

ment the photographs and drawings (based on one abdominal and one caudal centrum) which form the bases for the diagnostic vignettes.

I have tested out the identification scheme proposed in the book against identified skeletons and with material from an Anglo-Saxon midden. The results were varied, and showed up several flaws, particularly in presentation. For example, no scale is given for any figure (except the radiographs); many of the photographs are so lacking in contrast as to be useless, and the corresponding drawing is often too simplified to be critical. Where the drawings are naturalistic, no account seems to have been taken of individual or ontogenetic variation; indeed, nowhere is there any record of the number of individuals on which the diagnoses were based. Lack of contrast, the small size, and poor quality reproduction greatly reduce the value of the radiographs which, in fact, could be the most useful of all the figures.

In spite of these criticisms, I believe that the system developed by Desse and du Buit could be of great value, especially if in future publications the quality of the photographic reproduction is improved, or the photographs be replaced by good half-tone drawings. For the moment, the worker faced with the need to identify centra will still rely heavily on comparative specimens.

P. H. GREENWOOD

## MARINE BIOLOGY

### Marine Biology

An Introduction to its Problems and Results. By Hermann Friedrich. Translated from the German by Gwynne Vevers. (Biology Series.) Pp. xii + 474. (Sidgwick and Jackson: London, January 1970.) 70s boards; 25s paper.

To the modern student of marine biology the sea is presented as a dynamic system, emphasis being given to the interactions between the atmosphere, the oceans and the continental margins which influence the vast production cycles on which its economy is based. This demands a constant awareness of the physical and chemical conditions within the environment, in so far as they affect the biological systems in which the student is interested. This information must be gathered from a wide variety of sources, many written outside a biological context, and in drawing these together in a book, Dr Friedrich has performed a valuable service.

Principally an ecologist, the author gives a short historical introduction dealing with the great expeditions, collecting gear and the major ecological divisions of the sea. This is followed by widely ranging chapters on the adaptations of the plant and animal communities of the pelagic and benthic environments to the physical conditions they experience.

Although he claims the book is written for the non-specialist, it is obviously aimed at the advanced student of marine biology, and the twenty pages of references emphasize the thoroughness with which the author has documented his material. It is particularly useful as a guide to the European literature which might otherwise be neglected through language difficulties.

It is perhaps inevitable that in attempting to cover so wide a field the author's responsibility for independent critical appraisal is sometimes overlooked and the text becomes a mere compendium. For example, Tucker's theories on eel migration are acknowledged but not described, and (p. 166) a remarkable suggestion that the deep-water fish *Opisthoproctus* drifts upside down with its tubular eyes gazing into the depths is accepted without question. My students found the section on temperature/salinity relationships of water masses in relation to animal distribution so brief as to be incomprehensible without consulting the original authors.

Dr Vevers has provided a clear and fluent translation,

and the text is well illustrated with 206 figures and 56 tables (including one which has to be inverted to read it). In spite of these shortcomings, the value of the book lies in the presentation of material previously available only as original papers, and at this price the paperback edition represents a real bargain.

DEREK DORSETT

## VERTEBRATE BRAINS

Neurobiology of Cerebellar Evolution and Development Edited by R. Llinás. (Proceedings of the First International Symposium of the Institute for Biomedical Research: AMA Education Research Foundation.) Pp. x + 931. (American Medical Association: Chicago, 1969.) n.p.

This large, well produced book is a record of a symposium held only a little more than a year ago. With so much material, some attempt to organize the contributions into a logical pattern was clearly desirable, and this has been carried out partly by grouping the contributions according to phylogeny—one section dealing with fish, one with amphibia and reptiles, and another with mammals. A separate section is devoted to ontogeny, and two papers are included under the heading "Vestibulo-acoustic Input".

The book opens with an introduction, of laudable intention, comprising chapters on vertebrate history (Romer), comparative cerebellar morphology (Elizabeth Crosby) and on the comparative anatomy and physiology of the cerebellar cortex (Llinás and Hillman), and ends with a review by Jansen. The general standard of contribution is high, and one would have no reservations about recommending the volume as a collection of individual papers. Does it not, however, purport to be something more?

That the fashionable word "neurobiology" appears in both title and preface suggests this, and the inclusion of the chapters by Romer, Crosby and Jansen confirms it. There is, also, the opening of the introductory chapter by Llinás and Hillman: "Since this symposium is dedicated to the study of phylogenetic development of the cerebellum . . ." (p. 43). Such may have been the intention but, inhibited perhaps by the warnings of both Romer and Crosby on the difficulties of extrapolating "lines" of evolution from the data of comparative studies, the participants have in fact produced a series of excellent papers on various aspects of the comparative structure and function of the cerebellum. The contributions that do attempt some generalization or synthesis in the direction of this "dedication" do so from limited viewpoints. Thus Llinás and Hillman conclude that the evolution of the cerebellar cortex becomes readily comprehensible if one contrasts the development of the climbing and mossy fibre systems in relation to the control of Purkinje cells. No attempt is made to correlate such changes with other changes in the organization of the cerebellar system, or alterations in the locomotion of evolving animals. One might object that too little is known to enable us to do this, but that itself is worth demonstrating in this context.

This deficiency is significant enough to highlight the compartmental nature of the text, and brings into question the reason for publishing the proceedings of symposia in this form. From a perusal of the titles and declared intentions of many group meetings of this general kind, one might be forgiven for supposing the point of publishing the contributions as collections to be an attempt to distribute to a wider audience some measure of a synthesis or "state of knowledge" of the topic. Even if one assumes that the participants were able to reach such an enviable state of assimilation, this is rarely, if ever, communicated by the published volume. The present book is no exception, but it must again be stressed that this is no reflexion on the papers read as individual contributions.

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