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atmospheric oxygen levels may have had a profound influence on metabolism and growth of ectothermic amniotes in their evolutionary history (e.g., acting as a constraint on growth rates in some Triassic taxa). Attempts to infer growth rates of extinct taxa from their fossil bone microstructure should consider contemporary oxygen levels when offering alternative explanations.

Technical Session VIII, Thursday 1:30
SKINNING DINOSAURS: BONY CORRELATES AND PATTERNS OF CEPHALIC SKIN EVOLUTION IN ARCHOSAURIA

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Extant archosaurs bear a number of striking skin features on their heads, ranging from the elaborate display structures seen in many birds to highly sensitive feeding structures such as the bill tip organ of woodcocks and the dome pressure receptors of crocodilians. Several bony features of extinct archosaur skulls have been advanced as bearing similar skin structures, but in the absence of exceptionally preserved examples, many of these morphological hypotheses have been difficult to resolve. This study examined skin-to-bone relationships in extant sauropsids as a source of robust osteological correlates of skin structure. We tested (1) existing concepts of homology in facial skin, with the inclusion of underlying dermal structures, and (2) ahistorical relationships between similar skin morphologies and their associated osteological correlates in extant taxa. We were able to identify consistent bony correlates for some specific skin types, such as hardened scales and the heavily keratinized plates associated with beaks and horn sheaths. Bony correlates for scales suggest the presence of similar scale patterns in such distantly related groups of dinosaurs as abelisaurids, tyrannosaurids, and neoceratopsians. In addition, there are consistent associations of morphologically distinguishable regions of skin with the extent of medial ophthalmic (CN V_1), lateral ophthalmic (CN V_1), and nasopalatine (CN V_2) nerve supply. The bony foramina and canals that conduct these nerves through the facial skeleton are highly conserved among sauropsids, and thus the approximate boundaries of skin regions on the maxillary rostrum in fossil specimens can be visualized by identifying the corresponding bony correlates for major neurovascular bundles. The distinction between medial ophthalmic- and nasopalatine-innervated skin regions around the oral margin provides a more detailed framework for testing hypotheses of beak evolution, especially among the six parallel occurrences of beaks in maniraptoran theropods.

Romer Prize Session, Thursday 10:45
AQUATIC LOCOMOTION IN BASAL ORNITHURAE AND THEIR TRANSITION FROM AQUATIC TO TERRESTRIAL HABITATS

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Transitions of secondarily aquatic organisms to terrestrial habitats are not common; yet, birds represent a noted exception. Basal ornithurans that ultimately gave rise to all living birds were most likely aquatic. However, their aquatic adaptations remain to be quantitatively corroborated. This study is an investigation of locomotor strategies of basal members of Ornithurae to test whether these birds were truly aquatic and if there were any adaptive reasons why the unlikely transitions from aquatic to terrestrial habitats occurred. To understand aquatic affinities of extinct groups, I quantified swimming adaptations in bird skeletons through a framework of statistical analyses and mechanical models. I sampled 247 species of extant birds (n=1112) for 28 osteological characters. Discriminant analysis (DA) suggests that 90% of the avian taxa are placed in correct locomotor categories implying that we can safely correlate osteology with locomotion. My study strongly suggests that basal ornithuran birds were aquatic, supporting the view that all living birds had a common aquatic ancestor in the Cretaceous. DA and principal component analyses predict ecological preferences of these birds: basal Hesperornithiformes explored underwater habitats in at least two different ways, while *Gansus yumenensis* was not an underwater diver. Morphologically, hesperornithiforms had a reduced range of motion around the knee and a poor alignment of the hip with the center of mass. *Gansus yumenensis* was not as constrained by water: foot and wing shapes indicate surface swimming or at least skimming behavior. Surface swimmers and skimmers exhibit a very small degree of skeletal adaptations relative to terrestrial birds whereas diving birds are clearly distinguished from both. According to recent avian phylogenies, it is likely that the birds with locomotion restricted to the water surface historically gave rise to terrestrial descendents.

Poster Session I (Wednesday)
CRANIAL MORPHOLOGY OF *MESODERMOCHELYS* (CHELONIOIDEA; TESTUDINES) FROM THE LATE CRETACEOUS OF JAPAN

