Romer Prize Session (Thursday, October 18, 9:45 am)

EVIDENCE FOR SUSPENSORY LOCOMOTOR ADAPTATIONS IN A LATE MIOCENE FOSSIL APE BASED ON *IN VIVO*-VALIDATED MODELS OF HIP JOINT ABDUCTION

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Suspensory locomotion plays an important role in hypotheses for the origins of great ape locomotion. When and how suspensory behaviors evolved is currently debated. Early Miocene apes are hypothesized to have been above-branch quadrupeds with suspensory capacities inferred to have originated in the middle to late Miocene, but few data have been available with which to test this hypothesis. Hominoid suspension is thought to require an increased range of hip joint abduction compared to monkey-like above-branch quadrupedal behaviors. If hip joint mobility can be accurately reconstructed from bone morphology, this would provide an opportunity to evaluate locomotor abilities based on hip joint function in fossil apes. Here I present results of *in vivo* and *in silico* measures of hip joint abduction capacity in suspensory (*Symphalangus*, *Hylobates*, *Pongo*, *Gorilla*, *Pan*, *Ateles*) and non-suspensory (cercopithecids, *Cebus*) extant anthropoids. Angular abduction at the hip was measured on anesthetized living primates using a goniometer. Pelves and femora of the same taxa were laser scanned and 3D polygonal models were digitally articulated. Maximum hip abduction was modeled using PolyWorks software using strictly-defined morphological criteria for joint movement. *In silico* and *in vivo* data are strongly correlated, validating the use of digital reconstructions of hip joint mobility. Suspensory taxa have greater ranges of hip abduction than non-suspensory primates using both types of data. When these methods are applied to Miocene apes, results show that the early basal hominoid *Proconsul* had hip abduction similar to non-suspensory quadrupedal anthropoids, whereas the late Miocene crown hominoid *Rudapithecus* displays hip abduction capacity comparable to suspensory extant apes and *Ateles*. This project provides the first evidence for suspensory abilities from the hindlimb of any Miocene ape.

Poster Session I (Wednesday, October 17, 4:15 - 6:15 pm)

NEW SPECIMENS OF ELASMOTHERIINI (RHINOCEROTIDAE, PERISSODACTYLA) FROM THE NAMURUNGULE AND NAKALI FORMATIONS (EARLY LATE MIOCENE) OF NORTHERN KENYA

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The early Late Miocene Namurungule and Nakali Formations are distributed in northern Kenya. Previously, *Kenyatherium bishopi* is the only elasmotheriin described from the Namurungule and Nakali Formations. The Japan-Kenya joint expedition team has discovered several Rhinocerotidae fossils from these formations. We report new Elasmotheriini fossils from the Namurungule and Nakali Formations.

The specimens from the Namurungule Formation consist of a maxilla with molars (M2 and M3), a mandible with lower p4 to m2 and isolated teeth of upper P4 and upper M3. These specimens were preliminarily identified as Iranotheriinae sp. nov. The specimens from the Nakali Formation include isolated teeth of upper M1 or M2 and upper M3.

These specimens share the following diagnostic characters of the tribe Elasmotheriini: crown cement, constricted protocone of the upper molars and bucco-lingually elongated postfossette of upper P4. These specimens are distinguished from *Kenyatherium bishopi* by lacking characters of the species such as united protocone and hypocone of the molars and developed enamel folding. These specimens are characterized by lingually elongated protoloph and metaloph, undeveloped enamel folding and small crochet. These characters indicate that these specimens resemble following the middle Miocene Elasmotheriini: *Victoriaceros kenyensis* from Maboko of Kenya, and *Huaqingtherium lintungense* from Lintung, Shaanxi, China.

However, the specimens of the Namurungule and Nakali Formations have a small enamel plication in the medisinus of the upper molars. This character is not seen in the upper molars of *V. kenyensis* and *H. lintungense*. Additionally, molar size of these specimens is smaller than those of *V. kenyensis* and *H. lintungense*. Therefore, these specimens belong to a new taxon.

Poster Session III (Friday, October 19, 4:15 - 6:15 pm)

INVESTIGATING THE IMPACT OF COMPETING INTERPRETATIONS OF PECTORAL GIRDLE PLACEMENT AND APPENDICULAR FUNCTION ON SAUROPOD HEAD HEIGHT

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Previous attempts to reconstruct the posture and potential range of motion in the cervical series of sauropod dinosaurs have focused on restoring the osteological neutral position (ONP) of the axial column, and attempts to link ONP with the degree of habitual vertebral flexion observed in extant vertebrates. While placement of the pectoral girdle has met with passing discussion, the roll of differing interpretations of appendicular posture has been largely ignored.

