

and foraminifera, than it did in the mollusca, of which a considerable proportion were common to both areas. The abundance and variety of animal life on a bottom of which the temperature is at least 2° (Fahr.) below the freezing-point of fresh water, is a fact which has all the interest of surprise; and it is scarcely less remarkable that the forms of mollusks, echinoderms, and sponges, which seem to be the characteristic inhabitants of this cold area, should attain a very considerable size. The precise limitation of the Globigerina-mud and of the vitreous sponges to the warm area, was a very striking manifestation of the influence of temperature, and has very important geological bearings.

Thirdly, they have largely added to the number of cases in which types that had been regarded as characteristic of earlier geological periods, and to have long since become extinct, prove to be still existing in the depths of the ocean; and greatly increase the probability that an extension of the like method of research to more distant localities would produce even more remarkable revelations of this character.

The doctrine propounded by Professor Wyville Thompson, in the report of the *Lightning* expedition, as to the absolute continuity of the cretaceous formation with the deposit of globigerina-mud at present in progress on the North Atlantic sea-bed, has received such striking confirmation from the discovery of the persistence of numerous cretaceous types, not merely in our own explorations, but also in those carried on by the United States Coast Survey in the Gulf of Mexico, that it may be fairly affirmed that the *onus probandi* rests upon those who assert that the formation of true chalk has ever been interrupted since the cretaceous period. That period is usually considered to have terminated with the elevation of the cretaceous deposits of the European area into dry land. But according to the accepted doctrines of geology, it is highly probable that, coincidentally with the elevation of the European area, there was a gradual subsidence of what is now the Atlantic sea-bed; so that the *Globigerina* of the former area, with many accompanying types of animal life, would progressively spread themselves over the latter, as its conditions became favourable to their existence. And there seems no reason why they should not have maintained themselves in its deepest parts, through the comparatively small changes of level which took place in this portion of the earth's crust during the Tertiary epoch.

Fourthly, the *Porcupine* explorations have enormously extended our knowledge of the British marine fauna; alike by the discovery of new types, and by the addition of types previously known only as inhabitants of other localities.—The mollusca alone have as yet been fully examined; and Mr. J. Gwyn Jeffreys, whose authority upon this part of the subject is not second to that of any other naturalist, reports as follows:—The total number of species of marine mollusca enumerated in his recently completed "British Conchology" (excluding the Nudibranchs) is 451; and to these the *Porcupine* expedition has added no fewer than 117, or more than one-fourth. Of these as many as fifty-six are undescribed, whilst seven were supposed to be extinct as Tertiary fossils. Sixteen genera, including five which are undescribed, are new to the British seas. "All that I can do," he says, "by continual dredgings in comparatively shallow water during the last sixteen years was to add about eighty species to the number described by Forbes and Hanley. I regard the present (although a large) addition as merely an earnest of future discoveries. In fact the treasury of the deep is inexhaustible." The complete examination of the crustacea, which are in the hands of the Rev. A. M. Norman, and of the annelids, which have been undertaken by M. Claparède and Dr. Macintosh, will probably yield results scarcely less striking. It is, however, in the echinoderms and sponges, which are being examined by Professor Wyville Thomson; in the stony corals, which have been referred to Dr. P. M. Duncan; and in the foraminifera, which constitute the speaker's own speciality, that the most interesting novelties present themselves.

W. B. CARPENTER

SCIENTIFIC SERIALS

THE February number of the *American Naturalist* (Vol. iii. No. 12) contains only three original articles, and of these the first and most important is really a reprint of Professor Wyman's observations on the development of the thornback, with a few introductory remarks on the natural history of the skates, by Mr. F. W. Putnam. The other two are the continuation of Mr. J. A. Allen's notes on the rarer birds of Massachusetts, and a

paper on common fresh-water shells, by Mr. E. S. Morse. Professor Williamson's article on *Bathylabus* is reprinted from the *Popular Science Review*.

