

appearance at least, are extremely formidable. But they have been three times taken—in 1841, by Sir Gordon Bremer; in 1847, by the expedition which I took up myself; and again, in 1856, by Sir Michael Seymour. A little higher to the left is a long battery on Tiger Island, to which all ships are obliged to pass very close, on account of the shoals on the left bank of the river. No other defence occurs until the one called the First-bar Battery, on the left bank, erected about the time when Sir Thomas Herbert's light squadron routed the Chinese force in 1841. The principal defences towards Canton are at the point called the Barrier, where the two divided channels of the river unite, and where a barrier of stakes has been long constructed. Here are about six batteries, and the position would be impregnable were it not for the absurd manner in which the forts are built, upon perfectly square plans; so that if you advance on an angle scarcely a gun can be brought to bear. The embrasures, or rather windows, are almost large enough for a lord mayor's coach, and furnished with folding-doors of wood, by way of supplying plenty of splinters for the garrison. I have found no reason to change the explanation which I gave in a work on China, twenty-one years ago, of the unimproved condition of the military resources of the country. First, that pride and conceit which is a bar to all improvement in the arts, and, among the rest, the art of war. Secondly, that jealousy of the Chinese population which has prevented the Tartar Government from making of it such efficient troops as it might; for during the war we always found the greatest possible difference between the Tartars and Chinese. Thirdly, that overwhelming superiority which the empire has possessed over the petty and barbarous states on its frontiers, and which has precluded any serious calls on its exertions.

The remaining defences occur on reaching Canton. First, the French Folly (the origin of the name altogether unknown), which *was* on the east of the city, but which has been blown up and demolished by Sir Michael Seymour; the Dutch Folly, on an island in the river, which was lately occupied by our force, and from which the Viceroy's palace was bombarded and destroyed; a thing opposite the Foreign Quarter, very like a goose-pie, but named the Red Fort; and what is called the Shameen Fort, a little above the Foreign Quarter. Since our discovery and navigation of Blenheim Reach, a fort or two have been there erected. In the continuation of the same passage towards Canton is the Macao or Teatotum Fort on an island (so called, perhaps, from its square or octagonal sides), and the Bird's-nest Battery, a little higher up on the left bank. Sir Michael Seymour, in temporarily leaving the Foreign Garden, as a

less strong position, has very wisely occupied the Macao Fort, which is easily defended by co-operation with his ships. Having determined on keeping the river open pending the arrival of reinforcements, the admiral has placed his ships within signal distance of each other all down the river, so as to co-operate in case of necessity, and prevent the channel being blocked up by the Chinese. The difficulties of this plan are considerably increased by the numerous creeks and side-channels on each bank of the river, where the flat-bottomed junks can lurk and send out fire-rafts and other annoyances upon our ships, without the possibility of being followed and cut off in return. The fire-rafts, however, are not so dangerous as might be apprehended, since they can be taken in tow by rowboats, and driven on shore to burn at their leisure. The species of vessel most wanted by the last accounts were gunboats of light draft to follow up the junks into these creeks and destroy them; and, with the assistance of such, no doubt a good account will be given of the enemy. Almost every Chinese afloat in the neighbourhood of Canton is a pirate, whenever he can turn his hand that way; and perhaps one of the best results of the proposed naval expedition would be the extinction of piracy about Hongkong and the coast (interfering so seriously as it does with our trade) by disarming, and, if necessary, destroying, every armed junk fallen in with. The excuse for carrying arms is "self-defence against pirates;" but they are, in fact, all pirates in turn, and if all are disarmed equally this pretence will be annihilated.

In the mean while, both the internal and the external troubles of China seem to have conspired to favour the progress of our own colony of Hongkong. More than thirty years ago I remember sailing round it in a yacht, and occasionally landing to shoot, when it was nearly uninhabited, and now it contains 70,000 Chinese inhabitants, with occasionally as many as a hundred European ships in the harbour. This harbour is one of the finest in the world, and, according to the testimony of Admiral Cécille, of the French navy, superior to that of Rio Janeiro, which, I believe, has ranked as the first. All these circumstances combined, together with the accommodation for troops on shore, must tend to give the present expedition an immense advantage over the first one. The unhealthiness of Hongkong was experienced on the first occupation (I believe a very frequent occurrence), and this was much aggravated by the effects of Chinese spirits on our troops; for while the prisoners in gaol were quite healthy (without the luxuries which prisoners in gaol enjoy in this country), the soldiers in barracks, who had access to liquor, were dying at the rate of 10 in a week. I was rejoiced to

find, by 'The Times,' that his Royal Highness the Commander-in-Chief had himself addressed very seriously on this subject a corps of artillery at Woolwich previous to their embarkation. There is not only the inherent mischief of these unwholesome Chinese spirits (bad enough in themselves), but the additional danger of their being poisoned.

Quitting Hongkong, we may now proceed along the coast to the new ports in succession, where it is to be hoped the peacefully trading inhabitants (so different from the Cantonese) may not be disturbed by war, as most of them had plenty of it on the former occasion. If they can only experience our moderation for a time, they may perhaps at last get rid of the idea which in China attaches everywhere to an Englishman, viz. that of a *bipes implumis* who goes about surveying and map-making, with a view to ultimate occupation.

Leaving Hongkong, we proceed about 260 miles N.E. to Amoy, the first of the four new ports, and the first which felt the force of an armament in 1841. Here an immense range of stone-wall had been erected and mounted with cannon for our reception; but though the lower-deck guns of the Liners had little effect on it, the place was easily taken by escalade on the left flank of the wall. The harbour of Amoy and approach to it are extremely commodious for trade, which can be carried on close to the shipping. The small island of Koolangsoo forms the south of the harbour, and was retained by us, together with Chusan, as a guarantee for the payment of the indemnity; but on account of its extreme insignificance and the unhealthiness of our troops there, I was authorized to give it up to the Chinese government, according to instructions from home, before the expiration of the full period. Here are some curious vestiges of our former intercourse with China, in the shape of tombstones in an extraordinary state of preservation. The chief objection to Amoy as a place of commerce is the small trading capital of the native merchants. They have but few exports; and the imports which find most favour there are not our manufactures, but the productions of the Malay archipelago, which go under the name of Straits produce. The people of this province of Fokien are the most maritime of the Chinese population. Their voyages have long taken them to the islands of the above-named archipelago, where they need seldom be out of sight of land, and where they have familiarized themselves to the commerce of that region.

About 150 geographical miles to the north of Amoy lies Foo-chow-foo, the next of the new ports. This place escaped a visitation from the expedition in 1841, and would have been all the

better for some experience of our power; for in consequence of those obstacles to the spread of intelligence already adverted to, the people retain some of their original ignorance regarding foreigners, and have besides much of the turbulence and ferocity of character attaching to their neighbours the Cantonese; to whom, however, they bear a deadly dislike, and with whom they have a perpetual feud. It was here that an attempt was made to persuade me that our Consul at Foo-chow-foo must be excluded from the interior of the city, as he was at Canton; but I treated it as a mere pretence—which it really was—and had the satisfaction of establishing him in a good position within the city, soon after the opening of the port. This place was not promising at first as a port of trade. The river, which is picturesque and beautiful as a natural object (being rapid and rocky like the Rhine, but much more shallow), is on that account of difficult and dangerous navigation, and the anchorage besides is 10 miles below the city. The natural advantages, however, as a mart for black teas (being so near the place of their production), have conquered other disadvantages, and the exports of tea from Foo-chow-foo have of late years become considerable.

Ningpo-foo, the next of the new ports, lies as far as 270 miles to the north of this, and afforded winter-quarters to our invading force in 1841. The union of power and clemency, which the people of this place experienced from us at that time, has been followed by the best effects, and at no spot have foreigners enjoyed more comfort and liberty in their movements than here. As a place of trade, however, it has failed. This must be attributed to the near vicinity of Shanghae, by far the best port of all, which by its superior advantages and attractions has drawn away nearly all commerce from Ningpo. The embroidered silks of Ningpo, and the ingenious works in inlaid wood, constitute the principal native productions.

Opposite to the river's mouth, at the distance of some 50 miles, lies the island of Chusan, with its chief town Tinghae. It is well known that we had possession of this fine island for about five years in all, during four of which it was retained as a security for the payment of the war indemnity of 21,000,000 dollars. It was my fate to resign it with some regret, on the payment of the last instalment in 1846; and as this Society has done me the honour to place a Memoir and Map of the island in its 23rd Volume, there is the less need to say anything more concerning it on the present occasion. Chapoo, a port pertaining to the famous city of Hang-chow-foo, was visited by our war-expedition; but the tides and eddies of the dangerous estuary prevented the squadron going up to the town.

We lastly come to the very important and flourishing port of

Shanghai, something more than 100 miles to the north of Ningpo, and as much as 800 from Hongkong. Here it was that the Tartar government took serious alarm at the progress of our armament in 1842, after it had issued from its winter-quarters at Ningpo. An immense line of stone batteries had been constructed at Woosung, the mouth of the Shanghai river, but these were carried in about two hours, and the force found Shanghai itself not only deserted but a prey to hosts of Chinese plunderers. The natives showed so little patriotism here that they very merrily lent their aid to drag our guns against the town, the mandarins being all dispersed. In fact, the conduct of our force in winter-quarters at Ningpo had diffused such an opinion of our invincibility in the field, as well as of our clemency and good faith, that the people showed not the slightest objection to our approach, and this (as already observed) was one of those omens which opened the eyes of the Tartar government, and induced them to hurry the conclusion of a peace. The Treaty for this was shortly afterwards signed on board the Cornwallis flag-ship, opposite that very gate of Nanking where I myself in 1806 saw an act of incivility attempted to our Ambassador, the late Lord Amherst, in shutting the doors against him; though on a strong remonstrance being made the rudeness was atoned for, and the gates re-opened. Shanghai, as a place of trade, has more than answered expectation, having far outstripped Canton during even the few years that have intervened since 1842, and notwithstanding the troubles that ensued there from its capture by the rebels about four years ago. Circumstances here have contributed to make our condition very different from what it has been at Canton, and, instead of obtaining *less* than our Treaty rights, we have almost obtained *more*. In lieu of a mere *Consulate*, we obtained almost a *Settlement* of above a hundred acres on the river, which the neighbourhood of the rebels afterwards obliged us to fortify. Whenever the necessity for this ceases, the fortification should cease, if it were only to convince the Chinese that we do not want their territory, but only their commerce and friendly intercourse. It would not be right to conclude these observations without adverting to that splendid river, the Yang-tse-keang, on which Nanking stands, and which seems to have been specially adapted by nature to steam navigation. Lord Colchester, an ex-president of this Society, can bear me witness to its magnificent character, for we were travellers in the same boat along a great portion of its course, as far inland as the Poyang Lake. Pope says of the Thames,

‘Search not its bottom, but survey its shore.’

Lord Colchester did both; for he took soundings from Nanking to

the Poyang Lake, and with that and the compass constructed a chart which, if it is not already, ought to be, in the archives of the Society. From Nanking downwards an excellent survey has been made by Captain Collinson, R.N.

The PRESIDENT returned the thanks of the Society to Sir John Davis for his most instructive communication. They could not make a better comparison between the Chinese and ourselves, than by comparing the map of that country drawn by Mr. Arrowsmith, with the remarkable Chinese map presented to the Society by Consul Parkes. The subject of China could only be well discussed by those who were acquainted with the country; and he was glad to see present Mr. J. Crawford, and also that distinguished General, Sir Colin Campbell, who could illustrate how the Canton forts might easily be taken.

MR. J. CRAWFORD, F.R.G.S.—It was not very easy to speak with any effect after the best-informed man in Europe, and one, he believed, better informed than the Chinese themselves, respecting the empire of China. He had himself never gone farther than Cochin-China; but he had had a great deal of intercourse with the Chinese. He had lived among them, and had some authority over them, for twelve or fourteen years; and, on the whole, he was pretty well acquainted with them. He knew the emigrants tolerably well. It was well known that China was a populous country, and a country of vast extent; but mistakes prevailed respecting its population. It was said to be the most populous country in the world. This was not the case, as it was not even so densely peopled as Great Britain and Ireland. The whole area of China was 1,300,000 miles—about twelve times the extent of Great Britain. Its population was supposed to be 360,000,000, according to the census taken forty-five years ago. In Great Britain we had 300 inhabitants to the square mile, the Chinese 277. The population was most unequally distributed. In some provinces—the province of Yun-nan, for example—there were not above 50 inhabitants to the square mile, and that province is about the extent of Great Britain and Ireland put together. Then, there were some provinces which contained 600 or 700 inhabitants to the square mile, as in Che-kiang, a great silk country. The first subject he would bring under notice was the emigration from China. When Europeans were first acquainted with China 350 years ago, there were no emigrants; but the protection afforded by European governments, especially by our own, had encouraged the Chinese to emigrate and to settle in the neighbouring islands. The emigrants were all of the working classes, and they were all adult males. The women never emigrated, and the consequence was that the men were a little turbulent and ill-conducted. He estimated the number of Chinese emigrants in the eastern islands, including the Philippines, at about 350,000: there was, besides, a considerable number in Cochin-China, and a far greater number in Siam, which contained, he believed, not less than 1,000,000. All that was most valuable in Siam depended, indeed, upon the industry of the Chinese. The Chinese settlers generally were an exceedingly industrious, well-doing people, and he had never himself experienced the least inconvenience from misconduct on their part. When he was at Singapore, at the head of the civil administration, fears were at one time entertained of the Malays, and the chiefs of the Chinese came, and, in the handsomest manner possible, offered their assistance to put down the expected disturbance. He mentioned this, because it was said the Chinese were conspiring against us throughout the whole of our insular possessions. He believed there was no foundation whatever for that allegation, for he had never known them to be turbulent or disorderly. In our settlements they were upon the same footing as British subjects. They sat on petty juries, on grand juries, and some two or three of them were justices of the peace in our prin-

cipal settlements; they were shipowners, and they traded far and wide—to the Cape of Good Hope, to the Mauritius, and to every port in India. There were many wealthy people among them, and he was certain a people in their condition would not be disposed to insurrection; they knew, moreover, that they were better off under our government than any other. Our trade with China was a most important subject. The exports and imports, including the trade between India and China, could not be less than 15,000,000*l.* each, which approached the largest branch of our foreign commerce—the trade with the United States. Complaints had been made of the quantity of silver sent out of this country to the East. The cause was obvious enough. We received an immense supply of productions from China, and, of course, were obliged to pay for it in silver. With respect to the opium trade, he approved of it entirely. He thought the use of opium as innocuous as the use of any description of wine, and a good deal more so than that of brandy or other ardent spirit. He had the authority of Sir Benjamin Brodie for this. That eminent medical authority said that opium soothed the nervous system, while brandy and all alcoholic spirits irritated it exceedingly. Both were, of course, liable to abuse; but he conscientiously believed that opium was much more rarely abused than ardent spirits. Some people fancied that the Malays took opium for the express purpose of running a-muck. Now, when the Malays and Chinese took opium, they smoked it in the form of a little ball, not much larger than a swan-shot; half a dozen whiffs sent them fast asleep, and when asleep, they dreamed they were in a Mahommedan paradise making love to houris. That was surely not the condition for a man to run a-muck in. The Indian government received about 3,000,000*l.* a-year from the opium trade—about one-seventh of their entire revenue. It was not our business to put a stop to the trade. So long as the traffic was prohibited by the Chinese, smuggling must take place; and that could only be put a stop to by the Chinese legalising the traffic and imposing a moderate duty upon the article. It was argued that it was the duty of the Indian government to suppress the growth of the poppy, in order to favour an absurd and ridiculous prejudice on the part of the Chinese. The 'Edinburgh Review,' in its last number, proposed that we should enter into a treaty with the Chinese, and bind ourselves to put an end "progressively" to the growth of the poppy in India for the production of opium for exportation. We could not do that without "progressively" putting an end at the same time to our Indian empire; for, without the 3,000,000*l.* revenue derived from opium, it would be impossible to carry on the Indian government. There were other articles of import into China of some importance. The raw cotton of India was sent in considerable quantities to China; and that was one reason why (the gentlemen of Manchester should understand) it did not come to England. The cotton-wool imported into China was of the value of 500,000*l.* sterling, whereas the opium taken annually was of the value of 5,000,000*l.* To ask us to put a stop to the growth of the poppy, would be just as reasonable as to ask the French to put an end to the growth of the vine, because spirits and wine were sometimes productive of drunkenness in this country. Among other imports into China were the swallows' nests, a gelatinous substance, almost tasteless, but in much repute for making soup. There was another article of commerce, the sea-cucumber, of which specimens might be seen in the Gardens of the Zoological Society. Several thousand tons were imported into China annually. The Malays proceeded as far as the Gulf of Carpentaria in search of this article, and there Captain Flinders found them fifty years ago. Another article of import he might mention, was camphor, not the common camphor, but concrete camphor, obtained from a certain tree; it was valued for its supposed restorative properties, as are the other articles just named. With respect to the exports of China, he would only touch upon two—tea and raw silk. It was not until the

middle of the seventeenth century that the use of tea was known to Europeans. The first tea introduced into England was a packet of 2 lbs. 2 ozs., sent as a present to Charles II. by the East India Company in 1664. It was not obtained in China, but at Bantam; it was what is now called junk tea, and execrable stuff it must have been. Forty-six years afterwards we consumed about 1,000,000 lbs. of tea. In the first year of the next century our consumption of tea, notwithstanding monopoly, taxes, and duties, had risen to 20,000,000 lbs. In 1833, before the monopoly of the China trade was overthrown, it was 30,000,000 lbs., and last year our consumption was 63,000,000 lbs. We paid for this tea about 5,000,000*l.*, exclusive of the duty, and the duty amounted to about the same sum; so that our tea cost us 10,000,000*l.* prime cost, exclusive of retail profit. He had no doubt the consumption would continue to increase. A few words respecting the raw silk. Down to the years 1833 and 1834, the East India Company asserted that it was impossible to extend the production of raw silk. The monopoly was overthrown, and the importation of raw silk from China had risen from 2000 bales in that year to 20,000 bales in the year before last. This year, owing to the failure of the silk crop in France and Italy, the importation of Chinese silk will be 70,000 bales. Having thus spoken of the commerce of China, he would say a word about the war. The only point on which he begged to differ from Sir John Davis was with respect to the mode of carrying it on. Sir John Davis seemed to think that the attack and capture of Canton would be all-sufficient. He did not think so. It was not found to be so in the previous war.

SIR JOHN DAVIS.—We never captured it.

MR. CRAWFORD.—We did pretty much the same; we inflicted a heavy fine. Being 1200 miles from the seat of the Chinese government, the capture of Canton would not be sufficient. He thought we must do what we did before—cut off the communication between the northern provinces, containing the capital, and the southern, the chief sources of the supply of food and revenue.

MR. ED. DIVETT, M.P., F.R.G.S., wished to ask a question respecting a subject of great interest. Sir John Davis had spoken of the piracy which existed in the Chinese waters. He should be very glad to know whether the same sort of piracy was practised on the other parts of the Chinese seaboard?

SIR JOHN DAVIS.—The piracy which prevailed on the coast of Canton, and of the neighbouring province, Fokien, was very much the result of the physical configuration of the coast, which was that of an archipelago of small islands, abounding in harbours and indentations, affording lurking-places for predatory vessels. The very extensive system of fishing which prevailed on such a coast created those maritime habits so favourable to the life and profession of a pirate. They were, in fact, fishermen to-day and pirates to-morrow. The evil did not extend beyond the province of Fokien, to the same degree at least. It was absolutely necessary for the safety of our commerce, and for that of the Chinese *themselves*, that it should be put down in the most summary manner possible, and there could be little scruple in acting thus against those who were in fact the enemies of the human race, and the worst obstacles to commerce. With the possession of the light draft gunboats which we were about to send out, there never was such an opportunity for getting rid of them—disarming all, without exception, if not destroying them. He would now advert to the observation of Mr. Crawford on the subject of resorting to the mouth of the Grand Canal and the neighbourhood of Nanking. He should be the last man to say a word against it, because before the last war he had recommended in distinct terms to the Duke of Wellington himself the adoption of the plan, which plan was adopted with complete success. But at the present time the ground was pre-occupied by the insurgents. They had, by possessing Nanking and the canal, cut off the communication with Peking that way, as well as we could, and by

going there we should only come in collision with those to whom we have always professed perfect neutrality,—we must become either their allies or enemies. The communication with Peking had been at one time, if it was not now, as effectually cut off as if we were to go to the neighbourhood of Nanking. With respect to the effect on Peking of the capture of Canton, we had in reality never yet occupied the place. We had threatened it, but we allowed it to be ransomed by the Hong merchants, instead of the inhabitants themselves, and they had laughed at us ever since, as well they might. If we were fairly to *occupy* Canton, quarter our troops upon it, and make the inhabitants pay all that our merchants have lost, they would never forget it, and there would be an end of their “braves,” as they called their vagabond militia. The people did not pay a fraction of the last ransom; it was the Hong merchants who paid it. Canton was a provincial capital, the capital of *two* provinces; and if we were fairly in possession and our troops quartered there, it would make the Imperial Court listen to our terms to get rid of us.* With regard to opium, he quite agreed with Mr. Crawford as to the physical effects of the drug. It was infinitely less deleterious than the spirits which we license and encourage in England, and the consumption of which particularly disgraces the English *Sundays*, from the want of more inviting recreations for the lower orders. It seemed to himself quite superfluous attempting to put an end to the traffic, for since the war and the treaty of Nanking the Chinese had utterly abandoned all attempts to stop its sale and consumption. Several of our consuls had officially reported to him that they had seen it carried about in broad day, and consumed in regularly licensed houses. It would be the extreme of impertinence on our part to interfere with an article which the Chinese voluntarily admitted; we had no more right to interfere than the Chinese had to interfere with our consumption of both opium and (what was worse) spirits. The emigration alluded to by Mr. Crawford was a beneficial emigration, and one which ought to be encouraged. But there was another sort of emigration which was a disgrace to this country, and which ought to be at once stopped. This was the exportation to Cuba of coolies, who of course became slaves. He first got a glimpse of it when he was in China, and the instructions he issued to our consuls on the occasion prevented its spread at that time. Since then, however, the evil had extended, and the horrors endured by the coolies on board were equal to those of the middle passage between Africa and the West, with an enormously lengthened voyage. He trusted it would speedily be put a stop to. In vain would Wilberforce and Clarkson have exerted their energies in the abolition of the slave-trade, if it was to be revived in this new shape. This was the *real* grievance of China against us, and not the opium trade, which their own toleration of it had taken out of our hands.

THE EARL ALBEMARLE, F.R.G.S.—Do I understand that the rebels are in possession of the Imperial Canal?

SIR JOHN DAVIS.—They are, or have been, in possession of the mouth of the canal—exactly the neighbourhood where we dictated peace. Chin-kiang-foo is

* Lieut.-Gen. Sir Colin Campbell received these very remarkable observations in a note some years ago from the late Consul Thom, and allows their publication:—“Having once made the demand, we can hardly withdraw from it without confirming the Chinese in the impression that we are *afraid* of the Canton people. This impression *has* gone abroad over the empire, and a most fatal and unhappy impression it is; and this same impression may very likely cause seas of blood at some future day. In itself, the opening of the gates of Canton is (to individuals) neither here nor there; but being made the touchstone of whether we fear the Canton people or not, this gives it *immense importance*.” It is quite clear that Canton must be opened *vi et armis*; all other means would fail, either immediately or ultimately, on account of the “impression” which the Consul very truly and wisely commented on.—J. F. D.

the last place we took, and the city which commands the entrance of the canal northwards. The rebels are, or were until very lately, in possession of Chin-kiang-foo.

SIR COLIN CAMPBELL rose to say that Mr. Bowring, a young friend of his, son of Sir John Bowring, mentioned to him, a morning or two ago, that, within the last two years, two vessels had been sent up to Nanking by his father to ascertain what the insurgents were about, their numbers, and the manner in which they were occupying the country. That object was completely obtained, for he found the rebels at Nanking, but they had not come down so far as Chin-kiang-foo.

SIR JOHN DAVIS.—Mr. Meadows, in 1853, saw the rebels there, and conferred with them.

SIR C. CAMPBELL.—They were not in possession of Chin-kiang-foo, according to Mr. Bowring, when he was there; and without actual possession of that point you do not command the canal.

The EARL ALBEMARLE.—It is the point of junction.

SIR C. CAMPBELL.—It is. He remembered, when he went up there in command of a regiment, under Lord Saltoun, they were placed outside the town. One of the officers found a house where there was a number of papers, and brought the bundle to him as a curiosity; and it turned out to be a despatch from the officer who commanded the Chinese troops. It was translated by Mr. Thom, and described this officer's movements. It was addressed to the Emperor, and it mentioned his route, his march downwards, in obedience to the orders of the war department there, and stated that, instead of carrying out the farther orders of his Majesty, he had stopped at this place, which he called "the very throat between the north and south." He described that point, Chin-kiang-foo, as the "throat." And the English were at that throat.

SIR J. DAVIS.—Mr. Meadows, who was despatched by the British Plenipotentiary to communicate with the rebels, actually had his audience at Chin-kiang-foo with the leaders, and describes it in his book. Possibly they had abandoned the point since.

SIR C. CAMPBELL.—It appeared strange that they should be in force at Nanking, and not in possession of Chin-kiang-foo.

2. *North Australian Expedition.*

The following letter, from the Commander of the expedition to North Australia, was read by the Secretary:—

Burnett District, 2nd December, 1856.

SIR,—I have the honour to inform you of the arrival of the North Australian Expedition within the limits of the settled parts of New South Wales.

From the time of landing the horses at Point Pearce in September, 1855, to the 9th May, 1856, the party was employed in preliminary details, and the exploration of the country to the south of the Victoria River, having penetrated the interior deserts to latitude 18° 20' south, and longitude 127° 30' east; a detail of which I forwarded by the 'Tom Tough' schooner, via Copang, and which doubtless has already come to hand.

The schooner 'Tom Tough' having been seriously damaged in

ascending the Victoria River, and a quantity of stores and provisions thereby destroyed, I instructed Mr. Baines to embark that portion of the expedition which was not required to form the land party, and to proceed to Copang for supplies, and thence to the Albert River in the Gulf of Carpentaria, to co-operate with the land expedition.

On the 21st June I left the encampment on the Victoria River, with a party of six persons, viz. Mr. H. Gregory, Mr. Elsey, Dr. Müller, and three men—Dean, Bowman, and Melville.

The arid nature of the country in the interior of Northern Australia compelled us to increase our latitude to 15° S. in order to pass the central parts of Arnheim-land, after which we kept parallel to the coast as far inland as water could be found in the rivers, the greatest distance from the sea not exceeding 100 miles.

Reaching the appointed rendezvous at the Albert River on the 30th August, the schooner had not arrived, but, from some marked trees, it appeared that Her Majesty's Ship 'Torch' had sent a boat up the river a few weeks previous, but it was evident that this visit had no reference to the expedition, as the only marks left consisted of the names of some of the crew, which they had amused themselves by carving on the trees and stumps; and the ashes of their fire.

Under these circumstances, I deemed it not advisable to wait the arrival of the schooner; and having marked trees, and buried instructions for Mr. Baines at a spot which had been previously agreed upon, we left the Albert on the 3rd September, and made some ineffectual attempts to proceed to the south-east, but want of water compelled me to pursue a route parallel to the coast to latitude $17^{\circ} 20'$ S., when the Gilbert River enabled a S.E. course to be again pursued.

Crossing the heads of the Lynd in $18^{\circ} 40'$, we reached the Burdekin on the 16th October. Our route was then along the right bank of that river to the junction of the Suttor River, which was followed up to the Belyando River. Tracing that river to latitude 22° , we then pursued a south-east course to the junction of the Comet and Mackenzie Rivers, and from thence to the Dawson brought us to Messrs. Connor and Pitt's station on the 22nd November.

I am now on my way to Brisbane, where I purpose to leave the horses until arrangements can be made for their disposal, and proceed direct to Sydney.

(Signed)

A. C. GREGORY,

Commander N. A. Expedition.

The PRESIDENT said he held in his hand a letter from this distinguished explorer himself. The Society would be delighted to know that the Council had that day awarded one of its Gold Medals to Mr. Gregory, for there was scarcely any exploration in his time which seemed more worthy of the commendation of Geographers, than this exploit of Mr. Gregory. It would be recollected that the expedition was really undertaken by her Majesty's Government at the suggestion of the Geographical Society. In the course of his journey Mr. Gregory penetrated into the interior, in order to ascertain whether it was a vast saline desert, and he tested it on two or three points before he retraced his steps to the Victoria. He came to a valley which, according to his letter, far surpassed the best parts of Western Australia, both in fertility and extent, and also for settlement.

MR. J. CRAWFURD, F.R.G.S., believed Mr. Gregory to be an admirable explorer. He had told the whole truth, and that truth amounted to this—that the country he had explored was totally unfit for European settlements. He could not see how any country lying between 11° and 16° of latitude could be fit for the settlement of the Anglo-Saxon race. The heat must be intense. The grassy plains would fatten bullocks, but who were to eat the bullocks when they were fattened?

The PRESIDENT.—Mr. Gregory does not think so.

MR. CRAWFURD.—Mr. Gregory knew less than he did of countries so near the equator. He was perfectly certain the Anglo-Saxon race would never settle there.

LIEUT. CHIMMO, F.R.G.S., hoped these recent accounts would convince the public of the worthlessness of the country about the Gulf of Carpentaria.

The PRESIDENT.—That is quite another region, and differs from the valley of the Victoria.

LIEUT. CHIMMO read an extract or two from Mr. Gregory's communications respecting the climate and soil of the Gulf of Carpentaria, and said it was exceedingly gratifying to him that Mr. Gregory had corroborated the views that he had, on more than one occasion expressed, that the country along the Gulf of Carpentaria was entirely unfit for European occupation.

MR. CRAWFURD observed that the Victoria seemed to be the only considerable stream that existed in that part of Australia. He placed no reliance on the two to three hundred rivers that one gentleman spoke about, as falling into the Gulf of Carpentaria. If they all ran in one channel and formed one river, they would be more serviceable. With regard to the navigability of the Victoria, the schooner only ascended it fifty miles.

MR. T. SAUNDERS said, that if Mr. Gregory had pursued the same system of investigation, at the Gulf of Carpentaria, which he had pursued on the Victoria, his evidence as to the character of the country about the Gulf would have been worth as much as his evidence respecting the Victoria. But instead of following the streams up to their sources, as he had done with the Victoria, whereby he discovered the nature of the country far into the interior, he, on the Gulf, merely *intersected* the rivers a little distance farther towards the interior, than Leichardt had already done. Had he pursued the courses of the streams, he would probably have found all that Leichardt said he had experienced, with respect to the salubrity of the climate and the fertility of the soil in the Gulf of Carpentaria.

The PRESIDENT, before adjourning the meeting, announced that a communication had been received through the Foreign Office from our consul at Tripoli, stating that he heard no confirmation of the report that Dr. Vogel, the African traveller, had been assassinated. There was no foundation for the statement except the African report, and he, for one, would not believe it before it had been proved.

Twelfth Meeting, May 11th, 1857.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

ELECTIONS.—*Major the Hon. Wenman Coke; Lord Dufferin; Commander C. Rundel Egerton, R.N.; Sir A. H. Elton, Bart., M.P.; Captain M. S. Nolloth, R.N.; Viscount St. Vincent; and J. Bartholomew, jun.; R. C. Marsden; Arthur Mills; L. R. Reid; John Ross; and J. W. Willcock, q.c., Esqrs., were elected Fellows.*

DONATIONS.—The following were among the donations to the Library and Map-Rooms received since the former meeting:—A Chart, framed, showing the intended telegraph communication between Newfoundland and Ireland, &c., presented by Mr. Brook-
ing, F.R.G.S.; Maps of Moldavia and Bessarabia, by Consul Gardner, of Jassy; the Transactions of the Lombardo-Veneto Institute of Milan; of the Imperial Geological Institute of Vienna; and the Academy of Sciences, Paris; Barth's Travels in Central Africa; Lessep's Isthmus of Suez, &c.

EXHIBITIONS.—Among the articles exhibited were Reeder's Patent Mariner's Compass; Sheets of the original drawings of some of the Admiralty Surveys during the past season of Sheephaven, Mulray, Donegal, Dingle, and Ventry Harbours, and the Frith of Forth, by Captain Bedford, F.R.G.S., Mr. M'Dougal, and Lieutenant Thomas, R.N.; Map of the World, on the Homalographic Projection of the Sphere, by J. Babinet; with Maps of the Crimea and other places, engraved on a new principle on stone, by Erhard, and published by E. Bourdin, of Paris.

ANNOUNCEMENTS.—The President informed the Meeting of the departure of the Niger expedition under Dr. Baikie, F.R.G.S.; and stated that the report in circulation of the death of the enterprising and intrepid African traveller, Mr. C. J. Andersson, was happily without foundation. He was sorry, however, to add that another Swedish traveller, Dr. Wahlberg, had perished in an encounter with an elephant to the northward of Lake Ngami. A letter from Mr. K. L. Sutherland, F.R.G.S., was then read, suggesting the advisability of a Naturalist being on board the 'Agamemnon' in sounding the Atlantic and laying down the Telegraph cable. The Chairman next mentioned that, owing to the inadequacy of the Meeting Room to accommodate the rapidly increasing numbers of Fellows and Visitors who—as he was glad to see—were in the habit of attending, a Resolution had been passed at the Council that day, that he should represent the case to the President of the Council-Board of Educa-

tion, and request permission to hold their meetings, next session, in the Theatre of the Government School of Mines, in Jermyn-street. The President finally drew the attention of the Society to the approaching Anniversary Meeting, on Monday, the 25th inst., at one o'clock, when the Annual Address would be delivered, and the Gold Medals for the year awarded to Mr. A. C. Gregory, Commander of the North Australian Expedition, and to Lieutenant-Colonel A. S. Waugh, Surveyor-General of India; and likewise to the Dinner, which would take place at the Freemasons' Tavern, at seven o'clock, when he hoped to see the Chair well supported by the Fellows and their friends.

The papers read were :—

1. *Papers relating to the Himalaya and Mount Everest.*

- A. By Lieutenant-Colonel A. S. WAUGH, Surveyor-General of India, dated Dehra, March 1st, 1856; and
B. By B. H. HODGSON, Esq., dated Darjiling, Oct. 27th, 1856.

(A.)

SIR,—With my letter No. 99, of 18th December, 1855, I transmitted a Geographical Memorandum on the identification and revision of height of the famous mountain of Dwalagiri, originally measured by Captain W. S. Webbe, and at one time supposed to be the highest mountain in the world, though my operation in 1847 proved Kunchingga to be much higher.*

You are aware that the computations of the positions and elevations of all the principal peaks of the stupendous Himalaya, comprising $18\frac{1}{2}$ degrees of longitude, from Assam to the Safed Kho, have been provisionally completed, and I intend to make this subject one of special report for publication.

Previous to publication, however, it is essential that the computations should be scrupulously revised and every refinement of correction introduced. This I do not expect will materially modify the results.

The revision has proceeded to some extent, and I am now in possession of the final values for the peak designated XV in the list in the Office of the Surveyor-General of India.

We have for some years known that this mountain is higher than any other hitherto measured in India, and most probably it is the highest in the whole world.

I was taught by my respected chief and predecessor, Colonel

* See Asiatic Researches, vol. xii.

Geo. Everest, to assign to every geographical object its true local or native appellation. I have always scrupulously adhered to this rule, as I have in fact to all other principles laid down by that eminent graduist.

But here is a mountain, most probably the highest in the world, without any local name that we can discover, or whose native appellation, if it have any, will not very likely be ascertained before we are allowed to penetrate into Nepal and to approach close to this stupendous snowy mass.

In the mean time the privilege, as well as the duty, devolves on me to assign to this lofty pinnacle of our globe, a name whereby it may be known among geographers and become a household word among civilized nations.

In virtue of this privilege, in testimony of my affectionate respect for a revered chief, in conformity with what I believe to be the wish of all the Members of the scientific department, over which I have the honour to preside, and to perpetuate the memory of that illustrious master of accurate geographical research, I have determined to name this noble peak of the Himalayas 'Mont Everest.'

The final values of the co-ordinates of geographical position for this mountain are as follows, viz. :—

Mont Everest, or Himalaya Peak XV.

	Latitude N.			Longitude E. of Greenwich.			Height above Sea-level.
	°	'	"	°	'	"	Feet.
	27	59	16.7	86	58	5.9	29,002

As it will be interesting to you to see the independent results for all our observations to this mountain, and to contrast them with those of other celebrated peaks, I herewith append an attested statement of the geographical positions and elevations of Dwalagiri, Mont Everest, Kunchingira, and Choomalari.

You will perceive that the results are all satisfactorily accordant. In the case of Mont Everest the accordance of the independent heights is closer than could have been anticipated, because the mountain, though lofty and massive, is not a sharp well-defined peak and was observed from great distances.

You are at liberty to make use of these results, in anticipation of my forthcoming report on the positions and elevations of all the principal peaks of the Himalaya range.

In justice to my able assistant J. Hennessey, Esq., it is proper to acknowledge, that I am greatly indebted to him for his cordial co-operation in revising these computations.

Geographical Position and Height above Sea-level of certain Points in the Himalaya Mountains.

H. S. signifies Hill Station. T. S., Tower Station.

Intersected Object.	Station of Observation.	Latitude N.			Longitude E. of Greenwich.			Height above Sea-level.
		°	'	"	°	'	"	Fect.
Choomalari, or I.	Senchal, H. S. . . .	27	49	41·5	89	18	43·1	23,946
	Tonglo, H. S. . . .			41·5			43·1	41
	Mean	27	49	41·5	89	18	43·1	23,946
Kunchenginga, or IX.	Doom Dangi, T. S.	27	42	9·5	88	11	26·4	28,151
	Senchal, H. S. . . .			9·3			26·2	50
	Birch Hill, S. . . .			9·4			26·2	63
	Thakoorganj, T. S.			9·8			26·7	47
	Tonglo, H. S. . . .			9·3			26·2	80
	Banderjoola, T. S.			9·2			26·1	42
	Menai, T. S. . . .			9·2			26·3	72
	Baisi, T. S. . . .			9·6			26·3	60
	Harpoor, T. S. . . .			9·5			26·3	40
	Mean	27	42	9·4	88	11	26·3	28,156
Mont Everest, or XV.	Doom Dangi, T. S.	27	59	16·5	86	58	5·8	..
	Menai, T. S. . . .			17·1			6·1	28,990
	Harpoor, T. S. . . .			16·5			5·7	9,026
	Ladnia, T. S. . . .			16·7			5·8	8,999
	Janjpati, T. S. . . .			16·7			6·0	9,002
	Miriapoor, T. S. . .			17·0			5·8	9,005
	Jirol, T. S. . . .			16·7			5·8	8,992
	Mean	27	59	16·7	86	58	5·9	29,002
Dwalagiri, or XLII.	Ramnagar, T. S. . .	28	41	47·9	83	32	8·8	..
	Morairi, T. S. . . .			48·1			8·3	26,815
	Banarsi, T. S. . . .			48·1			8·7	..
	Saoubarsa, T. S. . .			47·8			8·9	60
	Poovenah, T. S. . .			47·8			8·9	43
	Ghaos, T. S. . . .			48·2			8·2	6
	Toolsipoor, T. S. . .			48·2			8·4	61
	Anarkali, T. S. . . .			47·8			8·8	..
	Mean	28	41	48·0	83	32	8·6	26,826

NOTE.—The longitude is referable to the old value for the Madras Observatory, $86^{\circ} 17' 21''$, to which a correction of $3' 25\cdot5''$ is applicable to reduce to the value adopted by the Admiralty and Royal Astronomical Society, or $3' 18''$ to reduce to the result of Taylor's observations up to 1845.

(B.)

Sir,—In the report which has just reached me, it is announced that a "nameless" peak, situated north-east of Kathmandu, and in east longitude 87° , had at length been definitely ascertained by our

very able Surveyor-General, Colonel Waugh, to be upwards of 29,000 feet high, and consequently to be the loftiest, yet known, peak of the Himalaya.

Agreeing as I do with Colonel Waugh in the propriety of adopting native names, and cordially sympathising with the sentiment which gave rise to the name Mount Everest, I trust I may be permitted, without offence, to state, in justice to my friends the Nepalese and to myself, who have been so long connected with them, that the mountain in question does *not* lack a native and ascertained name; that that name is Dévadhúnga, Holy hill, or Mons Sacer; and that it is expressly referred to under that name in our Journal. To the paper styled 'Route from Kathmandu to Darjiling,' there is appended a 'Memorandum relative to the seven Cosis.' In the latter occurred the following words: "The Bhotiá Cosi" has its source at Déodhúnga, a vast Himalayan peak situated 60 to 70 miles east of Gosainthán, and which Colonel Waugh conjectures may rival Kunchenginga in height." In the rude sketch map which accompanied that paper, Déodhúnga was set down in the position indicated, and that that position tallies with the site of Mount Everest, is clear from the words above quoted, since "60 to 70 miles east of Gosainthán," answers precisely to east longitude 87°, Gosainthán being in 86° east longitude.

Other indications equally correspond, and at the same time show why such an object could not remain unnamed or unascertained.

Thus Dévadhúnga and Mount Everest are both "about 100 miles N.E. of Kathmandu;" both are midway between Gosainthán and Kangchan; and, lastly, both are by their position and by the absence of any like mass of snow in all the intervals between those peaks, identifiable with the so-called Kútighát, or the great *Gale*, which annually for half the year is closed by Winter upon the Eastern highway of Nepalese commerce and intercourse with Tibet and China.

A few words more may be given to this last point, as being the matter which chiefly fixed my attention, as a political officer in Nepal, on the site of Mount Everest, and enabled me at once, when I heard in after years surmises of the great height of a peak in that direction, to fix on Dévadhúnga, or Bhaśravthán (both names are used) as being the "enormous snow mass" in question; and I have often of late repeated this here, very recently to Mr. Blanford. Round the shoulder of Dévadhúnga runs, as above intimated, the great Eastern highway (the western being round the shoulder of Gosainthán) of the merchants and envoys of Nepal proceeding to Lássa and Pekin; and this passage along the shoulder of the huge

snowy mass of Dévadhúnga is denominated the Kutighát by the Hindoos and the people of the plains of India, as the passage round the huge snowy mass of Gosainthán is denominated by them the Kérung, or Western Ghát. But Kúti and Kérung are names of towns, the one situated considerably within, and the other considerably beyond, the respective gháts; and, moreover, the word ghát is never used by the highlanders (Parbattias) of Nepal for a snow-pass. Their word is "langúr," and the especial langúr in question is named Bhaírava langúr, or the pass of Bhaírava, just as the mass above it, is called Bhaíravthán, or abode of Bhaírava: Bhaírava being the terrific form of the God Siva. Every merchant and statesman at Kathmandu talks familiarly of the Bhaírav langúr, owing to its formidable character, its obstructiveness (it bars the road to the North for half the year), and its strange contrast with that very extensive and very level tract of country in Tibet, called the Tingrí Maidan, on which the Bhaírav langúr immediately opens. And this marked character of the ghát, added to the unmarked character of the peak above it, may be one reason why the two are often confounded under the same appellation. But Dévadhúnga and Bhaíravthán are nevertheless sufficiently familiar and correct names for this peak, or snowy mass rather; and it were indeed a strange circumstance, if so remarkable a natural object had escaped the notice of the people of the country and thus remained unnamed. Nor would it have been very creditable to me after 20 years' residence in Nepal, had I been unable to identify that object. The two papers herewith submitted, together with those formerly submitted to the Asiatic Society of Bengal,* or to Government, will, I trust, show that I have given as much attention to the general subject of Nepalese Geography as my opportunities and training admitted and my duty required, whilst the foregone remarks must satisfy every one that this special object, supposed to have been heretofore utterly unheard of, was one so situated and circumstanced that no reasonable excuse for ignorance of it on my part could be made, it being clear that personal approximation was no more a

* 1. Military road throughout the centre of Nepal from Kamaon to Sikim; to the Government.

2. Route from Kathmandu to Tazedo on Chinese frontier, to the Society, and published in its Researches.

3. Route from Kathmandu to Darjiling, to the Society, and published in its Journal.

4. Physical Geography of Himalaya, to the Society, and published in its Journal.

5. Visit to Nagakote, with notice of the rivers flowing into it. Printed in the Journal.

6. Various routes through Nepal, from and to places specified. Sent to Government, and deposited in its archives.

7 and 8. Two Journals of embassies from Nepal to Chira, now sent.

necessary condition of ascertaining the name than it was of determining the height, of Dévadhúnga.

The only doubt in my mind is the greater or less prevalence in Nepal Proper of the term Devadhúngá.

Having possibly obtained it from persons dwelling in the vicinity of Kúti, not at Kathmandu, I have written to Kathmandu to determine that question, and will here only add, that should the name prove to be more familiar to the people of the Cosean basin, than to those of the valley and capital, it will not be one whit less a "true native name," just as Colonel Waugh's own "Powhanri" is as true a native name, as Dr. Hooker's "Dónkia," in relation to a Sikim peak and Ghát.

B. H. HODGSON.

To the Secretary of the Royal Geographical Society.

THE PRESIDENT was sure all who were present would be delighted if this mountain should for ever retain the name of the distinguished geographer who, following Lambton in the great trigonometrical survey of India, had been the means of carrying on that magnificent operation, which had been conducted to a conclusion by Colonel Waugh. A more appropriate name could not be given than that of Mount Everest; and, whatever might be its name in India, he hoped, in England at least, it would always be known by the name of Everest.

MR. PRINSEP, F.R.G.S., said it was known that the Himalaya range extended many degrees in length, and that in the whole course of it there were mountains of various heights. Some of them were the highest in the world. Those which had been really measured, overhung the plains of India, and until recently, it was supposed that the highest were near the sources of the Ganges. Since then, however, the discovery had been made that there was a mountain 28,000 feet high; and the present discovery showed another in Thibet, within sight of the territory of Nepal, 29,000 feet high. When we came to measure the mountains, in which the rivers of China rose, we should perhaps find some of them 30,000 feet high.

COLONEL EVEREST, F.R.G.S., begged to say that the very kind manner in which his successor and friend, Colonel Waugh, had spoken of him was far beyond his merits. He had certainly an arduous task in India to perform, and he did his best to bring it to maturity. One of the best measures he effected was to bring forward into the department a gentleman of Colonel Waugh's talents. The Court of Directors of the East India Company had the good sense to select Lieutenant-Colonel, then Lieutenant Waugh, upon his (Colonel Everest's) representation of his merits. Colonel Waugh had fully borne out those representations, and he believed the Court of Directors were thoroughly satisfied in accepting his recommendation. The decision of Colonel Waugh, in giving his name to this high mountain, he certainly never contemplated. But as a spontaneous effusion of the regard of those Indian surveyors, the most efficient of whom were bred in the department, educated in fact by himself, the proceeding was very grateful to him personally. Yet he must confess there were objections to his name being given to this mountain, which did not strike everybody. One was, that his name was not pronounceable by a native of India. The name could not be written in either Persian or Hindi,

and the natives could not pronounce it. It would be confounded with that of O'Brien, and the hill people would probably call this mountain Ob'ron. As another instance of the difficulty which the natives experienced in pronouncing English names, he might, among others, mention that the name of the "Hon. Mr. Cavendish" was pronounced by them "Humbel go munde."

2. *Notes on Moham'rah and the Chaab Arabs, etc.* By Col. Sir HENRY RAWLINSON, K.C.B., F.R.G.S., etc.

SIR H. RAWLINSON said he held in his hand a report upon Moham'rah and the Chaab Arabs, which he had prepared for the information of Her Majesty's Government about thirteen years ago, when the dependency of the first-named place was contested between the governments of Persia and Turkey, and when those powers had accepted the arbitration of England and Russia in the settlement of the dispute. Although this report, treating almost exclusively of political geography, might, perhaps, with some alterations and additions, be made fit for publication in the *Journal of the Geographical Society*, still he thought the Meeting, instead of having inflicted upon them a dry catalogue of barbarous names, and a still drier disquisition on the nationality of disputed territory, would prefer hearing something of the actual position and history of Moham'rah, a name which had now become, as it were, a household word in our annals. Therefore, instead of reading the official report, he proposed to divide his address into three parts. In the first place, he would trace upon the map the configuration of the adjoining country and explain something of the actual geography of Moham'rah. In the second place, as the ancient history of Moham'rah was of considerable interest, he would read a few notes which he had drawn up upon the comparative geography of the region in which it was situated from the earliest times. And, thirdly, if time permitted, he would offer a few observations upon the place, as connected with our recent military operations; that is in reference to the Persian war which had just been brought to a conclusion by Sir James Outram.

