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Journey across the Western Interior of Australia

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Barmano, preceduto dalle Notizie del Paese; scritta dal P. Luigi Gallo. 12mo. Milano, 1862 (3 vols., forming vols. xviii. xix. and xx. of the Collezione di Vite dei più distinti Religiosi della congregazione dei chierici RR. di S. Paoli detti Barnabiti) (*Colonel H. Yule*, C.B.). Missione al Gran Mogor del P. Ridolfo Aquaviva della Compagnia di Gesù, Sua Vita e Morte; dal P. Daniello Bartoli. 8vo. Piacenza, 1819 (*Colonel H. Yule*, C.B.). Della Vita di Monsignor Gio Maria Percoto, Missionario ne 'Regni di Ava e di Pegu;' dal P. D. Michelangelo Griffini. Plans. 4to. Udine, 1781 (*Colonel Yule*). Department of the Interior Bulletin of the United States Geological and Geographical Survey of the Territories, No. 4, 2nd series. 8vo. Washington, 1875 (*Dr. F. V. Hayden*). And the current issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF 14TH JUNE, 1875.—A Sketch-Map of South Africa, showing the Seven Electoral Provinces of the Cape Colony; by C. E. Solomons (*G. Street, Esq.*). Karte des Ober-Engadin und des Bernina Gebirges, &c.; by J. M. Ziegler (*Author*).

At the commencement of the proceedings, Admiral Sir R. COLLINSON, at the invitation of the President, read the following extract of a letter from Sir Leopold M'Clintock relating to the departure of the *Pandora* (under the command of Captain Allen Young) for the Arctic Regions:—

"The *Pandora* came alongside the dockyard on Friday evening [June 25], and we all went on board of her on Saturday. She sailed for Cowes the same afternoon, and on leaving the wharf she was cheered by the spectators. The cheer was taken up by the ships in the harbour—the *Fox*, the *Duke of Wellington*, and the *St. Vincent*. I am sure it was as gratifying as it was unexpected by Young. The *Pandora* appeared to be very well fitted, and amply provided with everything for 18 months.

"Young brought Esquimaux Joe and a chart to my house, and put him through a series of questions about his journey with Hall to King William's Land. Admiral Richards and Mr. Leigh Smith were also present. I think Joe is both intelligent and truthful."

The first Paper of the evening was—

1. *Journey across the Western Interior of Australia.* By JOHN FORREST.

Mr. FORREST spoke as follows:—

My desire this evening will be to give you a short account of my last exploration across the western half of Australia, from Champion Bay on the west coast to the Overland Telegraph Line between Adelaide and Port Darwin,—a distance in a straight line of about 1400 miles, but in the way we were obliged to go of about 2000 miles.

With, however, such a fine map near me of Australia, I cannot resist the temptation of pointing out to you my previous journeys in Australia, which will occupy but a few minutes.

In 1869 I was selected by the Government of Western Australia to command an expedition to the eastward, the main object being to test the accuracy of the reports of natives that white men had been murdered many years before, and that their remains were still in existence. People naturally supposed they must have been the remains of Dr. Leichhardt or some of his party, who left the eastern coast of Australia in 1848 and had never since been heard of. We reached lat. $28^{\circ} 41' \text{ s.}$ and long. $122^{\circ} 50' \text{ E.}$, but were unable to find any trace of the reported remains, and set the public mind at rest on the question. A considerable extent of good country was discovered, but a larger portion was so densely wooded with acacia and low scrub as to be of little use. Extensive inland salt-marshes were met with; the largest being Lake Barlee, which you see on the map.

