

On the Skull of *Xerobates* (?) *undata* Cope.

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In the University of Kansas Museum there are a number of specimens of turtles collected from the Loup Fork Beds of Phillips Co., Kansas, by Messrs. Sternberg, West and Overton. This material has been entrusted to me by Dr. Williston, under whose advice and direction I have thoroughly studied it, with the result that two well-defined species have been made out, the detailed description of which will be given in a later paper. A well-preserved and nearly complete skull of one of the species is of so much importance that it has been thought worth while to give here a preliminary description of it in advance of the fuller paper,

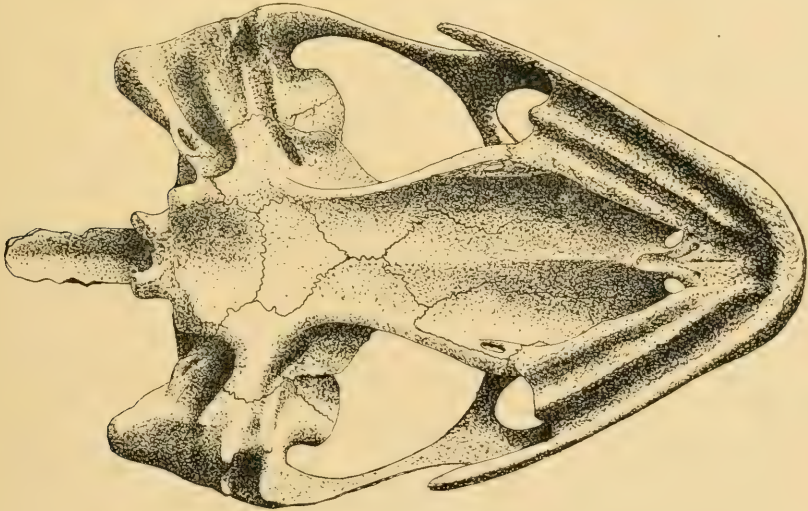


Fig. 1.—Skull of *Xerobates undata* Cope, from above; natural size.

inasmuch as this part of the anatomy of these Miocene reptiles has hitherto been wholly unknown. It is provisionally referred for the present to *Xerobates (Testudo) undata* Cope, but its specific identity is more or less doubtful, inasmuch as the original description of the species to which it is referred is very incomplete and imperfect.

The skull is rounded in the premaxillary region, and is rather narrow and long. The outline of the base of the skull may be described as follows: The sides in front of the anterior margin of the infratemporal fossæ make an angle of sixty degrees with each other; from this same margin to the quadrate an angle of twelve degrees. Seen from the side, the skull thins posteriorly, the dorsal and ventral planes making an angle of eight degrees with each other. The dorsal plane lies upon the highest portion of the supraoccipital crest, and the upper, flattened surface of the skull between the orbits; the ventral or basal plane extending from the lower margin of the outer maxillary cutting edge through the quadrates. Between the two points touched by the dorsal plane there is a long, shallow concavity, which merges into the broad, shallow depression in the region of the fronto-parietal suture. The supraoccipital crest is small, and arches only a little above the otherwise gently downward sloping bone.

The anterior nares are one-third wider than high; they are large and quadrilateral. From the highest portion of the cranium the face slopes downward and outward, with a small degree of convexity. The orbits are large and deep, round in outline, and look obliquely outward, forward and upward. The sutural union between the frontal and postfrontal occurs immediately above the middle of the orbit. The postorbital and infraorbital bars are thin and plate-like. The skull throughout, in fact, is characterized by its general lightness of bone. The supra-temporal fossæ are large, oval, with their long diameter making an angle of forty-five degrees with the sagittal plane. They look obliquely backward, upward and slightly outward. On the posterior border of these fossæ there is a prominent, quadrilateral, short, stout process for muscular attachment. This process is concave on its upper and anterior surface, and its long axis stands obliquely inward and forward. It is formed by the squamosal and prootic. Below the temporal bar there is a broad, deep notch, the plane of which looks immediately outward, with only a slight upward and forward obliquity. The process from the maxilla extends prominently backward for about 12 mm.

