Journal of Vertebrate Paleontology 28(2):582–583, June 2008

BOOK REVIEW

HORNS AND BEAKS: CERATOPSIAN AND ORNITHOPOD DINOSAURS by Kenneth Carpenter (editor), 2007. Indiana University Press, Bloomington, Indiana, 369 pp. US$49.95. ISBN-10: 0-253-34817-X; ISBN-13: 978-0-253-34817-3

Ornithischian dinosaurs dominated the herbivorous faunas of many late Mesozoic terrestrial ecosystems, particularly those of the Northern Hemisphere. They were morphologically and taxonomically diverse (over 170 valid genera, ranging in mass from less than 1 kg to more than 16,000 kg; Weishampel et al., 2004) and developed sophisticated feeding mechanisms, elaborate and bizarre cranial ornamentation and complex social behaviours. However, substantially less scientific and public attention has been devoted to ornithischians in recent years than to the other major dinosaurian clades (Theropoda and Sauropodomorpha); as a result, the taxonomy, phylogeny and paleobiology of many ornithischian groups remain poorly understood. For these reasons, a book devoted solely to new research on ornithischians should be a welcome arrival. *Horns and Beaks* is edited by Kenneth Carpenter and published by Indiana University Press (IUP), and is in some respects a sister to the earlier *The Armored Dinosaurs* (Carpenter, 2001), a compilation of research devoted to thyreophoran ornithischians. The focus of *Horns and Beaks* is on two major groups not covered by *The Armored Dinosaurs*: Ornithopoda (Chapters 1–10) and Ceratopsia (Chapters 11–15). Between them these groups account for most known ornithischian diversity, and contain clades (Ceratopsidae, Hadrosauridae) that were enormously abundant and successful during the Late Cretaceous.

The bulk of the book is made up of descriptive and taxonomic papers, often with an extremely narrow focus. Ruiz-Omeñaca et al. (Chapter 1) offer a new interpretation of the holotype of *Callovosaurus* from the Oxford Clay (Middle Jurassic) of England, considering it a valid taxon and identifying it as the oldest known dryosaurid. However, the inadequate nature of the available material (a single femur) means that the phylogenetic position of this taxon is difficult to assess and will remain questionable until better material is found. Given their identification, it furthermore seems strange that Ruiz-Omeñaca et al. barely discuss the interesting implications for the origination dates and ghost lineages of several major ornithopod clades. Galton (Chapter 2) provides a review of the dental anatomy of ornithopods and other ornithischians from the Morrison Formation (Late Jurassic); notably he provides the first published figures and brief description of an unnamed probable heterodontosaurid from Fruita, Colorado. Galton also erects the new genus *Othnielosaurus* for material previously assigned to the nomina dubia *Nanosaurus rex* and *Othnielia*. However, it is not clear that the holotype of *Othnielosaurus* possesses either autapomorphies or a unique character combination, and a further review of the small ornithopods from the Morrison is required.

Brill and Carpenter (Chapter 3) discuss one of the key specimens used by Gilmore (1909) in his reconstruction of the skull of the well-known and historically important Morrison Formation ornithopod *Camptosaurus*. They demonstrate that this specimen (YPM 1887) is actually highly likely to have been derived from the Lower Cretaceous Purgatoire Formation, rather than the Morrison, and represents a new genus of iguanodontian (*Theiophytalia kerri*) that is more closely related to *Iguanodon* than to *Camptosaurus*. A new reconstruction of the skull of *Camptosaurus* is also provided, with a much more plesiomorphic, short-snouted appearance. It would be interesting to see how (if at all) this new reconstruction affects the phylogenetic position of *Camptosaurus*, and to determine the phylogenetic position of *Theiophytalia*. Unfortunately Brill and Carpenter choose not to carry out a numerical analysis, considering such an analysis "premature" in the absence of postcranial material for *Theiophytalia*, despite the fact that cranial characters account for more than 50% of the characters utilised in recent phylogenies of Iguanodontia (e.g. Norman, 2004).

