

SKULL OF THE DICYNODONT *PLACERIAS* FROM THE UPPER TRIASSIC OF ARIZONA

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Abstract—We describe here a rare, incomplete but articulated skull of the dicynodont *Placerias* from the Blue Mesa Member of the Petrified Forest Formation in northern Arizona. This specimen comes from near the type locality of *P. hesternus* Lucas, 1904 in the vicinity of Ward's Terrace. Although the skull is crushed and somewhat distorted, it confirms previous reconstructions that posit the presence of a relatively short squamosal bar and dorso-ventrally robust, but relatively short, maxillary process, as opposed to the first reconstruction based on isolated bones from the *Placerias* quarry in east-central Arizona. With the exception of the *Placerias* quarry, dicynodonts in general are uncommon in the Chinle Group, but their occurrences are from strata of Otischalkian or Adamanian (late Carnian) age, and in part define a *Placerias* biochron of Otischalkian-Adamanian age.

Keywords: *Placerias*, dicynodont, topotype, Petrified Forest Formation, Blue Mesa Member

INTRODUCTION

During the Permian and Triassic, dicynodonts were a widespread group of terrestrial, herbivorous synapsids (King, 1986, 1988, 1990). In Triassic nonmarine strata, they are known from all of the continents and are particularly abundant (often the dominant) tetrapod fossils at Lower and Middle Triassic localities. The last dicynodonts are of Late Triassic age, from North America, South America, Morocco and India (Lucas, 1995; Lucas and Wild, 1995). The most widely distributed of the Late Triassic dicynodonts is *Placerias* Lucas, 1904, known from the western United States, eastern United States and from Morocco. Here, we describe an incomplete skull of *Placerias* from the upper Triassic Chinle Group in northern Arizona.

Abbreviations: MNA = Museum of Northern Arizona, Flagstaff; UCMP = University of California Museum of Paleontology, Berkeley.

PROVENANCE

The skull described here is MNA V8464, collected from MNA locality 1454 by R. Kirby and P. Luttrell in August, 1991. The locality is along Ward's Terrace, east of Cameron and just north of Landmark Wash at UTM Zone 12, 472000E, 3964620N. MNA locality records state the locality is in the Petrified Forest Member of the Chinle Formation in strata of late Carnian age (Fig. 1). Cooley et al. (1969, pl. 1, sheet 2) map these strata as lower part of the Petrified Forest Member, which is the Blue Mesa Member of the Petrified Forest Formation of Lucas (1993). Thus, MNA locality 1454 is from the same stratigraphic interval (and close to the same locality) as the holotype specimen of *Placerias hesternus* Lucas, 1904 (cf. Camp and Welles, 1956, fig. 1; Lucas and Hunt, 1993a; Lucas et al., 1997; Lucas, 1998) and is effectively a topotype (Lucas et al., 1999). The Blue Mesa Member hosts the "type assemblage" of the Adamanian land-vertebrate faunachron (lvf) of Lucas and Hunt (1993b), which is of latest Carnian age throughout its distribution in Arizona and New Mexico (Lucas and Hunt, 1993b; Lucas and Heckert, 1996). Thus, MNA locality 1454 is of Adamanian (latest Carnian) age.

DESCRIPTION

MNA V8464 (Figs. 2-3) is an incomplete skull that has been distorted dorso-ventrally and also compressed laterally toward the right side. The specimen is thoroughly fractured and sits in a

