

AETOSAURS FROM THE UPPER TRIASSIC DOCKUM FORMATION,  
POST QUARRY, WEST TEXAS

BRYAN J. SMALL

The Museum, Texas Tech University, Lubbock, Texas 79409

Abstract- Aetosaurs (Family Stagonolepididae) are represented by four valid genera in the Late Triassic deposits of the southwestern United States. These genera are: Desmotosuchus, Calyptosuchus, Paratypothorax and Typothorax. These genera have been recently used for biostratigraphic subdivisions of the Late Triassic. The first three taxa are believed to occur in the lower units of the Upper Triassic, whereas Typothorax is thought to be restricted to the upper units. The recent discovery of Desmotosuchus, Paratypothorax, and Typothorax at the same stratigraphic level of the Post quarry casts doubt on their utility for fine stratigraphic zonation. These new aetosaur finds also document previously unknown, diagnostic characters for these genera. Typothorax meadei Sawin, 1947, from the Dockum Formation of Texas is not congeneric with Typothorax coccinarum or Desmotosuchus haplocerus.

### INTRODUCTION

Aetosaurs constitute a major continental faunal component of the Upper Triassic. The remains of these possibly herbivorous thecodonts are known from an estimated ten genera worldwide. On the basis of armor, Long and Ballew (1985) recognized four valid aetosaur genera from the Chinle and Dockum formations of the American Southwest. These genera are: Desmotosuchus, Calyptosuchus, Paratypothorax, and Typothorax. All of these genera except Typothorax have been positively identified from the Dockum Formation in the past. Typothorax meadei also occurs in the Dockum, but its systematic position is questioned.

From 1980 through 1986 field parties from Texas Tech University collected a rich fossil site near Post, Garza county, West Texas. The fauna and taphonomy of the quarry have been discussed in detail by Chatterjee (1985) and Small (1989).

Among the fossils discovered were numerous remains of Desmotosuchus haplocerus. Two specimens of Paratypothorax were also discovered. Two specimens of Typothorax coccinarum have been collected from the quarry and the neighboring Rocker A oil field. This is the first documented occurrence of these three genera at the same stratigraphic level. These finds supplement the work done by Long and Ballew (1985) on the armor, with the use of cranial and postcranial bones. This paper will describe new features in the skeletons of the aetosaurs and determine their utilization as biostratigraphic markers. T. meadei will be compared to D. haplocerus and T. coccinarum from the Post quarry.

## MATERIALS AND METHODS

The aetosaurs from the Post quarry were recovered from a 30-cm-thick bone layer in a red mudstone. Mechanical preparation methods were used to extract the bones from the matrix. The aetosaur bones recovered from the quarry and housed in the Texas Tech Museum are as follows: TTU P 9023 - Desmotosuchus haplocerus, skull, mandibles, scapulocoracoid, humerus, dorsal vertebra, lateral shoulder horn, assorted dermal armor; TTU P 9024 D. haplocerus - skull, mandible, vertebrae, pelvis, femora, numerous assorted dermal armor; TTU P 9025 - D. haplocerus - skull, dermal armor; TTU P 9170 - D. haplocerus - right humerus, ulna; TTU P 9204 - D. haplocerus - vertebrae, numerous assorted dermal armor, ribs and unprepared material; TTU P 9207 - D. haplocerus - pelvis; TTU P 9229 - D. haplocerus - vertebrae, radius, numerous assorted dermal armor; TTU P 9169 - Paratypothorax sp.- dorsal paramedian plate; TTU P 9215 - Paratypothorax sp.- dorsal paramedian plates, dentary; TTU P 9208 - Typothorax coccinarum - partial skull, vertebrae, humerus, ischium, femur, tibia, fibula, astragalus, tarsus, armor consisting of dorsal, lateral, and ventral plates, osteoderms and unprepared material; TTU P 9209 - T. coccinarum - two dorsal paramedian plates from adjacent Rocker A oil field.

## SYSTEMATIC PALEONTOLOGY

Class Reptilia  
 Order Thecodontia  
 Suborder Aetosauria  
 Infraorder Pseudosuchia  
 Family Stagonolepididae Lydekker, 1887  
 Genus Desmotosuchus Case, 1920  
 Species Desmotosuchus haplocerus, 1892

Revised diagnosis: Large stagonolepidid; 3 m or more in length; skull with upturned, edentulous premaxilla; maxilla with 10-13 teeth, possibly heterodont; lower temporal opening almost closed off secondarily; anterior dentary edentulous; dentary with 5-6 teeth; small, narrow mandibular fenestra; ulna with prominent olecranon process; pelvis "advanced," acetabulum deep, imperforate; pubis plate-like, long, with strong median symphysis; femur straight, with inturned head; armor with lateral spines of shoulder region of variable length.

