

rence of radials among the arthrodires. A second specimen of *D. terrelli* possesses numerous basals with a carbon film representing the distal fin (no ossified radials are seen in this specimen suggesting radial ossification may represent an age-related phenomenon). Two specimens of unidentified selenosoteid arthrodires also demonstrate the presence of organic films. The importance of these specimens is the information they provide on estimates for the aspect ratio of the pectoral fin. In comparison to the chondrichthyan *Cladoselache* (a recognized active swimmer in the pelagic realm), the pectoral fin in arthrodires appears to have a comparable aspect ratio (standardized for size and thus suggesting equivalent lift capabilities). In the arthrodire *Heintzichthys*, the presence of potential muscle attachments on the basal elements suggests the possibility of active fin retraction or alteration of fin camber further adding to controlled maneuverability.

A proposed explanation for the extinction of placoderms is thought to be through the process of competitive displacement by the contemporaneous chondrichthyans and osteichthyans. This has been related, in part, to relative differences in effective locomotion (based on incomplete evidence among placoderms). The recognition of comparable locomotor structures in arthrodires and sharks of the Late Devonian necessitates our reevaluation of placoderm extinction at the close of the Devonian.

Marine Reptiles Symposium, Wednesday 4:45

SYSTEMATIC POSITION AND GEOLOGICAL CONTEXT OF *ANGOLASAUROS* (MOSASAURIDAE) AND A NEW SEA TURTLE FROM THE CRETACEOUS OF ANGOLA

JACOBS, Louis, SMU, Dallas, TX; MORAIS, Maria, Geologia, Luanda, Angola; SCHULP, Anne, Natuurhistorisch Museum Maastricht, Maastricht, Netherlands; MATEUS, Octávio, Museu da Lourinhã, Lourinhã, Portugal; POLCYN, Michael, SMU, Dallas, TX. Results of recent fieldwork in Angola after a hiatus of nearly fifty years include discovery of the skull of a new taxon of turtle, new and higher quality mosasaur material (including the second skull of the mosasaur *Angolasaurus*), and a number of plesiosaur specimens. The *Angolasaurus* material allows evaluation of alternative hypotheses of its placement within and composition of Plioplatecarpinae. The new turtle has a derived palate and closed incisura columella similar to Aptian *Sandownia* from the Isle of Wight and an unnamed late Aptian taxon from Texas. Turtles and plesiosaurs have longer marine records than do mosasaurs, but together their history must reflect the biogeographic evolution of the Cretaceous South Atlantic and its Albian connection with the North Atlantic. The completion of the Atlantic Ocean allowed mixing of low latitude marine faunas through the tropical Atlantic, but it also completed the breakup of western Gondwana and contradicted hypotheses of dinosaur dispersal between Africa and South America after 100 Ma.

Romer Prize Session, Thursday 9:30

EVOLUTIONARY INSIGHT FROM CHARACTER ANALYSIS: TESTUDINATA AS A CASE STUDY

JAMNICZKY, Heather, Univ. of Calgary, Calgary, AB, Canada

Treating phylogenetic characters as hypotheses has long been advocated. The process of character analysis, however, whereby potential characters are evaluated using multiple sources of data, prior to being inserted into phylogenetic analyses for congruence testing, has received less attention. Herein I demonstrate the utility of an integrative approach to character analysis, both as a means of positing more robust phylogenetic characters, and as a source of insight into the evolutionary trajectory of complex morphological traits. Multiple lines of evidence, provided by soft-tissue and developmental studies of extant taxa, provide new insight into homology relations among parts of organisms, and allow more robust inferences of morphology in fossil taxa. I show that the use of such techniques, in combination with an "overall pattern" approach to homology definition, reveals that the cranial arterial circulation of Trionychia is paedomorphic. Further, this approach allows the postulation of new hypotheses of evolutionary transformation of this character complex among members of Testudinata. Previous hypotheses of relationship within Testudinata are called into question by these results, emphasizing the importance of robustly investigated morphological characters in instances where such data are the only source of information available to systematists. The use of character analysis will help to ensure that morphological systematics remains at the forefront of evolutionary research, representing a unique means by which the anatomy and evolution of complex morphological features may be better understood.

Poster Session III

LOCOMOTOR SPECIALIZATIONS IN STHENURINE KANGAROOS

JANIS, Christine, KUCHENBECKER, Karalyn, BERGLAND, Alan, CLIFFORD, Andrew, Brown Univ., Providence, RI

Sthenurines, popularly known as "giant browsing kangaroos", are commonly assumed to have a similar mode of ricochet locomotion as large macropodines (e.g., gray and red kangaroos), perhaps being even more cursorially specialized as their pes is monodactyl. However, modern macropodines appear to be at the size limit for strain on the Achilles tendon, the determining feature in hopping, and some sthenurines were twice the mass of large extant kangaroos (i.e., around 200 kg). This preliminary investigation into sthenurine postcranial morphology reveals some interesting differences from macropodines, and suggests that sthenurines were not as specialized for hopping.

