

those discovered by Dr. Gann in a similar position in the ruin near Benque Viejo (Proc. of the Society of Antiquaries, May, 1895), and this fully establishes the connection of these curious objects with the builders of these now ruined cities.

On returning to British Honduras, at the frontier village of El Cayo Mr. Maler met Mr. Blancaneaux, a well-known collector of natural-history specimens, who told him that in the year 1882 he had included among specimens forwarded from the Island of Cozumel to the British Museum, two ancient maps of Yucatan, drawn on bark or agave paper. Careful inquiries have been made at the British Museum, both at Bloomsbury and South Kensington, but no

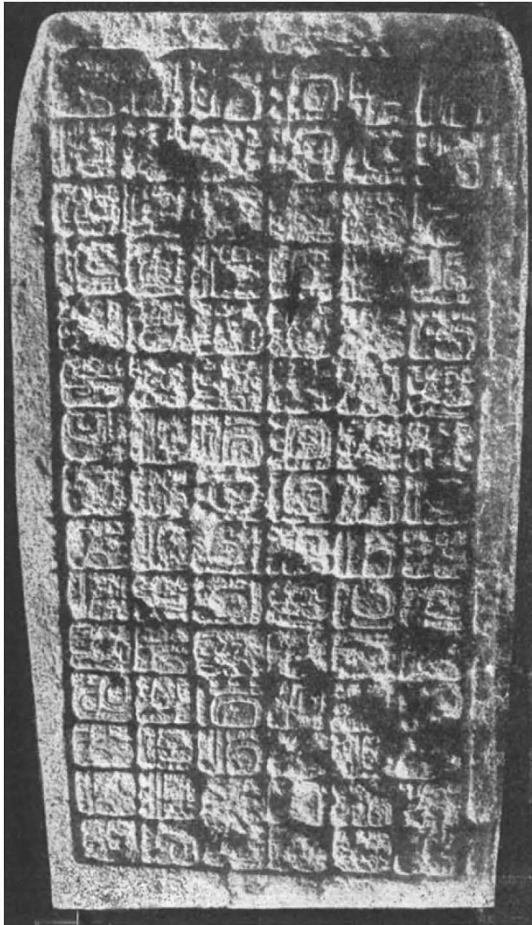


FIG. 2.—Naranjo: Stela 30, East Side.

trace of their arrival can be found. There is very little probability of their having been overlooked, as is suggested, because they were packed among natural-history specimens, for ethnological and other objects are frequently sent with such specimens, and when unpacked are at once handed over to the department concerned with them, and that such a valuable prize as two manuscript maps on some form of native paper could be overlooked is hardly possible. However, Mr. Blancaneaux is being communicated with, and every effort will be made to clear the matter up.

The next instalment of Mr. Maler's work describing his explorations of Tikál, one of the most interesting ruins in Central America, will be looked for with the greatest interest.

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ZOOLOGY OF THE ANTARCTIC.¹

FROM first to last there was high courage in the *Scotia* voyage. Dr. Bruce organised it single-handed, backed, of course, by generous pecuniary help from Mr. Coats and others, and he brought it to a successful finish with a minimum of loss or wastage. We do not forget the wise and wary captain and his loyal crew, or the fearless company of scientific assistants, or those who have helped to work up the results; but as volume follows volume from the unpretentious, hard-working laboratory at Surgeons' Hall in Edinburgh, we cannot withhold our admiration for what has been accomplished *essentially* by Dr. Bruce's pluck and determination. Both these qualities will be needed, we fear, before the tale of the *Scotia* voyage is fully told, for working up and editing scientific results is an arduous and unremunerative business, requiring all the encouragement it can get and a great deal more. "More power to your elbow, sir, in this unromantic age."

