A Complete Tertiary Camel Skull from Roger Mills County: Description and CT Scan

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The Tertiary beds exposed in Roger Mills County are continuous with beds which cover the northeastern part of the Texas panhandle; they are the Ogallala formation (*1*). The Ogallala rocks in northern Roger Mills County rest unconformably upon the Permian Cloud Chief and Quartermasters formations. The Ogallala rocks consist of fine to medium grain, well-sorted quartz sand and are about 90 m thick. At places where the lower 63 m of Ogallala section are exposed, the rocks are predominantly yellowish-brown, evenly bedded fine-grained quartz sands (*1*).

A complete camel skull with several articulated vertebrae was found in the Fall of 1991 at Section 3, T15N R23W, in northwestern Roger Mills County. The excavated, late Miocene, camel skull was in good condition with several cervical vertebrae attached. The skull was completely encased within the Ogallala formation (Fig. 1).

The camel skull was identified, by comparison with the fossil collection at Southwestern Oklahoma State University, as *Procamelus cf grandis (2). Procamelus*, described by Leidy (1858), has long functioned as a catchall genus for medium- to large-sized Pliocene-age camelids (*3*).

This skull is the third Tertiary *Procamelus* found in Oklahoma. Previous finds, in 1989 and 1990, were identified by comparison with fossil camels at the Natural History Museum, University of Kansas *(2).*

The right side of the skull is crushed and somewhat distorted, with an eye socket visible (Fig. 2); also visible is a protruding metacarpal, a metapodial bone near the last attached vertebra, embedded in Ogallala matrix on the ventral aspect of the skull (Fig. 3). The left side of the skull is in excellent condition with an eye socket visible ear cartilage, and fossilized tissue extending; the length of the neck vertebrae (Fig. 4). Two lower incisors were uncovered and identified (Fig. 5). Dimensions of the skull and

Figure 1. Complete skull of *Procamelus cf grandis* with articulated cervical vertebrae.

Figure 2. Right side of intact skull: (a) the eye socket; (b) a protruding metacarpal.

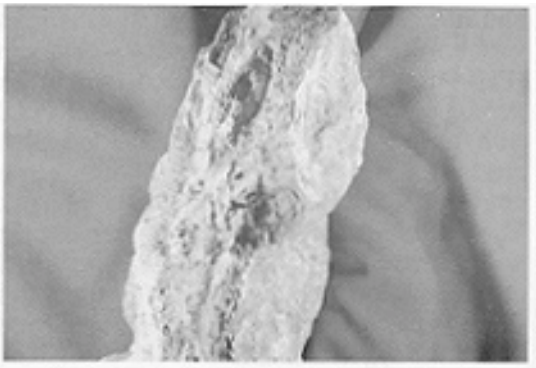

Figure 3. Vental surface of skull; arrow indicates protruding cannon bone.

TABLE 1. Dimensions of *Procamelus cf grandis* skull

Skull feature	mm
Cranium with attached vertebrae, length	537
Tip of premaxillary to condyle, length	310
Eye orbit, diameter	43.1
Premaxillary postorbit, length	206.7
Ear cartilage, max. diameter	46.7
Postorbit, width across	198
Attached vertebrae, length to condyle	260
Occipital crest to nasal tip, length	380
Postorbital process, width	27.3
External auditory meati, width between	91.1
Orbit, longitudinal diameter	45.1

vertebrae are given in Table 1.

After an extensive external study of the skull (*2*), the decision was made to retain the skull in the Ogallala-formation matrix and to study the internal anatomy through use of CT (Computerized Tomography) scans. Two CT scans were performed with a Toshiba TCT 80 AX instrument. One scan gave contiguous cross-sections of 5-mm-thick slices, starting at the caudal end. For the second CT scan, the fossil skull was placed into a clear plastic bag; the bag containing the skull was inserted into a PVC pipe (11.5 in i.d., 12 in o.d., 30 in long). The pipe was then filled with water, closed, sealed, and placed on the CT scan table. The scan resulted in contiguous, 2-mm-thick slices beginning at the caudal end. The CT scan revealed (Fig. 6) a radius bone with the epiphysis and diaphysis not fused; I concluded that the skull was from an immature *Procamelus*. The scan also demonstrated that the animal died with one foreleg folded near the skull.

From additional scans other features of the skull were identified: the palate, incisors, and lumen (Fig 7); the lambdoid crest and the atlas vertebra (Fig. 8); the axis vertebra (Fig. 9); upper and lower teeth (Figs. 10, 11). The scan showed four to six incisor teeth. The brain case is rather small with a strong occipital crest; the occipital crest rises only slightly in a smooth curve above the level of the zygomatic process. The orbits are circular. The lambdoid crest and lumen of the trachea are well developed. The molars had not erupted but there were two well-developed jugular veins above the zygomatic arch.

Figure 4. Left side of intact skull: (a) eye socket; (b) ear cartilage; (c) fossilized tissue.

Figure 5. Two lower incisor teeth (arrow).