To evaluate the impact of competing functional interpretations of the pectoral girdle and appendicular skeleton, a quantitative analysis was conducted on the three most commonly used interpretations of pectoral girdle placement in the literature, and several models of limb kinematics. Testing was carried out on a 3D digital dataset of *Camarasaurus*, as well as dimensionally-accurate skeletal diagrams of *Camarasaurus* and several other neosauropods to increase taxonomic sampling.

Results show that differing interpretations of the angle of the scapula on the body had a minimal impact on the elevation of the presacral column, while the location of the pectoral girdle had a significant impact, with more ventrally and posteriorly located pectoral girdles leading to progressively higher head height.

Published interpretations of forelimb posture in sauropods vary mostly in the orientation of the humerus and the degree of eversion in the elbow. Neither was found to have a significant impact on head height. Hind limb kinematics were found to have a larger impact on head height, as knee and ankle flexure reduced pelvic height, which in turn raised the cervical series. Differences in restoring the pes of sauropods differ markedly, from digitigrade to plantigrade; lowering the foot into a plantigrade stance was found to increase head height.

These findings demonstrate that restoring the ONP of vertebrae is insufficient to accurately estimate head height in sauropods. Competing interpretations of pectoral girdle position and hind limb kinematics can influence the angle of the cervical series significantly, suggesting that a more holistic approach must be taken with regard to sauropod neck posture.

Poster Session III (Friday, October 19, 4:15 - 6:15 pm)

A NEW SPECIES OF CANID FROM THE MALAPA HOMININ SITE, GAUTENG, SOUTH AFRICA

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The recently discovered hominin bearing site of Malapa (Gauteng South Africa), type locality for *Australopithecus sediba*, has yielded a mammalian fossil assemblage that is remarkable in both its taxonomic breadth and preservational quality. Many of the species that have been identified from this assemblage are represented by multiple elements from single individuals – a rarity for the South African fossil record. Numerous specimens of carnivorans have also been described from the site including both large and small species. Here we examine a smaller sample of specimens that represent the second new species (after *A. sediba*) to emerge from the 1.977 million year old Malapa sample – a new small canid that we attribute to the genus *Vulpes*.

The type specimen, University of the Witwatersrand (UW) 88-812 is a right mandibular fragment that includes part of the alveolus of the p3, the complete p4 and m1, the alveoli of m2 and m3 and the entire distal portion of the mandible. The coronoid, condylar and angular processes as well as mandibular foramen and masticatory muscle insertion scars are well preserved. Another specimen (UW 88-814) is a complete right m2 crown that we believe is from the same individual. Likewise, a complete right rib (UW 88-813) from a small canid was also recovered from the same breccia block. Given the preservational state of Malapa (almost no taphonomic mixing of the sample), this specimen likely came from the same individual.

Relative to a large sample of individuals of modern and fossil *Vulpes* as well as other small canid genera (which can be excluded based on morphology), the new Malapa species of *Vulpes* is defined by the lack of distal accessory cusp on its p4, mesiodistally compressed and high-crowned m1 trigonid, relatively large m2, and relatively small condyle. Overall, this new species is gracile with high-crowned sharp teeth, suggesting, despite its lack of accessory cusps, a tendency toward hypercarnivory or insectivory.

Romer Prize Session (Thursday, October 18, 10:15 am)

DYROSAURID CROCODYLIFORMS ATTAIN PEAK TAXONOMIC DIVERSITY AND CRANIAL MORPHOSPACE DISPARITY IN FRESHWATER FOLLOWING LATE CRETACEOUS LARGE MARINE TETRAPOD EXTINCTION

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The Cretaceous-Paleogene (K-Pg) boundary marked the extinction of most large marine tetrapods. While other large marine tetrapods were nearly absent in the following Paleocene, dyrosaurid crocodyliforms have been recovered from marine depositional environments from the Late Cretaceous through the Eocene, when their extinction coincides with the diversification of cetacean mammals. The lack of competition by other large marine tetrapods during the Paleocene may have enabled dyrosaurids to radiate into new habitats and occupy new morphospace. Dyrosaurid fossils from the Paleocene Cerrejón Formation of South America indicate adult individuals occupied entirely freshwater with very different skull morphologies from their saltwater counterparts. Past studies of stable isotopes from dyrosaurids have indicated similar behavior to extant C*rocodylus porosus* which inhabits freshwater as a juvenile then moves to more saline waters with maturity. This suggests the possibility that typically saltwater dyrosaurids inhabited freshwater as adults through paedomorphic modification of ontogeny. The Cerrejón dyrosaurids provide a test for the hypothesis that dyrosaurids diversified into new habitats and occupied new morphospace through paedomorphic modification in a non-marine habitat during the Paleocene. To quantify and compare fresh versus saltwater dyrosaurids, skulls of each dyrosaurid species, for which nearly complete fossils have been recovered (n=10), were analyzed using geometric morphometrics and compared to the same analyses for four extant crocodylian