

NOTICES OF MEMOIRS.

I.—BIDRAG TILL JAPANS FOSSILA FLORA AF A. G. NATHORST. Härtill sexton Taflor. (Ur "Vega-Expeditionens Vetenskapliga Iattagelser." Bd. II. Stockholm, 1882.) [CONTRIBUTION TO THE FOSSIL FLORA OF JAPAN. By Dr. A. G. NATHORST. With 16 Plates. From the Scientific Observations of the Vega Expedition, Vol. II., Stockholm, 1882.]

ON the homeward voyage of the *Vega*, after successfully accomplishing the north-east passage, Prof. Nordenskiöld called at Japan, and at a place named Moji, in the neighbourhood of Nangasaki, in 33° N. Lat., discovered a rich flora of late Tertiary or Post-Tertiary age. The collections made at this place were entrusted to Dr. Nathorst, who, in this memoir, fully describes and figures the plants, and draws from them some interesting conclusions respecting the climatal conditions of this region during the period when they flourished.

The plants were found in strata of fine clay, exposed at the sea-level, and they were covered by beds of volcanic tuff and ashes several hundred feet in thickness. With the exception of a fruit of *Carpinus* and fragments of beech-bark, the remains consist exclusively of well-preserved impressions of leaves. From 80 to 90 per cent. of these leaves belong to a species of beech which cannot be distinguished from the existing *Fagus ferruginea*, Ait., which now grows in North America from Lake Winnipeg to Florida; at the same time there is an existing species of beech in Japan which is very closely allied to the fossil form. The remaining 10 to 20 per cent. of the leaves in the collections made, belong to about 70 different species of trees and shrubs, which are referred to 42 genera. The principal of these are *Taxites*, *Salix* (?), *Betula* (?), *Juglans*, *Carpinus*, *Ostrya*, *Quercus*, *Ulmus*, *Exoecaria*, *Styrax*, *Vaccinium*, *Viburnum*, *Liquidambar*, *Deutzia*, *Prunus*, *Rhus*, *Acer*, *Vitis*, *Tilia*, *Magnolia*, and *Clematis*.

The peculiar feature of this flora consists in the fact that it does not correspond with that now growing in the same position and locality, but that it closely resembles the flora now inhabiting the forest regions in the mountain districts of the northern portions of Japan, at heights varying between 4500 and 7000 feet above the sea-level. It is therefore evident that when this fossil flora grew in the extreme south of Japan at the sea-level, the climate must have been considerably colder than that now prevailing. Judging from the number of species which are either identical with or closely allied to those of the northern hilly districts of Japan, Dr. Nathorst concludes that the age of these leaf-beds does not date further back than late Tertiary or Post-Tertiary times, and that most probably it coincides with the Glacial period. These fossil plants furnish the only evidence hitherto discovered of the former prevalence of a colder climate in Japan. There is every probability that in *Miocene* times the climate of Japan was warmer than at present, and the subtropical flora which then existed must have been driven southwards during

the colder period when the flora at Moji flourished at the sea-level, whilst at the same time Northern Japan was probably invaded by plants from Amourland and Kamtchatka, some of which still exist in the Alpine flora of the tops of the mountains.

Dr. Nathorst believes that a former land surface extended from Japan to the south-west, thus connecting it with Formosa and the Philippine Islands, and that the present flora of Japan is derived from that which lived on this now submerged area during the colder interval represented by the fossil flora of Moji, and that with the return of a warmer climate this flora again advanced northwards.

G. J. H.

II.—LA STRUTTURA MICROSCOPICA DELLE SPUGNE SILICEE DEL MIOCENE MEDIO DELLA PROVINCIA DI BOLOGNA E DI MODENA. Per A. MANZONI. Con 7 tavole. Bologna, Fratelli Treves, 1882. [The Microscopic Structure of the Siliceous Sponges of the Middle Miocene of the Provinces of Bologna and Modena. By A. Manzoni. With 7 plates. 4to., pp. 24.]

IN this interesting memoir Dr. Manzoni gives a very full and detailed description of the minute structure, the mineral state, and the conditions of deposition, of several species of siliceous sponges which he has discovered in the Italian Miocene. The sponges were derived from two localities, one in the neighbourhood of Montese, where they occurred in beds of dark argillaceous marls, intercalated in strata of coarse molasse or sandstone; in the other locality, in the hills of Zola, Guidoni, and Maserna, the sponges were imbedded in deposits of disintegrated siliceous, ochraceous material, traversed by layers and amygdaloidal masses of flint, which, like the Montese marls, intervene in the strata of the prevailing molasse sandstone. The sponges are so numerous in the siliceous and flinty layers that these may fairly be regarded as sponge beds. The author notices the occurrence of the siliceous sponges in conjunction with the flinty masses, which bear a great resemblance to the flints in the Upper Chalk, but as he has been unable to discover any traces of sponge structure in the amorphous masses of flint, he thinks that they cannot be derived, like the chalk flints, from siliceous sponges. He is, perhaps, unaware of the fact that in many places the flints in the chalk are quite destitute of any traces of the sponge spicules, and therefore the absence of structure in the Miocene flints by no means invalidates the probability that they have originated from siliceous sponges.