Moham'rah, as the meeting was aware, was the scene of our latest, and he hoped he might say, our last, military exploit against the Persians. It had thus become a place of very great interest; but he believed that at the present hour (as the town was not marked upon any of the standard published maps), there were very few people who were acquainted with its exact position. He proposed therefore, in the first place, to show exactly where it was, and to trace the geography of the surrounding country. The map before the Meeting exhibited the whole of the northern coast of the Persian

Gulf. It might be remembered that in the first instance the expedition of General Stalker had landed at Bushir, and that from that place a second expedition had subsequently moved on to Moham'rah. The line from Bushir to Moham'rah ran across the northern part of the gulf to the mouth of the Euphrates, Moham'rah itself being placed at this point, and the only practicable mouth of the Euphrates being here, and when he called this a practicable mouth, he might add that it was not practicable in our ordinary acceptation of the term—that is, it was not practicable like the Thames. He believed, indeed, that in the highest tide there were never more than three fathoms on the bar, and generally the depth of water was but from twelve to fourteen feet. He remembered on one occasion when he sailed into the Euphrates in her Majesty's ship 'Clio,' Captain FitzJames, the vessel grounded on the bar to the great horror of the captain, who immediately assailed the old Arab pilot for his carelessness in not keeping the ship in deeper water. The pilot, however, was by no means disconcerted; he very composedly sat himself down on the quarter-deck, with his pipe in his mouth, and replied as follows:—"Really," he said, "I did not make the 'Clio,' nor did I make the Euphrates; if you will come here in a big ship like this, and go across the bar, you must expect to get into the mud. But it will not hurt you," he added; "if you only wait here quietly till the tide rises you will get off without damage." And such was the case. The mud was so soft that no inconvenience whatever was experienced, and as soon as the tide rose the vessel floated off and pursued her way up the river.

On the present occasion he understood that the entrance channel at the mouth of the river had been buoyed throughout, so that the vessels would probably have all crossed the bar without grounding. If any of the ships had, however, run aground in the mud, they would get off again without injury as soon as the tide rose. There was but one practicable entrance to the Euphrates. Very few of the river beds marked upon the map as forming the Delta of the Karún and Euphrates, were navigable; most of them, indeed, were entirely dry. The only channel practicable for vessels of any considerable draught was the most western mouth of the Euphrates. From the embouchure the distance to Moham'rah was about forty miles. In proof of the difficulty of entering the Euphrates it might be observed that the flotilla which left Bushir on the 19th of March was only enabled to attack Moham'rah on the 26th, a full week afterwards, although the actual distance was under 200 miles and the transports were towed up by steamers.

After he had read his notes upon Moham'rah he should describe

how he supposed the attack to have taken place, judging from his personal knowledge of the country, and from the accounts he had received from the spot, of the commander's intentions. At present it was of more importance that he should explain the particular geographical configuration of the place, in reference to its national dependency: one of the questions constantly asked being, "Where is Moham'rah? is it in Persia or in Turkey? or is it on the frontier between the two countries?" Now there was a little map hanging on the wall, which had been drawn up by the Turco-Persian Frontier Commission, presided over on our part by our associate Sir Wm. Fenwick Williams, and which showed the exact frontier between the two countries the whole way from Ararat to the Persian Gulf. This survey he might say, *en passant*, was one of the most valuable and important geographical works which had been undertaken for a very long time past. The whole line of frontier stretching from Ararat to the Persian Gulf, together with a considerable extent of territory on either side, had been minutely and scientifically surveyed by English and Russian officers, under the direction of Sir Fenwick Williams on the part of the English government, and of General Tcherikoff on the part of the Russian government. The sketch-map hanging on the wall merely exhibited the result of that great survey, the details of which were, he believed, now being again put together at Constantinople, after an interruption of some years caused by the war which took place between Turkey and Russia. The line of frontier, they would perceive, ran down here, from the extremity of the mountain-range to the sea. He must explain that the physical law which was held to regulate territorial distribution between Persia and Turkey in this quarter was, that the country watered by the Euphrates belonged to Turkey, and the country watered by the Karun belonged to Persia. Moham'rah was here. The great Persian river Karun came down in that direction from the north-east, while the Shat-el-Arab, formed of the Tigris and Euphrates joined together, came down in this direction from the north-west. The question was, then, whether Moham'rah was on the Euphrates or on the Karun? If on the Karun it was Persian; but if on the Euphrates it was Turkish. After a great deal of discussion, all the *pros* and *cons* being given in the report which he held in his hand, it was decided that it should be Persian. This decision he believed to be contrary to geographical propriety; but nevertheless it might have been a proper decision in a political point of view; in fact, if it had not been so ruled, and Persia had not been encouraged to consolidate her position on the lower Euphrates, we should not have been able at the present day to have exerted that pressure upon her

in the occupation of Moham'rah which it might be hoped would now definitively put an end to the war. If we took geographical precedent, he believed it could be shown that Moham'rah was certainly on the Euphrates; and if on the Euphrates, it most unquestionably belonged to Turkey: the reasons for this geographical distribution he should be able to show when he read his notes on the ancient history of Moham'rah. Extracts, which he should give from Arab geographers, who were perfectly well acquainted with the country, would demonstrate that the Euphrates came to this point and bifurcated here; that this was the eastern branch of the river, called the Bahmeshire; that this, up which the fleet passed, was the western branch: that, in fact, the Euphrates discharged itself into the sea by a delta formed of these two channels; and that the Karûn was afterwards brought in through an artificial bed and joined the Euphrates at this point. However, it had been ruled by the Treaty of Erzerum, that Moham'rah was in Persia, and so it would now remain to the end of time. The reason for this settlement assigned at the Conference, was that Moham'rah had been occupied by the Persians for some fifteen or twenty years previously, and that it would be inconvenient to disturb the existing distribution of territory. He might further observe, although it was more a political than a geographical question, that the Turkish government had never been satisfied with this adjudication. In fact, within the last six weeks, when it was known that a British expedition was preparing to attack Moham'rah, the Turkish government entered a formal protest against the movement, stating that although they had agreed to the treaty of Erzerum, which required them to surrender the left bank of the lower Euphrates, yet, as other geographical conditions of that treaty (referring probably to Zohab and Kotur) had not been carried out, they did not consider that they had in the mean time lost their territorial claim to Moham'rah; and that, until that claim was waived, no foreign power had a right to attack the place. A troublesome discussion might have arisen on this point had not the Persians who were in possession of Moham'rah fired on one of our steamers, the 'Comet,' whilst passing up the Euphrates; and thus disposed at once of the protest and the pretended neutrality; because if the Turks had any claim upon the place, they ought to have been able to prevent parties in possession of it from taking the initiative in an attack upon us. The last accounts stated that an answer to the above effect had been given in to the Turkish government, and that, immediately afterwards, the expedition entered the river, sailed up, and attacked Moham'rah.

Having thus given a popular account of the geographical position

of Moham'rah, and of the respective claims upon it by Persia and Turkey, he thought he might pass on to the second portion of his subject, and read his notes on the ancient history of the place; after which he should feel himself more at liberty to discuss any general matters relating to it. He might explain that these notes, written off hurriedly, and merely referring to the ancient geography of the country, could not be expected to excite much interest; but there were two points contained in them to which he particularly wished to direct attention. One was the evidence they afforded of the whole of the country at the mouth of the Euphrates being new. He should be able to show that the great capitals of the country at the commencement of history were far up the river, about here and that century after century, with a fresh accretion of land, a fresh emporium was formed lower down the Euphrates, until we descended to the present day, and saw successive villages rising, one after the other, as the sea receded, and new lands were available for cultivation. That was one point. Another matter to which he desired to draw attention was, that this particular district of Moham'rah was, some 2000 years ago, the seat of a very famous Greek, or quasi-Greek kingdom. Although the present village of Moham'rah might not exactly occupy the site of the old capital, still the country dependent on it formed the kingdom of Characene, which was of much political importance in its day, and the Greek coins of which were still in great request among antiquarians.*

If the meeting would allow him he would say a few words with regard to the modern question, and endeavour to introduce them to a better acquaintance with Moham'rah under its present aspect, and with the surrounding country. They knew exactly where Moham'rah was situated, and before he proceeded farther, he would give them some information as to the condition and appearance of the modern town.

Sir Henry then read an account of the fort from his notes, and explained the reasons which influenced Sir James Outram in selecting Moham'rah as his point of attack. So long as he remained at Bushir he could only act on the defensive. He could not proceed inland or adopt any offensive measures for two very sufficient reasons; firstly, because he had no carriage, and secondly, because the passes which barred his progress were impracticable to an army. To have remained therefore in position at Bushir would have been a mere idle demonstration, leading to no result; yet Sir James Outram, it must be remembered, had no reason to suppose

* Sir H. Rawlinson here read his notes on the Comparative Geography of Moham'rah and the vicinity, which will be published in due course in the Journal.—Ed.

that a treaty would be concluded at Paris, or that the war would speedily finish. Anticipating a sustained resistance on the part of Persia, his object was to obtain a certain position, which would enable him to carry on the war with vigour and effect hereafter; and for that object it was absolutely necessary that he should, in the first instance, secure a strategic base. Such a base then he rightly judged to be only obtainable at Moham'rah, where the obstacles which impeded operations at Bushir would no longer require to be encountered. At Bushir, there were not only the passes to contend with but there was also a deficiency of carriage, and the latter difficulty appeared insuperable, for there were no camels in that part of the country, and if mules were obtained in sufficient quantities, they would require a corresponding amount of forage, which the district about Bushir was quite inadequate to supply. But at Moham'rah the General would be able to draw camels to any extent from Turkish Arabia, for the whole country teemed with them, and, moreover, in regard to the physical character of the region, the army could ascend the country up to the foot of the mountains without any difficulty whatever. He did not *know* what Sir James Outram's ultimate intentions had been, but that commander, he thought, probably saw that by obtaining command of the country up to Shuster, or to the base of the mountains, he would really make a great impression upon Persia—such an impression indeed as in all probability would bring the Persian government to reason. If this expectation had not been realized—if the Persians had still held out, whether Sir James Outram, in prosecution of the war, would have attempted to penetrate still further into the interior, was a matter which there was fortunately no occasion to investigate. His own idea was, that Sir James Outram would have found it extremely difficult to advance beyond Shuster and Dizfúl. But in Oriental countries experience had shown that we might always safely count on the enemy succumbing to moral pressure before there was any real necessity, and the result of the Persian war afforded no exception to the rule. At the same time it should be understood that it was not absolutely impossible to enter Persia from Moham'rah. There were several caravan routes leading to the interior of more or less difficulty. One route which had been traversed by many Europeans, led from Khuzistán, by Ram Hürmuz and Bébahán, through the mountains to Shiraz. It involved of course an enormous circuit, instead of passing direct from Bushir to Shiraz, to go by sea in the first instance from Bushir to Moham'rah, and then by land from Moham'rah to Shiraz. But still the line in question had been considered as a possible

means of entry into Persia, being the same which was followed by Alexander in his march from Susa to Persepolis. The direct road across the mountains from Shuster to Ispahan, he pronounced to be absolutely impassable for our armies, encumbered as they were with "matériel" of war; it was with difficulty that a laden mule could traverse the ranges; therefore to talk of transporting our artillery and ammunition, stores and baggage from one point to the other, was simply absurd. Again, there was a line running due north from Dizful to Búrújird, passing along the precipitous banks of the Dizful river, but that was still more difficult than the Ispahan route, and was in fact little better than a sheep track. Then there were two other lines which he had himself followed, leading from Dizful into the interior. One went direct over the hills to Khorremabad—it was badly supplied, and was, he thought, impassable for troops. The other line led up the valley of the Kerkha to a certain point called Jaecedur, where it bifurcated, one route branching off to the east to Khorremabad, and the other proceeding due north to Kermanshah. The last named line was just passable: it was difficult, but still it could be traversed by troops; and if the war had been prolonged, and General Outram had desired to penetrate into the interior from Khuzistan, he would in all probability have been obliged to follow up this difficult and circuitous line to Kermanshah.

The observations he had thus made referred however only to contingencies; he had merely been speculating on what might have happened if the war had been continued. At present it would be more interesting perhaps to explain what had actually taken place, or, at any rate, what might be supposed to have taken place in regard to the movements of the expedition. He had explained that General Outram left Bushir on the 19th, and that he attacked Moham'rah a week afterwards, on the 26th of March. Upon the plan suspended on the wall were marked the exact positions of all the Persian batteries, showing how the enemy had proposed to defend the entrance into the Moham'rah creek. One battery was at this corner, another was placed a little further on; and a third occupied the opposite corner; the fire of the three batteries concentrating at one point. Here, in the middle of the Euphrates, was a shoal which prevented a vessel of any size from clinging to the right bank of the river, and thus passing to the north of the creek. But the ships of the expedition, with their heavy guns, must have destroyed the batteries in a very short time, and as the information previously received from the spot stated the Persian troops to be all ready to retire, immediately the guns were dismounted and our troops were prepared to land, he inferred that such had been the actual result

of the attack. The Persians appeared to have retired as fast as they were able from Moham'rah immediately we landed, and to have never halted till they reached Ahwaz, where they were overtaken by a flotilla of small steamers and again dispersed.

Now the object of General Outram in taking Moham'rah was, as he had before stated, to obtain a strategic base, in order to be enabled to advance with safety into the country. His reasons for thus desiring to advance into the interior were three-fold. In the first place a general had to provide, as far as he was able, for the health of his troops. A consideration of not less importance was to make arrangements for feeding them, and in the third place it was desirable to locate the troops in a strong military position. These three objects then could only be obtained by advancing up the river from Moham'rah. Had General Outram remained at Bushir he could not have fed his troops at all; the cavalry at any rate must have starved; and again, if he had remained at Moham'rah after taking it, the troops would have suffered dreadfully from the climate, for notwithstanding that the place was supposed by some to be the site of Paradise, it was in reality about the most pestilential spot in the whole Eastern world. When the Frontier Commissioners, General Williams and General Tchirikoff, were encamped at Moham'rah in the spring of 1851, there was not, he believed, a single individual of their party who was not put *hors de combat* at one time or another from fever. Three years ago he remembered that the Persians had sent 500 men to garrison Moham'rah during the summer, and when relieved in the autumn only 100 men had marched out of the place. That, however, it must be admitted, was considered a bad season, but under ordinary circumstances the yearly mortality was about 50 per cent. The cause of this unhealthiness was the marsh malaria produced by the decomposition of vegetable matters under a burning sun, added to the great humidity of the atmosphere in the immediate neighbourhood of the sea. But on proceeding up the river, although the heat continued to be great, the climate was comparatively healthy. The heat, he must repeat, was extreme in this country of Susiana, and always had been so. Strabo mentioned on the authority of one of Alexander's generals, who had visited Susa, that the snakes and lizards could not pass across the streets from one side to the other without being burnt up. That story, whether intended to be taken literally or not, would at any rate give an idea of what the Greeks thought of the heat of Susa. He could not say that he had experienced quite the same degree of heat, but still it was undoubtedly very trying; he had remained in Susiana up to the end of May, or

about a fortnight after the great heats had fairly set in, and at that time the thermometer used to rise daily to 130° in the up-stair rooms, obliging him, in common with the rest of the inhabitants, to take refuge in subterranean caverns excavated in the solid rock 40 or 50 feet below the surface. The population of Shuster and Dizful, during the great heats, thus lived almost entirely under ground. But from that place (Dizful), in two days, he got upon the snowy mountains and enjoyed a most delightful climate. As our troops would have to remain in Persia through the summer, the treaty providing that they should not retire until three months after the ratification, which would take place early in the month of June—and June, July, and August being the three worst months in the year—he could only hope that the General would not remain at Moham'rah, but would take up a position in the interior of the country, either at Ahwaz itself, or at any rate half-way between Moham'rah and Ahwaz, beyond the reach of the malaria. In such a position, if the troops were well hutted, and the huts were surrounded with camel thorn, the temperature could be reduced to quite a bearable point. In fact when the thermometer at Baghdad in the shade had been 125° or 130°, he had seen in houses of this sort, surrounded with camel thorn, and constantly watered to produce evaporation, the temperature reduced as low as 80°, and with ordinary care the thermometer would never rise above 90°. He, accordingly, hoped that General Outram would take these precautions and canton his troops on the river, either at Sabla or Ahwaz, where the dryness of the atmosphere was peculiarly favourable to evaporation, such as he had described. With regard to food also, the whole of this province of Susiana at the present time was one mass of the most luxuriant vegetation. There was probably no country in the world richer than the neighbourhood of Shuster. The river Karun, above Shuster, was divided into two branches, which joined again about thirty miles below, and the country between the two arms reticulated with canals, and cultivated throughout, presented the aspect of one continuous garden, and yielded all sorts of tropical productions, some of which he might enumerate. In the first place there was a vast quantity of sugar-cane, and the manufacture of sugar had always been carried on, it would seem, to a great extent in the province, one of the classical epithets of the article in Persian poetry being derived from a city in the vicinity of Shuster.* Then there was a considerable cultivation both of opium

* The allusion is to the *Kend-i-Asheri*, or "Sugar of Asker," so called from the city of *Aster-i-Mokrim*, of which the ruins are to be seen on the left arm of the Karun (the *Masrukan* of the geographers), a few miles to the north of *Bend-i-Kir*.

and indigo, the latter of which products it had been stated not long ago in that room, would only grow in India; he would not say that the Shuster and Dizful indigo was of first-rate quality, but it was sufficiently good for the ordinary uses of the country; and he might add that one-fourth of the opium used in Persia was said to be grown at Shuster and Dizful. There were also produced in Khuzistan and the adjacent districts, rice, cotton, madder, cherry-sticks, gall-nuts, and especially mules and horses and wool. So that it would be seen that the province of Khuzistan was not only valuable in a military point of view, but also in a commercial one, and although at the present time there was no idea, he believed, of our retaining permanent occupation of the province, still the Persian government must be equally aware with us, of its value, as well as of its being entirely open to our arms, and these combined considerations would, of course, act as an inducement for them to get us out of the country as quickly as possible by agreeing to our terms.

He had only further to point out that the province in which Moham'rah was situated was so oppressively hot in summer that the governors never ventured to remain there during that season. All the provinces of Persia were under the rule of Prince governors, members of the Royal Family being sent from the court of Teheran to administer the several divisions of the empire, but no special governor was ever appointed to this province to remain there permanently. Khuzistan (or Arabistán, as it was now generally called) was placed under the rule of the governor of some other province. It was sometimes attached to Kermanshah, sometimes to Ispahan, and occasionally to the subordinate governments of Khorremabad or Búrújird. At present it formed a part of the government presided over by Khanler Mirza, the Prince who had been defeated by our troops at Moham'rah, but he merely came down to collect the revenues, and inspect the government of the country during the winter, and immediately the heats came on, which was generally by the end of April, he ascended the mountains again to his capital city of Búrújird, where he enjoyed an agreeable climate throughout the summer. Our troops would not be able, probably, as he had before explained, to ascend the mountains, but they could at any rate obtain healthy quarters at Ahwaz. There was a ridge of sandstone stretching across the desert for above 1000 miles, which struck the river Karun at this point, making it impossible for a steamer to ascend higher without very considerable difficulty. He imagined that General Outram would canton his troops below this *bund*, as it was called, in order to keep up an uninterrupted river.

communication with Moham'rah, and if such should prove to be the case—if General Outram, that is, did canton his troops at Ahwaz during the summer, and there were any further affairs with the enemy, which might make it of interest to the Society to hear more of the geography of the upper part of the river, he should be happy on a future occasion to communicate what he knew.

The PRESIDENT was glad they had returned thanks so heartily to Sir Henry Rawlinson for his remarkable communication. Sir Henry had the advantage of being a great critical scholar, of having accurately studied, not only the histories of ancient times, but of having compared all these sites, so famous in ancient history, with their actual condition in the present day. He really came before them as an antiquarian, as a physical and, he might say, a political geographer, and that last feature in his character had perhaps most interested the Society upon the occasion. For his own part, he would not dwell one moment upon the very valuable communication which had been offered to their consideration.

GENERAL MONTEITH, F.R.G.S., said, when he was in the country, it was then a doubtful point whether Moham'rah belonged to Persia or Turkey. It was after the mission to which he was attached had finished their labours that the Persians took possession of Moham'rah. The Sheik of Chaab possesses lands in both Persia and Turkish Arabia, and never paid tribute without being coerced. Mahomed, the great Sheik, dug a canal from the Karun to the Persian Gulf, to avoid paying the customs to Turkey. The mouth of the canal was still open near the small village of Sabla. He also constructed a bund which was broken by Kerim Khan after his capture of Busrah. The temperature of the Karun in summer is 20° lower than the Euphrates. General Monteith next spoke of the physical features of the country, and, with reference to the Karun, stated that in ascending that river to Ahwaz he met with the remains of a sluice, which, if a lock were made, would afford communication as far as Shuster. Respecting the passage into the interior, General Monteith said the route from Shuster to Disful was over a beautiful country, perfectly easy for artillery or anything else. But the march from Shuster, which was the line followed by Alexander, offered obstacles still more difficult than the passes to Shiraz. For a distance of 90 miles the country was destitute of water. From Ahwaz it was 64 miles across a desert, till you came into the valley of Ormuz; then, from that point, you might pass on, without any great obstacle, to the beautiful valleys of Sir-ab-Sea and Fallian, than which nothing could be more lovely, nothing more delightful than the climate. But here was a pass fully as difficult, if not more so, than any of the passes between Shiraz and Bushir. He surveyed the passes between Bushir and Shiraz, and, with some labour, he thought they were capable of being made passable for artillery, provided possession were taken of the heights, which must be done by whatever pass is taken.

MR. CRAWFORD, F.R.G.S., had only to make a short explanation respecting what passed the other night upon the indigo question. Sir Henry Rawlinson fancied that he considered indigo the sole product of India. That was not what he intended to convey. All he meant to say was, that, of all parts of Asia, India was the only country in which a marketable indigo could be produced. He ventured to say that the Bussora indigo would not fetch sixpence in the pound in the London market, while the indigo of Bengal and of Guatemala would fetch five and six shillings. He should like also to ask Sir Henry Rawlinson, what he thought could induce Alexander the Great to plant Greek colonies in such a climate as had been described, or how he could bring himself

to believe that Greeks would thrive with the thermometer at 130° in the shade?

SIR H. RAWLINSON replied that the Greek settlement at the mouth of the Euphrates was a well known historical fact. Alexander not only planted a colony at the head of the Delta, but he gave to the surrounding tract of country the name of Pellæum, after his native village Pella, in Macedonia. He presumed the object to have been one of national glory rather than a mere consideration for the comfort of the Greek soldiers; Alexander cared little perhaps whether the settlement thrived or not, but that he did fix a colony in the vicinity of the modern town of Moham'rah was certain. We had further the evidence of the coins, struck in Characene with Greek legends and Greek dates, to prove that the colony must have continued, under Arab or Partho-Arab kings, to exist at the mouth of the Euphrates for several hundred years. As to the doubt expressed whether Greek colonies could thrive in the great heat of that country, he could not help referring to the remarkable case of Seleucia, where the heat must have been fully equal to that of Moham'rah, the town being situated on the upper part of the Tigris, about 20 miles below Baghdad, but which, nevertheless, contained a Greek population of 100,000 souls, among whom Greek arts and literature were cultivated almost as ardently as in Europe. Some of the most interesting descriptions that we possessed of Greek society occurred in Plutarch's notice of Seleucia, under the Parthians (after the defeat of Crassus), with reference to the acting of the plays of Euripides in that city before an audience composed of Greeks and Parthians. It was well known indeed that the Greek cities of the East flourished quite irrespective of climate or of European comforts. He supposed that the Greeks did deteriorate, as Englishmen also deteriorated in India. But whilst we had an Indian empire, administered by resident Englishmen, we need not wonder at the establishment and maintenance of Greek colonies in the countries situated on the Tigris and Euphrates.

MR. MONTGOMERY MARTIN, F.R.G.S., said it would be interesting to know the declination of the country from Moham'rah to the northward? what was the nature of the soil, as regarded its salubrity? and how far Sir Henry Rawlinson thought our gallant soldiers would be able to sustain four or five months' residence in that country, without the loss that would arise from the extreme heat? Because the extreme heat was not always destructive of life. When he was at Aden, where the heat was intense, the mortality in the 17th was only 3 per cent.

SIR HENRY RAWLINSON could only make a few general remarks upon the sanatory question, because he had not examined the country between Moham'rah and the mountains with that especial view. He only knew the sanatory effects practically and from general observation. Near the sea there was an extensive marshy region, where the climate was most deadly, owing to the malaria which was engendered, he supposed, by the constant decomposition of vegetable matter in a tropical sun. But when this marshy region was once passed, the country was perfectly dry, the rivers remaining in deep beds in their course, and never flooding the adjacent lands. No rain fell except in the spring, at which period the whole country was covered with a most luxuriant and wholesome vegetation, principally rich, thick grass, which he had no doubt would be mowed by our troops and turned into serviceable hay. In April and May the grass on the banks of the Kerkha and Shaver rivers was so thick that it was difficult to force a horse through it; and such was the case all the way up to Shuster and Dizful. There was comparatively little irrigation in the plains of Susiana. The desert was chiefly watered by the rains of heaven. All this country was, of course, originally formed by alluvium, that is, by detritus from the mountains. The rise from the sea to Shuster, near the foot of the hills, was probably $1\frac{1}{2}$ foot per mile, so that the base of

the mountains might be about 400 feet above the level of the sea. But from that point the mountains rose abruptly, and, as he had already mentioned, on the second day after leaving Dizful he entered into the region of snow. The whole of the upper country, that is, between the marshy belt to the south and the mountains to the north, was healthy, although there was a good deal of heat during the summer months. But we had had experience of this heat in our former expedition to the Gulf when we occupied Karak. At first there had been great mortality, because the European soldiers were lodged in tents and were placed on sentry in the sun equally with the natives. It thus not unfrequently happened that a European soldier on guard was struck down by a *coup de soleil*, and that the party from the regiment sent out to bring in the man and place another sentry, lost two or three men from the same cause before they returned. The European authorities accordingly soon came to the conclusion that it was necessary to place natives only on sentry; and as the Europeans were shortly after lodged in huts of palm-mats and otherwise well cared for, it was found, before we had been a year on the island, that the mortality was not greater in Karak than it was in any of the warm stations of India, such as those in the north-west provinces. He felt satisfied if the same precautions were now adopted at Ahwaz, with the additional advantage of using wet screens made of camel-thorn facing the hot wind, which naturally produced evaporation, that the troops would not suffer more from the heat than in the north-west provinces of India.

A VISITOR, in reply to Mr. Crawford's statement that Bengal and Guatemala were the only countries which produced indigo, stated that Guatemala did not produce an ounce of indigo; it produced only cochineal.

MR. CRAWFORD presumed that indigo must have been manufactured in Guatemala, because it went under that name. He did not know into what particular parts of America the manufacture had been extended.

THE PRESIDENT, in closing the discussion, reminded the Society that the next meeting would be their Anniversary. The Society had so rapidly increased—numbering at present nearly a thousand Fellows—that the Council had to look out for a larger place of meeting. Various propositions had been made, among which was one that he, the President, should represent the case to the Earl of Granville, as the head of the Board of Education, and request permission to hold the meetings of this Society during next session in the theatre of the Government School of Mines, in Jermyn Street. If it should be the pleasure of the Society, as it was that of the Council, he was quite ready, as Director of that establishment, to apply to the proper authorities on behalf of the Royal Geographical Society.

The resolution was unanimously passed.

SIR GEORGE BACK next said that the Geographical Society had now arrived at that period when it was customary to make some changes in the Council. Those changes had been proposed that day in the Council, but one important omission had occurred—that of nominating the President for the ensuing year. They would all remember that Sir Roderick Murchison, on the demise of the late lamented President, Admiral Beechey, accepted the office with an understanding that it should not extend beyond the regular time, and the able manner in which he had fulfilled the duties was patent to all. Everyone knew his courtesy, and most of them had partaken of his hospitality. Indeed, he knew no gentleman who could have conducted the affairs of the Society more efficiently than Sir Roderick Murchison had. He appeared to be in such admirable health, and to have thriven so much upon the work, that with their permission, he would propose that Sir Roderick Murchison be President for the ensuing two years.

COLONEL EVEREST having seconded the proposition, it was carried unanimously.

SIR RODERICK begged to assure the Society that when he took the Chair, on the demise of his lamented friend Admiral Beechey, he said with all sincerity, that he did not feel that he could efficiently carry out the duties beyond this Anniversary. Having found that with the work, he had thriven, as it were, in health, he was ready to continue his services, if the Society thought him worthy of it. He could only say that, if he should be elected at the next Anniversary, he should consider it the highest honour that could be conferred upon any scientific Englishman ; for he should then have entered into his third Consulate, *i. e.* his third Presidency ; and, if he lived to a future Anniversary, he should have delivered six Addresses to the Society, all of them infinitely too long, but all prepared with the greatest pleasure—a pleasure the greater, if he could believe that they had conduced, in the slightest degree, to the advancement of geographical science.

PRESENTATION
OF THE
ROYAL AWARDS

TO

MR. AUGUSTUS C. GREGORY, THE EXPLORER OF NORTH AUSTRALIA; AND LT.-COLONEL ANDREW SCOTT WAUGH, DIRECTOR OF THE TRIGONOMETRICAL SURVEY OF INDIA.

THE President opened the Meeting by making the following statement of the grounds on which the Council had awarded the Medals:—

The Founder's Gold Medal has been awarded to Mr. Augustus C. Gregory, for his extensive and accurate surveys in Australia, and particularly for his last great and successful exploration of North Australia and his journey thence, or from the Victoria of Stokes to the Colony of New South Wales, as recommended by the Royal Geographical Society, and carried out under the orders of Her Majesty's Government.

When Her Majesty's Government decided that an exploration of North Australia should be made upon the general plan advocated by this Society, and in accordance with the suggestions of our members Stokes and Sturt, they wisely selected so experienced an Australian surveyor as Mr. Gregory to carry out this great and important project. That gentleman was already well known to us by his successful labours in unravelling the condition of the interior of Western Australia, as recorded and mapped in the 18th and 22nd volumes of our Journal. In the first of these journeys (in 1846) he ascertained that the inner part of that colony is generally flat, broken here and there by low hills of granite or other igneous rock, the depressions being usually occupied by salt lakes or marshes, no fresh-water streams having yet been detected. In 1848, Mr. Gregory proceeded from Perth on what was termed "the Settlers' Expedition," or an endeavour to discover a tract of good

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land in the latitude of Champion Bay, and, if possible, to penetrate to the Gascoyne river, which falls into the northern part of Shark Bay. Crossing the Moore and Arrowsmith rivers, he ascended the Murchison, for 50 miles towards its source, and found some rich soil on its banks. Determining everywhere his positions astronomically, he proceeded to the affluents of that stream and made ineffectual efforts to force his way through the dense brush or scrub of the waterless, arid plains south of Shark Bay; when the exhaustion of his horses, great heat, and the sterile sandy soil proved to him that the interior of the colony could only be explored in the moist winter months. He therefore returned to Perth, having travelled about 1500 miles without detecting any notable quantity of good land, and having failed in reaching the Gascoyne river, from the want of fresh water and the impenetrable thickets of scrub.

Most of the officers of the last and great expedition, which we had so long advocated, having been sent from England to Sydney, the expedition was there placed under the orders of Mr. Gregory. Being properly fitted out under the directions of our associate Sir William Denison, the Governor of New South Wales, and proceeding thence by sea through Torres Strait and along the north coast of the continent, it reached the great bay, first made known to us by Capt. P. King in 1819, the eastern gulf of which, or Queen Strait, and its stream the Victoria, were explored by Wickham and Stokes in 1839.

Having ascended the Victoria, with the schooner *Tom Tough*, as far as was practicable, Mr. Gregory established a camp on the right bank of this stream, at about 80 miles from its mouth. With his brother, Mr. H. Gregory, Mr. J. S. Wilson the geologist, and Dr. Ferdinand Mueller the botanist, he then explored the Victoria to Jasper Creek, determining the geological nature of the country, and ascertaining that the river made a great southward bend. Again taking with him his brother, and Dr. Mueller, together with the artist, Mr. T. Baines, he marched southwards to ascertain if the saline desert, which Sturt had discovered in proceeding inland from the southern regions of Australia, and which he had himself found to prevail in Western Australia, was also to be met with in a journey southwards from the north coast.

For this purpose he ascended the Victoria to its source, and found the hilly or dividing range to have an altitude of 1660 feet above the sea. Traversing this watershed, he descended by a

stream flowing south, which he named Sturt Creek, and which, bending to the S.S.W., terminates in a desiccated salt lake near Mount Wilson, in S. lat. $20^{\circ} 2'$ and E. long. $127^{\circ} 5'$. Whilst the south-eastern and southern slopes of the dividing range were thus proved to be everywhere dry and sterile sands, the whole of the territory to the north of the same presented the most striking contrast, being generally fertile in grasses, particularly the extensive grounds named Hutt Plains and Roe Downs.

In this first effort, therefore, made specially by the advice of our medallist Sturt, the grand geographical and statistical feature, which was suspected to exist, was brought to the test; and we may now fairly infer, that all the central portion of this continent, as well as the long southern coast-line examined by our associate Eyre, and a considerable maritime frontier of Western Australia, constitute an uninhabitable desert, probably the dried-up bottom of a sea, and that hence all future intercourse between our Australian colonies must take place either along the fertile coast ranges, or by sea.

Returning to his camp, which he had left under the charge of Mr. Wilson, who had in the mean time examined the adjacent country, of which he sent home a sketch map to this Society, Mr. Gregory sent away Mr. Baines, with Mr. Wilson, and the larger number of his party, in the schooner; and after giving directions that the vessel should meet him at the head of the Gulf of Carpentaria, he set out on his chief mission, accompanied by his brother, Mr. Elsey the surgeon, Dr. Mueller, and three men.

Quitting the basin of the Victoria, and passing over a broad table-land of sandstone, he entered a valley watered by a tributary of Leichhardt's river, the Roper, which he named Elsey Creek, in S. lat. $15^{\circ} 15'$ and E. long. $133^{\circ} 10'$. He next took a south-south-easterly direction to the west of Leichhardt's route, or about 70 miles distant from the western shore of the Gulf of Carpentaria, and traversed the various rivers discovered by his adventurous precursor (but nearer to their sources) until he reached the Albert, which empties itself into the head of the Gulf. Not meeting there with the party sent by sea, under the orders of Mr. Baines, he left the 'Plains of Promise' of Stokes, and crossed the river Flinders at about 80 miles distance from the Albert, and, journeying to the north-east, fixed a position on the Gilbert River at S. lat. $18^{\circ} 0'$ and E. long. $140^{\circ} 40'$. Ascending that stream, Mr. Gregory left behind the drainage into the Gulf of Carpentaria, and traversed the high basaltic plateau which separates the waters flowing into that gulf, from those which

descend into the great eastern ocean. To the dividing high lands he assigned the name of 'Newcastle Range,' in honour of the Secretary of State for the Colonies, who had sanctioned the expedition. Reaching the Burdekin, he followed that stream south-eastwards to its junction with the Cape river of Leichhardt.*

The next march showed the connection of the Suttor of Leichhardt with the Belyando of Mitchell; then striking south-west from the latter stream, Mr. Gregory skirted the Peak range, the extreme point to which squatters have extended their dwellings, *i. e.* in S. lat. $23^{\circ} 41'$ and E. long. $147^{\circ} 50'$, or about 560 miles from the head of the Gulf of Carpentaria.

Whilst a great breadth of entirely sterile tracts, with only one insulated rich spot on the river Roper, prevails between the basin of the Victoria on the north coast and the Gulf of Carpentaria, with occasional poisonous plants, Mr. Gregory found nearly all the vast region between the eastern side of the gulf and the northernmost station of our settlers, to be more or less fertile. During the last weeks of the expedition the horses fattened, and after traversing the rivers Mackenzie, Comet, Dawson, and Burnett, the party reached the Brisbane and Moreton Bay in excellent health.

The value of the researches of Mr. Gregory and his associates cannot be appreciated until all their records, and the general map, now in course of compilation by Mr. Arrowsmith, shall have been published; although we already know how vastly our acquaintance with the geographical distribution of plants has been enlarged by the collections of Dr. Mueller.† In the mean time, however, the geographers of all countries will admit that we have rightly awarded our Founder's Gold Medal to the successful explorer of such vast unknown lands, through which his united journeys have amounted to upwards of 6500 miles, and in making which he has determined many points of longitude as well as latitude, and has accurately defined the character of a fine basin of North Australia, which may probably, at no distant day, become a British colony,—a subject which will be particularly alluded to in the discourse which follows.

* It is my pleasing duty to state a fact which is in the highest degree creditable to Mr. Arrowsmith. That acute and indefatigable geographer, without any other guide than his own comparison of somewhat discordant materials, had placed upon his map the point of the confluence of the Burdekin and Cape Rivers, or Mount M'Connell, at not more than ten miles in error of the precise longitude, $155^{\circ} 50'$ E., determined by Gregory; for the latitude only had been fixed by Leichhardt, *viz.*, S. lat. $26^{\circ} 30'$.—R. I. M.

† See Sir W. Hooker's Journal of Botany.

The President, having read the preceding grounds of the award, rose, and thus addressed the Right Hon. Henry Labouchere :—

“Mr. Labouchere,—Having taken for many years the liveliest interest in the exploration of North Australia, it has been peculiarly gratifying to me to see this very difficult operation effectually carried out by a surveyor of the Australian colonies, so admirably qualified to ensure success as Mr. A. C. Gregory.

“On this memorable occasion I rejoice that you, Sir, her Majesty's Secretary for the Colonies, under whom this great task has been happily terminated, should have honoured us by attending here to receive for the explorer of North Australia the Founder's Medal of our Society, which I request you to transmit to Mr. Gregory with the expression of our entire and hearty approbation of his conduct.”

Mr. Labouchere replied :—

“Sir,—It affords me sincere pleasure on this occasion to receive, on the part of Mr. Gregory, this well-merited mark of approbation of the Royal Geographical Society. That gentleman had been selected by the Government for the arduous and important task of exploring the vast regions yet unknown to civilized man in North Australia, and the manner in which he has performed it has amply justified the selection.

“Of Mr. Gregory's scientific qualifications it would ill befit me to speak before such an audience, but I may advert to those moral qualities which were not less necessary to an explorer of those vast solitudes. Sir William Denison, in a despatch which rendered a high testimony to the merits of Mr. Gregory, observed that it was to his prudence and courage that the safe return of the entire party was probably due.

“You have called attention, Sir, to the description which Mr. Gregory gives of the soil and climate on the banks of the Victoria river; and, indeed, it is of such a nature that it is no extravagant supposition that some of us may live to hear of that hitherto unknown region becoming the home of a prosperous English settlement.

“Such anticipations have always been a source of great gratification to my mind; for I believe that, among the many blessings and advantages which have been permitted to this country, none ought to be ranked higher than, that she should have been enabled to scatter so widely over the globe the manners, the freedom, the civilization, and the religion of Englishmen.”

Mr. Labouchere concluded by assuring the Meeting that he would transmit the medal which he had received from the hands of their distinguished President to Mr. Gregory, who, he was sure, would highly value such an honour.

The President then continued :—

The Council has adjudicated the Victoria or Patron's Gold Medal

to Lt.-Colonel Andrew Scott Waugh for his valuable and able extensions of the Great Trigonometrical Survey of India, and particularly for his recent triangulation carried on through Rajputana, the Panjab, and the Himalayan Mountains, thereby adding to our geography an accurate and intimate knowledge of a part of the globe most interesting to mankind at large, and of vital importance to Great Britain in particular.

This Trigonometrical Survey of India was commenced by Colonel Lambton in 1803, and continued by him till his death in January 1823. During that period he measured an arc of the meridian from Punnae in $8^{\circ} 9' 35''$ near Cape Comorin to Damargidda in lat. $18^{\circ} 3' 16''$, being about ten degrees of latitude, and extended a net of triangles over the south part of the Peninsula of India, reaching on the east side of the principal meridian to the 19th parallel. Colonel Everest, who had been his chief assistant since 1817, and succeeded him at his death, completed the section commenced by Lambton, and extended the arc to Seronj, lat. 24° , near which place he measured a base of verification. This is the most important base in the Trigonometrical Survey of India, as all the work to the north, east, and west is dependent upon it. Colonel Everest carried on the measurement of the meridional arc to its completion in the Dehra Dún, lat. $30^{\circ} 19'$; the whole extent from Cape Comorin being $22\frac{1}{2}^{\circ}$ of latitude. He also extended a longitudinal series from the Seronj base to Calcutta, in the neighbourhood of which he measured a base of verification. From points selected on this series originate distinct sets of meridional series, the northern limits of which are united by a longitudinal series running along the foot of the great mountain chain, which thus completes the triangulation of that vast tract, comprising about 223,000 square miles.

When this distinguished officer left India, Colonel, then Captain Waugh, who had been his chief assistant since 1832, was appointed his successor in December 1843, and following up the admirable plan of survey laid down by his predecessor, the principles and methods of which have been described by Everest,* he worked out the several series left unfinished between the meridional arc and that of Calcutta. Finally he measured a base of verification at Sonakoda, lat. $25^{\circ} 18'$, long. $88^{\circ} 18'$, and also completed the triangulation of the south coast series from Calcutta to Ganjam.

Colonel Waugh then commenced operations on the west of the great meridional arc, and measured a longitudinal series from the

* Account of the Measurement of the Arc of India. 2 vols. 4to., 1847.

base at Seronj, passing through Rajputana and the sandy desert to Karachi, upwards of 700 miles in extent, where a base of verification was measured, whilst the triangulation of the Bombay meridian was connected with this series. He further extended another series in a north-west direction from the stations of the meridional arc, Banog and Amsot, through the plains of the Panjab and a great portion of the mountainous tract to Peshawar. Again, a base of verification was measured near Attock, the series embracing an area of about 67,000 square miles. A meridional series is far advanced from the base at Karachi, along the Indus, to that near Attock. This operation will complete a gigantic geodetical quadrilateral, of which the great arc series forms the eastern side. Simultaneously with these trigonometrical operations, most minute and elaborate topographical surveys have been executed under the superintendence of Colonel Waugh throughout the greater portion of these tracts.

Lastly, having determined that of all the mountains whence the affluents of the Ganges run, the loftiest summit is situated about midway along the Himalayan chain, and finding that this culminating point (N. lat. $27^{\circ} 56'$, E. long. $86^{\circ} 53'$) was 29,002 English feet above the sea, and consequently 846 feet loftier than the famous Kinchinjanga of Nipal, Colonel Waugh has gratefully and appropriately named this, the highest known elevation in the world, Mount Everest, after his valued geographical instructor.

These great results appear to come peculiarly within the scope of the Society, which takes for its motto "*Ob Terras Reclusas*;" for eight years ago, the mere exploration of the tracts in question would have been deemed impracticable, whereas under the direction of our Medallist, a vast portion of these countries is now accurately delineated, on the basis of astronomical observations, connected by the highest appliances of modern geodetical science and art.

The President rising thus addressed Colonel Everest:—

"Colonel Everest,—The reasons which induced the Council to adjudicate the Patron's Gold Medal to Lt.-Colonel Waugh having been made manifest by the document I have just read, I now place this our tribute to his ability and success in your hands, requesting you to convey it to your eminent associate, with the assurance that we deeply appreciate the importance of his labours.

"By transmitting this Medal, through your medium, to the officer who learnt his lessons under your able guidance, the Royal Geographical Society recognises the right of your predecessor Lambton and yourself to have had similar distinctions: and I rejoice that by

this one act, the grand Trigonometrical Survey of India should now receive a reward which it so long ago merited."

Colonel Everest replied :—

"Mr. President,—I beg to return my acknowledgments for the complimentary terms in which you have been pleased to advert to the labours of my honoured predecessor and myself, and on behalf of my esteemed successor Lieutenant-Colonel Waugh to express the warmest thanks to yourself and the Royal Geographical Society for the very proud mark of distinction which has just been conferred on him, by the award of the Patron's Medal of this year.

"The applause of our fellow men is naturally prized by us all, and nothing is more cheering to a person engaged in an arduous undertaking, replete with privations and hardships, than the persuasion that, if he endures to the end, his labours will not be unrequited. Colonel Waugh, however, is not of that stamp to need such a motive to induce him to persevere in the strict performance of his duty, and having no precedent which could hold out the prospect of such a distinction as the present, it will come on him altogether as an unexpected boon, and as such, will be additionally acceptable. I am certain that this Medal will be received by Colonel Waugh with the deepest and most sincere feelings of gratitude and respect for those who selected him for the proud honour of possessing it, and not only by himself, but by all the members of the department of which he is the chief, will this adjudication be hailed as an earnest that there is a body of gentlemen most qualified by their talents and knowledge to form a judgment, and as willing, as able to act according thereto, with right singleness of purpose. Sir, if anything could enhance the value of this mark of distinction, it is the circumstance that it has been conferred during the presidency of a gentleman of wide renown—known wherever civilization reaches—acknowledged even by our antipodes as one of the first geologists of the age, and not more distinguished by his scientific attainments than by his courtesy, urbanity, and kindness of heart.

"The Trigonometrical Survey of India has been in progress ever since 1803, a period of 54 years, and will in its entirety, embrace a tract which exceeds the area of Great Britain and Ireland in the ratio of about $12\frac{1}{2}$ to 1. Of course a vast deal still remains to be accomplished before so gigantic an undertaking can be pronounced complete; and as Colonel Waugh has now been engaged in this arduous task for 25 years, it is needless to expect much prospective effect from the present award as far as he is concerned, for his career in India must be drawing towards its close; but the memory of the present graceful act of this Society will assuredly not be lost on his eventual successor, or on India in general. He is still in the prime of life, and though he has suffered lately from more than one severe attack of illness, yet it is to be hoped that the injury which his constitution may have thereby sustained, is not greater than can be restored by a return to his native country, and that he will some day arrive to return his thanks in person to the Royal Geo-

graphical Society, and by his co-operation and counsel add fresh vigour to the active exertions of a body so effective—the first—the only learned Society in England, let me say, which has ever held out the hand of sympathy, friendship, and encouragement to the Great Trigonometrical Survey of India.

“Mr. President and Gentlemen, I thank you for having listened to me so patiently, and I conclude with my earnest wishes, that the prosperity of this Society may continue, until every portion of this globe shall have been as satisfactorily explored and as accurately delineated, as the regions under the influence of the Honourable East India Company.”

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 25th May, 1857,

BY SIR RODERICK IMPEY MURCHISON,

G.C.St.S., D.C.L., F.R.S., &c.,

PRESIDENT.

GENTLEMEN,—Having been called, through your kindness, to resume the honourable duty of presiding over you at a season, when the Royal Geographical Society has attained a condition more flourishing than its warmest well-wishers had anticipated, it is grievous to open this Address by dwelling upon the decease of my predecessor, the gallant Admiral Beechey, as well as that of my successor when I vacated this chair in 1854, the noble Earl of Ellesmere. Never since the foundation of our body has the hand of death fallen so heavily and so rapidly upon our leaders, and never has a more painful task been thrown upon your President, than that of recording the loss of two such men, however mitigated by the endeavour to do justice to their eminent and dignified characters. To delineate all their merits, even if I had the power, would be impracticable in the brief space of time to which I can lay claim on this occasion, and I shall, therefore, simply endeavour to place on record some of the salient features in the characters of my lamented friends, which more particularly connect them with the great pursuits of this useful Society.

Rear-Admiral Frederick William BEECHEY, the son of the late Sir William Beechey, R.A., was born in February, 1796, and before he reached the age of ten years was already serving as a midshipman in the Royal Navy. He bore a part in Commodore Schomberg's brilliant and decisive action off the Isle of France in 1811, and

after active employment in the expedition to New Orleans in 1815, he soon attained the rank of Lieutenant.

In 1818, public attention was again attracted to Polar exploration, which had been neglected during a lapse of forty-five years, chiefly through the exertion and energetic writings of our associate, the late Sir John Barrow. Lt. Beechey then served in the expedition under Buchan, and was appointed to the *Trent*, commanded by Franklin, who was also accompanied by Back. Having coasted the west side of Spitzbergen, they were finally arrested by heavy floe-ice in lat. $80^{\circ} 36'$ N. From some mistaken feeling on the subject, no account of the proceeding was published till 1843, when Beechey, remembering old Hakluyt's imputation on some of our early writers, who he says "should have used more care in preserving the memoirs of the worthy acts of our nation," brought out, under the authority of the Admiralty, a most interesting narrative of the voyage.

Subsequently our adventurous young officer joined the *Hecla*, and assisted the first great effort of the celebrated William Edward Parry (his former shipmate) to cut through the barrier of ice into Barrow Strait, beyond the 110th degree of west longitude, for which these officers and their companions justly received a parliamentary reward. In 1821-2 he had the good fortune to serve under the orders of our former esteemed President, Admiral W. H. Smyth, then surveying the Mediterranean, in co-operation with whose ship, the *Adventure*, he explored a considerable portion of the north shore of Africa.

During the three and a half succeeding years the sands of Cyrenaic Africa were exchanged for Pacific and Arctic researches, when, commanding the *Blossom*, Captain Beechey made accurate surveys of many islands in the Pacific, of the coasts of Russian America and of Behring Strait, of all of which he has left an admirable record in the work entitled 'Narrative of a Voyage to the Pacific and Behring Strait, to co-operate with the Polar Expedition.' In this publication, our respected President has left a record of scientific knowledge which places him high among the standard authors of our time.

