Institute at the National University of Piura is to begin long-term systematic excavations at the Talara Tar Seeps, the first in more than half a century.

Poster Session III (Friday, November 1, 2013, 4:15 - 6:15 PM)

TRIASSIC-JURASSIC BOUNDARY IDENTIFIED WITH VERTEBRATE FOSSILS IN NORTHWESTERN ARGENTINA (MARAYES-EL CARRIZAL BASIN)

MARTÍNEZ, Ricardo, Instituto y Museo de Ciencias Naturales, Universidad Nacional de San Juan, San Juan, Argentina; APALDETTI, Cecilia, Museo Paleontológico Egidio Ferugio, Trelew, Argentina; PRADERIO, Angel, Instituto y Museo de Ciencias Naturales, Universidad Nacional de San Juan, San Juan, Argentina; FERNANDEZ, Eliana, Instituto y Museo de Ciencias Naturales, Universidad Nacional de San Juan, San Juan, Argentina; COLOMBI, Carina, Instituto y Museo de Ciencias Naturales, Universidad Nacional de San Juan, San Juan, Argentina

Located on Northwestern Argentina, Marayes-El Carrizal is an extensional continental basin developed during the Early Mesozoic at the southwestern margin of Pangea. Quebrada del Barro Formation is the uppermost unit of the sequence and the only one of this Basin in which vertebrate fossils have been found. The controversial age of the Quebrada del Barro Formation has been regarded as Cretaceous, Rhaetian and Norian by different authors. Based on the recent find of the dinosaur *Leyesaurus marayensis*—a basal sauropodomorph closely related to the South African genus *Massospondylus*—a Lower Jurassic age of the Quebrada del Barro Formation was suggested. Here we report the discovery of a new faunal association from the upper layers of the Quebrada del Barro Formation that includes eucynodonts, pseudosuchids, basal sauropodomorphs, and sphenodontids. Preliminary comparative analyses indicate that some of the new findings have close affinities with *Chaliminia* (Cynodontia: Tritheledontia), *Pseudhesperosuchus* (Pseudosuchia: 'Sphenosuchia'), and *Riojasaurus* (Dinosauria: Sauropodomorpha); all of them known from the Late Triassic (Norian) Los Colorados Formation. On the other hand, a geologic survey conducted by the authors indicates that all the finds of the massospondylid *Leyesaurus*—used to suggest a Lower Jurassic age to the Quebrada del Barro Formation—are located in a different and overlaying stratigraphic unit. The new faunal association, which includes at least three equivalent components of the La Esquina fauna from Los Colorados Formation, supports the Norian age of the Quebrada del Barro Formation whereas the overlaying new unit includes only basal sauropodomorphs typical from Lower Jurassic strata.

Poster Session III (Friday, November 1, 2013, 4:15 - 6:15 PM)

INTEGRATION PATTERNS IN THE EVOLUTION OF CARNIVORAN LIMBS: AN APPROACH BASED ON 3D GEOMETRIC MORPHOMETRICS

MARTIN-SERRA, Alberto, Universidad de Malaga, Malaga, Spain; FIGUEIRIDO, Borja, Universidad de Malaga, Malaga, Spain; SERRANO, Francisco, Universidad de Malaga, Malaga, Spain; JANIS, Christine, Brown Univ, Providence, RI, United States; PALMQVIST, Paul, Universidad de Malaga, Malaga, Spain

Terrestrial locomotion, as with any other complex biological activity, needs the concerted work of several anatomical structures. Therefore, this coordinated activity should also entail a number of coordinated morphological changes in limb bones as a result of natural selection acting on structures constrained by morphological integration. However, as any morphological pattern is shaped by embryonic development, it is not clear to what extent natural selection can enhance patterns of morphological integration directly involved in function. In this study, we explore morphological integration between fore- and hind limb bones in a wide sample of living and extinct mammalian carnivores with the aim of better understanding some functional aspects of locomotor evolution in quadrupeds. We compared the strength of morphological integration among the taxa with a specialized type of locomotion (i.e. canids and hyaenids) and those with non-specialized locomotion (i.e. felids and ursids) by using three-dimensional methods of geometric morphometrics.