We obtained measurements from 27 species of extant macropodoids (4 potoroids, or rat kangaroos, and 23 macropodids), and 23 individuals of *Sthenurus* (of varying sizes and

degrees of completeness). Bivariate plots and ternary diagrams show that, while the limb proportions are broadly similar, sthenurines have a relatively shorter fourth metatarsal than macropodines (and thus a shorter foot, resembling dendrolagines [tree kangaroos] in this regard), and are also considerably more robust in their femur and tibia. PCA analysis revealed differences in the shape of certain bones between sthenurines and macropodines, and also similarities between sthenurines and dendrolagines. The sthenurines differ from macropodines (and resemble dendrolagines) as follows: the pelvis is broader mediolaterally and the ilium is longer, but the ischium is shorter and the pubic symphysis less elongated; the femur has broader proximal and distal articulations, and a longer greater trochanter; the calcaneum has a shorter and thicker heel. Additionally, the sthenurine astragalus has a broader tibial facet but a narrower fibular facet than the macropodine one. These differences relate to a postcranial skeleton that is built for power rather than for speed, suggesting a different locomotor focus from the derived hopping of macropodines. The similarities to dendrolagines, the only macropodids to move their hindlimbs independently of each other, raises questions as to whether this mode of locomotion was also seen in sthenurines.

Poster Session II

EFFECTS OF HEAT ON AVIAN DINOSAUR EGG SHELL FRAGMENTS

JANSSEN, Jennifer, Georgia Aquarium, Atlanta, GA; HAYWARD, James, Andrews Univ., Berrien Springs, MI

The taphonomic effects of heat and/or fire on bones, conodonts, and plant tissues have received significant attention among paleontologists and geologists, but to our knowledge an examination of the effects of high temperatures on amniote eggshell has not been made. We compared the effects of heat on extant avian dinosaur eggshell, which, like non-avian dinosaur eggshell, is constructed primarily of CaCO₃ deposited within a protein matrix. Ostrich and glaucous-winged gull eggshell fragments were heated to temperatures up to 850°C for various lengths of time. A series of dramatic color changes, similar to those reported for conodonts, began to occur at about 200°C, especially in ostrich eggshell. Reverse curling of eggshell was observed at temperatures above 600°C. Thermogravimetric analysis showed a negligible decrease in mass below 200°C, which was attributable to water loss. Sharp decreases in mass occurred at about 710°C for both eggshell types. The remaining CaO residue represented 55% of the original mass. Heat should not be overlooked as a factor contributing to the variability of fossil eggshell, including color differences and reverse curling. Existence of these features, in turn, may provide important clues toward an understanding of environmental conditions and events preceding or accompanying fossilization.

Poster Session III

A PRELIMINARY ANALYSIS OF STOMACH CONTENTS FROM A NEW POLY-COTYLID PLESIOSAUR

JANZIC, Anita-Maria, Canadian Fossil Discovery Centre, Morden, MB, Canada

The Pembina Hills of the Manitoba Escarpment of Southwestern Manitoba has produced many marine reptile specimens with the co-operation of mining companies. The mining has ceased but the quarries remain and a new discovery of a polycotyloid plesiosaur was discovered in 2004. The remains were located within the Pembina Member of the Pierre Shale Formation (Campanian) deposits from the Western Interior Seaway. This new polycotyloid and only two other plesiosaur specimens from the Pierre Shale Formation in Manitoba are associated with stomach contents.

The stomach contents were conglomerated into a solid layer beneath the specimen resulting in a gastric residue, spanning an area of 2.5 square metres. Preliminary dissociation of fragments from the residue yielded teleost teeth and vertebrae. These stomach contents are not unusual for polycotyloid plesiosaurs, however the dimensions and quantity are. This preliminary analysis indicates teeth lengths between 1.0mm and 5.0mm representing only the tips or apex of the crown. Samples that have been analysed yielded over 100 teleost teeth.

Wednesday 9:45

NEW PODOCNEMIDIDAE FOSSIL TURTLES FROM THE UPPER PALEOCENE CERREJON FORMATION, GUAJIRA PENINSULA, COLOMBIA

JARAMILLO, Carlos, CADENA RUEDA, Edwin, Smithsonian Tropical Research Institute, Panama

Six fossil turtles represented by nearly complete carapaces, plastrons, pelvic bones and an excellently preserved lower jaw, were collected during 2005 in the middle part of the upper Paleocene Cerrejon Formation, at the Cerrejon Coal Mine, Guajira Peninsula, Colombia. The fossils belong to the Podocnemididae Family and are useful to understand the origin of the extant fauna of South American podocnemid turtles. Indicative characters on the carapaces, are the absence of neural bones specially in three small turtles (<25cm long axis). This absence indicates an earlier tendency to reduction of neural bones in podocnemids, and also has been seen in some turtles from the Urumaco Formation (late Miocene, Venezuela). The absence of cervical scute, the first neural bone subrectangular and more elongated compared to the following ones, are additional characters that suggest a podocnemid affinity. Other characters as shape and position of pubis and ischial scars on plastron, ilium scar on carapace, axillary and inguinal process attachment and shell bones-scutes configuration are being analyzed and integrated into a matrix character for cladistic analysis. We also found a lower jaw that present a labial ridge curved acute, processus coronoideus less prominent than in *Shweboemys* group, fossa meckelli more narrow than in *Bairdemys*, low angle of