Poster Session III, (Tuesday)

SPARASSODONTS OF SALLA: SPECIES RICHNESS AND NEW TAXA OF CARNIVOROUS MARSUPIALS FROM THE LATE OLIGOCENE OF BOLIVIA

ANAYA DAZA, Federico, Universidad Autónoma Tomás Frías, Potosí, Bolivia; SHOCKEY, Bruce, Manhattan College & AMNH, New York, NY, USA; CROFT, Darin , Case School of Medicine, Cleveland, OH, USA

Sparassodont marsupials are uncommon in the late Oligocene Salla Beds of Bolivia, as in most faunas. However, this group shows considerable species richness and morphological diversity at Salla. We recognize a minimum of 7 species. Five of these have been formally described: *Fredszalay hunteri*; *Pharsophorus lacerans*; *Notogale mitis*; *Sallacyon hoffstetteri*; and *Paraborhyaena boliviana*. We also have recently recovered partial crania of two small, apparently new, borhyaenids. The new short-faced species from Unit 3 is distinctive in having: only 2 upper premolars; reduced upper molar stylar shelves; very well developed postmetacristae, with that of M3 strongly oblique and nearly perpendicular to the jaw axis; very large orbits; and a large infraorbital canal. It has 4 upper incisors followed by a gap for the large lower canine. The upper canine is large and long-rooted, as evidenced by the long, palpable bulge extending nearly 2 cm into the skull. The distinctive shearing blades of the molars in this taxon, as well as the two blade-like premolars, leave little doubt that animal material was an important food for this small, dog-like marsupial. A second small, dog-like specimen comes from higher in the section, Unit 5 of the Tapial Pampa region of Salla. The tooth crowns are badly damaged, but it is clear that it had 3 premolars and 4 molars. The snout is much longer than the previous specimen and its tip is wide, slightly flared, and blunt. We also have encountered a jaw of a very large proborhyaenid, cf. *Paraborhyaena*, at the base of Unit 3. It is distinguished by its large size, hypercarnassial m4, and the presence of a single pair of large, blunt incisors. The proborhyaenid(s) of Salla appear to represent the youngest record of the giant, carnivorous marsupials. The 7+ species of sparassodont marsupials at Salla are one of the most diverse communities known, potentially exceeded only by that of Santa Cruz, Argentina. These faunas illustrate the need for increased faunal sampling to accurately assess diversities of rare groups such as sparassodonts.

Evolution of the Modern African Fauna, Wednesday 11:00

COMPARISON OF THE LIFETIME HISTORIES OF HIPPOS FROM DIFFERENT ENVIRONMENTS USING STABLE ISOTOPES

ANDANJE, Samuel, Biodiversity Research and Monitoring, Kenya Wildlife Service, Nairobi, Kenya; CHRITZ, Kendra, Department of Biology, University of Utah, Salt Lake City, UT, USA; CERLING, Thure, Department of Geology and Geophysics, University of Utah, Salt Lake City, UT, USA

Stable isotope analysis (SIA) has the potential to elucidate aspects of ecology in fossil organisms that are not easily observable using traditional paleontological techniques, such as diet and migration. Before SIA can be applied to ancient specimens with confidence, more work must be done on modern analogues living in a variety of environments in order to understand how environmental parameters are recorded in the isotopic signature of diagenetically resistant tissues, such as tooth enamel. We present data from isotope measurements taken at 10mm intervals along the profiles of *Hippopotamus amphibius* (hippo) canine (tusk) enamel from a collection of 25 hippos living in a variety of environments across Kenya. These tusks present a wealth of information about isotopic variation across the lifetime histories of modern hippos. Tusk profiles indicate that hippo feeding behavior varies across environments and can deviate considerably from the traditionally assumed pure grazer (C_4) diet depending on their habitat and changes occurring therein. These data suggest that observations taken from isolated populations in time or space do not accurately reflect the ecology of a species, and care must be taken when using SIA in the fossil record without proper modern analogues for comparison.

Poster Session I, (Sunday)

PECTORAL GIRDLE AND FIN SEXUAL DIMORPHISM IN THE HOLOCEPHALAN *HARPAGOFUTUTOR VOLSELLORHINUS* FROM THE BEAR GULCH LIMESTONE OF MONTANA (HEATH FORMATION, BIG SNOWY GROUP, SERPUKHOVIAN) WITH COMMENTS ON *CHONDRENCHELYS PROBLEMATICA*

ANDERMANN Jr., Roy, Saint Joseph's University, Philadelphia, PA, USA; GROGAN, Eileen, Saint Joseph's University, Philadelphia, PA, USA; LUND, Richard, Carnegie Museum of Natural History, Mount Holly, PA, USA

Recently excavated specimens of the holocephalan chondrenchelyid *Harpagofututor volsellorhinus* reveal sexual dimorphism in the pectoral fin and girdle between these male specimens and the previously described females. The pectoral fin of the female *Harpagofututor* is paddle-like, characterized by a single series of axials from which thin radials radiate both dorsally and ventrally. This is distinct from the male pectoral fin in that the elements of the latter are appreciably more robust. The male fin axials are very broad and support jointed radials which are also considerably broader than in the female. These larger radials in the male *Harpagofututor* are positioned closer together in series than in females. To support the more robust paddle, the pectoral girdle of male *Harpagofututor* is correspondingly more developed than that of females. This sex based variation in anatomy suggests distinction in how these structures are used, possibly for display purposes. Such a correlation has been reported in extant fish with comparable sex-based pectoral dimorphism. In addition to pectoral fin and girdle dimorphism, the male *Harpagofututor* also possessed denticulated ethmoid claspers and pelvic fins, augmenting the already large body of evidence for pervasive sexual selection in Bear Gulch chondrichthyans. We also find the sexually dimorphic pectoral design reported here is comparable to that of the Scottish relative, *Chondrenchelys problematica*. Otherwise, the male *Chondrenchelys* pectoral fin is distinct from the male *Harpagofututor* in exhibiting denticulation on its leading edge. Ultimately, and in addition to other morphological features of the cranium, dentition and body, the similarity in pectoral fin structure of the American *Harpagofututor* and Scottish *Chondrenchelys* accentuates the close relationship between these fish.

