MEETING PROGRAM & ABSTRACTS

SVP
SOCIETY OF
VERTEBRATE
PALEONTOLOGY

November 5 – 8, 2014 • Estrel Berlin • Berlin, Germany

A likelihood analysis based on a supertree with 488 primate taxa, including 134 fossil taxa, was performed to test hypotheses of ancestral areas. The results show significant differences from previous analyses that did not include fossil primates. Primates *sensu lato* (including Plesiadapiformes) are inferred to have originated in North America. This is supported by the presence in North America of the oldest and most primitive group of stem primates, the Purgatoriidae. The most likely location of origin for Euprimates is also North America, contrary to previous studies that considered the location to be Eurasia. The many North American representatives of the Omomyoidea and Adapoidea are likely responsible for this result. Strepsirrhini *sensu lato* (including adapoids) appears to be Asian in origin, in opposition to previous analyses that have considered them Malagasy, Eurasian, and/or African. This stems from the presence in Asia of numerous primitive adapoids, such as *Rencunius*, *Asiadapis*, and *Marcgodinotius*. In contrast, crown strepsirrhines are inferred to have originated in Africa. With respect to the biogeographic origins of anthropoids, contrary to some previous analyses, none of the most likely resolutions include Africa. Finally, the biogeographic history of great apes is tied to Eurasia. Previous analyses placed great ape origins in Eurasia and "African" ape (hominine) origins in both Eurasia and Africa. While pongines probably originated in Eastern Asia, hominines most likely originated in Europe or in Western Asia (i.e. Anatolia). Adding data on fossil euprimates and stem primates significantly changes the ancestral areas inferred relative to previous analyses that used likelihood methods, demonstrating that extinct forms are critical to refining ancestral area reconstructions.

Poster Session II (Thursday, November 6, 2014, 4:15 - 6:15 PM)

UPPER CRETACEOUS (MAASTRICHTIAN) FISH REMAINS FROM THE DECCAN INTERTRAPPEAN BEDS OF PIPLANARAYANWAR, CENTRAL INDIA: IMPLICATIONS FOR PALEOENVIRONMENT AND PALEOGEOGRAPHY

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In search of Cretaceous mammals, extensive field exploration work has been carried out in the Deccan volcanic province of India. As a consequence, a new 2 m thick, fossiliferous intertrappean section was found 2.5 km west of Piplanarayanwar village in Chhindwara District, Madhya Pradesh, Central India. Following wet screen washing of 500 kg of samples from this intertrappean sedimentary sequence comprising of sandy marl and mudstone, a large number of vertebrate microfossils have been recovered. The recovered vertebrate fauna from this site includes fish, such as *Igdabatis indicus*, *Rhombodus*, *Lepisosteus indicus*, osteoglossids, and pycnodontids; frogs, such as Anura indet.; crocodiles, such as Crocodilia indet.; a snake, *Indophis sahnii*, and dinosaur eggshells. In addition to this vertebrate fauna, a large number of pulmonate gastropods, ostracods and charophytes have also been recovered from this site. Because of the presence of *Igdabatis* and *Rhombodus* in the fauna, which have previously been recorded from the Maastrichtian strata of Niger, Spain and India, the intertrappean section of Piplanarayanwar is considered as Late Cretaceous in age. The fish fauna, particularly *Igdabatis*, *Rhombodus*, and pycnodontids assume great significance from paleoenvironmental and paleogeographic points of view. The Deccan intertrappean beds of peninsular India are generally regarded as freshwater lacustrine deposits. The co-occurrence of marine batoid and pycnodontid and non-marine osteoglossid and lepisosteid fish, pulmonate gastropods, ostracods and charophytes points to a coastal-plain, brackish water environment of deposition for this intertrappean sequence. Recently, based on the occurrence of planktonic foraminifera in the intertrappean beds of Jhilmili, Chhindwara District, Madhya Pradesh, it has been suggested that a marine incursion into Central India took place in the Early Paleocene from the west coast of India along the Narmada valley. However, until now, no Maastrichtian or Danian marine strata were recorded from the Narmada valley. Since the batoid fish *Igdabatis* and *Rhombodus* along with pycnodontids have been documented from the infratrappean beds of Marepalli, Pisdura and Jabalpur and the intertrappean beds of Asifabad, Nagpur, Kislapuri and currently from Piplanarayanwar, mostly located along Godavari valley, we suggest here that marine incursion might have taken place along the Godavari valley rather than along the Narmada valley at the end of Cretaceous.

Poster Session I (Wednesday, November 5, 2014, 4:15 - 6:15 PM)

NEW INVESTIGATIONS INTO THE PLIOCENE-AGED VERTEBRATE BEARING BEDS OF THE CHINCHILLA SAND FORMATION, NORTHEASTERN AUSTRALIA

