Poster Session II

THE IMPORTANCE OF CT SCAN IN TESTUDINES TAPHONOMIC ANALYSES—A CASE STUDY IN PIRAPOZINHO SITE, SAO PAULO, BRAZIL

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Testudine material, collected at the Pirapozinho Site (Bauru Group), has been macroscopically analyzed and mechanically prepared for several years. All the studies indicated that, due to the richness of the material and to the excellent state of preservation of it (based mainly on the presence of articulated individuals (carapace/plastron conditions)), a catastrophic event occurred in the site. However, analysis of the slices obtained in tomographic exams proved to be essential to the study of the Testudines group as, by that means, it is possible to visualize the internal structures of the turtle material without causing damage to them, resulting in accurate data to taphonomic interpretation. These data indicated that some of the macroscopically analyzed material was not as complete as it was imagined to be. The majority of the sample presented different stages of disarticulated internal condition. As a result, it could be determined to the Pirapozinho Site eight taphonomic classes, enclosing completely articulated to disarticulated elements: class I—articulated and complete skeleton, including skull and mandible; class II—partially articulated skeleton with no skull and/or mandible; class III—articulated skull and mandible isolated from the post-cranium elements; class IV—isolated skull or isolated mandible; class V—carapace/plastron with a reduced or without intern bone material; class VI—isolated carapace or isolated plastron; class VII—isolated post-cranium material; and class VIII—high degree of bone fragmentation. The taphonomic data together with sedimentary ones indicate both slowly and catastrophic events. They also indicate a reworking and a time-averaging processes. The present model postulates a multi-episodic event to the Pirapozinho Site, with a total of ten different moments of humidity and drought registered.

Poster Session III

MACROEVOLUTIONARY INSIGHTS BASED ON BIOMIC SPECIALIZATION OF MAMMALIAN ASSEMBLAGES: INTERCONTINENTAL COMPARISON AMONG AFRICA, SOUTH AMERICA AND EUROPE

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Vrba's resource-use hypothesis, developed after the study of the mammalian fossil record from Africa, predicts that generalist species have lower speciation and extinction rates than specialists. We test several subsidiary predictions of this hypothesis using the biomic specialization index (BSI) for each mammal species, which is based on its geographical range within different climate zones. This index can be used globally allowing intercontinental and intertaxa comparisons. Our results, based on the study of extant African (A), South American (SA) and European (E) mammals, are consistent with the axioms of the resource-use hypothesis, which predicts (1) a high frequency of stenobiomic species, (2) that carnivores are more eurybiomic than herbivore clades, (3) the higher incidence of biomic specialists in the tropical rainforest, desert, steppe and tundra biomes, and (4) the fact that certain combinations of inhabited biomes occur more frequently among species than do others. We also found that the tropical deciduous woodland (A, SA), sclerophyllous woodland (E), nemoral forest (E) and taiga (E) are important sources of species, which is due to either the large size of these biomes or the high incidence of climatic cycles on them. These results can be explained within the premises of the resource-use hypothesis. The low incidence of tundra specialists in Europe might be due to the reduced extent of this biome in the continent. Other deviations from some predictions of the evolutionary hypothesis tested here are probably due to the high incidence of mountainous terrain on ecological specialization in European and South American mammals, or to the influence of the Pliocene Great American Biotic Interchange. The resource-use hypothesis and related habitat-theory suggest that a key to present-day macroecological patterns is found in the past: in the long term history of turnover (speciation, extinction) of clades, and in the palaeoclimatic and other geological changes of the areas in which the clades evolved. As a result of our work, here we present evidences based on extant assemblages that support an evolutionary theory originally based on the fossil record.

Poster Session III

LATE MIOCENE MAMMALIAN FAUNA INCLUDING LARGE HOMINOIDS FROM THE NAKALI FORMATION, RIFT VALLEY, KENYA

HIDEO, Nakaya, Kagoshima Univ., Kagoshima, Japan; YOSHIHIRO, Sawada, Shimane Univ., Matsue, Japan; YUTAKA, Kunimatsu, Kyoto Univ., Inuyama, Japan; MASATO, Nakatsukasa, Kyoto Univ., Kyoto, Japan; HARUO, Saegusa, Univ. of Hyogo, Sanda, Japan

