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TRIASSIC VERTEBRATES FROM EAST-CENTRAL NEW MEXICO IN THE YALE PEABODY MUSEUM

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INTRODUCTION

Although Triassic vertebrate fossils have been collected in east-central New Mexico for more than a century, very little has been published on the Triassic vertebrate paleontology of this part of the state. Perhaps the largest collection of Triassic vertebrate fossils from east-central New Mexico is that made under the direction of Joseph T. Gregory for the Yale Peabody Museum (YPM) in 1947 and 1958. This collection includes specimens from the upper shale member of the Chinle Formation (Kelley, 1972) and the Redonda Member of the Chinle Formation (Dobrovolny and Summerson, 1946; Griggs and Read, 1959). Although Gregory (1953, 1962, 1972, 1980) briefly mentioned and/or described and illustrated a few specimens from this collection, no extensive report on the YPM collection has appeared. Although this paper is not an extensive report, it does document the provenance of the YPM collection and describes and illustrates some representative specimens.

PROVENANCE

The YPM collection was derived from four localities in east-central New Mexico (Fig. 1). These localities, described briefly by Gregory (1972), are described in detail here using information provided by Gregory (written comm. 1984) and in the YPM.

Porter Ranch

The Porter Ranch locality is about 13 km south of San Jon in Quay County (NE¼ sec. 28, T9N, R34E). Abundant remains of phytosaurs occur here in siltstone and conglomerate of the lower part of the Redonda Member of the Chinle. These units overlie a sandstone bench near the top of a low, flat-topped promontory. Phytosaur teeth and fragmentary bones from this locality were donated to YPM in 1930. In 1947, Gregory collected phytosaur and fish material here, including an incomplete phytosaur skull, YPM 3294.

Cosner Ranch

Cosner Ranch formerly was 6.4 km due west of San Jon in Quay County. Here, extensive badlands are developed in the upper shale member of the Chinle Formation ("Dockum" of Gregory, 1972) along Revuelto Creek. The YPM collection, made in 1947, was principally derived from secs. 10, 14, 15 and 16, T10N, R33E. The most significant specimen collected here is the phytosaur skull, YPM 3293, identified by us as *Nicrosaurus gregorii*. Two other phytosaur skulls, both incomplete, from this locality have been combined to form an exhibit at the Cleveland Museum of Natural History.

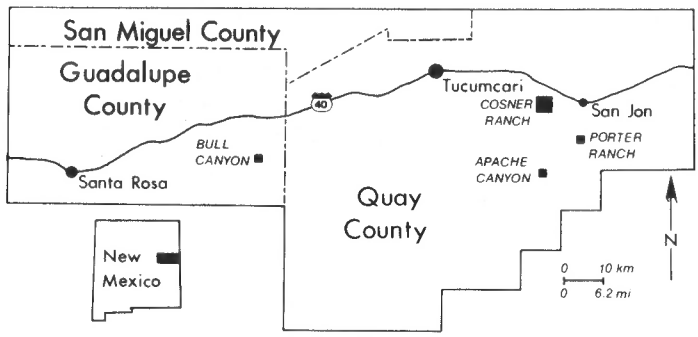

FIGURE 1. Map of part of east-central New Mexico showing the four localities (Bull Canyon, Cosner Ranch, Porter Ranch, Apache Canyon) from which the YPM collection of Triassic vertebrates was derived.

Apache Canyon

YPM obtained an extensive collection in 1958 from two quarries in the upper part of the Redonda Member of the Chinle Formation in Apache Canyon, Quay County. Both quarries are in the NW¼ sec. 3, T8N, R33E. The fossiliferous unit is a clay-pebble conglomerate within sandstone.

Bull Canyon

In 1958, Gregory collected phytosaur and metoposaur remains from the upper shale member of the Chinle Formation in Bull Canyon, Guadalupe County. These fossils were derived from clay-pebble conglomerate and claystone of the upper shale member about 10 m below the base of the Redonda Member of the Chinle Formation in the center of the W½ sec. 28, T9N, R26E.