Discussion: There have been at least seven specimens of Desmotosuchus recovered from the Post quarry. These specimens match up well with Desmotosuchus as described by Case (1920, 1922). A combination of the various specimens has given us a nearly complete skeleton of Desmotosuchus. A complete, detailed osteology of Desmotosuchus will be presented in a separate paper (Small, in prep.), but a few important features are discussed here.

There is little need to comment on the armor of

Desmatosuchus, Typothorax or Paratypothorax because of the detailed account given by Long and Ballew (1985). There is one note of interest pertaining to Desmatosuchus armor from the quarry. One specimen (TTU P 9024) exhibits unusually large lateral cervical spines immediately anterior to the usually large shoulder horn (Plate 5A-B). These enlarged lateral spines differ from Case's (1920) description of Desmatosuchus. This feature could be due to sexual dimorphism.

There have been three skulls recovered from the Post quarry, two of which are very well preserved (Plate 5D, F). The only Desmatosuchus premaxilla known to exist was found with TTU P 9024. It exhibits the usual aetosaur tendency of an upturned anterior tip. The unusual feature of this premaxilla is that it is totally edentulous. All other known aetosaur premaxillae contain teeth (Plate 5I).

The premaxilla was found disarticulated from the skull and would have been loosely connected in life. This loose connection to the nasal and maxilla forms a kinetic joint. However, the rest of the skull is strongly built, and the quadrate is entirely monimostylic. This loose connection of the premaxilla would account for the absence of this element in all other known Desmatosuchus skulls.

The morphology and tooth count are variable among the different specimens, ranging from 10 to 13. A typically aetosaurian bulbous tooth with a constriction between the crown and root was recovered with TTU P 9025. This tooth is very similar to the teeth of some crocodylians. It is unclear as to which socket this tooth came from. TTU P 9024 has two replacement teeth erupting in the next to last alveolus of the left maxilla. These teeth are not bulbous and possess numerous small serrations. This suggests the possibility of heterodonty in Desmatosuchus, and leads me to question its status as a herbivore.

TTU P 9023 and 9024 have well preserved mandibles (Plate 5C). They are edentulous anteriorly, and possess 5-6 teeth in the dentary. The mandibular fenestra is smaller than the same feature in other aetosaurs.

The ulna has a much larger olecranon process than the other aetosaurs (Plate 5E). The pelvis and femur suggest an erect gait for some aetosaurs (Small, 1985). The acetabulum is deep, and the femur has a straight shaft with an inturned head.

#### Genus Paratypothorax Long and Ballew, 1985

Revised diagnosis: A large stagonolepidid with a wide discoidal carapace, and a comparatively small skull; dentary with edentulous anterior tip; teeth set in deep groove instead of sockets; no evidence of Meckelian canal on anterior half of dentary; for armor see Long and Ballew (1985).

Discussion: There are two specimens from the Post quarry, TTU P 9169, and TTU P 9215 (Plate 5G-H). Some remains of Paratypothorax are known from the Dockum Formation in Crosby County, Texas. Long and Ballew (1985) allocated this genus based solely on dermal armor. Previous workers attributed this

armor to various aetosaurs and phytosaurs (Von Meyer, 1861; Gregory, 1953, Gregory and Westphal, 1969). The discovery of an aetosaurian dentary with TTU P 9215 verifies that Paratypothorax is indeed an aetosaur.

This dentary, while possessing the typical aetosaurian edentulous tip, also possesses some unusual features not found in other aetosaurs. The preserved portion of the dentary does not contain any alveoli, but instead possesses a deep groove for the teeth. This feature is known in immature crocodiles and some iguanodonts (Edmund, 1960). There is no Meckelian canal on the medial surface of the anterior half of the dentary, as in other aetosaurs. It is unclear where this opening is on the jaw due to the incomplete nature of the specimen.

Genus Typothorax Cope, 1875  
Typothorax coccinarum Cope, 1875

Revised diagnosis: Stagonolepidid with large, discoidal carapace; edentulous tip on dentary, dentary with 10-11 teeth, dentary expanded posteriorly; For armor see Long and Ballew (1985).

Discussion: The large amount of armor that has been prepared, along with the femur of TTU P 9208 matches well with Cope's (1887) material and the armor described by Long and Ballew (1985). The specimen also appears to be a juvenile. This is the first positive record of T. coccinarum in the Dockum formation.