To one portion of this work, which describes the exhumation of such vast quantities of bones of mammoths and other extinct mammalia from the cliffs of Escholtz Bay, in Russian North America, the late Dr. Buckland has rendered full justice.

At a later period, Captain Beechey surveyed the west coast of South America, and determined many points of high geographical

importance. Lastly, examining the shores of the Irish Channel, and performing much severe and valuable service to the detriment of his health, he produced many highly useful charts, and threw much light on the nature of the Channel tides. The result of these, his last labours afloat, was the publication of two very able and valuable memoirs in the 'Philosophical Transactions.' The first of these (in 1848) was entitled 'A Report of Observations made upon the Tides in the Irish Sea, and upon the similarity of the Tidal Phenomena of the English and Irish Channels,' &c. The principal object of the author was to point out the independence of the *set* of the *tide-current* in those seas, on the actual *state of the tide* as ebbing or flowing; and he showed, by a masterly exhibition of the facts, that there is no apparent connection between the direction of the stream and the rising or falling of the water. In addition to this, he laid down instructions for ascertaining the state of the tide, the value of which was much enhanced by two explanatory charts and many smaller diagrams.

This memoir, addressed to Sir F. Beaufort, was followed in 1851 by another letter to the same eminent hydrographer, which was written with the hope that its contents, when sufficiently known and circulated, would be the means of diminishing the number of those losses of both life and property, with which the annals of Lloyd's abound, and of advancing our knowledge of the tides, by the practical illustration of the phenomena of the tidal streams of straits under the influence of a combined wave.*

After the cessation of his arduous maritime exertions, Captain Beechey was appointed to the important post of Superintendent of the Marine branch of the Board of Trade, the duties of which he executed to the day of his death in a manner which drew from every successive Minister of the Department, the warmest acknowledgments of that clearness and precision of thought, and that skilful performance of official duty, which characterized our late President throughout his whole career.

Obtaining the rank of Rear-Admiral in 1854, he succeeded the Earl of Ellesmere in this Chair in 1856, and we all know with what sincerity he devoted his energies to the advancement of geography, how ably he directed our proceedings, and with what urbanity he presided over our meetings. Alas! I have too much reason to believe that the zealous endeavours he made to serve us, combined

* Phil. Trans., 1851, p. 717.

with the important duties of his office in regulating and improving the scientific instruction of the mercantile marine, acting on a constitution which had been sorely tried in many a clime, hastened that catastrophe which we so deeply lament.

Not long after his election to the post of President he was attacked by a severe illness, from which he only partially recovered during a summer's voyage in the yacht of the Trinity House. To that malady he feelingly alluded in the opening part of his excellent Anniversary Address—the only one he was permitted to deliver—when he thanked the other officers of our body for the effective manner in which they had conducted the affairs of the Society during his absence. On coming with his family to Tunbridge Wells in the autumn, where I happened to reside, I found that our zealous President was suffering from a disease of the heart. His affectionate wife and daughters then felt indeed, as well as myself, that the utmost tranquillity was essential to the preservation of his valuable existence; but he persisted in struggling with unflinching spirit to transact business both at the Board of Trade and in our Society. So dominant was this feeling that on Monday the 24th November, Admiral Beechey attended the rooms of this Society, and gave me, as the Vice-President he had selected to represent him, precise directions for conducting the business of the Council and of the evening meeting of that day. On Saturday, the 29th, alas! he was no more; thus exhibiting that firm resolve to do his duty to the last, which has ever been the glory of those British seamen among whom Admiral Beechey stood pre-eminent. He had long been a distinguished Fellow of the Royal Society, and was a member of the Council of that body at the period of his decease.

FRANCIS, Earl of ELLESMERE, a Knight of the Garter, Lord-Lieutenant of Lancashire, and our President during the years 1854-5, was the second son of the first Duke of Sutherland, and that gifted lady the Duchess Countess of Sutherland. He was born in 1800, and died on the 18th of February, 1857.

In endeavouring, with the approval of the Council, to induce this accomplished nobleman to succeed me in occupying the Chair of this Society in the year 1854, I felt certain, from an acquaintance of thirty years' standing, that through his varied knowledge, generous nature, and love of geography, he would render us right good service. His conduct in directing our affairs has indeed met with your hearty approval; and as we lamented that our

rules, limiting the presidential duties to two years, led to his retirement, so we have now to grieve over his demise, at the comparatively early age of 57.

Educated at Eton, and distinguished at Oxford, Lord Francis Egerton soon took a high place in the House of Commons, and served with ability both as Secretary for Ireland and Secretary at War. As he advanced in years he seemed to care less and less for political distinction; and as it is not my calling to dwell on his ministerial or parliamentary career, let me briefly remind you how he occupied many hours of his well spent life in cultivating and cherishing letters, science, and art.

I will first speak of those anonymous writings which, as they have exercised a salutary influence on society, ought to be made known, both to render justice to the man, and to indicate the great variety of his acquirements.

My auditors, who may have only known Lord Ellesmere as a member of either House of Parliament, or as our President, may not be aware that between the years 1834 and 1854 he was the contributor of not less than fifteen articles to the 'Quarterly Review;' and that about one-half of them were connected with the development of geographical research. Eschewing the troubled arena of party strife, he left no trace behind him of political acrimony even in those essays which touched upon disputed questions; whilst all of them, which did not bear upon the science we cultivate, were devoted to the fine arts, of which he was a true connoisseur, or to biography, and those military exploits which have raised the glories of Britain.

On geographical subjects he began by such attractive accounts of the works of the Dutch authors Meiglan, Fischer, and Doeff, that any one who will peruse his 'Sketches of the Manners and Usages of the Japanese' will find in them a most vivid picture of the life of that curious people, who, inhabiting a region separated from either continent, are apparently destined to remain longer an unbroken unit than the colossal empire of China. Of the Japanese he humorously wrote that he "left them to the complacent enjoyment of the conviction that they are the first of nations, and the eldest descendants of the Deity."*

Turning to the Eastern Archipelago, he has consigned to us a

* Quarterly Review, vol. lii. p. 317; vol. lvi. p. 438.

In his recent translation for the Hakluyt Society, of the Père d'Orléans' 'History of the Tartar Conquerors who subdued China,' Lord Ellesmere was largely assisted by his accomplished daughters.

memorial of the lively interest he took in that chivalrous expedition of our old associate, Sir James Brooke. After a preliminary sketch of the preceding wretched condition of Borneo, condensed from the descriptions of Sir Stamford Raffles, he painted, with the hand of a skilful master and a warm friend, all that the adventurous Irish gentleman was accomplishing. Every old member of the Raleigh Club and of this Society, recollecting the deep interest we felt in the successful voyage of the little schooner of the Yacht Club, fitted out by Mr. Brooke, will re-peruse with gratification the lines, which indicated that the young explorer of that day was destined to become the Rajah of Saráwak, and to receive not only our gold medal, but his due reward at the hands of his Sovereign.

Then, in his analysis of Arctic and Antarctic researches, Lord Francis Egerton gave long ago earnest that he was worthy to become our leader. In his review of the narrative of discoveries on the north coast of America, made by the officers of the Hudson Bay Company, in which the enterprising Simpson lost his life, we find him evincing those large views and kindly feelings which led him invariably, in subsequent years, to countenance and support those expeditions in the search after Franklin, which have shed so much lustre upon our country.

Again, when commenting in 1847 upon the memorable Antarctic discoveries of Sir James Ross and the natural history collections of Dr. J. Hooker, we see how emphatically he dwelt upon the exploits which he anticipated from our Arctic heroes when he penned these lines :—

“ With interest which accumulates by the hour do we watch for the return of those two vessels, which are perhaps even now working their way through Behring Strait into the Pacific. Should the happiness be yet allowed us of witnessing that return, we are of opinion that the Erebus and Terror should be moored henceforth on either side the Victory, floating monuments of what the Nelsons of discovery can dare and do, at the call of their country in the service of the world.” *

This was one only of the many soul-stirring paragraphs indited by my noble friend on a subject so near to his heart—one on which he never abandoned hope, as proved not only by his signing, with many of us, last year that petition to the Government, which is printed in our Proceedings,† praying for the final search of a

* Quarterly Review, vol. lxxxi. p. 167.

† Proc. Roy. Geogr. Soc., No. iv., p. 95, June, 1856.

limited Arctic area, but also by his willingly undertaking to make that appeal to the House of Lords in the last session of Parliament, which, in his unavoidable absence, was effectively made by Lord Wrottesley, the President of the Royal Society.

Among the last of Lord Ellesmere's anonymous contributions on geographical subjects, immediately preceding his two eloquent addresses to this Society,* I may advert to his lively account of Castren's Travels among the Lapps, in which he justly eulogised that enterprising Finn and his learned countryman Wallin, the successful explorer of Arabia. In other fragments of periodical literature he indicated his admiration and right estimation of engineering works in the article on the Skerryvore Light-House, and again in a very instructive Review of the progress in canalization, proceeding as it did from the inheritor of the great Bridgewater Canal.

Of his thorough acquaintance with the fine arts, Lord Ellesmere has left pregnant evidences in the pages devoted to his estimate of English artists, and to the elucidation of fresco painting. Liberally employing his wealth in making well-chosen additions to the gallery of paintings he inherited, he reared for their preservation, and for the residence of his family, that palatial structure designed by Sir C. Barry, which has scarcely a rival in our metropolis.

A distinctive feature in the character of Lord Ellesmere was his deep admiration of martial deeds. His veneration for the Duke of Wellington, founded upon a study of his campaigns, was matured by a personal intimacy of many years, during which the great Captain himself furnished the materials, which enabled our deceased President to give to the world a clear and well-condensed account of the battle of Waterloo.

The spirited sketch of the life of Blucher, the 'Marshall Vorwärts' of the Prussian soldiery, written in 1842,† was followed in 1845 by a luminous analysis of the French and English versions of the battle which decided the fate of Napoleon.‡ On these writings, coming as the chief matter in them did from *Wellington himself*, implicit reliance may be placed; and few historians, I venture to say, will improve upon the style in which the reminiscences of the illustrious Commander were conveyed to the public by our deceased Associate. In all such writings, whether he went back to the days of Wallenstein,§ or traced the struggling career of the old

* See Journal Roy. Geogr. Soc., vols. xxiii., xxiv.

† Quarterly Review, vol. lxx.

‡ Ib., vol. lxxvi.

§ Ib., vol. lxi., p. 105.

Scotch General Patrick Gordon,* who fought so well for the Czar Peter, or entered with the lamented Cathcart into the Russian and German campaigns of the first Napoleon,† or stood forth in the hour of trial as the champion of his dear friend the brave Lord Raglan, we invariably applaud the generous sentiments and true appreciation of merit which ever guided the pen in his portraiture of a hero.

The versatility of the talents of Lord Ellesmere was displayed in numerous other works published under his own name. A poet by nature, verses, whether martial, plaintive, or jocose, flowed freely from his heart, and the principal of these being collected under the title of the 'Pilgrimage and other Poems,' the author, with his habitual modesty, spoke of them in his preface as being a collection of the least unpopular of his works.

A master of several languages, he frequently put before his countrymen in good racy English, the thoughts of eminent foreign authors, and of these efforts, the translations of Goethe's 'Faust' and Schiller's 'Wallenstein' are prominent examples. The number of foreign works which he translated may well surprise us, when we reflect upon his numerous occupations, and among them I may enumerate Clausewitz's 'Campaigns of Russia,' the 'Sieges of Vienna by the Turks,' and the 'Last Military Events in Italy.'

Returning to my noble friend's connection with science, let me ask any old member of the British Association if he ever heard from the President of the year a more inciting appeal than was made by Lord Francis Egerton at the Manchester Meeting of the year 1842. Ranging from science to letters and art, he proved that he truly merited the application of that line with which he honoured his predecessor, Dr. Whewell—

"Through each mode of the lyre, and was master of all."

It was then that I rejoiced in being one of those assembled at Manchester, to bear witness that this distinguished nobleman, the possessor of large domains, was as truly esteemed by every artisan of that vast hive of industry, as he was beloved by his tenantry and agricultural labourers.

If it was specially when surrounded by his family and friends that the genuine heartiness and wit of the man came out most strikingly, every public act of his life was carried out with such stedfast sincerity and true liberality, that, whether he presided over a Royal commission, a literary or scientific society, or a parish vestry, he did his duty with his whole heart. Philanthropy and generosity

* Quarterly Review, vol. xc., p. 314.

† *Ib.*, vol. xc. p. 1.

were to be discerned, indeed, in all his actions by those who knew how quietly and unostentatiously he sustained with his purse men of genius, who were labouring under difficulties, and who, but for his timely aid, could never have produced works which have taken a high place in science and letters.* These acts were well crowned by that full-handed munificence with which he strove to succour our famishing and ill-clad soldiers in the Crimea.

In addition to the stores of varied knowledge which he could at all times playfully and instructively draw forth from his capacious mind, there was in Lord Ellesmere a fund of cheerful benevolence which bound to him affectionately every one who enjoyed his friendship. I cannot therefore better sum up the leading merits of our former President than in the expressive words of one of his most intimate and valued companions :—

“ His calm exterior and tranquil manner covered a deep-seated enthusiasm for the honour of his country, for the progress and amelioration of his species, and for all that was grand and noble in sentiment or in action.

“ They can bear testimony to this truth who have seen him kindle over the recital of some great battle of the Great Duke, or some less famous deed of individual heroism,—who have witnessed the eager interest with which he watched the bold enterprises of modern navigation,—or who have heard his lucid and animated explanations of the mechanical inventions for diminishing labour, or perfecting manufactures, in the vast workshops connected with his canal property. While his ardent spirit rejoiced in every discovery achieved by science, and every new phase of beauty elicited by art, his accumulated knowledge and cultivated taste enabled him to appreciate the merit and calculate the consequences of each; and he was ever ready to employ the influence of his position, the vigour and liveliness of his pen, and the princely contributions of his purse for the furtherance of such purposes.

“ His high estimation and assiduous study of the science to which the Geographical Society is especially devoted, were the result of that large range of knowledge which opened his mind to its infinite relations—moral and material, social and political—with the future destinies of mankind. In him the geographer was blended with the statesman and the philanthropist, not in wild and utopian spe-

* Let me cite one of several cases known to myself. When the eminent naturalist Agassiz was likely to have the publication of his great work ‘*Les Poissons Fossiles*’ stopped for want of means, Lord Ellesmere gave 500*l.* for the original drawings, which he immediately presented to the Geological Society.—R. I. M.

culations (for the poet's imagination was controlled by a sober judgment and a jealous love of truth), but in those prescient views which result from extensive acquaintance with the physical circumstances of remote regions, and from well-reasoned calculations of their several capacities for the advancement of civilization and the increase of human happiness." *

Suffering from complaints with which he had long struggled, and aware that the climate of Lancashire was hostile to his frame, Lord Ellesmere still persisted in residing during a portion of the year in that district where he felt he had, by the will of Providence, a responsible task to perform. Raising, therefore, a beautiful edifice near the entrance of his own great Bridgewater Canal, and little distant from the town of Manchester, expending large sums in building churches or founding schools, and ardently pursuing every plan for the bettering of the moral and social condition of the people, he braved the moisture of the climate, and only succumbed when, amidst the blessings of all to whom his influence extended, he had effected the main objects for which he lived. Well might the clergyman,† who preached the funeral sermon over his bier, point, not merely to the exalted character of the statesman, the orator, and the scholar, but specially to the true Christian, the lamented Lord of Worsley Hall, in whom all the surrounding inhabitants felt that they had lost the generous patron, the liberal, indulgent master, the charitable and tender-hearted soother of distress and poverty.

In short, as it was impossible to know him well and not to love him, so the deep sorrow which his death called forth is the noblest monument to the memory of the good Earl of Ellesmere. Such, doubtless, is the real consolation of the high-minded and devoted widow, who, cordially participating in all his acts of beneficence, is left to encourage her children to imitate so bright an example.

DR. WM. BUCKLAND.—Lost to the world and to his numerous admirers for several years through an impaired state of the mental faculties, caused by a diseased state of the bones at the base of the skull and of the neck, my valued friend, Dr. Buckland, the Dean of Westminster, expired on the 14th August, 1856, at the age of 73.

The principal merits of this eminent man and the leading events of his life having recently been brought before the Geological Society,‡ of which he was one of the early members, as well as before

* Extract of a letter from Mr. Ralph Sneyd to myself.

† The Rev. St. Vincent Beechey, M.A., brother of our last President.

‡ See Address of the President, Col. Portlock, B.E., F.R.S., Quart. Journ. Geol. Soc. 1857.

the Royal Society, whose chief honour * he had received, it does not become me to attempt any analysis of those writings upon the structure of the globe or its former inhabitants, which have been justly regarded as among the chief stepping-stones to the present state of geological science. I will, therefore, confine myself to a brief sketch of a few points in his character, which may convey to those who knew him not, some idea of the powers and habits of this great geologist.

Educated at Tiverton and Winchester, he obtained from the latter school a scholarship in Corpus Christi College, Oxford. There it was that, after he had become a tutor in classics, a youth came to the University (Oriol College), who, having already attained an acquaintance with fossil organic remains, was destined through that knowledge to influence the future career of many of his associates who had similar tastes. This was William John Broderip, afterwards my colleague during five years as joint secretary of the Geological Society, and now well known as one of the eminent naturalists of our age.

The study of the collection made by this juvenile companion, including the jaw of a marsupial quadruped found in the Stonesfield slate, first awakened the dormant talent of Buckland. Cultivating the friendship of the precocious fossilist, he soon developed that peculiar power, which characterized him through life, of catching up and assimilating with marvellous rapidity everything that illustrated the new science of fossil organic remains, then just coming into vogue through the work of Parkinson. So strongly did Buckland feel in after years the deep obligations he was under to young Broderip, that I have myself heard him speak of the latter as his "tutor in geology."

Admiring the original efforts of William Smith, who, in identifying strata by their organic remains and by his geological maps, has worthily acquired the title of Father of English Geology, Mr. Buckland made numerous excursions to examine the rocks in various districts, and in so doing sought out the few promoters of the rising science. The kindred scientific spirits of his Alma Mater, whether older men or of about his own age, were Pegge, Kidd, and John and William Conybeare, the last mentioned, now the Dean of Llandaff, rising afterwards to be the rival of our deceased member as the celebrated author of the 'Outlines of the Geology of England and Wales.' Thus working onwards he qualified him-

* The Copley Medal.

self to obtain that post of Reader in Mineralogy and Geology, in performing the duties of which, he had the great merit of rousing the University of Oxford from its lethargy in respect to the natural history sciences, and in rendering attractive the study of primeval nature.

It is true that his predecessor, Dr. Kidd, had opened out some good paths in the science of mineral geology; but it was reserved for Buckland to create by his native eloquence and his illustrations, a real and solid taste for geology properly so called, whether as based upon the records of lost races of animals, or on physical geography and the mineral composition of rocks.

Those persons who, like myself, can go back to the days when our deceased member was an inmate of Corpus Christi College, can never forget the impression made upon his visitors, when with difficulty they discovered him in the recess of a long collegiate room, seated on the only spare chair, and buried, as it were, amidst fossil bones and shells. So strange was this conduct considered by the graver classicists, and so alarmed were they lest these *amœnitates academice* should become dangerous innovations, that when he made one of his early foreign tours to the Alps and parts of Italy, which enabled him to produce one of the boldest and most effective of his writings, an authoritative elder is said to have exclaimed, "Well, Buckland is gone to Italy, so, thank God, we shall hear no more of *this geology*!" Augmenting his class of students, however, Dr. Buckland persevered successfully in spite of the opposition of the pedagogues of the old school, and certain narrow-minded theologians, who, ignorant of the imperishable records which the Creator has set before us in the book of Nature, endeavoured to destroy the moral influence, if not the character, of any clergyman who boldly taught those undeniable truths. Success happily attended his efforts, and if Buckland had done nothing more than educate a Lyell, a Daubeny, and an Egerton, he would justly have been placed among the most successful instructors of our contemporaries.

Marking the progress which has been made in this branch of science in the few years which have elapsed since it was publicly taught, we may indeed well look back with pity on its feeble opponents, and rejoice that the alumni of the Buckland school have become such strong men, and that the chair, which owed its origin to my illustrious friend, should now be filled by that sound geologist, John Phillips, the nephew of William Smith, who has added to the genius of that geological lawgiver, the richest accom-

plishments of modern science. The publication of his first remarkable work, the '*Reliquiæ Diluvianæ*,' naturally secured for Buckland honours and advancement, and through the patronage of Lord Grenville he obtained a canonry in Christ Church. Shortly afterwards Sir Robert Peel, with the appreciation of true merit which characterised him, sought out and cultivated his intimacy, and then came forth that '*Bridgewater Treatise*' with which his name will be long identified. For to whatever extent new data have since been obtained, this volume will ever remain a proof of the fertility of illustration with which he could reconstruct and set before us the forms of bygone periods,* and thus make evident to all, the prescience of the Almighty as exhibited in former epochs of creation. In a subsequent year we find Sir Robert Peel, to his great honour, presenting Buckland to the Deanery of Westminster, in which position, notwithstanding his hospitality and important occupations, he still found time to travel to and from his Alma Mater, and lecture on his favourite science, till he was stricken down with the illness from which he never recovered.

But let no one imagine that, whilst some of his leisure hours were thus occupied, including arduous efforts to improve the agriculture of our country, Dean Buckland was inattentive to his duties as the Head of an important Ecclesiastical Body. Not only do his surviving colleagues advert with marked respect and gratitude to his judicious efforts and his honourable conduct in improving their establishment, but the public owe to him their real thanks for the energy and determination with which, in a brief space of time, he effected the reform of abuses which had crept into the ancient school of Westminster. In that Foundation, education could no longer be obtained except at costly charges, and even where these were paid, the youths were ill fed and worse lodged. All these defects were speedily rectified by the vigour and perseverance of Dean Buckland. The charges were reduced, good diet was provided, the rooms were well ventilated, and the building properly underdrained; so that, these physical ameliorations accompanying a really sound and good system of tuition, the fame and credit of this venerable Seminary were soon restored.

As it must be my effort when occupying this chair to connect every deceased member with geographical science, let me assure you, from long personal acquaintance with Dr. Buckland, and hav-

* This work, which was rendered much more valuable by the recent discoveries of Professor Owen, was revised by Mr. Broderip.

ing, indeed, received some of my first lessons in the field from him, that he was really a good physical geographer. No one who followed him even from the valley of the Isis to the summit of Shotover Hill, can ever forget how forcibly he impressed upon the minds of his auditors, the causes which had operated in producing the outlines of the ground—how well he made his pupils comprehend why water rose in wells at certain spots and levels, and why other tracts were dry, or how he taught the young agriculturists the elements of draining, and showed them where the vegetation changed as dependent on the nature of the subsoil.

To whatever realm he travelled, whether over the undulations of Germany or the heights and glaciers of the Alps, he adroitly applied and extended these views, and everywhere exemplified (what I have endeavoured to imitate in my own walk) that union of geology with geography, without which the latter science is deprived of its firmest foundation.

While Dr. Buckland evinced enthusiastic zeal and great ability in the development of any phenomena connected with natural history which he could detect, whether in the organization of animals or of plants, he also often sought to apply his science practically. Thus, the most remarkable of these efforts, which I can now call to mind, proceeded from one of his own discoveries. Perceiving that certain fossil convoluted bodies, when extracted from their native bed in the lias of Gloucestershire, presented the appearance of *faeces*, which had assumed that form from passing through the intestines of reptiles or fishes, he submitted the substances to analysis, and when they were pronounced by the late Dr. Prout to be chiefly composed of phosphate of lime derived from the bones of animals, and that even fragments of the bones were detected in them, he assigned to these bodies the name of "Coprolites." With a fervid anticipation he was afterwards led to hope that these fossil bodies would prove of real use to agriculture; and one of the many regrets I have experienced since his bright intellect was clouded, was that my friend had not been able to appreciate the truly valuable results that have followed from this his own discovery, which, at the time it was made, was treated as a curious but unimportant subject, and almost scouted as being too mean for investigation. The hundreds of tons of these phosphatic coprolites and animal substances which are now extracted to the great profit of the proprietors of Cambridgeshire and the adjacent counties, for the enrichment of their lands, is a warning commentary to those persons of

the "cui bono" school, who are ever despising the first germs of scientific discovery.

The full and true character of Dean Buckland is not, however, to be measured by reference to his works only, including his records of those extinct Saurians of which he was the great historian, or his chief work, the 'Bridgewater Treatise,' nor even by his discoveries in a new science. The indelible impression he made upon all who listened to his instructive lectures—lectures like those which may still happily be heard at Cambridge from the lips of his illustrious contemporary, my old friend and coadjutor Sedgwick—and the general influence he exercised over society by the energetic and telling manner in which he inculcated his doctrines, as founded on observation of the progress of nature from the earliest periods to that icy epoch which preceded the era of his own cavern animals; these are the appeals which have procured for him a name which will last as long as the school of British geologists, of which he was so eminent a leader, shall be remembered!

In closing these few sentences, which, if I were addressing a kindred Society, might be expanded into a volume descriptive of the merits of one to whom I was sincerely attached, let me add that in his accomplished relict, our lamented member has left behind him a truly intellectual and excellent woman, who, aiding him in several of his most difficult researches, has laboured well in her vocation to render her children worthy of their father's name.

Dr. Buckland was a member of many European and American Academies, and a Correspondent of the Institute of France. Every where abroad, as at all great British meetings, and in every social party, he was invariably welcomed as the most cheerful and most successful contributor to the advancement of natural knowledge.

Lieut.-Col. NEIL CAMPBELL, who recently died in Paris on his return from Bombay, was an officer on the Quartermaster General's Staff of the East India Company's service, in which he was distinguished for his zeal and intelligence. He was best known to us as the author of the large Military Sketch-map of Scinde. During his stay in this country on leave of absence, he was one of the officers of the Indian Army who attended the funeral of the Duke of Wellington, and was always a welcome and agreeable attendant at our Club and Evening Meetings.

Captain Thomas GRAVES, R.N., who recently fell under the knife of a Maltese assassin, was the son of a gallant officer of the same name and rank. Entering the navy in 1816, and serving in several

vessels on foreign stations, he was chosen, through his merits, to form one of the scientific complement of the *Adventure*, in which ship young Graves played so able a part, that his Captain, now Admiral W. H. Smyth, and other officers strongly urged his promotion. During the next five years, he was a companion of that excellent officer the late Rear-Admiral Philip P. King, in his extensive surveys of the Straits of Magellan and the adjacent shores of South America, and it was only during that difficult service, and in the year 1827, that he was appointed a Lieutenant, *i. e.*, after ten years of arduous probation.

After performing, in conjunction with the Royal Engineers, a survey of Lough Neagh in Ireland, the next ten years of the life of Captain Graves were spent in surveying the Greek Archipelago, first in command of the *Beacon*, and next of the *Volage* corvette. These surveys were suddenly put a stop to by an order of the Admiralty, which both Sir F. Beaufort and Admiral Smyth considered to be an "inscrutable measure," and a heavy blow inflicted on this important branch of the naval service.

Whilst compiling about one hundred charts and plans of the Grecian Archipelago—as interesting to the antiquary and historian as they are valuable to the navigator—Captain Graves had the singular merit of attracting to his little ship the *Beacon*, as his friend and companion, that young naturalist Edward Forbes, then rising in the estimation of his contemporaries, and who, after passing nearly two years in dredging the *Ægean* Sea, and in developing the conditions of life and habits of submarine animals at various depths, threw a broad new light upon geological science. The name of Graves must therefore ever be associated with that of Edward Forbes! Even to Captain Graves himself geologists are much indebted, for his numerous contributions of fossils from distant parts. That these were very important all my contemporaries are aware, and particularly those still living, who, like myself, frequented the rooms of that remarkable naturalist Charles Stokes, whose merits I attempted to place on record for the late Lord Ellesmere when he last occupied this chair. To this Society Captain Graves communicated a description of *Skyros*, and was the cause of our *Journal* being enriched by the instructive papers of his assistants Spratt and Leycester.

Ever zealous in advancing knowledge, he also afforded to Sir Charles Fellows assistance in the investigation of the antiquities of *Lycia*, that was duly acknowledged. Such conduct surely called

for some mark of public approbation; but although the Sultan and the King of Greece specially thanked Captain Graves for services important to humanity, this meritorious officer never received any honour from his own country. Yet who can place in comparison with the anxious, untiring energy and science displayed during life by such nautical surveys as those of Thomas Graves, the lucky accident of a few months' war service in the Baltic or the Black Sea, in which perchance the individual decorated may not have accomplished any one feat of arms? Honour then to the Governor of Malta, Sir W. Reid, whose warm sympathy was offered to the neglected and really eminent scientific sailor. The offer of the post of Superintendent of the ports of Malta was willingly accepted, and the gallant Graves had zealously performed the duties of it during three years, when he received a mortal stab from a revengeful boatman, that deprived our country of his services. His kind, open-hearted and friendly disposition had long endeared him to every one who knew him; and from a personal intercourse of many years' date, I can well realize to my mind's eye the gloom, as attested by the public journals, which spread over the inhabitants of Malta on the occasion of his sad fate. Captain Graves was an old Fellow of the Royal Society, having been elected in 1826, and he was also one of the original members of the Royal Geographical Society.

Lieut.-Colonel Thomas Best JERVIS, of the Engineers, in the East India Company's Service, who died recently in London, at the age of 60, was formerly well known for his numerous important works in the Bombay Presidency, including Indian Metrology, and an elaborate treatise on the primitive universal Standard of Weights and Measures, &c. When a lieutenant, he served as the engineer in 1821 of the field force under Sir L. Smith sent to the Persian Gulf. On that occasion the Arab pirates were subdued, and the Fort of Beni-bu-Ali was taken after a vigorous resistance; operations in which he was distinguished. After repairing and putting in order many forts he was employed as a captain for ten years in making the trigonometrical survey of the Southern Konkan, a fertile country at the foot of the Ghauts. This Survey, when adjusted by the Grand Trigonometrical Survey, was incorporated into the Atlas of India, of which it formed several sheets. Fertile in resources, he devoted his residuary leisure to various useful purposes, such as building a suspension-bridge or opening out slate quarries in his Eastern abode. In 1838 he was provisionally

appointed by the Court of Directors to be Surveyor-General of India; but the appointment never really took place, as Colonel Everest had not resigned.

Colonel Jervis was the successful translator of Baron Hugel's *Travels in Cashmir*, and he had, I understand, translated other voyages and travels, which were never printed. Being well known for his untiring energy and his accomplishments as well as for his acquaintance with foreign languages, and having shown his foresight by the publication of a translation of the Russian map of the Crimea, and the rapid transference by the anastatic process of the Austrian military map of Turkey and the adjacent countries, he was proposed to the Treasury, and was appointed during the late war, to organize and conduct a topographical sub-department of the Government, in which he prepared numerous maps and plans. He had been a Fellow of the Royal Society since the year 1838, and was a frequent contributor to the library and map office of this Society.

The Rev. Thomas HALFORD, M.A., Oxford, who died in the 68th year of his age, was a well educated gentleman, and ever desirous of promoting art and science. Being partial to the Geographical Society, and a constant attendant at our anniversaries, we shall this day mark with regret his absence from our festive board.

Sir James MEEK was a highly respected and useful public servant, who, for his administrative talents in the victualling department of the Navy Board, was knighted and honoured with the Companionship of the Bath. An old member of this Society, he served on our Council for several years, and always supported our cause as long as he remained in London. Retiring from public life, he lived during the last few years at Ilfracombe in Devonshire. Being gifted with a kind heart, and possessing the most gentle manners, Sir James Meek was much beloved by all who knew him.

James Meadows RENDEL, the celebrated engineer, has had such ample justice done to his merits by those who can best appreciate them, whether at the Royal Society, or the Institution of Civil Engineers, that it would not become me to weaken such descriptions by any panegyric of my own. The skill and decision which he displayed in many works, such as a cast-iron floating or suspension bridge, and numerous piers and docks, besides innumerable hydraulic operations, were crowned by his two great achievements, the harbours of refuge of Holyhead and Portland. These, in the estimation of his associates, are alone sufficient to hand down his name to

posterity with a Smeaton, a Rennie, and a Telford. Consulted also by various foreign Governments, he was associated with M. Lesseps and Mr. Charles Manby as one of the International Commission for the construction of the Canal of Suez. Mr. Rendel was born in 1799, was elected a Fellow of the Royal Society in 1843, and was, during two years, President of the Institution of Civil Engineers. His death, which occurred on the 21st of November, 1856, was deeply lamented by all his friends and associates.

Mr. John KENYON, who died in December last, was born in 1784 or 1785. He was, for some years, at Mr. Seyer's school, at the Fort, Bristol, several of his companions from which seminary have since won for themselves fame and honour in the service of literature and science. Amongst his favourite playmates were John Eagles, known in later days as the author of 'The Sketcher,' Broderip, the naturalist; and Andrew Crosse, the electrician. These schoolday friendships remained through life, unclouded by a shadow.

After Mr. Kenyon quitted the University of Cambridge, he spent some time on the Continent, but, returning to England, he formed friendships with Wordsworth, Southey, and Davy. He was not only the friend of poets, but was himself a poet; having published, a few years since, at intervals, two volumes which show considerable originality, as well as a refined and cultivated taste. These poems breathe the spirit of a mild and tolerant man, wishing well to his fellow-creatures, with a liberality something more than orthodox, and seeing all things in the sunny hue of his own generous nature.

Mr. Kenyon's appreciation of genius and talent drew around him many savans and literati of the day, among whom his genial sociability seemed to have the power of amalgamating the most dissimilar natures, and of softening asperities between individuals. He was a person to whom no man volunteered to tell the worst he knew of his neighbour. He liked to see, talk, and hear of pleasant things; but he was one who feelingly shared the sorrows of his friends. His heart was ever full of true sympathy, and his hand ever ready to assist those who required his aid. In one year he spent four thousand pounds in acts of *private* charity!

Mr. Kenyon died on the 3rd of December, 1856. All those who knew him well, feel what they have lost; those who knew him but slightly will not soon forget his ever kind and bland manners. By his noble and generous will he divided his large fortune amongst

his numerous living friends, and the children of such of his old friends who had before him "gone to the many."

Vice-Admiral Lord RADSTOCK, C.B., has very recently been taken from us. Born in 1786, and entering into the profession of his father, the well-known admiral, who won the battle off Lagos in 1797, he distinguished himself in several engagements in the Mediterranean, in the last as Captain Waldegrave, and off the Italian coast, in destroying the batteries at the mouth of the Rhone. He was afterwards made naval aide-de-camp to the Queen. Although the death of Lord Radstock seemed appallingly sudden to those who had seen him sitting at the General Meeting of the London University a few days before, yet others who, like myself, had watched with grief the rapid change in his health during the preceding months, were not unprepared for the sad event. Valuing Lord Radstock highly for his personal qualities, I can truly say that the death of this brave officer and excellent man created a very general feeling of real sorrow, as deep among his friends and acquaintances as in all those public bodies, and numerous charitable institutions, in the welfare of which he took a warm interest.

Robert ANDERSON, Surgeon, R.N., who died in June, 1856, at the early age of 38, was born in the parish of Fettercairn, Kincardineshire. Receiving his early education at the Academy of Montrose, his medical studies were carried on and completed in the University of Edinburgh. Entering the Royal Navy, as an assistant-surgeon, in 1838, he served successively in the Royal Adelaide, the Princess Charlotte flag-ship, and in the Powerful, being on board the last-mentioned ship when commanded by Sir C. Napier at the siege of Acre and during other operations on the coast of Syria. Afterwards serving upon the East India and China station in the Agincourt, Spiteful, and Dædalus, and obtaining the rank of surgeon, he again passed to the Spiteful, in which he returned from India in 1847. In the following year Mr. Anderson was appointed surgeon of H. M. S. Investigator, Captain Bird, which shared in the expedition of Sir James Clark Ross to the Arctic Seas; and in 1849, he was again selected for similar service as surgeon of H.M.S. Enterprise, Capt. Collinson, in which he continued to serve till the return of that vessel to England. With the exception of scarcely 9 months, Mr. Anderson was constantly employed afloat for a period of nearly 17 years, of which 7 were spent in Arctic service.

Besides writing extended journals, Mr. Anderson made a large

collection of specimens illustrative of the natural history of the Arctic regions. Of this collection the zoological specimens were deposited in the British Museum, the dried plants being sent to Sir William Jackson Hooker at Kew, and the fossil remains to the Geological Society.

Frank, generous, and warm-hearted, esteemed alike for his professional abilities, scientific attainments, and private worth, his conduct through life exemplified a high-toned sense of honour and manly independence of character, and his premature death has caused real sorrow to his numerous friends.

Charles ELLIOTT, Esq., who died in May, 1856, at the age of 80, was a sagacious and esteemed Civil Servant of the East India Company. He always strove to promote the advancement of knowledge and geographical science, and was much beloved for his social qualities. Acting in various important capacities in Hindostan, he eventually rose to be the senior member of the Board of Revenue in Bengal, and agent to the Governor-General in the western provinces, in which capacity he proved a worthy successor of Sir Charles, afterwards Lord, Metcalfe.

Mr. Elliott had been, since the year 1832, a Fellow of the Royal Society, by whose members, as by our own, he was much esteemed; but it is specially in the Asiatic Society, of which he had been some years the Treasurer, that his loss is most felt, as evidenced by the Annual Report of that body, in which the soundness of his judgment, the integrity of his character, and the discrimination of his taste are justly extolled.

Lewis H. J. TONNA was a praiseworthy person, who formerly serving as a purser in the Royal Navy, became Secretary of the United Service Institution, and continued to carry on the business of our neighbouring establishment for many years with much efficiency and most obliging manners.

W. H. PEPYS, a native of this metropolis, was born in 1775. He succeeded to his father's trade in the Poultry as cutler and maker of surgical instruments. From his earliest years he devoted himself zealously, disinterestedly, and uninterruptedly to the advancement of science. It is now exactly half a century since Allen and Pepys communicated to the Royal Society the memorable experiment by which the identity of diamond with other known forms of the element carbon was confirmed. It was, however, as the contriver of ingenious modifications of chemical apparatus, that Mr. Pepys rendered the most signal service to scientific men.

During every phase of the rapid progress of chemistry, the gas-holder which bears his name, has maintained its place as well in the lecture-theatre, as in the laboratory of research. I have reason to believe that the arrangement of the magnificent voltaic battery, by which Davy decomposed the alkalies at the Royal Institution, was, more or less, confided to Mr. Pepys: hence, probably, originated the friendly regard in which he was held by that eminent philosopher. In the *Philosophical Transactions* for 1823 there is a description of a voltaic apparatus, consisting of two elements only, for electromagnetic research, made under Mr. Pepys' directions for the London Institution.

Let me add that Mr. Pepys was always anxious to associate with those who, like himself, desired to cultivate science for its own sake. He joined our Society at its commencement. He was one of the early promoters of the London Institution, and an original Member of the Geological Society. He was also a Member, and an office-bearer in the Royal Institution, where he received the honour of one of the ten Gold Medals awarded for chemical discovery. He died at his house, Earl's Terrace, Kensington, August 17th, 1856, aged 81.

A Foreign Associate whose loss we have to deplore during the past year is Baron von HAMMER-PURGSTALL, the distinguished Oriental scholar, poet, and historian. Attracted from his earliest childhood towards the East and Eastern literature, no one has done more good, in spreading the knowledge of Oriental History and Literature amongst the literary circles of Western Europe, than the learned author of the 'History of the Ottoman Empire.' Born at Gratz, in Styria, in 1774, he entered the Oriental Academy at Vienna in 1788, where he attracted the attention of the celebrated Jenisch, whom he assisted in the preparation of his edition of 'Meninski's Lexicon.' He subsequently entered the Austrian diplomatic service as Interpreter at Constantinople, he then served in the same capacity to the British army during Abercrombie's campaign, and after acting as Attaché to the Austrian Embassy at Constantinople and as Consul in Moldavia, he was appointed Interpreter to the Vienna Chancery in 1811. From this time devotion to Oriental Literature became the leading object of his laborious life; and when he subsequently quitted the public service he pursued his favourite studies on his estates in Styria.

Some opinion of his active energy may be formed from the long

list of works which he published,* in which great research, combined with much originality, is one of the most characteristic features. But the work which has formed the basis of his European reputation was undoubtedly his 'History of the Ottoman Empire,' by far the most important work yet written on this interesting subject, though even here he has been accused of an undue bias toward the House of Austria; a bias, however, as pardonable as it is natural in such a case.

He died at Vienna on the 16th of November, 1856, in his 83rd year. His monument, which he had himself prepared forty years before his death, is placed at his own request in the cemetery of Weidling, near Kloster Neuburg. In a spirit of humble piety he addressed a letter to our Secretary not long ago, in which, after announcing the formation of a Geographical Society at Vienna and presenting to this Society a copy of his last works, he adds:—"As there is little probability that I shall be long enough in life to see the end of the printing of this work, I mention the circumstance that you may claim after my death the continuation of the work from the Imperial Academy."

J. F. WAHLBERG, the Swedish Explorer and Naturalist, already known for his travels in South Africa in 1843, was killed by an elephant on the 6th of March, 1856, on the border of a river about 200 miles N.E. of Lake Ngami, probably the River Tamunakle of Livingstone. His collections have been sent to the Cape. His companion Mr. Green had ascended the Tioghe as far as Libebe, 100 miles to the south of which he was forced to leave his boat on account of the rapids.

M. Wahlberg, who was a Member of the Royal Academy of Sciences of Stockholm, had returned to his native land in 1844, but the indomitable desire to make new discoveries in natural history led him to revisit Southern Africa in 1854. Endowed with profound knowledge in zoology and botany, M. Wahlberg, being specially characterized by a modest and unassuming manner, was truly

* Amongst his numerous publications the most important are, 'Encyclopedie View of Oriental Science,' 1804; 'Glance at Turkish Literature,' 1816; 'History of Persian Belles Lettres,' 1818; 'History of the Assassins,' 1818; 'History of the Ottoman Empire,' 1827-1834; 'History of Ottoman Poetry,' 1830-1838; 'The Mongols in Russia,' 1840; 'Geography of Arabia,' 1840; 'The Mongols in Persia,' 1843; 'Treatise on the Seals of the Arabs, Persians, and Turks,' 1849; 'Report on Reinaud's French Translation of Abulfeda's Geography,' 1849; 'Report on Printed and Lithographic Works published at Constantinople during the Years 1845-1848.'

beloved by all those who knew him, and his death at the premature age of forty-four, occasioned general sorrow throughout Sweden.

Lastly, let me close this enumeration of our deceased friends by alluding to our late honorary Foreign Member, Dr. Elisha Kent KANE; although no language of mine can express the deep regret I feel at the premature decease of this heroic young Arctic explorer.

The son of a distinguished Judge of Pennsylvania, he was born in 1822, and educated at the Universities of Virginia and Pennsylvania. Accompanying as a medical officer the first American Expedition to China, he explored the Philippines, chiefly on foot, and made maps of those islands. Having survived severe attacks of fever he examined the volcanic region of Java, and was the first to descend into the great crater of Tael and make a sketch of its interior. In this early effort, the zeal of the youth seemed to have no bounds, for he was lowered upwards of 700 feet by a bamboo rope, and from the effects of the strong sulphurous fumes was senseless when hauled up to the rim of the orifice. He not only traversed India and Ceylon, but also visited Egypt, where he was associated with Lepsius; but unfortunately lost his notes and papers, and being stricken with the plague, narrowly escaped death. Subsequently he sailed to the west coast of Africa, examined the slave factories, and proposed to make a journey to Abomey, which he never accomplished, owing to a violent fever, from which he suffered during his life—a fact which is not to be passed over without the comment, that his Arctic sufferings were *not* the cause of his decease; for he returned from his last perilous exploits in perfect health. His bravery, ability, and generosity were next conspicuously elicited in the Mexican war; and even then he endeavoured to find time to make barometrical observations on the height of Popocatepetl. Having volunteered his services as surgeon to the first American expedition in search of Franklin, he published a narrative of this voyage under De Haven. Finally, he performed those extraordinary researches beyond the head of Baffin Bay, which obtained for him our Gold Medal at the last anniversary and the unqualified admiration of all geographers. At that time, however, we had not perused those thrilling pages, which have since brought to our mind's eye the unparalleled combination of genius, with patient endurance and fortitude, which enabled this young American to save the lives of his associates. With what simplicity, what fervour, what eloquence, and what truth has he described the sufferings and perils from which he extricated his ice-bound crew! You must, indeed, all agree

with me, that in the whole series of literature there is no work, which more feelingly developes the struggles of humanity under the most intense sufferings, or which demonstrates more strikingly, how the most appalling difficulties can be overcome by the union of a firm resolve with the never-failing resources of a bright intellect. In all these heart-rending pages there is no passage which comes more home to the Englishmen who are still advocating the search for the relics of the Erebus and Terror, than that in which, after judging from the experience of his own companions, how men of our lineage may be brought to bear intense cold and trail on their existence among the Esquimaux, he thus soliloquises:—"My mind never realizes the complete catastrophe, the destruction of all Franklin's crews. I picture these to myself broken into detachments, and my mind fixes itself on one little group of some thirty, who have found the open spot of some tidal eddy, and under the teachings of an Esquimaux, or perhaps one of their own Greenland whalers, have set bravely to work and trapped the fox, speared the bear, and killed the seal, the walrus, and the whale.—*I think of them ever with hope. I sicken not to be able to reach them.*"* These generous and lofty sentiments, as I shall afterwards point out in dwelling on Lady Franklin's final search, are shared by that distinguished Arctic officer, our associate Captain Hartstene, of the United States' Navy; and they have justly awakened the hope in the breasts of many of my countrymen as well as myself, that some of the fine young fellows who sailed with Franklin may still be alive—the conviction that they must, for the honour of our country, be sought for, as well as the débris and records of the Erebus and Terror.

It was, indeed, a subject of great regret to me that when Dr. Kane visited England last autumn, this metropolis (as is usual at that season) was deserted by many of those persons who most valued his character, and that none of those attentions could then be paid to him which, had his stay amongst us been prolonged, would doubtless have been showered upon him from the Sovereign downwards. But, alas! the stroke of death was already upon him, and when I first shook his hand, I at once saw that his eagle-eye beamed forth from a wasted and all but expiring body. As geographers we were not, however, remiss in our endeavours to honour him; and although his malady prevented his attendance at our apartments to receive our heartiest welcome, I then proposed

* Kane's Arctic Expedition, vol. i. pp. 243-6.

the Resolution expressive of our admiration of his conduct, which you passed with acclamation, and which was communicated to him personally by our lamented late President, Admiral Beechey.* Hurrying away to the Havannah to seek a milder clime, Dr. Kane there terminated his noble and brilliant career. If on the subject of Arctic research our meed of praise has justly been offered to such pure philanthropists as Grinnell and Peabody, let me say that there never has been an occasion in which the people of the United States have done greater honour to themselves than by the manner in which they sought to testify their respect for the memory of their young hero Kane, when his mortal remains reached his native city of Philadelphia. "The long procession of mourners (as is recorded in the 'Philadelphia Evening Journal' of March 12), the crowded yet silent streets through which they move, the roll of muffled drums, the booming of minute guns, the tolling of passing bells, the craped flags at half mast, and all the solemn pageantry of the scene proclaim that it is no ordinary occasion which has called forth these impressive demonstrations of public respect." Agreeing entirely with this eloquent writer, that few men have ever lived, who have earned a better title to the esteem and admiration of his race, and also warmly commending to your notice the sentiment proceeding from a great commercial city of our kinsmen, "that we are not to look to the mere *utilitarian* value of Dr. Kane's labours and adventures, to the claim for that bright and unfading glory which must ever surround his name," let me say that, by re-echoing the voice of America on this occasion, England can best cherish the memory of one who dared and did such heroic deeds to rescue our lost navigators.

Having thus imperfectly glanced at the feats which our deceased Medallist had accomplished in the short life-time of thirty-five years under the impulses of humanity and science, I cannot better sum up his virtues than in the words of the divine who preached his funeral sermon†—"He has traversed the planet in its most inaccessible places, has gathered here and there a laurel from every walk of physical research in which he strayed, has gone into the thick of perilous adventure, abstracting in the spirit of philosophy, yet seeing and loving in the spirit of poesy, has returned to invest the very story of his escape with the charms of literature and art, and dying at length in the morning of his fame, is now lamented with mingled affection and pride by his country and the world."

* See Geographical Proceedings, Jan. 1856.

† The Rev. C. W. Shields.

GEOGRAPHICAL PROGRESS.

Admiralty Surveys.—The Maritime Surveys of Britain have been steadily carried forward during the past year. I am informed by Captain Washington, R.N., Hydrographer to the Navy, the worthy successor of Admiral Sir F. Beaufort, that twenty different surveying parties are in active service, about one-half of which are employed on our own coasts, the remainder in the Colonies, the Mediterranean, the River Plate, the South-western Pacific, and the coast of China.

