*Samuel M. Peto, Bart.; Edward Beldam; N. Bridges; J. H. and W. J. Browne; A. C. Gregory (late Commander North Australian Expedition); Wm. Gaussen; John Kirk,* M.D.; *and P. L. Simmonds, Esqrs. were elected Fellows.*

AUDITORS.—*Thomas H. Brooking and E. Osborne Smith, Esqrs., on the part of the Council, and Thomas Lee and W. Foster White, Esqrs., on the part of the Society, were appointed Auditors.*

EXHIBITIONS.—*A bust, by Mr. Wyon, and photographs of Dr. Livingstone, by Claudet and Clarkington; instruments, by Casella, for the Livingstone Expedition, presented by the Society; and a Chinese Map of the World, presented by Mr. Lockhart, were exhibited at the meeting.*

The first Paper read was—

1. *On the Arru Islands.* By ALFRED R. WALLACE, F.R.G.S.

DURING a six months' residence in these islands (January to June, 1857) my movements were very limited, owing to a visit of the Magindanao pirates, who devastated some of the northern islands and the eastern coast, and struck such terror into the natives, that they could scarcely be induced to leave their homes. I, however, succeeded in reaching the eastern side of the main island by one of the curious channels which traverse it, and which I was most anxious to examine myself, as from the accounts of the traders I could make out nothing of their real nature. This journey, with some other excursions into the interior, has enabled me to understand the accounts I have received of the remaining portion, and obtain a general idea of the geography of this interesting group. The position of Dobbo, the Bugis trading village, has been determined by Captain Stanley, and the northern and southern limits are pretty well known by the observations of the Dutch and French exploring vessels; my remarks will, therefore, be principally confined to the physical features of the islands, which are in many respects highly interesting.

The Arru group may be said to consist of one very large central island with a number of smaller ones scattered around it. The great island is called by the natives and traders "Tanna busar" (great or main land), to distinguish it as a whole from any of the detached islands. It is of an irregular, oblong form, about 80 miles from north to south, and 50 from east to west, in which direction it is traversed by three channels or rivers dividing it into four portions. The northernmost of these, the river Watelai, I passed through, and found the entrance about 25 miles S.S.E. from Dobbo, in the southern angle of an extensive bay. The entrance is about a quarter of a mile wide, with low undulating land on each

side. It gradually narrows to about the eighth of a mile, which width it retains, with very little variation, till on approaching its eastern mouth it again spreads out to about one-third of a mile. Its course is winding moderately, with a general direction of E.N.E., the extreme range of the bearings in passing through it being 105°. The banks (except near the eastern extremity, where there is much tidal swamp) are dry and moderately elevated. In many parts there are cliffs of hard rock, more or less worn away by the action of the water. A few smaller streams enter it right and left, at the mouths of which are some small rocky islands, and on the whole it has every feature of a true river. It is, in fact, difficult to believe you are in a small island, and not on a fine river watering some extensive country. But that the clear, cool water around you is briny as the ocean there is nothing to undeceive you. The depth of this stream is pretty regular, being from 10 to 15 fathoms. Its length is, according to the best estimate I could make, about 44 miles. The other two rivers, whose names are Vorkai and Maykor, are stated to be very similar in general character. Between these two, however, which are near together, the country is flat and swampy, and there are innumerable cross channels cutting the land up in every direction. On the south side of Maykor the banks are very rocky, and from thence to the extreme southern end of Arru, near the small island of Kri, is an uninterrupted extent of rather elevated and very rocky country, penetrated by numerous small streams in the high limestone cliffs, bordering which the larger portion of the edible birds' nests are obtained. The two southern rivers are universally declared to be longer than Watelai.

