Regular Poster Session I (Wednesday, October 9, 2019, 4:15 - 6:15 PM)

CRANIAL ENDOCASTS OF COLUGOS, AND THEIR RELEVANCE TO UNDERSTANDING THE EARLY PHASES OF THE EVOLUTION OF THE BRAIN IN EUARCHONTA AND PRIMATES

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In order to better understand what is primitive in terms of the morphology of the brain for Primates it is essential to understand the form of the brain in primates' closest extant relatives: Dermoptera (colugos) and Scandentia (treeshrews). Treeshrews are often viewed as modern proxies for early primates because they are small-bodied and have lissencephalic brains. However, a previous study concluded that the endocranial morphology of treeshrews is derived and unlike that of primitive primates (plesiadapiforms). Dermopterans are also extant animals, closely related to primates, albeit much larger than treeshrews and with gyrencephalic brains. Little is known about the endocranial morphology of colugos despite their important position in Euarchonta.

Although dermopteran endocasts contrast with those of scandentians in being gyrencephalic, the relative neocortical surface area (~36%) is within the range of Scandentia (33.6%-39.8%), similar to early fossil euprimates (e.g., 31-36% in adapoids), and much higher than in plesiadapiforms (~20-22%). The olfactory bulbs are relatively smaller than observed in scandentians or plesiadapiforms, accounting for only 3.8% of the total volume; this is greater, however, than in adapoids (1.2-2.4%). To examine patterns in shape, a set of 30 endocranial landmarks were placed on endocasts derived from microCT data for 22 treeshrews: *Ptilocercus* (n=5), *Tupaia* (n=15), and *Dendrogale* (n=2), both species of dermopterans: *Cynocephalus volans* (n=1) and *Galeopterus variegatus* (n=1), and two plesiadapiforms: *Ignacius graybullianus* (n=1) and *Microsyops annectens* (n=1). Procrustes shape variables were examined in a Principal Components Analysis. The results show that dermopterans occupy their own shape-space, distinct from both treeshrews and plesiadapiforms. This is largely due to differences in the overall shape of the cerebellum and due to an anterior-dorsal shift in the highest point of the neocortex. These results highlight the distinctive nature of the dermopteran endocast, which lacks clear similarities in shape or proportions to those of plesiadapiforms. Although there are some general resemblances to early euprimate endocasts, these similarities are in features are either very prone to parallelism (e.g., reduction in the size of the olfactory bulbs) or are likely related to increased overall size (e.g., presence of neocortical sulci). These results highlight the problematic nature of using modern taxa as models for the early phases of primate or euarchontan brain evolution.

Grant Information:
Supported by an NSERC Discovery Grant to MTS.

Technical Session XV (Saturday, October 12, 2019, 9:15 AM)

A NEW RHAETIAN BONEBED FROM GERMANY: IMPLICATIONS FOR THE END-TRIASSIC EXTINCTIONS IN THE MARINE REALM

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The mass extinction at the end of the Triassic is arguably the least understood of the Big Five extinction events, partially because of dating and correlation issues and partially because of scarce Rhaetian fossil localities. Among these, the classical Rhaetian bonebeds (condensation horizons) of the European marine epicontinental Triassic have been important because of their taxon sampling from fully marine to terrestrial environments. Yet, the stratigraphic position of these bonebeds relative to the Triassic-Jurassic boundary is rarely well constrained. The newly discovered Rhaetian bonebeds of Bonenburg (eastern Westphalia, Germany) improve this situation by their biostratigraphically (palynomorphs, conchostracans) well constrained late Rhaetian age combined with an abundant and diverse vertebrate fauna. Bonenburg also provides a thick Triassic-Jurassic boundary section, including the latest Triassic (201.5 ma) Event Beds which directly overlie the bonebeds. Among the fish remains, chondrichthyan teeth and fin spines represent typical Rhaetian taxa (e.g., *Grozonodon candaui*, *Lissodus minimus*, '*Hybodus*' *cloacinus*, *Nemacanthus monilife*r, and *Rhomphaiodon minor*) which do not survive into the Jurassic. Large *Ceratodus* sp. lungfish teeth record continental input. Tetrapods are represented not only by amniotes, but surprisingly also by temnospondyls. Plagiosaurids are common, and abundant remains of large capitosauroid temnospondyls are the youngest record globally. Amniotes are represented by ichthyosaurs, sauropterygians, the possible choristodere *Pachystropheus*, saurischian dinosaurs, and the cynodont *Lepagia*. The most abundant ichthyosaur remains are extremely short (length < 20% of height) but large vertebrae of the *Shonisaurus* type and the cortical fragments of giant ichthyosaur jaw bones. Sauropterygians are represented by at least three taxa of plesiosaurs including *Rhaeticosaurus*, but also by non-plesiosaurian pistosauroids such as a large (30 cm) humerus and vertebrae.

