Holmesina septentrionalis, Glyptotherium cf. *cylindrcum, Northrotheriops* cf. *hanstesis, Pappogeomys* sp., *Lepus* sp. and *Kinosternon* sp. This it is the first occasion in recent times that it is reported a faunal list for this important area of the Pleistocene of Mexico, since the previous listings date from the 60's decade.

HOMOPLASTIC VARIATION OF BONE VASCULARIZATION IN BIRDS

CUBO, Jorge, MARGERIE, Emmanuel de, and CASTANET, Jacques, Universite Paris 6 and CNRS UMR 8570, UP7 case 7077, 2 pl. Jussieu, 75005 Paris France.

The potential usefulness of bone microstructures in systematics has been discussed for over one and a half century. However, so far, no statistical tests have been carried out to assess the influence of phylogeny on the variation of bone microstructural traits. Bone histodiversity can result from the phylogenetic legacy of the clade, from recent adaptive forces or both. The first hypothesis assumes that because closely related species have a recent last common ancestor they share a greater portion of genotype and might tend to share similar morphologies (including bone histology) than distantly related species. However, bone histodiversity may also be the result of species-specific "autapomorphic" adaptations, in which case it may be largely independent from higher levels of phylogeny.

The aim of this study is to quantify the "phylogenetic effects" possibly involved in bone histodiversity. The character analysed is the density of bone vascularization in birds assesed by permutational phylogenetic regressions. Bone compacity (i.e. the bone surface/bone surface plus vascular surface ratio) has been measured in several species of neornithe birds. For each pair of species, their histological dissimilarity (density of bone vascularization) and their phylogenetic distance were assessed. Two matrices were constructed. The trait dissimilarity matrix was then regressed on the phylogenetic distance matrix and the significance of this regression was tested using Mantel test. Phylogeny explains only a tiny fraction of the variation of bone vascularization. These results provide the first statistical evidence for variation of bone vascularization in birds which appear to be the homoplastic result from adaptive constraints independent from higher levels of phylogeny. These findings are relevant to assess the significance of variation in bone vascularization among extinct Archosaurs in a phylogenetic context.

A NEW SAUROPOD FROM MADAGASCAR: IMPLICATIONS FOR TITANOSAUR LOWER-LEVEL PHYLOGENY

CURRY ROGERS, Kristina, Science Museum of Minnesota, Paleontology Department, St. Paul, MN 55108.

The Titanosauria were the last survivors of the giant sauropod dinosaurs. Titanosaurs first came on the scene in the Late Jurassic, and attained a near global distribution by the close of the Cretaceous. In spite of their extensive geographic and temporal distribution, titanosaurs are commonly known only from fragmentary postcranial skeletons and exceedingly rare skull material. As such, evaluation of their higher and lower level phylogenetic relationships has relied almost exclusively on postcranial data. A new titanosaur from the Maevarano Formation of northwestern Madagascar provides the first view of titanosaur anatomy from head to tail. Malagasy Taxon A (MTA) allows the best opportunity yet to test Titanosauriformes monophyly, the lower level phylogeny of the Titanosauria, and the phylogenetic positions of several controversial taxa.

MTA includes an adult skull and a nearly complete, associated juvenile skull and skeleton. It is characterized by over 20 axial and appendicular autapomorphies. The skull is also rife with autapomorphies and is characterized by an intriguing amalgamation of brachiosaurid and diplodocoid-like features. The combination of features preserved in MTA clarifies titanosaur morphology and disputes claims of the overall similarity of titanosaurs and brachiosaurids. MTA highlights the need for total evidence phylogenetic analyses. Along with a few recent finds of other titanosaurs, it provides the data required for resolution of titanosaur phylogeny.

Analysis of a data matrix of 228 characters and 16 ingroup taxa (including 10 purported titanosaurs) in a branch and bound search in PAUP* supports a close relationship between brachiosaurids and titanosaurs within Titanosauriformes. Two distinct clades occur within Titanosauria. MTA cranial data also lay to rest questions concerning the enigmatic Mongolian genera *Nemegtosaurus* and *Quaesitosaurus*. In spite of their elongated, diplodocoid-like skulls, all three sauropods are firmly nested and closely related within Titanosauria.

BOTHRIOLEPIS SPP. (PLACODERMI, ANTIARCHI) FROM THE OKSE BAY GROUP (LATE DEVONIAN) IN NUNAVUT, CANADA

DAESCHLER, Edward B., Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103; SHUBIN, Neil H., University of Chicago, Department of Organismal Biology and Anatomy, 1027 E57th St., Chicago, IL 60637; JENKINS, Farish A., Jr., Harvard University, Museum of Comparative Zoology, 26 Oxford St., Cambridge, MA 02138.

The poorly known fish fauna from the Late Devonian Okse Bay Group in the eastern Canadian Arctic has been referred to as the "Ellesmereland" fauna or the "Okse Bay" fauna. The Late Devonian stratigraphic section, however, is more than 8000 feet thick and has been divided into at least four formal lithostratigraphic units (Fram Formation, Hell Gate Formation, Nordstrand Point Formation, and Parry Islands Group). Fieldwork during 1999 and 2000 revealed fossiliferous horizons throughout this section. Bothriolepid placoderms are the most commonly encountered fish and display an undocumented local diversity both through time and across facies.