TAXA REPRESENTED BY THE YPM COLLECTION

Although the YPM collection from the Triassic of east-central New Mexico consists of about 100 catalogued specimens, only four genera are represented: the metoposaurid labyrinthodont *Anaschisma*, the stagonolepid thecodont *Typothorax* and the parasuchians *Rutiodon* and *Nicrosaurus*.

Anaschisma

Identifiable amphibian specimens in the YPM collection pertain to a new, undescribed species of *Anaschisma*. These specimens (YPM 4201–4222, 4238, 4284, 4304 and 9628) are from the Redonda Member in Apache Canyon. Representative specimens of *Anaschisma* are YPM 4201 (Fig. 2A), an incomplete skull roof, and YPM 9628 (Fig. 2B), an incomplete left clavicle. Gregory (1980, fig. 7.2) illustrated YPM 4201 and argued, primarily on a metric basis, that it represents a new species of *Anaschisma*. The sample of *Anaschisma* from the Redonda Member is currently being studied by Gregory.

Typothorax

Typothorax is poorly represented in the YPM collection. Only dermal armor from the upper shale member of the Chinle at Cosner Ranch (YPM 3696) and from the Redonda Member in Apache Canyon (YPM 4256–4257) can be assigned to the genus. Shallow pitting in the dermal armor is a feature typical of *Typothorax*, and it is primarily on this basis that the YPM specimens are assigned to the genus (Gregory, 1953). Representative specimens illustrated here are YPM 3696 (Fig. 3C–E; also see Gregory, 1953, p. 12), 4256 (Fig. 3F) and 4257 (Fig. 3G).

Parasuchia

A large percentage of the YPM collection (37 catalogued specimens) is phytosaur. Those few specimens that can be identified pertain to *Rutiodon* or *Nicrosaurus*. The remaining specimens, mostly isolated postcrania, are not diagnostic at the generic level. Representative postcrania include the following:

1. YPM 3695 (Fig. 3A–B), a median scute of the mid-dorsal series, was originally assigned to *Typothorax* by Gregory (1953, p. 12). But,

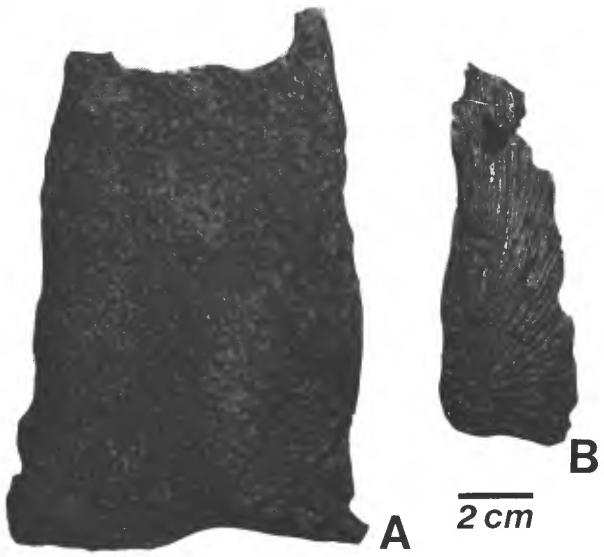

FIGURE 2. *Anaschisma*, new species, from the Redonda Member in Apache Canyon. A, YPM 4201, dorsal aspect of incomplete skull roof. B, YPM 9628, ventral aspect of incomplete left clavicle.

