

Preface

This book is a summary of the results of 25 years of work and lecturing. In 1979 I was invited by the State Bureau (now Ministry) of Geology of the Peoples Republic of China to tell staff and students in a number of colleges of my work. These lectures were grouped as a cycle of topics on Late Precambrian stratigraphy and palaeontology. On my return I decided that they could be usefully combined and expanded in the form of this book.

The book is intended for advanced students and for geologists and biologists interested in the early history of the living world and the marine habitat. It is not tailored to specific set courses of lectures given in certain years of specified courses of study; it does not represent transfigured lecture notes. It is meant to stimulate interdisciplinary studies; unavoidably, some parts of it may be too technical for some or too elementary for other readers. I have tried to make myself clear and I have provided or borrowed graphic tables where they may be helpful. A list of published dictionaries and glossaries of technical terms is added to the list of references.

Authors are frequently criticized for what they did not intend to write about. It may be appropriate to state at the outset that this book is neither a review of the literature, nor a comprehensive catalogue of descriptive data which can be found elsewhere; it does not deal with classification, nor with evolutionary, phylogenetic, or other biological theories which are at present too hotly debated to be handled without special care. Except where the context requires it, it does not try to answer criticism of what I have published, nor does it correct erroneous or misleading statements in other literature, simply because I wanted it to be less discursive and to keep it at a reasonable length. I have selected from the recent literature on geology, palaeontology and biology examples that seemed to me helpful in explaining relevant topics, and I have discussed the selected views of

their authors in some detail. Many authors whose works I have read or with whom I have discussed various aspects of my studies are not mentioned, nor are those who have asked after my lectures significant questions that made me think again. Collectively, they all have my gratitude. If some ideas in this book are rightly theirs, I apologize. Some of mine may have drifted through normal scientific discourse into their writings and if this is the case, I am pleased. I have not claimed priority, except in my technical papers, and I have not spent much time investigating questions of who said what first. I am too old to gain or lose from such efforts. I have attempted to be fair and to say clearly and concisely what I think should be more widely known about my subject.

The book tries to describe and analyse, within the limits of my comprehension, the process of the appearance and diversification of animals in the biosphere. It is based on the study of documents of this process: fossils interpreted as functioning organisms of the past. The time frame in which this process took place has to be discussed and understood. Its span is about 1000 million years. The main factual evidence was collected worldwide during the last 25 years. My aim of describing this process, or a part of it, at such an early stage of its documentation is to show that it will be best understood as the result of complex interactions, rather than through *ad hoc* theories explaining parts of it by various unrelated causes acting at various times. It is too early to expect an elegant theory explaining how it all happened, but it is assuredly no longer true that we shall never know the essential steps in the process of major diversification of the animal world because it occurred so long ago.

It should not be thought that reference to close interactions is an easy way of letting other branches of science decide problems of palaeontology and evolution. In an unpublished address I said some 10 years ago: 'The whole story of relations between lithosphere, hydrosphere, atmosphere and biosphere is beginning to make sense now, not as four and not as two stories – inorganic and organic – but as one sequence of complex interactions.' And in J. G. C. Walker's work *Evolution of the atmosphere* (1977) which came to my knowledge after this book was written, he says: 'The goal has been to call attention to the possibility of change in the atmosphere and to illustrate the interrelationships of atmospheric evolution with the evolution of the crust, the oceans, and life'. The insistence on further study of interactions and the possibility of change is not an excuse for present ignorance but a call for future research programmes crossing boundaries of specialized fields.