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ABSTRACTS OF PAPERS

FIFTY-NINTH ANNUAL MEETING
SOCIETY OF VERTEBRATE PALEONTOLOGY
ADAMS MARK HOTEL
DENVER, COLORADO
OCTOBER 20-23, 1999

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NEW CRETACEOUS THEROPOD MATERIAL FROM COLORADO

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Comodoro Rivadavia, Argentina; LAMANNA, M. C.; SMITH, J. B., Dept.

Associated remains of an amazing theropod have been recovered from the Bajo Barreal Formation (Cenomanian) of Chubut, Argentina, including much of a large ugalian phalanx of digit II of the left pes and an incomplete right metatarsal II. The unfossil is similar to that of the enigmatic theropod Megaraptor from slightly younger deposits in Neaquen. It is trans-
vously compared with other terrestrial and aquatic carnivores, with the material showing a more
dorsal than the lateral. The flexor tubercle is dorsolaterally low, and the articular surface is
keeled. The metatarsal is distally robust. It is much more massive than metatarsal III of
Megaraptor, suggesting heavier construction of the pes.

A second, smaller theropod specimen was previously discovered from the Bajo Barreal,
consisting of a dorsal vertebra, three caudal centra, a complete rib, a partial metatarsal II, and
manual and pedal unguals. The pedal elements have the same basic morphology in both of the
Bajo Barreal predators, suggesting that they pertain to the same taxon. The dorsal vertebra
shares features with that of Deinonychus, such as a high neural arch, widely spaced, subovoid
articular facets, a low neural spine, a marked haupidocoele, and a short, low-angled centrum
with a small pleurocoel. The neural arch has three large and deep caudal pumatic fossa.
However, metatarsal II does not have the distal, deep groove present in dromeosaurids. The
phylogenetic relationships of the Bajo Barreal theropod must thus remain uncertain pending
the recovery of additional material.

THE BIOSTRATIGRAPHIC AND TAXONOMIC DISTRIBUTION OF COLORADO MOSASAURS

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Mosasaur finds in Colorado date back to 1897, although most material has been recovered
in the latter half of the twentieth century. Material is known from the Late
Cretaceous (early Campanian-early Maastrichtian) of the Niobrara Chalk, and the Niobrara Chalk, Plane
Shale, and Fox Hills Sandstone of eastern Colorado. Many of the mosasaur species coming from the Plane
Shale. The majority of the material has been recovered from eastern Colorado. No certain transfers are known for both
iruslossaurini (Tylosaurus and Platecarpus) and Mosasaurini (Clyostomodon and

A DIVERSE VERTEBRATE ICHNOFAUNA FROM THE LOWER CRETACEOUS AMBILAN GATES FORMATION NEAR GRANDE CAYNE, ALBERTA

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Since the early 1990s, twelve vertebrate tracks actives have been reported in a 25km² area
with the Smoky River coal mine near Grande Cayne, Alberta. Footprints are recovered during
removal of coal of the Number 4 coal seam within the Grande Cayne Member. Most of these
tracks actives have only one ichnotaxon of footprint present (Tetrapodopus).
However, the W track actives boast a diverse vertebrate ichnofauna.

The footprints at the W site occur on a steep footwall, accessible only with the use
of climbing equipment. To date, at least seven vertebrate ichnotaxa have been recognized from the W3 footwall. The composition of the vertebrate ichnofauna present on the W3 footwall
includes the dinozaur ichnogena Tetrapodopus, Gypsichnium, Irenasaurus, Ornithomimnium and Irenichnites. Two avian ichnotaxa are also present, one of which is cur-
rently being described and which comprises over 60% of the documented ichnofauna. The W3 footwall displays an estimated 6000 footprints and over 100 tracks, most of which are found on the distal part of the footwall. During the summer of 1998, 1200 footprints covering just over
500 square meters were mapped and measured.

Several tibia records with avian footprints (Aquatilipes swinboi) were collected at the base of the W3 footwall and may well have originated from there. Very small mammal
footprints were found in association with the A. swinboi prints and are currently being
described. This is the first record of Mesoico mammal footprints from Alberta and the small-
est pre-Tertiary mammal footprints to be discovered.

AN ANALYSIS OF BONE ORIENTATION AT THE CLEVELAND-LLOYD DINOSAUR QUARRY USING VECTOR SUMMATION: A NEW SPIN ON AN OLD TECHNIQUE

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The Cleveland-Lloyd Dinosaur Quarry in Emery County, Utah is one of the most important
dinosaur quarries in North America. The quarry contains a diverse, late Jurassic fauna repres-enting 11 dinosaur species. Over 10,000 bones have been excavated and mapped since the quarry was first worked in the late 1920s. Approximately 80% of the identified fossils are from Allosaurus fragilis. It has been suggested that the quarry represents a predator trap or bog that existed along lake margins, as evidenced by the dense concentration of bones that are
embedded in calcareous claystone and reputedly scattered randomly.

This study examines bone orientation at Cleveland-Lloyd using a quantitative method
that is common in geology, vector summation. Vector summation compares the variance of
vectors in a uniform circular distribution (i.e., a distribution in which all vectors have equal
probability of representation) to the variance observed in the orientation of bones (the mea-
sured circular distribution). Vector summation was used to test the hypothesis that the bones at
Cleveland-Lloyd are randomly oriented, i.e., the variance of the measured circular distrib-
tion does not vary significantly from the variance of a uniform circular distribution.

Preliminary results indicate that the bones at the Quarry are in fact non-randomly oriented.
A non-random pattern typically indicates the influence of fluvial processes. However, hypothe-

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