Late Cretaceous Chondrichthyans from the Carlile Shale (Middle Turonian To Early Coniacian) of the Black Hills Region, South Dakota and Wyoming

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ABSTRACT

Twenty-three elasmobranch taxa have been recovered from the Upper Cretaceous Carlile Shale (Middle Turonian to Early Coniacian) of the Black Hills region of South Dakota and Wyoming. The oldest unit, the Pool Creek Member, represents marine shoreline depositional environments and contains a selachian assemblage composed predominantly of pelagic predators (Carcharias, Cretodus, Cretolamna, Cretoxyrhina, Jobnlongia, Scapanorhynchus, Squaticorax). Rocks from the lower part of the overlying Turner Sandy Member represent shallow-water environments influenced by wave-generated and tidal currents. Moderately diverse elasmobranch assemblages recovered from these rocks contain a preponderance of benthic taxa (Cantioscyllium, Chiloscyllium, Ischyryzna, Pseudohypsophagus, Ptychodus, Ptychotrygon, Rhinobatis, Sclerorhynchus). Only one taxon, Ptychodus latissimus, has thus far been recovered from the Sage Breaks Shale Member, which was deposited in an offshore, shelf-depth, open marine environment.

INTRODUCTION

The Upper Cretaceous Carlile Shale is exposed along the flanks of the Black Hills in western South Dakota and eastern Wyoming (Fig. 1). In this area, the formation is divided into three lithostratigraphic units which are, from oldest to youngest, the Pool Creek Member, Turner Sandy Member, and Sage Breaks Shale Member (Rubey, 1930, Cobban, 1951, Knechel and Patterson, 1962). The Carlile Shale is well-known for its abundance of invertebrate fossils, particularly diverse mollusk assemblages that include ammonites, bivalves, and gastropods (Cobban, 1951, Martin et al., 1996, Sawyer, 1996) Much less is known about the vertebrate palofauna. Bell et al. (1996) presented a short list of elasmobranch and osteichthyan taxa collected from the Pool Creek Member, and Cobban (1951) reported a small collection of shark teeth recovered from the Turner Sandy Member of the northern Black Hills of South Dakota. However, the only well documented fauna consists of an assemblage of selachian taxa reported by Cappetta (1973) from the Turner Sandy Member of the southern Black Hills of South Dakota. Everts (1979) later updated this list to include specimens found in eastern Wyoming. Further investigations conducted by the Museum of Geology, South Dakota School of Mines and Technology (SDSM), resulted in the collection of elasmo-