garia sp.), and tomato (*Lycopersicum esculentum* Mill. var. *vulgare* Bailey).

An unidentified species of a very minute, white mite occurring on ivy and China asters (*Callistephus chinensis* Nees) and a begonia mite (probably *Avrosia translucens* Nietner) were also successfully controlled by a single application of 2 per cent. solution of phthalic glyceryl alkyd resin.

Since these experiments for the control of red spiders were performed also in commercial greenhouses and in the field, it seems highly probable that this chemical may find a wide application. Additional advantages which it possesses include no disagreeable odor, lack of spray residue on the leaves, its high degree of spreading capacity and only one application is necessary for killing the adults and the ova.

P. A. ARK
C. M. TOMPKINS
UNIVERSITY OF CALIFORNIA, BERKELEY

A BIRD LIST

IN SCIENCE, for July 18, you refer to a bird list, made by Roger Peterson and myself (not my brother, Dr. Frederick H.) at the Fairchild Connecticut Gardens, on May 18, as a "bird census."

To my mind, it was in no sense a census, but simply a more or less superficial list of the species of birds noted during the course of a morning's walk through the area. The word "census" has been widely misused in this way in the past, and it would seem highly desirable to arrive at some general agreement as to what constitutes a "bird census."

If we adhere strictly to the dictionary definition of the word "census," a true bird census of a 127½-acre tract, swarming with migrants on the move, in addition to the resident species, would be almost impossible to take on a May morning. In view of the increasing need in ecological work for real censuses of the numbers and kinds of wild animals occurring on sample areas—it would seem wise to call any record, which does not represent a conscientious effort to record every single individual bird in the area at the time, a "bird count" or "bird list."

RICHARD H. POUGH

SCIENTIFIC BOOKS

ZOOLOGY

A Text Book of Zoology. By the late T. JEFFERY PARKER, D.Sc., F.R.S., and the late WILLIAM A. HASWELL, M.A., D.Sc., F.R.S. Sixth Edition, in two volumes, Volume II revised by C. Forster-Cooper, M.A., Sc.D., F.R.S. xxiii + 758 pp.; 1–656 figs. 8vo. London: Macmillan and Co., Limited.

THIS famous text-book of zoology was originally a descriptive reference work of monumental character; it stemmed from the heroic period of T. H. Huxley, W. K. Parker and W. H. Flower but was not completed and published until 1898. Although both the volumes emphasized the factual side of development and morphology, the first volume, on the invertebrates, contained far more and better treatment of major phylogenetic problems than the second, which was for the most part merely an orderly record of bare facts with a minimum of inference. But these facts were so conveniently set forth that the rising demand has kept the work going through six editions.

In the first five editions some new details were added, but few radical changes were made and there was scant notice of the huge expansion of knowledge that had meanwhile taken place in the fields of vertebrate paleontology and general morphology. At last, however, the time came when it was realized that Parker and Haswell, Volume II, was in great need of modernization, and this formidable undertaking was then fortunately entrusted to C. Forster-Cooper, M.A., Sc.D., F.R.S., late director of the University Museum of Zoology at Cambridge and for some years director of the British Museum (Natural History).

The theme of the volume is the "Phylum Chordata," treated strictly from a taxonomic-anatomical viewpoint. In order to compress this enormous subject into practicable limits, the reviser has ignored many such significant techniques as the mathematical treatment of growth and form and the illimitable fields of genetics, physiology and the like; albeit that in many universities these are considered to be the central themes of modern zoology. But these subjects are already well represented by excellent contemporary text-books; whereas Parker and Haswell, Volume II, while still without a peer in its own territory, was getting to be so far behind the times that it might have been abandoned entirely in favor of a wholly new work. Thanks to the reviser and his collaborators, however, the old book has now been thoroughly rejuvenated or, more accurately, revised and enlarged. In its handsome new format we might even liken it to some stately building to which new extensions have been added but in such a way as to increase the usefulness of the parts and enhance the general effect of the whole.

