ened him sufficiently to have made other attitude and action impossible. C. S. Ludlow

Army Medical Museum,
Washington, D. C.,
September 29, 1916

THE SONG OF FOWLER'S TOAD (BUFO FOWLERI PUTNAM)

In Science for September 29, Mr. H. A. Allard states that for some years he has heard at Clarendon, Va., two types of toad cries. One was uttered early in the spring, "a steady, trilling monotone," lasting "from 10 to 20 seconds," and "resembling the song of *Bufo americanus* as it is heard in New England." The other was that of Fowler's toad, "the unmistakable, weird, wailing scream which advertises its presence throughout its range." He further states that on May 2, 1916, he caught toads uttering the former note, and found them to be *Bufo fowleri*. He presented them to the National Museum, where they are under accession number 59692.

Now I have collected for some years in the region in question, as my home is in Alexandria, and I have found both *B. fowleri* and *B. americanus* fairly common, although *fowleri* seems the more abundant. I have studied the breeding habits of these toads at Haverford, Pa., where both occur very commonly and are quite distinct.

Americanus is one of the first Anura to appear in the spring; *fowleri* one of the last. Transformed *americanus* are sometimes met with before *fowleri* begins to sing. The note of *fowleri* there is always the short snoring scream. The note of *americanus* is always much longer, although its trill and its softness are somewhat dependent on whether the toad is on land or in the water. I have collected *fowleri* in numbers at Brevard, N. C., at an altitude of 2,200 feet. The note there was the same which I have heard at Alexandria and at Haverford.

Finally, during the first part of September, I was working in the reptile and amphibian department of the National Museum, and while looking over the catalogue I chanced to see there an entry of *B. fowleri* with the remark that the note was that of *B. americanus*. My interest aroused by this and also by the fact that they were local specimens, I looked them up and examined them. I soon came to the conclusion that they were not *fowleri* at all, but *americanus*. They were much too large for *fowleri*, and they had large warts arranged singly in spots as in *B. americanus*, instead of the small warts, three to five in a spot as in *B. fowleri*. These toads were catalogue number 59692, and were collected by Mr. Allard at Vinson Station, Va., on May 2, 1916. Mr. Allard was probably misled by the fact that they did not have the deeply spotted breast of most *americanus*, but this is not too reliable a character, as some *B. fowleri* have speckled breasts and some *B. americanus* have, as in this instance, immaculate breasts.

Thus there is no reason to believe that Fowler's toad has two distinct notes, and confidence can still be reposed in the calls of toads and frogs as differentiating characters.

E. R. Dunn

Smith College,
Northampton, Mass.

SCIENTIFIC BOOKS

Morphology of Invertebrate Types. By Alexander Petrunkevitch. The Macmillan Company, New York. 1916.

Under this title Professor Petrunkevitch offers us a laboratory guide for representative invertebrate types and, in addition, material of the sort commonly found in our textbooks. "Each chapter consists of two parts: a monograph in which a description is given of the animal selected as representative of its class and instructions for the students to follow in dissection." The purpose of the former is to give the student an account of the morphology of his type form to which he may refer throughout his dissection and to give the teacher more freedom, since the lectures are thus relieved of much detail. The book is frankly morphological, as its name implies, and the author makes no apology for this; but rather contends in his preface that the student who aspires to the work of experimental zoology is often hampered by "a superficial knowledge of the structure, life and development of those very animals which in his later studies

