Poster Session I

A CT SCAN OF A TITANOSAURIFORM SKULL (DINOSAURIA:SAUROPODA) FROM CENTRAL PATAGONIA, ARGENTINA

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We preliminarily report the results of a computed tomographic study of a titanosauriform skull from the Bajo Barreal Formation (Cenomanian-Turonian, early Late Cretaceous) of southern Chubut Province (central Patagonia, Argentina). For the study, we made a series of helical computed tomographies with a Multiple Slice System (MXTwin Multislice). Of the 281 images, 22 are three-dimensional reconstructions, 21 are sagittal, and 238 coronal. The slice thickness was two mm. The CT images allow the recognition of the olfactory bulb chiefly (CN I), the optic (CN II), trigeminal (CN V), and hypoglossal nerves (CN XII), the three subequal semicircular canals, middle and posterior cerebral veins, metotic fissure, and pituitary fossa. The latter is comparable in size to that in the endocranial mold of Camarasaurus grandis, although more rostrally oriented in the Chubut form. The exit points of the cranial nerves IX and X are tentatively identified. In the premaxillae, maxillae, and mandibles, the replacement teeth, adductor fossae and Meckelian grooves are visible. The latter are open medially as in Brachiosaurus and other forms. Other structures are more difficult to identify and will be the object of future studies. It is expected that the analysis of these images, and their comparison with related forms such as Brachiosaurus and more derived titanosauriforms, will allow to establish, in addition to the total encephalic volume of this dinosaur, characters and encephalic topographical features common to this sauropod lineage.

Wednesday 10-45

NEW MULTIPLE LATE JURASSIC DINOSAUR ICHNOCOENOCES OF SWITZERLAND: EVIDENCE FOR ENDURING DINOSAUR COMMUNITIES ON THE NORTHERN TETHYS PLATFORM

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Since 2002 dinosaur tracks are systematically excavated in Late Jurassic (Kimmeridgian) carbonate platform sediments (Canton Jura, Switzerland). This platform formed part of the Northern Tethys passive margin in Late Jurassic times. To date, over 55 essentially narrow-gauge trackways of sauropods, and over 90 trackways of large theropods are attributed to sauropods, have been excavated and documented on multiple (>15) track-bearing surfaces. This provides insight into track formation and taphonomy, in particular the distinction of true tracks from under- and overtracks, a key point for consistent ichnotaxonomical and paleoecological interpretations. Multiple ichnoocoenoses (associations of true tracks on a single surface) include (1) trackways of tiny (FL<10 cm) and large (FL>100 cm) sauropods with trackways of small (10-25 cm) theropods; (2) trackways of tiny and medium-sized (25-40 cm) sauropods with trackways of minute (FL<10 cm), small and medium-sized (25-30 cm) theropods; (3) trackways of tiny and medium-sized sauropods with trackways of medium-sized and large (FL up to 50 cm) theropods. These ichnoocoenoses exhibit diverse trackway orientation patterns and trackways with changes in gauge and gait of both sauropods and theropods. Even if these ichnoocoenoses only partially reflect the former terrestrial vertebrate ecosystem of the platform, they indicate a recurrent presence of diverse dinosaur communities, at least during periods with prolonged inter- to supratidal conditions. The repeated associations of trackways of similar pattern and track morphology of very small and medium or large sauropods give a hint for different age classes within a single species. Moreover, this suggests that—contrary to recent publications—stasis and resulting trackway gauge of sauropods is not necessarily related to ontogeny. This might be corroborated by more ichnoocoenoses obtained by ongoing excavations. Finally, the palaeogeographic situation implies that the platform was frequently connected to continental landmasses. This probably prevented a development of insular, dwarfed faunas, as has been postulated for similar carbonate platform settings.

