

has been modified and thickened by the addition to it of connective-tissue material from the deeper lying parenchyma. That the submuscular cells do not secrete this material is shown by the fact that the submuscular layer is absent from the caudal appendix of *Apoblema*, though the cuticular layer is as well developed there as over other parts of the body. It will be seen that the view which Pratt advocates is essentially the theory of Looss grafted upon the older view of Schneider and Minot. The evidence which he brings forward strongly antagonizes the views of Ziegler, Brandes, and Blochmann.

Pratt's account of the life-history of *Apoblema* differs from that given by previous investigators. He believes that the copepod is the primary host within which the young worm lives until it is nearly mature. It then escapes from the body of the copepod by forcing its way outward between two thoracic segments—a process which the author observed repeatedly. The young worm, while swimming about freely in the water, is probably swallowed by some fish, which thus becomes its final host.

W. S. NICKERSON.

**Michigan Unionidæ.**<sup>1</sup>—The distribution of the Unionidæ of Michigan has been worked out by Mr. Bryant Walker from a census which the Conchological Section of the Michigan Academy of Science has taken of all the known public and private collections within that state. Michigan possesses the richest unione fauna of all the territory tributary to the Great Lakes, and, as the state is wholly within the St. Lawrence basin, the problem is not complicated by the political boundaries of the investigation. Sixty-one species belonging to the genera *Unio*, *Margaritina*, and *Anodonta* are recognized. Of these only a small number have a general distribution; a few are peculiar to the northern part of the state; and several are confined to Lake Erie and the waters immediately tributary to it. On the other hand, a great majority of the total number (75 per cent of the species of *Unio* and *Margaritina*) are confined to the Grand-Saginaw valley and the region to the south of it. These forms are members of the fauna of the Mississippi basin, while those of the southeastern part of the state show decided affinities to the Ohian fauna. But two species peculiar to the fauna of the Atlantic region are found, and these have a general distribution throughout the state. Their westward migration could have taken place readily along existing waterways. On the other hand, the explanation of

<sup>1</sup> Walker, Bryant. *The Distribution of the Unionida in Michigan*. Detroit, 1898. Printed for the author. 20 pp., 3 pls.

the very large immigration of forms from the Mississippi and Ohio valleys is found by the author in the topographical changes incident to the glacial period. The formation of the Des Plaines and Maumee outlets to the lake region, as the ice-sheet receded, established the channels along which the Unionidæ of the Mississippi and the Ohio entered the Michigan area. The opening of the Grand-Saginaw valley as an outlet for the glacial lake Maumee into Lake Michigan, and the subsequent closing of the Maumee outlet, afforded the opportunity for the Unionidæ of the Mississippi to invade this region. It is a significant fact that the present range of the most of the invading species is still confined within the beach lines of the glacial lakes.

C. A. K.

**The Plankton of Puget Sound.**<sup>1</sup>—As the result of the examination of a vertical series of catches, taken at five levels in a depression in Puget Sound 112 fathoms in depth, the conclusion is reached that the surface strata present the greatest number of living individuals and furnish the most favorable, though irregular, conditions for their multiplication. The relative number of living and dead individuals changes in going from surface to bottom; for example, 82 per cent of *Coscinodiscus* in the surface water were alive, but only 29 per cent in the bottom water. A great accumulation of this genus in the deeper water is explained as the probable result of a previous, but no longer continuing, period of rapid growth in the surface water, followed by subsidence to the deeper strata. In the case of some diatoms the conditions of growth seem to be well fulfilled in the lower strata. Indeed, all the organisms of the plankton were found in a living condition throughout the 112 fathoms, excepting the Copepoda, which were not met with below 64 fathoms.

C. A. K.

**Faune de France.**<sup>2</sup>—This is the third volume issued of one of those convenient manuals of systematic biology so frequent in the Old World and so rare in the New. Would that we had something of the sort for other groups than vertebrates! The first volume of this *Fauna of France* dealt with the Coleoptera; the second embraced the rest of the Hexapoda. This volume contains the other Invertebrata, including the Thysanura, which were omitted from Vol. ii.

<sup>1</sup> Peck, J. I., and Harrington, N. R. Observations on the Plankton of Puget Sound, *Trans. N. Y. Acad. Sci.*, vol. xvi, pp. 378-387. Pls. XXXVII, XXXVIII.

<sup>2</sup> *Faune de France*, par A. Acloque, tome iii, 500 pp., 1664 figs., 18 mo. Paris, 1899. 10 frs.