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# A PARTIAL SKELETON OF THE TYRANNOSAURID DINOSAUR *AUBLYSODON* FROM THE UPPER CRETACEOUS OF NEW MEXICO

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ABSTRACT—A fragmentary tyrannosaurid skull and postcranial skeleton from the Kirtland Shale of northwestern New Mexico is the most complete specimen of a carnivorous dinosaur known from these strata. The specimen is identified as *Aublysodon* cf. *A. mirandus* on the basis of its narrow frontals, V-shaped frontal-parietal suture, and nondenticulate incisiform premaxillary tooth. The D-shaped cross section of the premaxillary tooth, rugose postorbital, well-developed footed pubis, and proximally constricted third metatarsal confirm the assignment of *Aublysodon* to the Tyrannosauridae. The limb bones are gracile and similar in proportions to those of *Albertosaurus*; however, the tibia and metatarsals are shorter relative to the femur. The distal end of the tibia exhibits a unique medial emargination not reported in other tyrannosaurids.

## INTRODUCTION

LARGE CARNIVOROUS dinosaurs were first reported from Upper Cretaceous continental deposits in the San Juan Basin of northwestern New Mexico by Barnum Brown (1910, p. 268) who found "disassociated limb bones . . . and vertebrae representing a dinosaur as large as *Albertosaurus.*" Brown's specimens came from what he termed the "Ojo Alamo Beds," which now include the Fruitland and Kirtland Formations, and the Ojo Alamo Sandstone (see Baltz et al., 1966). Following Brown's work, fragmentary, generically indeterminate carnosaur remains have been reported from the Fruitland Formation and all members of the Kirtland Shale (Sinclair and Granger, 1914; Gilmore, 1916, 1919, 1935; Armstrong-Ziegler, 1978, 1980; Lehman, 1981; Lucas et al., 1987). Many of these remains consist of isolated teeth and cannot be adequately identified, although some teeth have been referred to *Deinodon* sp. (see Sinclair and Granger, 1914; Armstrong-Ziegler, 1978, 1980). Because *Deinodon* is considered a nomen dubium by most authors (e.g., Russell, 1970), its occurrence in the San Juan Basin should not be perpetuated. Lucas et al. (1987) referred isolated teeth from the Naashoibito Member of the Kirtland Shale to cf. *Tyrannosaurus* sp. based on their size and serration count. This occurrence must also be regarded as questionable until better material is available. Other fragmentary specimens, referred to *Tyrannosaurus,* from elsewhere in New Mexico (Gillette et al., 1986) and Texas (Lawson, 1976) may belong to a new genus (Carpenter, in press b).

The only diagnostic carnosaur specimen thus far reported from the San Juan Basin is a toothless left dentary (USNM 8346) from the upper shale member of the Kirtland Shale, identified as *Gorgosaurus* sp. by Gilmore (1916, 1935). *Gorgosaurus* is, however, regarded as a junior synonym of *Albertosaurus* by some authors (Russell, 1970). Recently, Lehman (1981) tentatively identified a right fourth metatarsal from the Naashoibito Member of the Kirtland Shale as ?*Albertosaurus* sp. In addition, a right femur (UNM B-828) from the Fruitland Formation, with a circumference (361 mm) equal to 36 percent of its length (995 mm), also falls within the range observed in *Albertosaurus* (34–37%; see Russell, 1970).

Given the present poor understanding of San Juan Basin carnosaurs, the following brief description of a heretofore unreported fragmentary specimen is of interest. This is the most complete and diagnostic carnosaur material yet discovered in the San Juan Basin and is important in yielding new information about the enigmatic theropod *Aublysodon* Leidy 1868. The specimen (OMNH 10131) was collected in San Juan County, New Mexico, northeast of Chaco Canyon in June, 1940, by J. W. Stovall and D. E. Savage of the University of Oklahoma. The remains comprise several skull fragments, an incomplete dentary, parts of both femora, a tibia, pubis, metatarsals, several ribs, and gastralia. Records at the Oklahoma Museum of Natural History indicate that an ilium was also collected with the specimen, but it cannot now be located.

Although the precise stratigraphic horizon at which the specimen was found is unknown, its mode of preservation and adhering matrix suggest that it came from the Fruitland Formation or lower part of the Kirtland Shale. One of the specimen labels indicates Kirtland Shale. These deposits are well exposed just northeast of Chaco Canyon on Ah-She-Sle-Pah Wash, presumably where the specimen was found. The upper part of the Kirtland Shale (Naashoibito Member) is not present in this area (Lehman, 1985). The specimen may thus be referred, with some confidence, to the Hunter Wash local fauna (Lehman, 1981; Lucas, 1981).

*Abbreviations.*—The following institutional abbreviations are used in this discussion: AMNH, American Museum of Natural History; ANSP, Academy of Natural Sciences, Philadelphia; CMNH, Cleveland Museum of Natural History; FMNH, Field Museum of Natural History; GSC, Geological Survey of Canada; LACM, Los Angeles County Museum; NMC, National Museum of Canada; OMNH, Oklahoma Museum of Natural History; ROM, Royal Ontario Museum; TMP, Tyrrell Museum of Palaeontology; UNM, University of New Mexico; USNM, United States National Museum (now National Museum of Natural History).

