Technical Session XV (Saturday, November 5, 11:15 am)

AN ENIGMATIC LARGE-SIZED PARTIAL SKELETON OF AN EUCYNODONT FROM THE ANTLERS FORMATION, TRINITY GROUP, EARLY CRETACEOUS OF TEXAS

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The first remains of Early Cretaceous mammals in the Antlers Formation, Trinity Group, Texas, were described as a new genus and species of triconodont, *Astroconodon denisoni*. Mammals from the Antlers Formation, both in Texas and Oklahoma, include, in addition to *Astroconodon*, basal multituberculates, a spalcotheroid, a variety of small tribosphenic mammals basal to Theria, and arguably primitive members of both Metatheria and Eutheria. A small semi-articulated skeleton was also found at Mart Frye's Farm, about 4.5 miles from the center of Decatur, TX, in the sandstones of the Antler Formation, Trinity Group. Mart Frye's farm is about 2 miles from Greenwood Canyon, the type locality of *Astroconodon*.

The skeleton includes ten dorsal vertebrae (some of them articulated to ribs), partial right pelvis, epipubic bone and partial right leg including femur and proximal fragments of tibia and fibula. No dental elements were found. All of the bones are deficiently preserved and the articular surfaces appear not to be completely ossified suggesting a sub-adult individual. The ilium, pubis and ischium are relatively gracile, while the femur, which has suffered much compression, is short and stout, with poorly differentiated laminar trocanters and neck. The incomplete femoral head would be oval and only slightly medially inflected. In these features, the femur resembles those of recently described triconodonts from the Jurassic and Cretaceous of China and tritylodonts. The pelvis (ilium plus ischium) is approximately 40mm long and the femur slightly longer. This is a large specimen for a Mesozoic mammal and does not agree in size with any of the dentally known mammals from the Antlers Fm. The similarly aged Cloverly Fm. from central USA, has yielded a tricondont similar to *Astroconodon* and, among other forms, the larger gobiconodontid *Gobiconodon ostromi*. The femur and tibia of the skeleton presented here are unlike that of *Gobiconodon*. We regard this partial skeleton as representing either a yet unknown mammal, probably a triconodont, or more likely a tritylodont.

Technical Session XV (Saturday, November 5, 10:45 am)

OLDEST FOSSIL EVIDENCE ON ORIGIN OF THE MAMMALIAN BRAIN

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Origin of the mammalian brain is of general scientific interest and thanks to comparative anatomy and embryology of living species, many different hypotheses have been postulated as driving mechanisms in its early evolution. X-ray computed tomography of the Early Jurassic mammaliaforms Morganucodon and Hadrocodium affords a test of these various hypotheses using new information from the fossil record, and it sheds light on a nuanced historical sequence of evolutionary events. Basal cynodonts had uniformly small brains, with encephalization quotients far below mammalian levels. In two measurable evolutionary pulses, relative brain size expanded to mammalian levels with enlarged olfactory bulbs, neocortex, pyriform cortex, and cerebellum. Encephalization was likely driven by increased resolution in olfaction and tactile sensitivity from body hair, and improved neuromuscular coordination. The origin of crown Mammalia saw a third pulse of olfactory enhancement, with ossified ethmoid turbinals supporting an expansive olfactory epithelium, allowing full expression of a huge odorant receptor genome. Odorant receptor gene duplication events are implicated in all three evolutionary pulses. At its origin, the brain in the ancestral mammal differed from even its closest extinct relatives specifically in its degree of high-resolution olfaction, as it exploited a world of information dominated to an unprecedented degree by odors and scents.

Poster Session III (Friday, November 4)

THE WILKIN-QUARRY RANCHOLABREAN BIOTA OF LINCOLN COUNTY, NEVADA

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A sand-and-gravel quarry located near Panaca, Nevada (elev. 4,800 feet) has produced a *Bison latifrons* horn core and associated skull fragments, tusk material (probably *Mammuthus*), freshwater gastropods, pollen, and impressions of broad leaves. *Bison latifrons* is rare in Nevada, having been described from only one other site (Tule Springs). The quarry is owned and operated by Jim Wilkin, who has graciously cooperated in this research.

Most of the sediment consists of coarse sandy gravel, however there are isolated patches of silt. The *Bison* and proboscidean material was collected from the coarse gravels, whereas the pollen. leaf impressions and gastropods were recovered from the finer-grained sediment.

A highly diverse assemblage of pollen types has been recovered, including approximately 30% high-spine Asteraceae (sunflower family) and about 20% cheno-am pollen (mostly salt-tolerant species such as saltbush). *Artemesia* (sagebrush) pollen is abundant, reflecting a cold desert setting, however *Larrea* (creosote), a hot-desert genus, is also anomalously present. Also present is pollen from oak, alder, pine, juniper, sedges, and roses among other taxa.

