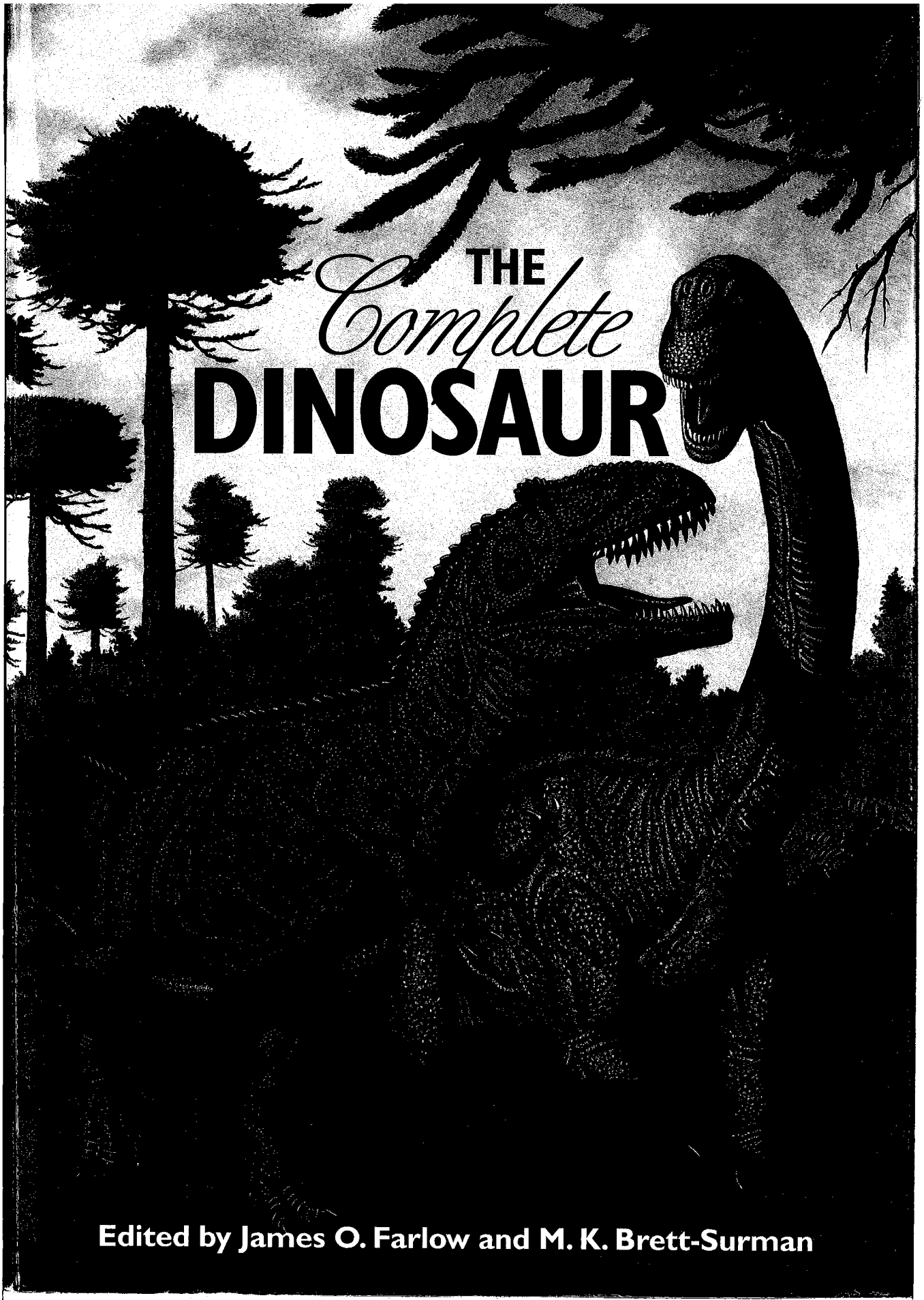

THE *Complete* DINOSAUR

Edited by James O. Farlow and M. K. Brett-Surman

Part Two

The Study of Dinosaurs

Any one of the larger carnivorous dinosaurs would meet the case. Among them are to be found all the most terrible types of animal life that have ever cursed the earth or blessed a museum.

—Sir Arthur Conan Doyle, *The Lost World*

As summarized in the first part of this book, our knowledge of dinosaurs has accumulated through the combined efforts of many people, professionals and amateurs alike, over the last century and a half. We now know a great deal about these "fearfully great" reptiles, and we are learning more all the time.

So *how* do we know what we know? What are the bases for the statements about dinosaur biology and evolution that will be made by one contributor after another in the remaining sections of this book? Those questions are the subject of Part Two, which describes how paleontologists, and the other professionals who assist them, find, study, and interpret dinosaur fossils.