## SYSTEMATIC PALEONTOLOGY

Family TYRANNOSAURIDAE Osborn, 1906
Genus AUBLYSODON Leidy, 1868
AUBLYSODON cf. A. MIRANDUS Leidy, 1868
Figures 1–6

*Frontal and parietal.*—The posterior parts of both frontals, and the anterior part of the fused parietals, are preserved as a single, thoroughly co-ossified mass (Figures 1.1, 2.1, 2.2). Additional fragments of the sidewalls of the braincase are crushed into the endocranial cavity and cannot be described. The frontals, from the midline to the postorbital suture, are much narrower than in other tyrannosaurids (Figure 3). Although the frontals are incomplete anteriorly, enough is preserved to show a deep vertical notch above the orbital border, a feature that

Russell (1970) considered diagnostic of *Albertosaurus*. Although a similar notch is also present in *Daspletosaurus*, it occurs between the lacrimal and the frontal, and is not incised into the frontal. In the New Mexico specimen, the notch penetrates even more deeply into the frontal than in *A. libratus*, and is more prominent than in any other tyrannosaurid (Figure 3). In a small, presumably juvenile, specimen referred to cf. *Aublysodon* sp. (TMP 80.16.485) the frontal notch is not as well developed. The notch may become more prominent with growth, as the buttress for articulation with the postorbital expands.

The frontal notch is developed immediately anterior to where the frontal expands laterally, forming a buttress for articulation with the postorbital. This buttress is separated into a rounded anterior lobe and an elongate posterior lobe, both of which articulated with the postorbital. A similar condition is observed in a specimen referred to ?*Albertosaurus* sp. (TMP 81.10.1). The edge of the frontal bordering the supratemporal fenestra is inclined sagittally, as in *Albertosaurus*, and not transversely as in the broad-skulled *Daspletosaurus* or *Tyrannosaurus*. The frontal is much narrower transversely than in *Daspletosaurus*, and also narrower than in most specimens referred to *Albertosaurus* (Figure 3). Its relative width is comparable to that observed in other specimens referred to *Aublysodon* (LACM 28471, TMP 80.16.485), although *Nanotyrannus* also has narrow frontals (Figure 3). Likewise, the preserved anterior part of the fused parietals forms a constricted sagittal crest, somewhat narrower than that seen in *Daspletosaurus* or *Tyrannosaurus*, and more closely resembling that of *Albertosaurus*. The parietals extend forward, separating the frontals posteriorly, and resulting in a prominent V-shaped frontal-parietal suture.

*Postorbital.*—Part of the left postorbital, lacking the distal end of the descending process (jugal ramus) and most of the squamosal process, is preserved (Figures 1.2, 1.3, 2.3, 2.4). The horizontal ramus of the bone bears a blunt rugosity for contact with the frontal. This sutural surface is, like the corresponding surface on the frontal, divided into two parts; one, a rounded cup-shaped depression, lies anterior and dorsal to the other, which is an elongate recess. A shallow pit below the frontal suture probably received the antotic process of the laterosphenoid. The descending process of the postorbital forms an overlapping suture with the jugal, and bears a slightly thickened ridge along the orbital margin where a low flange may have extended into the orbit. Owing to incomplete preservation, however, the extent to which this process was developed is unknown. Judging from the dimensions of the broken edge, the projection was much less developed than that seen in many *Tyrannosaurus* specimens (see Osborn, 1912). Development of the orbital flange in *Tyrannosaurus* is, however, ontogenetically controlled, and shows considerable variation among adults (Carpenter, in press b). Too little of the squamosal process is preserved to reveal its form.

The size and shape of the supraorbital rugosity on the postorbital vary among tyrannosaurids. In the New Mexico specimen, this rugose boss has a prominent crescent shape similar to that seen in *Daspletosaurus*, and is considerably more prominent than that seen in many specimens of *Albertosaurus*. Development of the postorbital rugosity is, however, subject to a great deal of individual variation, even between right and left sides of a single individual (e.g., *A. libratus*, FMNH PR308); hence its utility for taxonomic purposes is limited.

*Dentary.*—The posterior part of the left dentary contains eight alveoli with teeth in various stages of eruption (Figures 1.4, 2.5, 2.6). The last tooth is pushed posteriorly and is abnormally positioned. Well-developed interdental plates line the lingual side of the dentary and rest on a rounded supradentary plate (the lingual "bar" of Madsen, 1976). The supradentary plate is bounded below by a narrow and shallow Meckelian groove, and ends posteriorly where the Meckelian fossa expands behind the last alveolus. The external surface of the dentary exhibits two rows of foramina, one of which extends along the middle of the dentary, and the other just above the ventral edge of the bone. The preserved portion of the ventral margin of the dentary defines a smooth curve like that in *Albertosaurus*, and is not strongly deflected ventrally as in *Daspletosaurus* or *Tyrannosaurus*. This condition is, however, variable among specimens referred to *Albertosaurus*. The dentary is very similar in size and general form to the specimen (USNM 8346) referred to *Gorgosaurus* (=*Albertosaurus*) by Gilmore (1916, Pl. LXXIII, fig. 1; 1935).