The whole country of Arru is very low, but by no means so flat and swampy as has been represented, or as it appears from the sea. By far the greater part of it is dry rocky ground more or less undulating, now rising in abrupt hillocks, now cut into steep and narrow ravines. Except the actual tidal swamps, which extend on one side or the other at the mouths of most of the small rivers which everywhere penetrate it, there is no level ground, although the greatest elevation is probably not more than 200 feet. The rock, which everywhere appears in the ravines and brooks, is a coralline limestone, in some places soft and friable, in others so hard and crystalline, as to resemble the mountain limestone of England. The small islands which surround the central mass are very numerous, several hundreds in number. On the west are very few, Wamma and Pulo Babi being the chief. On the north-west extremity of the main land of Wokan is Ougia, and a little beyond it, Wassia, the north-westernmost of the group. To the east of these, and all along

the east coast, are an immense number, extending to the extreme south, but nowhere reaching more than 15 or 20 miles from the central island. All are contained in a very shallow sea full of coral, and producing the pearl shells, which form the principal article of commerce in the islands. The whole of the islands are covered with a dense and very lofty forest.

The physical features here described are of the greatest interest, and probably altogether unique, for I have been unable to call to mind any other islands in the world which are completely divided by salt-water channels, having the dimensions and every other character of true rivers. What is the real nature of these, and how they have originated, are questions which have occupied much of my attention, and which I have at length succeeded in answering, to my own satisfaction at least. There are three distinct modes by which islands may have been formed, or have arrived at their present condition,—elevation, subsidence, and separation from a continent or larger island. Most volcanic islands have been elevated; coral islands with lagoons or with barrier reefs have suffered subsidence; while our own islands, Sicily, Ceylon, and many others, have no doubt been separated from the adjacent continents. Now, the Arru islands, being all coral rock, and the adjacent sea all shallow and full of coral, it would seem easy to account for their origin by supposing them to have been elevated gradually from beneath the water, as the much more lofty islands of Ké, sixty miles to the westward, have no doubt been. But in this case it is impossible to explain the formation of those regular river-like channels which cut across the largest and most elevated mass. A fissure produced during elevation will not explain it, for it has all the regular curves and windings of a river; and the action of tides and currents combining with the elevating force will, indeed, well explain the origin of separate islands divided by channels, of varying width and depth, but cannot be imagined to have produced a true river-bed 40 miles in length and of the greatest regularity both in width and depth. If we suppose the subsidence of a more extensive island to have brought Arru to its present form, we shall find it equally difficult to account for these rivers, because the subsidence of any country with an irregular and undulating surface must, by allowing the sea to overflow all the level tracts, produce a most irregular distribution of water in the channels separating islands, and form deep inlets, creeks, and inland lochs, all of which are here absent. The only other way of accounting for the origin of the Arru Islands is, by supposing them to have once formed a part of the main land of New Guinea, from which they have been separated

by the subsidence of an intervening district. The principal objection to this view is the great width of open sea (from 100 to 200 miles) between their eastern limits and the south-west coast of New Guinea. It is, however, to be observed, that this sea nowhere exceeds a depth of 40 fathoms, while immediately to the north, a fathomless sea reaches close up to the New Guinea coast, and also within 20 miles of Arru on the west. By supposing the central land of Arru to have remained unmoved during the subsidence, the present transverse channels may be explained as being in fact portions of actual rivers which flowed from the great central mountain-range of New Guinea, and here had their outlet after a course of two or three hundred miles. The position and direction of the Utanata and Wakua rivers in New Guinea, renders it not improbable that the Arru rivers may have been once the continuation of them. In no other manner does it seem to me possible to explain the origin of these channels; for I believe no example exists of anything but true rivers producing narrow, winding channels of regular width and depth *through an undulating rocky country*. If, therefore, there is only one cause in existing nature adequate to produce the effects visible, we must impute them to that cause, even though implying changes of sea and land of such an extensive character.

