Page 299.

¶ Pages 302, 303, &c., Second Edition, vol. ii. p. 140.

** Page 149.

†† Page 301.

‡‡ Carifo in the map annexed to Clapperton's Travels.

two miles east of Eggebee, with the "large southerly river" requiring a ferry, a quarter of a mile west of Makami, with the "deep, broad, and rapid" Kudúnia,* and with the "large" south-easterly river Rari.

It now only remains to unite the Yeú or Shashum with the Karifo stream, towards which it is directed in Clapperton's map, and the Chadda with the Rari. If the contiguity of such large rivers, apparently without the intervention of high land, be not thought sufficient evidence, I can bring the report of many natives, independently of each other, given at various places, but nearly all within the tract of country of which we have been treating.

1st. Captain Clapperton was informed, both at Bedeguna and Katagúm, on the Yeú, that this river had its rise among rocky hills in the country of Boushi, near Jakobah and Adamawa.†

2nd. At Girkwa,‡ he was told by a black sherif that he would cross on the following day a river communicating between the Kwara and the Yeú.§ The captain did not believe this report, probably from some mis-statement of it.

3rd. Lander was told at Danrorah, by his servant Mohammed, that "a river called Shar or Sharra, deriving its source from a lake Chad, flows about half a mile from Jakobah; and that canoes can be paddled from the said lake to the Niger at any season of the year."¶

4th. Lander at the ferry above Bussah, when making some allusion to the river,—“A Felatah came forward and made the extraordinary assertion, that instead of running to Fandah it took a turn to the eastward, and disembogued itself in the lake Chad in Bornú.”¶

5th. Mr. Laird made many inquiries at Fandah about the course of the Shari. “The answers invariably were, that it came from Lake Chad; and one man, a native of Kukah, offered to take me up there in twelve days, without changing the canoe.”**

6th. I was myself informed at Dagbóh, on the Chadda, “that Jakobah was seven days higher up the river; and the city of Kukah, in Bornú, is said to be only six days, for canoes, above Jakobah, on the same river.”

7th. Lander told me at the same place that he had received information from natives, which I did not hear, that one could go

* I allude to the second river which he calls by this name; I conceive the first to be a mountain stream, falling into the large river. The name is common to other streams, and to towns. Clapperton mentions one of each; and Lander, having heard of a river of that name when he descended the Kwara, thought it was the same he saw in Wankarah, and they have been made to join in the map of his route. The butter-tree is called in Hausa Maï Kadania.

† Den. and Clapp. 8vo, pp. 202 and 222.

‡ Qu. Jaku of Bello. See Appendix to Clapp.'s Journal, p. 329.

§ Id. p. 236.

¶ Clapp. 4to, p. 297.

¶ Lander's Voyage, ii. 97.

** Laird and Oldfield, i, 232;

up the Chadda, from Jakobah on "*one water*" to the great water of Chad. Indeed he affirmed that he had information from various quarters that this noble river is the outlet of that immense lake.

8th. Lander says that at Wawaw "the king's head drummer, a Nufi man, stated, in answer to our inquiries, that the Chadda, Shari, flows into the Niger at Fandah; and a regular intercourse is kept up with the natives on its banks, for the purposes of trade, by means of very large canoes. The sheikh, he said, resided very near the Chadda, which in Bornù spreads into a large body of water.

Lastly. He was told that the Kudúnia falls into the Niger near Fandah; that is, the river which he had crossed so frequently in the Boushi country, which passes near Jakobah, which is the same as the Chadda, according to my information, and which comes from a lake Chad, according to Mohammed, Lander's servant.

I will now bring forward, and endeavour to combat, Denham's evidence on the other side of the question; no easy task, it would appear at first sight, since he is very circumstantial, and evidently intends to record his opinion that the lake has no outlet. But, as I said before, the difficulties he had to contend with must be taken into consideration, especially as he had to do with a very winding river, and therefore might easily be mistaken in its course. On the 24th of May, he came to the Yeú at Lada, 70 miles from Kuka,* where he says, "The river here makes a bend resembling the letter S; the water is extremely shallow, and a dry path over the bed of the river appeared close to our halting-place, although the banks were high, and capable of containing a very large stream. I walked out, following the *easterly* course of the stream, in search of game; but within four hundred yards of the river the ground was so choked with high grass and prickly under-wood that I was obliged to take a path more inland." He passed a great many small lakes in the vicinity of the river; one was very deep, containing hippopotami in great numbers. From the ruins of the walls of old Birni "we obtained a sight of the river Gambarú,† running nearly east, notwithstanding its *windings*, and only a few miles distant." Again—"We came to the river, which is here a very noble stream, nearly a quarter of a mile in breadth, and situated between two high banks thickly overgrown with jungle, bushes, and bamboo. We endeavoured to ascertain if there was any current; but the water appeared *perfectly stationary*. Omar Gana, however, and the shouas who had accompanied us, were unanimous in declaring that after the rains a very strong current from west to east constantly flowed."

* Denham, i. 206.

† Deni, vol. i. 212.

Again—"We followed the course of the river to the eastward (which he in another place calls the Yeú), nearly three miles. There being no pathway, we were obliged to break through the high grass, trees, and thickly-scattered bamboo, which made it a fatiguing excursion; and after all we could only get a sight of the water by following the tracks of elephants, and other animals, whose ponderous bodies beat down everything before them. At length we came to an open dry shoal of sand, the bed of the river extending more than two hundred yards; we were told that the stream was here again called the Yeú." At another place, "We proceeded *winding* with the river. In several places we had the banks clear of trees, and covered with verdure* for some hundreds of yards, and the stream nearly as broad as the Thames at Richmond." Again—"Crossing the Yeú at a *dry spot*, we came to the banks of a large water, called Dammasak,† about five miles distant from the ford."

On their return to Tripoli in August they again crossed the Yeú, "now a considerable stream full of water, and running *to-wards* the Chad at the rate of three miles an hour." The Arabs, again, appeared to have a different opinion respecting it, calling it the Nile, which Denham supposed meant the river of Egypt. He says, again, "Bellal accompanied me down the river about nine miles, where, increasing in width about 100 yards, it flows into the Chad, with a strong and *deep*‡ current of water."

At the eastern end of the lake he had very vague accounts from the natives and from Barca Gana; the amount of which is, that the Bahr-el-Ghazál, which once received the waters of the Chad, and was a day's journey broad, is now dried up, and they knew of no other river communicating with the lake: that Fitri had a stream running out of it,§ and was not like the Chad, which every one knew was a *still water*.

Having now quoted all that Denham says respecting the nature of the lake, and the course of the river Yeú, I would merely ask whether it is not only possible, but very probable, that he might be mistaken in the current of a river which is described as very

* Qu. African verdure ten feet high (?).

† Clapperton found the water of Dammasak so deep, broad, and rapid that it required a whole day to pass it on rafts. This could not, therefore, be a still water, as one might infer from Denham's description. I mention this discrepancy to show how easily travellers may fall into error in that country. One account must be wrong. Denham's was in the beginning of the rainy, and Clapperton far on in the dry season.

‡ Rivers at their discharge are usually shallow. The depth is, at all events, incompatible with the strength of current which might have been in consequence difficult to ascertain.—A.

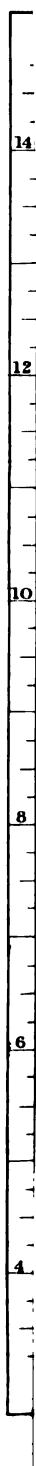
§ This is in opposition to the account of Major Laing's informant (see p. 299, line 7).

winding and difficult of approach, except by paths made by wild animals in the prickly bushes on its banks; a river that is in some places narrow, and in some a broad and noble stream, sometimes nearly dry, sometimes deep enough for camels to swim over, requiring rafts, as at Dammasak and two or three places mentioned by Lander, corroborating the testimony of Imhammed's "ill-constructed rafts," and deep enough for the huge hippopotamus to conceal himself at the bottom; a river, in fact, which in some places is said to be so sluggish as not to have any perceptible current, at others to run at the rate of three and a half knots, and which at one place, Dammasak, is described in an opposite manner by the two travellers? This perhaps is the strongest evidence of the difficulty of coming at the truth in that country. These arguments do not appear to me sufficient to overturn the reasons which I have given for believing that the waters of the lake Chad, collected from the lofty Kumri mountains, flow by the river Yeú through Wanḡarah and Boushi, to join the Chadda near Jakobah.

A strong presumptive evidence that this river flows *from* the lake may be also drawn from the description which is meant to serve the opposite purpose. Thus the farther it is from the lake the more important it appears, which may be in consequence of its having received an affluent from the Eyres (Aurás) mountains to the north* and the Mendefi range to the south; and certes, the increase in volume of a river is *below* its affluents. Again, the characteristics of the outlet of a lake may be said to be clearness, depth, rapidity, and singleness; those of the discharge of a large river are generally turbid, shallow, sluggish, and divided waters. And it is hardly probable that the Yeú would reunite the branches by which it surrounds Wanḡarah, in order to discharge itself by a single embouchure, in an alluvial country of its own formation, although it must be collected to pass between the Nora or Dushi hills, and the blue mountains which Clapperton saw to the south at Zangeia.

Of course it cannot be imagined that a river larger than the Kwara, which has been navigated to within seven days of Jakobah, can derive all its waters from the lake. It is most probable that near this city, where it takes a sweep to the westward, it receives another and a very large affluent from the Mendefi mountains. Indeed, a native informed Denham that having passed that range, he crossed a large river flowing between two high mountains, although his account of twenty days south would lead him far away from where Adamawa is supposed to be.

* The existence of such an affluent is noticed by Idrísí, p. 19.



Thus, if this hypothesis be proved, there is an uninterrupted navigation to the very centre of Africa; to the foot almost of the long-sought mountains of the moon, since Mr. Laird found two fathoms in the Chadda in the lowest part of the dry season: the natives and Idrisi say it is navigable for canoes throughout the year. Clapperton found some branches in Wankarah deep, where the water had already subsided six feet; and in addition to the length of the Chad, there is probably a chain of communicating lakes to the eastward. A great deal might be said on the importance of this easy access; but as I have already extended this paper beyond what I anticipated, I will conclude by putting the case in a very simple form. Clapperton was told that the Yeú had its origin near Jakobah, and Lander was told near Jakobah that the Chadda, which flows half a mile from that city, had its origin in a lake Chad. He had also crossed and re-crossed a large river flowing between these points. If these reports be true, and they were distinct and independent of each other, they must relate to one and the same river.

* * * * *

Subjoined are the positions of the principal stations at which I obtained astronomical observations on the banks of the Kwara and Chadda in 1835:—

	Lat. N.	Long. E.	
Cape Nun	4 21	5 53	
Eggabóh	5 28	6 25	
Okóh	5 54	6 38	
Adda Mugu	6 30	—	
Attáh	7 6	—	Variation.
Stirling	7 49	7 6*	19 51W.
Kattam Kárafí	8 7	—	
Fandah	8 12	7 42	
Egga Island	8 43	6 42	
Rabba	9 13	6 26	20 36W.

* The mean of many observations, with an artificial horizon, for longitude by three chronometers, and a lunar distance, gave the longitude of Stirling $7^{\circ} 3' E.$; by Jupiter's Satellites, $7^{\circ} 14' E.$; Idem, second observation, $7^{\circ} 16' E.$

XXIII.—*Notes on the Country lying between the Meridians of 55° and 64° East, and embracing a section of the Elburz Mountains in Northern Khorásán.* By JAMES BAILLIE FRASER, Esq.

THE great range of Elburz, which skirts the southern shore of the Caspian Sea, and pursues a course nearly east and west from the plains of Mogám to the highlands of Mergháb (improperly called Moorgháb), and the Házarah country, spreads out into greater width between the meridians of 55° and 64° east; that is, from Gúrgán* of Asterábád to Mergháb, and presents to the desert on the north a slope which has obtained the name of *Atak*,† literally the *skirt* (of the mountains), in the same way as *Dáman*, a province of Afghánistán, signifies the skirt of the hills sloping down to the banks of the Indus.

This tract, formerly one of the richest districts belonging to the sovereigns of these countries, and still covered with ruins of great cities, and vestiges of former prosperity, is now nearly a wilderness, or but sparsely occupied by tribes of Turkománs, who live partly on the produce of their flocks and herds, but much also on the proceeds of that plunder which they gain in inroads and pillaging parties systematically made by them upon their Persian neighbours.

The mountainous tract above alluded to, irregular in shape, and spreading out in some parts to a breadth of full 200 miles, is divided longitudinally into ridges, separating valleys which communicate with each other by passes or defiles, and form an extensive aggregate of districts, many of which are well inhabited and cultivated.

These districts may be conveniently arranged in several lines running from west to east, as they are divided by the principal intervening ridges, nearly as follows. Upon the skirts of the most southern ridge are found those of Meï-omíd, 'Abbás-ábád, Mazínán, Sabzawār, Nishápúr, and Sheríf-ábád. Close behind these, but separated from them by ridges of greater or less altitude, lie Jájerm and Sang-khást, Nárdín, Jaghetái or Juvein, Bám, and Miyán-ábád; Isferáin, Súfi-abád, Báwer, Sultán-Meidân or Mádan, forming what is locally called the *Serd-viláyet*, or Cold Country, being that between the first-mentioned line of districts and the great central line which comes next to be described. This includes the districts of Armúdlí and Semalghán; the plains of Bujnurd, Shírwán, Khabúshân, Rádkân, Chinarán, Tús, and Mash-hed, which are all continuous with, or opening into each other. At the western extremity of this line are found some of

* Or Jurján.—S.

† A Turkish word, pronounced *etek* at Constantinople; it is exactly the *sinus* of the Romans.—S.

the passes to the lower country of Gurgán, hereafter to be noticed; while the eastern end opens into a nearly continuous valley which reaches to Herát.

A chain of mountains, unequal in height as in breadth, confines the great line of valleys just described, on the north-east, and among these lie irregularly disposed a number of valleys and elevated plains, each forming a district in itself separated by or intermingled with lofty and craggy ridges. The north-eastern base of this mountainous tract which bounds the desert runs nearly N. N. W. from the point at Ak-derbend,* where it is pierced by the Mash-hed river, to Paráu, another point to the N. W., where that part of the range terminates, and the mountains turning back at an angle, probably acute, towards the south, preserve a very irregular and indented line. Paráu, as we are informed by persons acquainted with the country, is a mountain bounding on the north a valley, the bed of a fine stream, and known by the same name; and from its extremity, we are told, a narrow chain extends to the lesser Balkán, 120 miles. Thence to the greater Balkán is said to be a distance of ten farsakhs,† or forty miles; and thence again to O'k-kóh,‡ or the Arrowhill, the distance is called twenty farsakhs, or eighty miles, from which, according to our informant, Khívah is not more than five days' journey. From O'k-kóh to Kuruk súfi, where the Atrak falls into the sea, was said by the same person to be thirty farsakhs. These distances, though given by a person well acquainted with the country, are so uncertain that they cannot be relied on; insomuch, that no attempt has been made to use, or to reconcile them with other distances or bearings in the accompanying sketch.§

The following are a few of the best-known districts in this range of mountains. To the eastward lies Kelát-Nádirí,|| which is the last place of importance in that direction. Then, opening to the Atak, are found *Deregez*, *Sheúrek*, *Derbādān*, *Afghāz*, a fine wooded valley beneath a hill of the same name; *Gertstán* *Firtzeh* close on the verge of the Turkománs, *Germáu*,¶ in the same vicinity, *Gifhān*, *Rāz*, *Kúsh-Kháneh*, or the Hawk's Nest,** *Báikáni*, *Kolpili*, *Thikmaván*, *Zerzáú*. These are all said to be fine districts, with plenty of villages, and some of them wooded. Further removed from the mountains, and upon their skirts, lie the wider districts of Tíhejen, watered by that river, and inhabited by the Turkomán tribes; Abíverd was once a fine district, but is now abandoned, as are Dirum and Nişá. N. W. of these lie

* White Defile (Turkish).—S.

† Or farsang, the parasanga of the Greeks.—S.

‡ Turkish name.—S.

§ Preserved in the library.—Ed.

|| Nádir's kelát, being his favourite stronghold.—S.

¶ Germ-áu or Germ-áv, i. e. warm water, a provincialism for Germ-áb.—S.

** Kúsh in pure Turkish signifies only bird.—S.

Akhāl, inhabited by Tekeh Turkománs, a well-watered sloping plain; *Archaman*, *Burmah*, *Bāneh*, *Kizil Rebát*,* *Shehrul-islām*, described as a place of extensive ruins built of fire-burned bricks, and *Paráu*, which appears to have been a place of pilgrimage, where there are ruined shrines to 'Alí, &c.

More in the mountains, and north of the last-mentioned range, lie the more mountainous districts, which are too numerous to be detailed, many of them consisting of little more than a single village. On the way from Deregez we passed through *Meiheú-Kokan*, *T'hveri*, *Kasmān*, *Daúlat-Kháneh*, *Ráwir*, *Shehrazān*, *Karácheh*, and *Sukíyeh*, to *Shírwān*. On our left we had the fine valley of *Kal'ah Yúsuf Khán*.† On the right were *Gereneh* and *Inshá*,‡ with others, which give their waters to the *Atrak*.

From *Shírwān* we passed through *Dereh Shúrş* and *Hazár-jerib*|| to *Bujnurd*, having *Gérmeh Khán* upon our right, while on the left the mountain of 'Alátágh¶ separated us from *Sang-khást*. Proceeding westward, we descended into the *Mónah* valley, passed through part of *Inshá* (another district), and leaving the valley of the *Atrak* to the right entered *Semalghán*, from whence passing through the desert places of *Zerd*, *Kohistán*, *Julgehi-Kel-át-há*, and *Kalpish*, with *Múchih* on our right, and *Armudlí*** on the left, to *Deheneh-zoh*, the pass by which we descended into *Gurgān*.††

The mountains facing westward, from *Paráu* to *Senker*, are furrowed deeply with ravines, each of which gives access by a pass, more or less steep and abrupt, to the plain that intervenes between the base of the mountains and the Caspian sea. Of these valleys or passes the principal are the *Paráu*, the *Chander*, the *Sunt*, and the *'Serishei*. These all pour their streams into the *Atrak*, of which they form a large proportion; and their course is necessarily much to the south of west. A ridge of hills, running a long way into the plain, and named *Marábeh*, divides the *Atrak* on the south from the *Şaráşú*,‡‡ which joins it at the terminating point of the range. Through this valley runs one pass. The next is that of *Deheneh-zóh*, by which we descended. Next comes *Deheneh Kúzlú*,§§ which leads from a fine *julgeh* (green valley) *Kará Shokh*; then *Dehneh Esheklí*,||| which leads from the plain of *Armudlí*; then *Kúzlú Dehneh* and *Jul-*

* Red-hostel.

† Lord Joseph's castle.—S.

‡ Please God!—S.

§ Salt valley.—S.

|| Thousand acres.—S.

¶ 'Alá tágh (Turk.), beautiful mountain.—S.

** Pronounced *Armút-lí*, i. e. Pear-place.—S.

[†† Called by the Arabs, who substitute *j* for *g*, *Jurján*, the ancient capital of the country, of which a complete account, drawn from Asiatic geographers and historians, is given by the Baron de Sacy in the *Mines d'Orient*, i. 338.—S.

‡‡ *Şárf-sú* (Turk.), i. e. yellow water?—S.

§§ Walnut-tree mouth (T.)—S. ||| Ass's mouth (T.)—S.

geh, which leads from Kalpúsh. The mountain of Seráu intervenes between Kúzlú and Esheklí Dēhenehs; and Níl kóh,* a mountain celebrated in the Sháh Námeḥ, stands at the mouth of the latter.

But the mountainous tract which we have been describing becomes more peculiarly important from being the separating boundary between the fierce Turkomán tribes and the northern districts of Persia, which have been desolated by these marauders; and as the passes by which they reach the upper country all lead through this barrier, it becomes a matter of interest to ascertain the number and character of these several lines of approach.

From the best information that could be obtained upon the spot, the following are the principal passes from the Atak to Upper Khorásán, beginning from the eastern end of the tract in question:

1st, *Puli-Khátún*, or the Ladies' Bridge. I am not sure whether a separate pass has obtained this name from the bridge so called, which is thrown, as I believe, over the Mash-hed river, or whether the name merely designates a particular bridge in one of the succeeding passes. It is by this way that plundering parties, destined for Turbat, Haiderí,† and the road towards Ghóriyán, and Herát, ascend the hills.

2nd, *Ak-derbend*.

3rd, *Muzderán*.—I do not know whether these are one and the same, or different passes, but they are both on the road from Mash-hed to Serakhs. Burnes, in coming from that place, passed *Derbend* at forty-eight miles from Serakhs, and calls it the same as Muzderán. *Derbend* (or the gate) is a common term for such passes, and this may mean Ak-derbend, or the white gate. On the other hand, Burnes says nothing of the Mash-hed river, which certainly bursts through the southern continuation of the Kel'at mountains at Ak-derbend, from which it seems probable that he ascended by a separate pass, namely, that of Muzderán, leaving the Mash-hed river and the Ak-derbend pass to his left. There is also a doubt as to the precise point where the Mash-hed river joins the T'hejen.

The scenery of these passes, whether one and the same, or different, is described as picturesque, though not rich in wood. The ascent from the Mash-hed side is comparatively equable; but the corresponding descent towards Serakhs, on the N.E. side, is more precipitous.

4th, *Kelát-Nádirí*,‡ a pass to the Atak, lies through the inclosed valley of Kelát; but independently of its natural obstacles, which are great, no one can pass through that valley unless with the consent of the chief, who resides in this natural stronghold.

5th, *Chapishlú*.§—To the west of Kelát. It is steep and rugged,

* Blue mount (P.).—S.

† Nádir's castle.

‡ Haider's tomb.

§ Blindman's-buff-Place.—S.

and with great difficulty practicable for guns; but I am not in possession of any further particulars regarding it.

6th, *Alláhu-Akber*, or *Nardewán Nádirí* (the ladder of Nádir).—This leads directly from the valley of Deregez, and then by T'háverí or other roads into the valley of Khabúshán. It was improved by Nádir Sháh to facilitate the passage of artillery, and is defended by three bastions. Though steep and rugged on the south side of the mountain, the road down to the Deregez valley is tolerably good and easy. I saw heavy guns dragged both up and down this pass.

7th, *Tuinjí*.—A very steep ascent from the south, impracticable as it now stands, for the passage of guns—a long, tortuous and steep, but less difficult descent into the Deregez valley. It is connected with the pass of Zírek, which traverses the central ridge, and is sharp but not difficult.

8th, *Zohi-Gerenkeh*.*—A fine romantic pass; difficultly practicable for guns, and very defensible. It crosses the most northern ridge; and its lower extremity is defended by a bastion with guns mounted, which commands the water.

9th, *Zohi-Deringeh*.—A very romantic defile like the last, difficult though practicable for guns. There is a fine spring on each side of the *Kot'hal*† (or ascent and descent). One principal branch of the river Atrak takes its rise at Inshá, a point in this defile, and the stream must be repeatedly crossed in threading it. There is a *derbend* or rocky pass like a gateway at its lower extremity.

These are the principal passes from the Atrak to the upper country; but there are a variety of others of less importance and more difficulty, several of which lead directly to Deregez, from vallies opening at Rádíkán, Chinárán, and Khabúshán, &c.; others again lead from various points, but join the passes already enumerated. To the west of Bujnurd the hills become lower and more open, so that the paths by which the Turkománs can invade the upper country are by far more numerous. There are four or five which lead into the Mónah valley alone; several others which lead to Semalghán, and others still more easy, that crossing the Atrak and its valley, lead to Jájerm, Meí-omeid, 'Abbás-ábád, &c. Between Deregez and Kelát-Nádirí there are also some pathways of great difficulty and scarcely practicable for horsemen.

Itinerary with bearings and distances from Sabzawár to Mashhed by the *Serd-viláyet*, or upper (cold) country.

May 30th and 31st, 1834.—From Sabzawár to Káhríz-degez, nine hours and a half, chiefly by night. First half over a plain, then through a defile among low hills, and a pass called Chehel

* The word *Zoh* signifies a defile.

† Kutál or Kútal, a mountain-pass.—S. Kut'hal in northern Persia.

Pehlewán or the Forty Champions. The village, a miserable ruinous place on a plain twenty miles broad by sixty or seventy long, commencing at the mountain and district of Jaghetái on the west, and issuing out on the plain of Níshápúr on the east; it is bounded on the north by the hills of Bám and Miyán-ábád.

May 31st and June 1st.—On to Maskún, a small village, and then by night through the 'Alí Zengí pass, and up a grassy valley with a stream to 'Abdu-llah-gáu; distance about forty miles from Káhríz-degez, and direction about N. 25 E., on the whole time eleven hours, through hills of moderate height covered with grass, with plains among them of various extent. 'Abdu-llah-gáu is a thriving village of a thieving tribe, in the plain or valley of Sultán-Meidán, and within two miles of that town, now ruined.

Bearings from Káhríz-degez:—Village of Maskún of route N. 30 E. 12 miles. Direction of route, N. 35 E. 15 miles; of 'Abdullah-gáu, N. 25 E. 30 miles; of Šúfi-ábád (not seen) N. 5 W. 15 miles; of Bám (not seen) N. 28 miles; of Miyán-ábád (not seen) N. 25 W. Peak of Jájerm-hill, pointed out, probably an error, N. 42 W.

June 2nd.—From 'Abdu-llah-gáu to Nádir-tepeh,* to a ruined caravanseray, where we halted for breakfast; all the way through green valleys and cultivated land, with moderate pasture-hills on either hand. Then entered the long valley of Khabúshán, Chinpárán, &c., nearly in the same direction, and after eleven hours and a half, of which three-quarters in halts, reached the small village of Kal'ah Seyyed-hà, distance about 42 miles.

June 3rd.—On to Gunáh-ábád;† along the same plain, partly cultivated, partly meadows, to Gunáh-ábád; generally fine grazing-ground, but the country ruined by wars and plundering parties; distance about 24 miles.

June 4th.—On to Mash-hed,‡ passing through Khushmítí, and along a fine plain, with plenty of grass and cultivation; distance 28 miles.

From Mash-hed to Deregez; and from thence, by Bujnurd, to Gurgān.

June 18th and 19th.—To Rádkán, as formerly, through the plain of Mash-hed, by Tús, and through the meadow of Chínarán.

June 20th.—From Rádkán to Muchulún, about 14 miles, passing through the thriving village of Súhún, and all along the skirts of the hills that bound the valley on the N.E.

June 21.—To Yestanjí, 10 miles—a miserable village; direction from Rádkán, distant 24 miles, N. 58 W.; rising among hills on the right to Chamani-Naucheh; and then on same direction, crossing a small range to Kal'ah Yúsuf-khán—passed

* Nádir's-hill. (T).—S.

† Sin-ahode.—S.

‡ Mash-hed Imám Rízá, i. e., the place of the Imám Rízá's martyrdom.—S.

many pretty valleys, with much verdure. Kal'ah Yúsuf-khán* is a fine village, in a green, well-cultivated, and pleasant valley, through which runs the *Yæ'*† in a full stream, which joins that which flows by Khabúshán.

On nearly same direction, ascending the narrow valley, or defile of the *Yæk*, to T'háverí—a knot of three or four villages, in a small plain, surrounded by well-cultivated hills.

June 22.—On from T'háverí, to the pass of Zík,‡ about six miles; then descend into the pretty green valley of Bosmeyú. Direction of Kal'ah Yúsuf-khán, from top of Zírek-pass S. 20 to 25 W. On to top of Túinjí § pass—a very steep zig-zag path—up the face of a precipitous cliff. From top of Túinjí to Mo-hammed-ábád of Deregez, 15 miles distant N., 50 E. On descending, first very precipitously;—then through a tortuous defile, for full twelve miles;—then, turning sharp to the left, up the bank of the ravine, we entered the valley of Deregez, and rode in a northerly direction for full 16 miles to the Persian camp—no bearings obtained.

July 1.—Bearings from *Kizil-kótal*, a height overlooking the Atrak, about 8 miles N. E.:—Abíverd—due east 12 miles. *Bábájuk*, *Mír*, and another village, N.N.E. about 8 or 9 miles. General direction of the hill-skirts and the hills themselves, from Kelát Nádirí, and probably from Serakís—so far as can be seen and judged—probably to Nisá Dirún, Mehineh, &c., for 60 miles at least, about N.N.W. and S.S.E. Nothing to be seen looking on the Atak but an apparently boundless plain, brown, arid, and dusty—without a vestige of habitations, except the villages mentioned.

July 2.—Mohammed-ábád, we crossed the plain or valley of Deregez, to the foot of the pass of Alláhu-Akber||—which ascended: road good—broad, and ascent, for the most part, not abrupt. No bearings taken, but direction by general observation somewhat to the westward of south.

July 3.—Descend Alláhu-Akber pass—very rough and precipitous—but the heavy guns were taken down this way; and on, about 4 miles in all, to the Serdár's ¶ camp, in the hollow of Meíheú-kokân, a rich green valley, with a fine stream—up which we marched, and crossed the intervening high ground, to a descent nearly as lofty and rugged as the Alláhu-Akber pass, by which we dropped into the valley of T'háverí again.

July 4.—On, in a westerly course, up the T'háverí valley—a fine rich green *julgeh*—and through those of Kasmán, Daulat-Kháneh, Ráver, Shehrizán, to Kárácheh.** No bearings, but by occasional glances at the compass direction very little to north

* Joseph Khan's Castle.—S.

† Zírek (P.) swift.—S.

‡ Zírek (P.) swift.—S.

§ Túinjí (T.) watchman.—S.

¶ Commander's. (P.)—S.

† Yáik, or Yáyik (T.) i.e. broad, wide.—S.

‡ Zírek (P.) swift.—S.

§ Túinjí (T.) watchman.—S.

|| 'God is Great.'

** Black Well. (P.)—S.

of west. The whole way, a succession of the richest and greenest meadows, watered by fine streams.

July 5.—Quitted the line of julgehs, or natural meadows, by a pass to the left, and rose high among a maze of hillocks—the skirts of the northern hills of the Khabúshān and Shírwán Valley, to Sukhí, about 18 miles, the road traversing a tract of arid heights;—then 6 miles more, to Shírwán, along a plain—rich, but a good deal burned up. Shírwán, a small town, once containing 3000 houses and fortified, now a ruin almost empty, and the wall broken down in every part.

July 6.—From Shírwán to Bujnurd, over a series of craggy heights to the Kotal of Alakhahband—from whence, on left, the fine village and district of Zauran—into which descended. Further on, to right, saw the pass of Kal'ah-zoh, which is said to lead directly to the Atak without any bad descent, and is accordingly a great route of the Turkomans;—next turned up a narrow and winding ravine, called the Dereh Shúr (salt-valley), which is the boundary between the lands of Khabúshán and Bujnurd. At the head of this Dereh we came to the plain of Hezaijeríb, formerly a notable place of Turkoman resort, but now cultivated. A pass, called the Ak-kotal, leads from this plain over a succession of broken ground, into the valley of Bujnurd.

July 12.—Onwards 7 miles, to Lenger Village, about N.N.W.

July 13.—On 4 miles, to Akhór pass,* from Bujnurd, about N. 75 to 80 W.—a high hill, overlooking the Mónah Valley, and hills intervening between it and the Atrak.

Bearings from thence:—Kal'ah-khán of Sémalghán, distance 14 miles S. 75 W. General direction of course of Atrak, W. 25 N. Mónah Valley lies E. and W. Akhal on the Atrak, as pointed out by the guide, N.E. Mehineh, N. 25 E. Paráú, N. 25 W.

On our right was a high hill, *Kará-búlák*,† with a village, Karáchái, at its foot; Germeh-khán, a julgeh or valley, N. and N.E. of Bujnurd, furnishes a stream to the Atrak. The water from Shírwán comes round it on the N., and falls into the Mónah in a fine full stream. That from Shírín-Dereh, a small dell among the maze of hillocks and hills on the opposite side, between the valley and the Atrak, enters the valley nearly opposite. The waters of Kúsh-kháneh and Germ-ab (or Germáu), which run in a channel not in sight, join the Atrak (into which the Mónah has fallen) a good way below; and we hear of no other stream of consequence on that side, till those of the Sunt, Chander, Paráú, &c., which came from their respective hills and valleys.

On the left, the water from Sémalghán joins the Mónah—then

* Stable. (T).—S.
VOL. VIII.

† Black Town. (T).—S.
Z

that of Inshá, joined by that of Aïràn—both rising in the mountain of Kurkud; then, lower down, the streams from the Khál-básh-julgeh, and from Múchíh.

The mountains N. of the Atrak appear to be a most singular mass of dry, brown, scorched hillocks and rocky ridges, heaped on each other, and ribbed and furrowed in the most extraordinary manner, but exhibiting not the smallest particle of either vegetable or animal life. A few dark spots, it is true, on nearer inspection, upon those nearest the valley, denote bushes of the cedar or thorn,* common to such arid regions; but in the three or four days' journey across these mountains, I could hear of no habitable spot, and scarcely of a fresh-water spring. The Sunt Mountain is the highest to the north of the Mónah and Atrak valley, as Kurkud is on the south.

Onwards, descending into the Mónah valley, and through several Turkomán villages, to Kál'ah-khán of Sémalghán.

July 15.—Onwards, across a desert, dry track of irregular ground, skirting Kurkud, to the site of a village called Zerd,† long ago ruined by the Turkománs, on a pretty streamlet, when breakfasted. Then, in same direction, to the Mohák valley, and turned up to Káhistán,‡ another ruined village, where we bivouacked: it is on the Inshá stream, and fairly within the centre of the Kurkud mountains.

July 16.—Onwards, among heights and ravines, the skirts of Kurkud, down to a deep broad hollow, *Derehi-kelát-há*, or “The Valley of the Forts,” leading into the Khálbásh valley or plain, between which and that of Armúdlí intervenes a long low ridge, the tail of a part of Kurkud. This valley, irregularly varied with high grounds, is all barren and arid. Onwards, among hillocks on the S.E. side of the Múchíh valley. The Atrak here, within about four farsakhs or sixteen miles, makes a bend to the northward;—turn up through fine corn-land of the Góklán Turkománs,§ and descend through the Deheneh-zoh—a precipitous and long pass through a deep forest, to the camp of Mahmúd Walí Khán Góklán;—general course from Bivouac at Kóhistán to this camp, nearly W. $\frac{1}{2}$ N., from 48 to 50 miles.

July 18.—5 farsakhs, or 20 miles farther to Haïder Khán's camp, course about S.W. by S.—a perfect plain, covered with the withered and burnt-up vegetation of the spring, where not eaten bare by the flocks of the Góklán Turkománs.||

* Juniper? (S.) † Yellow. (P.)—S. ‡ Mountain Track.—S.

§ Or kóklen. Klaproth; Asia Polyglotta, p. 217.—S.

|| The spelling of the names is in some places doubtful, as it is very difficult to ascertain which, *z*, *s*, *k*, or *g*, is required, unless the word has been written down by a learned native. Some of the names ending in *ín* should probably be terminated by *án*, as that syllable, when final, has now for nearly three centuries been usually pronounced *ín* by the Persians.—S.

XXIV.—*Notes on a Journey from Belize to Guatemala, and return by the River Polochic in 1834.* By E. LEGH PAGE, Esq.

AFTER having passed a week at Belize, I embarked on the 10th of June, 1834, with Mr. Chatfield, appointed His late Majesty's Consul to Guatemala, and sailed for the Rio Dulce, about 100 miles to the southward. On the following evening we crossed the bar at its mouth, where we found only five feet nine inches water; and on the morning of the 12th proceeded up the river, or rather the outlet of the Golfo Dulce, which winds for about 23 miles in a general S.W. direction, as far as the fort of San Felipe, situated on the western shore of the gulf. Off the bar we were joined by Captain R. Owen, of Her Majesty's Ship *Thunder*, who with some of his officers took advantage of this opportunity to survey the gulf.

The entrance* to this stream is so narrow and so overhung with verdure, as to be almost hidden, until the very jib-boom of the vessel penetrates it: each side is bounded by hills rising almost perpendicularly to the height of 300 feet, clothed with impenetrable forests, and tenanted solely by monkeys and other wild animals; and with parrots of the brightest plumage. The heat was suffocating, as it did not proceed alone from the direct rays of the sun, but from the trees meeting above and thereby excluding the free air; this however had its advantage, for the sea-breeze is drawn into it, as through a funnel, otherwise the river could hardly be navigated by sailing-vessels. As we proceeded slowly, fresh beauties of nature burst upon the sight; occasionally a white cliff stood boldly prominent. At these spots the trees grew less densely, and the sun darted his fiery rays upon us; again the trees would meet aloft, and then the shadow and the gloom were a relief from the glare and heat of a tropical sun. Numbers of gaudy butterflies sported amongst the flowers that struggled, in gay colours, through the underwood; bright-coated lizards would dart along some overhanging bough; the monkeys had retired to the forest's deeper shade, and only showed themselves to peep at their new visitors, and grin and chatter, and then screaming to drive each other wantonly away.

At about 8 miles from the sea the stream expands to a small lake 9 miles long by 2 broad, called by the Spaniards the golfete or "little gulf," which narrows again for 6 miles, till we arrived at sunset off the Castillo or Fort San Felipe:† we here entered

* West point of entrance is in lat. 15° 50' N., long. 88° 46' 20" W. from Owen's Survey.—Ed.

† In 15° 38' N., 89° 1' 45" W.

the Golfo Dulce and steered across for Izabal, where we anchored early in the morning of the 13th.

Izabal* is a village of about forty huts, three houses, and a cabildo or court-house, situated on the southern shore of the lake, about 16 miles SW. by S. of San Felipe. From the hill behind the village is a beautiful view over the whole lake or gulf, bounded to the north by the mountains of Santa Cruz,† while to the S.E. is the lofty summit of Mico,‡ usually wrapt in clouds.

Having made the requisite preparations for our journey to the city of Guatemala, we started on the morning of the 15th of June, and travelling to the S.E. we shortly commenced the ascent of the mountain of Mico, by a slippery muddy road, or rather path: it took us six hours to reach the Cumbre or summit of the pass, whence we descended to the Rancho del Mico, composed of a few huts, and pushed on to Quirigua, a hamlet of about a dozen huts, which we reached at four o'clock, having been ten hours on the road, during which we had only accomplished six leagues of distance.

June 16.—Started at daylight, the road leading in a S.W. direction, occasionally over verdant plains, at times covered with gigantic trees and rank luxurious vegetation. At three leagues we commenced rather a precipitous descent, which brought us to the village of Encuentro, or 'Junction' of the rivers Motagua, or Rio Grande, and the Managua—a village of about 200 inhabitants, situated on the banks of the former river, which sweeps past at a rapid rate, and gives animation to a scene otherwise miserable enough. A fish called bobo, which is caught in abundance in this river, is much esteemed. We swam our mules over with some difficulty, and crossed ourselves in a flat-bottomed boat, called a bongo by the natives.

Continuing our journey we immediately commenced a steep ascent, the scenery gradually changing till we got to the region of the stately pine which stood in groups on the very edge of the precipice—the path led along the banks of a deep ravine, and was sufficiently dangerous.

Farther on the country assumed the appearance of an English park, then a picturesque ravine, or a flat valley interspersed with lofty trees.

Crossing several streams flowing to the N.W. to join the river Motagua, at nine leagues we reached Gualan, a village of fifty houses, with a plaza or square—the houses of one story and

* Izabal lies in 15° 24' 20" N., 89° 9' 53" W.—Variation in June 1834—7° 45' East.—Ed.

† 3420 feet above the sea.

‡ Its summit 2835 feet high.—Ed.

usually with a colonnade. We were detained here two days for want of mules. This was the rainy season, which lasts from April to November; and, although the mornings were fine, at three P. M. the clouds gathered on the wooded hill around, lightnings flashed, and torrents of rain poured down for about three hours, when the sky cleared, and all was bright and calm as a summer's evening in England.

June 19.—Left Gualan at sunrise: our journey lay in a S.W. direction, through a country rich in all the beauties of woodland scenery. At noon reached the village of San Pablo, a small but pretty assemblage of cane-built huts. We here turned off nearly south, and, after crossing a small tributary stream flowing to the N.W. to join the Motagua, we reached the town, or city as it is called, of Zacapá at two P.M., after a journey of eight leagues and a half.

Zacapá is a place of some extent; the streets regular; a plaza, on one side of which is a handsome church, on the other a court-house and gaol were erecting in a substantial manner. The people seemed much better clad than any we had yet seen. The population may amount to 5000 persons.*

June 20.—Half-an-hour to the westward of the town crossed in a ferry-boat a broad river, flowing to the northward, at a spot called Comantan, consisting of a few huts; hence our road continued in a W. by S. direction, through a beautifully-diversified country, and across several streams, to Chimalapa, a distance of seven leagues. Chimalapa is a village of about ninety huts, with the ruins of a church, from the top of which is a beautiful view of the windings of the noble river Motagua, which here flows through a rich and varied country, spreading fertility around those who, alas! hardly know how to profit by it. We here measured an acacia tree whose stem was four yards, and its luxuriant foliage 120 yards in circumference.

June 21.—At one league to the westward forded the river Chimalapa, which flows N. W. to the Motagua, and continued in a W. by S. direction, along the southern bank of the latter river, although at some distance; passed large herds of cattle; much more cultivation; fields of maize, &c. At six leagues turned off to the S. W., and at nine leagues reached the village of Guastatoya, a small but pretty hamlet, situated in a beautiful valley: the cottages had pointed roofs.

On the following morning continued our journey through a rich and fertile country. At five leagues we stopped at a farm to feed the mules: we here observed that all the people were more or less afflicted with goitre, or guëguicho, as it is called, said to arise

* About ten miles south-east of Zacapá is the town of Chiquimula de la Sierra, a place of much trade, and containing about 6000 inhabitants.

from some property in the water they drink. At nine leagues reached El Puente, or "the bridge," of stone, with two arches, over the adjacent stream, a tributary to the Motagua. This is a miserable collection of huts, where it was difficult to get anything to eat, as this road is only travelled during the rainy season.

June 23.—Started early for the capital, about ten leagues in a S.W. direction. For several hours we were without food, as not a hut could afford bread or anything else eatable. Passed through some fine scenery and saw a beautiful fall of water: at length, at a sudden turn of the road, we came in sight of the city of Guatemala, and, being at a considerable elevation, we looked down upon its whitewashed houses and churches: descended into the valley, crossed a neat stone bridge over the Rio de las Vacas, and again ascending reached the gates of the city.

The city of Guatemala la Nueva, or "the new," to distinguish it from "la Antigua," or the old capital, has been too often visited to need any description here. I will merely state that it lies in a valley or plain, about fifteen miles long by ten wide, and at an elevation, according to Haefkens, of nearly 5000 feet above the sea.* Its population has been usually stated at from 35,000 to 40,000 persons. The market is abundantly supplied with meat, fruit, vegetables, and fish from the far-famed lake of Amatitan.

The distant view from the city across the plain to the west is bounded by the three lofty mountains rising from 7000 to 8000 feet above its level, known by the names of Volcan de Agua, or Water Volcano, a perfect cone, clothed with perpetual verdure to its summit; the Volcan de Fuego, or Fire Volcano, generally emitting a white smoke from one of its peaks; and the Volcan de Pacaya: and nothing can exceed the boldness and beauty of the effect produced by these noble objects when seen against a cloudless sky, shortly after sunset, as the sun's last rays still gild their lofty peaks, while all below lies buried in a mass of shadow.

Aug. 22.—Anxious to form a nearer acquaintance with these great physical features of the landscape, I quitted the capital with two friends, and we directed our steps across the plain towards the old city of Guatemala, distant about eight leagues, in a general W.S.W. direction. The road led at first through plantations of maize on one hand, and on the other some remarkable mounds or tumuli, supposed to have been burial-places of the Indians before the invasion of the Spaniards. After two leagues across the plain we descended a deep ravine, and reached the Indian vil-

* It is not on record that either the elevation of this plain or of the neighbouring volcanoes has ever been measured, and it would be a good service rendered to geography if some traveller would obtain a series of barometrical observations in the city of Guatemala, and on the Volcan de Agua.—Ed.

lage of Mixco, built upon the declivity of a hill : here are a plaza and small church ; the population is said to be 4000 ; the costume of the Indians is remarkably handsome. Passing through the village we commenced a steep ascent by a rugged road ;—from the summit the view of Guatemala, the wide-spreading plain, and the village of Mixco, at our feet was very picturesque. We now crossed some fields of luxuriant grass, and abounding in wild flowers, whose delicious perfume was very grateful, and reached successively the villages of San Ignacio and San Lucas : two leagues beyond a sharp descent brought us to La Antigua, or ancient city of Guatemala.

The ruins of this town are seated in a rich valley, nearly surrounded by mountains, among which the volcanoes are proudly conspicuous ; its mouldering ruins presenting a strong contrast to the rife and luxuriant vegetation everywhere around. I need hardly mention that this city was abandoned in consequence of the numerous disasters that had befallen it from its foundation to the fatal earthquake of 1773. It now, however, contains a population of about 12,000. In the two days we remained here we visited all the neighbouring villages ; and the Ciudad Vieja, or site of the original capital, when founded by Alvarado in 1527, and which was overwhelmed by an eruption of water from the volcano in 1541 ; it lies about a league to the south of La Antigua. About one league beyond are the villages of Jocotenango and San Miguel de las Dueñas, near to which we ascended to the brow of a hill, and had a magnificent view of the Pacific ocean.

Aug. 25.—At 1 p.m. we set out from the old city for the summit of the Volcan de Agua. At 3 we reached the village of Santa Maria, where we halted to collect our party, which consisted of M. Lüder of St. Petersburg, Mr. Croskey of Philadelphia, and myself, two servants, and sixteen Indians. At 5 set forward again, and for an hour traversed a country studded with trees, and covered with luxuriant grass, among which the bright scarlet star of the native single dahlia was conspicuous ; by degrees the road became narrow and steep, till we reached a part of the mountain called La Cruz, from a cross being erected there. We here were obliged to abandon our mules, and after a short halt we proceeded onwards by torch-light, scrambling through the rank grass and dense underwood with great difficulty and fatigue for another hour, when we bivouacked for the night by the side of blazing fires.

At 5 on the following morning we again started on our ascent of the mountain, which became more difficult at every step, partly owing to the slipperiness of the long wet grass. We now entered the region of pines—some noble trees swung their branches to the sweeping wind with a solemn and mournful sound—others

lay prostrate on the ground, their bleached and broken stems blasted by the lightning or broken by the fury of the storm.

At sunrise we saw a vast sea of clouds floating far beneath the elevation we had gained: an Indian here tracked a tiger for some distance from a spring, but we saw nothing of it.

Two hours of this fatiguing ascent brought us at 7 o'clock to the summit, and we gladly descended into the apparent crater to escape the cold and cutting winds, where, by the aid of a good fire and a substantial breakfast, we soon recruited our strength.

The crater, or hollow space at the summit of the Volcan de Agua, is from forty to fifty yards in depth, and about 150 in diameter—the sides and bottom are strewn with masses of rock, apparently showing the effects of boiling water or of fire, and between them spring up bushes and trees. After some time spent here, we climbed to the crest of the crater, or summit of the mountain, which is stated to be 6800 feet above the old city of Guatemala at its base, or 12,620 feet above the level of the sea,* and from this elevated point we had a glorious view in every direction: immediately around us, and almost at our feet, the villages and numerous haciendas of the valley—the cities of Old and New Guatemala—the village and lake of Amatitan—more distant the province of Suchiltepec, and the range of volcanoes stretching away to the northward, even to the distant plains of Chiapa; to the north the mountains of Vera Paz and Belize; to the eastward the district of Sonsonate and the province of San Salvador, while to the N.E. and to the south the view is bounded by the Atlantic and Pacific Oceans, the former at a distance of 140 miles, its nearest point; the latter only 30 miles distant, or apparently almost at our feet.

To our astonishment, while here we suddenly encountered two large wild oxen: the Indians by shouting tried to frighten them over into the crater; they however escaped: we saluted them with our pistol-balls, and they retreated much to our satisfaction, yet not so much so to the hungry Indians, who would gladly have captured them.

After leaving an inscription to commemorate our visit, we started on our descent of the mountain: this was doubly fatiguing and difficult—and we proceeded with a cord round the waist, each being held by an Indian before and behind us. After reaching a certain distance flowers began to bloom on all sides; I recognised the dahlia, lupin, and a species of large poppy; we also gathered some fine strawberries: on our arrival at the "Cross" we were completely exhausted; but after a short rest mounted our mules

* Journal, vol. vi. p. 123. This elevation is probably not far wrong, but we do not know on what measurement it rests. The same authority gives the height of the village of Santa Maria 6920 feet above the sea.—Ed.

and travelled down to the village of Santa Maria ; and from thence in two hours reached our old quarters in the ancient capital.

On the following morning we set out on a visit to the lake of Amatitan, about four leagues to the S.E. of La Antigua ; the road lay through a fertile and luxuriant country. At two leagues we reached the farm of Barcena, prettily surrounded by wood. At three leagues we came to a pass in the limestone rock, so narrow that two mules could scarcely move abreast : on emerging from it at a considerable elevation we had a fine view of the city of Guatemala in the distance ; we then commenced a steep descent by a winding path, and after four hours' ride reached Amatitan.

This is a small village of about 100 houses, at the western end of a small lake of the same name : the lake itself is a fine sheet of water, about three leagues in length, from N.N.E. to S.S.W. by one in breadth, bounded by lofty hills, wooded to their summit. It affords an abundant supply of fish called moharras, which are excellent eating, and are sent in great numbers to the capital. The shores also supply salt.

Aug. 28.—We started in a N.E. direction on our return to the new city of Guatemala : from a rising ground, shortly after leaving Amatitan, we had a fine view of the lake and of the river Michatoya, which winds its course on the eastern side of the lake, and flows towards the Pacific. At two leagues we passed through a small dirty village called Villa Nueva ; and at four leagues halted to examine a large sugar estate named Villa Lobos. We were here shown some of the largest caterpillars I ever saw, from five to six inches in length : from hence we crossed the plain to Guatemala la Nueva.

After a stay of three months in the capital of Guatemala, during the whole of which time I had met with the greatest hospitality—had enjoyed the most delightful climate in the world—with a luxuriant soil—affording some of the most beautiful productions of nature—with a situation as lovely, and with scenery as picturesque, as any country can boast—it was with great regret that I found that circumstances, which it were needless here to relate, obliged me to return to England. I decided therefore upon travelling to the coast by a route seldom chosen, and never, as far as I am aware, described ; namely, by the river Polochic.

In company, then, with my former travelling companions, I quitted the city of Guatemala before daylight on the morning of the 14th September, and journeying in a northerly direction, by a good road, skirted on the left by a deep ravine, or baranca, over which we occasionally passed on a succession of naturally-formed bridges. The scenery was bold and beautiful : the ravine seemed

to have been caused by an earthquake rending the mountain, yet leaving at intervals arches or passes formed by masses of the rock, tumbled as if by accident together, yet forming a bridge, strong and perfect, as if built by man: the sides of the ravine were steep, almost to perpendicular, and some hundred feet in depth: large flocks of parrots rose screaming from the depths below, their plumage brightening in the rays of the rising sun: at times, in the deep gloom of the valley beneath, we could distinguish the fire of the Indian burning his charcoal for the market of that fair and hospitable city we were leaving.

After about two hours' ride we crossed a well-built bridge, and entered the village of Chinauta, which consists of a collection of about sixty huts and two churches. The river Chinauta is a small clear stream, which falls into the Rio Grande de Motagua, and owing to its serpentine course we crossed it not less than fourteen times during the day's journey. Quitting Chinauta, we passed successively the villages of San Antonio, San Rafael, and the farm of Carizal. Continuing along a good road we came to the Vuelta Grande (a 'sudden turn,' almost at right angles), and from an eminence had our farewell view of the city of Guatemala, the white churches of which were still visible.

We next passed the village of Jiji, consisting of about ten huts, and a beautiful ravine, called the Baranca de la Negra, and finally arrived at half-past three at the farm and sugar-mill called Trapiche Grande, about nine leagues from Guatemala. Having in the course of the day made a considerable descent, we found ourselves in a sultry climate compared with the temperate one of the capital:—the difference in temperature in one short day's journey in this country is very striking.

Sept. 15.—Started at six A.M., and shortly after halted to examine the remains of an ancient Indian fortification. It presented a succession of ruined breastworks of stone, but was so concealed by brushwood that we could make but little of it. We proceeded through a beautiful valley called the Vega de los Plátanos and a hamlet named Buena Ventura, a few huts embosomed in wood; had occasional views of the Rio Grande, after which the road became steep, stony, and bad: descending through a thickly-wooded country, we arrived at the Rio Grande, on the shady banks of which we were detained an hour in swimming our mules, and ferrying ourselves over. The river is here a noble and rapid stream. After halting for breakfast, we proceeded to the Aguas Calientes, or "hot springs." The face of the country was here completely changed: the trees grew distant from each other, and large masses of rock were scattered about in wild confusion: the water issues from the ground almost at a boiling heat, with a strong sulphu-

reous smell. I endeavoured to force my mule to step into the stream, but he would not; and on dipping my finger in I was glad to withdraw it. About one hundred yards farther on we came to a similar spring, but emitting a stronger sulphureous vapour. We continued by a rough broken road over the Llano Grande, or "great plain:" passed the small village of Texas, and halted at the Trapiche, or sugar-mill of Llano Grande, a pretty spot, surrounded by groves of orange and lemon trees. We started again at five P.M. by a good road, reached the estate of Choacus, and began the ascent of the mountain of Choacus by moonlight. By a steep and rugged road we reached a forest of pines, which cast their gloomy shadows across the path, while below us the bright fires of the sugar-mill offered a wild and uncommon scene.

