

Gallery of Geology

The trace fossil *Zoophycos* in the Sandia Formation of north-central New Mexico



Field view of several *Zoophycos* traces in Sandia Formation, Guadalupe Box.

The distinctive “rooster-tail” trace fossil *Zoophycos* is known worldwide throughout Phanerozoic time (Early Cambrian to Holocene; Ekdale 1992) but has seldom been encountered in New Mexico. The only reports known to me are from Lower Mississippian (Cooper and Dutro 1982; Lane and Ormiston 1982), Pennsylvanian (DuChene 1974), and Upper Cretaceous (Siemers et al. 1973) strata. DuChene (1974) noted its presence in the Pennsylvanian Sandia Formation of Guadalupe Box, on the southeastern side of the Nacimiento Mountains. I observed this occurrence in the course of studying the Sandia fauna and document it here. The *Zoophycos* traces are dense within a single, thin, light grayish-brown to tan unit of calcareous siltstone in the lower part of the formation, where they are associated with sparse calcareous shell fragments and valves of the inarticulate brachiopod *Lingula*. In contrast, the gray limestone beds directly above and below contain moderately diverse brachiopod-dominated faunas, but no *Zoophycos*.

Zoophycos structures were constructed by a deep-burrowing, deposit-feeding, worm-like organism, whose possible identity, although much discussed in the literature, is still unknown. The animal lived in a cylindrical burrow, from which it emerged (or extended a long proboscis-like structure) to mine the sediments around it for food, then retreated, and repeated the process while shifting slightly laterally in a more or less horizontal plane. This

highly efficient feeding program ensured continuous mining of new volumes of sediment, and produced the closely packed spreite structures that form the parallel, arcuate undulations within the “rooster-tail.”

Many Paleozoic and later occurrences of *Zoophycos* are in strata that have been interpreted as relatively deep marine (e.g., Seilacher 1967), but occurrences in late Paleozoic shallow-marine (Ekdale and Mason 1988) and even marginal-marine to estuarine (e.g., Martino 1989; Buatois et al. 2005) environments are not uncommon. A significant degree of oxygen depletion or other features of a stressed environment appear to be more important factors than depth in influencing where the *Zoophycos* animal lived, and is consistent with the generally low level of biotic diversity in strata dominated by *Zoophycos*. As the Sandia Formation was deposited in shallow marine to onshore nonmarine environments (e.g., Kues and Giles 2004), the *Zoophycos* bed in Guadalupe Box appears to represent a very transitory episode of oxygen depletion and/or salinity reduction in the prevailing nearshore, shallow-marine sequence of this part of the Sandia Formation.

The distinctive morphology, relatively large size, and typical high density of *Zoophycos* traces make them easy to spot in the field, and I would be interested in learning of other occurrences from those who have encountered them.



Slab with two large *Zoophycos* traces in contact; height of slab is 21 cm.

References

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