The two volumes before us are very different. The first is an entertaining zoological log, as logs go, that is, illustrated with a hundred beautiful and interesting photographs, and introduced by a charming picture by an artist who has himself seen ice. The second is a collection of technical reports by a dozen different workers, and though it is quite as interesting as the log, it appeals to a smaller circle. The log would have stood some more proof-reading, but we are glad to say that no attempt has been made to touch it up. It is a field note-book of the natural history of the voyage and of the wintering in Scotia Bay, South Orkneys, and it is full of interesting facts. We do not depreciate its interest when we say that with its splendid series of illustrations it would make an admirable book for any boy-naturalist who likes to get into close grips with the real thing. We wish to direct attention to the very fine set of photographs of penguins, shags, skuas, petrels, seals, and sea-lions, taken on the spot, and to the exceptionally good photographs of starfish, isopods, alcyonarians, and so forth taken in the laboratory by Mr. T. C. Dey. As a sample of the log we quote from October 11, 1903:—"The adelia penguins were nearly all actively collecting stones or resting from their labours, sleeping near their little heaps, either upright or prone. Some were very active and moved over ten yards at times in search of a good stone to return with; they throw the stones down in no apparent order. Thieving was being carried on extensively. The intending thief moved towards a heap the owner of which was away or not looking, and if he saw his chance picked up a stone and returned with it; but if the owner turned and spotted the thief approaching, the intending culprit walked innocently by as if nothing was further from his intentions than stealing a stone. If a thief was caught, the owner bit at him viciously and thus warned him off for the occasion, but as soon as an opportunity again presented itself he returned once more on thieving bent. I noticed several adelias eating snow in large quantities."

The various reports in the more technical volume have been mostly passed through the Transactions of the Royal Society of Edinburgh, which has thus aided in the publication. They are interesting in many different ways. Sometimes it is an isolated fact of

¹ Report on the Scientific Results of the Voyage of S.Y. *Scotia* during the Years 1902, 1903, and 1904, under the Leadership of Dr. William S. Bruce. Vol. iv., Zoology. Part i., Zoological Log, by David W. Wilton, Dr. J. H. Harvie Pirie, and R. N. Rudmose Brown. Thirty-three plates and 2 maps, including 100 photographs by the Editor and the Authors; coloured frontispiece by William Smith. Pp. xiv+104. (Edinburgh: The Scottish Oceanographical Laboratory; Edinburgh: Thin; Glasgow: Maclehose, 1908.) Price 13s. net, cloth, or 70s. 6d. paper. Vol. v., Zoology. Parts i.-xiii., Invertebrates. Pp. xi+313; 36 plates. Price 23s. 6d. cloth, 21s. paper.

distribution that arrests one, as when Messrs. Thomson and Ritchie report the occurrence of the very beautiful *Umbellula durissima*, Kölliker, from 48° 0' 6" S., 10° 5' W.—a far cry from the south of Yeddo, where the *Challenger* found it. In other cases we get a useful general impression. Thus we find abundant evidence of the distinctiveness of many of the elements in the marine fauna of the Antarctic and sub-Antarctic regions, for instance, in the Tardigrada, which Mr. Murray disintombed out of a little moss from the South Orkneys; or in Dr. von Linstow's new Ascarido from the Weddell seal; or in the new turbellarians reported by Drs. Gemmill and Leiper, the first adequately described members of this class from the far south; or in Mr. E. T. Browne's new medusa, *Botrynema brucei*, from 64° 48' S., 44° 26' W. Most striking, however, is Prof. Koehler's fine memoir on the asteroids, ophiuroids, and echinoids,

is a specimen of the hitherto unique abyssal gastropod *Guivillea alabastrina*, dredged from near the original *Challenger* locality at a depth of 1775 fathoms. Messrs. Melvill and Standen, who deal with the molluscs, direct special attention to some other benthical species from unusual depths, such as *Columbarium benthocallis*, n.sp., a "beauty of the deep," from 1775 fathoms, with a shell of papyraceous texture, as in many other abyssal forms. The bibliographical résumé given at the end of this report is to be commended. Among the remarkable types we must also rank the forgotten *Decolopoda australis*, a ten-legged Pycnogonid described by Dr. Eights some seventy years ago, and beside this there is now *Pentanympyon antarcticum*, which Mr. Hodgson found on the *Discovery* expedition. It is also represented in the large *Scotia* collection of Pycnogonids which Mr. Hodgson describes. He points out that the *Scotia* collection of



