

swellings further back, but still in the antero-dorsal region. M. Novák supplies also a table of the vertical distribution of the *Phyllocarida* in Bohemia.

In the *Annales XIII. Soc. Géol. du Nord*, 3^me Livr. April, 1886, p. 146, M. E. Canu gives a *résumé* of the results of M. O. Novák's researches in the *Phyllocarida*, with some woodcuts of *Aristozoe regina*, *Bactropus longipes*, and *Ceratiocaris debilis* (see Third Report, pp. 32-34), and of *Ptychocaris simplex* (see above).

26. Dr. A. S. Packard, jun., has described and figured some peculiar appearances on an internal cast of a Carboniferous Phyllopodous carapace from Illinois, as traces of four pairs of lamellate limbs (thoracic feet), probably "the homologues of the exopodites of *Nebalia*." He has defined the genus and species as *Cryptozoe problematica* (*American Naturalist*, Extra, Feb. 1886, p. 156; and *Proceed. Americ. Philosoph. Soc.* vol. xxiii. No. 123, pp. 380-383).

27. In a Geological Report, Assembly Document, No. 161, 1885 (or 1886), Mr. J. M. Clarke has defined the localities and geological succession in Ontario County and New York, where the Phyllopod which he previously described (see 'Second Report,' 1884, pp. 80-86, and 'Third Report,' p. 3) have occurred with or without *Goniatites*.

28. A list of the British Palæozoic Phyllocarida described in the Third and Fourth Reports is given on the preceding page (p. 461).

NOTICES OF MEMOIRS.

I.—RECORDS OF THE GEOLOGICAL SURVEY OF INDIA, vol. xix. pt. 2. 1886.

TWO short papers in this part relate to the disputed age of the beds in the Salt Range, containing species of *Conularia*. The first is "A Note on the Olive Group of the Salt-range," by R. D. Oldham, A.R.S.M., and the other "Memorandum on the Discussion regarding the Boulder-beds of the Salt-range," by H. B. Medlicott, F.R.S. Mr. Oldham visited the locality in the Salt-range, in which the *Conularia* beds occur, and states that the thin band of gravel in which they appear is the last kind of rock in which one would *à priori* expect concretionary nodules to be formed. At the same time he believes that for the most part these fossiliferous pebbles were originally concretionary nodules, and that they have been transported into their present position. From the character of the associated pebbles in the beds beneath, he believes that the original position of the beds from which the *Conularias* come must have been to the southward of where they now are. He further concludes from the stratigraphical relations of the beds, that the Olive group (including the gravel-bed with *Conularia*) is homogeneous, and must be associated with the overlying nummulitic beds, rather than with the underlying Palæozoic or early Secondary beds.

Mr. Medlicott does not admit that the petrological evidence brought forward by Mr. Oldham is altogether conclusive as to the transported origin of the fossiliferous pebbles, though it would be "almost absolute if he could assert that the ground-mass of the gravel-bed is quite

different from that of the fossiliferous pebbles in the bed." Further, even supposing the correctness of Mr. Oldham's theory, that the fossiliferous pebbles are concretionary nodules, it does not at all explain the presence of this small special fauna in a distinct bed by itself. Mr. Medlicott asks the following pertinent question: "Is it conceivable that in Upper Cretaceous time, when the abundantly fossiliferous Permian and Secondary deposits were in force in the neighbourhood, and presumably exposed to denudation, if older deposits were so, a special collection of fossils from those older fossils can have been raked together, transported together, and deposited together at a distance, by the promiscuous process of detrital agency?" "So long as special Palæozoic fossils only are found in these beds, their Upper Cretaceous age will be open to doubt."

This argument has great force; and evidence of a more decided character will be required, before the relative age of the *Conularia* beds, and the boulder-beds underlying them, can be regarded as settled.

G. J. H.

II.—MEMOIRS OF THE GEOLOGICAL SURVEY OF INDIA. PALÆONTOLOGICA INDICA. Ser. xiii. SALT RANGE FOSSILS, by WILLIAM WAAGEN, Ph.D., F.G.S., and JOSEPH PICHL. I. PRODUCTUS-LIMESTONE FOSSILS: 5. BRYOZOA—ANNELIDA—ECHINODERMATA. With ten plates, 87—96.

