MEETING PROGRAM & ABSTRACTS

SVP
SOCIETY OF VERTEBRATE PALEONTOLOGY

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jackets with connected bones were built including sacrum and proximal part of the tail, middle-to-posterior dorsal vertebrae and cervical remains. The jackets were built with bandages drenched in Paraloid B-72 solved in acetone. A coat of expanded polyurethane was used to ensure cohesion of the blocks, and an outer metal frame was made for removal. A detailed documentation from distinct sedimentary levels, geo-referenced data, draws, maps, photos and videos was recompiled.

Phases of preparation include: 1) removing extraction structures (metal frame, polyurethane, and bandages) using different techniques; 2) elimination of matrix (mainly clays) using mechanical techniques, both manual and with tools; 3) use of paraloid resin with microspheres to fill the present cracks in order to stabilize them and prevent the propagation of the vibration caused by airscribe, avoiding damage on the bone surface; 4) use of a kind of epoxy resin on problematic fractures using its high stability and machining characteristics (used in restoration of wood sculptures), avoiding dissolution processes in the posterior consolidation of the bone; and 5) when gypsum produced irreversible damage to the bone, it was decided not to withdraw it.

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

ELEPHAS AND OTHER VERTEBRATE FOSSILS NEAR TAGHROUT, MOROCCO

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The paleontological richness of Morocco has been scientifically known since at least the early 20th century. However, the Middle Atlas region, more specifically the Boulemane area, has only been sparsely studied since the 1960s, when it supplied various vertebrate fossils from the Middle Jurassic, mainly dinosaur and crocodilomorph bones. In 2003, some fossil bones were discovered in Anchrif valley formed by river Guigou, near the village of Taghrout, in the Fés-Boulemane Province. In September 2013, a Moroccan-Portuguese expedition made excavations in the site engaging local helpers. The Anchrif fossil site was dated to mid-Pleistocene, based on mammal material and hominid tools. It is a small high-altitude sedimentary basin, uncharted in previous geological maps, and surrounded mostly by shallow marine Middle Jurassic rocks (Bathonian). The excavations yielded bones from large mammals, with the most common findings as elephants ascribed to the genus *Elephas*, but unidentified artiodactyls, tortoises, and hominid Acheulean tools were also collected. One Acheulean amygdaloidal biface was recovered in situ, in the same layer as some of the proboscidean remains. So far, there are no signs of predation of elephants by humans in the site.

The proboscideans were found in two distinct layers and included: one skull, two tusks, two ilia, one scapula, several ribs and cervical vertebrae, one patella, a femur, a molar, and a possible radius and ulna. The remains can be attributed to at least three adults and one juvenile, classified as *Elephas iolensis*. The tusks have a circular section and are relatively straight when compared with other elephants. The molar enamel is thin (less than 2 mm) and does not present a median sinus. The enamel figures are symmetrical and parallel sided, with almost no folding.

Apart from the Anchrif dig site, the expedition also explored a nearby cave with Holocene material ascribed to the mammals genera *Hystrix*, *Syncerus*, *Panthera*, *Lepus*, and unidentified artiodactyls, as well as the tortoises genera *Mauremys* and *Testudo*. Some bones present porcupine (likely *Hystrix cristata*) bite marks.

The Bathonian sediments around Taghrout present theropod tracks and at least two layers rich in bivalves, plants and brachiopod fossils. The Bathonian sites near El-Mers were also revisited. The new findings include sauropod and tridactyl track and bones of possible crocodylomorphs.

Symposium 4 (Friday, November 7, 2014, 8:00 AM)

TEMNOSPONDYL ORIGINS IN A PHYLOGENETIC CONTEXT: AQUATIC, AMPHIBIOUS, OR TERRESTRIAL?

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Temnospondyli is a large group of Carboniferous to Cretaceous tetrapods that is widely thought to contain Lissamphibia, although some controversy remains. Even without Lissamphibia, Temnospondyli comprises a wide range of body sizes and habitats from terrestrial adults to obligatorily aquatic ones. There is no consensus on which of these lifestyles is ancestral. It has recently been proposed that the original temnospondyl ontogeny is that of *Sclerocephalus*, in which only the oldest, best-ossified individuals were able to walk on land and maybe act as a dispersal stage between bodies of water; alternatively, the possibility has been floated that an aquatic lifestyle may be ancestral, so that terrestriality evolved several times within Tetrapoda, fitting the recent finding that many aquatic temnospondyls replaced their external gills with internal ones in ontogeny. Internal gills are not known in any extant tetrapod; the gills of tadpoles are homologous to external gills and to the septa between internal gills. Any resolution of this question will depend on improved determination of the lifestyles of temnospondyl species, but also on temnospondyl phylogeny – the latest analyses of which find wildly divergent results. Outgroup choice has been found to be critical in determining how the aquatic temnospondyls are distributed over the tree. Because the relationships of the potential outgroups are unclear, I use an analysis of tetrapod phylogeny to tackle the problem. I find that the lissamphibians are not temnospondyls, but well supported as "lepospondyls". Temnospondyli is sister to (((((((Amniota, Diadectomorpha) Amphibia) Seymouriamorpha) *Solenodonsaurus*) Chroniosuchia) *Bruktererpeton*) *Gephyrostegus*); Anthracosauria lies more rootward than Temnospondyli. *Caerorhachis* ?= *Casineria* is the sister-group to all other temnospondyls. The likely amphibious *Balanerpeton* and *Dendrerpeton* form the sister-group to a largely terrestrial zatracheid/dissorophoid/*Palatinerpeton* clade, across which the "branchiosaurs" are scattered. The aquatic Dvinosauria is nested within the mostly aquatic Stereospondylomorpha, close to *Eryops* (slightly more terrestrial than *Sclerocephalus*), the aquatic and/or amphibious "edopoids" and *Capetus*, and the seashore-dweller *Iberospondylus*.

