

A NEW COTYLOSAUR FROM NORTH CENTRAL OKLAHOMA

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ABSTRACT. A Permian reptile skull new to science is described. Its appearance is so like *Labidosaurus* that it was at first thought to be that genus. Its excessive size and the batteries of teeth in the maxillaries and dentaries clearly indicate a new genus. It doubtless is a member of the family Captorhinidae. That it came from an area in which other very large Permian vertebrates have been found may indicate something of the ecological conditions in north central Oklahoma during Lower Permian time.

INTRODUCTION

Classification:

Class Reptilia

Subclass Anapsida

Order Cotylosauria

Suborder Captorhinomorpha

Family Captorhinidae

Labidosaurikos meachami gen. et sp. nov.

Genotype: skull and right mandible, M. U. O. No. 3-1-S2.

Generic and specific characters: larger than *Labidosaurus*; one round, large premaxillary and anterior dentary tooth; a battery (six rows) of remarkably uniform maxillary and dentary teeth; small nares; tabular and dermosupraoccipital posterior to parietal, and extending on top of skull; ratio of orbit to skull length smaller than in *L. hamatus*.

DISCUSSION

A skull of a Permian cotylosaur, found near Crescent, Oklahoma, was presented to the writer in 1939. Illness has prevented its previous description. The specimen is an excellent one and shows most of the skull features quite distinctly. Several features, notably the occurrence of six rows of simple conical teeth on both the maxillary and dentary (plate 1, figs. d, f), its excessive size, and the arrangement of the tabular and dermosupraoccipital partially on top of the skull, indicate an animal new to science.

The skull was found in Hennessey shale in the bank of a small creek one half mile east and one and a quarter mile north of the north edge of the little town of Crescent, Logan County, Oklahoma. No more of the skeleton was found, but

associated with it were vertebrae and a portion of the pelvis of *Dimetredon*.

The specimen is almost complete, and all of its features are present and distinguishable on the right side (plate 1, figs. a, b). The large premaxillary tooth, however, was broken off and buried in the matrix. All of the right mandible is present except a small portion at the symphysis.

When first examined, the specimen was thought to be a species of *Labidosaurus*, probably *L. hamatus*. This was because the general contours of the Crescent skull closely resemble those of *Labidosaurus*. The teeth, as then visible, were similar in both animals. There appeared to be more than 16 maxillary teeth as recorded by Williston (1908, p. 145) in *L. incisivus*. The removal of a small amount of matrix from the inside of the jaw revealed upper and lower teeth in that position. This suggested a battery of teeth in the maxillary and dentary bones instead of a single row as in *Labidosaurus*. X-rays confirmed this supposition. The mandible was then removed and six rows of conical, peg-like teeth were revealed in the maxillary and five rows in the dentary. Fragments of teeth indicate that in life there were also six rows in the dentary. The short row contains seven teeth while the other rows have a maximum of 34. The smaller number is on the lingual side of the maxillary and on the cheek side of the dentary (plate 1, figs. d, f). There is also a tendency toward lineal arrangement in a transverse direction.

The crowns are conical but show a slight amount of wear on the lingual side of those in the maxillary and on the cheek side of those in the dentary. Neither the wear, the number, nor the arrangement of the teeth offers conclusive evidence as to diet. The feebleness of the teeth suggests soft food, and the presence of four large teeth in the anterior portion of the mouth suggests a diet of soft plants.

In the posterior half of the maxillary, the teeth are remarkably uniform in height and size. Anterior to these, several smaller teeth are worn flat. Between these and the large premaxillary tooth, there are two or three peg-like teeth that are larger than those in the posterior half of the maxillary. They, like the single, large, recurved premaxillary tooth, are flanked by small, sharp pointed peg-like teeth.

The teeth are replaced by growth from a pulp cavity. Some

of the teeth have been exposed to considerable depth by the removal of an outer layer of bone along the margin of the maxilla and dentary, thus giving the appearance of normal sockets; although it is impossible to say whether they are true thecodont or set in grooves as in young alligators. Longitudinal openings filled with matrix along one or both sides of the teeth may be either fractures or natural grooves. One thing is certain, the teeth are surrounded by bone; and the large anterior maxillary and dentary teeth are set in true sockets.

There is a single, strong, recurved tooth in each side of the premaxillaries and in each of the dentaries. Neither of the premaxillary teeth are present in place, although one was broken off and preserved in the matrix. It is round and not chisel-like. The large tooth was present and complete in the anterior end of the mandible. These teeth are suggestive of corresponding teeth in *Limnoscelis* (Romer, 1946, fig. 3, p. 154), but are less recurved and relatively shorter. Also in *Lim-*

EXPLANATION OF PLATE 1

Labidosaurikos meachami gen. et sp. nov.

Maximum length of skull295 mm.

Maximum length of mandible267 mm.

Figure *a* — Dorsal view.

Figure *b* — Lateral view taken before the mandible was removed from the cranium.

