Volume 25, Supplement to Number 3
7 September 2005

JOURNAL of VERTEBRATE PALEONTOLOGY

ABSTRACTS OF PAPERS

SIXTY-FIFTH ANNUAL MEETING
SOCIETY OF VERTEBRATE PALEONTOLOGY
MESA SOUTHWEST MUSEUM AND
PHOENIX MARRIOTT MESA
MESA, ARIZONA

OCTOBER 19-22, 2005

SOCIETY OF VERTEBRATE PALEONTOLOGY

ISSN 0272-4634

Friday 10:15

BIOGEOGRAPHY OF THE MIDDLE AND LATE DEVONIAN (LATE GIVETIAN-FRASNIAN) ICHTHYOFAUNA FROM THE OKSE BAY GROUP, NUNAVUT TERRITORY, CANADA

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A diverse Middle and Late Devonian (late Givetian-Frasnian) ichthyofauna has recently been recovered from the Fram and Nordstrand Point Formations on southern Ellesmere Island and their distal equivalent (Beverley Inlet Formation) to the west. The fauna includes agnathan, placoderm, and sarcopterygian taxa that suggest close biogeographic affinity with the Baltic Region and Scotland.

Psammosteid agnathans from the Okse Bay Group include *Psammolepis*, *Ganosteus*, *Rohonosteus*, and *Psammosteus*. These taxa occur in the same stratigraphic order in the Okse Bay Group and in the Main Devonian Field in the Baltic Region. The obrucheviid, *Perscheia*, from the Okse Bay Group is the only record of these distinctive agnathans outside of northwestern Russia where *Obruchevia* occurs in the same time interval. Preliminary work on asterolepid and bothriolepid placoderms from the Okse Bay Group indicate a diversity of species, some of which appear to be new. Sarcopterygians found in association in the middle part of the Fram Formation include *Laccognathus*, *Eusthenopteron*, and an elpistostegid-grade taxon. These taxa are also found in association in the early Frasnian of the Main Devonian Field. The diversity of other holoptychiid porolepiforms from the Okse Bay Group is in need of further investigation.

The close similarity between the ichthyofaunas of the Okse Bay Group in Nunavut and the Main Devonian Field in the Baltic Region supports the existence of a northern Euramerican biogeographic province during the Middle and Late Devonian. Similar faunas are seen at Scottish localities and to a lesser degree at North American localities such as Miguasha and Red Hill, Nevada.

Poster Session A

A SMALL ORNITHISCHIAN DINOSAUR FOOTPRINT ASSEMLAGE FROM THE EARLY JURASSIC, HOLYOKE, MA

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Numerous trackways of small ornithischian dinosaurs referable to the ichnogenus *Anomoepus* were discovered in spring 2004 in an outcrop of mudstone layer belonging to the East Berlin Formation at the Gary Gaulin footprint site in Holyoke, MA. Much of the rock bearing these small footprints was excavated in 1996, and as a consequence some of the footprints occur on several disarticulated slabs. However, the recently discovered tracks of various sizes still remain *in situ*. Additionally, the site also yields multiple tracks belonging to the ichnogenera *Eubrontes*, *Anchisauripus* and *Grallator*. However, the small footprints of *Anomoepus* are the subject of the present study.

I have documented the footprints using a variety of techniques, including photography, mylar tracing and mapping. Measurements recorded from the fossils include length and width of the pes and manus, pace length and stride length. The tracks are randomly distributed *in situ* without preferred orientation. However, proximity of these trackways to one another might provide evidence for possible herding behavior of ornithischian dinosaurs inhabiting the same locality. Additionally some of the trackways indicate that some of the animals walked in a plantigrade quadrupedal manner, a mode of locomotion common for this ichnogenus from the Connecticut Valley.

Wednesday 11:30

FEEDING IN THE KOMODO DRAGON, *VARANUS KOMODOENSIS*: TAPHONOMIC AND FUNCTIONAL IMPLICATIONS OF ZIPHODONT DENTITION

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The majority of carnivorous Mesozoic archosaurs possessed ziphodont dentition, yet the functional and taphonomic implications of this dentary morphotype for paleoecological studies remain largely unexplored. First, there is disagreement in the paleontological literature concerning the frequency and validity of tooth marks presumably produced by extinct taxa with ziphodont dentition, especially the theropod dinosaurs. Secondly, there are few experimental studies that primarily address the functional morphology of ziphodont dentition. The Komodo dragon, *Varanus komodoensis*, is the only extant tetrapod with this dental morphotype, making it an appropriate analogue for feeding behavior in carnivorous Mesozoic archosaurs. Therefore, neo-taphonomic observations were conducted to gain a better understanding of these principles. Carcass portions, consisting of partially defleshed limbs of domesticated artiodactyls, were fed to a captive bred *V. komodoensis*. The animal's behaviors exhibited during the feeding bouts were observed and recorded using a handheld, one mega-pixel, digital camera. The bones were later processed and examined for tooth marks.

