

Preface

It has been said that scientific knowledge is built on the ruins of failed hypotheses. The real work of constructing science, however, is in the careful selection of tractable problems, solving them, and then applying their solutions to other, more difficult problems. Challenging problems cannot be solved without extensive preliminary groundwork. Peter Medawar once said that “science is the art of the soluble,” and an important part of the art of science lies in properly laying the groundwork.

The goal of this book is to introduce the art of the soluble as applied to paleontology. By means of more than a dozen case studies, or critical research topics, I hope to demonstrate how asking the right questions can produce not only correct answers to the original problems but can also provide fresh insight into conundrums that might otherwise remain refractory of solution. I have selected these particular cases because they interact with each other in fruitful ways. Useful interactions between investigations generate synergy that can be used to pry open some of the toughest secrets of the natural world.

A great strength of paleontology is that it can draw from temporal–historical sources of information that are not as frequently utilized in cognate sciences. This gives paleontology a multi-dimensional quality that allows the careful researcher to triangulate research investigations through time, as for example by asking what relationship characteristics of the Proterozoic might have to features of the Mesozoic, and what the Cambrian might tell us about paleobiological events occurring before the Cambrian. Universal, actualistic physical principles can be addressed by paleontology as well, because the stratigraphic record itself provides an answer key with every slab of rock and each fossil. A common slab of limestone with trilobite fossils is the answer to some important paleontological question. Researchers need to know how to ask the right question. A potentially fruitful tutorial for that skill is study of the cases where the *Dynamic Paleontology* approach has been most successful.

Dynamic Paleontology wades into controversy at times. Passions run high on many issues. This is good for the science as it focuses attention on the most critical

topics. The flip side of the coin is that *Dynamic Paleontology* methodology is not foolproof. Paleontology is by its very nature an error-prone process. Making honest mistakes is unmistakably a key part of the process. There is general agreement among paleontologists that unless you make the occasional mistake, such as Simon Conway Morris reconstructing *Hallucigenia* upside down or Louis Agassiz misinterpreting the aetosaur *Stagonolepis* as a fish, then you are not doing your job as a paleontologist. In the self-correcting scientific process, what remains after vigorous scrutiny is pure gold. *Dynamic Paleontology* aspires to accelerate this process, and it is my conviction that we can learn things about the history of life using this approach that cannot be learned in any other way.

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