THE authors reject from the Bryozoa, and regard as Corals, such forms as *Stenopora*, *Monticulipora*, and allied genera. The Bryozoa described belong to the families of the Fenestellidæ and Thamniscidæ. In the first of these families the following species are recorded: *Fenestella perelegans*, Meek, *F. jabiensis*, n., *Polypora Koninckiana*, n., *P. megastoma*, Kon. sp., *P. gigantea*, n., *P. ornata*, n., *P. sykesi*, Kon. sp., *P. biarmica*, Keyser, *P. vermicularis*, n., *P. transiens*, n., *Phyllopora jabiensis*, n., *P. cribellum*, Kon., *P. haimeana*, Kon., *Synocladia virgulacea*, Phill., *Goniocladia indica*, n. In the family Thamniscidæ are ranged *Thamniscus dubius*, Schlot., *T. serialis*, n., and *Acanthocladia anceps*, Schlot. In the Annelidæ, *Spirorbis helix*, King, and *Serpulites indicus*, n., are described. Fragmentary plates and species of *Eocidaris Forbesiana*, Kon., are noted. The following species of Crinoids are present: *Cyathocrinus goliathus*, n., *C. virgulensis*, n., *C. indicus*, n., *C. Rattaensis*, *Hydriocrinus*? sp. indt., *Poteriocrinus*, sp. indt., and *Philocrinus cometa*, Kon. The descriptions of these species are very carefully and fully drawn up, and they are excellently illustrated in the accompanying plates. G.J.H.

III.—NOTICE SUR LE PARALLÉLISME ENTRE LE CALCAIRE CARBONIFÈRE DU NORD-OUEST DE L'ANGLETERRE ET CELUI DE LA BELGIQUE; par L. G. DE KONINCK et MAXIMIN LOHEST. (Bruxelles, Bulletins de l'Académie royale de Belgique, 3^{me} série, t. xi. No. 6, 1886.)

ONE of the authors has lately examined the horizontal beds of conglomerate of white quartz pebbles in a calcareous matrix, which, in the neighbourhood of Ingleborough, rest unconformably on Silurian strata, and form there the base of the Carboniferous

system. The fossils in these beds comprise, amongst others, *Lithostrotion basaltiforme*, species of *Amplexus* and *Zaphrentis*, and teeth of Placoids, some of which are recognized as *Lophodus lævissimus*, Ag., and *Copodus cornutus*, Ag. Resting on the conglomerates are grey limestones with an abundance of *Chonetes papilionacea*, Phill. In these, and the beds below, *Productus giganteus* is conspicuously absent, whilst it is extremely abundant in the limestone beds of the series above. In the Belgian Carboniferous Limestone series there are no conglomerates like those at Ingleborough, but at the base of the limestones with *Productus giganteus* and *P. cora*, forming the 'Calcaire de Visé,' there are some beds distinguished by the abundance of *Chonetes papilionacea*, and between these and the Upper Devonian strata there is a great thickness of beds containing Corals and Placoid teeth, analogous to those in the Ingleborough Conglomerates, and the authors therefore conclude, that these Lower Limestones, beneath the Calcaire de Visé, are represented in part by the Yorkshire Conglomerates, which are not more than about 180 feet in thickness. On the other hand, the zone of *Productus giganteus* in the north of Yorkshire attains a much greater thickness than in Belgium.

G. J. H.

IV.—FIFTH ANNUAL REPORT OF THE UNITED STATES GEOLOGICAL SURVEY, 1883-84. By J. W. POWELL, Director. 4to. pp. 469, 58 Plates and 143 Figures. (Washington, Government Printing Office, 1885.)