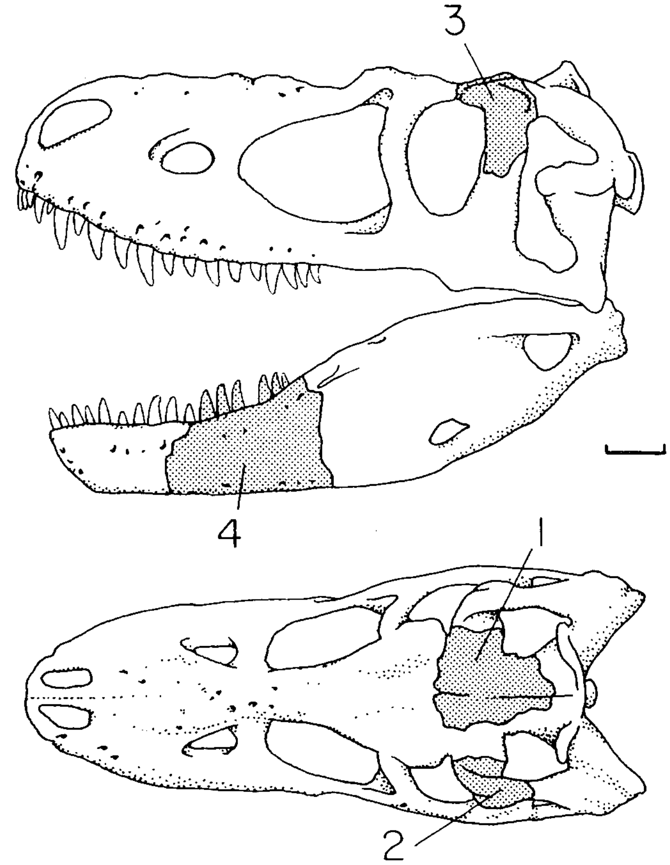


FIGURE *1*—Preserved skull fragments of New Mexico *Aublysodon* cf. *A. mirandus* (OMNH 10131). *1*, parts of the frontal-parietal mass; *2*, *3*, left postorbital; *4*, left dentary. General skull outline adapted from Russell (1970). Scale bar 10 cm.

*Dentition.*—The teeth preserved in the dentary are more strongly inclined posteriorly than in either *Albertosaurus* or *Daspletosaurus*, perhaps owing in part to post-mortem deformation. Serration counts (10–12 serrations per 5 mm on anterior carinae, and 9–10 per 5 mm on posterior carinae) are similar to those of other small tyrannosaurids. Like *Albertosaurus*, and to a lesser extent *Daspletosaurus*, the dentary teeth become more strongly curved posteriorly at their tips, and have anterior carinae that are deflected lingually along their bases.

Two additional isolated teeth are also preserved with the skull fragments. One, probably a maxillary tooth, 75 mm in length, has serrations comparable to those of the dentary teeth but is not as strongly curved at its tip. The other, a premaxillary tooth, 52 mm in length, exhibits the incisiform "D"-shaped cross section typical of tyrannosaurids, with posteromedial and posterolateral carinae on either side of a faceted lingual surface (Figure

