a complete knowledge of the life histories of all American frogs and toads. E. A. A.

Behavior of the Lower Organisms. By H. S. Jennings. New York, The Macmillan Co. 1906. Pp. xiv + 366; 144 figs.

This volume, which is the tenth in the series of biological treatises published by Columbia University, is a timely exposition of the behavior of the lower organisms by an author who has devoted a large part of his time to an investigation of this subject. The distribution of the materials in the volume follows an admirable plan. The first part of the book deals with the behavior of unicellular organisms, especially *Paramecium*. The second part takes up the behavior of the lower metazoans, including the cœlenterates, echinoderms, worms and crustaceans. The third part treats of the theoretic aspect of the subject, and the volume is concluded by a bibliography and a good index.

The first and second parts, which are naturally more concerned with statements of facts than with speculative matters, are a very full and adequate description of the reactions of the protozoans, lower metazoans, etc., and form, in the reviewer's opinion, the best digest of this subject that has yet appeared. They entirely supersede such recent works as that of Lukas and others, and with their bibliographical references they form a most serviceable introduction to the subject.

The third part of the volume is much less happily conceived. This opens with a chapter in which the essential similarity of the reactions of unicellular and of multicellular animals is pointed out and the true relations of a nervous mechanism to these reactions is made clear, and it closes with chapters on the development of behavior and the relations of behavior to psychic factors, etc., avowedly hypothetical matters. The body of the third part, however, is taken up with a discussion which turns in the main on a comparison of the tropism theory and the author's own views about animal orientation, etc. It is possibly asking too much to expect an author to make a plea for the opposing side, and yet truth is best served by looking facts squarely in the face. Almost no one nowadays, aside from Jennings, would accept the definition of the tropism theory given by him in Chapter XIV. To be sure, it is easy to find in the older literature the form of the theory that he describes, but practically every one at present who believes in the tropism theory at all has discarded as unessential that portion of it that asserts that the stimulus always influences directly the reacting organ. To retain this and demolish it in the belief that the tropism theory falls with it is rather Quixotic than clear-headed. If the modern tropism theory were as weak as Jennings would have us believe, the experimental evidence upon which it rests ought easily to be explained away. Yet it has always seemed to the reviewer that the characteristic circus movements performed by animals immersed in a homogeneous stimulant, but with sense organs unilaterally obstructed, are explainable only on the basis of this theory. There are other crucial observations in favor of the tropism theory and yet none of these have been satisfactorily accounted for by Jennings.

Jennings is perfectly correct in his insistence on the importance of what he formerly called the "motor reaction" as an explanation of the way in which many of the lower animals become distributed or massed, but to prove that this explanation holds in certain cases is not to disprove the tropism theory. The two theories are not mutually exclusive and the processes implied by them may perfectly well take place at the same time in a given animal. It would seem that Jennings in his enthusiasm for his own views had become blinded to the real strength of the tropism theory and not only was unable to accord it fair treatment, but also lacked appreciation of its real value. It is to be regretted that a book excellent in so many particulars should be marred by so considerable a defect. G. H. P.

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for September contains articles on "The Structure of Cilia,

Especially in Gastropoda," by Leonard W. Williams; "The Poison Glands of *Noturus* and *Schilbeodes*," by Hugh D. Reed; "The Structure of the Silk Glands of *Apanteles glomeratus* L.," by Robert Matheson and A. G. Ruggles, and "The Nest of the Kelp Fish," by Charles F. Holder. Mr. Reed states that all species of *Noturus* and *Schilbeodes* examined possess an axillary pore that is the opening of a poison gland, and, in addition, some species have poison glands about the dorsal and pectoral spines. Species with serrate spines have no spine glands. There are no special muscles controlling the glands and they are ruptured by the pressure of their contents. Under *Notes* F. T. L. shows that marked specific differences exist in the embryos of vertebrates.

The Museums Journal of Great Britain for August contains an account of the Dundee meeting of the Museums Association. The gathering was attended by the curators of twenty-nine museums, besides many associates, and the papers read were thoroughly practical; two papers dealt with the subject of "School Museums."

The American Museum Journal for October has for frontispiece an excellent plate of "The Warren Mastodon" and in the accompanying article will be found measurements of the skeleton, which has been admirably mounted; it stands 9 feet 2 inches high, much lower than the popular idea of the animal. There are articles on "A Blackfoot Lodge, or Tepee," "The Museum Whales," "A Diplodocus for the Frankfurt Museum" and "The Robley Collection of Maori Heads." This collection, which is practically unique, comprises thirty-five specimens; it will be described in detail later. The museum has recently acquired two examples of the rare *Solenodon paradoxus* from Haiti and a sea otter from Point Lobos, Cal.

The Zoological Society Bulletin for August, which escaped notice at the time of its issue, during the meeting of the International Zoological Congress, is devoted to the subject of Zoology in New York. It contains articles on the universities and other educational institutions, in whose curriculum zoology plays an important part; the museums of natural history, biological laboratories, zoological parks and aquarium. There are brief accounts of the scientific societies of Greater New York and a list of the zoologists of New York and vicinity, which includes about one hundred names.

The Museum News, of the Brooklyn Institute, for October, contains a good account of the "Home of the Guacharo," *Steatornis*, describing a visit to a cave in Trinidad, where a number of adults and young birds were obtained. It is noted that the weight of the excessively fat young is twice that of the old bird. The installation of a group of fishes about a coral reef is something of a novelty, being an attempt to give a glimpse of the life and color of tropical seas. The principal article in the section devoted to the Children's Museum describes the silkworm, which has been made the subject of a rather extensive exhibit.

THE publication is announced in December of a new international monthly, *Revue des études ethnographiques et sociologiques*, edited under the direction of M. Arnold von Gennep and published by Librairie Paul Geuthner.

DISCUSSION AND CORRESPONDENCE

AS TO HOLOTHURIA

TO THE EDITOR OF SCIENCE: In SCIENCE for August 7, Dr. Gill calls attention to the fact that the genus *Holothuria* as originally established by Linnæus contains no species of the group which since 1766 has been universally called "holothurians." In the *Zoologischer Anzeiger* for August 20, Dr. Poche makes the same announcement and goes on to show some of the resulting changes in nomenclature which will be necessary if we adhere to the International Code. Dr. Gill particularly wishes to know what Dr. W. K. Fisher and I propose to do about it. Dr. Fisher in SCIENCE for September 20 states his position: he elects to adhere to the code and accordingly abandons *Holothuria*. In this I am quite unable to follow him, although I find no reason to ques-