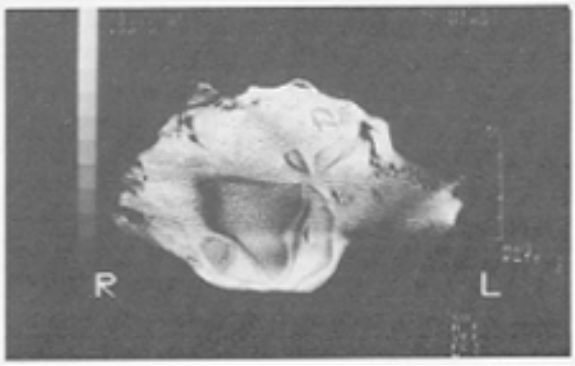

Figure 6. The radius, showing the epiphysis and the diaphysis unfused (arrow).

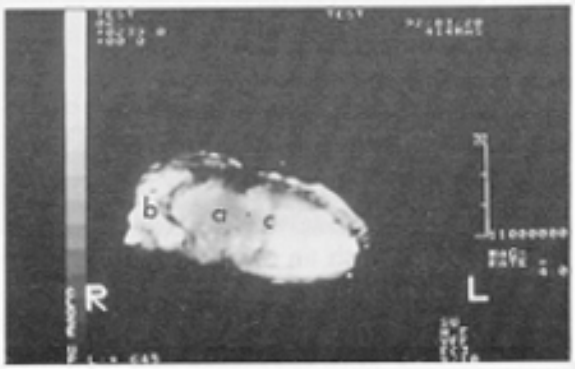

Figure 7. Palate (a), an incisor (b), and lumen (c).

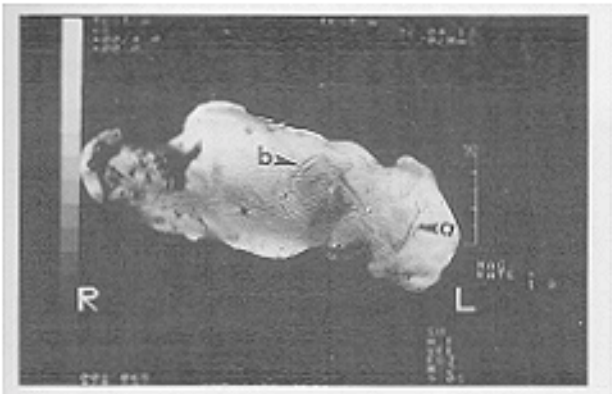

Figure 8. Lambdoid crest (a) and atlas vertebra (b).

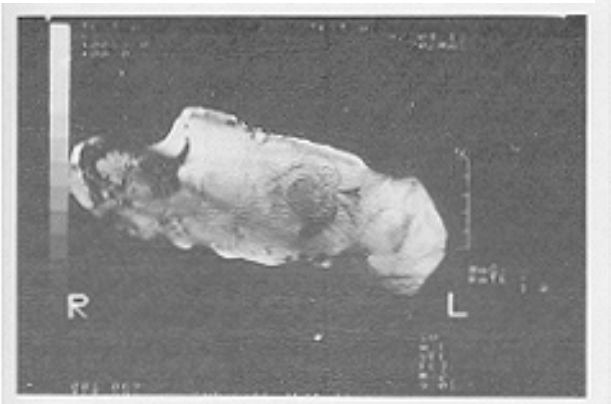

Figure 9. The axis vertebra (arrow).

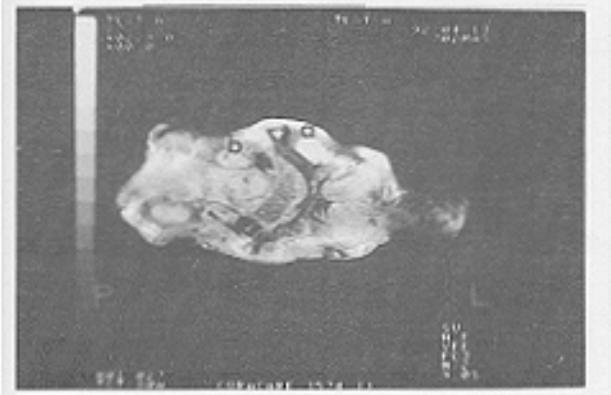

Figure 10. Upper teeth (a) and lower teeth (b).

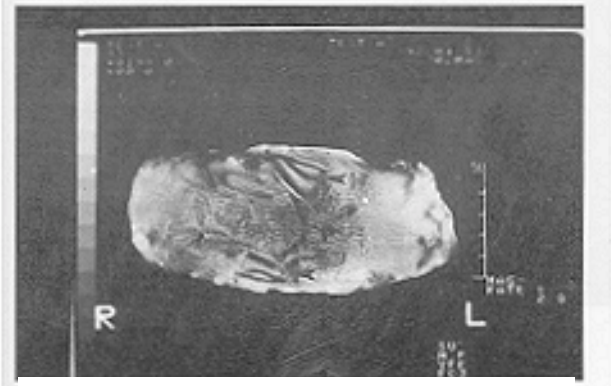

Figure 11. Upper teeth (arrows).

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