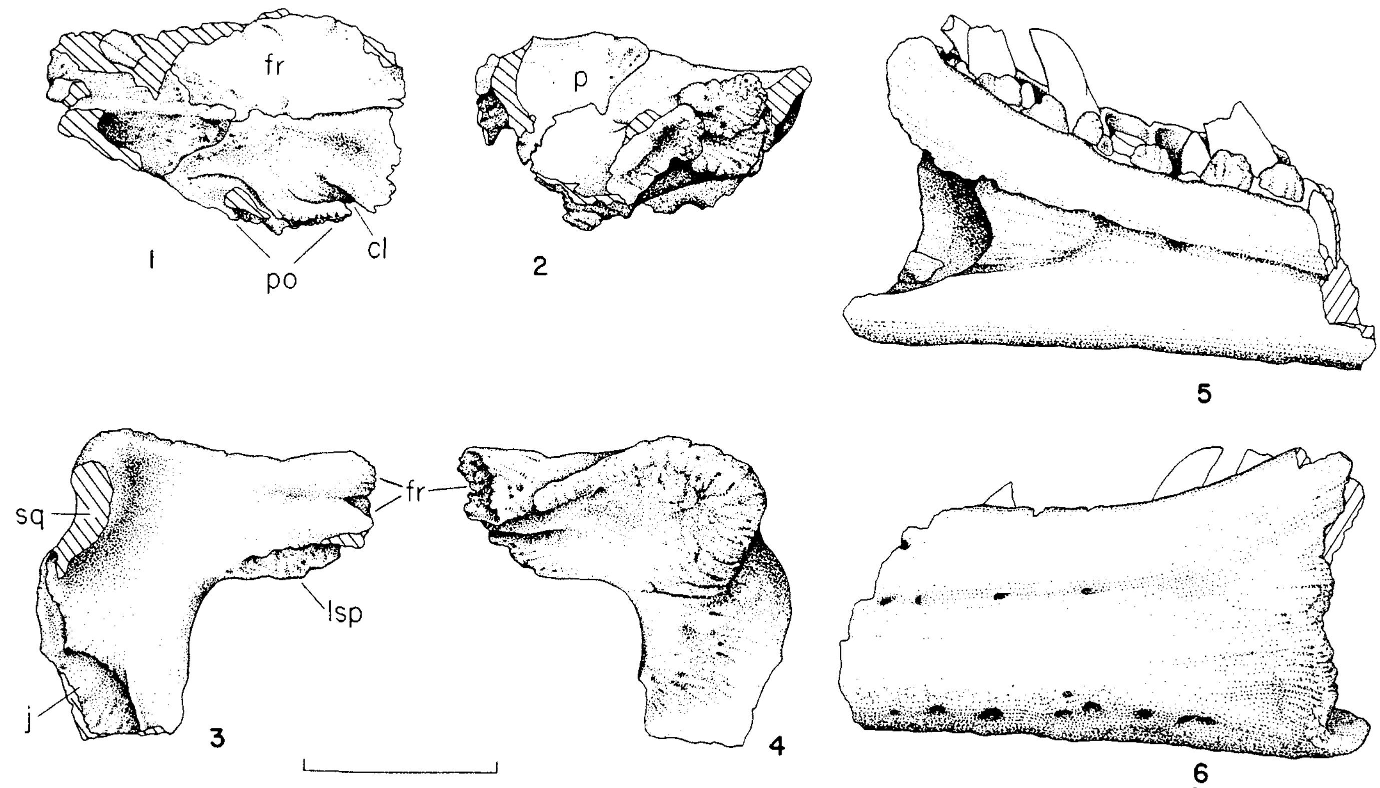


FIGURE 2—*Aublysodon* cf. *A. mirandus* (OMNH 10131). Frontal-parietal mass in *1,* dorsal view, and *2,* right lateral view; left postorbital in *3,* medial view, and *4,* lateral view; left dentary in *5,* medial view, and *6,* lateral view. Abbreviations: cl, cleft in frontal; fr, frontal and suture for frontal; j, suture for jugal; lsp, suture for laterosphenoid; p, parietal; po, suture for postorbital; sq, broken squamosal process. Scale bar 10 cm.

4). The carinae lack denticulations and converge toward one another about midway down the length of the tooth. There is a well-developed bilobed median ridge between the carinae on the lingual surface of the tooth. A small wear facet is present on the tip of the crown. Although larger, this tooth is comparable to those referred by others to *Aublysodon* (Carpenter, 1982; Paul, 1988; Molnar and Carpenter, 1989). The tooth is also similar to another (USNM 8355) figured by Gilmore (1916, Pl. LXXIII, fig. 4) from the Farmington Sandstone Member of the Kirtland Shale. Gilmore's specimen may likewise be referable to *Aublysodon* (Molnar and Carpenter, 1989).

*Ribs and gastralia.*—Four fragments of ribs are preserved. These include a distal end, a proximal end lacking the tuberculum, and two shaft fragments. A single, nearly complete, right gastralium is also present. The gastralium measures 636 mm along its ventral curve. It is slender and flattened at its medial end, as in *Albertosaurus,* and is unlike the heavy thickened element in *Tyrannosaurus.* The gastralia of *Albertosaurus* are well known in the type specimens of *A. libratus* (GSC 2120) and *A. arctunguis* (ROM 807). The present specimen is comparable in form and length to those from the middle part of the series (numbers 5–12).

*Pubis.*—The preserved portion of the pubis includes the pubic foot and parts of both shafts (Figure 5.7). The specimen is poorly preserved and obliquely crushed towards the right, so that the ventral surface is visible from the left side. The pubic foot measures 555 mm along the ventral surface of the symphysis, and has a maximum thickness of 165 mm just posterior to the pubic shaft. Neither the left nor right shaft is complete, the longest one (left) extending 285 mm above the foot. Although the longer shaft appears to be slightly bowed ventrally, this may reflect post-mortem deformation. The form and size of the pubis are comparable to that observed in *Albertosaurus libratus* and *A. arctunguis,* but the anterior end of the foot is proportionally larger.

*Femur.*—Both femora are preserved, although neither is complete. The left femur is truncated just above the distal condyles, crushed anteroposteriorly, and weathered along its posterior surface (Figure 5.1, 5.2). As preserved, it is 856 mm long and has a minimum circumference just below the fourth trochanter of 344 mm. The center of the fourth trochanter is 348 mm below the top of the femoral head, and the lesser trochanter is separated from the femoral head by a gap 46 mm deep. The restored length of the femur is estimated to be 1,080 mm. The right femur is considerably more damaged, particularly on its posterior surface, and the fourth trochanter cannot be located with confidence. It has also been anteroposteriorly crushed. The preserved portion is 670 mm long and has a minimum circumference of 370 mm. The gap separating the lesser trochanter from the femoral head is 45 mm deep. These femora compare well with an isolated specimen from the Fruitland Formation (UNM B-828) and with those of *Albertosaurus,* but are not as robust as in *Daspletosaurus* or *Tyrannosaurus.* As restored (Figure 5), the circumference of the femur is equal to about 31 percent of its length, compared with 34–37 percent in *Albertosaurus* and 38–41 percent in *Daspletosaurus* (Russell, 1970).

*Tibia.*—Only the distal half of the right tibia is preserved (Figure 5.3). It is slightly crushed anteroposteriorly. The preserved portion is 478 mm long and 216 mm across at the distal end. The shaft is 110 mm in transverse width. The anterior surface has a well-developed suture for the ascending process of the astragalus and a flattened facet to receive the distal end