England.—To begin with operations at home. Sanitary measures connected with the metropolis have necessitated a fresh survey of the upper portion of the River Thames. At the instance of the First Commissioner of Works, Commanders Burstal and Cudlip, in August last, began a minute survey of the river from London Bridge upwards to Putney, a distance of about $7\frac{1}{2}$ miles, running again the identical lines of sections, at about 700 feet apart, taken by Giles in 1823, in order to institute a comparison as to the change in the bed of the river. These soundings have been laid down on the sheets of the Ordnance Survey of London on a scale of 60 inches to a statute mile, a scale sufficiently large to show minutely every feature.

The result, as shown in Commander Burstal's Report and Transverse Sections, is that since the year 1823 the average deepening of the bed has been about 4 feet from Putney to Westminster Bridge, and about 6 feet from Westminster to London Bridge; but this average by no means shows the extent of the scour consequent on the removal of Old London Bridge in 1832, as, for instance, near the Grosvenor Canal there are places where the deepening has been 13 feet; at Westminster Bridge 10 feet; at Hungerford $11\frac{1}{2}$ feet; and above Southwark Bridge 14 feet. These figures are highly instructive, as showing the improvement which might be expected in other rivers in this country, if the old fashioned bridges which now act as dams were removed, as in the Tyne, the Slaney, and the Liffey; and if Newcastle, Wexford, and Cork Bridges were rebuilt with proper openings.

The sounding of the upper part of the Thames will be continued in sections of 150 feet apart from Putney to near the Thames Tunnel, about $1\frac{1}{2}$ miles below London Bridge. At that point it has been taken up by Commander Cudlip, who is now engaged sounding Greenwich, Blackwall, and Woolwich Reaches, the plans of which, it may be hoped, will form the foundation for a systematic and ex-

tensive dredging of all the upper part of the river so soon as the Thames Conservancy Board can be brought into action.

On the East Coast of England, Mr. E. K. Calver has revised all the charts during the past year, and inserted the changes that have taken place during the last ten years, and especially in the frequented anchorages of Yarmouth and Lowestoft Roads. He has also prepared the Sailing Directions for this coast and for the opposite shore of Belgium, Holland, and Jutland up to the Skaw, which will form Parts III. and IV. of the 'North Sea Pilot' now in preparation.

On the South Coast of England, the surveying party under Commander Cox and Messrs. Usborne and Davis have just completed a careful examination of Plymouth Sound, whence it appears that that well-known roadstead has not silted up in any appreciable degree since the breakwater was placed across its entrance—an interval of five and forty years—the first stone having been deposited in August, 1812.

In Cornwall, Captain Williams and Mr. Wells have completed the survey of the Fowey River, from Lostwithiel to the sea, and a portion of the coast from Fowey to the Dodman.

In the Bristol Channel, Commander Aldridge and Mr. Hall have surveyed Caldy and Tenby Roads, where they have discovered and mapped several new rocks and shoals not before pointed out.

Scotland.—In the Frith of Forth, Lieut. Thomas and Mr. Sutton have surveyed the coast of Haddington by Dunbar and St. Abb's Head to Coldingham, and have completed the outer soundings to the eastward of the Isle of May, which mark the approach to this extensive estuary.

Farther north, a detailed plan of the Bay and Harbour of Wick and Pulteney Town has recently been published at the Admiralty, preparatory, we trust, to the laying out of a Harbour of Refuge on that exposed coast, where in an easterly gale the 1000 herring-boats that annually fish out of Wick have no shelter to run for. The numbers of valuable lives at stake in these important fisheries imperatively demand that a suitable harbour in the most appropriate spot should be constructed without further loss of time.*

The Sailing Directions for the Orkneys and Shetland, originally drawn up by the late Commander Thomas, and revised and corrected by Mr. E. K. Calver, have been published during the past year, and

* A subject of considerable importance to physical geographers as connected with the harbour of Wick will presently be discussed (*see* Physical Geography).

they form Part I. of the four parts of the 'North Sea Pilot,' the whole of which work will, we trust, be in the hands of the mariner before the close of the present year.

On the north-west coast of Scotland, Commander Wood has surveyed a small portion of Skye, while Mr. Jeffery has mapped Loch Nevis. Several detached Charts also of these coasts have been published during the past year, as lochs Broom, Ewe, Hourn, Gairloch, Edrachilles Bay, including the lochs, Raasay and Inner Sound, Sounds of Seil, Mull, Sleat and Kyle Rhea.

In Argyleshire, Commanders Bedford and Creyke, and Mr. Bouchier, have added to our knowledge of the north shores of the isle of Mull, and have re-examined Oban bay.

In the Hebrides some soundings off the isle of Lewis have been obtained by Captain Otter and his staff in the Porcupine; and during the present season a survey of the Sound of Harris will, it is hoped, prove to the mariner whether, in case of need, he may safely run for that strait.

Ireland.—On the north-eastern shore of Ireland, Messrs. Hoskyn, Aird, and Yule, have completed the examination of Belfast Harbour, and made patent the improvements that public spirit, combined with good engineering, has within the last few years effected in that port. They have also mapped a portion of the coast of Antrim, from Garrow Point to Ballygally Head, the fine natural harbour of Lough Larne, and the artificial packet-station of Donaghadee.

In Wexford, on the south-eastern coast, Captain Frazer and Lieut. Bullock have re-examined the channels and banks at the entrance of that harbour, where some remarkable changes have taken place, and made a detailed survey of the River Slaney up to the town of Enniscorthy, preparatory, we trust, to some extensive improvements in the channel—a measure which could not fail to be attended with corresponding benefit to the fertile country which that river drains.

In Donegal, on the north-west coast, Captain Bedford and Lieut. Horner have completed elaborate plans of Sheep Haven and Mulross Bay. By permission of the Admiralty, these plans have been exhibited at our evening meetings, and I am sure you will all willingly join with me in acknowledging the apparent fidelity and beauty with which the features of these natural inlets have been portrayed.

In Kerry, on the south-western coast, Commanders Beechey and Edye, with Mr. W. B. Calver, have mapped a portion of Tralee and Brandon bays, while Mr. McDougall has surveyed Dingle and Ventry harbours, which lie on the southern side of the same bold projecting

peninsula of Kerry, and which, having twice examined myself, I can testify to be the most interesting part of Ireland, in showing certain relations of the Silurian to the Devonian rocks, which can nowhere else be seen in the sister island.

The neighbourhood of this immediate coast, on the south side of Dingle Bay, is about to become a site of much interest and importance, the small island of Valentia having been selected as the Eastern or European terminus of that Atlantic Electric Telegraph Cable, on which I shall presently enlarge, as destined to unite the two continents in stricter bonds of amity and good fellowship.

It must interest my hearers to know that Lieut. Dayman, R.N., who was a companion of Sir James Ross in his voyage to the Antarctic regions, will leave England in a few days in command of the Cyclops steamer, to carry a line of deep sea soundings across the Atlantic, from Valentia to Trinity Bay in Newfoundland. The vessel is furnished with some 20,000 fathoms of line of different sizes, a portion being of silk, with an abundant supply of sounding machines, and a steam-engine on deck on purpose to heave in and reel up the line, and we may fairly hope, ere long, to have a second continuous line of soundings across the Atlantic, and know the nature of the bed on which the Telegraph Cable will have to repose.

With the authority of our Council, I took advantage of the announcement of this expedition, so deeply interesting to naturalists, and suggested to the Hydrographer that, the opportunity being one which might never recur of obtaining an accurate acquaintance with submarine life at great depths, a competent naturalist might be allowed to accompany the survey, or that in any case the medical officer of the Cyclops might be so instructed as to record accurately the phenomena.

Black Sea.—In quitting our home for foreign shores, the survey of the Delta of the Danube claims precedence, and is entitled, in the opinion of my eminent friend Captain Washington, to our warmest acknowledgments for the admirable manner in which it has been carried out by Lieut. Wilkinson, R.N., under the orders of Captain Spratt, R.N., C.B., whose report on Fidonisi, or Serpent Island, has been communicated to the Society by the Admiralty. This recent survey of the streams which form the delta of the Danube is comprised in several charts, filled almost to overflowing with soundings of the three principal branches, Ochákov or Kilia to the north, the Súlina in the centre, and the St. George or Khedrilitz to the south. These plans are now lying on the table before us, and

they bespeak for themselves our admiration of the beauty of their execution and of the unflinching perseverance with which these services were accomplished in the short period of a few months of last autumn.

Sea of Azov.—During the present session, we have received from our associate, Captain Sherard Osborn, R.N. (so honourably known to us by his Arctic explorations and writings), an interesting communication on the geography of the Sea of Azov, the Putrid Sea, and the adjacent coasts, with remarks on their commercial capabilities. As the hydrographical features of this area are peculiarly deserving of notice, I naturally treat of them under the head of the British Naval Surveys. In no part deeper than 40 feet, the centre of this sea forms a flat basin 55 miles in extent from east to west, and 35 from north to south, with an inclination from the edge of this level to the coast of about a foot per mile, increasing somewhat in abruptness as the water shallows.

The sandy spits, which are so remarkable, and are attributed by the author to volcanic action, afford a shelter against easterly winds, but there is no protection in any part of the sea against those from the west. When this communication was read, I confirmed, from personal observation, the accuracy of Captain Osborn's remarks upon the rapid accumulation of sand on these spits; and the fact of their being precipitous on the east side and shelving on the west is a good addition to our knowledge. There can be no doubt, however, that the base of some of them, near the ports, consists of knolls formed by the discharge of ballast from trading-vessels, thus forming nuclei for fresh alluvial deposits, which, after a short time, become connected together; and unless means be adopted for checking this system of accumulation, the Sea will, before long, be hardly navigable in certain places.

The assertion of M. Taitbout de Marigny, that there is little current in the Sea of Azov, is shown by Captain Osborn to be an error; the existence of currents being indicated, not only by the influence of the winds on the motion of the water, but also being plainly manifested by the outflow from the delta of the Don, the Sivash, and the rivers between Taman and Kamisheva. The physical features of the Spit of Arabat, and of the Sivash or Putrid Sea, are described from observations made, under very difficult circumstances, during the late war.

Mediterranean and Archipelago.—On a recent route from Malta to the Dardanelles, Captain Spratt had an opportunity of obtaining a

line of deep sea soundings between that island and Candia, in which the greatest depth was 2170 fathoms. The section is very striking; for a distance of 50 miles to the eastward of Malta the depth does not exceed 100 fathoms, after which it drops almost suddenly to 1500 and 2000 fathoms, and continues near that level *below* the surface of the sea until within 20 miles of the east end of Candia or Crete, where the White Mountains and Mount Ida rise up to a nearly equal height *above* the level of the sea. Between Crete and the Dardanelles the greatest depth is 1110 fathoms.

Africa.—On the North Coast of Egypt, Commander Mansell in the *Tartarus*, with his assistants, Lieut. Brooker and Mr. Skead, have completed a survey of the coast from Damietta eastward to El Araish, an admirable plan of the port of Alexandria, and a survey of the bay of Suez, a place daily becoming of more importance as our direct mail communication extends to India, China, and Australia.

Taking advantage of fine weather and a calm sea, Captain Mansell has lately run a line of soundings between Alexandria and the island of Rhodes. From the coast of Egypt the depths gradually increase until at 70 miles off they reach 1000 fathoms, at 110 miles 1600 fathoms, which is the maximum depth of this portion of the basin of the Levant. The above soundings are of great interest to the geologist as well as the geographer, and do much credit to the officers who, overcoming many difficulties, have succeeded in carrying them out.

While on this subject I should mention that, in October 1856, Messrs. Delamanche and Ploix, Ingénieurs Hydrographes of the French Imperial Marine, carried a line of soundings across the Mediterranean between Port Vendres in France to Algiers, in which the greatest depth was about the same as in the Levant, namely 1600 fathoms.

South Africa.—In the Cape Colony the only addition we have to record is the completion by Mr. Francis Skead of the survey of Port Natal, begun by Lieut. Dayman, R.N., in 1855. I cannot here but repeat the words of my predecessor in this Chair, that both the land survey of the colony and that of the coasts ought to be pressed forward. Every year that they are delayed bars the progress of the settlers, hinders the development of the resources of the district, and is attended with loss to the colonial exchequer.

China Seas.—In the last anniversary Address a hope was expressed that Captain Bate, the surveyor of the island of Paláwan, might be more usefully employed in China than in merely commanding a

cruizing ship. It is gratifying to be able to state, that a thoroughly equipped surveying vessel, the *Actæon*, accompanied by a small steam tender the *Dove*, under command of Lieut. Bullock, has sailed for those seas, and as soon as the present unfortunate differences with China are settled, Captain Bate will resume his survey on such parts of the coast as most require it. In the meantime, Messrs. Richards and Inskip in the *Saracen* will proceed forthwith to make a detailed survey of the dangerous shoal *As Pratas* (lying only 60 leagues to the E.S.E. of our own colony at Hong Kong), with a view to the construction of a lighthouse upon that extensive coral reef which has caused the wreck of so many vessels.

Siam.—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards and Inskip have visited Bangkok, where they experienced great attention and assistance from the enlightened ruler of that country; they have rectified the positions of several islands and of many of the headlands and capes on the western as well as on the eastern shore of the gulf.

Tartary.—Farther north on the coast of Tartary the officers of one of our cruising vessels, the *Barracouta*, have examined a harbour, which they have named after that ship, and in which the Russian frigate *Pallas* had taken refuge. This capacious harbour is the same as that called *Imperadorski Gavan*, or Port Imperial, by the Russians, and lies about 130 miles south of Castries Bay.

In the Admiralty chart of these regions the whole course of the *Amúr* has been laid down from the astronomical observations made by Peschurof in 1855, which render the river quite a new feature in our maps. The details of these observations are given in the '*Morskoi Sbornik*,' or Russian Nautical Magazine, for March and May, 1857. They are also to be found in that excellent geographical periodical, '*Mittheilungen*,' edited by Dr. A. Petermann at Gotha.

New Zealand.—The publication of the detailed charts of the coasts and harbours of this group of islands advances rapidly; the past year has produced four coast charts, on the scale of 4 miles to an inch, and 11 plans of harbours and rivers, including Auckland, Waitemata, Taupanaa, Whangaroa, Hokianga, &c., being a portion of the ten years' labour of Captains Stokes and Drury, with Messrs. G. Richards, Frederick J. O. Evans, J. H. Kerr, &c., and we trust that before the close of the next year every item of information we possess of these islands will be in the hands of the mariner.

Pacific Ocean.—Captain Denham in the *Herald* continues his

useful labours in the south-western Pacific. During the past year he has surveyed several islands of the Fiji group, as Angau, Matuka, Mbatiki, Moala, and has swept from the charts the imaginary Underwood and Rosaretta reefs. Assistant-Surgeon Macdonald of the *Herald* has made a journey into the interior of the island *Viti Levu*, which, with a track chart of the route, has been communicated to the Society by the Admiralty. Various views of headlands and characteristic sketches of the scenery and of the natives have been made by Mr. Glen Wilson, artist to the expedition.

A chart of the Pacific Ocean, in 12 sheets, on the scale of $\frac{1}{4}$ ths of an inch to a degree, has recently been published by the Admiralty, in which the curves of equal variation have been carefully laid down for the year 1855, by Mr. Frederick J. O. Evans, chief of the Compass Observatory. The whole forms a valuable contribution to hydrography, and physical geography.

America.—Pursuing our imaginary eastern route, we have the gratification to announce that a well organized expedition, under the command of Captain George Richards, R.N., favourably known as a fellow-labourer with Captain Stokes in the survey of New Zealand, has sailed for Vancouver Island, to determine, in conjunction with the United States Commissioners, the boundary, as laid down by treaty, between the British and American possessions. This expedition cannot but be productive of a good harvest of geographical information.

In the Rio de la Plata, Lieut. Sidney, with slight means at his command, has fixed the position of the north edge of the English Bank, lying some 10 miles south of Monte Video; he has completed a detailed plan of the river and outer roadstead of Buenos Ayres, and has partially examined the lower course of the Uruguay.

On the coast of Brazil, Lieut. Parish, R.N., has furnished plans of several small harbours and otherwise improved our charts, while a more complete Sailing Directory, founded on the labours of Baron Roussin, is in course of preparation by Rear-Admiral FitzRoy.

West Indies.—The additions to geography in the West Indies consist in a survey of the island of Santa Cruz, and the harbour of Christianstadt, by Messrs. Parsons and Dillon; a re-examination of the harbour of Grey Town by Mr. Scott, master of H.M.S. *Impériuse*, and some new coral patches discovered among the Pearl Cays.

Nova Scotia.—In the Bay of Fundy, Commander Shortland, with Lieut. Scott and Mr. Scarnell, has completed the soundings in the

independently of the advancement of the theoretical branches of his subject, and the acquirement of a sound knowledge of the substrata, he can essentially serve the purposes of the mining proprietor.

Having always held (as I still hold) that the 1-inch map is the publication which the country most requires, I am bound to record that my conviction of the utility of the 6-inch scale, for certain geological and mining purposes, is the result of an examination of the able surveys conducted on maps of that size under the guidance of Mr. J. Beete Jukes in Ireland and of Professor Ramsay in Scotland. I trust, therefore, that this larger scale will be maintained coordinately with the smaller one.

Roderick I. Murchison
PHYSICAL GEOGRAPHY.

Observations on the Summit of the Peak of Teneriffe.—Having spoken of the progress of practical geography at home and in our distant Naval Surveys, it becomes my agreeable duty to notice the uncommon British expedition proposed and executed last year by Professor Piazzzi Smyth, Astronomer-Royal for Scotland. During the last five years this zealous observer had endeavoured to impress upon Government, founded on his experience at the Cape of Good Hope, the eligibility of rising above the grosser stratum of our atmosphere, and had pointed to the facilities offered by the Peak of Teneriffe.

The Admiralty having finally listened to his arguments, and acceded to his moderate estimate of expense, Mr. H. Pattinson of Newcastle-on-Tyne added a powerful telescope to his instruments; and our associate Mr. Robert Stephenson, generously lent him his yacht for the whole voyage out from Southampton and home; whilst several leading scientific men were glad to have their favourite experiments tried in so novel a position.

The Professor established his first station on the Peak of Teneriffe, from the 14th of July to the 20th of August, amid the old trachytic lavas of the volcano, on a spot called Guajara, 8843 feet

* I say nothing here of the Survey on the 25-inch scale which is in progress in the richer tracts of Scotland and the north of England, because it contains no delineation of the natural features of the ground. Such surveys are not to be viewed as *Maps*, but simply as cadastral plans, which many eminent public men consider to be of the highest value for the conveyance and settlement of property, &c. They are also highly useful as Fortification Plans, and for all such purposes of detail they are, in my opinion, preferable to any smaller surveys.

above the sea. Here, above all the clouds, except a few scirri, which appeared about one day in five, he mounted the five-foot Sheepshanks equatorial, which revealed test objects of three magnitudes smaller than it had ever shown before. In the apparatus supplied by Prof. Stokes, the increase of black lines was remarkable as the sun's zenith distance increased, and there was a growth of the red end of the spectrum. The dryness was so great, that while the country below was covered by a dense bed of clouds, the average of the dew point was 40° . The sun's radiation exceeded the graduation of the instruments, the temperature reading $180^{\circ} + x$. The moon's radiation became perfectly sensible to Mr. Gassiot's thermo-multiplier, showing it to amount to one-third of the heat of a candle at the distance of 15 feet.

The second station was at Alta Vista, 10,710 feet above the sea; and there the twelve feet Pattinson equatorial was finally mounted, and by its space-penetrating power, stars of the sixteenth magnitude were easily seen, and the fractions of a second in the distance of double stars were defined. The colour also was observed. Only on one occasion could red prominences in the sun be suspected. Many other branches of observation were included, and minutely reported to the Admiralty. The breaking up of the season, after the middle of September, rendered a hasty retreat necessary, but with the conviction of a yet higher station being desirable in future, if only to get above the persecuting dust, a convenient site was marked at the height of 11,700 feet above the sea, still accessible to mules, if a little money were spent in removing some rugged blocks of lava.

Specific Gravity of Sea-water.—Our attention was recently called to the condition of the sea-water on the West Coast of Africa, when it was rendered more or less turbid to the distance of many miles from the mouth of the great river Congo or Zaire. Dr. James Campbell, F.R.G.S., of H. M. ship Plumper, observing this phenomenon, had the precaution to collect and send home, with a notice, various samples of sea-water taken at various distances from the shore, noting the day of collection, the latitude and longitude, and the temperature of the water and air at each of these spots. It became therefore a subject of interest to determine, if possible, the nature of the discolouring matter, and the relative specific gravity of the water in the different localities. Mr. Henry M. Witt, of the Government School of Mines, has had the goodness to examine, at my request, these samples of water, and his account of them will be published in

our next Volume. Unluckily the quantities of the water sent home were far too small to admit of rigid chemical analysis. Thus, in regard to the discolouring matter, it could only be ascertained, that it was a suspended, light, yellowish, flocculent substance, which affected the usual green colour of the sea, and is in all probability of organic (vegetable?) origin. The specific gravity, however, of the water has been determined, and the result, as will be shown in a table, confirms the observations of Mulder and Dr. John Davy, of a diminution of such gravity in sea-water as it approaches the mouths of rivers. Mr. Witt further mentions the results of other observers, and states, that after a series of experiments, in a voyage from Southampton to Bombay, MM. Adolf and Hermann Schlagintweit give 1.0277 as the mean specific gravity of the Atlantic; whilst our late member, Admiral Philip King, found the mean specific gravity of the Pacific to be 1.02648 between 10° and 40° s. lat., and 1.02613 between 40° and 60° s. lat. It would, therefore, appear probable, that whilst the density of inland seas, such as the Mediterranean, is higher than that of the broad oceans, the Atlantic will be found to have a higher specific gravity than the Pacific—a point, however, which ought to be ascertained accurately by numerous determinations of the quantity of saline matter in the waters of each of these oceans.—(See Smyth's 'Mediterranean,' p. 131.)

Permanent Effects of Winds and Currents.—By perseveringly observing the phenomena attendant upon the wear and tear of the coast of Caithness, and by pondering upon the changes that have taken place in and about the harbour of Wick, Mr. John Cleghorn, of that town, after pointing out that the south-west side of the harbour was comparatively shallow and its north-east deep, extended this observation, and found it to be true as respected other bays of the east coast of Scotland. The same observer, who had previously roused attention to the ruinous effects of the present system of fishing, in destroying the breed of herrings, and who has also written an able notice upon the formation of rock basins by the action of waves upon large stones (both derived from his own examination), was, in this case, led to believe that the natural cause affecting Wick harbour has been the long-continued prevalence of the south-west wind, which produced waves that had worn away the north-eastern headlands into precipices, and had sent back the débris by a counter or reflux current, which necessarily tended to shoal up the opposite or south-western side of the bay.

Consulting Mr. A. Keith Johnston, of Edinburgh, who had devoted many years to the accumulation of such data, Mr. Cleghorn found that his view of the prevailing south-west wind was correct, as respected all the region of the globe north of N. lat. 30° ; and hence he is naturally disposed to generalize the application of facts which are not only curious, but of value to the practical civil engineer.

An acquaintance with these data may, indeed, stimulate physical geographers to look into the general effects which have resulted from the continuance during a very long period of the same great dynamic force. In the mean time much inquiry seems to be called for. Mr. Findlay, to whom we are so much indebted for a perspicuous collection of all observations on tides and currents, whilst agreeing to the chief datum of Mr. Cleghorn, that the north-eastern shore ought, in our latitudes, to be the deepest, and the south-west shore the shallower, as due to the south-west wind governing the direction of waves which frequently have their origin at a distance of 1000 to 1800 miles from their effects, is not yet convinced of the truth of the other portion of the inference of Mr. Cleghorn, that the *débris* of the worn side is translated by a counter current towards the south-west. He reminds me, in a letter to myself, that the two circulating tidal systems, demonstrated by Dr. Whewell to exist in the North Sea, seem to explain the drift of silt from the extreme eastern shores of Britain to the Goodwin Sands and the Flemish Banks; whilst the *débris* abstracted from the south-west coast finds its way to the heads of the flow-beds in Morecambe Bay and the Straits of Dover, as shown by the tidal diagrams of Admiral Beechey.

As there is evidently conflicting evidence on this obscure part of the subject, and as the "*Flot du Fond*" of M. Emy * has been much disputed (M. Givry contending that wind affects the sea to no greater a depth than 10 fathoms, whilst Captain M. White extends that influence to 60 or 70 fathoms), we see how much additional observation is required before we can definitely judge the question with precision. If, by the examination of many other localities, the views of Mr. Cleghorn should be sustained, the generalization will be essentially serviceable in its practical application, and we may then be able to define the origin and progress of many large collections of drifted and alluvial matter, whether accumulated in

* *Du Mouvement des Eaux, &c.* Par le Colonel A. R. Emy. Paris, 1831.

remote periods, or now in progress. Once let the two points of this simple view be established, and we may extend the reasoning to those periods of change in the surface of the globe when, after the former sea-bottoms were raised up to constitute the mass of the present continents, great lines of cliff were formed in given directions, facing, as it were, broad, low tracts, covered by marine drift.

"How is it," said a native of the country to me, when I was formerly travelling in Russia, "that the Volga has always its right bank lofty and precipitous, and its left bank low?" The question was startling; but, in examining the rocks of the mightiest of European streams, I found that it was true, though the course of the stream varied more than the fourth of a circle in the two main directions which it followed. Descending along the high or right bank from Nijny Novogorod to Kazan, I did, indeed, speculate upon its having been the ancient shore of a sea which covered the lower country to the north; and if we adopt the law that the precipitous face was the side exposed to the waves, the prevalent wind in that region, at a period antecedent to the creation of the human race, must have proceeded from the north.

This phenomenon, of a precipitous face exposed to the north, continues from the confluence of the Oka and Volga on the west, to Kazan on the east, a distance of upwards of 200 miles. Throughout that space, headlands of red sandstone and marls stand out on the right bank, opposed, in a striking manner, to the low country on the left or northern shore. Again, whilst not a single northern erratic block is to be found to the south of this portion of the Volga, the low country, at a little distance to the north, is covered by those great erratics, all of which, as geologists know, were transported by ice-floes from the north, and dropped upon the bottom of a former sea. We may, therefore, naturally infer, that this east and west line of cliffs was formed during the icy period, when the great northern currents prevailed, the waves of which lashed against the hills extending from Nijny Novogorod by Tchiboksar and Sviask to Kazan.

On the other hand, when the same great stream turns abruptly to the S., and trends even to the S.S.W., a line of cliffs, still on the right bank, ranges from the bold headland of Carboniferous Limestone near Samara, and extends for about 550 miles to near Tzaritzin, facing the E.S.E. and S.E. Now, it is to be noted that, in front of this line of cliff, the low country on the opposite bank of the

stream was unquestionably occupied, at a very modern date, by a great internal sea, the desiccated shells of which, now lying on the steppes, are of the same species as those still living in the Caspian.

In these dried-up bottoms of a vaster Caspian, or what I termed "Aralo-Caspian,"* the erratic blocks of the north are no longer to be seen, and we are in a region where the right bank of the Volga has been fashioned into cliffs by the agency of winds and currents proceeding from a point of the compass very different indeed from that whence the winds and waves proceeded, when the cliffs ranging from Nijny to Kazan were formed.

In thus cautiously reasoning from data which are absolutely in our possession, and by extending the application of existing causes, we may be capable of determining the direction of the prevailing winds in different epochs of the earth's formation, and even in very remote geological periods; for many of the escarpments of ancient stratified rocks have doubtless had their prevalent direction of cliffs formed by the breakers and atmospheric agency of by-gone periods.†

Again, as we know that the ripples on the surface of the sands of the present shores indicate the direction of the waves, so when a sufficient number of observations shall have been made by Mr. Sorby and others ‡ upon the ripple-marks which have been preserved in the successive surfaces of stone, we shall be enabled to infer the direction in which the prevailing winds blew during each former geological period!

But I am now, perhaps, realizing too demonstratively for all my hearers, the truth of the incontrovertible axiom, that physical geography and geology are inseparable scientific twins.

* See 'Russia in Europe and the Ural Mountains,' p. 299, and the Geological Map, on which are noted the two points here contrasted, viz.—the southern range of the northern erratic blocks and the western boundary of the Aralo-Caspian Deposit.

† See the account of the formation of the '*Straits of Malvern*,' in Murchison's 'Silurian System,' p. 530; and consult Professor Ramsay's writings on this point in his 'Memoir on the Denudation of England and Wales,' 'Memoirs of the Geological Survey of England and Wales,' vol. i. p. 333.

‡ See 'Edinburgh Phil. Mag.,' New Series, vol. iii., p. 112, 1856. Mr. Sorby has particularly distinguished himself by his numerous observations on this subject, and has also explained his views by ingeniously contrived instruments of his own invention.

USEFUL INVENTIONS.

The Atlantic Telegraph.—At the head of the list of useful inventions in the course of application, must unquestionably be placed the Great Atlantic Electric Telegraph.

The series of nautical observations recommended for statistical purposes, in reference to the meteorology and physical geography of the sea, by the Maritime Congress held in Brussels in 1853, followed by the co-operation therein of the mercantile and governmental navies of the countries there represented; the subsequent writings and investigations of Lieut. Maury, U.S.N., founded largely upon those observations, and the soundings of Lieut. Berryman and others in the Atlantic Ocean, have determined the path which seems at present to be the only practicable one for successfully submerging a telegraphic cable beneath that sea, and so uniting Britain and America.

This path would appear to lie, in a straight line, nearly due east and west, between 48° and 55° N. latitude from the coast of Ireland to that of Newfoundland, along the course of which the depth of water is believed to be nowhere greater than 12,000 feet. The depth descends in gradual inclinations to that maximum, free from sudden chasms or subaqueous promontories; and upon a plateau at the bottom of the sea there is formed an agglomeration by the constant current of the Gulf stream, which proves, under microscopic observation, to be composed of the minute shells of Foraminifera and Diatomaceæ, and which, it is believed, will, in time, form a complete incrustation over the outer metal of the telegraphic cable.

It is singular that in no other part of the Atlantic than across this broad belt do conditions exist which, according to our present knowledge, would justify an attempt involving so much scientific interest, and so large a cost, as that of such a submergence of telegraphic wires.

To the southward of the Great Bank of Newfoundland, the bottom of the ocean suddenly recedes into vast and uncertain depths, due to some great former depression of the earth's crust, in many places unfathomed, which leave a channel for the Gulf-stream, along the whole of its course to the northward of the Gulf of Mexico. These depths continue, with intervals of abrupt and almost precipitous

breaks of elevation and depression, for half the distance eastward from the seaboard of the United States towards the coast of Portugal, and for as great a length in a north-easterly direction towards the coasts of England and Ireland. They are succeeded, in a direction due east, by the region of the Azores, where submarine volcanic action is constant, and where, owing to the deep soundings inshore and the absence of suitable bays or coasts in those islands, the secure landing and subsequent maintenance of the telegraphic cable would be very difficult and problematical.

With regard to the distance, it may be mentioned that a line from the nearest point on the coast of the United States, if taken direct, without touching at the Azores, would consume nearly 4000 miles of cable, and absorb considerably more than half a million of capital, and, that when laid, it would, in all probability, be soon abraded and destroyed, owing to the many and deep valleys it would necessarily have to bridge over along its course; while its great length would increase the difficulties and delay experienced in transmitting a current of electricity through very long circuits. Moreover, if carried by way of the Azores, using one of the islands as a relay station, the physical inequalities of the bed of the ocean would in no way be lessened in the western part of that route, and it would have the disadvantage of passing over a broader submarine volcanic region.

North of the coast of Newfoundland and Labrador, great difficulties also obviously present themselves. Vast masses of floating ice would, at all times, render the operation of laying a cable a most difficult, if not an impossible, undertaking, and even if landed, it would be liable to perpetual abrasion. The long and dreary tract of inhospitable country that would have to be traversed by land-wires, to complete its connection with the civilised portions of the American continent, would alone be sufficient to prevent its adoption.

These then are the considerations which led to the adoption of the route for laying the telegraphic wires across the Atlantic.

We now come to the means by which the electric current is to be transmitted. It is quite obvious that the great bulk and enormous weight of all previously manufactured submarine cables would preclude their use for a distance so great as that to which, it is hoped, the Atlantic Company are about to extend a successful operation. A form of cable had therefore to be devised, which should combine a maximum of strength with a minimum of weight, great flexibility with sufficient rigidity to allow of its being laid in a straight line,

a capacity of tension if needful to a moderate extent without injury, with cohesion sufficient to ensure resistance to a strain of considerable amount.

In the form of cable adopted by the Company,* it is believed that all these conditions are fulfilled. The conducting medium is formed by a strand of seven copper wires; six of these wires are wound spirally round the seventh, which latter is laid straight through the centre, and the diameter of the entire strand is somewhat less than the eighth of an inch. Around this strand are placed three separate layers of gutta percha, and thus the "core" is formed, which is about three eighths of an inch in diameter. Upon the core the appliances for sinking it and providing against the strain and abrasion incident to the paying it out into the Atlantic are laid. These consist of a soft bed of hempen twist saturated with tar, which is wound round the gutta percha core, and on the exterior of this is spun, in spiral continuity, eighteen strands of iron wire. This operation completes the cable, the total diameter of which is five-eighths of an inch, and the total length 2500 miles, or about a third of the earth's diameter. The total continuous length of the copper and iron wire employed in its manufacture will be 332,500 miles, and if extended in one line would therefore go fourteen times round our little planet.

The form of apparatus with which it is proposed to project the electric current through a conductor of such enormous length, has also been specially adapted for the purpose.

The connection of Great Britain with America by the means thus delineated will, it is trusted, be realized by the end of August in the present year. The magnificent United States' frigate *Niagara*, commanded by Captain Hudson, will ship her portion of the cable, consisting of 1500 tons, at Liverpool, and H. M. ship *Agamemnon*, under Master-Commander T. A. Noddall, will receive an equal amount off East Greenwich. They will then proceed to mid-ocean, when they will commence paying out the cable, the *Niagara* steaming towards the coast of America, and the *Agamemnon* returning to England. The *Agamemnon* has been preceded by the paddle-wheel steam-frigate *Cyclops*, for the purpose of taking soundings; and steps have been taken by the Admiralty to secure for naturalists all the materials whether animal or vegetable which may be brought up from the sea bottom. Let us

* I am indebted to Mr. T. Holdsworth Brooking, F.R.C.S., for these details. Mr. Bright is the able engineer of the Atlantic Telegraph Company.

then wish every success to this gigantic project, by which, combining the discoveries of Wheatstone with the ingenious contrivances of Morse and Whitehouse, the Anglo-Saxon race is determined to show, that not the broad or deep ocean can really separate the two great families of the same race and lineage.

Free-Revolver Stand.—A most ingenious invention, and one which must prove of great use to seamen, having been made by Mr. Piazzzi Smyth, was recently tested by that skilful astronomer in his outward voyage to examine the natural phenomena on the Peak of Teneriffe, which has just been alluded to. This trial demonstrated the entire efficacy of his newly mounted "Revolver stand for steadying a telescope at sea."

Notwithstanding the excessive rolling and pitching of the vessel, he kept the sea horizon in one unvarying position in the field of the telescope long enough for several persons to observe it in succession. The only addition required was a remedy for the third element of motion, arising from the azimuthal yawing of the ship's head, and this his mind immediately suggested to him for consideration during a subsequent voyage.

New Geometrical Projection of two-thirds of a Sphere.—Our associate Colonel James, the Superintendent of the Map Office, has presented to us a copy of his new geometrical projection of a sphere, and in an accompanying letter has explained the manner in which the projection is made.

Its peculiar feature consists in the fact, that by it we are enabled to represent two-thirds of the surface of the globe in a strictly geometrical projection, much in the same manner that a hemisphere is represented in the stereographic projections; but as two-thirds of the surface of the globe includes the entire continents of Europe, Asia, Africa, and America, and indeed all the habitable regions of the globe, with the exception of part of Australia and some of the islands in the Pacific, this projection gives a more accurate representation of the relative position of every portion of the habitable globe (with the above exceptions) than any other, and as the circles of the parallels of latitude, down to the parallel of 47° , are complete, the circumpolar regions are very accurately represented. Availing himself of this latter advantage in his new projection, Colonel James is now having maps of the stars made on it, in which the circumpolar stars will appear in their true relative positions to each other and to the other stars, which will be included in the same map.

This projection of our Earth will be found of great use in many

scientific inquiries, and particularly when employed for geological lectures, in which it is required to bring as large a portion as possible of the land of the globe under the eye at once, and in which such distorted projections as those of Mercator or Babinet cannot be satisfactorily used.

Metallic Boats.—Our associate Major Vincent Eyre having suggested the use of metallic boats for Arctic as well as other expeditions, our Vice-President Sir George Back has strongly recommended the adoption of them for every purpose of inland navigation and among ice. Their great superiority to boats of wood was, he reminded us, clearly indicated when Lieutenant Lynch in 1848 passed down the river Jordan, running through thirty or forty desperate looking rapids and cascades, and, though frequently striking against sunken rocks, they received no injury beyond a few indentations; whilst a wooden boat of the expedition was broken up and lost.

Bells on the Goodwin Sands.—Mr. George Chowen has suggested a plan of attaching bells to the buoys placed over sand-banks or rocky reefs, so that in heavy mists and storms when the mariner cannot discern the buoy, he may be warned off by the ringing of a bell, which will sound as long as the buoy is agitated by the waves. Leaving this matter for the consideration of our nautical members, the suggestion seems to me to deserve serious consideration; seeing that such bell-buoys might be advantageously used, not only on sandy shoals like the Goodwin Sands, but might, if found to work well, be placed on lines at a certain distance from dangerous rocky headlands on which so many wrecks occur, such as the Deadman and the Land's End in Cornwall.

France.—Among the many proofs of the prevalence of the good feeling now happily subsisting between our nearest foreign neighbours and ourselves, the proceedings of the Geographical Society of France offer striking examples. Thus we have seen the accomplished geographer M. de la Roquette zealously devoting his best energies to the publication of a sketch of the life of Franklin, and then coming forward generously with a large subscription to aid in the final search after the ships and crews of our illustrious countryman. Next we find the same liberal spirit evinced in the award of their annual Gold Medal to our own Livingstone.

When we turn from the general efforts of the Geographical Society of France to the works executed by the Imperial Government, we recognize a steady progress in the surveying and mapping

of all tracts, coasts, and bays to which the influence of France extends.

Through the obliging communication of Rear-Admiral Mathieu, the Director of the Charts and Plans of the Imperial Navy, a catalogue has been transmitted to us of all the works of that nature which have been published, or are in the course of execution, during the years 1856-57. Referring you to this list which will be published in the Appendix to our Volume, I may now simply state, that it comprises four charts of the rivers Gironde, Loire, and Seine, in France; seven of the coasts of Italy, from Genoa to the Tiber; three of the Black Sea and environs, one of which is a detailed plan of the Bosphorus, in three sheets; and no less than fifteen charts and plans relating to various parts of the Mediterranean, both on the African and Spanish shores, even up to Ceuta, Algesiras, and the Straits of Gibraltar. In the sequel, and in speaking of the absence of good maps of Southern Italy, it will appear that in her occupation of the Papal States, France has effectually supplied that desideratum.

If we turn to the far west, we perceive that our active allies have been vigorously surveying the coasts of that central region of America which now justly occupies public attention, and that Haiti, Bahia, and New Grenada have also come in for their share of exploration; whilst of Newfoundland, not less than ten plans of bays, havens, and islands have been completed. From Iceland on the north to China and New Caledonia on the south-east, we have numerous examples of that zeal and precision of geographical survey which has characterized the French geographers from the days of d'Anville and Cassini.

To five new plans of the ports and bays of New Caledonia, a chart of the Archipelago of Pomatou, and six charts and plans of portions of the coast of China, are to be added numerous works included under the head of "Nautical Instructions," which are of great value to all seamen. In the present list we meet with Illustrations of the Sea of Azov, Nautical Description of the North Coast of Morocco, Instructions for entering the Port of Alexandria, Manual of the Navigation of La Plata, Description of Passages between Luçon and the Main Islands of Japan, together with General Considerations on the Pacific, &c.

Spain.—This ancient kingdom, so renowned in history, has hitherto remained without a Trigonometrical Survey, though its surface is,

perhaps, more diversified and offers more attractions to the physical geographer than any area of similar extent in Europe. The Spanish Government is now, however, removing this opprobrium, through the agency of a commission composed of officers of the Engineers, Artillery, Staff, and Navy.

In 1854 the preparatory works were commenced for laying down the Trigonometrical Survey of Spain. The principal base line was measured on the plain near Madridejos, in the province of Toledo, and on the road to Andalusia, about 100 kilometres from Madrid. Its length is 14,480 metres. The first reconnaissances for several systems of triangles were made in the same year 1854, and in 1855 and 1856. One of these follows the direction of the meridian of Madrid, near which the primary base line is situated, and ends northwards in the neighbourhood of Motril, resting on the great mountain range the Sierra Nevada, and comprising in its network the towns of Ciudad-Real, Jaen, and Granada. Towards the north it is prolonged to Santander, including Segovia and Burgos. This chain is extended eastward, following the coast till it joins that of the triangles of the French Etat-Major on the Pyrenees, at the stations of Biarritz and Baigorry. This portion comprises the capitals of Bilbao and San Sebastian.

Another series is extended in the direction of the parallel of Madrid, and runs eastwards to the Mediterranean, resting on several points of the French triangulation made by Mechain and Delambre, and subsequently by Biot and Arago, for the prolongation of the meridian of Dunkirk, and taking in the chief towns of Ternel and Castellon de la Plana. Towards the west, this series passes by Avila, and for the most part following the direction of the Sierra de los Gredos, terminating in the interior of Portugal, on stations of the triangulation already made in that kingdom.

Another secondary series, leaving the last mentioned, has a northward course, terminating in the Cape Di Peñas, taking in Salamanca, Zamora, Leon, and Oviedo, all capitals of provinces. This chain is intersected perpendicularly by another which commences from that of the meridian of Madrid, to the south of Burgos, and runs westward, taking in Palencia, and following nearly the northern boundary of Portugal, until it reaches the sea near Vigo.

Another secondary chain of triangles has been similarly projected, which rests on that of the parallel of Madrid eastward, and stretches northward to Pampeluna, to connect itself with the French triangulation of the Pyrenees, passing by the Moncayo and between

Saragossa and Soria. This chain has a branch which runs westward between the towns of Soria and Logroño.

In the early part of this year (1857) the instruments arrived for the definitive measurement of the fundamental base line, which will probably be effected immediately. Of late years, the Corps of Engineers has continued the survey of the fortifications and their environs with great minuteness and precision, whilst the *Etat-Major* has executed military reconnaissances of the principal lines of communication and of the battle-fields of Spain. The works carried out by the engineers of "*Ponts et Chaussées*" and other persons concerned in projecting roads, and especially railroads, have produced some interesting geographical details, especially with reference to the inequalities of the surface.

The commission formed for making the geological map of the Province of Madrid has zealously continued its labours in it and in the surrounding districts. Some of its Members, moreover, have made some interesting reconnaissances and surveys in the mountains of the provinces of Palencia, Santander, and Leon, which will be continued throughout the length of that great mountain range.

In the course of 1856 our correspondent Colonel Coello published maps of Almeria, Orense, and Pontevedra, and the supplements of Leon, Cáceres, and Badajoz. The engraving of the maps of other provinces, by the same accomplished geographer, is far advanced, and in 1857 the remaining reconnaissances may, it is hoped, be finished.

Some memoirs and articles bearing upon the geography of Spain have also been published, both in separate papers and in the scientific journals, the '*Revista Minera*,' the '*Memorial de Ingenieros*,' &c.

M. A. de Linera has completed a small work upon the Sierra Nevada. M. Rojas Clemente had, half a century ago, fixed the height of the peak of Mulahacen at 3555 metres, an altitude which has been adopted by the Bureau des Longitudes of Paris. From new measurements it appears that this peak is only 3399 metres high; and hence the peak of Nethou, in the mountains of Venasque, in the Pyrenees, and near the French frontier (3405 metres), would seem to be the highest point in Spain.

Between the Pyrenees and the Sierra Nevada there are three other very considerable mountain groups. 1st. The Sierra de los Gredos, the highest peak of which, or Plaza de Almanzor, reaches to 2630 metres, according to the trigonometrical measurements of M.

Subercase. 2nd. The Torre de Cerredo, one of the celebrated '*Picos de Europa*' between the Asturias and Leon. According to the observations of M. Casiano de Prado the mountain is 2668 metres high, and is composed of Carboniferous Limestone. 3rd. La Sierra Sagra de Huescar, on the borders of Andalusia and the kingdom of Murcia. According to the observations of MM. de Verneuil and Collomb,* this lofty mountain (2400 metres) is composed of Jurassic Limestone.

That indefatigable explorer and sound geologist, M. Casiano de Prado, aware that he could not adequately express those geological discoveries which he is continually making in his native land, if unprovided with good geographical data, has himself surveyed the province of Palencia, of which, in the course of the year, a map will be published exhibiting all the geological as well as geographical features of that interesting tract. M. Casiano is also continuing his researches in a more southern region, and is preparing a map of the province of Leon.

M. Vezean, a young student of Montpellier, has, it appears, published a geological map of the environs of Barcelona, the data of which are spoken of favourably by M. de Verneuil, as having been laid down on a local survey, which contains many corrections of pre-existing maps.

I cannot conclude this notice of the progress of geography in the Peninsula, without reminding you of the great value of the researches of my dear friend and old companion in Russia, Sweden, and Germany, M. Edouard de Verneuil, one of the most distinguished members of the French Institute.† During several consecutive years this eminent geologist and palæontologist has so laboured, entirely at his own cost and unaided by any government, that he has not only thrown a new light upon the internal structure of large regions of Spain, but has, by careful barometrical measurements, determined the heights of many of the most lofty mountains, and of localities equally important to the geographer and naturalist as to the geologist, all of which were previously unknown.

Switzerland.—The very able notices on the progress of Swiss geography, which have been received by the Secretary from our

* See Tableaux Orographiques par MM. de Verneuil, E. Collomb, et de Loriaère, Bull. Soc. Geol. de France, 1854, and Comptes Rendus, tom. xl. 1855.

† The account of the progress of geography in Spain I owe to M. de Verneuil, who obtained the details of the Government Surveys from Colonel Coello, whose maps, above alluded to, are to be added to the great statistical work of M. Madoz.

distinguished correspondents Chaix and Ziegler, will be noticed in an early publication, and reviewed at the next Anniversary.

Italy.—The most important contributions to geography during the past year have been the continued publications of the great Government Surveys in Piedmont and Central Italy.* The Piedmontese survey, on a scale of $\frac{1}{300,000}$, is nearly completed, and upwards of forty sheets have been already given to the public.

My predecessors in this Chair and myself have had occasion to allude to the Austrian Survey of Central Italy, perhaps the most important work of the kind connected with Italian topography. I am happy to announce that this great work is now completed—the last sheets embracing the mountainous region of the Marcii, Hernici, Volscii, and Sabines, on the Roman and Neapolitan frontier. The Carta Topografica dell' Italia Centrale, in fifty-two sheets, embraces the whole of the Tuscan and Roman States, on a scale of $\frac{1}{400,000}$, and forms a suite to the elaborate surveys of the Lombardo-Venetian kingdom, and of the Duchies of Modena, Massa, Carrara, Parma, and Piacenza, published some years before by the same Government. A reduction of the Italia Centrale, in four sheets, is now in progress at Vienna.

Rome.—The wish so long felt by every antiquary, geographer, and geologist, to possess a good map of the environs of Rome, has been at length satisfied by the publication of the elaborate survey, undertaken by the officers attached to the French Army of Occupation, and of the last sheets of the Austrian map of Central Italy. The French map, in four large sheets, has just been completed, and is in every respect worthy of the Dépôt de la Guerre, from which it has been issued. The scale is the same as that of the great Trigonometrical Map of France, $\frac{1}{400,000}$; it embraces all the Roman territory between the parallels of $41^{\circ} 30'$ and $42^{\circ} 20'$, and as far east as the meridian of $12^{\circ} 55'$ east of Greenwich, consequently the most interesting parts of Southern Etruria, of the Sabine territory, and of Latium, in the vicinity of the capital of the Roman world. The topographical details are beautifully laid down; those of the volcanic group of the Alban range are in this respect remarkable. Two advantages of the French Survey over the Austrian, consist in having the heights of the principal localities marked, and their ancient names annexed. The Roman Government is now preparing a map of the

* For these details respecting the geography of Italy, I am indebted to my gifted friend Mr. Pentland.

environs of Rome, nearly upon the same scale as the French Survey, upon which will be laid down the principal estates of the great landowners; and M. Rosa, a very laborious topographer, who has already surveyed in great detail many of the most interesting districts around the Eternal City, has just completed a very beautiful map of the Alban hills, on the eve of publication by the Roman Topographical Office (*La Direzione del Censo*).

In the posthumous work of the late eminent Antiquary, Architect, and Topographer, Commander Canina, are contained several maps and plans of considerable interest in a geographical point of view, amongst which the revised edition of his great map, in six sheets, of the Campagna of Rome, of the Upper Valley of the Anio, with detailed plans of the most remarkable ancient towns and classical sites of the Alban Lakes, and the ancient ports of Centumcellæ, Portus Trajani, Ostia, Antium, &c. &c. Connected with our pursuits may be mentioned the detailed statistics of the Roman States (*Statistica della Popolazione dello Stato Pontifico*), just published by the Papal Government.

