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

A POSSIBLE CARCHARODONTOSAURID THEROPOD RECORD FROM THE VALANGINIAN (EARLY CRETACEOUS) OF PATAGONIA, ARGENTINA

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Skeletal remains corresponding to an adult specimen of an allosauroid theropod (MLL-Pv-007) were collected in the sandstones of the Mulichinco Formation (Valanginian, Lower Cretaceous of the Neuquén Basin). The specimen includes the tip of the snout, some postdentary bones, vertebrae (cervicals, dorsals, sacrals and caudals), ribs, and fragments of the pelvic girdle. The cervico-dorsal section consists of five complete, articulated vertebrae (the three last cervicals and first two dorsals) with cervical ribs attached. Nine posterior dorsal vertebrae are represented by portions of the neural arches and centra, and are still attached to their ribs. The three preserved sacral vertebra are very pneumatic, and the four articulated caudals are from the middle to distal part of the tail. The hip elements are fragmentary but include the dorsal margin of the supracetabular blade, the pubic peduncle, and fragments of the pubis. The sculptured lateral surface of the maxilla, the moderately sized cervical epipophyses, the presence of sacral pleurocoels, and the well-developed prespinal laminae in the caudals form a combination of characters present in allosauroid theropods. A preliminary cladistical analysis links this specimen with carcharodontosaurid theropods by having a single unambiguous synapomorphy — a maxilla with a sculptured external surface. These are the first reported theropod remains from the formation, which is associated stratigraphically with dicraeosaurid sauropods and non-hadrosaurid ornithopods. The Bajada Colorada Fm partially overlaps the Mulichinco Formation temporally, and has yielded fragmentary and poorly preserved theropod remains assigned to abelisauroid and megalosaurid theropods. Thus, the Mulichinco specimen would represent the oldest carcharodontosaurid record from South America, and suggests that the evolutionary history of this clade in the continent is older than thought.

Grant Information:
Research supported by grants from PIP-CONICET 0233/0683, University of Río Negro and Municipalidad de Las Lajas (Neuquén) (to R.A.C).

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

THE RECORD OF *DEINOSUCHUS* EAST AND WEST OF THE WESTERN INTERIOR SEAWAY

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Deinosuchus is a giant (10+ m) Late Cretaceous crocodylian. It was the largest semiaquatic predator in its environment and is known to have fed on dinosaurs. Fossils have been found in units of Campanian age from Coahuila, northern Mexico to Montana in the west and Mississippi to New Jersey in the east. Three species have been named - *D. hatcheri* and *D. riograndensis* from the western interior and *D. rugosus* from the Atlantic coastal plain - and recent consensus has been that all three represent a single widely-ranging species. We studied newly-collected material from the Big Bend region of western Texas and increased sampling of the lineage from throughout North America to review species-level systematics of *Deinosuchus* and help refine its phylogenetic placement among crocodylians.

Deinosuchus from western and eastern North America can be consistently differentiated and represent different species. Western specimens have inflated, deeply ornamented osteoderms whose keels are largely obliterated whereas eastern specimens have pronounced keels and reduced ornamentation. Additional differences are manifest in the premaxilla. Eastern specimens have deep occlusal marks posterior to the junction of the first and second premaxillary teeth. Ontogenetic sequences show the development of this feature from a depression to a deep groove as the animal matures.

We conducted a phylogenetic study using Mesquite, Winclada and TNT. The matrix included 73 crocodylian taxa and 156 characters – the authors included new character states describing the unique osteoderm and skull table morphology of *Deinosuchus*. *Borealosuchus sternbergii* was used as an outgroup to root the trees. Eastern and western *Deinosuchus* are recovered as sister taxa in a basal polytomy with contemporaneous North American *Leidyosuchus canadensis* and more derived alligatoroids. Pruning the taxa to include only alligatoroids results in *Deinosuchus* being recovered one node crownward of *L. canadensis*. Homoplastic character states shared with crocodylians outside of Alligatoroidea are responsible for the modest difference in the placement of *Deinosuchus* between the analyses. This work reinforces the identity of the "terror crocodile" as an alligator.

Technical Session XVII (Saturday, August 26, 2017, 8:30 AM)

THE IMPORTANCE OF RATS: MURID RODENT FOSSILS FROM AUSTRALIA AND WHY THEY MATTER

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Murid rodents are an understudied component of the Australian fossil record, despite representing nearly 25% of the extant non-volant terrestrial mammal fauna. In particular, few extinct taxa have been described, and the palaeoecology of many fossil species are poorly known. Murids appear to have arrived in Australia during the early Pliocene, but their fossil record is patchy at least until the early Pleistocene. By that time several major lineages were already established, and molecular phylogenies suggest that those modern taxa not yet represented by fossils had also diverged. The majority of fossil murids from the middle to late Pleistocene have been assigned to modern species, so the discovery of a diverse assemblage of new taxa from the middle Pleistocene of eastern tropical Queensland is surprising. The main study sites are limestone cave fills in the Mount Etna area in central eastern Queensland, which together contain a record of faunal and environmental change from >500 ka to the present day. The oldest deposits contain faunal assemblages indicative of a rainforest palaeoenvironment, whereas those <280 ka predominantly contain fauna adapted to xeric habitats. The sites in the Mount Etna area thus document the collapse of a diverse rainforest palaeoenvironment during the middle Pleistocene. A similar event is recorded in cave sites in the Broken River area in northeast Queensland. Although Broken River and Mt Etna have many faunal similarities to suggest continuous rainforest coverage over a large area of eastern Queensland, the loss of rainforests was asysnchronous, with the northern fauna experiencing turnover prior to that in central Queensland. Several marsupial taxa from middle Pleistocene sites also show similarities to species otherwise known only from New Guinea, and this has suggested to some workers that rainforests were continuous with faunal exhanges between the two landmasses at that time. 12 extinct murid species are associated with sites interpreted as rainforest palaeoenvironments. This includes taxa with similarities to both extant north Queensland/New Guinean rainforest taxa as well as fossil assemblages from the Early Pleistocene. However, the absence of several distinctive New Guinean murid lineages from the study sites suggests that large-scale faunal exchange could only have occurred prior to the arrival and diversification of murids. It would thus appear that the extensive area of rainforest in central Queensland during the middle Pleistocene was already isolated from that to the north prior to its destruction.

