

ramids preferentially inhabiting dysoxic to anoxic bottom waters. Cretaceous bonebeds are widespread in the WIS and may eventually serve as stratigraphic and sequence stratigraphic markers integrated into a basinwide framework.

Poster Session I (Wednesday)

PAIRED FISH OTOLITHS FROM POSSIBLE COPROLITES IN THE GLENDON LIMESTONE (OLIGOCENE, RUPELIAN) OF CENTRAL MISSISSIPPI
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Paired actinopterygian otoliths are essentially unknown in the paleontological record except in the case of *in situ* earstones in skeletons. Matched pairs of fish otoliths were extracted from two possible coprolites in the Glendon Limestone (Oligocene, Rupelian) at the Smith County Lime Plant quarry in central Mississippi. Fish otoliths are very rare, although not unknown, in indurated sediments. The probable coprolites contained excellently preserved fish otoliths and fragmented skeletal remains of fish. One sample (MMNS VP-3854) contained otoliths from *Aplodinotus distortus*, *Sciaena pseudoradians*, and *Paraconger sector*. It yielded 15 otoliths, and 12 of these otoliths appear to be matched pairs from *Aplodinotus distortus* and *Sciaena pseudoradians*, both sciaenids or drums. The other sample (MMNS VP-3841) contained only otoliths from the drums *Aplodinotus distortus* and *Sciaena pseudoradians*. It had 27 otoliths, and 20 appear to represent matched pairs from the two drum taxa. Parameters for matched pairs of teleostean otoliths, determined from modern studies, include 1) same species, 2) right and left sagittae, 3) one millimeter or less difference in right and left sagittae length, 4) found in same stratigraphic interval, and 5) similarity of miscellaneous features (preservation, coloration, ostium width, maculae patterns, etc.). Possible origins of the suspected coprolites include piscivorous taxa such as sharks and bony fish. Oligocene sharks known from the Glendon Formation include *Isurus* (mako shark), *Carcharhinus* (bull shark), *Carcharias* (sand tiger shark), *Galeocerdo* (tiger shark), *Abdounia* (catshark), *Carcharodes* (white shark), and *Hemipristis* (snaggletooth shark). Piscivorous bony fish are represented primarily by *Sphyræna* (barracuda). Comparisons of the length of the fossil sagittae to Recent otoliths of *Aplodinotus grunniens* indicate that the fish were quite small (70 to 170mm) and probably juveniles. Fish size may indicate the barracuda rather than sharks as the originator of the coprolites, but the number of fish represented in each sample (minimum of nine and seventeen) may point to a larger predator such as a shark.

Poster Session III (Friday)

INCREASES IN SACRAL VERTEBRAE IN NON-AVIAN DINOSAURS: A PERSASIVE, HOMOPLASTIC, DRIVEN EVOLUTIONARY TREND
PINE, Sarah, University of California, Berkeley, Berkeley, CA, USA; WEDEL, Matthew, Museum of Paleontology, Berkeley, CA, USA

Increase in the number of sacral vertebrae is a pervasive evolutionary trend in non-avian dinosaurs. The primitive sacral count for Dinosauria is three. Increases in the number of sacra occurred across Dinosauria as a clade, and also as repeated parallel events within clades. For example, the number of sacra increased to five in basal theropods, and this count persisted along the 'backbone' of theropod phylogeny from the base of Neotheropoda to the base of Aves (including *Archaeopteryx*). However, increases to six or more sacra occurred independently in ceratosaurs, alvarezsaurids, therizinosaurs, oviraptorosaurs, troodontids, and dromaeosaurs. The number of sacral vertebrae also increased independently in saurischian dinosaurs, thyreophorans, ornithomimids, and ceratopsians (and in many subclades thereof). The increase in sacral vertebrae in Dinosauria passes all of the standard tests for a driven evolutionary trend (i.e., moving minimum, subclade, and ancestor-descendant tests). Further, it is homoplastic, with increases occurring independently in every major dinosaurian clade and in many of the subclades. Remarkably, the trend shows few or no reversals in non-avian dinosaurs; sacral count increases in all lineages but decreases are limited to a handful of singleton taxa, and even these reductions are doubtful (i.e., because of ontogenetic or preservational factors). The incorporation of large numbers of vertebrae into the synsacrum in the evolution of birds can now be seen as an instance of this pervasive, homoplastic, apparently irreversible, driven evolutionary trend.

Technical Session IV, Wednesday 2:00

TAXON SPECIFICITY IN BONE DAMAGE LEVEL AND TOOTH MARK FREQUENCY INFLICTED BY EXTANT AFRICAN CARNIVORES
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The use of bone modification data to identify the taxon or size of carnivore(s) involved with fossil bone assemblages is increasingly becoming a common goal of taphonomic analyses. A large sample of bones from kills made by several free-ranging African carnivore species (lion, spotted hyena, leopard, cheetah, and jackal) were analyzed to assess potential inter-specific variability in bone damage level and tooth mark frequency inflicted by these carnivores. Differences in bone damage level and tooth mark frequency on different prey sizes, skeletal regions and elements, and long bone classes and portions were evaluated using chi-square tests. Results support the hypothesis that in some instances either bone damage level or tooth mark frequency, or both, can be used to

infer the identity of the carnivore that caused the bone modification. This methodology can be useful when investigating fossil assemblages with clear evidence of carnivore involvement, especially where body fossils of more than one species of carnivore have been found, and where the identity of the carnivore accumulator(s) and/or modifier(s) of the fossil assemblage are in question.

