NEW MATERIAL FROM THE TYPE SPECIMEN OF *MEGALNEUSAURUS REX* (REPTILIA: SAUROPTERYGIA) FROM THE JURASSIC SUNDANCE FORMATION, WYOMING

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ABSTRACT

In 2008, an articulated distal forelimb of the type specimen of the large pliosauromorph *Megalneusaurus rex* (UW 4602) was discovered adjacent to the original excavation pit from which two hindlimbs had been collected in 1895. The new material includes six complete or partial carpals, four metacarpals, and nearly all of the phalanges. Although the new bones were damaged by weathering and gypsum crystal growth, the articulated arrangement of the bones is preserved. Important features include (1) broadly flared metacarpals that articulate proximally and distally with the adjacent metacarpals; (2) curved facets on phalanges that are concave proximally and convex distally; (3) laterally interlocking phalanges between digits I and II and between digits IV and V for the entire length of the outer digits; and (4) tightly articulated, interlocking phalanges among all digits distal to the 3rd phalanx. Examination of the material collected in 1895 indicates that a similar structure occurred on the hindlimb as well. The results of this arrangement are rigid, reinforced leading and trailing edges of the flipper, as well as a stiff distal end. During swimming, the limb moved as a rigid unit, with no flexibility at any articulation distal to the head of the propodial. The stiff flipper generated thrust by pushing backward and downward against the water during power stroke; and generated lift when the limb was rotated and moved forward and upward during the recovery stroke.

INTRODUCTION

In 1895, Wilbur Knight discovered the type specimen of *Megalneusaurus rex* (UW 4602; for institutional abbreviations see below), originally described as *Cimoliosaurus rex*, the only Jurassic pliosauromorph known from North America (Knight, 1895; Wahl et al, 2007). Knight collected a nearly complete, articulated limb including the propodial, most of which is presently on display at the Geological Museum, University of Wyoming. Material including cervical, dorsal, and caudal vertebrae, neural arches, a large portion of the limb girdle, and ribs were also reported in the paper which erected a new genus for the species (Knight, 1898). This material has since been lost. Knight (1898) did not mention nor figure the disarticulated second limb of the same specimen, which includes a complete set of epipodials, mesopodials, metapodials, and phalanges of the same individual, which is presently housed in the UW collections. Only two other specimens from Wyoming can be referred to *M. rex*: a weathered neural arch, collected as float from Natrona County (UW 24238), and a very weathered propodial fragment from Hot Springs County (WDC SS019). Neither specimen has been described in publications. Another specimen of *M. rex* comprising a partial propodial has been reported from the Upper Jurassic Naknek Formation of Alaska (Weems and Blodgett, 1994).

In 1996, the excavation site of the type specimen of *Megalneusaurus rex* was relocated in the Gas Hills area of eastern Fremont County, WY (Wahl, et al., 2007). The discovery revealed that UW 4602 is from the upper part of the Redwater Shale Member of the Sundance Formation, about 10 m below the Windy Hill Sandstone. The specimen is thus of Oxfordian age (Kvale, et al., 2001). We report here on the discovery in 2008 of a third limb from the type specimen of *Megalneusaurus rex* (UW 4602).


MATERIAL

The new limb, which is missing the propodial and epipodials, is 106 cm long from the proximal edge of the intermedium to the distal end. The limb has five digits, with the first considerably shorter than the others. It is missing the metapodial and half of the first phalanx of digit V, but is otherwise fairly complete, but