methods currently in use by paleontological artists and illustrators, in an effort to clarify these methods for critical evaluation, as well as suggest areas of research that are currently under-explored. These methods differ in focus from mainstream paleontology, but are of great concern to artists and illustrators. Some, such as the application of phylogenetic bracketing, are becoming reasonably well established; others, such as animal pattern and coloration, remain unsystematic. Finally, I will discuss the current aims of paleontological reconstruction in it's differing contexts, whether that be to communicate, educate, or inspire, and ask whether we should attempt to measure the impact of our work.

Technical Session XVI, Saturday 10:30

BIOGEOGRAPHY OF EUROPEAN CHALICOTHERES (PERISSODACTYLA, CHALICOTHERIIDAE): OLD AND NEW INTERPRETATIONS AND SYNTHESIS
COOMBS, Margery, University of Massachusetts, Amherst, MA, USA

Understanding the distribution of chalicotheres (clawed Perissodactyla) is helpful for reconstructing faunal and ecological changes in the European Cenozoic. Chalicothere evolution evidently centered in Asia, from which migrants reached Europe, North America, and Africa at different times. The first definite appearance of chalicotheres in Europe was in the Oligocene, when the genus *Schizotherium* spread widely across Eurasia. Around the Oligo-Miocene boundary several important events occurred: the schizotheriine chalicotheriid *Moropus* first reached North America, and at around the same time (MN 2) very similar schizotheriine chalicotheres appeared in Europe. Early Miocene European material has variously been called *Moropus*, *Phyllotillon*, or *Metaschizotherium* and comes from France, Spain, Portugal, Germany, and the Czech Republic. Unfortunately much of it is fragmentary, so correct generic identification is difficult. Excellent material of *Metaschizotherium* from Sandelzhausen (MN 5) and several fissures at Petersbuch (MN 6) have vastly increased our knowledge of this genus, which is best known from MN 5-7 in Germany but probably had a greater temporal and geographic range. Although the very peculiar chalicotheriine subfamily is known from the earliest Miocene in Asia and East Africa, Chalicotheriinae made their European debut late in MN 5 in the form of *Anisodon grande*. From that time onward in the Miocene, both subfamilies coexisted in Europe and occasionally co-occur in the same deposits. The MN 7-8 fauna of La Grive in southern France is of particular interest for understanding chalicothere faunal changes leading into the later Miocene. Reinterpretations of material from La Grive suggest that *Ancylotherium* (Schizotheriinae) and *Chalicotherium* (Chalicotheriinae) may have first reached Europe about this time. In the late Miocene, *Chalicotherium goldfussi* became the dominant chalicothere species in Central Europe, while *Ancylotherium pentelicum* is well known from southeast Europe and adjacent Asia. Both subfamilies disappeared from Europe by the end of the Miocene but persisted later in Asia (Chalicotheriinae) and Africa (Schizotheriinae).

Technical Session XVI, Saturday 11:15

ANATOMICAL AND LOCOMOTOR SPECIALIZATIONS OF THE EOCENE RAOELLID *INDOHYUS*
COOPER, Lisa Noelle, NEOUCOM, Rootstown, OH, USA; THEWISSEN, J.G.M. , NEOUCOM, Rootstown, OH, USA; BAJPAI, Sunil, Indian Institute of Technology, Roorkee, India; TIWARI, B.N., Wadia Institute of Himalayan Geology, Dehra Dun , India

Raoellids are an extinct family of cat-sized artiodactyls. Skeletons of at least 30 individuals of the raoellid *Indohyus* were recovered from middle Eocene streambed sediments of India. For the first time a detailed analysis of anatomical and locomotor specializations has been completed for this population of *Indohyus*. Skeletal morphology of Indohyus was compared with the primitive fossil artiodactyl *Diacodexis metsiacus*, members of the earliest family of cetaceans (pakicetids), and an extant artiodactyl of similar body size, *Tragulus*. Metapodial and phalangeal bone morphologies indicate a digitigrade stance based on articular surface morphologies and terminal phalanx shape. *Indohyus* also lacked several adaptations for an aquatic lifestyle seen in pakicetid cetaceans. Like pakicetids, *Indohyus* displayed elongated hindlimbs and an elongated tail. Pakicetids, however, displayed a greater number of osteosclerotic appendicular and axial elements that acted as skeletal ballast. This extensive bone ballast likely allowed pakicetids to forage at depth with less expenditure compared to *Indohyus*. Also, pakicetids displayed more extensive foot interdigital webbing and more robust digital muscles compared to *Indohyus*. Taken together, these results indicate that pakicetids displayed skeletal morphologies that facilitated invasion of the aquatic environment, and the skeletal morphology of *Indohyus* likely represents that of an aquatic wader as it was not as adept at aquatic locomotion.