Three hours brought us to the summit, which I should estimate roughly at 2000 feet above the plain; and descending on the northern side at ten P.M. we came in sight of the moon-lit plain of Salamá. After breaking all our horses' cruppers from the steepness of the descent, we reached a small plain, then ascended a second series of the heights of Choncono, and at eleven P.M. arrived at Salamá—distance estimated twelve leagues—and took up our quarters at the hospitable house of Don José Soria, one of the few remaining old Spaniards, courteous, kind, and well-bred; a real *hidalgo*.

The town, or as it is called, the city of Salamá, is the residence of the chief of the department of Vera Paz, although Coban, about twelve leagues farther north, is its capital: the town may contain from 5000 to 6000 inhabitants, of which a few are merchants, about one-sixth ladinos, and the rest Indians. Here is a plaza, a cathedral, a *cabildo*, and some respectable shops; it is surrounded by farms, and is situated in a luxuriant valley.*

After one day's detention here for mules we quitted Salamá at 3 on the morning of the 17th, travelling in a north-easterly direction—by a rough road we crossed the hills of Cachil and Quililá, and at 9 o'clock arrived at Purulá, a small Indian village about five leagues from Salamá. After two hours' halt we commenced the ascent of the mountain of Purulá; the road at first good, and the scenery beautiful: heavy rain with thunder and lightning continued throughout the ascent: for some distance the path led along the banks of a river, after which it became, if possible, worse than that of the Mico mountain. At the end of three hours we reached the summit, which may be estimated at 1500

* At San Jeronimo, about three leagues S.E. of Salamá, is a large estate belonging to Mr. Marshall Bennett of Belize, which formerly belonged to the Dominicans. In the village are about 2000 ladinos. Sugar, cochineal, and cattle, are the chief products of the estate.

feet above the plain: the first part of the descent is bad, but it afterwards becomes good, opening on all sides upon romantic views. On the right the river Polochic winds its course through a fine plain, while directly before us, surrounded by orange groves, was the peaceful village of San Miguel Tucurú, which we reached at 6 P.M. Here is a poor church, a poorer cabildo; a plaza, and some mud huts; a population perhaps of 500 persons. We could not obtain bread to eat, and with difficulty any thing else.

Sept. 18.—Started at 6 A.M., and by a steep descent reached the river Polochic, which is here a rapid stream, foaming over a rugged bed: at intervals are small islands clothed in the richest verdure: the road continues along the banks of the river skirted on the left by a rich plain, crossed by numerous streams in their course to swell the torrent of the river. At 9 reached the large farm of Rachguizch on the right of the road; and at noon the little hamlet of Chemaguin in a luxuriant valley surrounded by well wooded hills. After two hours' halt we pushed forward with fresh horses, and shortly ascended a hill, whence we had a view of the plain of Polochic and the distant glittering water of the Lago Dulce: we descended through a thickly-wooded country, and soon came to the banks of the Polochic, which is here rapid and much widened, and crossed it by a singular suspension bridge, called the Hamaca, slung, as it were, from one side to the other across the stream—an ingeniously contrived and well constructed bridge, formed of the strong rope-like stems of the *bejucos* or parasitical plants, wattled together and attached to the trees on either side: the *lianes* or binds are annually renewed:—by this means we safely crossed the torrent, and the horses having swam over, by a short steep ascent we reached a good level road through groves of the Manaca palm, bending gracefully like a large feather; the platanilla with its strings of coral-red flowers, and the mojan: these woods extend for many miles, and afford a cover for numerous wild animals which infest this unfrequented part of the country.

At 5 P.M. we reached the village of Teleman, having rode about twelve miles in a general E.N.E. direction.

The Embarcadero de Teleman is a small hamlet of about a dozen huts, situated on the northern bank of the river Polochic, at its highest navigable point; the heat and the musquitos proved to us

* Mr. Page's Journal, which he has kindly presented to the Society, and from which these extracts are made, contains a picturesque sketch of this curious bridge. We learn from Mr. Fletcher, who has several times travelled this road, that the bridge is about 100 yards long, by about 2 wide, and is suspended about 3 yards above the stream in the rainy season, when alone it is required.—Ed.

that we had reached the low lands, and the limit of our land journey.

Sept. 19.—At noon we embarked in a piragua or bongo, a flat-bottomed boat, about thirty feet long, manned by a patron or coxswain and three sailors, and turning a bend of the river lost sight of Teleman, and glided rapidly down the stream.

The Polochic is a fine river, which rises in the mountains of Purulá, in the district of Coban, in lat. $15^{\circ} \frac{1}{2}$ N., long. $90^{\circ} \frac{1}{2}$ W. nearly, whence it holds a general E.S.E. course for a direct distance of about seventy geographical miles, and falls into the Golfo Dulce* at its south-western angle. It is navigable only as far as Teleman, and thence to the gulf its course is extremely winding.

We passed on the right bank the site of Pueblo Viejo, or the "old town," where a small tributary falls into the river. Farther on to the north rose majestically in the distance the wooded mountain of Cajabon.

Upon a rock overhanging the water we observed two beautiful rose-coloured storks, posted like sentinels; whilst numerous juoacaromeyas or large macaws, parrots, king-fishers, wild pheasants, and turkeys, flew across the stream; passed the Boca Nueva, the outlet of a stream of some extent, on the right, and a few wretched huts to shelter the Indians when gathering sarsaparilla, which abounds near all the rivers in this vicinity. We could just see through the gloom of the evening the mouth of the Cajabon† river on the north shore. Owing to rain, mosquitos, &c., we passed a very uncomfortable night, and the following morning through the haze we distinguished the gulf and hills behind Izabal, where we arrived at 1 P.M. The distance from Guatemala to Teleman is about 45 leagues, from Teleman to Izabal about 30, making about 75 leagues as the whole distance by this route.

* The *Golfo Dulce*, from the late survey by Captain Richard Owen and Messrs. Smith and Lawrance, officers of the *Thunder*, is found to be 24 geographical miles in length, by about 10 miles in breadth; the average depth of water is from 6 to 8 fathoms, with a bottom of bluish clay.—Ed.

† It is about 2 miles up on the banks of the river Cajabon that the site of the town of New Liverpool has been selected by the Vera Paz British Agricultural Company.

XXV.—*Memoir to accompany the Survey of the Delta of the Indus, in 1837, by Lieut. T. G. CARLESS, Indian Navy.*
Communicated by the Geographical Society of Bombay.

ABOUT fifty miles from the sea, the river Indus, a few years ago, divided into two grand arms, the Bagár and the Sátá: all its mouths and branches were then open, and some were navigable for vessels of considerable size. Extensive changes have since taken place; and these have been carried to such an extent, that the course of the river in the Delta has been entirely altered and most of its branches destroyed. During the dry season, no communication now exists between the Bagár and the main stream, a sand-bank having accumulated at the confluence, which fills up its bed for a distance of several miles, and is five or six feet above the level of the water. In all the branches diverging from it, the water is salt for the greater part of the year, and they are then merely inlets of the sea. The Sátá, or eastern arm, as it is called in the late maps, pursues the same course to the ocean as the great river from which it is supplied, and is, in fact, a continuation of it. In every part it preserves a similar magnitude; and for the last ten or twelve years it has been, as it is now, the principal channel of the Indus. In its passage to the sea it receives many local appellations, but is best known, near the coast, as the Wanyaní. Of the five branches it formerly sent off, the Mall and Mutní, discharged by the Mall and Káher mouths, are completely choked at the part where they leave the parent-stream, their beds being now nearly level with the adjacent country and partially overrun with jungle. The other three, the Hajámari, K'hédíwári, and Titíyah, pursue a westerly course to the sea, and are the only branches that are now favoured by the fresh water in the dry season. The two first empty themselves by the mouths of the same name, and possess navigable channels into the main river, but the latter is merely a narrow and shallow creek that conveys a very small portion of water to the Richel mouth. Above the Delta, the Indus throws off two more branches, the Pinyarí and Felelí, which are rivers only during the inundation; after it has subsided, they dry up in many places for miles, and in others form a series of shallow, stagnant pools that have no connexion: they are, besides, closed by bands or dams thrown across them above the the sea-port towns in order to retain all the fresh water that passes into them for agricultural purposes.

The Indus formerly reached the sea through eleven large mouths, but three now suffice, in the dry season, to discharge its waters. Of these, the Pítí, the Pintiyání, Juwah, and Richel, belong to the Bagár; and the Hajámari, K'hédíwári, Kúkwári Káher, and Mall, to the Sátá; the Sír and Kórí are entrances to

the Pinyári and Feleíli branches, and complete the number. Besides these there are many small mouths, some still open, and others that are partially choked; but, as it would only tend to confuse, I shall not name them. At present, the Kúkewári, which gives egress to the waters of the Wanyaní, or main river, is the grand embouchure of the Indus: in the late maps it is called the Górá, but erroneously so, for that mouth was deserted by the stream some years ago, and its site is now occupied by an extensive swamp, intersected by several small creeks. There are only two other mouths, the Hajámari and K'hédiwári, that discharge fresh water in the dry season. Some of the branches that have been partly destroyed receive a small supply by means of canals cut for the purpose; and are said to be fresh in the upper part, but at all their mouths the water is salt.

From the foregoing sketch of the state of the Indus in the Delta, it will be perceived that only two of its large branches have at present a communication with the main stream in the dry season. A trigonometrical survey of these and of the main river, from its mouth to the Títíyah, a distance of thirty-five miles, has recently been completed, and I shall now proceed to describe them, with the part of the coast that has been examined, and such other facts, connected with the Delta and its rivers, as have fallen under my observation in the course of the survey.

Between the eastern and western mouths of the Indus, the sea-coast* of the Delta runs nearly in a straight direction to the N.W., about 125 miles: the shore is low and flat throughout, and, at high tide, overflowed to a considerable distance inland. With the exception of a few spots covered with jungle, which serve as marks for indicating the mouths of some of the rivers, it is destitute of trees or shrubs; and nothing is seen for many miles but a succession of dreary swamps. Wherever these occur, the land is scarcely discernible two miles from the shore; but, at those parts where there are bushes, it is visible from the deck of a small vessel about double that distance. Between the Sír and Korí mouths it is overspread with low mangrove-jungle running far into the sea; and, from the former, a bare uninhabited marsh, without a single bush or other object to relieve the eye, extends up to the Mall mouth, a distance of thirty-five miles: it is intersected by four large salt-water creeks, or rather inlets, the Kajah, Rúdah, Warí, and Khaï, which run far into the land, and are probably portions of destroyed rivers. Above the Mall all the mouths of the Sátá reach the sea within a space of twenty miles; and, at this part, the

* In the charts now in use it is laid down above half a degree too far to the eastward, and the same error will be found in every part that exists at the Hajámari and Korí mouths, where the longitude has been ascertained by numerous observations. The former is in $67^{\circ} 25' 21''$ east, and the latter in $68^{\circ} 30'$ east of Greenwich.

coast presents a peculiarity of formation not observable elsewhere. From the more elevated plains further inland, it runs off in a number of long spits, or tongues, of considerable breadth, which, from the rounded form they have assumed, bear the appearance of having been thrown up by a violent rush of water. They are composed of the soil deposited by the inundation; and, being always submerged at high tide, have not become firm, like the tracts that are only overflowed at intervals. The highest part is covered with a kind of long thorny grass, and they are separated from each other by creeks leading into the different rivers, which, with their numerous ramifications, form an excellent water-communication throughout the districts on this part of the coast. About the mouths of the Sátá, tamarisk-jungle is seen for the first time near the sea: there is a large patch on the north point of the Richel mouth; and, although not very high, it serves as a mark for distinguishing that entrance from the others. On a coast so devoid of objects, and so extensively flooded at times, it is often difficult to discover the mouths of the different rivers; and the pilots, many of whom have passed their lives in navigating it, are frequently a long time before they can find them.

The broad alluvial bank, projecting everywhere from the coast, extends from the bay of Karáchí to the N.W. extremity of Kach'h, and in width varies considerably. Off the mouths of the Sátá, where numerous shoals and flats have been cast up by the greater strength of the tide, it runs out in some places five or six miles, and is dry for a distance of twenty miles along the shore. At the Kórí mouth it is of a similar breadth, but only dries here and there in small patches. In other parts the outer edge is only two miles from the land, sometimes less; and there is a depth of water on it which, from three fathoms, decreases gradually as you approach the shore to three or four feet. That part of the bank lying off the mouths of the Sátá, which extends farther out and has attained a more advanced stage of formation than any other, has been thrown up partly by the strong current from the rivers, and partly by the heavy sea of the S.W. monsoon: it covers an area of not less than sixty square miles; and, with the exception of the narrow channels leading across, it dries at half-ebb. The interior part is composed of soft clay, mixed more or less with sand, and, near the shore, grass is seen springing up over the surface in large patches. Farther out, extensive sand-flats have been formed, which have risen to such a height that they are not covered in many places at the highest tides: they are smooth and firm, and a few blades of grass have already made their appearance on the most elevated parts. Being thrown up by the sea they are steep along the outer edge, frequently rising almost abruptly from a depth of two or three fathoms; and they abound

with a species of long, thin worm, which serves as an article of food for the swarms of aquatic birds that frequent the coast. From the report of the natives, the whole of this portion of the bank is rapidly rising above the surface of the sea; and, before many years have elapsed, it will probably be added to the land. Outside the bank the bottom is very soft, but on it, except in a few spots, and in all the channels leading across it, extremely hard, being composed of sand mixed with a very small quantity of clay. Very little mud is found in any of the rivers, except the Kórí; it being apparently all carried out of them by the strong tides, and not deposited until at such a distance from the shore as to be out of their influence.

The tides are everywhere extremely irregular: between the Sír and Mall mouths there is a feeble current setting constantly to the E.S.E. along the shore, and the flood or ebb can only be distinguished by the rise or fall of the water, which is only four feet. No rivers are discharged on this part of the coast, and the sea is very slightly discoloured in consequence. Off the mouths of the Sátá the ebb runs out of the different channels in a broad muddy stream, direct from the land, but quickly loses its strength as it leaves the bank. Here the water is fresh at low tide 5 or 6 miles from the shore, and the rise and fall increases to 10 feet: in other parts, where the small mouths are numerous, the tides change their direction almost every hour, and are scarcely felt 2 miles outside them.

From the beginning of October to the middle of March the Sind coast is navigated by the boats of the country without difficulty or danger. The soundings are everywhere a sufficient guide; and, in general, decrease so gradually that no danger is to be apprehended in approaching it. The only shoal of any consequence is the great bank off the mouths of the Sátá, which projects beyond the line of the direct route to the northern rivers. From the dangerous appearance of the breakers during the sea-breeze the native boatmen have a great dread of approaching it, and at night always stand out into eleven or twelve fathoms before they venture to pass it. During the fine season, land and sea breezes generally prevail, with cold clear weather; but the wind sometimes blows very fresh from the N.E., and the atmosphere is obscured by clouds of fine dust many miles from the land. The season terminates long before it does on the Malabar coast, and the navigation then becomes very dangerous. Early in February, westerly winds set in with considerable violence, and, for the first fortnight, the weather is always very tempestuous. Strong gales, also, sometimes blow from the same quarter; and there is a heavy, tumultuous sea running, which breaks across the mouths of all the rivers. Short intervals of moderate weather occur afterwards until the

middle of March; but, after that date, the Indus may be considered closed for the season. A few of the most adventurous of the Dutch boatmen sometimes navigate the coast, and enter the river as late as the end of April; but it is considered a very hazardous undertaking, and their vessels are frequently wrecked in attempting it.

The fisheries carried on along the coast give employment to about 100 vessels, and are a profitable source of commerce to the inhabitants of the seaport towns. Maghribí, situated upon the Sír river, sends about 30 boats, and Karáchí nearly double that number. The dingys, or sea-boats employed, seldom exceed 10 or 15 tons in burden, and, from their construction, are well adapted for navigating the coasts or entering the shallow mouths of the rivers. They have great beam in the centre, and the bow and stern, which are precisely similar in form, are very sharp; some are decked over, but others have merely a light platform abaft for the convenience of steering, and they are rigged with a single lateen sail. The upper part of the stem is always carved and profusely ornamented with coloured beads, shells, and other trifles: this is done by the boatmen from a superstitious belief that it propitiates the saints and secures success in fishing. These boats sail very fast in smooth water, and, from their buoyancy, are enabled to run into the shallow mouths through the breakers without sustaining the least injury or inconvenience. The best fishing-ground is about the great bank, and along the coast immediately below it: in the fine season the sea about those spots is covered with buoys, and clusters of boats are seen at anchor, waiting for the turn of tide to examine their nets. Besides sharks, which abound, several kinds of large fish are obtained; two of these, called by the natives Ringán and Sírí, are varieties of the cod, and are valuable for their sounds, which, with shark-fins, are exported to Bombay for the China-market. Other kinds, such as the Sír-fish, cavalho, and red snapper, are taken in such quantities that only the best are preserved for the purposes of commerce, as the supply would otherwise exceed the demand. Every evening the boatmen proceed to the nearest river and send on shore all those that are not required, for they imagine that if they were thrown overboard it would scare the others from the coast. At the spots frequented by them for this purpose, the shore is covered with fishes in every state of putrefaction, and there is such an intolerable stench, that it is almost impossible to remain in their vicinity. Most of the men engaged in the fishery belong to Karáchí, and are rather superior, in point of intelligence and appearance, to the other inhabitants of the sea-coast.

The large boats employed in the trade to Maskat, and the ports on the Malabar coast, are from 30 to 50 tons in burden, and

sail principally from Karáchí: they are built in the same form as the fishing-dingys, but are disfigured by a very high poop, and have their sides raised several feet above the gunwale with mats and bamboos. There is not a greater number than 30 or 40 of these sea-going vessels in Sind, and none of them are armed. A few of the largest belong to the merchants at Vikkar and D'hárájá, and ascend the rivers on which those towns are situated without difficulty.

Hajámari.—The general course of the Hajámari, or, as it is called in the upper part, Sýahan river, is W. S. W., and its length forty miles. It quits the parent-stream about 22 miles from the sea, and is the most winding of all its branches: in some parts you do not advance in a direct line more than one mile in three, and the reaches turn back so directly upon each other that nothing but a narrow neck of land, scarcely 100 yards broad is left between them. Its mouth opens like a funnel, and, with the exception of that part where the stream takes its course along the right bank, is occupied by a broad flat, partially covered with water: this forms a continuation of the bank, everywhere extending from the coast, which is here rather more than a mile in breadth. The best and largest channel leading across it runs in a N. N. E. direction towards the north point of the river, and is 600 yards wide: at the entrance there are heavy breakers on either side, and at high water no greater depth is found on the bar than thirteen feet. Besides this channel there is another, 300 or 400 yards above it; but it is extremely shallow, and can only be used by the smallest boats, when the weather is moderate. About this mouth the land is extremely low, and entirely destitute of trees or other remarkable * objects by which it may be known.

A short distance above the entrance the river has a width of 550 yards, which decreases gradually as you proceed upwards, until it contracts to a narrow stream, not more than 50 yards broad. Bander Vikkar, its port, is situated 20 miles from the sea. Below that town the channel occupies about half the stream, and, with a few exceptions, crosses from side to side at the middle of each reach: the deepest part is generally found close to the steep banks, and the shallowest wherever they rise gradually from the water. The soundings are very irregular, and there is frequently a depth of 6 or 7 fathoms, but at high tide there is nowhere less than 12 feet, until you arrive at an extensive bar or flat 19 miles from its mouth, on which not more than $7\frac{1}{2}$ feet are found. This is the only obstacle that exists below Vikkar,

* A beacon has been lately erected, on the north point of the river, that can be seen ten miles from the land, and buoys are to be placed in the channel leading into it, as soon as they can be got ready.

and the large boats arriving from Kach'h and Guzerát are frequently detained until the height of the springs before they can cross it. Immediately above Vikkar the river runs in a succession of reaches, broader in the middle than at the ends, where they contract so much as to leave a passage barely 80 yards wide; here it is alternately deep at the angles and shallow wherever it widens. On the flats the depth varies from 3 to 8 feet, but they are full of holes, and a continuous channel of more than 5 nowhere exists. Near its junction with the main stream, its breadth for many miles rarely exceeds 50 yards, and in the dry season, when there is not more than 3 feet water on any of the shoals, it is easily forded in six or eight different places: at this part it has shrunk within its former limits considerably, and appears like a large creek, wandering through the deserted bed of a river; the old banks are visible throughout, and at least 300 yards apart.

Quitting the main river in a direction nearly opposite to the course of its current, the water is prevented in a great measure from entering the Hajámari, and the quantity that finds an outlet through it is very small. In the upper part the current is extremely feeble in consequence, but below Vikkar the tides, influenced by the ocean, are much stronger; even there, however, they are not rapid, for their velocity is scarcely ever greater than 3 miles an hour, and is generally much less. At Vikkar the flood is irregular in its approach, and 10 miles above it ceases to be felt altogether. At the mouth of the river there is a rise and fall of 8 feet, and it diminishes gradually in ascending to 9 inches.

At high water vessels drawing 9 feet can pass into this branch without difficulty, but none of a greater draught than 7 can ascend it as high as Vikkar. The boats that navigate it throughout in the dry season do not draw more than 2 feet 8 inches.

In its course to the sea the Hajámari sends off several creeks, which connect it during the inundation with the branches of the Bagár. Of these the Chagalú quits it about 5 miles below Vikkar, and the K'hédiwári, once a broad and deep river, a few miles farther down: midway between them there is also a large canal called Bórá-ke-wá, constructed some years ago by a wealthy Hindú, whose name it bears. After the swell has subsided they all partially dry up, and the only communication that then exists between this river and the western branches is by a salt-water creek, close to its mouth, called the Baghá. At high tide it affords a passage to the largest dúndís, and by this route they are enabled to enter the Richel, and proceed up that river into the Bagár, which is said to be accessible to vessels drawing

15 or 16 feet. From that arm they pass through a creek into the Gahrah, a small stream that leads to the harbour of Káráchí. On the eastern side the Ráhpúrah creek leaves the Hajámarí 5 miles above its mouth, and after pursuing an irregular course to the S.S.E., falls into the lower part of the K'hédiwári branch; it is never filled until the night-tide has run to its greatest height, and even then is so narrow and shallow that it can only be used by the smallest boats. Opposite the village of Juwah, a few miles higher up, a large canal, called Jahlú, also affords a communication with the K'hédiwári: it joins that stream near its confluence with the main river, is navigable for boats of some size, and connected by a small branch with the Ráhpúrah.

About the mouth of the Hajámarí the land from a short distance appears dry and covered with the richest verdure, but, on a closer inspection, is found to be one vast swamp, thinly spread with a species of coarse thorny grass, mixed with rushes, and intersected in every direction by small creeks. Above these plains, which extend about 5 miles from the coast, and are partially overflowed by the spring tides, the jungle commences, and cultivation is first seen. The country, however, is still very swampy; for although the banks of the river are sufficiently high to keep out the water, it obtains access to the interior through the numerous canals cut for the purpose of irrigation, and converts each field into a deep marsh, only passable on the narrow bank of clods raised to prevent its escape. About this part the jungle is composed entirely of low mangrove bushes, but a short distance higher up the mangrove disappears and gives place to the tamarisk. Below Vikkar it is thinly spread over the face of the country in large patches, and in some places approaches to the verge of the river, but generally keeps some distance from it. The intervening spaces present to the view a succession of grassy plains or rice-grounds, with here and there thickets of tall reeds and sedges. About the dreary tracts of the sea-coast there are few villages, but, as you ascend the river, they are passed in quick succession; and numerous flocks and herds are seen roaming about in every direction, which give an appearance of animation to the scene not observable in any other part of the country. Above Vikkar the tamarisk attains a greater height, and the jungle increases in density to such a degree, as to be almost impervious. With the exception of a few low points covered with reeds, the banks of the river are so thickly fringed that it is scarcely possible to pass along them; and the boatmen, when tracking their Dúndis, often find it difficult to proceed. Very few villages are visible from the river, but they are thickly scattered along the banks a short distance inland.

Above and below Vikkar, where extensive tracts are met with

clear of jungle, a large portion of the land is under cultivation, but above that town the spots cleared for tillage are small and confined to the immediate vicinity of the villages. Nearly all the flats that now occupy the bed of the river are made available for agricultural purposes; and these, although not so productive as other localities, are preferred by the indolent natives on account of the little labour they require. Rice is almost the only kind of grain produced in this part of the Delta: barley and moong are cultivated, but the quantity grown is so small that it scarcely merits notice. From every part of the Hajámarí numerous canals have been cut to convey the water to the fields in the interior, but only those below Vikkar are filled in the dry season. Very few water-wheels are in use, and they are employed in the irrigation of spots devoted to the cultivation of esculent vegetables.

Amongst the seaports of Sind, Bander-Vikkar ranks next in importance to Karáčí: the port takes its name from a small village in the vicinity, but the town is called Bárí Górá, after the old Górá river, which formerly flowed past it to the southward. It is the only town in the Sáyáhan district, and belongs to Mír Naşir Khán, the brother of the reigning Amír, who obtains a revenue from it of rather more than a lac of rupees, derived from his share of the produce of the soil, and a duty of 10 per cent. on the trade. It contains about 200 houses, constructed of reeds and grass plastered with mud, and, including the contiguous villages, has a population of about 1200 persons, composed of Hindús, Játs, and a small number of Belúches. At the few shops it possesses nothing is procurable but rice, coarse cloth, tobacco, sweatmeats, and some trifling articles of domestic use: a strong spirit extracted from the sugar-cane, which is in great request amongst the inhabitants, may also be had. Mutton is exposed for sale three days in the week, and butter, eggs, and fowls, which are both cheap and good, are supplied from the neighbouring villages. Vegetables can only be procured in small quantities, and are very inferior, consisting of egg-plant, carrots, radishes, garlic, onions, and sweet potatoes.

Opposite the town the river, although not more than 170 yards wide, is deep, there being four and five fathoms close to the bank; it affords in consequence every facility for the discharge or shipment of cargoes; and the largest boats are enabled to lie close to the storehouses for that purpose. Besides numerous dingys or sea-going vessels, fifty or sixty flat-bottomed boats, of all sizes, from 5 to 50 tons in burthen, will generally be found here in the fine season.

Although the appearance of Bander-Vikkar is wretched beyond description, it possesses nevertheless a considerable trade, having become within the last few years a depôt for the greater

part of the foreign and internal commerce of the Delta, which is entirely owing to its situation on the only river that now affords a communication by water with the upper parts of the country. As the water forsook the branches leading to the old ports D'hárájá and Sháh-bander, the trade naturally flowed into this channel, where it has remained stationary for some years; but as the river is fast filling up at its confluence it will probably be diverted before long to other places. If it does not become choked, and a commerce is ever established by the Indus, Bander-Vikkar may naturally be expected to rise into considerable importance. The average number of boats that annually sail from it with full cargoes is about 400; of these ten are sent from Bombay, three from Demán, three from Maskat, nine or ten from the Makrán coast, and the remainder from Kach'h and Guzerát: in size they vary considerably, but it will not be far from the truth if 20 tons is assumed as the medium tonnage. The value of the trade is as follows:—

EXPORTS.			
Rice, 8000 karwáns	.	.	£24,000
Ghee, 2000 maunds	.	.	1,600
Gáir, 3000 maunds	.	.	900
Grindstones, about	.	.	50
			£26,550
IMPORTS.			
From Bombay.			
		Brought forward	£6,850
English cloths, about	£1,200	Copper, 300 maunds	1,800
Sugar, 200 bags	600	Lead, about	150
Iron, 1000 maunds	500		
Malabar Coast.			
Pepper, 200 bags	700	Timber	1,000
Coir, coarse cloths, cocoa-nuts, &c.	350		
Maskat.			
Dates, about 6000 maunds	1,200	Dried fruits, pomegranate rinds, &c.	250
Slaves, about 100	800		
Kach'h.			
Cotton and coarse cloths	1,500		
Carried over	£6,850		£10,050

For some years past no route has presented such facilities to the natives for the conveyance of merchandise to the upper parts of this country as that by the Hajámarí branch, but in consequence of the heavy duties exacted at different places on the main river they have never been able to avail themselves of it. With the exception of a small quantity of timber none of the goods imported to Vikkar ever find their way above the Delta, and these consist merely of such articles as are required for the most pressing wants of its inhabitants. Nothing is received from Upper Sind but a little indigo; wheat, although grown there in large quantities, being generally procurable at a much cheaper

rate from Kach'h and the Makrán coast. The most valuable part of the trade has for many years passed into Sind by the seaport of Karáchí, from which place it is conveyed to Tálá and Haider-ábád on camels. The amount of the imports levied along this route is about 12 per cent., but by the river it frequently exceeds 35, and is never less.

Along the course of the Hajámarí the beds of several deserted streams are still visible, which formerly connected it with the main river and other branches. One of them, the old Górá, flowed past Vikkar to the southward, and a few years ago was navigable for large vessels. Some idea may be formed of the rapidity with which the branches of the Indus fill up, when I mention, that in 1831 Captain Burnes passed through it on his way to Haider-ábád, and that when I visited it, four years after, the greater part of its bed was level with the plain. Hitherto it has been considered a matter of doubt whether large vessels ever navigated this celebrated river or any of its branches; but the recent discovery of one on the banks of the Hajámarí, about two miles above Vikkar, has placed the point beyond dispute: she lies half embedded in the ground, about 150 yards from the river, and is at least 400 tons in burthen; her hull, which is of the old-fashioned build and pierced for fourteen guns, is almost entire; and she is said to have belonged to the fleet of the Kalórá princes, the former rulers of Sind. One of the men employed during the survey as a pilot, had served on board of her in his youth, and by his account the remains of others, of a much larger size, were visible until very lately in different parts of the Delta.

On examining the Hajámarí again, since the survey was completed, I found that considerable alterations had occurred throughout its course. In many places the channels have shifted from one side to the other, and in general become shallower; new shoals have risen above the surface, and there is scarcely a part of the river where the depth is the same as it was before. At the mouth it is less in some places by 5 feet, and in strong westerly winds the water now breaks right across it. At the N. point the combined effect of the S.W. monsoon and the inundation is exhibited. Formerly the bank was steep, and there was a bank of 7 or 8 feet close to it, but now it shelves gradually off and projects 50 yards farther into the stream, a flat of hard sand, so firm that in walking over it the foot leaves no impression, having accumulated along it for a distance of 400 yards up the river. Large masses of clay have been torn from the bank by the violence of the current and carried out upon this shoal, where they have become firmly fixed as the sand was thrown up, and from a short distance now appear like detached rocks protruding through the surface. When this branch was first surveyed a narrow

channel of 12 feet led from the main river into it, but on examining it again not more than 5 could be found in the deepest part; a shoal has also accumulated just before it, and this has been thrown up in such a position that it prevents the water in a still greater degree from turning into it. The most extraordinary change however is observable in the second reach from the junction, where the old steep banks of the river are 300 yards apart, and which is about a mile in length. Previous to the last inundation, the stream, 50 yards wide, took its course along the RIGHT bank, and the remaining space was filled up by a piece of land, in such an advanced stage of formation that it had been brought under cultivation: now the stream flows close along the LEFT bank, and the flat has shifted its position to the opposite side.

From the direction in which the Hajámari leaves the parent stream, very little water passes into it, and the current has not sufficient velocity to prevent the soil brought down from settling in its bed; it is fast filling up at the junction in consequence, and before long will become impassable from the same cause that has operated in closing the Bagár and other branches. This, however, might perhaps be prevented. About half a mile below the part where it is thrown off, the main river turns with a sharp bend to the southward, and the whole body of water is precipitated against the right bank, which is very steep, with considerable force; if a canal were cut from the angle in the same line as the current runs down upon it, and about 1500 yards in length, it would reach one of the windings of the Hajámari, and, from the volume of water that would be thrown into it by this means, with the increased rapidity of the tide, it might in a few years regain its former magnitude. The advantages that would be gained by a work of this nature are obvious, the Hajámari mouth being accessible to larger vessels and more easily navigated than any other now favoured by the fresh water. It is impossible to calculate what alterations would take place in the lower part of the main river by turning a portion of its waters into another channel, but I do not think it would be affected either in its course, depth, or magnitude. Of one thing, however, we may be assured, the Indus can scarcely be in a worse state at its mouths than it is at present, and any change must be for the better.

K'hédiwari.—This river leaves the main stream 16 miles below the confluence of the Hajámari, and, after pursuing an irregular course to the W.S.W., reaches the sea 3 miles below the entrance of that river, in latitude $24^{\circ} 6' 30''$ N. The mouth of this small branch is approached by a broad channel that crosses the upper or northern extremity of the great bank nearly in a straight line; it is 4 miles long, from 600 to 800 yards broad,

and at high tide has in most places a depth of 16 or 18 feet. The shallowest spot is an open space of some extent about half-way up it, where several channels, some of them partly destroyed, diverge across the bank to the southward and eastward; here there is not a greater depth than 10 feet. In strong westerly winds the sea breaks across the mouth of this channel, which is not sheltered in the slightest degree from the swell, and even in the fine season the breakers are heavy on the shoals that bound it, whenever the sea-breeze blows rather stronger than usual. Last year there was a bar of 8 feet stretching across it near the mouth of the river, but it has since been entirely removed by the inundation, and there is now 16 and 18 feet in the same spot.

The K'hédwári mouth is 650 yards wide, but at low tide not more than half that breadth is occupied by the water, the remainder being filled up by a mud flat projecting from the left bank. On the south side, the land, which is extremely depressed, extends from the more elevated part higher up the river in a broad spit or tongue of soft mud, covered with grass, and at high water is submerged for several miles. The opposite bank, although considerably higher, is also overflowed on the springs when the flood has attained its height; and the entrance then presents an appearance so totally different from what it does at other times that it is difficult to recognise it as the same place: all signs of a river disappear, and nothing is seen but a broad sheet of water, dotted here and there with herds of cattle, and bounded in the distance by a low indistinct line of banks and villages.

From its mouth the river runs nearly east in one long, straight reach for a distance of 3 miles, and then receives the water of a small stream called the Ad'hiyári. At the point of junction its width is not more than 200 yards, but further down it increases to 500, and at high tide there is nowhere less than 13 feet in the deep channel. On the left bank, a muddy swamp, intersected by numerous small creeks that convey a small portion of fresh water to some of the half-destroyed channels of the great bank, extends from the mouth of the river to the Ad'hiyári: it produces nothing but coarse grass or rushes; and, as before remarked, is submerged at high water. On the opposite side the country, although very swampy, is everywhere under cultivation, and scored by innumerable canals cut to the fields in the interior. Besides these, there is also the Ráhpúrah creek, which connects this branch with the Hajámari.

About the junction of the Ad'hiyári the river winds in a succession of short reaches to the northward, then takes an easterly direction for about 2 miles, and, turning with a sharp bend to the southward, joins the main river 8 miles above its mouth.

Throughout this part its average breadth does not exceed 160 yards, and it presents precisely the same features as are observable in the other branches: the banks are alternately steep and shelving; and the deep channel, in which there is often 3 or 4 fathoms, always runs along the former. At the sharp bend, where the river turns suddenly to the southward, a narrow bar extends from the low projecting point across the stream, in a lateral direction, to the opposite bank; and on this, in ordinary tides, there is not a greater depth than 5 feet. At its confluence, this branch, like all the others now open, is extremely shallow—a broad sand-bank having been thrown up along the right bank of the main river which reaches across it.

The Ad'hiyárí leaves the parent stream a short distance below the K'hédiwárí, and enters that branch after pursuing a course to this W.S.W. for about $2\frac{1}{2}$ miles; in its passage it is joined on the right bank by a stream of similar magnitude called the Músáwari, which is also an offset from the main river. In the narrowest part the Ad'hiyárí has a breadth of 35 yards, its banks are steep on both sides, and at high water the depth is never less than 9 feet. In the K'hédiwárí the tides are regular at night, but during the day the ebb runs 8 hours and the flood 4; the velocity of the former is seldom greater than $2\frac{1}{2}$ miles an-hour, and the strength of the latter varies in different parts of the river from $\frac{1}{2}$ a mile to $1\frac{1}{2}$. In the Ad'hiyárí the tide rises 4 feet on the springs, which increases to 6 at the mouth of the river, and to 10 at the entrance of the channel leading across the great bank towards it.

The district through which the K'hédiwárí flows is entirely destitute of trees; near the main river a few small tamarisk-bushes are seen, and this is the only part where they are met with. The soil is in general favourable for the production of rice, and, as the land is clear of wood, a large portion of it has been brought under cultivation; in some places, however, it is extremely sandy, and yields nothing but rushes or reeds. Along the lower part of the river, the few villages visible are situated some distance inland, but above the junction of the Ad'hiyárí they are thickly scattered along the banks and throughout the adjacent country. At Béló Kúkewárí, the largest, the hákim and principal zemindárs of the district reside.

From the report of the natives this small branch has been gradually increasing in magnitude for some years; the last inundation swept away the bar at its mouth, and, besides removing several shoals in the lower part, deepened it considerably. In consequence of this favourable change, it was navigated by large boats for the first time this year, and, as it was found that grain could be procured at a cheaper rate than in other parts of the Delta, they will probably resort to it in greater numbers next season: I

am, however, inclined to think it will experience, before long, the same fate as the other rivers, and become choked at its confluence. At present it possesses many advantages over the Hajámari, the only other branch now open, and, in affording access to the main river, presents equal, if not superior facilities, to the grand embouchure itself. From the sea the distance, through the Ad'híyári creek, is only 10 miles, and at high tide there is not less than 9 feet in the shallowest part; all the difficulties of the navigation will disappear when a few buoys are laid down, which is about to be done, and by this route a steamer drawing 6 or 7 feet might enter the main river in two hours, at a spot 7 miles above its mouth.

From Häider-ábád the Indus pursues a S.S.W. direction to the ocean, and, with the exception of two sharp bends, one at the part where the Pinyári quits it, and the other near the confluence of the Hajámari branch, its course is rather direct. The distance in a straight line is 90 miles, but, by the windings of the stream, about 102. In the Delta it receives many names; below the Hajámari it is known as the Wanyaní, and near the sea is sometimes called the Manijá, but this name is only applied to it by a few of the natives residing on its banks, and is not generally recognised in other parts of the country. From the Hajámari to the deserted bed of the Nair, it receives the appellation of Pópét; and above that is called successively the Múgrah and Sátá, from having once formed a part of those now abandoned rivers. The width of its mouth, the Kúkewári, is nearly a mile, but at low water a mud flat on the right bank contracts it to 770 yards. On the full and change of the moon, the tide rises $1\frac{1}{2}$ foot higher than usual, and then, like all the other mouths, it can scarcely be distinguished even from a short distance, the country on both sides being inundated for several miles.

When I first examined the Kúkewári mouth there were three channels leading from it across the great bank outside, which here projects 5 miles from the land; and that running to the N.W., in a line parallel to the shore, towards the K'hédiwári entrance, was by far the best: the last inundation destroyed all but one, and this, from the greater body of water discharged through it, has attained more than double the width it then had, and is rather deeper. It takes a course across the bank to the S.W. in the same line as the river above, and preserves the same breadth, 1100 yards, until near the sea, where it gradually widens to $1\frac{1}{2}$ mile: the greater part of this broad space, however, is occupied by an extensive shoal, with only 7 or 8 feet on it at high tide; and the channel becomes divided by it into two smaller ones; these again have shoals at their mouths, and by these continual divisions the great channel has no less than four different openings by which it

may be entered. The best of these small channels is 500 yards broad at the entrance, but about a mile above contracts to 130, and it has a depth varying from 12 feet to $3\frac{1}{2}$ fathoms; it is defended from the swell that usually accompanies the sea-breeze by the projecting point of a shoal, and in this respect possesses a great advantage over the others, which are unprotected. Above the large shoal the depth of water in the great channel is 10 and 12 feet, and it increases as you approach the mouth of the river to 4 fathoms, but there is one spot where there is not more than 9 feet right across. In the dry season the current does not run with such velocity as might be expected: during the months of January, February, and March, it never exceeded $3\frac{1}{4}$ miles an-hour, and was frequently much less: the flood varied in strength from a quarter to one mile an-hour. Outside, the sea rises 10 feet on the springs, but this quickly decreases on the bank to 6, and at the mouth of the river to 5: two days after the change of the moon there was a further rise of $1\frac{1}{2}$ foot; but this, which is always the case in the night, only happened twice in the day, and the country was then flooded for miles. At the entrance of the channel leading to the Kúkewári mouth, the navigation is certainly intricate, but a few buoys or marks would render it sufficiently easy for steamers drawing 6 or 7 feet, and I do not think they would experience any difficulty in entering the main river by it.

About the Kúkewári mouth extensive alterations have occurred since it was examined last year. The following description of it is taken from the first report published by order of the Bombay government, and, when compared with the account that has been given of its state at present, shows the extraordinary changes the mouths of the Indus annually undergo:—"The broad bank that has accumulated before the Kúkewári mouth projects 5 miles from the land, and is intersected by three channels which give egress to the waters of the main river; two of them cross the bank nearly in the same direction as the course of the river that supplies them, but the other, turning to the N.W., runs some distance in a line parallel with the shore, and, after uniting with the channel of the K'hédiwári, reaches the sea about 5 miles to the southward of the Hajámári mouth. The latter, which is the best of the three, is between 300 and 400 yards broad, and in the shallowest part has a depth of 9 feet. At the lowest state of the tide the central parts of the bank are elevated 12 feet above the level of the sea, and the beds of the two southern channels from 3 to 4: the vast body of water issuing from the main river rushes through them with great impetuosity, and with a noise that in calm weather is heard some distance: they then form what may be termed rapids, and on the extreme edge of the bank terminate in a fall of about 12 inches." Of these two channels only

one, as before remarked, now exists, the other being choked at the point of separation: the lower part of it, however, has not been destroyed, and there is still a small quantity of water forced into it over the bar of sand that has been thrown up. The northern channel, which was 5 miles long, and formerly connected it with the K'hédiwári mouth, has been entirely obliterated, with all the branches it sent off towards the sea; not the slightest trace of them now remains. These changes have been caused by the rapid current of the inundation throwing up a bar at the point where the channels are separated at an early period of its rise; the water being thus prevented from passing into them, they were subjected, as the swell attained its height, to the action of a feebler current setting off-shore across them from the depressed part of the coast between the Kúkewári and K'hédiwári mouths, and quickly filled up. The closing of two of the old outlets by throwing the whole body of water into the channel leading direct from the river, which was formerly the worst of the three, has increased its depth and breadth considerably, and, its bed being now much lower than it was, the rapid described in the first report with the fall at its mouth has disappeared.

Near the sea the Indus attains a magnitude at high tide conformable to the idea generally entertained of it; but at other times, when the fall of water has uncovered the shelving flats and contracted the width of its bed, it appears inferior in point of size to most of the other large rivers of the Eastern hemisphere. As before stated, it has been surveyed trigonometrically up to the Títtyah, a small branch thrown off 35 miles from its mouth. In this part its average breadth is about 700 yards, but in some places it is much broader, and in others contracted to half that width by shoals projecting from the old banks far into its bed. The greatest and least breadth is found abreast of the Mutní branch, where from 1060 yards it decreases to 305; in three or four places besides it is 1900 yards wide, and there are few reaches where it does not diminish in some part to 350 or 400. Throughout this portion of the river the banks in general are alternately steep and shelving, and the former in most cases indicate the side on which the deep channel lies; in a few of the reaches the high bank is formed of several ledges, and then it has a narrow ridge of shallow water running along it.

In general, half the bed of the stream is occupied by a dry flat, extending from the old bank, and the shallowest part of the channel is always found at those spots where you cross between two of them from one side to the other. There are also a few detached shoals, with from 3 to 6 feet on them in the centre of the river. At the bends of the reaches the depth of water is always great, there being frequently 6, 8, and even 10 fathoms; but the

crossing-places, between the flats, are much shallower; at these spots it varies from 13 to 18 feet. Opposite Miyáhan, a large fishing-village, one mile above the junction of the K'hédiwári, a very narrow ridge extends in a lateral direction across the channel from one flat to the other; and there is another close to the Siyáhan branch, which projects from the right bank about a mile down the centre of the reach, and connects a line of small shoals. On both these bars there is 9 and 10 feet at high tide, and they are the shallowest spots in this section of the river. Abreast of the old Mutní branch the bed of the stream is rather foul, but one of the channels has from 10 to 16 feet in it, and, although narrow, could easily be navigated.

The strength of the current varies from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles an hour, and the latter is about the average velocity: it nowhere exceeds $3\frac{1}{2}$ miles, and only flows at that rate in two or three places, where the water is confined to a narrow channel at the bend of a reach. This part of the river was surveyed in February and March, when it is at its lowest state, and the comparative weakness of the current must be attributed to the diminished quantity of water it discharges in those months. Along the steep banks, especially where they are much indented by the separation of large masses, it sometimes runs into small eddies, but they seldom extend farther into the stream than 10 or 12 yards. It is only at these places that it is necessary to pay particular attention to the boats in tracking, for, the water being thrown off from every small projecting point of the bank, if the track-rope is not brought down from the mast-head to the stem before it strikes the bow, they are shot out suddenly into the middle of the stream, and carried down the river. At the junction of the Titíyah, and opposite Panj-gajer, a large village, three miles below the Siyáhan branch, the eddies are upon a larger scale, and afford some insight into the manner in which the shoals are formed that eventually effect a change in the course of the river. At the first-named spot the current strikes against the steep bank, a little above the Titíyah,* and is thrown off it, nearly at a right angle, down the middle of the stream: half a mile below that branch it turns into a small bay or bight, and runs up past it, at the rate of about a mile an-hour. This upward current prevails over a space of 180 yards broad in the deepest part of the river, and at the point where it turns into the bay the formation of a shoal has already commenced. A short distance below it there is another similar bight and eddy. The flood does not ascend the main river higher than Anní, a village ten miles from its mouth,

* Accompanying the MS. of Mr. Carless is a plan of this part of the Indus, on the scale of 4 inches to a mile, showing the alterations in its course near the Titíyah branch, and the direction of the eddies.—Ed.

nor even to this distance on the neaps; but the influence of the ocean-tides is perceptible as high as the Títíyah, where there is a mean daily rise and fall of 4 inches. The velocity of the flood varies in different places, but never exceeds a mile an-hour, nor does it continue to flow longer than 2 or, at the utmost, 3 hours.

The country about the mouth of the main river is submerged at high tide for some distance, and continues swampy as high as Bétri, a village four miles from the sea, at the head of the first reach. On the left bank the land, being free from bushes or reeds, and the soil good, is under cultivation to a considerable extent, and affords also excellent pasturage to large herds of buffaloes. Numerous canals, that are filled by every tide, conduct the water to the fields; and there is also a navigable creek of some size about 2 miles above the entrance of the river, called the Babúlú, which leads into the lower part of the old Górá branch, and affords a communication by the Gumbrah, another large creek, with the Káher mouth. At Bétri the Mutní river is not more than 3 miles distant, and boats can be seen in it very distinctly. Bétri was formerly a very large town, but, from some connection with the alterations of the stream, was gradually deserted, and now does not contain above a dozen scattered huts. Near it there is a small lagoon 8 or 10 feet deep, supplied with water by cuts from the main river, which forms a kind of reservoir for the numerous canals that irrigate the grassy plains and rice-grounds in the vicinity. Along one side the bank is very steep, and, as this peculiarity could only have been produced by a strong current, it is evidently a portion of what was once a connecting branch between the Mutní and the old Górá river. On the right bank of the main river nothing is seen for some miles but a dense mass of reeds, occupying the site of an extensive morass that was formed some years ago when the stream deviated from its course more to the eastward. At the lower part of it a large navigable creek is thrown off which traverses the swampy land of the coast in a westerly direction, and reaches the sea by a small channel that joins the one leading from the K'hédiwári mouth near its entrance. On the other side of the river, opposite the lower part of the morass, the Babúlú creek leads to the old Górá mouth, situated 2 miles below the Kúkewári: it has still a width of 850 yards, but is so choked with mud as to be impassable at low tide even for small boats. Above the thicket of reeds the country becomes more elevated, and is bare of trees up to the junction of the K'hédiwári, where a few small tamarisk-bushes are first perceived. Below that branch there are few villages in the vicinity of the river, but along the course of the Babúlú creek they are numerous.

About the K'hédíwarí the tamarisk-thicket is thin and inter-mixed with patches of reeds; but as you advance it quickly becomes dense, and the bábul* (*mimosa Arabica*) appears in large quantities. In this part the river has a most desolate and melancholy appearance, for, the country being overrun to the edge of the banks, very few villages or fields are seen from it. The first village of any size is Miyáhan, situated on the right bank, about 10 miles from the sea, and inhabited entirely by fishermen. It is the principal station of the river fishery; and the man who farms the tax on it resides there. He pays 1600 rupees per annum to the Amírs, and is entitled to one-third of the quantity caught. About Miyáhan the soil contains a large portion of sand, and is so loose that in some places it is thrown up by the wind in heaps 8 or 10 feet high. Amongst the cultivation barley appears in small quantities; and there are a few spots cleared for grain and esculent vegetables. At Anní, a small village about a mile higher up, two ferry-boats are kept constantly in readiness to convey passengers across the river. Near this village there is a dry bare flat, extending some distance down the stream, in the form of a long spit, which has a deep but narrow inlet between it and the steep bank: this is the favourite haunt of four large alligators; and it was here we saw these monsters for the first time on the Indus. They were of enormous size, at least 25 feet long, and of that species with a long pointed snout. The Sindian boatmen told us they were much smaller but more rapacious higher up the river, and that the large ones, being very sluggish, rarely attack a man. As evidence of this we saw the stream in the vicinity covered with fishermen floating fearlessly past them on pots, with their bodies half immersed in the water.

Thirteen miles from the mouth of the river the destroyed bed of the Mutní branch is seen: the space filled up forms a triangle, each side about a mile and a half long, and in most places is overrun with bushes. There is still a small creek flowing through the centre of the plain, amongst the irregular furrows left in the bed, but it is separated from the main river at low water by a broad bar of sand; and as there is not a greater rise of tide even on the springs than 2 feet, none but the very smallest boats can pass into it. The Mall branch, which is about three miles higher up, appears to have been as large as the Mutní, and is still more completely choked, the land having attained a more advanced stage of formation. The greater part of its bed is now covered with jungle or under cultivation, and the remainder is occupied by heaps of loose sand, with pools of water between them that have no connexion. At the point where the banks contract to the

* Bábul, from the Sanskrit Barbura, is a generic name for the *Acacia*, or *Mimos* tribe.

breadth preserved by the lower part of the river it is 700 yards wide, and it is dry for several miles farther down. The cause of the changes that have taken place in these two branches, and also of the foul state of the main river in their vicinity, is apparent in the nature of the soil, which about this part of the Delta is extremely loose and sandy.

About a mile above the Mall a canal was cut two years ago, from the main river to that branch below the part that has been destroyed. It was 15 feet broad, but during the last inundation attained a width of 30 yards, and deepened so much that it is now navigable for small boats at high tide, even in the dry season. The natives frequently call it the New Mall, and before long it may perhaps become a new branch. Nearly opposite the canal is situated the village of 'Alí-ábád: it is of some size, and has a market for vegetables, which are produced in large quantities. A short distance above it a low flat projects into the river from the left bank. The natives point to this spot as the place where a large ship called the Fateh Jang, that carried 40 guns, was wrecked. About two years ago her upper works were visible above the water, and they succeeded in taking out her masts and some of the casks from her hold; but she has since sunk in the mud. About Panj-gajer, a large village near the Síyáhan branch, the country is more open than in other parts, and sugar-cane cultivation is first seen. Panj-gajer means five yards; and the village owes its name to the following circumstance. Ten or twelve years ago the chief of the district cut a canal near it to the Mall branch, which was 5 yards broad; the inundation increased its size and depth so much that it became a small river, but afterwards filled with sand, and dried up altogether. He then opened another 300 yards above it, which met with exactly the same fate, and he is now cutting a third through the bed of the first one. This gives some idea of the continual labour required to keep the canals open, and the fields in the interior properly irrigated.

About the Síyáhan branch none but small villages are seen until you arrive at Killán on the left bank, containing seventy or eighty houses, and inhabited chiefly by Hindús. About this part of the country the remains of several destroyed rivers are visible. I traced three, the Náir, the Mugrah, and the Killán, several miles inland, and the natives told me there was another called the Sátá 10 or 12 miles higher up. The bed of the Náir is almost level with the land and overrun with a dense mass of underwood: it is said to have been a river of considerable size fifteen years ago, flowing from the Bagár or Great Western arm, and to have been connected with the Síyáhan branch. The Mugrah is rather more than a mile above it, and is only partly filled up, there being numerous hollows still in its bed that have pools of water in them

throughout the dry season: the natives say it was also thrown off from the Bagár, and has been in this state for the last fifteen years. About 3 miles inland a small branch, called the Harám Kháneh, joined it to the Náír, and the beds of other creeks are visible in every direction in the tract of country between them. The Killán is on the opposite side of the river, and in the centre of its bed there is now a large village named after it, surrounded with fields and groves; a short distance beyond the village it appears like a long straight glade cut through a forest, and at one spot there is a small lake left by the inundation, enclosed between high irregular banks overhung with trees placed in most picturesque groups, amongst which the mango, tamarind, and plantain are conspicuous. This river appears to have formed a connecting branch between the Mugrah and Sátá.