Previous collections from the Okse Bay Group were made a century ago from a limited section of what is now recognized as the early to middle Frasnian Fram Formation. New collections from widespread sites in the Fram Formation and the laterally-equivalent Beverly Inlet Formation provide material of three to four bothriolepid taxa from this interval. The previously unsampled middle to late Frasnian Nordstrand Point Formation also produced several bothriolepid taxa, among them an extremely large form with an estimated length (head + body armor) of 66 cm. The late Frasnian to early Famennian Parry Islands Group produced mostly isolated and fragmentary elements of additional bothriolepids. Refinement of the systematics and distribution of these bothriolepids will aid in intrabasinal correlation and provide new data on Late Devonian diversity and biogeographic patterns.

WITHIN-HABITAT MAMMAL DIVERSITY AND PRODUCTIVITY AND THEIR RECENT PATTERNS ACROSS LATITUDE

DAM, Jan A., Utrecht University, Netherlands; ANDREWS, P., BADGLEY, C., DAMUTH, J., FORTELIUS, M., HADLY, E.A., HIXSON, S., JANIS, C., MADDEN, R.H., REED, K., SMITH, F.A., THEODOR, J., VAN VALKENBURGH, B., WERDELIN, L.

The working group on "Climatic and Habitat Inference from Mammalian Communities" at NCEAS has compiled an extensive data set containing over 200 present-day mammal localities with associated faunal, vegetational and climatic data. Here we present results of analyses of the relationship between within-site mammal species richness and mean annual precipitation at the hemispheric scale. Simultaneously plotting rainfall and species richness of non-volant, terrestrial mammals versus latitude reveals a striking correspondence between richness and rainfall. The western Old World (roughly from South Africa to northern Europe) shows a bimodal species richness pattern, with a broad richness peak in the tropics and a smaller, but distinct peak at Northern temperate latitudes (centered at ~ 45°N). The pattern is the same for both large and small mammals. Annual rainfall (a reasonable proxy for levels of primary productivity) also follows the same latitudinal pattern. These results are thus consistent with a production-based model for diversity, which predicts higher species richness in climatic zones with higher precipitation (tropics, temperate zone), and lower species richness in the in-between subtropical arid zones (including Sahara and Middle East deserts). Because the western Old World is under the regular control of zonal circulation, mammal diversity there displays simple geographic trends associated with latitude. In contrast, because of the N-S cordilleras, the New World is dominated by E-W gradients of rainfall and by longitudinally as well as latitudinally oriented biome configurations. Hence, neither species richness nor rainfall exhibit simple latitudinal patterns, but the association between the two is again evident when regions east and west of the cordilleras are considered separately. These results suggest strongly that, both over time and geographically within a time-slice, diversities of fossil mammal faunas are affected by, and are reflective of, climatic variation.

MORPHOLOGY OF EARLY TESTUDINOIDS AND RELATIONSHIPS OF CRYPTODIRAN TURTLES

DANILOV, Igor G., Zoological Institute, St. Petersburg, Russia

The primitive morphology of testudinoids was established by studying early members of the group (Lindholmemydidae), all of which are known from Cretaceous to Paleocene of Asia. These turtles possess testudinoid synapomorphies (plastral buttresses contact costals and laterally curved iliac blade), but retain some of the primitive characters of the macrobaenid grade (complete row of inframarginals, foramina basisphenoidale in the skull, amphicoelous vertebra at the base of the tail). Thus, the initial formation of the testudinoid morphotype included an advanced construction of the shell and pelvic girdle while the skull and vertebrae retained the primitive morphology of the macrobaenid grade. Lindholmemydids appear to have no synapomorphies and should be considered as a paraphyletic taxon, or a primitive grade of testudinoids.

Based on a comparison of primitive testudinoids (Lindholmemydidae) and Trionychoidea (Adocidae) as well as Macrobaenidae, Chelydridae and Platysternidae, I argue for closer relationships of testudinoids to some macrobaenids (*Hangaiemys*), chelydrids and platysternids than to trionychoids. Synapomorphies of this clade could be biconvex 4th cervical and position of the internal carotid canal far from basisphenoid-pterygoid suture, which represent more advanced condition in comparison to adocids and some macrobaenids (*Ordosemys, Dracochelys*), in which carotid canal passes very close to basisphenoid-pterygoid suture. The presented data support the traditional view of testudinoid affinities while contradicting their placement in most recent analyses.

THE NEAREST-LIVING-RELATIVE METHOD OF PALEOCLIMATE RECONSTRUCTION: TESTING THE ASSUMPTIONS WITH SPECIES OF THE RODENT *MARMOTA*

DAVIS, Edward B., Univ. of Calif., Dept. of Int. Bio. and Mus. of Paleo., Berkeley, CA 94720.