

Technical Session X, Friday 10:30

**SEDIMENTOLOGY, TAPHONOMY, AND ICHNOLOGY OF LATE JURASSIC DINOSAUR TRACKS FROM THE JURA CARBONATE PLATFORM (NW SWITZERLAND): INSIGHTS INTO THE TIDAL-FLAT PALEOENVIRONMENT AND DINOSAUR DIVERSITY, LOCOMOTION, AND PALEOECOLOGY**  
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This study is based on dinosaur tracks from the Swiss Jura Mountains, excavated on multiple superimposed paleosurfaces located within Late Jurassic (Kimmeridgian) biolaminite intervals. The approach is first actualistic by studying processes acting during the formation and taphonomy of human footprints on tidal-flats, notably the stabilizing role of microbial mats. When compared with these recent prints, dinosaur tracks and the encasing sediment provide insight into walking dynamics, properties of the substrate, processes modifying and preserving tracks, consolidation history, and they identify true tracks, undertracks, and overtracks. These observations can be linked with the exposure index and suggest that the paleoenvironment was a supratidal flat. Trackway configuration (e.g. gauge) and patterns (degree of manus overprinting) are quantified and analyzed. Their variability is an expression of locomotion capabilities related to walking style and speed, behavior, and substrate properties. Manus-only and pes-only sauropod trackways are explained by animals exerting more pressure on manus than pes, and to overprinting of manus by pes. Sauropod trackways with similar track morphology vary from medium- to wide-gauge (not clearly related to speed and ontogeny) challenging the traditional classification of sauropod trackways. Nonetheless, wide-gauge trackways are tentatively assigned to *Brontopodus* and narrow-ones to *Parabrontopodus*. Small (i.e. < 0.2 m long) tridactyl tracks are assigned to *Carmelopodus* (extending this ichnogenus into the Late Jurassic), and larger (i.e. > 0.2 m long) ones to *Therangospodus*. Trackway orientation and alignment indicates gregarious behavior amongst sauropods, and the common presence of small bipedal dinosaurs on supratidal flats. Small tridactyl and small (i.e. < 0.3 m) sauropod tracks are abundant, but large tridactyl (up to 0.8 m) and sauropod (up to 1.2 m) tracks are also common. Size-frequency distributions suggest the establishment of *in situ*, saurischian-dominated populations on the Jura carbonate platform, which consequently was regularly connected with the neighboring massifs and could also serve as a migration corridor.

The Evolution of Birds in the Mesozoic: a Symposium in Honor of Cyril A. Walker, Thursday 11:15

**MORPHOMETRICS AS A PROXY FOR DEDUCING THE LIFE-HISTORY OF THE EARLY CRETACEOUS BIRD *CONFUCIUSORNIS SANTUS***  
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In the last decade, hundreds of specimens of the basal pygostylian bird *Confuciusornis sanctus* have been collected from the Early Cretaceous Yixian and Jiufotang formations (~ 125-120 mya) of Liaoning Province, in northeastern China. Such a great number of specimens has resulted in detailed information regarding the anatomy of this early bird but many aspects of its ecology and life-history remained unclear and/or controversial. There have been interpretations about its feeding habits, flying abilities and foraging styles, growth rates, and life-history and reproductive behavior. Here we focus on the latter, namely, on the hypothesis that the presence of a pair of long stiff caudal feathers in some specimens indicates the existence of marked sexual dimorphism as well as lekking behavior. Morphometrics and multivariate statistics of measurements of the large sample available for this early bird allow us to evaluate this null hypothesis. Our study aims to determine whether the alleged dimorphism in plumage is also expressed by differences in the size of the males and females. Our analyses are based on the maximum lengths of five limb bones (humerus, ulna, radius, femur, and tibiotarsus) measured in 106 specimens. Our results refute the null hypothesis—while size variability within the sample is divided into two size classes, the pair of long stiff caudal feathers is distributed throughout the sample. Not surprisingly, these analyses also revealed further insights about other important life-history attributes. The most notable is the fact that the two size classes resultant from the analyses indicate that the growth in these animals was isometric. Other interesting aspects of the life-history of *Confuciusornis sanctus* are explored through an expansion of our analytical tools and a larger data set that includes more than 1000 measurements of the skull and the post-cranium.

Technical Session XVIII, Saturday 2:30

**THE SAUROPOD DINOSAUR *TURIASAUROS RIODEVENSIS* IN THE LATE JURASSIC OF PORTUGAL**  
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A partial sauropod was found in Vale Pombas, north of Lourinhã, Central West of Portugal, in the Lourinhã Formation, top of Amoreira Porto Novo member dated as c. 150 M.a. (Early Tithonian, Late Jurassic) and is currently housed at Museum of Lourinhã, in Portugal. The specimen (ML368) comprises a complete tooth with root, anterior chevron and almost complete right forelimb including partial scapula, complete coracoid, humerus, ulna, radius, metacarpals I, III and V, phalanx, and ungual phalanx I. It can be ascribed to *Turiasaurus riodevensis*, which was previously described from the Villar del Arzobispo