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Mesodermochelys undulatus is a chelonioid sea turtle dominated in the Late Cretaceous (Campanian and Maastrichtian) of Japan (Hokkaido, Hyogo, and Kagawa Prefectures). *Mesodermochelys* has been classified as a primitive Dermochelyidae, largely based on postcranial morphology such as an elongate lateral process of the humerus. An isolated skull presumed as *Mesodermochelys* was found from the calcareous concretion of the Late Cretaceous (Santonian) Yezo Group of Tomamae-cho, Hokkaido Prefecture, northern Japan by Mr. Yoshiyuki Hattori in October of 2005. A large portion of the dermal roofing elements, including prefrontal, frontal and squamosal, and premaxilla were missing due to weathering from this specimen, which is donated in the Historical Museum of Hokkaido, Sapporo as HMH 151807. Nonetheless, this is the first known well-preserved skull of this genus, though more fragmentary skull and lower jaws were unearthed from the Maastrichtian type locality (Hobetsu of Mukawa-cho, Hokkaido Prefecture). HMH 151807 was carefully prepared by using formic acid, revealing the following distinct characters: 1) palatines medially meeting, 2) foramen posterius canalis carotici interni incompletely covered by bones on ventral surface of pterygoids as in *Plesiochelys, 3*) basisphenoid has a V-shaped crest on its ventral surface, deeply emarginated from the posterior. One tree was obtained through PAUP analysis (Version 4.0) by using 142 characters of 36 taxa (4 outgroups and 32 chelonioids). Tree length is 356, with a consistency index of 0.4888. *Mesodermochelys* is here shown as a sister taxon of the Protostegidae, an extinct member of chelonioids once flourishing during the Cretaceous. Thus, *Mesodermochelys* is a chelonioid closely related with protostegids, or basal member of the latters, though dermochelyid-like limb morphology was independently acquired in this genus.

Poster Session IV (Saturday)
A REVIEW OF THE *PANTHERA ONCA* (MAMMALIA; CARNIVORA; FELIDAE) FROM THE CURTIS RANCH LOCAL FAUNA (BLANCAN), SOUTHEASTERN ARIZONA

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The fossil materials from the Curtis Ranch local fauna referring to jaguar (*Panthera onca*) has been cited as the oldest occurrence of *P. onca* in North America. These fossils include a left partial p4, a right calcaneum, and an upper third metatarsal fragment. This material was originally attributed as "*Felis,* near *F. atrox*" by Gazin was then later placed in *Panthera onca* by others. Reexamination of these fossil materials now suggests that *Panthera* did not occur within the Curtis Ranch local fauna and instead these fossils represent two separate taxa. In comparison of the lower p4 in *Panthera* the principle cusp is usually broad and low, has a concavity on the medial margin of the crown when viewed in occlusal, and lacks the presence of a cingulum on the posterior margin of the tooth. The lower p4 from Curtis Ranch has a broad and tall principle cusp, is ovate when viewed in occlusal, and has the presence of a pronounce cingulum on the posterior margin of the tooth. These characters suggest an affinity not with *Panthera* but rather the hyaenid *Chasmaporthetes ossifragus*. Bi-variant analysis of the length and width of lower p4s of *Panthera* and *Chasmaporthetes* shows the Curtis Ranch p4 to be placed in the *Chasmaporthetes* cluster. This p4 represents the first record of *Chasmaporthetes ossifragus* from the Curtis Ranch local fauna. The characters in the calcaneum of *Panthera* vary between species, with *Panthera onca* having a shorter peroneal tubercle relative to other *Panthera* species. In the Curtis Ranch calcaneum the peroneal tubercle is proportionately longer than that seen in *P. onca* and a navicular is present, a character that is typically absent in pantherid felids. The long peroneal tubercle, the presence of a navicular facet, and a long shaft for the Achilles tendon attachment are characters seen in the large felid *Miracinonyx inexpectatus*. This specimen was found in association with the metatarsal fragment that also shows characters to a very large *M. inexpectatus*. This reevaluation of the Curtis Ranch material supports *Panthera* onca migrating into North America during the middle Irvingtonian and not before the Pleistocene.

Poster Session III (Friday)
PITCH, YAW AND, ROLL - HADROSAURIAN LOCOMOTION KINETICS INVESTIGATED WITH CAE

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In this study digitized bones of *Brachylophosaurus*, a non-crested hadrosaur, are employed to generate biomechanical 3D computer models. These are used in a CAE (Computer Aided Engineering) software to investigate the different postures and gaits of hadrosaurs. The purpose is to achieve a better definition of their locomotion capabilities with special regards to interspecific interaction. The front limbs of hadrosaurs show significant adaptations for locomotion, such as elongation of the forearm and the hoof-shaped unguals. Additionally, hadrosaurs exhibit the most rigid axial skeleton among dinosaurs due to the trellis-like pattern of well-ossified longitudinal tendons on the spinal processes. Kinetic/dynamic computer modeling of *Brachylophosaurus* for slow speeds shows differing duty factors in the fore- and hind limbs, caused by the unequal limb lengths and the position of the center of gravity, which rests almost directly above the toes. This means that hadrosaurs used a 'normal walk with emphasis on the hind legs'. This effect increases with greater step lengths (i.e. higher speeds). The fact that weight carrying on the front limbs appears not to play a significant role begs the question why hadrosaurs use the fore limbs at all when walking. Potentially, lateral instabilities ('yawing' motions) induced by the transfer of rotational inertia along the body axis are countered. Most other animals can employ lateral bending of the vertebral column to this purpose, but hadrosaurs lack the required body mobility. Also, vertical 'pitching' motions are induced by rapid locomotion; again, the rigidity of the hadrosaur backbone does not allow the conventional counter of dorsoventral flexion. Furthermore, faster turn rates and higher speeds during turns may be achieved with only limited