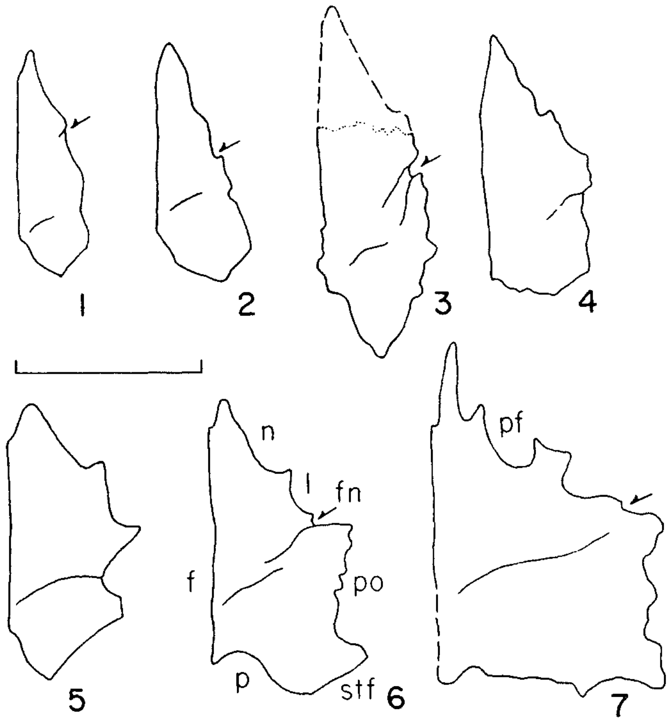


FIGURE 3—Comparison of tyrannosaurid frontal bones in dorsal view. *1, Aublysodon mirandus* (LACM 28471). *2,* cf. *Aublysodon* sp. (TMP 80.16.485). *3, Aublysodon* cf. *A. mirandus* (OMNH 10131). *4, Nanotyrannus lancensis* (CMNH 5741). *5, Albertosaurus libratus* (AMNH 5664). *6, Albertosaurus libratus* (USNM 12814). *7, Daspletosaurus torosus* (NMC 8506). Sutures for adjacent bones are shown: f, frontal; fn, notch in frontal (also indicated by arrow); l, lacrimal; n, nasal; p, parietal; pf, prefrontal; po, postorbital; stf, border of supratemporal fenestra. Scale bar 10 cm. *1* and *5* are adapted from Molnar (1978), *2* from Currie (1987), *4* from Bakker et al. (1988), *6* and *7* from Russell (1970).

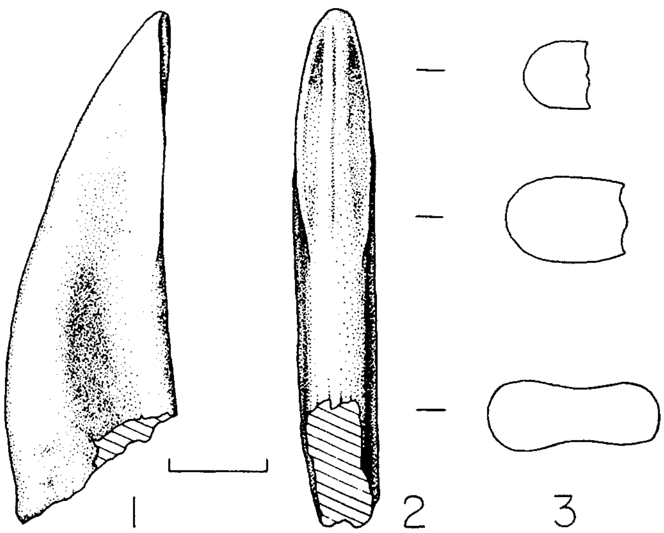


FIGURE 4—*Aublysodon* cf. *A. mirandus* (OMNH 10131). Premaxillary tooth in *1,* lateral view, and *2,* posterior view; *3,* cross sections at indicated levels with anterior end to the right. Scale bar 10 mm.

of the fibula. The distal end of the tibia bears of deep medial emargination for reception of the astragalus, such that the astragalar suture is markedly oblique relative to the shaft, and the bone appears to lack a medial "malleolus" (Figure 6). This appears to be a natural condition, not a result of crushing, and the entire distal surface of the tibia is grooved for reception of the astragalus. Although the astragalar facet is also oblique relative to the shaft of the tibia in *Albertosaurus,* it does not approach the condition observed in this specimen, which is unique among large theropods (Figure 6). The deep medial emargination does not appear to represent a juvenile condition, based on comparison with juvenile *Albertosaurus libratus* specimens (e.g., AMNH 5458 and 5664) and the seemingly adult proportions of the present specimen. A similar condition is found, however, in primitive theropods such as *Dilophosaurus* (Welles, 1984), *Coelophysis* (Padian, 1986; Colbert, 1989), and *Liliensternus* (Huene, 1934) where instead the lateral surface is deeply emarginated. As restored (Figure 5), the length of the tibia would be about 82 percent the length of the femur, compared with 87 percent in *Daspletosaurus,* 88 percent in *Tyrannosaurus,* and 90–100 percent in *Albertosaurus* (Russell, 1970).

*Metatarsals.*—The left fourth metatarsal is complete, 461 mm in length, and 70 mm wide at the distal articular surface (Figure 5.4, 5.6). It compares well with a specimen described by Lehman (1981) from the upper Kirtland Shale, but is shorter and stockier. It is substantially shorter than the comparable element in *Albertosaurus libratus* (546 mm) and *A. arctunguis* (558 mm). The length of metatarsal IV is about 43 percent the length of the femur as restored (Figure 5), compared with 50–60 percent in *Albertosaurus,* 49 percent in *Daspletosaurus,* and 46 percent in *Tyrannosaurus.* The distal third of metatarsal III is also preserved (Figure 5.5, 5.6). The preserved portion is 252 mm long and 85 mm wide at the distal articular surface. Enough is preserved to indicate that metatarsal III is constricted proximally between metatarsals II and IV, as is typical of tyrannosaurids.