These experimental results showed that a tetrapod with ziphodont dentition (*V. komodoensis*) does produce tooth marks, even though the animal tended to avoid unnecessary contact with bone surfaces and did not process the bones for within-bone nutrients. These tooth markings occur at a low frequency and consist of mostly scores. In the future, these marks will be compared to alleged tooth marks found on Mesozoic fossil bones in order to better determine if the assemblage was accumulated by carnivory. In addition, analysis of the movement of the *V. komodoensis* head suggests a functional correlation with the positioning of serrations along the tooth carinas. If this correlation holds true for extinct ziphodont taxa, one may be able to deduce the direction of head and tooth movement while feeding based on the relative positioning of these serrations in extinct taxa.

Wednesday 3:00

PALEOECOLOGICAL INFERENCES USING TOOTH WEAR RATES, HYPSODONTY AND LIFE HISTORY IN UNGULATES

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Ungulate teeth wear at different rates, depending on both the diet and habitat preferences of each species. Increased crown height (hypsodonty) lengthens the lifetime of a tooth in the face of high rates of tooth wear. The time required for the permanent dentition to be worn to the point where function is lost places a definitive limit on individual lifespan. Thus ungulates are constrained by their degree of hypsodonty to particular combinations of habitat types and plant foods. Knowing these joint constraints would allow well-informed paleoecological inferences, but disentangling the various factors is difficult. A major problem is the fact that the fitness consequences of differences in longevity are understandable only in the context of a population demographic analysis. Many life history variables (e.g., litter size, age at first reproduction) are predictable from body size, so we can estimate realistic values for fossil species. This allows us to model the demography of fossil species using standard matrix projection models. With projection matrices we can take a fossil species of known unworn m3 crown height and estimated body mass, and generate a series of demographic models, varying longevity (which represents limits imposed by different rates of tooth wear) and life-history parameters. This way we can identify those combinations of demographic variables that allow the possibility of a positive population growth rate (λ), and thus estimate the maximum rate of molar wear that the species could experience without rapid population extinction. Comparing this rate with a new dataset on rates of tooth wear in extant ungulates reveals the combinations of habitat and diet that are viable for those species. Application to mid-Miocene low-crowned (brachydont) fossil ungulates shows that these species could not have endured wear rates characteristic of species that today feed on substantial amounts of grass in any habitat, nor could they have fed on any diet in a grassland steppe. Because they are the species most severely limited by crown height, brachydont species are particularly powerful in constraining interpretations of paleohabitats.

Poster Session A

HEADS AND SKULLS AS SEDIMENT SORTERS: AN ACTUALISTIC, CT-BASED STUDY IN TAPHONOMY

DANIEL, Joseph, WITMER, Lawrence, Ohio Univ., Athens, OH

Whereas fossilization is an uncertain process at best, soft-tissue preservation is particularly rare, typically found as impressions, casts, or stains. Soft-tissue preservation can be difficult to recognize, and interpretations are often hotly debated. Interpretations may be clarified by actualistic taphonomic studies. CT scans of fossil skulls frequently show density variations within rock matrix within the skull cavities (e.g., the matrix filling the pneumatic cavities of *Nanotyrannus* is clearly of lower density). These variations may be due to factors inherent in sediment infilling, biological activity or remains, or some combination. Due to their complicated construction, fleshy heads and dried skulls may sort sediment, and this sediment sorting may be influenced by soft tissue. If this hypothesis is valid, considerable anatomical information may remain in the matrix, even after the soft tissues themselves were degraded. For example, one might predict that finer sediments might infill the paranasal sinuses than the main nasal cavity, and that relatively coarser sediments might be found in the oral cavity. In exceptional cases, it may even be possible to distinguish remnants of nasal conchae and other major soft tissue structures. We are addressing this question in laboratory experiments in which we will bury a variety of heads (e.g., pig, alligator, ostrich), spanning the spectrum of decomposition from fresh heads to clean skulls and allowing control of both the aqueous depositional environment and the grain size of the sediment. After burial, the heads and surrounding 'matrix' will be frozen and CT scanned. Variations in the CT density will be correlated with grain size by direct sampling of infilled sediment. These data will be compared with variations found in CT scans of fossil skulls. The experimental 'modern fossils' will provide a baseline for interpretation of CT scans of matrix-filled fossils, potentially allowing us to extract more anatomical information than previously thought possible. Moreover, it may be possible to identify optimal soft-tissue preservational environments, such that fieldwork can target promising rock units.

Poster Session A

CHRONISTER DINOSAUR SITE INVESTIGATIONS: NEW INFORMATION ON THE CRETACEOUS OF MISSOURI

DARROUGH, Guy, Marble Hill, MO; FIX, Michael, Univ. of Missouri, Saint Louis, MO; PARRIS, David, New Jersey State Museum, Trenton, NJ; GRANDSTAFF, Barbara, Univ. of Pennsylvania, Philadelphia, PA

Improved excavation technologies have yielded better specimen recovery and detailed records than were previously possible at the Chronister Site, an admittedly challenging deposit.