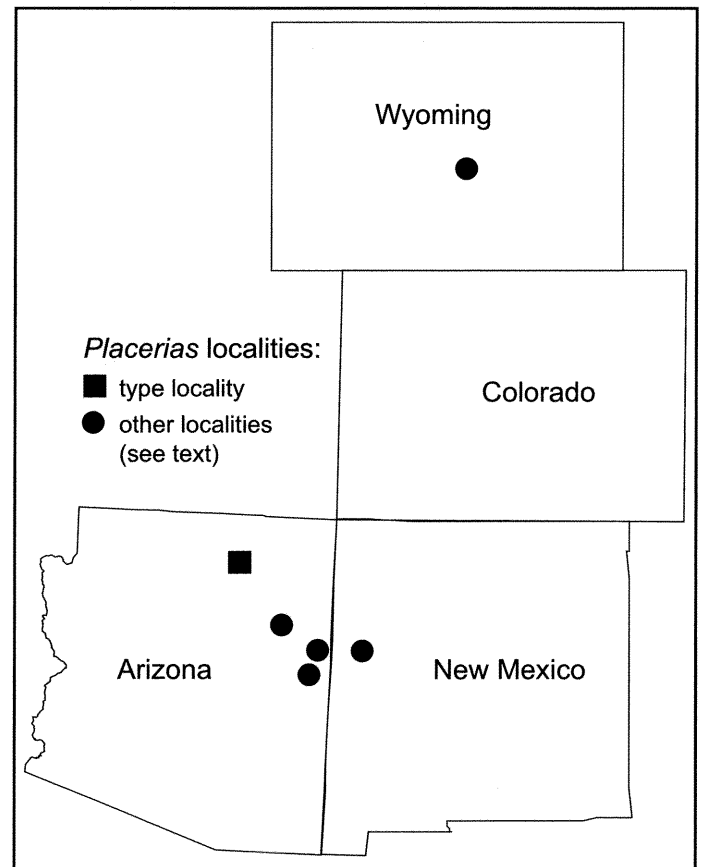


FIGURE 1. Index map showing the distribution of Chinle Group *Placerias* localities.

plaster jacket, so that its ventral side is not visible. What is preserved is 580 mm long antero-posteriorly and includes the right and left maxillae, the left orbit and the left parietal-squamosal region. The rostrum has been splayed anterior to the orbits so that both the left and right maxillae are in essentially one plane (Figs. 2-3).

Both maxillae are thick, rugose bones, and on the right maxillae the base of a stout "tusk" can be seen along its antero-external edge (Figs. 2-3). The nasal, prefrontal and lacrimal (their separate sutures are not visible) unite to form a thick, deep ros-