Vertebrate Development Symposium, Wednesday 10:45

EVALUATING CRANIAL DISPARITY, MORPHOLOGICAL INTEGRATION, AND MODULARITY OF THE ARCHOSAURIAN CRANIUM USING GEOMETRIC MORPHOMETRICS

MARUGAN-LOBÓN, Jesús, Madrid, Spain; BUSCALIONI, Angela D., Universidad Autónoma de Madrid, Madrid, Spain

Shape analysis via Landmark-based Geometric Morphometrics is currently one of the best suited methodologies for the study of the organization and evolution of the phenotype, hence its usefulness in Paleobiology. While the multivariate statistical apparatus of geometric morphometrics is readily set, for instance, for the exploration of allometry, other concepts such as morphological integration and modularity are becoming prevalent among morphologists, mostly among those interested in the role of and mechanisms by which the developmental program might bias the direction of evolution. Evolutionary developmental biology research is making giant steps into unveiling the mechanisms underlying such phenomena, thus providing the experimental basis upon which to interpret morphological integration and modularity at a phenotypic level. We have explored the major patterns of endcranial shape variation and integration at a macrovolutionary scale across modern avian and some fossil Theropod dinosaurs by means of geometric morphometric procedures. Interfacing our morphological observations and the statistical accounts of the anatopographic current distributions of developmental processes on the first tooth, and in modern birds (i.e. chick and quail embryos), we render a hypothesis from which to propose the integrated and modular nature of the theropod skull, and possibly of representatives of the node Archosauria.
Besides the rich fish fauna, the known Cretaceous tetrapod fauna comprises turtles (including a recently collected undescribed genus of cryptodirs), mosasaurs, squamates Globidosaurus sp., at least two Prognathodon-like taxa, Angolosaurus boscai, Plipoptiliscatus sp., and Tysosaurus imbeciens, plesiosaurs aff. Cimoliasauria, and a non-titanosaur sauro- pod dinosaur.

Friday 9:30
COMPARISON OF NEOGEOE RECORDS OF ENVIRONMENTAL CHANGE IN THE GREAT PLAINS, U.S.A., BASED ON PALEOSOL CARBONATES AND PALE- OBIDS OF EQUIDAE
MATSON, Samuel, FOX, David, MAROT, Jonathan, Univ. of Minnesota, Minneapolis, MN; JANIS, Christine, Brown Univ., Providence, RI
Neogene records of environmental change in the Great Plains, U.S.A., derived from paleo- osols and paleoecological studies of fossil Equidae exhibit surprising contrasts. The stable car- bon isotope composition (δ13C) of paleosol carbonates suggests C4 grass comprised ca. 20% of plant biomass throughout the Miocene, increased to about 40% of biomass by the early Pliocene, and reached modern abundance by the early Pleistocene. Equids evolved high-crowned (hypodont) teeth, an adaptation for open habitats and/or grazing by ca. 18 Ma, and δ13C values of equid tooth enamel indicate C3-dominated diets during the Miocene until 6.6 Ma, at which point several species began to consume C4 vegetation while other taxa continued to consume C3-dominated diets. To understand these contrasts better, we examined C3-dominated diets within several derived genera nested within the tribes Equini and Hipparionini. Evolution of hypodonty and consumption of C4 biomass do not appear to have promoted taxonomic diversification. Average magnitudes of evolutionary changes across the phyloge- netically nested genera and tribes Equini and Hipparionini are similar, suggesting that the evolutionary changes were sufficiently rapid to promote greater extinction. Parallel analyses of clades that migrated laterally on timescales rapid relative to carbonate formation; shorter-lived, C4- dominated clades appear to have experienced greater extinction.