## DISCUSSION

The size, general form, and proportions of OMNH 10131, its D-shaped premaxillary tooth, rugose postorbital, well-developed pubic foot, and proximally constricted third metatarsal clearly identify it as pertaining to the Tyrannosauridae. At present, however, there is little agreement regarding the number of valid genera or species within this family. In a thorough revision of tyrannosaurids, Russell (1970) concluded that three valid genera are represented in North America (*Albertosaurus, Daspletosaurus,* and *Tyrannosaurus*) and one in Asia (*Tarbosaurus*), and that *Gorgosaurus* is a junior synonym of *Albertosaurus.* In contrast, Bakker et al. (1988) regarded *Gorgosaurus* and *Albertosaurus* as separate genera, named a new genus *Nanotyrannus,* and indicated that another new genus is represented by an undescribed specimen (TMP P81.3). Paul (1988) included *Aublysodon, Indosuchus,* and *Alioramus* within the Tyrannosauridae, regarded *Daspletosaurus* as a subgenus of *Tyrannosaurus, Nanotyrannus* as a subgenus of *Albertosaurus,* and *Tarbosaurus* as the junior synonym of *Tyrannosaurus.* Carpenter (in press a) accepted the synonymies of *Tarbosaurus* with *Tyrannosaurus,* and *Gorgosaurus* with *Albertosaurus,* but regarded *Nanotyrannus* as a juvenile specimen of *Tyrannosaurus* and *Daspletosaurus* as a valid genus.

Several peculiarities of OMNH 10131 prevent assigning the specimen to any of the well-known tyrannosaurids. The size and form of the frontal, postorbital, and dentary, and the dental serration counts of OMNH 10131, as well as the slender proportions of its postcranial bones, exclude all but *Aublysodon, Albertosaurus,* and *Gorgosaurus* from consideration. The narrow, elongated, and deeply notched frontals, wide V-shaped frontal-

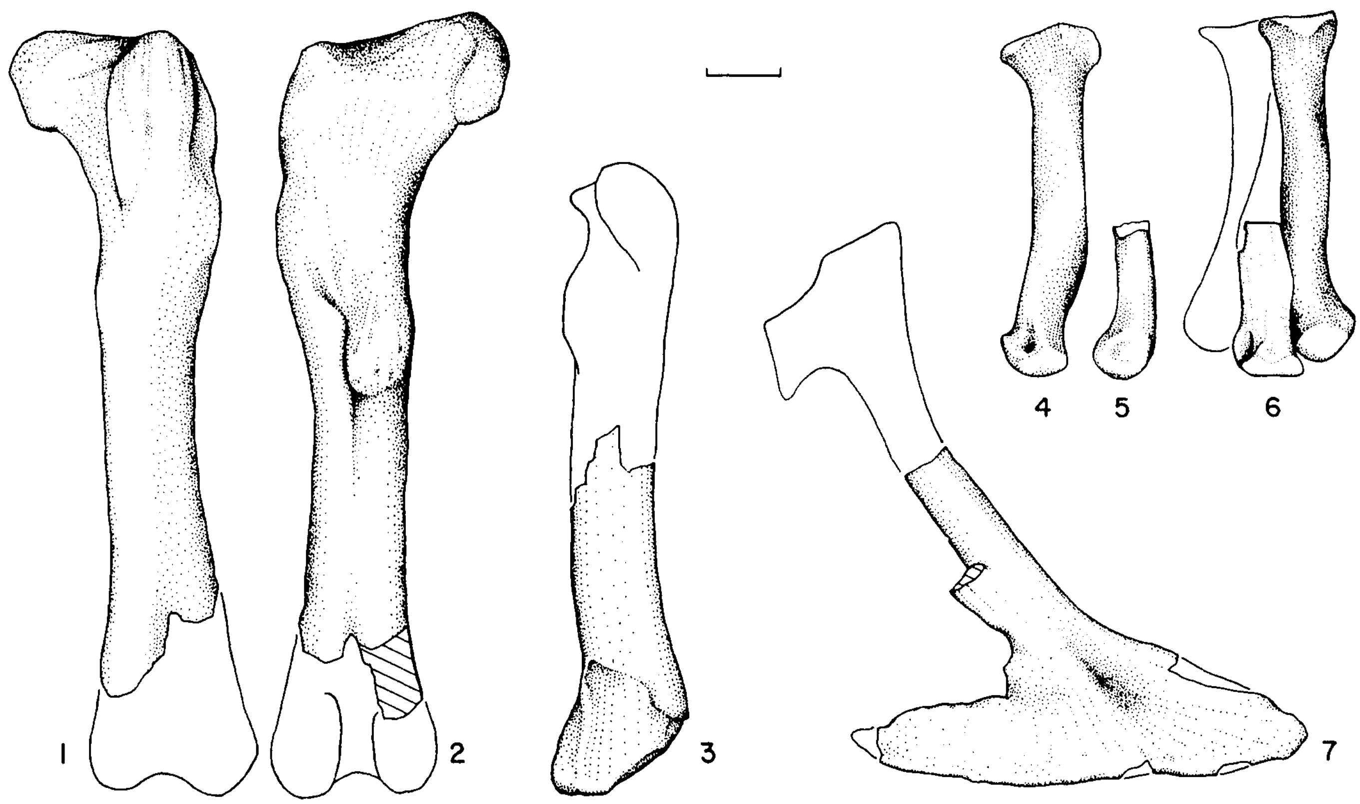


FIGURE 5—*Aublysodon* cf. *A. mirandus* (OMNH 10131). Left femur in *1*, anterior view, and *2*, posterior view; *3*, right tibia in anterior view; *4*, left metatarsal IV in lateral view; *5*, left metatarsal III in lateral view; *6*, left metatarsals III and IV articulated in anterior view; *7*, pubic foot in right lateral view. Scale bar 10 cm.