In the following year, 1870, the Governor of our colony, his Excellency Governor Weld, conceived the idea of opening up an overland route to South Australia, and I was requested to organise and command an expedition for that purpose. Although Mr. Eyre had travelled along the coast (round the great Bight) in 1841, very little was known of the country inland, in fact nothing at all. His map only showed Flinders' coast-line, and the chief remarks were such notes as these:—"Here the party were obliged to abandon a horse." "Here they were obliged to abandon everything." "Here they had to kill a horse for food." "Here the overseer was murdered," &c. So little, indeed, was known that it was not believed that there were no rivers running into the great Australian Bight; and it was even suggested that Mr. Eyre, having to travel at night, might have crossed the sandy bars without seeing them. All this was set at rest for ever by our expedition. We escaped most of the difficulties experienced by Mr. Eyre, and benefited greatly by the water marked on his chart, which we found in the positions described by him. Although there was little rain we were enabled to examine the country a considerable distance inland, and in five months reached Adelaide without losing a horse, a distance of 2000 miles. The result of this expedition has been that much of the country about Eucla has been occupied, and a telegraph line now is in course of construction, along our route and with my map for a guide, from King George's Sound to Adelaide, thereby connecting Western Australia with the telegraph systems of the world.

Having said these few words in explanation of my previous

experience in exploration, I will try and give you a short account of my last and most arduous one. After considerable difficulty, and chiefly again by the support of Governor Weld, I was enabled to collect funds to equip this expedition; and on the 1st April, 1874, left Champion Bay, with my brother as second in command, and two white and two black men, with twenty-one horses and six months' provisions. Our instructions were to follow up the Murchison to its source, and to examine the country along the watershed of the rivers running to the north-west coast, and finally, if I thought it expedient, attempt to cross the unknown interior to the Telegraph Line. Just before leaving we heard of the success of the expedition under Colonel Warburton, whose route appears on the plan before you. He had experienced great difficulties and had been compelled to eat most of his camels. Before leaving I received from the West Australian Government the following short but graphic account of his expedition.

"Surveyor-General's Office, Perth,

"SIR,

"March, 27th, 1874.

"The gist of all the information I have from Colonel Warburton may be summed up in a few words.

"From the MacDonnell ranges in South Australia to the head of the Oakover River (which is about 150 miles from the coast), keeping between the parallels of 20° and 22° south latitude, he traversed a sterile country in which he states horses could not possibly exist; they would starve, as they could not live on the stunted scrub and herbage which the camels managed to keep alive on.

"The general character of the country seen was that of a high, waterless, slightly undulating, sandy table-land, with, in some parts, sand-dunes in ridges most harassing to traverse. There was nothing visible in the way of watercourses in which water could be retained; but they were successful in finding, at long distances, sufficient to maintain themselves and their camels as they fled, as it were, for their lives westward over the Sahara, which appears to be in a great part a desolate wilderness, devoid of life or of anything capable of sustaining life. Though this is a grim picture put before you, I would not have you daunted: your task is a different one, and one which all the colony is looking forward to see successfully completed by you.

"I have the honour to be, sir,

"Your obedient servant,

"MALCOLM FRASER, *Surveyor-General*."

This report was not at all cheering, and I think most people,

both in Western and South Australia, thought there was little chance of our succeeding. Colonel Warburton was the only one of four explorers from South Australia that succeeded. Mr. Gosse, Mr. Giles, and Mr. Ross, having been defeated in attempting to cross over to Perth. Two of the expeditions that failed were supplied with camels, and therefore there was every reason for supposing that we might fail, considering we only had a very ordinary lot of horses.

When it is remembered that a horse in poor condition can scarcely go more than a day without water, and when the sterility of the spinifex desert is considered, the great advantage of the camel, which can go from ten to fourteen days without water, can readily be seen. From my experience of the Australian continent, and I make this statement carefully, I have no hesitation in saying that with the camel there is little difficulty in going anywhere.

On the 1st of April last year (perhaps not a very auspicious day to start on) we left Champion Bay, as I said before. I was very sanguine of being able to accomplish what I had undertaken, but never expected to encounter such obstacles and difficulties as we afterwards did. I had no idea of any such large extent of country so utterly wretched. We reached Mount Hale, the farthest point known on the Murchison River, without much difficulty, and had a very pleasant time until we reached the watershed of the river in longitude 120°.

Travelling on, along grassy alluvial flats, with nice pools of water here and there, with ducks numerous and kangaroos plentiful, we thought we were going to have a splendid journey, and little knew what was in store for us on the other side of the watershed. I had anticipated finding a river running to the east; but when we arrived at the watershed, which I named the Kimberley Range, I found it was only a low rise, with a few dry watercourses leading from it, and, instead of a river running to the east, we had not gone many miles before we entered a spinifex desert, which lasted, without any break worth mentioning, for 600 miles.

