

A NEW PARVICURSORINE ALVAREZSAUROID SPECIMEN IVPP V20341 (DINOSAURIA: THEROPODA) FROM THE UPPER CRETACEOUS GOBI BASIN: A SPECIMEN OF *LINHENYKUS* OR AN EIGHTH GENUS?

PITTMAN, Michael, The University of Hong Kong, Pokfulam, Hong Kong (CN); STIEGLER, Josef B., George Washington University, Washington DC, DC, United States of America; XU, Xing, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing, China

Upper Cretaceous rocks from the Gobi Basin of China and Mongolia have yielded alvarezsaurid theropod dinosaurs with impressive specialized body plans, including the uniquely monodactyl parvicursorine alvarezsaurid *Linhenykus monodactylus*. The latter taxon is the only parvicursorine species from the Upper Cretaceous Chinese Gobi Basin and belongs to the Wulansuhai Formation of Bayan Mandahu, Inner Mongolia. We compare a new fragmentary disarticulated parvicursorine specimen IVPP V20341 from the same formation and locality with *Linhenykus* and find that they have different origination points for their anterior caudal transverse processes: in IVPP V20341, this is the anterodorsal corner of the centra whilst in *Linhenykus* it is the posterior end of the prezygapophyses. There are also a number of tentative differences observed, but these require further information from future finds to confirm – particularly with regards to anatomical variation along the parvicursorine spine as many of these differences relate to vertebral elements that have similar, but not identical, vertebral numbers. IVPP V20341 lacks any of the known autapomorphies of other Asian parvicursorines, but this is partly because many relevant elements are missing from the specimen. IVPP V20341 is seemingly unique amongst alvarezsaurids because of the presence of cervical procoely and its relatively larger semi-circular neural canals. However, these features can be plausibly explained as anatomical variations of the parvicursorine cervical series because similar degrees of variation are actually observed in the dorsal and caudal series of these animals. Thus, erring on the side of caution IVPP V20341 is not identified as a new taxon, although future discoveries, particularly of vertebral elements, may warrant a taxonomic revision. As a parvicursorine specimen without any autapomorphies, IVPP V20341 does not contradict the hypothesis that the Bayan Mandahu fauna is unique compared to other localities within the Upper Cretaceous Gobi Basin. Thus, despite the description of this specimen there are still seven parvicursorine species in the latter basin (*Linhenykus*, *Albinykus*, *Ceratonykus*, *Kol*, *Mononykus*, *Parvicursor*, and *Shuvuuaia*). This study represents an extreme example of making anatomical comparisons when precise vertebral position data – vertebral number along the spine – is lacking. It is hoped that this example can serve as a valuable case study for vertebrate palaeontologists conducting work on similarly-preserved material, particularly younger students.

Grant Information

National Natural Science Foundation of China, 973 (National Basic Research) program and the Department of Land and Resources, Inner Mongolia, China

Technical Session XIV (Friday, October 16, 2015, 3:30 PM)

TETHYAN AND WEDDELLIAN BIOGEOGRAPHIC MIXING IN THE MAASTRICHTIAN OF ANGOLA

POLCYN, Michael J., Southern Methodist University, Dallas, TX, United States of America, 75275; JACOBS, Louis L., Southern Methodist University, Dallas, TX, United States of America; SCHULP, Anne S., Naturalis Biodiversity Center, Leiden, Netherlands; MATEUS, Octávio, Universidade Nova de Lisboa, CICEGe, Caparica., Portugal; ARAÚJO, Ricardo, Southern Methodist University and IPFN/LATR/IST, MfN, & ML, Dallas, TX, United States of America