The dentary of T. coccinarum possesses 10-12 alveoli of uniform size (Plate 5J). The edentulous anterior tip is not as extensive as in Desmotosuchus. The fossa for the Meckelian canal is not well developed. The lateral surface of the dentary is expanded posteriorly, leaving little room for the mandibular fenestra.

The femur is relatively complete except for the inner condyle on the distal end (Plate 4M). The shaft is relatively straight with a well developed, inturned proximal head.

The armor of TTU P 9208 and TTU P 9209 possess all of the criteria for T. coccinarum sensu Long and Ballew (1985) (Plate 4J-L). These characters are : (1) presence of anterior bars; (2) great expansion of dorsals plates; (3) random pitting; (4) very small dorsal eminences; and (5) possession of a thick, rounded strut on the ventral surface of the dorsal paramedians. There is still a great deal of material to be prepared and studied, and it will be presented in another paper.

Comparisons with Typothorax meadei

Typothorax meadei was described by Sawin (1947) from the Dockum Formation of Howard County, Texas. The material consists of two skeletons, and is to date restricted to Howard County. Some writers have cast doubt on the taxonomic position of T. meadei, as it is sufficiently different from the original description of this taxon by Cope (1875, 1887). Long and Ballew (1985) suggested that T. meadei is not congeneric with

Typothorax. Elder (1978) suggested that T. meadei and Desmatosuchus are congeneric and are merely sexual dimorphs.

A comparison of the Post quarry specimens with T. meadei shows that D. haplocerus is not a sexual dimorph of T. meadei. Only features of the skull will be presented here. There are a few differences readily apparent between the skulls (Fig. 1). An osteological study of the skull of Desmatosuchus, based upon the Post quarry specimens, allows for a good comparison between the two species. A partial list of the skull differences is as follows: (1) D. haplocerus has an edentulous premaxilla, while the premaxilla of T. meadei bears teeth; (2) the maxilla of D. haplocerus holds 10-13 teeth, and the maxilla of T. meadei holds 9 teeth; (3) the dentary of D. haplocerus holds 5-6 teeth, and the dentary of T. meadei holds 7 teeth; (4) the configuration of the dentary in relation to the surangular and angular is different between the two species; and (5) the mandibular fenestra is narrower in D. haplocerus.

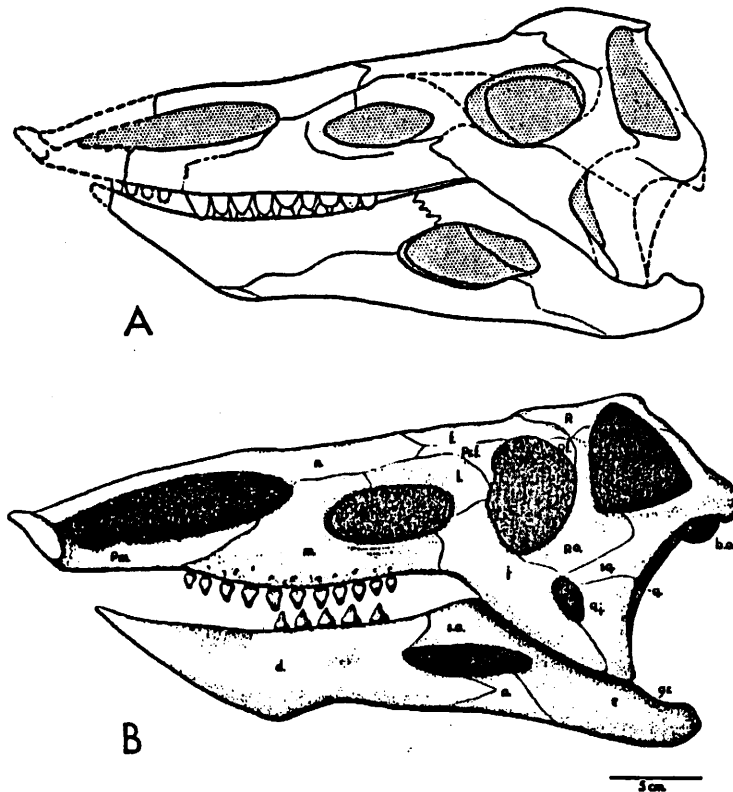


FIGURE 1. Lateral views of skulls of T. meadei (A, from Walker, 1961) and D. haplocerus (B, from Small, 1985).

The differences between T. meadei and T. coccinarum are as follows: (1) major differences in the armor; and (2) the dentary of T. coccinarum holds 10-11 teeth, T. meadei holds 7 teeth. It is apparent that T. meadei belongs neither with D. haplocerus or Typothorax. A detailed study of T. meadei is needed to determine its taxonomic position.