Naples.—I am not aware that any progress has been made by the Government of this country in the great Survey of the kingdom, inaugurated by our late Associate, General Visconti.

The French Dépôt de la Marine, having obtained the consent of the King of Naples to prolong its hydrographic survey of the West Coasts of Italy, beyond the Neapolitan frontier, M. Darondeau has been able, during the past year, to complete it as far south, and including the Bay of Naples, the Ponza Islands, &c. This, with the survey of the Roman Coast, is terminated, as my friend Mr. Pentland tells me, and will form a worthy complement to the great survey of the coasts of Italy, commenced in 1841, and which extends from the mouth of the Var to the Island of Capri. M. Darondeau is now engaged in rectifying the charts of the Lipari Islands, in the position of some of which errors of importance have recently been pointed out.

Island of Sardinia.—General A. della Marmora has completed his labours on the Physical Geography and Geology of this interesting island, by publishing the last volume of his great work, containing geology and descriptions of the fossils, by the eminent palæontologist, Professor Meneghini, of Pisa. As General Alberto della Marmora (brother of the Sardinian commander-in-chief in the Crimea) has devoted the best years of his life to the accomplishment of this ar-

duous task, I have sincere pleasure in recording my hearty approval of a work, in which he has united the powers of a skilful physical geographer with those of an indefatigable geologist.

GERMANY.

The progress of geographical science is now so well promulgated through Germany by the 'Mittheilungen' of Dr. Petermann, that it is unnecessary I should do more than call attention to the value of this methodical and well-illustrated monthly Periodical. In it are to be found accounts not only of what is written or recorded in the Geographical Societies of Berlin, Vienna, and other cities, under the guidance of a Humboldt, a Ritter, and a Haidinger, but also reports of descriptions of newly-explored countries in various distant regions, accompanied by well-executed maps.

Aware that a certain amount of discontent has sometimes been expressed, at the appearance for the first time in this German work of the voyages and travels of individuals who have been, or are in the pay and service of Britain, I would beg my associates to consider, how natural is the feeling of any foreign traveller engaged in the British service, to wish to see the outline of his researches first made known in his native land, and how his countrymen on their part should feel a just pride whether in perusing or in publishing the writings sent home to them in their vernacular freshness from remote corners of the earth, with which they are necessarily less familiar than the people of a maritime country like our own.

Whilst then there have occurred examples of the publication of the outline of travels of English agents for the first time in German, which might have been previously noted in the Proceedings of our Society, as coming from the Secretaries of State who are our Associates, and who usually send to us their earliest communications respecting foreign travels, I would earnestly deprecate anything approaching to a feeling of uneasiness upon this subject.

Contented with the reflection, that knowledge cannot be too widely diffused, let us hope that our German friends, clearly recognizing and honouring the British channels through which their information is obtained, will always work harmoniously and in unison with us. Banishing therefore all jealousy, and admiring the perseverance and skill of such contemporaries, I am bound in fairness to say, that the 'Mittheilungen' is exercising a powerful and salutary influence on the progress of our science; and as the spi-

rited proprietor of this Periodical, M. Justus Perthes of Gotha, has spared no expense in bringing out the work in an attractive form, so I rejoice to hear that its sale is becoming very large—upwards, as I am told, of 3000 copies being in monthly circulation.

The advancement of our science in Prussia has, I am sorry to say, received a serious check in the recent decease of Dr. Gumprecht, the Editor of the 'Monats-Berichte' of the Geographical Society of Berlin, who, after successfully prosecuting some branches of geology, had devoted himself with great energy to the extension of our acquaintance with the geography of Southern Africa. But what is most deeply to be regretted is, that he was suddenly carried off when engaged in a great and important work on the geography of Germany, a subject, on which I hope, through the assistance of my friend M. Ritter, to be better enabled to speak at our next Anniversary.

In this brief and very imperfect notice of the progress of geography in Northern and Central Germany, I have great pleasure in specially acknowledging the accession to our collection of many valuable maps published by the Bavarian Government, which have been communicated to us through His Excellency Baron de Cetto.

Of the distinguished travellers Schlagintweit it is my province to speak in a notice of Asiatic discoveries.

Austria.—Endowed with various noble establishments for the advancement of science, possessing many good geographers, and publishing most admirable maps of the different parts of her empire, Austria was without a Geographical Society until the 21st of September, of last year. It was then that my valued friend William Haidinger, long known as an eminent mineralogist and geologist, and much esteemed by his contemporaries in every land as well as in his own, uniting with a few zealous friends, and obtaining the consent and protection of the Government, established the Imperial Geographical Society of Vienna. To a great extent this body, like that of St. Petersburg, is founded on the model of our own Society, though the regulations and interior management necessarily vary with the different form of the Government of the country.

In speaking of the Proceedings of this Society, I cannot avoid specially alluding to one point of the proceedings of our Austrian friends; namely, the recent departure of the Imperial frigate the Novara on a voyage of scientific exploration round the world. When this expedition was decided upon, and a number

of able men were chosen, to form its scientific staff, the President of the Imperial Geographical Society having applied to me, and explained its object, I had real gratification in writing letters of introduction to all the authorities, with whom I was acquainted, at the places which this frigate might visit. Admirably organised, the expedition has enjoyed the great advantage of having had its officers furnished (as M. Haidinger informs me) with the minutest instructions of the venerable Humboldt, whether upon the magnetic equator, the magnetic curves in the different oceans, the lines of no deviation and equal intensity, or on cold and warm currents, particularly those along the Peruvian coast, and on the tropical East and West counter-currents. The great traveller has also enjoined the cutting of marks on the rocks, to register the actual mean level of the sea, the same practice which he had formerly recommended for adoption on the shores of the Caspian; and he has especially urged the collection of specimens from the active volcanos of South America, which he has enumerated *seriatim*, with a view to a correct classification of such igneous products, which he believes will be found to exhibit an arrangement in separate linear masses.

If I may judge of Dr. Scherzer and the other gentlemen who accompany him by the encouraging example of his associate Dr. Hochstetter, the geologist, who visited this country to obtain from General Sabine information and instruction in making magnetical observations, I can have no hesitation in saying that this first effort of Austria to circumnavigate the globe will produce a harvest worthy of that ancient empire, and will reflect the highest credit on the new-born Geographical Society of Vienna.

Russia.—With the return of peace, which has happily taken place since our last Anniversary, it is most gratifying to one who has been so long connected with the science of Russia as myself, and who has been so heartily welcomed in that Empire by all persons, from the Emperor to the peasant, to be enabled to recur to the geographical labours of those old allies of our country, to whom I am naturally much attached.

Whilst the late war impeded all scientific communication with the countries of the West, Russia was steadily advancing researches of the highest importance to physical geography in her distant and slightly known territories, and particularly on the north and east. The great expedition to the northern part of the Ural Mountains, under the conduct of Colonel Hoffmann, had indeed obtained, before the war, the active support of the Imperial Geo-

graphical Society, and of its President the Grand Duke Constantine.

The second volume of the work descriptive of this long and laborious enterprise has recently been published; the first part, by Krusenstern, having already been made known to geographers. This second volume specially relates to the 'Pae-Khoe,' or Rocky Mountains, and has completely satisfied the expectation of naturalists, physicists, and geologists. The historical and geological portion by Hoffmann; the classification and description of the fossil organic remains by Count A. von Keyserling, my distinguished coadjutor in earlier days; and the descriptions of the minerals by Gustaf Rose; of the animals by my colleague of the Imperial Academy, Brandt, and of the flora by Ruprecht, together with meteorological, physical, and hypsometrical observations, are all of a high order of merit. The exploring parties examined the principal chain of the Ural, north of Petropaulovsk, from the sources of the river Petchora up to the highest northern peak ($68\frac{1}{2}^{\circ}$ N. lat. and $66\frac{1}{2}^{\circ}$ E. long.), which, hitherto nameless, had been termed by this expedition Konstantinov Kamen, in honour of their geographical president, his Imperial Highness the Grand Duke Constantine. Westward from this point runs another mountainous ridge, the Pae-Khoe, continuing in a w.n.w. direction, and running parallel to the northern coast as far as Vaigats Strait. The highest point of it is the Pue-daia, and the geological structure proves that the Pae-Khoe is not, as hitherto supposed, a continuation of the Ural.

The average height of the northern Ural is about 3000 (the Töll Poss' and Sablja are above 5000) feet. Patches only of snow are visible on some mountains, but no lasting covering of it is seen at 68° N. lat.; although, as Leopold von Buch remarks, snow is found in Norway at 67° , and at a height of 3800 feet only. The volumes in which these important explorations are described, are characterized by a minuteness of detail, on all branches of science within the scope of the undertaking, which entitles the work to rank as one of the most valuable scientific publications that Russia has ever produced. The accompanying map is of great use to practical geographers, and a marked addition to the pre-existing geography of Europe.

The efforts of the Imperial Geographical Society to diffuse an adequate acquaintance with our science throughout the interior of Russia have been most commendable. Thus, this body not only publishes volumes and bulletins like our own, but also translates

into Russian, useful standard works, including those of the celebrated Carl Ritter, and brings out catalogues of the geographical maps of Russia, as well as reviews of geographical, statistical, and ethnographical labours. Even the commerce of the interior comes within the scope of our vigilant rivals, whose Society was founded on the model of our own.

The most extensive scientific exploration which the Society has ever undertaken, is one which is still in progress, or that of Eastern Siberia. Its object is to examine and determine, by astronomical and trigonometrical observations, the geographical features of the vast region between the Lena and the Vitima, and also of the south-eastern tracts beyond the Lake Baikal. The chief astronomer, M. Schwartz, has under his direction MM. Oussoltzoff and Sminia-guine, and is accompanied by the artist and academician Meyer, and by M. Radde the naturalist.

The results of the first year's labours are given in the 'Compte Rendu' of 1855, edited by M. Lamansky, and there can be no doubt that geographers will soon possess not only a correct delineation of these remote regions, but also striking and characteristic sketches of the scenery of all the border frontier regions of Siberia—a map of the river Amur having been already published. Among the great feats of our contemporaries, I learn that MM. Semenoff and Wasiljin have made known the existence of an extinct volcano near Mergen, in Manchuria, which was in activity in the year 1721; and that the mountain of Demavend has been ascended by M. Khanikoff.

In writing to me of these explorations, and of a remarkable expedition to the Lake Issingul, my illustrious friend Humboldt thus expresses himself:—"On the northern side of the great volcanic chain of Thian-Chan, they have, it is true, discovered plutonic rocks only, such as granite and gneiss, and along the edges of the great bitter lake of Central Asia (Issingul) no trachytes (volcanic rocks) have been seen; but it must not be forgotten, that from the eastern shore of that lake to the Volcano Peschan (the most western of the volcanos of the Thian-Chan, or Celestial Mountains) the distance, in a straight line, is not less than 250 English miles."

In reference to Eastern Siberia and those vast tracts of Central Asia which lie between the defined boundaries of the Russian and Chinese Empires, let me say that the English public will soon have presented to them a work containing the most vivid and remarkable

pictorial representations from the pencil of their countryman, Mr. J. W. Atkinson.

Under the patronage of the Emperor Nicholas, Mr. Atkinson devoted seven years of his life to the exploration and delineation of a region, of the greater part of which no European had hitherto obtained the slightest knowledge. Let my associates inspect the large original water-colour landscapes by this artist, representing the marvellously tinted and wild rocky countries of Mongolia, the great Steppes of the Khirgis and Chinese Tartary, including views of even the snowy Thian-Chan, of which reduced engravings will soon be published, and they will readily admit, that if such sterile, igneous, rocky masses, should not afford gold or silver, they can prove of little value to any civilized country.

Among the subjects treated by the Russian geographers during the year 1856, the mere enumeration of the following works, which constitute a very few only of the communications to the Imperial Society, will show the importance of its labours:—The Geography of Vegetables, in four vols., by M. Béketoff; the Fauna of the Mouth of the river Amur,* by Schrenck; a new Ethnographical Map of Europe, by Koeppen; the Geographical and Ethnographical Terminology of Central Asia, by Stehoukine; Report of Lieutenant Oussoltzoff of a Voyage to the Sources of the River Vitima; and an account of those Volcanos of Central Asia, by Semenoff and Wasiljin, to which allusion has just been made.

Asia Minor.—In February of this year, I had the pleasure of communicating to the Society a memoir, which I had received from General Jochmus, relative to a proposed communication in Asia Minor between the Lake of Sabanja, the River Sakaria, and the Gulf of Nicomedia. The utility of this project had been fully recognized in ancient times, and the question has been several times agitated, at widely different periods, up to the close of the last century. The distance from the River Sakaria to the Lake of Sabanja, between which there already exists a natural communication by the little river of Sari-deré, is not much more than three miles and a half; and from the Lake to the Gulf of Nicomedia it is scarcely nine miles, whilst no difficulty exists on the score of difference of level. There can be no doubt that such a system of canals, of sufficient width

* See p. 406 *ante*, for a notice of the hydrography of the river.

and depth to admit of the passage of coasting-vessels and small steam-boats, would open up valuable internal communication for the ready supply to Constantinople of wood, charcoal, and the most necessary articles of daily consumption.

Persia.—During the present session, whilst our country has been temporarily engaged in hostilities with Persia, it has been our good fortune to have present amongst us our distinguished medallist Sir Henry Rawlinson, who has enlivened our meetings by his agreeable and instructive lessons on the geography of countries with which he has made himself so intimately acquainted. By his extensive personal knowledge of the East, united with those varied attainments in classical and Oriental literature, which have made his name distinguished throughout the world, Sir Henry has been enabled not only to communicate to us information of the most important nature with respect to the modern geography of Southern Persia, but also to illustrate that information from the rarer resources of his own especial studies in ancient history. With respect, moreover, to the recent movements of our army in Persia, the strategical knowledge of Sir Henry has added a peculiar interest to his observations on the country where they have taken place. I cannot refrain from congratulating you, at the same time, on having had the advantage of two such able and experienced commentators on these interesting and important subjects as General Monteith and Mr. Layard.

In summing up the results of the information we have thus gained, I will here confine my remarks to that which is essentially geographical. The most striking points to which our attention has been drawn, in this respect, are the changes produced in the channels of the rivers and on the coasts immediately proximate to their embouchures. These important facts are worthy of especial notice, both in a prospective and a retrospective sense, since they will materially modify our calculations in the more doubtful reading of early history, and our judgment as to calculations with respect to the future condition of these coasts. The agents of these changes are clearly intelligible. There are but two winds which prevail in the Persian Gulf—the north-west and the south-east, and, when the latter sets in, the whole force of the Sea is brought to bear directly against the current of the Euphrates, and hence an enormous deposit of the alluvium brought down by the stream is effected, thus barring up its mouth. This deposit, constantly on the increase, progresses, by Sir Henry's calculation, at the rate of a mile

in the lapse of thirty-five to forty years. An example of the effect of this agency in by-gone times is adduced in the fact, that a great city, of which the ruins are to be seen above Mohammerah, was an island in the time of Sennacherib, named Billat, and can be shown to have been still an island in the time of Alexander. At the present time it is sixty miles from the embouchure of the river, and a succession of cities can be traced upon the desiccated delta below it, along the river, down to the sea.

A question of essential moment has also been explained by Rawlinson as to the frontier line between Turkey and Persia,—a point upon which our maps have been greatly wanting in correctness. The real line of frontier—as determined by the Commission of Delimitation, appointed under the provisions of the Treaty of Erzerúm—comes down to Mohammerah, and then follows the course of the Euphrates to the sea. It was agreed that the country watered by the Euphrates belonged to Turkey, and the country watered by the Karun to Persia; but the question was, whether Mohammerah was on the Euphrates or on the Karun. It was decided that the place should be considered to belong to Persia, but as according to Sir Henry's belief it is situated on the Euphrates, this decision would seem to be contrary to geographical accuracy.

Tibet.—Early in this year some extracts were read to the Society from the memoir of a journey across the Kuen-luen from Ladak to Khotan, communicated by Colonel Sykes from the brothers Schlagintweit, already so well known to geographers and naturalists by their labours on the physical geography and geology of the Alps.

These accomplished gentlemen, who travel by the desire of the King of Prussia, and at the suggestion of Baron Humboldt, have been employed, under the patronage of the East India Company, in the physical survey of the distant trans-Himalayan regions. The extracts communicated to us, form a small portion only of the information they have sent home, but from some brief allusions to the groups of hot springs near the Kiok-Kiul Lake and the Valley of the Nubra, we may feel assured that, when all their memoirs are published, they will be found replete with curious observations on many subjects; and specially on those mineral springs to which Humboldt long ago invited attention, as proofs that the Kuen-luen was of volcanic origin.

The brothers Schlagintweit have laid down the entire orography of Kemaun. M. Adolf Schlagintweit, after visiting the glaciers of

Pindari, was joined by his brother Robert; and they examined together the glacier of Milum, which surpasses in extent all those of Switzerland. It is from 8 to 10 miles in length, and 3000 feet broad. The mountains which surround this glacier consist of crystalline schist, covered by fossiliferous strata of the Silurian age. The two brothers have also measured the height of Nanda Devi, an insulated peak surrounded by deep precipices, at the foot of which is the glacier of Pachou.

But rather than attempt, on my own part, any sketch of what these distinguished German travellers have accomplished, I will here quote to you, from the pen of Humboldt himself,* a short summary, which he has sent me, of their remarkable explorations.

“Hermann and Robert Schlagintweit,” says the Baron, “have had the proud satisfaction of passing in August, 1856, the chain of the Kuen-luen mountains, and of reaching Eltschi in the province of Khotan. As I am vain enough to believe that my map of Central Asia (the result of five months’ labour, in bringing together the detailed accounts of the Buddhist priests Fahian and Stenan-thiang, with those of Marco Polo, Wood the explorer of the Pamir, Burnes, Vigne, together with the excellent sources of information supplied by Klaproth and Stanislas Julien) represents more faithfully the formation of the ground than the other maps in your possession, the range of which beyond the Himalaya is mythologically doubtful, I invite you to examine it before you read or rather try to decipher these lines. A botanist of the highest merit, Dr. Thomas Thomson, who, conjointly with my excellent friend Joseph Hooker, published in 1855 the ‘Flora Indica,’ says in the Introduction Statistique, p. 215, ‘The chain of the Kuen-luen, where it forms the northern boundary of Western Thibet (where Dr. Thomson resided a considerable time), is as lofty as the Himalaya.’ *Its axis has not been crossed by any European traveller*, but has been reached by Dr. Thomson, who visited the Kara-korum pass, elevated 18,300 feet. This testimony will show you the importance of the success of the brothers Schlagintweit. On the morning of the day, on which they crossed by the Kara-korum pass, they met a caravan coming from Yarkand, and near the salt lake of Kiok-Kiul they found the hot springs of Panamik and Tchanglung, with a Centigrade temperature of 74° 2’ and 78°, and on an immense plateau at altitudes of from

* For the letters of the brothers Schlagintweit, communicated by Baron von Humboldt, see also the Berlin ‘Zeitschrift der Allgemeiner Erdkunde’ for 1856, pp. 532, 551.

16,800 to 18,000 feet, they had to endure a degree of cold at their nightly bivouac of $11^{\circ} 4'$ Cent. below freezing point. Fahian, at the close of the 4th century, writing of Bushia south of Eltschi, the capital of the province of Khotan, praises its high cultivation; its elevation being not more than 9200 feet. 'We were at a day and a half's journey,' say the Schlagintweits, 'from the northern part of the high chain of Kuen-luen. After leaving Sumgal, we travelled for three days along the banks of the Karagash, which gave us an opportunity of inspecting the famous quarries of stone called Yaschem, which people come from a great distance to visit. Between Kara-korum and the Valley of the Nubra we measured several mountain peaks above 24,000 feet of absolute elevation. The dip of the magnetic needle between July and September is registered in figures.' The geological excursions of Adolf and Robert Schlagintweit in Eastern Thibet by Niti and Gertope, to the glacier of Ibi Gamin, have also been very important. The travellers reached it on the 19th of August, 1855, and trusting to the corresponding observations in Agra, fixed the height they attained on Ibi Gamin at 22,260 feet = 20,886 French feet. This is not only higher than I reached at Chimborazo (18,096 French feet) in 1802, and which Boussingault made (18,480 feet) in 1831, but it is also higher than the summit of Chimborazo itself, which I found by trigonometrical observation to be 20,100 French feet in height. As the Schlagintweits were the first who reached the top of Monte Rosa, they are accustomed to this kind of expedition. A portion of their magnetic observations of the Himalaya has been printed separately at Calcutta, and my respected friend General Sabine will doubtless give them due credit for their assiduity. They have also made some interesting and delicate observations on the influence of great heights on the variation of the magnetic needle. They will bring back to England some beautiful geological collections, perhaps even in the course of this autumn; for you are aware that by the munificence of the East India Company and the generous kindness of Colonel Sykes, who is a noble advocate of every thing which appertains to the sciences, the brothers Schlagintweit have received every encouragement."

When I reflect that these brothers have penetrated farther into Thibet and Tartary from the plains of India on the south, than any other European, that their physical, geological, and geographical observations are of the highest value, and that they have even made photographic sketches at heights of 20,000 feet above

the sea, I cannot but rejoice, that these élèves of the great traveller of the age, should have performed journeys, which have elicited from that illustrious man, now in his eighty-seventh year, the expression which I have read to you, reminding us of the best days of the explorer of the Andes and Siberia.

BORNEO, BURMAH, AND CHINA.

Bornéo.—Our Associate Mr. A. R. Wallace has supplied us with some important corrections of the north-west portion of the map of Borneo, derived from his observations in a journey up the Sadong River. From his account we gain valuable additions to our information respecting the physical geography of that vast island, together with some very interesting comparisons, bearing on the ethnological similarity between some tribes of the Dyaks and the Indigenes of the valley of the Amazon. Amid the uncertainty which hangs over the history of the migrations of various branches of the human family in remoter periods, these notices of distinct resemblance are of especial moment; and in the present instance the observations of Mr. Wallace are confirmatory of the views of Dr. Latham and others, who regard the Americans as Mongols who have emigrated direct from Eastern Asia.

A further exploration of this important island has been set on foot during the past year by Lieut. C. A. C. de Crespigny, R.N. Great importance must be attached to the investigation of the resources of this vast country, which is already known to be largely productive of some of the choicest desiderata for the advancement of civilisation. As a mineral country it is, according to Mr. John Crawford, perhaps the richest in the East. Gold, coal, antimony, iron, caoutchouc, and gutta-percha, have already been derived from it in abundance; and who shall say what further discoveries may lie open to the search of a skilful explorer? The geographical position of the island moreover, lying, as it does, in the direct route between China and Australia, presents an additional stimulus to the development of its unknown resources.

It is satisfactory to know that our Medallist, Rajah Brooke, has been anxiously occupied in developing various branches of industry within the range of his jurisdiction at Saráwak, among the most important of which must be classed the opening of coal-mines; and it is indeed a matter of sincere congratulation that he should recently have escaped from the imminent danger in which he was placed by the late insurrection of the Chinese settlers.

Burmah.—We are indebted to Captain Yule, of the Bengal Engineers, who had been sent by the Indian Government to Amarapura as secretary to Major Arthur Phayre, for a most valuable communication on the geography of Burmah, with an illustrative map of that country. Captain Yule has compared and brought together with great ability the various valuable surveys of several of his precursors in different parts of this extensive field of operations. His principal materials were a Survey of the new British Province of Pegu, by Lieut. Williams of the Bengal Engineers, still in progress; a New Survey of the Province of Martaban, by Mr. Hobday; a Survey of the Irawady to Ava, by Captain Rennie and Lieut. Heathcote of the Indian navy. Besides these data, Captain Yule contributes his own sketch of part of the Aracan Yoma range and its passes, and a rearrangement of the Chinese frontier and the Laos States east of Burmah, as taken from the Route Surveys of Dr. Richardson and Captain McLeod. A considerable error in the longitude of the Irawady at Prome, and the higher parts of the stream, as assigned in previous maps, is pointed out. This error, which, in 1853, Captain Yule had indicated as probable, in a Memoir on the Passes of the Yoma, has been confirmed by the surveys since made. The geological portion of the work by Mr. Oldham, the Superintendent of the Geological Survey of India, affords much important information respecting the structure of the country, the rocks, and their relations; and renders the publication additionally valuable by the observations it contains on the statistics of the productions of the country, including certain mineral substances described by that good geologist. This work, which was printed for limited circulation at Calcutta, by order of the Governor-General, is now in the course of publication by the East India Company, accompanied by a map, engraved by Mr. Arrowsmith; and Mr. John Crawford, who, from his acquaintance with the Burmese empire, is most competent to express an opinion, has spoken of it with marked approbation.

China.—Believing that our members would gladly receive information relating to China from so competent an authority, I induced our distinguished member Sir John Davis to read at one of our meetings a Paper of great value, and which many of you heard with pleasure.* Certainly no living Englishman, and indeed no living European, was so competent to such a task. He is among

* See Proceedings, No. IX.

the few of our countrymen who have acquired the difficult language of China, and he long filled the highest offices which an Englishman can discharge in relation to that singular country. The fruits of his literary labours have been several works, which have the rare merit of being at once popular and scientific. As one of the most important of these, his 'China and the Chinese,' is by far the best account of the empire in any language, I am glad to find that a third edition of it has just been published.

AFRICA.

The additions to our acquaintance with the interior of Africa since the last anniversary, when my predecessor delivered the Patron's Gold Medal to Dr. Barth, have been considerable. That meritorious explorer of vast regions has since issued to the public three volumes, which, recording his earlier wanderings, are to be followed by two others, completing a work which will doubtless be considered the worthy termination of so many years of patient research under great privations. The maps which accompany the narrative have been executed by Mr. Petermann, from the careful itineraries of Barth, the astronomical determinations by Vogel of the positions of Murzuk, Kuka, and Zinder having formed the base. Dr. Overweg's determinations of latitude have been made use of as regards the route from Tripoli to Tintellust and the route to Musgu; and I learn from Dr. Barth that all these points will be discussed at the close of the work. I reserve, therefore, my full observations on the whole of the labours of the only British traveller who ever returned from Timbuctoo, until we have before us the concluding description of his arduous journeys. In the mean time, however, it may be truly said, that the volumes already published contain much valuable information, and show that Dr. Barth was so completely at home among the natives, with seven of whose languages he was familiar, and made such very diligent inquiries, that the information thus gathered, is far more ample and minute than that of his precursors; the itineraries, which have been compiled from hearsay evidence, being entitled to especial weight. It is particularly worthy of notice that the tracts which this traveller explored to the south of Lake Chad were found to be level, and abounding with lagoons, swamps, and long flooded tracts, analogous to those which Livingstone found to the south of the Equator, whilst the watershed between the affluents of Lake Chad and the river Benué, would seem to be little more marked, than that between the Zam-

besi and Lake Ngami of S. Africa. So much is this the case, that Barth suggests how boats may reach the lake in ascending from the sea.*

Independently of the impediments which the climate and its diseases offer to the research of Europeans, the other great obstacles presented to the enterprise of Barth and his companions have not, I apprehend, been sufficiently appreciated. All along the broad zone stretching across Central Africa, between 11° and 5° of N. lat., there prevails more or less a continuous and merciless warfare between the Mahomedans and the Pagans, which presents the most appalling checks to the traveller proceeding from the territory of any Mahomedan prince to whom he may be accredited. For whilst Livingstone has demonstrated the practicability of traversing vast tracts of Southern Africa, occupied by people speaking various dialects of the same language (none of them being Mahomedans), such facility of intercourse is forbidden through the region north of the equator. There, a solitary traveller, scantily supplied with means, has to cross this belt by proceeding through hostile tribes engaged in sanguinary warfare, and is at the mercy of every petty tribe and barbarous chief whose district he has to traverse.

Whilst in regard to Overweg, who, it appears, kept very few notes, we have to regret that nearly all the important information he had accumulated perished with him, I am bound to record that Dr. Barth deserves all praise for making and preserving detailed records, when struggling against depressing illnesses and great poverty.

From what we know of the efforts made by himself and his associate, it is, indeed, too manifest that the progress of discovery in Africa, south of Lake Chad, can be only very slow and gradual.

Such, then, are the difficulties from which Barth has escaped, and of which he is now rendering us a vivid and detailed account—such is the country in which Vogel and his faithful attendant, Corporal Maguire, were left. My predecessor has recorded in his last and only Address, what progress Vogel had made after leaving Barth in 1854. Foiled in his attempt to reach Adamawa, the route between Hamarrawa and Yole being occupied by warlike bodies, Dr. Vogel had already determined by astronomical observations the real site of the important town of Yakoba, situated on a rocky plateau 2500 feet above the sea. Returning from Hamarrawa to Gombé, through

* Vol. iii. pp. 202, 221.

mountains inhabited by Pagan tribes, he left Corporal Maguire there, and turned westward himself to determine the watershed between the so-called Yeou, the river which joins the lake Chad from the west, and the smaller and eastern branches of the Kwara or Niger. It was then that he discovered in a very hilly tract a northern or important branch of the Benué, named Gongola, and proceeded as far as Zuriga, the capital of Zeg-Zeg, the erroneous position of which in previous maps he corrected. Proceeding to Bebeji, the site of which he also fixed, he arrived at Kano, a place then afflicted by cholera, and, returning to Yakoba, again descended into the valley of the Benué at Zhibu of Dr. Baikie (Chunbum of Vogel). Visiting several places on the river, he observed a large cetaceous animal called Ayu, to which his attention had been directed by Barth, and since named by Professor Owen *Manatus Vogelii*. Having rejoined Maguire, who had suffered much in the mean time from sickness, they returned in December, 1854, to their head-quarters at Kuka. Procuring there fresh supplies he intended to proceed to the E. and S.E., and started for Waday on the 1st of January of last year, leaving Maguire in Kuka, since which time we have had no reliable tidings of his progress.

Dr. Barth suspects, however, that he must have made some stay at Loga or Logone, visited by both Denham and Barth, and also at Bagirmi, where the latter traveller spent some months, as described in the third volume of his work.

Whether the order ever reached Vogel to direct his steps towards the Nile is unknown, but at all events it is certain that he was proceeding in that direction, when, as it is reported, he fell a sacrifice to the orders of the savage King of Waday, such being the news brought by the natives to Corporal Maguire,* and reported to the Foreign Office by Colonel Hermann, H. M.'s Consul at Tripoli. There is, indeed, too much reason to apprehend that this report may prove true, seeing that the King of Waday, a violent and revengeful man, may have taken the life of Vogel, because some of his sable majesty's property had unfortunately been seized and confiscated in the port of Bene-Ghazi to satisfy the claims of British merchants, and at the very time when an English agent was travelling in Waday.

On the other hand, knowing that both Dr. Barth himself and our other African Medallists, Galton and Livingstone, were reported to

* Corporal Maguire is coming home with the observations and instruments.

be dead, and are now happily among us, I still entertain some hope, that the able and accomplished young Vogel may have escaped with rough treatment and detention only, and that he may return to receive the highest reward which this Society can offer for determining the true position of so many important sites of Central Africa.

Renewed Expedition to the Niger.—From the explorations in Central Africa, which have been progressing from the time of Mungo Park to the present day, let us now turn to the consideration of the expedition which has just been sent out to explore those central parts of Africa, watered by the Niger or Kwara * and its tributaries, and which, recommended to the attention of H. M.'s Government by the Royal Geographical Society and the British Association for the Advancement of Science, is commanded by our associate, Dr. Baikie, who so successfully led the party on the former occasion. Our members will also be glad to hear that this officer is accompanied by the same intelligent surveyor, Mr. May, R.N., who was his companion during the previous voyage up the Chadda or Benué; by Lieut. Glover, R.N., well acquainted with surveying and astronomical observation; by Assistant-Surgeon Davis, R.N., and by collectors of natural history specimens; whilst it is expected that the well-known Church Missionary, the Rev. Samuel Crowther, may also join the expedition on the coast.

The vessel for ascending the rivers is the *Day-Spring*, an iron screw steamer of 170 tons burthen, prepared by Mr. Macgregor Laird, combining 30-horse power with less than 5 feet draught of water, and arranged to carry three months' provisions and coals for 20 days. The main objects of the expedition as contemplated by the Earl of Clarendon, who has specially patronised and sanctioned it, and as organized by the Admiralty, are to explore the river Niger and its tributaries, to ascertain the natural productions and capabilities of the countries through which they flow, to enter into friendly relations with the native chiefs, to facilitate the return of liberated Africans to their homes, and practically to show the advantages of legitimate trade over the debasing and demoralising traffic in slaves.

Ascending the Kwara to Rabbat, and leaving the steamer there, the party will, in the first instance, proceed by land to visit Sakatu,

* Spelt Kwara by Barth and by the Admiralty; Kwora by Baikie, and Quorra by old travellers.

where poor Clapperton died, and there present to the Mahomedan Sultan, to whom they are accredited, a firman from the Porte. After a short stay at Sakatu it is proposed that they should march westerly to Isai on the Kwara, a populous town visited by Barth in 1854, and thence descend the river by Busah in canoes and rejoin the vessel at Rabbat, a tract which may, I apprehend, prove rich in mineral contents. Now, whilst parts of this region have before been traversed by the travellers Park, Clapperton, Lander, and Barth, the first of whom was killed at Busah, the country is still much too imperfectly known to be accurately mapped, though, as we have just seen, Vogel has fixed the site of some adjacent places. Still less are we acquainted with its mineral constitution.

As this expedition, well equipped and well found in provisions, medicines, and presents for the natives, will consist of 12 Europeans and 40 liberated black seamen, opportunities will be afforded of dividing the force and of exploring regions on either bank of the great river. Thus, the Government attaches great importance to the ascertainment of a safe route from Lagos and Abeokuta to Rabbat on the Niger, by which the liberated Africans can return to their homes, and extend their commercial habits to the places of their birth. During the period of the next year, when the river is low and the heat great, the party is to seek high and healthy ground near the confluence of the Benué or Chadda and the Kwara, where it is understood that Mr. Macgregor Laird will establish a commercial station.

When in the interior, however, the leader of the expedition is specially charged to impress upon the natives that the British Government is far from having any desire to establish colonies or settlements which might give umbrage and provoke quarrels, but is solely desirous of promoting such legitimate trade as, in enriching the natives and our own merchants, may effectually check the slave-trade.

A second rainy season will be devoted to the exploration and ascent of the Chadda or Benué, and, as the Day-Spring draws less water than the Pleiad did, it is hoped she may reach a higher point than was attained on the former occasion. It is possible that the fertile region of Adamawa, on the one hand, and Hamarrawa, on the other, may be explored, and even, if opportunity offers, that the higher part of the Old Calabar river in a more westerly meridian may be reached at some point above that to which Oldfield ascended in a steamer in 1836.

Heartily must this Society wish success to such a well-planned

renewal of our intercourse with the more civilised and Mahomedan tracts of Central Africa, which, in addition to the acquirement of important geographical and natural history knowledge, has in view the object so dear to all philanthropists, of encouraging the natives to exchange their natural productions for the manufactures of Europe, and in abandoning their warlike predatory habits to take to the pursuits of agriculture and commerce.

Having taken a deep interest in that former expedition, which, under the command of the same meritorious officer, returned without the loss of a man, I have on this occasion prepared instructions for the geological examination of a region which I apprehend may be found to contain much mineral wealth.

In fact, if the survey be completed in the manner devised, the whole western side of Central Africa will have been so traversed, as to yield two important sections, which cannot fail to give us the knowledge we desire. The Niger, or Kwara, flows in a gorge across such thick ribs of rock as must surely enable the travellers to read off a clear lesson; whilst an excursion from the upper part of the Chadda to the sources of the Calabar on the one hand, and to the heights of Aed Hamarrawa on the other, will also afford an instructive parallel traverse of no less importance.

Rejoicing that Mr. May, the Master, of the Royal Navy, who laid down the soundings and defined the banks of the Chadda, should have returned from Canton, where he has been serving, during the capture of the forts under Admiral Sir Michael Seymour, to rejoin his old companion Dr. Baikie, and confident that they will both of them do all in their power to make geological observations, I must express my regret that there should not have been some one person in this expedition, whose special duty it was to ascertain the true condition of the substrata. For, inasmuch as one great feature of the enterprise is the discovery of sources for future trade, so surely must it be of paramount value to be made acquainted with sites of coal, iron, copper, lead, and gold.

Hoping, however, that the zeal and ability of the explorers may remedy the only deficiency which is observable in the project, I cannot terminate the subject without reminding you of our deep obligations to the Earl of Clarendon for his judicious and liberal support of an exploration which, carried out as it will be by the efficient orders of the Admiralty, must not only advance our favourite science, but will also, I trust, prove a blessing to the natives, and a boon to the commercial world.

The White Nile.—M. Ferdinand de Lesseps has collected, during a recent visit to Khartúm, some information on the present state of the several European settlements along the upper course of the White Nile.

It appears, from his account, that the missionary station of Don Ignacio Knoblecher has attained considerable importance. It is situated about lat. N. $4^{\circ} 35'$, and is above the highest point reached by M. d'Arnaud. A trading establishment has been formed by M. de Malzac among the Djours, at 300 miles west of the river, and between the 6th and 7th parallels of N. latitude, where he collects ivory, and sends it down to the Nile on men's shoulders, the country being too marshy to admit of the employment of beasts of burden.

It will be recollected that, in the Address of our late President, it was mentioned that, according to the opinion of M. Brun Rollet, so long a settler in these parts, the Misselad was entitled to be considered as the main branch of the Upper Nile; but M. de Malzac dissents from this opinion, and regards the Misselad as a tributary, and not as the main river. The question must, therefore, remain an open one, until we shall have received far more accurate hydrographical data about these regions, than we now possess.

Nile Expedition.—I have to notice with regret the failure of an expedition whose object was to explore the still mysterious sources of the White Nile. Organised with method, it was liberally paid for by the Viceroy of Egypt, and placed under the charge of the Count Escayrac de Lauture, a French geographer, previously known to us by his exploration of Soudan. But disunion and want of zeal among many members of his party becoming painfully apparent, that gentleman was unable to proceed beyond Cairo. In the mean time, however, the flotilla was ordered on in advance, and placed under the direction of our countryman Mr. Anthony Twyford, an able and adventurous young seaman, who, overcoming all obstacles, had the singular merit of carrying two steamers, upwards of 50 feet in length, and four sailing-boats, over the first, second, and third cataracts, to beyond Dongola! * Having laid in abundance of cordage at Alexandria, and commanding, through a firman of the Pasha, a vast number of the natives (at one time upwards of 3000 men), Mr. Twyford so skilfully applied his ropes to the projecting

* The flotilla was manned by sixty-six native soldiers and sailors, whilst Dr. Ponchet, a physician, and Mr. Clauge, a photographer, were of the party. The largest of the two steamers was left at Assouan.

rocks, and so energetically urged on the men, that he reached Dongola in ten weeks from Cairo.

When all the difficulties had been overcome, a messenger reached Mr. Twyford, and, to his great annoyance, ordered him to return, which he did, without loss.

*Livingstone's * Researches.*—Passing now to South Africa, let us see what immense strides have been made since our last Anniversary. Our late President, then speaking of the previous achievements of Livingstone, told us that the undaunted traveller was proceeding to the East to reach the Indian Ocean at Quilimane. But how apprehensive were we that, after all his marvellous escapes, this extraordinary man might still fall a victim to the climate in which so many of our countrymen had succumbed! Great, therefore, was the rejoicing, when those letters arrived † in which he narrated his passage from the interior low country, across the high grounds, and along the gorges of the Zambesi, and the great falls of that river, and announced his safe arrival at the Portuguese settlement of Tete!

Still greater was our joy when he landed on his native shore to receive that hearty welcome which was sure to attend a traveller who, having accomplished such feats, brought us back so much fresh knowledge respecting the interior and flanks of that part of the great continent of which we were previously ignorant.

The outline of the travels of Livingstone is now so generally known to the public, and has been so graphically presented by himself to various assemblies of his countrymen, that any rehearsal of it on my part is wholly uncalled for; the more so, as at the Special Meeting we held on the 15th of December last, in honour of his arrival, I offered those observations which were printed in your Proceedings. Whilst the public is anxiously looking forward to the publication of the details of these journeys, which I have reason to believe will take place in about three months, I will briefly advert to one or two leading features only of them.

The hypothesis I ventured to throw out in what I termed a "Comparative View of Africa in Primeval and Modern Times," when I presided over you in 1852,‡ that the central regions of

* Since his return to England this traveller has changed the spelling of his name, adopting the form used by his father, and adding the *e* to Livingston.

† Addressed to myself.

‡ Journal Royal Geog. Soc., vol. xxii., Prel. Discourse, p. cxxi.

Africa would be found to be a comparatively low, watery expanse, the rivers issuing from which escaped to the east or to the west through gorges or rents in the subtending higher chains, was proved to demonstration by Livingstone, as respects that vast African river, the Zambesi.

The observations of this great traveller afford also the proof that several of the principal rivers of Africa south of the equator have their sources in comparatively level tracts of no great altitude. Just as the great rivers of Russia are separated at their sources by water-partings of such slight altitude, that Peter the Great connected these diverging streams by canals, so Dr. Livingstone has observed analogous phenomena in the heart of Africa. The African case is, indeed, still more remarkable. In this region Nature herself has made the connecting canal; for flat boats and canoes can pass northwards by the Dilolo river into the affluents of the Congo or Zaire on the west, and into the Zambesi on the east.

These humid regions, particularly towards the west side of the continent, are covered by lofty forest trees, abundance of ferns, mosses, and other plants requiring much moisture. Hence the explorations of Livingstone, opening out such new and unexpected data, induce me to put a question for solution by physical geographers. Why does it happen, that whilst moisture so prevails in 10° to 15° south of the equator, the same districts equally distant from that line upon the north (as touched upon by Barth) should be arid and comparatively dry? After such positive data as those collected by Livingstone, we have indeed no longer occasion to stretch the imagination and suppose the existence of great snowy mountains from which the waters of the Nile take their rise; since we now see that the Zambesi and the Congo are supplied from marshes at lower levels than the chains through which those streams escape. The simple fact is, that in Central Africa there are two copious rainy seasons due to the periodical influence of the sun, the passage of which is accompanied by copious torrents. By the first of these rains the boggy lands become to a great degree saturated, but the water not overflowing, finds no exit in the absence of an adequate declivity. It is only when the whole spongy mass becomes supersaturated by the second rains, that the waters rising to a great height, furnish the Zambesi with its annual flood.

In like manner the Nile may owe its annual flood to a similar cause—a point which can only be determined when our bold ex-

plorer, Captain Richard Burton, shall have informed us, whether the large Lake of Uniamesi be not the real feeder of the Nile, or if there really be lofty snow-covered mountains under the equator, as dencribed in the distance by our missionaries.

On this latter point I confess myself to have been to a great degree incredulous; whilst the last observations of Livingstone would lead me to suppose that the Nile, like the Zambesi, is fed from a great interior, boggy, and lacustrine region.

Again, in bringing home specimens of the white dolomitic rocks which constitute the eastern ridge, at a distance of 300 miles from the shore of Africa, and in expressing his opinion that such rocks range far to the N.N.E., or towards Kilimanjaro, the supposed sources of the Nile, Livingstone arrives at the suggestion, that the whiteness of those mountains near the equator, which the missionaries, who saw them at a distance, took for snow, may truly be nothing more than white quartz rocks and crystalline dolomitic limestone, which, glittering under a tropical sun, might well be mistaken.

Let us hope that the journeys now in progress by our clever and adventurous traveller, Captain Burton, from Mombas or Zanzibar, may settle this problem, and also determine the real nature and extent of the supposed great inland sea, on which our learned geographer Cooley has speculated, and of which the missionaries, Krapf, Rohmann, and Erhardt, have given us a rude sketch-map, compiled from hearsay testimony.

On this and many other collateral points it is not my intention to dilate; for he who would arrive at a sound conclusion must study the writings of Cooley and McQueen, and all the Portuguese authorities, and then collate them with the practical conclusions of Dr. Livingstone, who, having travelled over eleven thousand miles of African ground, and having wandered so long among the sources of the Congo and the Zambesi, is certainly the most valuable witness we can call, when such matters are under discussion.

Great as are the deserts of Dr. Livingstone as a discoverer of new lands, or as a missionary and philanthropist, his real title to the high estimation of the Geographical Society is, that by astronomical observations he has determined the longitude as well as latitude of so many sites, hitherto entirely unknown to us, and has constructed detailed maps of those regions. On this head indeed the language which Mr. Maclear, the astronomer at the Cape of Good Hope, has

used is the most appropriate and truest eulogy which can be applied to our Medallist.*

Having observed in the character of my friend Dr. Livingstone a happy union of simplicity, patience, unruffled temper, and kindness, with the quickest perception, and the most undaunted resolution, I feel persuaded that, vast as have been his achievements, he is still destined to confer great advantages upon South Africa and his own country. His aim, when he returns to Quilimane and Tete, in the spring of 1858, or the first period of the healthy season, and after he has rejoined his old companions the Makololo, who are anxiously waiting for him, will be to endeavour to establish marts or stations beyond the Portuguese colony, to which the inhabitants of the interior may bring their goods for sale, and where they may interchange them for British produce. At these stations, which will be in those flanking, high grounds of the African continent that he has described as perfect sanatoria, he will endeavour to extend the growth of cotton, as well as to teach the natives how to till their lands, taking out with him for these intents cotton-seed, gins, ploughs, &c. He will further endeavour to bring to the English market a vegetable called Buaze, which possesses so tough and fibrous a tissue as to render it of great value even to the natives in their rude manufactures. Specimens of this plant, which grows in profusion on the north bank of the Zambesi, have been converted into a substance that has been pronounced by a leading manufacturer to be worth, when prepared, between fifty and sixty pounds per ton, and applicable to all purposes for which flax is employed. In this material, therefore, alone, to say nothing of indigo, cotton,† beeswax, ivory, and the ores of iron, with much good coal, we have sufficient indication that no time should be lost in establishing a regular intercourse with the natives of so prolific a region.

Thus, acting as the pioneer of civilisation, Dr. Livingstone will first engage the good will of the natives through their love of barter, and, having secured their confidence by honesty of purpose, he will the more readily be able to lead them to adopt the truths of that religion of which he is a minister, and of the value of which his whole life is a practical illustration.

Fortunate is it for our country that we have in the Earl of

* See Proceedings, No. vii. p. 268.

† I learn with pleasure that great success has already attended the endeavours of the philanthropists who have introduced the culture of cotton near Abeokuta, in West Africa, and its preparation for export.

Clarendon a Minister of Foreign Affairs, who not less than the noble Premier has been the consistent and vigorous supporter of every measure tending to root out the trade in slaves; and impressed as our Government is with the desire to sow those seeds of civilisation among the natives, and probably realise the cheering prospect of a great production of the raw material necessary for our manufactures by the independent nations of Africa, let us hope that, whilst the Niger or Kwara Expedition under Baikie, to which I have adverted, is working towards that good end upon the West, the benevolent and enterprising Livingstone, already so dear to the natives, may be sent back to reside among his friends the Makololo, as the "Agent of the Queen of the people who love the Black Man."

AUSTRALIA.

Although there are grounds for believing that in the sixteenth century the Portuguese descried lands which, from their position in old MS. maps, must have been Australia, our own great navigator Cook was really the first to discover, examine, and describe large portions of the coast of this vast continent.*

Afterwards remaining for a long time among the "*terræ reclusæ*" of the world, this vast region, the interior of which proves to be a worthless desert,† now offers to the world the glorious spectacle of four great British colonies or separate governments on its eastern, western, and southern shores, whilst it pours forth on the old countries of Europe a shower of mineral wealth far exceeding in amount anything hitherto recorded in the history of mankind.

Thirteen years have elapsed since, as your President, I dwelt at some length upon an Australian topic, which seemed to me of paramount importance—the retention of Port Essington, and the establishment of other settlements in Northern Australia. Having lived to re-occupy this Chair, I will revert to the same theme; whilst I crave your indulgence if I previously engage your thoughts for a few moments on another Australian subject to which I have also given some attention—the gold produce of those countries.‡

* An ingenious paper or two have been written to show that the discoveries of Cook may have been based upon a knowledge of those early documents, but in a forthcoming volume of the Hakluyt Society, our Associate, Mr. Major, will demonstrate that such suggestions are entirely fallacious.

† See Award of the Patron's Medal, p. 367.

‡ For the first printed documents relating to Australian gold, see the following Memoirs, viz.—Journal Royal Geographical Society, 1844, President's Address; Letter from myself to Sir C. Lemon, Transactions Roy. Geol. Soc. Cornwall, 1846; Letter to the Secretary for the Colonies, 1848; Report of the Nineteenth

If New South Wales has exhibited a diminished supply from most of those tracts which first gave forth their golden abundance, and has only recently been enriched by a small additional quantity derived from a part of Bathurst county, the great coast-chain, bending to the west, and passing from the high level of the Mount Kosciusko of Strzelecki to Victoria, has proved to be charged in certain spots with an amount of gold quite unheard of in any other part of the world.*

The extraordinary rise of the flourishing colony of Victoria is the necessary result of such a vast auriferous produce, and the simple fact, that upwards of 125 tons of gold were sent to Britain in the preceding year, exclusive of local use and exportation to other countries, is so astounding, that a few years ago the mind would have been incapable of measuring the effects which such an enormous addition to the symbol of material wealth might produce upon the destinies of the human race.

