AUGERINOICHNUS HELICOIDALIS, A NEW HELICAL TRACE FOSSIL FROM THE NONMARINE PERMIAN OF NEW MEXICO

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INTRODUCTION

NEW MEXICO contains a significant record of trace fossil assemblages, in terms of both abundance and ichnodiversity, from Lower Permian nonmarine depositional settings. Most notable amongst these are the trace fossil assemblages in the Robledo Mountains Formation of the Robledo Mountains in Doña Ana County, southern New Mexico, as recognized by the recent proposal to designate this area as a national monument. These trace fossil assemblages formed on a tidal flat under largely nonmarine conditions (Mack and James, 1986; Hunt et al., 1993; Lucas et al., 1995a, 1998) and are dominated by the trackways of tetrapods and arthropods, yielding important information on the paleoecology, diversity and behavior of late Paleozoic arthropods (Braddy and Briggs, 2002; Minter and Braddy, 2006a), as well as evidence of specialized foraging strategies (Minter et al., 2006). Additional Lower Permian trace fossil assemblages occur at a number of localities in New Mexico and represent a variety of nonmarine depositional settings.

The material described herein represents a new ichnogenus of helical burrow, named Augerinoichnus helicoidalis, and is recurrent across Lower Permian localities in New Mexico (Fig. 1). Augerinoichnus occurs in tidal flat settings from the Robledo Mountains Formation of the Robledo Mountains (Mack and James, 1986; Hunt et al., 1993; Lucas et al., 1995a, 1998), fluviolacustrine coastal plain settings from the Robledo Mountains Formation of the Doña Ana Mountains in southern New Mexico (Lucas et al., 1995b), and floodplain sandflat settings from the Abo Formation of Cañoncito de la Uva in the Joyita Hills of central New Mexico (Hunt et al., 1995), the McLeod Hills of central New Mexico (Lucas et al., 1995c), and the Fra Cristóbal Mountains of central New Mexico (Lucas et al., 2005). The report of this new ichnogenus provides important paleoecological information on foraging strategies in nonmarine palaeoenvironments, as well as further evidence for the occurrence of trace fossils in nonmarine settings similar to those considered indicative of deep marine depositional settings.

SYSTEMATIC ICHNOLOGY

The material described and illustrated herein is housed at the New Mexico Museum of Natural History and Science (NMMNH).

Ichnospecies AUGERINOICHNUS HELICOIDALIS new ichnospieces

Type ichnospecies.—Augerinoichnus helicoidalis new ichnospecies.

Diagnosis.—Trace fossil comprising a succession of horseshoe-shaped structures preserved in negative epirelief or positive hyporelief along parting plane exposures. The individual horseshoe-shaped structures may occur in a linear succession with consistent offset to one side relative to one another, may alternate from side to side along the length of the succession, or occur in a more irregular succession.

Etymology.—After the helical nature of the burrow.

Types.—Holotype, NMMNH P-25390 (Fig. 2), a single specimen preserved as part and counterpart from NMMNH locality 2938 (UTM zone 13, 300335E, 3638153N, NAD 27) from the Lower Permian (Late Wolfcampian) Abo Formation of the McLeod Hills, central New Mexico (Lucas et al., 1995c).

Other referred material.—NMMNH P-23466, a single specimen preserved in negative epirelief (Fig. 3.1), P-24224a, a single specimen preserved as part and counterpart on the same slab (Fig. 3.2), P-24447, a single specimen preserved in negative epirelief (Fig. 3.3), P-25842, a single specimen preserved in positive hyporelief (Fig. 3.4), P-25997, a single specimen preserved in positive hyporelief (Fig. 3.5), P-25989, a single specimen preserved in positive hyporelief (Fig. 3.6), P-35411, a single specimen preserved as part and counterpart on the same slab (Fig. 3.7).