Poster Session III
THE ANATOMY OF THE EMM WING: AN EXAMPLE OF PRIMARY DIGITAL REDUCTION IN ARCHOSAURS
MAXWELL, Erin, MICHEL, Adam, LARSSON, Hans, HEPPLSTEIN, Audrey, McGill Univ., Montreal, QB, Canada
The Emu (Dromaius novaehollandiae) is a palaenognath bird native to Australia that has undergone extreme wing reduction, both in relative size and in the number of ossified ele- ments. It usually ossifies only a single digit corresponding to the digitigrade majorities in other birds, and has no free carpal elements. This digital reduction is thought to have taken place over a very short evolutionary time scale since it has occurred since the divergence of the Emu from the rest of the extant ratites. In order to examine the developmental changes accompanying such an extreme adult morphology, we studied the mesenchymal skeletal development and cartilage in the Emu. Furthermore, while the number of elements ossifying in flying birds as well as in the Ostrich is constant, the Emu ossifies either one or two digits. There is a wide range of variation in terms of shape, number and position of the elements that remain car- tilaginous in late stage embryos. This variability is also seen at the level of wing muscula- ture in Emu embryos. We also cleared and stained sets of later stage embryos for the presence of bone and cartilage. Our results indicate that the Emu is the only known example of primary digit reduction in birds. In other words, unlike the state in Ostrich (Struthio) in which five digits condorify, or the chicken in which a large boss flanking the anterior portion of both nasals, supratemporal bosses that rise above the skull roof to form a saddle between them, and a postorodorsally facing shelf por- torid to the ridge that is formed between the supratemporal bosses. This potentially new taxon also possesses all three autapomorphic characters of B. baini, which would make those charac- ters synapomorphic for both taxa. This would establish these two taxa firmly as sister groups, in which results in B. baini as yet another member in the genus Bradysaurus that possesses no autapomorphies and could therefore be considered a metaxaognath.

Poster Session III
OLD SPECIMENS NEWLY DESCRIBED: CAMP'S PAREIASAUR SKULLS FROM THE UPPER DEVONIAN ESEINCUS FORMATION (MIGUASHA, QUE- BEC): IMPLICATIONS FOR PALEOENVIRONMENTAL INTERPRETATION
MATTON, Olivier, STEVENSON, Ross, CLOUTIER, Richard, Université du Québec à Rimouski, Rimouski, QB, Canada
Preliminary TIMS 87Sr/86Sr isotope ratios vary from 0.70815 to 0.70830 with an average laser ablation analysis of 0.70854 for a single tooth. These ratios are consistent with Devonian seawater Sr isotope compositions and suggest that the fish species and the Eseincus Formation were not significantly affected by continental supply during this period. A possible explanation for the low variability in Miocene paleosol δ13C values is that habitats dominated by C4 grasses were patchily distributed across the landscape and migrated laterally on timescales rapid relative to carbonate formation; shorter-lived, C4- consuming genera may have been specialists that utilized C4-dominated patches and habi- tat change was sufficiently rapid to promote greater extinction. Parallel analyses of clades with similar diversity histories in the region, such as Camelidae, could help elucidate the basis of the contrasts between paleosols and equids.

Poster Session III
THE PHYLOGENY AND PHYLOGEOGRAPHY OF THE GENUS THYREOCEPHALUS: AN EXAMPLE OF RESPONSE TO A LARGE CLIMATE CHANGER IN AN ADAPTIVE STRATEGY OF TETRAPOD DIVERSIFICATION IN THE LATE LEBANONIAN (OCTOBRELLA, TETRAPODA)
MAY, Nancy, SQUARR, Leslie, Utah State Univ., Logan, UT
This study compares the phylogenetic relationships of Thyreolepis with those of all known placoderm taxa, and attempts to determine the evolutionary significance of the possession of a well-developed supratemporal boss on the skull roof of these animals. The supratemporal boss, a large boss flanking the anterior portion of both nasals, is a unique synapomorphy of the genus Thyreolepis that is not found in any other placoderm family. The supratemporal boss is a likely synapomorphy for the family Thyreolepididae, which is supported by the fact that all species of Thyreolepis possess this autapomorphy. The supratemporal boss is a likely synapomorphy for the family Thyreolepididae, which is supported by the fact that all species of Thyreolepis possess this autapomorphy. The supratemporal boss is a likely synapomorphy for the family Thyreolepididae, which is supported by the fact that all species of Thyreolepis possess this autapomorphy. The supratemporal boss is a likely synapomorphy for the family Thyreolepididae, which is supported by the fact that all species of Thyreolepis possess this autapomorphy.