Formation at Riodeva (Teruel, Spain). Characters shared with *T. riodevensis* holotype include: curvature and asymmetry of tooth crown, expansion of crown, outline of humerus, medial deflection of the proximal end of humerus, shape and prominence of deltopectoral crest, vertical ridge in the distal half of the ulna (considered as diagnostic of *Turiasauria*), configuration of metacarpals, and bone proportions. It differs from *T. riodevensis* holotype by the smaller size and the more rectangular ungual phalanx in lateral view. The sediments from which the Riodeva specimen was recovered were previously thought to be Tithonian to Berriasian in age. The presence of this species in Portugal, in beds confidently dated as Early Tithonian, may allow a more precise date for the Riodeva type locality of early Tithonian in age. The humerus of the Portuguese *T. riodevensis* is 152 cm long. Although shorter than the Spanish specimen (790 mm), it represents a large individual. All adult sauropods recovered in Portugal thus far are very large individuals: *Dinheirosaurus* (estimated body length is 20-25 m), *Lusotitan* (humerus length estimated to be 205 cm), *Lourinhasaurus* (femur length: 174 cm), and *Turiasaurus* here reported. The lack of small or medium adult body-size sauropods in the Late Jurassic of Portugal, suggests browsing niches thought to be occupied by smaller forms, could have been available for other dinosaurs, like the long necked stegosaur *Miragaia longicollum*.

Poster Session IV, (Saturday)

**THE HANKSVILLE-BURPEE QUARRY: NEW INSIGHTS INTO A SAUROPOD DOMINATED BONEBED IN THE MORRISON FORMATION OF EASTERN UTAH**  
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The late Jurassic Morrison Formation is one of the most productive and diverse dinosaur bearing formations in the world. Perhaps one of the most striking features of the formation is the abundance of sauropod dinosaur remains. Notable Morrison Formation dinosaur quarries include Dinosaur National Monument, the Cleveland-Lloyd Quarry, and the Mygatt-Moore Quarry. A newly discovered bonebed in eastern Utah preserves the remains of at least six different dinosaur taxa including *Camarasaurus*, *Diplodocus*, *Stegosaurus*, *Allosaurus* and possibly *Brachiosaurus* and *Barosaurus*. The site, designated as the Hanksville-Burpee Quarry, was discovered in the summer of 2007 by a small crew from the Burpee Museum of Natural History on federal land managed by the Bureau of Land Management. In the initial days available to explore the site, many well preserved dinosaur bones were discovered, including sauropod scapulae, limb elements, and partially articulated vertebrae. Subsequent excavations over in the summer of 2008 by Burpee Museum and Western Illinois University crews have uncovered over 150 bone from the site which measures at least 100 meters wide and 400 meters long. Sauropod dinosaur account for the majority of the remains. Of particular interest at the site is the absence of large specimens. Other interesting features of the site include numerous large petrified logs, possible mammal burrows and abundant unionid bivalves. A preliminary analysis of the geology, taphonomy and vertebrate paleontology of the site indicates that this quarry represents a series of sand bars in a braided river system, upon which dinosaur carcasses washed. Due to the size of the site, taxa present and good preservation of the site, the site has considerable long term research potential.

Poster Session III, (Friday)

**PALEOENVIRONMENT ESTIMATION OF THE CHAINGZAUK MAMMAL FAUNA (LATE NEOGENE, MYANMAR) USING STABLE ISOTOPES OF TOOTH ENAMEL**

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The upper Neogene Irrawaddy Sediments are widely distributed in central Myanmar and are mainly composed of fluvial sediments characterized by the abundance of the silicified fossil wood. These sediments yield a variety of mammalian fossils that have been correlated with those from the Siwalik Group of the Indian Subcontinent. In the Siwalik, the isotopic evidences from paleosols and fossil teeth have indicated that many C3 plant dominant forests were replaced by C4 grasslands around 6 Ma, corresponding to a global floral turnover. Such floral transition probably occurred in Southeast Asia due to the effect of an enhanced monsoon, but paleoenvironment in this region have not been studied in detail. Here, we present paleoenvironmental estimation for a mammal fauna from the Upper Miocene/Lower Pliocene part of the Irrawaddy sediments at Chaingzauk area in the western part of central Myanmar. We carried out the stable carbon and oxygen isotopic analyses using tooth enamel of several ungulates that are relatively abundant in the Chaingzauk Fauna. The rhinoceros (*Rhinoceros*), an elephant (*Stegodon*) and boars (*Propotamochoerus* and *Sivachoerus*) have  $\delta^{13}C$  values from -12.8‰ to -10.0‰ (n=12), indicating that they were forest dwelling browsers. In contrast, the bovids (*Tragoportax* and cf. *Selenoportax*) and hippopotamids (*Hexaprotodon iravaticus* and *Hex. sivalensis*) have  $\delta^{13}C$  values ranging from -4.0‰ to 1.9‰ (n=16), supporting that they mainly consumed C4 plants in grasslands. The coexistence of browsers and grazers suggest presence of both forests/woodlands and grasslands that were large enough to support both ecological niches. Therefore, the Chaingzauk mammals have possibly inhabited mosaic environment ranging from forests