The Títíyah quits the Indus 35 miles from the sea and joins the Richél river near its mouth: it is not more than 30 yards broad and has not a greater depth in many places during the dry season than $1\frac{1}{2}$ or 2 feet. There are two large villages near its confluence; one of them, Kóterí, is pleasantly situated in a grove of fruit-trees, and the other, Béman-jo-poro, is the residence of the Kárdár of the district. The main river has not as yet been surveyed above this small branch, but it has been examined by Lieut. Wood of the Indian Navy up to Haider-ábád, from whose reports the following description of that portion of it has been drawn up:—

Between the Títíyah and T'hat'hah shallows abound, and the navigation becomes intricate; in some spots the river is very foul, and wanders in many channels over the whole extent of its inundation bed: they are narrow and winding, and in general not more than one of them is navigable. In the bends of the reaches their depth is often very great, but in other parts they have not more than 9 or 10 feet in them; they also change their direction with great rapidity, for in two instances the fair channel, which ran close along the left bank when the Indus steamer passed up the river, was found two months afterwards to have shifted its position over to the other side. At the commencement of the dry season the current runs in some places at the rate of 5 miles an hour, and its average velocity is about $3\frac{1}{2}$ miles. In this part of the river the banks are alternately shelving and steep, and marks of the alterations that have taken place in its course are everywhere visible: in some places they have evidently, at no distant period, formed shoals in its bed, and at others they are fast giving way before the strength of the current. The country is thinly populated, and in general covered with thick tamarisk-thicket, occasionally mixed with the bábul: few villages are met with, and the largest does not contain 100 houses. At Uplán, a few miles

above the Titíyah, but on the other side of the river, there are two large canals leading one to Sháh-bander and the other to Maghribí: they are filled about the middle of July, and navigable for small boats to those towns, until the final fall of the river takes place in the last week of September. Abreast of T'hat'hah the banks of the river are a mile and a quarter apart, but the water does not occupy above one-third of this space, the remainder being filled up by an extensive dry shoal. The Bagár or Great Western arm was formerly thrown off 4 miles below that city, and the sand-bank that has been cast up at its confluence now forms the right bank of the river.

Above T'hat'hah the bed of the river in many places is full of small shoals, and the intricacy of the navigation increases; the banks are also frequently low on both sides, and no longer indicate, as in the lower part, where the deepest water is to be found. At the village of Kaddí its width is 980 yards, but at the angle of the reach in which it is situated, not more than 390: abreast of the Pinyárí it increases to 760, and at Trikal, a few miles below Haider-ábád, again contracts to 380. The strength of the current is considerably diminished, and there are very few places where its velocity is greater than 3 miles an hour. In this section of the river the depth of water has not yet been fully ascertained in every part, but in the lines of soundings taken across the shallows at certain distances, $7\frac{1}{2}$ and 8 feet have always been found in some part. The only branch thrown off by the Indus in this part of its course is the Pinyárí, which quits it at Baná, a village half way between T'hat'hah and Haider-ábád, and in the dry season is not more than 40 yards wide: the stream does not extend many miles from its efflux, and its waters are clear and stagnant. Near Trikal a small creek communicates with the Feleilí branch, but it is only filled by the inundation, and then insulates the land on which the capital is built. A short distance above T'hat'hah, and on the same side, the first hill is seen: it is low and of sandstone formation. From this place the Shikár-gáhs or hunting-places of the Amírs extend on both sides of the river up to the capital; they are composed principally of large mimosa and tamarisk trees, and are so overrun with thick underwood as to be almost impervious. Most of the low sandy tracts between them are thinly covered with bushes, and very little cultivation is seen until you arrive at Haider-ábád, where there are a few fields and gardens. From that city a range of low table-hills, about 200 feet high, extends along the left bank to Trikal, 12 miles below it, and there is also a small group at Jérkh, 8 miles farther down.

The local divisions of the Indus, which have been entirely disregarded by those who have written about it, merit notice, for in

some instances a knowledge of them will prove practically useful. The confusion apparent in many of the accounts descriptive of the general character and features of the river must be attributed to the authors not having paid sufficient attention to this subject, for, being ignorant of the causes that have led the natives to separate it into sections and distinguish each by an appropriate appellation, they have in many instances made the mistake of supposing that these names denoted distinct branches. Thus the *Siyáhan* has been described as flowing into the *Hajámari* at *Vikkar*, whereas the *Siyáhan* and *Hajámari* do not possess with regard to each other the relation of two separate branches, but are merely local appellations applied to different portions of the same river.

The terms employed to designate the different sections are often derived from some physical peculiarity, natural or artificial, or from some tradition referring to the locality, but they are most frequently named after the district through which they flow, or the principal tribe that occupies it: examples of all these different names are met with in *Sáhú*, *Siyáhan*, *Pópét*, and *Mugrah*. The first term, *Sáhú*, means "good," and is applied to that portion of the river so called, because the banks are composed of firmer materials and the stream is less liable to vary than in the sections immediately below it. *Siyáhan* is taken from the district through which that branch flows. *Mugrah* is derived from a *Belúch* tribe that formerly occupied the country about the old river of that name, and *Pópét*, which in the *Sindian* language means a parrot, from a tradition that in former times the boatmen always sacrificed one of these birds as an offering to a celebrated *Pír* or Saint on entering this division of the river, the navigation of which was dangerous and perplexing. The following table exhibits the different sections below *Haider-ábád*, with their limits and the derivation of their names, and will, perhaps, render this naturally complicated subject more intelligible:—

	Names.	Limits.	Derivation of Names.
Main trunk of the Indus.	<i>Sáhú</i> .	From a village close to <i>Haider-ábád</i> to the first range of hills above <i>T'hat'hah</i> , 40 miles.	From a word signifying "good."
Main trunk of the river, called in the late Maps the <i>Sáda</i> or Great Eastern arm.	<i>Sáda</i> .	From the latter point to the <i>Titíyah</i> branch, 28 miles.	From once having formed a part of the old <i>Sáda</i> river.
Ditto.	<i>Mugrah</i> .	From the <i>Titíyah</i> to the bed of the old <i>Náir</i> river, 5½ miles.	From having once formed a part of the <i>Mugrah</i> , which was called after a tribe of that name.
Ditto.	<i>Pópét</i> .	From the <i>Náir</i> to the confluence of the <i>Siyáhan</i> , 4½ miles.	From a tradition.
Ditto.	<i>Wanyaní</i> or <i>Banyaní</i> .	From the latter point to its mouth, 24 miles.	From the number of <i>Hindús</i> of the <i>Banyan</i> Caste resident on its banks.
<i>Hajámari</i> branch.	<i>Siyáhan</i> .	From point of junction to <i>Vikkar</i> , 20 miles.	From the district through which it flows.
	<i>Hajámari</i> .	From <i>Vikkar</i> to its mouth, 20 miles.	From a drunken <i>Hajjam</i> or barber having been drowned in attempting to swim across it.

Of the different sections of the main river, three of them, the Pópét, Mugrah, and Sátá, possess the same physical peculiarities, and a correct knowledge of them will be found in a practical point of view of some importance: it is in this part of the Indus that the destroying process is continually going on, which causes so much vacillation in its course amongst the subordinate branches in the Delta, and produces those frequent changes which render the navigation so uncertain. In the division above it (the Sáhó) this unsteady stream is confined to a permanent channel by the firmness of the soil, and the existence of a low, but in this particular important, range of hills, until it passes into the Sátá section, where the destructive operations commence. The causes that produce the frequent alterations observable throughout this part of the river are seen in the nature of the soil, and the velocity of the current at particular places. The soil is loose, light, and easily soluble, being composed of fine micaceous sand, mixed with a small quantity of clay; it is apparently distributed throughout the Delta in extensive patches, being met with at intervals along the whole course of the river below Haider-ábád, and in all the branches I have examined. Wherever it prevails, but especially in the three sections I have attempted to describe, the destruction of the banks continues without intermission, for in the dry season, when the level of the river is low, the current, in flowing along those that are high and steep, is constantly exerting itself to undermine their bases, which soon causes the upper portion to slide into the water: in this manner the navigable channel is often partially filled up and forced to shift its position by the large masses of soil that fall into it. This phenomenon is of such frequent occurrence that at night, when the range of sound is most extensive, as many as thirteen reports, produced by the precipitation of pieces of the bank into the water, have been counted in the short space of a minute. Dr. Heddle, in his valuable report on the Indus, when speaking of the effect this peculiar action has on the course of the river, relates a circumstance which shows the extent to which it sometimes takes place. At a village where he came to for the night, a large portion of the bank, measuring 400 feet in length and nearly 100 in breadth, suddenly gave way a short distance a-head of his boat: the noise attending its fall resembled that of a large body of water rushing over a precipice, and the agitation of the river that followed caused the boat to roll as if in a heavy sea: a few huts were precipitated with it, and it was with difficulty the property in some of them was saved. On the following morning the part of the channel into which the bank had fallen, where prior to the accident there was a depth of 3 fathoms, was converted into a shoal partly above water, and the boat in getting under way was obliged to make a considerable circuit to clear it. When it is

considered that so many reports, produced by similar causes, may be heard in the space of a minute, some idea may be formed of the rapidity and extent of the destructive action constantly going on in this part of the Indus; the alterations are in fact so frequent, and the position of the deep channel fluctuates to such a degree, that a pilot is of little use, further than by the knowledge he may possess of the character of the stream in the different sections, and of the extensive local changes that are continually taking place.

In the upper and lower parts of the Wanyani section, where the banks are comparatively permanent, the soil is a stiff clay, but in the centre, about the old Mall and Mutní branches, a large tract occurs of the same sandy incoherent kind that is met with in the Mugrah and Pópét divisions; and similar physical peculiarities are observed in the character of the river.

Below Haider-ábád the navigation of the Indus is very intricate in some places, but, with proper precautions, unattended with danger or any great risk to property. Unaided by steam it will always be extremely tedious, and even with that power applied to it the time required for ascending the river will not be shortened so much as is anticipated; for it is evident, from the foul state of its bed and the strength of the current in many parts, that frequent delays will occur. From the continual alterations that take place in the channels it is often difficult to find and follow them; and the boatmen seldom possess a sufficient knowledge of their direction to act as pilots. In dropping down the river in the dry season they always have a small boat sounding a-head; but even with this precaution they often run aground, where a few months before there had been abundance of water, and much difficulty is at times experienced in getting into the deep channel again. From the prevalence of strong northerly winds in the dry season steamers are better adapted for navigating the Indus than sailing vessels; and it will be seen from the description that has been given of the main stream, that one drawing 6 or 7 feet might enter it by its own mouth, the Kúkewarí, or by passing through the K'hédiwarí branch, and ascend it as high as the Títíyah without difficulty, even when it is in its lowest state. The mouths, it is true, undergo great changes annually, and this will always render them difficult of access; but it appears to me that, as they must always discharge the same body of water, the channels, although they may alter their position, will generally be of the same average depth. Although steamers of the draught I have mentioned may navigate the river up to the Títíyah, I do not think any that draw more than 4, or, at the utmost, 5 feet, will be able to ascend it to Haider-ábád in the dry season. In sounding across it in several places below that city, no greater depth was found than $7\frac{1}{2}$ and $8\frac{1}{2}$ feet; and this being the case, it

is probable that a continuous channel does not exist of more than 5 or 6 feet; for it appears to be a peculiarity of this river to throw up narrow bars or ridges, stretching obliquely across it, from bank to bank. Two have been discovered in the main stream in a distance of 35 miles, and in a part that is both deeper and more free from shoals than any other: they are also met with in the K'hédiwári, and in the Kóri, or eastern branch, they are both more numerous and on a much larger scale. Steamers built expressly for the navigation of the Indus ought to be constructed with flat bottoms; and if it is intended to employ them as tugs, they should possess a speed of at least 9 miles an hour.

On the banks of the river fuel is scarce, and, except in the shikár-gáhs or game-preserves, there is no large wood. In those spots it is abundant; and if permission could be obtained to take it away, no scarcity would be experienced, in the event of steamers being introduced, for some years. It is not, however, likely that the Amirs will grant any request that may be made to them on this point; for in all the late treaties there was nothing about which they showed so much anxiety as the preservation of these hunting forests. In the Delta the tamarisk is the only resource: it seldom attains a great height or thickness, and as a single bush affords but few billets; it requires considerable time to cut down a cargo. During the late trip of the Indus steamer the wood of the bábul (*mimosa Arabica*) was found to answer admirably, and that of the tare or mangrove was equally good: the latter, however, is scarce, the tree being only found near the sea. At present, if proper arrangements were made, a sufficient supply of fuel might, perhaps, be commanded to keep two small steamers constantly plying.

Sailing vessels ascending the river in the dry season, when the winds are blowing strong down it, can only proceed by tracking, and seldom make a greater progress than 12, or at the utmost 14 miles a-day. This method, although extremely tedious, is well suited to the peculiarities of the Indus, and, as now performed, admits of little or no improvement. The only danger is experienced in the bends of the river, where the current sometimes runs in strong eddies, and is continually exerting its influence to undermine the banks. If a boat is driven with force against the steep bank in these places, and a large mass becomes detached by the concussion, which sometimes happens, her destruction is almost inevitable.

The form of the dúndí, or flat-bottomed boat of the country, is well adapted to the navigation of the river, and there is no kind of vessel better calculated for the transport of goods. Many of the largest are 80 feet long, and 60 tons in burthen. They have no keel, and both the bow and stern, which are perfectly flat, rise from the water at an angle of about 30 degrees. They are very high

abaft, where there is a small deck, and are generally steered with a long curved oar. The boatmen are very expert in handling it, and frequently propel the dúndí with it alone. These vessels have also a broad triangular-shaped rudder, which, as there is no sternpost, is hung over the slanting stern, and moved by ropes on each side. The masts are stepped on a plank secured at each end to the gunwale, and are supported entirely by ropes: the after-sail is square and very large; the foresail of a lateen shape; and in order to give them greater power they are usually hoisted abaft the mast. When laden these vessels do not draw more than 4 feet. The chief defect in their construction is the small power possessed by the rudder, which arises from the great breadth of the stern below the water-line. This might easily be remedied; but any great deviation from the general principle on which they are constructed would not be an improvement. From the scarcity of large trees, and the high price of teak plank, the workmen are obliged to use the small wood of the country in building their boats; and most of them are formed of innumerable pieces, fastened by bamboo pegs, nails being only employed to secure the knees and ribs. They are in consequence liable to many accidents that would not affect their safety if they were constructed of better materials; and in the lower part of the river there are about forty or fifty lost annually. Dúndís are hired at so much per karwár (about three-fourths of a ton), in proportion to the length of the trip; and the rates, as now charged, are as follow:

From Bander-Vikkar	to T'hat'hah	1½	rupees per kurwar.
"	"	to Haider-ábád	2½ to 3 " "
From Haider-ábád	to Sihwan	2½ to 3	" "
"	"	to Lárkhánah	4 to 6 " "
"	"	to Shikárpúr	6 to 6½ " "

These rates are for ascending the stream in the dry season: the crew attached to each boat is never large enough to manage her properly, and extra men must always be hired, who are paid and found in provisions by the employer.

The jumbtis, or state barges of the Amírs, are of the same form as the other flat-bottomed boats, and some of them are large and commodious. I saw one with four masts that measured 90 feet in length; and the natives told me there was another at Haider-ábád 20 feet longer. These vessels are constructed entirely of teak, brought from the Malabar coast, and are much better built than any other description of boat on the Indus. They have generally two large open cabins, or rather pavilions, on deck, elaborately carved all over, and furnished on all sides with silk curtains. The foremost one, being considered the post of honour, is always occupied by the Amírs; and that aft, which is the largest, is devoted to the use of the chiefs and followers in attendance. In going down the river against the winds they are im-

pelled by four or six oars, each of them so large as to require five men to pull it; and on these occasions they are always gaily decorated with flags and streamers innumerable.

The periodical rise of the Indus has been ascertained by Lieut. Wood, who was directed to remain in Sind for that purpose; and as his observations have already been published, I shall confine my remarks on it to the effect it has in the lower part of the Delta. At Haider-abad it was found to be 15 feet 3 inches. Above the Delta the water only rises to the level of the banks when the swell has attained its height, but a short distance below T'hat'hah overflows them, although not to any great extent. At the confluence of the Síyáhan, 22 miles from the sea, where the banks are 11 feet high, the rise is 13 feet, and the whole country below this is inundated. It decreases towards the sea in proportion to the slope of the land, for at Vikkar it is only 6 feet above the highwater mark of the ocean tides; and the low flats on the coast, which are often flooded even in the dry season, are seldom covered to a greater depth than 2 feet. None of the permanent villages are removed during the continuance of the swell, but are merely defended from the water by a bank of earth thrown up around them, and the cattle are turned out to roam about in search of food. Throughout the Delta the water is retained, and the supply to the different fields regulated, by dykes thrown up along the banks of the rivers, which in some places are 6 feet high, and extend in a continuous line for a distance of 40 miles; they also serve the natives as a road. During the swell the flood-tide causes a heavy bore at the mouths of most of the rivers, but it quickly loses its force, and does not ascend them to a greater height than 6 or 7 miles.

Although the water of the Indus is extremely muddy in appearance the quantity of soil suspended in it is not so great as might be expected. When reduced to the consistence of stiff mud, or the same state in which it is deposited on the banks, I found it at the Kúkewári mouth to be 3 cubic inches in a cubic foot of water; but the mean of several experiments, made above the influence of the ocean tides, gave only $2\frac{1}{4}$, and this is, I think, about the average quantity in the dry season. During the inundation the amount is much larger, being 4 cubic inches, which is no doubt caused by the greater strength of the current at that period.* On examining the soil obtained from the water, Dr. Heddle found it to be composed of argil, or fine clay, and carbonate of lime, with a quantity of mica in the form of fine sand. It also contains a portion of common salt, with carbonate of soda

* Taking 3 cubic inches as the average throughout the year, and the quantity of water discharged by the river, as given by Lieut. Wood, I find, by a rough calculation, that the Indus conveys to the sea annually 10,503,587,000 cubic feet of mud, and this would cover a space $8\frac{1}{4}$ miles square to a depth of 4 feet.

and nitre. The water, besides the mud suspended, holds in solution a proportion of saline ingredients, principally common salt, carbonate of soda, and nitrate of potash; but the amount is not so great as to render it at all disagreeable to the palate. An idea prevails very generally amongst the natives of Sind, that the water of the Indus is unwholesome.

The changes that have occurred in the branches of the Delta within the last twenty years are most remarkable, and exhibit the inconstant character of this celebrated river in the strongest light. I was fortunately able to obtain some information respecting them; but as few of the natives possess any knowledge of the country beyond the immediate vicinity of their own villages, I could not in some instances trace the course of the destroyed rivers to my own satisfaction. About twenty years ago the main stream of the Indus flowed to the sea by the Bagár, and the Sátá or great eastern arm of the maps, which at present forms the lower part of it, had no existence: * this fact is asserted by all the natives, and is corroborated by the report of the gentlemen attached to Mr. Smith's mission, who found the river in 1809 emptying itself by the Pítí or westernmost mouth. At this period the Bagár threw off numerous branches, and some of them were navigable for large vessels. The Sátá was the first that quitted it below T'hat'hah: it was not very broad, and after pursuing the same course as at present for a few miles, turned more to the eastward, and traversed the country between the Mall and Pinyári, in a S.S.E. line. Ten or 12 miles farther down, the Bagár sent off a larger branch, and this divided into two streams a short distance below its confluence: the Mugrah, which was connected with the Sátá, by the Killán river, was one of them, and the Náir the other: the latter appears to have emptied itself into the Mall branch. Between the Sír and Mall mouths, a distance of 35 miles, no rivers are now discharged, but there are several salt-water creeks, or rather inlets, running 8 or 10 miles into the land. The Sátá and Mugrah must have reached the sea at this part of the coast, and these creeks are, in all probability, the remains of their mouths and lower parts. The account given by the natives of the changes that have occurred in the other branches of the Bagár is extremely vague and unsatisfactory: throughout the line of the Hajámari portions of destroyed rivers are met with everywhere; but the clue afforded by them is so slight, that it is not sufficient to trace their entire courses with any degree of accuracy, and until farther information is obtained on the subject, I shall not attempt it.

From the report of the natives it appears that a very high inundation sometimes occurs in Sind, which invariably causes great

* In some old maps I obtained at Bombay, the Sátá is laid down as a small creek, and pursues quite a different course from what the main river does at present.

alterations in the lower part of the Indus: it is said to happen once in about half a century. About eighteen years ago* one of these floods came down; the river rose several feet above its usual height during the swell, and the strength of the current was much greater than in ordinary seasons: whole villages were swept away from the banks, and in many parts of the country the crops were completely destroyed. On this occasion the river altered so much about the part where the Sâtá was thrown off, that a larger body of water than usual was forced into that stream, and it increased in size considerably; the change became greater every successive year, until at last the main river turned into the Sâtá and abandoned the Bagár altogether. It did not, however, pursue the same course as that branch for many miles, but forced a passage for itself, nearly in a straight line, through several creeks, across the Mugrah and Náir, into the lower part of the Górá river, and shortly after opened a new mouth, the present Kúkewárá. Before this happened, many of the branches were navigable for large ships, and at an earlier period were frequented both by the Company's cruisers and merchant vessels. The rulers of Sind had also a fleet of fifteen ships stationed at Sháh-bander, which owes its name (the King's Port) to that circumstance, and it is mentioned in the histories of the country that they sometimes ascended the river as high as T'hat'hah. The line of route they pursued from the sea to Sháh-bander is accurately pointed out by the natives: they entered the Richél, the only accessible mouth, and passing into the Hajámari, through what is now the Kejeirí creek, ascended that river to a part about 10 miles above Vikkar, where it joined the Bagháná, or, as it is now called, the Mall, on which branch, but considerably lower down, Sháh-bander was situated; they could also pass into the Górá river from the Hajámari, and navigate it down to Bétrí, then a large town. At this period the Richél mouth, which is now nearly closed by a sand-bank, had a depth of 4 fathoms, and there was a high beacon erected on the south point to facilitate the navigation: this, from its resemblance to a minaret, the natives called Múnara: no trace of it now remains, but its name has been retained in that of a village built near its site. Such are the alterations that have occurred in the lower part of the Indus within the last eighteen years.

Having completed the description of the rivers I have examined, and given some account of the changes they have undergone, I shall now proceed to offer a few general remarks on the Delta and its inhabitants. The country on the sea-coast is submerged at high tide for a distance of 3 or 4 miles, and continues

* It is almost impossible to obtain the exact date of any occurrence in Sind from the natives; but if their assertions are correct, this flood must have happened in 1819, the year in which the great earthquake was experienced in Kach'h.

swampy about 2 miles further in-land. These marshy tracts, which in most places are destitute of bushes, afford excellent pasturage for large herds of buffaloes, and on that account are considered by the peasantry as valuable property: notwithstanding their dreariness they often present a greater appearance of animation than is observed in more populous parts of the country, for every creek is full of boats, and men are seen in every direction cutting grass for the cattle of the distant villages. It is of a coarse thorny kind, that grows to the height of 16 or 18 inches, and is only obtained close to the sea, for a short distance inland the small rush springs up in such abundance that it is impossible to separate it: being impregnated with salt it is preferred by the cattle to the herbage of the upper parts of the country, and the natives say they thrive on it much better. The districts immediately above these swampy plains are the most productive in the Delta, and a great part of the land being free from jungle, which here only appears in patches, is easily brought under cultivation: they terminate about 12 miles from the sea, and the dense mass of jungle with which the whole of Upper Sind is overrun, commences. It is principally composed of the tamarisk-bush, mixed here and there with the bábul; but the latter in some places is met with in large quantities: the mangrove is only seen on the coast, where there are also a few saline shrubs of the same species as those so common on the shores of Arabia. The soil, in general, is composed of clay mixed more or less with sand, and contains a large quantity of salt, which frequently appears in a thin crust on the surface: in a few spots it is a stiff tenacious clay, that hardens when exposed to the sun, and turns white; but in the upper half of the Delta, where it contains a very large proportion of sand, it crumbles into a fine dust, and in strong winds rises in clouds that obscure the atmosphere and penetrate everything. The soil of Lower Sind is not, in fact, so rich as has been represented; for, although a large quantity of rice is produced, it is all of a very coarse inferior quality, and the esculent vegetables are small and tasteless. Much of the land lies waste and neglected, and in many places, spots that have been already cleared for tillage have been allowed to return to a state of nature: with a little labour they might again be rendered available for agricultural purposes, but the system pursued by the government and its agents towards the peasantry discourages every effort, and paralyzes all exertion. Besides rice, which is of two kinds, white and red, barley, múng,* and bájerá,† are raised in the dry season by irrigating the fields from cuts to the river, and the sugar-cane and castor-oil plantain cultivated to some extent. There are a few fruit-trees in the upper part of the Delta, such as the mango, plantain, and tamarind, but the fruit is inferior.

* Phaseolus Mungo.

† Holcus spicatus.

In the winter season the climate of the Delta is delightful, being cool, dry, and bracing; the temperature ranges from 45° to 82°, and during the day is most agreeable: fogs sometimes occur, but they are by no means prevalent, and quickly dissipate as the sun rises. In the summer months the heat is excessive, and less rain falls than might be expected. During the inundation the climate is very unhealthy: fevers, dysentery, and agues prevail, and all the inhabitants, that reside constantly in the Delta have an appearance of premature old age, which is doubtless to be ascribed to this cause. None of the chiefs or wealthy landholders remain there during the hot months, but repair to Haider-ábád, and do not return to their estates until the water left by the swell has dried up. The dryness of the atmosphere may be seen in the annexed abstract of a meteorological table.

The population of the Delta is miscellaneous, being composed of Hindús and Jats, with a mixture of various tribes from the adjacent countries. Besides Belúches and Jókíyahs from the western side of the Indus, many parties are met with that have emigrated at different periods from Kach'h; and there are also a few villages inhabited by Patháns or people from Afghánistán, the Panjáb and Bikánír. The Belúches are generally fine-looking men, with a Jewish cast of countenance, aquiline nose, high forehead, and large expressive eyes: in stature they are somewhat above the middle height, and their make bespeaks more activity than muscular strength. They are a rapacious, vindictive, and dissolute race, and as far as I have been able to form an opinion of them, appear to possess few good qualities. The soldiers have a more martial appearance than most Asiatics, and are undoubtedly brave, but they would have no chance against regular troops, from the total absence of discipline amongst them. This tribe, which conquered Sind about sixty years ago, is composed of many small sub-divisions or rather families, but none claim or exercise any superiority over the rest, and they are found mixed together throughout the country; the largest and most powerful is the Lagharí, whose chief resides some distance above Haider-ábád. There is no peculiarity of physiognomy observable in the Jats to distinguish them as a distinct people: amongst them you see every cast of countenance that denotes ignorance and stupidity, and they are now perhaps the most miserable, superstitious, and degraded race in India. They are a branch from the Jats or Játs, a Hindú tribe that anciently occupied the country about the upper part of the Indus, and were converted to the Mohammedan faith on the subversion of the Hindú dynasty in Sind. The Jókíyahs belong to a Rájput tribe that formerly governed the country; but in the Delta they are not numerous. The Hindús are of the Lowáná and Bhattiyá castes, and do not differ from those of British India: patient, persevering, and in-

dustrious, they are in possession of nearly all the trade of the country, and form by far the most wealthy class in it. All those following any occupation on the river are called Mowánás: the men that navigate the dūndís are generally natives of the Panjáb; but the name by which they are distinguished in Sind is unknown there. In enumerating the tribes of the Delta, the Sayyads and Fakírs, or religious mendicants, must not be omitted, since they form a large proportion of its population, and may be considered almost a distinct class. Their number is estimated by the Sindians at 100,000, which is perhaps somewhat exaggerated: it must, however, be considerable, for large parties are frequently encountered travelling about to collect alms, and there are many villages entirely inhabited by them. The Sayyads, or descendants of the Prophet, are generally shrewd and intelligent men, and there is no peculiarity about them either of dress or appearance by which they can be distinguished from the wealthiest class of Muselmán inhabitants. Most of them possess grants of land, and they also derive a considerable revenue from the offerings of the pious. These impostors had formerly great influence with the rulers of the country, but it is now on the wane, the present Amírs not being so bigoted and superstitious as their predecessors: it will be fortunate for the country when it ceases to be felt altogether, for they add by their exactions to the misery of the lower classes, without conferring the slightest benefit on them in return. The Fakírs pursue an erratic life, subsist entirely on the charity of individuals, and disfigure their bodies in the same manner as those in other parts of India: their principal place of resort is the shrine of Lál Sháh-báz, at Sihwan, where there are seldom less than five or six thousand collected, who receive their food daily from the temple.

The condition of the lower classes of the peasantry in Sind is truly wretched: unable at times to obtain a sufficiency of food and clothing for themselves, it is quite out of their power to provide for the wants of a wife and family, and they never marry. The consequence of this miserable state of existence may easily be imagined: theft is common, and many of the villages are full of public women of the lowest description, living in a state of hopeless poverty and disease. Very few fine-looking men are seen in the Delta, and the women are nowhere so destitute of personal charms: they are ugly and haggard even in youth, which is to be attributed to the hardships they undergo in early life, and the unhealthiness of the country during the swell. Smoking is universally indulged in to excess, and the strong spirit distilled from gaur* is in great request amongst all who can afford to purchase it. The lower orders use bang, an intoxicating and very deleterious drug obtained from hemp, in large quantities. In

* Molasses, or raw sugar.

most of the towns there are numerous dancing girls, and the only amusement of the inhabitants consists in smoking their capacious hukkahs, and drinking until they are intoxicated, whilst these women exhibit their indecent postures before them: the pleasures of the Sindian are, in fact, entirely sensual, and his rank in the scale of civilization is consequently very low.

Amongst the animals of Sind the camel, both from its size and utility, ranks first in importance: very few are seen near the sea-coast, but in the upper part of the Delta droves of forty or fifty are frequently passed: they are rather smaller and lighter in limb than those of Arabia, but from being better fed are much finer looking animals. The horned cattle do not differ from those of India. Horses of a diminutive breed are met with at every village in great numbers. In the woods wild hogs abound, and there is also an animal very common in the interior which, from the description, must be the elk. The country is infested with jackals, who prowl about day and night, and are very ravenous: on several occasions they have been known to attack men. A lynx and a leopard were seen, and tiger-cats three or four times; but none of these animals are numerous. Hares and deer are abundant everywhere. The dogs are large and ferocious; so much so, that it is dangerous for a stranger to approach them without being accompanied by some of the inhabitants.

It is almost impossible to convey an idea of the vast quantities of water-fowl that frequent the rivers and the swamps of the sea-coast: the latter are literally covered. The varieties of the wild duck are innumerable, and geese, pelicans, flamingoes, spoonbills, storks, cranes, royal and grey curlews, herons, snipes, with several other kinds, are seen in immense numbers. The Egyptian ibis is common. There is also a large bird about the size of a turkey, called the kalam, which only makes its appearance in the winter months, and is found both in wet and dry situations: I have seen the fields actually covered with them. In the thick woods of the upper part of the Delta partridges, quails, and plovers are equally numerous. Among the small birds are some with very rich plumage, which I think are unknown. The domestic fowl is remarkably fine, and generally of the kind with black bones and skin.

The fish obtained in the greatest quantity is the delicious pulla: it is of a most delicate flavour; but so rich from the quantity of oil it contains, that some people cannot eat it. The mullet is also abundant, and attains a large size. Besides these there are several other kinds that are common to most of the Indian rivers. Otters and turtles abound everywhere, and porpoises are seen as high as T'hat'hah. There are also great numbers of water-snakes of a large size in all the rivers.

Kôri.—The Kôri, or eastern branch of the Indus, was surveyed

in 1833, and as it exhibits some physical peculiarities not observable in any of the other rivers, I shall conclude this paper with a short description of it. The Kórí, which separates Sind from Kach'h, once formed the lower part of the Féléikí, and it also received the waters of a large branch, thrown off by the main river during the inundation near B'hkur: the beds of both these branches are now partially filled up throughout the whole line of their course, and the portion of water they receive during the swell is prevented from passing into the Kórí by bands that have been thrown across them by the Sindians. The alterations caused in this branch by the earthquake of 1819 increased its magnitude so much, that it became a small gulf or arm of the sea, and it now gives a better idea of a great river than any other branch of the Indus. At its mouth it is 6 miles wide, and the Sind coast, being very low, is not visible from the Kach'h side: it begins to contract at Kótásír and continues to do so up to Lak'hpat, a fortified town situated 39 miles from the sea, where it diminishes to a narrow stream, 200 yards wide, and is so shallow that, if the bottom were firm, it might be forded at low water in several places without difficulty. The broad bank fronting the coast of the Delta extends right across the entrance, and terminates a short distance below it on the shores of Kach'h: in many places the sand-banks are dry at low tide, and the sea outside them is very shallow, there not being a greater depth than 5 fathoms 8 miles from the land. Two channels, the Ad'hiyáru and Súr, lead out of the river across this mass of shoals; they are broad and deep, having a depth of 20 feet in the shallowest part, which is on the bar at their mouths. Above the part where these two channels separate, the river for some miles has a depth of 7 and 8 and in some places 14 fathoms, and there are no sand-banks until you arrive at Kótásír: near this town the bed of the stream is extremely foul, and vessels of any size are prevented from ascending higher by several shallow bars or ridges, that reach across it in a lateral direction from side to side. A short distance above these, extensive flats of soft mud occupy half the breadth of the river, and the channels being narrow and intricate, the difficulty of the navigation increases every mile as you advance towards Lak'hpat.

During the neaps the tides are very irregular; they run at a rate of from 2 to 3 miles, vary in duration from 4 to 8 hours, and rise sometimes 9 feet, but at others only 6. On the springs they are alternately weak and strong, and in the latter case, when they have a velocity of 6 miles, they continue to flow for a period of 8 hours: this is caused by the sudden influx of water from the ocean during the night, when they attain their greatest height. At Kótásír there is a rise and fall of 10 feet, and at the mouth of

the river it increases to 13, but at Lak'hpat it does not exceed 4. The Kórí is navigable for vessels drawing 16 feet to within a short distance of Kótásír, but they could not proceed any higher on account of the bars stretching across the stream from side to side: even the country boats that frequent it, which seldom draw more than 6 or 7 feet, are obliged to remain at that town and send up their cargoes to Lak'hpat in dúndís.

About the mouth of this branch the land is low and swampy: on the Sind side it is overrun with a dense mass of stunted mangrove bushes and overflowed by every tide: the Kach'h shore for some miles is a mere ridge of loose sand, thrown up between the river and a broad tract of marsh land intersected with small creeks, that extends from Kótásír to Jakaú. None of these creeks have any communication with the Kórí; but the largest, which reaches the sea a few miles below the mouth of that river, affords a passage for the boats of the country to Jakaú, a seaport town of some importance in the N.W. extremity of Kach'h. Along that part of the sandy ridge exposed to the action of the sea, the beach is literally covered with heaps of clay balls, that have apparently been formed by the waves rolling the small pieces of clay, detached from the banks and thrown up here, on the smooth firm sand.

About the mouth of the river the country on the Sind side, up to Lak'hpat, is low and flat, and thinly covered with saline shrubs or the decayed trunks of bushes that have been destroyed by the salt water: this part of the Delta is evidently depressed below the level of the rest, which is to be attributed to the effects of the earthquake of 1819, and being from this cause partially flooded at times to a great extent, even in the dry season, is uninhabited. On the Kach'h side, the country above Kótásír presents to the view a confused mass of rugged broken hills, evidently of volcanic formation, which at a distance assume the appearance of moderately elevated table-land: here and there the small spurs sent off from them project in low promontories into the river, and the rocks extend under water half way across its bed: the only mountains seen are the J'hárah hills, situated 8 miles to the S.E. of Lak'hpat, which are about 1000 feet high.

From Lál Chettah, a small mosque 10 miles above Kótásír, the low hillocks on the Kach'h side run in a direct line up to Lak'hpat; but the river, receding gradually from them for some miles, and then turning suddenly towards that town, leaves an extensive tract of low land at their bases of alluvial formation: this is said to have sunk several feet in some places during the earthquake, and a small fort in the upper part, erected close to the river, the ruins of which are still visible, was overthrown. During the inundation it is now covered with water to some depth, and in the dry sea

salt is obtained in large quantities, from those parts that are below the level of the river. Near Lál Chettah, where the stream is $2\frac{1}{2}$ miles wide, a large rock covered with oysters rises in the centre of the deep channel, and on the opposite side of the river there is a ruined fort, called Bastah Bander, which formerly belonged to the Ráós* of Kach'h, and was destroyed by the Sindians during their wars with those princes.

Kótásír is a small village and pagoda on the Kach'h side, situated about 16 miles from the sea, and is dependent on Naránsír,† a fortified town full of pagodas, about a mile farther inland: they are both celebrated places of pilgrimage of the Hindús, and are said to be of equal antiquity with the most ancient of the Hindú temples in other parts of India. The pagoda at Kótásír is erected on a small rocky eminence close to the river, and, like all these edifices, has been constructed with more solidity and strength than elegance: a broad terrace runs round it, defended by a low massive wall with embrasures, and in these several small guns are mounted. One side of the hillock on which it stands is bounded by the swamp that now occupies the site of the old bed of the river, and before it, a mud flat extends from the banks, about a hundred yards into the stream: across this flat a handsome stone causeway has been carried out to another but smaller temple, where there is a large tank built in the river for the convenience of the pilgrims when performing their ablutions.

The fortified town of Lak'hpat is built upon the edge of the elevated land, about a mile from the river, and incloses a space about 800 yards square, of which not more than a third is occupied by houses. It is of an irregular shape, and the walls are defended by numerous towers and bastions, with guns mounted on them of all sorts and sizes. Most of them are so old as to be entirely useless; but one, a long brass six-pounder, with the arms of Portugal engraved on it, deserves some notice, from the peculiarity of its construction. In the upper part of the breach there is a square piece cut out, about 2 feet long, and 8 inches wide, which admits of a small gun being placed inside the large one, with the muzzle projecting about a foot beyond the open part. It is furnished with a handle, and appears to have been contrived for loading with greater celerity and safety. Lak'hpat was built about thirty-five years ago, by Jem'ahdár Fateh Mohámmad, a celebrated Kach'h general, to defend the frontiers of the kingdom against the encroachments of the Sindians. It is now garrisoned by 50 Arabs and 150 native soldiers, and contains a population of about 5000 persons, composed principally of merchants and

* Princes or chieftains.

† Naráyan-sir?
2 c 2

Hindús, who have fled from Sind to escape the tyranny of the Amírs. About the town the country is barren and unproductive; and, from the quantity of shells found in the soil in most parts, has probably at a remote period been submerged. Kóteri, the landing-place on the Sind side, where there is a small custom-house and guard, is 4 miles below Lak'hpat, and numerous ferry-boats are constantly passing between them, full of men, cattle, and merchandise. From this station the goods are conveyed on camels to the eastern parts of the Delta, and distributed throughout the inhabited districts of the T'har.*

The effects of the earthquake that visited Kach'h in 1819, and laid most of its towns in ruins, are visible in every part of the Kórí. Opposite Kótásír the banks of the river on the Sind side are perpendicular for about three miles, and close along them there is a depth of 14 fathoms. In this part the land is of alluvial formation; but all the strata exposed to view in the face of the banks, with the exception of two or three of the upper ones that have been deposited since, are broken up in confused masses, and inclined to the horizon at an angle of 30 or 40 degrees. This is also the case throughout the tract of low land lying at the base of the hillocks between Lak'hpat and Lál Chettah. Previous to the earthquake, the river, instead of pursuing the course it now does, turned close round the rocky eminence on which Kótásír is built, and reached the sea between its present mouth and the Jakaú creek. Along this line the country is overflowed at high tide to a depth of 2 or 3 feet; and the old banks may still be traced. The alterations that have taken place in this part of the river are very extensive, and have evidently been produced by the sinking and upheaving of the ground during this awful convulsion of nature. The fact is attested by the remains of several boats, which are still visible, half buried in the soil that fills up the bed of the old river, and it is probable that to this cause the Kórí owes its present magnitude.

Abstract of the Meteorological Journal, in the Delta of the Indus, 1836-7:—

		Dec.	Jan.	Feb.
Thermometer (Fahr.)	{ Max.	82°	83°	82½°
	{ Mean	65	64	63
	{ Min.	49	50	49
Evaporation	{ Max.	·620	·520	·780
	{ Mean	·320	·330	·330
	{ Min.	·210	·155	·100

* Desert, from the Sanskrit St'hala.

XXVI.—*Report on Mr. AINSWORTH's Observations on the Magnetic Intensity of the Earth, made during a Journey across the Continent of Europe in 1838.* By Major EDWARD SABINE, R.A.

Mr. AINSWORTH has accompanied the manuscript record of his observations by the following description of the instruments with which they were made :—

“ The observations of the dip were made with a needle $4\frac{1}{10}$ inches in length, with a steel axle, supported by agate cylinders. This instrument, which had previously accompanied the Euphrates expedition, was made by Robinson of London. At the time of observing, it was always adjusted to the magnetic meridian by the compass, and also by taking a position at right angles to the vertical position of the needle.

“ The observations on the intensity of the horizontal force were made with two pair of cylindrical needles, vibrated in small arcs, commencing with 20° , in an apparatus similar to M. Hansteen's. In these observations every care was taken to prevent errors from difference of strength in the supporting fibre of silk, in the distance of the needle from the bottom of the box, and in the equipoise of the cylinder as well as the level of the box itself. One pair of these needles, E 1 and E 2, had been previously used in the Euphrates expedition. The other pair, A 1 and A 2, were made for the Kurdistán expedition, by Mr. Robinson, and brought to a steady, although with regard to one another, an unequal force, by immersion in boiling water. Successive experiments made on the same and on different days at Westbourn Green, near London, gave irregular results before this immersion; but the force at the same place became afterwards pretty constant at the same temperatures. The needles were $3\frac{3}{10}$ inches in length.”

On the 9th of September Mr. Ainsworth, being then at Constantinople, and having completed his series of intensity results across the continent of Europe, enclosed needles E 1 and E 2 in a packet addressed to me, under cover to Captain Beaufort, Hydrographer to the Admiralty, for the purpose of having observations repeated with them in England, and compared with those made before his departure, in order to examine the steadiness of their magnetism in the interval. They reached me at Tortington, in Sussex, on the 18th of October, and were immediately examined as follow :—

		h. m.		Degr.		Seconds.
E 1,	Oct. 18,	1 40 P.M.	Therm.	53.5	100 vibr. in	559.5
	Oct. 20,	1 50 P.M.		64.0	. . .	560.83
				58.75		560.2
		h. m.		Degr.		Seconds.
E 2,	Oct. 18,	2 32 P.M.	Therm.	53	100 vibr. in	562.83
	Oct. 19,	4 40 P.M.		56	. . .	563.2
				54.5		563.0

Mr. Ainsworth's journal contains the following record of observations made with these needles at Westbourn Green, near London, before his departure from England:—

		h. m.		Degr.		Seconds.
E 1,	May 30,	4 28 P.M.	Therm.	67	100 vibr. in	559.5
	May 31,	10 15 A.M.		64.5	. . .	561.5
				<hr/>		<hr/>
				65.75		560.5
E 2,	May 30,	4 15 P.M.	Therm.	67	100 vibr. in	561.0
	May 31,	10 28 A.M.		64.5	. . .	567.5
	June 1,	10 40 A.M.		65	. . .	566.5
				<hr/>		<hr/>
				65.5		565.0

From the well-ascertained difference in the horizontal intensity at the two stations, Tortington and Westbourn Green, these needles ought each to have made the time of performing 100 vibrations about 4 seconds *less* at Tortington than at Westbourn Green; whereas, when corrected for the difference of temperature, the times at Tortington are nearly the same as those in London. So far there is an indication of a slight loss of force sustained during their continental journey. It is, however, so slight,—not exceeding probably the fluctuations of the horizontal intensity itself at different seasons, and on different days,—or at least, not exceeding the limits of the differences which *these needles* have occasionally shown at the same place on different days,—that I have not thought any correction on this account called for.

Table 1 contains the times of vibration of the four needles at the stations observed at by Mr. Ainsworth. Table 2 contains the conclusions drawn from them. The values of the intensity are expressed in relation to the force at Paris, as Paris has been taken as a fundamental station by previous observers in the same parts of the European continent; and Mr. Ainsworth's results are thus brought into immediate comparison with theirs. His observations at Paris were made in M. Arago's magnetic cabinet, which is the usual place of observation there. In computing the horizontal intensities by E 1 and E 2, the times of vibration at the different stations have been corrected to a mean temperature, employing the co-efficient .00038 found for E 1 in reducing the results obtained in the Euphrates expedition. As E 1 and E 2 were made of the same steel, are of the same dimensions, and have so nearly the same magnetic strength, the same co-efficient has been considered applicable to both. In the final results, which occupy the last column of Table 2, and exhibit the total intensities deduced from their horizontal components by means of the observed dips, the observations with E 1 and E 2 have been alone employed, as these needles are the only ones which have

received the necessary verification of their unchanged rates. But the horizontal intensities computed by A 1 and A 2 are also given in separate columns, both distinctly and combined, for the purpose of comparison with those of E 1 and E 2. We may infer from the comparison that A 1 and A 2 both altered their magnetic state considerably between London and Paris; but as, when their results are combined, the difference of the force at those stations is the same by A 1 and A 2, as by E 1 and E 2 (·932 to 1.000), we may also conclude that what the one lost in force the other gained. This is, I believe, a very common circumstance with needles when first put together in pairs: they undergo more or less alteration, causing their respective forces to approximate; and this change takes place very shortly after they have been put together, their differences being subsequently pretty constant. Such appears to have been the case with needles A 1 and A 2, which, after Paris, present a tolerably uniform relation to each other. They have probably, on the whole, lost a little force: we may infer this from the general comparison of their results with those of E 1 and E 2: but they show a regularity which gives promise of their being very useful needles in the hands of so diligent and careful an observer as Mr. Ainsworth.

In the journal of the observations at Isella, in the pass of the Simplon, it is remarked that the dip instrument had been rudely examined by the Custom-house officers at the Sardinian frontier, and that the dips in the different positions of the instrument were not so accordant as previously. Mr. Ainsworth complains of this also in a letter from Constantinople; and the injury which the needle appears to have received at that time is traceable throughout the subsequent observations.

TABLE 1.

Station.	Date.	Time of 100 horizontal vibrations.				Therm.	
		E 1.	E 2.	A 1.	A 2.		
	1838.						
London . .	May 29	560·5	565	367·25	385·5	66	Westbourn Green.
	June 7						
Paris . . .	June 20-21	541	546·5	357·75	369	68	Observatory.
Chalons . .	July 2	530·5	532	350·5	360·25	72	Near the Saône.
Geneva . .	July 10	522·5	525·5	346·75	358	74	Observatory.
Isella . . .	July 16	525	536·5	349·25	359	80	S. side of the Variola.
Milan . . .	July 20	517·5	527	345	356·25	82	Botanic Garden.
Verona . .	July 23	511	524	not obsd.	not obsd.	74	Convent Garden.
Venice . . .	July 26	510·5	517·5	341·5	351·5	71	Botanic Garden.
Ober Laybach	July 29	510	513·5	340·75	350·5	69	Inn Garden.
Vienna . . .	Aug. 8	521	526·5	348·75	357·75	71	Bn. Hügel's Garden.
Pest	Aug. 14	517	525	344·25	353·75	70	Summit of Blocksberg.
Galatz . . .	Aug. 27-28	493·5	499	330·75	339·5	68	B. Consul's Garden.
Constantinople	Sept. 10	466·5	456·5	307·75	319·0	71	B. Ambassador's Garden.
Tortington .	Oct. 18-20	560·1	565·3	..	..	56	In a plantation.

TABLE 2.

Station.	Horl. Intensity. Paris = 1.000.				Means.		Observed Dip.	Total Inten- sity. Paris = 1.345 E 1 and 2
	E 1.	E 2.	A 1.	A 2.	E 1. and 2.	A 1. and 2.		
London . .	.930	.934	.949	.916	.932	.932	69 24	1.352
Paris . . .	1.000	1.000	1.000	1.000	1.000	1.000	67 33	1.348
Chalons . .	1.043	1.042	1.042	1.049	1.043	1.045	65 23	1.289
Geneva . .	1.077	1.087	1.064	1.062	1.082	1.063	64 37	1.298
Isella . . .	1.072	1.046	1.049	1.057	1.059	1.053	65 20	1.305
Milan . . .	1.104	1.087	1.075	1.073	1.095	1.074	64 29	1.307
Verona . .	1.104	1.092	not obsd.	not obsd.	1.098	..	62 49	1.236
Venice . . .	1.125	1.118	1.097	1.102	1.121	1.100	64 03	1.319
Ober Laybach	1.126	1.133	1.102	1.108	1.129	1.105	63 07	1.284
Vienna . . .	1.080	1.079	1.052	1.064	1.080	1.058	64 16	1.280
Pest	1.097	1.084	1.080	1.088	1.090	1.084	63 15	1.245
Galatz . . .	1.202	1.200	1.170	1.181	1.201	1.176	61 15	1.284
Constantinople	1.348	..	1.351	1.338	1.348	1.345	56 34	1.258
Tortington .	.927	.925	..	..	.926	..	68 51	1.377

I have not drawn any result from the observations of E 2 at Constantinople. In every other instance the time of vibration of that needle is greater than that of E 1; but in this instance it is less. From this circumstance, and from the agreement of the results of E 1 with those of A 1 and A 2, it is probable that the observations with E 2 were on this occasion affected by some accidental irregularity.

I am able to supply the following comparisons of Mr. Ainsworth's results with those of other observers:—

Geneva,	{ Quetelet, 1830	. 1.292
	{ Ainsworth, 1838	. 1.298
Milan,	{ Humboldt, 1805	. 1.312
	{ Quetelet, 1830	. 1.294
	{ Ainsworth, 1838	. 1.307
Lohitsch, Keilhau, 1826		. 1.314
Ober Laybach, Ainsworth, 1838		. 1.284
Vienna,	{ Keilhau, 1826	. 1.325
	{ Ainsworth, 1838	. 1.280

The manuscript journal of Mr. Ainsworth's magnetic observations is deposited with the Geographical Society.

EDWARD SABINE.

Tortington, 23rd October, 1838.

ANALYSES, &c.

I.—*Alle Geographie des Kaspischen Meeres, des Kaukasus, und des Südlichen Russlands.* Von Dr. E. EICHWALD. 8vo. Berlin. 1838.

[*On the Ancient Geography of the East Coast of the Caspian Sea, &c.*] Communicated by W. R. HAMILTON, Esq., F.R.S.

THE hydrography of the Caspian Sea generally has long been one of the great *desiderata* with geographers :—an equally interesting subject of inquiry is the examination of its eastern shore, and of the intervening tract of land between this sea and the Aral. From the time of Anthony Jenkinson in 1557—Christopher Burrough in 1579—Ssoimonoff in 1719—Peter Henry Bruce in 1723—Jonas Hanway, Woodroffe, and Elton in 1746—Gmelin in 1770—down to Muravieff in 1820—and Bassargin in 1826, we have no account of this vast inland sea, equal in extent to the whole kingdom of Spain, that can be relied upon for its accuracy. The author of the present work, although writing professedly on the *ancient* geography of the east coast of the Caspian, appears to have given the most detailed account of its *present* state that has yet been produced. In addition to his own journey* to that country, Dr. Eichwald has had the advantage of free access to all the documents in the Admiralty at St. Petersburg : it is, therefore, to be presumed, that his account may be received as the most correct hitherto published.

The first 200 pages of the work contain an abstract of all former accounts relating to this country, by the Greeks, Romans, Arabians, and modern Europeans—from Herodotus to Muravieff. They also give the detail of Colonel von Berg's expedition in 1825-6, to carry a line of levels between the Aral and the Caspian—from pages 192 to 197, the geologist will find an account of the structure of the steppe or table-land, more than 700 feet in height, which lies between those two seas—and, from pages 106 to 170, the hydrographer will find a brief statement of all

* See Reise, &c., von Dr. E. Eichwald.

charts of the Caspian, from that of Adam Olearius, in 1696, to the latest times—and the antiquary will discover some Arabic inscriptions from Derbend and Galatí, explained by Frœhn; and a Sanskrit inscription, recently found at Báku, with an explanation by Bopp.

The following is Dr. Eichwald's description of the *present* state of the country, on the ancient geography of which his work professes to treat:—

The eastern coast of the Caspian Sea, with the exception of the projecting promontory of Tuk-karagan and a few gulfs, extends nearly in a direct line more than 10° in length from N. to S., between the parallels of 37 and 47 nearly. The small gulf of Aster-abad forms its southern limit, whilst its northern boundary is marked by a very large bight at its N.E. extremity, which receives the waters of the Emba. The principal branch of this river expands before it reaches the sea, into a great many shallow basins, like lakes, the northern branch of it being nearly choked up with sand. All this part of the coast, as well as that adjoining to the N. and N.W., is extremely flat and shallow; as the large rivers, namely, the Aral, the Wolga, and the Tuck, which here empty themselves into the sea, are constantly bringing along with them a quantity of sand which is accumulated on the shores; consequently the whole of the northern part of the Caspian Sea, which is exceedingly low, together with the adjoining eastern coast, is so shallow, that for the distance of several miles from the shore, there is only a few feet depth of water, and an immense number of small sand-hills and banks of sand, make it difficult to land on any part of it. Similar sand-hills occupy also the shore itself, which extend to a considerable distance inland among the steppes; but it cannot be said that they form any connecting chains of hills.

