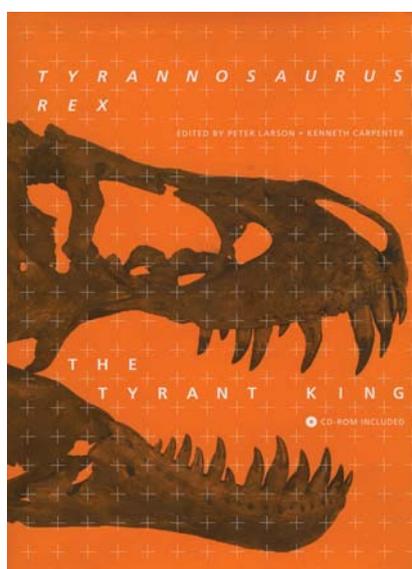




BOOK REVIEWS

Larson, P. & K. Carpenter. Eds. 2008. *Tyrannosaurus rex*, the Tyrant King. - Bloomington, Indiana University Press

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Over a century has elapsed since Henry Fairfield Osborn described the enormous theropod *Tyrannosaurus rex*. Since that time, it has come to represent the archetypal dinosaur, at once horrifying and fascinating. A symposium in 2005 to commemorate the 100th anniversary of its debut convened researchers from around the globe and updated both scientists and the general public on the state of knowledge about the world's favorite dinosaur. The fruit of this symposium is a comprehensive volume that covers various aspects of the anatomy, biology, and history of the magnificent *T. rex*. The book is edited by Peter Larson, founder of the institute responsible for the discovery of the largest collection of *T. rex* fossils, and veteran editor Kenneth Carpenter, who has compiled volumes

of similar scope about armored dinosaurs, dinosaur babies, and long-necked sauropods. Although not explicitly subdivided as such, the chapters seem logically to be organized into historical perspectives (chapters 1–2), stratigraphic and taphonomic descriptions (chapters 3–6), and integrative biological pieces (chapters 7–20). The final chapter provides a smart, historical epilogue that chronicles the rise of *T. rex* in popular culture from an unknown fossil to a Cretaceous celebrity.

The book begins with a very practical chapter summarizing the known specimens of *T. rex*; an essential database that presents details of discovery, locality, description, and reposition of the 45 known skeletons. Unfortunately, the details of completeness suffer from several

inconsistencies, making it frustrating and at times impossible to tell how much material is represented by each specimen. For example, 14 bones are described as 49% of a skeleton, whereas 58 bones represent only 19%. Known specimens of *T. rex* are reported to range from 5% to 80% completeness, but tables show this range as 3% to 73%. Perhaps the potential for this type of error would have been reduced by presenting the information only once, instead of multiple times throughout the chapter.

Several subsequent chapters detail the circumstances of discovery of important individual specimens, and emphasize the role of taphonomy in how, or whether, a fossil will be discovered. Importantly, the maps in these chapters, taken together with the comprehensive map in the first chapter, highlight poorly sampled areas and tacitly recommend the next exploratory steps toward finding more *T. rex* material.

The chapters on functional biology begin with a piece on the comparative histology of theropod bone, wherein Mary Schweitzer and others concisely demonstrate that medullary bone probably existed in nonavian theropods, providing not only a window into paleophysiology, but an unambiguous determinant of sex in *T. rex*, and perhaps other dinosaurs. Sexual dimorphism is then explored by Peter Larson, who argues that robust and gracile morphotypes of *T. rex* represent female and male individuals respectively. Addressing a point of significant current debate, he suggests that *Nanotyrannus* and several indeterminate tyrannosaurid specimens represent species or genera distinct from *T. rex*. This assertion, based on a table of 28 morphological characters in seven taxa, practically begs the reader to code and evaluate the data cladistically.

Other highlights include a detailed yet elegant solution to the perplexing question of why *T. rex* had diminutive forelimbs. Martin Lockley and others draw on heterochrony, morphodynamic compensation, and hox genes to suggest that the processes leading to puny arms and an enormous head may be one and the same. The forelimb is further deconstructed – and reconstructed – in the next chapter. Later chapters present useful soft-tissue reconstructions of the jaw musculature and infer intracranial joint mobility for *T. rex*. In the penultimate chapter, Thomas Holtz, Jr. presents an explicit method-

ology by which he tests, and provisionally refutes, the hypothesis that *T. rex* must have been a scavenger.

Unfortunately, the chapter “Atlas of the skull bones of *Tyrannosaurus rex*” does not live up to its ambitious title. It consists mainly of terse descriptions of disarticulated bones from a single specimen, often focusing on peculiarities of this specimen alone. For example, a single paragraph is devoted to the description of the “relatively complete” braincase, never mentioning the individual bones it comprises, but detailing a healed puncture wound. Also disappointing are the illustrations, which are all contained on the accompanying CD-ROM. It is unclear whether these images are photographs or reconstructions from CT data. Most troubling of all, however, the figures completely lack labels, directional orientation, and scale bars. For the reader unfamiliar with, say, the tyrannosaurid vomer, the images of this bone give no clues as to its size, sutural contacts, or anatomical position within the skull.

As can be (but should not be) expected from a multi-authored volume, there are some inconsistencies in formatting. There is no uniform appearance to the figures, some lack labels and scale bars, and photos are inconsistently credited. In contrast, the accompanying CD-ROM is very well-organized. Unfortunately, however, only three authors made use of the alternative format to present supplementary data. The color images from the histology paper are aesthetically pleasing as well as informative, and are referenced to captions in both the text and electronic versions. They are also labeled and include scale bars. These excellent images should have set the bar for similar color images to accompany nearly every other chapter, but unfortunately, they stand alone. Also of interest on the CD-ROM is an animated presentation of *T. rex* adopting crouching postures and standing back up. The biomechanical constraints governing these movements are addressed in the text and, although the movie plays somewhat too fast, the viewer is treated to a persuasive reconstruction of how a resting *T. rex* may have behaved.

In all, “*Tyrannosaurus rex*, the Tyrant King” is an interesting read. It provides food for thought about a number of controversial topics in dinosaurian biology, and definitive evidence in support of even more hypotheses. For the profes-

sional palaeontologist, it holds abundant data, and will undoubtedly be a frequently cited reference. For students, it may serve as a valuable point of reference for understanding the diversity of palaeontological studies. For the general reader, the book illuminates the complexity of the quintessential carnivorous dinosaur, recasting it as more than just a gargantuan skeleton. From dusty fossils entombed first in rocks, then in museum crates, *T. rex* emerges as a walking, crouching, growing, hurting, healing, living being.

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