# NEW PERSPECTIVES ON THE TAPHONOMY AND GEOLOGICAL CONTEXT OF *LOTOSAURUS ADENTUS* (ARCHOSAURIA: POPOSAUROIDEA): **RE-EXAMINATION OF THE TYPE LOCALITY FROM THE MIDDLE TRIASSIC BADONG FORMATION, HUNAN, CHINA**

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### ABSTRACT

The Lotosaurus Quarry, traditionally dated to the Anisian, is unique in that it is a dense bonebed from which tens to hundreds of individual bones and partially articulated skeletons of Lotosaurus adentus have been collected since its discovery in 1970. Lotosaurus adentus is a highly unusual sail-backed, edentulous poposauroid pseudosuchian archosaur known primarily from a single locality in Sangzhi County, Hunan Province, south China. Members of our team returned to the Lotosaurus Quarry in 2012 in order to excavate an expansive new region of the bonebed in a search for other Middle Triassic vertebrates. Due to their work over 600 new Lotosaurus bones were exposed and left in situ. Local authorities consequently built a protective structure over the site to facilitate future research and geotourism. Our team mapped the distribution of the exposed fossils and investigated the taphonomy of this important locality in early 2015. Few details were recorded during the original excavations but we have found that the bonebed is a monospecific assemblage, characterised by pervasive disarticulation, a lack of apparent damage from predators and scavengers, and a preferential orientation of elements. Detailed sedimentological analyses of the locality and other exposures of the Middle Triassic Badong Formation were conducted. We also utilized U-Pb detrital zircon geochronology to better constrain the age of the locality and formation, and to help reconstruct sedimentary provenance patterns and paleogeography. Our results indicate that the locality formed in a fluvial-floodplain depocenter with sediment derived from numerous sources, rather than in a tidal flat setting as previously suggested. The presence of a population of younger than anticipated detrital zircons from the bonebed unit indicates that Lotosaurus is likely to be Ladinian in age, rather than Anisian as previously reported. Lotosaurus lies among, or just outside, a grouping of derived poposauroids known from the Upper Triassic of North and South America, making this result more congruent with the phylogenetic projections.





Figure 1. Lotosaurus bone bed locality map in Hunan Province, China. A. Map of China; B. Google earth image of northern Hunan Province showing locality of bonebed & other sampling sites in the region; C. Geologic Map of northern Hunan. Arrows show location of sites from B.

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Figure 2. Magnetostratigraphy of the Badong Formation from Huang and Opdyke (2000).





Triassic unit. This work suggests a maximum depositional age for the Lotosaurus bonebed of 236.3+/-8.0 Ma.

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setting as previously suggested.