The same species of Lithistid and Hexactinellid sponges occur in both the above-mentioned localities, but whilst those from the siliceous deposit retain a siliceous structure, though modified by secondary depositions of silica during fossilization, the sponges from the marly strata at Montese have had the silica replaced by calcite in the same manner as so many of the Hexactinellid sponges in the Jurassic Limestone of Germany. Another remarkable feature of these Miocene Hexactinellid sponges is the fact of their occurrence in a deposit, which, from its mechanical character and the included

fossil Mollusca and Echinoderms, is clearly proved to be of comparatively shallow-water origin, whereas the habitat of the existing Hexactinellids is distinctly in deep water, though an exception to this rule is known in the occurrence of a species of *Cystispongia* in the Gulf of Mexico at no greater depth than 120 feet.

These Miocene Hexactinellids are referred to the genus *Craticularia*, in which the nodes of the spicules are solid. There are excellent illustrations of the structure of the surface layers and of the interior mesh of the sponge-wall, as well as of the secondary changes due to fossilization. The Lithistid sponges are less perfectly preserved, and are referred to the genera *Astrocladia*, *Siphonia*, *Jerea*, *Meta*, and *Chenendopora*. These sponges are probably closely related to the Miocene sponges, from the province of Oran in Algeria, discovered by Pomel,<sup>1</sup> but as this author has only described the outer form and canal structure, disregarding the all-important features of the minute spicular structure, it is impossible to make an exact comparison with them. The presence of fossil Hexactinellids in the Miocene strata to the north and south of the Mediterranean is of special interest from the recent discovery of existing sponges of this order in deep water off the south-east coast of Sardinia.

G. J. H.

### III.—RECENT OPINIONS ON INTERGLACIAL AND PRE-GLACIAL MAN IN BRITAIN.

IN the first part of his paper on "The Newer Pliocene Period in England" (*Quart. Journ. Geol. Soc.* vol. xxxvi. 1880, p. 497) Mr. S. V. Wood gives his reasons for concluding "that the Hoxne palæolithic brickearth, so well known to geologists by the description of Prof. Prestwich, is of the age of the Chalky [Boulder] Clay itself, though of the latest part of it." In fact (to quote from the second part of his paper, *Ibid.* vol. xxxviii. 1882, p. 669), he "described how the ice of the Chalky Clay at its greatest extension in East Anglia (and probably as the first step in the general recession of the ice of the great glaciation), by receding from the plateaux and uncovering the moraine there for vegetation to spring up on it, but still occupying the valleys, had intercepted the drainage from the plateaux, and so given rise to the lagoon deposit of Hoxne, with its palæolithic implements, mammalian and arboreal remains."

Referring also to "the bed of brickearth at Mildenhall, which is overlain by the Chalky Clay as well as underlain by it (and in which Mr. Skertchly has found palæolithic implements)," Mr. Wood has expressed his opinion that it "was formed by the drainage issuing westwards from the inosculating valleys of the Little Ouse and Waveney and from the valley of the Lark, when, though the ice was wasting and had withdrawn from those valleys, a large body of it still remained" (*Ibid.*, vols. xxxvi. p. 499, xxxviii. pp. 672, 673).

On the other hand, in the last number of the Proceedings of the Norwich Geological Society (vol. i. part vi. 1882), Mr. H. Prigg, in describing the implement-bearing beds in the Valley of the Lark,

<sup>1</sup> Paléontologie de la Province d'Oran, Spngiaries, 1872.

Little Ouse, and other places, says (p. 165), that "A vast antiquity must be assigned to the implements; at the same time, the evidence thus far, fairly interpreted, will not allow us to assign to any of the beds containing them a greater age than those usually classed as Quaternary or Post-Glacial." In the discussion that followed the reading of this paper, Mr. J. H. Blake stated "he was well acquainted with many of the localities mentioned in the paper, where implements had been found; and, so far as his own investigations had gone, he considered there was no reliable evidence whatever of any flint-implement-bearing-bed in the East of England, being of greater antiquity than that generally known as the Post-Glacial Period."

