chemical work in reference to their stability reappear in the text practically verbatim as they were developed by him in his own notebooks. The method of experimentation on vitamine stability as published in this paper was the outgrowth of methods previously employed by Professor Steenbock in experiments with pigeons. He should at least have appeared as a joint author of this article.

Inasmuch as the records of rat feeding, although they were part of a continuing project of the experiment station, were removed in toto from the campus with the change in staff and consequently no longer available, it had not been possible for Professor Steenbock to correlate this material for publication.

E. B. HART
Chairman of the Department of Agricultural Chemistry, University of Wisconsin

SCIENTIFIC BOOKS

Outlines of Comparative Anatomy of Vertebrates. By J. S. KINGSLEY, Professor of Zoology in the University of Illinois. Philadelphia, P. Blakiston's Sons & Co. Second Edition, Revised. 1917. Pp. 449.

A well-known teacher of comparative anatomy has characterized Professor Kingsley's "Outlines of Comparative Anatomy of Vertebrates" as "the best text-book of comparative anatomy in the English language." The rapid exhaustion of the first edition and the appearance of the second suggests that many other teachers share his opinion. The second edition is enlarged by the addition of fifty pages of reading matter and contains sixty more text-figures than the first edition, while the fundamental plan of the book remains unchanged. A list of Greek and Latin roots has been added to help the student to understand the meanings of the anatomical and embryological terms used.

From extended experience as a teacher of comparative anatomy Professor Kingsley has learned that a plain diet of anatomy is unacceptable to the average college undergraduate. "Boning" and "grinding" are college synonyms and the undergraduate does neither gladly. Anatomy therefore in the Kingsley text is made more palatable by the addition of enough physiology to give it flavor—and "meaning" in terms of function. Furthermore, an embryological approach to the study of each organ system is calculated to give a clearer conception of the fundamental relationships of the system within the organism as a whole. The text is well written with these pedagogical ends in view.

College students, however, are interested in comparative anatomy chiefly because of the bearing of the facts upon the theory of evolution in general and upon the history of the human body in particular. The text fails in general to utilize this interest. Were the bearing of the evidence upon the important problem of human phylogenesis more frequently pointed out and were much material devoid of such human interest omitted, the text would undoubtedly lose somewhat as a reference book in comparative anatomy, but it would make a much stronger appeal to undergraduates.

In its lucid and accurate descriptions and careful classification of materials the book serves as an admirable example of the scientific method. Its generalizations and interpretations, moreover, are cautious and based upon exceptional familiarity with animal structure and acquaintance with the extensive literature of comparative anatomy and embryology. The spirit of the book is open-minded and undogmatic. Errors of statement in the second edition are relative few. The statement (p. 132) that "the somatic wall of the myotome does not participate in muscle formation" needs qualification, since it is not true of all vertebrates. The retractor bulbi muscle (p. 134) is a derivative of the third and not of the first head cavity (Johnson, '13; Miss Fraser, '14). The electric organ of *Astroscopus* (p. 142) comes from the superior oblique muscle as well as from the muscles innervated by the oculomotorius. The "limiting sulcus" (sulcus of Monro) is not a characteristic feature of vertebrate embryos in general, as might be inferred from the descrip-

tion on page 148. It should not be forgotten that the nervous character of the so-called thalamic nerve (mentioned on p. 184) has never been demonstrated, nor is it so certain that "the eye grows out from the dorsal zone of the forebrain" since that depends upon what is taken to be the morphological anterior end of the brain.

Is the conclusion (p. 191) justified that "since the vagus is a cranial nerve, its distribution to heart, stomach and lungs, shows that these structures belong to the head"? Possibly they do, but by the same token so does the tail belong to the head since this also is innervated by a branch (N. lateralis) of the vagus. In the light of what we now know regarding nerve histogenesis is it not time that the dogma of a primary, unalterable connection between nerve and its terminal organ were abandoned? Fats are spoken of (p. 220) as "hydrocarbons," although the term is used by organic chemists only in reference to oxygen-free carbon compounds. Considering the scope of the book, however, such exceptional errors are not surprising. In a field where the possibilities of divergent opinion are so many it is remarkable that the book contains so few statements to which exception may be taken.

Numerous illustrations, mostly from original sources, constitute one of the most distinctive features of the book. The unusual skill of the author as an artist is shown especially in the admirable stereograms scattered through the book, which in this respect makes another real contribution to the pedagogy of comparative anatomy. The outline drawings, however, are not always easily analyzed by the eye and might be improved by more contrast. The addition of a diagram to illustrate some of the more important fiber tracts of the vertebrate (Mammalian?) brain would aid the description on page 153. A few errors of labelling persist in the second edition. The numbers of the first and second head cavities are interchanged in Fig. 270. In Fig. 336 the right and left post-cardinals are incorrectly labelled as "post-cavæ." In Fig. 378 the two oviducts are shown as uniting in a "urinary bladder." Some typographical errors there are of course. The book as a whole however, is one in which American morphologists may take just pride as an admirable piece of work by an American zoologist of distinction aided by an American publisher of high ideals of typographic workmanship.

Herbert V. Neal
Tufts College, Mass.

A Year of Costa Rican Natural History. By Amelia S. Calvert and Philip P. Calvert.

The chief object in the visit of these two entomologists to Costa Rica was a study of the dragonflies with special reference to their life-histories and seasonal distribution. However, in the preface, we are told: "Our investigations have not yet been completed and we have little to say in these pages on that technical subject. What we here set forth are chiefly our more incidental observations recorded in our diary." The first point made by the authors is in regard to the changes which will be induced by the Panama Canal. We are given no hint of the factors productive of such changes or of their nature or extent. But in view of the expectations of such transformations, it is a pity that a delay of about eight years has intervened between the expedition and this publication of the general résumé of its results.

The authors have shown wisdom in rewriting their notes and doing away with any diary form. They have grouped their observations geographically and when several separate visits were made to any one place, these are grouped in a single chapter. As the five hundred pages of text deal chiefly with disconnected, casual notes, with annotated facts and identifications, it is impossible to offer anything like a detailed criticism. The excellent index places this information in a form readily available for reference. The volume is filled with interesting matter and adumbrates what must be the all-important scientific work of the future—the direct correlation of field work with that of the laboratory and museum. As we might expect, the chief interest was insects, although plants form a close second in