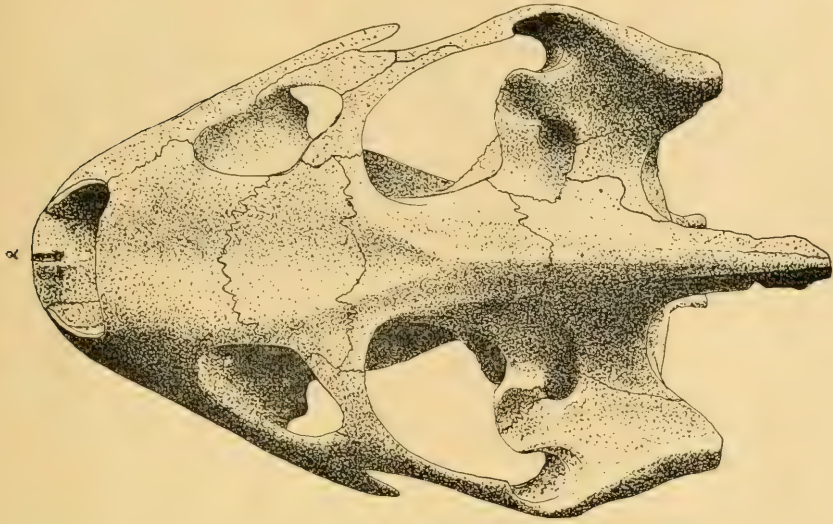


Fig. 2.—Skull of *Xerobates undata* Cope, from below; natural size.

The premaxillaries are sharp at their lower border, which is gently concave in side view. Seen from below the lower plane is very uneven, with the basisphenoid only flattened.

The premaxillaries are straight on the edge below and arched to a point above. They form almost the entire floor of the anterior nares. They are convex transversely in the middle, and doubly convex in front. They have no articulation with the palatine; in front below there is a deep, round fossa for the reception of the beak of the mandible. The posterior nares at the posterior margins of the bones are rounded. The premaxillaries articulate posteriorly with the stout descending process of the vomer. The maxillaries have two cutting edges, the inner one with its plane much above the plane of the outer. They send up a broad process, thinned and narrowed above to join the prefrontal. The outer cutting edges increase in thickness from a sharp, serrate one, to one four millimeters thick above. The pterygoids, palatines and vomers together form a deep ascending channel, broadest a little in front of the palatine foramina; the channel is divided by a low ridge in the middle, which in the anterior part of the vomer is thin and sharp and curves downward. The posterior process extends from the outer cutting edge, instead of from the second, as in many turtles. It is thin, acutely angled, and extends slightly outward and downward below the basal plane, while the outer surface slopes at an angle of forty-five degrees. The groove on the inner

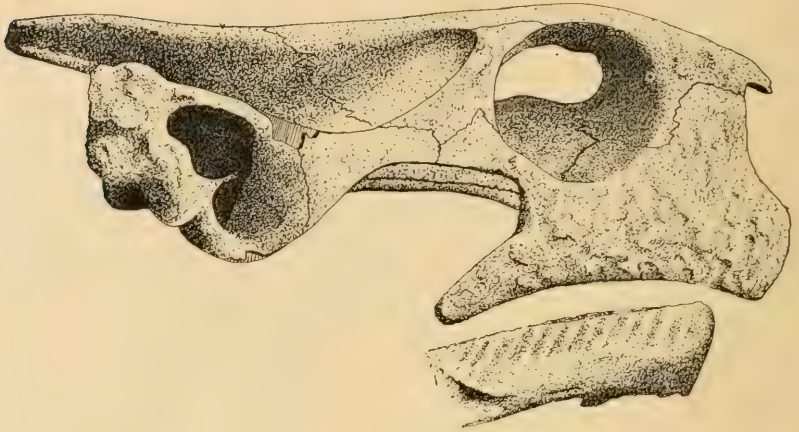


Fig. 3.—Skull of *Xerobates undata* Cope, natural size.

side also deep. The maxilla does not curve inward anteriorly to meet the premaxilla, but is rounded in this region by thinning to a sharp edge. The inner edge of the maxilla makes a low, almost serrate border, becoming lower anteriorly until it merges into the level bottom of the inner channel.