At the very commencement of this Sinus Mortuus (Mertvõi Kúltuk), there rises a small chain of calcareous hills, called the Chink, which forms, as it were, the rampart of a remarkable high level, named Ustúrt, which extends under the 45th parallel, between the Aral and Caspian Seas, with a breadth of about 160 miles. This high plain is so steep towards both those seas, that it rises above the Caspian 639 English feet, and its fall towards the side of the Aral is not less, though its last is 117 English above the level of the Caspian. This plain is never at a less elevation than 550 feet, and is in some places more than 727 feet above the level of the Caspian: it extends nearly in a direct line between the two seas, and it sinks so insensibly, that there is nowhere to be observed anything like a connected chain of hillocks, and it can only be considered in the light of one elevated plain.

The extreme headlands of this high plain—namely, the Ak-sakál, the Surak, the Kará-úl, and the Kará-táu, form so many small connected hill-tops round the bight of Tuk-kará-sú, which is the southern branch of the Sinus Mortuus. The summit of the Manghislák and Tuk-karagan hills is still higher than these hill-tops; they form the projecting promontory of Tuk-karagan, and they rise nearly perpendicularly to the height of some hundred feet. This continuous range of hills incloses the whole coast from this spot to Alexander's Bay, and extends nearly straight from N. to S., with the exception of a small divergence to the E. They consist throughout of a recent tertiary calcareous formation, as will be more particularly described in the historical narrative of the journey. The depth of this coast is very remarkable; it is seldom so little as 6 fathoms, generally between 10 and 18; and this has been observed in Alexander's Bay.

This gulf is connected with a large bight, the entrance of which is formed by a precipitous rocky bank, from whence the bight widens considerably, and receives several rivers descending from the high plateau, namely, the Sirbásh, the Kichík and the Kumbenska.

Further east, and a little to the south, where we come upon the gulf of Kenderlin, the land shelves off, but as it is entirely surrounded by hillocks, it seems to receive no stream. Here, however, the hills of Kenderlin form again small chains connected with the larger hilly chain of the Karakhteh, and further inland they are quite lost in the elevated plateau. A coast stream, the Turakhth, here empties itself into the sea, between the Kenderlin and Kará-bóghá gulfs.

The narrow entrance into this supposed very deep gulf is confined by a number of rocks, amongst which are some dangerous eddies, and it is surrounded in all directions by a steep bank; along the whole of its coast there is but one inconsiderable stream, the Makranda. To the east it is bounded by some small hilly knolls, which extend from north to south; but these are less remarkable for their height, than for the great number of salt lakes, most of them very small, which are in the lower valleys.

Finally, under the 40° of N. lat. the gulf of Balkán is bounded by the extreme points of this elevated plateau: here also the hills rise steep and precipitous from the bank, and present at the top porphyritic formations, which in remote times have broken through beds of granite, and which occur also round the gulf of Krasnovodsk, at the entrance of the bay of Balkán, and in some of the islands in the bay; but farther to the east they are at a greater distance from the shore, and are more inland where the flat and elevated plateau prevails. Here, likewise, this plateau consists of a tertiary calcareous formation, which;

towards the Balkán, crops out in single protuberances. The great and little Balkán, and two lofty and insulated eminences, being the extreme points of the Búlán-mountain, a continuation of the farthest part of the elevated plateau, and to which they are united by the chain of the Kurreh-mountain, and the Koshasúrí-mountain, form its southern limit, and shut in to the east the bay of Balkán; so that the Amu-daryá, whose old bed I followed up for $5\frac{1}{2}$ miles,* could only fall into the bay between the great and little Balkán, whilst it wound round the southern point of the great Balkán, and thus emptied itself into the bay in a direction from south to north.

In consequence of the confined outlet of this old river the bay is continually more and more choked up with sand, and has scarcely a depth of a few feet, though this is somewhat more considerable at the entrance into it, about the island of Dógadán.

All this part of the coast is very much choked up with sand, and is very flat: the extreme points of the Ustúrt, or the high plateau between the Caspian and the Aral, terminate at the end of the Krasnovodo-mountain, which to the north joins on to the chain of the great Balkán. This plateau again unites with the Mangojar hills, which are lost in the Aral chain; and we thus trace a continued high range of hill from the N.E. to the S.W., less and less elevated as it approaches the south, presenting at its extreme limit, near the Balkán Gulf, the appearance of a crater, and porphyritic formations raised by volcanic influence through granitic and calcareous hills. It is exactly here, where the low shores presented the least resistance, that the eruption must have taken place; and the same has been observed on the opposite or western shore of the Caspian, on the peninsula of Absheron,† whose igneous exhalations, naphtha-springs, and other volcanic outbreaks, are still in activity. Here also we come upon the lowest extremities of the great chain of Caucasus. Finally, we observe also similar porphyritic formations on the southern coast of the Caspian Sea, about the snow-capped volcano of the Demávend, which proceed eastwards by Herát through the Hindú-kush into the three gigantic mountain-ranges of central Asia, namely, the Himálaya, the Kwen-lun or Kulkun, and the Múztágh, or the mountains of ice.‡

One consequence of this great and extensive elevation on the west, south, and east coasts of the Caspian, has evidently been the great depression of western Asia, represented on the one side by

* See the *Periplus of the Caspian Sea*, p. 268, *sq.*

† *Ibid.* p. 176, *seq.*

‡ See the excellent description of the mountain-chains and volcanoes of Central Asia, by A. von Humboldt, in Poggendorff's *Annalen der Physik und Chemie*, 1830, p. 3.

the Caspian Sea itself, and on the other by the low level which stretches out far to the north, the interminable south Russian steppe, which is not indeed so deep as the Caspian, but which, as far as Saratov and Orenburg, is below the level of the ocean,* and which at the eastern slope of the Aral, which rises from it as an elevated mountain range, contains up to the sources of the Tobol so many salt lakes, evident proofs of a sea-coast in very ancient times.

The depth of this great depression of the old world increases in proportion as we approach the Caspian and the Aral seas: thus on the north-west coast there is a depth of more than 50 toises below the sea-level,† at the mouth of the Tuck; while on the north-west coast of the Aral, in the desert of Borsúk, on the eastern slope of the Ustürt, where it is lost in the Mongojar hills, there is a relative depth of 31 toises below the surface of the ocean.

The elevation of the Ustürt, which is more than 300 feet ‡ above the level of the ocean, and which connects with the Aral range by the Mongojar hills, affords an easy and convincing proof that the supposition of an outflow from the Aral into the Caspian, as well as that of any river flowing into the latter from the eastward of the great steppe of the Kirghiz, are equally untenable. From the moment in which the Ustürt and the Mongojar extremity of the Ural were raised to their present elevation, at least during the great contemporaneous crater-like depression of western Asia, that is, since the first existence of the Caspian Sea, no river could possibly flow into that sea, either from the Aral or from the great steppe of the Kirghiz, or generally from central Asia.

But in the same manner as the lake of Aral has been formed by the Šihún (Jaxartes), and by the Jihún (Oxus, or Amú-daryá), and is at this moment supplied by them, other, and much smaller seas or lakes have been formed and supplied in the great Kirghiz steppe, to the east of it; thus the Ak-sakál lake has been formed by the waters of the Turghái river, and two other lakes owe their existence to two other streams, the Sara-sú and the Chin.

The whole of the north part of the barren highlands of the east coast of the Caspian is inhabited by Kirghiz-Kozzáks, that to the south by Turkmáns and Khívahlis. These tribes wander about with their Aúls, and carry on the coasting-trade. A

* "Central Asia," by A. Von Humboldt.

† This must have been written before the completion of the late levelling from the Black Sea to the Caspian: from which it appears that the latter is 101 feet below the former; and if the relative difference of level of the Aral and Caspian be 117 feet, as here stated, the Aral will consequently lie about 14 feet *above*, instead of 190 feet *below*, the ocean.

‡ More than 500 feet.

large sandy steppe, called Sam, which is entirely barren, and without water, marks the commencement of the elevated plateau; further south is a large salt lake, called Jareb Guzken, which still further south has several other smaller ones in its vicinity.

The southern end of the east coast of the Caspian is devoid of any mountainous formation, is quite flat and sandy, and has evidently been once covered by the sea, from which it is continually retreating. Besides the embouchure of the old Amú-daryá, which has here, under the 39th parallel, a depth of several fathoms, a circumstance which denotes also the bed of a large river in very remote times, we have in the 37th parallel, the Atrak, which seems to rise out of a salt spring, and flows northerly from Jorján or Gurgán into the sea. As this whole extent of coast consists of a shifting sand, and is therefore extremely shallow, to a considerable distance from the shore, with a depth of no more than a very few feet, we might naturally expect to find on the coast only detached sand-hills, connected sometimes in small chains, which evidently formed in ancient times sand-banks in the sea. Among these may especially be noticed the Green, White, and Silver Hills; which last lie near the mouth of the Gurgán, which in the middle ages was an important emporium for the trade with India. Aster-ábád also, which doubtless once flourished in the south-eastern-most angle of the Caspian sea, may then have been a trading place of some consequence, though at present the river which washes its walls has a course of several miles to the west before it reaches the sea, and the bay, which is very much choked up with sand, is no longer able to admit the larger class of merchantmen.

The remainder of the first part of Dr. Eichwald's book is taken up with a dissertation on the ancient authorities for the tribes and peoples inhabiting the eastern coast of the Caspian. The second division is devoted to the ancient and comparative geography of Caucasus, and of south Russia. The work is accompanied by an ancient and modern map of Caucasus; the latter extending from 38° to 45° N. lat., and from 36° to 50° E. long., on the scale of 2½ inches to a degree, and contains the latest observations of the officers of the Imperial Russian Staff.

II.—*Observations Météorologiques et Magnétiques faites dans l'étendue de l'Empire de Russie.* Rédigées et publiées par A. T. KUPFFER, Membre de l'Acad. de Sci. de St. Petersburg, &c. 4to. 1837. Communicated by Colonel JACKSON.

INDEPENDENTLY of the reciprocal advantages derived by nations at peace with each other, they not unfrequently confer, by their joint efforts for the advancement of knowledge, a lasting benefit upon mankind; for while commercial interests are sacrificed by those unhappy differences which occasionally sunder the bands that unite them, the scientific truths they have discovered together remain secure from contingencies, imperishable and glorious monuments of the noblest impulse which can actuate nations.

Science, in its higher branches especially, is too frequently regarded as matter of curiosity rather than of utility, but surely we have seen enough of the important results obtained by the application of science, to hail every new discovery as the forerunner of material, tangible benefits. But even were it not so, is not truth lovely in itself? And can there be given to our comprehensive faculties a nobler direction than the investigation of those laws which, emanating from the Great First Cause, maintain the harmony of the universe? Certainly not; and when those laws more immediately affect the planet on which we live, they have a still more powerful claim on our attentive consideration. Of these laws, those which regulate the magnetism of the earth, that occult force, known only by its effects, are of peculiar interest, since by the application of this force we have been enabled to cross the trackless ocean, and draw together in social compact the widely-spread families of mankind.

The variations of the needle, its dip, and the different intensities of the magnetic influence in different places, are so many circumstances which could not fail to awaken attention, as being not only remarkable in themselves, but as materially affecting the value of an instrument to which we owe the discovery of a new world, and which is in daily use, whether for directing our progress to foreign shores, or for correctly delineating the countries we know.

To discover, therefore, the cause of the variations of the needle, and the laws which regulate those variations, so as to determine the exact value of the needle's indications, became a most important desideratum; and it was reserved for Humboldt to add to the other glories of an imperishable name, that of stimulating the leading nations of the world to an exact and systematic observation of the phenomena of terrestrial magnetism. His call has been responded to, and in the work before us we have a

valuable proof of what may be effected by a system of observations properly methodised and carefully executed.

The name of M. Kupffer is too well known in connexion with some of the most important physical phenomena of the earth, lately discovered, to require any eulogium here. We shall, therefore, merely give a succinct notice of the work in question. This, as its title indicates, is not confined exclusively to magnetic observations, but embraces meteorology generally; indeed the connexion between the whole range of meteorologic phenomena is so close, they are so mutually modified each by every other, that the independent and unconnected observation of any one would be of little utility. Not only is it necessary to observe simultaneously all the meteorologic and magnetic phenomena at any one station, but similar observations must be made at various places, at the same moment, in the same manner, and with instruments reduced to a common standard of comparison.

This has been effected in Russia, over which extensive empire a great number of observatories have been established:—

“At some of these points,” says M. Kupffer in his preface, “both meteorologic and magnetic observations are made; at others only meteorologic. A normal observatory has been founded at St. Petersburg, at the *Institut des Mines*, where a certain number of officers receive the practical instruction requisite to become observers in the establishments in the provinces; detailed instructions are communicated to them, in which a rigorous and uniform system is followed both in the distribution of the hours as well as in the choice of instruments and the method of observing. Eight times a day they observe the atmospheric pressure, the temperature of the air, the humidity of the atmosphere, and the quantity of water which falls either in the form of rain or snow. At some places they also observe, at the same hours, the magnetic dip and variation: the change in the variation is also observed, at certain times of the year, simultaneously with those set on foot in different parts of Europe. It is proposed also to add to these, observations on the temperature of the ground, on atmospheric electricity, and on the intensity of the force of terrestrial magnetism. In each observatory there are, besides the officer specially intrusted with its superintendence, two assistant observers, who live in the observatory, as a single observer would not be sufficient for such a task. These assistants have been formed at the normal observatory at St. Petersburg, where they have passed one or two years in making the same observations, so that they are quite equal to it. That the zeal of the observers may not slacken, they are employed only for a few years, and are from time to time relieved by others who have recently left the normal observatory. This arrangement facilitates the introduction occasionally of improvements in the system of observations.”

From such an arrangement the most satisfactory results may be fairly anticipated, and the scientific world will be put in possession of them by successive publications.

The present volume, the first of the series, is divided into two parts; the first contains the necessary instructions for making the observations, and the second the observations made by Mr. Kupffer himself and his assistants at the observatory of St. Petersburg.

The instructions, drawn up by Mr. Kupffer, are divided into two sections: the first is devoted to thermometric, hygrometric, and barometric observations, the direction and strength of the winds, the quantity of rain and snow which falls, and the appearance of the heavens; while the second is exclusively appropriated to observations on the horary variations of the dip of the magnetic needle, the absolute dip, the variations of the declination, and the positive declination. These instructions have the great merit of being lucid, and they embrace all the necessary details except those minute cautions and directions which can only be communicated orally, while teaching the manipulation of the instruments themselves.

The second part of the volume contains, in tabular arrangement, the various meteorologic observations made daily at St. Petersburg, from the 1st July, 1835, to the 30th June, 1836, inclusive. The thermometer, hygrometer, and barometer were each registered eight times a-day; every two hours from 8 A.M. to 10 P.M. inclusive. Observations on the winds and weather were made at the same hours. The quantity of rain or snow fallen was observed twice a-day, at 8 in the morning and at 8 in the evening, excepting in cases of very great rains, when the quantity was observed as soon as they had ceased to fall, and immediately registered as to quantity and time, independently of the regular observations; the snow which fell was thawed. In summer the fall of rain was more frequently observed, on account of the evaporation.

In addition to his observations, Mr. Kupffer has given a set of psychrometric tables, which will be found eminently useful as abridging the calculation of the psychrometric formula. These tables refer to the mode of observing the moisture of the air by two thermometers, the bulb of the one being covered with a wetted muslin; and they are so arranged, that by entering them with the indications of the covered thermometer and the difference between the indications of the two thermometers, the tension of the aqueous vapour in the air is immediately found.

The magnetic observations were not begun till much later, and they are not contained in the present volume.

From the well-known zeal and ability of Mr. Kupffer, his scrupulous attention to exactitude, and unremitting patience, we receive with particular satisfaction the result of his personal observations as data upon which we can confidently rely; and the

general direction of the meteorologic and magnetic observations in the Russian empire could not, we feel assured, be placed in better hands.

We cannot, however, close this brief notice without expressing our admiration of the zeal with which the Russian government encourages the investigations of mathematical and physical science. The munificent grants of money, and the assistance of every kind afforded by the emperor for scientific objects, are worthy of a great sovereign, and justly entitle him to the gratitude of all those who, like ourselves, cultivate knowledge as a means of happiness; and we sincerely hope that the joint labours of Russia and England in the field of meteorologic and magnetic research will, from the vast extent of their respective possessions, and the acknowledged ability of their observers, be soon rewarded by a rich harvest of important discoveries.

III.—*Reisebeschreibung nach Arabien und andern umliegenden Ländern.* Von CARSTEN NIEBUHR. 3d band. Hamburg. 1837. 4to.

[*Carsten Niebuhr's Narrative of a Journey to Arabia and other contiguous Countries.* Third vol.] Communicated by the Rev. G. C. RENOARD, M.R.A.S.

OF all the acts of royal munificence which have a just claim to the gratitude of mankind, none surely can rank higher than those which are calculated to advance knowledge and promote a friendly intercourse between distant nations. Much of the glory reflected on our own country, and on other European nations, in the most brilliant epochs of their history, is due to the patronage afforded by their sovereigns to expeditions despatched for the purpose of discovering unknown regions; but the moral and scientific value of most of those expeditions was tarnished by one deteriorating ingredient which entered too largely into the motives of their patrons. The lust of wealth and dominion was too plainly the leading principle in the councils of the monarchs who aided Columbus and Gama. Nor was it till the middle of the last century, that Denmark gave the noble example of sending out, at the national expense, a body of travellers for the sole purpose of pursuing scientific inquiries. Frederick V., probably at the suggestion of his excellent minister, Count von Bernstorff, and with the assistance of the celebrated Michaelis, to whom the selection of the persons to be employed was in a great measure left, despatched four young men duly prepared, on a mission to Constantinople, Egypt, and Arabia, for the purpose of ob-

taining accurate information respecting the geography, climate, and natural productions of those countries, as well as of the languages and condition, moral and physical, of their inhabitants, especially with a view to the elucidation of the Scriptures of the Old Testament. Having received their instructions at the close of 1760, the travellers set sail for Smyrna on the 7th of January, 1761, and Carsten Niebuhr, the only survivor, for his four companions, the draughtsman, physician, linguist, and naturalist, all sunk under the influence of the climate not long after their arrival in Arabia, reached Copenhagen at his return on the 20th of November, 1767. His description of Arabia, published in 1772; the first volume of his travels printed in 1774; the observations relative to botany and other parts of natural history, made by Professor Peter Forskål, together with plates illustrative of them, edited by Niebuhr, in 1775; and finally, the second volume of the travels in 1778, fully justified the choice of Michaelis; nor did any of the travellers appear more deserving of approbation than Niebuhr himself. Though the first two volumes comprehended the largest and most important part of his travels, yet a third still remained which was to give an account of his journey through Syria and Asia Minor in his return homewards. This volume, by which the work is completed, appears to have been ready for publication in 1779; but its appearance was retarded by various untoward circumstances, so that all hope of its publication seems to have been abandoned, till about two years ago, proposals for printing it were circulated by M. Perthes of Hamburg; and it is to the liberality of that bookseller, as well as to the affection of Niebuhr's family, particularly of his daughter, that the admirers of her father's works have at length the satisfaction of accompanying him to the end of his long pilgrimage.

The present volume is divided into five sections or chapters, containing the traveller's remarks on Aleppo; his voyage to Cyprus, and thence to Jaffa and Jerusalem; his observations on those places; his return to Aleppo, and journey from thence through Kóniyeh to Constantinople; geographical information collected in his passage through Asia Minor, and an abridged account of his route through Bulgaria, Vallachia, Moldavia, Poland, and Germany, to Denmark.

The last section has been very judiciously shortened by the editors, as much of the ground passed over is not only well known, but has been sufficiently described by later travellers; and as this portion of the author's narrative does not supply matter enough for a volume of nearly the same thickness as the preceding ones, there are added, in the form of an appendix, several valuable tracts relating to the nations and antiquities of Western

Asia and Abyssinia, drawn up by Niebuhr, together with the astronomical data of the celestial observations made during his journey. For the republication of all of these, particularly the latter, the literary world is much indebted to the Editors, as it is always desirable to have the works of an eminent writer collected, and few persons have an entire command of the various periodical publications through which these papers are scattered. That is particularly the case in this country, where the 'Monthly Astronomical Correspondence' of the late Baron von Zach is not easily met with. So little have the Editors of the present volume been influenced by any undue desire of augmenting its bulk, that no less than ten papers contributed by Niebuhr to the 'German Museum,' between the years 1781 and 1791, have been omitted, though most, if not all of them, would still be read with interest.

The description of Aleppo and Antioch, the account of their inhabitants and commerce, and the remarks on the antiquities and condition of Cyprus, contained in the first section, are very deserving of notice, particularly the observations on Citium* (pp. 21-25); and the amusing anecdotes respecting that extraordinary son of an extraordinary mother, Edward Wortley Montagu (p. 29). From Jerusalem, Niebuhr returned to Jaffa, and went on by sea to 'Accá (Acre) and Šaidá (Sidon), making an excursion from that place to Damascus, having to his surprise and satisfaction, met with, at least, one country in Asia in which an armed escort was not wanted (p. 82). From Šaidá he proceeded by sea to Ládhihiyyah (Laodicea), stopping by the way at Tripoli only long enough to take the altitude of some stars (p. 92), as he was anxious to meet M. van Masseyk, the Dutch Consul at Aleppo, at Ládhihiyyah, from whom he was sure of receiving much valuable information. There he was detained some weeks, waiting for the departure of a caravan, and had thus leisure to extend his inquiries respecting Syria, and to revise his plans and routes.

As his road northwards lay through Bayás and Adeneh, he not only passed through a tract little known, but was able to make a plan of that town, as well as of Kóniyah, the ancient Iconium. These plans, though not minutely exact, are valuable as expressing relative bearings; and in that respect the slight sketch of Jerusalem given by Niebuhr (Tab. iv. p. 52) may be of service when compared with the elaborate plan published by Mr. Catherwood. In his route from Kóniyah to Constantinople, Niebuhr

* Now called Chitium, which is pronounced Shiti by the modern Greeks. Niebuhr does not seem to have been aware that Shiti (Chiti) is identical with Chitium; or that the inscriptions copied by him (tab. iii. p. 22) are quite different from those published by Pococke (*Descript. of the East*, ii., tab. xxxii.), and interpreted by Gesenius (*Scripturæ Phœnicæ Monumenta*, p. 122, tab. 11, 12).

passed through two remarkable places, one of which has seldom been visited by other European travellers; viz., Kútáhiyah, the ancient Cotyæum, remarkable in modern times as the centre of the tract where the carpets are manufactured, which, for wear and colour, have not yet been equalled by our own: the other place is Afíyûm-kará-hisâr (Opium-black-castle), so long erroneously supposed to be on the site of Apamea Cibotus, which stood near the confluence of the Marsyas and Meander. D'Anville (*Geogr. Ancienne*, ii. 53), with whom this error originated, seems in this, as in some other cases, to have been misled by an apparent resemblance between the ancient and modern names.

Niebuhr's observations on the government and condition of Moldavia and Vallachia, are still worth reading, notwithstanding the great political changes experienced in those principalities within the last few years, in consequence of the Sultán's ill-judged attempt to resist the overwhelming power of Russia. The peculiarities and affinities of the Vallachian language did not escape the notice of Niebuhr, and the information he gives will be new, at least, to most of his English readers, so little is known in this country respecting that remarkable monument of the Roman dominion in Dacia, and of the amalgamation of the Latin and Slavonian languages.

The astronomical data given in the appendix have long been known to all geographers who could make use of the Baron von Zach's work. They, with a few others found among M. Niebuhr's papers, are here reprinted with the corrections and reductions of M. von Zach and Professor Bürg, which greatly enhances their value, as they are thus made immediately applicable in practical geography. Of the remaining papers, which all have merit, the most remarkable are a dissertation on the Nosáirís, a singularly fanatical sect, who are numerous in the northern mountains of Syria (iii.); some observations on the exposed position of the temple at Jerusalem, and its liability to suffer from tempests (iv.); and memoranda respecting Abyssinia, which were collected at Cäiro in 1762, about six years before Bruce visited that country (vi.). "This paper deserves to be compared," say the editors, Messrs. Gloyer and Olshausen, "with the author's review of the two first volumes of Bruce's *Travels*, printed in the German Museum for June, 1791." The illustrations of Xenophon's *Anabasis* (v.), drawn up during Niebuhr's stay at Brusa, have been in great measure superseded by Major Rennell's able work, and the more extensive observations of modern travellers, some of the most important of which, however, have not yet been published.

IV.—*Journal de la Navigation autour du Globe, de la frégate la Thétis et de la corvette l'Espérance, pendant les années 1824-6.* Par M. le Baron de BOUGAINVILLE, Capitaine de Vaisseau. 2 vols. 4to. Paris, 1837. Publié par ordre du Roi.

DURING the course of the last twenty years five distinct naval expeditions sent out by the French government have circumnavigated the globe, and the narrative of their respective voyages, with a full account of all their observations in detail, illustrated by admirably engraved charts, and generally by some excellent drawings, have been liberally published, by order of the Minister of Marine, at the expense of the state. Such liberality must afford a cheering prospect to the navigator, when exposed to numerous privations in a tedious voyage round the globe; or to the surveyor struggling against the difficulties of a long-protracted examination of inhospitable shores, and cannot fail to stimulate officers employed on such expeditions to exert themselves to the utmost in the service of their country.

Of the expeditions above mentioned that of the *Uranie* and *Physicienne*, commanded by M. de Freycinet, took place in 1817-20, and brought home a number of facts relative to the physical history of the globe; the voyage of the *Coquille*, under the orders of M. Duperrey, occurred in 1822-5, and is distinguished for his examination of the little-known islands of New Zealand and the Caroline group; the expedition of the *Thétis* and *Espérance*, commanded by M. de Bougainville, took place in 1824-6; the voyage of the *Astrolabe*, under M. Dumont D'Urville, in 1826-9, is remarkable for his examination of the eastern coast of New Guinea, of New Zealand, and for the great attention paid to the Polynesian languages; and, lastly, that of the *Favorite*, Captain Laplace, noted for the examination of the Gulf of Tonkin, and of the Archipelagos of the Natunas and Anambas in the China Sea.

The narratives of four of these expeditions have been for some time before the public, but the detailed account of the voyage of the *Thétis*, although more than eleven years have elapsed since her return to Europe, has only recently issued from the press. The chief results of this voyage, with respect to hydrography and the collections in natural history, were of course immediately made known to the French government, and probably found their way into some periodicals at the time; but it cannot but be a subject of regret that the authorized narrative of the voyage, and of its results, should have been so long kept back from those who take an interest in the advancement of geography, and from the public at large.

In fulfilment of a similar mission to that intrusted to M. de Kergariou, in *la Cybèle*, in 1817, and to M. de Camper, in *la*

Cléopâtre, in 1822—namely, to show the French flag in the Indian and China seas—the frigate *Thétis*, commanded by the Baron de Bougainville, quitted Brest on the 2nd March, 1824. In the course of her passage to the Canaries, where she anchored on the 13th March, the vessel had experienced a set of $2^{\circ} 43'$ to the eastward; on the 29th crossed the Line in $17^{\circ} 40'$ west of Greenwich; on the 26th April sighted the Cape of Good Hope; and on the 5th May, in lat. 39° , long. $37^{\circ} 40'$, the magnetic variation attained its maximum, namely $32^{\circ} 12'$ W., decreasing immediately afterwards as she steered to the eastward; on the 20th the *Thétis* anchored at the Isle of Bourbon, where she found her consort *l'Espérance*, Captain Camper, arrived from Rio de Janeiro.* After a stay of a few days the two vessels sailed in company, recrossed the equator on the 18th June, between 67° and 68° E. long., and on the same day the variation was at zero. On the 23rd sighted and fixed the position of the north part of the coast of Suadiva, the southernmost group of the Maldivas,† in lat. $0^{\circ} 51' 10''$ N., $73^{\circ} 20' 40''$ E. of Greenwich, making the channel of Adumati 58 miles wide.

June 25.—Made Adam's Peak, on the island of Ceylon, and on the 29th anchored at Pondichery. M. de Bougainville devotes a chapter to a description of this city, and contrasts well the monotonous uniformity of its *white* town with the animated scene presented by the junglers, the bazaars, and attractive dances of the Bayadères, &c., in the *black* town. He states the population of the five French establishments in India—viz. Pondichery, Chandernagor, Karikal, Mahé, and Yanaon, at 4000 whites and 132,000 blacks, and gives some other statistical details.‡

July 30.—Quitting Pondichery the *Thétis* traversed the Bay of Bengal, entered the Straits of Malacca, anchored for a few days off that town, and also at Sincapore, thence crossed the China Sea to Manila, where she arrived on the 17th September, and anchored in the port of Cavite. Two days previous, in lat. 13° N., long. $115^{\circ} 20'$ E., the variation of the compass was observed to be *nil*, with the ship's head East. At Manila the vessels remained three months, in order to refit, and where they found everything requisite for their equipment.

From Manila the *Thétis* went to Macao, on her passage thence

* There appears to be an error here of 10° of long. in M. de Bougainville's text not marked in the *errata*. See also vol. ii., p. 113, of Appendix.

† The whole of this group has lately been surveyed by Captain Moresby, of the Indian navy, and published on the scale of 4 miles to an inch. By his observations the north point of Suadiva is in $0^{\circ} 55'$ N. long., $73^{\circ} 19' 0''$ E. of Greenwich, and the channel of Adumati 53 miles wide. The channel to the north of Adumati, in lat. 2° N., is 16 miles wide.

‡ There must be some mistake here, as the official returns in 1835 give 980 white, 1515 mixed, 165,241 blacks. Since the 1st of July, 1836, a fixed light, 97 English feet above the sea, has been shown at Pondichery, visible from 15 to 18 miles from the deck of a ship.

to Tourane examined the isle of Haï-nan, which forms the eastern side of the gulf of Tonkin. On the 13th Jan. 1825, anchored in the Bay of Tourane, in Cochin China. M. de Bougainville differs from Horsburgh and Crawford in considering this bay so excellent as they represent it; they probably knew it only from an imperfect survey, but it was afterwards thoroughly examined by M. de Kergariou and the officers of the *Cybèle*, in 1819. After about a month spent in this bay, in execution of a mission with which M. de Bougainville was charged to the emperor, as he is styled, of Cochin China, and which afforded an opportunity of seeing a little of the manners of this curious people, the *Thétis* sailed for Surabaya, on the north coast of Java; on her passage she examined, for the first time we believe, the Anambas islands,* a group extending 150 miles from north to south, and as much from east to west, lying about 100 miles from the eastern coast of the Malay peninsula. Some of the islands rise up in blocks of granite, with white marks, similar to those of the Pedra Branca, in the Strait of Malacca,—indeed their general structure is granitic, with coral reefs in all the sheltered spots. Here are said to be 50 islands; they are of moderate height, and in parts wooded; the group may contain from 1500 to 2000 inhabitants, apparently Malays, which M. de Bougainville agrees with Horsburgh in considering as pirates. The islands are called *Scianthan* by the natives, and the officers of the ships explored more than one excellent anchorage. The position of twenty-two of the principal islands or remarkable points were also accurately determined—extending between the parallels of $3^{\circ} 27'$ and 1° N. and 106° and $108^{\circ} 21'$ E. long.; high water at full and change, at 5h. 25m.; rise of tide 2 feet 4 inches; the current set N.N.W. and S.S.E., at its greatest strength 3 miles an-hour; the variation observed on different islands $1^{\circ} 7'$ E.

Proceeding to the southward, the *Thétis* crossed the Line for the third time since her departure from Brest; ran through the dangerous strait of Gaspar, reconnoitred the Carimon-Java islands, cleared the straits of Madura, and anchored on the 20th March off Surabaya, where the ships remained for six weeks, and unfortunately suffered much from dysentery. Quitting Java, at a short distance to the N.E. of Madura, they found the soundings change suddenly from 46 fathoms, mud, to 26 fathoms, coral—immediately after to 44, gravel, and then 47, blue mud as before. M. de Bougainville cautions navigators to beware of being lulled into security, as coral is commonly found in these seas rising from a bottom of sand. Steering through the strait of Allas, the shores of the island of Lombock were examined, and the road-

* Since re-examined in the voyage of the *Favorite*, and included, with many other corrections, in the excellent chart of the China Sea just published at the Dépôt de la Marine at Paris, by MM. Daussey and Wissocq.

stead of Tanjong-Louar or Peejow found to be the best on the coast, and far superior, in the opinion of M. de Bougainville, to that of Bally. Having cleared the S.E. point of Lombock, remarkable from its resemblance to the angle of a lofty bastion at the foot of which stands a column on a low base, the *Thétis* and *Espérance* steered to the southward, rounded successively the S.W. point of Australia and the southern extreme of Van Diemen's Land, and on the 1st July anchored in Port Jackson. M. de Bougainville remained here nearly three months, and devotes his 14th chapter to a description of the colony of New South Wales. On the 21st September the vessels sailed for the coast of Chile, and arrived at Valparaiso on the 23rd November, without having made any land in the passage of 6000 miles across the Great Ocean, between the parallels of $31\frac{1}{2}^{\circ}$ and $37\frac{1}{2}^{\circ}$. In this passage the current set the vessels 163 miles to the north and 125 miles to the east—the variation of the compass increased from $8^{\circ} 30'$ to 13° E.; it began to decrease in 177° E. long., and reached its minimum 5° , in 123° W.: from this point it varied slightly between 7° and 8° as far as 105° W. long., when it was again 5° ; it shortly after increased to 13° and 16° , and remained so till the ships' arrival at Valparaiso.

M. de Bougainville makes some very just remarks on the want of correct charts of the Great, or, as it is called, the Pacific Ocean. The difficulty of accomplishing such a task he fully admits, but surely, where so many lives and so much property are annually risked, it cannot be admitted as an excuse that all the *ingénieurs hydrographes* of this or any other country are fully employed in more urgent business, and have not leisure to attend to it; nor does M. de Bougainville admit as an excuse that we have not yet sufficiently correct *data* to construct such a chart. Let but a really competent person devote himself to the task, and it will be found that far more *data* are available than is generally imagined, and quite enough to warrant the immediate construction of a chart on a large scale in several sheets.*

After a stay of six weeks at Valparaiso, the vessels sailed on the 8th January, 1826, for Rio Janeiro, where they arrived on the 21st March, left again on the 8th April, and finally anchored at Brest on the 24th June, after an absence of two years and four months.

During the whole of the voyage great attention was paid to meteorologic, as well as to the more common magnetic observa-

* La Carte du Grand Océan, par MM. D'Urville et Lottin, published in 1833, and corrected to 1834, at the Dépôt de la Marine at Paris, is by far the most correct chart of this ocean. It has the merit also of distinguishing between the high and low islands; but being a general chart, in one sheet, it is necessarily on a small scale.

tions, as variation of the compass, &c. ; the indications of the barometer, thermometer, and hydrometer were invariably registered four times in the 24 hours ; and the appendix, besides some valuable notes, contains a list of 150 geographical positions determined on the voyage chiefly by M. Fabré and other officers, with a discussion of the observations on which they rest :—the position of the ship at noon each day is also given with the variation, current, winds, &c.—in short, a complete abstract of the ship's log-book—a more valuable document than at first might be imagined ; but the late researches by Colonel Reed, R.E., into the law of storms has shown how extremely valuable are these minute meteorologic registers : from the too often despised log-books of merchant-ships he has educed the basis of a theory, which, when carried into practice, may be the means of saving property to a large amount, and the lives of numerous fellow-creatures. May this be an inducement to all who traverse the ocean to pay strict attention to such registers, assured that their labours will not be in vain !

The second volume of M. de Bougainville's work contains an itinerary from Santiago de Chile to Buenos Ayres, by M. de la Touanne, who has also enriched the work with many highly picturesque views of scenery in Cochin China, Philippine Islands, Java, &c., and some characteristic sketches of the natives of the Indian and China seas.

The narrative of the voyage of the *Thétis* is related in the simple style of a nautical journal. M. de Bougainville well observes that "he is a sailor by profession, and that he will not give up the sextant or the lead for the painter's pallet," and that it is to facts that he trusts to make his account useful ; yet, although unprovided with a naturalist or hydrographer, an unusual omission in a French voyage, M. de Bougainville was enabled to give to the Jardin du Roi at Paris a fair collection of objects in natural history, and some living animals, and has shown himself by his observations a worthy successor of his celebrated father, who conducted, in 1766, the first voyage round the world made by the French marine, in the memorable expedition of *la Boudeuse* and *l'Etoile*.

One cannot but regret that M. de Bougainville should give place in his work (p. 361) to the story of the Master of a French ship, called the *Gustave*, having discovered a bay on the coast of Chile in June, 1836, to which he, as discoverer, gave the name of *Baie des Français* ; whereas any one either at Valparaiso or Callao, or at any other intermediate port on the coast, could have told M. Langlois that the tenders of the *Beagle*, Captain FitzRoy, had not only entered but thoroughly surveyed the bay in question in June, 1835.

V.—*Der Ugrische Volksstamm, &c.* [*Researches upon the country between the Ural and the Caucasus, with reference to history, geography, and ethnography.*] By Ferd. Heinr. MUELLER, Ph. D., &c. Berlin, 1837. Communicated by Dr. I. C. PRICHARD, M.D., F.R.S.

THE object of research which the author has proposed to himself is the history of the great nomadic nations of Asia, whose movements have produced in various times, and particularly during the middle ages, a powerful impression on the eastern countries of Europe. The light already thrown on many subjects connected with this pursuit by Thunmann, and more lately by Julian von Klaproth, has encouraged the author to pursue their investigation by the study of the Byzantine historians in connexion with Arabian and other eastern writers. The present work, of which this is the first volume, is devoted to a preliminary survey of the region which has been the principal theatre, not of the military exploits of the nomadic tribes, but of their national development. The nations whom Dr. Müller has chiefly in view, are those belonging to the great Finnish race, by him termed *Ugrische Völkerschaften*, and to this stock he refers not only the *Madjars*, or Hungarians, but likewise the more celebrated Huns, as well as the Chasares, Bulgarians, and several tribes who have been by other writers derived from a Tartarian origin. Much information has been already collected with reference to this subject by the Russian academicians Pallas, Gmelin, Lehrberg, Frähn, Sjögren, and others; but the views adopted by some of these writers are erroneous in part, and none of them has fulfilled the design of our author, which is, as he says, “to give a survey of the theatre in which human nature has here developed itself, and of its relations of the region to the families of men that were formed within it.”

In the course of his work Dr. Müller proposes to display the relations which the ancient races of the Uralian mountains bear to those of the Caucasus and the chain of Altai. He follows Klaproth in supposing the Ural to be the native seat of the race, to the history of which his inquiries are chiefly directed.

The first section of the present volume contains a geographical survey of the Ural mountain-system, which the author divides into three regions, the southern, middle, and northern Ural. The principal rivers sent forth by the southern Ural are surveyed and followed through their course; the countries watered by the Jaik and the Biela have frequently changed their population, and even their physical condition, and many regions now occupied by vast steppes were at one period the abode of an agricultural people. The plains between the southern extremity of the Ural and the Euxine were the great road by which the nomadic nations of Asia poured themselves into Europe. The middle Ural sends forth the rivers of Perm, viz. the Kama and the Chysova, and several considerable

streams which flow westward into Siberia. There are two principal transits over the middle Ural, one of which is supposed by Lehrberg to have been the situation of the "Eiserne Pforte," or Iron Gates, mentioned in the old Russian annals, and by which it is said that the Novgorodians gained access to *Iugrien*, or the country of the Ugri. By Lehrberg, as well as by Karamsin, it is maintained that this country included a considerable tract of northern Siberia, and that a part of the Asiatic empire of Russia was in fact tributary, in the middle ages, to the republic of Novgorod. The northern Ural is the most inclement part of Europe. It is only in the best season of the year that the Vogouls and Samoiedes hunt in this region. Yet, though now correctly termed a desert, the northern Ural was in former times, according to Dr. Müller, inhabited. It formed a considerable part of the land of Iugrien, or Iugoria, mentioned in the ancient imperial title of the Russian Sovereigns. This, in the opinion of Lehrberg, Müller, and many other Russian antiquarians, was the native country of the Ugri, Hungarians, or Madjars, and of the more celebrated Huns.

Novaia Zemlia is only a continuation of the Uralian chain. Müller has collected in his work all the early notices of this country, and the coast near the Straits of Waigatz, and of the trade of the English and Dutch to the coasts of the White Sea.

The second section contains a survey of the *Alginskoi Syrt*, a broken and often interrupted series of high levels which connects the southern extremity of the Ural with the chain of Altai, and likewise of the great steppes inhabited by the Kirghiz Tatars.

The third section is devoted to a survey of the river-systems of the Irish and Oby, and a geographical account of the countries watered by those streams. The aboriginal inhabitants of these countries are the Ostiaks and Samoiedes; the tracts between the two rivers are now occupied by a Tatar tribe, the Barabintzes, and at Beresov there are many Russian settlers.

The fourth section contains the physical geography of the countries to the westward of the Ural, and a survey of the great rivers which issue from that chain in a westerly direction, and which divide the northern countries of Europe; it also gives an outline of the ethnographical history of their inhabitants.

The fifth, and last section, comprises a geographical survey of the countries occupied by Finns and Laplanders, the western division of the group of nations derived from the Ugrian stock.

In the volume which is to follow the present, and which will conclude this part of the author's work, he promises to "survey the fruitful plains of Sarmatia, from the midst of which the great rivers flowing into the Euxine and Caspian will conduct him into the Alpine valleys of the Caucasus, where he will investigate in that region the primitive as well as the present abodes of the nations belonging to the Ugrian race."

VI.—*Report on the Eastern Frontiers of British India ; Manipúr, Assam, Arracan, &c.* By Captain R. BOILEAU PEMBERTON, 44th N.I. Calcutta, 1836.

OF the several passes into the territories of Ava, through the mountain chain which forms the eastern frontiers of the British dominions in India, we had none but the most imperfect and unsatisfactory accounts previous to the late Burmese war, and of the existence of some we were wholly ignorant. The few from among our subjects who, in the pursuit of traffic, had ventured into the fastnesses of the mountains had scarcely ever penetrated beyond the first ranges which immediately overlook the low lands of Bengal and Kachar.

Of the countries beyond, or on the eastern side of this mountain barrier, our information was necessarily still more imperfect; and with the exception of that part of the Irawaddi river between Ava and Rangún, our knowledge had not advanced one step beyond the point it had attained when the clear, laborious, and accurate Buchanan withdrew from the field of investigation.

When, at the commencement of the Burmah war, our ignorance of the whole frontier became manifest—the impolicy, the short-sightedness of not having instituted, even by force if requisite, a proper examination of the mountain passes flashed upon the mind of even the most careless observer, and its lamentable effects were afterwards shown in an expenditure of life and treasure without parallel in the annals of Indian warfare. Another proof, if proof were wanting, to be added to those lately brought forward,* of the absolute necessity of a complete survey, to insure the good government of any country.

To remedy this evil officers were at various times despatched to examine these frontier districts, and the report before us, drawn up by one of the most able of these officers, and who was for some time joint-commissioner in Manipúr, combines, in a clear and masterly sketch, the results of these investigations in both a geographical, political, and statistical point of view.

As the work is printed at Calcutta, and probably very few copies are to be met with in Europe, a brief abstract of the physical geography of these countries is offered in the following pages.

The Report professes—1st, To give a general description of the great chain of mountains which running from the southern borders of the Assam valley, in lat. $26^{\circ} 30'$, extends to Cape Negrais, the extreme southern limit of our possessions in Arracan, in lat. 16° N., and forms a barrier on the east along the whole line of the Bengal Presidency, from one extremity to the other.

Secondly, To describe the nature of the passes and countries

* See Major Jervis's Address at the meeting of the British Association at Newcastle, in 1838, on the Present State and Progress of the trigonometrical survey in India.

by which this great mountain-chain has been penetrated, and which may be conveniently subdivided under three heads :—

1st. Those routes which extend from the frontier of the Silhet and Kachar districts, through the Manipúr territory to the Ningthí or Kyen-dwen river and central portions of the northern provinces of Ava.

2nd. Those lines of communication extending from the southern borders of the valley of Assam into Manipúr.

3rd. Those through the province of Arracan, by the several routes of Yalak, Aeng, and Tongo, to the towns of Shembegwen, Membú, and Prome, on the banks of the Irawáddi river.

Thirdly, To describe the countries extending east from the banks of the Ningthí river to the frontiers of China, as far as we have become acquainted with them from native information.

Fourthly, To endeavour to estimate the comparative value of the different passes from the British territories into Ava, &c.

And lastly, To describe the countries of Kachar, Jintíyah, and the Kossiyah hills, which have been recently annexed to the British Indian dominions.

The mountainous chain which forms our eastern frontier may be considered a ramification from that which, sweeping round the south-eastern border of the Assam valley, stretches nearly due west along the northern frontier of the Silhet district, and terminates at the great southern bend of the Bramahpútra, in long. 90° east. The point of divergence is situated between the twenty-sixth and twenty-seventh parallels of north latitude, and the ninety-third and ninety-fourth degrees of east longitude: from thence it runs south for about 60 miles, with a mean breadth of from 80 to 120 geographical miles. At the S.E. extremity of the Silhet and Kachar districts it trends in a S.W. direction to the twenty-third parallel, when its breadth is upwards of 180 geographical miles, from the sea on the west to the Ningthí river on the east; it thence runs full 360 geographical miles in a S.S.E. direction to the seventeenth parallel, where its breadth scarcely exceeds 20 miles, and from that point it again trends to the W. of S., and terminates in the rocky promontory of Negráis.

The loftiest points of this great chain are found at its northern extremity, on the confines of the Manipúr territory, where the peaks attain an elevation of from 8000 to 9000 feet above the sea, and average from 5000 to 6000. On the Kachar and Silhet frontier the measurements hitherto made give an altitude of from 2000 to 4000 feet; east of Tripurah and Chittagong they fluctuate between 2000 and 5000 feet. On the Arracan frontier the Table Mountain, in lat. 21° N., long. 93° E., is said to be upwards of 8000 feet above the level of the sea. From this it gradually declines, and may range between 3000 and 4000 feet at all those passes which have hitherto been, or are ever likely to be, resorted to for purposes of traffic or war.

The rivers which flow from this mountainous tract of country on the east and west, though numerous, are, with but few exceptions, of trifling importance. On the western side the seven principal are the Súrmah or Barak, the Gúmti, the Fenni, the Chit-tagong River, the Kuladain or River of Arracan, the Talak, and Aeng. On the eastern side the Man or Maín River, the Yúma Kiyúng, the Manipúr River or Impan Turál, and the Maglung, which flows through the valley of Kubo from north to south.

Of the geological structure of this tract of country we know little: between Manipúr and Kachar a light brown sand-stone and a red ferruginous clay prevail on the lower heights; above these slate or shale is found. In the central ranges, west of Manipúr, limestone occurs. Crossing the Kubo valley we reach the Ungoching hills, where lignite coal is found, which has been traced to the opposite bank of the Ningthí, where it rises to the surface in abundance: the great central ridge, when crossed between Manipúr and Assam, is composed of hard grey slate, and on its northern face boulders of granite were found resting on the inferior heights.

The timber on these heights is various and plentiful. Oak, fir, teak, and bamboo, in all its varieties, from the most delicate and small to the most gigantic, abounds.

The report then describes sixteen of the tribes of people by which this range is inhabited. All the tribes around the Manipúr valley partake strongly of the characteristic features of the Tatar countenance, whereas the Kúkís, or southern tribes, resemble the Malay more than the former.

MANIPUR.—The present boundaries of this country are, on the west, the Jírí river to its confluence with the Barak, thence south to the mouth of the Chikú, which is a point of some political importance, as it marks the union of boundary of the states of Manipúr, Kachar, and Tripurah. From this point the southern limit of Manipúr is ill defined as far as the Impan Turál, when it follows the course of that river due south to the parallel of $23^{\circ} 55'$, then east to the foot of the chain of mountains which separates the valleys of Manipúr and Kubo. The eastern boundary-line runs north along the eastern foot of this range to the N.E. corner of the Lúhúpa country, in lat. $25^{\circ} 5'$, beyond which no exploring parties have hitherto been able to penetrate. On the north the great central ridge which, running from N.E. to S.W., separates Assam from Manipúr. The territory comprised within these limits occupies an area of 7000 square miles, of which a valley of 650 miles of rich alluvial soil constitutes the central portion; this valley rests at an elevation of 2500 feet above the sea, its extreme length is about 36 miles, with an average breadth of 18 miles. The range of mountains which forms the western barrier of this valley has nine celebrated peaks and ridges, whose elevation varies from 5790 to 8200 feet above the sea, chiefly of

compact sandstone and slate. The loftiest peak of the eastern boundary of the valley does not exceed 6700 feet, and from this elevation they descend to 4900 feet above the sea. Many detached groups of hills of about 500 feet in height appear in various parts of the valley, while to the east of the ancient capital there is one range whose central peak, called Nongmuiching, is 2700 feet above the valley and 5200 above the sea.

The chief stream which waters this valley is the Khongba, or Impan Tural, which falls into the Ningthi. The surrounding mountains are covered with the noblest varieties of forest-trees, as cedar, oak, pine, redwood, ash, willow, &c. Limestone appears to form the substratum of the whole valley, over which is a great depth of alluvial deposit. Iron also is found, and salt abounds. Fruits, both of temperate and tropical climes, are plentiful. The climate is favourable. In short, from its situation, extent, climate, and products, Manipúr is a very valuable acquisition.

The Report, at p. 51, goes on to describe in detail the three different routes by which Silhet and Kachar are connected with Manipúr, and also those by which the latter is connected with the Burmese territory. Then the three routes from Manipúr into Assam.

ASSAM.—Having stated the boundaries of Upper, Lower, and Central Assam, the Report gives the area of the whole valley at 18,900 square miles, with a population of 602,500, and a revenue of 44,000*l.* sterling. The lines of communication between Assam and Kachar and Silhet are then described and their several advantages pointed out, and the general resources and capabilities of the country are displayed. The valley of Assam is rich in mineral treasures; nearly all the streams wash down particles of gold; iron is found under the Naga hills and elsewhere, and coal to the east of Rangpúr.

ARRACAN.—Although founded on rather imperfect data, the total area of this province may be stated at 16,500 square miles; its population in 1831 was 173,928, and the net revenue 32,630*l.* sterling. Of the land but little is under cultivation; but foreign commerce is much on the increase. Not less than twenty-two passes are reported to exist between Arracan and Ava, but of these only five are in use, and have been explored by different officers of the Indian army—the best of them is the pass of Aeng, so called from a village, of about 150 houses, of that name; its summit is 4664 feet above the sea.

The Report then completes the description of our eastern frontier from Assam to Arracan, nearly the whole of which is the result of personal examination by Captain Pemberton.

PONG.—The kingdom of Pong extends from the foot of the mountains forming the south-eastern boundary of the Assam valley, in lat. 27° N., down to the twenty-second parallel, and from the mountains which separate the Manipúr and Kubo

valleys on the west, to the Chinese province of Yunan on the east. A chapter is devoted to a highly interesting account of this little known country. The next section of the Report, from p. 146 to 188, contains an estimate of the comparative value of the different passes from the British territories into Ava, and the author offers many suggestions which appear likely to facilitate the rendering them either lines of commercial intercourse or military operations.

KACHAR.—Captain Pemberton then proceeds at once to an historical, topographical, and statistical description of the whole province of Kachar, and after stating its boundaries, he estimates its area at 4200 square miles, of which more than half are considered to be of a fine rich plain. The population of Southern Kachar, by far the most valuable portion of the province, may be assumed at 50,000 persons.

JINTÍYAH.—This province, as well as that of Kachar, is divided into a northern, central, and southern district; the latter, which is the most important, has an area of 650 square miles, and a population of 150,000, and is described as composed of well-watered and fertile plains. The central or hilly portion contains an area of 2340 square miles, with a population of 20,000, and is a tract of undulating table-land elevated from four to five thousand feet above the sea.

KOSSIYAH HILLS.—This tract of country forms an irregular parallelogram, the length of which from north to south is about 70 miles, and its average breadth 50, giving an area of 3500 square miles, which consists of three portions of unequal breadth and diversified character—the first, or more northern, is a closely-wooded tract rising from the Assam valley; and stretching by a succession of gentle undulations for 20 miles, to the heights on which stands the village of Mopía, 2746 feet above the sea, and from which the northern crest of the more elevated central plateaux is seen resting at an elevation of between four and five thousand feet.

From Nangkláu, which stands on the northern crest to Musmái, which is similarly situated on the southern verge of this elevated region, the direct distance is about 35 miles; and it is within these limits that the region is included, whose salubrity has been so much extolled by its friends, and so much questioned by its opponents. The elevation of this lofty region, imperfectly described by the name of “table-land,” appears to vary from four to six thousand feet above the sea, which would give an annual mean temperature of from 59° to 65° Fahr., or from 19° to 13° lower than that of Calcutta, which is nearly 78°.

At such an elevation, and with such a temperature, the change from a residence in the plains to one on the hills is, during the hot season, the most delightful it is possible to conceive.