Field work performed by Projeto PaleoAngola recovered a rich and diverse marine amniote fauna of mosasaurs, plesiosaurs, and turtles from Maastrichtian age sediments in Angola. Although some taxa appear to be endemic and others cosmopolitan, the mosasaur fauna is taxonomically most similar to the Tethyan assemblages of North Africa and the Middle East; faunas in which mosasaurs are the dominant component and plesiosaurs are rare. Conversely, plesiosaurs remains are common in the Angolan deposits, comprising about half of the specimens. The relative abundance of plesiosaurs is exceeded only in Antarctic localities of comparable age, in which plesiosaurs are the dominant component, followed by mosasaurs and an absence of turtles. Of the five mosasaur genera reported from Antarctica, two are also known from New Zealand, three from Patagonia, and two from Angolan localities. Of the two recently described plesiosaurs from Angola, one shares a relationship with northern hemisphere elasmosaurs, and the other, an aristonectine, shares a close relationship with southern hemisphere forms reported from Patagonia, New Zealand and Antarctica. Recently published paleotemperature data for the Angolan locality indicates relatively cool (~18°C) sea surface temperatures, while a mosasaur producing locality in Morocco, at ~25° North paleolatitude, has a paleotemperature of ~25°C, and Antarctic temperatures range from ~4°C–10°C in the Maastrichtian. Given previously published estimates of thermoregulation in these forms, the taxonomic distribution of marine amniotes may reflect thermally mediated ranges. Mixing of Tethyan and Weddellian Biogeographic Provinces has also been suggested for marine amniote localities in Australia and Patagonia; however, the Angolan localities, at ~25° South paleolatitude, are the most northward extension of this phenomenon.

Preparators' Session (Thursday, October 15, 2015, 8:30 AM)

EXCAVATION AND COLLECTION OF A NINE-TON FIELD JACKET CONTAINING FOSSILS OF NUMEROUS IGUANODONT AND *UTAHRAPTOR* DINOSAURS FROM THE EARLY CRETACEOUS YELLOW CAT MEMBER OF THE CEDAR MOUNTAIN FORMATION IN EASTERN UTAH

POLICELLI, Philip, Utah Friends of Paleontology, Salt Lake City, UT, United States of America, 84117; DE BLIEUX, Donald, Utah Geological Survey, Salt Lake City, UT, United States of America; KIRKLAND, James, Utah Geological Survey, Salt Lake City, UT, United States of America; MADSEN, Scott, Utah Geological Survey, Salt Lake City, UT, United States of America; GRAY, Dale, Utah Friends of Paleontology, Vernal, UT, United States of America; CROSS, James, Cross Marine Projects, American Fork, UT, United States of America

In 2005, the Utah Geological Survey began excavation of a site in the Early Cretaceous upper Yellow Cat Member of the Cedar Mountain Formation. This site, located high on a cuesta in eastern Utah, contained a number of well-preserved bones of iguanodont and *Utahraptor* dinosaurs. Because of the number of delicate elements preserved in close association with one another, efforts to isolate and collect individual elements became unfeasible so an effort was made to isolate larger blocks. In 2006, a roughly 1000-pound (450 kg) block was jacketed and flipped off of the top of this dense accumulation of fossils and slid down the cuesta on a car hood. In subsequent years, efforts were made to isolate blocks of a size that were practical to collect by hand but the number of bones present made this difficult to achieve. We decided that the only way to proceed was to collect a very large block. During excavation it became apparent that the bones were confined to a lensoidal-ovoid shaped green sandstone mass within a red mudstone unit that we hypothesize was a dewatering feature (quicksand) that trapped, killed, and preserved at least two iguanodont and numerous *Utahraptor* dinosaurs. A massive amount of hand digging and rock removal using an electric hammer drill was accomplished over a number of field seasons, resulting in the isolation and plaster jacketing of a large block from the surrounding unfossiliferous mudstone. The block measured over 10' x 9' x 3' (3 m x 2.7 m x 0.9 m), too large to be transported by all but the largest helicopters, so we decided to construct a temporary track to the site, and build a wooden frame under the block. A wooden frame was designed, pre-assembled off site, and disassembled for transport. We bolted four 10" x 10" (25 cm x 25 cm) crossbeams to two underlying 8" x 8" (20 cm x 20 cm) beams at the base, and reinforced the assembly by using three 6' x 1.5" (180 cm x 3.8 cm) steel rods encased in 2" (5 cm) diameter pipe. We pedestalled the jacket and then tunneled under the center so that it was sitting on two pillars, allowing us to slide two crossbeams through the center. Once the frame was constructed the pillars were removed, additional wood and plaster were used to shim the block, and heavy-duty strapping was used to secure the block. The block and frame were then pulled down the steep temporary track using a hydraulic excavator (track hoe). At the base of the hill, the rocky terrain was damaging the wooden skids so metal guard rails where attached under the skids, for the remainder of the 1.6 km journey to where it could be loaded onto a semi truck trailer for transport to Salt Lake City.

