

others. Advances in technology are allowing us the opportunity to gather together our ideas, pause, reflect, and think critically about the future development of our profession.

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

#### THE THEROPOD EGG SITES FROM THE LOURINHA FORMATION, PORTUGAL

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Dinosaur eggs and eggshells of Jurassic age or older are relatively rare worldwide when compared with Cretaceous ones. However, the Lourinha region in central-west Portugal is rich in Kimmeridgian-Tithonian dinosaur egg- and eggshell localities, two with associated theropod embryo material of *Lourinhanosaurus* and another large theropod.

Here, we describe specimens from two sites from the Late Kimmeridgian-Early Tithonian Sobral Member of the Lourinha Formation: i) eggshells from Casal da Rola (Museu da Lourinhã [ML]1194) and ii) a new isolated egg from Porto das Barcas (ML1842). These are compared with previous findings with similar morphology: *Lourinhanosaurus* nest from Paimogo (ML565) and clutches from Peralta (ML156), and the theropod clutch ML1403, also from Porto das Barcas but in a different horizon and locality than ML1842.

Two main ootaxa were identified: ML1194 as *Preprismatoolithus* and ML1842 as an undescribed *Dendroolithus*-like phacelolithid. The first is clearly identified by the dinosauroid eggshell morphotype angustiprismatic/obliquiprismatic, with an obliquiculate or angusticulate pore system, smooth outer surface, and an eggshell thickness range of 0.8-1.0 mm. *Dendroolithus* is identified by: eggs are medium sized (10-20 cm) and spherical in shape; eggshell morphotype dendrospherulitic, with shell units irregularly shaped and displaying a fanning pattern; pores display a prolatocanaliculate network throughout the eggshell; outer surface ornamentation is irregular with crests and the pores irregularly dispersed between the crests; and average eggshell thickness is approximately 1.1 mm.

The eggshells from Casal da Rola are identical to *Preprismatoolithus* eggs from Paimogo and Peralta. The eggs from Paimogo have been assigned to *Lourinhanosaurus* by the presence of embryos, so we ascribe Casal da Rola also to *Lourinhanosaurus*.

The phacelolithid egg ML1842 is morphologically identical to the clutch ML1403 found in the same area and assigned to a large theropod. Apart from Porto das Barcas, Phacelolithidae is only known from the Late Cretaceous of China and Mongolia.

Preparators' Session (Thursday, October 31, 2013, 9:45 AM)

#### NEW TECHNIQUE TO REMOVE ASPHALT FROM MICROFOSSIL-RICH MATRIX FROM RANCHO LA BREA

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Rancho La Brea is one of the richest terrestrial late Pleistocene fossil localities. Typical Rancho La Brea fossils are composed of unaltered organic material—bone, plant remains, shells, insect exoskeletons. Extraordinary preservation of Rancho La Brea fossils is due principally to asphalt impregnation which helps protect the material from diagenetic changes. Vertebrate fossils from Rancho La Brea rarely display permineralization.

Asphalt-preserved fossils present specific cleaning and preparation challenges not encountered with permineralized fossils. Historically, heated kerosene was used to remove the asphalt but is flammable and occasionally caught fire. Solvents used since include 1, 1, 1-trichloroethane and perchloroethylene but these come with a variety of drawbacks including environmental hazards, regulatory restrictions, adverse health effects, and expense. Biodiesel is a safe, economical, and efficient alternative.

Pure biodiesel, or B100, is a diesel fuel consisting of methyl esters of fatty acids produced by refining vegetable oil triglycerides. While biodiesel is not an effective asphalt solvent at room temperature, it becomes very effective when heated to temperatures between 60°C and 80°C. Biodiesel can subsequently be removed from the treated fossil materials by soaking them in an n Propyl Bromide. Our current excavation, Project 23, has yielded large quantities of microfossil-rich asphaltic sand. We have found heated biodiesel to be an effective and efficient solvent for processing these asphaltic samples.

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

#### TWO UPPER TRIBOSPHENIC MOLARS FROM THE MESOZOIC OF AUSTRALIA AND TWO HYPOTHESES

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Since 1997, twenty-eight mandibles of tribosphenic mammals have been collected from polar Early Cretaceous deposits in southeastern Australia. Assigned to an endemic family erected to accommodate them, Ausktribosphenidae, two suggestions have been made regarding their affinities. Originally, they were tentatively allocated to the Placentalia. Soon afterwards, they were placed in a newly established Southern Hemisphere group of primarily tribosphenic mammals, the Australosphenida. Placentals and marsupials were by contrast placed in simultaneously established group, the