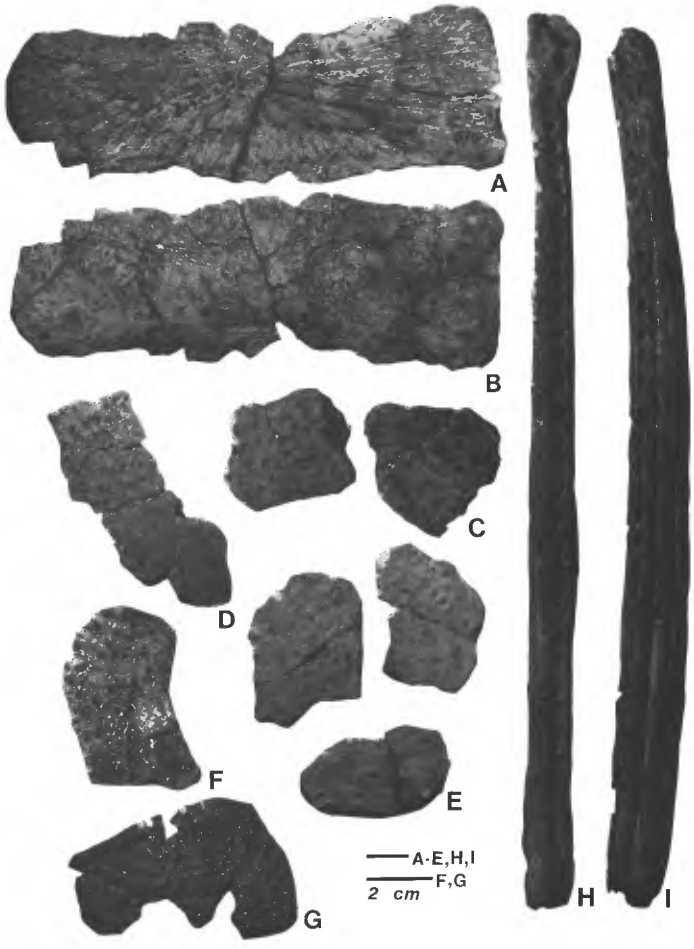

FIGURE 3. *Typothorax*, unidentified (indeterminate) phytosaur and *Rutiodon* from the Triassic of east-central New Mexico. A–B, dorsal (A) and ventral (B) aspects of median scute of the mid-dorsal series of a phytosaur, YPM 3695. C–E, dorsal aspect of fragmentary scutes of *Typothorax* sp., YPM 3696. F, dorsal aspect of incomplete scute of *Typothorax*, YPM 4256. G, dorsal aspect of incomplete scute of *Typothorax* sp., YPM 4257. H–I, occlusal (H) and labial (I) views of edentulous right dentary of *Rutiodon* sp., YPM 7899.

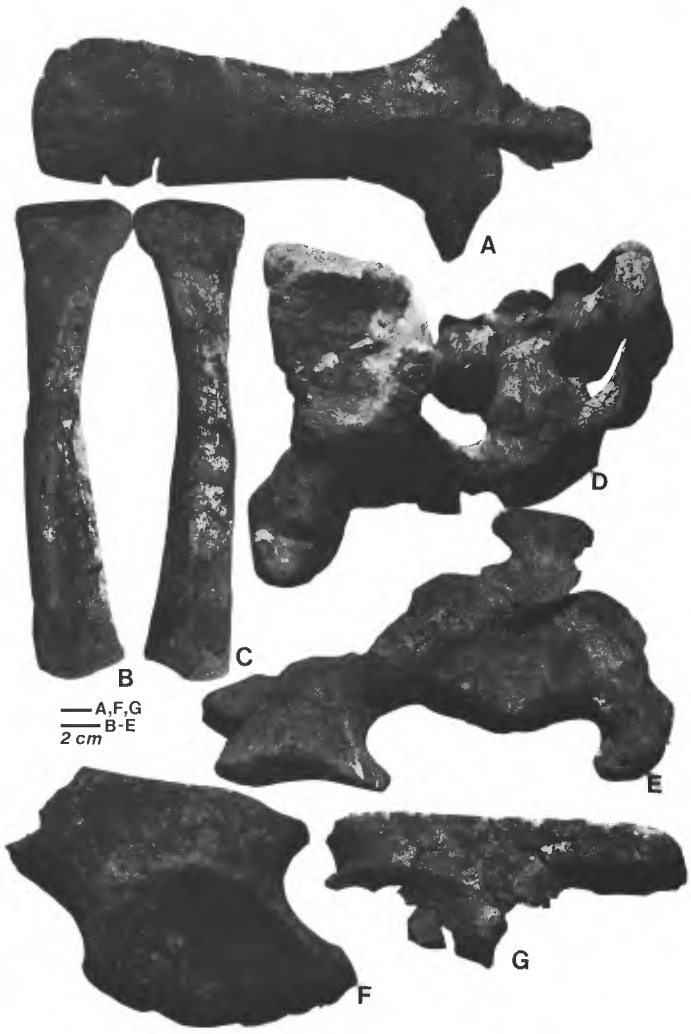

FIGURE 4. Phytosaur postcrania from the Triassic of east-central New Mexico. A, ventral aspect of interclavicle, YPM 9898. B–C, anterior (B) and posterior (C) aspects of right radius, YPM 7900. D–E, dorsal (D) and ventral (E) aspects of an incomplete sacrum, YPM 9896. F, lateral aspect of incomplete right ilium, YPM 9899. G, lateral aspect of incomplete left ilium, YPM 9897.