he is going to use for experiments." The book is written not for the elementary course in invertebrate zoology, which is sometimes offered as a part or the whole of a course in general zoology, but for third and fourth year undergraduates who are presumed to have completed one or more courses in zoology. It is the outcome of a course in which its author attempts to give students, who desire more zoology either from general or professional interest, a foundational knowledge of invertebrate morphology, and very wisely he makes no attempt to overload a large subject with the many other interesting facts by which we often think to re-clothe the dead bones—or in this case perhaps one should say shells—of morphology. The types included are as follows: *Paramœcium, Grantia, Pennaria, Sertularia, Tima, Gonionemus, Aurelia, Metridium, Dendrocœlum, Dicrocœlium, Tœnia, Ascaris, Lumbricus, Nereis, Hirudo, Daphnia, Homarus, Schistocerca, Agelena, Asterias, Ophiopholis, Pentacrinus, Arbacia, Thyone, Venus, Limax, Loligo* and *Molgula.* This list is comprehensive and probably represents as much work as can be accomplished in the time allotted to a course of this nature. Other forms are promised, if the sales warrant a subsequent edition. From the morphological standpoint, this list is excellent and the reviewer would only suggest that the addition of another Gastropod, preferably *Helix,* of notes on the fresh-water mussel and of something further upon the Entomostraca would be of value. The presence of the fluke *Dicrocœlium lanceatum* in the list is an innovation which will doubtless be welcome to American zoologists, since it is so highly recommended; though the reviewer has found a fluke from the frog's lung, which he identifies as of the genus *Hœmatolœchus,* extremely satisfactory when properly fixed and stained. The very complete account of the spider *Agelena nœvia* is a valuable addition, as the arachnids have often received scant attention, and reflects the author's familiarity with this class of invertebrates. In a paragraph entitled "Material," which appears at the beginning of each chapter, there is given a brief statement of the specimens and preparations needed for the work outlined and of the author's methods of technique. This information is valuable and in a number of instances, such as the use of a leaf in the killing of *Dendrocœlum lacteum* mentioned on page 55 and the method of preparing *Tœnia,* page 72, the reviewer notes methods with which his experience in invertebrate zoology has not made him familiar.

The distinctive feature of the volume is the elimination of explanations and interrogations from the *Instructions* and the inclusion of all such matter in the *Descriptive Part* which is a morphological monograph of the form under discussion. The "instructions" are reduced to such a degree that those for the simpler forms and the sections of those for more complex forms covering any one day's work might almost be written out in full on a blackboard of moderate size. There is no attempt to put the student through his paces or teach the method of induction through the medium of the laboratory instructions. Such brief directions demand rather more of the instructor, but the plan is a good one with students of the class for whom the book has been written, as the reviewer knows from having once or twice tried a similar scheme in his own classes. In looking through these instructions one gains an impression that there are some drawings suggested which are too difficult for any one without pronounced artistic ability, as, for example, the figure of the mouth parts of the lobster mentioned on page 137, and there is perhaps a tendency toward more isolated figures and fewer larger and more comprehensive ones. This statement, however, represents an impression which might not be justified after the actual use of the book in the laboratory. As a matter for special commendation, the author of this review notes the procedure outlined for the dissection of *Molgula,* which can be recommended since it is essentially like a method which has been developed in my own laboratory after some disappointment at the failure of students to master what seemed an easy matter.

The figures are few in number, but in the main good. Those of the Nematode on pages

80 and 82 and the longitudinal section of the lobster on page 129 are obscure and need to be redrawn with a view to clearness and perspective. The old Parker & Haswell figure of Anodonta which appears on page 209 has been through the mill of text-books in the past twenty years and looks it. By comparison with its appearance in the original edition of the work from which it was taken it presents a sorry spectacle and it is time such a plate went to the scrap-heap. In Figs. 28 and 31, the explanations are written at the ends of label lines and not below with reference letters or abbreviations on the figures. Without criticism of the present work, we may ask why this practise is not more common. The time required for reference is distinctly less and the eye work not so much of an effort in the examination of a figure so labeled. The great majority of the figures in this volume might have been labeled by writing the words in full at the ends of the label lines, and when we come to recognize the importance of every little saving in eye strain this is one of the reforms which will be effected.

It is stated in the preface that "the student is expected to read the descriptive part at home, the day before" and thus to prepare himself for the laboratory exercise. The reviewer objects to this on pedagogical grounds because in his experience one of the least profitable things a student can do is to read accounts of things he has not yet seen when it is possible for him to see them first and particularly when he is to see them next day. Although quite familiar with most of the forms included in this volume, the reader will find it something of an effort to picture to himself the morphology of the animal in question, and what must it be to the student who has never seen the inside of a starfish or a squid. Can he really do otherwise than create at some labor a mental picture which he will find incorrect the next day and which might have been simply and correctly formed if such a morphological account had followed rather than preceded his study of a given form. The experience of one of my old teachers, who once remarked that for twenty years he had tried to understand *Nautilus* from accounts in published papers and always thought of it as a form with structures most difficult to understand, comes to mind. At last by chance he obtained a specimen which he was able to dissect for himself, and then he wondered at its simplicity and thought how few difficulties the animal would present to one beginning with the actual specimen. In a work like the present volume, the individual instructor is left free to use the monographic parts in any relation to the laboratory work he may choose and the writer believes that, as a matter of economy and efficiency in learning, the student should use these accounts at the same time or subsequent to the laboratory study, for it is very difficult to understand such matters in advance where the figures are so few. The only difficulty in the way of such use of the present volume is the brevity of the instructions, which are, of course, written with reference to the monographic accounts; but there should be no difficulty in the student's using the two together as he works in the laboratory, since both are in one volume. We should not object to reading in the laboratory save that it can also be done elsewhere, and it would be a fortunate thing if we could make the laboratory more a place of quiet study both of animals and of books than one for an altogether mechanical process of dissection and drawing. My suggestion for the efficient use of such a book would be that the student read the monographic parts as he needs them in the laboratory and again with great thoroughness in reviewing his work and when his completed drawings may serve as illustrations; though for my own purposes I prefer a less complete separation of "instructions" and "explanations."