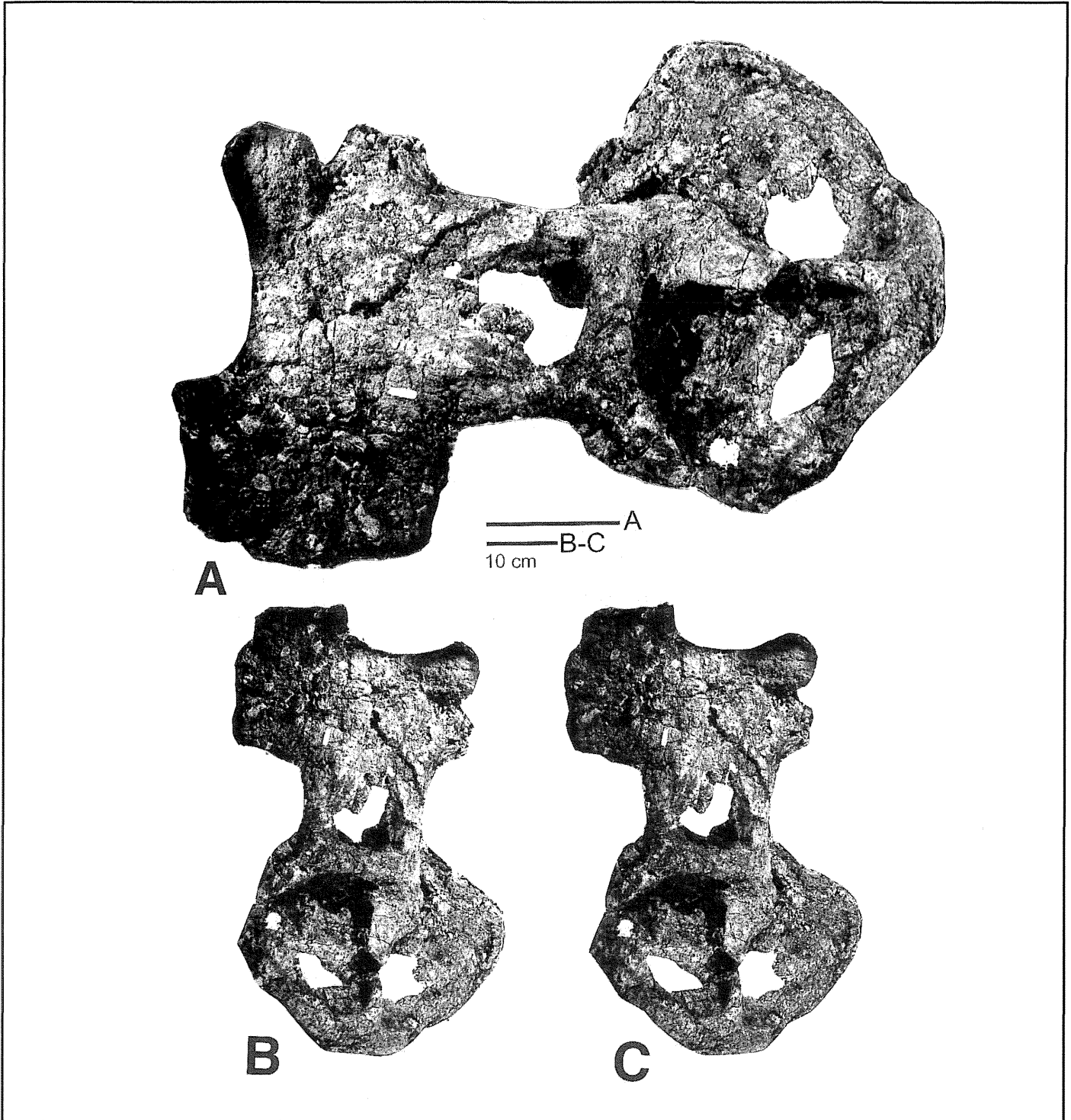


FIGURE 2. MNA V8464, incomplete skull of *Placerias hesternus* Lucas in lateral view. A, Overview; B-C, Stereophoto.

trum dorsal to the left maxilla and anterior to the orbit. The orbit is nearly round and is bordered dorsally by a thick frontal, a prominent postorbital ridge posteriorly and a more gracile jugal-maxillary ridge ventrally. The squamosal has a thick, blunt, flange-like jugal bar that projects laterally. It is confluent with the dorsal crest of the squamosal, which is thick and rugose. The fossae dorsal and ventral to the jugal bar are deep and concave. The parietal edge of the skull is a broad arc of bone that rises sharply just posterior to the orbit.

DISCUSSION

Although Camp and Welles (1956) and Cox (1965) reconstructed the skull of *Placerias* from extensive material collected at the *Placerias* quarry near St. Johns, Arizona (cf. Long and Murry, 1995; Lucas et al., 1997), the specimens available to them were not as complete as MNA V8464. Indeed, the dicynodont specimens from the *Placerias* quarry consist almost entirely of disarticulated skull and postcranial elements, and skull reconstructions were necessarily based on composite specimens (Camp and Welles,