Viewed geologically, this tract consists of two portions separated

by the Boga Paní, which flows between them from N.E. to S.W. The northern portion consists, almost exclusively, of granite, masses of which are seen protruding through the soil at every step, and large boulders are scattered over the surface. In the southern portion coal and iron are found. Nangklaú, Máirang, and Charra Púnjí, have each been selected at different times as a *sanatorium* for our invalids in India, and the Report discusses at length their claims to salubrity: from the experiments of Mr. Cracroft, who instituted a series of observations to determine the actual quantity of rain that fell at Charra Púnjí, it appears that the total quantity in four months, between June and October, was 225 inches! The peculiar position of Charra would perhaps warrant the expectation of a great amount of rain; but this exceeded all conjectures; yet there appears no reason to doubt the result. From observations in Arracan, we learn that 197 inches of rain fell between the months of June and October, 1825, which seems the only parallel on record.

Captain Pemberton concludes his excellent Report in the following words:—

“On our own frontier, we have seen a spirit of enterprise awakened, which, in Arracan, has been already productive of a most extraordinary revival, and increase of commercial pursuits; and in Assam, the same ardour is rapidly diminishing the space which separates her numerous tribes from the industrious and energetic inhabitants of Yunan and Sechuen:—the races dwelling on the eastern borders of the Irawaddí are seeking an asylum under our protection, and the tide of emigration already begins to flow from east to west. The holy zeal of the missionary, tempered by a necessary discretion, has outstripped the advances of commerce, and the most extensive schemes have been planned for conferring upon their population the blessings of civilization and letters. In Assam, Manipúr, and Arracan, a propitious commencement has been already made; and standing on the neutral ground which separates Hindooism, on the one hand, from Boodhism on the other, the disseminators of sound knowledge, aided by all the influence and talent of the local authorities, are kindling an intellectual flame which, spreading east and west, will illumine the gloom of superstition and ignorance in which their benighted inhabitants now rest, and qualify them for higher destinies than they have ever yet fulfilled. If such be the result of the extension of British influence over the numerous tribes and nations which dwell on our eastern frontier, the recollection of the horrors of the Burmese war will fade before the glorious prospect of redeeming many millions of men from such mental debasement, and elevating them to that higher station, in the intellectual and moral world, upon which the favoured inhabitant of Europe now stands. We rescued them from a yoke which has bowed to the dust the energies of every people over whom it has been cast; and we may fearlessly refer those who doubt the ameliorating influence of our rule to Arracan, to Kachar, to Manipúr, and Assam, and abide the result of a comparison between their past and present condition—between the sufferings they formerly endured, and the peace they now enjoy.”

The appendix contains a list of the seventeen principal tribes around the valley of Assam; and of the twenty chief passes from the borders of Assam into the Búthan territory, with a table of the geographical positions and elevations of 300 places along the eastern frontier.

The work is also accompanied by various maps, chiefly constructed from Captain Pemberton's own observations and surveys. Ten of these are special maps on a large scale of the chief passes through the frontier; besides a general map of the Manipúr territory; and also of the whole eastern frontier from Thibet and Bhútan on the north, to Rangún and Múlmein on the south; and from the meridian of Calcutta to the western frontier of Yunan in China.

VII.—*Etudes Grammaticales sur la Langue Euskarienne.*

Par A. TH. D'ABBADIE et T. AUG. CHAHO. Communicated by J. COWLES PRICHARD, M.D., F.R.S., &c.

THE Euskarian language, the native idiom of the aboriginal inhabitants of Western Europe, has been, until within a comparatively recent period, almost entirely unknown to philologists. Many old Spanish writers have devoted themselves to the illustration of their national antiquities, and the monuments of ancient Iberian art. The works of Velasquez, Zuaiga, and Flores, on the Celtiberian, and on the Turdetan, or Bætic coins and inscriptions, are well known. The same subject was treated by Jacob Barry, a Dutch consul at Seville. Of later date is the work of Iztueta on the ancient usages, dances, and games of Guipuzcoa. The idea of investigating the history of nations by a comparison of their languages is almost of modern invention. Scarcely any attempt had been made to illustrate the history of the primitive language of Spain till the early part of the last century, when a dissertation, written on that subject by Jezreel Jones, was published at the end of the collection by Chamberlayne and David Wilkins, containing specimens of the Lord's Prayer in different languages. In that paper little more is to be found than mere conjectures. The writer imagined the Basque or Biscayan language to be allied to the dialects of the Berbers and the Shúlúh, the aboriginal inhabitants of Mount Atlas. The earliest Spanish works on the Bascuence or Biscayan were not, as it may be supposed, written with any view to speculations on the history of languages, or with the design of illustrating through that medium the origin and affinities of the old Iberian people. The earliest Biscayan grammar was printed by a singular chance in a country where the nearest approximation to the structure of that curious

idiom has been discovered, viz. in the Spanish dominions of the New World. The author was Balthazar de Etchabié; he was a native of Guipuzcoa, and published his work in Mexico, in 1607, for the use of the numerous Biscayans who were settled there. This work fell into oblivion after the more splendid achievement of Larramendi had appeared, which the author pompously entitled '*El imposible vencido*.'* To this indefatigable Jesuit we owe likewise the first Biscayan dictionary, the "prologo" of which is the earliest production that aspires to the character of a philosophical account of the Biscayan language. The grammar of Larramendi, and his dictionary, published in 1746,† have long been well known in Spain, and they have inspired some native writers with the desire to illustrate the language of their ancestors—a task which they have undertaken just in the manner that might be expected. The most celebrated attempts are by Astarloa and Juan Bautista de Erro. The former, in his '*Apologia de la Lengua Bascongada*,' devotes himself to a proof of the position that the Biscayan was one of the eight primitive languages which he supposes to have originated at the building of the tower of Babel. Erro's works are still more absurd. In his '*Alfabeto de la Lengua Primitiva*,' and his '*Mundo Primitivo*,' he even ventures more in favour of the Basque than did General Vallancey for his favourite Erse. The Biscayan is at least as old as the planting of Paradise: the Hebrew is but a late offspring from it.

German philologists were the first who investigated with any degree of success the history of the Iberian language. English writers, from the time of Edward Llyud, though they had nearer access to the means of better information, had always supposed the Basque to be a Celtic dialect. That notion was commonly entertained till the publication of the Mithridates, in which the treatise on the Basque was written by Adelung. Several years afterwards there appeared an appendix to the same work by Baron Wilhelm von Humboldt, containing much valuable information, not only on the language, but on the literature of the ancient Iberians, of which the author had, during his abode in Spain, been indefatigable in collecting the remains. Fragments of an ancient national poem on the taking of Numantium by Scipio carry very far back indeed the commencement of this literature, or rather of its scanty relics. Humboldt's subsequent work, his '*Prüfung der Untersuchungen über die Urbewohner Hispaniens*,' contains a most successful attempt to investigate, by

* *El imposible vencido*. Arte de la Lengua Bascongada. Su autor el P. Manuel de Larramendi de la C. de Jesus, Maestro de Teologia de su real Colegio de Salamanca. Salamanca, 1729.

† *Diccionario trilingue del Castellano, Bascuence, y Latin, &c.* San Sebastian. In folio, 1745.

topographical terms plainly derived from the Biscayan language, the history of the Iberian race in different parts of western Europe. But both Vater and Humboldt wanted the advantage of a thorough acquaintance with the idiom of ancient Spain; an incalculable advantage, if only it could be found united with the knowledge of the true principles of scientific philology and sound critical judgment. This rare combination has displayed itself for the first time, if we are not mistaken, in the writer whose name stands at the head of this article. M. D'Abbadie is an enterprising and highly talented man, from whose zealous exertions in the cause of geographical discovery, if his life be spared, much may be expected. He is now in Abyssinia. Previously to his departure, he left with us a proof of his possessing the qualifications which are most important for those who embark on investigations respecting the history and affinities of human races in his '*Études Grammaticales sur la langue Euskarienne*.'

This work contains, if we are not greatly mistaken, a far more complete analysis of the Biscayan language, and especially of the curious and elaborate construction of its parts of speech, than any that has before appeared. The multitude of inflections which the verb undergoes in its numerous conjugations are clearly and accurately analysed. Each of these modifies the sense in an infinitely more various manner than the conjugations of the Semitic verbs. The only real counterpart or parallel to the conjugation of the Biscayan is to be found in the native idioms of America. In the form of the verb itself, every modification of meaning is expressed, which we denote by inflections, or by adverbs and conjunctions, including even the sex, and number, and person, of the subjects and objects.

For an European of any other race to learn this language by study would be impracticable. The only individual who could by possibility achieve the task would be an Algonquin or Mexican, or some native of the New World, whose original speech, though totally different in vocables, is constructed on a model nearly similar, and indicates at least a direction of mind in the process of the development of language in a great measure analogous. This analogy had not escaped the observation of Vater and Du Ponceau. These writers, who first made known to the learned of Europe the very remarkable facts connected with the structure of the American languages, were at first struck forcibly by the resemblance which discovered itself between those languages and the Biscayan: and they would have been led by it to conjecture that the Basques are the last relic of an ancient population which may have found its way from the west of Europe across the Atlantic, had not a further investigation proved that, together with these marks of resemblance, there are others equally important of discrepancy. It is now the opinion of the best

informed philologists that the analogy in structure belongs rather to a similar stage and mode of cultivation, than to the results either of accidental intercourse or of a common origin. Such is at least the supposition in which Du Ponceau and W. von Humboldt acquiesce. They appear to have resorted to it as affording a probable explanation of the facts, without observing that it involves much that is hypothetical. M. D'Abbadie has adopted this opinion. He says,—

“L'Eskuara, différent en cela de toutes les autres langues d'Europe, appartient à la famille des idiomes polysynthétiques, si riche et si variée chez les races primitives d'Amérique, et qui ne se trouve dans l'ancien monde que chez les aborigènes de l'Espagne et du midi des Gaules,” &c. —p. 10, *et seq.*

M. D'Abbadie has more fully than any other writer compared the structure of the Basque with that of other languages in the Old World. He gives an account of its relations to the Finno-Hungarian idiom, the only European family of languages which bear such a comparison, to the Georgian in Asia, and to the Wolof or Jolof in Africa. The observations which follow will be read with interest :—

“Passant aux contrées transatlantiques, nous nous trouvons dans le dédale des langues Américaines, si nombreuses et si peu connues. On sait qu'en général ces idiomes ont une ressemblance commune dans la grammaire, mais qu'ils diffèrent singulièrement dans les racines. Des analogies qui se rapportent à ces deux ordres de phénomènes, le fond et la forme, suivent quelquefois une marche parallèle dans les langues que nous avons examinées ci-dessus, le Wolofe seul excepté. Ainsi les langues Laponne, Hongroise, Finnoise, Latine, Hébraïque, Arabe et Georgienne, nous ont offert plusieurs racines communes au Basque, malgré le peu de développement que nous avons donné à ce genre d'étude.” “Dans les langues primitives de l'Amérique au contraire, la constitution de chaque mot a une physiognomie étrangère, et pour trouver des rapports avec le Basque, il faut se borner à la grammaire. Ici les analogies sont nombreuses et le seraient peut-être davantage, si la plupart des auteurs n'avaient suivi de trop près la marche de la grammaire Latine. On serait donc obligé de posséder ces langues à fond pour décider si elles ne se prêteraient pas plus aisément à une autre classification.” “Le nom Mexicain n'a pas de genre et fait sa déclinaison par des post-positions. Il ne forme pas ces mots composés par une désinence que prendrait l'un des noms composans.” “La langue Quichua, parlée par les aborigènes du Pérou, est l'une de celles qui ressemblent le plus à la nôtre,” &c.—p. 24.

The author concludes by observing that by assuming as types of this small number of comparisons, the principal languages of the two hemispheres, he trusts to have said sufficient to encourage philologists and those who take an interest in ethnography as a branch of geography, to follow out the connexion, as there is little doubt their labours will not be in vain.

MISCELLANEOUS.

I.—Recent Intelligence upon the Frozen Ground in Siberia. By Prof. K. E. VON BAER, Imp. Ac. Sci., St. Petersburg.

As the Royal Geographical Society of London has taken some interest in the communications it has received on the depth to which the ground at Yakutsk remains in a frozen state, it will, I conceive, be glad to learn the measures adopted by the Imperial Academy of Sciences at St. Petersburg, to ascertain precisely, not only the law which regulates the temperature of the ground to the depth which is affected by the periodical changes of summer and winter, but also the influence of the external air penetrating into the well or shaft at Yakutsk, upon its sides; and, finally, to ascertain the depth which the summer heats, which in Yakutsk are very considerable in respect to its position, generally reach.

As soon as I had laid before the Academy the observations made by the merchant Schergin, which had been communicated to me by Admiral Wrangel, a commission was nominated for the purpose of pointing out the means which were to be applied to carry them on in the most desirable manner. Accordingly the commission recommended that a thermometer of a peculiar construction should be introduced into the side of the well, and placed horizontally, at the several depths of 1, 3, 5, 10, 20, 50, 100, 150, 200, 250, 300, 350 feet: two thermometers, indeed, at each of these depths, close to each other, one of which should be inserted a foot deep, and the other a fathom, so that the difference between the two would show the effect of the air in the shaft on the temperature of the ground. These thermometers are to remain a whole year in their places, and to be observed daily. A note is also to be taken of the depth at which the ground is thawed in the autumn, on the approach of winter, whether in forest ground, or under the dry steppes, in marshy countries, sandy places, &c. &c. Attention is also to be paid to the greatest degree of heat attained by the ground in these several districts, at a foot and a half beneath the surface. These directions were sent as early as February last, to Yakutsk, with orders to inquire whether any competent person could be found there to undertake

these observations. But in all probability the academy will be obliged to send some one thither on purpose, properly qualified. They will also in due time, if the means at their disposal allow of it, direct deeper excavations to be made, to pursue still further the observations on the increase of temperature.

The members of the Royal Geographical Society have very justly observed that the observations of M. Schergin are already sufficient to demonstrate the gradual increase of the temperature, although it appears to be more rapid than has been found in other countries where the ground is not frozen. Nor did the mention I made of the doubts expressed by M. von Buch refer to this point; on the contrary, M. von Buch, in an address which he read to the academy of Berlin in the year 1825, distinctly expressed it as a matter of doubt, whether in a district covered with wood the ground can be in a frozen state at so great a depth as the first excavation in Yakutzk had reached, namely, 91 English feet.

Professor Erman, it appears, is not satisfied with the expression "ground ice" (*bodeneis*, Germ.) which I have proposed. I did so because it seemed to me to embrace all the requisite modifications, and is very concise. It is clear that ground which is totally free from moisture cannot be frozen; but the ground in high northern latitudes is never in this state. Even the sand, though in the arctic summer its surface may now and then be perfectly dry, is yet before the winter begins always saturated with wet. If we examine ground which contains only very little moisture in a frozen state, it is very difficult to detect the ice, as it forms an extremely thin partition between the single particles of the earth. Should the moisture be somewhat more considerable before the freezing comes on, we perceive in its frozen state small pieces of ice, wherever the spaces between the particles of the soil are large enough to admit them. These bits of ice, which look like small crystals, I have particularly noticed between the upper layer of soil which is thawed, and the lower layer in a frozen state. But in the flat marshy districts of the high northern latitudes, which in Russia are called *Fundun* (originally a Finnish word), there is so much water in the ground that the quantity of water frequently exceeds that of the soil mixed with it. If in the summer you drive a pole into the turf, which is here formed by the grass, or by the moss, a dirty water, mixed with soil, spirts up in a stream to a considerable height. In some places, too, and particularly those which are surrounded by hills, the ground is covered with pure ice. I have seen such a situation in *Nóvaia-Zemlia*, which was entirely covered with perfect fresh-water ice more than a foot thick. This was not a steep cliff covered over with a bed of ice, like that of which Captain Beechey speaks in Kotzebue Sound,

but it lay horizontally upon the ground ; nor was it the least doubtful how this layer of ice had been formed. It was almost entirely surrounded by hills : the water from the melted snow had collected in the hollow, and had been frozen in the winter. In the following spring or summer the ice, before it could be again melted, had been covered with warm soil from the neighbouring hills to the depth of three feet ; and, as in *Nóvaia-Zemlia*, the increasing temperature of the earth during the summer does not thaw it so deep as three feet, the ice had remained unmelted. From the narrative of Admiral Wrangel's Journey, which I have read in MS., I observe that similar layers of ice are not rare in the valleys of Siberia. It sometimes indeed happens, as I have observed in *Nóvaia-Zemlia*, that the ground is penetrated by perpendicular clefts or shafts of ice. These clefts, which are, however, extremely thin, and which I have never found above four inches thick, occur most frequently in loamy soils. This ground in *Nóvaia-Zemlia* is penetrated by fissures in all directions, which are occasioned by contractions produced by the frost. They are usually from one to three inches in width. Water is collected in them in summer, which is frozen in the following winter ; and if the fissures go to any depth, it is never thawed. This is especially the case if the spot be gradually overgrown with a layer of moss. All these modifications may be comprehended under the term of ground ice, which has also the advantage of allowing of the expression, "perpetual or permanent ground ice," as we speak of perpetual snow. Perpetual ground ice is, then, that which is found in the arctic regions, in that layer of earth which is immediately below that which is thawed by the summer heat, reaching, as this does, to the depth where the temperature of the earth is at freezing-point.

It seems to me very important for physical geography to ascertain the thickness of perpetually frozen ground in countries of which the mean temperature is considerably under the freezing-point. I will merely mention one approximation. If, as is the case at Yakutzk, the ground never thaws at the depth of 300 or 400 feet, all the small streams whose superficial waters only are kept in a liquid state in the summer, must be in winter entirely without water, and *vice versâ*, we may conclude that all rivers which do not come far from the south, and of which the course is entirely within those countries which preserve perpetual ground ice, and yet do not cease to flow in winter, must receive their waters from greater depths than those which remain in a frozen state. It is thus clear that these veins of water penetrate the perpetual ground ice. This circumstance strikes me as not devoid of interest with respect to the theory of the formation of springs, and it would be very desirable that some researches upon this subject

should be set on foot in high northern latitudes. In the narrative of Admiral Wrangel's travels there occurs a remarkable instance of very considerable rivers in very cold countries being without water in winter, like our ditches and inconsiderable brooks. He was riding (to the north of Yakutzk, in about 65° N.) over the ice of a pretty considerable river, when the ice suddenly gave way, and his horse sunk: he was himself saved by being thrown on the ice, at the moment his horse fell. He was lamenting the loss of his horse to the Yakutzkers who accompanied him, as he knew not how to get another, when they laughed, and assured him they would soon get his horse back, and with a dry skin too. They got some poles, and broke away the ice, under which the bed of the river was perfectly dry, as well as the horse and his pack. The Yakutzkers were therefore aware that there was no water in the winter time at the bottom of rivers of this size; and in this case the water must have disappeared before the ice had gained sufficient thickness to bear a loaded horse and his rider. Similar accidents and similar results must doubtless have frequently taken place during the many journeys which the English have made in North America; and the agents of the Hudson's Bay Company must be well acquainted with the real state of the small rivers in winter in those high northern latitudes, *i. e.*, whether all of them are in a liquid state below the ice or not; *i. e.*, whether water flows in them under the ice or not.

I am collecting materials to ascertain the *southern* limit of the perpetual ground ice in the Old World. Those I have are not yet very complete; but I am already aware that this phenomenon extends much further in a southerly direction in Siberia than in Europe. I do not believe it has yet been observed in Lapland out of the mountainous districts. Nor did I ever hear of it at Archangel; though Herr Schrenk, a young botanist, who, during last summer travelled through the country of the Samojedes in the suite of the imperial botanist Sartens, and who reached the northernmost extremity of Ural and the island of Waigatz, assured me that on the Petchora the ground at a certain depth is never free from ice. It has long been known that further north the ground is at all times frozen, and a thaw is very rare.

The further we go east, the more southerly do we find the limit of perpetual ground ice. Humboldt found in Boguslowsk, in lat. $59\frac{3}{4}^{\circ}$ N., 60° E., at the foot of the Ural mountain, small pieces of ice at the depth of six feet in the summer; but Boguslowsk lies very high. No permanent ice has been found in Tobolsk in 58° N.; but at Berezov, in 64° N., where Erman found the temperature of the ground above $+ 1$ R., at a depth of 23 feet, we learn from other observations, and particularly those

of a Russian traveller of the name of Belawski, that the lower districts are never without ice in the ground; so that Berezov is probably very near the limit of perpetual ground ice; for it is clear that the peculiarities of soil must have considerable influence in countries which lie near this limit. Further east, this frozen soil extends much more to the southward. Already in the last century, travellers who visited Siberia, and especially Georgi, related that ice remained in the ground throughout the whole year, in the environs of the Lake Baikal, and upon an island in lat. 52° N., 106° E. long. It was generally supposed that this circumstance was occasioned by the high mountains surrounding the lake. But Herr von Helmersen has communicated to me some ancient notices, from which it seems that the whole of this south-east angle of Siberia has perpetual ground ice. Captain Frehse, who, according to 'The Berlin Review,' went in search of gold-sand in 1836, states that so early as September, *i. e.*, very little before the beginning of the winter in those latitudes, he found the ground frozen at some distance below the surface, and that this frozen stratum was continued uninterruptedly quite to the under-lying rock, to the depth of from one to six Russian sashén, 42 English feet. But, as at that depth there was always rock, it was not possible to say how thick the layer of frozen earth would be under this latitude (52°). It thawed on the surface of the banks of the river to the depth of from $2\frac{1}{2}$ to 6 English feet, and still deeper (6 to 9 feet) on the naked heights. But in the forests, where the light of the sun was intercepted, the thaw reached only from $\frac{3}{4}$ to 6 feet. If it be true that there are places in forests where the ground is never thawed a foot deep, it would demonstrate how little it is necessary for the ground to be thawed for trees to grow on it. The development of the leaves of the pines depends less on the temperature of the soil than on that of the air in the spring; it only requires that the ground should be so far thawed that the tree may be able to draw from it a sufficient quantity of moisture for its growth. I was convinced of this upon observing in Lapland large leaves already upon the shrubs when the thaw had scarcely reached a foot deep in the swampy soil on which they were growing; but the air was in consequence of the long days (in June) very warm. On one occasion, after having dug down six feet through the frozen ground in these trenches in the district of Nertchinsk, they came upon the pure ice, an archin, or $2\frac{1}{2}$ feet thick, and inclosing boulders (*gerölle*) of different kinds of rock. According to other observations, made equally in the circle of Nertchinsk by Colonel Tatarinoff, the frozen stratum was not more than six feet thick; and the annual thaw of the superficial stratum in each summer is rather less. The greater thickness of the frozen stratum, in the observations of Captain

Frehse, may be accounted for by the fact that they were made in higher latitudes; nor ought we to forget that the country of Nertchinsk is mountainous, and lies high.

Still further east, again, the perpetual ground ice is found at a less depth southwards, probably because the neighbourhood of the sea raises the temperature of the soil. Erman, at least, found no ice in the soil at Okhotzk.

It seems that Fort Churchill in America, in lat. 59° N., long. 94° W., lies exactly on the limit of perpetually frozen ice, as the mean temperature of this place is only a little below freezing point.

(Signed) BAER.

II.—*Astronomical Positions in European Turkey, Mount Caucasus, and Asia Minor, fixed by F. G. W. STRUVE, from the Observations by Officers on the Imperial Russian Staff, in the years 1828 to 1832. Communicated by Captain H. G. HAMILTON, Royal Navy.*

[The following important Table of Geographical Positions is extracted from the *Bulletin de l'Académie Impériale des Sciences de St. Petersbourg*.]

DURING the campaigns of the Russian armies in the last Turkish war in Europe and Asia, a series of astronomical and geographical observations was carried on, which were as important as they were remarkable for their extent and accuracy. On the appointment of the Director of the Dépôt of Maps belonging to the Imperial Staff (Lieutenant-General von Schubert), some officers were named to make astronomical observations at the points occupied by the armies, and were for this purpose supplied with a complete set of instruments. These observations were made in European Turkey, from 1828 to 1832, by Captains Vrontschenko, Ortenberg, and von Essen. They made use of two portable transit instruments, two astronomical theodolites, pendulums and chronometers, and telescopes for the observation of occultations, sextants, and a magnetic dipping-needle. In the further Caucasus and in Asia Minor, Captain Birdin worked with similar means, but without theodolites or a dipping-needle. On this side of Caucasus, and at some points of Turkey in Europe, the observations were made by officers of the Topographic corps. These observers had previously followed a complete course of practical astronomy at the Dorpat Observatory. From this circumstance, their labours became an object of peculiar interest to me; and I had much pleasure in undertaking the office of comparing their occultations and lunar culminations with corresponding observations—of deducing the longitudes from them,

of revising the latitudes, and azimuth and chronometrical longitudes of the observers, and of bringing out the final results, particularly of the longitudes, by a comparison of what had been done by the several methods. For this purpose the original journals, as well as the calculations of the observers, were all brought to Dorpat. In making these various calculations, I had the assistance of the officers, both of the staff and of the fleet, who were residing there for their astronomical studies, as well as of some other young men attached to this pursuit. Besides, the astronomer Captain Lemm, of the Imperial Staff, had been ordered to Dorpat for nine months, as well to assist in the calculations as also to prepare the manuscript for the press. When this was completed, nothing remained for me to do but the comparison I have already alluded to, and the bringing out the results, which I took in hand a short time ago; and I have thus been able to bring to a conclusion, after several years' labour, the working up of these rich materials.

The result of this operation is the fixing astronomically of 89 points in Turkey in Europe, of 14 points in Caucasus and in Asia Minor, in addition to 6 positions on Ararat ascertained by Fedorov—making in all 109 points.

Of these points, the latitudes of 85 are determined by observations made with the astronomical theodolite; and these are correct, at least, to two seconds. The sextant was made use of for those in Servia, Caucasus, and Asia. In Servia also Captain von Essen observed with this instrument the altitudes of the stars. The agreement of the results by the northern and southern stars, generally α Aquilæ and the polar star, ensures the certainty of the latitudes within ten seconds. In Asia Minor, Captain Birdin found the latitudes by altitudes of the sun, with the exception of Erz-rûm, where he made use of the circle in the prime vertical, the results of which agree very well with that obtained from the altitudes of the sun. Fedorov determined with great accuracy the latitude of Tiflis with the theodolite, as well as that of one of the points on Mount Ararat, from whence the others were trigonometrically deduced.

It is well known that longitudes are much more difficult to fix than latitudes. It is only of late years that the right ascensions of the moon and of neighbouring stars have been applied for fixing longitudes correctly; and they were first used for geographical purposes by Preuss, in fixing the position of the harbour of St. Peter and St. Paul in Kamtchatka, and of St. Francisco in California, during the second voyage of Kotzebue round the world. This was prior to their application to the same end by Foster, when with Parry in Port Bowen. If the Russian navy may claim the honour of having first used this method, where it is

much wanted—namely, in fixing positions at a distance from observatories—it has been much more extensively adopted by the officers of the Russian army: inasmuch as 22 longitudes, fixed in this way by lunar culminations, served as a basis for all the rest. Of these 22 longitudes, 16 belong to Turkey in Europe, and 6 to the other continent. Ten positions—that is, 7 in Europe and 3 in Asia—were also observed by occultations of stars. Finally, the longitudes of these positions, Várnah, Burgház, and Adrianople, were correctly fixed by a new method proposed by me—that is, by observing the zenith distances of the moon, and of a neighbouring fixed star. The advantage of this method is greater in proportion as the moon is nearer to the meridian. The coincidence of the longitude of Várnah, as found by this method with that derived from lunar culminations, as well as that of the longitudes of Burgház and Adrianople with those which Captain Manganiari ascertained by the chronometer on some neighbouring points of the coast, from the observatory of Nicolaye, have proved the utility and the correctness of this method.

From the positions thus fixed, the longitudes of the remaining points have been ascertained, by the chronometer or by instantaneous lights, and by latitudes and azimuths. Besides single chronometric observations, five journeys (comprehending a greater extent of country) were also made with chronometers; among which journeys the most important was that which extended from Tchernetz, on the frontiers of Servia, upon the Danube, as far as Shurshhah, and thence northwards as far as Butushan in Moldavia. Five chronometers were used on this journey—(Barraud No. 542 and 810, Parkinson No. 542, Breguet No. 4160, Arnold No. 293).

The materials thus obtained for ascertaining the longitudes of places in European Turkey, between the Servian frontier and the Black Sea, have been so important, that, after a comparison between the mean longitudes and the various differences, a very remarkable degree of certainty has been obtained for all the results.

The following table contains all the longitudes, latitudes, and magnetic variations. In those longitudes which are marked with one asterisk there may be an error of something more than 10 seconds of time; in those with two asterisks, the error may be something more than 20 seconds of time. All the other longitudes must be correct within from 2 to 4 seconds of time:—

No.	Name of the Place.	Locality.	Latitude, North.	Longitude East of Greenwich.	Variation.	
					Date.	West.
BESSERABIA.						
1	Ismâ'il . . .	Sobor Cpola*	45 20 29'6	28 47 49		0
2	Tuchkova . .	Church Tower	45 20 35'6	28 49 29		
3	Soñyáni . . .	Church Tower	45 24 16'0	28 51 50		
4	Kiliya . . .	Sobor	45 26 2'6	29 15 56	1828-77	8 53-2
MOLDAVIA.						
5	Yassi . . .	Church of St. Charalampia	47 10 24'1	27 34 43	1828-56	11 50-7
6	Chitatusa Convt.	North Tower	47 8 13'9	27 34 45		
7	Skuleni . . .	Posthouse	47 19 13'1	27 36 44		
8	Butushán . .	Church of St. Elias	47 45 4'5	26 39 38	1831-24	9 43-5
9	Rómano . . .	Armenian Church	46 55 21'8	26 55 19	1828-67	11 20-5
10	Fokshán . . .	Church of St. Spiridion	46 13 49'7	27 54 17	1830-69	10 44-9
11	Berlát . . .	Church of St. John	45 41 48-9	27 10 19	1829-30	11 19-0
12	Galátz, or Galách	Uspenski Church	45 26 12'3	29 2 56	1828-70	11 1-9
WALLACHIA AND BULGARIA.						
13	Ibraíl, or Bráilov	Minaret of Láz-jámi'	45 16 11'3	27 58 11	1828-72	10 43-1
14	Ditto . . .	Church of St. Michael	45 16 19'8	27 58 10		
15	Buzeo . . .	Ch. of the Banu Monastery	45 9 1'4	26 48 52	1829-36	12 4-8
16	Ditto . . .	Church of Episcopia	45 9 31-9	26 48 32		
17	Ploveshti . . .	Uspenski Church	44 56 20'7	26 16 9	1828-98	11 48-9
18	Bucharest, or Bukuresti	Metropolitan Church	44 25 39'0	26 35 23	1829-05	9 14-4
19	Kalarash . . .	Church	44 11 29-2	27 19 24	1829-54	11 13-8
20	Silistrah, or Silistria	Mesjid, i.e. Mosque	44 7 9-8	27 14 41		
21	Shurshah . . .	Church Tower of St. Nicholas in the Citadel	43 53 14'7	25 57 33	1831-39	9 7-3
22	Rushchúk . . .	Tower	43 50 36'8	25 56 40		
23	Zimnitsa . . .	Church of St. Constantine and Helena	43 39 8'0	25 21 14	1831-40	10 15-2
24	Sistovah . . .	Mosque	43 37 13'8	25 19 45		
25	Mogureni . . .	Village	43 44 39'1	24 52 9	1831-40	11 1-7
26	Nicopolis, or Nicébolí	Eastern Mosque in the Fort	43 42 18'1	24 53 19		
27	Kalafát . . .	Village	43 59 33'9	29 55 36	1831-65	11 42-3
28	Viddin . . .	Tower	43 59 28'9	22 52 42		
29	Viddin . . .	Mosque in the Citadel	43 59 34'9	22 52 50		
30	Chernetz . . .	St. Troitzki's Church	44 38 3'9	22 42 6	1831-65	14 51-0
31	Ditto . . .	St. Peter's Church	44 38 1'5	22 41 13		
32	Ditto . . .	St. Nicolas' Church	44 38 24'6	22 42 16		
33	Ditto . . .	Lazaretto	44 37 22'8	22 36 24		
34	Kladovah . . .	Mosque	44 36 53'1	22 35 57		
35	Tirgoahil . . .	Bisserika Domneska Church Tower	45 2 10'5	23 15 53		
36	Ditto . . .	Delya-Kimp Church-Tower	45 2 0'7	23 16 16		
37	Kráyovah . . .	St. Anne's Church-Tower	44 19 23'5	23 47 39		
38	Ditto . . .	All Saints' Church-Tower	44 19 8'4	23 47 43	1831-64	12 48-1
39	Ditto . . .	St. Nicolas' Church-Tower	44 19 7'5	23 47 20		
40	Ditto . . .	Tower of the Light-house	44 19 7'6	23 47 10		
41	Slatina . . .	St. Troitzki's Church-Tower	44 25 55'8	24 20 56	1831-60	13 22-8
42	Ploveshti . . .	St. Elias' Church-Tower	44 51 4'8	24 52 4		
43	Ditto . . .	Uspenski Church	44 51 16'9	24 52 1		
44	Ditto . . .	Tower of St. George's Church	44 51 25'3	24 52 0	1831-58	12 47-0
45	Tirgovist . . .	Church Tower of St. George	44 56 15'2	25 26 27		
46	Ditto . . .	Ch. Tower of St. Demetrius	44 56 6'2	25 26 35		
47	Ditto . . .	Tower of the Metropolitan Ch.	44 55 33'6	25 27 5	1831-57	12 48-4
48	Ditto . . .	Tower of the Mountain Convt.	44 57 29'4	25 28 22		
49	Bábá-tágh . . .	Minaret	44 53 39'6	28 44 25	1828-82	12 9-8
50	Hirshóvah . . .	Mosque	44 41 3'8	27 54 30	1828-94	11 48-8
51	Chernovodi . . .	Mosque	44 20 23'2	28 0 26		
52	Zimni-dindel . . .	Centre of the Village	44 22 27'3	28 0 50	1828-93	11 40-4
53	Tarkutai . . .	Mosque	44 3 35'5	26 36 35	1829-50	11 36-0

• The Cathedral.

* The Cathedral.

No.	Name of the Place.	Locality.	Latitude, North.	Longitude East of Greenwich.	Variation.	
					Date.	West.
WALLACHIA AND BULGARIA—CONTINUED.						
54	Kustenje, or Chiastenza	Mosque	44 10 21' 2	28 42 2	1838-93	1° 38' 8
55	Mankaliyá, or Mangalia	Mosque in the Market-place	43 48 31' 3	28 37 18	1830-48	12 13' 1
56	Bázájik . . .	Mosque in the Market-place	43 34 16' 8	27 54 3	1830-36	10 41' 2
57	Kávarnah, or Egerneh	N. W. Mosque	43 25 49' 8	28 22 50	1830-46	10 11' 9
58	Várnah . . .	Mosque of Hasan Bairákalár	43 12 3' 3	27 57 33	1829-72	9 49' 5
59	Parávdí, or Právdí	Mosque	43 10 30' 4	27 28 7	1830-44	14 41' 1
60	Yení bázár . .	Mosque	43 20 32' 1	27 13 24	1830-36	11 6' 2
61	Shumliá . . .	Minaret	43 17 23' 2	26 58 47		
62	Near Shumliá	Point of Rock	43 14 55' 4	26 56 53		
BULGARIA AND ROUMELIA.						
63	Silvno . . .	Mosque, called Háji Ibráhim jámi' sí	42 40 45' 0	26 19 48		
64	Karínabád, or Carnabat	Mosque, called Háji Ádes jámi' sí	42 38 57' 6	27 1 13	1839-70	11 20' 2
65	Aídós, (Áctos)	Mosque, called Gornatá-jámi'	42 48 17' 5	24 48 28	1829-70	11 38' 3
66	Misávrí (Mesembria)	Metropolitan Church . .	42 39 44' 9	27 47 28	1839-68	10 47' 6
67	Akhyóli (Anchialé)	Preobrazhenski Church . .	42 33 25' 05	27 42 21	1839-69	11 19' 3
68	Sozeh-bóli (Sozopolis)	Centre of the Hospital, on an insulated height in the City	42 26 46' 3	27 45 25		
69	Burghás (Pyrgos)	Chief Mosque in the Bázár .	42 29 35' 87	27 31 48	1839-70	11 5' 4
70	Yaubóli (Joannopolis)	Old Jámi'	42 29 6' 3	26 33 31	1829-34	11 35' 3
71	Adrianople . .	Tower of the Eski-Sarai (old Seraglio)	41 41 26' 5	26 35 41		
72	Kirk kilísa (40 Churches)	Mosque, called Mohammed Debender-jámi' . .	41 43 58' 8	27 12 38		
73	Vízah (Byzia)	Mosque, formerly the Ch. of St. Nicolas . .	41 34 26' 9	27 45 28		
74	Sarái . . .	Mosque, called Áges Páshá-jámi'	41 26 27' 0	27 56 23		
75	Chóriá . . .	Yení Jámi' (i.e. New Mosque)	41 9 46' 3	27 48 2		
76	Lúleh Burghás .	Principal Mosque	41 24 25' 1	27 21 21	1839-75	11 25' 0
77	Dímotikah (Dymotichos)	Tower of the Castle . . .	41 21 3' 5	26 30 39	1829-74	11 41' 4
SERVIA.						
78	Porech . . .	Island in the centre of the City	44 30 36' 3	22 2 51		
79	Gradeshtí . .	End of the Great Road on the bank of the Danube . .	44 45 53' 8	21 29 37		
80	Smedreva . .	Stone Church in the suburb towards Belgrade . . .	44 29 51' 3	20 24 17		
81	Shabtzá . . .	Suburb, not far from the new stone church . . .	44 45 22' 1	19 41 58		
82	Belgrade . .	Vracha, Prince Milosh's country house, outside of the fortress, not from the river Tópehider . . .	44 47 57' 0	20 25 12°		
83	Krakoevatz . .	Centre of the City	44 0 29' 4	20 53 32°		
84	Karanovatz . .	Soshestvi Church	43 43 26' 2	20 39 17°		
85	Chachak . . .	Near the Church of All Saints, now a mosque—stone-house with a cupola	43 53 29' 7	20 21 7°		
86	Svoídruz . . .	Pot-house	44 2 15' 3	19 16 45°		
87	Tapriyeh . . .	Lazarotto	43 56 3' 2	21 19 59°		
88	Poshegi . . .	Pot-house	43 50 49' 6	19 46 44°		
89	Yassika . . .	Centre of the City	43 26 37' 3	21 17 9°		

No.	Name of the Place.	Locality.	Latitude, North.	Longitude, East of Greenwich.	Variation.	
					Date.	West.
CAUCASUS AND ASIA MINOR.						
1	Tiflis . . .	Height in the Governor's Garden . . . A place near it, south of the Catholic Church . . .	41 41 4.0 41 41 37.4	44 50 39 43 5 8		
2	Piati-gorsk . .	Alexandrov's Spring . . .	44 9 39.3			
3	Kizlovodsk . .	Centre of the Fortress . . .	43 54 21.0			
4	TzarskieKolodzi .		41 27 57.7			
5	Jar, or Novaya Zakatali . . .		41 37 40.6			
6	Nukhi . . .		41 11 46.3			
7	Akhaltzikeh . .	Second Gate of the Citadel . .	41 39 4.7			
8	Kars . . .	In the Fortress . . .	40 37 1.7	43 9 2		
9	Ardagan . . .	Near the Fortress, the House of the old Caravanserai . .	41 7 15.9	42 48 24		
10	Gumri . . .	Close to the Lazaretto Surgery . . .	40 46 57.6	43 46 54		
11	Hasan Kal'eh . .		39 58 47.4			
12	Ery-Rum . . .		39 55 16.1	41 18 31		
13	Balaburt . . .		40 15 36.5	40 8 48		
14	Kalkit chiftlik .		40 8 2.6	39 10 23		
FEDEROW'S DETERMINATIONS ON ARARAT.						
15	. . .	Point of Little Ararat . . .	39 39 10.63	44 24 31		
16	. . .	Foremost point of Great Ararat . . .	39 43 24.17	44 17 53		
17	. . .	Hindmost point of Ditto . . .	39 42 21.94	44 17 38		
18	. . .	Convent of St. Jacob . . .	39 46 13.10	44 21 52		
19	. . .	Village of Bujak . . .	39 52 38.78	44 31 5		
20	. . .	Point of the Hill of Alagetz .	40 31 35.65	44 11 23		

III.—On the recent Russian Expeditions to Novaia Zemlia. By Professor K. E. VON BAER.

[Abridged from the *Bulletin de l'Académie Impériale de Sciences de St. Petersburg.*]

[While our enterprising countrymen in the west are gradually prosecuting discovery on the northern shores of America within the arctic circle, it may not be uninteresting or uninstrucive to turn our eyes to the east, and observe what our active rivals in the polar regions, the hardy Russians, are doing towards the improvement of the geography of the more northern lands that lie immediately adjacent to their own coasts;—and with this view, as also with the object of enriching our Journal with some valuable geographical information, an outline is subjoined of the recent expeditions to the islands of Novaia Zemlia, abridged from several communications made by Professor Baer, during the past year, to the Academy of Sciences at St. Petersburg, and accompanied by a chart showing the *actual* outline of its coasts, as traced by the

VOL. VIII.

2 F

pilot Ziwolka, from the latest examinations, by which it will be seen that more than the eastern half represented on our maps has no existence in reality.—Ed.]

THE first discoverer of these islands, as far as is known, appears to have been Stephen Burrough, who in the year 1556 reached Waigatz Island; this being only separated from Novaia Zemlia by a strait thirty miles wide, there can be little doubt but that he saw its southern coast. Forty years later Barentz and the crew of a Dutch vessel wintered on the islands, and in the seventeenth century the Dutch are said to have pushed some distance to the eastward; but the eastern coast does not appear to have been approached before the time of Loshkin, a walrus-fisher, who in 1742 perished near the river, named after him the Sawina, in $71^{\circ} 30' N.$ lat. Twenty years later his countryman Rosmysloff penetrated through the Matotshkin-Shar, a strait so called extending in an east and west direction about forty-five miles long by three broad, which in the parallel of $73^{\circ} 20'$ divides the length of Novaia Zemlia into two nearly equal portions.

From 1762 till the year 1819 no expedition is on record, yet, doubtless, its shores were visited annually by seal, whale, and walrus-fishers; but between that and the year 1824, five successive exploring voyages were ordered by the Russian government. Four of these were under the command of Lieutenant, now Admiral, Lütke; yet all the skill and perseverance of this officer could not effect the desired object, namely, to explore the eastern shores of the islands.

The attempt, so often frustrated, to survey the shores of Novaia Zemlia, would probably have been abandoned but for the enterprise of Mr. Brant, a merchant of Archangel, who, desirous of restoring the former trade along the northern coast of the continent, from the White Sea to the gulf of Obi, and of establishing the walrus-fishery on the eastern shore of Novaia Zemlia, fitted out three vessels commanded by experienced officers. One vessel, commanded by the Master Pachtussoff, was to sail through the strait of Kara, and to examine the eastern shore of the islands. The second, under Lieutenant Krotoff, was to keep on the west coast as far as the entrance of the Matotshkin-Shar, then working through the strait, to steer for the gulf of Obi, or the mouth of the Yenisei. The third was merely to fish for walrus on the west coast, in which she was successful.

Quitting Archangel together on the 13th of August, 1832, Pachtussoff separated in a fog from Krotoff in the White Sea; they rejoined off Kanin Noss, and again parted for their respective stations, since which nothing has been heard of the latter, but the wreck of a large ship found in 1834 by Pachtussoff, at the

western entrance of the Matotshkin-Shar, leaves no doubt as to the fate of Krotoff and his crew.

Pachtussoff was more fortunate; he reached the south shore of Novaia Zemlia, and, steering to the eastward, he met with so much ice that he was obliged to take up his winter-quarters on the 12th September in Felsen or Rocky Bay; and employed himself and his crew for the dreary months he remained here as usual with persons in similar circumstances. On the 6th May a heavy snow-storm occurred, and lasted three days, which M. Baer observes is remarkable for its great extent, having learnt from Mr. Helmersen, who was at that time travelling in the Ural mountains, that it was felt throughout the whole extent of that range as far as the parallel of 48° , a distance of nearly 1500 miles from the coasts of Novaia Zemlia.

On the 6th July Pachtussoff profited by a clear sea in the Strait of Kara to examine in his boat the eastern coast as far as a small river in $71^{\circ} 30' N.$, now named the Sawina, from the circumstance of the cross left by Ssawa Loshkin, who perished in 1742, having been found there.

On the 26th July, ten months from their arrival, the vessel was extricated from the ice, and left Felsen Bay, and they continued to the northward along the eastern coast, at one time detained in Lütke's Bay in $72\frac{1}{2}^{\circ} N.$ for eighteen days. On leaving it they met with an iceberg, grounded in eleven fathoms, and on the following day, August 25, Pachtussoff entered the Matotshkin-Shar, having surveyed the eastern coast of the southern island.

At the western outlet of the strait he encountered a heavy gale of wind, which obliged him to run for shelter to Petchora on the Russian coast, where on the 15th September the vessel was wrecked, and he returned by land to St. Petersburg.

The following year, 1834, the Russian government sent two vessels under the command of Pachtussoff and the master Ziwolka to follow up these discoveries. They sailed from Archangel on the 5th August, pursued different courses along the shores of Novaia Zemlia, and met again at the western entrance of the Matotshkin-Shar. By the 26th September they contrived to effect their passage to the eastern outlet of the strait, but there the closely-packed ice compelled them to retreat to their winter-quarters, near the western end, which they occupied on the 20th October. In the following spring they constructed sledges; Pachtussoff completed the survey of the strait, while Ziwolka with great exertion pushed 100 miles to the northward along the east coast as far as Cape Flottoff, but want of provisions obliged him to return.

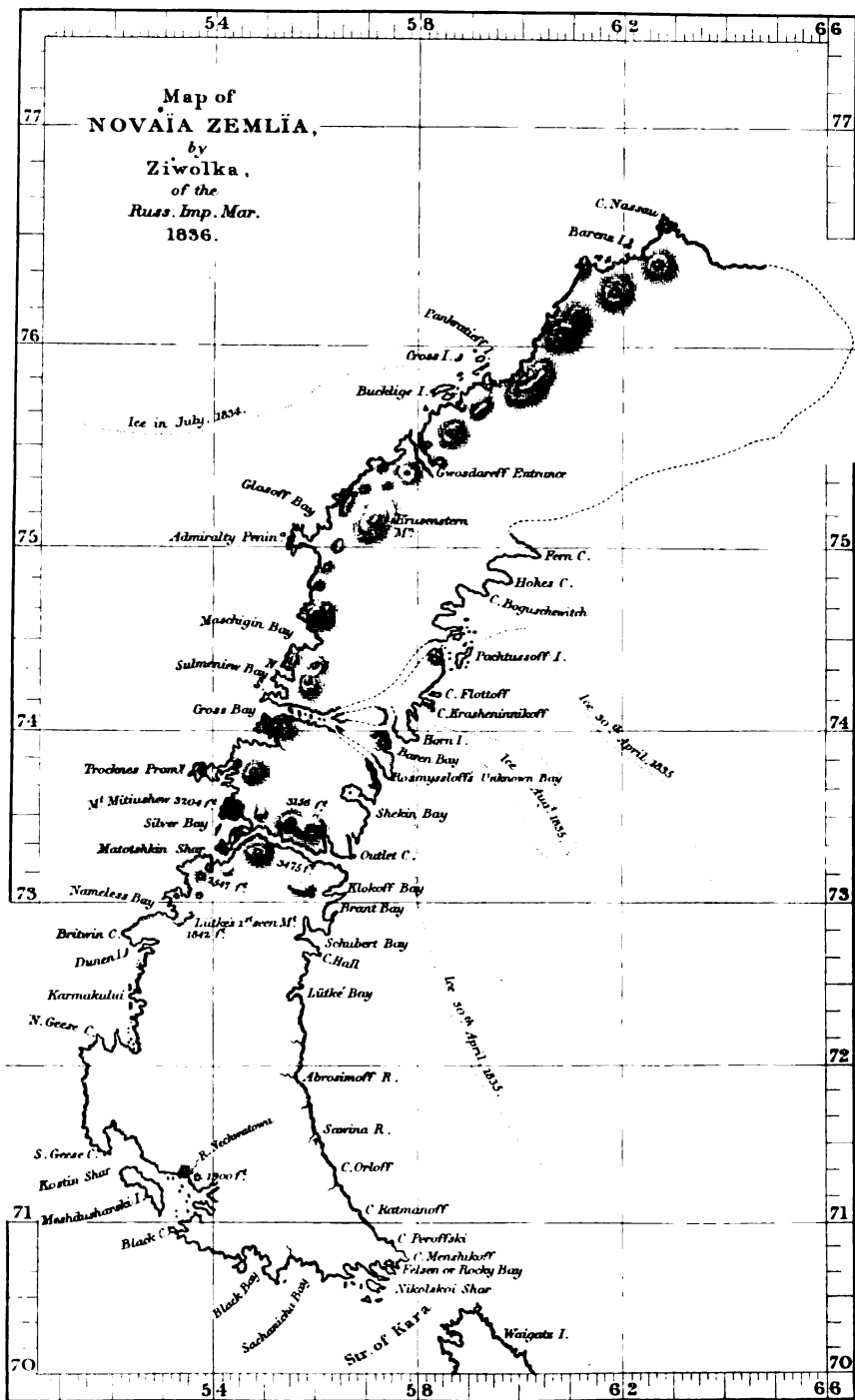
Pachtussoff, who had by this time completed a boat, started on

the 12th July to the northward along the west coast, and met with the first ice off Admiralty Peninsula on the 8th July; two days after the ship was nipped and went to pieces; the crew were saved and proceeded to the northwards, dragging their boats over the fields of ice as far as Bucklige Island, in $75^{\circ} 45' N.$ The persevering Pachtussoff here set about surveying the neighbouring islands and coasts as far as $76^{\circ} N.$ when a walrus-fisher approached the coast, rescued them from imminent peril, and carried them back to their winter-quarters. On the 26th August Pachtussoff started for the east coast, and explored as far as the island which bears his name, $74\frac{1}{2}^{\circ} N.$, when the ice compelled him to retreat, and he returned to Archangel, where shortly after his arrival he died.

The ardour of M. Baer in natural history would not permit the examination of these islands to remain in this imperfect state. By his representations another expedition, being the eleventh to these shores, was fitted out under the pilot Ziwolka, accompanied by MM. Baer and Lehman as naturalists, and sailed from Archangel on the 1st July, 1837: touching on the coast of Lapland, they reached the western entrance of the Matotshkin-Shar on the 29th, where they found the sea in high latitudes clear of ice. With some difficulty they succeeded in penetrating to the eastern end of the strait, but stormy weather drove them back to their former anchorage. Excursions were made in various directions to explore the natural history of the country, &c. On the 16th August they quitted the strait and steered to the southward, examined Nameless Bay in lat. 73° , and proceeded round the western extreme of the land to the strait on the S.W. coast called Kostin Shar, which was found studded with small islands; here they ascended the small river Nechwatowa into the interior, but, the weather becoming very stormy, on the 12th September they quitted these shores for Lapland, and finally reached Archangel on the 23rd September.

Although but six weeks were spent on the coasts of Novaia Zemlia, and no opportunity was afforded for a further examination of its shores, still the voyage was far from being unproductive in scientific results, and especially in natural history. These may already be partly found, and will be more fully developed hereafter, in M. Baer's reports to the Academy of Sciences at St. Petersburg, and in which he has also discussed the latitudes and longitudes of the various points, the result of which is shown in the chart, and has entered fully into the meteorology and climate of Novaia Zemlia; but our object is entirely with the physical geography of the islands. On reference then to the chart, it appears from the recent examinations that Novaia Zemlia stretches

Map of
NOVAIA ZEMLIA,
by
Ziwolka,
of the
Russ. Imp. Mar.
1836.



Published for the Journal of the Royal Geographical Society, by J. Murray, Albemarle Street, London, 1830.

John Armstrong

in a N.N.E. and S.S.W. direction, slightly curving to the westward, nearly 400 geographical miles in extent, between the parallels of $70\frac{1}{2}^{\circ}$ and $76\frac{1}{2}^{\circ}$ N. and 52° and 66° long. E. of Greenwich, with an average breadth of 50 miles, or about one-half the size hitherto represented on all our maps. The land on the western side of the islands is mountainous, rising generally 2000 feet above the sea; the mountains overhanging the Matotshkin-Shar both on the north and south side reach respectively 3156, 2547, 3204, and that nearer the eastern entrance of the strait full 3475 feet above the level of the sea: they are chiefly composed of a very black clay-slate: in the more southern portions of the islands near the Kostin Shar, grey primitive limestone prevails, similar to that found in the northern parts of the Ural chain, of which *Novaia Zemlia* may be considered a northern prolongation.

The eastern shores are comparatively low and barren. The various portions of the coast are coloured on the original chart to show by whom they were explored; whence we learn that nearly all the west coast was copied from Lütke's chart; that all the east coast of the southern isle was explored by Pachtussoff in 1832-3; that the Matotshkin-Shar, and the east coast, from $73\frac{1}{4}^{\circ}$ to 75° , was examined by Pachtussoff and Ziwolka in 1834-5; from 72° to 73° on the west coast is the information derived from Bashmakoff, a walrus-hunter; and the rest of the dotted line, or the north-eastern portion of the coast, that obtained from other walrus-hunters.

