

# Feathered dinosaurs of Chinese Mesozoic lacustrine lagerstätten: Extraordinary preservation or extraordinary effort?

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Over the last 30 years, Mesozoic (Jurassic and Cretaceous) lake deposits of China have produced a spectacular array of beautifully preserved fossils of birds, feathered non-avian dinosaurs, proto-feathered pterosaurs, mammals with fur, insects with color patterns and many other wonderful fossils. These fossils have highly corroborated a suite of provocative 19<sup>th</sup> and 20<sup>th</sup> century hypotheses of bird-dinosaur-pterosaur physiology and relationships based on osteological evidence and have yielded some amazing surprises. The preservation of these articulated body fossils with soft tissue preservation, such as feathers and color, unquestionably shows that these deposits fit the definition of *Konservat-Lagerstätten* that have been generally interpreted as the result of some extraordinary preservational process, and these Chinese lake deposits are no exception.

Using a comparative method, we show, however, that the style of preservation seen in these fossils is not in itself unusual and in fact characterizes deposits produced by lakes in many areas globally that were simply deep relative to their surface area, and hence chemically stratified (meromictic). By examining the history of discovery of the Chinese Mesozoic lacustrine Lagerstätten and a few similar deposits globally, as well as the abundance-diversity relationships in modern ecosystems, we can see that the amazing fossils found in these deposits are largely a result of unprecedented collection efforts by huge number of skilled collectors since the discovery of the first fossil bird in the lake sediments in the early 1980s. The physical evidence for this is visible in the landscape on the ground and even from space.

The remarkable assemblages of fossils from these deposits owe at least as much or more to the energy, persistence, and intensity of the collectors, as it does to attributes of the deposits themselves. This is a very important conclusion if progress is to be made with older lacustrine deposits such as those of the Triassic and Early Jurassic of Eastern North America and many other areas and that probably preserve material bearing on the origin of dinosaurs, pterosaurs, and the modern biota.

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