Poster Session I (Wednesday)

HALISAURUS (SQUAMATA: MOSASAURIDAE) FROM THE MAASTRICHTIAN OF ANGOLA

POLCYN, Michael, Southern Methodist University, Dallas, TX, USA; JACOBS, Louis, Southern Methodist University, Dallas, TX, USA; ANNE, Schulp, Natuurhistorisch Museum Maastricht, Maastricht, Netherlands; MATEUS, Octavio, Museu da Lourinhã, Lourinhã, Portugal

Recent fieldwork in the Namibe province in southern Angola yielded cranial and post-cranial elements of at least two individuals of the rare and enigmatic mosasaur *Halisaurus* from a single small excavation. The genus *Halisaurus* is unique in retaining a primitive configuration of the temporal arcade, specifically a broad, vertically oriented contact between the parietal and the supratemporal. The supratemporal is broadly sutured to the opisthotic and prootic, unlike the condition in varanoids in which the simple lunate element lies between the parietal ramus and the squamosal and does not form a sutural contact with the opisthotic or prootic, but as in other halisaurines retains a plesiomorphic, vertically oriented contact with the parietal rami. The squamosal is lightly built and broadly arched as in *Varanus*. Comparison with known halisaurines indicates the new material is referable to the species *Halisaurus arambourgi*. The locality that yielded the new specimens has also yielded a large number of isolated teeth, bones, articulated, and associated skeletons of *Mosasaurus*, *Prognathodon*, *Globidens*, and *Plioplacarus*, which with *Halisaurus* comprise a mosasaur assemblage most similar to that reported from the Maastrichtian of Morocco.

Carnivora: Phylogeny, Form and Function Symposium, Saturday 11:00
TIPTOEING THROUGH THE TROPHICS: MEASURING DIGITIGRADY IN CARNIVORA FOR PALAEOENVIRONMENTAL INFERENCE

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That ankle posture in Carnivora is linked to substrate is well known. Large species from open settings like grasslands are often cursorial with digitigrade stance, whereas smaller species from closed woodlands are often arboreal with plantigrade or semidigitigrade stance. Digitigrade species typically have feet that are proportionally longer than plantigrade species. It is less well known that the proportional length of the foot varies within mammalian species according to substrate, as demonstrated by previous authors. Taken together, these two observations suggest that a simple index of digitigrady calculated either for a single species or an entire fauna across a broad geographic range could reveal variation in palaeocommunity types. But practical difficulties beset measuring variation in digitigrady because fossil carnivorans are seldom represented by unbroken metatarsals and femora with which to measure it. Recent work on the 3D structure of the calcaneum by the author showed that calcaneum shape, particularly the proportions of the in- and out-levers and the position of the sustentacular facet, are closely related to locomotor posture. Here, 34 terrestrial carnivoran species were studied to determine whether femur/metatarsal III length ratios are correlated with two simple linear ratios: the in-lever to the out-lever of the calcaneum, and the position of the sustentacular facet (measured from the proximal end of the calcaneum) to the total length of the calcaneum. The ratio of in- to out-lever was not correlated ($R^2=0.02$, $P=0.52$), but the position of the sustentacular facet was ($R^2=0.30$, $P=0.003$). Either 3D surface analysis or the sustentacular facet ratio thus has potential for measuring digitigrady from a single, commonly preserved bone.

Poster Session III (Friday)

A NEW IGUANODONTID SPECIMEN FROM THE CEDAR MOUNTAIN FORMATION, GRAND COUNTY, UTAH

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The Stikes Quarry, near Green River, Utah, contains remains of two iguanodontids and a small theropod. The lithology of the quarry consists mostly of fine grained, green to gray sandstone with abundant chert pebbles, but mudstones are also present. Bedding is discontinuous, with sharp lateral transitions between sandstones and mudstones. While further excavation is needed, material from the smaller iguanodontid is described here, and includes an ilium, ischium, femur, four articulated caudal vertebrae, and a dentary. Unfortunately, no teeth are preserved in the dentary. Initial study of the pelvic elements, though, shows some interesting features. The preacetabular process of the ilium is straight in both lateral and dorsal views, and there is no curvature between it and the blade of the ilium. In contrast, DMNH 45857 from the Yellowcat Member of the Cedar Mountain Formation, and the holotype of *Planicoxa venenica* from the overlying Poison Strip Sandstone Member, have preacetabular processes that run cranio-laterally from the blade of the ilium. This creates an ilium that is strongly concave laterally, as in *Iguanodon*. The ischium from the Stikes Quarry is