About 100 miles of the north-eastern shore yet remain unexplored; but we learn from a letter from M. Baer to Dr. Berghaus,* that the master Ziwolka was to sail again this summer with two vessels, with the intention of wintering at Bucklige Island, in $75^{\circ} 45' N.$, on the west coast, and in the year 1839 was to use all his exertions to sail round the north-eastern point of *Novaia Zemlia*, and there complete the discoveries carried on in so persevering and praiseworthy a manner by the Russian government.

* *Annalen*, No. 154.

IV.—*Notes on Cloudy Bay and Harbour, and on some other Harbours in New Zealand.* Communicated by Captain W. C. SYMONDS, 74th Regiment.

So little is generally known of the coasts and harbours of New Zealand, that I am tempted to offer, for the perusal of any who may take an interest in its geography, the following notes gathered from several quarters, and originally put together in another form, for my own guidance, in the event of my ever carrying into effect a project long contemplated, of visiting that delightful country. If they have not the merit of being the result of personal observation, the correctness of their details will, I hope, entitle them to some consideration.

It is a subject for regret that, among the many who have lately visited New Zealand, none should have communicated the contents of his note-book to the Geographical Society, more particularly if his pursuits should have led him to the southward of Cook's Straits. All who have published their remarks have limited them to a description of the northern part of the northern island in its narrowest part, and very few have even there explored beyond much above a dozen miles from the coast, though New Zealand has been the resort of Englishmen for upwards of five-and twenty years. All that can be learned of the southern and largest island is chiefly culled from the crude remarks of whalers, who naturally take but little interest in the coast beyond its capabilities of affording them an easy means of speedily filling their butts and shelter from occasional storms; consequently our information respecting it is very meagre, and confined principally to accounts of two or three harbours, and the appearance of parts of the eastern shore.

Owing to the prevalence of westerly winds, the western coast of either island is little frequented.

In the northern island we have a knowledge of the existence of several very fine harbours on the western coast, namely, Wharo, Whangape, Hokianga, Kaipara, Manakou, &c., in all ten; but of these (Hokianga excepted, of which there exists a tolerable survey) very few have been explored. We are chiefly indebted to the missionaries, and also to Lieut. Mc Donnell, R.N.,* for what we do know of them. The following account of those most known is extracted from details for which the writer is, I believe, indebted to the Rev. William White, late chairman of the Wesleyan Mission in New Zealand.

“The harbour of Kaipara is distant, southwards, from Ho-

* The first vessel that entered this harbour was the *Tui*, of 25 tons, on the 23rd Nov. 1835, sent by Lieut. Mc Donnell, R.N., many years resident at Hokianga. This vessel also explored the river Wairoa. Mr. Mc Donnell has obligingly communicated to the Geographical Society a plan of the harbour of Kaipara.—Ed.

kianga about sixty miles. The distance between the two heads of the harbour is about five or six miles. There is a sand-bank about mid-channel, but on each side of it there is abundant water to carry in a vessel of any tonnage in all states of the tide: it is at least ten fathoms deep at low water. A false impression has been created against this harbour in consequence of the position of a very extensive sand-bank which runs out to sea six or eight miles, and extends from the northward of the north head to the southward of the south head, and in approaching from the westward appears to form a complete bar right across the entrance. But it is not so by any means. Inside of this bank there is a deep channel of at least two miles broad at its narrowest part, affording a safe passage for a ship of the largest class to work in. One of the first vessels which discovered this channel was the schooner *Fanny*, on the 6th January, 1836, at which time were written down the following directions for entering:—‘Sailing into Kaipara, middle channel, go well to the southward of the south head; then steer E.N.E. by compass for a green patch on the sandy land, until you bring the middle green patch on the northward N. by E. $\frac{1}{4}$ E.; steer in that course until you are clear of the north end of the inner sand-bank, then steer direct for the inside point of the north head.’ After passing the heads the channel extends about five or six miles, when the vessel gains the bay and is completely sheltered from every wind. The expanse of the bay from north to south is not less than twenty-five or thirty miles. On the north there fall into the bay two large rivers, the Wairoa and Otamatea, and on the south the river Kaipara, which gives its name to the bay.

“The banks of these rivers abound in magnificent timber, particularly the banks of the Otamatea. The natives describe this as the largest pine or cowdie district in the island. Three or four Europeans have lately located here. Towards the head of the Wairoa there is a missionary station. Mr. White recently, at different times, ascended the Kaipara for about forty miles in two vessels, the *Fanny*, about 45 tons, and the *Martha*, about 200 tons. The same vessels ascended the Wairoa for about eighty miles, and the natives stated it to be equally navigable for thirty miles farther. From the top of a high mountain there were seen numerous and most extensive forests of timber, chiefly of cowdie. Great part of the shores of the inland bay are covered with forest trees: there are few natives. It is one of the districts nearly depopulated by the celebrated Houghi’s wars several years ago.”

The next harbour is Manakou, distant from the entrance to Kaipara about 30 miles. A tolerably detailed description of this fine harbour is contained in a work lately published;* but as no

* *Present State of New Zealand.* London, 1837.

correct survey of it has ever been made, comparatively nothing is known respecting it. More correct information may soon be expected of Manakou, as it is reported that H.M.S. Buffalo has gone there for spars, and will shortly return to England.

To the southward of Manakou is Waikato—distant from Manakou 25 miles. "It is a bar harbour, and no survey of the entrance has been obtained; but vessels of 250 tons have often been in for fresh provisions and water, and for flax. There are a few Europeans settled there, and the natives come down the rivers in their canoes, with flax, in great numbers. This harbour is formed by the Waikato and the Awaroa rivers: the Waikato is stated by the natives to have its source in an extensive inland lake, called Roturoa, but no account has been obtained of a passage from the lake to the sea. About 80 miles from the entrance of the harbour the river divides into two streams, the one called Horoteu the other Waipa."

The Horoteu flows in a N.W. direction, and is supposed to communicate with the lake Roturoa in the centre of the island. The Waipa is believed to rise in the high snowy mountains behind Tui, which are part of a range, being a spur from the great range or back-bone of this island.

The district about the lake Roturoa has the credit of being the most fertile portion of this part of the country, and in this report reliance may be placed, though we are chiefly indebted to natives for the information, assisted by the account given by that extraordinary man Rutherford, who was for several years in the interior.

The river Horoteu offers the easiest means of exploring in these parts; its stream is broad, deep, and unbroken by falls or torrents as far as has, up to the present, fallen under the eye of a traveller. And should it flow out of the Roturoa and prove navigable up to that lake, it is invaluable as the high road for the inland commerce to the coast. The inhabitants of the country through which it runs are few in number, peaceably disposed, and courting communication with Englishmen. The missionaries have not extended their labours beyond the neighbourhood of Waikato, but there they have been well received, and their exertions have been rewarded with success, equal to any which they have met in a more northerly part of the island.

Of the other harbours on this coast little or nothing is known beyond the report of their existence and excellence. Along the shore from Manakou to the river Mokou, and on the banks of the several rivers between these, great quantities of iron is found in the shape of dust or sand, for a distance estimated at 80 or 100 miles.

The principal harbours on the eastern side of the northern island are too generally known to require any notice here. Of the coast I shall offer a few remarks, for which I am indebted to

my brother, Captain Symonds, R.N., who was on the coast of New Zealand in H.M.S. *Rattlesnake*, and has recently returned.

The Bay of Plenty is interesting as containing a volcanic island, like Stromboli, always burning, and affording a beautiful spectacle to the voyager by night in the columns of fire which issue from the crater at its summit. It is called White Island, is between 1900 and 1500 feet high, and would be visible from forty to forty-five miles from the deck of a ship.

Of Cape East, Captain Dumont D'Urville's account is generally correct, but he has omitted to call the attention of the navigator to the remarkable and high land which rises immediately behind it, and is estimated to be about 3000 feet above the level of the sea; it is a table land gradually shelving down towards the cape.

The *Rattlesnake*, in her passage from the Bay of Islands to Cloudy Bay, was driven by northerly gales so far to the southward of Cook's Straits that she sighted Banks' Peninsula, which my brother describes as the most remarkable land he ever saw. It is high table-land of about forty miles extent, rising abruptly from the sea, white, and visible from a great distance.

Of the south coast of Cook's Straits we are also indebted for an account to the French navigator M. D'Urville, who, as I before remarked, is considered very correct in his description, though he does not enter into all the details which the peculiarities of the coast seems to call for. He was prevented from visiting Cloudy Bay by a lack of wind; and being carried to the southward by a strong current, which has a set out of the straits in that direction, he anchored at a station six miles to the eastward of Cape Campbell, which he describes as of a moderate height, terminated to seaward by a low spit of land. Mount Tako rears itself behind Cape Campbell, and is a lofty peak covered with snow, seen at a great distance, and an excellent land-mark for making Cook's Straits on this side.

For the details of the following description of Cloudy Bay and Harbour I have to thank Mr. Rossiter, an Englishman, the sailing-master of the French whaler *Mississippi*, who gave me a copy of a survey* made by himself while lying there; and to my brother, whose notes, though few (having remained in the harbour but twelve hours), are valuable, as confirming the report of Mr. Rossiter. I copy the following from my brother's journal.

"June 14, 1837.—After much tossing about in gales all round the compass, from S.E. to N.W., which drove us considerably to the southward in sight of Banks' Peninsula, the most extraordinary promontory I ever saw, we this day made Cape Palliser, a fine, high, bold point, the entrance to Port Nicholson showing

* Presented by Captain Symonds to the library of the Geographical Society.—Ed.

itself very distinctly. A course, west by compass, of forty-five miles, brought us to the entrance of Cloudy Bay, off the White Cliff, its eastern point on entering. This is easily distinguished at some distance, and has behind it a high mountain, consisting of three peaks, the summits of which are covered with eternal snow. The bay affords good shelter from all but S.E. winds, which is the severest gale in these parts. The soundings are from seven to ten fathoms, and is a favourite resort of the black whale.

"While we lay here at anchor we saw several whales killed, and there were not less than thirty boats out, manned by natives, with many European ones also—English, American, and French. The difference in the temperature here and at the Bay of Islands is sensible, being here much colder. From Cloudy Bay we went into Cloudy Harbour, steering a north course; thermometer at freezing point. There is not a single rock or obstacle in the way of entering, and this perhaps is one of the finest natural basins in the world. There are creeks all over it on both sides, into which the whalers haul to boil down their fish. In them is deep water, and the natives supply the ships with pigs, potatoes, fish, wood, and water, which are in great abundance and of excellent quality. The country is mountainous and the soil very rich. Queen Charlotte's Sound is a short distance from the head of the harbour, across a neck of land which divides them. Many of our countrymen have settled here, residing in log houses, chiefly on the west coast, and in Cook's Straits; their occupation—procuring oil from the black whale, which runs from forty to seventy feet in length, and gives from seven to ten tons of oil. This they supply to the ships which call here to take in their cargoes."

Mr. Rossiter lay in Cloudy Harbour for some time—in all its different bays on either hand. He gives it the highest character as a haven; its great draw-back however being, that in heavy S.E. gales the sea breaks across its mouth in from nine to seven fathoms water, which is open to the whole roll of the southern ocean; but in any of the bays, which are eight in number, the water is as still as in a mill-pond in the heaviest gales.

The southern point of Cloudy Bay is a white bluff cliff, called by the natives Buri-nui-hohiti, rising from 300 to 400 feet above the sea, and which, from being visible for a considerable distance, is an excellent land-mark. Its southern shore is high for some miles, as far as the mouth of the Wai-rau River, which falls into it at its south-western angle, and runs nearly parallel with the west shore, forming a long narrow peninsula, low and swampy at its extremity and covered at its higher and upper part with a forest of fine timber of three or four leagues in length. The Wai-rau has its source in the Snowy Mountains, and is navigable for several miles from its mouth: its banks swarm with ducks and other wild fowl of several species. Here also the apteryx abounds

and offers capital sport to the hunter, to whom it is valuable for its feathers, which are held in high estimation.

Cloudy Harbour is in the northern shore of this bay, and extends in a N.N.E. direction for about 5 miles; the breadth from cape to cape, at its mouth, being about $1\frac{1}{2}$ mile; the eastern point of entrance lies in lat. $41^{\circ} 20'$ S., long. $174^{\circ} 10'$ E. of Greenwich, and from this the White Bluff at the southern entrance of the bay bears S. by E. $\frac{1}{2}$ E. about twelve miles.

The head of the harbour is divided from Queen Charlotte's Sound by a narrow neck of land, over which the natives drag their canoes, and not exceeding, according to Mr. Rossiter, half a mile.

The five small bays on the western side of this harbour afford excellent anchorage, with a bottom of sand, and shells, and mud; deep water close in-shore. The best of these are "Europe Bay," "Tom Cary's Bay;" "Liln's Bay;" the country about them is beautiful; the soil fertile, and rendering a plentiful supply of provisions, wood, and water, to the many ships which frequent Cloudy Harbour. Several Englishmen have settled on their shores, and possess all things requisite for refitting ships of the largest dimensions. The natives are very few in number, having been nearly exterminated by the Kapiti tribe from the southern part of North Island and Entry Island. They live scattered on the banks of the Wai-rau and its neighbourhood, in miserable huts, in extreme poverty and wretchedness, whilst their foes, possessing the finest part of their territory, drive a lucrative trade with the whalers, and aid the English settlers in their establishments.

The three bays on the eastern side are larger than those on the western, affording equally good anchorage, and perhaps more perfect shelter from S.E. gales, but the country around them is sterile for the most part, the inhabitants few, and the water of a bad quality. Their names are—"Solyan's Bay," "Martin's Bay," and "Poverty Bay."

"Point Underwood" divides the head of the harbour from "Poverty Bay," by a peninsula 2 miles long, by $\frac{1}{2}$ a mile broad, and forms a beautiful, land-locked bay, 3 miles in length by about 1 in breadth, sheltered from all winds, with from 5 to 7 fathoms water, muddy bottom. This point received its name from being covered with low brush-wood, flax, &c.

"Queen Charlotte's Sound"—an excellent harbour in D'Urville's Island, Cook's Straits—"Akerva," in Banks' Peninsula—and "Dusky Bay," on the S.W. coast, are the only other havens in this island of which we have any account. All, except the harbour in D'Urville's Island, are the resort of sealers and whalers, and have been surveyed. Of the interior nothing is known. "The Southern Alps," which extend along the whole

length of the island, *are said* to abound in coal and iron: on what authority this report is grounded I know not, but I conceive it highly probable that such may be the case.

On the S.E. coast of this island are several immense lagoons, into which flow rivers said to be navigable for vessels of heavy burthen for many miles, but I am not aware of our having the testimony of any one who has so navigated them.

The native inhabitants are very few in number, and much scattered all over the island: whether they, like the natives of Northern Island, are divided into different tribes is unknown, but it is probable that the high mountain range should cut off all communication between those on the eastern and those on the western coast, and that therefore they have become distinct, having separate interests and acknowledging different chieftains.

By the kindness of Captain Beaufort, R.N., hydrographer, we are enabled to add some extracts from the "Remark Book" of Mr. George Johnson, Master of H.M.S. *Conway*, Captain C. R. Drinkwater Bethune, who visited and partially surveyed Cloudy Bay and Harbour in October, 1837:—

"Approaching Cloudy Bay from Cook's Straits, a large grove of trees in the bottom of this deep inlet appears like an island, and it is not till well in that the low, sandy shore can be seen:—the north point of the bay has high, rocky cliffs, with an inlet a short distance off it, and this side generally is well wooded: the south projection of the bay is a bold white bluff, with numerous little green hills gradually rising to the interior, without either trees or verdure, and backed at a considerable distance by lofty mountains covered with snow.

"Cloudy Harbour bears from the white bluff N. by W. $\frac{3}{4}$ W. 10 or 12 miles: it is difficult to distinguish, but may be known by a high conical hill over its upper extremity: it is commodious, with moderate depth of water from 7 to 10 fathoms: the shore is bold to, by just keeping without the long kelp (peculiar to this island), which runs off most of the points. Wood, water, and pigs are plentiful."

The above remarks are accompanied by a sketch-plan of the harbour, on the scale of 4 inches to a mile, showing the soundings generally, drawn by Mr. C. R. Read, Midshipman of the *Conway*, from which it appears that the harbour is 4 miles long, by an average breadth of 1 mile: width of entrance $1\frac{1}{2}$ mile. The east point of entrance lies in lat. $41^{\circ} 20' 40''$ S., long. $174^{\circ} 9' 50''$ E., measured by five chronometers in a nine-days' run from Sydney. Variation 17° E.

The *Conway* also anchored for two days off Capati or Entry Island, Cook's Straits, where a sketch survey of the eastern shore of the island was made by Mr. Johnson, and the position of the

Brothers and Hummock Isles fixed. The observatory on the latter isle was found to be $40^{\circ} 52' 26''$ S. lat., $174^{\circ} 56' 45''$ E. long.; var. $11^{\circ} 33'$ E. in October, 1837. Entry Island is about 6 miles long in a N.E. and S.W. direction, by $1\frac{1}{4}$ broad. The highest land rises 1800 feet above the sea. Water, wood, and stock plentiful. The tide rises from 4 to 6 feet; the flood-tide sets to the E.N.E. from 2 to 3 miles an hour; good anchorage in 10-fathom water; Hummock Island E., the Brothers S.W., about $\frac{1}{4}$ mile off shore.

V.—*Geographical Positions of the Principal Points of Eastern Greece, determined by the triangulation of Monsieur PEYTIER, Capitaine d'Etat Major. Communicated by Captain H. G. HAMILTON, Royal Navy.*

[Extracted from the *Bulletin de la Société de Géographie de Paris.*]

THE operations executed in Eastern Greece by M. Peytier are a continuation of those in the Morea, an account of which has already been published.* These observations have been made with the same instruments (Gambey's Theodolites), and with the same care. No new base has been measured, nor any further astronomical observations made. Several sides of the triangulation of the Morea have been made use of, as the basis for the calculations of the new triangles; and to determine the geographical positions, the extremities of these bases have been taken.

The heights above the level of the sea have been calculated from a massive ruin at the entrance of the Piræus, which has been connected with the triangulation, and of which the precise height above the level of the sea had been measured.

Starting from this point, the elevation of two mountains in the Isthmus of Corinth were calculated, the heights of which had been already obtained, starting from the Gulf of Napoli; and the agreement of the two results confirms what had already been said in the paper before alluded to, that the Gulfs of Napoli, Athens, Corinth, Marathonisi, and the sea near the Ionian Islands, were on the same level.

M. Peytier's recent operations extend over the Negropont, Attica, Bœotia, and Phocis, as far as the high mountains on the W. of Salona, and the frontier near Zeitún. They reach over a surface of more than 700 square leagues; and the number of positions fixed are nearly 600; the principal of which are contained in the following table:—

* Bull de Geog. vol. xix. p. 89.

Names of Places.	Designation of the Points observed.	Latitude North.		Longitude East from Greenwich.		Height above the level of the Sea in English ft.
		°	'	°	'	
Ambelaki . . .	Windmill on the ruins of Salamis . . .	37	56 6	23	33 37	
Ambelo-Nisi . . .	Small island to the S.E. of the Bay of Aspraspitia . . .	38	17 34	23	43 14	
Andera . . .	Cape to the N. of the village . . .	38	51 0	23	43 3	
Arakhova . . .	Church in the upper part of the village . . .	58	28 43	22	26 16	
Argyro-Nisi . . .	Small island towards the entrance of the Gulf of Volo . . .	39	0 27	23	5 41	
Atalanta . . .	Summit of the island . . .	38	40 15	23	7 00	436
Athens . . .	Top of the W. pediment of the Partheum . . .	37	58 8	23	44 51	571
Bay of Cuma . . .	Small island to the E.	38	36 31	24	14 36	
Biabardi . . .	Bridge on the Cephissus in Boeotia, near to . . .	38	30 33	22	53 00	371
Bodonista . . .	The upper part of the highest tower of the fort of . . .	38	45 1	22	38 12	1992
Bourzi . . .	Fort on the Coast to the S. of Egripo . . .	38	24 16	23	39 35	
Cape Colonna . . .	The Temple (upper part)	37	38 51	24	2 46	369
Cape D'Oro . . .		38	9 25	24	37 21	
Daphne . . .	Summit of the mountain (Mount Egialeus) . . .	37	59 40	23	38 25	1536
Daulis . . .	Church on the ruins of	38	30 16	23	45 10	
Delphi . . .	Summit of the mountain (Eubœa) . . .	38	37 26	23	51 44	575
Disto . . .	Tower of (Eubœa)	38	21 9	24	9 56	
Distomo . . .	The southernmost house of the village of (Ambrissus) . . .	38	25 29	22	41 6	
Dramesi . . .	Ruined Tower near the village of (Delium?) . . .	38	22 52	23	28 51	
Egripo . . .	Fort Kara-Baba, upper part (Chalcis) . . .	38	27 46	23	26 15	
Ekhinos . . .	The Tower	38	53 21	22	44 50	463
Elatea . . .	Summit of the mountain (Citheron) . . .	38	10 53	23	16 14	
Eleusis . . .	The Tower	38	2 25	23	33 13	
Eretria . . .	Windmill of the Ipsariots, to the W. of (Eubœa) . . .	38	23 18	23	47 48	
Gaidouro-Nisi . . .	Patroclus Island (summit of the island) . . .	37	38 49	23	58 15	856
Galaxidi . . .	Windmill situate to the S.E., and near the town . . .	28	22 9	22	24 31	
Gatza . . .	Summit of the island	38	31 3	23	24 29	
Gavaliani . . .	Small summit near the S. cape of the island . . .	38	12 29	24	7 13	
Gerako-Vofui . . .	The summit (Othrys)	39	0 55	22	43 43	5570
Grauzitsa . . .	Summit of the mountain of	38	24 8	22	55 11	2940
Guiona . . .	Highest point of the mountain (the highest mountain in Greece) . . .	38	38 40	22	16 24	8329
Gypto-Kastro . . .	Highest tower (Acropolis of Eleuthera) . . .	38	10 38	22	23 51	
Hagios Ioannis . . .	Chapel to the S. of Topolias	38	28 59	23	11 5	221
Hagios Ioannis-Kiligos . . .	Monastery	38	0 1	23	51 29	
Hagios Meletios . . .	Monastery	38	11 21	23	28 44	
Hagios Nikolaos . . .	Mountain with a Palmokastro, near to Siyra (Eubœa) . . .	38	8 26	24	17 10	
Hagios Nikolaos Galatas . . .	Monastery (Eubœa)	38	42 50	23	23 33	
Hagios Nikolaos . . .	Ruined tower in the island	38	29 11	23	31 23	
Haliartus . . .	Small tower on the ruins of	38	23 10	23	6 55	
Haseki . . .	Large ruined Turkish Pyrgos, near Athens . . .	37	58 50	23	43 35	
Hellada . . .	Mouth of the river	38	50 14	22	36 54	
Jerusalem . . .	Monastery on Parnassus	38	30 45	22	42 49	
Kakosio . . .	The Tower (Thisbe)	38	15 13	22	59 35	
Kandili . . .	Ruined Khan of (Isthmus of Corinth) . . .	38	1 5	23	13 39	
Kaprena . . .	Church to the N. of the village (Chersonese) . . .	38	29 36	22	51 51	
Karysto . . .	The highest part of the citadel (Eubœa) . . .	38	1 57	24	27 9	7061
Katabothra . . .	Highest point of the mountain (Eta) . . .	38	47 22	22	16 34	
Kavasala . . .	Tower on a height to the W. of the village . . .	38	10 53	23	31 27	2136
Keratea . . .	Highest point of the mountains of . . .	37	47 18	23	59 38	
Kerato Pyrgos . . .	Ruined Tower near the anchorage off Salamis . . .	37	57 27	23	37 16	

Names of Places.	Designation of the Points observed.	Latitude	Longitude	Height above the level of the Sea in English ft.
		North.	East from Greenwich.	
		° ' "	° ' "	
Khlomo of Talanta	Summit of the mount	38 35 46	23 0 20	3547
Khlomo of Volo	Summit of the mount	39 5 2	22 57 57	2952
Kliphissia	White house in the shape of a tower	38 4 4	23 50 4	
Korombili	Summit of the mount	38 11 43	23 5 41	9982
Koumi	The westernmost and most isolated of the windmills to the S. of	38 37 23	24 7 29	
Kouroublia	One of the summits of the chain called Kandili on the maps (Eubœa).	38 40 12	23 29 16	3967
Konveli	Small island in the bay of Dombrena	38 12 8	23 0 42	
Krevassara	Bridge on the Cephissus of Bœotia, near to Summit of the mountain (Messapius)	38 34 24	22 49 3	3363
Ktyra	Summit of the mountain (Messapius)	38 37 43	23 30 33	
Larymna	Small island, with chapel, in the gulf of	38 34 27	23 19 16	
Lesko-Nisia	The most eastern of the small islands	38 57 16	23 28 28	
Likeri	Ruined Pyrgos on a cape in the lake (the soil).	39 24 29	23 16 37	426
Limni	Windmill on the coast	38 45 42	23 20 29	
Lithada	Summit of the mountain (Eubœa)	38 51 28	23 53 59	2221
Lithada	Island between Cape Lithada and the con- tinent in the centre of the channel.	38 48 21	22 50 39	
Livkdia	Highest tower of the castle	38 25 40	22 53 40	
Livadoestro	Ruined tower of	38 12 17	23 8 17	
Livanotora	Ruined tower with Grecian ruins near cape of	38 43 15	23 5 00	
Liakoura	Highest summit of the mountain (Parnas- sus).	38 31 57	22 38 36	8068
Makro-Nisi	Long Island, highest point of the island	37 44 17	24 9 37	992
Mandoudi	Ruined tower to the west of the village	38 47 45	23 29 53	
Mandoudi	Small island with two high rocks, near the coast of (Eubœa).	38 48 36	23 32 21	
Mantelo	English Island, south summit of the island	37 55 51	24 32 48	
Marathon	Cape	38 7 9	24 4 43	
Marathon	The tomb of	38 6 43	23 59 29	
Mariolatas	The church (the ruins of Lilea are 3828 yards to the S.E.).	38 39 3	22 29 8	
Mazi	Small island near the coast N.W. of Mazi (Gulf of Corinth).	38 3 49	23 9 21	
Megara	Square tower in the upper part of the town	37 59 46	23 21 24	
Mendeli	Summit of mountain (Pentellicus)	38 4 44	23 54 14	3642
Menidi	Church of Panagia to the west of the vil- lage of	38 4 39	23 45 20	
Molo	Isolated new church to the S.E. of the vil- lage.	38 49 16	23 40 13	
Monomati	Ruined tower of	38 5 16	23 47 49	
Moriki	Tower	38 25 13	23 22 40	
Moulki	White Turkish Pyrgos in ruins	38 22 47	23 8 14	
Okthonia	Summit of the mountain (Eubœa)	38 31 30	24 12 6	9403
Okthonia	The smallest of the two islets off the cape	38 30 53	24 15 23	
Olympus	Summit of the mountain (Attica)	37 44 59	23 57 15	1501
Olympus	Summit of the mountain (Eubœa)	38 28 33	23 53 8	3848
Orchomenus	Highest ruin of the Acropolis	38 29 33	22 58 49	
Oreos	Chapel in the Acropolis	38 56 45	23 7 4	
Oropo	Large house in the port of	38 19 5	23 48 36	
Oxylithus	Summit of the mountain (Eubœa)	38 35 7	24 7 45	1309
Ozea	Summit of the mountain (Parnes)	38 10 20	23 44 18	4636
Palamo-Vouna	Summit of the mountain (Helicon)	38 17 47	23 54 8	5738
Panagita	Small island with chapel near the bay of Oreos.	38 56 27	24 3 37	
Panopea	Tree and chapel in the centre of the ruins of	38 29 35	22 49 1	
Patisia	House of Admiral Malcolm near Athens	38 0 7	23 45 31	
Petradyk	The Tower	38 52 19	22 15 44	
Paximada	Small island near Karysto	37 57 20	24 24 30	
Petali	Highest point of the largest of the islands	37 59 29	24 17 14	1214
Petra	Steep mountain with Greek tombs and ruins.	38 23 1	23 2 0	
Phaga	Summit of the mountain (Sphingius)	38 22 10	23 12 21	1860
Phaneromem	Monastery (island of Salamis)	37 58 51	23 27 26	
Pireus	Massive ruin at the entrance of the port	37 56 15	23 39 3	
Platæa	Chapel on the ruins of	38 13 10	23 17 42	

Names of Places.	Designation of the Points observed.	Latitude North.	Longitude East from Greenwich.	Height above the level of the Sea in English ft.
Politiki	The large tower of (Eubœa)	39 33 40	23 34 1	
Porto Thoriko	Or Porto Mandri (peak of)	37 44 13	24 4 37	479
Pyxaria	Summit of the mountain (Eubœa)	38 42 29	23 40 3	4436
Rafti	Statue on the largest island	37 53 48	24 3 57	
Rovies	The tower (Eubœa)	38 48 18	23 15 8	
Sagmata	Monastery	39 23 51	23 25 56	2457
Saint Elias	White chapel on a summit to the south of Iegrana. . . .	37 41 29	24 0 2	1171
Saint Elias D'Oro	Mount Ocha, summit of the mountain (Eubœa). . . .	38 3 36	24 29 8	4607
Saint Elias of Salona	Highest summit of the mountain	38 30 9	22 19 59	6277
Saint George	Chapel on a summit near Athens (Mount Lycabettus). . . .	37 53 45	23 45 53	912
Salamis	Mavrovouni, highest summit of the island	37 55 42	23 31 3	1347
Sarandavli	Woody summit on Parnassus, the Corycian cave is on the southern slope. . . .	38 31 52	22 38 12	
Saromata	Naked summit of the mountains	38 44 6	22 35 29	4568
Skripou	Monastery of	38 39 28	23 59 51	
Salona	Cape of the harbour of	38 25 46	22 26 14	
Stephani	The northernmost of the two ruined mills near the sea. . . .	38 1 37	23 37 7	
Stilida	The custom-house	38 54 34	22 38 12	
Stoura	Highest point of the island	39 10 2	24 10 58	
Talanta	Large house in the port of	38 40 8	23 5 40	
Thebes	The school (the ground)	38 19 5	23 20 17	676
Thebes	The tower	38 19 16	23 20 20	
Topolias	The church (Copaia)	38 29 25	23 10 51	
Tower	To the south of Aliveri near the sea (Eubœa). . . .	38 23 14	24 4 23	
Tower	S.W. of the lake Topolias (Coronea)	38 23 26	22 58 57	
Tourko-Khori	Bridge on the Cephissus in Beotia, near to Summit of the mountain (Hymettus)	38 37 2	23 43 39	518
Tio-Vouni	Summit of the mountain (Hymettus)	37 56 37	23 50 7	3370
Trakones	The tower on a small summit	37 54 49	23 45 35	
Trikeri	Ruined windmill on the coast at the entrance of the Gulf of Volo. . . .	39 5 19	23 4 51	
Vardoussia	Highest rock of the mountain	38 40 42	22 9 54	3176
Vasilikos	Tower of (Eubœa)	39 25 39	23 41 24	
Vatero	Ancient ruined tower to the S.E. of the ruins of Thespia. . . .	38 16 52	23 11 41	
Velissa	Church in the eastern part of the village (Tithorea). . . .	38 34 49	22 41 26	
Vraona	Tower near to	37 54 40	23 58 42	
Xero-Khori	Large ruined house belonging to the Pacha	39 57 2	23 10 22	
Xero-Vouni	Summit of (Mount Cirphis)	38 27 33	23 33 45	5128
Xero-Vouni	Highest rock (Eubœa)	38 34 32	23 54 45	4639
Zagara	Highest point of the mountain (chain of the Helicon). . . .	38 19 3	23 2 14	5010
Zeitún	Minaret of the citadel	38 54 5	22 27 20	

VI.—*On the Site of Cusco, &c.* By J. B. PENTLAND, Esq.,
H.M. Consul in Bolivia. Communicated by Captain BEAUFORT, Royal Navy.

La Paz, March 28, 1838.

I HAVE just returned from a two months' tour into the southern provinces of ancient Peru, during which I have visited the capital of this ancient empire, Cusco, and the many interesting localities round that imperial city. An account of this journey, hitherto untrodden by scientific travellers, I hope to send to the Geographical Society; in the mean time, as a wish is expressed by the Secretary, in one of the late volumes of its Transactions, that the position of Cusco should be accurately determined, I beg you will tell him I have acted upon his suggestion, and that the ancient capital of the Peruvian empire is situated (the Temple of the Sun, now the Church of San Domingo) in lat. S. $13^{\circ} 30' 55''$, long. W. of Greenwich, $72^{\circ} 4' 10''$, and at an elevation above the sea of 11,380 feet.

I have determined, also, the position of all the principal places between La Paz and Cusco, and of the western shores of the great inter-alpine lake of Titicaca.

In latitude $14^{\circ} 33' S.$, on the mountains of *Vilcanota*, which transversely connect the two great east and west chains of the Cordillera, the limit of perpetual snow is at an elevation of 15,800 feet.

The eastern chain of the Cordillera of Upper Peru, from the parallel of *Sorata*, in $15^{\circ} 50' S.$, to that of *Salcantai*, in $13^{\circ} 10' S.$, is composed of an almost uninterrupted series of snowy peaks; and the whole of this central chain is a compound of quartziferous porphyry, posterior to the transition state, and new red sandstone formation.

On the *Nevado de Guaracolta*, in $14^{\circ} 30' S.$ lat., a copious spring, which issues from the mountain about 250 feet below the limit of perpetual snow, has a temperature of $38\frac{1}{2}^{\circ}$ Fahr. [$+3^{\circ} \cdot 6$ cent.]

It would be very possible to measure an arc of the meridian extending from $13^{\circ} 20'$ to $20^{\circ} S.$ lat. in the centre of the Andes. The ground towards each extremity of the arc is well adapted for the measurement of the bases.

VII.—*Brief Notice of the Gulfs of Kos and Symi.* By Lieutenants GRAVES and BROCK, R.N. Communicated by Captain BEAUFORT, Royal Navy, F.R.S., Corr. Inst. France.

AT Patmos, where we commenced this year's survey of the islands and coast of Asia Minor, we made a plan of Gümüşlü, which I can with great confidence assert to be the ancient Myndus, from the extent of ruins and a colonnade of fifty-two columns, of which the pedestals all remain, besides foundations of temples and remains of ancient baths, tombs, &c.—the plan of them shall be forwarded as soon as we have time to copy it. From Patmos we proceeded to Kos, picking up a boat that had been detached to survey Zinari and Livata. Kos is a beautiful island, and it was quite a pleasure to behold it after the rugged and barren spots we have been so long accustomed to. Here our reports were confirmed of the wretched state of Kalymno, which, since our examination of it last year, has been depopulated by plague—the corn is uncut, and dead bodies are lying about in the streets. From Kos we steered for Symi. On reading over Mr. Brooke's communication, in the *Geographical Journal* (vol. viii. p. 133), respecting the Gulf of Symi, it appears that, after passing five islands, he entered a bay, the scenery of which was grand and imposing, and that on its further shore were the remains of a castle crowning the summit of a hill. This forms the northern coast of the harbour of Losetho. Again, his cruise ended at what he terms "Gothic Island." Now at about 2 miles to the northward of this, at the head of a narrow creek, on each side of which are high and precipitous cliffs, is, I believe, the narrow isthmus forming the ancient Triopium promontory. We levelled it across, and made a plan of this interesting locality, which agrees well with ancient authorities, and in no other place do the gulfs approach so near each other, although at Dahtchak, a bay on the north shore, nearer to Cape Krio, there is no great distance.

The boats being all occupied on the survey, I started for Mughlah (the ancient Alinda), then and now the capital of Caria; we took horse at the head of the gulf, at a place correctly called by Colonel Leake, Assereneh (modern): 18 hours of execrable road took us to our destination, the route leading us close to the head of the Gulf of Kos, but no ruins of any extent repaid us for our trouble, so I proceeded 6 hours farther to Eski Hisar (Stratonicea), the position of which I thought it would be satisfactory to determine. Here we were partly repaid for our toils, and found, as we almost invariably have done, that Chandler's description was perfectly correct.

The coast-line of the Gulf of Symi and the Island of Symi are finished, so that by the end of the season I hope to get as far as the harbour of Marmorice and Kara-kach.

No inscriptions worth mentioning have been found in the Gulf of Symi, but many ruins, chiefly buildings of the middle ages, built upon ancient foundations; from Kos they are very numerous; they shall be copied and sent home as soon as possible.

The plates published by the Society of Dilettanti have reached me safely. They are very beautiful, and, as far as I have yet examined, very faithful and correct.

Lieutenant Brock, describing the Gulf of Kos, states that the crew of his vessel suffered very severely from a fever caught on the unhealthy plains of Keramus, the town which formerly gave its name to the gulf. He proceeds to say that, in consequence of the various indentations and harbours on the south side of the gulf, they had much hard work, but still should have completed their survey, had it not been for this unfortunate sickness.

He then adds, "I was much disappointed in not finding any inscriptions among the numerous ruins, both ancient and modern, with which the gulf abounds. There are some buildings at Keramus which I shall narrowly examine, but am afraid shall only meet with the customary disappointment. The gulf is considerably deeper than any charts show, being 52 miles in length, of a very peculiar shape, taking that of a canal toward the bottom, bounded on the north side by precipitous mountains falling in a series of cliffs nearly to the water's edge, and on the south side by a constant succession of broken hills and deep ravines, with small patches of ground capable of cultivation—in some places well watered, and covered by most luxuriant vegetation. The rivers which water these small plains find an outlet in low, marshy ground in the harbours, but, owing to the flat nature of the ground, are salt at some distance from the sea, and can only with great difficulty be made use of for watering, and then only by carrying breakers up the valleys. There are no inhabitants near the coast, and it was with great difficulty we procured a few goats and fowls, and seldom met any one from whom we could procure information."

[In addition to this prospect of geographical information from the zealous officers intrusted with the survey of the coasts of Asia Minor, we have the satisfaction to add that Mr. Charles Fellows, just returned to England, made during the last summer an extensive journey through an almost unknown part of that country.

From Constantinople Mr. Fellows went to Kútáhiyah; not far from this he examined the ruins of Tóghánlú, which are misplaced on our maps; thence to Sandúklí, Búrdúr, Isbartah, Aghlásun, where were fine ruins, Súsah, and Antáliyah; thence eastward along the coast about 40 miles to Manavghát; returned to Antáliyah, then to Delik, Tegr-ovah, Cape Khelidonia, Phínika, Kákava [Andriace], Antiphellos, Pátara; thence up the valley of the Xanthus, the scenery of which is described as very beautiful, to the town of Xanthus; thence to Pinara, a town 4 miles in circuit, with many and splendid ruins; then westward to Makri, to 'Húláh? Mughlah, Mélasso, Palátia [Miletus], and to Ephesus; and Mr. Fellows has kindly offered to communicate to the Society the journal kept during this novel route.—Ed.]

VIII.—*Itinerary from Tehrán to Alamút and Khurrem-ábád in May, 1837.* By Lieut.-Col. JUSTUS SHIEL, serving in Persia.

MAY 19, 1837.—Marched from Tehrán to Kend, a large village about 10 miles N.W. of Tehrán, close to the range of El-burz, and near to which is a pass over the mountains into the district of Shehristánek.

May 20.—W. by S., 16 miles to Kerej or Suleimáníyeh. The road was over an undulating, barren, stony plain, near to the foot of El-burz. At half a mile crossed the Kend stream, flowing from north; at 2 miles the peak of Demávend bore N. 79° E.;* the pass over El-burz was 2 miles to our right; at 12 miles Demávend still bore E. by N. $\frac{1}{2}$ N., the hill above Rei E.S.E. At 16 miles crossed the Kerej stream, flowing from north, and which is afterwards lost in the Kevir or salt desert south of Tehrán.

May 21.—Left Suleimáníyeh or Kerej, and proceeded to Fúshend, 27 miles. At Kerej the village of Hájí-ábád, in El-burz, bore N. 10° W., distant 3 miles; Senger-ábád, village on Kazvín road, N. 70° W., 12 miles; the mountains above Kinar-gird, the first day's march from Tehrán to Kum, bore from S. 11° E. to S. 16° E. The general direction of the road for 8 miles was N.W. $\frac{1}{2}$ W.; then for 7 miles N. 30° W.; and the remainder N. 35° W. At the third mile from Kerej the road to Kazvín turned off N. 63° W.; at fourth mile, village of Imám-zádeh was half a mile to our left; at thirteenth mile we passed close to the village of Kurdán on our right; and at 16 miles the village of Chendár was 1 mile on our left; at 27 miles, reached Fúshend, a large village close under the range of El-burz. The plain we travelled over to-day contained many villages.

May 22.—Left Fúshend for Mír, 27 miles; the first 4 miles the direction was N. 40° W.; then 3 miles N.; then 2 miles N. 45° W.; and the remaining 18 miles by a winding road, in the general direction of west. Immediately on leaving Fúshend we entered a defile and pass through El-burz, of 6 miles in length, and then descended into the district of Tálkán, through which the Sháh-rúd, rising at the eastern extremity, flows from E. to W.; at 10 miles we passed close to the village of Fúshendek, and then descended to the Sháh-rúd, down the left bank of which we proceeded until opposite to the village of Shehreser, when we crossed to right bank. At 21 miles passed the village of Leheren, and then, ascending a high hill, reached Mír. Tálkán is about 30 miles in length and 10 in breadth. It is fertile and populous. The western extremity of the valley is bounded by a high mountain called Yúzá, said to be 13 miles from Mír, and which bore S.W. The eastern boundary is a high mountain called Eserlik, where the Sháh-rúd rises. This river is here about 36 yards in width, with a rapid stream.

* All the bearings are *magnetic*, and were taken with a Kater's or prismatic compass. The variation at Tehrán in 1837 was 2° westerly.—Ed.

May 23.—Left Mír, and proceeded 10 miles to the small village of Yerek, in the district of Alamút. For 3 miles the direction was west; then 4 miles N. 60° W.; and 3 miles N. 40° W. On leaving Mír there was a very bad descent of 2 miles to the right bank of the Sháh-rúd, down which we travelled for 2 miles; at the third mile passed the village of Kúshán; at the fourth mile commenced ascending the very fatiguing pass of Dú-derán, through a chain extending north and south, and left the Sháh-rúd flowing west; at 8 miles from summit of pass saw the hilly district of Rúd-bár to the west, with the Sháh-rúd flowing through it. It is called the Sháh-rúd of Tálkán, to distinguish it from that of Alamút. Rúd-bár is bounded on the north by a high range which separates it from Gílán. From the top of the pass Yúzá mountain bore W. 17° N., and Eserlik mountain, at the eastern end of Tálkán, S.E. $\frac{1}{2}$ E. Having crossed Dú-derán, we were in the district of Alamút. Yerek is a small village at the southern foot of the Pishakúh range, which runs from east to west.

May 24.—Marched from Yerek to Gaser Khání, in Alamút, 10 miles. For 2 miles the direction was N. 45° E.; then 4 miles north; then 4 miles N. 30° E. We commenced by an ascent of 2 miles over the Pishakúh range, at the top of which Yúzá mountain, in Tálkán, bore S. 27° W., Yerek south; Selembár, a high peak at eastern extremity of Alamút, bore E. 6° N.; and Siyálán, a peak in the same quarter in which the Sháh-rúd of Alamút rises, bore N. 42° E. At the third mile we saw the village of Gaser Khání N. 29° E. At the fifth mile we passed the village of Díhek; at the seventh the village of Mahmúd-abad, and then crossed to the right bank of the Sháh-rúd river, which flows east and west, and falls into the Sháh-rúd of Tálkán. At 8 miles we passed the village of Shutur Khán. From Gaser Khání, El-burz, the name applied to a large high mountain at the extremity of Alamút, bore S. 35° E. From that village the rock of Alamút is distant 2 miles north, and said to be 8 farsakhs, or 32 miles, from Kazvín. The district of Alamút is enclosed by a high range to the north, which separates it from Gílán and Mázonderán; on the south is the Pishakúh range; on the east are El-burz and Siyálán; and on the west is Rúd-bár, and may be about 30 miles in length by 20 in breadth. The rock of Alamút stands alone; it is about two miles north of the village of Gaser Khání. The ridge is about 300 yards in length from east to west, and very narrow, not 20 yards at the top. The height is about 200 feet on all sides excepting the west, where it may be 100. It is a bare naked rock, exceedingly steep. There are no habitations in the vicinity nearer than Gaser Khání, nor are there any traces of ruins. Within a short distance of the rock there is a burying-ground. There are several remains of walls belonging to apartments at the top of the rock, besides two or three cisterns

or reservoirs for water. It must have been a place of great strength; and its capture would seem almost impossible by an army unprovided with the modern weapons of war. There are several excavations or pits in the side of the rock, which probably were used as store-rooms, as described by Von Hammer.* The vicinity of the rock is a most dreary solitude: excepting eagles and lizards, not a living thing is to be seen, nor even a single tree. The view from the summit of the rock is very fine, embracing nearly the whole of the valley of Alamút, and all the high mountains by which it is enclosed. Among them the most conspicuous is El-burz, which bore S.E. $\frac{1}{2}$ S., and Siyálán E. $\frac{1}{2}$ N., the pass through the Pishakúh range, S.W.

May 26.—Marched 12 miles to the village of Germ-rúd, in Alamút. For 2 miles the road was south; then the general direction for the remainder of the march was E. 15° S. We returned to the village of Shutur Khán, and then went up the banks of the Sháh-rúd, near to which Germ-rúd is situated; at fifth mile, Selembar mountain bore E. $\frac{1}{2}$ S.; at sixth mile passed the hamlet of Chelmír; and at eighth mile, the village of Serráj Mehelleh. We travelled through a great deal of cultivation, and near a number of villages. Germ-rúd is near the eastern end of the valley of Alamút, on right bank of Sháh-rúd, close under a steep bare range of mountains, which separate it from Mázanderán. El-burz mountain is immediately opposite to it, on the left bank of Shah-rúd.

May 27.—Left Germ-rúd, and proceeded 12 miles to Mírán, in the district of Túnákapán,† province of Mázanderán; our courses were east 1 mile, N.W. $\frac{1}{2}$ W. 3 miles, N. 20° E. 4 miles, north 2 miles, N. 25° W. 2 miles. After 1 mile we commenced ascending the very long and fatiguing pass of Germ-rúd into Mázanderán. We reached its summit at 8 miles, and found much snow. At $4\frac{1}{2}$ miles El-burz bore S. 51° W. From the top of the pass we descended continually to Mírán; nothing but hills to be seen. The Sih-hezár‡ or Mírán river rises here.

May 29.—Left Mírán, and marched 14 miles to a spot in the thicket, where we encamped. The direction was very winding, but the general course was N. 20° W. The road was through the ravine in which the Mírán or Sih-hezár river flows, and which we crossed during to-day's march twenty-five times. It enters the Caspian one mile to the north-west of Khurrem-ábád. The road was a continued descent, and was often so bad and narrow that we were obliged to unload the baggage, and have it carried by porters. At the fourth mile we entered a thick jungle of oak, beech, elm, walnut, and brushwood; at the fifth mile we passed the village of Káz Mehelleh; at night we stretched our carpets in the thicket, and halted.

* History of the Assassins, p. 70.

† Túná-*kapán*, i.e. Crane-catchers. (Turk.)

‡ Three thousand—S.

May 30.—Left our camp, and proceeded 12 miles to the large village of Khurrem-ábád, in the district of Túnikában. The general direction was north, through the thicket, and among hills which gradually diminished in height. At the eighth mile we saw the Caspian, and then descended some low wooded hills into the flat plain which separates the hills from the sea, and which here was three and a half or four miles in breadth. This plain was covered with thick wood, intermixed with rice cultivation, and many villages. At 8 miles a peak and cape on the shore called Már Kúh* bore N.W. 6° W.; another cape called Zanes bore E. 13° S. Khurrem-ábád is a large village; the houses chiefly scattered through the thicket; the capital of the district of Túnakában.† Salmon is abundant here in the Mirán river, or Sihhezár, which falls into the Caspian one mile and a half from the village. The water of the sea here is not so brackish as to prevent horses from drinking it. From this spot Mount Selembar bore S.W. 6° S., and Siyalán S. $\frac{1}{2}$ W.

June 2.—Left Khurrem-ábád, and proceeded to Kelár-ábád, in Túnikában, 24 miles. Marched E.S.E. for 3 miles through the thicket, and then reached the sea, along the shores of which we travelled for 19 miles in the general direction of E. $\frac{1}{2}$ S. The thick wood reached nearly to the shore. At 6 miles Már-kúh peak bore N. 75° W.; at sixteenth mile we passed close to the village of 'Abbás-ábád (thirty houses); and at the twenty-second mile we turned south into the forest, and arrived at Kelár-ábád (fifty houses).

June 3.—Left Kelár-ábád, and proceeded to 'Alí-ábád, in the district of Keláristákh, 14 miles. We returned 2 miles nearly north to the shore, close to which we continued to travel; at the twelfth mile we turned south into the thicket, and, travelling through the latter, mixed with cultivation, reached 'Alí-ábád, the principal village of Keláristákh. Half a mile to the eastward flows the Chális river, which is the boundary of the district, and separates it from that of Kerán or Kujur.

June 4.—We left 'Alí-ábád and proceeded to Merzin-ábád, 24 miles. The road was a continued ascent, though not abrupt, through a forest of underwood, which now began to be rather less dense; its depth from north to south seems to be about 35 miles. Our path was very winding; the general direction a little to the west of south, and up the banks of the Chális river or torrent. We saw no villages excepting that of Tever, at the twenty-second mile, on the right bank of the river.

June 5.—Proceeded from Merzin-ábád and encamped in the thicket at seven miles. Our course was winding, its general direction being south, with a gradual ascent up the left bank of the Chális river. At 1 mile, village of Píshkhár, 1 mile on right

* Mount Serpent.

† Steel Mount.

at 4 miles, village of Tewíl, 2 miles on right; cultivation more abundant, wheat and barley taking the place of rice.

June 6.—To I'nen, 16 miles. We first proceeded along the banks of the Chális, now a mere rivulet, nearly south, for 6 miles; here a high bare peak, called Fúlád Kúh, bore south; we then ascended a very fatiguing pass called Hezar Chesn, or "thousand twists;" in a general S.E. by S. direction for 6 miles farther, the 4 last miles were a little to the south of east; wood still abundant. The Chális stream proceeds from mountains east of I'nen; this latter village is in the district of Keláristákh.

June 7.—Journeyed 14 miles to Melik fáris, a village in the district of Laurá. We descended the mountain on which Enen is placed, and proceeding S.E., crossed the Chális, which rises to the east. At $4\frac{1}{2}$ miles a remarkable rocky peak, 6 miles off, bore E. 16° S.; to the east of this is the district of Núr. After crossing the Chális we proceeded 4 miles a little to the east of south, and commenced ascending the high mountain and pass of Kildíwán; our course was south for 2 miles to the summit, and we then quitted the province of Mázanderán and re-entered that of 'Irák. We descended south into the district of Laurá to the foot of Kendíwán, and entered a ravine through which the Suleimániyeh or Kerej river was flowing from west to east, its source being higher up the ravine to the west; south of the ravine, and quite close to it, lay a high range with snow at the top, which separated us from the plains. We proceeded down the ravine, following the course of the stream, and at the twelfth mile reached the village of Gerchek on the right bank of the river; two miles farther on brought us to Melik fáris, situated on each side of the stream. Wood had disappeared altogether soon after quitting I'nen.

June 8.—To Ehár, 17 miles. For 6 miles the general direction was S.E. by S., then E. by S. 11 miles; at 5 miles the Kerej river, being joined by a small stream which came from N.E., turned off to W.S.W. There was considerable ascent and descent during this day's march; on our right was the ridge separating us from the plains. At the seventh mile we entered a long narrow valley covered with cultivation, and with a succession of small villages which seemed to form one large village; it was called Shehristánek or "little city."

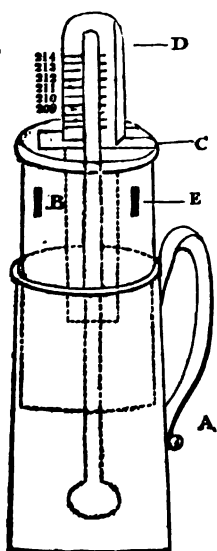
June 9.—To Gúlcíkh,* 18 miles. We first proceeded south down the ravine, through which flows the Jáj-rúd river, and which, like that of Kerej, is lost in the salt desert to the southward. At 8 miles we ascended the last range of El-burz, from the top of which the peak of Demávend bore N. 74° E.; Jaj-rúd river E. 34° S.; Rei, or the ruins of Rhagæ, S. 6° W.; and Tehrán S. 25° W.; from this point we descended about 9 miles to the village of Gúlcíkh, 7 miles to the north of the city of Tehrán.

* Göljik (Turk.) "Little Lake." S.

IX.—*On the Use of Common Thermometers to determine heights.*
By Lieut.-Col. W. H. SYKES, F.R.S.

