

## Hadrosaurs

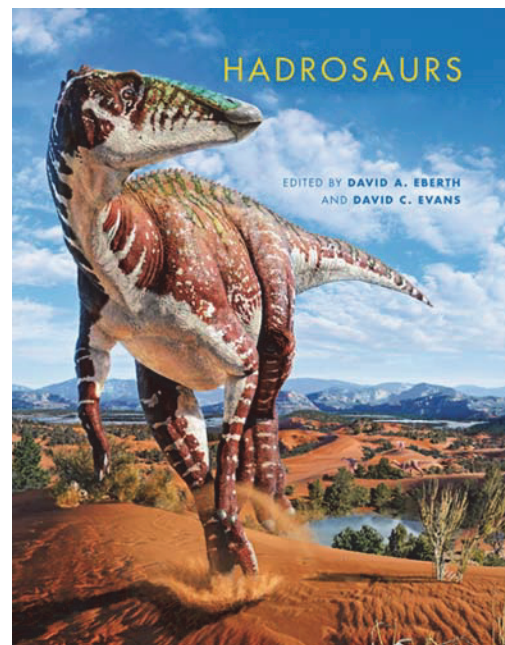
Reviewed by Victoria M. Arbour

David A. Eberth and David C. Evans (eds.), 2014, Indiana University Press. 619 pages, ISBN: 978-0-253-01385-9

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Hadrosaurs may not attract the media attention given to their feathered, carnivorous, highly ornamented, or gigantic dinosaur relatives, but their propensity for dying in convenient locations that lent themselves well to fossilization and later discovery means we have a more complete picture of hadrosaur anatomy, evolution, and paleobiology than for many other dinosaurs. The large sample sizes for many taxa also means that we are able to statistically test paleoecological hypotheses with greater rigour than for most non-avian dinosaurs. Following the highly successful Royal Tyrrell Museum Ceratopsian Symposium in 2007, it was an obvious next step to host a conference on the other major clade of herbivorous dinosaurs from the Late Cretaceous of North America, and so in September 2011 the Royal Tyrrell Museum and Royal Ontario Museum convened the International Hadrosaur Symposium in Drumheller, Alberta, Canada. Like the Ceratopsian Symposium in 2009, presentations from the International Hadrosaur Symposium have now been collected into an edited volume. With thirty-six contributions by a good cross-section of today's active ornithopod-oriented researchers, *Hadrosaurs* represents a substantial collection of data and interpretations for this clade. An interesting survey of the hadrosaur literature opens the book, providing the reader with a perspective on the evolving nature of hadrosaur research over the past 190 years.

Given the Albertan location for the original symposium, it is perhaps not surprising that many



of the papers focus on Canadian hadrosaurs. However, the volume includes a global perspective on hadrosaurs, with excellent review articles about European, South American, and Mexican hadrosaurs, and discussions of Mongolian, Chinese, and Russian taxa. An entire section of the book is devoted to papers investigating the middle Cretaceous hadrosaur record, an important transitional period during which the first hadrosauroids evolved from more basal iguanodonts. A review of the tax-

onomy of Wealden iguanodonts pares recently identified generic diversity back down to just four genera, and a revised phylogeny of iguanodonts helps set the stage for the evolution of hadrosaurs and includes some new clade definitions, most notably Clypeodonta, the "shield teeth". David Evans and David Eberth, the book's editors, opted to let authors follow their preferred taxonomic nomenclature with regards to current discussions over the definitions of Hadrosauridae, Hadrosaurinae, and Saurolophinae. While this could be confusing for a newcomer to hadrosaur studies, I think this approach, rather than choosing one nomenclature for the entire book, will hold up more robustly over time and avoids the potential for the volume having taken an idiosyncratic approach to terminology in retrospect.

Hadrosaur specialists, and dinosaur paleontologists more broadly, will appreciate the wealth of anatomical information contained in this volume. Skin impressions and scale patterns are now known in at least ten species, allowing for a comparison of conserved and unique aspects of scalation across taxa. And because hadrosaurs are some of the most abundant dinosaurs in the fossil record, there is a good record of pathological specimens that provide unique insights into hadrosaur behaviour. There are much needed descriptions of the postcranial anatomy of the iconic and ubiquitous *Edmontosaurus* (a taxon which has not, astonishingly, had a detailed postcranial osteological description previously), the cranial anatomy and postcranial anatomy of the Lower Cretaceous *Equijubus*, and the cranial anatomy of mature *Hypacrosaurus* (most previous discussions centered on the embryonic and subadult skulls known for this taxon). Two new genera make their debut in this volume: *Adelolophus*, from the Wahweap Formation of Utah, and *Plesiohadros*, from the Djadokhta Formation of Mongolia.

Two sections of the book deal with the paleobiology of hadrosaurs and include some interesting new perspectives on hadrosaur locomotion, jaw mechanics, and ontogeny. A computational study on the floating abilities of hadrosaurs versus ceratopsians provides, in addition to some amusing figures, new insight into the taphonomy of these two clades. Another section includes papers examining the taphonomy of hadrosaur occurrences, includ-

ing discussions of hadrosaur bonebeds and the potential role of melanin in hadrosaur skin preservation. Given the large number of ornithomimid track-sites found worldwide, I was surprised to find only one paper on hadrosaur trackways in this volume. Hadrosaur nests and eggs also receive little attention.

*Hadrosaurs* is published in the same large format found in other recent Indiana University Press Life of the Past series publications like *At the Top of the Grand Staircase* and *New Perspectives on Horned Dinosaurs*. The dust jacket includes two wonderful pieces of art by some of today's top paleoartists: the front cover features *Plesiohadros* by Julius Csotonyi, and the back features a pair of *Parasaurolophus* by Danielle Dufault. The title page and section breaks also have great black-and-white reproductions of *Amurosaurus* and *Equijubus* by Lukas Panzarin. Peek under the dust jacket to find the sacrum of *Mantellisaurus* in foil on the spine. Although there are no colour figures in this volume, the reproduction on the greyscale figures is crisp and clear and the quality of figures is high throughout. One drawback to a paper-only book format is that character matrices for the numerous phylogenetic analyses discussed within the book are only available in print, as there are no electronic supplementary materials hosted at the publisher's website; researchers interested in building on these matrices will need to either copy the information from the page into the matrix editor of their choice, or request the digital files from the authors.

So, who should buy *Hadrosaurs*? As an edited volume of technical papers, this book is definitely aimed at professional paleontologists and those who enjoy following the primary literature on dinosaurs, and probably will not find its primary audience in the general public with its relatively high price tag of \$95 USD. Given the high quality of the figures, the detailed osteological descriptions of key taxa, up to date reviews of hadrosaur occurrences around the world, and interesting new ideas about hadrosaur paleobiology, I think this should comfortably find a home on the bookshelf of any dinosaur specialist, or researchers interested in Mesozoic vertebrates or vertebrate evolution more generally.