Without pretending to statistical acquirements, I formerly ventured to contend that, as the scarcity of the precious metals throughout vast portions of the civilized world had long been a growing evil, and that the hoarding of a substance so easily hidden as gold would continue, and even increase, in countries having unsettled governments, so it seemed to me † that, great as the supply might be, it would not be more than sufficient to meet the demand. The dry river-beds of the old world had, in fact, to be filled up with the golden stream; and experience has now shown us how long it has taken to fill them, and how inadequately they are yet supplied.

But then comes this question. If the present annual amount of supply from Victoria and California should continue, must not a great depreciation of the precious metal follow? Now the answer must be shaped in accordance with unquestionable geological and statistical evidence. Judging from experience, all gold-veins in the solid crust of the earth diminish and deteriorate downwards,

Meeting Brit. Assoc. Adv. of Science, 1849, &c., Trans. of Sections, p. 60; Quarterly Review, vol. lxxvii. (1850), p. 429.

* The total produce of New South Wales in 1856 was 138,823 ozs., whilst the returns from Melbourne for the same year give the enormous amount of 125 tons 6 cwt. 6 lbs., or a money value of upwards of 12 millions. My distinguished friend Sir Charles Nicholson, formerly Speaker of the House of Representatives at Sydney, informs me that there can be no doubt that gold is surreptitiously disposed of to a considerable extent (by the Chinese especially); so that the actual quantity of the precious metal produced is probably in great excess of that specified in the official tables.

† Quarterly Review, *supra*.

and can rarely be followed to any great depth except at a loss in working them. Again, as the richest portions of gold ore have been aggregated near the upper part of the original veinstones, so the heaps of gravel or detritus resulting either from former powerful abrasion or from the diurnal wear and tear of ages, and derived from the *surface* of such gold-bearing rocks, are, with rare exceptions, the only materials from which gold has been or can be extracted to *great* profit. These postulates, on which I have long insisted, in spite of the opposition of theorists and schemers, have every year received further confirmation, and seem, on the whole, to be so well sustained as matters of fact, that the real problem we have now to solve is, How much time will elapse before the gold of Australia is finally riddled out of these heaps or basins, or extracted from a few *superficial* veinstones?

It would indeed be presumptuous in any one who had not closely surveyed the rich auriferous tract of Victoria to pretend to answer this question; but I beg my associates to understand, that there is a wide distinction between the measurable capacity of the contents of these broken heaps, or rare thin veinstones *in situ*, and those imaginary mountains with bowels of gold of the theorist, the very thought of which has shaken the nerves of so many fundholders. For, it must be remembered, that all the accumulations of broken golden materials, or the great sources of supply, have well-defined bottoms. They are, in fact, troughs filled in with gravel or shingle, the cubical contents of which, when the country has been thoroughly surveyed, can be computed; and though it may never be possible to predicate the amount of ore contained in all parts of such slopes or hollows, yet, judging from the rate of excavation now going on, a good geologist like Mr. Selwyn, who is conducting the survey in Victoria, may well be able to give us approximate data as to the probable number of years required to empty out the metalliferous fragments from all those troughs or basins in which they have been detected.*

The other sources to which I have alluded, I learn from Mr. Westgarth, an intelligent resident of the colony, have however of late been worked to some profit. These are the narrow veinstones of quartz rock, two or three feet thick, which at the surface are rich in

* A certain amount of the gold of Melbourne, whether occurring in drift or finely levigated clay, is reached by sinking shafts through basaltic coulees, which have evidently flowed in recent times, since they cover woody substances, including cones which, though in a charred or brown-coal condition, have been recognised by Mr. Robert Brown, as belonging to the remarkable Australian living genus, the *Banksia*, which that great botanist was the first to find and describe.

gold, and which have also been partially worked in California; and so long as the miner is near the surface, these veinstones will unquestionably well repay the cost of working them. When, however, they are followed downwards into the body of the rock, they have usually been found impoverished, either thinning out into slender filaments, or graduating into silver or other ores; so that these insulated thin courses of auriferous quartz—mere threads in the mountain masses—will soon be exhausted for all profitable purposes, when the upper portions shall have been quarried out.

But whatever may be the duration of the gold produce, Victoria has already become a wealthy colony, whose agriculture and commerce have risen to a pitch which will ensure her future greatness, even should the period arrive when her rich golden harvests are no longer to be gathered.

Nowhere in the annals of mankind has there been known so wonderfully rapid a rise, as that which has taken place in and around a spot which, surveyed only a few years ago, was first formed into a separate colony in 1837. In each file of the well-written periodicals of Melbourne, we see pregnant proofs that this spot is already one of the great centres of the world's commerce, and is inhabited by an intelligent and advancing people, well worthy of the parent stock.

The latest accounts from Western Australia, given in the detailed explorations of it, as published in our Proceedings, afford little hope that our colonists are there to be enriched by mineral wealth; the great saline desert which Sturt tracked from south to north, and Eyre travelled upon coast-wise on the south-west, having been met with at several points by Gregory and Austin. Again, rich as is South Australia in her Burra-Burra copper-mines, no material quantity of gold has yet been detected in that colony, notwithstanding some vigorous searches, among which those of Mr. Herschel Babbage have recently been brought to your notice.

Turning, then, from that knot of elevations which, forming the background of Victoria, are so prolific in gold, and exploring that long Eastern Cordillera which leads from New South Wales to the Gulf of Carpentaria, though we may meet at intervals with an auriferous patch or two to entice the explorer northwards, the real incitement to new settlers is found in the rich soil and the good herbage they fall in with, as they extend civilization northwards. Thus, from the clear and accurate survey of the vast Peel River settlements by that sound mining geologist, M. Odernheimer, we now

know that no valuable amount of gold is to be found there, either in the loose débris or in the solid rocks. Independently, however, of gold, the northern progress of civilization, as far as skill and energy can aid it, will assuredly be secured upon a solid basis by the present enlightened Governor-General Sir W. Denison.

The exploration of that eastern Cordillera, so long ago undertaken by our enterprising associate Count Strzelecki, to which I specially directed your attention in 1844, and which has since been carried further out by Leichhardt, Kennedy, and Mitchell, has recently had its northern and north-western offsets brought more definitely into notice by Gregory and his associates.* The advanced guard of the colonists has now even crept on so far beyond Moreton Bay, as to be already within about 560 miles of the head of the Gulf of Carpentaria; and judging from the fertile nature of most of the unoccupied lands, the period is doubtless not very distant when our countrymen will reach that great haven, which, penetrating for 500 miles into the continent, will surely, in future ages, be crowded with ships carrying on a great commercial intercourse between Australia and the Eastern Archipelago, Hindostan, and China.

Looking to that future, and even to our present interests, it was a subject of regret to many of us, that it should have been thought expedient to discontinue the occupation of Port Essington, and to abandon all intention of holding any other station along the northern coast of this vast continent. Unable now to enter upon a consideration of what bay of the eastern side of the Gulf of Carpentaria may be selected as an "entrepôt," I have little doubt that the time will soon come, when all minor difficulties will disappear before the energy of British colonists, in their endeavours to connect their Australian possessions with the rich marts of the Eastern hemisphere.

In treating this subject there is, however, another point which seems to me of such incalculable national importance, that I must beg your permission to say a few words upon it. If the idea of forming settlements through convict labour is to be discarded as respects the Gulf of Carpentaria, because the free population of New South Wales is advancing towards that great haven, then let us turn to that noble bay upon the north coast, of which Cambridge Gulf forms the western side, and whose eastern side receives the waters of the Victoria River. First explored by Philip King in

* Award of the Gold Medals, *ante*. No auriferous tract appears to have been discovered by Mr. Gregory's party.

1819,* and by Wickham and Stokes in 1839, the basin of the Victoria was recently the scene of the encampment of Gregory, whence he extended his researches southwards to the saline desert, and eastwards to the Gulf of Carpentaria. The real opinion of such an experienced colonist and geographer (whose merits have been already dwelt upon in conferring upon him our Founder's Gold Medal) is of infinitely greater value than those speculations which would describe the whole of that region, on account of its latitude, as unfit for the settlement of the Anglo-Saxon race! The plain answer to this view is, that on the banks of the navigable river Victoria, the party of Wickham and Stokes were perfectly healthy in 1839; and that recently our countrymen were stationed there for nine months without the loss of a man. Our medallist Mr. Gregory, after a residence of many years in Western Australia, has thus written to his friend, the former Governor of that province:† "This portion of Australia far surpasses the western coast both in its fertility and extent, and its capabilities for settlement. Good harbours are numerous along the coast, and there is abundance of fine country for stock and cultivation." Again, he says: "The valley of the Victoria far exceeds the best parts of Western Australia both in fertility and extent."

Let us also hear what Dr. Ferdinand Mueller, the botanist of the last expedition, says. This gentleman, who, by his Australian researches, has, according to Sir W. Hooker, placed himself in the front rank of botanists, having collected in tropical Australia about 1500 species of plants, of which 500 are new, thus writes to his friend Mr. C. Latrobe, the former Lieut.-Governor of Victoria:—"North Australia, with the exception of the east coast, possesses essentially a *dry Australian*, and not a *moist Indian climate*. *Fevers do not therefore exist*, and we escaped such jungles and swamps as those in which Kennedy's party exhausted their strength. There

* As these pages are passing through the press, my valued friend Dr. Fitton called my attention to his Appendix to the Voyages of that admirable surveyor the élève of Flinders, Capt. Philip P. King, along "Intertropical and Western Australia" (1826). I have communicated the letter of this eminent geologist to the Society, and the readers of our Journal will see in it an able effort to derive generalizations from the examination of specimens collected by King and the trend of the rock masses.

These descriptions of King and Fitton should be compared with those of Grey and Lushington, who in 1837 examined that portion of the north coast between Prince Regent River and the Glenelg, and also with the more recent observations of Mr. J. Beete Jukes, as given in his work entitled 'Sketch of the Physical Structure of Australia' (1847).

† Captain Fitz Gerald, R.N.

is abundance of good country in North Australia, and, with access for vessels to the lower part of the Victoria, full scope for the formation of a new colony. But as a new settlement can scarcely be formed in such a remote and certainly hot part of the globe without prison labour, against which the public mind is turned with such decision, and as, without great inducements, the squatters will find it for a long time unprofitable to migrate in this direction, I fear that the pastures of North Australia will yet be left flockless for a long time." *

With such facts before them, it is possible that our Government may see that this prolific and healthy region, *so remote and so entirely cut off by the great interior saline desert from all our established colonies, that no intercommunication can possibly take place,* † is, notwithstanding its summer heats, a perfectly fit and proper receptacle for our convicts, whose labour there would completely repay their cost of maintenance. When our prisons are crowded, and crime is rapidly augmenting with our increasing population, it does indeed seem desirable to seize upon such a zone of exile as is here offered, and, by removing worthless characters from our land, render them really useful in occupying the only coast of that continent on which the British flag does not now fly, though it has been there twice unfurled. But I forbear to press this feature of a topic which can be better handled by politicians; and all I venture to urge is, that, whether by forced ‡ or free labour, North Australia should be colonised.

When presiding over you in 1844, and in then expressing an opinion from the best authority § that, if our Government would

* Mr. Elsey, the surgeon of the expedition, who has reached London whilst this Address is passing through the press, completely confirms this view of the productiveness and healthiness of the region.

† See Grounds of the Award of the Patron's Gold Medal to Mr. Gregory, and a description of these tracts.

‡ It has indeed been stated, that the inhabitants of the free colonies of Australia protest against any further transportation to that continent. Now, a resident of Victoria in S. Australia might with as much consistency declare, that there should be no penal settlement in any part of the world, as that the *Victoria of North Australia* should not be so first settled through convict labour; for the great interior saline desert more completely separates the northern from the southern region of Australia than any sea. That desert is utterly impassable by human efforts, and any convict who should escape from Victoria River or Cambridge Gulf would have to find his way by upwards of 4000 miles of sea voyage before he could reach Melbourne! It is indeed extraordinary that in the debates upon this subject, no allusion has been yet made to Cambridge Gulf and the rich basin of the Victoria river. See Debates H. of Commons, May 15, 1857, when Mr. Baxter quoted the Melbourne Correspondent of 'The Times.'

§ Journal Roy. Geogr. Soc., vol. xiv., President's Address, p. xevii.

render Port Essington a permanent and independent colony, rich mercantile houses would at once set up establishments there, and freight large vessels to trade with the Eastern Archipelago and China, I wrote in the full conviction that, even if that particular station should be abandoned because it was exposed to tornados, other sites could be selected in a region, which so many experienced naval officers and other authorities have eulogised as offering capacious harbours and a climate not unsuited to Europeans—lands in which the pastures are magnificent, whilst the sea swarms with the finest fishes.

In the face, then, of these evidences, is the state of indifference of our country to North Australia to continue? Is Britain not to commence the formation of a settlement, whether by penal servitude or free labour, in the fertile basin of the northern Victoria or elsewhere, and thus secure future entrepôts for her commerce? What better guarantees can be had that success would follow, than the fact, that in the worst and most exposed part of this region (Port Essington) a British garrison was in a healthy state for several years, and that in its more southern portion the explorers in two expeditions have equally preserved good health?

Lastly, looking to the future destinies of our country, is it to be forgotten, that France has recently taken possession, not only of that New Caledonia which our own Cook discovered and named, but also of the Isle of Pines, where our colonists from Sydney carried on a trade in sandal-wood, and has thus acquired a "point d'appui" on the eastern flank of our largest Australian colony?

Or, ought we to close our eyes to the vast importance not only of securing good harbours of refuge in Northern Australia, but also of there establishing naval stations, which would prove invaluable for steam navigation, and where, in the event of war, our fleets may rendezvous, and thence move directly upon the flank of any enemy, who might be operating against our Eastern trade and possessions?

In short, it is scarcely possible to point to any region of the globe where British occupation is so imperatively called for, whether as a precaution, or with a view to future commercial interests. Expressing, then, an earnest hope that a settlement may be soon established on the banks of the Victoria, and in the adjacent Cambridge Gulf, and believing that great national advantages must follow, let us trust that, if such a consummation be attained, the proposers of it may not be forgotten, and that it will be remembered that the last

North Australian expedition, now happily completed under the direction of Her Majesty's Government, was a child of the Royal Geographical Society.

NORTH AMERICA.

British Possessions.—The gradual advance of civilized man towards the remoter regions of North-western America, has long drawn the attention of geographers to those extensive tracts, still distant from the settled country, which afford an almost undisturbed asylum to the aboriginal population of the continent. It would scarcely be credited, that within the limits of British America, a region including at least 112,000 square miles, extending from the head waters of the Assiniboine River to the foot of the Rocky Mountains, and from the northern branch of the Saskatchewan to the 49th parallel of latitude, our boundary with the United States, has remained almost completely unexplored.

The comparative scarcity of fur-bearing animals in this portion of the territory of the Hudson Bay Company, the warlike character of the Indians, and other causes, have alike contributed to prolong our ignorance of lands which may, at no distant time, become the home of thousands of our countrymen.

Mr. Palliser, a traveller, who had already spent a considerable time in the neighbouring districts of the Upper Missouri, and whose adventures as a sportsman form the subject of a popular work, conceived the project of employing two years in the exploration of the tract to which I have referred, along with the adjoining portion of the Rocky Mountains.

Mr. Palliser's original intention was, as I have understood, to undertake this journey at his own expense and with no other companions than those whom he might engage as voyageurs and hunters to join him in traversing the Indian territory. Having, however, addressed himself to our Secretary, his proposal was at once brought before the notice of the Council, by the direction of which it was referred to our Expedition Committee and fully discussed. In consequence of this a letter was directed by myself on the 6th of January to the Right Hon. Henry Labouchere, the Secretary of the Colonies, in which the Council strongly advocated the exploration of that portion of British North America between the parallels of 49° and 53° N. latitude and 100° to 115° W. longitude. The chief objects of the exploration were then stated to be—

1st. To survey the water-parting between the basins of the

Missouri and Saskatchewan; also the course of the south branch of the Saskatchewan and its tributaries.

2nd. To explore the Rocky Mountains, for the purpose of ascertaining the most southerly pass across to the Pacific, *within the British territory*.

3rd. To report on the natural features and general capabilities of the country, and to construct a map of the routes.

Mr. Palliser's experience, his success in conciliating the good will and respect of the Indians, and his anxiety to make his journey conducive to the increase of scientific knowledge, pointed him out as well fitted to be the leader; but it was evident that without the aid of fellow travellers trained to accurate research and accustomed to the use of scientific instruments, no very accurate results could be expected from the expedition.

After considerable discussion, the Lords of the Treasury consented, on the recommendation of the Secretary for the Colonies, to submit to Parliament a vote of 5000*l.* for this purpose, on the understanding that all the collections and results of the expedition should be placed at the disposal of Government.

Three scientific gentlemen have been since appointed to the expedition—Lieutenant Blakiston, of the Royal Artillery, on the recommendation of the President of the Royal Society, to conduct the astronomical and physical observations; Mr. Bourgeau, an experienced and successful botanical collector, selected by Sir William Hooker, the Director of the Royal Garden at Kew; and Dr. Hector, a medical gentleman recommended by myself on the score of his geological and zoological acquirements, as well as for his general fitness to contribute to the objects of the expedition.* Mr. Palliser is, moreover, himself conversant with the use of the instruments which have been supplied by Government, and has the advantage of an experienced assistant as his Secretary; so that the important object of determining the geographical position of the points visited by the expedition has been amply secured.

The instructions given to Mr. Palliser by H.M. Secretary of State direct, that the journals of the expedition, together with the records of the observations, shall be made out in duplicate, and that one copy shall be transmitted to England, from time to time, as oppor-

* General Sabine has instructed Lieutenant Blakiston in making magnetical observations, a Committee of the Royal Society furnished the necessary instructions in physical science, and the geological suggestions were supplied by myself.—R. I. M.

tunities may occur. An assurance was also given that the journal of the expedition shall be regularly communicated to this Society, according as it shall be received at the Colonial Office.

The departure of the expedition was somewhat delayed by the severe illness of Mr. Palliser, but he sailed with his companions on the 9th of May, and information has been received of their arrival at New York in good health and with their instruments in working order.

During the present season it is intended that they should proceed from Fort William on Lake Superior to Lake Winnipeg and Fort Garry, examining *en route* some portion of the watershed between Lake Superior and Rainy Lake. From Fort Garry the expedition will proceed westward to the head waters of the Assiniboine River, and will explore some portion of the country between the southern branch of the Saskatchewan and the boundary of the United States, turning to the northward to winter at Carlton House Fort.

The summer of 1858 is to be employed in traversing the country of the Blackfeet and Blood Indians, between the two branches of the Saskatchewan, tracing the southern branch to the foot of the Rocky Mountains, and in endeavouring to settle the disputed question as to the existence of a practicable pass in the chain, between the Kootaine Pass south of the 49th parallel, and the Pass between Mount Brown and Mount Hooker, more frequently used by the servants of the Hudson Bay Company.

Apart from the public interest which belongs to the exploration of a large and important portion of British territory, it is impossible not to anticipate valuable additions to natural science from the united labours of the members of this expedition, and to feel proportional satisfaction, that Government should have seen the propriety of complying with our recommendation by fitting it out in an efficient manner.

Let me add, that the establishment of a direct line of intercourse between our Canadian possessions and Vancouver Island, which being 250 miles in length, contains good ports and valuable coal-seams, is not the least important of the national interests connected with this survey.

United States.—The omission at our last anniversary of the progress made in the Coast Surveys of the United States, was owing to the circumstance that the Reports of it had not been received. Since that date, however, the Society has received from Professor A. D. Bache, the Superintendent of the Coast Survey, the Report

for 1854 of the progress of the department under his very able guidance. This great work has been so often mentioned with praise in former Addresses from this chair, that it is unnecessary for me to do more than direct the attention of all geographers to the continued activity and effective practical efforts of Professor Bache and his assistants.

The report on the United States Coast Survey for 1855, has, I regret to say, not yet been received. I hope, however, at our next Anniversary, to be enabled to do full justice to the advances in this department, and the other branches of geographical science which are in progress in the United States.

The eighth volume of the excellent 'Contributions to Knowledge' published by the Smithsonian Society has been received, and comprises most valuable papers by Mr. S. F. Haven, Professor Olmstead, Major Alvord, Dr. Jones, and Mr. Torce, to which I beg particularly to refer.

The American Geographical and Statistical Society—established at New York in 1854, under the presidency of the celebrated historian Bancroft—has now become a numerous and important body. I refer with gratification to one of the pamphlets which this Society has recently published, entitled 'A Report on Recent Discoveries in Sub-Oceanic Geography.' Referring to the data gathered by our Associate, Lieutenant Maury, in the Hydrographical Department at Washington, this Report as put forth by Mr. W. H. C. Waddell, U.S.N., points to the observations of Commander Rodgers, on the temperature and specific gravity of the waters of the Arctic Ocean at various depths; showing that near the surface the water is warm and light, at mid-depths cold, and at the bottom warm and heavy. This discovery, it is inferred, furnishes the only link that seems to have been wanting to complete by facts, the theory of open water in a really polar sea, as originally suggested by General Sabine, and as since supported by De Haven, Kane, and other Arctic voyagers.

Then, again, the deep-sea soundings of Lieutenant Brookes demonstrate that the most profound repose prevails at vast depths, the bottom being found to be of a down-like softness, and composed in most parts of the skeletons and casts of microscopic shells and infusoria.*

* The details of the zoological results afforded by these operations between America and England, as conducted by Lieutenant Berryman, are reserved for future publication.

These observations, so important to the physical geographer, mariner, and naturalist, when combined with the experiments of Professor Morse, led the way to the formation of a company to construct that wonderful telegraphic cable of which I have elsewhere spoken, whilst the wind and current charts as registered in the United States have enabled speculators to select the best line for paying out the electric cord, which, scarcely thicker than a finger, is to connect the New World with the Old.

I must further refer you to the Report of the American Geographical Society for most curious information, as derived from the microscopic examination by Professor Bailey of West Point, of certain unabraded particles brought up from vast depths, which being ashes of volcanic origin, afford fine scope for the speculations of the geographer and geologist respecting the currents by which such materials may have been carried to their present tranquil abode.

One of the most striking works which the American Government has published in the last year is Commodore Perry's 'Narrative of the Voyage of the Squadron under his orders to China and Japan.' This work is replete with valuable geographical and ethnographical notices of the tracts visited, and is illustrated by many explanatory maps and lithographs. It was transmitted to us by that eminent scholar of the United States my friend Mr. Edward Everett, so justly valued by every man of science and letters in our country.

The question of the priority of discovery of the Bonin Islands, so amicably discussed between Commodore Perry and my predecessors the Earl of Ellesmere and Admiral Beechey, has, I trust, at length been settled by the memoir on those islands published in the last volume of our Transactions.

Geographical progress in the United States has been farther marked by the production of two maps of North America by the distinguished geologist Professor Henry Rogers, as brought out by Mr. Keith Johnston, of Edinburgh. One of these is purely a geographical map, on which the strait boundary lines of the different States, as marked by strong colours, necessarily interfere with the natural features of the country. The other, on the contrary, being a geological map, is a representation of ancient nature, in which the author's peculiar talents shine forth; and the masses of land, independent of the shackles which the interests of man have imposed upon them, stand out in all their simplicity.

Our library has also been enriched since the last Meeting with

a work by Captain Randolph B. Marcy, of the U.S. 5th infantry, on his exploration of the Red River of Louisiana, in which he was assisted by Captain George B. McClellan, of the U.S. Engineers. The book is accompanied by reports on the natural history of the territories visited by the expedition, and also by two valuable maps of the country between the frontiers of Arkansas and New Mexico, and of the tract embraced within the basin of the Upper Red River.

Mr. J. G. Kohl, the industrious labourer in the field of statistical research, whose works on Russia and other countries have obtained for him due consideration, has now entered upon the illustration of the geography of America, and, as a prelude to labours which he hopes will be found useful, has just published a little treatise under the title of a 'Descriptive Catalogue of those Maps, Charts, and Surveys relating to America, which are mentioned in Hakluyt's Great Work.'

Though the last session of Congress was the short one, or from December to March only, the subject of geography was not neglected. Adequate grants of money were made for the publication of the surveys of the Expedition to the North Pacific Ocean and Behring Strait, and for finishing the publication of the Charts made by the late Expedition for the Exploration and Survey of the River la Plata and tributaries, as well as for an Exploration of the Paraná and the tributaries of the Paraguay River.

I am also informed that towards the verification of the Survey of the Atrato and Truando Rivers in New Granada, as proposed by Mr. Kelley (see last Anniversary Address, p. cccxii), for the purpose of making a ship canal between the Atlantic and Pacific Oceans, Congress has liberally granted 25,000 dollars. It has also, I am happy to say, been intimated, that the Governments of Great Britain and France are not unwilling to assist in this very important preliminary Survey.

CENTRAL AMERICA.

The communication by canal between the Pacific and Atlantic, to which my predecessor called attention, has a much better chance of being investigated, now that all the states of Europe are at peace, and that the most friendly relations possible exist between the Governments of the United States and Britain.

The Proceedings record how favourably the project of Mr. Kelley of New York was entertained by this Society, and show how deep an interest we take in realizing the early anticipations and wishes

of the illustrious Humboldt. I can only say that no exertion on my part as the President of this Society shall be wanting, to support any proposal which may be made to bring about such a simultaneous and conjoint Geographical Survey made by the Governments of Britain, France, and the United States, as shall definitively settle the points at issue, and demonstrate whether or not it be practicable to execute a great inter-oceanic canal.

SOUTH AMERICA.

New Granada.—Captain Battersby, who has been lately travelling in New Granada, strongly advocates the superior commercial advantages of the River Atrato over the Magdalena as a channel of communication, not only with the people on the upper waters of that stream, but with those of the extensive districts bordering the Cuenca, and of the cities of Antioquia and of Cartajo, the population of which alone he estimates at 30,000; expressing his belief that ere long the traffic on the Atrato must be carried on by steamers, and that then the Gulf of Darien will become the centre of nearly all the commerce of New Granada.

It appears that, in the course of the last year, two steamers, drawing 7 feet water, did ascend the river as high as Quibdo, the capital of Choco. British goods destined for that place are now sent round Cape Horn to the Bay of Buenaventura, and have to be carried thence on mules across the Andes.

Chile.—M. Plessis has completed his map of the province of Santiago de Chile, coloured geologically, a copy of which has been received by the Society, through the kindness of Mr. Bartholomew, who has engraved it.

Those who wish for the latest data on the geographical and other statistics of that section of South America will find them in the *Anuario Chileno*, a yearly publication which contains much useful local information, and in the *Anales de la Universidad*, another periodical, principally edited by M. Domeyko, a well-known geologist and good observer.

Peru and Bolivia.—Mr. Bollaert, our associate, has drawn attention to the existence of a statistical account of *Peru*, published in Lima by Don J. M. Cordova y Urrutia; as well as to a similar work on *Bolivia* by Don José Maria Dalence of Chuquisaca; both of which, if translated, he thinks might be useful to parties interested in those countries.

Rio de la Plata.—Lieut. Page's preliminary Report has been pub-

lished '*On the Exploration and Survey of the Rio de la Plata and its Tributaries*,' noticed in Admiral Beechey's Address last year.

The United States' steamer *Waterwitch* was employed on the service in question for more than three years, during which the Paraná and Uruguay, the principal affluents of the Plata, were explored, and the river Paraguay ascended as high as the Brazilian fort of Coramba, in lat. 19° S. From that point the further progress of the vessel was not permitted by the ruling powers, much to the disappointment of Lieut. Page, who hoped to have led the way in opening a communication by steam for the first time with the rich provinces of Matto Grosso and Cuyaba, on the higher waters of this magnificent river.

There must, doubtless, be a great mass of new information to be collected respecting those countries which, under the Colonial rule of their old masters, were closed to all the rest of the world; and we cannot, therefore, but join in anticipating a rich harvest of interesting matter respecting them whenever the further details of the expedition shall be published in extenso, as no doubt they will be ere long, conformably to the liberal and enlightened practice of the Government of the United States.

It is, however, but due to others, when treating of this subject, to mention that the rivers Paraná and Uruguay have been already very carefully surveyed by our own officers, and that Captain Sullivan's admirable charts of them, upon a large scale, were long ago published by the Admiralty under the superintendence of that eminent hydrographer Sir Francis Beaufort.

Those rivers, as well as the Paraguay throughout its course, had been also previously mapped (and, it may be inferred, with some accuracy) by commissioners eminently qualified for the purpose, who had been chosen by the Courts of Spain and Portugal to settle and define their respective rights and limits, in virtue of the treaties of 1750 and 1777, and whose labours on the last occasion extended over a period of no less than twenty years.

The portion of them best known, perhaps, is that connected with Paraguay, in which every place of any importance was fixed by astronomical observation, as may be seen in the well-known work of Azara, who was one of the Spanish commissioners.

Copies of many of the maps of that part of this grand survey were purchased some time ago by the British Museum, and may be referred to in the MS. Department.

The most important result of Lieut. Page's expedition as yet

made known, is the exploration of the River Salado, a tributary of the Paraná, with the evidence adduced of its being navigable in the greater part of its course through the upper provinces of the Argentine Confederation. This has been since verified to a considerable extent by the passage down the river of a boat from Matará,* in the province of Cordova, to Santa Fé, on the Paraná, under the personal guidance of Don Antonio Taboada, a brother of the Governor.

M. Amedée Jaques, a French gentleman, who joined Lient Page in his journey into the interior, to explore the course of this river, has published in the '*Revue de Paris*' (last March) a highly graphic account of the personal adventures of the party, and of a bloody conflict they had with the wild Indians in the Chaco.

Coast of Patagonia.—Mr. Bragg, an English engineer employed at Buenos Ayres, has discovered and surveyed a good port and roadstead near the old settlement of the Jesuits, in the vicinity of Cape Corrientes, to the south of Buenos Ayres, which had hitherto escaped notice, but which is likely to be of some importance as a place of export for the produce of the adjoining districts. The details respecting it have been forwarded to the Hydrographer of the Admiralty.

Orinoco.—At the commencement of the present year, a proposition was laid before the Society by Admiral Sir Charles Elliot, late Governor of Trinidad, for the resumption of Humboldt's scientific investigations on the Orinoco and its affluents.

The prospective estimate formed by the illustrious philosopher of the advantages to be anticipated from the junction of the Tuamini, a branch of the Orinoco, with the Rio Negro, which falls into the Amazon, together with his more earnest advocacy of the importance of the navigation of the Meta, unquestionably place this suggestion in a very favourable light. The region drained by the vast water-system of the Orinoco is described by Humboldt as "*enrichi des productions les plus variées*;" and though we may no longer look for the fabled El Dorado of the adventurous Raleigh, the hope may yet be indulged that, by exploratory enterprise and the judicious application of steam navigation, a real El Dorado may yet be founded in this fertile portion of the western world. Nor can I here refrain from an allusion to the valuable edition by our dis-

* Sir Woodbine Parish, in the first edition of his work on those countries eighteen years ago, mentioned that the Salado was known to be navigable as high as that place (Matará), and that if it were used, there would be an enormous saving of land carriage in the conveyance of goods from Buenos Ayres to Santiago in the interior.

tinguished medallist Sir Robert Schomburgk, formerly her Majesty's Commissioner to survey the boundaries of British Guiana, of the "Discovery of the Empire of Guyana by Sir Walter Raleigh," printed for the Hakluyt Society in 1848. Having himself explored what he describes as "the wondrous delta of the Orinoco," Sir Robert was able to enter, with the fullest intelligence and zeal, into the reproduction of those elegant descriptions by Raleigh which he had read with so much delight. These early narratives not only charm us by the quaint and nervous language in which the manly exploits of our ancestors are related, but frequently record discoveries or assert important truths which, from those distant times, lie dormant or are regarded as fictions, until accident or science unfolds anew, to the adventurer of the present day, the secret of their existence. I may mention, by way of illustration, an instance of the manner in which a fact of the greatest moment to the interests of the world may thus lie buried for more than two centuries and a half after its distinct announcement by one of our most distinguished early travellers. In the "World encompassed by Sir Francis Drake," edited for the Hakluyt Society by our associate Mr. Vaux, we find it said of California, which then received from Drake the name of Nova Albion, "There is no part of earth here to be taken up wherein there is not some special likelihood of gold or silver." This voyage of Drake's was made in 1578, and it was not till 1848 that the whole world was astounded by the discovery of the Californian goldfields.

Observatory of Santiago.—"The astronomical geography of positions (Baron Humboldt writes to me) has made progress through the useful establishment of the observatory of Santiago de Chile, founded during the residence of the able astronomer Lieut. Gilliss, of Washington. The Director of the Observatory of Santiago, M. Moesta, has found the difference of longitude between Santiago and Greenwich 4h. 42' 32".4 in time, probable error 3".2.

"M. Moesta thinks, that all the west coast of South America is 17" too much to the west on the best maps. I had found that Callao de Lima was 5h. 18' 16" west of Paris by the passage of Mercury over the solar disc; now Admiral FitzRoy finds the difference of longitude between Valparaiso and Paris 4h. 50' 6".6; and that between Callao and Valparaiso by means of chronometers 0h. 22' 8".4; so that Callao would be 5h. 18' 15" west of Paris, which coincides to within one second of time with the result of the observation of the passage of Mercury observed by me—an accuracy probably accidental. Admiral Beechey has repeated the calculations of Herz and

FitzRoy, showing that the difference of longitude in time between Valparaiso and Paris is $10''\cdot4$ in excess. Callao, therefore, would be only 5h. 18' $4''\cdot6$ to the west of Paris. The passage of Mercury, however, over the solar disc, which was observed on the 4th of May, 1832, at Lima by Mr. Scholz, again gives for Callao 5h. 18' $13''\cdot7$ west of Paris—supposing the chronometrical differences between Lima and Callao, which I published in the second volume of my *Astronomical Observations*, to be correct. The electric telegraph, established in May, 1855, has given 0h. 3' $56''\cdot5$ for the difference of longitude between Valparaiso and Santiago. M. Moesta, therefore, places Valparaiso in 4h. 55' $49''\cdot5$; and I and FitzRoy 4h. 56' $6''\cdot6$."

After this clear and succinct analysis of so valuable a geographical datum, obtained through an expedition of the United States, the veteran philosopher concludes in these words: "And thus this long endurance of life (*cette patience de vivre*) has enabled me to witness all these rectifications." *

In looking to the general configuration of South America, I am further reminded by Baron Humboldt, that the trachytic regions form insulated bands in the Cordillera, such as the volcanic Sangai, to the S.E. of Quito, which is constantly throwing out incandescent scoriæ, like those of Stromboli. This insulated trachytic mass, which has a diameter of 45 English miles only, rises out of a granitic and gneissose plateau 16,070 French feet above the sea, thus presenting an analogy to the structure of the Thian Chan in Central Asia.

* Having been made acquainted by my friend Mr. Pentland with data respecting Admiral Beechey of which I was ignorant, it is due to the memory of my lamented predecessor to state, that in a letter to Admiral Krusenstern, he fixed the longitude of Valparaiso by independent astronomical observations at 4h. 46' $37''\cdot6$ ", only differing $8''\cdot6$ from that deduced by Moesta's observations; and as the latter are probably $3''\cdot7$ in error, it follows that there may be little more than one mile between his result and that of Admiral Beechey."

The position adopted on the Admiralty Charts, and in Lieut. Raper's elaborate *Tables of Positions*, has been deduced solely by means of chronometers during Admiral FitzRoy's surveys; the latter officer having made few absolute astronomical observations; whilst his chronometrical data are entitled to the greatest degree of confidence.

I am also informed by Mr. Pentland, that he having made independent observations, similar to those of Admiral Beechey (moon culminating stars) at stations referred trigonometrically and chronometrically to places on the coast, he found for the latter, longitudes agreeing with those deduced from the position of Valparaiso, as determined by my distinguished predecessor. Thus the position of Arica deduced by Mr. Pentland from observations made at La Paz, and carried on by a series of triangles and chronometers to that place, is identical with that deduced from Beechey's longitude of Valparaiso carried on by FitzRoy's chronometrical chain to the Peruvian port.—R. I. M.—*1st Aug. 1857.*

* See *Journal R. G. S.*, vol. ix. p. 502; also Daussey's *Positions Géographiques*, 1842, p. 67, &c.—Ed.

FINAL ARCTIC SEARCH.

When I last addressed you as your President in 1853, it was still my hopeful task, as in the previous year, to urge the Government and the country to send out another expedition in search of my old and honoured friend Franklin and his crews. I then congratulated you upon fresh expectations having been raised by the successful voyage of Lady Franklin's little vessel, the *Isabel*, under Inglefield, and also in anticipation of good results from the large public expedition under Belcher and Kellett. Alas, we know too well what fatalities interfered with the solution of the great problem, so clearly recorded last year by my lamented predecessor. Since this Address was delivered, the light which had been thrown upon the subject, whether by the information and memorials brought home by Dr. Rae, or the exploration down the Back River by Dr. Anderson, has rendered me still more anxious to ascertain the real fate of the *Erebus* and *Terror*, and their gallant crews. Through the unexpected tidings communicated by our medallist Rae, we were no longer allowed to speculate on the course followed by Franklin; the "whereabouts" of the journeyings of some, at least, of our missing countrymen being for the first time made known. Had these traces been discovered two years sooner, what efforts would not have been saved to Great Britain and America! All the endeavours of Belcher and De Haven to penetrate northwards by Wellington Channel, as well as those of Kellett to communicate by a north-western course with Collinson and McClure, and the almost superhuman struggles of Kane to reach a Polar basin—all these might have been averted! The daring efforts to penetrate with ships through the intricate channels which separate the great islands of the Arctic Archipelago, would have been stopped by that one fact, and the Government would have known how to dissipate at once the mystery which still hangs over the fate of the missing vessels and a large portion of their crews.

Is it, therefore, to be wondered at that many men of science willingly signed a memorial,* beseeching the Government to make a final endeavour to search efficiently the area, at the edges of which

* This document, which was prepared by myself, the list of subscribers being headed by Admiral Sir F. Beaufort and General Sabine, was most kindly received by Lord Palmerston in June, 1856, a month after the last Anniversary of this Society. My predecessors, Lord Ellesmere and Admiral Beechey, were among the subscribers, as well as Lord Wrottesley, who in his last Anniversary Address to the Royal Society handled the subject with great effect. See Proc. Roy. Soc., No. IV.

the relics were discovered, and where the Esquimaux reported, that some of the wanderers were last seen? I regret to say that notwithstanding the kind consideration of the Prime Minister, and the hopes we were led to entertain, the limited search asked for has been withheld, and Lady Franklin has once more been thrown upon her own resources, to terminate that inquiry which my friends and associates felt it to be the duty of the nation to complete.

The intense feeling displayed on this subject by our kinsmen the Americans, has been demonstrated by the strenuous efforts made by their Government as well as by Mr. Grinnell. In 1853 I rejoiced with you in learning, that this liberal philanthropist was about to renew with his own funds another Franklin search, and that Kane was about to sail on such a voyage. That noble young man, as I have already shown, extended far the northern limits of Smith Sound, at the head of Baffin Bay, and opened out headlands, glaciers, and frozen seas, hitherto unknown to us. This search and all the other trying endeavours were, we now know, made in wrong directions.

If, for example, Collinson had not made extraordinary efforts to force his way to the north-east through packs of ice, but had simply confined his voyage to the channel along the north coast of America, which he found so easy to follow, and by which he brought his ship safely back, and had known that the tract near King William's Land and the mouth of the Back River, the edges of which he actually touched, formed the goal we now desire to reach, the problem would have been for ever solved by him. If, then, there is no obstacle to a renewal of the western route, by Behring Strait and the north coast of America, what difficulty can there be in reaching the north-eastern edge of the limited area sacred to the memory of Franklin, by a ship proceeding to Batty Bay or Wager River, places which our vessels have already reached, and whence they have also returned unscathed? The instructions of Lady Franklin to Capt. Kennedy, the Commander of one of her private expeditions, were, that on reaching that tract where poor Bellot has left his name, a search was to be made south-westwards; and had the suggestion of that clear-sighted woman been followed, she would really have been the first to discover, by her own efforts, the remnants of her husband's expedition.

An ingenious essay, by Mr. Findlay, on the probable course pursued by Sir John Franklin's expedition, which was published in the last volume of our Journal, and in which the directions of the Arctic

currents are delineated, has sustained the idea which I once thought possible, but afterwards abandoned, that the two ships seen floating on an iceberg on the Newfoundland Banks may have been the *Erebus* and *Terror*. The same author has recently published an Appendix, in which, supporting his view by letters from parties well acquainted with the seaman who made the observation, he also gives a letter from Captain Ommaney, expressing his concurrence in the same view. With every respect for the opinions of such contemporaries, I cannot yet admit, that the vessels seen floating southwards may have been the *Erebus* and *Terror*; nor can I see why they may not have been other vessels. But even if it be granted that the question is to be thus disposed of as respects the ships, it is consolatory to find, that both Captain Ommaney and Mr. Findlay strongly advocate a renewed search, to dispel our ignorance of the only region, whose exploration can solve the great Franklin mystery. Whatever may be thought of Mr. Findlay's view of Peel Sound being closed to the south, his suggestion, that the unexplored tract between the south end of Melville Sound and Victoria Strait is the area, which ought specially to be searched, is entitled to the serious consideration of all those who continue, like myself, to take a lively interest in the solution of this problem, and who are bent upon ascertaining, by positive survey, whether no traces of the ships or their records can be found, and also to satisfy us that no survivors are eking out their existence among the Esquimaux. On this last point I can never forget what I heard from the lips of Captain Hartstene himself. After our Sovereign had in December last visited the *Resolute*, that token of the good-will of the American people, the British Queen inquired, with the right feeling which is her characteristic, if he thought that any of her poor sailors might be still alive, and the gallant officer assured Her Majesty that, in his opinion, such might well be the case.

A strong tendency towards this belief, has indeed gained much ground since the publication of the admirable volumes of Dr. Kane. One passage from that work has been already cited in the brief tribute I have paid to the eminent man, who, when he was himself in dire want and had unexpectedly procured some fresh supplies of animals, thus exclaims: "How can my thoughts turn despairingly to poor Franklin and his crew? . . . Can they have survived? No man can answer with certainty, *but no man, without presumption, can answer in the negative.*" . . . "Of the one hundred and thirty-six picked men of Sir John Franklin in 1846, Northern

Orkney men, Greenland whalers, so many young and hardy constitutions, with so much intelligent experience to guide them, I cannot realize that some may not be yet alive—that some small squad or squads, aided or not aided by the Esquimaux, may not have found a hunting ground.”

On this subject there has truly been much misapprehension in the mind of the public, owing to their ignorance of the geographical data on which hope is founded. The area within which some of the crews of Franklin were last seen, though much further to the south than the wild islands and headlands of the Arctic Archipelago, in which the Resolute and her companions were abandoned, and though easily and safely approached by sea, either from the west or east, is hopelessly cut off from all land furnishing the necessaries of life, by a broad, cold, and sterile region, occupied by a few wretched natives. The individuals of Franklin's expedition who might have survived, if located to the north among the Esquimaux who fatten upon seals and walruses, could by no possibility track their way southwards over these wilds, on which even the reindeer finds no sustenance. It is chiefly in the meridians on either side of the Back River that this sterility prevails; and here it was that Franklin and his former companions, Back and Richardson, suffered so intensely in 1824, that their existence was then nearly terminated.

With such a wilderness between them and any home, the exhausted crew of Franklin, contemplating nothing but starvation in that sterile icy region of central North America, would naturally, as Kane has suggested, seek a refuge among the Esquimaux, in some chosen spot where animals abound.

When we know from the declaration of a highly respectable seaman still living (one indeed of the crew of Parry),* that he was on the point of embracing the life of those savages, merely for the allurements of the chase and the wild attractions it offered, we can well imagine that those who were left of Franklin's noble crew, should, according to the dictates of nature, endeavour in like manner to prolong their existence. Let it therefore be impressed on the public mind, that although the area, on the southern edges of which some of Franklin's people were last seen, has been approached and can be easily again visited by ships, it has never yet been examined; † and also, that though it be to the south of many tracts formerly penetrated, yet is it so cut off by impe-

* See 'Times,' December 20, 1856, Letter from Mr. John Pead to myself.

† Montreal Island, which has alone been visited, is incapable of affording sustenance even to Esquimaux.

*netrable wilds from the nearest parts of North America, in which food can be obtained, that by no exertion could any survivors of the Erebus and Terror be saved except by sending out a well-found ship or ships to the points nearest to such insulated Esquimaux quarters.**

As you are all acquainted with that appeal already mentioned, which my friends and myself thought it our duty to make to our countrymen on this exciting topic, I am sure you will rejoice with me, that the charge of the expedition, which Lady Franklin has resolved to send out, should have been undertaken by the eminently distinguished Arctic explorer, Captain M'Clintock. Commanding a thoroughly adapted screw yacht, the Fox, assisted by a well-qualified Polar associate, Lieut. W. R. Hobson, with Dr. D. Walker as the surgeon, and provided with a picked crew, this gallant officer will realize all that a firm resolve, a clear head, and skilful calculations can effect.

Let it also be recorded in our volumes, that amid the many generous Englishmen who have responded to the call, the name of Captain Allen Young, of the Merchant Service, stands pre-eminently forward; since this meritorious young seaman, who has already commanded large ships in various seas, has not only volunteered his

* Proposals were made by Lieutenant Bedford Pim and Dr. King to combine a land or river journey with maritime exploration; the former having, indeed, communicated previously a long memoir on the subject to the Geographical Society. Applauding those experienced men for their laudable endeavours to rouse public sympathy to continue the search, and reminding my associates that Dr. King accompanied Franklin in a former voyage, and that Lieut. Pim was highly commended by myself and others, not only for his Arctic researches, but also for his devotion to the cause in proposing to reach the supposed scene of disaster, by traversing Siberia, followed as it was by his march across the ice of Banks Sound to rescue M'Clure,—still, looking to the slender results of the recent land-expedition down the Back River, though carried out with all possible energy by Mr. Anderson, I cannot bring myself to believe that the renewal of any such enterprise can have a satisfactory issue. In fact, as we now know it to be impracticable that an exploring land and river party can convey more food in their canoes than will just enable them to make a hasty and wholly ineffectual search near the mouth of the river, all efforts to explore the adjacent northern tracts where those Esquimaux are chiefly living, among whom some of the missing navigators were heard of, must cease just at the moment and on the ground where they ought to be pursued. No exertions, in short, save those which can be made upon the ice by vigorous men proceeding from a well-supplied ship, can succeed in really ascertaining the fate of the crews of the Erebus and Terror. Other memoirs, suggestive of different plans for the most effective search after the relics of the Erebus and Terror, have been recently sent to the Society; thus evincing the great interest still taken by the public in the settlement of this question. These memoirs are: 'On the Discovery-ship Resolute and the Arctic Currents,' by M. Turnbull; 'On the Search for Sir J. Franklin,' by Chief-factor Anderson, communicated by Sir John Richardson; 'Plan of a Search for Franklin Expedition,' by Dr. R. M'Cormack; 'Plan of a future Search for the lost Franklin Expedition,' by James Parsons.

services, under the command of M'Clintock, but has actually subscribed 500*l.* towards the expense of the expedition in which he sails.* May God, therefore, crown their efforts with success! and may M'Clintock and his companions gather the laurels they so well merit, in their noble endeavour to dissipate the mystery which shrouds the fate of the *Erebus* and *Terror* and their crews!

If, however, this last effort which, in the absence of other aid save that of her friends, Lady Franklin is now making, should fail in rescuing from a dreary existence any one of our countrymen, and should not even a plank of the *Erebus* and *Terror* be discovered—still, for her devotion in carrying out this examination of the unvisited tracts wherein, we have every reason to believe, the ships were finally encompassed, every British seaman will bless the relict of the great explorer, who has thus striven to honour the memory of her husband and his brave companions.

My earnest hope is, that this expedition of Lady Franklin may afford clear proofs that her husband's party came down with a boat to the mouth of the Back River in the spring of 1850, as reported on Esquimaux evidence by Dr. Rae, and thus demonstrate that which I have contended for, in common with Sir Francis Beaufort, Captain Washington, and some Arctic authorities, that Franklin, who in his previous explorations had trended the American coast from the Back River westward to Barrow Point, was really the discoverer of the North-West passage!