Technical Session XIV, Friday 2:15

DISCOVERING DEVELOPMENTAL SIGNALS IN PHYLOGENETIC DENTAL DATA - FROM MICRO- TO MACRO-EVOLUTIONARY VARIABILITY
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Results from developmental biology can help investigate dental characters used for phylogenetic and evolutionary analyses. We examined a recently published comprehensive data matrix of fossil and extant primate relationships from a developmental perspective. Empirical development and population level variation studies show that features which appear chronologically later during development (those low on the crown or posteriorly located) tend to be more variable intra-specifically. Similarly, features in posterior molars tend to be more variable than in anterior ones. To determine whether these patterns are also true at the macro- rather than micro-evolutionary level, we examined the frequency of polymorphisms scored in the data as a measure of variability. For example, the paraconid cusp of lower molars is coded as an ordered character and scored as; absent or crestiform (0); polymorphic between states 0 & 2 (1); small (2); polymorphic between states 2 & 4 (3); large (4). Small cusps are initialized later in development than large ones and are located lower on the tooth, so we hypothesized that there would be more taxa polymorphic between absent/small cusps than small/large cusps. Results show 8-12% polymorphism in the later developing paraconids (dependent on tooth position) and only 0-2% polymorphism in earlier developing paraconids. Furthermore, a constant decrease in the 'average' character state of the paraconid between m1-m2 and m2-m3 was observed, as predicted by a developmental cascade model of tooth formation where constant tooth-tooth size change is expected. Our results show that a developmental perspective is useful for uncovering patterns in character states across taxa. Conversely, in addition to containing hierarchical information relating to phylogenetic relationships, phylogenetic data may contain information about development, an underlying mechanism of evolutionary change.

Technical Session VII, Thursday 3:30

DOES INCISOR MORPHOLOGY CORRELATE WITH DIET IN CAVIOMORPH RODENTS?
CROFT, Darin, Case Western Reserve U., Cleveland, OH, USA; NEIMI, Kyle, Case Western Reserve U., Cleveland, OH, USA

Caviomorph rodents represent a remarkable mammalian radiation. They colonized South America prior to the earliest Oligocene, diversified into more than 250 Recent species in 13 families, and presently fill niches occupied on other continents by lagomorphs, artiodactyls, and hyracoids. Despite the importance of caviomorph rodents in modern and fossil ecosystems, comparatively little research has focused on morphological correlates of behavior useful for reconstructing habits of extinct species. Given that the large, ever-growing incisors of rodents have been cited as a key adaptation for the clade, we investigated whether the morphology of these teeth varied in a predictable way with diet. Using Carnegie Museum specimens, our pilot study focused on 11 caviomorph genera classified into one of three dietary categories: fruit-leaf (incl. soft fruit pulp, leaves, twigs, animal material), fruit-seed (mainly seeds), and grass-leaf (grasses, leafy plants). Several specimens of each genus (31 total) were measured for six incisor variables: buccolingual diameter (BD), cord length (CL), buccal enamel extent (EE), mediolateral diameter (MD), outer radius of curvature (RC), and sharpness (SH). BD, CL, EE, and MD were measured with calipers; RC and SH were measured using ImageJ and digital photos. A stepwise discriminant analysis (DA) using all variables except CL correctly classified all 31 individuals according to diet. A DA using only BD, EE, and SH correctly classified all genera (i.e., species averages). Leave-out-one DAs classified ca. 65% of individuals and genera correctly. Hydrochoerus (the largest rodent in the dataset) and Ctenomys (a chisel-tooth digger) were most commonly misclassified. To test the model's general applicability, one specimen of each of five additional extant genera (four non-caviomorphs) were included as unknowns; the DA of individual specimens classified 80% correctly. Incisor morphology thus appears to be highly correlated with diet in extant caviomorphs and, in combination with hypsodonty and enamel microwear, should permit more refined dietary inferences for extinct species.

Poster Session II, (Thursday)

MOLAR MICROWEAR OF INSECTIVOROUS BATS: IMPLICATIONS FOR THE TROPHIC ECOLOGY OF TWO EARLY MAMMALS
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Morganucodon and *Kuehneotherium* are iconic and historically controversial basal mammals found in Early Jurassic fissure-fill sites within Carboniferous Limestone in Glamorganshire, South Wales. Previous workers have noted marked differences in tooth and jaw morphology between these two taxa, leading to the assertion that each utilized a distinct food source. Tooth microwear supports this hypothesis and the results of this work are presented here, along with a more detailed assessment of diet based on a comparative analysis of microwear in extant insectivorous microchiropteran bats, and analysis of the reaction of teeth to virtual stress loading.

High-resolution 3D data were acquired via focus variation microscopy (Alicona IFM) from functional surfaces of the molars of *Morganucodon*, *Kuehneotherium*, and five genera of bats. Surface roughness was quantified through microtextural analysis, a novel, highly repeatable method of microwear analysis that limits the operator error that hampers traditional approaches. Bat specimens were chosen to represent a continuum of dietary preferences from the 'hard-object' feeding beetle-specialist *Eptesicus serotinus* and mixed forager *Rhinolophus ferrumequinum* to the 'soft-object', moth-specialist *Plecotus auritus*