amivorous Strigopus major and the herbivorous Iguana iguana provided the basis for the extent comparative sample. The invasive Canudosaurus hollisteri and C. petricola were also dissected for further comparison. A suite of skull structures and muscle locations were identified that appear to relate to differences in feeding styles in these extinct iguanids. In the constrictors and lizards, similarities include the oblique slice of the temporal masseter in relation to each other and the long axis of the skull, the dorsal shift of the suprarenal masseter, and the overall lengthening of the jaw muscles. Alternatively, in the herbivorous iguanids, features include the relationship of the temporal masseter to the exit of each muscle and the long axis of the skull, the larger surface area of the parietal base in the suprarenal masseter, and the lesion located jaw muscles. These features are also found in the early sauropodomorphs under study. The skull of P. englesiardi exhibits temporal masseter that are located at a right angle with respect to each other and the long axis of the skull, like that of I. iguana, whereas A. polychrous has temporal masseter that are of an oblique relationship, similar to that of S. major. Therefore, it is suggested that Ankylosaurus had a facultative constrictive feeding style whereas Plateosaurus was predominantly herbivorous. This study presents the likelihood of a dain origin of herbivory in Sauropodomorpha, as archosaurians are thought to be phylogenetically more derived than richest; this study further elucidates the evolution of herbivory in the derived sauropod dinosaurs.

Technical Session II (Wednesday, October 30, 2013, 9:45 AM)

FRACAL DIMENSIONALITY AS A MEASURE OF OCCLUSION ENAMEL COMPLEXITY IN EQUIDAE (MAMMALIA: PERISSODACTYLA)

FAMOSO, Nicholas, University of Oregon, Eugene, OR, United States; DANZER, Edward, University of Oregon, Eugene, OR, United States

Occlusal patterns on the occlusal surfaces of equid teeth are asserted to have tribital-level diversity. The most notable example compares the Equus and Hipparionini, where Equus have higher crowned teeth with less enamel-broad complexity and less total occlusal enamel than Hipparionini. While previous work has successfully quantified differences in enamel band shape by dividing the length of enamel band by the surface root of both the buccal and lingual occlusal area (OIT), these studies have discovered that OIT only partially removes the effect of body size. Because enamel band length scales allometrically, body size still has an influence on OIT, with larger individuals having relatively larger enamel bands resulting in individuals. Focal dimensionality (D) can be scaled to any level, so we have used it to quantify occlusal enamel complexity while completely eliminating the influences of scaling from body size. With the effects of body size removed, we can now directly investigate complexity. To test the hypothesis of tribital-level complexity differences between Equus and Hipparionini, we digitally traced a sample of 20 teeth, ten from each tribe. We restricted our sampling to the P3 to eliminate the effect of tooth position. After calculating the D of these teeth with the fractal box method, we performed a nested two-way analysis of co-variance (ANCOVA) with taxonomy (tribe, genus, and species) as a nested independent factor, tusk occlusal area (a proxy for body size) as a continuous independent factor, and D as the dependent factor. The ANCOVA indicates that genera nested within tribe (p=0.0483), and species nested within genus and tribe (p=0.0148) are significant. Pecocul surface area (p=0.4116) and tribe (p=0.0666) are not significant. Our preliminary results suggest that, as expected, fractal complexity is independent of body size. The tribital level was not significantly different for complexity and the significance of the lower taxonomic levels suggests that complexity is the product of selection and behavior rather than taxonomy.

Technical Session III (Wednesday, October 30, 2013, 3:00 PM)

BIOMETRIC STUDIES OF BASAL NEOCERATOPSID DINOSAURS ILLUSTRATED BY A SKULL FROM THE CLOVERLY FORMATION (LOWERT CRETACEOUS) OF MONTANA

FARKE, Andrew, Raymond M. Alf Museum of Paleontology, Claremont, CA, United States; HILLIS, David, University of the Pacific, Stockton, CA, United States; CEPPELLI, Richard, Oklahoma Museum of Natural History, Norman, OK, United States; WEDDELL, Minhow, Western University of Health Sciences, Pomona, CA, United States

