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A Brachiosaurid dinosaur (Saurischia: Sauropoda) from the Upper Jurassic of east-central New Mexico

Adrian P. Hunt, 2001, pp. 213-214

in:

Geology of Llano Estacado, Lucas, Spencer G.; Ulmer-Scholle, Dana; [eds.], New Mexico Geological Society 52nd Annual Fall Field Conference Guidebook, 340 p.

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A BRACHIOSAURID DINOSAUR (SAURISCHIA: SAUROPODA) FROM THE UPPER JURASSIC OF EAST-CENTRAL NEW MEXICO

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Abstract.—The Upper Jurassic Morrison Formation of northeastern New Mexico has yielded several dinosaur bones during the past 100 years. A newly collected specimen from the Brushy Basin Member of Quay County is a partial humerus of a brachiosaurid dinosaur. This occurrence of *Brachiosaurus* sp. is the first for the state of New Mexico.

INTRODUCTION

Upper Jurassic strata are widely exposed in northeastern New Mexico and include the Summerville and Morrison formations (Lucas et al., 1985; Lucas and Woodward, 2001). Stanton (1905) first reported a tetrapod fossil from the Brushy Basin Member of the Morrison Formation in Quay County. Since that time, a number of dinosaur bones and tracks have been reported from this part of the state (Table 1). Here, I report on a newly collected specimen that represents an addition to the dinosaur fauna of the area and indeed is the first report of the sauropod family Brachiosauridae from New Mexico.

GEOLOGIC CONTEXT

This specimen derives from the Brushy Basin Member of the Morrison Formation in Quay County. The Brushy Basin member in this area consists mainly of green mudstone. The Brushy Basin is the most extensive and fossiliferous member of the Morrison Formation in the western United States.

TABLE 1. Jurassic tetrapods of New Mexico (Lucas and Hunt, 1985; Hunt and Lucas, 1993; Lucas et al., 1996; Lockley et al., 2000; Lucas and Heckert, 2000; this paper). ** indicates occurrence in northeastern New Mexico.

JURASSIC TETRAPODS OF NEW MEXICO			
Formation	Member	Tetrapod taxa	
Morrison Formation	Jackpile Member	Indeterminate dinosaurs	
		Brushy Basin Member	<i>Allosaurus</i> sp. Large allosaurid <i>Apatosaurus</i> sp. <i>Camarasaurus supremus</i> <i>Diplodocus carnegie</i> <i>Diplodocus</i> (= <i>Seismosaurus</i>) <i>hallorum</i> <i>Brachiosaurus</i> sp. <i>Stegosaurus</i> sp.** Camptosauridae indet.** Theropod eggshell
	Salt Wash Member	Indeterminate dinosaurs dinosaur skeleton observed in field	
	Summerville Formation		? <i>Camarasaurus</i> sp. ? <i>Megalosauripus</i> sp. aff. <i>Therangospodus</i> sp.**

DESCRIPTION

This specimen is in a private collection and is currently on loan to the Mesalands Dinosaur Museum. It consists of four pieces of a large limb bone. Several other pieces were discarded after collection. The largest piece consists of a shaft with broken ends that gently flairs proximally (Fig. 1A-B, D). This fragment is 870 mm long and has maximum and minimum diameters of 380 mm and 280 mm, respectively. The broken end of the shaft has the cross-section of a rounded rectangle with dimensions of 210 and

