68th Annual Meeting
Society of Vertebrate Paleontology

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Poster Session II (Thursday)

**A COMPUTATIONAL BIOMECHANICAL APPROACH TO THE RECONSTRUCTION OF PREDATORY BEHAVIOR IN THE TERROR BIRD ANDALAGALORNIS STEULLETI**

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The predominantly South American phorusrhacid radiation comprised a range of small to gigantic terrestrial predators for which there are no close functional analogues, making reconstructions of their feeding behavior particularly problematic. Here we have applied a Finite Element approach to a 3-D model of the cranium of the medium-sized (~40 kg) patagonornithine phorusrhacid Andalgalornis steulleti (Upper Miocene-Lower Pliocene, Andalgalora Formation, Catamarca, Argentina), in order to assess its mechanical performance in a comparative context. We found that relative to a range of extant species, including one of its closest living relatives, the red-legged seriemas, as well as eagles and vultures, the terror bird’s cranium shows high stress under torsional and lateral loading, but low stress where force is applied in dorso-ventral or in ‘pullback’ simulations. We conclude that if A. steulleti used its beak in the dispatch of relatively large prey, then it must have been applied with considerable precision.

Poster Session I (Wednesday)

**ANATOMY AND TAXONOMIC RELATIONSHIPS OF TWO SNAKE FRONTALS FROM THE PECOS SNAKE FORMATION, WYOMING: IMPLICATIONS FOR NORTH AMERICAN SNAKE EVOLUTION**

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Snakes represent only a minor component in North American Cretaceous faunas and occur predominately as isolated vertebral. The discoveries of two complete frontals from the Campanian Mesaverde Formation of Wyoming are the oldest known snake cranial elements from North America. These frontals were found in association with numerous fossil fishes, amphibians, reptiles, and mammals and were collected from friable, yellowish channel sandstones of the Barwin Quarry/Fales Rocks vertebrate microsite. Features of the frontals allaying them with snakes include the well-developed and ventrally fused desmoentral frontal, and the likely presence of the anterior margin of the optic foramen on the posteroventral margin of the desmoentral frontal. Conversely, these specimens are unique among snakes in possessing complete dorso-medial fusion of the frontals into a single element. In contrast to modern snakes, the anterior portion of the enclosed olfactory tracts is not separated by paired median flanges which is similar to the condition observed in the preencontemporaneous Gondwanan snake, Dinilysia. Absence of median frontal flanges suggests a basal position outside of Alethinophidia; however, an important characteristic that allies these frontal elements with modern aniloids, a basal group within the Anetinhophidia, includes the anteriorly well-developed median flange/trabecular ridge on the ventral surface of the fused desmoentral frontal. This feature is shared between modern Cylindrophis and Anilius due to the configuration of the medial processes of the palatine bones which are ‘braced’ against this frontal ridge. The oldest North American fossil genus, Coniophis (a poorly constrained taxon tentatively assigned to the Anilidae), is known only from isolated vertebrae; nevertheless, these records of Coniophis are consistent with other occurrences of this taxon and show no other generic forms throughout the North American Cretaceous. These specimens may be referable to Coniophis based on association with isolated precloacal vertebrae and while we do not here assign these frontals to Coniophis, we tentatively refer them as cf. Coniophis sp. pending further analysis.

Poster Session I (Wednesday)

**REVISION OF THE SQUAMATE FAUNA OF THE ELLISDALE DINOSAUR SITE, UPPER CRETACEOUS (CAMPAIGNAN) OF NEW JERSEY**

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Discovered in 1980, the Ellisdale “dinosaur” Site has produced the most diverse assemblage of terrestrial vertebrates yet known from the Upper Cretaceous of eastern North America. Unfortunately, the most commonly cited reference summarizing the Ellisdale fauna was published in 1992, and is sorely out of date. Most of the errors made in our early analysis of the site’s fossils were a result of attempting to find direct comparisons of Ellisdale animals with known Judithian taxa, functioning under the premise that there was faunal interchange taking place between the Cordilleran and Appalachian subcontinents. This bias was particularly evident in the fossil lizard assembly, and it was assumed that the characteristic Cordilleran genera Champsos, Leptochampsos, Contogenys and Pellosaurus were present at Ellisdale. Careful restudy of the Ellisdale squamate fauna over the subsequent years has revealed that none of the known taxa share generic affinities with these lizards of the western interior. Specimens of what were assumed to have been Champsos, Leptochampsos, and Contogenys are now understood to represent a single new taxon, Prototesus stageri.