HAVING been recently applied to by two gentlemen about to travel—the one in Africa and the other in Asia Minor—for a description of the thermometers and apparatus used by myself for some years in India for determining heights by the boiling temperature of water, I have ventured to believe that a brief account of a process which I found to produce results sufficiently near to the truth for most practical purposes, may not be unacceptable to some members of the Society, particularly as I carried on my barometrical observations contemporaneously, and thereby obtained data for fixing the value of certain points on the thermometric scale. To determine heights accurately, good barometers are necessary, which have been carefully compared with a standard barometer; the observations must be taken simultaneously at the upper and lower stations, and the temperature of the mercury and the air, and the hygrometric state of the latter, must be noted. Heights so determined, when tested again in the same or succeeding years, I have rarely found to vary more than 10 or 20 feet in 4000 or 5000. When barometers are used which have not been previously compared with a standard, when the observations are not simultaneous, and when the pressure and temperature at the level of the sea are *assumed*, the results may by accident be near to the truth, but they will usually be from 100 to 300 feet wrong,—at least such is the result of my experience within the tropics. But good barometers are very costly; they are troublesome to carry, are particularly exposed to accident on a journey, and get out of order by the escape of the mercury, which being frequently unobserved, the barometer continues to be used as if it were correct. The late Archdeacon Wollaston, aware of these facts, invented the thermometric barometer to supply the place of the ordinary barometer. This instrument is very sensible, but it is very fragile from the great weight of the bulb compared with the slenderness of the stem; moreover, there are some complex accompaniments, and the instrument is also expensive: in short, I found it not fit for *rough work* out-of-doors, having had three destroyed at the outset of my labours; and the same opinion is expressed by Mr. James Prinsep, of Calcutta, who is well known for the practical application of his scientific knowledge. I had then recourse to common thermometers, and, with certain precautions in their use, found them answer my purpose sufficiently well. A tin shaving-pot was my boiler; dry sticks and pure water were usually to be had, and by

the time my barometers were settled I was ready to take the boiling temperature. The following is a sketch of the apparatus.



A, A common tin-pot, 9 inches high by 2 in diameter.

B, A sliding tube of tin moving up and down in the pot; the head of the tube is closed, but has a slit in it, C, to admit of the thermometer passing through a collar of cork which shuts up the slit where the thermometer is placed.

D, Thermometer, with so much of the scale left only as may be desirable.

E, Holes for the escape of steam.

It will be seen that the chief part of the scale usually attached to the thermometer is removed, only so much of it being left as may be desirable: I however permitted the brass scale of one of my thermometers to remain, and I did not discover that it was the cause of error. Previously to taking the thermometers inland, it is necessary to ascertain their boiling points at the level of the sea; for in many instances the scales are so carelessly applied, that a thermometer may indicate a boiling temperature of 213° 214° or 215° at the level of the sea; one of mine stood at 214.2 when water boiled. Nevertheless, by making a deduction of $2^{\circ} 2'$ in all observations, the indications rarely differed five-hundredths of a degree from the other thermometer, of which the boiling point was 212° : the temperature of the air and the height of the barometer at the time the verification of the thermometers is made must be noted. The following is the manner in which my observations were taken:—

from 4 to 5 inches of pure water were put into the tin pot; the thermometer was fitted into the aperture in the lid of the sliding-tube by means of a collar of cork; the tin tube was then pushed up or down to admit of the bulb of the thermometer, being about *two inches*, above the bottom of the pot. Violent ebullition was continued for 10 minutes or a quarter of an hour, and the height of the mercury was repeatedly ascertained during that time, and the temperature of the air was noticed. Similar operations were repeated with a *second* thermometer, for it is never safe to rely upon *one* instrument. Having obtained the boiling points, it remains to determine the value of the indication of diminished pressure when the observations are taken above the level of the sea. The elastic tension of steam at different points on the thermometric scale has been determined by experiment, but not at regular intervals on the scale, nor with similar results, by different persons; tables, therefore,

computed from the formulæ of the various experimenters do not accord; but, in three tables which I have in my possession, the heights computed by them, when compared with heights determined by corresponding barometrical observations, with previously compared barometers, (the only satisfactory way to ascertain heights not taken trigonometrically,) approximate sufficiently near for all practical purposes where great accuracy is not desired. These tables, however, differ slightly from each other.

The table which first came into my hands appeared anonymously in the *Madras Gazette* for 1824. In 1826 an able friend, Lieut. Robinson, of the Indian Navy, who entered warmly into my views to determine heights by common thermometers, thought he could improve upon the table I was using, and accordingly made a new computation; the third table came under my notice much more recently than the two former. It is computed by Mr. James Prinsep, of Calcutta, Secretary of the Asiatic Society of Bengal, a gentleman distinguished for his scientific research. He published it in the *Journal of the Society*. To admit of a just estimate being formed of the value of these tables,—of the value of corresponding barometrical observations, made with due precautions, although with different coadjutors and different instruments,—of the value of barometrical observations, with an assumed pressure and temperature, at the level of the sea,—of the value of thermometrical compared with barometrical observations,—out of many hundred heights determined in various ways, I have taken many at random, (the number it appears is eighty-eight,) and I have put them into juxtaposition in a tabular form. In thermometric heights the elements at the level of the sea were a boiling temperature of 212° Fahr. and a mean temperature of the air of 82°. The assumed pressure in heights determined barometrically, without corresponding observations, was 30 inches; mean temperature 82°. In looking over the tabulated results I was a good deal surprised to find that in no instance, by whatever method determined, do the barometric differences in height exceed 127 feet, and this only by comparing the highest indications with an assumed pressure with the lowest indications of corresponding observations. It will be seen that the various tables for determining heights thermometrically, with certain exceptions, do not differ very *materially* in their results from each other, nor from corresponding barometric observations; the formulæ on which they are founded may therefore be considered, on the whole, sufficiently accurate for the present state of our knowledge.

Lieut. Robinson's and Mr. Prinsep's tables give close approximations to each other in their results, but they are as much below

the corresponding barometric observations, which I consider the true heights, as the results by the Madras table are above the true heights. Some of them curiously coincide within a foot or two of the heights determined by corresponding barometrical observations, but this coincidence must be the result of mere accident. Taking the mean of all the thermometric observations at a station calculated by the three tables, and the mean of all the corresponding barometric observations at the same place, the utmost difference is 107 feet in less than 600; and the least difference is 8 feet in about 3000; but, as the thermometric heights in which the difference of 107 feet occurs were single observations, made by a gentleman who had newly begun to use his thermometers, they may be looked upon as probably less accurate than subsequent trials would have made them. This is scarcely an unjust inference, as it will be seen that the next greatest difference made by the same gentleman was only 24 feet in 4490. It must be admitted however that this amount of error is just as likely to occur in heights of 100 feet as in those of 10,000. My thermometers were not graduated to less than half-degrees, and long practice enabled me to determine the height of the mercury in the stem to one-twentieth of a degree; but I would recommend thermometers being used in which the degrees are graduated to fifths or tenths of a degree. On the whole, I think the results of six years' experience justify me in saying that common thermometers may be satisfactorily used to supply the place of barometers in measuring heights where great accuracy is not required, and it will be recollected that what is usually looked upon as a difficult and troublesome operation with barometers, will be attainable by any person who carries with him a couple of thermometers, the requisite tin pot, and the tables, and who is master of the simplest rules of arithmetic.

Of the three tables in my possession I have chosen Mr. Prinsep's to submit to the Society, from their perspicuity and the facilities they offer for the conversion of boiling temperatures into heights with very little trouble; but a glance over the figures in my tables of altitudes will show that the tables are susceptible of considerable improvement, for, with two exceptions, all the heights deduced from Mr. Prinsep's and Lieut. Robinson's are much below those determined by simultaneous observations with good barometers; and I join with Mr. Prinsep in expressing a hope that every traveller boiling his thermometers will at the same time, if he possess a barometer, make a record of its indications, and thus render essential service to physics by fixing so many points on the scale of the elastic tension of steam at different temperatures.

Year.	Date.	Names of Places.	ALTITUDES DEDUCED FROM													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
			Jones's Bar. No. 2, with assumed pressure of 30° in., and mean temp. 52° at the level of the sea.	Cary's Barometer, No. 2, ditto ditto.	(Corresponding observations with Capt. Jervis's Gilbert's Bar. and Cary's No. 2.	(Corresponding observations with Dr. Walker's Gilbert's Bar. and Cary's No. 2.	(Corresponding observations with Capt. Jopp and Cary's Bar. No. 2.	(Corresponding observations with Cary's Bar. Nos. 1 and 2.	Corresponding observations with Cary's Bar. No. 1, and Jones's No. 2.	Heights by boiling therm. 1 by the Madras tables.	Heights by boiling therm. 2 by the Madras tables.	Heights by boiling temp. by Lieutenant Robinson's tables, Indian Navy.	Heights by boiling temperatures, by sep. Bsq. Calcutta.	Difference between boiling temp., and barometric correspond- ing observations.	Mean of corresponding observations by Barometers.	Mean of all the boiling temperatures.
1827	23 May....	{ Highest point, Hill Fort of Purundhur..... }	4588	4599				4471	4528	4536	4553	4415	4427	-16	4490	4483
1827	10 May....	Singhur Hill Fort	4199	4180				4421	4170	4341	4320	3937	3928	-86	4190	4104
1828	15 May....	Temple at Bina Shunkur					43090			3037	3037	2392	2391	-71	3030	3019
1825	6 March									52693	2646	2463	2478	+27	2530	2557
1827	11 May.,	Karleh, Cave Temple	2483	2652				42530		2526	2936					
1827	23 May....	{ Highest point of Purnu- dhur above Pina	2697	2681				42648	42650	2661		2539	2566	-61	2649	2538
1828	{ 9 Feb.,	Pait on the Yail River					42470			2494	2494	2480	2484	+8	2430	2488
1828	{ 3 April . }				{ 42478 } { 42493 }					3840	3869	3834	3788	-46	3392	3846
1828		{ Temple in the Hill Fort of Hurichundurgur	3972	3931	3845	+3922	43871	+3887	3935	{ 3840 } { 3857 }	{ 3869 } { 3887 }					
1829	{ 11 to 17 } { Dec.... }	{ Source of Kristina River at Mahabuleshwur				{ +4406 } { +4503 }				*4498	*4556	*4422	*4425	-24	4499	4475
1828	27 April ...	Pokri					+3197			3194	3194	3185	3141	-19	3197	3178
1828	6 April ...	Kullumb, on Goreh River			{ 3043 } { 2927 }		+1995			1971	2000	1988	1986	-36	2022	1986
1825					{ 1810 } { 1830 }	+1810	+1837	+1823		{ Means } { 1883 }	1897	1876	1861	+49	1830	1879
1826		Pina, Hay Cottage														
1827																
1828																
1828	16 Feb....	Downde, on the Bina River..					1623			1591	1591	1567	1575	-41	1623	1582
1828	29 Oct.	Saswar, above Pina				592				*514	*456			-107	592	485

* Boiling temperatures determined by Dr. Walker.

† The heights most relied upon.

TABLE 1.

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

Boiling Point of Water.	Barometer Modified from Tredgold's Formula.	Logarithmic Differences or Fathoms.	Total Altitude from 30.00 in. or the Level of the Sea.	Value of each Degree in Feet of Altitude.	Proportional Part for One-tenth of a Degree.
°			Feet.	Feet.	Feet.
214	31.19	00.84.3	-1013	-505	..
213	30.59	84.5	507	-507	..
212	30.00	84.9	0	+509	..
211	29.42	85.2	+509	511	51
210	28.85	85.5	1021	513	..
209	28.29	85.8	1534	515	..
208	27.73	86.2	2049	517	..
207	27.18	86.6	2566	519	52
206	26.64	87.1	3085	522	..
205	26.11	87.5	3607	524	..
204	25.59	87.8	4131	526	..
203	25.08	88.1	4657	528	..
202	24.58	88.5	5185	531	53
201	24.08	88.9	5716	533	..
200	23.59	89.3	6250	536	..
199	23.11	89.7	6786	538	..
198	22.64	90.1	7324	541	54
197	22.17	90.5	7864	543	..
196	21.71	91.0	8407	546	..
195	21.26	91.4	8953	548	..
194	20.82	91.8	9502	551	55
193	20.39	92.2	10053	553	..
192	19.96	92.6	10606	556	..
191	19.54	93.0	11161	558	..
190	19.13	93.4	11719	560	56
189	18.72	93.8	12280	563	..
188	18.32	94.2	12843	565	..
187	17.93	94.8	13408	569	57
186	17.54	95.3	13977	572	..
185	17.16	95.9	14548	575	58
184	16.79	96.4	15124	578	..
183	16.42	96.9	15702	581	..
182	16.06	97.4	16284	584	..
181	15.70	97.9	16868	587	..
180	15.35		17455		59

The Fourth Column gives the Heights in Feet.

TABLE 2.

Table of Multipliers to correct the Approximate Height for the Temperature of the Air.

Temperature of the Air.	Multiplier.	Temperature of the Air.	Multiplier.	Temperature of the Air.	Multiplier.
°		°		°	
32	1.000	52	1.042	72	1.083
33	1.002	53	1.044	73	1.085
34	1.004	54	1.046	74	1.087
35	1.006	55	1.048	75	1.089
36	1.008	56	1.050	76	1.091
37	1.010	57	1.052	77	1.094
38	1.012	58	1.054	78	1.096
39	1.015	59	1.056	79	1.098
40	1.017	60	1.058	80	1.100
41	1.019	61	1.060	81	1.102
42	1.021	62	1.062	82	1.104
43	1.023	63	1.064	83	1.106
44	1.025	64	1.066	84	1.108
45	1.027	65	1.069	85	1.110
46	1.029	66	1.071	86	1.112
47	1.031	67	1.073	87	1.114
48	1.033	68	1.075	88	1.116
49	1.035	69	1.077	89	1.118
50	1.037	70	1.079	90	1.121
51	1.039	71	1.081	91	1.123

Enter with the mean temperature of the stratum of air traversed, and multiply the approximate height by the number opposite, for the true Altitude.

When the thermometer has been boiled at the foot and at the summit of a mountain, nothing more is necessary than to deduct the number in the column of feet opposite the boiling point below from the same of the boiling point above: this gives an approximate height, to be multiplied by the number opposite the *mean* temperature of the air in Table 2, for the correct altitude.

Boiling point at summit of Hill Fort of Párun- ° feet.
dhur, near Púna . . . 204.2 = 4027
Boiling point at Hay Cottage, Púna . . . 208.7 = 1690

Approximate height 2337

Temperature of the air above . . . 75°
Ditto ditto below . . . 83

Mean 79 = Multiplier 1.098

Correct altitude 2.566 feet.

When the boiling point at the upper station alone is observed, and for the lower the level of the sea, or the register of a distinct barometer is taken, then the barometric reading had better be converted into feet, by the usual method of subtracting its logarithm from 1·47712 (log. of 30 inches) and multiplying by ·0006, as the differences in the column of "*barometer*" vary more rapidly than those in the "*feet*" column.

<i>Example.</i> —Boiling point at upper station	-	-	185°	=	^{Feet.} 14548
Barometer at Calcutta (at 32°) 29 in. 75°					
Logar. diff.=1·47712-1·47349=00363	×	0006=			218
					<hr/>
	Approximate height	-	-		14330
Temperature, upper station, 76°	} 80=multiplier				1·100
Ditto lower, 84°					
					<hr/>
	Correct altitude	-	-	-	15763

Assuming 30·00 inches as the average height of the barometer at the level of the sea (which is however too much), the altitude of the upper station is at once obtained by inspection of Table 1, correcting for temperature of the stratum of air traversed by Table 2.

[Newman, Optician, 122, Regent Street, has been in the habit of making these instruments; he recommends the use of copper brazed, instead of tin, as more durable; and a free escape for the steam, or the results will be incorrect from the boiling taking place under pressure; a model may be seen at the apartments of the Royal Geographical Society.—ED.]

X.—*Proposed Exploring Expedition to the Asiatic Archipelago.*
By JAMES BROOKE, Esq.

SHORTLY before leaving England for Singapur, Mr. James Brooke, a member of the Royal Yacht Squadron, and to whom we are already indebted for an account of the island and gulf of Symi,* forwarded to the Society an outline of his intended expedition to the Asiatic Archipelago in his yacht the *Royalist*, a fine schooner of 140 tons burthen, on board which are embarked Mr. Murray, a master in the Royal Navy, a surgeon, and a crew of 20 men; the vessel being well equipped with all the requisite instruments for observation, including three chronometers, and the means for collecting and preserving specimens of natural history, sailed from Plymouth on the 10th November, to carry into execution the spirited enterprise of which an abridged account is contained in the following pages:—

“Touching at the Canaries and the Cape of Good Hope the *Royalist* will proceed direct to Singapur, which may be considered as headquarters for the necessary intervals of refreshment and repose, and for keeping open a certain communication with Europe. Here the best local information can be obtained, interpreters procured, the crew augmented for any particular service, and here, if needful, a small vessel of native construction may be added to the expedition, to facilitate the objects in view. An acquaintance may likewise be formed with the more respectable Bughis merchants, and their good-will conciliated in the usual mode,—viz., by civility and presents, so as to remove any misconceived jealousy on the score of trading rivalry, and to induce a favourable report of our friendly intentions in their own country, and at the places where they may touch. The *Royalist* will probably reach Singapur in the month of March, 1839, at the latter end of the north-west, or rainy monsoon. The delay consequent on effecting the objects above mentioned, besides gaining a general acquaintance with the natural history and trade of the settlement, and some knowledge of the Malay language, will usefully occupy the time until the setting-in of the south-east, or dry monsoon. It may be incidentally mentioned, however, that in the vicinity of Singapur there are many islands imperfectly known, and which, during the intervals of the rainy season, will afford interesting occupation. I allude, more especially, to the space between the straits of Rhio and those of Duryan,† and likewise to the island called Bintang, which, although laid down as one large island, is probably composed of small ones, divided by navigable straits; a better acquaintance with which might facilitate the voyage from Singapur to the more eastern islands, by bringing to light other passages besides those of Rhio and Duryan, and, at any rate, would add something to our geographical knowledge in the immediate vicinity of our settlement. On the com-

* Journal, vol. viii. p. 129.

“† All the names of places mentioned in this paper will be found in Mr. John Arrowsmith's Map of the Asiatic Archipelago.”

mencement of the healthy season I propose sailing from Singapur, and proceeding without loss of time to Mallúdu Bay, at the south end of Borneo. This spot has been chosen for the first essay; and in a country every part of which is highly interesting, and almost unknown, the mere fact of its being a British possession, gives it a prior claim to attention.

"The objects in view may be briefly mentioned:—1. A general knowledge of the Bay, and the correct position of various points,—more especially the two principal headlands at its entrance, so as to determine its outline. The westernmost of these headlands, called Sampanmange, will likewise determine the extreme north point of Borneo. 2. Inquiries for the settlement of Cochin Chinese, reported on Earl's authority to be fixed in the vicinity of Bankoka: an intercourse will, if possible, be opened with this settlement, if in existence. 3. The rivers which flow into the Bay will be carefully and minutely explored, and an attempt will be made to penetrate into the interior as far as the lake of Kíní Ballú. 4. For the same purpose, every endeavour will be used to open a communication with the aboriginal inhabitants of the country, and every means employed to conciliate their good opinion; and (if the ceremony exists in this part of the island) to enter into the bonds of fraternity (described by Mr. Dalton) with some of the chiefs.

"I speak with great diffidence about penetrating into the interior of this country, for I am well aware of the insurmountable difficulties which the hard reality often presents, which are previously overlooked, and easily overcome in the smoothness of paper or the luxury of a drawing-room. The two points to be chiefly relied upon for this purpose, are a friendly intercourse with the natives, and the existence of navigable rivers. It is mentioned by Sir Stamford Raffles, on native authority, that a land communication, of not more than forty miles, exists between Mallúdu Bay and Lake Kíní Ballú; but neither this computation, nor any other derived from the natives, however intelligent otherwise, can be relied on, for the inhabitants of these countries are generally ignorant of any measure for distance, and their reckoning by time is so vague as to defy a moderately-certain conclusion. The fact, however, of the vicinity of the lake to the bay may be concluded; and it follows, as a reasonable inference, that the river, or rivers, flowing into the bay communicate with the lake. The existence of such rivers, which were from the locality to have been expected, is vouched for by Captain Forrest. 'Most of this north part of Borneo, (he says,) granted to the English East India Company by the Súlús, is watered by noble rivers: those that discharge themselves into Mallúdu Bay are not barred.' It is by one or other of these rivers that I should hope to penetrate as far as the lake and mountain of Kíní Ballú, and into the country of the Idaan. I have not been able to learn that any Malay towns of importance are situated in the bight of Mallúdu Bay, and their absence will render a friendly communication with the aborigines a matter of comparative ease. The advantages likely to result from such friendly relations are so evident, that I need not dwell upon them, though the mode of effecting such an intercourse must be left to the thousand contingencies which govern all, and act so capriciously on the tempers of

the savage races. The utmost forbearance, and a liberality guided by prudence, so as not to excite too great a degree of cupidity, appear the fundamental rules for managing men in a low state of civilization. The results of an amicable understanding are as uncertain as its commencement, for they depend on the enterprise of the individual, and the power of the native tribe into whose hands he may have fallen. I will not, therefore, enter into a visionary field of discovery; but it appears to me certain, that without the assistance of the natives, no small party can expect to penetrate far into a country populous by report, and in many parts thickly covered with wood. Without entertaining any exaggerated expectation, I trust that something may be added to our geographical knowledge of the sea coast of this bay, its leading features, productions, rivers, anchorages, and inhabitants, the prospect of trade, and the means of navigation; and although my wishes lead me strongly to penetrate as far as the lake of Kíni Ballú, yet the obstacles which may be found to exist to the fulfilment of this desire will induce me to rest satisfied with the more moderate and reasonable results.

"It may not be superfluous to notice here, that a foregone conclusion appears to be spread abroad regarding the *aboriginal* (so called) inhabitants of Borneo, and that they are usually considered and mentioned under the somewhat vague appellation of *Dyaks*. They are likewise commonly pronounced as originating from the same stock as the *Arafuras* of Celebes and new Guinea, and radically identical with the *Polynesian* race. The conclusion is not in itself highly improbable, but certainly premature, as the facts upon which it is built are so scanty and doubtful as to authorize no such structure. On an island of the vast size of Borneo, races radically distinct might exist; and at any rate, the opposite conclusion is hardly justifiable from the specimens of language, or the physical appearance of the tribes of the southern portion of the country. We have Malay authority for believing that there are many large tribes in the interior, differing greatly in their degree of civilization, though all alike removed from the vicinity of a superior people. We have the *Dyaks* of the south; the *Idaan* of the north; the *Kagins*, and a race little better than monkeys, who live in trees, eat without cooking, are hunted by the other tribes, and would seem to exist in the lowest conceivable grade of humanity. If we may trust these accounts, these latter people resemble in many particulars the *Orang benua*, or aborigines of the peninsula; but the *Dyaks* and *Idaans* are far superior, living in villages, cultivating the ground, and possessing cattle. Besides these, likewise, we have the names of several other tribes or people, and, in all probability, many exist in the interior, with whom we are unacquainted.

"There are strong reasons for believing that the *Hindú* religion, which obtained so extensively in Java and Sumatra, and yet survives at Bali and Lombeck, was likewise extended to Borneo; and some authors have conceived grounds for supposing a religion anterior even to this. If only a portion of these floating opinions should be true, and the truth can only be tested by inquiry, we may fairly look for the descendants of the *Hindú* dynasty as well as an aboriginal people. It never seems to have occurred to any one to compare the *Dyaks* with the people of Bali and Lombeck. We know indeed but little of the former, but both races

are fair, good looking, and gentle. Again, respecting the concluded identity of the Dyaks and the Arafuras: it is clear we have a very limited knowledge indeed of the former; and, I may ask, what do we know of the Arafuras?

"In short, I feel as reluctant to embrace any preconceived theory, as I am to adopt the prevailing notion on this subject, for it requires a mass of facts, of which we are wholly deficient, to arrive at any thing approaching a reasonable conclusion. To return, however, to the proceedings of the *Royalist*, I would remark that it depends greatly on the time passed in Mallúdu Bay, whether our next endeavour be prosecuted at Abai on the western, or Tusan Abai on the eastern coast. The object in visiting Abai would be chiefly to penetrate to the lake, which, on the authority of Dalrymple and Burton, is not far distant thence, by a water communication: but should any success have attended similar efforts from Mallúdu Bay, this project will be needless, as in that case the enterprise will have been prosecuted to the westward, and reach to the vicinity of Abai. At Kaminis is the limit of the British territory to the westward, so Point Kaní-úgan, situated to the southward of the bay of Sandakan, forms the eastern boundary; and a line drawn from coast to coast between these points, is represented as including our possessions. A reference to the chart will show the extent to be considerable, and the eastern coast from Mallúdu Bay to Point Kaní-úgan is so very little known, that it is highly desirable to become acquainted with its general features and conformation, and to seek thence the means of gaining an inlet into the interior, should it be denied at Mallúdu Bay.

"The reported proximity of Kíní Ballú to Mallúdu Bay, and likewise to Abai, would (supposing it is anything like the size it is affirmed to be) lead us to expect that it cannot be far distant from the eastern coast; and it is but reasonable to conclude that some rivers or streams discharge themselves into the sea in the numerous indentations that abound on this shore. However this may be, the coast, with its bays, and islands, and bold headlands, is one of great interest, and almost unknown; and the careful inspection of it as far as Point Kaní-úgan will, I trust, add something to our knowledge. The longitude of Point Kaní-úgan and Point Unsang will likewise determine the eastern extremity of Borneo.

"Much more might be added on this topic, especially of the reported communication by a line of lakes from Mallúdu Bay to Benjar Massín, which, if true, would in all probability place some of these lakes near particular points of the east coast, as the whole line, from the relative position of the two extremes, must be on the eastern side of the island. These reports, and the various surmises which arise from them, are rather matters for verification than discussion, and I will therefore only add, that, tempted by success, I shall not devote less than a year and a half to this object; but in case of finding a sickly climate, or meeting with a decidedly hostile population, I shall more easily abandon the field, and turn to others of not less interest, and perhaps of less risk.

"Equal to Borneo in riches, and superior in picturesque beauty to any part of the Archipelago, is the large and eccentric country of the Bughis,

called Celebes. So deep are the indentations of its coasts, that the island may be pronounced as being composed of a succession of peninsulas, nearly uniting in a common centre in the district of Palos, and thus, by the proximity of every part to the sea, offering great facilities for brief and decisive interior excursions. The Dutch are in possession of Macassar, and had formerly settlements on the north-west coast, and in the bay of Sawa. Their power appears, however, never to have been very extensively acknowledged; and at present I have not been able to meet with any account of the condition of their factories. This information will probably be gained at Singapore. Avoiding the Dutch settlements, I propose limiting my inquiries to the northern and north-eastern portion of the island, more especially the great bay of Gúnonng Tella. It is impossible to state here the direction of these inquiries, or any definite object to which they should be turned, as I am acquainted with no author who speaks of the country, save in a general and vague manner. It is reported as rich, fertile, mountainous, strikingly beautiful, and possessed of rivers; abounding in birds, and inhabited, like Borneo, by wild tribes in the interior, and by the Bughis on the sea shores and entrance of rivers. The character of the Bughis, though so variously represented, gives me strong hopes of rendering them, by care and kindness, useful instruments in the prosecution of these researches; for all writers agree that they are active, hardy, enterprising, and commercial; and it is seldom that a people, possessing such characteristics, are deaf to the suggestions of self-interest or kindly feeling. The arrogance, and especially the indolence, of the Malays, counteracts the influence of these strong incentives; and the impulse which governs such rude tribes, as the Dyaks and Arafuras, is a dangerous weapon, which cuts all ways, and often when least anticipated. The Bajús, or sea gipsies, are another race, on whom some dependence may be placed. Mr. Earl, who had a personal acquaintance with this tribe, and could speak their language, always expressed to me a degree of confidence in their good faith, which must have had some grounds.

"I may here conclude the first stage of the expedition, during the progress of which the head quarters will be fixed at Singapur. During some of the intervals I hope to see Manila, and to acquire a cursory knowledge of the unexplored track at the southern extremity of Celebes, called in Norie's general chart the Tiger Islands.

"The time devoted to the objects above mentioned must, as I have before said, be regulated by the degree of fortune which attends them, for, cheered by success, I should not readily abandon the field; yet, if persecuted by climate, or other serious detriments, I shall frequently shift the ground, to remove myself beyond such evil influence. It is scarcely needful to continue a detail of projects so distant, having already carved out for myself a work which I should be proud to perform, and which is already as extended as the chances of human life and human resolves will warrant. The continuation of the voyage would lead me to take the *Royalist* to Timor or Port Essington, thence making excursions to the Arru Isles, Timor Laut, and the southern shores of New Guinea. That part of the coast contiguous to Torres Straits I am particularly desirous of visiting, as it has been suggested to me by Mr. Earl, and I think with reason, that a better channel than the one we are

at present acquainted with may be found there. That such a channel exists, and will be discovered when the coast is surveyed, I entertain but little doubt; but the navigation is hazardous, and must, from the westward, be attempted with great caution.

"My own proceedings must, of course, be regulated by the discoveries previously made by Captain Wickham or others; and as this gentleman has orders to survey Torres Straits, the field may be well trodden before I reach it. The rest of the voyage I shall consider as one merely of pleasure, combining such utility as circumstances will permit. It is probable that I shall visit our Australian settlements, glance at the islands of the Pacific, and return to Europe round Cape Horn. Before concluding, I may observe that there are points of inquiry which may be useful to the studies of the learned, which (provided the process be moderately simple) I shall be willing to make, and I shall always be happy to receive any directions or suggestions regarding them. I allude to observations on the tides, to geology, to the branches of natural history, &c. &c., for the general inquirer often neglects or overlooks highly interesting facts, from his attention not having been called to them. The specimens of natural history will be forwarded home on every visit to Singapur; and the information will be sent to the Geographical Society, and may always, if it be of any value, be used as freely as it is communicated. In like manner, the objects of natural history will be open to any person who is at all interested in such pursuits. I cannot but express my regret, that from pecuniary considerations as well as the small size of the vessel, and the limited quantity of provisions she carries, I am unable to take a naturalist and draughtsman; but I should always hail with pleasure any scientific person who joined me abroad, or who happened to be in the countries at the time; and I may venture to promise him every encouragement and facility in the prosecution of his pursuits. I embark upon the expedition with great cheerfulness, with a stout vessel, a good crew, and the ingredients of success as far as the limited scale of the undertaking will permit, and I cast myself upon the waters—like Mr. Southey's little book—but whether the world will know me after many days is a question which, hoping the best, I cannot answer with any positive degree of assurance."

XI.—*Some Account of Mohammedu-Siseë, a Mandingo, of Nyéni-Marú on the Gambia.* By Capt. WASHINGTON, Royal Navy.

ALTHOUGH the special object of our inquiries, as geographers, is the surface of the earth which we inhabit, yet, as has been well remarked, as that earth is only interesting to us as the abode of man "for whom it was created," it may be permitted to pause for a moment in our more ordinary researches, for the purpose of contemplating a native of one of the least known regions of the globe—and to mark the vicissitudes in the life of a Mandingo, born on the banks of the river Gambia, who in his native village had seen and been in company with Mungo Park, one of the first and best

of our African travellers—and successively to notice him as a slave—a soldier in the British army—a freeman—and finally as about to return to the home of his fathers, and to impart to his countrymen some few of the blessings of civilization which he may have acquired during an absence of more than a quarter of a century from the land of his birth.

Mohammedu-Sisei, was born at Nyáni-Marú, a village of about 200 houses on the northern bank of the Gambia,* of Mandingo and Muselmán parents; his father's name was Abú-Bekr, his mother's Aiseta [Ayishah]. At eight years old he was sent to school, at a place called Dar Salámi (House of Peace), about 2 hours N.W. of Fataenda, on the limits of the Wúli country, where he learned to read the Korán and to write.

After about eight years at school, he underwent the rite of Súnna^h or circumcision when he returned home. At the age of seventeen years old, he distinctly remembers Mungo Park passing through Nyáni-Marú on his way from Joka-kúnda, where he had landed, to Pisaniáre; this we know from Park's travels occurred in the year 1805, when he started on his second journey; and Mohammed says, among other circumstances that cause him to remember his arrival, was the quantity of rum given to the governor in exchange for his horses. This date also enables us to fix his age at from forty-eight to fifty.

In this same year Mohammed went by sea in a vessel to the French settlement at Gorée, to purchase trinkets apparently for his approaching marriage. He also made a journey by land as far as the Bundú country, and Bulibane, about seven days' journey to the N.E., a mountainous country which divides the waters of the Gambia and the Falémé, for the same purpose; in both these routes he names the places marked on our maps correctly, and many others which do not there appear.

On his return he married his cousin Aiseta, and then kept a school for five years in his native village.

At this time, it would seem, that the king of Wúli, Mansa Kóï (or White King), and the king of Janjan-búre, Salám Mansa (or King of Peace), went to war, and the King of Wúli proving the more powerful, Salám Mansa retreated to the Kabú country for more troops; on his return he attacked Nyáni-Marú, and after some days' fighting, Mohammed, among many others, was made prisoner, and sent to the village of Kánsalá [Kansorály] in the Kabú country, (whose king was called Mansa Wal,) some days' march to the southward, where he was kept for five months.

At the expiration of this period, Mohammed, with many others, was marched to Sikka, near the mouth of the Gambia, sold to a French slaver, at once embarked, and sailed from the coast.

* In lat. 13° 42' N., long. 14° 58' W., exactly 100 geographical miles from the mouth of the river *Gambí*, as Mohammed always called it.

Thus, in a few months, was this poor African, living peaceably in his native village, torn from his parents and his wife, sold into slavery, and quitted, apparently for ever, the land of his birth.

Would to God that we could hope that even now a similar fate may not await him! but the recent capture of some liberated Africans, who returned from Demerara to Sierra Leone, and the inefficient measures adopted by other nations to suppress the slave-trade, prove too clearly the state of insecurity to which the European traffic in human flesh has reduced the region of western Africa.

But the hour of Mohammed's freedom was nearer at hand than he supposed; five days after the vessel sailed from the Gambia, she was captured by a British frigate, commanded by Sir Thomas Cochrane, and carried into Antigua. Of course, instantly on landing, he became free, and was put into the third West India regiment, in which he served from 1811 to 1825, in the grenadier company; he was present at the capture of Guadaloupe and the Saintes; and, after being stationed at Barbadoes, Dominica, &c., in 1816 he was sent to Trinidad, where he remained as a soldier till the reduction of the regiment in 1825, when he was discharged with a good character.

Land, at Manzanilla, on the eastern side of Trinidad, was given, in lieu of a pension, to the greater part of the soldiers when disbanded, but Mohammed appears to have lived chiefly at Port of Spain, the capital. In 1831 he married a creole of Grenada, who, with one child, accompanied him to England, whither he came in the hope of obtaining a pension for his fourteen years' service, and then of returning to his native country.

During the twenty years he had lived at Trinidad, Mohammed was a member of the Mandingo society of Mohammedans, who voluntarily subscribed funds among themselves to rescue their brother Mohammedans from slavery. He remembers more than twenty being thus ransomed at an expense of from 300 to 700 dollars each (70*l.* to 150*l.*), which the society voluntarily paid; and for several years, he says, no Muselmán has existed in slavery in Trinidad.

Very little intercourse with Mohammed will suffice to show that he has a good share of the intelligence generally found by travellers among the Mandingos. He is a strict Mohammedan; is well acquainted with the Korán, certain texts of which he always carries about him. He writes Mandingo indifferently in the Arabic character. He speaks English tolerably well, and, in forming a vocabulary of his language, he has often surprised me by naming the correct English word for a circuitous sentence, by which I had endeavoured to arrive at the Mandingo term.

While passing a few days with a kind friend, to whom we are indebted for the excellent account of Abú Bekr,* the com-

* Journal, vol. vi. p. 100.

panion of Davidson, Mohammed was introduced to Mr. Park, brother of the well-known traveller, when he mentioned circumstances and described persons with whom Mr. Park was well acquainted from his brother's accounts.

When taken to the Zoological Gardens and to the British Museum, Mohammed at once recognised and gave the Mandingo name to several animals and plants, natives of his country. At the Museum he pointed out the conical hat, the Fúláh cloak and mandolin, brought home from Africa by Clapperton; but at the sight of the elephant walking about at liberty in the Zoological Gardens, he clapped his hands with delight, and exclaimed, "O Sama! Sama! now I really see my own country again."

As has already been correctly observed by Golberry and Laing of the Mandingos, Mohammed resembles, in his complexion and character of face the Hindús or blacks of India, more than those of Africa in general. His features are regular and open, his person well formed, full six feet in height, his nose Roman, with the nostrils rather flattened, not thick lips, beautiful teeth, hair woolly, colour a good clear black, but not jet.*

The country of the Mandingos, as stated by Ritter in his well-known *Erdkunde*, and derived from the accounts of travellers, as Park, Mollien, Durand, &c., is the northern slope of the high table-land of the Senegambia. Park, on his return from the interior, first heard the Mandingo language spoken to the west of Taffara and Jabbi, from whence a high tract of fertile land extends as far west as Worombáka, between the head waters of the Niger and the Senegal; to the north is the Šahrá or great desert; to the south and west the high mountains of Jallonkadú, traversed by numerous rivers which descend through parallel ravines to the north. This, according to historical tradition, is the proper and immemorial abode of the Mandingo race.

The Mandingo language, we learn from Balbi and others, is one of the most extended of the 36 families of languages into which that author has divided the 115 languages of Africa, and is, on several accounts, the most important of the 21 families of languages of Nigritia or of the Negroes.

With the assistance of Mr. Renouard, I set to work diligently to obtain from Mohammed a vocabulary of his native language, not being aware that more of it was known than a list of about 200 words, collected in 1730 by Francis Moore—about 300 words given by Mungo Park in 1796—200 words by Caillié in 1829, and the small collection by Hannah Killam, in her specimens of African languages; after having written down about 1000 words and phrases, I was much surprised to find that the Gospel of St. Matthew in Mandingo had just been printed by the British and Foreign Bible Society, from a translation by Mr.

* Mr. W. Carpenter has obligingly painted an excellent portrait of Mohammed,

R. Maxwell Macbrair, a zealous and active agent of the Wesleyan Missionary Society, a copy of which was very civilly sent to me by Dr. Bunting. I also learnt that Mr. Macbrair had lately printed a grammar and vocabulary of the language, compiled during a residence of some years at the Gambia: finding this to be the case, and having very little leisure for so tedious an undertaking as compiling a vocabulary, (if done conscientiously,) I at once abandoned it. Yet while on this subject it would be unjust to omit Mohammed's spontaneous testimony to the accuracy of the vocabulary given by that excellent traveller Mungo Park. It was my custom while writing to have the three lists of Park, Moore, and Caillié open before me, and to refer to them as a new word occurred. Mohammed noticed this, and became curious to know what version each author gave, which I always read to him, and at length said in his negro English, pointing successively to the three books, "This man speak real Mandingo"—"That speak Mandingo, but not Mandingo of Nyáni Marú"—"Him never speak Mandingo at all."

Of the origin, progressive extension, and change of territory of the Mandingo race, as well as of their distribution into tribes, Mohammed could tell me nothing, although strictly questioned in compliance with the wish expressed by one intimately acquainted with African history and geography.

At my request he wrote down the following list of 25 places where Mandingo is spoken; many of them are probably only villages near the Gambia, at least the names are not familiar to me, and I have not leisure to search them out: they are given in the order in which he wrote them, as they may be useful to others:—Saman-galla, Gimbara-kunda, Dide, Welingara, Kanáko, Delafing, Kusang, Bokan-dandi, Hojuliri, Talibaji, Jalakoto, Jikir-illahi, Dar Salámi, Falamah, Palingo, Kanja, Tinkidah, Nyalen-kunda, Puró-pana, Sotoma, Paisori, Faraba, Garja, Lalenulé, Marená.

The 3rd West-Indian regiment, to which Mohammed belonged for fourteen years, was composed of natives of Central Africa; among them he enumerated some of Bambara,* Súsú, Fúláh, Bassari, Jolab, Serawúlli, Yáriba, Hausa, Futa-toro,* Futa-jallo,* Krú-man,* Búndú, Jenné,* Ibú, Karamanti, Moko, Wamvi, Kanjá, Sereri, and Kalbé (as he always called Senegal); I also find Tumbúkatú* (as he pronounced it) in my notes; but I am not positive that he said there was a native of that city in his regiment,—my impression is that he did. These men always conversed with each other in English, although, said Mohammed, those marked * could speak 'half Mandingo.' Jonas Bath, a well-known, intelligent, and highly respected man in Trinidad, was a Súsú by birth, and was considered chief priest and patriarch of the Mohammedans; he is lately dead. The greater

part of these men are now about to return to their native country, her Majesty's government having granted their petition to send a vessel with them to Africa. Should they succeed in reaching their several homes, which is much to be feared, we may hope that the quarter of a century passed in the midst of civilization will not have been entirely lost upon them, but that they may carry with them some useful arts, at least, which may tend to raise their countrymen from their present degraded state.

Mohammed has just left England for Bathurst, at the mouth of the Gambia, where it is hoped, through the kindness of the governor, Major Mackie, he may be usefully employed; as an interpreter with his nation he would be invaluable, as he is intelligent, and speaks English very fairly—and should any traveller be disposed to attempt to penetrate Africa, by following the route of Mungo Park, he would find a useful companion in Mohammed, who, before he left London, assured the writer that he was ready and willing to travel to any part of the interior.

It may not be generally known that there are several establishments besides Bathurst on the river Gambia belonging to Great Britain. Fort James, near Sikka, situated on an island about 16 miles up the river; opposite this, on the north side, is Jilifri, in a healthy situation, and surrounded by a fertile district. On the south bank are Bintang; Tankoral, at 37 miles; and Joka-kúnda, at 95 miles (?) from the entrance of the river.

The import trade to the Gambia, in 1836, was valued at 114,772*l.*; ships, 275; tonnage, 14,522; the exports were valued at 147,732*l.*; ships, 284; tonnage, 14,081; men, 2273.

The most valuable part of our traffic is carried on high up this extensive river, which, in a course of upwards of 400 miles from its hitherto unexplored sources to its mouth, fertilises a productive and highly populous country; and had we but stations to protect our trade, there is little doubt but that it might become the most valuable of our possessions in this quarter of the world.

But by far the most important station, and one that we cannot contemplate without every wish and hope that it is destined to form the nucleus of civilization in this portion of Africa, is MacCarthy's Island, as we term it, the *Janjan-Buré* of the natives, an island with an area of about 3 square miles, situated 127 miles* from the entrance of the river, in the midst of a populous country, and 60 miles below the falls of Barra-kunda, up to which spot the river is navigable for vessels of fifty tons burthen.

It is on this island that we have now an establishment for liberated slaves, and by the last returns for 1836 it had a popula-

* Measured on Owen's chart of the Gambia, surveyed in 1826. Fort George, MacCarthy's Island, is in 13° 33' N., 14° 45' W. long.

tion of 1600 persons; of these seven only were white; and 350 were Mandingos, who inhabited a village before the British took possession of it. Thanks to the active zeal of the Wesleyan missionaries, here are now two chapels, two schools for children, and one for adults, and the natives seem cheerful, orderly, and well-disposed to cultivate the ground, and to apply themselves to learn the various arts in which they are instructed.

When we consider the dreadful state of the slave-trade, which recent inquiries have brought to light, and the absolute necessity that exists, if we really wish to put a stop to it, of inducing the negroes to turn their attention either to cultivating the ground, or to some peaceful occupation, in their own country, we are sanguine enough to look upon this establishment at *Janjan-Buré* as a normal school, where people of nearly every tribe of Western Africa are receiving instruction in arts and civilization, if not in Christianity, which they may eventually carry with them to their several homes, and thereby be the means of diffusing civilization in places the most remote and inaccessible, which for the next century neither missionary nor traveller can hope to visit.

XII.—*A brief outline of the recent Expedition to the North-west Coast of Australia; under Lieutenants GREY and LUSHINGTON.*
Principally from documents in the Colonial Office.

[IN offering to the readers of the 'Geographical Journal' a brief outline of the recent expedition to the north-western coast of Australia, extracted chiefly from documents liberally furnished to the Society by the Colonial Office and the Admiralty, it is not with the slightest hope of satisfying curiosity, or to anticipate the interest which the public in general, and geographers especially, always feel in enterprizes of this nature, but merely to give such a sketch of the principal features of the expedition as may serve to direct those who are desirous of obtaining information respecting a portion of this remarkable country—hitherto only visited by Tasman, Dampier, Baudin, and King, and never before, we believe, penetrated by any European—to look forward to the detailed journals of the spirited officers who had the conduct of the expedition, assured that they will contain much to interest them, not only in geography and in the light thrown upon the origin of the races who now inhabit this vast island, but in natural history, geology, and other branches of science.]

Her Majesty's Ship *Beagle*, Captain Wickham, destined for the nautical survey of the north-western and other parts of the coast of Australia, on board which vessel were embarked Lieu-

tenants Grey and Lushington, and their party for the land expedition, left England on the 14th of July, and touching at Teneriffe and Bahia in the Brazils, reached the Cape of Good Hope on the 21st of September, 1837. Here the parties separated, as the *Beagle's* orders directed her to Swan River, while the leaders of the land expedition adopted the spirited but hazardous determination of proceeding direct to their destination on the N.W. coast of Australia.

Having freighted the *Lynher*, a schooner of 160 tons, taken on board 50 sheep and goats, and made all the requisite arrangements for the thorough equipment of their party, Messrs. Grey and Lushington quitted the Cape on the 20th of October, and on the 3rd of December reached Hanover Bay, at the outlet of Prince Regent's River, in lat. $15^{\circ} 20'$ south, long. $124^{\circ} 40'$ east.

Here having landed and pitched their tents in a beautiful valley now for the first time trodden by European feet, and having formally taken possession of this part of the country in the name of her Majesty, the schooner, under charge of Mr. Lushington, was despatched to Coepang, in the island of Timor, distant about 300 miles to the north, to embark ponies, of which six-and-twenty were obtained, at the rate of about two pounds each, chiefly in exchange for muskets and powder.

During the vessel's absence Mr. Grey and his party examined the country in the immediate vicinity of their camp—and explored a small stream which watered the valley, for about five miles to the southward, where it separated into two branches; one of which is little more than a mountain torrent; the other a much more considerable stream, winding through a deep and narrow valley: the soil brought down by it was rich and good, and therefore it was probably the drain of a considerable tract of fertile country.

The country generally as viewed from the sea, promises well, but upon landing the first appearance is monotonous and steril; being composed of rocky hills of sandstone about 300 feet in height, covered with brushwood and prickly grass; but between these hills are beautiful vallies, the soil of which is fertile, and where fresh water may always be found. Although at this time, from prudential motives, no communication was held with the natives, still their huts were visited, and found to consist of a conical frame-work of wood, about 4 feet high and 10 feet in diameter at the base, and were upon the whole well and neatly made. The natives were evidently in possession of sharp-cutting instruments, and many large trees were seen with notches or steps cut in them, by means of which they ascend for the purpose of stripping off the bark, which furnishes them with all the clothes they need in this fine climate—the hatchets may probably be of stone. The principal food of the natives would seem to be here, as in other parts of this land, kangaroo and shell-fish, as the remains

of them were found near their fires, and both of them are abundant.

On the return of Lieutenant Lushington from Timor with the ponies and other necessities, on the 20th of January, 1838, the party commenced their preparations for their immediate departure; and on the 1st of February quitted their encampment at Hanover Bay for the interior. The party consisted of 12 persons, including besides the leaders of the expedition, Mr. Walker, as surgeon and naturalist, two sailors, three men of the corps of sappers and miners, &c., with their ponies laden with instruments, provisions, and baggage, and followed by part of their flock of sheep and goats. They proceeded first about 15 miles in a nearly due south direction, until they had reached the parallel of $15^{\circ} 29'$ S. lat. The whole of the country lying between this point and Hanover Bay was composed of ridges of sandstone, of no great elevation, but intersected by deep ravines; their progress was consequently slow and toilsome, for they had to construct paths for the horses to travel upon before they were able to move from one encampment to the next spot where they intended to halt. In this first part of the journey they also lost many horses; indeed all of them suffered more or less from it.

After passing the parallel of $15^{\circ} 29'$ S. they entered upon a very rich tract of country, that even surpassed in fertility that small portion of the Brazils which they had had an opportunity of seeing. A large expanse of water having been seen a little to the west of south, they were induced to pursue that direction, and still found the country to be of the same rich and luxuriant character. Upon attaining the parallel of $15^{\circ} 43'$ S. lat., and $124^{\circ} 44'$ E. long., they found themselves upon the banks of a very considerable river, which Lieutenant Grey named Glenelg River, in testimony of the obligations which he and the whole expedition were under to the Principal Secretary of State for the Colonies.

The river was at this point salt; and as, from its magnitude and rapid current, no possibility existed of crossing it, they were obliged to travel up its banks in a north-easterly direction—their progress being much impeded by the number of tributary streams which poured into it, many of these being of such a size and depth, owing to their running through a low country, that they were in the same manner obliged to travel for several miles up their banks, before they could get an opportunity of crossing them.

The luxuriance of the vegetation also much impeded their progress; so that, although their horses again began to thrive from the goodness of the grass, their advance was still slow and difficult.

The river first became perfectly fresh at a point situated in $15^{\circ} 41'$ S. lat., and $124^{\circ} 53'$ E. long. Beyond this point it would not be navigable for large vessels; for a series of rapids occur

here, so that a portage must necessarily be established: immediately below this point a shoal of porpoises was seen.

From hence they still continued their course to the eastward, in the direction of the river, but at some distance from it, until they arrived at a point situated in $15^{\circ} 41' 50''$ S. lat., and $124^{\circ} 59'$ E. long. The river was here quite fresh, running at the rate of rather more than 5 knots an hour. Its banks were composed of fine white sand; and even close to the bank it was $2\frac{1}{2}$ fathoms in depth.

On the other side of the river the country hereabouts appeared to be low and marshy; and a remarkable circumstance was observed, namely, that drift-wood, weeds, &c. were lodged in the forked branches of trees at least 15 feet above their heads when they stood upon the banks of the river: extensive inundations must therefore sometimes take place, and at these periods there is little doubt that the whole of the low country to the south is flooded.

A very large tributary stream here joined the river, which they could not cross, as it ran through a low and marshy country; and they were again obliged to turn off to the northward. After following its course for about eight miles through a marshy and almost impassable country, they succeeded in crossing it, but still experienced great difficulty in travelling upon the other side of it; for owing to the heavy rains which had lately fallen, the marshes were almost impassable.

Lieut. Grey here remarks that these heavy rains, which were of several days' continuance, had but very little effect upon the main river, and would by no means account for the signs of inundation which they there saw. This is a remarkable fact, and, viewed in connexion with some others, bears materially upon the physical geography of the country.

In $15^{\circ} 49'$ S. lat., and $125^{\circ} 6'$ E. long., they crossed another very considerable stream, which ran in the direction of Glenelg river. This was the largest tributary stream seen flowing down to it.

The next point at which they saw the river was in $15^{\circ} 56'$ S. lat., and in $125^{\circ} 8'$ E. long.; it was here 250 yards wide, but again formed a series of rapids; and they found a ford just above these, the average depth of which was not more than 3 feet. The soil on its banks was still good: the bed of the river at this point trended away to the eastward.

Only 12 ponies now surviving out of the 26 which had arrived from Timor, it was deemed prudent no longer to follow the course of this river; but Lieut. Grey resolved to push on with as much dispatch as possible in the direction of the great opening behind Dampier's Land; for although it was evident that from want of provisions they would soon be compelled to return to Hanover

Bay, he conceived it absolutely necessary that the part of the country above alluded to should be examined.

After crossing the river, the country again changed its character, the soil becoming sandy, and they began the ascent of a chain of hills running from S.E. to N.W. They continued this gradual ascent for three days, and then found themselves at a point situated in $16^{\circ} 3' \text{ S. lat.}$ and $125^{\circ} 13' 30'' \text{ E. long.}$: they were now nearly at the summit of the part of the range that they were on, but to the S.E., south, and S.W. they could see nothing but inaccessible precipices.

Several days were occupied in trying to find a pass by which the horses might proceed over the mountains, but none such could be found; they, therefore, resolved to proceed with a small party to examine the country to the south of their present position.

At this time Mr. Grey's wound in the hip, which he received from the spear of a native at the outset of his journey, became so painful, that the surgeon positively forbade his proceeding a step farther. A detached party, therefore, started under the command of Mr. Lushington, and attained a point situated in about $16^{\circ} 30' \text{ S. lat.}$ and $125^{\circ} 15' \text{ E. long.}$; the result of their *reconnaissance* was, that in all probability, no large river could exist immediately to the south.

As any further attempt to proceed in that direction appeared then to be useless, and as the party were compelled to return to Hanover Bay from want of provisions, they resolved to make for this point by a route different to that which they had already traversed, and thus fully to complete the exploration of this portion of the country.

On arriving at Hanover Bay, on the 15th March, they had the unexpected pleasure of meeting with Captain Wickham, R.N., in command of H.M.S. *Beagle*, who had, after a careful examination of the coast, arrived at the same conclusion, viz., that no large river could exist between the one that they had discovered, and *Fitzroy River*, which he had discovered at the south part of the great opening behind Dampier's Land.

These rivers, although of considerable magnitude, are still utterly insufficient to account for the drainage of this vast continent, and this interesting question, instead of being at all placed in a clearer point of view by the united exertions of these two expeditions is, if possible, at this moment involved in deeper obscurity and mystery than ever.

