



A basal parvicursorine (Theropoda: Alvarezsauridae) from the Upper Cretaceous of China

XING XU¹, DE-YOU WANG², CORWIN SULLIVAN¹, DAVID W. E. HONE¹, FENG-LU HAN¹,
RONG-HAO YAN³, & FU-MING DU³

¹Key Laboratory of Evolutionary Systematics of Vertebrates, Institute of Vertebrate Paleontology & Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China

²Scientific Academy of Land and Resources of Henan, Zhengzhou 450000, China

³Xixia Museum of Dinosaur Fossil Eggs of China, Xixia, Henan 474550, China

Abstract

A new alvarezsaurid theropod, *Xixianykus zhangii* **gen. et sp. nov.**, is described based on a partial postcranial skeleton collected from the Upper Cretaceous Majiacun Formation of Xixia County, Henan Province. The new taxon can be diagnosed by the following autapomorphies: sacral rib-transverse process complexes and zygapophyses fused to form separate anterior and posterior laminae; distinct fossa dorsal to antitrochanter on lateral surface of ilium; short ridge along posterior surface of pubic shaft near proximal end; distinct depression on lateral surface of ischium near proximal end; sharp groove along posterior surface of ischium; distal end of femur with transversely narrow ectocondylar tuber that extends considerable distance proximally as sharp ridge; transversely narrow tibial cnemial crest with sharp, ridge-like distal half; lateral margin of tibiotarsus forms step near distal end; fibula with substantial extension of proximal articular surface onto posterior face of posteriorly curving shaft; distal tarsals and metatarsals co-ossified to form tarsometatarsus; and sharp flange along anteromedial margin of metatarsal IV near proximal end. Cladistic analysis places this taxon as a basal parvicursorine within the Alvarezsauridae, a position consistent with the presence of several incipiently developed parvicursorine features in this taxon and also with its relatively early geological age. A brief analysis of vertebral functional morphology, together with data from the hindlimb, suggests that parvicursorines represent extreme cursors among non-avian dinosaurs.

Key words: Late Cretaceous, Majiacun Formation, Parvicursorinae, Theropoda, cursoriality

Introduction

Alvarezsaurids are a group of small maniraptoran theropod dinosaurs with highly modified forelimbs and elongate hindlimbs (Bonaparte 1991; Novas 1996, 1997; Chiappe *et al.* 2002), though a large-sized taxon has been recently referred to the group (Turner *et al.* 2009). Derived members of this group (Parvicursorinae, here defined as the most inclusive clade including *Parvicursor remotus* but not *Patagonykus puertai*) display many derived features that also occur in some birds, and were originally interpreted as very basal avians (Perle *et al.* 1993, 1994; Chiappe *et al.* 1996, 1998). However, most recent studies suggest that parvicursorines and other alvarezsaurids are non-avian coelurosaurs (Serenó 1999, 2001; Norell *et al.* 2001; Novas & Pol 2002; Xu 2002). Alvarezsaurid fossils have previously been recovered from the Upper Cretaceous of Inner Mongolia, but the known material is extremely fragmentary (Zhao X. J. personal communication). In the present paper, we describe the first diagnosable alvarezsaurid taxon from China based on a specimen collected from the Upper Cretaceous Majiacun Formation of Zhoujiagou, Xixia County, Henan Province (Wang *et al.* 2008). Previously, alvarezsaurid fossils have been recovered from only the northern part of Asia, so this new find extends the fossil record of the group a considerable distance southwards to a relatively low latitude part of the continent (Fig. 1).