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2. Kemp, S. Global Social Media Users Pass 2 Billion. *News* [Online] **2014**, <http://wearesocial.net/blog/2014/08/global-social-media-users-pass-2-billion/>.

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3. Bert, A. How to use social media for science - 3 views. [Online] **2014**,
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4. Brossard, D. and Scheufele, D. A. Science, New Media, and the Public. *Science* [Online] **2013**, 339, pp 40-41. DOI: 10.1126/science.1232329.
<http://www.sciencemag.org/content/339/6115/40.full>.

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<http://www.the-scientist.com/?articles.view/articleNo/40992/title/Science-Gone-Social/>.

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The screenshot shows the Facebook profile of the Natural History Museum, London. The cover photo depicts a large group of people, mostly children, gathered in a museum hall. The profile picture is the museum's logo, featuring a large 'N' and the text 'NATURAL HISTORY MUSEUM'. The page name is 'Natural History Museum, London', with a subtitle 'Muzeum · Turistická atrakce · Orientační bod'. Navigation tabs include 'Timeline', 'Informace', 'Fotky', 'Události', and 'Další'. On the left sidebar, there are statistics: 'Toto se líbí více lidem (343.399)', 'Byli tady (866.970)', and a 'Ted je zavřeno' (Closed now) status. The main content area shows a post from the museum announcing the 'Wildlife Photographer of the Year' exhibition, with a video player showing a prehistoric scene.

The screenshot shows the Google+ community page for 'Project Paleontology'. The header includes the Google+ logo, a search bar with the text 'Hledejte na Google+', and user avatars. Below the header, there are tabs for 'Komunity' and 'Všechny komunity'. The main content area features a post from 'Project Paleontology' with a large image of a dinosaur skull. The post text reads: 'Online scientific community focusing on dinosaurs and other prehistoric vertebrates...'. Below the image, it says 'Veřejná' (Public) and '212 členů' (212 members). To the right of the post, there is a section titled 'O této komunitě' (About this community) which describes the community's focus on paleontology and lists rules and guidelines. At the bottom, there is a section for 'Všechny příspěvky' (All posts) with a list of topics: 'Discussion (general paleontolo...', 'Paleobiology', 'Phylogenetics', 'Dinosaur anatomy', and 'Personal projects (e.g essays)'. On the far right, there is a section for 'Připnuto moderátorem' (Pinned by moderator) featuring a post by 'Luigi Gaskell' (Vlastník) dated 8. 7. 2015, with the text 'PLEASE READ THIS FIRST BEFORE POSTING'.

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*J. Anat.* (2015)

doi: 10.1111/joa.12378

Best practices for digitally constructing endocranial casts: examples from birds and their dinosaurian relatives

Amy M. Balanoff,^{1*} G. S. Bever,^{2*} Matthew W. Colbert,³ Julia A. Clarke,³ Daniel J. Field,⁴ Paul M. Gignac,⁵ Daniel T. Ksepka,⁶ Ryan C. Ridgely,⁷ N. Adam Smith,⁸ Christopher R. Torres,⁹ Stig Walsh¹⁰ and Lawrence M. Witmer⁷

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Abstract

The rapidly expanding interest in, and availability of, digital tomography data to visualize casts of the vertebrate endocranial cavity housing the brain (endocasts) presents new opportunities and challenges to the field of comparative neuroanatomy. The opportunities are many, ranging from the relatively rapid acquisition of data to the unprecedented ability to integrate critically important fossil taxa. The challenges consist of navigating the

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Journal of Systematic Palaeontology, 2014
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A new saurolophine hadrosaurid (Dinosauria: Ornithopoda) from the Campanian of Utah, North America

Terry A. Gates^{a,b*} and Rodney Scheetz^c

^aDavid Clark Labs, North Carolina State University, Raleigh, NC 27695, USA; ^bNorth Carolina Museum of Natural Science, 11 W Jones St., Raleigh, NC 27601; ^cBYU Museum of Paleontology, 1683 N Canyon Rd., Provo, UT 84602, USA

(Received 21 February 2013; accepted 17 June 2014)