We have, however, other evidence of a totally distinct nature, which gives a powerful support to this view of the origin of the Arru Islands. The distribution of the animals of Arru and New Guinea proves the close connection between these countries, it being evident that, where a considerable number of animals which have no means of passing from the one to the other are common to two countries, some former communication must have existed between them. A few such cases of community may indeed be explained by the various accidents by which animals may be transported from one country to another; but when the community is more general, there is no such easy way of accounting for it. In the present case birds being almost the only animal productions of New Guinea of which anything is known, the argument must be drawn almost entirely from that class, which, it may be objected, can furnish no certain data, as they have the means of passing from one country to the other. It is, however, well known that birds have their geographical limits as accurately defined as other animals, and that many extensive groups are quite as unable to pass wide tracts of ocean as any quadrupeds can be.

The first fact, then, is, that out of the small number of land birds known from all parts of the coast of New Guinea, or about one hundred, I have myself found thirty-six in Arru. This renders it

highly probable that all the birds of Arru are also found in New Guinea; for, to illustrate by an analogous case, suppose about one hundred species of birds had been collected in various parts of Europe, and a person were then to collect for six months in England, it is not likely that more than thirty birds would be common to the two collections, although every English bird is also found on the continent. Some of these birds, however, are incapable of flight, as the cassowary, closely allied to the emeu of Australia; others are short-winged ground feeders, as the beautiful ground thrushes (*Pitta*), two species of which are identical with the only two known from New Guinea; others, again, as the "great bird of paradise" and the "king bird of paradise," are found only in New Guinea and Arru, and not in the islands of Ké and Goram, which actually approach considerably nearer to New Guinea than does any part of Arru. These facts, scanty as they must necessarily be in the present imperfect state of our knowledge of the zoology of New Guinea, certainly support the view I have taken of the former connection of the Arru Islands with that country.

A few remarks on the inhabitants and on the trade of Arru will now be given. The natives are all of the Papuan race, having typically a nearly black skin and woolly or frizzly hair. They are taller than the Malays, and more slenderly made; have a flatter forehead, more projecting brows, larger and thicker nose, with the apex rather bent down, and thick lips. The varieties, however, are so numerous and puzzling, that a person unacquainted with their origin would be apt to conclude that no line of demarcation could be drawn between the Papuan and Malay races. In Arru there are evident signs of the admixture of Malay, Arab, and European blood, and that so extensively and for so long a period, that the mixed races perhaps preponderate over the pure Papuans. Everywhere are found natives of Macassar, Javanese, Ceramese, and Amboynese, who have native wives, and have settled permanently in the country. In the Mohammedan districts a lighter skin, and finer features, indicate the infusion of Arab blood, while the discovery of many Portuguese words still in use in Arru, though unknown to the Malays, enables me to account for some decided South European characteristics which I had previously observed. That enterprising nation had evidently discovered these remote islands, and commenced the trade with them during the short period they held the supreme dominion of the Eastern seas.

The languages spoken in Arru are very numerous, but they possess so much in common that the different tribes can make themselves understood without much trouble. The affinities of the lan-

guages of this part of the Archipelago are very obscure, owing to the difficulty of distinguishing between the words introduced by the constant trading intercourse and intermixture, and those resemblances which arise from a community of origin. More materials must be collected to come to any definite conclusion on this point.

The character of the natives of Arru is very different from that of the Malay races. They are less reserved and apathetic, they speak louder, laugh more, and are altogether a much noisier, merrier set of people. The difference is, in fact, so very marked and striking, that it alone would suffice to separate them completely from the Malays. They wear no clothing, but a small waist-cloth for the men, and a piece of matting for the women. The bow is their national weapon, and they are very skilful in the use of it. They cultivate yams, sweet potatoes, and other roots, which with native sago form their whole food, the coast tribes adding fish, and those inland the flesh of the wild pig, kangaroo, cassowary, and various birds which they obtain occasionally with their bows and arrows. A rich layer of vegetable mould over the coral rock produces sugar-cane of the finest quality, which they chew incessantly and sell during the trading season at Dobbo.

