ANOTHER DICYNODONT FROM THE TRIASSIC MUSCHELKALK OF GERMANY AND ITS BIOCHRONOLOGICAL SIGNIFICANCE

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Abstract—An isolated limb bone from the upper Anisian interval of the Muschelkalk in Bavaria, Germany is the radius of a Dinodontosaurus-grade dicynodont. This is the third dicynodont bone documented from the German Muschelkalk, and it may indicate that Dinodontosaurus records are not strictly Ladinian in age, but could also be late Anisian.

INTRODUCTION

Dicynodonts were a Pangea-wide group of terrestrial tetrapods of the Permian and Triassic that provide important biostratigraphic data for tetrapod biochronology (e.g., King, 1988; Lucas, 1995, 1998, 2006; Lucas and Wild, 1995). Their fossils are particularly abundant in Lower-Middle Triassic strata in Gondwana. In contrast, very few dicynodont fossils have been recovered from the Lower-Middle Triassic of Europe. Here, I add to this meager European record of Triassic dicynodonts a radius from the Anisian interval of the Muschelkalk in southern Germany and discuss its biochronological significance. In this paper, SMNS refers to the Staatliches Museum für Naturkunde, Stuttgart, Germany.

PROVENANCE

The dicynodont fossil described here was collected on 20 July 1974 by M. Wild at Hegenbrunn bei Kulmach in Bavaria, Germany. The fossil came from strata of the upper Muschelkalk that are in the spinosus zone of the standard ceratitie zonation of the Muschelkalk. This means that the dicynodont radius is of late Anisian age (e.g., Hagdorn et al., 1998).

DESCRIPTION

SMNS 83875 (Fig. 1) is described here as the nearly complete left radius of a dicynodont. The proximal end has a nearly oval cross section and is broader than the shaft but lacks the epiphyseal cap and/or is eroded proximally. However, it appears that the proximal end of the radius was nearly flat or shallowly concave. There is a sharp radial crest on the antero-medial edge near the proximal end of the bone. The shaft has a trihedral cross section, and the entire bone is slightly bowed (arched), with the most concave side of the arch facing posteriorly. The distal end is much wider than the shaft and wider than the proximal end. It projects antero-medially and has a smooth, saddle-like articular surface, but is crushed in the medio-lateral plane. Maximum length = 109 mm, maximum proximal width = 39 mm and maximum distal width = 52 mm.

IDENTIFICATION

Many tetrapod fossils have been collected from the Muschelkalk, mostly of marine reptiles—nothosaurs, placodonts, pachypleurosaurs, protorosaurs, thalattosaurs and ichthyosaurs (e.g., Lucas, 1997; Hagdorn and Rieppel, 1999). However, some specimens (usually isolated bones) of freshwater or terrestrial tetrapods are also found in the Muschelkalk and include mastodontosaurids, plagiosaurids, tany strephoids and two previously published isolated bones of dicynodonts (Broili, 1921; Lucas and Wild, 1995; Lucas, 1999). Comparison of SMNS 83875 by myself and by O. Rieppel to marine reptile taxa known from the Muschelkalk indicate that it does not belong to any of these groups.

Instead, it appears to be an isolated bone of a terrestrial tetrapod, and it very closely resembles the left radius of a dicynodont, as first suggested to me by R. Wild (cf. Camp and Welles, 1956, fig. 26; Cox, 1965, fig. 17; King, 1981, fig. 26, 1988, fig. 39C-D; Lucas and Harris, 1996, figs. 8.7-8.8; Ray and Chinsamy, 2003, pl. 1, fig. 5, text-fig. 5A; Ray, 2006, pl. 1, fig. 7, text-fig. 1E-F). Indeed, size and shape of the bone are very similar to the radii of Dinodontosaurus illustrated by Huene (1935), Beltrão (1965) and Lucas and Harris (1996). Differences, though, between the Muschelkalk bone and the radius of Dinodontosaurus include the relative expansions of the ends of the bone and its bowed (curved) shaft. Some or all of these features may, however, be due to distortion (plastic deformation) of the bone. Certainly, an isolated radius cannot be assigned to a dicynodont genus with certainty, so I only identify SMNS 83875 as aff. Dinodontosaurus sp., for the same reasons that Lucas and Wild (1995) so identified an isolated dicynodont humerus from the early Ladinian interval of the Muschelkalk near Crailsheim, Germany.

BIOCHRONOLOGICAL SIGNIFICANCE

The specimen described here adds to a sparse Muschelkalk record of isolated dicynodont bones that defy precise identification because of their incompleteness. Two of these records are assigned to aff. Dinodontosaurus and are of late Anisian and early Ladinian age. This provides prima facie evidence of Dinodontosaurus-grade dicynodonts in marine late Anisian-early Ladinian strata.

Dinodontosaurus is a South American dicynodont known from the Santa Maria Formation in southern Brazil and the Ischichua (formerly Chañares) Formation of Argentina (Cox, 1965, 1968). These records are in tetrapod assemblages of the Berdyankian land-vertebrate faunachron (lvf) of Lucas (1998) and are generally considered to be of Ladinian age (e.g., Bonaparte, 1982; Lucas, 1998, 1999, 2002), though there is little basis for correlation to the marine timescale. The record of a Dinodontosaurus-like dicynodont in late Anisian marine strata of the Muschelkalk opens up the possibility of a late Anisian age for the South American records of Dinodontosaurus and the Berdyankian Ivf. Thus, at present it may be most defensible to say that the records of Dinodontosaurus, and the Berdyankian Ivf, likely correlate to late Anisian as well as Ladinian time.

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FIGURE 1. SMNS 83875, left radius of a dicynodont (aff. *Dinodontosaurus* sp.) from the upper Muschelkalk at Hegenbrunn bei Kulmach in Bavaria, Germany, in A, medial, B, lateral, C, anterior, D, posterior, E, proximal and F, distal views.

REFERENCES