A new hadrosaurid is described from the Upper Cretaceous Neslen Formation of central Utah. *Rhinorex condrupus* gen. et sp. nov. is diagnosed on the basis of two unique traits, a hook-shaped projection of the nasal anteroventral process and dorsal projection of the posteroventral process of the premaxilla, and is further differentiated from other hadrosaurid species based on the morphology of the nasal (large nasal boss on the posterodorsal corner of the circumnarial fossa, small protuberances on the anterior process, absence of nasal arch), jugal (vertical postorbital process), postorbital (high degree of flexion present on posterior process), and squamosal (inclined anterolateral processes). This new taxon was discovered in estuarine sediments dated at approximately 75 Ma and just 250 km north of the prolific dinosaur-bearing strata of the Kaiparowits Formation, possibly overlapping in time with *Gryposaurus monumentensis*. Phylogenetic parsimony and Bayesian analyses associate this new taxon with the *Gryposaurus* clade, even though the type specimen does not possess the diagnostic nasal hump of the latter genus. Comparisons with phylogenetic analyses from other studies show that a current consensus exists between the general structure of the hadrosaurid evolutionary tree, but on closer examination there is little agreement among species relationships.

<http://zoobank.org/urn:lsid:zoobank.org:pub:0FDD0FE6-6C20-4838-BD4A-092161179095>

Keywords: Hadrosauridae; ornithopod; Cretaceous; Utah; Book Cliffs; Neslen Formation; biogeography; phylogenetics


Introduction

underappreciated for their fossil potential. Early in the twentieth century, coal mines in the Book Cliffs were rec-

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Nuclear β -catenin localization supports homology of feathers, avian scutate scales, and alligator scales in early development

Jacob M. Musser,^{a,b,*} Günter P. Wagner,^{a,b} and Richard O. Prum^a

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SUMMARY Feathers are an evolutionary novelty found in all extant birds. Despite recent progress investigating feather development and a revolution in dinosaur paleontology, the relationship of feathers to other amniote skin appendages, particularly reptile scales, remains unclear. Disagreement arises primarily from the observation that feathers and avian scutate scales exhibit an anatomical placode—defined as an epidermal thickening—in early development, whereas alligator and other avian scales do not. To investigate the homology of feathers and archosaur scales we examined patterns of nuclear β -catenin localization during early development of feathers and different bird and alligator scales. In birds, nuclear β -catenin is first localized to the feather placode, and then exhibits a dynamic pattern of localization in both epidermis and dermis of the feather bud.

We found that asymmetric avian scutate scales and alligator scales share similar patterns of nuclear β -catenin localization with feathers. This supports the hypothesis that feathers, scutate scales, and alligator scales are homologous during early developmental stages, and are derived from early developmental stages of an asymmetric scale present in the archosaur ancestor. Furthermore, given that the earliest stage of β -catenin localization in feathers and archosaur scales is also found in placodes of several mammalian skin appendages, including hair and mammary glands, we hypothesize that a common skin appendage placode originated in the common ancestor of all amniotes. We suggest a skin placode should not be defined by anatomical features, but as a local, organized molecular signaling center from which an epidermal appendage develops.

Introduction

Understanding the origin of novelty is a central focus of developmental evolutionary biology (“devo-evo”; Müller and

exhibiting feathers of varying complexity (Ji et al. 2001; Xu et al. 2001, 2009). Simultaneously, theories of feather evolution shifted attention to developmental evidence (Prum 1999; Brush 2000; Chuong et al. 2000; Sawyer and Knapp 2003). Prum



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Best practices for digitally constructing endocranial casts: examples from birds and their dinosaurian relatives

Amy M. Balanoff,^{1*} G. S. Bever,^{2*} Matthew W. Colbert,³ Julia A. Clarke,³ Daniel J. Field,⁴ Paul M. Gignac,⁵ Daniel T. Ksepka,⁶ Ryan C. Ridgely,⁷ N. Adam Smith,⁸ Christopher R. Torres,⁹ Stig Walsh¹⁰ and Lawrence M. Witmer⁷

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⁹Department of Integrative Biology, University of Texas at Austin, Austin, TX, USA

