

group which would support to the possibility that both the molar cusp triangulation and the separation of the middle ear from the dentary are homoplastic.

Friday 1:30

**EARLY WHALES *ICHTHYOLESTES* AND *PAKICETUS* (MAMMALIA, CETACEA): TERRESTRIAL, AQUATIC, OR BOTH? CAVEAT EMPTOR!**

GINGERICH, Philip, Univ. of Michigan, Ann Arbor, MI

*Ichthyolestes* was named in 1958, based on a maxilla from the early middle Eocene of Pakistan with teeth interpreted to represent a fish-eating mesonychid. A second larger genus *Pakicetus* was named in 1981 from the same provenance, based on an archaeocete skull with both aquatic and terrestrial characteristics. These are classified as Pakicetidae, and from 1983 were interpreted to be an amphibious stage in the evolutionary transition of whales from land to sea. Some later studies interpreted pakicetids as fully aquatic, or fully terrestrial, but neither extreme is justified.

Evidence favoring a terrestrial habitus for pakicetids includes (1) preservation with land mammals in continental red beds; and (2) retention of a periotic integrated in the basicranium, multiple contacts between the tympanic and basicranium, small mandibular foramen, unreduced crus longum of the incus, tympanic annulus and membrane, and semicircular canals of large radius. Evidence favoring an aquatic habitus includes (1) sharply pointed teeth and an elongated rostrum for feeding on fish; (2) a tympanic involucrum, sigmoid process on the bulla, and inflated incus for inertial hearing in water; and (3) tooth enamel with  $\delta^{13}\text{C}$  values of low variability. Features shared by artiodactyls and later semiaquatic protocetids are not informative, but short cervical vertebrae enhancing hydrodynamic stability, and a short ilium minimizing any gluteal contribution to extension of the femur complicate a fully terrestrial interpretation.

Aquatic or terrestrial? The type specimen of the type species of the type genus of Pakicetidae has clear evidence for both, and new evidence from isotopes, periotics, and postcrania corroborates that pakicetids were semiaquatic. When a representative skeleton is found, it will indicate how pakicetids swam and how they should be exhibited. In the meantime, caveat emptor. Journalists write what they think we want to hear, and dealers sell what they think we will buy. Most of us are educators, in some capacity, and we should do our homework before we believe or buy extreme interpretations.

Neoceti Symposium, Saturday 10:30

**ARAEODELPHIS NATATOR KELLOGG, 1957, THE MOST PRIMITIVE KNOWN MEMBER OF THE PLATANISTIDAE (ODONTOCETI, CETACEA), AND RELATIONSHIPS TO OTHER CLADES WITHIN THE PLATANISTOIDEA**

GODFREY, Stephen, Calvert Marine Museum, Solomons, MD; BARNES, Lawrence, L.A. County Museum of Natural History, Los Angeles, CA; BOHASKA, David, Smithsonian Institution, Washington, DC

The extant river dolphins in the family Platanistidae, *Platanista minor* and *P. gangetica*, are amongst the most highly derived odontocetes. In contrast to *Platanista*, stem-ward Miocene platanistids like *Prepomatodelphis*, *Zarhachis*, and *Pomatodelphis*, are more diverse anatomically, more widespread geographically, and are marine in habitus. A partial cranium (USNM 526604) from the Plum Point Member that is low in the marine Calvert Formation (Early Miocene, Burdigalian) in Calvert Cliffs, Maryland, is identified as *Araeodelphis natator* Kellogg, 1957. Previously, this species was un-assignable to any odontocete family for lack of diagnostic cranial remains, but USNM 526604 demonstrates that *A. natator* is a member of the Platanistidae, and is its most primitive known member. *A. natator* has a suite of plesiomorphies providing a clearer picture of the cranial morphology for stem Platanistidae. Synapomorphies of *A. natator* that define the Platanistidae are: asymmetrical cranial vertex; frontals exposed between mesethmoid and nasals on the posterior wall of naris; elongate and narrow rostrum; mesorostral groove closed over dorsally on the anterior half of the rostrum by a meeting of the premaxillae at the sagittal plane; premaxillae and maxillae both reaching the anterior rostral extremity; distal ends of premaxillae and maxillae fused at the rostral extremity; posterior ends of premaxillae expanded posterolaterally; posterior maxillary foramina located far posteriorly; thickened frontals and maxillae comprising incipient supraorbital crests; zygomatic process of the squamosal flattened transversely and expanded dorsoventrally; and zygomatic process having a broad connection to the dorsoventrally reduced postorbital process of the frontal. Synapomorphies shared by *Araeodelphis* and other platanistoid families (Squalodontidae, Waipatiidae, Squalodelphinidae, and possibly Dalpiazinidae) are presence of a foramen spinosum, and loss of the coracoid process and supraspinatus fossa on the scapula. The Squalodelphinidae is the apparent sister taxon of the Platanistidae.