We collected landmarks from the proximal bones of the appendicular skeleton: scapula, humerus, radius, and ulna (for the forelimb); pelvis, femur, and tibia (for the hind limb). Different Partial Least Squares Analyses (PLS) were performed between pairs of connected bones (within limbs) and between functional or anatomically homologous bones (between limbs).

These comparisons showed that both allometry and phylogeny increased the level of morphological integration. Once the effects of allometry and phylogeny were removed, a robust pattern emerged through the entire dataset showing that the strength of morphological integration within and between limbs increased from the more proximal bones to the more distal ones. The morphological changes associated with this pattern of integration were depicted by a gradient of slenderness vs. robustness. Furthermore, specialized taxa showed higher values of morphological covariation within and between limbs, especially for the more distal bones, than non-specialized taxa.

These results indicate that, despite constraints resulting from embryonic development, natural selection has shaped the patterns of morphological integration in the appendicular skeleton of carnivoran mammals.

Poster Session III (Friday, November 1, 2013, 4:15 - 6:15 PM)

THE ESTIMATED RANGE OF INTRASPECIFIC VARIATION IN RECENT DELPHINID SKULLS AND ITS APPLICATION FOR THE TAXONOMY OF THE EXTINCT DELPHINOIDEA

MARUYAMA, Satoshi, Kyoto University, KYOTO, Japan

Skulls of recent Delphinoidea were studied for the purpose of reconsidering the taxonomy of the genus *Kentriodon* (Kentoriodontidae, Delphinoidea) from the view point of intraspecific variation in the Delphinoidea.

Ranges of intraspecific variation were examined in 48 skulls of Short-beaked common dolphin (*Delphinus delphis*), 68 skulls of Bottlenose dolphin (*Tursiops truncatus*), and 120 skulls of Narrow-ridged finless porpoise (*Neophocaena asiaeorientalis*) for extinct species. The taxonomical standards of *Kentriodon* were reconsidered on the basis of the estimated range of the variation in the Delphinoidea. The skull fossil of the kentriodontid dolphin was discovered from the lower–middle Miocene Niniu Group, Hidaka, Hokkaido, Japan. This specimen is called the Hidaka specimen here. This study was compared to the Hidaka specimen according to the estimated range of intraspecific variation.

As a result, I reconsidered 30 characters for taxonomic characters of species included in Kentriodon. The result means that 18 of 30 characters are not suitable, because these 18 characters cover a large range of intraspecific variation. Another 12 characters, such as the position of the anterior end of the pterygoid sinus and the position of the posterior ends of alveoli, are suitable for taxonomic standards because of the small range of the intraspecific variation. The Genus Kentriodon has five species, *K. pernix*, *K. obscurus*, *K. hobetsui*, *K. schneideri*, *K. fuchsii*. *K. fuchsii* does not have a described skull, so the Hidaka specimen was compared to *K. fuchsii*, using each humerus. This comparison results in this specimen being significantly different from *K. fuchii*. The skull of the specimen was compared to *Kentriodon* species except to *K. fuchii*. The Hidaka specimen is distinguished from four species on the basis of the 12 stable characters. The Hidaka specimen is a new species of genus *Kentriodon*.

This study indicates that estimating the range of Delphinoidea intraspecific variation is available for the taxonomy of the fossil species.

Poster Session II (Thursday, October 31, 2013, 4:15 - 6:15 PM)

CATHETOSAURUS* AS A VALID SAUROPOD GENUS AND COMPARISONS WITH *CAMARASAURUS

MATEUS, Octávio, FCT- Universidade Nova de Lisboa & Museu da Lourinha, Caparica, Portugal; TSCHOPP, Emanuel, Universidade Nova de Lisboa & Museu da Lourinhã, Caparica, Portugal

Here we report a nearly complete camarasaurid sauropod from Wyoming (Howe-Stephens Quarry, Upper Morrison Formation), which shares three character states with *Camarasaurus lewisi* that was originally described as its own genus, *Cathetosaurus*. The shared states are the following, and are not present to the same degree in other *Camarasaurus* species: i) the pelvis is rotated anteriorly, such that the pubis projects posteroventrally, and the ischium projects posteriorly, ii) lateroventrally projecting spurs in the neural spines of the last dorsals; iii) posterior cervical and anterior dorsal diapophyses bearing an anterior projection lateral to the prezygapophysis.