¹⁰Department of Natural Sciences, National Museums Scotland, Edinburgh, UK

Abstract

The rapidly expanding interest in, and availability of, digital tomography data to visualize casts of the vertebrate endocranial cavity housing the brain (endocasts) presents new opportunities and challenges to the field of comparative neuroanatomy. The opportunities are many, ranging from the relatively rapid acquisition of data to the unprecedented ability to integrate critically important fossil taxa. The challenges consist of navigating the logistical barriers that often separate a researcher from high-quality data and minimizing the amount of non-biological variation expressed in endocasts – variation that may confound meaningful and synthetic results. Our purpose here is to outline preferred approaches for acquiring digital tomographic data, converting those data to an endocast, and making those endocasts as meaningful as possible when considered in a comparative context. This review is intended to benefit those just getting started in the field but also serves to initiate further discussion between active endocast researchers regarding the best practices for advancing the discipline. Congruent with the theme of this volume, we draw our examples from birds and the highly encephalized non-avian dinosaurs that comprise closely related outgroups along their phylogenetic stem lineage.

Key words: Aves; brain; comparative neuroanatomy; computed tomography; endocast.

Introduction

The last 25 years of evolutionary morphology have been witness to an explosion of digital techniques for observing, analyzing, and interpreting anatomical information. The impact of these innovations has been transformative in the field of comparative neuroanatomy where the various

forms of computed tomography (CT) [i.e. viewing a three-dimensional (3D) structure based on a parallel series of digitally acquired two-dimensional (2D) images known as tomograms] are now widely used across vertebrate clades to visualize the endocranial space and to assess morphological details of this space as a proxy for brain morphology through the construction of digital endocasts (Fig. 1) (e.g. Maisey, 2004; Colbert et al. 2005; Zollikofer et al. 2005;

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Sauroposeidon proteles is a large brachiosaurid sauropod recently described from the Antlers Formation (Aptian-Albian) of southeastern Oklahoma. Sauroposeidon represents the culmination of brachiosaurid trends toward lengthening and tightening the neck, and its cervical vertebrae are characterized by extensive pneumatic structures. The elaboration of vertebral air sacs during sauropod evolution produced a variety of internal structure types. We propose a new classification system for this array of vertebral characters, using computed tomography (CT) of pneumatic internal structures. Comparisons with birds suggest that the vertebrae of sauropods were pneumatized by a complex system of air sacs in the thorax and abdomen. The presence of a thoraco-abdominal air sac system in sauropods would dramatically affect current estimates of mass, food intake, and respiratory requirements. Sauroposeidon was one of the last sauropods in the Early Cretaceous of North America; sauropods disappeared from the continent by the early Cenomanian. The demise of sauropods in the Early Cretaceous of North America predates significant radiations of angiosperms, so the decline and extinction of this dinosaur group cannot be linked to changes in flora.

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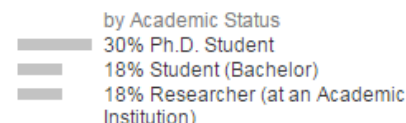
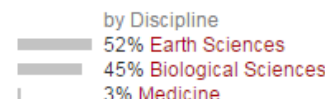

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A partial theropod skeleton from the Albian (ca. 105 ma) Cloverly Formation of Wyoming is shown to exhibit many features in common with members of Carcharodontosauria and is referred to *Acrocanthosaurus atokensis* on the basis of an autapomorphy and a unique combination of characters. The absence of neurocentral fusion in dorsal and caudal vertebrae and bone histology of the femur indicate that the specimen is a juvenile. The circumferences of lines of arrested growth were used to estimate mass over successive years of the animal's life. These mass estimates suggest that early in ontogeny, *Acrocanthosaurus* grew at rates on par with growth rates inferred in *Allosaurus* and most tyrannosaurid theropods, which are similar to rates expected for scaled-up precocial birds. Histological data from adult specimens suggest that *Acrocanthosaurus* reached adult body size in two to three decades. Gigantism in *Acrocanthosaurus* likely evolved via acceleration of growth rates relative to those of basal members of *Allosauroidae*, a transition also observed within tyrannosaurid theropods. Contrary to previous assessments, there is only evidence for one large-bodied theropod species in the Early Cretaceous of North America, though many fragmentary specimens are indeterminate to the genus level. Aptian-Albian and Maastrichtian-aged dinosaur communities were more similar to one another than to those of the intervening Campanian stage in that both seem to have featured a single, extremely large-bodied, fast growing, geographically widespread theropod dinosaur. (C) 2012 Elsevier B.V. All rights reserved.

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