A JUVENILE PLESIOSAUR (REPTILIA: SAUROPTERYGIA) ASSEMBLAGE FROM THE SUNDANCE FORMATION (JURASSIC), NATRONA COUNTY, WYOMING

William R. Wahl

Wyoming Dinosaur Center, Big Horn Basin Foundation, 110 Carter Ranch Road, Thermopolis, WY. 82443
wwahl2@aol.com

ABSTRACT

The predominance of juveniles from one taxon is rarely found in faunal studies. However, the presence of seven juveniles in a sample of ten cryptocleoid plesiosaurs from the Redwater Shale Member of the Sundance Formation of Natrona County, Wyoming may be such a paleocommunity. Juvenile characters are recognized by the lack of facets and ossification on the distal ends of the propodials and by cross-sections of the limbs. Juveniles have dense pachyosteosclerotic bone structures whereas adults have more spongy, osteoprotic bone. The dense bone of the juveniles suggests a difference in environmental preference between juvenile and adult plesiosaurs.

INTRODUCTION

The Sundance Formation (Bajocian-Oxfordian) was the last and most extensive transgressive sequence of the Jurassic in North America (Kvale et al., 2001). The majority of the vertebrate fossils have been collected from the Redwater Shale Member. The presence of the small cardiocerid ammonite, Quenstedtoceras colleri, establishes the lower Redwater Shale as latest Callovian. This Callovian age was further confirmed by the identification of the coleoid belemnite, Pachyteuthis densa, and the pelecypods Camptonectes bellerstius and Ostrea strigilecula (Kvale et al., 2001).

The upper Redwater Shale Member is Oxfordian in age (Kvale et al., 2001). It represents a shallow, open shelf environment dominated by silty to shaley mudstone, occasional bioturbated shale, and ripple-dominated, glauconitic fine-grained calcareous sandstone (Figure 1; Andersson, 1979; Specht and Brenner, 1979; Kvale et al., 2001). It has been compared to the Callovian lower Oxford Clay of England (Wahl, 1997, 1999). The Sundance Seaway was affected by the Arctic or Boreal Seaway that connected to the Tethys Seaway of Europe, of which the Oxford Clay was included (Doyle, 1987; Martill, 1991). This connection is indicated by the identification of the coleoid family Cylindroteuthidae (belemnites), notably the species Pachyteuthis densa, which exhibited provincialism with notable migrations southwards related to sea-level change or possible seasonal migration (Doyle, 1987, 1995). The presence of belemnites in various sizes may indicate seasonality during deposition of the Redwater Shale (Imlay, 1980, Kvale et al., 2001; Wahl 1998).

The water depth during the Redwater Shale sequence was estimated to be 40 m (Specht and Brenner, 1979). The relatively shallow depth made storm action on paleocommunities very destructive (Tang and Bottjer, 1996). The presence of glauconitic grains and siltstone rip-up clasts is evidence of a high-energy environment (Specht and Brenner, 1979). The presence of storm damaged bioherms consisting of bits of fragmented Camptonectes and Gryphaea and winnowed sandstones are further evidence of a rough depositional environment in the Redwater Shale (Specht and Brenner, 1979).

Remains of fish are extremely rare in the Sundance paleoenvironment (Schaeffer and Patterson, 1981). The marine reptile fauna is dominated by ichthyosaurs. Specimens collected in recent years suggest a fauna comprised of 80 % ichthyosaurs, 18 % plesiosaurs and only 2 % pliosaurs. Currently, a single species of ichthyosaur, Ophthalmosaurus natans is recognized from the Sundance (McGowan and Montani, 2003). A single specimen of the giant pliosaur (13m), Megalansaurus rex as well as two genera of cryptocleoid plesiosaurs, Pantosaurus striatus and Tatenecktes laramiensis have also been reported (O’Keefe and Wahl 2003a, b). This is the first report of a plesiosaur fauna from one locality in the Sundance Formation where a majority of the specimens are juveniles.

Institutional Abbreviations—LEIUG, Leicester University, Department of Geology, Leicester, England; UW, University of Wyoming, Laramie, WY; WDC, Wyoming Dinosaur Center, Big Horn Basin