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GLYPTOPS (TESTUDINES, PLEUROSTERNIDAE) FROM THE UPPER JURASSIC MORRISON FORMATION, NEW MEXICO

SPENCER G. LUCAS[1], LARRY F. RINEHART[1] AND ANDREW B. HECKERT[2]

[1]New Mexico Museum of Natural History and Science, 1801 Mountain Road NW, Albuquerque, NM 87104; [2]Department of Geology, Appalachian State University, ASU Box 32067, Boone, NC 28608-2067

Abstract—We document an incomplete turtle carapace and plastron from the Peterson quarry in the Brushy Basin Member of the Upper Jurassic Morrison Formation, Bernalillo County, New Mexico. This is the first non-dinosaurian vertebrate from the Peterson quarry and the first Morrison Formation turtle from New Mexico. This specimen has the following combination of characteristics that supports its assignment to *Glyptops plicatulus* (Cope): low and oval carapace, surface ornamentation of small tubercles and raised ridges, peripherals not scalloped, no plastral fontanelles and mesoplastra meet at midline. The *Glyptops* record from New Mexico extends its distribution southward, almost to the southern edge of the Morrison depositional system and suggests that the turtles were part of one homogeneous Morrison vertebrate fauna. *Glyptops* has traditionally been reconstructed as an aquatic turtle, but a careful functional morphological analysis of *Glyptops*, particularly based on its limb proportions, is needed to verify its habitus.

INTRODUCTION

Although Late Jurassic vertebrate fossils have been known from the Upper Jurassic Morrison Formation in New Mexico for about a century, only dinosaur remains have been reported (Lucas and Hunt, 1985; Lucas et al., 1996; Lucas and Heckert, 2000; Heckert et al., 2000, 2003). Here, we add the turtle *Glyptops* to New Mexico's record of fossil vertebrates from the Morrison Formation. This extends the distribution of *Glyptops* southward, and thus supports the idea that the vertebrate fauna was paleobiogeographically homogeneous across the entire Morrison depositional system. In this paper, NMMNH refers to the New Mexico Museum of Natural History and Science, Albuquerque.

PROVENANCE

The *Glyptops* specimen documented here was collected at NMMNH locality 3282, generally referred to as the "Peterson quarry" (Fig. 1). Located in Bernalillo County, the Peterson quarry is New Mexico's most extensive and productive Jurassic dinosaur locality, and has yielded more than 70 jackets and well over 100 bones (Heckert et al., 2000, 2003). The quarry is developed in the upper part of the Brushy Basin Member of the Morrison Formation, approximately 26 m below its upper contact with the Jackpile Member. The fossil bones typically occur in a 1.1-m thick interval of well-indurated, trough-crossbedded subarkosic sandstone. They are mostly of sauropod dinosaurs (*Camarasaurus* and a diplodocid, possibly *Diplodocus*) and a large, *Saurophaganax*-like allosaurid theropod (Williamson and Chure, 1996; Heckert et al., 2000, 2003). Taphonomic and sedimentological analyses suggest that the bones are part of the mixed fill of an abandoned river channel (Heckert et al., 2003). The turtle fossil reported here was lodged against a sauropod limb bone in jacket 44 (see Heckert et al., 2003, fig. 2). This is the first non-dinosaurian vertebrate fossil from the Peterson quarry.

DESCRIPTION

NMMNH P-44530 is an incomplete carapace and plastron, extensively crushed dorso-ventrally (Figs. 2-3). The texture of the bone on the shell is one of fine tubercles and raised ridges. On its left lateral edge, the carapace preserves parts or all of six peripherals (Figs. 2-3). These are rectangular bones that are longer than wide. They are not scalloped laterally. The carapace is very fragmentary, and other than the six left peripherals it preserves no useful morphological information.