Given the lack of a skull in the holotype specimen of *Cathetosaurus lewisi*, the new specimen (Sauriermuseum Aathal specimen SMA 0002) adds considerable information, which allows the recognition of several additional differences to known skulls. The number of autapomorphies is herein considered enough to revive *Cathetosaurus* as a genus distinct from *Camarasaurus*. Additional skull autapomorphies of *Cathetosaurus* are: i) frontals with anterior midline projection into the nasals; ii) trapezoidal supraoccipital (more expanded dorsally than ventrally), iii) lateral spur on the dorsal part of the lacrimal, iv) fenestrated pterygoid; and v) the large pineal foramen between the frontals.

Cathetosaurus shares with *Camarasaurus* (as camarasaurid synapomorphies) the following characters: broad robust teeth, lacrimal with long axis directed anterodorsally, anterior cervical neural spines bifid, twelve cervical vertebrae, quadratojugal with short anterior ramus that does not extend anterior to the laterotemporal fenestra, posterior cervical and anterior dorsal neural spines bifid, and scapular blade with rounded expansion on the acromial side.

The genus *Camarasaurus* remains, at least, with the following autapomorphies: conspicuous groove passing anteroventrally from the surangular foramen to the ventral margin of the dentary, and anterior caudal neural spines broad transversely.

The body proportions of the new specimen are peculiar: the head is large, the limbs are short when compared with the presacral vertebral column, the ribs are long, such that the lower part of the ribcage is well below the knee level. These characters, and the rotation of the pelvis provided larger gut volume to this taxon.

Poster Session III (Friday, November 1, 2013, 4:15 - 6:15 PM)

FEEDING BEHAVIOR AND THE FUNCTIONAL ANATOMY OF THE NECK IN THE LONG-SNOUTED CHORISTODERANS *CHAMPSOSAURUS* AND *SIMOEDOSAURUS* (REPTILIA: DIAPSIDA)

MATSUMOTO, Ryoko, Kanagawa Prefectural Museum of Natural History, Kanagawa, Japan; EVANS, Susan, Univ College London, London, United Kingdom

