

Preface

This book is an introductory guide to invertebrate evolution for university students and others. It is designed to be read as a whole to interest and orientate students who encounter invertebrates. The book is needed because in our overcrowded biology courses sadly little is taught about invertebrates; again and again in recent years students have asked me 'Is there a little book?' because the current comprehensive invertebrate textbooks are too big and heavy for their requirements.

This second edition is needed because in the last six years there has been a surge of information from molecular methods of tracing phylogeny. Knowledge of genes and genetic control of development has given us exciting new tools for assessing relationships between phyla, and new fossil finds have contributed also. The result is that there is an increased interest in invertebrates. Yet the relationships between animals can mean nothing without some basic knowledge of the animals themselves: an introductory guide to invertebrates is more than ever necessary. Accordingly, this book maintains the structure of the first edition, with a chapter devoted to each phylum to establish how the animals with this particular body plan can make a living and what forms have been able to evolve; with a brief paragraph at the end indicating relationships. The final chapter (20) explains and discusses our present understanding of invertebrate relationships.

Changes within the earlier chapters, apart from some rearrangement and introducing new discoveries, concern separation of groups which have become better understood: in particular Chapter 6 separates acoelomorphs from platyhelminths and Chapter 18 finally separates hemichordates from chordates. A box about the significance of body cavities has been removed as being out of date; there is a new box about deep-sea invertebrates.

As before, the first two chapters of the book explain the process of evolution by natural selection and indicate how the pattern of evolution may be investigated by molecular as well as morphological methods. Each phylum is then considered in turn, since each consists of animals with a common body plan that will offer particular opportunities for evolution and impose particular constraints. After the body plan of each phylum has been defined, the ways of life open to animals so constructed are considered and the resulting diversity is indicated: this book therefore complements books discussing the animals living in a particular environment. Each chapter has a theme, indicated at the beginning of the chapter, relevant to the particular phylum. Boxes within the chapters present general background information about animal physiology, thereby avoiding interruption or repetition. The last two chapters, like the

first two, are more general, discussing first animal development and then the evolutionary relationships revealed by fossils and by molecules. The text is illustrated throughout by specially prepared figures, many of them new for this edition. Many of these are diagrams of generalised examples and therefore have no scales indicated on the figures.

This book aims to discern and communicate overall patterns because the human mind cannot comprehend a scatter of unrelated facts. Classification is kept to a minimum, with just enough subdivision of phyla to provide group names needed for discussion; in general the aim is to use no more terminology than is necessary for communication. Generalisations are made that, on further enquiry, will require qualification, but this does not obviate the need for a framework of generalisations.

The book arises from many years of teaching undergraduates from many colleges (including my own, New Hall) at Cambridge University. It is written in the hope that others will catch and share an enthusiasm for invertebrate animals.