Theropod limb function has been the focus of numerous studies in the past two decades. This research has concentrated on maniraptoran theropods and specifically on the origin and evolution of flight. Non-maniraptoran theropod functional morphology studies have focused on the hindlimb and its role in locomotion, whereas non-maniraptoran theropod forelimb function remains poorly understood. The common Late Jurassic theropod Allosaurus provides an opportunity to investigate forelimb function in a non-maniraptoran theropod. Forelimb use can be inferred using the humerus as a guide. The proximal end of the humerus is the insertion site for shoulder and pelvic musculature, whereas the distal condyles are the origin site for the lower forelimb flexors and extensors. Allosaurus (n = 35), Cumbria Itzta (Pigeon) (n = 44), and Alligator mississippiensis (n = 51) lumbar data were collected from institutions across North America. Using reduced major axis (RMA) linear regression and principal components analysis (PCA), allometric changes in humeral landmarks (proximal and distal breadth, lateral and medial condyle breadth and height, deltoid-pectoral crest length, and medio-lateral and anterior-posterior midshaft least diameter) were measured in relation to the maximum length. RMA revealed an overall positive allometric signal for all taxa. Assuming a class two lever system, over the ontogenetic spectrum of the Allosaurus specimens the musculature associated with humeral landmarks increased their mechanical advantage while overall forelimb mobility may have decreased. Allosaurus PCA results revealed the shoulder as the major component, but humeral landmarks (medial-lateral and anterior-posterior midshaft least diameter, medial condyle breadth and height) also contributed significantly to variation. These results support previous interpretations of a possible predatory function for Allosaurus forelimbs. Ultimately, the exact forelimb use for Allosaurus remains a mystery, but these results provide a base from which further research into non-maniraptoran theropod and archosaurian forelimb function can be conducted.

Technical Session IX, Friday 8:00
NOTES AND REVIEW OF THE ORNITHISCIAN DINOSAURS OF PORTUGAL
MATEUS, Octávio, Museu da Lourinhã, Lourinhã, Portugal
The record of ornithischian dinosaurs from Portugal is substantial but incomplete in terms of our understanding of taxonomic composition and details of the anatomy of many forms. New data and reinterpretation of these forms are provided. The basal thyreophoran from the Lower Jurassic (the now dubious "Leucatosaurus lusitani") is the most primitive dinosaur from Iberia. Concerning the Late Jurassic, new material from the Lourinhã Formation (Kimmeridgian/Trithiopian) referable to the stegosaur Dacentrurus provides additional information on the systematic position and osteology. The new material shows two rows of paired triangular plates, with a notch in the anterior rim. A mandible of an ankylosaur from the Vale Frades (Lourinhã Fm.) is here reported, but cannot be referred to Dacopelta, the only ankylosaur genus currently known from Portugal. The ornithopod Aurosaurus knusti reported as Middle Jurassic (Callovian) is probably Oxfordian in age. A right dentary (MLT80 from Zambela) from the Lowermost Trithiopian/Tithonian, and shares affinities with Dinosaurus, but possesses more dentinolysis and no secondary ridges, suggesting the occurrence of a new or unreptor species for the Late Jurassic of Portugal, which is here tentatively referred to Dinosauria. sp. In summary, the Late Jurassic ornithischians species/genera from Portugal include Dacentrurus armatus, Segnosaurus d. angulosus, Dromaeostra zbyzenskii, Hyphalosaurus knusti, Aurosaurus knusti, Trimucrodon canarius, aff. Dinosaurus and Dacopelta knusti. The Lower Cretaceous (Hauteriavium / Bajocian) of Fras da Aguiacelas, in Coa Escolhe, provided a partial (left mandible (CPDP 11507) of a basal iguanodontian that shows affinities with Camptosaurus, and is tentatively assigned to this genus. The tooth dentine tetrads differ from Iguanodon or other Iguanodontia because not shown mammillations. More material is necessary to validate but, to be true, that would confirm the presence of this genus in the Lower Cretaceous. The Iguanodon has been well reported in the Lower Cretaceous of Coa Escolhe.

Poster Session III (Friday)
TAXONOMY AND TECHNICAL NUMERENTOLOGY OF THE FIRST KNOWN TRICERATOPS BONEBED. CARTER COUNTY MONTANA
MATHEWS, Joshua, Northern Illinois University, Milton, WI, USA; HENDERSON, Michael, Barque Museum of Natural History, Rockford, IL, USA; WILLIAMS, Scott, Barque Museum of Natural History, Rockford, IL, USA
Bone bed accumulations of ceratopsian dinosaurs are not uncommon in Cretaceous age strata. There are several localities that provide strong evidence that these animals congregated in herds. Bone beds have been found for Centrosaurus, Synodonianosaurus, Tyrannosaurus and Chamosaurus. Many of the bonebeds discovered contain the remains of hundreds to possibly thousands of individuals that died during a cataclysmic event, such as a flood. While bone beds for these animals are common, perhaps the most famous of the huroned dinosaurs, Ticeratops, has only been found as individual speci-