Most of you present may have heard of the spinifex desert, and I will try to explain what it is like. As far as you can see in every direction stretch plains of apparently ripe corn, which is the grass or stalk growing out of the spinifex tufts. Spinifex is very sharp, and on that account is commonly called Porcupine Grass: it is the *Festuca irritans* of botanists. The grass is very disagreeable to walk through, and often makes the horses' legs bleed: when dry, horses will not and cannot eat it; the grass or stalk is so dry, and entirely without nutriment. Day after day, week after

week, and for months, we fought against it; and in this fearful country, whichever way we turned, all was the same. A few grassy valleys of very small extent were sometimes crossed. One of these, in lat. 25° , long. $121^{\circ} 21'$ E., in which we discovered a magnificent spring, named by me the Weld Spring (after our Governor, who has been such a great supporter of exploration), is a very delightful spot. Abundance of water, game of every description, kangaroos and emus numerous, and pigeons innumerable; it certainly was a delightful break in the fearful monotony of our journey, an oasis in the desert. We were obliged to halt here three weeks, while we searched for water ahead; during the time we were attacked by fifty or sixty armed natives, and were compelled to fire on them. There were only four of us at camp when they attacked us. On two other occasions during our journey we were attacked; the first by about twenty, and the last by about a hundred natives. Each of the three times we had to fire on them; and although some were wounded, as far as we know, none were killed. We were now in the very heart of the desert; great care was necessary in moving on, and our horses were getting very poor. Our course of procedure was as follows.

Myself and a native would leave camp where there was water, and go ahead in search, leaving instructions for my brother to follow with all the party, one, two, or three days after us, as we thought expedient. Should we find water, we would rest until he overtook us, as he would follow our horses' tracks, and this would save us the trouble and labour of returning to bring them on. On the other hand, if we were unsuccessful, we had sufficient time to return and meet them before they got into any serious difficulty. On many occasions we found enough for our own two horses, but not sufficient for the main body of the party.

Our daily life during the six months we were away from civilization was as follows:—We had breakfast before daylight, being awakened by the man on watch (one always kept watch regularly in turns, two hours each), who would have the tea made if there was any water. At peep of day four of us went to collect the horses, which were often a long way off, leaving two at camp to pack up and get everything ready for saddling. As soon as the horses were all collected, we saddled up and continued on. We had to walk in turns the whole way, as our horses were too poor to carry us, the whole distance being nearly 2000 miles.

It would serve no good purpose my giving you a more detailed account of our troubles and labours in this miserable country; suffice it to say we got through it by the middle of August, and

sighted the hilly country ahead that had been formerly visited by Mr. Gosse and Mr. Giles. Up to this time we had only lost two of our horses; but before we reached the Telegraph Line, owing to heavy travelling and scarcely any food, our losses were six. One poor old horse bore up wonderfully until within sight of the Telegraph Line, when he fell down and died in less than a minute: he died in harness like a good soldier.

The season was one of such great drought that, as soon as I got fairly on the tracks of the South Australian explorers, I determined to lose no time in reaching the settled districts. No rain had fallen since Mr. Gosse was here the previous year, and we had considerable difficulty in many places, owing to the water being dried up, and our depending too much on expecting to be able to stay where he had stayed. However, by continually moving on, we reached the Telegraph Line on the 27th September, and the Peake Telegraph Station (which is 636 miles from Adelaide) on the 30th.

We had about 60 lbs. of flour remaining, having finished everything else, and had abandoned about 300 lbs. of flour besides all the baggage we could possibly do without. We had been living chiefly on bread and water for about a month, except when we were fortunate in shooting game.

All our troubles were now over: we travelled down slowly towards Adelaide, and had quite a triumphal march all through South Australia. At every town we were entertained at public dinners and presented with congratulatory addresses; and on our arrival in Adelaide were honoured with a public reception, in which more than 20,000 people took part.