Poster Session IV, (Wednesday)

FUNCTIONAL SHIFT IN THE DENTITION OF EXTANT AND FOSSIL MAMMALS

ANDERS, Ulrike, Universität Bonn, Bonn, Germany; VON KOENIGSWALD, Wighart, Universität Bonn, Bonn, Germany

Bunodont teeth are generally regarded as being used for crushing food. However, in some suids (e.g., *Sus scrofa*) and fossil proboscideans (e.g., *Gomphotherium*) the degradation of the cheek teeth opens up the possibility of functional changes. During ontogeny wear causes the flattening of the surface and enamel margins of the exposed dentine fields in the cusps may function as shearing edges. Crushing elements in the cheek teeth are present on the bunodont dentition with the eruption of the deciduous fourth premolar shortly after birth. Whether the first molar comes in function the crushing area shifts distally and the deciduous fourth premolar with exposed dentine bordered by enamel margins modifies to functional shearing. Measurements in *Sus scrofa* show that the relationship between crushing surfaces and shearing edges remains almost constant in the dentition throughout a long period of individual age. In older individuals badly worn teeth give the impression of functional disability but the loss of crushing surfaces and afterwards shearing edges in the anterior region is compensated by the late eruption of the posterior second and third molars. Thus, the functional shift can be recognized from the anterior to the posterior region. To increase the efficiency *Sus scrofa* has enlarged third molars with an exceeded number of cusps. Accompanied with an elongation of the tooth exchange crushing and shearing surfaces are functional over a longer period. The functional shift might give advantage to large or even hypsodont third molars as in *Phacochoerus* while anterior teeth may be expelled. Furthermore, the elongation of the tooth eruption phase and the posterior shift of the main functional area favour the evolution of a horizontal tooth exchange as seen in some fossil and extant proboscideans.

Preparators' Session, Monday 10:30

HOW TO MOLD AND CAST A MUMMY DINOSAUR

ANDERSEN, Arthur, Virtual surfaces Inc., Mt Prospect, IL, USA; LICHKO, Joseph, Cubic Vision Inc., Deerfield, IL, USA; JONES, Martin, Ford Motor Co., Livonia, MI, USA; LARSON, Peter, Black Hills Inst of Geological Research, Hill City, SD, USA

Traditional molding and casting of fossil bones is a time-honored process going back to the first preparators. The result is a very accurate cast of the original fossil specimen.However, some specimens are so unique and delicate that traditional molding and casting would destroy the specimen. We found this to be the case with Leonardo, a mummy dinosaur. The molding process involves the usual cleaning of excess matrix, gluing broken pieces and filling in any cracks. Mold release agents may be applied. To accurately record the surface geometry, latex and/or silicon rubber is applied to the fossil surface, which is then backed with foam or fiberglass to maintain the shape. Once the rubber and backing elements have cured, they are removed. Of course, a fossil would require several separate mold jackets to enclose the entire specimen. The mold jackets can now be filled with a casting compound such as a polyester acrylic resin or polyurethane. Leonardo has skin impressions, exposed fossilized bone, and a myriad of small and large surface cracks. He is a very unique specimen. But filling the cracks along with extensive application of chemical release agents, compromises the chemical signature of the surface. After some discussion we opted to employ the use of a non-contact 3-D scanner. Once the scanning is complete, it is followed-up with data editing and rapid prototyping. The scanning itself took 7 days complete, which included the main specimens' body, a separate tail section and his right arm. Over 300 scans were made to insure that as much detail was included. And since the scans are line-of-sight, every feature required multiple scan views. Total resolution: 0.10 mm, at 10 microns accuracy. Data editing required 4 months, which resulted in a series of 32 blocks suitable for rapid prototyping. The rapid prototyped blocks were sent to the Black Hills Institute for assembly, molding and casting. Also rapid prototyped were ¼ and 1/10 scaled models. Thus a valuable specimen remains in pristine condition, saved for future studies.

Poster Session IV, (Wednesday)

NEW SPECIMENS OF *THISBEMYS BREVICRISTA* (RODENTIA) FROM THE MIDDLE EOCENE BRIDGER FORMATION, GREEN RIVER BASIN, WYOMING

ANDERSON, Deborah, St. Norbert College, De Pere, WI, USA; KEIL, Kim, St. Norbert College, De Pere, WI, USA; HOLT, Beth, St. Norbert College, De Pere, WI, USA

New specimens from the Green River Basin allow for the lower dentition of the middle Eocene rodent *Thisbemys brevicrista* to be described and compared with other species of the genus for the first time. Previously, only the upper dentition and a partial maxilla were known from Bridgerian (Br) 3. Included in the new sample are the first specimens of lower molars, additional upper molars, and maxillary fragments including a partial zygomatic arch