Poster Symposia (Wednesday - Saturday, October 14-17, 2015, 4:15 - 6:15)

FORM, FUNCTION, AND CLADE SORTING: A PHYLOGENETIC AND ECOLOGICAL ANALYSIS OF CARNIVORAN TARSAL EVOLUTION USING 3D DATA

POLLY, P. David, Indiana University, Bloomington, IN, United States of America, 47405; LAWING, A. Michelle, Texas A&M University, College Station, IN, United States of America; BORMET, Allison K., Indiana University, Bloomington, IN, United States of America; FUENTES GONZALEZ, Jesualdo, Indiana University, Bloomington, IN, United States of America

Mammalian ankles have complex, interlocking surfaces whose form is functionally related to a repertoire of locomotor movements that vary widely across clades. The shapes of the tarsals constrain movements at the upper ankle joint, at the transverse tarsal joint, and at the interface between the calcaneum and astragalus. We used 3D morphometric analyses of calcaneal and astragalus shape to characterize the morphological correlates of locomotor variation in extant carnivorans. These results show that the curvature of their interlocking facets, the proximo-distal position of the sustentaculum, and the proportional length of the calcaneal process are correlated and vary functionally in a spectrum ranging from digitigrade leapers and scansors (primarily felids), digitigrade cursors (primarily canids and hyaenids), semidigitigrade scansors (primarily mustelids and herpestids), to plantigrade terrestrial and semiarboreal taxa (primarily ursids and procyonids). While tarsal morphology and locomotor style show some homoplasy, both form and function have a strong phylogenetic correlation such that each living carnivoran family has its own characteristic locomotor style.

The locomotor specializations of carnivoran communities vary with environment: open habitats are dominated by cursorial and fossorial species; closed forest habitats contain a mix of semicursorial, scansorial, and arboreal taxa; and highly heterogeneous habitats, such as basin and range, are also mixed but with a higher proportion of ambush predators and cursors. Using morphometric data in a phylogenetic framework, we show that these differences in the locomotor repertoire of carnivorans between habitats are due to clade sorting. Furthermore, the taxa composing New World tropical forest communities have, on average, a more recent common ancestor than other habitats because carnivoran arboreal specializations in North and South America are found almost exclusively in procyonids (scansoriality is more widespread, especially in small felids). Thus, the ancestral carnivoran conditions of scansoriality and arboreality were lost in the New World during the Neogene and re-evolved as carnivorans occupied the emerging neotropical forests of Central America.

Romer Prize Session (Thursday, October 15, 2015, 11:00 AM)