The branching age of the human clade from the other hominoids was estimated to be around five million years ago by the calibration of DNA sequence. Hominid fossils are reported from some localities over six million years ago (Senut et al. 2001, Brunet et al. 2002) post 20th Century. The late middle to early late Miocene (between 13 and 7 Ma) is the important age for revealing the human origins. *Samburupithecus kiptalami* (Ishida & Pickford 1997) from the Namurungule Formation (Rift Valley, Kenya) is the only hominoid fossil associated with a rich vertebrate fauna from Sub-Saharan Africa in this geologic age. The Namurungule Fauna was correlative with the Fauna Set VI (10 to 8 Ma) of mammalian biostratigraphy of Sub-Saharan Africa by Pickford (1981) (Nakaya et al. 1984, Nakaya 1994, Pickford et al. 1984, Tsujikawa 2004). Geologic age of the Namurungule Formation was determined as 9.6 Ma by K-Ar dating and magnetostratigraphy (Sawada et al. 1998). However, *S. kiptalami* is represented only by a single left maxilla with the upper cheek tooth row. Phylogenetic position of *S. kiptalami* is not yet established within the Hominoidea. The Japanese expedition team has excavated the Nakali Formation (Rift Valley, Kenya) since 2002. This team has collected more than 700 vertebrate remains including hominoid fossils (Nakatsukasa & Kunimatsu 2005, Nakatsukasa et al. 2005). We have identified 27 taxa of the following orders and families from the Nakali Fauna including unreported taxa by previous works. Reptilia: Crocodilia, Testudinata, Squamata (Serpentes), Mammalia: Primates (Non-cercopithedoid catarrhine, Hominoidea spp., Colobinae), Rodentia (Rhyzomyidae, Thryonomyidae), Proboscidea (Deinotheriidae, Gomphoteriidae, Elephantidae), Hyracoidea (Procaviidae), Carnivora (Mustelidae, Hyaenidae), Perissodactyla (Equidae, Rhinocerotidae), Artiodactyla (Suidae, Hippopotamidae, Giraffidae, Bovidae). The faunal assemblage from the Nakali Formation is similar with the assemblage from the Namurungule Formation, and also correlative with the Fauna Set VI (10 to 8 Ma). Large hominoid fossils from the Nakali Fauna are new material from the late Miocene in age.

Friday 12:00

HORN MORPHOLOGY OF *PACHYRHINOSAURUS* AND HORN EVOLUTION IN CENTROSAURINE DINOSAURS

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The integument covering the rugose nasal and supraorbital bosses of the centrosaurine dinosaur *Pachyrhinosaurus* has been reconstructed with structures ranging from thin, unornamented skin to massive, rhino-like horns. Skin morphology has an impact on paleobiological inferences (e.g., behavior). As pachyrhinosaur bosses are novel structures, inferences regarding their soft-tissue morphology and function require a three step approach of testing (1) similarity by analogy to extant taxa, (2) transformational homology by congruence in the EPB, and (3) adaptation within the ingroup using phylogenetic comparative methods.

The nasal and supraorbital horn cores and surrounding bone of *Pachyrhinosaurus, Achelousaurus, Einiosaurus*, and *Centrosaurus* were compared to the osteological correlates of extant amniote skin types to assess relative similarity of centrosaurine skin to modern analogs. Hypotheses of homology for the skin covering the skull roof were tested for congruence in extinct archosaurian taxa and extended to centrosaurines. Finally, hard- and soft-tissue character states were optimized onto a phylogeny of Centrosaurinae by parsimony.

The center of the horn bosses present on adult *Pachyrhinosaurus* and *Achelousaurus* shows bone texture most similar to that found beneath the horny frontal 'helmet' of muskoxen (*Ovibos*), and were most likely covered by a thick (2-10 cm) flat plate of papillary horn attached to an unspecialized, thin, tangentially-oriented dermis. The periphery of the horn bosses shows bone texture similar to that found beneath avian rhamphotheca and bovid cornotheca, suggesting that the morphology of the base of the primitive centrosaurine epidermal horn was retained. Preliminary results indicate that ceratopsian nasal horns are transformational homologs of the frontal scale sequence in crocodilians and the frontonasal beak plate in birds, and that these structures initially arose by the tangential projection of a horny plate, similar to the derivation of the casque in hornbills.

Poster Session I

INSIGHTS INTO THE BIOLOGY OF LARGE, EXTINCT SOUTH AMERICAN UNGULATES

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Several orders of ungulate mammals have arisen and become extinct on the continent of South America. The biology of these South American ungulate mammals is enigmatic, since there are obvious convergences in body form with many modern ungulates (including those that now live natively in South America), and yet no extant members of the South American ungulate orders exist. Most interpretations of the biology of South American ungulates are based upon the general morphology of teeth, skulls, and limbs. New advances in geochemistry allow for further investigation into the habitats of the animals. We have conducted isotopic analysis of 15 teeth or tooth fragments from members of the Notoungulata, Pyrotheria, and Litopterna, representing at least 11 individuals. Ten of the specimens were sampled serially, to examine annual variation in stable oxygen and carbon isotopes. The data provide insight into seasonal variation in climatic variables, such as temperature and rainfall, the approximate rate of growth of rootless molars, incisors, and tusks that are common in the large South American ungulates. Isotopes provide a means to study the advent and spread of C4 grasses in South America. Furthermore, isotopes from fossil teeth provide important information about the timing of uplift of the Bolivian Andes and the formation of the Altiplano.

Poster Session II

DYROSAURID (CROCODYLIFORMES) FOSSILS FROM THE CRETACEOUS AND PALEOGENE OF MALI

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Dyrosaurids are common components of late Mesozoic and early Cenozoic faunas in western Africa, yet their fossil record presents special challenges to the interpretation of their