Experimental Studies of Adaptation and Selective Elimination in Fishes: FRANCIS B. SUMNER, College of the City of New York. No abstract.

Habits and Reactions of Crabs bearing Actinians in their Chelipeds: J. E. DUERDEN, University of Michigan.

Möbius in 1880 first made known the fact that the crab, *Melia tessellata* Latr., has the remarkable habit of carrying a living actinian in each claw. The polyps are carried about in front of the crab, held in a kind of defensive attitude, and it is assumed that the actinians, by means of their stinging threads, may be useful to the crab for purposes of offense and defense, while the activity of the crab may serve to bring the actinian into the neighborhood of more prey. During a recent visit of the writer to the Hawaiian Islands, under the auspices of the Carnegie Institution, two specimens of *Melia,* both bearing an actinian in each claw, were collected, and observations made upon their habits and reactions. These may be summarized as follows:

1. The commensalism is not restricted to a single species of actinian. One crab carried a *Bunodeopsis* and the other a Sagartid. The species are interchangeable, and the crabs will dislodge a small polyp to take up a larger. Apparently the crab is not aware of the presence of an actinian until it comes in actual contact with it; dislodgment of a fixed actinian is brought about by means of the first pair of ambulatory limbs.

2. When irritated the crab moves its chelipeds so as to place the actinians in such a position as to best serve as a means of defense. Food given the polyps is abstracted by the crab by means of its first pair of walking limbs, the stimulus to activity being probably derived from the diffusion of the meat juices.

3. *Melia* has lost the direct use of its chelipeds as organs of defense and offense, or for grasping objects other than the actinians; in correlation with this the functions of the first ambulatory appendages have become largely modified.

4. A second species of crab, *Polydectus,* was also found which bears an actinian, *Phellia,* in its chelipeds.

On the Structure of the Larval Oyster and its Occurrence in the Plankton: JOSEPH S. STAFFORD, McGill University. Read by title.

A Statistical Study of Correlation and Selection in Lepidoptera: HENRY E. CRAMPTON, Barnard College. Read by title.

HENRY S. PRATT,
Secretary.

SCIENTIFIC BOOKS.

Vorlesungen über Pflanzenphysiologie. LUDWIG JOST. Jena, Gustav Fischer. 1904. Pp. xiii + 695; 172 figures.

In the form of forty odd lectures the author presents a comprehensive view of the whole field of plant physiology. In the preface he states that it is his purpose to supply, in this volume, a book for the student, which will fill the gap between Pfeffer's exhaustive treatise and the short accounts found in various general text-books. In this he has succeeded and has filled a long-felt want for the reader who wishes a full, but not too detailed, account of the important facts and problems of plant physiology. There is a departure from the usual mode of treatment, in that the subject is divided under three main heads, instead of two. The first of these concerns the chemistry and nutrition of the plant and occupies somewhat less than half of the book. The rest is about equally divided between a section entitled 'Formwechsel,' treating of growth and reproduction, and another entitled 'Energiewechsel,' which has to do with movements of both growth and locomotion.

In general the treatment of nutrition does not differ materially from that of many other books, except that it is fuller. Under the general term assimilation is considered both

photo-synthesis and the assimilation of nitrogenous substances. This is to be regretted, for it fails to bring out the essential differences between these forms of chemical activity within the plant. This is especially true since the author follows the fate of the nitrogenous products up to the point of the final construction of albuminous material and even considers the processes of digestion before a word has been said about respiration and the accompanying phenomena. It is true that in the following section, on dissimilation, as the author terms it, the phenomena connected with respiration are spoken of from the standpoint of the release of kinetic energy, but the importance of this in the upbuilding processes in nitrogen assimilation is not sharply brought out. The first part, on nutrition, closes with a cleverly constructed diagram which brings out the origin and fate of the various substances connected with nutrition processes.

In the already noted division of the balance of the book into two parts, it is not altogether evident that there is much advantage over the more usual plan. The problems connected with the change in form, in short the growth of the plant, are in many ways intimately connected with growth curvatures, yet in the arrangement followed the former are included under 'Formwechsel,' the latter under 'Energiewechsel.' If this treatment tends to draw the attention of the student from the relation of expenditure of energy to ordinary growth phenomena, or if thereby growth curvatures—tropism—are separated too sharply from unmodified growth responses, it seems to hinder rather than help the proper appreciation of the question as a whole. Some subdivision is certainly an advantage, but it might have been better if the title 'Energiewechsel' had been used for both of the sections and suitable subtitles devised to indicate more adequately the different phenomena.

Aside from such points, which are, perhaps, after all, but matters of opinion, there can be no question but that the book is an excellent one. It is clear, concise, fairly up to date as regards the literature, and, moreover, written in a style which makes it attractive and interesting reading. One can but regret that there is not a book in the English language so suitable for the student; it is to be hoped that a translation will appear.

Columbia University. H. M. Richards.

Cleiocrinus. By Frank Springer. Memoirs Mus. Comp. Zoology, Harvard College, Vol. XXV., No. 2, January, 1905.

A few years ago the Museum of Comparative Zoology brought out Mr. Springer's beautiful and exhaustive account of *Uintacrinus,* and now we have before us a similarly complete paper on one of the oldest of known Crinoid genera—*Cleiocrinus.* This genus was described by E. Billings in 1856, from specimens found in the Lower Silurian at Ottawa, Canada. It has been discussed by various authors, who have had great difficulty in placing it in the system of classification, owing partly to its anomalous character, and partly to the condition of the specimens. In 1886 Messrs. Wachsmuth and Springer wrote: 'If certain parts were better known, we should make it the type of a new family, but at present, having no positive knowledge of the basal regions, nor even of the arms, we are not in a position to give a satisfactory definition of the group.' Mr. Springer does not now establish the family Cleiocrinidæ, in so many words, but it is evident that the expectations of 1886 have been more than realized. The story of the discovery of the new characters is so dramatic that it is worth quoting nearly in full:

> It was apparent, however, that no further information was to be obtained, unless we could find some means of seeing what is underneath the column. My examination of the specimens gave no hope of being able to detach the column in either of them; but after a very careful study of specimen B [one of Billings's types borrowed from the Geological Survey of Canada], under a strong magnifier, I came to the conclusion that it might be possible to get at the inside of the base by removing a part of the plates above it. * * * * The small size of the specimen and the uncertainty as to how the fractures might run, rendered the operation a delicate and risky one to undertake with a type specimen; but I thought the benefit to be gained in case of success would warrant the risk. I accordingly laid the matter fully before Dr. Whiteaves, and requested his