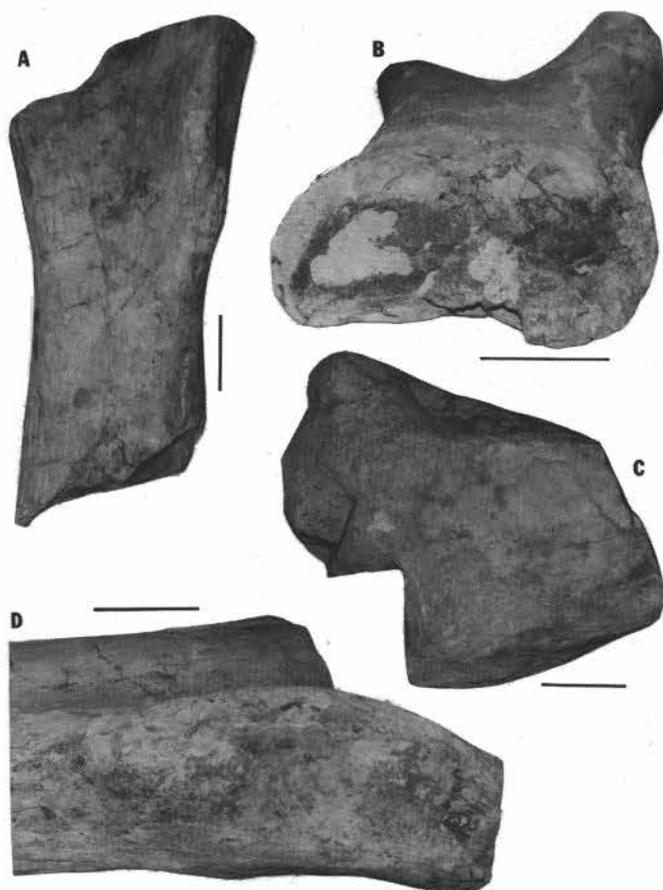


FIGURE 1. Left humerus of *Brachiosaurus* sp. from the Brushy Basin Member of the Morrison Formation, Quay County, New Mexico. A. Proximal fragment in cranial view. B. Proximal fragment in distal view. C. Distal fragment in cranial view. D. Proximal fragment in medial view. Scale bar is 10 cm.

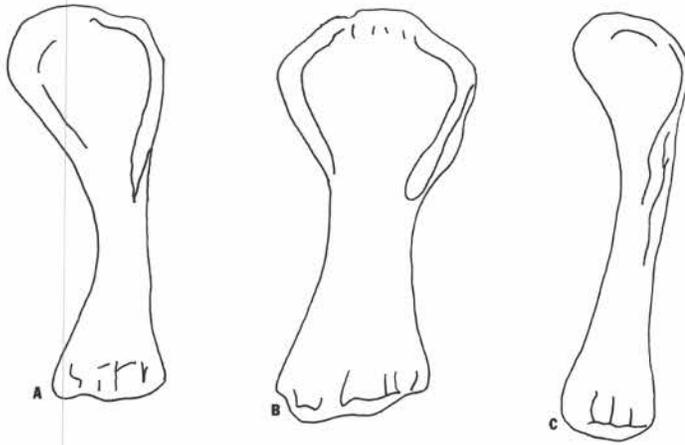


FIGURE 2. Late Jurassic sauropod left humeri in cranial view (after McIntosh, 1990). Not to scale. A. *Camarasaurus*. B. *Apatosaurus*. C. *Brachiosaurus*.

320 mm. Proximally, the bone widens, one side becoming more convex and the other more concave, so that the cross-section is like a rounded crescent. A vertical ridge about 380 mm long is developed on the edge of one side, and in cross-section the lateral side of the bone is vertical and less rounded. The vertical ridge is about 100 mm high and is composed of a higher segment about 280 mm long and a lower segment about 100 mm long that is connected to a rugose area on the lateral wall of the bone.

The second large fragment is a roughly fan-shaped piece, 400 mm long, 430 mm in maximum diameter and 205 mm thick (Fig. 1C). The top and bottom surfaces of this bone are slightly concave and convex, respectively and only one of the sides preserves a margin. The two smaller pieces are a flattened shaft fragment 240 mm long, 220 mm wide and 140 mm thick and a fragment of the end of a rounded condyle 220 mm long, 150 mm wide and 110 mm thick.

DISCUSSION

Based on size, occurrence and age this bone obviously pertains to a sauropod dinosaur. Furthermore, it is a limb bone and a left humerus based on the flaring ends and prominent cranio-lateral crest (deltopectoral crest). Humeri are known for all the principal taxa of sauropods from the Morrison Formation. Camarasaurids, diplodocids and *Haplocanthosaurus* have hour-glass-shaped humeri with a short, broad shaft separating two widened ends (Fig. 2). The Quay County specimen, however, exhibits a relatively long, parallel-sided shaft. Among the sauropods this morphology is found only in the Brachiosauridae (Fig. 2; Janensch, 1961, fig. 1a). Similarities between the Quay County humerus

and *Brachiosaurus* include prominent groove on the cranial surface medial to the deltopectoral crest, axis of deltopectoral crest in cranial view is medial to the humeral margin and shaft is narrowest at deltopectoral crest rather than more distally. The deltopectoral crest is not as prominent as in other specimens of *Brachiosaurus* (e.g., Janensch, 1961, fig. 1c), but this could be an ontogenetic feature. Based on the ratio of minimum humeral shaft diameter: humeral length compared to other brachiosaurid humeri, the Quay County humerus would have been about 2650 mm long, which would be as long or longer than the holotype of *Brachiosaurus brancai* (Paul, 1988, table 1). However, so little is known about variation in large sauropods that I conservatively assign this specimen to *Brachiosaurus* sp.

Brachiosaurids are rare components of Late Jurassic dinosaur faunas in North America. Currently, *Brachiosaurus* is known from Colorado and Utah (McIntosh, 1990). This new specimen is a first occurrence for New Mexico and represents one of the largest dinosaurs known from the state. This specimen suggests that the Morrison Formation of northeastern New Mexico has the potential to yield significant specimens.

ACKNOWLEDGMENTS

Jim Haller kindly let me study this important specimen and Spencer Lucas provided a helpful review.

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