On our return to Western Australia we were received with much enthusiasm. No less than twenty addresses were presented to us, and I can never forget the kindness and attention we received.

Natives.—I will now say a few words about the natives we met with. They were very similar in habits and appearance to all others I have seen in different parts of the interior of Australia. They are entirely without clothing, and sleep with a fire on each side of them, without any hut, unless in very wet weather, when they make a very poor shelter with wood and thatched with grass. There are a good many of them even in the worst spinifex country, in which much wallaby exists. It may be thought by many that there must be plenty of water where there are natives, but it is not so. A native does not wash or cook with water: all he uses it for is to drink; therefore a small rock-cavity, with say from 20 to 100

gallons, will suffice a long while for a number of them, and they cover it up to keep it from evaporating; but that quantity goes a very little way with fifteen or twenty horses. The natives, again, know every little waterhole and spring; whereas we had to look for it, and might sometimes pass it. I have no doubt, that there are no parts of Australia, or scarcely any, that you could not travel over easily if you knew every watering place; but an explorer has to find all these places, and hence the difficulty. With us the guides to water were the encampments of the natives, the tracks of emus and those of the natives themselves; the flight of birds, such as pigeons, especially in the evening, was also an indication. Emus, however, I think, were our best guides, as they are birds which must have water regularly. The natives sometimes go a long way away from water, and get it from the roots of a species of Eucalyptus, called Mallee Scrub. They choose the roots, break them in lengths of about a foot, and stand them on end, when all the moisture drains out into a wooden dish. The traveller meets with great heaps of these roots, and it is a bad sign when in search of water.

I have made these few remarks to show that if the explorer does not meet with water, it does not follow that there is none; and also that a native does not require much to satisfy him, and is very unlike a horse in that respect.

Results of the Expedition.—I now beg to make a few remarks regarding the character and capabilities of the country we travelled over.

A great deal of the country from the west coast to the watershed of the Murchison is admirably suited for pastoral settlement, and is already being taken up and stocked; but after crossing the watershed as far as long. 128° E., I do not think it will ever be of much use. The whole of this immense tract is a slightly undulating spinifex desert, and the prevailing rock is the tertiary desert sandstone. From long. 128° to the Telegraph Line the country is in many places beautifully grassed, and most of it has been taken up already by the South Australians. But, perhaps, the greatest result of the expedition has been the addition to our geographical knowledge of the country. The western half of Australia has now been traversed from east to west through the centre along the 26th parallel, and all theories as to the nature of the interior of the vast continent are finally set at rest.

Future Exploration.—I will now venture a few words on the future exploration of Australia. As you all see by the large map before you, there is comparatively very little more to be done: all the geographical problems have now been finally solved, and the only

remaining portion of interest is the small part in the north-west corner from Roebuck Bay to the Victoria River. This would be a very interesting expedition, as there are some fine rivers to be examined, amongst them the Fitzroy and the Glenelg. You would be certain of having good country to travel through, and would most probably accomplish all you would set out to do, viz., to examine all the country to the west of the watershed of the rivers running into the sea.

In my opinion, this is the only part of unexplored Australia that is worth examining. I am sorry to see the energy of Mr. Giles, under the auspices of Mr. Elder, of South Australia, almost thrown away in examining the country between the explored portions of South and Western Australia, keeping to the south of lat. 30°.

As you can easily see by the map, there is scarcely any unknown country there, and the character of it is tolerably well known; and more especially when such a splendid and interesting field (though of rather small limits) is to be found at the north-west.

Australian discovery has made very rapid strides within the last few years, and I feel convinced the day is near at hand when the whole of the available country of Australia will be occupied and stocked.

Conclusion.—And now, Mr. President and Gentlemen, I must not detain you longer. I have attempted to give you, in as short a time as possible, a brief account of our journey, and I thank you very much for giving me the opportunity. I can only add that, if I have omitted anything, I shall be very glad to answer, as well as I am able, any question that any of you wishes to put to me.