The palatine foramen is situated near the sutural union of the palatine and pterygoid. There is a strong ridge below the foramen and, on either side, a narrow, shallow groove. The pterygoids have the anterolateral sides projecting as long, narrow, rod-like processes, standing at an angle of thirty-three degrees with each other. They unite for a short distance between the basisphenoid and vomer deepening anteriorly the palatine region. The lateral edges approach each other to just behind the anterior end of the basisphenoid, where they diverge gradually, becoming less prominent, and finally terminating in the postero-lateral process. The vomer has very irregular margins and a medial ridge throughout its entire length, except at the anterior end, where a small, deep, narrow, U-shaped groove occurs. Anteriorly the vomer sends down a strong, triangular column, the anterior surface of which is deeply and angularly channelled. The jugal is an hourglass-shaped bone, and is very light. The quadrato-jugal is a much wider bone than the jugal. It is broad, thin and plate like, expanding anteriorly to a width of twelve millimeters, posteriorly to eight.

The deep external tympanic fossa of the quadrate is oval or inverted reniform, with its long axis directed downward and forward. The squamosal is arched over the tympanic fossa from the

inner, almost vertical surface, and takes no part in the formation of a false roof.

The occipital condyle is triangular, broadest above, with a slight depression on the posterior surface. Back of the basi-sphenoid there is a well-marked concavity, the anterior and lateral margins of which coincide with those of the bone itself. The basioccipital processes are strong.

The exoccipital fossa is a shallow, round pit, with its ventral wall quite low. Immediately above this concavity, and over the sutural union between the exoccipital and the opisthotic, there is a long, shallow concavity.

The epiotic is only partially fused with the supraoccipital. The external carotid foramen is midway between the tympanic rim and the zygomatic arch; there is a shallow crease curving upward and forward from this foramen. On the posterior margin of the temporal fossa and in front and exterior to the carotid foramen there is a large, stout, dorsally concave tuberosity, the suture between the prootic and the squamosal passing through its middle and through the carotid foramen. A broad, shallow groove separates the tuberosity from the zygoma, and there is another on the inner side. The external auditory meatus is oval; it looks downwards, backwards and slightly outwards.

The basisphenoid is triangular, with its base posterior; the surface is in a plane of about twenty-six degrees with that of the base of the skull.

The parietals form no portion of a false roof; they are rounded above, and there is a perceptible ridge arising from each antero-lateral process and fusing with its mate a little in front of the occipital crest. The antero-lateral margin is at an angle of forty-five degrees with the horizontal. There is a broad, shallow depression on the upper surface.

The frontals are much wider than long, with a broad, median depression, a continuation of that from the parietals. The antero-lateral ridges of the parietals continue on the frontals. The rhinencephalic groove below is not bridged over.

The prefrontals are strongly convex forward and laterally. The compressed top and flattened sides give to this region a decidedly quadrilateral shape. The anterior margin is concave antero-posteriorly and convex vertically. On the inner side and from the posterior part, a strong triangular process extends inward and backward to meet the upward and forward process of the vomer. The anterior ventral part of this process has an angular ridge,



Fig. 4.—Mandible of *Xerobates undata* Cope, from above; natural size.

which, with its mate, is so prominent that it constricts the nasal cavity at this place, forming a smaller, secondary nasal cavity behind. This lateral is equitrilateral in cross-section, while the anterior portion is distinctly quadrilateral.

The mandibles have two strong cutting edges enclosing a deep groove between them, the channel for the inner ridge of the maxilla. The symphyseal portion slopes forward at an angle of fifteen degrees, and the lower portion of the symphyseal region extends backward so as to cause the otherwise angular symphysis to be broadly concave.