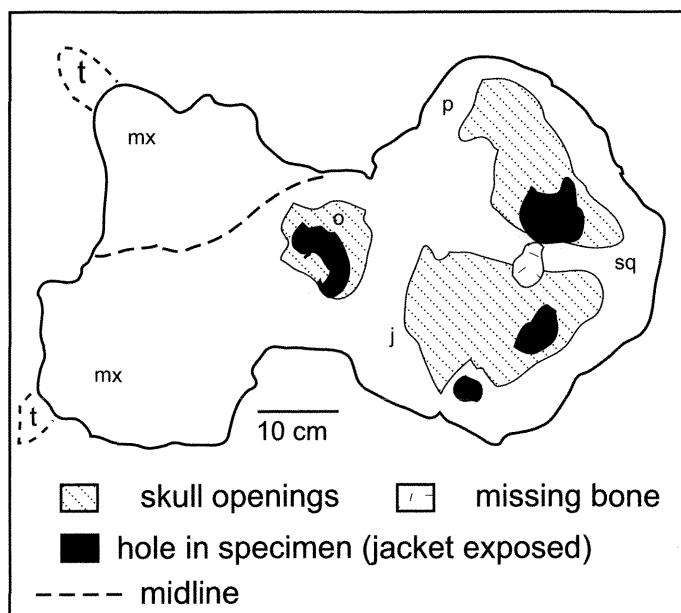


FIGURE 3. Interpretive sketch of MNA V8464, incomplete skull of *Placerias hesternus*. Abbreviations: mx = maxilla, o = orbit, p = parietal, sq = squamosal, t = "tusk."

1956; Cox, 1965). Likewise, cranial material of *Placerias* from the Newark Supergroup in North Carolina is not as complete as MNA V8464 (Lucas, 1998). MNA V8464 is thus the most complete skull of *Placerias* found in North America.

This most complete skull conforms in a general way to the revised reconstruction of the skull of *Placerias* published by Cox (1965). Indeed, it confirms Cox's reconstruction of a relatively short squamosal bar and dorso-ventrally robust but relatively short maxillary process, which contrasts strikingly with the skull reconstruction of Camp and Welles (1956, pl. 31).

Outside of the *Placerias* quarry in Arizona, specimens of *Placerias* are relatively rare in the Chinle Group. Lucas and Hunt (1993a) reviewed records of *Placerias* from the Upper Triassic Chinle Group of the western United States. There are eight occurrences that span the Otischalkian-Adamanian (Lucas and Hunt, 1993a; Lucas, 1994; Long and Murry, 1995; Lucas et al., 1997):

1. The type locality of *Placerias hesternus* Lucas just northeast of Cameron, Arizona is in the Blue Mesa Member of the Petrified Forest Formation (Lucas, 1904; Lucas and Heckert, 1996).

2. The occurrence documented here (MNA V8464), which is very close to the type locality and also in the Blue Mesa Member.

3. At Carrizo Arroyo near Adamana, Arizona, *Placerias* also is present in the Blue Mesa Member (Lucas and Hunt, 1993a; Long and Murry, 1995).

4. The *Placerias* specimen from the Blue Forest quarry in the Petrified Forest National Park, Arizona, also is in the Blue Mesa Member (Long and Murry, 1995).

5. At the Blue Hills north of St. Johns, Arizona, *Placerias* occurs in the Blue Mesa Member (Long and Murry, 1995).

6. The *Placerias* quarry near St. Johns, Arizona, is in the basal Bluewater Creek Formation (Camp and Welles, 1956; Cox, 1965; Lucas et al., 1997).

7. The middle part of the Bluewater Creek Formation at Fort Wingate, McKinley County, New Mexico, has produced isolated, large postcranial fragments of a dicynodont, probably *Placerias* (Heckert, 1997, p. 160-161).

8. The Popo Agie Formation in Wyoming yielded dicynodont postcrania for which Williston (1905) created two taxa, *Brachybrachium brevipes* and *Eubrachiosaurus browni*. The holotype of *B. brevipes*, a humerus, has been lost, but the illustration indicates it is very similar to the humerus of *Placerias*. Technically, *B. brevipes* thus should be considered a *nomen dubium* that is most likely a synonym of *P. hesternus* (Lucas and Hunt, 1993a).

Placerias localities in North America come from a relatively restricted stratigraphic interval that can be demonstrated to be upper Carnian. This interval is part of the biostratigraphic basis of the *Placerias* biochron of Lucas (1995, 1998) and Lucas and Wild (1995). This biochron is less precise (encompassing Otischalkian and Adamanian time) than many phytosaur- or aetosaur-based biochrons, but is still useful for correlating upper Carnian strata.

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