The preserved plastron includes part of the entoplastron, most of the right and left hyoplastra, the complete left mesoplastron and part of the right mesoplastron and parts of the right and left hypoplastra (Figs. 2-3). Total width of the plastron at the hyoplastron-mesoplastron suture can be

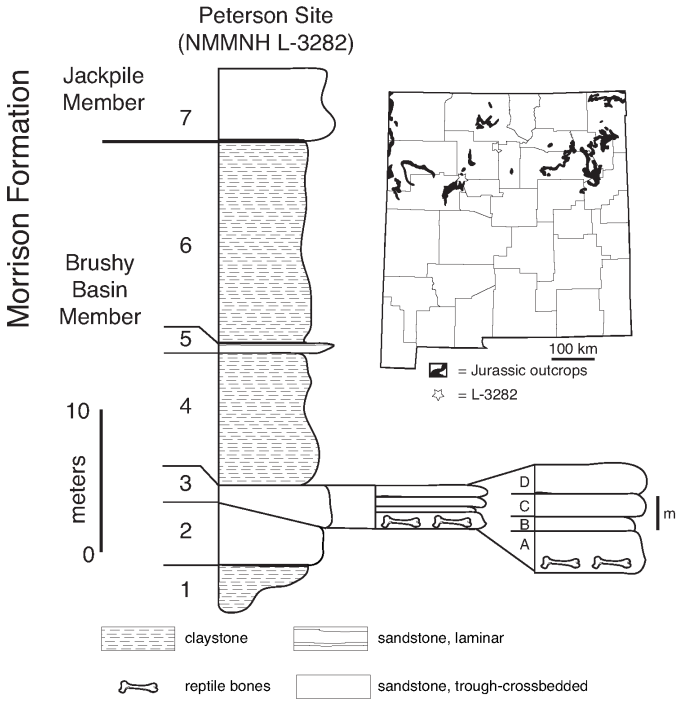

FIGURE 1. Location map and stratigraphic section at NMMNH locality 3282, the Peterson quarry (after Heckert et al., 2003).

readily estimated at 280 mm. Total length of the plastron is greater than 200 mm. The preserved posterior part of the entoplastron indicates it is an unpaired, broad bone with a convex posterolateral articulation with the two hyoplastra posterior to it. The hyoplastra are large, nearly square bones that form the anterior part of the plastral bridge to the carapace. The suture between the hyoplastron and mesoplastron is a nearly straight, transverse line. The mesoplastron is nearly rectangular, though it does taper somewhat medially (the medial edge is shorter than the lateral edge). It has a nearly straight transverse suture posteriorly to the hypoplastron. The hypoplastron is larger than the mesoplastron, though not as large as the hyoplastron. The mesoplastron and hypoplastron make up the posterior two-thirds of the bridge. No sulci can be discerned.

IDENTIFICATION

NMMNH P-44530 has the following combination of characteris-

FIGURE 2. NMMNH P-44530, incomplete plastron and carapace of *Glyptops plicatulus*, in ventral view. See Figure 3 (right side) for outline drawing of specimen.

tics that supports its assignment to *Glyptops*: low carapace, surface ornamentation of small tubercles and raised ridges, peripherals not scalloped, and mesoplastra meet at midline. This combination of features readily differentiates the specimen from the other Morrison turtle known from shell material, *Dinochelys*, (Gaffney, 1979). The other Morrison turtles are *Dorsetochelys* and *Uluops.* Furthermore, the preserved suture pattern of the plastron is identical to that of *Glyptops* (e.g., Gaffney, 1979, fig. 5c). One species of *Glyptops*, *G. plicatulus*, is valid (Gaffney, 1979; Foster, 2003), so we assign P-44530 to *G. plicatulus*.

DISCUSSION

Prior to the record documented here, fossils of *Glyptops* were known from the Morrison Formation in Wyoming, Utah and Colorado (Cope, 1877; Marsh, 1890; Hay, 1908; Gilmore, 1916; Gaffney, 1979; Foster, 2003). The *Glyptops* record from New Mexico thus extends its distribution southward, almost to the southern edge of the Morrison depositional system. This is consistent with the conclusion that the Morrison dinosaur fauna was homogeneous across the depositional system (Foster, 2000, 2003) and suggests that the turtles were also part of one homogeneous Morrison fauna.

We reconstruct *Glyptops* as an aquatic turtle (Fig. 3), consistent with the paleoecological inferences of earlier workers (e.g., Dodson et al., 1980; Foster, 2003). This inference is primarily based on the low carapace and the occurrences of *Glyptops* in fluvial sediments, though neither are incontrovertible evidence of an aquatic habitat preferences (cf. Joyce and Gauthier, 2004). What is needed is a careful functional morphological analysis of *Glyptops*, particularly based on its limb proportions, to verify its habitus.