Amphibious adults thus seem to be ancestral for temnospondyls. Loss of the tail fin skeleton and the postbranchial lamina on the cleithrum may be synapomorphies of Temnospondyli and its sister-group; they are not shared by the aquatic Anthracosauria.

Poster Session IV (Saturday, November 8, 2014, 4:15 - 6:15 PM)

A MORPHOTYPE-BASED RANKING APPROACH TO MEASURE DENTAL COMPLEXITY IN ARVICOLINES AND ITS APPLICATION TO REVEALING PATTERNS OF DENTAL VARIATION IN LIVING AND EXTINCT FORMS

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In order to improve resolving power of morphological methods in studying the Quaternary fossil record of arvicolines (one of the most abundant rodent groups in the Northern Hemisphere during the last 2.6 Ma), we develop a unified approach to measuring dental complexity based on counting the number of additional prisms of the crown and the respective number of dentine elements of the occlusal surface. The novelty of the approach is determined by unification of the criteria to establish morphotype dental patterns and by using the same scale to measure dental complexity of any molar in a tooth row in any arvicoline taxa, living or extinct. The approach is used to describe dental variability patterns in phylogenetically distant species (16 widespread arvicolines in the Late Pleistocene and modern fauna of northern Eurasia) and to test several hypotheses to reveal the most important sources of dental variation in modern hypselodont arvicolines (genus *Microtus*). Ontogenetic changes in molar complexity and bilateral symmetry among right and left molars of the same individual during the process of tooth wear were assessed in *M. gregalis* using an intravital tooth-printing method. Moreover, a geographic sampling of *M. gregalis, M. oeconomus*, and *M. arvalis obscurus* was undertaken in different landscape-geographic zones in the central part of northern Eurasia in order to compare the amounts of dental variation related to geography and to age of an individual (based on the percentage of skull maturity). The results suggest that in captivity, for animals of 1 month and older, the age differences in morphotype dental patterns are non-significant and negligible compared to among-individual variation. Within-individual differences among right and left molars, when present, were not related to age of an animal suggesting that bilateral asymmetry of morphotype dental pattern could be regarded as inherent characteristic of an individual persisting during post-juvenile tooth wear. However, in natural populations of *Microtus* occurring along the environmental gradients, age component could not be excluded from the list of significant sources of dental variability.

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Poster Session III (Friday, November 7, 2014, 4:15 - 6:15 PM)

THE AGE OF THE KAYENTA FORMATION OF NORTHEASTERN ARIZONA: OVERCOMING THE CHALLENGES OF DATING FOSSIL BONE

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The Glen Canyon Group spans a period of Earth history that records the Triassic-Jurassic boundary and a biotic response to the end-Triassic mass extinction. Owing to the absence of datable ash beds or useful biostratigraphic invertebrate fossils, the Early Jurassic has been poorly constrained in western North America and its chronology has been constructed upon difficult superpositional relationships and the presence of vertebrate taxa. The Kayenta Formation is host to a number of important taxa such as some of the first frogs, caecilians, turtles, crocodyliforms, ornithischians, and large-bodied saurischian dinosaurs in North America. However, that unit has been assigned to either the Triassic or Jurassic nineteen different times since it was first mapped in 1882. Here, we attempt to directly date fossil bone from the Kayenta Formation from a single quarry near Gold Spring, AZ that produced skeletons of the theropod *Dilophosaurus wetherilli* and early sauropodomorph *Sarahsaurus aurifontanalis*. Electron-dispersive spectroscopy of bones from this quarry shows that they comprise recrystrallized hydroxylapatite with pore spaces permineralized by calcite, iron-rich calcite, and barite. We analyzed two bones from the Gold Spring quarry using a laser ablation multicollector-inductively coupled plasma mass spectrometer (LA-MC-ICP-MS) configuration but the calculated apatite ages are too young to corroborate the stratigraphic evidence suggesting that the Kayenta Formation is either Late Triassic or Early Jurassic. Further investigations into the spatial distribution of elements in the bones shows that concentrations of major and trace elements decrease moving away from the bone surface. Lead concentrations are highly variable within the fossil bone suggesting that some regions may have been subjected to Pb loss. However, the anomalously-young apatite ages are mostly a result of U enrichment, where U concentrations are as high as 1100 ppm in the fossil bone. We collected detrital zircons from matrix removed from the Gold Spring quarry and four other localities within the Kayenta Formation and calculated U-Pb ages using high-resolution LA-ICP-MS. One of these dates, 183.7 +/- 2.7 Ma, is the first deposition-age radiometric date from the Kayenta Formation and shifts the age designation for this Early Jurassic unit from the Sinemurian-Pliensbachian to the Pliensbachian-Toarcian. Future efforts will sample the rest of the Glen Canyon Group in order to construct the first chronology of the Early Jurassic in western North America.