Other points which had been jotted down in reading for this review appear now of such a minor nature that to mention them might seem like petty criticism. The book is well done, clear, concise and to the point and shows a mastery of invertebrate morphology which may be envied. It is not a work which gives the impression of having been carelessly put together. Whatever criticisms one may have, it should be remembered that it is for the

use of older students who will have their own ways of working, and the very brevity of the laboratory instructions allows greater latitude for both student and teacher. The older courses in invertebrate zoology are being crowded in these days when zoology has developed so much of interest, but some of us have always insisted that it is preposterous for a man to go into zoological work without at least as much knowledge of invertebrate morphology as is set forth in this volume and a man should get this as an undergraduate. Students who have other scientific interests or whose interest in zoology has no direct relation to their subsequent work may well elect, after an introductory study, other courses in preference to this; but for the young zoologist such a knowledge of morphology is a foundation stone, and perhaps our author has produced a volume that will be more lasting because it makes no attempt to modernize the invertebrate course, but offers it on an exclusively morphological basis, leaving the other things to the newer courses in ecology and parasitology and field zoology which are already in our midst.

In behalf of the publishers it may be said that the typographical work is up to their usual standard and the surface and quality of the paper ideal for a work of this nature.

WINTERTON C. CURTIS

CAPTAIN WHITE'S RECENT EXPLORATORY WORK IN AUSTRALIA

FOR several years past I have corresponded regularly with that most indefatigable explorer of certain unknown regions in Australia —Captain S. A. White, of Adelaide. Captain White, who is a member of many scientific societies and institutions, resides upon his elegant estate at Fulham, South Australia, and almost every year, in one capacity or another, he becomes connected with expeditions that explore the entirely unknown regions of the far northwest parts of the Australian continent. On these trips he is accompanied by his wife, who cheerfully shares her husband's trials and dangers, and she is more than entitled to her quota of the glory and credit of their common discoveries. No fewer than fourteen of these hazardous trips have been made—some of them lasting many months—the travelers pressing their way into the most remote and unexplored districts of this great island continent. Upon the return of the expedition, Captain White usually publishes their discoveries in some of the scientific journals, such as the *Transactions of the Royal Society of South Australia;* but in addition to these accounts he gets out popular ones in booklet form, and he has kindly presented me with several of these, covering some of the more important expeditions. The last one of these is now before me; and, as its recorded results, discoveries and contributions to science are so remarkable, I am sure that no apology is required for making a brief notice of them here.

This, the fourteenth excursion of the kind, was made during 1914, the start having been made about the middle of June. On this occasion Captain White officially represented the Royal Society of South Australia and the Royal Geographical Society of Australia as the associated naturalist, and he was fully equipped for the most varied duties pertaining to that part of the work. Mr. G. M. Mathews, F.R.S.E., the distinguished ornithologist of Australia, accompanied them, with other noted individuals, the party as a whole being a large one. Baggage and collecting material of all kinds was packed on camels, sixteen of these valuable animals forming a part of the expedition, which, for this particular year, was known as the "Geological Survey Expedition." It started at the terminus of the railroad on June 17, 1914, at a place called Oodnadatta, with all hands well and everything in fine shape. After reaching the Alberga River, it followed this stream more or less closely for a long distance, and then made direct for the Everard range of mountains, where considerable collecting and survey work was accomplished. Skirting the foothills, it returned to Moorilyanno N. Well, and took a side route to examine Indulkana Spur and neighboring territory. The route then led to the Musgrave ranges far beyond, the expedition being subjected to terrible hardships on