Basal neoceratopsians have been previously reported from the Early Cretaceous of North America based on postcranial and isolated teeth, but the incompleteness of these fossils has hampered meaningful broader interpretation. The skull of a small basal neoceratopsian from the Cloverly Formation of Carbon County, Montana, provides clarification of the phylogenetic and biogeographic relationships of Asian and North American neoceratopsians. The specimen was collected from the basal portion of Unit VII of the formation; we provisionally regard it as Alkallis in age. The skull measures 44 mm from the tip of the rostral to the tip of the jugal, representing a small (possibly immature) animal. Definitive ceratopsian synapsomorphs include a rostral bone, among other features. The premaxillary is largely preserved, anteriorly and posteriorly, though the left maxillary tooth postes exist. Each tooth crown shows a distally-placed primary ridge with at least one accessory ridge on each side, as in Archaeoceratops. Similar to Archaeoceratops and ceratopsians, the premaxillary tapers to a sharp tip. The jugal is present but lacks an epipophysis in Lacertopedia. Phylogenetic analysis places the Cloverly ceratopsian within Neoceratopsia, close to Lacertopedia and the origin of the clade. Somewhat surprisingly, the Cloverley taxon is not closely related to later North American ceratopsians. Dispersal/Vicariance Analysis and the Dispersal-Extinction-Cladogenesis model were used to reconstruct ancestral ranges within Ceratopsia. In agreement with previous hypotheses, the earliest ceratopsians are reconstructed as Asian; dispersal into North America during the Early Cretaceous is required to account for the Cloverly taxon. As many as two subsequent and separate dispersals are required to account for later North American ceratopsians and leptoceratopsians. The Cloverly ceratopsian provides additional evidence for a faunal connection between North America and Asia by the mid-Albian or perhaps even earlier.

Technical Session XIV (Saturday, November 2, 2013, 8:00 AM)

USING AVIAN SUBSURFACE 3D FOOT MOTION TO SIMULATE FOSSIL TRACK DIVERSITY

PALKINGHAM, Peter, Royal Veterinary College London, London, United Kingdom; GATISSY, Stephen, Brown University, Providence, RI, United States

The fossil track record is our primary window on the locomotor capabilities and behaviors of extinct animals, yet the variations seen among footprints is daunting; both in the assemblage level, and even within trackways made by a single individual. In order to make solid inferences about the trackmakers, locomotion, or behavior, we must understand how pedal anatomy, distal limb kinematics, and substrate interact to generate track morphology.

Our aim was to begin to deconvolute this complex system by simulating tracks of different depth while holding foot structure and motion constant. We first analyzed a chicken-like bird, the hatched gosling, traversing a bed of poppy seeds using X-ray Reconstructor of Moving Morphology (XROMM) to reconstruct the 3D kinematics of the distal limb both above and below the surface of the compliant substrate. We then imported these 3D kinematics into computer simulations of granular material, carried out using the Discrete Element Method (DEM).

Changes in depth alone produce a wide diversity of resultant tracks, both at the exposed surface and at intermediate levels. The shallow angle of the metatarsus and digits at entry and exit cause elongation of the surface morphology as the foot sinks deeper. Backcross sections of the distal phalanges at toe-off result in parallel scratch marks at the base of the track.

The variation seen in these simulated tracks bears striking resemblance to many of the tracks in the Hildensepse collection held at the Boreal Invertebrate Museum of Natural History, Ambleside. Our kinematic data and simulations suggest much of this variation stems from the depth to which the foot sank and to the level subsequently exposed, rather than from a diversity of foot morphologies or locomotor kinematics. We also show that the subsurface foot movement is more predominant substrate behavior than track morphology (or portions of tracks) which vary, if interpreted without complete context, be attributed to unusual behaviors such as swimming.

Technical Session I (Thursday, October 31, 2013, 6:15 - 6:35 PM)

A PHOTOMGRAMMETRIC RECREATION OF ROLAND T. BIRD'S PALYS RIVIERA BIKER/SPORT-USA TRAIL® TRACTS (GLEN ROSE FORMATION, LOWER CRETACEOUS, DINOSAUR VALLEY STATE PARK, SOMERVILLE COUNTY, TEXAS)

FARLOW, James, Indiana Parks Univ Fort Wayne, Fort Wayne, IN, United States; BATE, Chris, Brown University, Providence, RI, United States; BATES, Karl, University of Liverpool, Liverpool, United Kingdom

In 1940 R.T. Bird of the American Museum of Natural History (AMNH) exposed a sequence of footprints of a sauropod and an associated theropod dinosaur in the dolostone mudstone bed of the Palys River. Portions of the two trackways were cut into pieces from the river bed, and later reassembled at the AMNH and the Texas Memorial Museum (TMM). Austin. Bird took an extensive series of photographs to record the length of the two trackways. We digitized these images, and used photogrammetric software to combine them into a model that can be viewed from any perspective, digitally adding accurate three-dimensional surfaces to the model.

October 2013—PROGRAM AND ABSTRACTS