Thursday, 10:30

NEW LATE PLEISTOCENE BAT FOSSILS FROM ANJOHIBE CAVE, NORTHWESTERN MADAGASCAR

SAMONDS, Karen, Stony Brook University, Stony Brook, NY; BURNEY, David, Fordham University, Bronx, NY

Despite decades of research on Madagascar's extant fauna, one of the most unique and endemic on the planet, the evolutionary history of the island's bats remains poorly known. Thirty bat species (in seven families) are presently recognized, 60% of which are endemic. Their origin and evolution remains enigmatic due to the poor fossil record; the deepest glimpse comes from fossils at a mere ~26,000 BP. Numerous bat remains have been recovered from these fossil sites, but are rarely identified or described.

We report a diverse assemblage, represented by isolated teeth, jaws, and postcranial elements, of newly discovered fossil bats from Anjohibe Cave, northwestern Madagascar. Some of these fossils were extracted from breccia dated at ~90,000 BP, more than three times the age of the island's oldest known Cenozoic fossils. Fossiliferous breccia was collected from four horizons in Anjohibe Cave and dated using U-series dating techniques. Three of the seven extant Malagasy bat families are represented: Hipposideridae—*Hipposideros*, *Triaenops*; Pteropodidae—*Eidolon*, *Rousettus*; and Vespertilionidae—*Myotis*, *Scotophilus*. *Hipposideros* is the most well-represented genus, represented by multiple jaw elements, proximal limb elements, and wrist bones, including the fused scaphocentralolunate. Compared to extant *Hipposideros commersoni* collected at Anjohibe, fossil *Hipposideros* have larger molars and a more mesiodistally expanded P4. Since *Hipposideros* is the largest microchiropteran bat present on Madagascar today, this suggests that these fossils represent either a closely related but extinct species, or that this genus experienced molar reduction through time, a phenomenon previously documented in other bat faunas.

Some bats are sensitive to habitat destruction and hunting, and therefore may have experienced extinctions and range restrictions during the Holocene, as has been shown for many other groups in Madagascar. A better understanding of the Malagasy fossil fauna has great potential to help reconstruct the historical changes in bat species richness and diversity during the late Pleistocene and Holocene.

Friday, 11:00

PROVINCIALISM IN LATE CRETACEOUS TERRESTRIAL FAUNAS: NEW EVIDENCE FROM THE CAMPANIAN KAIPAROWITS FORMATION OF UTAH

SAMPSON, Scott, LOEWEN, Mark, ROBERTS, Eric, SMITH, Joshua, ZANNO, Lindsay, GATES, Terry, Univ. of Utah, Salt Lake City, UT

Recent work in the Late Campanian-aged (Judithian) Kaiparowits Formation, Grand Staircase-Escalante National Monument, southern Utah, has yielded remains of several previously unknown taxa of dinosaurs and other vertebrates. The new dinosaur taxa include a caenagnathid theropod, the first recovered south of Montana, and a chasmosaurine ceratopsid allied with southern forms. High-resolution chronostratigraphic data from multiple ash layers indicate that the Kaiparowits Formation is contemporaneous with several dinosaur-rich formations to the north (Dinosaur Park, Judith River, and Two Medicine) and to the south (the Fruitland and portions of the Kirtland and Aguja). Previously, vertebrate assemblages from these Western Interior formations have been characterized as northern and southern faunas, respectively. A comprehensive comparison of known vertebrate taxa from these formations was undertaken, encompassing over 324 taxa across fishes, amphibians, lizards, turtles, crocodilians, dinosaurs, and mammals. Relative to the northern and southern biotas, the Kaiparowits Formation fauna consists of a diverse mixture of endemic, cosmopolitan, northern, and southern taxa. We tentatively interpret this pattern as representative of an intermediate zone of faunal mixing and endemism that directly parallels a contemporaneous, latitudinally equivalent marine fauna from the adjacent Late Cretaceous Interior seaway. In addition, given the considerable latitudinal variation in constituent vertebrate taxa within these coeval terrestrial ecosystems, the faunal distributions and chronostratrigraphic data together provide strong support for the vertebrate provincialism hypothesis. The present study represents one of the few examples of subcontinental scale biogeography for this era, underlining the future potential for addressing key ecological and evolutionary questions.

Poster Session B

SEMIAQUATIC AND FOSSORIAL ADAPTATIONS IN EXTINCT BEAVERS (CASTORIDAE)

