

Poster Session III (Friday)

**A NEW *PARASAUROLOPHUS* (HADROSAURIDAE) BRAINCASE FROM THE DINOSAUR PARK FORMATION, ALBERTA**

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The lambeosaurine hadrosaurid *Parasauroplophus* is known only from rare occurrences in Campanian deposits of the Dinosaur Park Formation, Alberta, Canada. An undescribed large hadrosaurid braincase collected in 1955 by W. Langston Jr. is recognized here as pertaining to the genus *Parasauroplophus* on the basis of several derived characters associated with the frontal-nasal articulation at the base of the crest. The specimen is generally poorly preserved, but it consists of complete frontals, the parietal, both orbitosphenoids, and the lateral wall of the braincase on both sides. When included in a phylogenetic analysis of lambeosaurines, the specimen forms a polytomy with all other species of *Parasauroplophus*. It can be identified as this genus on the basis of two unambiguous synapomorphies: 1) the massive thickness and steep, posterodorsal inclination of the frontal platform that overhangs the parietal, and 2) the greatly shortened ectocranial surface of the frontal. This specimen represents the third and largest cranial specimen of *Parasauroplophus* from the Alberta. Although it cannot be positively assigned at the species level, it occurs in the same deposits as the holotype specimen of *P. walkeri*, and may represent a late ontogenetic stage of this taxon. Re-examination of the holotype of *P. walkeri* suggests that the frontals form a large portion of the ventral base of the crest, an area that has historically been difficult to interpret. In the new braincase, the region of the frontal dome is completely overgrown by the posterodorsal expansion of the frontal platform, where as a distinct frontal dome is present in the holotype of *P. walkeri*. This suggests that the crest had not reached its full development in the holotype of *P. walkeri*. A particularly important aspect of the specimen is that the field notes allow it to be tightly constrained stratigraphically, and its stratigraphic position supports the notion that *Parasauroplophus* occurs only in the lower part of the Dinosaur Park Formation.

Poster Session III (Friday)

**COMPARATIVE OSTEOHISTOLOGY OF *MAIASAURA PEEBLESORUM* (HADROSAURIDAE) FROM THE TWO MEDICINE FORMATION (CAMPANIAN) CAMP-O-SAUR BONEBED OF MONTANA**

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A good use of osteohistology is to study the growth history of a single individual, since this is at best difficult to study from the external surface. By comparing the growth histories of multiple individuals of a species, we can arrive at a more complete understanding of the growth of that species than we would from studying the history of a single individual. A wide range of factors can affect bone growth, such as physiology, the environment, and individual variation. By examining bones representing a single species from a deposit interpreted as resulting from a single death assemblage, we can minimize physiological and environmental factors, and evaluate individual variation. A lack of understanding of how much individual variation there is has led some researchers to rely too heavily on data that may not be reliable. To better understand the expected amount of individual variation, full cross-sections cut from the mid-diaphysis of the tibia from nine individuals of *Maiasaura peeblesorum* collected from the Camp-o-saur bonebed were examined. ANOVA statistical tests were run on the data collected, analyzing both the variation in growth within single bones, and between different bones. The results show statistically significant (0.1 and higher confidence levels) variation within a single bone, demonstrating the importance of making multiple measurements from several areas around the cross-section of the bone. Comparing the same area of different bones gave mixed results; most areas show statistically significant variation between the bones, except in the anterior and posterior areas. This suggests that if only a limited area can be studied, these two areas are best. This study demonstrates that there is enough variation that researchers must be cautious when interpreting osteohistologic data.

Technical Session VI, Thursday 3:45

**CRANIODENTAL ONTOGENY IN THE DESMOSTYLIA**

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In recent years, many new specimens of desmostylians have been found and await description. Complete adult specimens of desmostylians are rare, and any hopes of understanding intraspecific variation are mostly limited to isolated dentitions. To complicate matters, many specimens, including holotypes, are those of juvenile or subadult individuals. As more specimens are found and described, it is important that we find some way to recognize what characteristics vary within species and change during ontogeny. In order to address the role of ontogeny in the differences between specimens, I examined cranial and mandibular specimens from a number of collections in the US, Canada, and Japan. Specimen ontogenetic stage was determined by coupling dental eruption status with sutural fusion. The delayed eruption of postcanine teeth is most extreme in the Desmostylidae, as is the loss of incisors and enlargement of tusks. The presence and size of the sagittal crest also depends on ontogenetic stage, like in many mammals. Being one of the characters that differentiate the Paleoparadoxiidae and Desmostylidae, it is important that ontogenetic stage of individuals be considered before character states are designated in phylogenetic analyses. In a broader perspective, delayed dental eruption, tusk development, and craniofacial elongation are characteristics that appear to be shared among many crown tethytheres, even though basal

members of the Sirenia, Proboscidea, and Desmostylia appear to lack it. Whether these features are convergent or are homologous shared developmental potentials is still uncertain.