because of its ornamentation, thin margins and intimate association in the field with YPM 3293, a skull of *Nicrosaurus gregorii* (see below), Gregory (1962, p. 682) reassigned this acute to *Nicrosaurus*. YPM 3695 was collected from the upper shale member of the Chinle at Cosner Ranch.

2. YPM 9898 (Fig. 4A), an incomplete interclavicle of a phytosaur (compare Case, 1922, fig. 27A; Camp, 1930, fig. 14B), is from the Redonda Member in Apache Canyon.

3. YPM 7900 (Fig. 4B–C) is a right radius of a phytosaur (compare Case, 1922, fig. 29D), also from the Redonda Formation in Apache Canyon.

4. YPM 9896 (Fig. 4D–E) is an incomplete sacrum of a phytosaur (compare Case, 1922, pl. 12, figs. A–B; Camp, 1930, pl. 4, fig. o). It was collected from the upper shale member of the Chinle at Cosner Ranch.

5. YPM 9899 (Fig. 4F) and 9897 (Fig. 4G) are incomplete ilia of phytosaurs (compare Case, 1922, pl. 12, fig. F, pl. 13, fig. A, fig. 27B–E; Camp, 1930, fig. 16, pl. 3, fig. A). Both are from the Redonda Member in Apache Canyon.

A right dentary of a phytosaur, YPM 7899 (Fig. 3H–I), from the Redonda Member in Apache Canyon, is tentatively referred by us to *Rutiodon*. This edentulous dentary is very slender and deeper than wide, features characteristic of *Rutiodon* (Gregory, 1962).