A SHORT paper appears in the last number of Tröschel's *Archiv für Naturgeschichte* from the pen of Dr. A. A. Krohn, on the earliest development of the Botryllus stock, which, as most of our readers are probably aware, constitutes one of the Tunicate Molluscs analogous to the misshapen bodies found so commonly on our sea coasts, and known as "dead men's fingers." Hitherto certain processes found at the anterior end of the larva have been regarded as the germs or buds of new individuals which subsequently become completely differentiated, but M. Krohn shows that these are clavate processes, constituting the first rudiments of the blood-vessels which make their appearance soon after the metamorphosis of the larva. After a short time the vessels begin to branch, each branch terminating in a dilated coecal enlargement resembling the calyx of the common *Erica tetralix* in form, and at this time a round projection appears on the right side of the body, near the heart, into which a stream of blood from the mother sets, and having circulated around it returns to its starting point. It now, curiously enough, begins, together with the mother animal, to shrink, and finally disappears, and in its place a daughter Botryllus is developed. The daughter Botryllus forms two buds, a right and a left, while itself passes through the same stages as the original mother, becoming also fluid and disappearing. The two buds of this third generation, when fully developed, have their cloacal apertures opposed, and each gives off two buds which are arranged with the parents in a circular manner, and these four buds may again give off others, and so regularly arranged systems of the animals are produced, the vascular system undergoing corresponding development and extension. The blood contains colourless corpuscles, and under certain circumstances a number of dark pigment granules present in the bodies of the successive generations, on undergoing atrophy appear to gain entrance into the circulating fluid.

THE *Revue des Cours Scientifiques* for the 19th inst. contains a report of a lecture by M. Claude Bernard on the history of medical science and its actual condition; of one by M. Harny, on human remains in the tertiary deposits in America, and on the theories of multiple centres of creation; and of one by Dr. Bertillon on the mortality of different departments of France.

In the just published *Proceedings of the Royal Society of Edinburgh* for the session 1868-69, Professor Allman gives a description of Rhabdopleura, a new genus of Polyzoa. The cœnœcium or common stem consists of a branched tube partly adherent and partly free, the free portion forming tubes of egress through which the polypides move in the acts of exertion and retraction. In the walls of the adherent portion a rigid chitinous rod is developed along their attached side, from distance to distance, each by a flexible cord or funiculus. The polypides are hippocrepian, and each carries a shield-like process on the hæmal side of its lophophore, external to the tentacular series. In development the polypide at an early stage is included between two fleshy plates on the right and left sides respectively, and which are partially united. For some time the two plates keep pace with the general development of the bud, but ultimately they cease to increase in size, and then remain as the shield-like processes carried by the lophophore of the polyzoan. Professor Allman regards these plates as representing the right and left lobes of the mouth in a Lamellibranchiate Mollusk, from which it follows that the relations of the Polyzoa are more intimate with the Lamellibranchiata than with the Brachiopoda, with which of late years they have been associated, but whose mantle lobes lie dorsally and vertically, instead of lying right and left as in the Lamellibranchiata. The lophophore of the Polyzoa he considers to have its representative in the labial palps of the Lamellibranchiata. The animal was obtained by the Rev. A. Norman and Mr. J. Gwyn Jeffreys in the course of deep-sea dredging in Shetland.

THE *Journal of the Chemical Society* for February is mainly occupied by a long paper by Mr. F. A. Abel, entitled "Contributions to the history of explosive agents," abstracted from the Philosophical Transactions for 1869. There are also shorter articles on nontronite, and on a new chromium oxychloride, by Dr. T. E. Thorpe, and observations on the solution of gases in water by Dr. Williamson.

THE *Monthly Microscopical Journal* for March contains the President's Address, an obituary notice of the late J. J. Lister, F.R.S., and articles on the structure of the stems of the arborescent *Lycopodiaceæ* of the coal measures, by Mr. Carruthers, and on the mode of examining the microscopic structure of plants.