Weddell Seal (*Leptonychotes weddelli*), male, off Coats Land, Antarctica. From vol. iv. of the Report on the Scientific Results of the Voyage of S.Y. *Scotia*.

which deals with more than forty new species. The author indicates firmly that the Arctic and Antarctic echinoderms are completely different—that question is settled. The Antarctic echinoderm fauna is much richer than the Arctic, and more diverse. Dr. Koehler speaks enthusiastically of Dr. Bruce's "Collection d'Echinodermes antarctiques la plus importante qui ait été recueillie jusqu'à ce jour," and both in the text and in his beautiful plates he does justice to it.

In other cases we have to welcome a new type, like Sir Charles Eliot's Notæolidia, a genus of large nudibranchs linking the Æolididæ to such forms as *Dendronotus* and *Lomanotus*. The largest specimen of *N. gigas*, it may be noted, is no less than 122.5 mm. long. Interesting also is Mr. Ritchie's new hydroid *Brucella*, with two nematophores to each hydrotheca, and a beautiful, highly specialised coppinia or bunch of clustered gonangia. Not new, but very welcome,

Pycnogonids is "totally different from that made by the *Discovery* in the same region, but on the opposite side of the world."

A collection of the minute wingless insects known as springtails does not seem to the outsider of much geographical interest, yet if those who come to scoff at this sort of small game will read Prof. Carpenter's report on the Collembola of the South Orkneys, they will probably remain to pray—for more springtails. "For the wingless—primitively wingless, as we believe—condition of these insects, their frail integument, and their concealed mode of life make it highly unlikely that they can cross broad tracts of sea; therefore the presence of identical or closely allied species on widely separated islands or continents may safely be regarded as sure evidence of the antiquity of the insects, and of the former existence of land-connections to explain their present discontinuous

range." There seems good reason to suppose that the Antarctic Continent, to which the South Orkneys once belonged, was formerly connected with the northern continents, probably by way of America.

Among the curiosities we may notice *Echinorhynchus antarcticus*, n.sp., from the stomach of the Weddell Seal, well described by Dr. Rennie, who compares it to a pipe with a short stem and a fantastic lid, and notes that the males are larger than the females.

We have not thought it necessary to do more than illustrate the varied interest of the reports which make up this volume, but we hope we have said enough to show that the *Scotia* has made contributions to zoology not less important than those of a meteorological kind already published. If we are to know our earth we must know the Antarctic, if we are to know the Antarctic we must know it all round, with its spring-tails as well as its magnetic mysteries, and we earnestly hope that Dr. Bruce, who is one of the most intrepid and disinterested of living geographers (in the wide and only true sense), will be encouraged by the reception given to his reports and will not be straitened in the publication of more.

INDIAN MINERAL RESOURCES.¹

IN a recent article in an American journal, the editor remarked that "geology in Britain scorns the study of ore deposits, and it is deemed gentlemanly to investigate molluscs rather than ores, scenery rather than outcrops." Such a reproach would never have been just, though naturally certain branches of economic geology cannot be studied in this country through lack of necessary material, and Sir T. H. Holland's instructive "Sketch of the Mineral Resources of India" shows the increasing recognition by British geologists of the interesting problems of economic geology. This report is a concise summary of the mineral resources of India, and the use now made of them.

The most important Indian metalliferous minerals are now gold and manganese. The metallurgical industries for which India was once famous have been practically killed by the competition of European imports. The brass used is now all imported, and none of the old copper mines are worked, though efforts are being made to revive them. Lead ores are widely distributed, but none of them is mined. Sir Thomas Holland is careful to explain that the ruin of the local industries has been due less to the cheapness of the imported metals and chemical products than to their greater trustworthiness and uniformity.

