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Dinosaur death pits from the Jurassic of China

David A. Eberth,[1]* Xu Xing,[2] and James M. Clark[3]

[1]*Royal Tyrrell Museum of Palaeontology, Drumheller, Alberta, T0J0Y0 Canada;*
[2]*Institute of Vertebrate Paleontology and Paleoanthropology, Beijing 100044, China;*
[3]*Department of Biological Sciences, The George Washington University, Washington, D.C. 20052, USA*
e-mail: david.eberth@gov.ab.ca
**Corresponding author.*

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ABSTRACT

Three newly discovered bonebeds from the Shishugou Formation of Xinjiang, China, are unusual in preserving vertically stacked and articulated to associated skeletons of at least 18 small, non-avian theropod dinosaurs in pits that are 1–2 m deep. The pits host a soft sediment-deformed mixture of alluvial and volcanic mudstone and sandstone. There is no evidence that the pits were discrete depressions in the topography that filled through time. Rather, they appear to have been highly localized areas of liquefaction caused by large-dinosaur (possibly sauropod) trampling of saturated sediments. Evidence indicates that the small theropods, and some other small vertebrates, became mired and died in these mud-filled pits. High quality skeletal preservation suggests that most individuals were buried within days to months after their deaths. Carcasses were buried successively, coming to rest above previously buried individuals. In some cases, skeletal body parts became separated or were removed, probably during scavenging. Given the large sizes of the pits relative to the small body sizes of the vertebrates contained within them, we conclude that small vertebrates (<3 m long and <1 m tall) were particularly susceptible to miring at these sites. Although the small, presumably herbivorous ceratosaur, *Limusaurus inextricabilis*, dominates the combined small theropod assemblage from these bonebeds (minimum number of individuals [MNI] = 15), there is no evidence that any biological features other than its small size and a large, and possibly, gregarious local population were responsible for its becoming mired in large numbers. A bias for small theropods in these bonebeds, compared to their relatively low abundance in the overall Shishugou Formation fauna, underscores that small theropods are underrepresented in Mesozoic fossil assemblages collected from other ancient alluvial and paludal settings.