Sir G. BOWEN said that, having been for eight years Governor of Queensland, which occupies on the eastern coast of Australia a position similar to that of Western Australia on the opposite coast, no one could appreciate more highly than he did the service rendered by Mr. Forrest to the colonies. When he first went to Queensland some 500 miles of coast only were settled, i.e. from Brisbane to Rockhampton; but now a chain of flourishing settlements extended 1200 miles further, up to the Gulf of Carpentaria. Queensland was richer in coal, iron, and gold than Western Australia; but this latter colony had also many advantages, and might ultimately attain the same success as Queensland had already arrived at.

Mr. LEAKE (Speaker of the House of Representatives, Western Australia), enumerating the important explorations in which Mr. Forrest had been engaged, said that his first journey to Lake Barlee, in search of the remains of white men reported to exist there, and supposed to be those of Leichhardt and his party, quite settled that question, and proved that Leichhardt had not passed that neighbourhood. On his second expedition he accomplished the great feat of travelling from King George's Sound along the coast of the Great Bight to South Australia. In this, as in previous undertakings, he did his work well, and rendered great service to geography

and to the colony. His discoveries had led to a large portion of the country being settled, and the neighbourhood of Eucla in the Bight was now largely stocked, the only difficulty being the want of water; but no doubt, as in other parts, permanent springs would be found when settlements were established. By his last expedition from Champion Bay to the Telegraph Line at Peake Station he had also done good and useful work. He had travelled with his brother and four assistants, two of them being natives, and 21 horses, right across the sandy desert, and thus accomplished a journey which had scarcely ever been surpassed. The result of the expedition was to show that nothing could be hoped for from the central districts. However, on the boundary of the Telegraph Line of South Australia, and on the west coast after leaving Champion Bay in a north-easterly direction, there was a large quantity of good land, which was now being taken up, and afforded as fair a field for settlement as any other in the colony, if people would only go there with energy and capital, and indeed he believed West Australia might be made to surpass both South Australia and Queensland. In the neighbourhood of Champion Bay was the Murchison River, and a little south of that the Irwin. The whole of that country was one mass of minerals, and sooner or later must become very valuable. The district of Shark's Bay abounded in pearls, many thousand pounds' worth being sent to England annually. The shell, however, was not very valuable, the mother-of-pearl being so small; but further north, near Exmouth Gulf and Nicol Bay, the most magnificent pearls and pearl-shells were found. These were collected principally by Malays employed by colonists, the shell being worth upwards of 300*l.* a ton. The exports of West Australia had doubled during the last three years, and the imports had increased proportionately. When Sir G. Bowen went to Queensland he found only 7*½d.* in the coffers of the Treasury there; but West Australia, unlike Queensland, had but a small debt, the total amounting to only 135,000*l.*, and there was money enough in the colonial chest at the present time to pay off a very considerable portion of that sum if it was desirable to do so.

Mr. TOMKINSON said he had had the happiness on two occasions to assist in receiving Mr. Forrest on his arrival in South Australia after successfully accomplishing his wonderful journeys. Mr. Forrest had not done justice to his own merits, for he had not dilated upon the difficulties which he had to face, and which he overcame. As a South Australian, he (Mr. Tomkinson) could endorse all that Mr. Leake had stated with regard to the capabilities of West Australia, and Mr. Forrest merited any distinction which the Royal Geographical Society might think fit to confer upon him.

Mr. DAINTREE, referring to the desert sandstone which was so abundant in the districts traversed by Mr. Forrest, said he had seen the outliers of that sandstone throughout a large part of Queensland, and he was satisfied that during the Tertiary epoch almost the whole of that colony had been covered with it. Had it not been for the denudation caused by the rivers running east and north, there could be no doubt that at the present time it would still be a desert, similar to that passed over by Mr. Forrest.*

* Mr. Daintree, having been interrupted by the entrance of the Sultan, has communicated the following continuation of his remarks:—

"In my paper on the Geology of Queensland, published in vol. xxviii. No. 111 of the Geological Society's Journal, at p. 275 I state that 'all the available evidence tends to show that this "Desert Sandstone" did at one time cover nearly, if not quite, the whole of Australia.' At p. 282, I again assert my belief that the Cretaceous system, such as forms the plains of the Flinders and Thompson in Western Queensland, extends throughout the whole of Central Queensland to Western Australia, *probably hidden, however, over large areas by desert sandstone.* The explorations of Messrs. Forrest and Warburton have proved that these prognostications were correct, but that comparatively small oases of the underlying

HIS HIGHNESS the SULTAN of ZANZIBAR and suite, accompanied by the Rev. Dr. George Percy Badger, Dr. J. Kirk, H.B.M. Consul-General and Political Agent, Zanzibar, and Clement Hill, Esq., entered the hall amid the acclamations of the audience.