The Bonenburg faunal record thus offers a contradictory signal regarding the nature and severity of the extinctions. The finds indicate that many chondrichthyans, two clades of non-brachiopoid temnospondyls and giant shastasaurid ichthyosaurs survived into the latest Triassic but not beyond. Non-plesiosaurian sauropterygians also went extinct, but plesiosaurs seem to have suffered little. In summary, the extinctions appear to have been sudden, constrained to the latest Triassic Event Beds, but selective.

Grant Information:
We acknowledge the LWL Museum für Naturkunde, Münster, Germany, for financial support through the Denkmalpflegeprogramm NRW.

Technical Session VI (Thursday, October 10, 2019, 12:00 PM)

A REVIEW OF AFRICAN ELASMOTHERES (MAMMALIA, RHINOCEROTIDAE) AND THEIR ROLE ON EARLY MIOCENE MIGRATION EVENTS INTO EAST AFRICA

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Rhinoceroses first ventured into Africa at the early Miocene. By the beginning of the middle Miocene, all the main clades recorded in Eurasia were already represented across East Africa by a series of endemic species, pointing to a critical period of rhinoceros evolution at a continental level. These include members of the Elasmotheriina, rhinoceroses with a highly hypsodont dentition and a conservative postcranial skeleton. We studied the holotype of *Turkanatherium acutirostratum*, the first elasmothere species reported from the continent. The skull comes from the early Miocene (16.8–17.5 Ma) strata of the Moruorot Hill, Kenya, and is housed at the National Museum of Colombo, Sri Lanka, where has not been accessed by specialists for the last 65 years. Previous studies proposed the presence of a long-lasting lineage of African elasmotheres. Our detailed re-description and revised diagnosis of *T. acutirostratum* not only confirms its elasmothere affinities but also shows that African Elasmotheriina species are related to separate Eurasian clades. The lineage leading to *T. acutirostratum* is part of a distinct early Miocene migration event separated from that of *Ougandatherium napakense*, an earlier elasmothere species found in the early Miocene deposits of Napak (Uganda). However, East African elasmothere postcranial remains poorly known, highlighting the need for their study in order to elucidate the distribution of the group at a continental level. This work highlights the role of Rhinocerotidae in the strong but progressive faunal turnover event taking place in East Africa for much of the Miocene.

Grant Information:
This study is funded by the NSERC, the 2017-P1/AMB-5298 Talent Attraction program, the NSF grant #1241817, the Handel T. Martin research grant, and is part of the REACHE project.

Technical Session VI (Thursday, October 10, 2019, 10:15 AM)

THINK BIG, EVOLUTIONARY ALLOMETRY AS A MAJOR FACTOR IN RATES OF MORPHOLOGICAL EVOLUTION OF THE PRIMATE BRAIN SHAPE

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Primates constitute one of the most successful and diverse mammalian clades. One key factor in their diversification is the evolution of their peculiar brain morphology, however, the evolutionary and developmental processes determining the relevant shape changes in the primates brain remains largely unknown. In this study we used 3D geometric morphometrics, phylogenetic comparative methods and Bookstein's novel concept of scaling in shape