

deal primarily with Amphibia (H. Tiedemann on induction and cell interaction in embryonic development, and G. M. Maniatis and V. M. Ingram on "foetal" haemoglobins).

Photographs and curricula vitae of the speakers are included, but no subject index. Misprints make some of the tables and figures hard to understand for anyone not familiar with the work. On the other hand, the editing of the discussions has been well done, with only the occasional "Well . . ." or reply to a non-existent comment.

ANNE MCLAREN

## Geology on the Move

*The Great Ocean Business.* By Brenda Horsfield and Peter Bennet Stone. Pp. 360+27 photographs. (Hodder and Stoughton: London, January 1972.) £3.50.

THE only really unsatisfactory feature of this book is the rather uninformative and jingoistic title, although it is exceeded in this respect by some of the chapter headings which include "All Change!", "The US Conjuring Trick" and "Where Is Everybody?". These contrast with the book itself which in general avoids journalese and is well written and painstakingly researched. Its fundamental thesis is that oceanography is the new "Big Science", following in the footsteps of atomic physics and space research; or rather that it would be were it not for the general economic recession in the Western world which is affecting not only the amount of money that governments are prepared to spend on scientific research but also the extent to which commerce is prepared to gamble capital investment on new and untried technologies. It makes the case therefore that oceanography as a science has blossomed within the past decade, with spectacular successes in certain areas, and is on the threshold of large-scale expansion, despite financial stringencies, because of its relevance to environmental problems, resources and defence.

A word of warning, however: three-quarters of the book concerns marine geology and marine geophysics and two-thirds of this is devoted to the evolution of the ocean basins in terms of seafloor spreading and continental drift. The justification for this is that it is in this area that oceanography has made greatest strides within the past ten years. Thus physical and chemical oceanography and marine biology get rather lean treatment although the last three chapters, which deal with these subjects, make fascinating reading, concentrating as they do on applied aspects such as fisheries

research, tidal and wave prediction, and pollution in relation to the general circulation and to marine life.

The first four chapters contain an excellent summary of geological thinking and oceanographic exploration before 1960, primarily in relation to the large-scale structural features of the Earth's surface and the ocean floor. The next four chapters relate the development and confirmation of the geological concepts of seafloor spreading and plate tectonics during the 1960s. The treatment is therefore historical and in terms of the individual scientists who had the ideas and made the crucial observations. This story, of the so-called "revolution in the earth sciences", has recently captured the imagination of other popularizers of science and several accounts are imminent; one can only hope that they emulate the accuracy and attention to detail of this one. The geological profession is indeed fortunate and has been well served by the authors of this particularly well-informed account. The only obvious lapse from objectivity is, perhaps inevitably, in chapter 7, where the senior author describes her own contribution to the subject.

The remaining chapters of the book concern more mundane and applied aspects of oceanography—defence related research, the development of manned submersibles as a new and expedient outlet for the US aerospace industry, the various national efforts, and the rapidly expanding field of undersea technology related at present to drilling, primarily for oil and natural gas, and in the future to the mining of manganese nodules and the deep-sea brine sinks.

In some ways the book is two books in one. The first half, describing the revolution in geology within the past ten years, is in many respects an entity in itself; the second half makes the case for oceanography as the new Big Science and the new Big Business: the last frontier on this planet to be explored and exploited. I can heartily recommend it to laymen, students and professionals alike for its readability, veracity and topicality.

F. J. VINE

## Invertebrate Compendium

*The Invertebrate Panorama.* By J. E. Smith, J. D. Carthy, Garth Chapman, R. B. Clark and David Nichols. Pp. x+406+28 plates. (Weidenfeld and Nicolson, November 1971.) £7.25.

THIS is a book ideal to read in the summer between taking A levels and going to a university to study for a degree in zoology. Five well known zoologists have collaborated closely in

its construction. Considering the difficulties of putting such a book together it is remarkably successful. I suppose the decision to make a compendium dictated the pattern of the contents, for I imagine that no single author would have done it quite like this. It is easy to criticize the book as attempting too wide a field. The wide view should clearly be taken in such a book, yet many hands are required to take it because of the very diversity of the subject, and herein lies the dilemma. Taken as initial reading for university students in zoology this is a stimulating book which will lead naturally to those by Barrington and Barnes, and it is to be recommended to libraries of colleges and schools. It is stimulating in giving glimpses of what is known about invertebrates, but being a compendium it is necessarily selective and some other aspects of invertebrate biology which are equally interesting are only touched on or are left out completely. The chapters on the past history and evolution and on the phylogeny of invertebrates come at the end. In a way it might have been more stimulating to have combined these with the initial survey of the "major" and "minor" phyla. Leaving aside the wilfully trendy titles, the division of the phyla into "major" and "minor" as defined here has meaning only with regard to past events and present conditions. Some of the "minor" phyla may have been major in the past, as indeed some were. But if the view of present size is taken as a criterion then I feel a discussion of why their structure or biology allowed them to proliferate into many, or restricted them to few species, should have been discussed in that context. The definition of "major" on the basis of  $10^3$ – $10^5$  living species, and "minor" as those with only  $10$ – $10^2$  species, draws attention to the discrepancy in size between the different groups but the division is uneasy and does not reflect "the major styles or architecture", a description of which forms another chapter. As Dr Smith himself says, "the size of a phylum is of course in no way a measure of its zoological interest". One can only hope that this approach will stimulate rather than confuse. The protists are omitted; and presumably they will form a further complete volume in this series.

The Weidenfeld and Nicolson series is in many ways the successor to the "New Naturalist"—a most successful series published by Collins over more than twenty years—and one must question for whom this present series is intended. Collins's series was clearly intended for the educated layman: all could be read with profit by anyone with school science. This series is directed at a more advanced level, and hence my opening remark.

R. P. DALES