In wishing then Godspeed to this private expedition, as I did to all the previous efforts of Lady Franklin, far be it from me to under-rate the zealous endeavours which successive Administrations have made during a series of years, whether to extend geographical knowledge and determine a north-west passage, or more recently to rescue Franklin and his crews—endeavours which will be recorded as among the great glories of Britain, in having brought forth in striking relief the characters of some of the ablest of our seamen, who, formed in that school of severe trial, have proved to be leading men in the late war. These British worthies have now been

* I am happy to announce that, whilst these pages were passing through the press, Petersen, the Esquimaux interpreter, well known to all the readers of the voyages of Penny and Kane, having returned from Greenland to Copenhagen, has, through the instrumentality of our distinguished foreign member Captain Irminger, Royal Danish Navy, and a telegraphic communication from myself, travelled through London and reached Aberdeen in time to join Captain M'Clintock. The *Fox* sailed from that port under Lady Franklin's eye on the 1st July, the whole party on board in the highest spirits.—*July 4, 1857.*

appropriately rewarded by having had conferred on them their hard-earned Arctic medals; and I only regret that their noble feats should not, for the honour of the nation, have been terminated by one exhaustive public effort.

My admiration of these voyagers has indeed been recently enhanced, by the ardour and sincerity with which so many of them have offered their services, to continue the search after the relics of the Erebus and Terror. Such men are truly worthy of any distinction which their country can bestow, and all geographers must agree with me in regarding the Arctic medal which they wear, as an honour second to none which the Sovereign can confer.

CONCLUSION.

In bringing this discourse to a close I have now only to congratulate my associates on the steady rise which this Society has made in the estimation of the public, and on the vast accession to its members in the last few years. Commencing in a striking manner under the guidance of Admiral Smyth, and increasing during the successive Presidencies of myself, the Earl of Ellesmere, and Admiral Beechey, the augmentation has so continued, that we now nearly double the number of members at which we stood during many years.

Besides the vast augmentation of our Map Office, another distinctive feature in our recent progress has been the periodical publication of our Proceedings, which, whilst they record the doings and sayings at our evening meetings, sustain the spirit of the Society, and serve to keep the members, who have been unable to attend our meetings, well acquainted with the passing events.

Putting forth the substance of what is spoken as well as read, these periodical reports impart vitality to our Society, and will in future times be consulted with interest, as expressing the current opinions of British geographers and travellers "de die in diem;" a result for which we are mainly indebted to our able and zealous Secretary, Dr. Norton Shaw, who, in addition to the editorship of our Journal, has recently taken upon himself the whole of the editorial duties connected with this new publication.

Whilst the masses of our countrymen, it must be admitted, are better pleased with the news of the day, than with scientific discussions, many of the topics of which we treat are so popular, as well as important, that an enlightened portion of the press merits our best thanks for endeavouring to do justice to the promotion of those geographical researches in which we are embarked. It would be truly surprising if this were not so amongst Englishmen, whose

colonies extend to the Antipodes; and who have, therefore, more grounds than any other nation, for making themselves well acquainted with the surface of the earth, its productions, and inhabitants. I rejoice then to see that our numbers have so increased since my last Presidency, that adequate as we then thought the present apartments would prove for our wants, we already find that they will not by any means contain our members. Assisted, however, by Her Majesty's Government with an annual grant for keeping up a public Map Office, and enjoying a good balance at the banker's, there can be no difficulty in remedying this temporary inconvenience; and when the next Anniversary arrives, I trust that we shall be assembled in halls well adapted to accommodate us, including those ladies also who, following the example of their illustrious countrywoman, Mrs. Somerville,* take a deep interest in geographical science; for there is nothing more encouraging than to see the fair sex gathering information amongst us, to be by them communicated to the sons of England.

At the same time, whilst we maintain our popularity, we must render our annual Journal as far as practicable, not merely the exponent of interesting travels, but also the index of the progress of physical and comparative geography strictly so called, since we reckon amongst our associates, men who are competent to realize every wish to which the scientific geographer can aspire.

In thanking you, Gentlemen, for your friendly support, let me say, in conclusion, that when I undertook to stand in the breach occasioned by the death of my gallant friend Admiral Beechey, I did so under the persuasion that I could not execute more than one session of labour, considering that I had other scientific and official duties to perform. Feeling, however, that I may still be able to serve you for another year, I have, in compliance with your flattering request, consented to retain that which I consider to be as distinguished and useful a post as a man of science can occupy.

* In announcing that a new edition of Mrs. Somerville's remarkable work on Physical Geography is about to appear, I am happy to be able to state, that whilst we are taking measures to secure a permanent meeting-room, the Senate of the University of London and the Council of the Royal Society have acceded to the request of the Council of our Society, and have granted us the use of the large rooms at Burlington House for our ordinary meetings during the ensuing Session.—*July 12, 1857.*

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1857.

Thirteenth Meeting (ANNIVERSARY), 1 P.M., May 25th, 1857.

The President, SIR RODERICK I. MURCHISON, in the Chair.

The Minutes of the previous Meeting were read and confirmed. The Regulations respecting the Anniversary Meetings were next read, when the President appointed William Bollaert and John Brown, Esqrs., Scrutineers for the Ballot.

The Report of the Council, with the Balance-sheet for 1856, and the Estimate for 1857, was then read and adopted.

The PRESIDENT next delivered the Founder's Gold Medal to the Right Hon. H. Labouchere, Her Majesty's Secretary of State for the Colonies, on behalf of Mr. Augustus C. Gregory, Commander of the North Australian Expedition, for his explorations in Northern and Western Australia.

The Patron's Gold Medal, awarded to Lieutenant-Colonel Andrew Scott Waugh, of the Bengal Engineers, Surveyor-General of India, for his geodetical operations and triangulation of that country, was delivered to Colonel George Everest, F.R.G.S., etc., for transmission to Colonel Waugh.*

The PRESIDENT then read his Anniversary Address, for which a unanimous Vote of Thanks was passed, with a request that he would allow it to be printed.

The Ballot being concluded, the Scrutineers reported that the changes advised by the Council had been adopted; and the President announced the two vacancies in the offices of Vice-Presidents, occasioned by the deaths of Rear-Admiral F. W. Beechey and the Earl of Ellesmere, to be supplied by Colonel G. Everest and Sir Walter C. Trevelyan; the vacant Honorary Secretaryship to be filled by Francis Galton, Esq.; and those in the Ordinary Councillors

* For these Awards and the President's Address see No. X.

produced by the retirement of Lord Colchester, Sir Charles Fellows, Rear-Admiral FitzRoy, William J. Hamilton, Esq., the Earl of Harrowby, Colonel J. E. Portlock, and the Earl of Sheffield, to be filled by Lord Broughton, Captain Collinson, R.N., John Crawford, Esq., H. Raper, Esq., R.N., Colonel Sir H. Rawlinson, and Major-General Sabine, R.A.

The Thanks of the Meeting having been voted to the President, Vice-Presidents, Members of the Council, Auditors, and Scrutineers, the President finally directed the attention of the Meeting to the usual Anniversary Dinner, and the Meeting adjourned at half-past 3 P.M.

Fourteenth Meeting, June 8th, 1857.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Major-General A. Alexander, Mr. W. H. Hovell, and Mr. R. Sweeting, were presented on their election.*

ELECTIONS.—*Commander R. D. Aldrich, R.N.; Rev. G. R. Gleig; Capt. F. Hughes, Madras Cavalry; Colonel the Hon. J. Lindsay; Capt. A. P. Ryder, R.N.; Capt. Allen Young; and Messrs. A. C. Blackstone; Cornucallis R. Cartwright; John Dobie, Surgeon, R.N.; Edward John Eyre, Lieut.-Governor of St. Vincent's; Samuel Gurney, M.P.; Abel Smith; Horace Smith; Philip Smith; and Henry White, were elected Fellows.*

DONATIONS.—The following were among the donations to the Library and Map-Rooms received since the previous meeting:—‘Maps of the Crimea, Erzurum, Khiva, &c.,’ published by the Topographical and Statistical Dépôt of the War Department; eight sheets of the Admiralty charts of the Delta of the Danube; Sir John Davis’ ‘China;’ The Transactions of the Franklin Institute of Philadelphia; of the Academy of Sciences of Paris; of the Zurich Natural History Society, &c.

EXHIBITIONS.—Among the articles exhibited were fragments of ancient pottery found on Serpent Island by Capt. Spratt, R.N.; an original plan of Alexandria, by Capt. Mansell, R.N.; and maps of St. Miguel and Caledonia Bays, &c., by Mr. Lionel Gisborne, F.R.G.S.

ANNOUNCEMENTS.—The President announced the return of Dr. Elsey, F.R.G.S., the surgeon of the North Australian Expedition; of Mr. A. W. Twyford, recently attached to the Egyptian Nile Expedition; and also of Sir Robert Schomburgk, F.R.G.S., from the Consulate of Samana, in St. Domingo, *en route* to that of Siam.

The Papers read were :—

1. *On the Battles of Sellasia, Marathon, and Thermus.* By Lt.-General JOCHMUS.

GENERAL JOCHMUS explained that these papers had been written in Greece, between the years 1830 and 1834, when he was Aide-de-camp to General Sir Richard Church, Commander-in-chief of the armies during the war of Greek independence ; or later, when he was employed as a captain in the Greco-Bavarian service, at Athens. The above manuscripts had been presented to the Royal Geographical Society in 1853, together with others,* written in English, which have already been published by the Society ; but the present manuscripts required translations from the French and other preparations prior to being printed. In referring to, and commenting on the eight maps which accompany the above manuscripts, General Jochmus pointed out how the ancient geography of some districts in Greece was elucidated by commentaries like these on the old military operations in those countries, and *vice versa*, how the study on the spot of those military operations had assisted him in determining, amongst others, the sites of Thermus and of Metapa (Polybius, lib. 5), the site of Marathon (already identified before him with the position of modern Vranà by Colonel Leake), the probable extension of the Greek and the Persian lines of battle, and the number of troops engaged at Marathon (Herodotus, Plutarch, Thucydides, &c.). General Jochmus further showed how he had determined the sites of the ruins of Sellasia, its subterranean spring mentioned by Pausanias, and of the battle-field † between Antigonus and Cleomenes in its immediate neighbourhood. It was also stated how he happened to discover in 1834 the sites of all the places and monuments mentioned by Pausanias in his description of the road from Argos to Sparta, viz. the Ruins of Caryae, the Trophy of Hercules, the Temple of Jupiter Scotitas, the Statue of Apollo at Thornax, &c. Finally, General Jochmus, by referring to the eighth map representing a part of Laconia and Cynuria, showed how he had been enabled to trace thereon the following military positions and operations :—1st. The Camp of Epaminondas advancing against Sparta after the battle of Leuctra ; 2nd. Philip in order of battle opposed to the Spartan army, after the fight on the Menelaion ; 3rd. Battle field of Sellasia ; 4th. Philopemen in ambuscade in the forest of Scotitas ; 5th. Philo-

* A Journey into the Balkan, and Comparative Commentaries on the Marches of Darius, Alexander, and Marshal Diebitch, between the Danube and the neighbourhood of Constantinople ; also, Notes on the Water Communication in Asia-Minor.

† B.C. 221.

poemen encamped at Barbosthenes before the battle against Nabis, A.C. 192; 6th. Titus Quinctius encamped at Caryae, A.C. 195; 7th. Philopoemen at Caryae, A.C. 192. (*See* Pausanias, Xenophon, Livy.)

The PRESIDENT expressed the thanks of the Society to General Jochmus for his communication. Although a period of twenty-five years had elapsed since the General visited these spots, yet he had described them with all the freshness of his youth, and had given such a clear account of them that, with the aid of the large and graphic charts exhibited, every one might have followed him. They were much obliged to General Jochmus for having, as a practical soldier, described these ancient positions. It should not be forgotten that we were glad to receive such valuable contributions on comparative geography; as the objects of the Society were not confined to the cultivation of physical geography and the exploration of unknown countries.

The BISHOP of ST. ASAPH, F.R.G.S., said there was one point of view in which he thought communications of this kind peculiarly valuable—and that was that they verified history. In this instance, after nearly 1500 years, a military man, an able judge of the matter, went upon the ground and found all the details such as they were described in history. The value of that fact, to his mind, was this—that it gave a person a confidence in history which nothing else could provide. This was peculiarly the case with respect to the Holy Land. The investigations that had taken place in that land had every one of them proved the truth of sacred history. It was so many years since he had studied these matters, that he was not able to speak to the details of General Jochmus's communication; but he was fully aware of the extreme value of a soldier's investigating military matters, and reporting them to scholars, who were able by comparison with ancient history to prove that history true.

MR. GEORGE BRENT, F.R.G.S., said that, as he had been entrusted by the Secretary with the duty of revising the translation of General Jochmus's papers, it might be proper that he should say a few words. He had found the task one of pleasure; the papers were written with learning and taste, and, moreover, in excellent French. One thing which forcibly impressed him was the great advantage there was in examining localities mentioned by ancient authors with the book of the author in one's hand, as had been done by General Jochmus in this instance. The advantage was most obvious. Had the same plan been pursued by modern authors, instead of theorising at a distance, with the aid of very imperfect maps, many doubts and difficulties would not have existed with reference to the writings of ancient authors, which did exist in the present day. In going through the manuscripts, another circumstance which struck him was the correct appreciation the General had of the labours of Colonel Leake, whose researches in Greece had placed him in the first rank of comparative geographers. Wherever General Jochmus had found occasion to dissent from Colonel Leake, he had stated his views and opinions with so much candour and exactness, that they could not be without their weight upon the mind of the Colonel himself. Another idea which had forced itself upon his attention was, the great advantage which would accrue if any of the Fellows of the Society, who had leisure at their command, would in the same way examine localities in our own country having reference to military actions which took place in dark periods of our history, of which we had only obscure notices, and ascertain the real truth of the matter—which could only be done by observations upon the spot. If it were true that the earth was interesting as the abode of man, surely those spots on its surface which had been the scenes of events that had materially affected the destinies of our race, must be among the most interesting portions.

MR. CHARLES BRACEBRIDGE, F.R.G.S., begged to make one observation. It was that the late Dr. Arnold, upon receiving from him a Map of the Morea, drawn up after the survey of the French, made the very natural, but perhaps not known, observation that, until this map came into his hands, he did not understand the wars of Greece. It was well known that Dr. Arnold was for many years occupied in writing comments on the history of Greece, and such was his appreciation of that beautiful survey, which had made us acquainted with the ravines, the heights of mountains, the ancient causeways, the tracks of commerce, and the topography of different localities. He believed that some of these spots—the plains of Argos, for instance—no scholar could comprehend, unless he saw the beautifully illustrated map made in that survey of the Morea.

The PRESIDENT said, as reference had been made to Colonel Leake, he begged to state that the communications of General Jochnus had been submitted to that accomplished scholar, who had strongly recommended their publication.

The second Paper read was—

2. *Remarks on Serpent Island.* By Capt. TH. SPRATT, R.N., C.B.

[This Paper has been directed to be published in the Journal.]

The PRESIDENT observed that the distinguished nautical surveyor, Captain Spratt, whose papers on different parts of the adjacent coasts had been read at various times to the Society, had given a very clear account of this singular island. As a geologist he might say that, if the structure of rocks was to be the ground for the construction of empires, Serpent Island being of the same composition as the adjacent provinces, the question recently agitated might at once have been decided.

MR. W. J. HAMILTON, F.R.G.S., as an old friend of Captain Spratt, and having given him his first lesson in geology in the neighbourhood of Smyrna, took great interest in anything Captain Spratt said upon the subject. The various papers, he had read before the Geological Society, were quite enough to show that he had made very rapid progress in that science. With regard to the observation made by the President, if the question of political configuration was to be decided by geological constitution, he believed this island would be found to form a sort of connection between Bulgaria and the Crimea.

The third Paper read was—

3. *On the Hydrography of the Valley of the Arve.* By Professor PAUL CHAIX, of Geneva, Corresponding F.R.G.S.

Addressed to the Secretary.

[This Paper has been directed to be published in the Journal.]

The PRESIDENT said that Professor Chaix's communication was one of value, more particularly with reference to the changes in physical geography produced by modern causes; and also to geologists, in forming their calculations as to what must have passed in vast periods of time.

The fourth Paper read was—

4. *A Notice of a late Exploration of Darien.* By Dr. H. C. CALDWELL, of the U. S. frigate Independence.

Communicated by JOHN POWER, Esq., F.R.G.S., of Panama.

During an official expedition made towards the end of last year to the Gulf of San Miguel, for the purpose of reporting on the facilities of obtaining lumber suitable for ship building, Dr. H. C. Caldwell, surgeon, U. S. ship Independence, who accompanied it, met with Mr. Andrew Hoseac of Chepigana, from whom he learned the particulars of the explorations made by Dr. Cullen, Mr. Gisborne, Capt. Prevost, R.N., and Lieut. Strain, of U.S.N., in 1853, and also that, in Mr. Hoseac's opinion, based upon information derived from the Indians, there existed a comparatively level tract of land between Fort Principe, on the Savanna river, and Caledonia Bay, on the Atlantic, in a direction *more northerly* than that followed by Capt. Prevost, of H. B. M.'s ship Virago, in 1853.

On his return to Panama, Dr. Caldwell obtained from Commodore Mervine leave of absence for three weeks, and, accompanied by a sailor from the Independence named Parker, set out with the intention of exploring this new route. Having reached Chepigana, every assistance was rendered to him by Mr. Hoseac, but the greatest difficulty was experienced in procuring men to accompany him; all giving as an excuse their dread of the Indians, &c., &c. At last, an Indian to act as interpreter, his nephew, a lad of fourteen, and a negro, were prevailed upon to go; and on the 5th of April the party started from Chepigana and reached Principe on the morning of the 6th.

The next day, the party started in a northerly direction, cutting their way through a thick undergrowth of palms, vines, and thorny bushes; the bed of the river was crossed during the day four or five times—an insignificant stream running in a watercourse 20 to 30 yards wide. Captain Prevost's track was also crossed, the cutting through the bush being still distinguishable; and on a tree was found cut the words, W. JONES, VIRAGO, DEC. 1853. The distance travelled this day was estimated at about six or seven miles, and an elevation was reached of about 160 feet, as near as it was possible to judge without measurement. For the next three days the country crossed still continued to be thickly wooded, of a gently undulating or almost level character, intersected in different directions by numerous watercourses, and in some parts the ground seemed to be swampy during the rainy season. On the fourth day two shots were heard, apparently quite near, and said to be from some of the

Indians on the Atlantic side; marks of a trail were also seen, and also a tree recently cut. The whole party suffered much for want of water, which was very scarce, and in hunting for which much delay was caused. The negro peon, being in fear of the Indians, persuaded the Indian interpreter and boy to return, and neither threats nor promises could induce him to proceed. At evening on this the fourth day the Atlantic was seen from the top of a tree, through a gap in the hills, in a N.E. direction, apparently about 10 miles distant. The following morning (the fifth day) the Indians and negro retraced their steps, and Dr. Caldwell and Parker continued their route, cutting their way with much difficulty through the bush, and suffering still from want of water. Two more shots were heard in the woods this day.

Towards evening, on ascending a tree, the gap in the Atlantic range was again distinctly visible, distant about five or six miles; but the want of water and provisions compelled the Doctor to return, and on the morning of the eighth day he reached Principe, where he fortunately found the Indians and negro with the canoe, they having, in the mean time, returned to Chepigana, whence they had been compelled by Mr. Hoseac to go back and await the arrival of the party.

Dr. Caldwell believes that the summit between the two oceans was crossed on the *first* day's march near Principe, and that thence to the Atlantic there was a gradual descent. This agrees with the accounts furnished to him by various Indians in Chepigana and Yavizo, especially with regard to the gap through which the Atlantic was so distinctly visible.

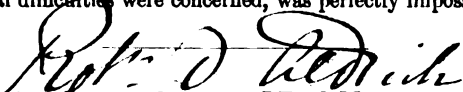
This route Dr. Caldwell considers well worthy of being scientifically examined, and he expresses no doubt of his being able, by following the path he has cut, to reach the Atlantic from Principe in four days at the outside. Not having taken any instruments with him, Dr. Caldwell does not profess to give more than an approximation to the heights and distances.

MR. L. GISBORNE, F.R.G.S., had been twice to the Isthmus of Darien, and he had heard the paper with great interest, because it showed that the author had fallen into the same error that he (Mr. Gisborne) had, on his first visit. The only difference was that he did not fall in with Indians. Dr. Caldwell stated that, on the fourth day, he saw the Atlantic. The Society had in their archives his own report on the last expedition to the isthmus of Darien. It was undertaken at the request of the three Governments of France, England, and America, and with the consent of the Government of New Granada, and he might, therefore, call it an official survey. They found out for the first time that the whole coast on the Atlantic was eight miles out of longitude—an error so important, that another explorer of Darien, Captain Prevost, who, he believed, was the first that went so far into the interior, starting from the

same place that Dr. Caldwell did, with the best Admiralty maps before him, and intending to proceed to the east coast, found that he was steering towards a point really 25 miles to the north of it; the geographical error in the position of Caledonia having misled him that much. This error was corrected by the surveys which were undertaken in 1853. With respect to Dr. Caldwell's paper, all the information he had collected was evidently wrong. The summit of the range was within five or six miles of the Atlantic; and that range consisted of mountains from 900 to 1000 feet high. There was a map upon the table, the official map sent there from the Admiralty, which showed the different heights taken by instrumental observations, with spirit levels, or mountain barometers. As to a ship-canal across *this* portion of the isthmus, he (Mr. Gisborne) really considered it to be an absurdity. The ridge was like a backbone. He had walked along the top of it for miles and miles together, and it was so narrow that few men could walk along it abreast.

THE PRESIDENT.—Is there not any point of depression?

MR. GISBORNE.—There is none. The sources of all the rivers were from 500 to 700 feet above the level of the sea; it was, therefore, impossible to suppose that there could be any break in the mountains below 700 feet. That alone would render the question of a canal in this spot impossible. He had levelled the range instrumentally and barometrically, and there was no point in it that was less than 900 feet high. This might be taken as an established fact. He had also made a survey of the Caledonia, with the object of following the traces of the Americans, who, under Lieut. Strain, were upon that river in a state of starvation. He had with him a copy of a map of the river, made by a Spanish officer 130 years ago, and the survey made by himself placed a position within a short distance of the spot where the Spaniards had placed it so many years before. Now that his own surveys had been completed, and the report placed in the possession of the Society, he hoped they would let it go forth to the world that a ship-canal across the Isthmus of Darien, as far as geographical difficulties were concerned, was perfectly impossible.



Fifteenth Meeting, June 22nd, 1857.—[Final Meeting of the Session.]

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Horace and Philip Smith, Esqrs., were presented upon their election.*

ELECTIONS.—*M. de la Roquette, Vice-President of the Geographical Society of Paris, as an Honorary Member, and M. Malte-Brun, Secretary of the Geographical Society of Paris, as a Corresponding Member. Commander E. Burstal, R.N.; Capt. H. Caldwell, R.N.; the Rev. H. J. Hose, Warden of St. Paul's College, Sydney; the Right Hon. H. Labouchere, M.P.; and Messrs. J. W. Brett; G. M. M. Esmeade; William Evans, M.P.; F. P. B. Martin; T. A. Noddall, R.N.; and A. D. White, were elected Fellows.*

DONATIONS.—The following were among the donations received since the former meeting:—‘Index to the Ordnance Survey of Lancashire;’ ‘Blackie's Imperial Atlas of Modern Geography;’ ‘Observations made at the Magnetical and Meteorological Observatory

at Toronto,' 4to.; Transactions of the German Oriental Society; the Darmstadt Geological Society; the Academy of Sciences of Paris; and the Statistical Society of London.

EXHIBITIONS.—Three very beautiful sketches of Eastern and Western Siberia, by Mr. T. W. Atkinson, made during his Seven Years' Journey in those regions, were exhibited at the meeting.

ANNOUNCEMENT.—The President announced that through the activity and zeal of their Corresponding member at Copenhagen, Captain Irminger, of the Royal Danish Navy, the services of the well-known Esquimaux interpreter, Carl Petersen, had been secured for the Arctic Expedition under the command of Captain McClintock, R.N., which would sail immediately on the arrival of the interpreter at Aberdeen.

The Papers read were:—

1. *Description of Vancouver Island.* By Lt.-Col. W. C. GRANT, F.R.G.S.

The position of Vancouver Island is between $48^{\circ} 20'$ and $51^{\circ} N.$ lat., and between 123° and $128^{\circ} 20' W.$ long. It is situated on the western coast of North America, within a short distance of the mainland, the Straits of Fuca, which separate the island from the mainland on the south, forming the boundary in those parts between the British territories and those of the United States. The extreme length of Vancouver Island from north to south is 270 miles, with a general breadth of from 40 to 50 miles. The general aspect of the island is that of a broken rocky country densely covered with timber. The proportion which the available land bears to that which is totally incapable of cultivation is extremely small. The whole centre of the island as far as it has yet been explored consists of a barren rocky waste, the timber with which it is covered being, as well from its nature as from its position, unavailable for any useful purpose. Along the sea-coast a few patches of level land are to be met with, where the timber is extremely fine, and suitable either for masts and spars or for being sawn into planks. Small spots of open land, clear of trees, occasionally intervene, but seldom of more than a few hundred acres in extent; on these spots the soil is almost invariably extremely rich, and will produce abundantly every description of crop grown in Great Britain. The climate is agreeable and healthy, the summer is warm and dry; no rain falls from March till November; the remainder of the year is rather a rainy season than a severe winter; some snow falls, but does not generally lie long on the ground; and the frosts are neither hard nor of long duration.

The deposits of coal on the island are extremely rich, and are in many places favourably situated for export. The seas by which the island is surrounded teem with fish of almost every description. The salmon and herring are particularly numerous, cod and sturgeon also abound, and several whales are annually caught by the natives at a short distance from the coast. The prevailing geological structures in the higher parts of the island are the gneiss and mica schist systems; in the lower, greywacke and clay-slate prevail. These are intersected by several dykes of igneous rock; and on the sea-coast basins of sandstone and of limestone occasionally occur. The native population of the island is calculated at from 15,000 to 20,000 souls; who are divided into numerous tribes, many of whom speak languages entirely different from each other. They are in general a harmless race, they live almost entirely by fishing, they are willing to work for the white man, but their labour cannot be depended on continuously. The island is still in its infancy as a colony; it possesses numerous safe and commodious harbours, is favourably situated for export to Oregon, California, the Sandwich Islands, Central and South America, Australia and China; and though now but little known, Vancouver Island cannot fail eventually to be of very considerable importance. The object of this paper is to make its position, its products, its natural resources, and its history, better known to the British public.

In answer to questions as to the climate, the adaptability of the island for colonisation, its mineral productions, &c., COLONEL GRANT said the climate was delicious for travellers, as from April to September there was no wet. This absence of humidity, however, was somewhat unfavourable for agriculture. With respect to colonisation, he thought Vancouver Island fitted for it, to a certain extent. The available arable land was small in proportion to that which was useless, so that it could never support a large population. The wheat and vegetables grown were very fine indeed. The island had not been surveyed, except a small portion by the Hudson Bay Company, and of that part about two-thirds were fit for agricultural purposes; the remaining third was useless rock. The quantity of coal discovered at present was small, but it was fitted for steam purposes.

SIR HARRY VERNEY, F.R.G.S., asked Colonel Grant whether the natives in the different parts of the island could communicate with each other, whether their languages were similar; and also whether there was any trace of any patriarchal government that had at any former period ruled over the whole of the island; also whether there was any trace of religion among the natives, whether it was a common religion, and whether there were any missionaries there?

COLONEL GRANT said that he had never been able to trace any real religion among them. They had some traditions excessively childish in their nature, and which did not point to one common object. They were scarcely aware of the existence of a supreme Being, though some had a glimmering notion of such a Being. One missionary informed him that they worshipped the sun, but he thought this too noble a superstition to exist in the breast of such a

grovelling race of Indians as they were. They had a few superstitions among them. There were among them several most zealous Roman Catholic missionaries, who were incessant in their endeavours to implant Christianity. The savage was very ready to take any impression, but his mind was incapable of retaining any fixed idea, and the missionaries had consequently been unable to make any permanent progress. There were three languages in the island; the prevailing one was the Cowitchew. The languages again were subdivided into various dialects, so that the different tribes speaking them could, with some difficulty, understand each other. There was not the slightest trace of a common patriarchal government. Each tribe had a patriarchal government, because each tribe formed a family something like our clans in Scotland.

MR. KENNETH SUTHERLAND, F.R.G.S., remarked that our Government had sent an expedition to Nootka Sound towards the end of the last century.

COLONEL GRANT said the object of Vancouver's expedition was to discover the North-West Passage, and in trying to discover it he saw a large inlet, which he immediately proceeded into, thinking it would conduct him to the opposite coast of America, and that he had found the long sought North-West Passage. He followed the channel and learned that he was sailing round an island, and he was much disappointed in finding himself in the Pacific again. In going round the island he met two Spanish vessels coming from Nootka, and they first told him that he was sailing round an island. He then went round to Nootka and gave the Spaniards notice to quit.

MR. MONCKTON MILNES, F.R.G.S., asked whether Colonel Grant had ever turned his attention to the practicability of rendering the island a convict settlement?

COLONEL GRANT was afraid that it would not make a good convict settlement, on account of its contiguity to America. Access to the continent across the channel was easy, and to prevent the convicts escaping, a large military guard would be required.

THE REV. BRYMER BELCHER, F.R.G.S., believed what had been said about the missionaries in Vancouver Island was quite correct. At present there were no missionaries in the island, except some Roman Catholics, who had been engaged there several years. The Hudson Bay Company had a chapel at Victoria, and about a year ago an unordained labourer, a catechist, was sent out by one of the great missionary societies of this country to the southern part of the island. The gentlemen who brought their geographical knowledge to bear upon the missionary work of the Church, had looked on Vancouver Island as an unoccupied field, and had directed the attention of the Society for the Propagation of the Gospel to it. A grant of 250*l.* had been expended in sending out two missionaries. The population amounted to between 20,000 and 30,000 of native inhabitants, according to the last census given by the Hudson Bay Company. With respect to the climate and nature of the country, all the information that the Society had been able to obtain, went to show that there was nothing in either respect which the Anglo-Saxon race might not most easily overcome. The coal, to which allusion has been made, he had reason to believe, was spread over a large field, and was of very excellent quality, well suited for furnaces and for steam purposes. With coal and wood, and with what, there was every reason to believe, would be found in mineral products as well, Vancouver Island appeared to him to be one of the most promising fields open to the English settler.

MR. R. BLANCHARD, F.R.G.S., late Governor of Vancouver Island, begged leave to offer an observation with regard to the population. Colonel Grant estimated it at 17,000, and Mr. Belcher at between 20,000 and 30,000. When he was there he took great pains to make inquiries of the people who, he considered, were best qualified to judge, and they stated the numbers to be, at the outside, 10,000, and that the population was decreasing.

The PRESIDENT, in closing the discussion, said it was evident that the island was destined to become a valuable possession of the British crown. The position it occupied, and the mineral riches it contained, with the probability of finding more, all tended to indicate its future value to our country.

The second Paper read was—

2. *Continuation of the Report of the North Australian Expedition.**

Communicated by the Right Hon. H. LABOUCHERE, F.R.G.S., H. M. Secretary of State for the Colonies.

Sydney, 7th January, 1857.

SIR—I have the honour to transmit, for the information of his Excellency the Governor-General, an outline of the proceedings of the North Australian Expedition, from the period of leaving the Victoria, on the 21st June, to the 16th December, 1856, when the expedition reached Brisbane.

2. The exploration of the interior, beyond the sources of the Victoria River, having been carried to the full extent that the resources of the expedition would admit, I made preparations for carrying out that part of the instructions relating to the exploration of the country between the Victoria and Albert Rivers.

3. In making these arrangements it was desirable to provide against any contingencies which might prevent the land party obtaining supplies from the Tom Tough at the Albert River, which I had appointed as a rendezvous for the expedition; and it thus became necessary to reduce the land party to such a number that the horses now remaining could convey a sufficient supply of provisions for the whole journey to the out-stations in New South Wales, should we be compelled to do so, without further assistance.

4. I therefore organized a party of seven persons, consisting of myself, Mr. H. Gregory, Mr. Elsey, Dr. Mueller, C. Dean, R. Bowman, and J. Melville.

5. For the transport of this party and its equipment, only thirty-four horses remained out of the fifty originally embarked at Moreton Bay. Of these, seven were appropriated as saddle horses, and the remaining twenty-seven for the conveyance of the stores, &c., which comprised 1060 lbs. flour; 872 lbs. pork; 350 lbs. sugar; 380 lbs. meat; — biscuit; 100 lbs. rice; 30 lbs. sago; 32 lbs. tea; 30 lbs. coffee; 2000 rounds of ammunition; instruments; clothing; spare harness, &c.,—the whole weighing about 2 tons, exclusive of packages.

6. Having instructed Mr. Baines to embark the remainder of the exploring party and stores in the Tom Tough, and proceed to

* See former Nos. of the Proceedings of the Royal Geographical Society.

Coepang for supplies of fresh provisions, and thence to the Albert River, to co-operate with the land party, I left the camp on the Victoria River on the 21st June, 1856.

7. Proceeding up the Victoria to the eastern bend in latitude $15^{\circ} 38'$, left the river on the 26th June, and followed up a large creek, coming from the eastward. The country at first was very rocky and of indifferent quality, except on the immediate bank of the creek, till we approached its source, when the sandstones were replaced by basaltic rocks, and the country changed to fine open grassy ridges, very thinly wooded.

8. Beyond this creek (latitude $15^{\circ} 33'$, longitude $131^{\circ} 40'$) a low sandstone table land commenced, elevated about 700 feet above the sea. The country now changed to thinly-grassed stringy-bark forest, destitute of watercourses, except a small creek which we struck in latitude $15^{\circ} 30'$, longitude 132° . As no water appeared to exist except in this creek, I followed it down to the N.E. to latitude $14^{\circ} 54'$, longitude $132^{\circ} 30'$, where it turned to the N.W.; but after five days' reconnoitering, succeeded in finding a passage to the E. across the table land (which appeared to be the northern extension of the interior desert) to a small creek, tributary to the "Roper" River, and moved the party to it on the 12th July.

9. Attempting a S.E. course, we were repulsed by a scarcity of water, and had to trace down the creek to its junction with the Roper, in latitude $14^{\circ} 58'$, longitude $133^{\circ} 20'$. The country improved, and was well suited for pastoral purposes, the rocks being basaltic.

10. Having followed the Roper 20 miles to the N.W., I again returned to a S.E. course, re-entering a poor sandstone country; and on the 18th July encamped on a small creek with a few waterholes.

11. In the afternoon a small party of blacks were observed watching the camp, and, on finding they were discovered by us, came up, but would not speak a single word, and soon after retired, but were detected stealing into the camp at night, when a discharge of small shot compelled them to retire.

12. The following day continued a S.E. route, encamping at a spring in a sandstone ravine, where the grass was very inferior, and we experienced some difficulty in keeping the horses near the camp, their instinct doubtless leading them to avoid a spot where poisonous plants existed, as the next day at noon two horses were taken ill, and died in less than an hour after; the stomachs, on examination, showing the action of violent poison.

13. We continued to traverse a very indifferent country, with flat-topped sandstone ridges, between scrubby valleys, in which small

creeks took their rise, and trending to the N.E., form the heads of the "Wickham" and "Limnin Bight" Rivers.

14. Scarcity of water, however, compelled us to turn to the northward, and travel along the broken sandstone country at the edge of the table land, reaching the "MacArthur" River on the 4th August, in latitude $16^{\circ} 25'$, where the channel did not exceed 20 yards in width; and so little water remained, even at this season, that it had to be followed down for some miles before a sufficient supply could be obtained.

15. Being desirous of keeping as far inland as possible, I again struck S.E., crossing the spurs of the table land. In the valleys between, many small creeks took their rise, and form the heads of the rivers which flow into the Gulf of Carpentaria.

16. The principal feature of the country was sandstone, though basalt and limestone frequently cropped out, and formed small tracts of grassy country, which seemed to expand to the north of our route; but to the south, the sandy table was almost unbroken.

17. The elevation of this table land gradually increased to about 900 feet above the sea, and in latitude $17^{\circ} 40'$, longitude $137^{\circ} 40'$, a spur, or rather a detached mass of greater altitude (1300 feet) projected from it to the north. From its higher ridges the view extended for 40 or 50 miles to the south; all was hopelessly level, and without a single marked feature.

18. 20th August.—Deep gullies took their rise on the S.E. slope of this high land, rapidly increasing, by their junction, into a considerable creek, which proved to be the head of the Nicholson River. Considerable difficulty was, however, experienced in descending into its valley, owing to the abruptness of the ridges, which were formed by the edges of sandstone strata at a high angle, while granite prevailed in the lower ground.

19. The Nicholson, however, soon re-entered the sandstone ranges to the E., over which we toiled for three days, without finding sufficient grass for our horses. Following down the river, the country became more level; narrow grass flats appeared on the banks, but the back country was still worthless, covered with very open scrub or terminalia and melaleuca, to within 30 miles of the Albert River, when grassy plains commenced, and extended several miles back from the right bank of the river.

20. On the 30th August crossed a fine running creek, which joined the Nicholson from the south, in latitude $17^{\circ} 53'$, after which the river turned to the N. Continuing our route E.N.E. for three miles, struck a fine brook of running water, with open grassy plains on its banks; its course was nearly east for four miles, when it was joined

by a small creek from the S., forming a fine reach of water, which we recognized as the Albert River of Captain Stokes, and Beam Brook of Dr. Leichhardt.

21. As the junction of these two branches of the Albert had been appointed as the rendezvous of the two sections of the expedition, it was with some anxiety we approached the spot, though our journey from the Victoria had been so rapid that I could scarcely hope to find Mr. Baines had arrived before us. Our hopes were raised almost to certainty, when in the distance a tree, with an inscription recently cut in the bark, was seen in the exact place appointed, but a closer inspection showed that it was not the work of any individual belonging to the expedition.

22. The following was the inscription, which, cut in large characters, extended round the tree:—

CHUMMLUT +
 ↑ ORE
 RCH TO
 1856.

23. The remains of a large fire, the names of some of the boat's crew, and the word "Torch," were cut and scratched on the small trees and stumps around, but nothing to guide us in the search for any papers which would throw light on the subject of the visit.

24. Having marked a tree with the date, initials of the expedition, and instructions for finding a tin canister containing memoranda, which was buried near the tree, I moved the party down to the right bank of the river, half a mile lower down, with the intention of proceeding downwards to the entrance of the Albert; but finding the water salt, I marked a second tree, and buried a tin with a memorandum of the proceedings of the expedition, prospective movements, and instructions for the guidance of Mr. Baines, should he arrive after our departure, as it was not prudent, under existing circumstances, to await the arrival of the vessel.

25. On the 3rd September left the Albert River, and traversed a level open country, thinly clothed with indifferent grass, the soil a brown clay loam. Two days' journey S.E. brought us to a river 100 yards wide, in detached pools. (Latitude $18^{\circ} 12'$, longitude $139^{\circ} 55'$.) This river was mistaken for the Albert by Dr. Leichhardt, and I therefore named it after that enterprising explorer.

26. Soon after we encamped a small party of natives approached, and assumed a somewhat threatening tone, but shortly after retired. On the following morning about twenty came up to us, well armed, and, while we were crossing a deep ravine, made a rush forward to

attack us, but when in the act of throwing their spears were checked by a discharge of small shot, and were quickly dispersed with the loss of their leader.

27. From the Leichhardt our course was nearly E., the country consisting of low sandstone ridges, very thinly timbered, and nearly destitute of grass. A few inconsiderable watercourses trended to the N., in which direction extensive grassy plains appeared to exist. Water was very scarce.

28. The country improved again as the Flinders River was approached, and where we crossed it, in latitude $18^{\circ} 8'$, longitude $140^{\circ} 50'$, the grassy plains extended nearly 20 miles back from the river on both banks.

29. Beyond this again we encountered a worthless country, perfectly level, covered with small trees and melaleuca scrubs. The scarcity of water repulsed us several times in the attempt to pursue an easterly course, and forced the party N. on the meridian of $141^{\circ} 30'$, to latitude $17^{\circ} 15'$, when we reached a broad sandy river bed, which is probably the Gilbert of Leichhardt.

30. The approach of the rainy season, which would prevent us from drying the flesh of our horses, should we require to replenish our stock of provisions, and the general health of the party rendering it desirable that fresh meat for a time be substituted for the salt pork, which had suffered much from the heat of the climate, both in quantity and quality, on the 18th we killed one of the horses, which had become otherwise unserviceable. The meat was cut into thin slices, and dried in the sun. The process occupied two days; the meat was tough, but by long stewing became very palatable, and scarcely distinguishable from beef.

31. The general course of the Gilbert was from the S.E., and this enabled us to resume our course, as a sufficient supply of water existed in its channel, though several miles often intervened between the pools. The country along this river was extremely level: only one ridge of hills was seen till we reached latitude $18^{\circ} 20'$, longitude 143° (27th September), though the bed of the river rose to about 700 feet above the sea level. Grassy flats extended along its banks, from one to two miles wide; beyond which the country was very poor, with patches of melaleuca scrub.

32. Low ranges of hills now rose abruptly from the plain,—the prevailing rocks, slate, porphyry, gneiss, and granite. A decided improvement was also observed in the vegetation.

33. On the 5th October reached the head waters of the eastern branch of the Gilbert, and as it was necessary to reconnoitre the country before moving the party across the ranges, I proceeded

onward with Mr. H. Gregory for that purpose, and had a horse killed and dried during my absence from the camp.

34. On the 11th the party moved across the ranges, which rose about 2,500 feet above the sea level, in latitude $18^{\circ} 45'$, longitude $143^{\circ} 50'$, and encamped on a large sandy creek, tributary to the Lynd River, the southern branches of which we crossed the following day. The lower part of the valley of the Lynd was here about 1,500 feet above the level of the sea, the primary ranges rising abruptly to the W., but the eastern side was formed by a gradually rising sheet of basaltic lava, which separated it from the valley of the Burdekin. This portion of the country was well grassed, but from the porous nature of the rock, destitute of surface water.

35. On the 14th descended into the valley of the Burdekin, and on the 16th reached that river in latitude $18^{\circ} 57'$, longitude $144^{\circ} 50'$. The channel was about 50 yards wide, with a small running stream of water winding along the sandy bed. The country was of a very broken and almost mountainous character, the valley and some of the lower ridges well grassed and suited for stock, the higher ranges usually poor and stony.

36. Except in the river itself, surface water was very scarce at this season, and our route consequently along its right bank; the general course S.E.

37. Below the junction of the "Clark," the country improved considerably, large tracts of basaltic rock forming very fertile land by its decomposition.

38. South of latitude 20° granite and trap prevailed, forming fine open grassy ridges, timbered with iron bark; and this continued to latitude $26^{\circ} 40'$.

39. Reaching the junction of the Burdekin with the "Suttor" River, on the 30th October, in latitude $20^{\circ} 36'$, longitude $146^{\circ} 50'$, I followed up the latter river, soon encountering dense brigalow scrubs, which gradually extended over the whole face of the country, and impeded our progress considerably.

40. In about latitude $21^{\circ} 30'$, longitude $146^{\circ} 40'$, the Suttor is joined by the "Belyando" of Sir T. Mitchell. This river was running, there having been heavy rains on the upper part of its course.

41. Availing myself of this favourable circumstance, I followed it up to latitude 22° , and then steered S.E. in hopes of finding a more open country, but after crossing a low ridge of sandstone hills, entered a vast level plain, covered with brigalow scrub, which continued to latitude $22^{\circ} 40'$, longitude $147^{\circ} 10'$, where we crossed a range of scrubby mountains, and descended to "Peak Downs" on the 12th November.

42. Peak Downs, as seen from the western range, extended N.W. and S.E. for about 60 miles, with a breadth exceeding 30 miles, consisting of gently undulating plains of rich black soil, well grassed. These plains are separated by belts of thick scrub; the prevailing rock, basalt and limestone. The absence of the surface water will, however, prove a serious drawback to this otherwise fine tract of country.

43. This scarcity of water obliged the party to skirt the S.W. limit of the open country, and much brigalow scrub was encountered.

44. On the 15th November reached the left bank of the "MacKenzie" River, about 15 miles above its junction with "Comet" River.

45. Being nearly on the latitude of Port Curtis, I steered an easterly course through a succession of dense scrubs, and on the 22nd November reached Messrs. Fitz and Connor's station on the Dawson River, where we experienced a most hospitable reception.

46. It now only remained for me to connect the route of the expedition with some known point on the surveys of the district, and I proceeded to Mr. Hay's station, near which the Crown lands commissioner of the district was encamped; but as the duties of this department have little reference to the geographical features of the country, the position of the stations could not be ascertained. Mr. Wiseman, however, afforded me all the information in his power, and I consequently proceeded fifty miles by the road to Gladstone to obtain bearings to Mount Larcom and other hills near Port Curtis. The party travelled by the road through the Burnett District, and reached Brisbane on the 16th December, 1856.

47. Extreme monotony characterises the physical features of the whole country travelled by the Expedition from the Victoria to the 140th meridian, the interior appearing to consist of a table land of sandstone formation, averaging 800 feet above the sea level, along the edge of which small rivers take their rise, and traverse the short space which intervenes between the table land and the ocean.

48. This table land appears to form the continuation of the interior desert which exists to the south of the Victoria, the geological structure being the same, though from its greater proximity to the coast, on the line traversed, causing a less arid climate, the soil supports a greater amount of vegetation, and, consequently, it did not exhibit those remarkable ridges of drifting sand which characterise the more inland portions.

49. It was this inhospitable region, destitute of the requisites for the support of the party, which compelled the expedition to deviate so much towards the coast, and by following the northern slope take

advantage of the watercourses which there take their rise, and originate the numerous small rivers crossed by Dr. Leichhardt in his journey along the coast of the Gulf of Carpentaria.

50. I was desirous, had the nature of the country justified the attempt, of taking a more inland course than that traversed; but the absence of tributaries on the easterly side of the upper valley of the Victoria had warned me that the country in that direction was impracticable at the period of the year, as the wet season had terminated before the return from the exploration of the interior.

51. The route of the expedition was perhaps that which will tend more to develop the physical character of the northern portion of the continent, as the distance to which the rivers extend from the coast has now been approximately ascertained, and as none of the watercourses could extend any considerable distance into the interior beyond the line traversed by the party.

52. The insignificant size of the watercourses crossed between the Victoria and Albert Rivers is almost a proof that no country available for the purposes of settlement, exists to the south of the line traversed, while the small quantity of available land seen to the north, and the unfavourable account given by Leichhardt of the parallel line on which he travelled near the coast, render it improbable that any considerable tract of land suitable for settlement exists on the S.W. shore of the Gulf of Carpentaria.

53. On the western shores of the Gulf, the extensive development of basaltic rocks results in the formation of a fine tract of pastoral country, in which the upper river takes its rise.

54. The "Plains of Promise," which occupy the south shore of the Gulf between the meridians of 139° and 141° , extend little beyond latitude $18^{\circ} 10'$, south of which we always met with miserable sandstone ridges, except on the banks of the Flinders and Leichhardt Rivers, and the whole of these plains seem to result from the gradual recession of the waters of the Gulf. The grass was generally inferior, both in quantity and quality, to that on the Victoria or the eastern coast. Water is scarce during the dry season, and the surface is so level that it is excessively wet and boggy during the rains.

55. Had the vessel reached the Albert in time to co-operate with the land party, my intention was to have explored the courses of the Leichhardt and Flinders Rivers, which are now the only rivers in Northern Australia, the sources of which have not been ascertained, though from their size there is reason to think that they do not extend more than 100, or at the most 150 miles from their mouths.

56. East of the Gulf, after receding 30 miles from its shores, the

level country is covered with worthless scrubs of melaleuca, and *tridalia* covers the more open country. Even along the course of the Gilbert, the extent of available country is by no means great.

57. Crossing from the western to the eastern waters, a marked change was observed, after travelling over nearly 13° of longitude in a country where the same geological and physical characters were almost constant. The sandstones were completely superseded by slates and primary rocks, climate and vegetation seemed to change in the space of a few miles, and it was only where wide spread plains of basaltic lava, with their peculiar vegetation, occurred, that any semblance of the western country remained.

58. Although large tracts of inferior country exist on the upper portion of the Burdekin, yet there are many fine patches of country well adapted for stock, while the never-failing supply of water in its channel, the hilly and varying character of the district, by protecting it from the serious consequences which attend long droughts in more level portions of Australia, will render it eventually one of the important districts of the colony.

59. South of the Burdekin we encountered the first brigalow scrub, which formed a broad belt, widening as it receded from the coast, and it separates the fine country just referred to, from the valleys of the Mackenzie, and other tributaries of the FitzRoy River.

60. So large an extent of this latter district has already been tendered for as stock runs, and reported upon by the Commissioner of Crown Lands, that it would be useless for me to attempt a further description, which would necessarily be imperfect.

61. With reference to the capabilities for settlement, the portion of Australia traversed by the expedition may be divided into three sections, each with its distinct character, climate, and geographical position, viz., the N.W. Coast, the Gulf of Carpentaria, and the Eastern Coast.

62. The first of these offers considerable facilities, the Victoria giving access to the interior; the navigation is by no means difficult, if due precaution be observed. That the country is suited for stock, is shown by the excellent condition of our horses and sheep, which recovered rapidly from a state of extreme exhaustion, consequent on the protracted sea voyage, while there is reason to believe that large tracts of good country extend as far to the S.W. as the FitzRoy, beyond which the desert appears to come down to the coast.

