Vol. 29, Supplement to No. 3

Journal of Vertebrate Paleontology

September 2009

JVP

Journal of Vertebrate Paleontology

Program and Abstracts

Volume 29, Supplement to Number 3
September 2009

69th Annual Meeting
Society of Vertebrate Paleontology

and the 57th Symposium of Vertebrate Palaeontology and Comparative Anatomy (SVPCA)

University of Bristol
Bristol, United Kingdom
September 23-26, 2009

Society of Vertebrate Paleontology
ISSN 0272-4634

consistent across both monophyodont and diphyodont taxa, thus falsifying the hypothesis. Therefore the relative size of the developing dentition does not influence the size of the mandible, and its utility in dietary reconstruction, in the taxa studied here. This finding has important implications for our understanding of the coordinated development and evolution of the dentition and skeletal masticatory system.

Poster Session IV, (Saturday)

A PARTIAL SKELETON OF *BEHEMOTOPS* (DESMOSTYLIA, MAMMALIA) FROM VANCOUVER ISLAND, BRITISH COLUMBIA

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In July of 2007, a partial articulated skeleton of a desmostylian was found in place in siltstone in the streambed at mouth of Sombrio River in Juan De Fuca Provincial Park, Vancouver Island, British Columbia, Canada. The fossils were found in association with late Oligocene Sooke Formation mollusks and an odontocete caudal vertebra. Sombrio Beach is part of the Sooke Formation siltstone "Facies F" and represents a backbench ponded area. Nearby portions of the formation are dated to Chron C6Cr age, 24.1-24.8 Ma. The material preserved includes the left side of the entire skull, including two molars and a premolar and canines, as well as a partial scapula, a nearly complete humerus, and numerous vertebrae and ribs. Molar characteristics and size appear to be the same as material of *Behemotops proteus* from the late Oligocene Pysht Formation of Washington State (LACM 124106), near the type locality of *Behemotops proteus* also from the Pysht. Previous specimens of *Behemotops proteus* were limited to lower jaws and portions of the upper and lower postcanine dentition. The smaller *Behemotops katsuiei* from Japan is known from more material, yet its cranial material is limited to the posterior cranium and a small portion of the zygomatic arch. This new material allows us to see that *Behemotops cf. proteus* had cranial features much like those seen in *Cornwallius sookensis* of North America. These include a postorbital process of the jugal, with no dorsally expanded zygomatic process of the squamosal, a deeply concave hard palate, enlarged canine tusks that point sharply ventrally, and a narrow, curved incisor arcade. *Behemotops* may be more closely related to desmostylids, making the divergence of the Desmostylidae and Paleoparadoxiidae further back among fossil taxa yet unknown. Interestingly, the unfused epiphyses of this specimen's limb and vertebral elements appears to indicate that it is a subadult, even though all but it's M3 have erupted. This suggests that *Behemotops*, unlike *Desmostylus* and other Afrotheria, did not delay the eruption of its adult dentition, indicating that the most likely primitive state for the Desmostylia is not delayed dental eruption.

Technical Session VII, Thursday 2:30

ONTOGENETIC SEQUENCE ANALYSIS (OSA) OF TOOTH ERUPTION AND SUTURE CLOSURE IN *TAPIRUS* (MAMMALIA: PERISSODACTYLA): IMPLICATIONS FOR ASSESSING SEQUENCES IN FOSSIL SAMPLES

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Deducing sequence heterochrony involves comparison of the relative order of ontogenetic events between species in a phylogenetic context. Such analyses obviously require both a phylogenetic framework, as well as ontogenetic sequences for the considered species. While the difficulties of phylogenetic analysis are well known, the process of determining ontogenetic sequences within species is not trivial. The primary difficulty in establishing ontogenetic sequences relates to inadequate sample sizes that often show biased demographics. These sampling artifacts are further complicated by the widespread occurrence of intraspecific sequence polymorphism, an underreported phenomenon that should be expected as a transitional condition between fixed event-order differences between taxa. In this study, Ontogenetic Sequence Analysis (OSA) is used to establish all most-parsimonious sequences of tooth eruption and suture closure, which are important indicators of mammalian maturity, for the four extant species of *Tapirus*. Results document considerable sequence polymorphism within each tapir species, and also underscore the relationship between sample size and resolution. The implications are obvious for sequence deduction in fossil species that, compared to extant species, are generally represented by smaller samples of individuals that are often fragmentary. Although it is not surprising that small sample sizes yield less-resolved sequences, an interesting finding is that the differences between the poorly resolved sequences of *Tapirus* are consistent with current phylogenetic estimates based on both morphology and molecules. These differences were analyzed by treating all event-pair comparisons in each species as phylogenetic characters. It is hypothesized that the phylogenetic signal within these sequence data is largely epigenetic, with inferred instances of heterochrony reflecting dramatic changes in cranial morphology. These results encourage the analysis of even limited samples to find sequences not only because relatively unresolved sequences may still have phylogenetic signal, but also to allow rough calibrations of individual maturity.