Paul (Chapter 4) addresses the historically important taxon *Iguanodon*, a clear example of a taxonomic wastebasket into which many phylogenetically disparate species have been placed (some of these taxa have been recently removed from *Iguanodon*; Norman, 1998; Norman & Barrett, 2002), suggesting that the differences between the English Wealden taxa *Iguanodon bernissartensis* (the type of the genus) and "*Iguanodon*" *atherfieldensis* are sufficient for generic level distinction, thus erecting the new genus *Mantellisaurus* for the latter species. While it is clear from work published by other authors (see Norman, 2004, and references therein) that many morphological features distinguish these two species, Paul does not make the case sufficiently here; the differences between the two are only briefly addressed, and are offered as statements, without supporting evidence from specimen numbers, ratios or references. The key point is whether or not *I. bernissartensis* and "*I.*" *atherfieldensis* form a clade to the exclusion of other iguanodontians: Paul concludes that they do not and that "*I.*" *atherfieldensis* is more closely related to hadrosaurs than to *I. bernissartensis*. However, this conclusion is not supported by an explicit phylogenetic analysis or even by a satisfactory non-numerical discussion of character distribution (ironically, Paul does not cite two recently published numerical phylogenetic analyses [Norman, 2002, 2004] that would support his case). Finally, Paul does not discuss other genera (e.g. *Vectisaurus*, *Heterosaurus*) generally considered to be synonyms of "*I.*" *atherfieldensis* (e.g. Norman, 2004) that would have priority over *Mantellisaurus*. Paul's conclusions ultimately may be proven correct, but they are incompletely and inadequately assessed here; one is left to wonder whether this chapter was properly peer-reviewed.

Gilpin et al. (Chapter 5) describe a new ornithopod taxon, *Cedrorestes crichtoni*, on the basis of a single very incomplete postcranial skeleton from the Yellow Cat Member (Early Cretaceous: Barremian) of the Cedar Mountain Formation, Utah. The dorsal margin of the ilium of *Cedrorestes* has a laterally directed process just posterior to the ischial peduncle, upon which the M. iliofemoralis externus is believed to have inserted; a similar feature is present in many hadrosaurs and is generally referred to as an 'antitrochanter'. Gilpin et al. suggest that the presence of this feature in *Cedrorestes* potentially identifies it as the "oldest basal hadrosaur", which would make it a highly important taxon. However, an 'antitrochanter' is not limited to hadrosaurs amongst ornithopods (Head, 2001): Kirkland (1998) documented an 'antitrochanter' in the Cedar Mountain iguanodontian *Eolambia*, and a more detailed comparison of specimens referred to *Cedrorestes* and *Eolambia* is required.

Prieto-Marquez (Chapter 6) provides a detailed and well-figured account of the postcranial osteology of *Brachylophosaurus canadensis*, demonstrating that considerable postcranial morphological variation may occur within a single hadrosaur species, and emphasising the need for greater consideration of hadrosaur postcrania in taxonomic and phylogenetic analyses. Taking up this baton, Brett-Surman and Wagner (Chapter 8) discuss variation and ontogeny in the appendicular anatomy of North American Late Cretaceous hadrosaurs. Although a useful summary and basis for future work, there is unfortunately no attempt to synthesise the data to determine the implications for the clade's taxonomy and phylogeny, nor is any of this variation investigated using numerical techniques (e.g., morphometrics). Murphy et al. (Chapter 7) provide the first published data on the collection, taphonomy and gut contents of a complete skeleton of *Brachylophosaurus canadensis* (nicknamed "Leonardo") that demonstrates remarkable skin preservation. New material of the neoceratopsian *Leptoceratops* is discussed by Ott (Chapter 11) who demonstrates a broader ecological distribution for this taxon than previously recognised, while Farke (Chapter 12) describes two new specimens of the ceratopsid *Torosaurus*, and is the only author in the book to include a cladistic analysis (albeit based on only seven taxa and ten characters). Lehman (Chapter 13) contributes an entertaining thought experiment, discussing dietary and environmental preferences,