The visitors having taken their seats, the PRESIDENT spoke as follows :—

“I have now the pleasure of introducing to the Society the Sultan of Zanzibar. He has been an honoured guest everywhere in England, as you know, but in no place is he more welcome, I am sure, than in the Royal Geographical Society, he having been an Honorary Member of our Society for several years, and having also on all occasions, whenever an opportunity occurred, conferred upon us very essential service in forwarding geographical research. It was owing to his Highness's assistance that we were able to send our Relief and Search Expedition for Livingstone into the interior of Africa, and on every occasion he has shown the utmost good will and energy in assisting us. I would only further remind you, ladies and gentlemen, that the friendship of the Seyd's family with England is not a thing of yesterday. It was in the first year of this century that Sir John Malcolm made his first treaty with the grandfather of the present Sultan, and from that day to the present, throughout the long fifty years of his father's reign, the family

Mesozoic rocks are anywhere exposed along the tracks followed by them. Mr. Forrest has examined the specimens of rock and photographic illustrations of the desert sandstone in the Queensland Museum at South Kensington, and was struck with the similarity of those passed over by him. I pointed out, in the geological paper before alluded to, that it was simply a matter of denudation as to what areas of rock other than desert sandstone would be found between Queensland and Western Australia, and therefore as to what areas would be found available for pastoral settlement, or what mineral areas might be exposed. The rich Cretaceous plains of the Flinders, the valuable mining districts of the Gilbert, Palmer, Charters, Towers, Ravenswood, and Cloncurry in Northern Queensland, are only now available by reason of the removal of the desert sandstone by meteoric influences. All are sharply bounded by cliffs of this inhospitable rock-system and its accompanying spinifex. But what I would wish especially to call attention to, is the fact that extensive lava-flows have taken place in Queensland subsequent to the desert-sandstone period; notably, the tract extending from the Upper Burdekin to the Upper Flinders, a strip 200 miles long by 80 broad, affording splendid pastoral country, well watered, and giving access to the Great Western Plains, which otherwise would have been almost inaccessible to the East Coast, on account of the spinifex and poison-plant everywhere found on the watershed between eastern and western waters. The hope of discovery of any available country between Forrest and Warburton's tracks, and between Warburton and the north-western coast range, must therefore rest on the possibility of the discovery of isolated tracts of volcanic country resting on the desert sandstone, for any extensive denudation seems out of the question; and perhaps the best clue to this would be examination of the native weapons which may have been collected on these expeditions, as the denser basalts are used for stone tomahawks by natives where better material is not to be obtained. Even were such tracts to be discovered, however, their isolation in such inhospitable country would be an insuperable bar to their profitable occupation; and there seems little doubt that Mr. Forrest's opinion is the correct one, that the country between the west and north-west coast range of Australia and the Overland Telegraph Line is useless for any purpose of settlement. Knowing the difficulties attached to travelling over this miserable desert country, which M'Kinlay says is fit only for 'black fellows and wallabi,' I can heartily endorse the opinion just expressed by Mr. Tomkinson, that Mr. Forrest fully merits any distinction to which an explorer who, after enduring great privations and hardships, has practically solved the problem of the physical character of the interior of Australia, is entitled.”

has always behaved with the most unswerving loyalty to the British Government. His Highness has shown the utmost desire not only to further the political interests of England, but also to protect trade; and latterly, as you are aware, to facilitate the measures which we have thought it proper to introduce for the suppression of the slave trade. On all these grounds his Highness Seyd Burghash certainly deserves well of this country, and especially of the Society of which he is an Honorary Corresponding Member. And let it be remembered that the Geographical Society is, I believe, the only society in England which has the honour of having his Highness enrolled amongst its members. I had hoped that Sir Bartle Frere, who was lately sent out by her Majesty as Envoy to his Highness, would have been present; but as he has been unavoidably detained, I will ask General Rigby, who for many years was Political Resident at the Court of Zanzibar, briefly to point out upon the map the situation of that country and to give you in a few words the result of his experiences."