Poster Session IV (Saturday)

**LUMBAR SPINE OF *REMINGTONOCETUS* (MAMMALIA, CETACEA, ARCHAEOCETI) AND IMPLICATIONS FOR AQUATIC LOCOMOTION**  
BEBEJ, Ryan, University of Michigan, Ann Arbor, MI, USA

Remingtonocetids are semiaquatic archaeocetes endemic to India and Pakistan that are known for their long, narrow skulls. Fragmentary vertebrae and partial hind limb elements are among the post-cranial remains known for these whales. A recently collected specimen of *Remingtonocetus* (GSP-UM 3552) from the upper Domanda Formation (late Lutetian; early middle Eocene) of Pakistan includes a partial innominate and the most complete pre-caudal vertebral column of any remingtonocetid described to date, offering insights into the swimming capabilities of the group. The specimen preserves 7 cervical, 8 of a probable 13 thoracic, 6 lumbar, and 3 of 4 sacral vertebrae. Posterior thoracic, lumbar, and sacral vertebrae were preserved in articulation, showing definitively that remingtonocetids possessed 6 lumbar vertebrae like their protocetid contemporaries. Lumbar centra are broad and only moderately long, with reniform endplates. Short, robust transverse processes project laterally from lumbar vertebral bodies. These processes angle increasingly more cranially and ventrally from L4-L6. Prezygapophyses are convexly curved and face medially, which would have allowed some dorsoventral movement while restricting lateral and axial rotation. Neural spines are relatively short dorsoventrally, but are over two-thirds of the centrum length anteroposteriorly, limiting dorsiflexion. Posteriorly flaring apices of neural spines and excavations in the laminae dorsal to the neural canals accommodated robust supra- and interspinous ligaments that would have resisted ventral flexion. *Remingtonocetus* had a stable lumbar region with a small degree of dorsoventral flexibility. Taken together with a fused 4-vertebrae sacrum, large innominates, and robust femora, the morphology of the lumbar vertebrae is consistent with an animal that swam primarily by powerful movements of the hind limbs rather than dorsoventral undulation.

Poster Session I (Wednesday)

**UNAMBIGUOUS, LARVAL AND JUVENILE DEVONIAN DIPNOANS**

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The dipnoan fossil record is fairly abundant, although unambiguous larval forms have not been described yet. The adult morphology of the Late Devonian *Scaumenacia curta* from the Escuminac Formation (Miguasha, Québec, Canada) is one of the best known among extinct dipnoans. Recently, abundant material of well-preserved larval-juvenile specimens of *S. curta* were found in a juvenile effective habitat or nursery. Size and shape changes as well as sequences of ossification are evaluated based on more than 200 specimens ranging in size from 18.5 to 50.0 mm. In the smallest specimen, squamation, fin rays, pectoral girdle, cranial ossification and tooth plates are well developed and the second dorsal, anal, and caudal fins are barely distinguishable from one another. Larval-juvenile specimens differ from larger specimens (adults) in terms of body proportions, number of fin rays, number of ossified elements, and caudal curvature of the notochord. Reconstructed patterns of ossification for serial bony elements include: (1) pleural ribs ossify from anterior to posterior, whereas (2) supraneurals ossify from posterior to anterior; (3) caudal and anal proximal radials ossify from anterior to posterior, whereas (4) dorsal proximal radials ossify bidirectionally. All these characteristics are consistent with larval-juvenile stages of growth and suggest that *S. curta* was going through metamorphosis. Ontogenetic patterns of *S. curta* are compared with those of living dipnoans and extinct sarcopterygians.

Technical Session XI, Friday 11:30

**TRENDS IN THE EVOLUTION OF BODY SIZE IN NON-MAMMALIAN SYNAPSIDS**

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As the earliest non-mammalian synapsids (e.g., pelycosaurs) were relatively large (~20 to 100 kg), and the first mammals relatively small (~ 5 to 15 g), there is an apparent trend of decreasing body size in the evolution of non-mammalian synapsids. Several authors have suggested that small body size was either a prerequisite for, or a direct result of the evolution of a mammal-like way of life characterized by a relatively high metabolic rate, active foraging, endothermy, and an upright stance. Despite the importance of body size in the origin and evolution of mammals, the apparent trend toward decreased body size in the evolution of non-mammalian synapsids has never been quantitatively examined within a phylogenetic context. Using this approach, we address two questions: (1) is the trend toward decreased body size active or passive, and (2) what is the mechanism behind the trend (e.g., biased morphologic evolution, constrained morphologic evolution, or differential extinction or speciation)? We approximated body size (using limb bone lengths as a proxy) on a composite cladogram of 75 genera, then estimated and compared (using a likelihood-ratio test) the numbers and magnitudes of evolutionary increases and decreases in body