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The Pliocene Chinchilla Sand is a > 20 m deep fluviatile deposit consisting of interbedded clay, sandstone and conglomerate located in the western Darling Downs, southeast Queensland, Australia. The fauna derived from these beds represents an incredibly diverse (ca. 63 taxa in 31 families) assemblage of terrestrial and aquatic organisms preserved in high energy flood and low-energy meandering channels. This locality is a rare representative of a critical period in the development of Australian vertebrate ecosystems, during which a long-term trend towards cooling and aridification and marked vegetation shifts, including the emergence of widespread grasslands, precipitated the earliest appearance of numerous ecologically important and successful taxa, including many genera that are still extant today. However, despite over 150 years of collection and study of the Chinchilla Local Fauna, many uncertainties remain as to which taxa were present due to a dearth of stratigraphically controlled excavations, specimen loss and destruction, and poorly documented provenance data. We present an update of the vertebrate fauna, its taxonomic status and its depositional and environmental context, as well as the first intensive palaeomagnetic and sedimentological analyses aimed at determining the age and time-depth of the deposits. We targeted 10 stratigraphic horizons and collected ca. 60 independent samples for palaeomagnetic dating. The upper beds have a normal polarity, while the lower beds have a reversed polarity. Based on this polarity sequence and biostratigraphy, the reversal at the site is considered to be the boundary between the Gilbert and Gauss Chrons at 3.6 Ma. This would make the upper beds between 3.6 and 3.3 Ma and the lower beds between 4.2 and 3.6 Ma, although perhaps closer to 3.6 Ma in each case. These data suggest that the fauna from the site should not be considered a single temporal entity but could represent variation over as much as 900 ka. Taken together, this data allows us to reconstruct some of the most significant changes that Australian vertebrate faunas have experienced in response to increased aridity over the last 3.6 Ma or so.

Poster Session II (Thursday, November 6, 2014, 4:15 - 6:15 PM)

THE EFFECT OF ABSENCE OF PREDATORS ON JUVENILE SURVIVAL IN THE INSULAR PLEISTOCENE DEER *CANDIACERVUS* (CETARTIODACTYLA, RUMINANTIA, CERVIDAE)

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Judging from worldwide patterns, commitment to predator-free island life tends to have significant consequences for the species concerned—for example, marked changes in body size (the island trend). But what would a total lack of ecologically relevant predators have on traits *other than* body size? For this we evaluated population structure and dynamics in two fossil dwarf deer taxa (*Candiacervus* spp.) from the Late Pleistocene of Crete, Greece.

We hypothesize that life tables of these populations should differ characteristically from those of wild deer living on mainlands with predators. Importantly, these deer became extinct before any plausible date for human arrival, and therefore the impact of human-caused mortality can be ruled out. However, age-graded fossils of species from two well-sampled cave sites reveal unexpectedly high juvenile mortality (0-2 Red Deer Years) of about 50%, similar to that reported for extant mainland ruminants. Age profiles additionally reveal that deer surviving past the fawn stage were relatively long-lived for ruminants, with an adult peak mortality at about 70% of maximum longevity (16 Red Deer Years).

The mortality profile for *Candiacervus* spp. indicates that high juvenile mortality was not an expression of their living a “fast” life. Our results are similar to those found for two populations of extant sika deer (*Cervus nippon*), one on a predator-free island (Kinkazan, Honshu) and one in a protected area in which hunting is prohibited (Nara Park, Honshu). So did lack of predators have any effect on Cretan deer? *Candiacervus* is remarkable for its variability; whether this reflects actual speciation or unusual ecomorphological differentiation has long been controversial. The effects of variables such as fatal accidents, starvation, and disease on survivorship are difficult to gauge in extinct taxa. However, the presence of extreme morphological variability within nominal species of *Candiacervus* is consistent with the view that high juvenile mortality can function as a key innovation permitting rapid adaptation (via high levels of variation) in insular contexts.

This research was co-financed by the European Union and Greek national funds (Research Funding Program THALIS-UOA MIS375910, KA:70/3/11669).

Technical Sesssion XII (Friday, November 7, 2014, 3:30 PM)

ORIGIN OF THE UNIQUE VENTILATORY APPARATUS OF TURTLES

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The turtle body plan differs markedly from that of other vertebrates and serves as a model system for studying structural and developmental evolution. Incorporation of the ribs into the iconic turtle shell negates the rib movements that effect lung ventilation in the majority of air-breathing amniotes (the clade encompassing mammals, lizards, turtles, birds, and crocodilians). Instead, turtles have a novel abdominal-muscle-based ventilatory apparatus whose evolutionary origin remains a mystery. Here we show through broadly comparative anatomical and histological analyses that the earliest stem-group turtle from the middle Permian (260 Ma), *Eunotosaurus africanus*, has several turtle-specific lung ventilation characters: rigid ribcage, inferred loss of intercostal muscles which drive lung ventilation in all other amniotes, and histological correlates for the primary abdominal muscle, M. transversus, used in exhalation. Our results place the origin of the unique lung ventilatory apparatus of extant turtles shortly after the divergence of turtles from other reptiles and approximately 50 million years before the oldest known fully developed shell. These data indicate that it was an easing of structural constraints through division of function (divergent specialization) between the ribs and abdominal musculature that facilitated the evolution of both the novel turtle lung ventilation mechanism and the turtle shell.

Technical Session XV (Saturday, November 8, 2014, 10:30 AM)

MATRIX VS. MONOGRAPHS: COMPARISON OF PHENOTYPIC RICHNESS ACROSS DATA SOURCES.

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How fully do morphological phylogenetic matrices represent the range of phenotypes preserved in a fossil organism? Are there phenotypic classes that are not seen in matrices, and what kind of comparative or functional information do they hold? To address these questions we chose four well-characterized taxa for the fin to limb transition (*Eusthenopteron*, *Panderichthys*, *Tiktaalik*, and *Acanthostega*) and examined