In the villages of Wamma, Wokan, and Maykor, are resident schoolmasters, sent by the Dutch Government from Amboyna, and the inhabitants are Christians; one or two other villages are Mahommedan, but all the rest of the population are pagans. As far as I could judge, however, there is very little difference in their degree of civilisation, that seeming to depend more on their proximity to Dobbo, and the amount of communication they have with the traders. A Dutch war-schooner brings a commissioner annually to Arru, who stays about a month visiting all the principal villages to hear and decide disputes among the natives, and with the traders; so that the whole group is actually under the Dutch Government.

The trade of Arru is very considerable, and is all carried on with the port of Macassar and with the islands of Goram and Ceram. In the present year (1857) fourteen large prows, of from fifty to one hundred tons, and one brig arrived at Dobbo from Maçassar. The owners are Bugis, Chinese, or Dutch, and the gross value of their cargoes about 20,000*l*. Besides these, not much short of two hundred boats and prows of small size arrived from Ké, Goram, and Ceram, the whole value of whose cargoes may be 7000*l*. or 8000*l*. more. The Macassar traders bring rice, tobacco, gambir, muskets, brass cannon, gunpowder, gongs, swords, knives, choppers, axes, English and Chinese crockery, calicoes and cottons, Bugis cloth and arrack. The prows from Goram and Ceram bring principally sago-

cakes, which are there manufactured for the supply of all the eastern part of the archipelago. The Ké islanders bring boats and prows for sale, wooden bowls, native earthen vessels, cocoa-nuts, and plantains. The produce obtained consists of pearl-shell, pearls, tripang, tortoiseshell, edible birds'-nests, and birds of paradise. Of these, the tripang, birds'-nests, and I believe most of the pearls and tortoiseshell find their way to China, the mother-of-pearl shell principally to Europe.

Each of the larger prows calls at Ké on its way to Arru, and purchases there one or two small vessels, which are loaded immediately on arriving, and sent with a supercargo to pick up produce among the islands on the east coast. The traders themselves reside at Dobbo, where they all have houses built entirely of poles and palm-thatch, and annually repaired. Natives from all the adjacent parts daily arrive, bringing their little bits of produce, which they sell to the highest bidder. They may often be seen wandering about with a single pearl-shell, calling at every house to see where they can get the highest price. These, as well as the tripang, tortoiseshell, and birds'-nests, are all bought by weight; and a whole cargo is made up by purchases of a few pounds or even a few ounces at a time. When a native has accumulated a little stock of produce, he takes payment in an assortment of articles, including always a box of arrack, the quantity of which consumed is immense. About 3000 boxes are brought annually, each containing fifteen square bottles of very near half a gallon each, making a total of about 20,000 gallons of strong spirit.

The prows begin to arrive at Dobbo in December, at the commencement of the west monsoon; and in June and July they return to Macassar. Some of the small traders remain the year round, picking up produce at a greater profit when there is less competition; and some of the larger merchants leave agents to do the same for them. Some years ago the profits of the Arru trade were very great; now they are very moderate, owing to the excessive competition. English calicoes can be bought in Arru as cheap as they can in England.

With the exception of the short visit of the commissioner, there is no law or government in Arru; yet the motley population, all striving to get what they can, live very peaceably together. Every one minds his own business, and, although he "does that which is right in his own eyes," takes care not to injure his neighbour. Gambling quarrels occasionally arise among the Bugis, and a few deaths by the creese may occur, as they do in Macassar; but on the whole, considering the mixture of races and religions, the competi-

tion in trade, and the crowding together of a population of about a thousand in such a remote spot and so far removed from the civilised world, a degree of good feeling and charity is shown which I am very much afraid would not exist in an equally miscellaneous assemblage of Europeans for similar purposes.