The old text aimed to describe accurately the resemblances and differences between the innumerable products of vertebrate evolution; it but rarely referred to the changes in anatomical structure whereby one type has been transformed into another. The result

was a static picture of vast scope and intricacy, catalogued systematically and described with the aid of a countless multitude of technical terms. As clues to this labyrinth there were and are an excellent classification of the chordates in the table of contents and a most full and useful index, the latter now filling fifty-seven pages of three columns each. But though these and similar features still make the book invaluable as a reference work, they must at the same time have contributed to the sense of continued frustration, especially to those students who persisted in asking such questions as: "By what steps did this particular anatomical complex attain its present state?" or, "Through what successive grades and branches did this animal evolve?"

The best of the additions to the old text are those in which the reviser and his nearer colleagues and friends have themselves made major contributions: especially in the sections dealing with the paleozoic ostracoderms, placoderms and fishes, the earlier amphibians, the origin and adaptive branching of the main divisions of the reptiles, the rise of the mammal-like reptiles and the diverse evolution of the ungulate mammals. These were all very inadequately treated in earlier editions but are now concisely set forth with the aid of many new figures, diagrams and charts; all of which fairly shine forth from the ample pages. In the newer parts of the work the reviser aims to outline the history of each major group in so far as it can be reliably reconstructed from paleontologic evidence and to indicate its probable relationships with other larger groups. This is most admirably done for the perissodactyls and some other groups of ungulates among the mammals and in varying degrees for other vertebrates.

From a work that already gives so much it may seem unreasonable to ask for more; but we hope that in the next edition the reviser may preface the general chapter on chordate morphology with a critical review of the principal theories of the origin of the vertebrates. It may then be noted that theories involving the transposition of the primary invertebrate nerve cord from the functionally ventral to the functionally dorsal surface are based on similar but apparently convergent adaptations to forward locomotion in bilateral animals of widely different phyla, as between *Limulus* of the Arthropoda and *Cephalaspis* of the Vertebrata. And it seems further that the factual material might have gained added significance if it had been suggested that the typical piscine chordate is essentially a swift-moving predaceous fish, which is already far advanced beyond the stage of the earliest known chordates. These were the Ordovician, Silurian and Devonian ostracoderms, which were relatively slow-moving, partly bottom-feeding forms, whose head and thorax were covered with a stiff dermal armor somewhat like dentine. Although these are well described and figured in the present work, it might have been noted that the studies of Stensiö, Heintz and Kiaer have led them to infer that the more or less continuous thoracic armor later broke down into the more flexible armor of such relatively swift-moving forms as the anaspids.

The present edition adopts the conservative view that the ostracoderms as a whole were an early side branch of the vertebrate stock, ancestral to the existing lampreys and hagfishes but definitely not ancestral to the true jaw-bearing or gnathostome branch of the vertebrates. While this may well be true of almost any given ostracoderm, it seems to the present reviewer far more likely that the general characters of the ostracoderms are truly primitive and that the jaw-bearing vertebrates in adopting predatory habits arose by greatly enlarging the branchial pouches, which are already present in the ostracoderms, and by emancipating the gill bars from the chondrocranium and modifying the anterior ones into jaws, according to the stages recently suggested by Romer (1937). And in like manner, the placoderm stock, although giving rise to many side branches, seems in its basal characters to be structurally intermediate between the officially "jawless" ostracoderms and the typical gnathostomes.

In general the reviser seems to follow the current practice of assuming that the possession of any conspicuous specialization, such as the slightly movable joint across the skull roof of the Devonian rhipidistian fishes, debars its possessor from being ancestral to later forms which do not have this specialization. The reviewer, however, has seen many such cases in which it seems that earlier specializations become overshadowed by later ones and fade out of the hereditary pattern. However this may eventually prove to be, it seems safe to predict that in the publication of the sixth edition the second volume of Parker and Haswell enters upon a new and far wider career of popularity among advanced students and teachers of vertebrate zoology.

WILLIAM K. GREGORY
THE AMERICAN MUSEUM OF NATURAL HISTORY

SYMBOLIC LOGIC

Introduction to Logic (and to the methodology of deductive sciences). By ALFRED TARSKI. Enlarged and Revised Edition. New York: Oxford University Press. 1941. $2.75.

THE last thirty years have witnessed a rapid and intense development of the symbolic study of logic and of its profound applications in mathematics, in