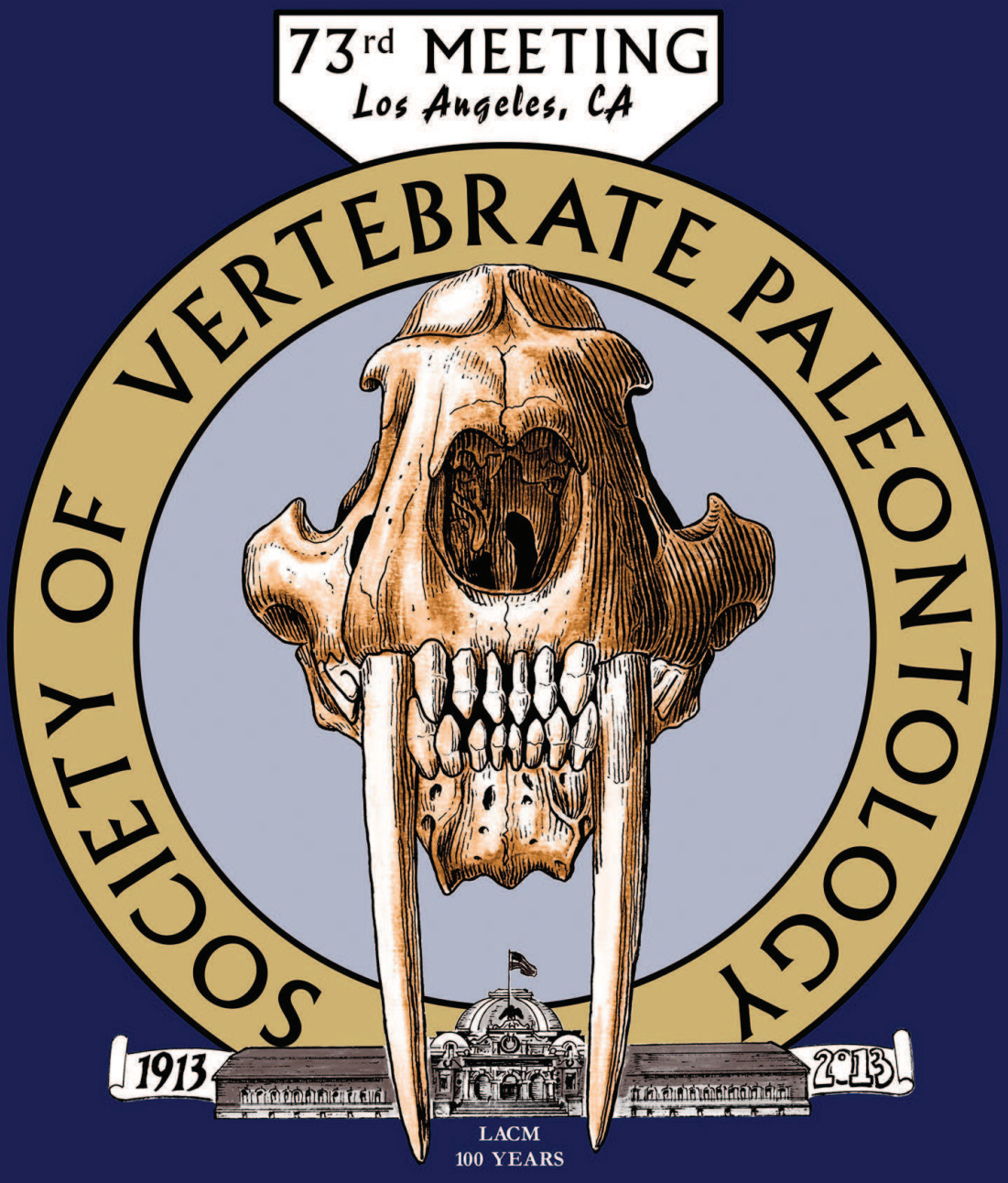
Choristoderes are freshwater diapsid reptiles that were distributed across Laurasia from the Jurassic to the Miocene. The most fully known genera are the large, long-snouted neochoristoderes, *Champsosaurus* and *Simoedosaurus*. These two genera co-occur in several Paleogene horizons in Europe and North America and, by comparison with extant crocodiles, both are thought to have been piscivores. This raises the question as to how they partitioned the niche. Previous hypotheses have focused mainly on rostral morphology. As *Champsosaurus* has a proportionally longer, narrower snout than *Simoeodosaurus*, it has been interpreted as more gavial-like in its feeding strategy. However, neck movements also have an important role in feeding. The living *Gavialis gangeticus* uses rapid lateral movements of the head and neck to attack schools of fish under water, whereas wide-snouted crocodiles like *Alligator mississippiensis* dismember large prey by spinning the head-neck and body. Comparisons of extant crocodiles show that these behavioral differences are matched by differences in the morphology of the cervical joints, vertebrae and musculature.

Choristoderes cannot be examined to the same level of detail, but a comparison of the cranio-cervical region of *Champsosaurus* and *Simoedosaurus* has revealed two important differences. Firstly, the zygapophysial facets in the posterior part of the neck

SVP
SOCIETY OF VERTEBRATE PALEONTOLOGY

Supplement to the online
Journal of Vertebrate Paleontology
October 2013

PROGRAM AND ABSTRACTS



Westin Bonaventure Hotel & Suites • Los Angeles, CA, USA • October 30 – November 2, 2013

ISSN 1937-2809