Three species of freshwater gastropods occur in the assemblage: *Gyraulus circumstriatus*, *Gyraulus parvus*, and *Physella virgata*, all of which are still extant. *P. virgata* lives in ephemeral bodies of water and is capable of migrating between shallow pools. The most abundant species are *G. circumstriatus* and *G. parvus*, both of which inhabit ephemeral pools and marshes.

The gravelly sediment occurs in 1-to-2-m-thick, fining-upward cycles. Cross-bedding and clast imbrication show a predominantly southwestward paleocurrent direction, which matches the flow direction of Pleistocene White River. That river drained into the Colorado River via Meadow Valley Wash.

We interpret this biota and associated sediments to represent a floodplain ecosystem with a shallow, gravel-bed river. The finer-grained deposits represent abandoned channels; these became marshy pools teeming with tiny gastropods. Alder was a conspicuous riparian species, with a woodland of oak, juniper, and pines occurring in nearby drier habitats. Xeric habitats apparently also existed in the vicinity.

Technical Session XV (Saturday, November 5, 9:45 am)

MIDDLE PERMIAN BIODIVERSITY CHANGES AND THE GUADALUPIAN EXTINCTION ON LAND; UNRAVELING EVIDENCE FROM THE BEAUFORT GROUP, SOUTH AFRICA

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The Beaufort Group of South Africa chronicles a near continuous record of fluvial sedimentation from the Middle Permian to the Mid Triassic. The lowermost formation in the group, the Abrahamskraal Formation, has the potential to record the end-Guadalupian extinction, if indeed it occurred on land. This formation, which is up to 2 500 m thick and has a rich diversity of fossil tetrapods, corresponds with the *Eodicynodon* and *Tapinocephalus* biozones. Despite its potential significance, it has received relatively little research attention because fieldwork has been hampered by the intensely folded nature of the rocks. Extensive fieldwork over many years combined with the application of the newly developed GIS-based database for Beaufort fossils has begun to remedy this problem, and allowed important new insights into faunal change in the Abrahamskaal Formation. In particular, taxonomic refinements for dinocephalians and dicynodonts have enabled a more detailed delineation of stratigraphic ranges and biogeographic distributions of the various elements of the tetrapod fauna. The recent recognition of several new dicynodont genera from the *Tapinocephalus* Zone has brought the diversity of this clade up to levels that are similar to those of the Late Permian. In addition, dicynodonts display a stable pattern of turnover throughout the stratigraphic range of the Abrahamskraal Formation, with no apparent extinction event. In fact, the appearance of the common genus *Diictodon* predates the disappearance of dinocephalians, and it retains its high abundance into succeeding biozones. Apart from providing a greater understanding of biodiversity changes throughout the stratigraphic succession, these new data make it possible to biostratigraphically subdivide the *Tapinocephalus* Assemblage Zone and to refine stratigraphic correlation with other Middle Permian continental deposits.

Poster Session I (Wednesday, November 2)

A HUMERUS OF A GIANT LATE EOCENE PSEUDO-TOOTHED BIRD FROM ANTARCTICA

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We report a nearly complete right humerus (SGO.PV 22001) of a huge pseudo-toothed bird (Odontopterygiformes) from the Late Eocene of La Meseta Formation, Seymour Island, west Antarctica, collected during the XLVII Chilean Antarctic Scientific Expedition (2011). The fossil was found in glacial moraine deposits belonging to the stratigraphical unit "Telm 7", approximately 1.5 km to the west from the Marambio base. Its preserved length is 85 cm and only the distal end is missing. The fragmentary material from Seymour Island is not identifiable at genus- and species-levels. It is notable, however, that by its morphological features, the fossil more closely resembles Neogene than Paleogene Odontopterygiformes. Features in which it agrees with *Pelagornis* but differs from *Dasornis* include the greater cranial prominence of the caput humeri, which also has a more abrupt and straighter distal border. Although the tuberculum dorsale is badly preserved, it is wide and protrudes proximally to the level of the caput. The diaphysis is flat and also distinguishes the fossil from *Dasornis*. Judging from the size of the humerus, the fossil appears to have been larger than the largest known pelagornithid, *Pelagornis chilensis*. Together with another large-sized humerus from the middle Eocene of Belgium, which was tentatively assigned to *Dasornis emuinus*, the *Pelagornis*-like morphology of the fossils supports a single origin of giant pseudo-toothed birds as has been previously suggested.