The total value of the minerals for which returns are available amounted in 1906 to only 6,312,818*l.*, of which gold yielded 2,230,284*l.* and coal 1,912,042*l.* The other important minerals are petroleum, manganese, salt, saltpetre, and mica; they range in value of output from petroleum, with a yield of 574,238*l.*, down to mica, worth 259,544*l.* The mineral output compared with the size and population of India is, therefore, small, but Sir Thomas Holland points to a marked increase in value during the past five years, and is hopeful for its future.

The memoir opens with a short statement of the geology of India in relation to the distribution of its minerals. The author explains that, owing to the exceptional geological stability of the Indian peninsula, its rocks have been comparatively little mineralised; it is only in the very oldest that metallic ores occur in valuable quantities, and their discovery is often difficult, as they are buried under prolonged

accumulations of weathered material. In the later rocks the only minerals of economic value are those found in beds, such as coal, rock-salt, clay, and laterite. Coal mining is unusually easy and safe, owing to the slight geological disturbance of the country. Coal is sold at the pit's mouth for 3*s.* 11*d.* a ton, the low cost being due to the shallowness of the mines, the deepest shaft being only 800 feet, the firmness of the roofs of the seams, and the freedom from explosive gases; underground fires due to spontaneous combustion are, however, troublesome.

The geological foundation of India is a series of Archæan schists and gneisses with infolded areas of schists that belong to the Dahwar group. Upon this foundation rest the rocks of the Purana group, which are perhaps all pre-Cambrian. The Lower Purana beds are sedimentary rocks and limestones, and they are known as the Cuddapah series in southern, and as the Bijawar series in northern, India. The upper Purana beds are the horizontal sandstones, shales, and limestones of the Vindhya. Then, after a long break, follow the Gondwana beds, which range in age from the Upper Carboniferous to the Upper Jurassic; they contain the chief Indian coal-fields, and probably many that are still unknown, as they are buried under the Upper Cretaceous lavas of the Deccan traps.

The only important Indian gold-field is that of Kolar, in Mysore, where mining was begun in pre-historic times, and some of the ancient workings reached the depth of 500 feet. The present mines are 3000 feet deep, and it is interesting to hear, on Sir Thomas Holland's authority, that the lodes at that depth show "little diminution in value or width of the auriferous gold quartz" (p. 30).

The Indian iron ores are now comparatively little used. They are very widely distributed, and the chief ore is a quartz schist with layers of iron oxides, like the banded ironstones of Rhodesia. In most cases the ore is siliceous and of low grade. The author gives further information about the oft-reported vast block of almost solid iron (pp. 32-3) of Mayurbhanj; he tells us that one bore there gave a core of 120 feet of solid ore containing 68 per cent. of iron.

There is comparatively little information in his report on the manganese mines, the rapid development of which in recent years has been the most remarkable feature in Indian mining; but a monograph on these ores by Mr. Fermor, of the Indian Geological Survey, is announced as in the press.

Among the earthy minerals the most characteristic is mica, of which India produces half the world's supply; but Sir Thomas Holland predicts that unless better methods are adopted for its mining, the output must be greatly reduced. He deplores the practical absence of phosphates from a country where the agricultural industry is of primary importance. There is a short note on each of the gems, for which India was once famous; some diamonds are still obtained, but they are all alluvial.

The carbonaceous minerals include coal, amber, and oil. The coal is of fair quality, and now supplies practically all the fuel required on the Indian railways. Amber of the species free from succinic acid, and known as "burmite," is found in north-eastern Burmah, but the quantity is small, and most of the amber worked in India is succinite imported from Prussia. The author gives an interesting summary of the present development of the Burmese oil industry. The industry was begun by the natives, and wells are still dug by hand to the depth of 400 feet, the men wearing a diving dress for protection against the gases that collect in the shaft. The fields now yield 138 million gallons of crude oil a year,

¹ "Sketch of the Mineral Resources of India." By Sir T. H. Holland. Pp. xi+86; 3 maps. (London and Calcutta, 1908)