Boreosphenida to emphasize their presumed Northern Hemisphere origin. Little progress has been made since the beginning of the current Millennium in resolving this difference of interpretation, a reflection of the fact that other elements of tribosphenic mammals from the Mesozoic of Australia have previously not been found. There is now a single specimen of two unfortunately both heavily worn and damaged upper tribosphenic molars from the Early Cretaceous of Australia. What is preserved of this specimen suggests possible affinities with metatherians. Illustrations of this specimen and the placental-like or placental ausktribosphenids have been made from synchrotron scans. Based on these images, with significant restoration in the case of the upper molars, feasibility of an occlusal fit between upper and lower molars was assessed. The ausktribosphenid *Bishops whitmorei* does not have a lower dentition likely to have occluded with these two upper molars. However, at this writing, the situation in this regard to the other ausktribosphenid, *Ausktribosphenos nyktos*, is not as clear. If a plausible occlusal fit is found, this would suggest the existence of a mammal with eutherian-like lower molars occluding with metatherian-like upper molars. If such an incongruous association can be established in a single species or even closely related genus, it would suggest it/they were neither metatherians nor eutherians and thus favor the Australosphenida hypothesis. At this stage, two hypotheses present themselves. First, in Australia there are Australosphenida dentally convergent on both eutherians and metatherians. Alternatively, that eutherians and metatherians were in Australia in the Early Cretaceous. This is considerably earlier than Eocene, the age of the next oldest record of either group on that continent.

Technical Session V (Wednesday, October 30, 2013, 3:15 PM)

#### THE FIRST MESOZOIC LIZARD FROM NORTHERN GERMANY (PARAMACELLODIDAE, LATE JURASSIC, LANGENBERG QUARRY) AND ITS TAPHONOMY

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Remains of a fossil lizard were discovered during the 2012 field season of the *Europasaurus*-Project in the Langenberg Quarry in Oker, Lower Saxony. The bone fragments are between 1.5 and 4 mm in size and derive from a middle Kimmeridgian (154 my) micritic, marly limestone layer deposited under shallow marine conditions. Besides a femur, the majority of the identifiable bones belongs to the skull. Parts of both dentaries, a frontal, a jugal, a supposed squamosal and a part of a premaxillary bone are well-preserved. Another tooth-bearing fragment is situated below the main bone conglomeration; osteoderms are not preserved. The characteristic teeth with their chisel-like morphology and marked, oblique cutting edges and the unpaired frontal with its rugose surface define this specimen as belonging to Paramacelodidae. Thus, it represents the first Mesozoic lizard from northern Germany.

The tiny bones of the Langenberg lizard are disarticulated, although right and left dentary fragments are preserved side by side, the right one on top. Taphonomic interpretation follows known disarticulation stages of complete lizards (Messel Pit, Eocene, Germany) and lizard skulls (Uña, Barremian, Spain). The best comparison can be made with lizard bone aggregates from the Kimmeridgian of Guimarota, Portugal. Its predominantly terrestrial coal sedimentation has preserved a rich paramacelodid lizard fauna with several genera and species. We describe their taphonomy for the first time and compare it to the preservation of the Langenberg lizard. Two bone aggregates of Portuguese paramacelodids are especially suitable for comparison. One coal slab contains both dentaries and postdentary bones plus one maxillary, still adducted, but all other skull elements are slightly disarticulated. The other specimen shows less skull bones, but both dentaries lie aside. With only a small distance between the mandible tips, the two bones still keep their original orientation. Disarticulation of the Langenberg paramacelodid must range between these two stages. The skull and especially the snout tip remained rather complete during the beginning decay and it is very likely that all bones belong to the same individual. The find shows that the marine sediments in the Langenberg Quarry have not only potential for large terrestrial vertebrates such as the dwarfed sauropod *Europasaurus*, but also for fragile and minute remains.

Poster Session IV (Saturday, November 2, 2013, 4:15 - 6:15 PM)

#### NEW FOSSIL FISHES FROM THE PERMIAN PEDRA DE FOGO FORMATION, PARNAIBA BASIN, NORTHEASTERN BRAZIL

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Three multidisciplinary expeditions to Permian localities in the States of Maranhão and Piauí since 2011 have yielded abundant fossil fishes, tetrapods, invertebrates and plants. Most fossils were surface collected at approximately 100 GPS marked sites. The Pedra de Fogo Formation (PFF) accumulated in a large shallow epicritic sea that became shallower towards the top of the sequence where alluvial plain deposits become interdigitated with extensive aeolian dune fields. There are no radiometric data available so far to precisely date the 240 meter-thick PFF, whose Permian age is principally based on palynology and the tree-fern *Psaronius* sp. Teeth and fin spines of ctenacanth, xenacanth, and other chondrichthyan, including new taxa, represent the shark fauna recovered from wavy-bedded sandstones and siltstones that accumulated within the basin depocenter. The petalodont holocephalan *Itapyrodus punctatus* is indistinguishable from a species found in the Early Permian Irati Formation and the Late Permian Corumbataí Formation of the Parana basin further south in Brazil. This suggests that these two basins may have been linked during the Permian, and that *Itapyrodus* represents a geologically

# PROGRAM AND ABSTRACTS

**73<sup>rd</sup> MEETING**  
*Los Angeles, CA*