GENERAL RIGBY pointed out on the map the portion of East Africa ruled over by the Sultan of Zanzibar. He said that it entirely depended upon the good government of Zanzibar whether the interior of East Africa should be civilised, and its trade opened or not. The Zanzibar dominions extended from about $2\frac{1}{2}^{\circ}$ N. to $10\frac{1}{2}^{\circ}$ S. A number of large rivers flowed through it, such as the Pangani, the Rufigi, the Juba, and others, and opened up communications with the interior. Probably there was no part of the world that had a richer soil or was better adapted for trade than the east coast of Africa, and it was entirely owing to his Highness Seyd Burghash and his predecessors that this country was now settled and comparatively civilised. Its trade was increasing and becoming of greater importance to Europe year by year. For many staple articles of trade Europe now depended almost entirely on the Zanzibar dominions. These dominions had the largest trade in ivory in the world; they supplied all the carriage-varnish gum-copal, of which there was an inexhaustible supply, and almost the entire supply of cloves in the world came from Zanzibar, although it was only recently that cloves had been grown there. Before they were cultivated there, cloves cost from 2s. to 4s. per pound, whereas now they could be bought for 4d. or 5d. Within the last ten or fifteen years a vastly increasing trade has sprung up in gums, spices, sugar, cotton, grain, and various other articles; in fact, there was no limit to the production of the Zanzibar dominions. His Highness Seyd Burghash had done all in his power to open up the country, and would still continue to do so, to his own benefit and the benefit of the world.

DR. BADGER then read the following translation of the reply to the President's greeting, which his Highness had placed in his hands:—

"Mr. President, my ladies, lords, and gentlemen,—

"Our gratification overflows at meeting this honourable assembly, and we thank you heartily for the generous welcome which you have given us, and which we ventured to anticipate from your famed courtsey. We have heard wonderful accounts of the proceedings of this Royal Society in all parts of the world; but we have also ourselves seen and known much, and learned more, from our beloved friend, John Kirk, of its explorations of Eastern and Central Africa, especially through their distinguished and indomitable explorers, Burton, Speke, Grant, Livingstone, Stanley, and Cameron, who braved many and great dangers in order to make known to the world what was before unknown respecting the land of the Great Lakes, and who have given us correct information of those parts which, albeit reckoned under our rule, we knew little of except by untrustworthy report. There can be no doubt that these researches will lead the way to many advantages, and will result in the eventual civilisation of those large districts, and the extension of

commerce, to the benefit of all concerned. In our little way we have endeavoured to forward these researches in the midst of great difficulties, which have not always been appreciated. All we would now say is, that we have done what we could, and that by the aid of God in the first place, and next through emulation of what we have seen in this country, stimulated thereto also by what we see before us this evening, and particularly because we have been honoured by having been made a member of this Royal Society, we shall do our best, God helping us, to further its useful objects. Several Arabian poets have dilated on the advantages of travel; and since our arrival in England we have been convinced of the truth of their statements. This Society, by making generally known the peculiarities and productions of different countries, together with the habits and customs of their inhabitants, must contribute largely to the instruction, the pleasure, and the benefit of mankind at large. We desire once more to reciprocate your kindly greeting, and to express towards you all whatsoever good will and happiness you have expressed for us."