AT the beginning of this massive volume the Director of the Survey gives an epitome of the work carried out, together with the financial statement, from which it appears that the year's expenditure for the Survey amounted to nearly 330,000 dollars, or about £67,300. This is followed by brief administrative reports of chiefs of divisions and heads of independent parties, from which an idea may be formed of the extent and variety of the operations included in the Survey. Thus, the chief geographer, Mr. Henry Gannett, reports that topographical field work had been actively carried on by different parties in Northern California, Arizona, New Mexico, Montana, the Yellowstone Park, Massachusetts, the Denver District of Colorado, and part of the Elk Mountains. The party under the charge of Mr. Arnold Hague was engaged in working out the geology of the Yellowstone National Park, and studying the physics of geyser action in that district. Mr. T. C. Chamberlain reports on the investigations made by himself and others under him in tracing out the moraines and other glacial deposits in the upper valleys of the Mississippi and Missouri, in Dakota, and also in Illinois, Indiana, Ohio, and Kentucky. The division under Prof. Roland D. Irving is engaged in a general investigation of the Archæan formations of the North-western States, and its field of operations extended from Northern Michigan to the country on the north-west of Lake Superior. Dr. F. V. Hayden studied the relations of the Laramie Group and other Cretaceous rocks, exposed between the Missouri at Bismark, Dakota, and the Yellowstone at Glendive, Montana. Mr. G. K. Gilbert and his assistants carried on their

work of investigating the Quaternary Lakes of the Great Basin in Utah and California. Mr. W. J. M'Gee reports on the progress made in preparing a general geological map of the United States, as well as on his studies of the superficial deposits of the district of Columbia and adjacent territory. Captain C. E. Dutton is engaged in studying the chain of volcanoes constituting the Cascade Range in California, Oregon, and Washington Territory. Mr. S. F. Emmons reports on mining geology of the Rocky Mountains, and Mr. G. T. Becker on the quicksilver mining district of Knoxville in California. Prof. O. C. Marsh states that eight different parties were engaged in collecting fossils in Oregon, Wyoming, Kansas, and Nebraska, and that his monographs on the *Sauropoda* and the *Stegosauria* were in course of completion. Dr. C. A. White was engaged in studying the Laramie Group on the Upper Missouri, and on various palæontological investigations in Washington and California. Mr. C. D. Walcott, assisted by Prof. H. S. Williams and others, has studied the Devonian and other Palæozoic rocks of New York, Tennessee, Virginia, Vermont and Alabama. Mr. Lester F. Ward has been collecting and arranging the fossil plants of the Fort Union Group on the Yellowstone and Upper Missouri rivers. The chemical work of the Survey is directed by Mr. F. W. Clarke, whilst Mr. A. Williams is engaged on the statistics of metals; and, finally, Mr. G. W. Shutt traces the course of a preliminary geological investigation in Virginia.

These administrative reports, however, only occupy sixty-six pages of the volume; the remaining 400 pages contain a series of elaborate essays on different branches of geological science, each of which is treated in considerable detail, and abundantly and beautifully illustrated. We can here but mention the titles of the different treatises and the authors' names, and refer the reader to the volume itself. The first treatise is on "The Topographic Features of Lake Shores," by G. K. Gilbert. This is followed by "The Requisite and Qualifying Conditions of Artesian Wells," by T. C. Chamberlain; "Preliminary Paper on an Investigation of the Archæan Formations of the North-Western States," by R. D. Irving; "The Gigantic Mammals of the Order Dinocerata," by Prof. O. C. Marsh; "Existing Glaciers of the United States," by T. C. Russell; and "Sketch of Palæobotany," by Lester F. Ward.

G. J. H.

REVIEWS.

DEPARTMENT OF THE INTERIOR. REPORT OF THE UNITED STATES GEOLOGICAL SURVEY OF THE TERRITORIES. F. V. HAYDEN, UNITED STATES GEOLOGIST-IN-CHARGE. VOLUME III. THE VERTEBRATA OF THE TERTIARY FORMATIONS OF THE WEST. BOOK I. By EDWARD D. COPE, Member of the National Academy of Sciences. (Washington, Government Printing Office, 1883.)

(Continued from p. 419.)

BATS are scantily represented in the Bridger fauna, the only American species described by Professor Cope being *Vesperugo anemophilus*, which has the inferior molars like those of *Didelphys*.