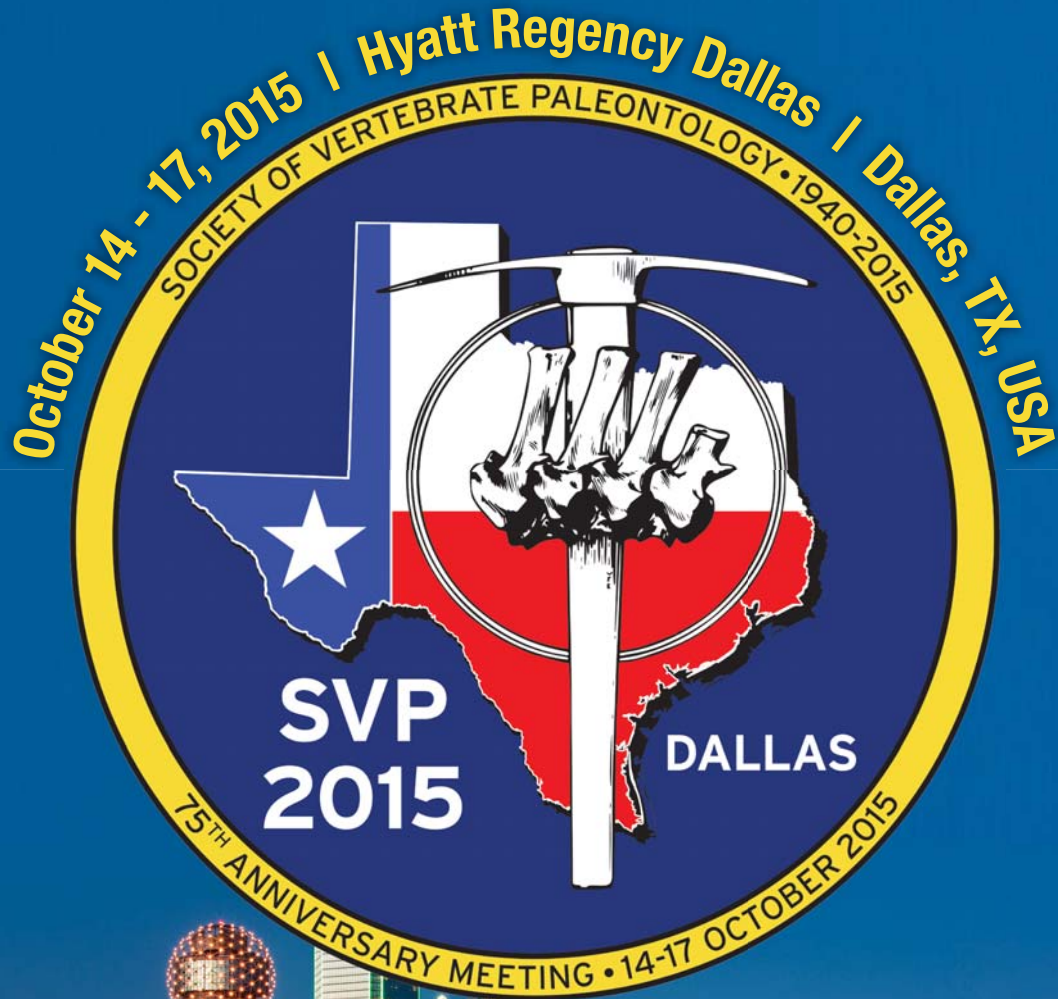
PHYLOGENY OF IGUANODONTIA (DINOSAURIA: ORNITHISCHIA) AND BIOMECHANICAL ANALYSIS OF THE CARPUS-DIGIT I COMPLEX

POOLE, Karen, The George Washington University, Washington, DC, United States of America, 20052

Non-hadrosaurid iguanodontian dinosaurs (hereafter iguanodontians) were abundant and widespread, yet their phylogeny has been poorly resolved. Three key morphological changes occur in the postcrania during their evolution: (1) extensive fusion of the carpals and digit I, (2) enlargement of the first manual ungual, (3) a shift to a quadrupedal stance. The aim of this study is to construct hypotheses of iguanodontian phylogeny, trace the evolution of quadrupedality using osteological correlates, and use Finite Element (FE) methods to test whether carpal fusion was driven by the function of the first digit or by the novel weight-bearing function of the forelimbs.

A character matrix was created for 66 taxa using 329 characters (194 more than any published matrix). Parsimony analysis using New Technology searches in TNT yielded 35 most parsimonious trees. The majority rule consensus largely agreed with time-calibrated Bayesian trees found using relaxed clock methods in MrBayes. Several monophyletic subgroups of iguanodontians arise in this tree, replacing the pectinate topologies of previous analyses, though there is no single clade of 'iguanodontids'.

SVP 75th Annual Meeting



Meeting Program & Abstracts