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New Genera and Species of Fossil Marine Amioid Fishes (Actinopterygii, Holostei) from the Late Cretaceous Agoult locality in Southeastern Morocco

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increased developmental age in two of the specimens. Additionally, developmental and growth patterns including the rapid fusion and obliteration of the mandibular symphysis and the widening of the mandible at the symphysis were identified. The concentration of Haversian canals along the occlusal margin and lingual ridges suggests remodelling as a histological response to high levels of repeated stress. These descriptions add to our knowledge of the growth and development of Caenagnathidae and the identification of an ontogenetic series may aid in the taxonomic classification of partial or incomplete caenagnathid skeletons.

Poster Session I (Wednesday, August 23, 2017, 4:15 – 6:15 PM)

THERIAN MAMMALS FROM THE LOWER BLACK PEAKS FORMATION, BIG BEND NATIONAL PARK, TEXAS ARE TORREJONIAN, NOT PUERCAN, IN AGE

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The early Paleocene mammal faunas from the Black Peaks Formation, Big Bend National Park, Texas, represent the southernmost of North America and thus are important for understanding mammalian diversity and biogeographic patterns soon following the end-Cretaceous mass extinction. Some workers have argued the faunas from the lower parts of the Black Peaks Formation are Puercan in age based primarily on fossils collected from localities in or near the Dawson Creek area: TMM 41400 (LSU VL-111; "Tom's Top") in Dawson Creek and TMM 42327 (LSU VL-108; "Dogie") from nearby Rough Run Amphitheater about 5 miles (8 km) east of the Dawson Creek section. "Tom's Top" and "Dogie" have yielded diverse microvertebrate assemblages that are 20 m and 80 m, respectively, above the highest occurrence of dinosaur bones in those areas. A re-evaluation of these faunas indicates that they are Torrejonian, rather than Puercan, in age.

The therian mammals from "Tom's Top" includes a new small species of the carnivoramorph *Bryanictis*, the euarchontan *Mixodectes malaris*, the plesiodapiform *Plesiolestes wilsoni*, and the "condylarth" *Promioclaenus* cf. *P. lemuroides*. "Dogie" contains a more diverse fauna including the metatherian *Peradectes* sp., a generically unidentifiable cimolestid, the new small species of *Bryanictis*, and six "condylarths"; cf. *Goniacodon levisanus*, *Periptychus carinidens*, *Haploconus* sp., *Ellipsodon* cf. *E. inaequidens*, and a new species of *Mioclaenus*. The presence of *Periptychus carinidens* indicates a Torrejonian age by definition. The other mammals present are consistent with a Torrejonian age assignment. Several of the mammalian genera appear to be restricted to the American Southwest supporting the presence of a distinct southern mammalian faunal province during the Torrejonian.

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Technical Session XVI (Saturday, August 26, 2017, 11:00 AM)

A NEW CENTROSAURINE CERATOPSID FROM THE UPPER CRETACEOUS TWO MEDICINE FORMATION OF MONTANA AND THE EVOLUTION OF THE 'STYRACOSAUR' DINOSAURS

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The Late Cretaceous Two Medicine Formation of northwestern Montana has produced numerous remains of centrosaurine ceratopsids, from which three stratigraphically separated taxa, *Rubeosaurus ovatus*, *Einiosaurus procurvicornis*, and *Achelousaurus horneri*, are currently recognized. *Rubeosaurus*, the stratigraphically lowest at 60 meters below the upper contact with the Bearpaw Formation, is diagnosed by a parietal with medially inclined P3 processes, elongate P4 and P5 processes, and a tall, erect nasal horn. This taxon was originally known only from the isolated holotype parietal and first named *Styracosaurus ovatus*. With the recent referral of the more complete MOR 492 to *S. ovatus,* new characters were attributed to this taxon which separated it from *Styracosaurus* and created the need for the new genus name *Rubeosaurus*. Here we reassess MOR 492 and provide evidence that it is not referable to *S. ovatus*. Rather than possessing seven parietal processes (P2-P8) per side, with elongate P4 and P5 processes as previously thought, MOR 492 only exhibits six processes (P2-P7) per side. This is supported by imbrication of the two anteriormost processes (P6 and P7), as conserved in all Two Medicine Formation centrosaurines. With P6 and P7 identifiable, P5 is demonstrably non-elongate and P4 only somewhat elongate, unlike *S. ovatus*-. Further, there is no evidence that the preserved P3 process of MOR 492 was medially inclined, but rather the anteroposteriorly near-straight left lateral bar of MOR 492 produces a posteriorly inclined P3, as conserved in the stratigraphically successive *Einiosaurus*. Therefore, the characters from MOR 492 used to erect *Rubeosaurus* no longer pertain to the diagnosis of *S. ovatus*, making *Rubeosaurus* a junior synonym of *S. ovatus*. *S. ovatus* is a genuine taxon represented only by the holotype.

MOR 492 possesses a unique combination of characters drawn from *Styracosaurus albertensis* and *E. procurvicornis*, which is consistent with its intermediate stratigraphic placement and recovered phylogenetic position, and warrants diagnosing a new taxon. Like *Styracosaurus*, MOR 492 possesses an elongate, erect nasal horn, but like *Einiosaurus* exhibits a reduced P5. The somewhat elongate P4 of MOR 492 is intermediate in length between the stratigraphically highest *Styracosaurus* specimens and lowest *Einiosaurus* specimens. This is consistent with the hypothesis that these taxa represent anagenetic evolution, though cladogenesis remains a viable alternative. Overall, this study refines hypotheses of North American ceratopsid evolution.