In conjunction with these opinions, it is interesting to read that expressed by Prof. W. Boyd Dawkins in his address to the Department of Anthropology of the British Association (Southampton, 1882). After noting the discoveries of palæolithic implements at Crayford and Erith, he asks, "To what stage in the Pleistocene period are we to refer these traces of the River-drift hunter? The only answer which I am able to give is that the associated animals are intermediate between the Forest-bed group and that which characterises the late Pleistocene division in the region extending from the Alps and the Pyrenees as far north as Yorkshire. Nor am I able to form an opinion about their relation to the submergence of Middle or Northern Britain under the waves of the glacial sea. They are quite as likely to be pre- as post-glacial."

IV.—REPORT ON THE ROCKS OF THE FINTONA AND CURLEW MOUNTAIN DISTRICTS. By G. H. KINAHAN, M.R.I.A., with Palæontological Remarks by W. H. BAILY, F.G.S.

THIS report commences with a discussion of the age of the Pomeroy and Lisbellaw fossiliferous rocks. Near the former place, in County Tyrone, three distinct groups of rocks (neglecting the Carboniferous) are developed, namely:—

3. "Lower Old Red Sandstone" (Silurian).
2. Pomeroy Series.
1. Arenig Group.

Attention is now directed to the rocks of the Pomeroy series, which are evidently much newer than the metamorphic rocks north of them (Arenig Group), although both groups are called Lower Silurian in the Geological Survey Memoir descriptive of the district. The fossils indicate an age similar to the Caradoc-Bala series. The "Lower Old Red Sandstone," it was thought, rested unconformably on the Pomeroy Series.

In his palæontological notes, Mr. Baily remarks that the Pomeroy district is celebrated for the beauty and variety of its fossils, 111 species having been recorded from a comparatively small area of strata.

A portion of the report is devoted to a discussion of the Silurian rocks, commonly called "Lower Old Red Sandstone," of Tyrone, Fermanagh, and the Curlew Mountains, with their relations to the

Silurian rocks of S.W. Mayo and N.W. Galway. One group of these beds was called by Jukes the "Dingle or Glengariff Grits," and they comprise a red arenaceous type of accumulation, coarse in nature. Mr. Kinahan points out that this type is no indication of relative age, for although the rocks are more often above the other group of finer accumulations, of a green and grey argillaceous type, yet this is not always the case; and he endeavours to show, with the aid of sections, that the Silurian strata having been deposited in separate basins, the littoral rocks usually coarse, must be on different horizons. Referring to Dr. Archibald Geikie's paper "On the Old Red Sandstone of Western Europe," and the five "Basins of Deposition" therein suggested, Mr. Kinahan observes that, if extended into Ireland, the Lake Caledonia or Middle Scottish Basin might be called the *Ulster and Connaught Basin*, and the Welsh Lake Basin the *South Munster Basin*.

The evidence brought forward in this Report goes to show that these Silurian rocks [Lower Old Red Sandstone] rest unconformably on Cambrian or Cambro-Silurian [Lower Silurian] rocks, and are overlain unconformably by Carboniferous rocks. H. B. W.

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## REVIEWS.

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I.—TEXTBOOK OF GEOLOGY. By ARCHIBALD GEIKIE, F.R.S., LL.D.,  
 Director-General of the Geological Survey of Great Britain and  
 Ireland. (London: Macmillan & Co., 1882.)

THE absence of a general Text-book in which all the departments of the science receive a fairly equal amount of attention has long been felt to be a great want in British Geology. Of late years we have had nothing on this side of the Atlantic that could be compared for a moment in general interest and completeness with the American Manual of Dana. The classical "Elements" of Lyell were excellent in their original form, but as transformed into the later "Student's Elements," they have lost much of their former attraction, while the order of description of the formations has always appeared to us to be unnatural. The well-known manual of Page, which has made many a geologist in its day, is, on the whole, too much of a compilation for the ambitious student of the present time, and too small as a work of reference. The manual of the late Professor Jukes was all round the fairest and best work upon the subject. Jukes's manner was irresistibly attractive. His absorbing love for his subject glowed through every page. He had a way of taking his reader into his confidence which made the pupil regard him less as a master than as a hearty friend. In the sunshine of his presence, in his utter unconsciousness of personal dignity, in his carelessness of authority as such, in his honesty of purpose in the search for truth, and his belief in that of his pupil, the reader was impelled swiftly forward, and was inspired, if not with a fruitful love of the science itself, at any rate with a profound respect for its methods, and a confidence in the perfect reliability of its widest conclusions that never left him.