parietal suture, and nonserrated incisiform premaxillary tooth compare well with a skull (LACM 28471) previously identified as the "Jordan theropod" by Molnar (1978), and recently referred to *Aublysodon* (Paul, 1988; Molnar and Carpenter, 1989). The frontal also compares well with that in another specimen (TMP 80.16.485) identified as cf. *Aublysodon* sp. (Currie, 1987). Owing to these similarities, OMNH 10131 is herein referred to *Aublysodon* cf. *A. mirandus*. This specimen represents a large individual, comparable in size to other adult tyrannosaurids. Hence, the unique features of OMNH 10131 do not reflect ontogenetic variation, and this is not a juvenile specimen referable perhaps to a genus other than *Aublysodon*.

*Aublysodon* has had a difficult taxonomic history. The lectotype tooth (ANSP 9535) was originally one of several named *Deinodon horridus* by Joseph Leidy in 1856. Leidy later provided figures of the teeth (1860, Pl. 9, figs. 41–45). Three of the specimens, comprising both serrated and nonserrated premaxillary teeth, were removed from *Deinodon* and renamed *Aublysodon mirandus* by Leidy in 1868. Subsequently, Marsh (1892) restricted the name to the nonserrated form. Since that time, *Aublysodon* has been variously synonymized with *Deinodon* or *Albertosaurus*, or considered a nomen dubium. Carpenter (1982), Currie (1987), and Molnar and Carpenter (1989) have described new material referable to this taxon, and have demonstrated the validity of *Aublysodon mirandus*.

Paul (1988) recognized three species of *Aublysodon*: *A. mirandus*, *A. huoyanshanensis*, and *A. molnaris*. *Aublysodon huoyanshanensis* was originally named *Shanshanosaurus huoyanshanensis* (Dong, 1977), and is based on a partial skull and pelvis from the Subash Formation of the People's Republic of China. Although Dong (1977) reported that the premaxillary teeth of *S. huoyanshanensis* are incisiform, it is unknown whether or not they resemble those of *Aublysodon* in having nonserrated converging carinae, or if they possess serrated parallel carinae as in all other tyrannosaurids. Because Paul (1988) did not adequately justify the synonymy of *Shanshanosaurus* with *Aublysodon*, they are herein regarded as separate genera.

*Aublysodon molnaris* (Paul, 1988) is based on the specimen described as the "Jordan theropod" by Molnar (1978). Paul (1988) regarded the specimen (LACM 28471) as representing a species distinct from *A. mirandus* on the basis of its larger size, more robust snout, and bigger teeth. However, the specimen's larger size was attributed to ontogenetic variation by Molnar and Carpenter (1989). Because an adequate diagnosis of the species was not given by Paul (1988), *A. molnaris* is here considered a junior synonym of *A. mirandus*, and LACM 28471 is referred to *A. mirandus*. Hence, at present only a single species of *Aublysodon*, *A. mirandus*, can be recognized.

Specimens referable to *Aublysodon* are now known from the Judith River and Two Medicine Formations (Judithian) of Montana and Alberta, the lower Kirtland Shale (Judithian) of New Mexico, and the Hell Creek, Lance, and Denver Formations (Lancian) of Montana, Wyoming, and Colorado (Molnar and Carpenter, 1989). If all of these specimens are correctly identified, *Aublysodon* was a wide ranging genus, both geographically and temporally. Likewise, *Aublysodon* exhibits a unique combination of derived and primitive theropod characters. The primitive theropod characters include: long, narrow frontals, emarginated distal end of the tibia, and relatively short metatarsals. Derived tyrannosaurid characters include: incisiform premaxillary teeth, rugose postorbital, well-developed foot on pubis, and proximally constricted third metatarsal. Characters