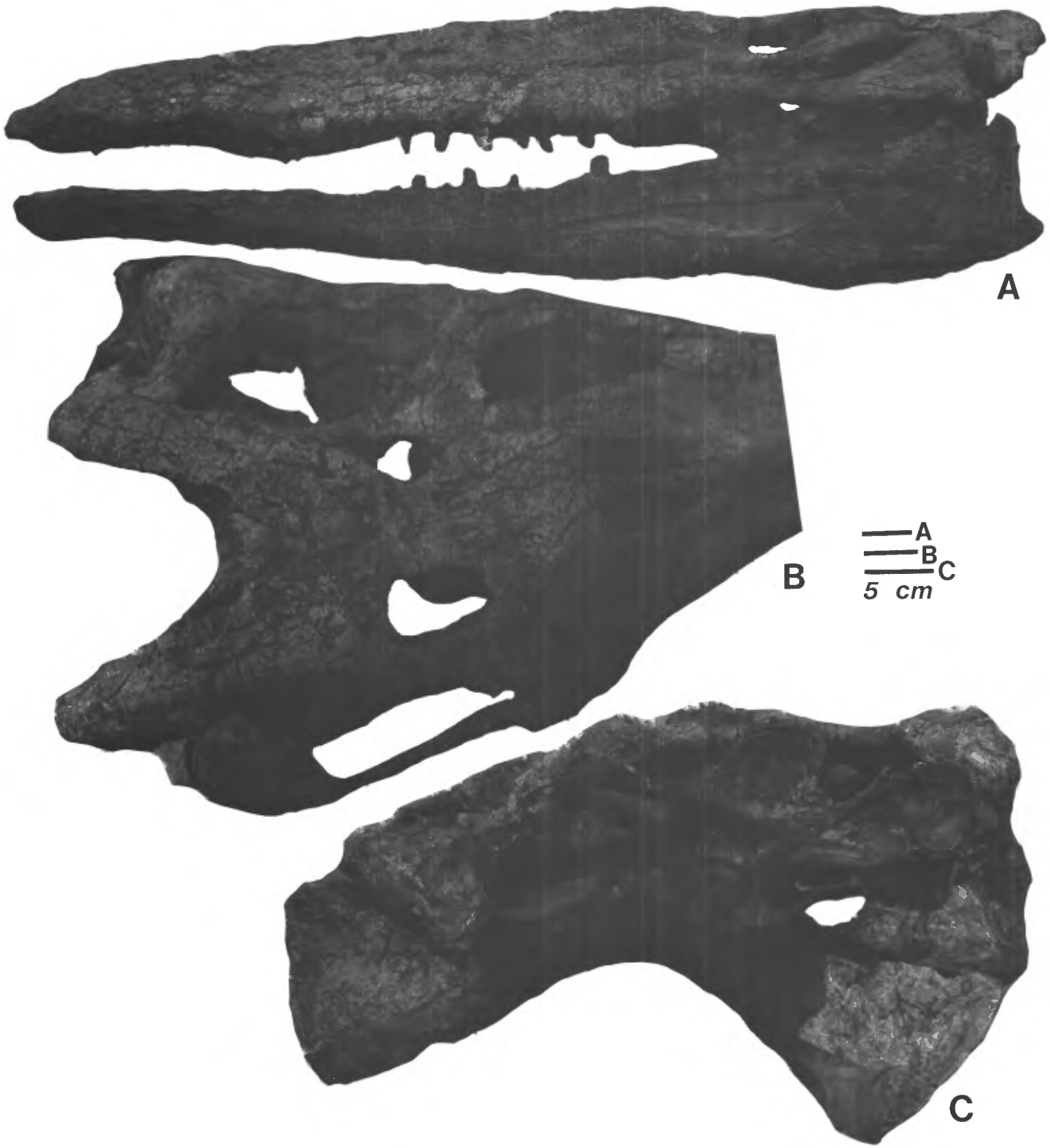

FIGURE 5. *Nicrosaurus gregorii* from the upper shale member of the Chinle Formation at Cosner Ranch. A, lateral view of skull and lower jaws of YPM 3293. B–C, dorsal (B) and posterior (C) views of the posterior portion of YPM 3293. Note distortion of the posterior end of the skull evident in C.

YPM 3293 (Fig. 5) is the slightly distorted skull and lower jaw of a large phytosaur (total skull length = 1270 mm) from the upper shale member of the Chinle at Cosner Ranch. The external nares of YPM 3293 are between the anterior portions of the antorbital fenestrae. The posterior borders of its supratemporal fenestrae are depressed below the level of the skull roof, and its post-temporal fenestrae are large. The squamosal projects posteriorly well beyond the occipital, and the orbits are directed obliquely outward and upward. The rostrum of YPM 3293 is robust and bears a dorsal crest that terminates about 80 mm posterior to its tip. The rostrum is constricted at the maxillary–premaxillary suture. These features support assignment of YPM 3293 to *Nicrosaurus* (Gregory, 1962; Westphal, 1976).

The size and proportions of YPM 3293 (prenarial length = 710 mm, postnarial length = 485 mm, narial length = 75 mm; see Colbert, 1947, and Gregory, 1962, for explanation of measurements) are essentially identical to those of *Nicrosaurus* (= *Machaeroprosopus*) *gregorii* (Camp, 1930, pls. 5–6). Indeed, the YPM skull is only 40 mm longer than the holotype skull of *N. gregorii,* which is from the Petrified Forest Member of the Chinle Formation in Arizona (Camp, 1930). The only apparent difference between the two skulls is the degree to which the squamosals dorsally cover the upper temporal fenestrae; these fenestrae are much more covered in YPM 3293. This difference, however, seems to be an artifact of distortion of the YPM skull (Fig. 5C). Therefore, assignment of YPM 3293 to *N. gregorii* is reasonable and consistent with earlier published identifications of this specimen by Gregory (1953, 1972).