In the course of the journey Messrs. Grey and Lushington found a great many curious native paintings in caves, executed in a surprising way for a savage race. In these caves were some

drawings of the human hand, which showed great knowledge of the art of producing effect: they selected a rock in the most gloomy part of the cave, and the hand must have been placed upon this rock and some white powder dashed against it. When the hand was removed, a sort of stamp was left upon the rock; the hand was then painted black and the rock about it quite white, so that on entering that part of the cave, it appeared as if a human hand and arm were projecting through a crevice, admitting light. Many of the figures in these drawings were clothed, though the natives themselves were in a perfect state of nature. These and other circumstances would countenance the belief that they are a race of Asiatic origin; indeed, Lieut. Grey expresses his conviction that the mass of evidence he has collected on this point will enable him to prove it.*

These caves and paintings were all far inland, and nothing of the kind was near the coast. Copies were also obtained of some of the drawings by the natives living on the coast, but these are said to be the productions of a quite distinct race.

Before quitting Hanover Bay the party had the gratification of seeing the bread-fruit and cocoa-nut trees which they had brought from Timor, and planted in the valley, as well as numerous seeds from the Brazils and the Cape of Good Hope, in a most flourishing state. They had also introduced and left there several animals, as ponies, goats, and sheep, and in short done everything in their power to make their visit a blessing to the natives and to the country.

On the 30th April the *Lynher* sailed for the Mauritius, whence Mr. Grey's letter is dated on the 2nd June, at which time, it is highly satisfactory to add, he had quite recovered the effects of his wound, and contemplated returning to a more southern portion of the same coast of Australia. Lieutenant, now, we are happy to say, Captain Lushington, has arrived in England, and it is gratifying to hear the distinct testimony he bears to the zeal and energy displayed by Lieutenant Grey, even when suffering from the effects of a wound and a tropical temperature, in his anxiety to carry into execution the expedition entrusted to his charge.

* Colonel Fox's letter.

XIII.—Outline of the Survey of part of the N.W. Coast of Australia, in H.M.S. Beagle, in 1838. By Captain WICKHAM, R.N. Communicated by Captain BEAUFORT, Royal Navy.

H.M.S. *Beagle*, 17th April, 1838.

Port-George IV., N.W. Coast of Australia.

SIR,—I have the honour to acquaint you that H.M. surveying vessel, under my command, sailed from Swan River on the 4th January, 1838, and proceeded direct to the N.W. coast of Australia.

We reached the shoal soundings off Cape Villaret on the evening of the 15th without being able to make out the land before dark; but continued to stand on until the water shoaled to 14 fathoms, when an anchor was dropped to enable us to retain our position, with a view to commence the examination of Roebuck Bay in the morning; consequently at daylight we were under way and standing into the bay, which we soon found to be very shoal, and were obliged to anchor with Cape Villaret bearing S. 15° W. 6 or 7 miles, and about 3½ miles off shore, in 6 fathoms at high-water, and a rise and fall of 18 feet at the neaps.

Several attempts were made to get the ship farther into the bay, but we only succeeded in getting her about 5 or 6 miles above our first anchorage. The examination of the bay was consequently commenced in the boats, and was soon found to be of small extent, terminating in flats of muddy sand, which dried from 1 to 2 miles off at low water.

The shores of the bay were carefully traced without our being able to discover any opening whatever, thereby setting at rest the question respecting Dampier Land being an island.

From Roebuck Bay we proceeded to the northward, where the coast was found to differ a little from that laid down in the charts; and, thinking there might be some opening unobserved by Captain King, owing to his distance off shore, we narrowly examined every part of the coast as far as Point Swan, never being more than from 2 to 3 miles off shore, and at times considerably within that distance, anchoring every night, which we were fortunately enabled to do, owing to the favourable state of the weather.

The bay round Sandy Point, which has been named Beagle Bay, in lat. 16° 50', affords the best anchorage on the coast, but it is exposed to westerly winds.

The coast from Roebuck Bay to Point Swan having been closely examined, without the slightest appearance of even a

stream of fresh water running into the sea from any part of it, and the weather being evidently on the eve of a change, and the westerly monsoon setting in upon the coast, the ship was moored off the first sandy beach round Point Swan, which place appeared to offer the best anchorage we were likely to find. I therefore resolved to wait a few days for the purpose of rating the chronometers, and making the other necessary observations, and, if possible, to complete our stock of water: wood we saw was plentiful everywhere.

We remained at this anchorage until February 9th, during which time we had constant bad weather, blowing hard from the westward, between N.W. and S.W., with very heavy rain, and much thunder and lightning.

This bad weather, although very much against our surveying operations, was favourable to us, inasmuch as it enabled us to fill up our water, which was caught by the awning, and bailed from the hollows of the rocks. A well was sunk 16 feet deep, and some feet below the level of the sea at high water, but there the soil (still of a sandy nature) was perfectly dry.

From Point Swan we proceeded towards Sunday Strait, having previously ascertained that there was no passage fit for a vessel of any description between that and Point Swan, the whole space being thickly strewed with rocky islets and reefs, nearly all dry at low water, and causing heavy races and overfalls as they became covered at half-tide.

Owing to the unsettled state of the weather, we were obliged to anchor at three different times under the large island on the west side of the strait, in exposed anchorages; but this trifling delay enabled us to complete Captain King's plan of the place.

From these islands, which we have named Roe's Islands (in compliment to Lieut. Roe, who accompanied Captain King), we proceeded to Cygnet Bay, and continued a close examination of the coast to the southward. Many good anchorages were found, but no appearance of streams of fresh water.

Having reached as far as Foul Point, I sent Lieutenant Stokes with two boats to trace the shore farther to the southward, and to gain some information as to the probable extent of the opening. He returned on the eighth day, having succeeded in discovering that the southern part of King's Sound terminated in the mouth of a river, or of an extensive lake, as at low-tide (the fall being 36 feet) the water was quite fresh alongside the boat, and running in small streams from the southward, between the extensive flats that were left dry by the tide, and reached from shore to shore, a distance of 5 or 6 miles, without leaving a passage for a boat.

In consequence of this information the ship was moved to the

S.E., in which direction Captain King had seen land raised by refraction, but which was found to be only 18 miles distant, and very low. From this point the examination of the river was continued by Lieut. Stokes and myself.

We found it to be of trifling extent; but, from the quantities of drift-wood and weeds suspended to the trees from 12 to 15 feet over our heads, it must be subject to immense inundations at certain seasons of the year; and from the lowness of the land on each bank, as far as we could see, the whole country must then be under water for an extent of many miles.

We proceeded about 15 miles in a straight line, S. by E., at which place our progress was impeded by the numbers of drift-trees that completely blocked the passage. At this point the river was rapid, and ran in three or four small streams, occasioned by some islets, and a number of fallen trees.

The banks were nowhere above 12 feet high, and the land on each side perfectly level, as far as could be seen from the top of the highest tree. Quantities of rich grass covered both banks; and the country appeared in places to be thickly wooded.

The entrance to this river, which has been named *FitzRoy River*, in compliment to Captain R. FitzRoy, R.N., is in lat. $17^{\circ} 34' S.$, and long. $123^{\circ} 38' E.$ (nearly).

During the examination of the river, a boat was employed in tracing the shore to the eastward, which appeared to be a deep opening, as no land was visible from the mast-head; and I thought it not improbable that a passage might be found communicating with Collier Bay; but, like all the other openings we had examined, it terminated in low flat land, thickly studded with mangroves, amongst which the tide flows for a considerable distance; and at low water the whole shore is fronted by extensive flats of soft mud.

From this point the shore of the main land has been carefully traced as far as Port-George IV., chiefly by Lieut. Stokes, in the boats, who is perfectly satisfied that there is no stream of any consequence running into the sea from any part of it.

On the passage from King's Sound to Port George IV. we discovered a dry sand-bank, 10 or 12 feet above water, and which is not laid down in Captain King's chart. It lies in lat. $15^{\circ} 19' 20'' S.$, and long. $123^{\circ} 35' E.$, being about 26 miles N.E. by E. of Adele Island.

It lies in a direction about N.W. and S.E.; the dry part about a third of a mile; but the whole extent of the breakers occupying a space of about 4 or 5 miles in that direction, which appears to be the direction of all the islands, reefs, sand-banks, and tide-rippings on this part of the coast, there is much uneven ground

between Adele Island and this bank, which has been named Beagle Bank.

I take this opportunity also of making known the discovery of two dangers seen by Mr. Browse in the *Lynher* (the vessel in which Mr. Grey and party arrived on the coast).

One is situated in lat. $15^{\circ} 26' 30''$ S., and long. $121^{\circ} 55'$ E., and is a reef about 2 feet under water; the other is in lat. $14^{\circ} 4'$ S., and long. $123^{\circ} 30'$ E. This last was fallen in with on the second night after sailing from Timor; therefore cannot be much out of position; besides, the vessel was furnished with a good chronometer. It is an island about a mile in extent, but very low, and was not discovered until about 2 cables distant, when Mr. Browse sounded in 10 fathoms. He afterwards sounded, when he thought himself about a mile to the westward of it, but had no bottom with 40 fathoms.

As we have been fortunate enough to meet Lieut. Grey and his party, who returned from his expedition three days after our arrival here, and who has kindly offered to take charge of any letters we may wish to send, I take the opportunity of sending this short account of our proceedings, and merely a sketch of our work in continuation of Captain King's charts, as there has not been time to lay down the work that all have been busy in collecting, and which will require at least two quiet months to put together.

As we have now only three weeks' provisions on board, and I am given to understand that no supplies can be procured at Timor, excepting for present use, and those with some difficulty, in exchange for gunpowder only, we shall make the best of our way to Swan River, where it will be necessary to refresh the crew, who, although we have had no sickness occasioned by the climate, which I consider equal to any in the world, will be much invigorated by a change of temperature, which, since our arrival on the coast, has rarely been below 83° , and frequently as high as $95^{\circ} 5'$ in the shade.

After receiving supplies and refreshments at Swan River, I shall proceed to Sidney for stores and to refit; likewise to get the work of this cruise completed, before going to Bass' Strait, the examination of which place will afford ample employment for the summer months. I have the honour to be, &c.

JNO. C. WICKHAM, Commander.

Extract from a private letter from Captain WICKHAM to
Captain Beaufort:—

“I was afraid at the commencement of our survey that Captain King's luck was to attend us; as on the night of our anchoring off Cape Villaret, one of those furious squalls he so well describes came

off the land at E.S.E., and, although we had nearly 80 fathoms of cable out, our anchor broke like a piece of glass, and, having previously broken one at Swan River, it was no very pleasing event; however, since that everything has favoured us. We have had frequent communications with the natives at different places, and all have been of a most friendly nature; indeed, they have invariably sought our acquaintance, by coming to the beach and beckoning to us to land; and, whenever our parties have landed, although at times in great numbers, for the purpose of fishing, wooding, and watering, they have never drawn back, but have put themselves (unarmed) entirely into our power, and have never once expressed a wish that our arms should be laid down. Almost all that we have seen have had the two front teeth of the upper-jaw extracted, and all perfectly naked, with the exception of a small grass apron.

"This appears to be a very extraordinary part of the world; the whole coast on the western side of King's Sound, also the entire coast between Roebuck Bay and Point Swan, being entirely of sand-stone, whereas, the islands and all the high land on the eastern side are entirely of quartz, and of so rugged an outline, that it is a most difficult matter to proceed in any direction. The islands are almost void of vegetation, and the whole seem to be thrown up into such fantastical shapes, as to lead one to suppose this part of the world to be in the last stage of utter ruin and confusion. From Valentine Island (where the cliffs end) the land is very low, and continues so to the banks of FitzRoy river. I am afraid that this river is never likely to become of any service, owing to its distance from the sea, and the risk in approaching it, occasioned by the strong tides amongst the islands of Buccaneer's Archipelago; but I am of opinion that, if a party is ever to reach the interior of Australia, it must be on its banks; the wood is nowhere so thick as to offer any impediment to such an undertaking, and there would be a certain supply of good grass. It appears to me that the inundations that evidently take place at times are in no way connected with the rainy season on the coast, as at our visit, which was immediately after the rains, there were no recent marks of the country having been flooded; these overflowings might prove a serious evil, as in many places there would be no escape but in the trees; the bed of the river is entirely of sand and gravel, therefore, no sickness would be likely to arise from keeping on its banks.

I find that Mr. Grey has discovered another river at no great distance from Prince Regent's River, and which he thinks discharges itself into the sea, somewhere between this port and Collier Bay; but, as Lieut. Stokes has just returned from the exami-

nation of that piece of coast, without having seen any opening, or anything to lead him to suppose the existence of a river, I think it more than probable that Glenelg River loses itself in the low land, and escapes by numerous creeks through the many mangrove-flats by which each small bay is bounded; and it is not improbable that it may lose itself in the boundless mangrove-flats at the head of Stokes' Bay. From the account of Lieut. Stokes, it appears very unlikely that any river of consequence empties itself into the sea on this side of Collier Bay, as no drift-trees or timber was seen by him; the tides were regular, and in the depth of Collier Bay there was scarcely any stream of tide. This was not the case in the entrance to FitzRoy River, as there the tides were very rapid; the flood ran only 4 hours, and the ebb 8, and in King's Sound there was a great deal of drift timber, which increased very much as we approached the river, and the water was quite muddy; between this and Collier Bay the water was not even discoloured. It appears strange where this river runs into the sea, but I am quite of opinion that it may be lost in numerous creeks which we generally find in all mangrove-flats, and into which it is next to impossible to penetrate in the boats. I am very glad that we have met Grey's party, and that all has gone on well, as I should have been reluctant to leave the coast without having heard of them; it is a satisfactory wind-up to our first campaign.

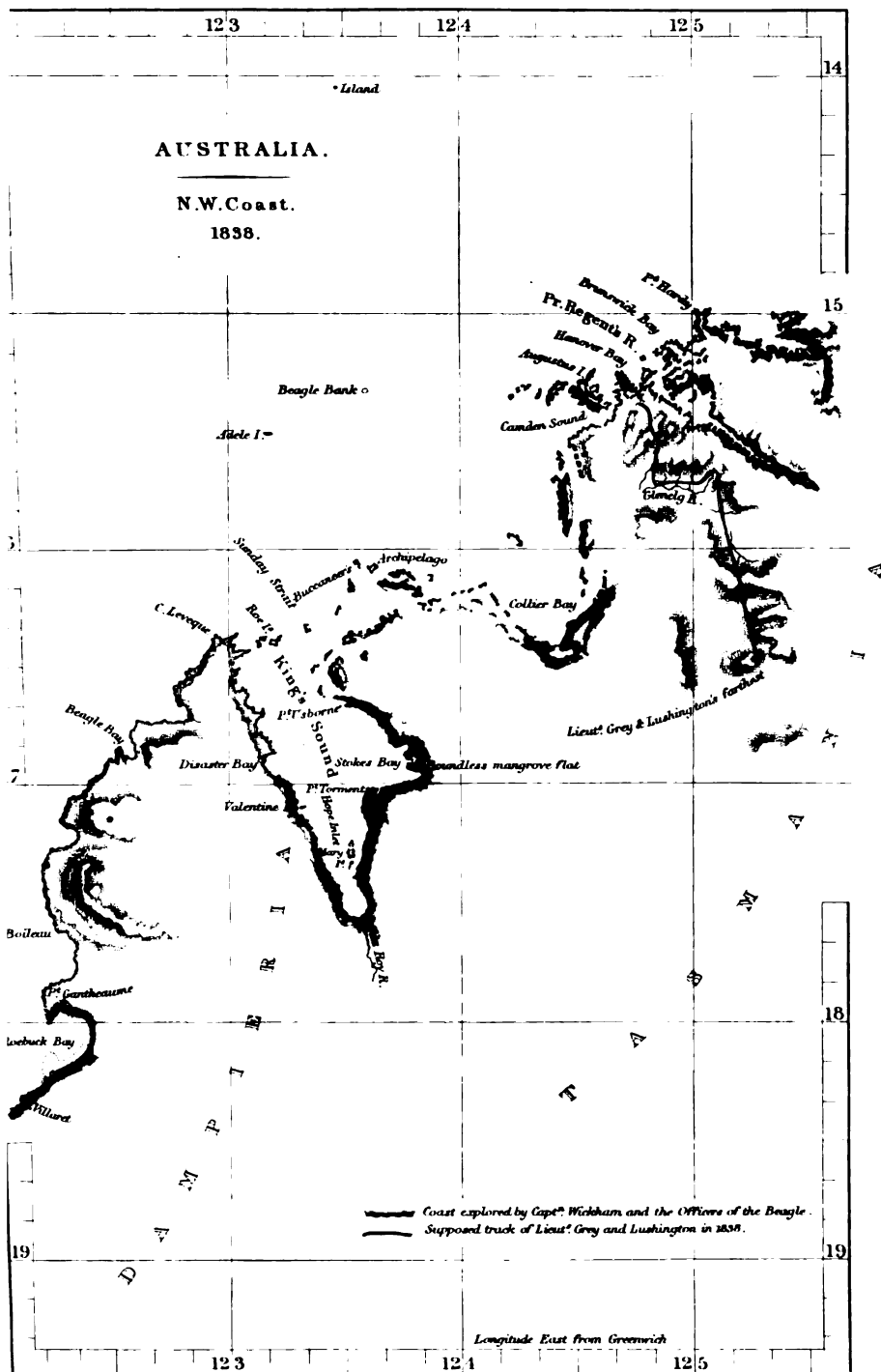
"I cannot conclude this without expressing to you the entire satisfaction I feel with respect to the manner in which *all* have performed the different duties allotted to them. Stokes has been most indefatigable. Natural history has not been forgotten by those who have had time to attend to it."

I. C. W.

[When that clever old navigator Dampier was off this part of the coast in the year 1699, he noticed the extraordinary rapidity of the tide, which had not been the case in the higher latitudes of this western coast, and he makes this observation, that, "by the great tides I met with a while afterwards, more to the N.E., I had a strong suspicion that here might be a kind of archipelago of islands, and a passage possibly to the south of New Holland and New Guinea into the great sea eastward, which I had thoughts also of attempting on my return from New Guinea." He did not, however, return. The examination made by Capt. Wickham sets the question of a *passage* at rest; and I think the great occasional rise of the two rivers, that of Prince Regent, observed by Grey and Lushington, and that of FitzRoy River,

described by Wickham, both stating it to be about 15 feet, will fully explain the rapidity and irregularity of the tides mentioned by Dampier, when these rivers are in a state of flood, and the whole country adjacent inundated.

These rivers now discovered are not of sufficient magnitude to explain the discrepancy which seems to exist between the great land of Australia and all other continents and large islands on the face of the globe. The drainage of these, and the rest already known, are quite insufficient in ordinary cases to carry off the waters of so vast a country. May not the extraordinary occasional rise point to the old conjecture of some great Mediterranean sea? One spot only now remains where a large river can be looked for, and that is in the bottom of the deep and wide gulf of Carpentaria; and if not there, we must either conclude that there is some peculiarity in the construction and material of Australia, or that the waters are collected in numerous lakes or one great sea, and evaporated or absorbed before they reach the coast.—
JOHN BARROW.]



LIST OF GEOGRAPHICAL WORKS RECENTLY PUBLISHED.

EUROPE.

- AUSTRIA.**—Travels in Austria, Russia, and Turkey, by the Rev. C. B. Elliott. 2 vols. 8vo. 1838.
- BRITISH ISLES.**—Ordnance Survey of the County of Londonderry. 4to. 1838.
- Statistique de la Grande Bretagne et de l'Irlande**, par A. Moreau de Jonnés. 2 vols. 8vo. Paris, 1837.
- DENMARK**, Sweden, and Norway. Hand-Book. Murray, 1838.
- GREECE.**—Residence in Greece, and Journey through Bulgaria, by F. Hervé. 2 vols. 8vo. 1838.
- ICELAND.**—Voyage en Islande et au Gröenland en 1835-6, publié sous la direction de M. Gaimard, 6 vols. 8vo. 7 livraisons du texte, et 12 livraisons des planches en vente. Paris, 1838.
- ITALY.**—Dizionario Geografico della Toscana, da E. Repetti. Firenze, 1838. Letter L.
- Memorie sul beneficamento delle Maremme Toscane.** 4to. Firenze, 1838.
- Statistica d'Italia**, dal Conte Serristori. 6 Nos. Firenze, 1838.
- PORTUGAL.**—Meine Reise durch Portugal in 1836, von Gust. v. Heeringen. Leipsig, 1838.
- RUSSIA.**—Narrative of a Tour in the North of Europe, by Lord Londonderry. 8vo. 1838.
- SAXONY.**—Mittheilungen des Statistischen Vereins des Königreich Sachsen. 9te Lieferung. Dresden, 1838.
- SCANDINAVIA**, Ancient and Modern, by Dr. A. Crichton and H. Wheaton. 2 vols. 8vo. Edinburgh, 1838.
- SPAIN.**—Sketches in the Mountains of Ronda and Granada, by Capt. C. R. Scott. 2 vols. 8vo.
- SWITZERLAND**, Savoy, and Piedmont. Hand-Book. Murray, 1838.
- TURKEY.**—Journal of a Tour through Rumelia, by D. Urquhart. 2 vols. 8vo. 1838.

ASIA.

- ASIA.**—Die Erdkunde von Asien, von Carl Ritter, Vol. IV., Part I. Berlin, 1838.
- Asia**, Von Dr. H. Berghaus. 4to. Part IV. Gotha, 1838.
- Reise um die Erde**, durch Nord Asien, &c., in 1828-30. Von A. Erman. 8vo. 2d vol. Berlin, 1838.
- ARABIA.**—Travels in Arabia—Omán, Mount Sinai, and Red Sea, by Lieut. Wellsted, I.N. 2 vols. 8vo. 1838.
- ASSYRIA.**—Researches in Assyria, Babylonia, and Chaldea, by W. Ainsworth. 8vo. 1838.
- CAUCASUS.**—Alte Geographie des Kaspischen Meeres des Kaukasus und des südlichen Russlands, von Dr. E. Eichwald. 8vo. Berlin, 1838.
- Travels in the Western Caucasus** by E. Spencer. 2 vols. 8vo. 1838.
- EASTERN INDIA.**—Topography and Statistics of Behar, Shahabad, Bhagulpur, Assam, &c., by Montgomery Martin. 3 vols. 8vo. 1838.
- Topography of Assam**, by Dr. M'Cosh. Calcutta, 1838.
- Report on the Eastern Frontier of India**, with an Appendix and Maps, by Captain R. B. Pemberton. 1 vol. 8vo. Calcutta, 1835.

- Instructions Nautiques sur les mers de l'Inde, traduites de Horsburgh, par M. le Capitaine Prédour. 3^{me} tom. 8vo. Paris, 1838.
- HINDUSTAN.**—Travels in the Panjab, Ladakh, Kashmír, &c., by Messrs. Moorcroft and Trebeck. 2 vols. 8vo.
- Voyage dans l'Inde, par Victor Jacquemont. 4 vols. 4to. 24 livraisons en vente. Paris, 1838.
- Personal Narrative of a Tour through the Western State of Rajwara in 1835, comprising Bikaner, Jesulmer, and Jadhpur, with the passage of the Great Desert, by Lieut. Boileau, Bengal Engineers. 4to. Calcutta, 1837.
- Observations on the Nilgherry Hills, with an account of their Topography, &c., by Dr. Baikie. 8vo. Calcutta.
- JAPAN.**—Nippon Archiv zur Beschreibung von Japan; von P. F. Siebold. Folio. Leyden, 1832-8.
- Expedition from Singapore to Japan, with a visit to Loochoo, by Dr. Parker. 12mo. 1838.
- JAYA.**—Ueber die Kawi-Sprache auf der Insel Java, von Wilhelm von Humboldt. 4to. Berlin, 1837.
- MALACCA.**—On Penang and Province Wellesley, by Captain Lowe. Singapore, 1838.
- Notices of the Indian Archipelago, by J. H. Moor. Singapore, 1837.
- PALESTINE.**—Palästina, von Carl von Raumer. 8vo. Leipzig, 1838.
- Reisen durch Syrien und Palästina nach Cypern und durch Kleinasien, in 1766, von Carsten Niebuhr. 4to. Hamburg, 1837.
- PERSIA.**—A Winter's Journey from Constantinople to Tehrán, with Travels through various parts of Persia, Khorasán, and the Caspian Sea, to Tabriz, by J. Baillie Fraser, Esq. 2 vols. 8vo. 1838.

AFRICA.

- ABYSSINIA.**—Voyage en Abyssinie, &c., par MM. Combes et Tamisier. 2 vols. 8vo. Paris, 1838.
- AFRICA, SOUTH.**—An Expedition of Discovery into the Interior, through the countries of the Great Namáguas, Boschmans, and Hill Dámaras, by Captain Sir Jas. Alexander. 2 vols. 8vo. 1838.
- Excursions dans l'Afrique Septentrionale, par MM. Falbe et Sir Grenville Temple. 8vo. Paris, 1838.
- ALGIERS.**—Tableau de la Situation des Etablissements Français dans l'Algérie. 4to. Paris, 1838.
- CANARY ISLES.**—Histoire Naturelle des Isles Canaries, par MM. Webb et Berthelot. 4to. Paris, 1838. 32 livraisons en vente.
- EGYPT.**—Letters from Egypt and Edom, by Lord Lindsay. 2 vols. 8vo. 1838.
- MADAGASCAR.**—History of, compiled from Original Documents, by the Rev. Wm. Ellis. 2 vols. 8vo.

AMERICA.

- AMERICA.**—Antiquitates Americanæ, sive scriptores septentrionales rerum ante Columbianarum in America, by the Northern Society of Antiquaries. Copenhagen. 1 vol. folio, 1837.
- Examen Critique de la Géographie du Nouveau Continent, au 15^{me} et 16^{me} siècles, par le Baron A. von Humboldt. Imp. fol. Edition en 8vo. 4 tomes, en vente.
- Reise durch Nord-America, von Maximilien Fürst von Wied. Coblenz. 1838.
- Narrative of the Voyage of H. M. Ship *Terror* to Hudson's Strait, in 1837, by Capt. Sir George Back, R.N. 1 vol. 8vo. 1838.
- Exploring Visits to the sources of the Hudson, in 1836-7, by W. C. Redfield. Pamphlet. 1838.

Reise nach Saint Louis am Mississippi. Weimar, 1838.

Journal of an Exploring Tour beyond the Rocky Mountains, by the Rev. J. Parker. Ithaca, U.S. 1837.

AMERICA, SOUTH.—Voyage dans l'Amérique Meridionale en 1824-33, par Alcide d'Orbigny, 7 vols. 4to. en 75 livraisons, dont 35 en vente. Paris, 1838.

PATAGONIA.—Surveying Voyages of H. M. Ships *Adventure* and *Beagle*, 1833-6, (Patagonia, Chile, and Peru,) by Captains P. P. King and R. FitzRoy, R.N., with extracts from the Journal of C. Darwin, Esq.

LA PLATA.—Coleccion de obras y documentos relativos à la Historia Antigua y Moderna de las Provincias del Rio de la Plata, por P. de Angelis. Vols. V. and VI. Buenos Ayres, folio, 1837.

A Journey across the Pampas and the Andes, from Buenos Ayres to Valparaiso, Lima, and Panama, with Remarks upon the Isthmus, by the Hon. P. C. Scarlett. London, 2 vols. 8vo. 1838.

Buenos Ayres and La Plata, by Sir Woodbine Parish. 8vo. 1838.

Letters on Paraguay, by J. P. and W. P. Robertson. 2 vols. 8vo. 1838.

Voyage à Buenos Ayres et à Porto Alegre, &c., par Arsène Isabelle. 8vo., Havre.

POLYNESIA.

AUSTRALIA.—Three Expeditions into the Interior of Eastern Australia, with descriptions of the recently-explored region of Australia Felix, and of the present Colony of New South Wales. By Major T. L. Mitchell. 2 vols. 8vo. 1838.

ARAFURA SEA.—Sailing directions for, by G. W. Earl. 8vo. 1837.

NEW ZEALAND.—Travels and Adventures in, between 1831-7, by J. S. Polack. 2 vols. 8vo. 1838.

MISCELLANEOUS.

AN Attempt to develop the Law of Storms, by Lieut.-Col. W. Reid. 8vo. 1838.

ANNALEN der Erd-Völker und Staatenkunde, von Dr. H. Bergbaus. 8vo. Berlin.

ANNALES des Voyages, par MM. Eyries, Humboldt, et Larenaudière. 8vo. Paris.

——— Maritimes, par MM. Bajot et Poirré. 8vo. Paris.

ATLANTIC Ocean, Sailing Directory for the South, by John Purdy. 1847.

GEOGRAPHIE d'Edrisi, tome V., du Recueil des Voyages et des Mémoires, publié par la Société de Géographie de Paris. 4to. 1837.

JOURNAL de la Navigation autour du Globe de la frégate la *Thétis* et la corvette l'*Espérance*, en 1824-6, par M. le Baron de Bougainville. 2 vols. 4to. Paris, 1837.

NAUTICAL Magazine. 8vo. 1838.

PHYSIKALISCHE Geographie, von F. Hoffman. 2 vols. 8vo. Berlin, 1838.

POSITIONS Géographiques des Principaux Lieux du Globe, par M. Daussy. 8vo. Paris, 1838.

RESEARCHES into the Physical History of Mankind, by Dr. J. C. Prichard. 2 vols. 8vo. 1837.

STATISTIQUES des Colonies Françaises. 2 vols. 8vo. Paris. 1838.

VOYAGE Round the World in 1836-7, in the U.S. Ship *Potomac*, by C. J. Ruschenberger, M.D. New York, 1838.

ZEITSCHRIFT für die Kunde des Morgenlandes, von H. Ewald, C. N. D. Gabelentz, und R. Rüdiger. 8vo. Göttingen, 1837.

MAPS RECENTLY PUBLISHED.

EUROPE.

- AUSTRIA.**—The Arch-duchy of Austria, in 47 sheets, scale 1-144,000th. Quart.-Mas.-Gen. Off., Vienna, 1838. 30 sheets published.
The environs of Vienna in 28 sheets, scale 1-14,000th. Quart.-Mas.-Gen. Off., Vienna, 1838. 9 sheets published.
- BRITISH ISLES.**—England and Wales, the ordnance survey of, in 120 sheets, scale 1 inch to a statute mile. 75 sheets published.
— Plan of Teignmouth, Devon, by Mr. Spratt, R.N., scale 6 inches to a mile, Hyd. Off., 1838.
Wales.—Porth-dyn-Ilaen Harbour, by Lieut. Sheringham, R.N., scale 4 inches to a mile. Hyd. Off., 1838.
Ireland, the townland survey of, scale 6 inches to a mile. 15 counties published. Dublin, 1838.
— Map in 4 sheets, scale 4 miles to an inch. Dublin, 1838; drawn by C. and J. Walker.
— Map in 2 sheets, scale 10 miles to an inch, by the Diff. Use. Know. Soc., London, 1837.
— Ballyshannon Harbour, by Capt. W. Mudge, R.N., Hyd. Off., 1838.
- Scotland. The Shetland Isles, by Mr. G. Thomas, R.N., scale 2 miles to an inch. Hyd. Off., 1837.
- FRANCE.**—Carte Topographique de la France, in 258 sheets. 60 published. Scale 1-80,000th. Dépôt de la Guerre, Paris, 1838.
Côte de France, entre Fontenailles et Langrune, Dép. de la Mar., Paris, 1838.
— entre Grandchamp et Fontenailles; pointe et raz de la Percée. Dép. de la Mar., Paris, 1838.
Plan du Port de Courseulles. Dép. de la Mar., Paris, 1838.
Corsica, by M. le Capitaine Hell. Hyd. Off., London, 1838.
- GERMANY.**—Topographische Karte der umgegend von Frankfurt. Von A. Ravenstein. Scale 1-75,000th. 1837.
- HUNGARY.**—Map of Hungary, in 9 sheets, by Professor Schedius. Pesth. 1836-8.
- ITALY.**—Map of the Lombard-Venetian Kingdom, in 43 sheets, scale 1-86,400th. Dépôt Topog., Milan. 36 sheets published.
Sardinia. Cagliari, by Capt. Smyth, R.N., Hyd. Off., 1838.
— Channel of San Pietro, by Capt. Smyth, R.N., Hyd. Off., 1838.
— Ports Conte and Alghero " " "
— Graham's shoal, by Mr. Shadwell, R.N. " "
Naples. Plan de la Baie de Naples. Dép. de la Mar., Paris, 1838.
- RUSSIA.**—Military Map of Russia, in 16 sheets, scale 1-680,000th. Dépôt Topog., St. Petersburg, 1837.
- SAXONY.**—Topographical Map of the Kingdom of Saxony, in 20 sheets, scale 1-57,600th. Dépôt Topog., Dresden, 1836-8. 5 sheets published.

ASIA.

- ARRACAN.**—Route from Aeng in Arracan to the Iráwádi, by Capt. B. Pemberton. Calcutta, 1837.
- CAUCASUS.**—Karte des Kaukasus, scale $2\frac{1}{2}$ inches to a degree; by F. G. Morin. Berlin, 1838.

- CHINA.**—La Mer de Chine, dressée par M. Daussy, en 1838; scale 1 inch to a degree. Dép. de la Mar., Paris.
- INDIA.**—Rajamandry.—Sheet 95 of Indian Atlas, scale 4 inches to a mile. E. I. Company, 1838.
- Cochin.—Sheet 62 of Indian Atlas. E. I. Company, 1838.
- La Mer des Indes, par MM. Daussy et P. E. Wissocq. Dép. de la Mar., Paris, 1837. Scale 3-10ths of an inch to a degree.
- Les Entrées de la Rivière d'Hoogly, &c. Dépôt de la Mar., Paris, 1838.
- JAVA.**—Straits of Madura and Bali, scale 6 miles to an inch, by J. Schwart. Amsterdam, 1837.
- MALDIVAS.**—Trigonometrical Survey of the Maldivas, by Captain R. Moresby and Lieut. F. T. Paul, Indian Navy; scale 4 miles to an inch. London, 1838.
- MANIPUR.**—Map of the Manipúr Territory, with part of Kubo Valley and the Burmese Frontier, by Captain Pemberton. Calcutta, 1837.
- PERSIAN GULF.**—Bushire Port and Karak Island, by Lieuts. Brucks and Cogan, I.N. Hyd. Off., 1838.
- SUMATRA.**—Karte von Sumatra, von H. Berghaus. Scale 2 inches to a degree. Gotha, 1837.
- SUNDA.**—Chart of the Straits of Sunda, by Mr. J. Schwart, scale 4 miles to an inch. Amsterdam, 1838.
- Sunda oder Borneo-Meere, von H. Berghaus. Scale 2 inches to a degree.

AFRICA.

- ALGIERS.**—L'Algerie en 3 feuilles Dép. de la Guerre. Paris, 1838.
- Province d'Alger,—Echelle, 1-400,000th " "
- " de Constantine " "
- " d'Oran " "
- ALEXANDRIA.**—Plan du port et des mouillages d'Alexandrie, Dép. de la Mar. Paris, 1838.
- SOUTH AFRICA.**—Les côtes méridionales d'Afrique et de l'entrée du canal de Mozambique, Plan du Port Natal et de la Baie Delagoa. Dép. de la Mar. Paris, 1838.
- Port Natal, by W. T. Haddon. Hyd. Off., 1838.
- MADAGASCAR.**—Le Canal de Mozambique et l'île de Madagascar. Plan du Port de Mozambique, du mouillage à la côte S. O. de Zanzibar. Dép. de la Mar. Paris, 1838.
- Les îles situées à l'est et au N.E. de Madagascar. Dép. de la Mar. Paris, 1838.

AMERICA.

- CANADA.**—Gulf of St. Lawrence, by Captain Bayfield, R.N., Hyd. Off., 1838.
- Mount Louis Bay and Magdalen River, " "
- Cawee and Egg islands, " "
- Gaspé and Mal Bay, " "
- Chateau Bay (Belleisle Strait), " "
- Little Miccatino Sound, " "
- Red Bay—Bradore Bay—Kegashka Bay, " "
- Bonne Esperance—Little Natashquan, " "
- St. Nicholas Harbour—Coacocho Bay, " "
- Amherst Harbour—Grand Entry Harbour, " "
- Belles Amours—Manicouagan Rivers, " "

- CANADA.—Gulf of, S.W. Part of Anticosti—Wapitayum, by Captain Bayfield, R.N., Hyd. Off., 1838.
 — E. Part of Anticosti—Bear Bay, " "
 — Mingan Islands—St. Paul's Island, " "
 — Magdalen Islands, by Lieut. P. E. Collins, R.N.
 River St. Lawrence, by Captain Bayfield, R.N., Hyd. Off., 1838.
 — Traverses, " "
 — Above Quebec, sheets 1, 2, 3, 4, " "
 — Montreal Harbour, " "
- NEWFOUNDLAND.—Les attéragés de l'île de Terre Neuve, entre Cap Race et les îles St. Pierre et Miquelon. Dépôt de la Mar., Paris, 1838.
- MEXICO.—Apalachicola Bay. Captain Roals. $\frac{1}{4}$ inch to a mile. Hyd. Off., 1838.
- WEST INDIES.—Bahama—Western Elbow of Cay Sal Bank. Capt. R. Owen, R.N., Hyd. Off., 1838.
 Cuba.—Colorados and Sancho Pardo Shoals, from Span. MSS., and Capt. R. Owen, R.N. 5 inches to a mile. Hyd. Off., 1838.
 Trinidad.—Bocas de Dragos, by Capt. Columbine, R.N. 2 inches to a mile. Hyd. Off., 1838.
- SOUTH AMERICA.—General Map of, comprising the whole of the late Survey of the Coast, in one sheet, by John Arrowsmith. Nov., 1838.
- GUAYANA.—Entrance of the river Corentyn, by R. H. Schomburgk, scale 1 inch to a mile. Hyd. Off., 1838.

AUSTRALIA.

- AUSTRALIA.—General Map of Australia, scale 9-10ths of an inch to a degree, by John Arrowsmith. 1838.
 Map of the South-Eastern portion, scale 7-10ths of an inch to a degree, by John Arrowsmith. 1838.
 Spencer and St. Vincent's Gulf, &c., scale 3 inches to a degree, by John Arrowsmith, 1838.
 Port Phillip, by Lieuts. Symonds and Henry, and Mr. Shortland, R.N. $\frac{1}{4}$ mile to an inch. Hyd. Off., 1838.
 Eastern Entrance to Torres Straits, by Capt. P. P. King, R.N. Hyd. Off., 1838.
 Arafura Sea, by G. W. Earl. Hyd. Off., 1838.

MISCELLANEOUS.

- ATLANTIC.—Carte reduite des mers du nord, depuis 45° jusqu'à 75° de lat. par M. P. Daussy. Dép. de la Mar., Paris, 1838. Scale 4-10ths inch to a degree.
- PACIFIC.—L'Océan Pacifique, par MM. D'Urville et Lottin; revue en 1834. Dép. de la Mar., 1838. Scale 5 degrees to an inch.
 Actæon Group, by Mr. G. Biddlecomb, R.N. Hyd. Off., 1838.
 Atlas du voyage de la *Thétis* et de l'*Espérance*, en 1824, 5, 6. Dép. de la Mar., Paris, 1838.
 Physikalischer Atlas, von Dr. H. Berghaus. Parts 1 and 2. Gotha 1838.
- WORLD.—Map of the World, coloured according to the different religious creeds, &c., by James Wyld. London, 1838.

I N D E X.

A.

ABAI, 446
Abulliont, 137
Abyssinia, 252
Adda Múgú, position, 307
Adumáti, 385
Afiyún-kará-hisar, 144
Africa—North, 250 ; West, 253. 289.
 440 ; South, 1. 253
Ahar, 30
Aidinjik, 137
Aineh-chai, 142
Ak-derbend Pass, 311
Akerva, New Zealand, 421
Akhal, 310
Ak-sakal, 375
Ak-serái, lat. of, 146
Ak-shehr, 144, 146
Alamút, 431
Aleppo, 382
Alginskoi Syrt, 390
'Ali-ábád, 31. 348
Altún Kupri, 99
Amádiyah, 77. 95
Amanus, 188
Amatitan, 323
America—discovery of, 114 ; North, 255 ;
 Central, 360 ; South, 256
Amol, 105
Amu-daryá, 374
Anambas Island, 386
Anjar Island, 181
Anjálíyah, 429
Antioch, Bay of, 228-234 382
Antiquitates Americanæ, 114
Aquæ Tibilitanæ, 42
Arabia, 170. 247. 267
Arafuras, 263. 445
Aral, level of, 375
Ararat, position of, 411
Arctic Discoveries, 213
Argæus, ascent of, 150 ; height, 151
Ardábil, 32
Arracan, 391-4
Artákí, 138
Artamid, 68
Asia Minor, journey in, 137. 157. 248 ;
 positions in, 411. 428-9
Ask, 107
Askur, 41
Assam, 394
Astarah River, 35
Atak, 308
Atrak, 310. 376
Athens, position of, 424
Attica, position in, 424
Australia, 157. 259 ; N.W. coast of, 450
Ava, 491

B.

Bálfurúsh, 104
Balkán, 374
Balkís, 138
Bander Abbas, 174, 175
Bander Vikkur, 333-339
Banks's Peninsula, 419
Bankoka, 444
Básidóh, 176-180
Bayas, 187
Beagle Bay (Australia), 460
Bebeji, 290
Bedawis, 274
Beg-shehr Lake, 156
Béilán—Town, 185 ; **Pass**, 185
Belgrade, position of, 410
Belúches, 360
Berlin, height of, 136
Bessarabia, positions in, 42
Bhútán, 397
Bínbir-kílísá, 154
Bitlis, 72-74
Bœotia, positions in, 424
Boga Paní, 396
Boguslowsk, 404
Bonah, 39
Bór, 152. 153
Borneo, 444
Borzúk, 375
Boschman's Cave, 3
Brahmahpútra, 392
Rucharest, position of, 409
Bucklige Island, 414
Buhtán, Mountains, 87-89
Bulgaria, positions in, 409
Busá, position of, 290
 C.
Cambay, Gulf of, 196-205
Capati, or **Entry Island**, 422
Carpentaria, Gulf of, 466
Caspian, level of, 135 ; **E. coast** of, 371
Caucasus, positions in, 411
Cedar Mount, 3
Chad Lake, 290
Chadda River, 289
Chalis River, 433
Chalons, Mag. Int., 369
Charra Punji, 396
Chittagong, 392
Choacús, Mount, height of, 325
Chúntop River, 12
Cilician Gates, 185-195
Citium, 382
Clanwilliam, 3
Cloudy Bay and Harbour, 419 ; **posi-**
 tion of, 422
Cochin China, 386
Colonna Cape, position of, 424

Copper Berg, 7
 Cusco, position of, 427
 Cyprus, 381
 Cyzicus, 138

D.

Dámaras—people, 17, 18; land, 20
 Dampier's Land, 460
 Dayaks, people, 445
 Demávend—Vill., 102; Mount., 107;
 ascent of, 109, height, 112
 Demirji range, 141
 Dilmán, 54, 55
 Diakenstein, height of, 2
 Dulce Rio, 317; Golfo, 318
 Dusky Bay, 421

E.

Ed-dere'an, 40
 Egga Island, site of, 307
 Egzaboh, position of, 307
 Elbák, Valley, 57
 Elburz, 108. 308. 431
 Elkósh, 92
 Entry Island, 422
 Enzeli, 36
 Erbil, 99
 Erchek, Vill., 60
 Erz-rúm, position of, 411
 Eski hisar, 428
 Ethnography, 261-266. 389. 397
 Euskalian Language, 397

F.

Fandah, position of, 307
 Fazarah, Lake, 40
 Fish River, 10. 22-24
 Fitz-Roy River (Australia) 462

G.

Galatz, Mag. Int., 370
 Gambia, 453
 Gamrún, 174
 Geneva, Mag. Int., 369
 Geography—progress of in Europe, 235;
 Asia, 244; Africa, 250; America,
 254; Australia, 259; Polynesia, 260-
 262
 Germí, Vill., 34
 Gilán, distr., 38
 Glenelg River, 456
 Goljik, 434
 Greece, positions in Eastern, 424-426
 Guaracolta, Nevado de, 427
 Guari, 390
 Guatemala, 320

H.

Hajámarí River, 353-359
 Hájilar, 155
 Hajfr, 275-276
 Hanover Bay, 455
 Harraz, Mount, 277
 Heights measured by Thermometers,
 435
 Herawel-dágh, height of, 57

Herhaz River, 105
 Hexar Chesn Pass, 434
 Hokianga, 416
 Horutea, 418
 Hormuz, Island of, 170-172
 Húmaris River, 16
 Húntop River, 20

I.

Impan Turál, 393
 Indus—survey of, 328; local names,
 351; rise, 356; deposit of mud, 356;
 changes in Delta, 357; pop. of Delta,
 360
 Inen, 434
 Irawáti, 392
 Irtish, 390
 Isauria, 155, 156
 Isella, Mag. Int., 369
 Iskenderún, 185
 Izabal, 318

J.

Jáj-rúd, 434
 Jakau, 364
 Jakobah, 292
 Janjan-búre, 453
 Jezireh, 86
 J'harrah Hills, 364
 Jintiyah, 395
 Joka-kúnda, 453

K.

Kachar, 393, 395
 Kaipára Harbour, 416
 Kaisariyeh, lat. of, 149; height, 149
 Kalbé (Senegal), 452
 Kalemah, 42
 Kamiesberg, 4
 Kamop, 10
 Kanó, position of, 290
 Karleh, height of, 439
 Karas, Mount, 9
 Kars, position of, 411
 Kasan, height of, 135
 Kashka, Mount, 30
 Kashnah, 290
 Katagúm, 290
 Katakekaumenc, 142
 Kattam Kárap, 307
 Kazvín, 39
 Keikáp River, 11, 12
 Kelát Nádirí, 311
 Kerganah-rúd, 36
 Khasáb, Bay of, 183. 184
 Khediwári River, 339. 358
 Khurrem-ábád, 433
 Killan, 343
 Kíuf Balló, 445
 Kishm, 176. 178
 Kiskilies, 131
 Kiz-hisar, 153
 Koan-quip, 11
 Koch-hisar, 147
 Komákas, 5

Kóniyeh, lat. of, 145. 381
 Kópum'naas, 12
 Kori River, 363
 Kos, gulf of, 428-9
 Kos'syah Hilla, 395
 Kostañtinah, 47. 53. 226
 Kostin Shar, 415
 Kotasir, 365
 Kowsie River, 5
 Kristnah, height of source, 439
 Kubo Valley, 393
 Kudyat 'Atf, 45. 47
 Kúisip River, 13. 16
 Kúkah, 290
 Kúkewárf, 342
 Kúks tribe, 393
 Kuladain, 393
 Kulah, 142
 Kullumb, height of, 439
 Kurdistán, journey in, 54
 Kútáhiyah, 383, 429
 Kwara, 292

L.

Ladik, 145
 Laft, 178
 Lak'hpat, 363.5
 Larek, 181, 182
 Laybach, Ober, Mag. Int. at, 370
 Lombock, 387, 445
 Losetho, 428
 Luhúpa, 393

M.

Mac Carthy I. (Janjan-búré) 453
 Macestus, 140
 Máhf River, 196
 Mairang, 396
 Maldivas, 385
 Mallódú Bay, 444
 Mandingo, account of, 448
 Manakou Harbour, 417
 Manipúr, 393
 Marathon, position of, 425
 Matotahkin-Shar, 413
 Mázándarán, 103
 Mæander, 143
 Mediyád, 82, 83
 Mejáz Amár, 43
 Mendefi hills, 293
 Menjil, Vill., 38
 Meteorologic Obs. in Russia, 377
 Mico Mount, height of, 318
 Milan, Mag. Int., 369
 Minau, Fort of, 173, 174
 Minoa, 205, 209
 Mishkin, distr., 31
 Misf, 152
 Mixco, pop. of, 321
 Mofhak, 279
 Mokha, 268
 Moldavia, positions in, 409
 Mopta, 395
 Motagua River, 319
 Muglah, 428-9

VOL. VIII.

Mulmein, 397
 Musmai, 395

N.

Nakabu-l Hajar, 267
 Namáguas, People, 8
 Námin, 33, 34
 Nangkáu, 395
 Naransfr, 365
 Narbadá River, 197
 Nardewán Nádirí, Pass, 312
 Nasr-Abád, 31
 Natunas, 334
 Nechwatoa, 413
 Negrais, Cape, 391
 Nertchinsk, 405
 New Zealand, 416-23
 Niais, Vill. 19
 Nílkóh, 311
 Ningtí River, 392, 3
 Nisæa, 205. 209
 Noadeh, 32
 Nongmuiching, height of, 394
 Nosop River, 20
 Novaia Zemlia, 403, 411
 Nun Cape (Kwara) 307
 Nyáni-Marú, 449

O.

Obi, 390
 Okhotsk, 406
 Okóh, position, 307
 Onar, 31
 Orange River, 5, 6. 24
 Oup River, 10

P.

Pacific Ocean, no good chart of, 387
 Pait, height of, 439
 Palliser, Cape, 419
 Panj-gajer, 348
 Parau, 309
 Paris, Mag. Int., 369
 Pátara, 429
 Patmos, 428
 Paz, La, 427
 Persian Gulf, 170
 Pest, 369
 Phocis, positions in, 425
 Pinara, 429
 Pisaniare, 449
 Pokrí, height of, 439
 Polochic River, 326, 327
 Pondichery, 385
 Pong, 394
 Puli Khatún, 311
 Púna, height of, 439
 Purulá, height of, 325
 Púrundhur, height of, 439

Q.

Quanwas Mountains, 15
 Quorra—see Kwara, 292

R.

Rabba, position of, 307
 Rangún, 397
 Rás Musandam, 182, 183

Q K

- Rawanduz, 95
 Resht, 37
 Rio Grande de Motagua, 324
 Rodah, 286
 Roebuck Bay, 460
 Roturoa, Lake, 418
 Rumelia, positions in, 43
 Rumli River, 46, 47
 S.
 Saittæ, 142
 Sakatú, position of, 390
 Salamá, pop., 325
 Salcantai, mountain, 427
 San'a, Journey to, 267; City, 281;
 height, 284; pop., 289
 Sandukli, 144
 Sari, 103, 104
 Sátá, 328. 352
 Savalan, Mount, 32
 Sebús River, 40. 42
 Selmás, 54
 Sennif, 273, 274
 Serjel-'Audah, 43
 Sért, 76. 78
 Servia, positions in, 43
 Servia, 12 positions in, 410
 Shah Bander, 172, 173
 Shari River, 294
 Shikár-gáh, 350
 Shindan, Mount, 35
 Shumla, position of, 410
 Siberia, on the frozen ground of, 210.
 213. 401
 Sihwan, 361
 Sikka, 453
 Silhet, 392
 Sind, 359
 Singapur, 443
 Singhur, height of, 439
 Sipán dâgh, 60
 Siyalan, 431-3
 Sorata, 427
 Stirling, 307
 Stokes Bay (Australia), 465
 Suleimaniyeh, 100
 Swakop River, 15
 Symi, Island and Gulf of, 129, 428
 T.
 Table Mountain (Arracan), 392
 Tabriz, 29
 Tako, mount, 419
 Talak, 393
 Tálkán, 430
 Tanjong Louar, 387
 Tankoral, 453
 Tans Desert, 13; Mount., 18
 Tarahap Mountain, 16
 Tehrán, 29
 Thermometers to measure heights, 435
 Tifis, position of, 411
 Tiýári, 95
 Tourane, Bay of, 386
 Tripurah, 392
 Tuinjí, 312
 Tómas, Mount, 16
 U.
 Uch-hisár, 148
 Ugrische Volksstamm, 389
 Ujarád, 34
 Ulúbád, 137
 Ulú-bunár, 155
 Ulúburlú, 157
 'Umk, El, Plain, 185
 Ungoching hills, 393
 Unuma, Mount, 23
 Ural, 389
 Urgúb, 148
 Ustúrt, 372; height of, 375
 V.
 Van, 63. 66
 Verona, Mag. Int. at, 369
 Vienna, 370
 Vilcanota, Mount, 427
 Volcan de Agua, ascent of, 320. 322
 Voyage round the Globe (Bougainville),
 384
 W.
 Waikato Harbour, 418
 Wairoa, 417
 Wallachia, positions in, 409
 Walvisch Bay, 14, 15
 White Island, height, 419
 Womba, position of, 290
 X.
 Xanthus, 429
 Y.
 Yakutzk, 402
 Yalak, 392
 Yeú River, 289
 Yuma Kiungj, 393
 Yunan, 397
 Z.
 Zab River, 98
 Zacapá, pop. of, 319
 Zákhú, Mount, 89, 90
 Zanjeia, 301
 Zaria, position of, 290, 302
 Zealand, New, 416
 Zebaní, Mount. 97
 Zebíd, 270-272
 Zeítún, position of, 426
 Zemlia Novaia, expeditions to, 411
 Zenati River, 44, 45
 Zinari, 428
 Zohi Deringeh, Pass, 312
 Zohi-Gerendeh, 312

END OF VOL. VIII.

London: Printed by W. Clowes and Sons, Stamford Street.

This book should be returned to
the Library on or before the last date
stamped below.

A fine of five cents a day is incurred
by retaining it beyond the specified
time.

Please return promptly.

Widener Library



3 2044 105 225 916