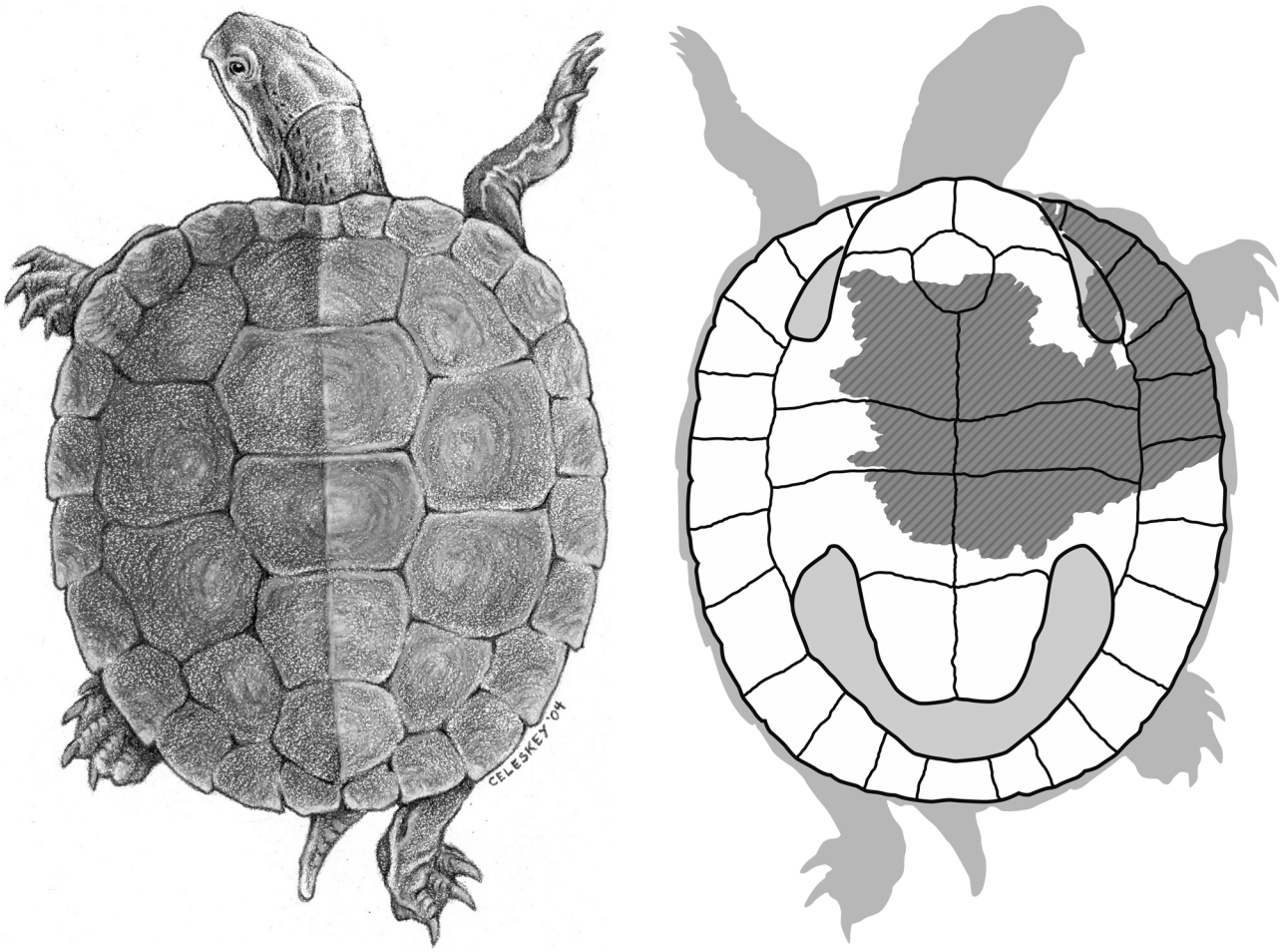

FIGURE 3. Restoration of *Glyptops plicatulus* by Matt Celeskey in dorsal (left) and ventral (right) views. Ventral view shows portion of plastron-carapace represented by NMMNH P-44530 (darkened area).

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