Colbert and Gregory (1957, p. 1465) indicated that a new phytosaur taxon, distinguished primarily by having completely concealed superior fenestrae, was collected from the Redonda Member. This undescribed taxon apparently is represented by YPM 3294, an incomplete skull from the Redonda Member at Porter Ranch. This skull is missing the anterior portion of the rostrum and has a preserved length of 810 mm. The premaxillary hump and external nares are missing, although the remainder of the skull is in good condition. It has not been completely prepared or removed from its plaster jacket and so is not suitable for illustration. The upper temporal fenestrae are completely roofed over by the squamosals, which overlie the fenestrae by at least 15 mm. This skull may represent the same taxon as the phytosaur skull described by Stovall and Savage (1939) from the Sloan Canyon Formation, a lateral equivalent of the Redonda in northeastern New Mexico.

Other vertebrates

Gregory (1972) mentioned ganoid-fish scales, a dipnoan tooth plate and pseudosuchian material from the Redonda Member in Apache Canyon. Possible dinosaur material, reptile trackways and fish scales from either the Chinle or Redonda were also mentioned by Gregory (1972). Uncatalogued scraps from Apache Canyon in the YPM collection do include fish scales, fish-skull fragments and pseudosuchian material. Ganoid-fish scales have also been noted in uncatalogued scraps from Porter Ranch.

BIOSTRATIGRAPHIC SIGNIFICANCE

The YPM collection from the Triassic of east-central New Mexico long formed a primary basis for correlation of the Upper Triassic rocks of this area (Colbert and Gregory, 1957; Gregory, 1957, 1972). It assumed this importance despite the fact that few specimens in the YPM collection can be precisely identified and even fewer were adequately described or illustrated in the literature. In effect, the YPM collection only offers four taxa—*Anaschisma* n. sp., *Typothorax* sp., *Rutiodon* sp. and *Nicrosaurus gregorii*—upon which to base biostratigraphic correlation. The phytosaur skull from the upper shale member of the Chinle in Bull Canyon described by Mehl (1922), now identified as *Rutiodon andersoni*, was added to this scanty list of vertebrate taxa from the Triassic of east-central New Mexico (Colbert and Gregory, 1957).

Based on these taxa (except *Anaschisma,* not discovered until 1958), and within the context of a biostratigraphy based primarily on phytosaurs, Colbert and Gregory (1957) equated the upper shale member of the Chinle Formation in east-central New Mexico with the Petrified Forest and Owl Rock Members of the Chinle Formation in the Colorado Plateau. They considered the Redonda Member of east-central New Mexico to be a probable correlative of the Rock Point Member of the Wingate Sandstone, primarily on the basis of the undescribed and putatively "advanced" phytosaur from the Redonda. In addition, Colbert and Gregory (1957) correlated the upper shale member of the Chinle with the Tecovas and Trujillo Formations of the Dockum Group in west Texas. They considered the Redonda to be younger than the Texas Dockum.

More recent correlations are based on more extensive biostratigraphic and lithologic data on the Triassic of east-central New Mexico, west Texas and the Colorado Plateau (Lucas et al., 1985). These correlations suggest the upper shale member of the Chinle is younger than the Tecovas and Trujillo Formations of west Texas. It is equivalent to the upper shale unit of the Dockum of Drake (1892), and the Redonda has no equivalent in the Texas Triassic. The upper shale member of the Chinle still appears broadly correlative with the Petrified Forest Member of the Chinle in the Colorado Plateau. However, the Redonda arguably is a correlative of the Owl Rock Member.

These recent correlations are based on more extensive data than were available to Colbert and Gregory (1957). However, it is clear that additional collecting and stratigraphic study are as necessary today as they were in 1957 to establish firm correlations between the Triassic of east-central New Mexico and other continental Triassic strata of the American Southwest.

ACKNOWLEDGMENTS

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Tucumcari Mountain from I-40, approximately 0.4 mi west of Mountain Road. View is S30°E. Jurassic Entrada Sandstone (white) overlies Triassic Chinle Formation in canyon head at left. Cretaceous Mesa Rica Sandstone is exposed in cliff just below top of mountain. Camera station is in NW¼ sec. 26, T11N, R30E. W. Lambert photograph No. 85L10. 5 April 1985, 4:15 p.m., MST.