tains, vast though this be, but rather in its wholly enlightening effect upon the search for biologic truths, and for this alone it is worthy of deep study and a lasting place in literature.

LOUIS AGASSIZ FUERTES

Einführung in die Physiologie der Einzelligen (Protozoen). By S. VON PROWAZEK. Leipzig and Berlin, B. G. Teubner, 1910. Pp. 172.

Ever since the appearance of Verworn's excellent paper on the psycho-physiology of the protozoa in 1889, it has been the hope of many that in these supposedly simple organisms a key would be found to the solution of various perplexing problems in the higher forms; that physiological and psychological processes as well as structures would be discovered here in their very inception. Unfortunately this hope has not been realized. The life processes in the unicellular forms have been found to be exceedingly complex. Even the anatomy is far more complex than was formerly supposed. As a matter of fact the more thorough the investigation, the more intricate and involved the physiology and structure of these apparently simple creatures is found to be. Our author, realizing this, says that a protozoan "is in a certain sense a unicellular metazoan," and the establishment of this idea, he asserts, is the underlying motive of the volume under consideration.

This volume, as the title indicates, is intended to serve as an introduction to the physiology of the unicellular forms. The author says it is not a hand-book. In reality, however, it takes the form of a hand-book and might truthfully be called a very brief review or statement of results of original work bearing on all functional processes in unicellular forms. The principal topics discussed follow in the order of presentation: The structure of the cytoplasm and the nucleus, both physical and chemical; The nature and function of the surface membrane or layer and various organic bodies within the cell; Respiration; Process of feeding; Excretion; Motion and locomotion; Fertilization; Regeneration; Protection; Immunity; Responses to chemicals, electricity, light, etc.; Inheritance; Variation, and Mutation.

While the results of investigation bearing on some of these topics are fairly conclusive and present some coherence, those bearing on others are quite the opposite and the author's treatment of these necessarily consists mainly of a series of dry incoherent statements of experimental results of interest only to those who are in search of a brief account of the work done and the references to such work.

In general the author's selection and review of papers and his discussion appear sane and trustworthy. He usually presents the literature bearing on both sides of mooted questions without taking a definite stand himself. However, as might be expected in a subject as new as the physiology of the unicellular forms, he supports some conceptions which in the minds of many are erroneous. Among such may be mentioned (1) the idea that the movement of certain amœbæ can be accounted for by the effect of the environment on surface tension; (2) the idea that the activity and form of organisms is regulated by a non-energetic principle, an entelechy or a psychoid as described by Driesch; (3) the idea that unicellular forms orient and move directly toward or from a region containing certain chemicals or having a given temperature; (4) the idea that there is no selection of food in the protozoa; (5) the representation of the eye-spot of *Euglena* as a hollow cylinder.

The volume in question will no doubt be found valuable principally as a book of reference. Unfortunately, however, it is not well adapted for this use, owing to the very brief table of contents and the absence of an index, and to the fact that the titles of the papers cited are scattered through the body of the text making it difficult to locate the references referred to. Moreover, the frequent interruption in the text by titles which in many instances appear again and again annoys the reader.

S. O. MAST.

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Biological Chemistry, Vol. VIII., No. 2, issued August 29, contains the

following: "The Formation in the Animal Body of *l*-β-Oxybutyric Acid by the Reduction of Aceto-acetic Acid," by H. D. Dakin. Experiments are described which show that the liver possesses a mechanism, dependent upon the antagonistic action of two ferments, by which the mutual interconversion of β-oxybutyric acid and aceto-acetic acid may be effected. It is thought probable that the β-oxybutyric acid which appears in the blood in acidosis is the result of reduction of aceto-acetic acid in the liver. The mechanism of the reactions involved is discussed. "On Decomposition of Aceto-acetic Acid by Enzymes of the Liver: Part II.," by A. J. Wakeman and H. D. Dakin. The primary product of the action of the enzyme in the liver which has been shown to decompose aceto-acetic acid is lævo-rotatory β-oxybutyric acid. "The Products Resulting from the Putrefaction of Fibrin by *Clostridium carnofœtidus, Salus* and *Rauschbrand,*" by Francis H. McCrudden. Analyses show that distinct differences exist between the putrefactive products of the organisms named which may be of diagnostic value. "The Metabolism of Some Purine Compounds in the Dog, Pig and Man," by Lafayette B. Mendel and John F. Lyman. A comprehensive, comparative study of the fate of various purines in the organism. "A Study of Enzymes by Means of Synthetical Polypeptids," by A. H. Koelker. Racemic alanyl-glycin may advantageously be used in the study of proteolytic enzymes. The rate and extent of digestion can be easily estimated by the optical method.

SPECIAL ARTICLES

FURTHER DATA ON THE HOMING SENSE OF NODDY AND SOOTY TERNS

During May and June of the present year I continued my studies on distant orientation in the noddy and sooty terns at the Tortugas colony. The report of the work done in 1907 will be found in publication 103 of the Carnegie Institution. The work in 1910 like that in 1907 was done under the auspices of the Marine Biological Laboratory of the Carnegie Institution. I wish to thank Dr. Mayer, of the laboratory, for his continued kindness to me during the past season's work.

The 1910 season was one very unfavorable for conducting experiments upon distant orientation. The spring was late in the northern temperate regions, and this, combined with the severe storms in the Gulf, seriously handicapped the work. It was often impossible to get birds to Key West in time to make connections with the Mallory steamers. The water between Tortugas and Key West is often very rough, and unless there happens to be a flat calm we never attempt to go to Key West in our small launches. Several times our experiments had to be given up for this reason, even after the birds had been captured and marked. Then, too, after every important release (Galveston, New York and Mobile) adverse winds set in against the birds.

By far the most serious defect in the work was the failure until towards the very last to perfect a favorable technique for shipping and feeding the birds. In 1907 the orientation work was incidental. In 1910 it was the principal feature. For this reason it was desired to make large shipments. The method adopted in all cases was to capture and mark about twelve to fourteen birds, put them into one large hooded cage and give them in charge of a capable employee of the laboratory, who would accompany them on the trip and release them at the proper time. Minnows, when they could be obtained, were purchased in Key West and put in the ice chest of the Mallory boat. At times when they were not obtainable, large fish were carried and cut up into small pieces and fed the birds in the place of minnows. This latter method is not nearly so satisfactory, since many of the birds will refuse chopped fish when they will not refuse minnows. The most serious mistake made was in sending too many birds in one cage. They could not be given individual attention. Many died on the way, either from starvation or else were trampled to death. The birds apparently have an instinctive tendency to perch. Some get seriously lacerated through having others climb up and perch upon them. In carrying