Dr. KIRK, addressing the Meeting at the invitation of the President, said he could add but little to General Rigby's statement with regard to Zanzibar, but perhaps the Meeting might be anxious to know the latest accounts of the travellers who had gone into the interior. No positive information had been received for some time from either Mr. Stanley, or Lieutenant Cameron, but he had no doubt they were advancing safely. Mr. Stanley, when his last letters were dispatched, had reached Ugogo, and had gone to the north towards the Victoria Lake. Lieutenant Cameron, when last he was heard of, had reached, for the second time, the western shore of Tanganyika, whence he would follow up Dr. Livingstone's discoveries in the Manyuema country, and if possible pass down the Congo. From what was known of his character and the admirable way in which he had organised his expedition from Ujiji and conducted the circumnavigation of the lake, there was very little reason to doubt that he would accomplish his object. The Zanzibar mail had that day arrived, but no mention was made of the explorers in his Highness's letters, and his Highness therefore concluded that all was going well with them.

Dr. BADGER said that his Highness desired him to say that all he had heard about Lieutenant Cameron went to show that he was received everywhere with great kindness by the people, and was making his way famously. Those who should hereafter be sent out by the Royal Geographical Society for the exploration of Eastern Africa would always receive his Highness's best assistance, for his wish was to consider England and his own dominions in Africa as one and the same country.

Mr. F. O. MARTIN recommended that an attempt should be made to open up the internal communication of Eastern Africa by means of domesticated elephants, which he thought would greatly contribute to the civilisation of the country. That the African elephant could be domesticated, was proved by the fact that they had been used by Hannibal. He had learnt, upon the authority of Professor Owen, that in some parts of Africa, in order to get the ivory, the elephants were driven into the high grass, which was then set on fire and the animals burnt to death. He was sure that, when the existence of such a practice was made known to him, his Highness would do all that lay in his power to put an end to it.

Dr. BADGER said he had translated the remarks of the last speaker to His Highness, who said, "I should be extremely thankful to anybody who will come to Africa and show us the best way to catch and tame elephants."

The PRESIDENT announced that, with a view to the utilization of the Indian elephant in Central Africa, it had just been decided by the Indian Government to present six thoroughly trained animals to his Highness the Khedive of

Egypt, to be employed with Colonel Gordon's Expedition. It was hoped that by these means a way would be opened for the future domestication of the more docile Indian elephant in Central Africa.

His Highness the Sultan being about to leave the meeting,

The PRESIDENT said: "I now beg the Meeting by acclamation to allow me to present their best wishes to his Highness, and to thank him very much for having done us the honour of attending our meeting on this occasion, and to wish him God speed in his future journeys. He is about to leave London, and very shortly he will leave England; but I am sure he will carry with him the best wishes not only of the Royal Geographical Society, but of the English people, for his future success in the civilization of Eastern Africa."

His Highness and suite then retired; the audience all standing.

The following paper was then read by the author:—

2. *Summary of Recent Observations on Ocean Temperature made in H.M.S. 'Challenger,' and U.S.S. 'Tuscarora;' with their bearing on the Doctrine of a General Oceanic Circulation sustained by Difference of Temperature.* By WILLIAM B. CARPENTER, M.D., LL.D., Corresponding Member of the Institute of France.

INTRODUCTION.

THE Reports on Deep Sea Temperatures sent home from Sydney and Hong Kong by the 'Challenger' expedition, for copies of which I am indebted to the kindness of the Hydrographer to the Admiralty, afford additional data of much interest in their bearing on the doctrine of a General Oceanic Circulation, which I have been permitted on two previous occasions to bring before the Royal Geographical Society. And as I find in these new facts a very decided confirmation of that doctrine, I venture to believe that a concise exposition of them will not be unacceptable.

I have been further enabled, by the kindness of the Hydrographer, to acquaint myself with the results of the Temperature-observations recently taken in the North Pacific by the U.S.S. 'Tuscarora.' Of these results, obtained in an entirely new field of enquiry, some, being in complete and obvious accordance with the doctrine, afford a further confirmation of it, whilst others appear at first sight inconsistent with it. I propose, therefore, to present a summary of the whole series, and then to enquire whether the apparently antagonistic facts are not capable of being fairly explained in a manner quite consistent with the doctrine which the others support. The correctness of the *rationale* I shall offer will probably be tested by the more complete enquiries now being carried on by the 'Challenger' in the North Pacific, and by the extension of its researches to the South Pacific.