Similarly, fragmentary remains putatively identified as Pellosaurus are now understood to be a previously unknown taxon of glyptosaurus lizard. In addition, indeterminate xenosaur, helodermatid and iguandind cannot show any favorable comparisons to equivalent taxa from Judithian or Lancian assemblages. Although there are strong familial affinities between the Ellisdale fauna and those of equivalent age from western North America, the lack of any congeneric squamate taxa suggests that the eastern subcontinent was effectively isolated from western North America by the Epeiric Sea, and for a sufficient amount of time to produce the differences that are now recognized. These data may also be able to contribute to the understanding of the timing and rate of trans-continental distribution, vicariance and taxonomic diversification among other, non-squamate Cretaceous terrestrial taxa.

Poster Session I (Wednesday)

**COMPARISONS BETWEEN OLDEST CHONDRICTHYAN CRUSHING-TOOTH AND TOOTH WITH CUSPS**

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Extant chondrichthyans give a dental lamina dentition pattern with a continuous replacement of shedding teeth. Usually crushing-teeth are considered to grow continuously (contrary to teeth with cusps) and are more subject to abrasion due to a slow replacement rate. A new Devonian crushing-tooth (Melanodus) from the Bougonnais (northern France) shows microscopic, oblique strie on its surface. These striae could be linked to the diet, not necessary due to the prey but also to the nature of the substrate. We could consider that striae result of abrasion by sand grains usually on the shells because the hardness of apatite (5) for the predator teeth is higher than the calcite one (3) for the prey test. Differences exist between inorganic and organic materials (biomineralization, composite i.e. mineral and organic material). Furthermore, the combination of osteodentine, inner more soft tissue and the enameloid-like, outer hard tissue confers highest characteristic than separate characteristic of each tissue. An outer thin layer of hard tissue protects dentine against inward deformation. In fact teeth are made of composite material microscopically and macroscopically. A second crushing-tooth (Thoralodus) from the Devonian does not show so dense strie. The surface shows a convergence of tubules of orthotrabeculine regularly spaced with the long axis perpendicular to the mesio-distal length. A front of decalcification is clearly visible on the surface, hiding diet signs. The oldest cladodont tooth (Pragian, from Algeria) without strie but the enameloid is very badly preserved- is an asymmetrical tooth in number of cusps; it leads to propose a new process of budding. The model of a continuous growth in Paleozoic teeth with cusps is proposed to correspond to chondrichthyan spine growth. Even with associated material, we can conclude about relations of jaw teeth, and tooth/tooth regarding the vascularisation and the histology. Phylogenetic, morphogenetic, histological and functional aspects may be treated about the evolution of the dermal skeleton.

Technical Session XIII, Friday 3:00

**STABLE ISOTOPES AND REES OF UNGULATES AND XENARTHANS FROM HAILE 7G: ELUCIDATING THE PALEOEKOLOGY OF A LATE PLEISTOCENE FOSSIL SITE FROM FLORIDA**

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The newly discovered Haile 7G site, a late Pleocene fossil locality in north central Florida, contains a unique mammalian fauna consisting of abundant tapirs and xenarthrans, and rare horses and carnivores. It is highly fossiliferous and yields about one skeleton per day of field excavations. Clarifying the paleoenvironment of the Haile 7G fossil site will allow a better understanding of the context of mammalian evolution over the past 2 million years in Florida. Haile 7G can be compared to the geographically and temporally similar fossil sites of Ingis 1A and Leisey 1A from Florida. Although many of the taxa from Haile 7G overlap with those present at the glacial Ingis 1A and interglacial Leisey 1A localities, anomalously low ungulate diversity limits stable isotope comparisons to tapirs, a few horses and xenarthrans, and a deer. Nevertheless, stable carbon isotope data from these taxa reveal that Haile 7G principally represents a forested environment. The majority of all taxa sampled are interpreted to have utilized C3 plant resources, despite the concurrent presence of C4 grasses at, or within some distance from, the site. Stable isotopic evidence from Equus sp. at Haile 7G will facilitate the interpretation of this site as glacial or interglacial based on comparing serial samples to those from the late Pleocene Ingis 1A and Pleistocene Leisey 1A localities. In addition to examining ungulate dietary niches, it may be possible to reliably interpret xenarthran stable isotopes if they are diagenetically altered in a similar manner to ungulate tooth enamel. The degree of diagenesis is evaluated by comparing the relative uptake of rare earth elements (REEs) in ungulates and xenarthrans (e.g. enamel, orthodentine, dentine, bone) from Haile 7G, Ingis 1A, and Leisey 1A. While it is tempting to use xenarthran stable isotope data for paleoecological interpretations, caution must be taken if relative uptake of orthodentine or dentine tissues exceeds that of enamel.