Poster Session IV, (Saturday)

THEROPOD TEETH FROM THE LATE CRETACEOUS OF CHERA (VALENCIA, EASTERN SPAIN)

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Several exposures of the Late Campanian-Early Maastrichtian palustrine deposits of the Sierra Perenchiza Formation at Chera Basin (Valencia province, Eastern Spain) have provided abundant micro- and macrovertebrate fossil remains. The vertebrate assemblage recovered includes remains of actinopterygians, amphibians, squamates, chelonians, crocodyliforms, pterosaurs and dinosaurs. Among the last ones, there are representatives of sauropods (*Lirainosaurus* cf. *astibiae*), ornithopods (*Rhabdodon priscus*), thyreophorans (*Struthiosaurus* sp.) and theropods, which are presented in this work. Only two of the abovementioned localities, named Chera-0 and Chera-2, have provided theropod remains, which consist of scarce isolated teeth. Three different morphotypes have been identified in the Chera material. The first one (?Neoceratosauria indet., Chera 0 and Chera 2), corresponds to the largest teeth of the sample (TCH up to 50 mm); these teeth are moderately compressed laterally, and distally recurved, their crowns bear denticles on both mesial and distal margins, and the mesial carina is laterally displaced; the denticles are chisel-shaped, wider labiolingually than they are long mesiodistally; the mesial denticles are slightly smaller than those of the posterior carina (about 3 denticles per mm); the crown enamel is slightly stretch-marked. The second type (Dromaeosauridae: cf. *Pyroraptor* sp., Chera 0 and Chera 2) includes two isolated teeth of much smaller size (TCH of about 10 mm); these teeth are strongly compressed, slightly recurved distally, and both mesial and distal carinae have minute denticles (about 7 denticles per mm). The third morphotype (Coelurosauria indet., Chera 0) corresponds to the smallest teeth of the sample (TCH of about 6 mm); they are distally recurved, strongly compressed laterally, and lack denticles. The association of neoceratosaurians and coelurosaurs, including dromaeosaurids, seems typical of the Campanian-Maastrichtian of the Ibero-Armorican Realm.

Technical Session III, Wednesday 3:45

MIOCENE ASIAN INVASION OF EUROPE BY VARANUS (VARANIDAE)

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Varanus possess a frustratingly incomplete fossil record. The crown radiation of Varanus had begun diversifying by the Early Miocene (~18 million years ago; Ma) as evinced by relatively complete remains of Varanus rusingensis from Kenya. Other varanid fossils from the Miocene and later include primarily isolated vertebrae or other non-diagnostic material. We report on the first diagnostic fossil species of Varanus from Europe. The specimen (AMNH FR 30630) comes from the Mytilini Formation (Late Miocene, approximately 8.33 Ma) and consists of most of the right side of a braincase, a partial right squamosal, a right quadrate, the right mandibular glenoid and surrounding areas, three cervical vertebrae, and three dorsal vertebrae. The specimen was originally collected with and identified as part of a partial mammal skeleton. We performed a cladistic analysis of 53 extant and fossil varaniforms, including 23 extant Varanus, to test the position of the Samos lizard. Our analysis finds the Samos Varanus to be nested within an Australasian clade of Varanus. Absence of a crista prootica, size and shape of the tympanic crest of the quadrate, presence of a dorsolateral surangular ridge, and relative degree of precondylar vertebral constriction unite the Samos Varanus with the Asian Varanus salvator-group. The length of the braincase from the tip of the basipterygoid process to the tip of the paroccipital process is 41 mm, the quadrate is 25 mm tall, the mandibular glenoid is 12 mm wide across its anterior margin, cervical vertebra 4 is 26 mm long along its ventral midline. Based on comparisons with 16 extant species, this suggests a snout-vent length (SVL) of 620-700 mm; thus, the Samos Varanus was comparable in size to modern Varanus niloticus and Varanus marmoratus. Presence of a relatively large Varanus in the Mytilini increases our understanding of that Formation's fauna, which is dominated by a variety of mammals. The Samos Varanus also suggests a Miocene origin for some Australasian Varanus clades and an Asian rather than an African Varanus invasion of Europe.

Poster Session II, (Thursday)

METHODS OF PALEONTOLOGICAL RECONSTRUCTION

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The field of paleontological reconstruction is an old one, probably as old as paleontology itself, yet the literature on the life appearance of extinct animals is rather limited. The information required for accurate paleontological reconstructions is often limited to by-products of science concerned with other areas, such as biomechanics or phylogenetics. There has been little discussion of how the problems related to the field differ from the concerns of mainstream paleontology, or how those differences might be addressed in a systematic way. Previous discussions on the problems of reconstructing the life appearance of extinct animals have tended to focus on the dynamics of scientist/artist collaboration, or been relatively straightforward treatises of comparative anatomy. However the field has moved on, with new methodology and lines of evidence being pursued—some of which are somewhat distinct from the concerns of mainstream paleontology. Here I will discuss the