This section begins by explaining how a paleontologist decides where to look for dinosaur bones, and what is done with them once they are found; both traditional and state-of-the-art methods of collecting and preparing dinosaur fossils are summarized.

It would be very nice to have a living *Anatotitan* or *Triceratops* to study in the field or laboratory, but nature hasn't been that kind to us. Most of our information about dinosaurian evolutionary relationships, or about

how the great reptiles functioned as living animals, comes from study of their skeletons. This means that in order to understand how paleontologists interpret dinosaurs, one must have a basic knowledge of the bones of the dinosaur skeleton, and so we devote chapter 7 to a tour of the different bones of a dinosaur's body.

One of the major goals of paleontology is to reconstruct, to the extent that this is possible, the course of evolution. In dinosaur paleontology this involves determining the phylogenetic relationships of the various dinosaur groups to each other, and also to other kinds of animals. How is this done? Chapter 8 explores different approaches to the naming and classifying of organisms, including dinosaurs.

One of the key developments in evolutionary biology over the last generation has been the general acceptance of the principles of phylogenetic systematics (cladistics) in interpreting the evolutionary relationships among different groups of organisms, including dinosaurs. Although a cladistic approach to organizing information about evolutionary patterns is an eminently logical way of doing things, it comes as a shock the first time one encounters it. (Birds *are* dinosaurs? Get out of here. . . .) So our chapter on classification explains how phylogenetic systematics works, and compares its approach to dinosaur classification with a more traditional approach.

To say that dinosaur classification is contentious is like saying that the Atlantic Ocean is a bit damp. The number of different dinosaur classifications operational at any one time can be described by the formula

$$C = (N + A) - 1$$

where C is the number of classifications, A is the number of amateur paleontologists, and N is the number of dinosaur paleontologists. The "–1" represents the true classification, which we shall never know (part of Durham's Law). The stability of any classification can be a double-edged sword. A classification can be stable because we have obtained a close approximation to the actual relationships of the organisms under study. Unfortunately, stability can also reflect consensus due to the lack of an adequate fossil record—or a stagnation of research.

Geologists have constructed a formidable set of terms to describe the intervals of earth history during which dinosaurs and other ancient organisms lived. Readers will not be able to understand how dinosaurs evolved unless they understand the names applied to the various intervals of Mesozoic time. Consequently we include a short chapter to orient the novice in a timely manner.

Although some field and laboratory methods in paleontology have not changed in the last century, new technologies have revolutionized much of the way in which dinosaurs are studied. Chapter 10 describes these new technologies, and the way they are affecting the research methods of paleontologists.

Jurassic Park gripped the imagination of the moviegoing public with the possibility that dinosaurs might be re-created from genetic material in dinosaur blood once imbibed by Mesozoic mosquitoes. Paleontologists are indeed interested in the possibility of recovering dinosaur biomolecules, but there is very little chance that these can be used to populate our zoos with living examples of the fearfully great reptiles. On the other hand, dinosaur biomolecules may well provide us with valuable insights into the relationships of dinosaurs to other animals. It is, in consequence, necessary to include a chapter about the problems and potential of finding and studying such biochemical traces of dinosaurs.

The results of scientific research on dinosaurs are generally published in learned technical journals written by and for scientists. However, the general public has an insatiable interest in dinosaurs, and part of the mission of major natural history museums is to satisfy that curiosity by putting dinosaur fossils, and explanatory material about them, on display. This is not an easy task. Chapter 12 describes all the planning and labor that goes into putting together a successful dinosaur exhibit.

Our most vivid impressions of dinosaurs as living creatures are based on the work of scientific artists. The final chapter of Part Two outlines the thinking and the steps that a paleontological artist goes through in preparing a scientifically accurate drawing or painting of a dinosaur as a living animal.

The physiology of dinosaurs has historically been a controversial subject, particularly their thermoregulation. Recently, many new lines of evidence have been brought to bear on dinosaur physiology generally, including not only metabolic systems and thermoregulation, but on respiratory and cardiovascular systems as well. During the early years of dinosaur paleontology, it was widely considered that they were sluggish, cumbersome, and sprawling cold-blooded lizards. However, with the discovery of much Itâ€™s not just the study of Dinosaurs but of all ancient living things. As to the name: > The term itself originates from Greek Ï€Î±Î»Î±Î¹ÏŒÏ‚, palaios, "old, ancient", á½„Î½, on (gen. ontos), "being, creatu...Â The definition of paleontology is the study of fossils of animals and planets. Dinosaurs fall in this field of study since their remains are all fossilized. Therefore paleontologist have to come in and examine the remains. Ealry humans, planets, animals fossils are studied by paleontologists. 8 views Â· Answer requested by. Anthony Paparo.