SAMUELS, Joshua, Univ. of California, Los Angeles, Los Angeles, CA

The beaver family (Castoridae) includes ca. 20 genera (50 species) in four distinct subfamilies. Members of this family vary in limb morphology, including taxa with specializations for semiaquatic or fossorial habits. Modern taxa are often used to infer adaptations of their extinct counterparts. Here, detailed morphometric comparisons are used to infer locomotor habits of extinct beavers. Extant rodent taxa with diverse locomotor habits (including *Castor canadensis*, *Ondatra*, *Myocastor*, *Hydrochoerus*, *Aplodontia*, *Marmota*, *Neotoma*, *Spermophilus*, *Cynomys*, and *Thomomys*) were compared with several extinct North American beavers (*Castor californicus*, *Dipoides*, *Procastoroides*, *Castoroides*, and *Palaeocastor*). Specimens were measured for 35 functional osteological characteristics (e.g. limb bone length, breadth, anteroposterior diameter). Limb ratios were used to assess semiaquatic and fossorial adaptations. Correlations between morphology and locomotor habits in extant taxa were analyzed using principal components analysis and discriminant function analysis; results were used to infer habits of extinct beaver taxa. All extant semiaquatic rodent taxa studied show some morphological convergence linked to this locomotor habit. Ratios and multivariate analyses show *Castor* and 3 genera of extinct beavers from the subfamily Castoroidinae display similar specializations in their limbs related to semiaquatic locomotion. Multivariate analyses show *Procastoroides* and *Castoroides* to be less specialized for semiaquatic locomotion than *Castor*, possibly related to their significantly larger size. Data also reveal some convergence among extant fossorial taxa and the extinct *Palaeocastor*. Locomotor specialization of extinct beavers may help explain patterns of diversification and extinction within the group. Future work will include additional fossil taxa, and when combined with cranial and isotopic analyses will help elucidate the origin of semiaquatic and fossorial adaptations in the various castorid subfamilies.

Student Poster Session

IMPORTANT NEW INFORMATION ON MID-EOCENE VERTEBRATES OF THE UINTA BASIN, UTAH

SANDAU, Stephen, Brigham Young Univ., Provo, UT

Late mid-Eocene time marks one of the most dynamic phases of the Paleogene in the western interior of North America. A new collection of vertebrates from the Pariette and Wells Draw area south, southwest of Myton, Utah has yielded a variety of taxa. Partially articulated *Lepisosteus* (garpike) specimens were recovered along with abundant skull elements and ganoid scales. These are found in channel sandstone within the study area along with hashes of scales, bones and crocodilian teeth in washed lag deposits. The anguid lizard *Glyptosaurus* is represented by several vertebrae. An exceptionally well-preserved skull and mandible of "*Crocodylus*" *affinis* is of particular importance, showing the shared dominance of this large basal crocodyloid with other more modern crocodilians within the Uinta Basin well into the late mid-Eocene. This is further substantiated by a number of isolated "*Crocodylus*" *affinis* teeth and postcranial elements found throughout the study area in many locations. An impressive variety of fossil turtles were collected including *Echmatemys callopyge*, *E. uintensis*, *Hadrianus* sp., *Xerobates uintensis*, *Baena arenosa*, *Chisternon undatum*, *Apalone (Platypeltis)*, and *Pseudanosteira pulchra*. They show surprisingly abundant pathological markers, most likely induced by bacterial or fungal infections and/or invertebrates, indicating possible environmental influences and prolonged postmortem exposure.

Uintan mammals are represented by *Mytonomys robustus?* (Rodentia), *Protoreodon petersoni*, and *P. pumilus* (oreodontid), *Poebrodon kayi?* (camelid), *Leptotragulus* sp. (protoceratid), *Epihippus* sp. (equid), and *Diplacodon?* (brontotheriid), as well as other unidentified Brontotheres represented by numerous postcranial elements. Harvesting (rodent gnawing), of turtle shell fragments (costals) and mammalian limb elements, again shows evidence of extended subarial exposure and ecological interaction between fauna. Magnetostratigraphic work done within the Uinta Basin east and west of the study area tie in with Chrons C20n (43.5-42.5)-C19r (42.0-42.5) indicating late mid-Eocene time.

Saturday, 9:15

INSULAR DWARFISM IN A BRACHIOSAURID SAUROPOD FROM THE UPPER JURASSIC OF GERMANY

SANDER, Martin, Universitaet Bonn, Bonn, Germany; LAVEN, Thomas, Dinosaurier-Freilichtmuseum Muenchehagen, Rehburg-Loccum, Germany; MATEUS, Octavio, Museu da Lourinha, Lourinha, Portugal; KNOETSCHKE, Niels, Dinosaurier-Freilichtmuseum Muenchehagen, Rehburg-Loccum, Germany

Sauropod dinosaurs were the largest animals to ever inhabit the land, with truly gigantic forms in at least three lineages. However, small species of adult body mass of less than 5 t are very rare, and small sauropod bones generally represent juveniles.

Based on the comparison of bone histology, such small bones may also represent island dwarfs, akin to the Pleistocene pygmy island elephants. This is the case in material that comes from marine beds of Kimmeridgian age from Oker (Harz Mountains, Germany). It records individuals of a new brachiosaurid not exceeding 6 m in total body length and represents the first unequivocal case of dwarfing for any dinosaur. The same ontogenetic stages in histology are present at much smaller body size than in the abundantly sampled large sauropods from the Morrison Formation and the Tendaguru Beds.

Growth cycle counts suggest that the dwarfed brachiosaurids reached maximum size at 8-9 years and may have attained sexual maturity as early as 2-3 years. Dwarfing evolved by reduction of growth rate and shortening of ontogeny.

Saturday, 2:30

PLESIOSAUR SWIMMING RECONSTRUCTED FROM SKELETAL ANALYSIS AND EXPERIMENTAL RESULTS

SANDERS, Frank, CARPENTER, Kenneth, REED, Brian, REED, Julia, Denver Museum of Natural History, Denver, CO

Three basic hypotheses have been proposed for the swimming locomotion of plesiosaurs: rowing motion in which the flippers move primarily in a horizontal plane; figure-eight motion (underwater flight) in which the flippers move primarily in a vertical plane while continuously being rotated on their longitudinal axes so as to generate thrust in a manner roughly analogous to that of penguins or sea turtles; and a sea lion stroke in which the flippers move down-