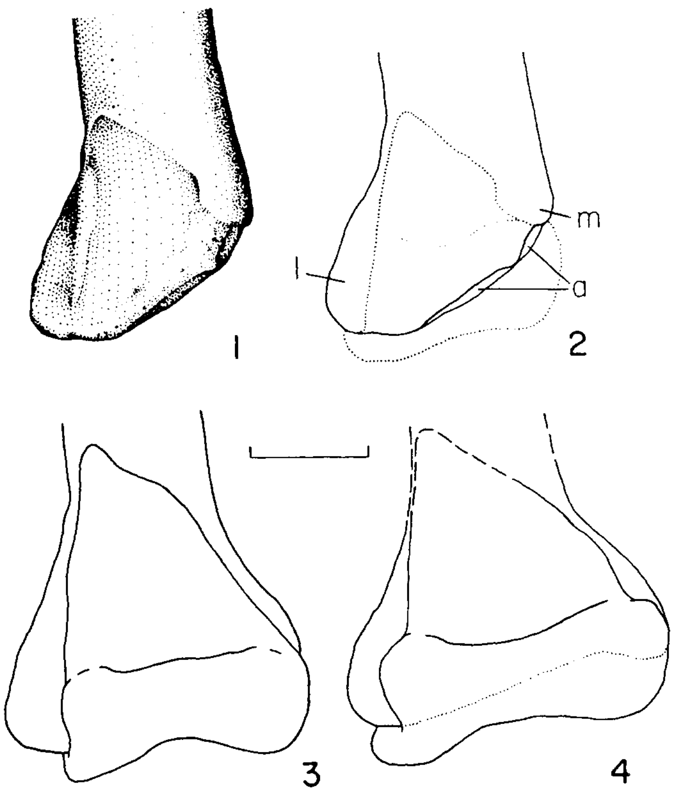


FIGURE 6—Comparison of distal end of right tibia and astragalus. *1, 2, Aublysodon* cf. *A. mirandus* (OMNH 10131). *3, A. libratus* (AMNH 5432). *4, A. sarcophagus* (NMC 5601). An interpretive outline of the astragalus is shown by the dotted line in *2*, as is the extent of the tibia behind the astragalus in *4*. Abbreviations: a, astragalar facet; l, lateral malleolus; m, medial malleolus. Scale bar 10 cm.

unique to *Aublysodon* include: premaxillary teeth lacking serrations and with converging carinae, relatively wide V-shaped frontal-parietal suture, "step" in the dentary above the symphysis, and strongly oblique astragalar facet on the tibia. Several primitive theropods (*Coelophysis, Syntarsus, Liliensternus,* and *Baryonyx*) also have a "step" in the dentary; however, this feature may be secondarily derived in *Aublysodon.* The unique characters of *Aublysodon* separate it from all other tyrannosaurids and may justify its placement in a separate subfamily or family (e.g., Paul, 1988; Molnar and Carpenter, 1989).

Identification of the New Mexico specimen as *Aublysodon* draws into question the earlier tentative identifications of less adequate material from the same region. Many of the fragmentary tyrannosaurid specimens thus far recovered from the Fruitland and Kirtland Formations, and tentatively identified as *Albertosaurus,* may pertain instead to *Aublysodon.* If OMNH 10131 is correctly referred, *Aublysodon* attained a body size comparable to a typical adult *Albertosaurus,* and many features of the postcranial skeletons in both genera are indistinguishable.

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# REDIAGNOSIS OF THE GENUS *AMEBELODON* (MAMMALIA, PROBOSCIDEA, GOMPHOTHERIIDAE), WITH A NEW SUBGENUS AND SPECIES, *AMEBELODON (KONOBELODON) BRITTI*

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ABSTRACT—The diagnosis of the shovel-tusked gomphothere genus *Amebelodon* has been subject to dispute since it was first established by Barbour in 1927. This dispute stems from a failure to evaluate the phylogenetic nature of two characters found in some specimens referred to *Amebelodon*: four lophs(ids) on some intermediate cheek teeth (M2 and M1) and internal dentinal rods within the lower tusks. These characters are considered diagnostic for the shovel-tusk gomphothere genera *Platybelodon* and *Torynobelodon*, and conflict with the traditional diagnosis of *Amebelodon*. Newly described specimens of *Amebelodon* and a detailed morphological analysis of one of the disputed characters, dentinal rods, indicate that the character states in the two shovel-tusker groups are analogous. The genus *Amebelodon* is rediagnosed to take into account this new information.

The rediagnosis of *Amebelodon* is taxonomically recognized by the designation of a new subgenus, *Amebelodon* (*Konobelodon*), which includes all *Amebelodon* specimens convergent with *Platybelodon* and *Torynobelodon*. A new species, *A.* (*Konobelodon*) *britti*, is established that includes all specimens of this subgenus from North America. Specimens from the Moss Acres Racetrack site (Hemphillian) in northern Florida are used in the description of this species.

## INTRODUCTION

THE SHOVEL-TUSKED gomphotheres represent one of the most distinctive of the proboscidean groups. As indicated by their common name, the shovel-tuskers are characterized by broad, flat lower tusks that resemble the heads of shovels. The shovel-tuskers include such well-known genera as *Amebelodon*, *Platybelodon*, and *Torynobelodon*.

The genus *Amebelodon* has been the subject of considerable systematic dispute since it was established by Barbour (1927). It has been considered both monophyletic (e.g., Gregory, 1945) and polyphyletic (e.g., Bennett, 1977) by different authors. The controversy stems from failure to arrive at a clear diagnosis for the genus; some specimens referred to *Amebelodon* possess characters considered diagnostic for other shovel-tusker genera, *Platybelodon* and *Torynobelodon*, and have been linked to these genera by some authors. *Amebelodon* fossils described by Gaziry (1987), as well as numerous and exceptionally preserved *Amebelodon* fossils from the Moss Acres Racetrack site (Hemphillian) in North Florida, help resolve this controversy and provide a basis for a rediagnosis and taxonomic revision of the genus. On the basis of this rediagnosis a new subgenus, *Amebelodon* (*Konobelodon*), and a new species, *A.* (*K.*) *britti*, are established.

## SYSTEMATIC PALEONTOLOGY

The following devices were used to make measurements: dial calipers, tree calipers, and an anthropometer. Dental terminology follows that of Tobien (1973). Abbreviations are as follows: D.M.N.H., Denver Museum of Natural History; K.U.M., Museum of Natural History, University of Kansas; T.M.M., Texas Memorial Museum at Austin; UF, Florida Museum of Natural History; and UNSM, University of Nebraska State Museum.