63. Considering its position within the tropic, it is well watered by the rivers; and though the climate is extremely hot during three

months of the year, the dryness of the atmosphere seems to counteract that unhealthiness which is usually inseparable from these latitudes.

64. The country around the Gulf does not offer any great inducement to the settler, being devoid of good harbours; the rivers are only accessible for small vessels, while the available country bears but small proportion to that which is utterly worthless. Its relative position causes its climate to participate in some degree with that of the Australian interior, and appears to be subject to drought.

65. On the eastern coast a large proportion of good country exists along the course of the Burdekin River and its tributaries. It forms a continuation of the tract which extends north from Moreton Bay, over which the stations are extending with such rapidity, that a few years will probably suffice for the settlement of the country to latitude 18°.

66. Judging from the character of the vegetation, the climate of this part of Australia is cooler and more humid than that of the Gulf or N.W. Coast; the rainy season is not confined to any particular period of the year, being situated between the intertropical and extratropical climates, the wet season of the former occurring from November to March, and the latter from May to September.

67. With reference to the aborigines of Northern Australia, I have been able to collect little information. Except in the immediate vicinity of the sea coast at the mouth of the Victoria, and on the southern shores of the Gulf of Carpentaria, their numbers are apparently small, though the recent traces in every part of the country visited, showed them to be diffused over the whole, and small parties were often seen.

68. Except on the few occasions detailed in the journal, our interviews were of a friendly nature, though twenty-six years' constant intercourse with the aboriginal Australians has convinced me how little their professions are to be relied on; and I therefore never relaxed those precautionary measures which, though they somewhat interfered with the collection of information regarding their habits and customs, has, with one exception, enabled us to avoid collision in which life had been unavoidably sacrificed.

69. In no part did I observe any marked difference in race or form of weapons from the aborigines of the western coast, except such variations in the latter as were requisite from the difference of the materials from which they were constructed. The language differed from either that of Moreton Bay or Western Australia. Circumcision, and the removal of the front teeth, are practised by some of the tribes, but others did not practise either rite.

70. Circumstances over which I had no control compelled me to impose many duties on the scientific officers of the expedition, which, of course, greatly circumscribed their opportunities for collecting specimens and notes relative to the departments specially in charge. A large collection had, however, been made before I left the Victoria, to which the unabated zeal of Mr. Elsey and Dr. Mueller has enabled them to make many valuable additions during the last journey; and it gives me pleasure to record my thanks to those gentlemen, and also to Mr. H. Gregory (to whose unwearied care and judgment in conducting the transport service of the expedition, the extraordinary rapidity and success of the several journeys are mainly attributable), for the cheerful assistance and support they afforded me in carrying out the objects of the expedition. To Mr. Baines I am also particularly indebted, and can only regret that I have been compelled to detain him on service which, while it almost precludes his devoting his time to his artistic pursuits, imposes duties of a peculiarly harassing nature.

71. I would also bring under his Excellency's favourable notice the excellent conduct of Charles Dean, Robert Bowman, and John Melville, who accompanied me from the Victoria to Moreton Bay, and whose constant attention to their several duties, and cheerfulness under privations of no ordinary nature, merit the highest commendation.

72. I am now preparing a map of the route of the expedition from the Victoria River towards Moreton Bay, and will transmit the same on its completion.

73. All the documents relative to the expedition, previous to the 21st June last, are now on board the *Messenger*, which vessel was employed on the service of the expedition after the *Tom Tough* became unfit for further service; and I daily expect her arrival in Sydney, with the remainder of the party in charge of Mr. Baines.

I have the honour to be, Sir,

Your obedient servant,

A. C. GREGORY,

Commanding N. A. Expedition.

*The Honourable the Colonial Secretary,
&c., &c., &c., Sydney.*

MR. J. R. ELSEY, F.R.G.S., surgeon to the North Australian expedition, made a few remarks on some of the physical features of the country traversed by the expedition. He brought forward a short report which he had furnished to Mr. Gregory, of the climate of the country, and its sanitary effect upon the party. He hoped before the next meeting of the Society to have corrected and completed a meteorological journal kept by him at the Victoria River, during

nine months, which was at present, with other more detailed notes, on board the *Messenger*.

The PRESIDENT asked whether it was discovered that the Newcastle range divided the waters that fell into the Gulf of Carpentaria from those that flowed into the ocean?

MR. ELSEY replied that the Newcastle range did not divide them. It was a peculiar feature of the range that the Gilbert river ran through it.

The PRESIDENT said the Meeting would agree with him that the exploration of Mr. Gregory and his associates had been one of the most remarkable ever undertaken by the explorers of Australia. The Society had already honoured the chief of the expedition with their Gold Medal; and he was sure, from what had fallen from Mr. Elsey, that a whole evening might still be profitably devoted to the consideration of the subject.

Wm. H. Fitton

The third Paper read was—

3. *On the Structure of North-Western Australia.* By WM. H. FITTON, Esq.,
M.D., F.R.G.S., &c.

Addressed to Sir RODERICK I. MURCHISON.

HAVING undertaken so long ago as in 1825 to examine and describe some specimens brought from the coast of Australia by Captain Philip Parker King, R.N., I ascertained the disposition of the strata on the part of the north-western coast which that officer has described; and finding in Captain Flinders, an account of the chains of islands, where he closed one division of his survey, I was led to connect his observations at the N.W. of the Gulf of Carpentaria with what I had learned from Captain King—the distance between the two stations and the extreme points of this region being not less than 18° of longitude,—about 1250 English miles.

The following is an extract from Captain Flinders's description of a part of the N.W. coast:—

“A third chain of islands commences here, which, like Bromby's and the English Company's Islands, extends out north-eastward from the coast. I have frequently observed a great similarity, both in the ground plans and elevations of hills and of islands, in the vicinity of each other; but do not recollect another instance of such a likeness in the arrangements of clusters of islands. This third chain is doubtless what is marked in the Dutch chart as one long island, and in some charts is called ‘Wessel's Eylandt,’ which name I retain, with a slight modification, calling them *Wessel's Islands*. They had been seen from the N. end of Cotton's Island to reach as far as thirty miles out from the main coast; but this is not more than half their extent, if the Dutch chart be at all correct.”

These observations from a geographer of such talents and experience as Captain Flinders, coinciding with what I had learned from the maps and specimens of Captain King, led me to the speculations

* Flinders's ‘*Voyage to Terra Australis* (vol. ii. p. 24), prosecuted in the years 1801 to 1803’—with an Atlas. London. Two vols. 4to. Not published till 1814.

given in the paper, which form a part of the Appendix to the voyage of Captain King,* and which have been confirmed by more recent observation; so that it is now ascertained as matter of fact that the whole of the N.W. coast, from the Gulf of Carpentaria to the scene of Captain King's observations, and those of the French voyages on the W.,—may be regarded as one great deposit of ancient sandstone, extending to more than 14° of longitude (about 973 English miles), and forming, apparently, a great natural division of the country.

This view, which is given as a speculation in the Appendix to Captain King's work, published in 1825, has been confirmed by the more recent observations of Leichhardt,† and especially by the valuable discoveries of Captain Stokes in the years 1837 to 1840.‡ It is further confirmed by the observations obtained during a recent expedition of Mr. Gregory, of which an account has been published in the *Geographical Journal*, and a sketch given in Arrowsmith's map of 1856;—and by the tracings of Mr. Wilson, the geologist connected with that expedition, which represent several remarkable ranges of sandstone, named Stokes, Newcastle, Ellesmere, and Murchison Ranges; all of them according in direction and composition with what was to have been expected.

A copy of Arrowsmith's map, which I now send, with lines rudely marked upon it, will sufficiently explain these views; representing first, the remarkable ranges on the N.W. coast, described by Captain Flinders; secondly, the course of Leichhardt's journey, which exhibits two portions—first, a line parallel to the coast at the bottom of the Gulf of Carpentaria, and, secondly, a continuation, nearly in the same direction, of streams connecting that gulf with Van Diemen Gulf, and passing through a remarkable group of mountains, which form what is called in the map a high table-land, 3000 or 4000 feet high; thirdly, a portion of Victoria River, discovered by Captain Stokes; and fourthly, the remarkable group of islands, extending from Dampier Land to Cape Londonderry, and exhibiting numerous instances of the peculiar form resulting from the summit of trap-rocks, described by Captain Stokes and represented by Captain King,—with long straight fissures, of which Prince Regent River is a remarkable example.§

* 'Narrative of a Survey of the Inter-tropical and Western Coasts of Australia.' Two vols. London: 1826. Appendix, vol. ii. pp. 556 and 600.

† 'Journal of an Overland Expedition in Australia from Moreton Bay to Port Essington,'—a distance of upwards of 300 miles. 1844 to 1845. London: 1847.

‡ 'Discoveries in Australia, with an Account of the Coast and Rivers explored and surveyed during the Voyages of H.M.S. Beagle, in the years 1837 to 1842.' By John Lort Stokes, Capt. R.N. Two vols. London, 1846.

§ See the Plate, given by Captain King, of a portion of strata, consisting of reddish sandstone, on Prince Regent River. Vol. ii. p. 40.

It may be remarked that the general outline of the island of Timor, at the distance of about 250 miles, is nearly parallel to the direction of the strata in this portion of Australia.* And, perhaps, it may not be carrying speculation too far to observe that the lines of direction of the strata, in several points in the northern hemisphere, nearly coincide with that above mentioned, the predominant ranges in North America and in England having a direction nearly from N.E. to S.W.

The points of resemblance of a large portion of the S.W. of this part of Australia to the old red sandstone (Devonian) of England, are obvious; and the analogy is increased by the trappean rocks, which, in many instances, are found, especially on the N.W. coast, capping, or alternating with, red sandrock; but no fossils have yet come to my hands.

The relations of the sandstone in the S. of Australia, and in Van Diemen Land, are now interesting subjects for inquiry.

The PRESIDENT pointed out the value of this memoir to geologists, and warmly commended the speculations of his old and eminent friend Dr. Fitton.

The fourth Paper read was—

4. *Notes relative to the late proposed Expedition to discover the Sources of the White Nile.* By MR. A. W. TWYFORD.

THIS expedition was organised in the autumn of last year, through the direction of the Pasha of Egypt, by M. le Comte d'Escayrac de Lauture, who, in accordance with the wishes of the Pasha, collected for the purpose twelve gentlemen from different European countries. Through the kind introduction I received from your Secretary, Dr. Shaw, to the Count d'Escayrac, I had the honour of receiving one of the appointments with a view of assisting in navigating the boats up the Nile.

As communications respecting the objects of the expedition have already been made to the Society by Count d'Escayrac, I feel it only necessary under the circumstances to explain what part I myself took in the expedition. As every one knows the route from Marseilles to Cairo, I will not dwell upon that part of my trip, but at once begin by stating that we arrived at Cairo on the 27th of September, 1856, and after consuming a good deal of time, through want of preparation before my arrival, I managed to start with the

* The line which includes the great volcanoes of Symbaua has a direction nearly from east to west, making a considerable angle with that of Australia, &c., a change not impossibly connected with volcanic action. I find in Mrs. Somerville's *Physical Geography* that the line of direction of Wessel and the other islands is continued in New Guinea, but the authority is not mentioned.

boats on the 19th of the following month; it having been arranged at Cairo, that with M. Pouchet the doctor, and Mr. Clague the photographer, I should proceed with my flotilla to Berber, up the river, there to be joined by M. d'Escayrac de Lauture and the rest of the party.

Under instructions from the Government I had collected at Cairo one steamer of 30 horse-power, one of 15, and four of the large-sized country boats heavily laden with waggons, which were considered necessary for the expedition, with four ordinary ship-boats.

I was furnished with a guard of sixty soldiers and sailors, and invested with the command of this—the nautical—part of the expedition.

Having left Cairo on the 19th of October, 1856, we were towed by two large steamers as far as the first cataract, where we arrived on the 31st of same month.

As so many country boats now pass over this cataract every year, the difficulty is greatly diminished as regards that sort of craft, but, as far as steamers are concerned, it is very different, for with the exception, I believe, of the two steamers that conveyed Mahomet Ali and his suite to Korosko, about the year 1820, the steamer under my charge is the only one that has been carried over.* The chief difficulties I encountered here arose from the dislike that the sailors had to pass over the cataracts in the steamers, and the terror with which the natives viewed the proceeding altogether.

Nothing short of my immediate presence in each boat, as it went over, would induce any of them to work at all. It took about a day to pass each boat over, having frequently upwards of 600 men all pulling or pretending to pull at once. It was entirely owing to my being there too late in the year that I failed in getting the large steamer over, for I am persuaded that it would be comparatively easy to pass any vessel, not drawing more than 10 feet of water, over the first cataract in the months of July and August. For this reason we left the largest steamer behind, as when once the Nile has commenced falling it does so with amazing rapidity.

The first cataract is nothing more than a very narrow and shallow succession of channels, through which the water pours with great rapidity at the rate of 6 or 8 miles an hour. About 3 miles from

* With reference to a paragraph that appeared in 'The Papers' that I had lost one of the steamers under my charge in ascending the first cataract, I beg to state that this assertion was incorrect. The facts of the case were these:—Finding I was not able to get my second (the largest of the two) steamer up the cataract, I left it at Assouan; but a steamer belonging to the Pasha, that was at Assouan at the same time, was lost in an attempt to ascend the cataract, which probably led to the above mistake.

Assouan I came to the first ridge of rocks, which stretches, with the exception of a very narrow channel, right across the river. The water pours through this channel at great speed, but the engines were powerful, and we got through in safety. From Assouan up to this part of the cataract there were 10 to 20 feet of water. After getting over this, you go through quiet waters for about three-quarters of a mile or so, when you come to the second ridge, which is a repetition of the first, with the exception that the higher you go the greater is the difficulty, as the water then runs with greater rapidity and the channel becomes more shallow. The steamer passed through the second rapid; but on coming to the third, the engines were not able to hold their own, and began to go astern, on seeing which there was a universal yell set up by the rais or boat-swain of the cataracts and his men—as they were told that if anything happened to the boats they would have their heads cut off by Said Pasha, the Viceroy. Overboard they all went, and in a few minutes we had about 800 men pulling away on the ropes, and after an immense struggle with the water, we passed over. Another ten minutes brought us to a corner round which the water ran more rapid than ever. Here we again went astern, although the engines were going at full power. Here the steamer struck on the rocks, and although the boat had no hole made in her, I was in momentary fear of losing the screw or the rudder. The Governor of Assouan and his numerous attendants got into a fright here, and began to count their beads. The women and children were driven out of the neighbouring hovels and made to catch hold of the ropes, and at last we succeeded in hauling the steamer off.

We next reached the fourth ridge, where the steamer struck violently on the rocks.* She was then on the west side of the channel, but we got her off again and tried her in the middle channel, and there she struck again, and continued bumping violently. I then saw that it was quite impossible to get her over the rapids, and after taking counsel with the Governor, I determined to take her back to Assouan, at which place we arrived in the evening.

The following day I went over the cataracts with the rais, and got capsized out of my boat; but I am of opinion that the large steamer might have been taken over if I had received proper assistance.

On the following day I determined to make another attempt with the steamer over the cataracts, but as the rais refused to lend me assistance I was obliged to give up the attempt.

On Wednesday, 12th of November, I got my last boat over the

* This Channel, after December, is quite dry.

cataracts, and on Thursday the 13th started at daylight with all the boats before me. About 8 A.M. came to a village named "Kouloutout," where two of the rais or pilots had their country-houses of mud, and where at their request I stopped for ten minutes to allow them to get some food that their families had prepared for them. The whole population ran out to say "Good bye" to their relations, crying bitterly; for they all thought that we would never return.

The wife of one of the pilots made her appearance with a sheep as a present to me. As long as the villagers could walk along the shore they kept the boats in company, wailing and screaming fearfully; and when the shore came to an abrupt termination, they all set to work throwing water at us for good luck.

The morning that the first of my boats tried to get over, the rais of the cataracts sacrificed a sheep to some saint's tomb or another, to persuade him to get the boats over safely; and when the steamer struck on the rocks, he swore by Mahomed that he would never waste another sheep. One of my cawasses also told my interpreter that as he had to go over the cataracts next day, he had sacrificed a sheep the night before.

On Sunday the 23rd we reached the village of Wadi Halfeh. As soon as possible I went up to the foot of the second cataract in the steamer, and we then took to a little cutter and went over the cataracts. These deserve the name of cataracts, though the first do not.

There are two channels, one easier than the other, both passable at high Nile; but I arrived too late for the easy and safe passage, and had to wait until the large passage became passable. The water rushes through with the greatest violence, and there is a 2 or 3 feet fall.

The cataracts are a succession of rapids, each one as you ascend being worse than the former.

I took the effendi and the sheik of the village with me in the cutter, who were both in a great fright. They had neither of them been over the cataracts, and never would have gone of their own free will. The cataracts do not present such a fine view to the eye as one would expect, but they are much more extensive and more dangerous than the cataracts at Assouan.

No one can conceive the rapidity with which the water pours down. For instance, it took me, in a small boat pulled by ropes and fifty men, eight hours to ascend, and one to come down; and in ascending one rapid, it was as much as I could do to sit still without going head over heels into the water, the boat's bow was so much above the stern.

Monday, 24th November.—From the date of my arrival at Wadi Halfeh till my departure, it blew a strong gale from the N.W. and was very cold.*

I was 16 days in passing the steamer and dahabiahs (boats) over these cataracts, during which time I kept 3500 men fully employed. Some of the men I took from Assouan and the villages as I came along, and the rest were sent all the way from Dongola.

The cataracts are 12 miles in length by 3, and are interspersed with rocks and islands,† some a mile in length, and the channels alter according to the time of year at which boats happen to arrive. In some places I found a fall of water of 3 or 4 feet, and in others the rapids had to be passed over a straight piece of water of 300 or 400 yards.

On the morning of the 15th of December, after great difficulty and contention with the natives, and much anxiety on my part, we got clear of the Wadi Halfeh or cataract, and on the following morning started early for Dongola. On our way we found four more cataracts: the names of these are Ambercole, Tangúr, Dal, and Hannek. After having with difficulty surmounted them, we proceeded up the river and arrived at Dongola on Sunday the 4th of January, 1857. Here I waited a fortnight to repair the boats.

On the morning of the 28th I started towards Meroe, or the fourth cataract; and on reaching the village of Ambercole received a letter from his Highness the Viceroy, informing me that the expedition was broken up, and ordering me to return, but to wait for him at the village of Abdúm, where he would join me in a few days from Khartum.

On Friday, 6th of February, the Pasha with his suite and troops arrived, and we all returned to Dongola. I was then informed of the particulars which led to the breaking up of the expedition, and received orders to return overland to Cairo, at which place I arrived, after a very fatiguing journey, on Sunday the 19th of April.

I cannot submit these few hurried notes without making a few concluding remarks. When I accepted my appointment from the Count d'Escayrac, I was not aware that I should have held the responsible situation I did. A French naval officer was to have had the command of the boats; but as he did not make his appearance in time, I was obliged to take his place. I was determined, however, not to shrink from the responsibility—the pride of being the only Englishman in the expedition, the confidence I had in my own

* The meteorological and other observations I made, I will take another opportunity of communicating to the Royal Geographical Society.

† These islands are barren, though at high Nile they are mostly under water.

determination to do my best, and the hope of distinguishing myself, bore me up. I very much regretted that boats especially adapted for the purpose had not been built in England. If this had been done, the great and almost insurmountable difficulties I sustained at Wadi Halfeh would have been in a great measure obviated; and had I left Cairo at the proper season I should have experienced much less trouble altogether. When I heard that this expedition was abandoned, it was a great source of satisfaction to me to know that my conduct had been appreciated by the Royal Geographical Society.

The PRESIDENT said, they must all feel proud of the prowess of their young countryman. He must remind them that M. d'Escayrac, the head of the expedition, was the author of a valuable work on the geography of Sudan, and he only regretted that the dissensions which had broken out in his camp, had prevented him from joining Mr. Twyford at the cataracts of the Upper Nile, and thus carrying the expedition towards its ultimate destination.

The fifth Paper read was—

5. *Report of the Expedition for the Exploration of the Rewa River and its Tributaries, Na tite Levie, Fiji Islands.* By Dr. MACDONALD, R.N.

Communicated by the ADMIRALTY.

[This Paper will be published in full in the next Journal.]

The sixth Paper read was—

6. *Report on the Specific Gravity of the Sea-Water on the West Coast of Africa.* By HENRY M. WITT, F.C.S.

Royal College of Chemistry, April 17, 1857.

SIR,—The samples of sea-water collected on the western coast of Africa by Dr. Campbell, and placed in my hands by you, were, I regret to say, far too small to admit of chemical analysis.

The colour which the sea had acquired by the influx of a large river you mentioned as being peculiar, and were desirous of information as to the nature and amount of the colouring matter: all that I have been enabled to ascertain on the subject is, that it was evidently a suspended yellow substance which modified the usual green colour of the sea; this suspended matter had separated from the water in the samples submitted to me, and appeared curiously light and flocculent, so that it would suggest for itself a more or less organic origin; but its amount was really small, in some of the samples only just visible: so that to have made a chemical examination of it

in order to ascertain its real nature, or even to determine its relative proportion, would have required at least a gallon instead of one or two ounces of water.

In most cases, however, the samples were sufficient to enable me to determine the specific gravity, and these numbers may possess some little interest, as a further confirmation of the general observation of the diminution of the specific gravity of sea-water as it approaches the mouths of rivers.

The experiments were made after filtering off the suspended matter, so that all the samples were in the same clear state, and at the same temperature of 60° F.; and I may be allowed to mention that, although the differences may appear slight, they are, in fact, considerable, it being remembered that in every case about 1000 grains of water are used.

The samples were numbered as they approached the coast, commencing at the greatest distance from it, and their specific gravities are contained in the subjoined Table:—

Number of Sample.	Date when Collected.	Latitude.	Longitude.	Temp. of Water.	Temp. of Air.	Specific Gravity.
	1856.			Fahr.	Fahr.	
1	May 23 .	3° 17' S.	2° 25' E.	75° 0'	77°	1·027455
2	„ 24 .	3 17 S.	3 37 E.	75 0	77	1·027865
3	„ 25 .	3 26 S.	4 42 E.	74 5	76	1·027370
4	„ 26 .	3 27 S.	5 37 E.	75 0	76	1·027070
5	„ 27 .	3 45 S.	6 55 E.	77 0	77	(*)
6	„ 28 .	3 57 S.	8 25 E.	76 0	76	1·027000
7	„ 29 .	4 58 S.	8 27 E.	75 0	76	1·025200
8	„ ..	..	..	75 0	74	(*)
9	No label.	..	..	..	..	(*)

(*) In these cases, there being less than 1000 grains, the specific gravity even could not be taken.

Hence it appears that the specific gravity of the open sea, unaffected by rivers, may be assumed to be about 1·02745 to 1·02785, unless at these furthest points it be still reduced by the same cause.

The following are some of the results of other observers:—MM. Adolphe and Hermann Schlagintweit* give 1·0277 as the mean specific gravity of the Atlantic, from the results of a series of experiments made on a voyage from Southampton to Bombay in 1854; and Rear-Admiral Philip King, R.N., F.R.S., gives a mean specific gravity for the—

Pacific, between 10° and 40° S. of 1·02648,
 „ „ 40° and 60° „ 1·02613,†

* Philosophical Transactions, January, 1855.

† Ibid., December, 1856.

so that it would appear probable that the Atlantic has a higher specific gravity than the Pacific, and it would be interesting to confirm this by further observations, or more correctly by actual determinations of the quantity of saline matter.

Of course the density of inland seas, as the Mediterranean, &c., is higher than that of the Atlantic or Pacific Oceans.

Although the fact of the diminution of the specific gravity of sea-water by the influx of large rivers is an observation which we should anticipate *à priori*, I find only two other recorded sets of experiments on the point. Mulder* states that the specific gravity of the Atlantic falls, in the North Sea, where several large rivers enter it, to 1·0255; and Dr. John Davy† found that at the mouth of the Demerara the density of the water was 1·0036, whilst that of the sea eighty miles distant was 1·0266; and my own experiments show a similar diminution, the sample taken nearest the Loando coast (*viz.* in long. 8° 27' E.) having a specific gravity of 1·02520, whilst in the long. 3° 37' E., or 4° 50' further from the coast, the specific gravity of the sea-water rose to 1·02786.

I have, &c.,

HENRY M. WITT, F.C.S., *Assistant Chemist.*

To Sir Roderick Impey Murchison, PRESIDENT R.G.S., &c., &c.

The PRESIDENT next announced the titles of other papers which, for want of time, had not yet been read.

He had also to call their attention to a series of remarkable water-colour sketches of the mountains of porphyry, basalt, and other igneous rocks in the interior of Asia, extending into China—countries of which they had hitherto possessed little knowledge. The explorer of this region, Mr. Atkinson, was present, and was about to produce a beautifully illustrated work which would throw new light upon the structure of the interior of Asia.

The President then gave some information respecting the expedition which was about to proceed to the Arctic regions under Captain M'Clintock. Great importance was attached to the acquisition of an interpreter, and they knew that an Esquimaux interpreter was not easily obtained. The Secretary had long ago been in correspondence with Captain Irminger, of the Danish navy, to procure the services of that excellent man Petersen, who had lived among the Esquimaux in Greenland a long time, and who had already served as interpreter with Penny and Kane. That person had arrived from Greenland at Copenhagen a few days ago, and intelligence of the fact having been received on Saturday, he (the President) had immediately telegraphed to Captain Irminger, requesting him to send off Petersen at once. He was happy to say that an answer had been received, stating that Petersen would be in London on Wednesday, and proceed on Thursday to Aberdeen. The expedition would sail immediately on his arrival.

In concluding the business of the meeting, and at the same time closing the session of 1856-57, the President said he was sure his associates would admit

* Poggendorf's Annalen, xxxix. 513.

† Edinburgh New Philosophical Journal, xliv. 43.

that there never had been a session of the Geographical Society more productive of valuable results than the one which had just transpired. Lastly, he had the pleasure to announce that having applied to the University of London, and to the Royal Society, for permission to assemble in their great room at Burlington House during the ensuing season, the request had been willingly conceded. They would thus have a spacious place of meeting, where ladies as well as gentlemen might assemble, without being exposed to the inconvenience which had been felt in their present small apartments.

The PRESIDENT then formally declared the Session to be closed.

ADDITIONAL NOTICES.

1. *A short Account of a Journey across the Rivers of British Kafraria, thence from the Great Kei to the Ghabaka River, with a Description and Sketches of Fossil Remains near the mouth of the Ghabaka.* By the Rev. FRANCIS FLEMING, M.A., F.R.G.S.

I LEFT King William Town at 5 A.M. on Monday, Nov. 21, 1853, and having heard of some gigantic fossil remains lying somewhere near the mouth of the Ghabaka, I determined to visit them, and likewise see something of the country lying near that river and the Bashee. Having but six days' leave, I consequently felt that I had undertaken no easy week's work, as these rivers rise about 150 miles to the N.E. of King William Town, and in the centre of Krel's Kafirs, among whom the rebel Hottentots had been dispersed. I put my full confidence, however, in the savage *honour* of the Kafirs, and determined to go nowhere without one, from whom I would first exact a promise to guide me safely. This I found to answer admirably, as during my trip I had on different occasions, and in different localities, six Kafir guides, who all fulfilled strictly their engagements with me, conducted me safely, prevented interruptions and inquiries from the Hottentots, and brought me back to the point whence we started. From the English traders who are located in that wild country I also received the greatest hospitality and aid, was everywhere received gladly, given the best of all they possessed, and procured the Kafir guides when I required them.

I travelled rapidly during the six days I was in the saddle. In the upper parts of the country there are of course no roads. I crossed the Great Kei river about 25 miles from its mouth, and found there that the Butterworth river is not the Coga, as laid down on some maps, but the Goa, which runs into the Great Kei about 20 miles from its mouth. The Coga is then the next river. East of this it runs near Butterworth, and falls into the sea at Mazeppa Bay.

The next river that I crossed was the Gwaninga, which runs nearly parallel to the Coga, about 20 miles N.E., and also empties itself into the sea. It is not more than 40 miles long from its source to its mouth. The Ixixini was the next. This is a larger river, and rises about 60 miles from the coast, in three sources, which join about half way down, and then flow into the ocean through one mouth, about 20 miles N.E. of the Gwaninga.

We next reached the Ghabaka. This is a much larger river than it is represented to be. It rises in the hills which formerly belonged to the great Kafir chief Hintza, who was slain in single combat by Sir Harry Smith. It has five distinct heads to the Little Ghabaka, and three to the Great Ghabaka. These flow into one course, each about 10 miles below the other: the first, which rises in the Great Ghabaka, about 85 miles from the coast; the smaller Ghabaka,

about 65 miles from it. These two rivers then flow on as distinct streams, and unite just at the mouth, which is wide and open, but intersected with sandbanks. This river meets the ocean about 20 miles N.E. of the Ixixini, and about 12 miles S. of the Bashee.

Crossing the Great Gnabaka, and passing along the coast towards the Bashee, about a hundred yards up is a small bay or estuary, surrounded by cliffs of red sandstone and oolite rock, in the faces of which I found the fossils imbedded. They appear to have been subject to the action of the surf at high tides, for they are much injured; in fact hardly any parts of the original animals seem left, but merely the indentation of where they have lain. They are, notwithstanding, wonderful in dimensions, and sufficiently distinct to show pretty plainly what they have been. So far as I could conclude from what I saw of them, as well as my very limited knowledge of geology, I at once determined them as gigantic sauroid reptiles of the oolite system,* but to classify them beyond this I could not dare. I consequently made drawings separately of each, as faithfully as I could, and with as much accuracy as to colour and form as time would allow me. The measurements I obtained by getting one of my Kafir guides to stand on the upper edge of the cliff and suspend a tape line 50 feet long, and the other Kafir to hold it tight at the base of the cliff, where the different fossil extremities intersected: the marks on the tape gave me the exact length, breadth, and dimensions.

I much regretted that my time was so limited; as it was, I remained there till dark, met with a fearful thunder-storm in the mountains on my return, and did not reach the traders' station, from which I had started in the morning, until half-past 11 at night, wet through and benumbed with cold. From this I started at daylight, and rode until half-past 8 in the evening, excepting two hours during the extreme heat of the day, when I offsaddled the horses.

In returning I took a different route, and inspected much of the country. In all directions it was most lovely and luxuriant. Limestone and ironstone were in many parts seen close to the surface, and the whole landscape was undulated into long ridges of fertile hills, and these again divided by longitudinal valleys. In no part of Kafirland have I seen more vegetation and fertility, and in saying this I am not unmindful that I have always ranked Kafiraria as the finest part of Southern Africa; if not indeed the most fertile and lovely locality in the known world.

I returned to Butterworth on Thursday night, and reaching the Kei, found, to my dismay, that recent rains in the mountains had brought down the torrent of this formidable river as a barrier to my farther progress. Trusting myself again, however, to my Kafir guides, I swam the river, and was nearly drowned. Thank God, I reached its furthest bank at length in safety, and after spending one more night under the canopy of heaven, I rose with the sun and reached my home at King William Town by 3 P.M. on Saturday.

* The dimensions of the largest one were as under:—

				Feet.	In.	
Length of the head	..	..	..	3	0	} Total length, 25 feet.
„ back	..	..	..	12	0	
„ tail	..	..	..	10	0	
Width of the head	..	..	..	2	0	
Length of front fins	..	..	..	2	4	
„ hind feet	..	..	..	3	0	

Prof. J. F. Napier Hewett
 2. *On the Jolloffs of West Africa.* By Lieut. J. F. NAPIER HEWETT,
 72nd Highlanders.

DURING my sojourn in the British colony of Bathurst, on the river Gambia, Western Africa, which is chiefly inhabited by Jolloffs, I enjoyed especially favourable opportunities of observing the manners and customs of this people, which so much interested me that I determined to make an excursion into their country.

With this intention I started from Fort Bullen, on the N. bank of the river, passed the town of Yassaou, situated in the district ceded to Britain by the King of Barra, and entering the adjacent country of Barra, inhabited by Mandingoes, travelled some miles until I arrived at a walled but ruined town (Whydah), which, having fallen under the displeasure of Demba Sego, the warlike king of the country, had been by him destroyed.

Soon afterwards I reached Berending, the capital, and the king having provided me with horses, accompanied by one of his sons, I crossed the border, and, passing several towns and villages, came to Bákándik.

Here I made another stage, and proceeding arrived at length in the Jolloff country, Saulaem, and shortly afterwards at Woioutaou, probably about midway between the French settlements at St. Louis, Senegal, and the British colony on the Gambia; but, as I possessed no instruments and took no observations, I can only speak from opinion, and am unable to assign the particular locality of any of the towns; and, as the vicissitudes of military life have caused the loss both of my journal and of the rough map I drew out, I cannot speak with much certainty; but the greater part of the paper now submitted was compiled on the spot from that journal.

The country bordering on the north bank of the river Senegal is inhabited by wandering Arabs, Moors of Ludamar, and within the inclosure between that river and the Gambia principally by a race of Mahomedan blacks, who speak an Arabic dialect. They are called Jolloffs; are one of the most powerful and extensive of the north-western tribes; and are a fine-looking, intelligent, handsome race of people, as unlike the American and West Indian negro of every-day life as the Englishman of the present age is like his forefather, the rude wood-stained Briton.

The features of the men of this race being devoid of the slightest trace of the negro cast of countenance, and being regular and well-formed, are very comely—so much so, that I have seen Jolloffs whose physiognomy, if white, or merely swarthy, instead of black, jet black, would be esteemed models of manly beauty.

They are all of tall, symmetrical stature, having a dignified, sedate presence, and do not possess the negro characteristics of large hands and unwieldy feet, but remarkably the reverse.

Their notable peculiarity is their hair, which appears to be of greater length than the wool of most negroes, and is twisted and tortured into little cylindrical ringlets about the thickness of three straws, and from five to six inches in length.

Hence it might be imagined they are Arabs, but, unlike that race, they live a settled life, dwell in established towns, cultivate lands, feed flocks, and engage in a regular system of traffic.

Taking into consideration their religion, the length of their hair, their other physical characteristics, and the similarity of these to those of the Arabs and the most stalwart tribes of the Hindostan peninsula, I am of opinion that the Jolloff race cannot be classed with the negro family, but pertain rather to the Caucasian, and must have sprung from an Arab horde that has abandoned a wandering life. Yet, in the first place, it must be remembered that the Jolloffs

are quite jet black ; and, secondly, I must premise that they have, as I believe, become Mahomedan comparatively lately ; but, be their origin what it may, they are negroes to all intents and purposes, and occupy a large tract of country.

The Jolloff country is divided into three or more independent kingdoms, which frequently war with one another ; and of which states the principal are Danaar or Senegal, Saulaem, and Ballagh or Baa. The chief towns of Danaar are Bowael and Kadjo ; of Saulaem, which lies to the southward of Danaar, Saulaem and Woioutaou, the latter about half way to Gambia ; and Ballagh or Baa, situated on the north bank of the river Gambia, but some distance up the stream.

Each kingdom is governed by a hereditary monarch, and each city by a hereditary magistrate or alcade, who is responsible to the king for the conduct of the townspeople, and accountable for the apprehension of all malefactors who may be supposed to have sought asylum within the walls.

The chiefs of Danaar and Saulaem maintain regular standing armies, and are, I believe, the only negro potentates who do so.

The King of Danaar is named Djumael, whose army, said to number 12,000, chiefly cavalry, is by no means to be despised, as the French at St. Louis, Senegal, and Goree tacitly acknowledge, by declining to accept the frequent challenges which Djumael offers, to quit their fortresses, marshal their forces on the plain, and measure their strength in fair fight with his army.

The religion, habits, laws, customs, country, towns, and pursuits of each and all of the Jolloff kingdoms being precisely the same, I speak not of the one particular kingdom I visited, but of the whole race and country.

The greater part of the expanse is perfectly flat—one vast sandy level, studded with groves of palms, stately trees, noble forests, tangled jungles, and intersected by sluggish creeks, whose swampy margin is overrun with the baleful, miasma-exhaling, but beautiful mangrove. The soil, though sandy, is very fertile, and, being generally cultivated, produces vast quantities of grain, and the ground-nut, which plant, putting forth its clove-like leaves after the rainy season, clothes the plain in a mantle of brightest emerald, and growing exactly like and about the height of clover, overrunning the ground and interlacing its sprays, makes the surface of the earth resemble a soft carpet. During the dry season the plain, with its vegetation yellowed by the burning sun, is of a rich golden hue, wearing the appearance of a landscape of chased gold, and the bright green and dense dark foliage of the trees contrasts beautifully with the brilliant tint of the expanse.

A remarkable feature is the number and size of the ant-hillocks, the tenements of the termites, which are conical, sometimes six feet in height, and so firmly constructed as to be almost capable of resisting the application of a pickaxe.

The principal trees I have noticed are the palm ; the towering silk-cotton-tree, whose trunk is like an inverted closed umbrella, and which would overshadow our most gigantic oak ; the ash-like mahogany ; the dense umbrageous caoutchouc ; the naked spectre-like monkey-bread ; the wild tamarind ; and a peculiar tree, and also bush which grows six feet in height, the extremities of the twigs of which appear at a distance to be on fire. This remarkable appearance in both is caused by their putting forth bright scarlet flowers at the end of each twig, while the bush itself is devoid of leaves.

The towns and villages are fenced round with a triple stockade, eight or ten feet high, made of the trunks and limbs of trees, planted perpendicularly, irregular at the crest, and therefore impracticable to escalate by ladders.

The streets are about three feet wide, having either side lined by mats, or bamboo hurdles, seven feet high, and, as the walls of the dwellings are but three or four feet high, the wayfarer sees nothing but roofs, which, being thatched, lofty, generally circular, and finished off at the apex with an orna-

ment, lend to the place the appearance of an extensive rickyard, until the traveller, arriving at a square, beholds the tenements unmasked.

The houses are built of clay burnt hard by the sun, and are very neat in aspect, and consist of a circular wall, built of mud, two to four feet high, pierced with ornamented loop-holes as windows, and a doorless entrance, the lintel of which is sometimes modelled into pillars, which last, like all primitive ornamental architecture, is imitative of the prevailing vegetable feature of the country, in this instance the palm. Within this inclosure is another and a higher circular wall, like a tower, having a lofty doorway, and the rafters for the roof are laid resting on this wall and on the lower one; these are thatched over, and then the hut is finished off as before described. The doorway of the inner chamber opens in the opposite direction to the low entrance, and this apartment, notwithstanding its utter want of ventilation, is that of the master and his favourite sultana, while the exterior gallery is the dormitory of the slaves, domestics, and children, and is also the kitchen, where in the evenings the fires are kindled against the inner wall, which is thus burnt like brick. Each house possesses a rectangular inclosed yard, in which is a shed having a mat on the ground, where the master performs his devotions and religious ablutions, and the sides of these inclosures form the previously-mentioned linings to the streets. I may here remark that each one of these huts is a small castle in itself, and is so admirably adapted for defence, that one man might evade his pursuer or defend it some time against numerous assailants.

The squares generally contain, besides other dwellings, the mosque; the school, over which a Marabou presides, expounding the Koran, teaching the youth, and preparing some of them for the priesthood; and the residence of the Marabou, where may be seen the Jolloff books, which consist of wooden tablets whitened and superscribed with Arabic characters.

The principal square is distinguished by a lofty tree in the centre, and is called the "penang" or market-place, and here the caravanserai is situated, the horses and camels belonging to halted caravans picketed, palavers held, and, beneath the spreading branches of the tree, the women meet to dance, the men to hold festival, and the children assemble to celebrate certain Olympic games.

The granaries, wherein they deposit their ground-nuts, &c. are cane edifices erected on posts of palm-trunks, and the doors are merely bolted; while to the bolt is affixed a gree-gree or charm, which, the people being afraid to touch lest some mischief should befall them, serves as a lock.

The Jolloff cattle are very similar to the small short-horned Highland breed; but the sheep are the most remarkable animals, being long-legged, as tall as a small calf, marked piebald, yellow, brown, or black, and long-tailed. At first I mistook them for calves, and, as I said before, I do not recollect ever having seen them gathered in flocks. The horses are small, symmetrical, spirited, and tireless; but, being ridden with cruelly sharp bits, are not pleasant to the hand of an Englishman, and certainly are most incommodiously accoutred.

The Jolloffs are very superstitious, and are covered with amulets consisting of beads; pieces of cut, embossed, and enamelled leather, in number and beauty proportionate to the wearer's wealth; and snake-like necklaces of polished leather, in quantity and weight sufficient to bend the neck. The beads are either fancy beads or the Mahomedan rosary, and the others, amulets both decorative and useful, are called gree-grees. They consist of illuminated extracts from the Koran, enveloped in leather and beautifully ornamented—sometimes twenty on a string, and sometimes the whole Koran itself. These talismen are supposed to defend the bearer from certain terrestrial evils; to possess curative power; and even to ensure a passport to, and safe reception in Paradise.

These charms vary in value according to the price paid for them, and this

depends upon the degree of fame for sanctity the transcriber of the enclosed verse enjoys. Again, the value increases as the Marabou's sanctity increases; and *vice versa*. The production of a youthful saint might only avail against rheumatism or lesser maladies; thus a man afflicted with that disease will so load the part affected as to impede the free use of the limb; and the little children rolling in the sand, though utterly naked, are laden with strings of cheap gree-grees, sometimes even crossed over the body like the belts of a soldier, protecting, as it is believed, the infant from the bites of insects, and lesser evils incidental to childhood. The people do not object to part with a gree-gree for a consideration; and the case, if opened, will be found to enclose a MS. exceedingly skilfully executed in illuminated Arabic characters. Prompted by curiosity, I uncased a crescent-shaped amulet. The exterior covering was of leather, very neatly sewn, enveloping a goat's horn, the orifice of which was sealed by what had been an aromatic composition; beneath which coating lay two pages (superscribed with texts from the Koran), yellow with time and worm-drilled—two pages of a printed English tract or sermon dated thirty years back! Little did the author and distributor anticipate the use to which the tract would be devoted.

The Jolloff religion is a mild form of Moslem, devoid of the intolerant bigotry that disgraces the creed of their neighbours the Moors of Ludamar; wherefore, few but the Marabous scruple to drink intoxicating liquors, and few entertain the orthodox animosity to Christians.

Notwithstanding the credulous superstition of the race, the Jolloff worship is pure Mahomedan, unsullied by any admixture of idolatry or paganism, but inculcating rigid observance of the various feasts, fasts, and ablutions, and proselytisation both by sword and by missionaries.

At Bathurst I met a Moor,—a bishop, I suppose,—who, surrounded by disciples, was on his travels, confirming and strengthening the faith of the wavering, and adding new converts to his religion. The Mahomedan religion consequently increases rapidly among the Kafir (infidel) tribes, while, from the comparatively attractive nature of that creed, few belonging to it are converted to Christianity—excepting the females, who, when dwelling in European colonies, and finding that in the Christian creed they enjoy equal rights with the men, are often converted.

The Jolloff is a musical race, possessing numerous musical instruments; and a synod of bards, which, I understand, confers degrees in music on the minstrels, one of whom, attached to the train of each eminent man, extols his patron's greatness, generosity, and deeds in arms, and, relating his pedigree, and eulogising each distinguished warrior who passes in review, stimulates the auditory to emulate the fame of those celebrated. The others are the historians of the country, who, roaming from place to place, from festival to funeral, celebrate whoever and whatever desired; reciting the history, martial achievements, and ancient traditions of the people; and, when occasion demands, inciting the populace, by heroic strains, to maintain the warlike renown of their sires.

Some of the airs are simple and pretty, others are wild and undistinguishable; and one of the most popular is almost the same as the Persian national air, which is called by the Hindoos "Taza-ba-Taza."

The males dress, as do the Arabs, in a loose toga-like garment of striped and coloured homespun cloth, and wear on their heads either an embroidered white cap, something similar to a Glengarry bonnet, or a turban formed of a white wrapper, which, in the evening and morning when the atmosphere is chilly, is worn like a plaid, and as a turban at midday, when the head requires protection from the burning sun. Their feet are shod with red sandals, the straps of which are neatly sewn and embroidered, and they are armed with swords and daggers encased in handsome red leather sheaths, stamped, em-

broidered, and enamelled; with spears of curious workmanship, and muskets. The chiefs possess robes of coloured cloth, embroidered with gold, and their everyday garments are well and tastefully embroidered with coloured cotton or silk.

They are armed with muskets, with curiously wrought spears, swords, and daggers; and their sandals, bridles, and saddles are generally tastefully decorated. The pieces are procured from the French merchants at Senegal and the English of Gambia, the silk for embroidery from the Moors, and the iron weapons and leathern articles they either fashion themselves or procure from their neighbours the Mandingoes, a race peculiarly skilful in such work; in barter for gold and silver trinkets, in which the Jolloffs much delight, and which appear to constitute their chief wealth. These leathern articles are also given to the Jolloffs in payment for working rough gold, as in the goldsmith's trade they much excel; and the cunning with which they fashion the precious metals, even with their clumsy tools, is wonderful, almost rivalling the celebrated Maltese work in ingenuity and minuteness.

All business is conducted through the alcade of a town, who, on application being made, orders his men to procure whatever may be wanted; receives whatever payment he himself has fixed; discharges the claim of the artisan, and of course reserves a commission for himself. Regular trading caravans are received and dispatched to all quarters—to St. Louis and Mogador, to the Arabs, to the Mandingoes, westward and southward, and even to the banks of the Gambia. Owing, however, to the number of petty independent townships which, ever at war with one another, intercept and plunder these caravans laden with slaves, tobacco, baft, cloth, gold, and ivory, on the journey to or from a hostile tribe—less frequently to the last than to the other places—wars are too often declared on a frivolous pretext, either with the Mandingoes or with the Kafir (infidel) tribes, for the purpose of collecting slaves; but now that the slave-trade of the Senegal and Gambia rivers has been abolished, these raids are undertaken with the ultimate view of selling to the Moors the unfortunate prisoners captured. These predatory forays among the infidels have another object, viz., the conversion—in obedience to the injunctions of the Koran—by fire and sword, to the Moslem religion: thus, as interest is made to accord with duty, and those who fall in these crusades are preferred in Paradise above all others, the wars are frequent, and the tribes gathered to the fold of the “true believers” increase daily.

The Jolloff people are mild, hospitable, possessing no sanguinary laws; and, in hope of opening a trade, always welcome a “tobaubo,” or white man, towards whom, notwithstanding his creed—especially repugnant to Mussulmans—they are invariably gentle, accommodating, and inoffensive. A European may traverse their country in perfect safety, and even by himself, if he possess a knowledge of Arabic, and provides himself with a few colar-nuts for distribution; as the presentation and acceptance of a colar seals a friendly compact, the breach of which would be esteemed a crime of the blackest dye. The colar is a bitter pink kernel, brought from Sierra Leone. It is an excellent tonic, and is so preventive of thirst, that a Jolloff having one in his mouth will walk 30 miles without drinking water; and on this account, in a country where fresh water is only procurable at the city wells, the colar must be highly prized.

In conclusion: the recollection of the journey my mind now retains is that of galloping over an immense unenclosed plain, threading tangled jungles, and passing through dark forests; of seeing expanses of tall grass, eight or nine feet high, which seemed to bar the way, but when approached, a small opening, a dark green cave through which the path winds, would appear. I would dart in, the grass waved and whispered as it closed around me, and my knees brushed the stems, arched over my head and obscuring the sky from my view; but wild as was the scene, it is one of indescribable beauty, and having been once presented to the eye, has ever after an irresistible fascination and attraction.

3. *Result of DR. VOGEL'S Observations for Latitude and Longitude, January to August, 1855.*

Place.	Latitude.			Longitude.			Remarks.
	°	'	"	°	'	"	
Kuka	12	55	33 N.	13	24	00 E.	{ The Latitude from Equal Altitudes.
Gujeba	11	32	00 N.	11	38	36 E.	
Gabbei	11	04	30 N.	11	21	15 E.	
Gombé	10	48	42 N.	10	20	55 E.	
Yakóba	10	20	10 N.	9	31	45 E.	
Muri	9	12	00 N.	10	32	33 E.	
Tindang	9	07	42 N.	10	52	44 E.	
Dalhaji	10	32	20 N.	8	23	08 E.	
Salia	11	04	46 N.	7	23	10 E.	{ This place is not so well determined in Longitude as the preceding.
Bebeji (Kano) ..	11	35	30 N.	8	06	25 E.	

N.B.—The Latitudes are deduced from Observations “*off the Meridian*,” and are computed by Dr. Inman’s method of Cir-cum-Meridian Altitudes.

The Longitudes are from Meridian Distances, by one chronometer (Molyneaux, No. 3147). Judging from its uniform rate, it must have been very carefully attended to in travelling from place to place.

Kuka is assumed to be in Longitude $13^{\circ} 24' E.$, the other places measured from it.

October, 1857.

C. GEORGE, R.N.,

Map Department, R. G. S.

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