Poster Session III

**IMAGING THE OTIC CAPSULES OF A Pliosaur**

GOMEZ-PEREZ, Marcela, Univ. of Cambridge, Cambridge, United Kingdom; NOE, Leslie, NORMAN, David, The Sedgwick Museum, Cambridge, United Kingdom

Well-preserved pliosaurs (Reptilia: Sauropterygia) are rare, and those with high-quality braincase material are extremely uncommon. A new and undescribed genus and species of pliosaur from the Lower Cretaceous of Colombia, South America, is one of the very few pliosaur specimens which preserves the otic capsules and braincase substantially complete, articulated and uncrushed. The 3-D cranium of this new specimen has been acid-prepared, revealing the otic capsules and details of the internal osseous labyrinth. However, the bones surrounding the osseous labyrinth are fused and extremely fragile, so understanding the

detailed osteology and visualising the precise morphology of the semicircular canals is challenging. In order to obtain the fullest possible information from the fossil, the otic capsules were CT scanned and the images manipulated with the software MIMICS to produce a virtual 3-D 'cast' of the semicircular canals. The generation of this 3-D computer model of the otic capsules and the osseous labyrinth of this pliosaur, displays for the first time the full details of this region of the cranium in a sauropterygian marine reptile. Reconstructions of the osseous labyrinth are presented and the 3-D digital 'endocast' suggests that the balance and angular acceleration sensory system in this group of marine reptiles was developed so as to be equally sensitive in all three planes of space.

Poster Session I

**DISCOVERY OF AN IMPORTANT HOMINID TRACKSITE, ?EARLY HOLOCENE OF COAHUILLA, MEXICO**

GONZALEZ, Arturo, LOPEZ, Jose, Laboratorio de Paleontología, Saltillo, Mexico; ROJAS, Carmen, INAH, Saltillo, Mexico; LOCKLEY, Martin, Dinosaur Tracks Museum, Denver, CO

The Museo del Desierto (MUDE) collections include two well-preserved Holocene hominid tracks, with a previously obscure history. Although collected from a 'tufa-like' deposit near Cuatro Ciénegas, Coahuila, in 1961, since then, until 2006, the locality of origin was unknown. We report the discovery of a dozen hominid tracks in a similar 'tufa-like' deposit associated with the famous underground springs and pools from this same region. The new site, previously excavated for building stone, may be the same locality from which the original tracks were collected. The two MUDE tracks, a right and a left, are 24 cm long, 10 cm wide, and may be from the same trackway. They are well-preserved showing heel, ball and all five toe impressions. The new discovery includes an incomplete trackway of 11 footprints, of which 6 are also well-preserved, mostly with clear toe impressions. These tracks are 25 cm long and 10 cm wide with steps from 74-81 cm. Another area reveals another clear track on a trampled surface. Hominid (presumably *H. sapiens*) tracks from the Americas have recently generated much interest because of controversial claims of purported Mexican tracks that may date to 40,000 years. With the exception of one track from Chile dated at about 12,500 years, the oldest well-documented and well-preserved hominid tracks are from Nicaragua, California and Argentina and date to about 6-7,000 years BP. The Coahuila tracks are not yet dated, but it is well known that early humans were very active in this region around 9,000-10,000 BP.

Poster Session III

**MUHI QUARRY, HIDALGO IN CENTRAL MEXICO, A POSSIBLE BREEDING AND NESTING SITE FOR LATE CRETACEOUS FISHES**

GONZALEZ-RODRIGUEZ, Katia, BRAVO-CUEVAS, Victor, Museo de Paleontología, Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico; FIELITZ, Christopher, Emory & Henry College, Virginia, VA

Mesozoic calcareous rocks belonging to El Doctor Formation (Albian-Cenomanian) outcrop in the northwestern portion of the State of Hidalgo, Central Mexico. The lower part of this Cretaceous unit consists of thinly to medium bedded light gray micritic limestones and black flint bands intertongued by fine-grain sandstone and marls, deposited in a pelagic environment above the continental shelf. From strata of this composition, an important marine fish community including over 400 specimens of sharks and teleosts has been recovered.

Although the complete diversity of the locality is unknown because of the newness of the discovery, it is surprising to find a diversity of small size fishes representing juvenile specimens of enchodontids, dercetids, ichtyodectids, beryciforms, and other taxa not yet identified. A new species of *Enchodus*, which is the most numerous fish in the locality includes many small individuals of different sizes, the smallest having a mandible length of 1.5 cm and the largest with a mandible measuring of 7.5 cm. Adult ichtyodectids are represented by only two specimens (one head and one incomplete trunk), but two complete juveniles have been found. Dercetids include five incomplete adult specimens and a complete juvenile. A new species of beryciform includes three juveniles and an adult specimen. This finding suggests that the site where the specimens were deposited was a breeding or nesting ground. Possible anoxic events followed by rapid burial allowed for the preservation of such small specimens.

Vertebrate Development Symposium, Wednesday 11:30

**MODULARITY AND MORPHOLOGICAL DIVERSITY IN THE MAMMALIAN CRANIUM**

GOSWAMI, Anjali, The Natural History Museum, London, United Kingdom

Variation is the raw material of evolution, but there is little understanding of how variation on a microevolutionary scale relates to large-scale evolutionary patterns. In particular, trait correlations have often been invoked as a possible constraint on variation, and thus a major influence on evolutionary change, but there are few empirical studies of the relationship between trait correlations and morphological evolution. The study of modules, autonomous sets of highly-correlated traits, allows for broad comparisons of trait correlations across large clades and across scales of evolutionary study, from genetics to paleontology.

I have used a quantitative framework, 3-D morphometrics, to assess modularity in crania of fossil and Recent mammals, including monotremes, marsupials, and placentals. This work has demonstrated that monotremes and placentals differ markedly in their patterns of