Poster Session II (Thursday, August 24, 2017, 4:15 – 6:15 PM)

NEW GENERA AND SPECIES OF FOSSIL MARINE AMIOID FISHES (ACTINOPTERYGII, HOLOSTEI) FROM THE LATE CRETACEOUS AGOULT LOCALITY IN SOUTHEASTERN MOROCCO

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The Late Cretaceous Agoult locality in southeastern Morocco has yielded a diverse array of marine fishes including †Macrosemiidae, †Pycnodontidae, †Aspidorhynchidae, †Cladocyclidae, †Sorbinichthyidae, †Paraclupeidae, †Clupavidae, †Dercetidae, †Aipichthyoidei, and †Pycnosteroididae. Housed in University of Alberta collections from Agoult are numerous specimens of at least two undescribed amioid fishes. They share derived features with the Amiidae including a rounded or almost rounded caudal fin. They share with derived amiids an elongate dorsal fin, although the length of the fin differs somewhat between the new species. Four subfamilies are currently recognized in Amiidae: †Amiopsinae, †Solenhofenamiinae, †Vidalamiinae, and Amiinae. We recognize two new species, each in a monotypic genus. Compared to representatives of the amiid subfamilies, the two new species differ in retaining the more primitive S-shaped as opposed to semicircular posterior border of the hypural complex in the caudal fin. The new species differ from each other in the length of the dorsal fin, the number of supraneurals, and the number and posterior extent of the ossified ural centra. Preliminary phylogenetic analysis suggests that the Moroccan amioids may be related to another amioid genus, †*Tomognathus*, and that these together should be recognized as a new family that is the sister group of the Amiidae. The †Sinamiidae are the sister group of the new family plus the Amiidae. These new amioids add to the known taxonomic and morphological diversity of earlier marine members of the Amiiformes, a group represented today only by a single North American freshwater species, the Bowfin, *Amia calva* Linnaeus.

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Poster Session IV (Saturday, August 26, 2017, 4:15 – 6:15 PM)

SEABIRDS AS ECOLOGICAL INDICATORS IN LATE CRETACEOUS MARINE ENVIRONMENTS

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In modern marine ecosystems, seabird geographic distribution is correlated with physical, chemical, and biological oceanographic factors. Pursuit diving seabirds – those that actively pursue prey underwater using wing or foot propulsion – are more limited in distribution and closely tied to oceanographic factors because diving ability is often gained at the expense of flight capabilities. Today, pursuit diving seabird populations are restricted to waters cooler than 15ºC. In contrast, Late Cretaceous marine environments were characterized by greenhouse climate and high sea levels, producing marine environments generally warmer than 15ºC. Despite this, flightless pursuit diving seabirds called hesperornithiforms are particularly well-represented from North American Western Interior Seaway (WIS) deposits. The contrast in distribution implies that different biotic and abiotic factors may have affected Late Cretaceous epicontinental ecosystems than seen in today's oceans.

Biotic factors like predator-prey relationships and competition are hypothesized to have affected fossil penguin diversity in the Cenozoic, and are also suggested to influence modern pursuit diving seabird distributions. However, the spatio-temporal overlap between hesperornithiforms, marine reptiles, and large predatory fishes does not support the same type of temperature-based competition or predator-prey relationships as the biogeographic driver in the WIS. Rather, is seems that the presence of different apex predators (most notably the lack of marine mammals) may partially account for biotic factors affecting hesperornithiform distribution. Additionally, the shallow depth, abundance of shoreline, and high primary productivity characterizing epicontinental seas are the abiotic factors that likely explain why pursuit diving seabird distribution was so different in the Late Cretaceous compared to today.

Poster Session III (Friday, August 25, 2017, 4:15 – 6:15 PM)

IMPLICATIONS OF AN ANALYSIS OF DEEP PES TRACES AND MANUS IMPRESSIONS FOR THE SUPPOSED *ATREIPUS-GRALLATOR* ICHNOGENERIC PLEXUS*:* AN APOMORPHY-BASED APPROACH

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The apparent continuum between the Triassic ichnogenera *Atreipus* and *Grallator* has been used as a basis for hypothesizing an evolutionary continuum between their track makers. We use an apomorphy-, cladistics-based methodology of track maker identification to test the hypothesized *Atreipus*-*Grallator* complex that we argue does not reflect a biological entity. Eastern North American *Atreipus* (*A. milfordessis, A. sulcatus,* and *A acadianus*) morphology, in well-preserved examples, is consistent with a silesaurid, based on the presence of a highly reduced digit I (hallux) on the pes that is an apomorphy of *Silesaurus* as seen in deep footprints in which the metatarsus is impressed. In marked contrast, brontozoids, including *Grallator,* have pedal traces consistent with early saurischians in retaining the primitive condition of a relatively long digit I, always present in deep footprints. *Atreipus* is usually a quadrupedal ichnite with a manus bearing 3 to 5 short digits and small claws. In contrast, the simplest hypothesis for dinosaur monophyly has the primitive condition for the dinosaurian manus with elongate manual digits I-III that restricted quadrupedal locomotion (e.g., *Heterodontosaurus* and *Herrerasaurus*), and did not allow significant pronation, or extreme hyperextension. Examination of the very few brontozoid and basal sauropodomorph manus impressions is consistent with this interpretation in which manus impressions are present only in resting traces. In medium sized brotozoids (*Anchisauripus*) the manus trace consists only of knuckle impressions of digits II and III. *Atreipus* had small manus with small claws primarily used for locomotion that would itself be highly derived compared to the primitive dinosaurian condition. As silesaurs were a separate clade from dinosaurs and