Podium Symposium (Wednesday, August 23, 2017, 11:30 AM)

PATTERNS OF LIMB ELONGATION IN ENDEMIC SOUTH AMERICAN UNGULATES (NOTOUNGULATA AND LITOPTERNA) AS MEASURED BY METATARSAL/FEMUR RATIO

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The early appearance of hypsodont mammals in South America has spurred a variety of investigations of habitat change and mammalian paleobiology spanning the middle to late Cenozoic. Nevertheless, few such studies have focused on mammal limb morphology and potential correlations with vegetation structure. I compiled genus-level occurrences of notoungulates and litopterns, the predominant South American endemic ungulates, for late Oligocene to Pleistocene South American Land Mammal Ages (SALMAs; Deseadan to Lujanian) and calculated a measure of distal limb elongation, metatarsal/femur ratio (MT/F), to quantify and compare limb morphology across this interval. Litopterns have highest MT/Fs as a group, followed by typothere and toxodont notoungulates (mean = 0.45, 0.37, and 0.24, respectively; $p < 0.05$, Wilcoxon test). Few subclades are sufficiently represented to permit within-group trends to be assessed except: (1) mesothere notoungulates, with decreasing MT/Fs, possibly related to fossoriality; (2) pachyrukhine notoungulates, with increasing MT/Fs, possibly linked to habitat; and (3) macraucheniid litopterns, with diverging MT/Fs, possibly correlated with body mass. No endemic ungulate has MT/F > 0.65, the lower limit for modern "cursorial" ungulates (camelids, pecoran ruminants, equids). Only two ungulates have MT/F > 0.50: the early Miocene monodactyl proterotheriid litoptern *Thoatherium* (0.59) and an undescribed, relatively small-bodied macraucheniid litoptern from the middle Miocene of Quebrada Honda, Bolivia (0.53). Surprisingly, the middle Miocene interatheriid notoungulate *Miocochilius*, which shows greater lateral digit reduction than any other notoungulate, does not have appreciably longer distal limbs than other typotheres of similar size: its MT/F (0.40) is approximately equal to that of the early Miocene interatheriid *Protypotherium* (0.42) as well as the contemporaneous hegetotheriid *Hemihegetotherium* (0.41). Although only a small proportion of native ungulates could be included in this study due to limited postcranial material, there is no evidence for concordant distal limb elongation in multiple groups of endemic ungulates during this interval as has been documented for North American ungulates. This supports a recent hypothesis based on astragalus morphology that the most significant change in endemic ungulate limb morphology during the middle to late Cenozoic took place during the late Eocene or early Oligocene, concordant with the evolution of hypsodonty and development of more open habitats.

Grant Information:
Supported by the National Science Foundation (EAR 0958733, EAR 1423058)

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

IDENTIFICATION OF SCIURIDS (RODENTIA:SCIURIDAE) FROM TWO LATE CENOZOIC LOCALITIES IN THE EASTERN U.S.

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Sciurids are one of the most diverse mammalian species worldwide, yet this is not reflected in the fossil record, particularly in North America. Few non-marmotine sciurid records occur in North America before the Pleistocene; east of the Mississippi River there are only three pre-Pleistocene sciurid records: two marmotine squirrels from Pipe Creek, Indiana, and a pteromyine flying squirrel from the Palmetto Fauna of Bone Valley, Florida. Described are sciurids from two more late Miocene-early Pliocene localities—the Gray Fossil Site, Tennessee, and Tyner Farm, Florida. Three Sciuridae taxa comprised of four ecomorphs are described from the late Miocene-early Pliocene Gray Fossil site; these are the chipmunk, either *Eutamias* or *Neotamias*, the flying squirrel, *Glaucomys*, and two tree squirrels, one large and one small, identified as cf. *Sciurus*. From the late Miocene site Tyner Farm two ground squirrel ecomorphs were identified: a chipmunk, identified to the subtribe Tamiina, and a marmotine ground squirrel, identified to the tribe Martmotini. The presence of the three arboreal ecomorphs at GFS confirm the paleoenivronment was densely forested, consistent with previous studies. Two ground squirrel ecomorphs at Tyner Farm suggest a more open grassland type environment; the presence of both browsers and grazers suggest a wooded savannah ecosystem, thus the inferences based on the sciurids are consistent with the paleoenvironment as suggested by the presence of both grazing and browsing ungulates. The identification of sciurids from these two sites expands the sciurid record of North America, adding to the greatly lacking record of non-marmotine squirrels and providing insights into the evolution of the family through time.