

Preface

When our planet was only half its current age it was already teeming with life, yet not a single animal swam in its oceans, walked on its land, or flew in its skies. Now, in contrast, there are well over a million known species of animals on Earth. Sometime in between, the very first animal arose from a unicellular ancestor. This animal was probably a tiny marine creature whose body consisted of just a handful of cells. One way of looking at the animal kingdom is as a vast number of lines of descent – or lineages – radiating out through time from that original animal, with each lineage either terminating in an extinction or continuing to evolve today.

Each line of descent has its own story to tell. So the story of the animal kingdom is a composite one, with many subplots being played out in individual lineages. In between a single lineage and our whole kingdom lie the stories of particular animal groups. In this book, I try to tell some of the individual stories, notably the human one, and some of the group stories, for example those of the three biggest groups of animals (the arthropods, the molluscs and the vertebrates). From these accounts, the composite story of the animal kingdom gradually emerges.

Often, biologists distinguish between the *pattern* and the *process* of evolution. The former concerns relationships – the issue of which types of animal are most closely related to which other ones. The latter concerns the mechanisms by which evolution comes about, including Darwinian natural selection. There have been major advances in both areas in the last two or three decades, with the result that our current view of evolution is considerably different from the view that prevailed in the middle of the twentieth century. In terms of patterns of animal relationships, a radical reappraisal of our perception of these began in the 1990s; and our views have been refined ever since through the use of DNA data to build more accurate evolutionary trees. In terms of process, the comparative study of embryonic development using modern techniques has yielded new insights into the way in which evolution works at the level of the individual animal. These insights

complement earlier ones concerning how evolution works at the level of population and species. Ultimately, our theory of evolution must incorporate insights into the key mechanisms operating at both of these levels.

Not only can a story have many facets, but it can be told in many ways, each appropriate for different kinds of reader. This book is intended for anyone with an interest in the animal kingdom, its history, and how it came to be as we find it and not otherwise. All the chapters are short and are written in a conversational, non-technical way. This means, I hope, that the book will appeal to the general reader, as well as to students of zoology and other biological sciences. Also, the structure of the book is designed to ensure variety in the sequence of topics encountered, with chapters about evolutionary pattern interspersed with chapters about process.

The pictures are very much part of the story. All of the illustrations and diagrams herein are original and were commissioned specifically for this book. They are varied in type, including many evolutionary trees and several pictures relating to animal development. However, there are quite a lot of illustrations that are simply pictures of animals. It's important for readers to be able to picture in their minds animals that are not familiar to them. These include animals that are very small (for example, millimetre-long water-bears), animals that are rare (for example, fish called coelacanths), animals that are found in places we are unlikely to visit (for example, the beard-worms that are found in association with thermal vents on the seabed), and animals that are extinct and are not as well known as the dinosaurs (for example, anomalocarids and plesiosaurs). I hope that the combination of original artwork and non-technical language makes for an enjoyable read.