mem. Ticeratops is one of the most common dinosaurs found in the Hell Creek Formation, second only to Edmontosaurus. Until now, there has never been a documented case involving a Ticeratops horridus. The Homer Site, excavated by the Barque Museum of Natural History in the summer 2000, has yielded the remains of two subadult Ticeratops within the same quarry. Over 110 bones and bone fragments have been recovered from the site, a majority of which is skull material, pectoral and pelvic girdles, and ribs. Excavation of the site resulted in 3 postorbital horns, 4 quadransals, 2 parietals, 3 squamosals, and numerous ribs. Limb elements were represented by only one femur. The enclosing rock type at the Homer Site is an organic rich mudstone, interpreted as an overbank flood deposit along a paleo river or stream. Although at first glance, there appears to be a preferred direction within the quarry that would show current direction, there is no statistical evidence to support it. The bones are well preserved and show minimum signs of abrasion. Most of the bonebed present can be attributed to the excavation and collection process as well as compaction of the bone bearing layer over time. The lack of cervical and caudal vertebrae, along with the lack of phalanges and metapodials, suggest that the current was strong enough to carry the smaller skeletal elements, none of which were found in the larger skeletal elements. Most of the bones in the quarry were assigned to Voorhees Transport Groups 2 and 3 which are representative of a lag deposit.

Technical Session XII, Friday 2:45
STABLE ISOTOPIC RECORD OF MESSINIAN MAMMALS FROM THE CIRCUM-MEDITERRANEAN REGION
MATSON, Samuel, University of Minnesota, Minneapolis, MN, USA; FOX, David, University of Minnesota, Minneapolis, MN, USA
During the Late Miocene Messinian Salinity Crisis (MSC), severance of the Mediterranean-Atlantic corridor coupled with a negative hydrological budget for the Mediterranean region, resulted in widespread destruction of the Mediterranean Sea. We measured stable carbon and oxygen isotope preserved in later Miocene and early Pleistocene ungulate fossils from southeastern Spain and northern Libya to examine the potential environmental and ecological effects of a large, desiccated marine basin on nearby terrestrial ecosystems. Tooth enamel d13C values from Libia (MN 15; Spain) range from -11.3‰ to -9.4‰ VPDB and those from Sahab (MN 13/14) Libia range from -10.4‰ to -8.6‰ VPDB, suggesting ungulates at both localities consumed C3 vegetation in a relatively arid climate. These latest Miocene enamel d13C values are within the range (-8.0‰ to -12.1‰ VPDB) of later Pleistocene ungulates from the Iberian Peninsula, suggesting that large herbivore diets were not significantly different during the MSC. Relative positive tooth enamel d18O values further support the interpretation of an arid circum-Mediterranean climate during both the latest Miocene and the early Pleistocene. Mean d18O of tooth enamel from Sahab (-3.5% VPDB) is more positive than that of Libia (-13.7% VPDB) or the Iberian Peninsula (-6.2% VPDB), consistent with a more arid climate and more 18O-enriched precipitation in northern Libya during the MSC. Hippopotamuses from Sahab and the Iberian Peninsula are depleted in both 13C and 18O relative to other taxa in the fauna, which is consistent with their semiaquatic habitat and diet. This observation also suggests that primary d18O values are preserved in enamel carbonate. However, a lack of correlation between intra-individual enamel and dentine carbonate d13C values suggests diagenetic alteration has taken place in one or both skeletal materials. Analysis of enamel and dentine phosphate d18O will provide further insight into interpretations drawn from carbonate d18O.

Student Poster Session (Thursday)
THE EARLY CRETACEOUS CHORISTODERAN REPTILE, MONJUROSUCHUS, IN CHINA AND JAPAN
MATSUMOTO, Ryoko, University College London, London, United Kingdom
New material of the Lower Cretaceous choristoderan reptile, Monjurusuchus, has been recovered from the Tottori Group, Japan. This genus was first described from the Lower Cretaceous Ichit Bota of China, but has only recently been recognised as a choristoderan. The new material provides the first record of the genus in Japan, but the same deposits produced the first long-necked choristoderan, Shoshukan. The Japanese Monjurusuchus material is broadly similar to specimens of the type species, M. splendens, but differs in details of the partial and temporal region. Cladistic analysis supports the monophyly of Neochoristodera, and also the sister group relationship of Shoshukan and Hyphalosaurus, forming a new Japanese clade of long-necked choristoderans. The placement of the European Tertiary Lazarusuchus remains problematic but the analysis supports its placement within Choristodera rather than on the stem, as in some other recent studies. Although the Jurassic Centrosaurus and all neochoristoderans possess large, fully open, lower temporal fenestrae, these fenestrae are closed in Monjurusuchus, Hyphalosaurus, Polydactylus, and Lazarusuchus. The identification of Monjurusuchus from the Tottori Group provides an important link between the fossil assemblages of Japan and those of the roughly contemporaneous, and better known, Ichit Bota of China.