A few remarks on the climate will close this short notice of the Arru Islands. In most districts where the monsoon winds prevail, they regulate with more or less exactness the wet and dry seasons. In the south-western half of the archipelago, as far as Timor, Macassar, and N. W. Borneo, the east monsoon is accompanied by dry weather, the west by almost continual rains. In N. E. Borneo (Labuan), however, the seasons are reversed; the west monsoon, from about October or November to March or April, being accompanied by dry weather, and this same rule prevails more or less over all the islands of the Molucca Sea. In Arru I was led to expect the same kind of seasons, and was therefore much surprised on arriving there in January, which should have been the height of the dry weather, to experience during the whole month violent storms and almost daily rain. In February and the beginning of March it was finer, but still not a dry season, there being only periods of four or five fine hot days alternately with an equal quantity of wet, windy, and cloudy weather. The end of March and all the month of April were very fine. In April the winds began to be variable, and in May, when the east monsoon had regularly set in, the weather became wet and gusty, as in January, and this continued till we left in June. Both the natives and the traders assured me that the only regular dry season in Arru was a short one in October and November, during which months there is often no rain at all. This is just at the time of change from the east to the west monsoon, and from the dry to the wet season in the south-west parts of the Archipelago. This is only one of many anomalies in the climate of the various islands, an explanation of which cannot be given without more numerous and more accurate observations than have yet been made.

MR. J. CRAWFURD, F.R.G.S., said he had never visited the islands, but he had written about them. The name was a matter of curiosity: it had no relation whatever to our word "arrow" or dart, but signified in the Malayan language the tree *Casuarina muricata*. The native inhabitants were a peculiar people. Mr. Wallace concluded they were negroes, similar to the negroes of New Guinea; but he had seen them as more nearly resembling the inhabitants of the north of Australia. The population of the islands was very small, about 80,000, giving about eight to the square mile. A bank ran along between the islands and New Guinea. Tortoise-shell, mother-of-pearl, pearls in small quantities, edible birds'-nests, and birds of paradise, constituted the chief wealth of the islands. The birds'-nests were found in caves towards the

eastern side of the island; and the fishery of the tripang, the tortoise-shell, mother-of-pearl shells, and pearls on an extensive bank to the east. He had looked into the returns of what we received into this country of tortoise-shell and mother-of-pearl, and was surprised at the quantity consumed here: 33,550 lbs. of the former, value 33,153*l.*, and above 100 tons of the latter, value 34,630*l.*, had been imported into England. The islands were covered with stupendous forests; but then it ought not to be forgotten the most bulky trees will grow on the smallest amount of soil, where nothing like food for man can be produced—as, for example, the firs of Norway. The proof of fertility is the production of grasses in abundance and of good quality. The production of huge forest trees, be the trees ever so large, is not of the slightest consequence as indications of fertility. Travellers ought to be aware of this.

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The second Paper read was:—

2. *Note on Sabrina Land, &c.* By CHARLES ENDERBY, Esq., F.R.G.S.

WITHOUT wishing to detract in the smallest degree from the merit due to Admiral d'Urville, Commodore Wilkes, or the officers and crews of the French and American Exploring Expeditions, for their discoveries in the Antarctic Ocean in the year 1840, I think it due to the memory of Captain Balleny that the discoveries he made in 1839 should be more determinately fixed on our charts than at present.

With this object I consider it my duty to bring under the immediate notice of the Council of the Royal Geographical Society the subject of South Polar Discoveries; and therefore beg, in the joint names of my brothers and self, to present the Journal of one of your gold medallists, Captain Biscoe, when in the command of the "Tula" and "Lively" from the year 1830 to 1833, on the occasion of his having discovered Enderby and Graham Lands. This Journal was kept in duplicate, and the other part has been deposited in the British Museum.

I also beg, in the joint names of Mr. G. F. Young, Mr. Thomas Sturge, Mr. Henry Buckle, my brothers, and self, to present to the Society the Journal and Log-book of the voyages of the "Eliza Scott" and "Sabrina," under the command of Captain Balleny, in the years 1838 and 1839, when he discovered the Balleny Islands and Sabrina Land; and it is to the last mentioned discovery, Sabrina Land, that I am desirous of drawing your special attention. This land, as will be seen on reference to the South Polar Chart published by the Admiralty, is stated to be doubtful; and in the Journal of the American Exploring Expedition it will be observed that this same

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* *See* the ninth Volume of the Society's Journal.—ED.