Figure *c* — Lateral view after removal of the mandible.

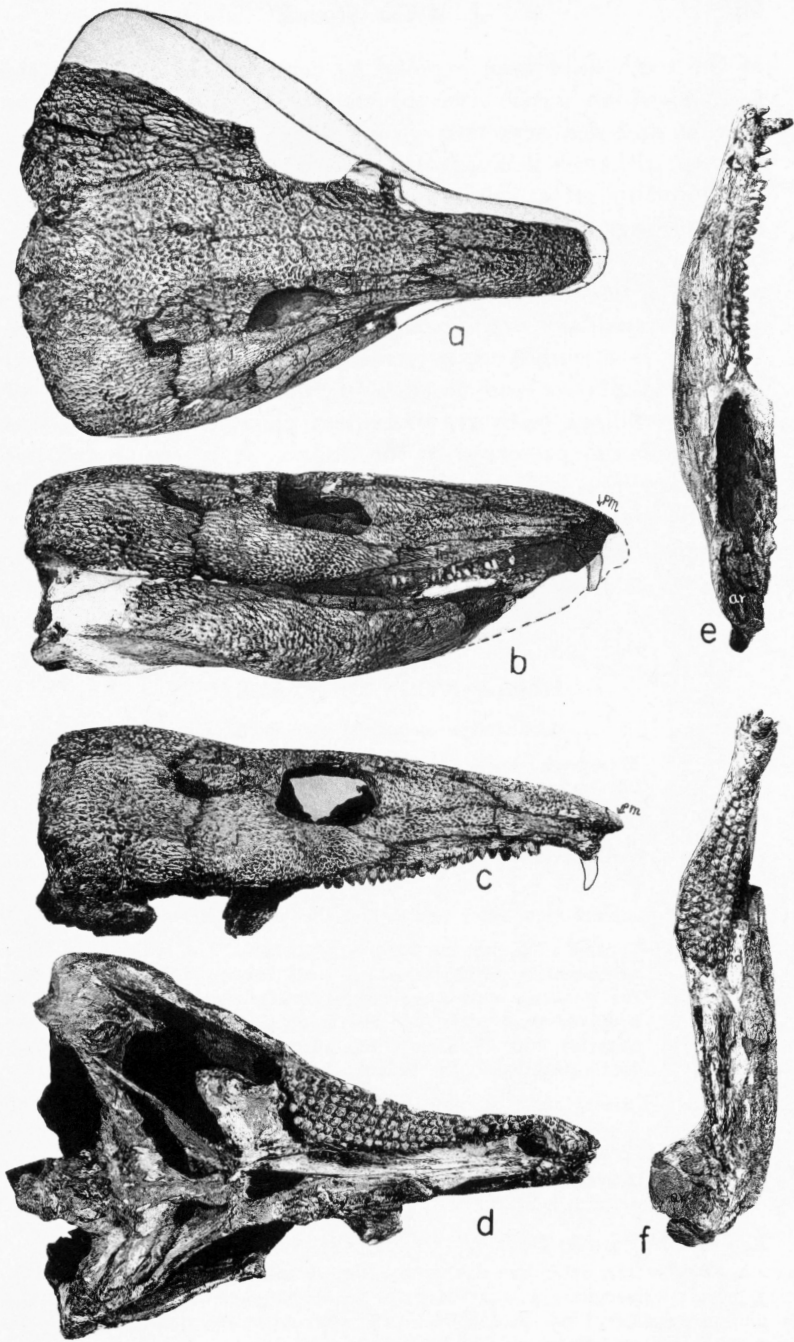
Figure *d* — Ventral view showing tooth arrangement. The scar of the large premaxillary tooth, the small teeth immediately behind it and the palatine teeth have been retouched in the photograph in order to show their true character. The dark area toward the anterior end represents the place where the large dentary tooth penetrated the palate.

Figure *e* — Lateral view of right mandible showing the large Meckelian fossa. The small elongate dark spot near the bottom and a little in front of the middle is the infra-Meckelian fossa.

Figure *f* — Dorsal view of the right mandible showing the tooth arrangement.

Key to the bones in Plate 1:

a, angular; ar, articular; d, dentary; do, dermosupraoccipital; f, frontal; j, jugal; l, lacrimal; m, maxillary; n, nasal; p, parietal; pf, postfrontal; pm, premaxillary; po, postorbital; prf, prefrontal; qj, quadratojugal; sa, surangular; sq, squamosal; t, tabulare.



noscelis there are three large teeth in each premaxillary and dentary and no tiny teeth around the base of the large teeth.

There are many tiny tooth tubercles on the pterygoid and palatine bones. They are arranged in a row along the margin of the palatine vacuity and in an irregular mass along the summit of each transverse bone. A small cluster present in the lateral depressions of the palatines of the Williston specimen of *Labidosaurus* appear to be present in a single line in the Crescent specimen.

There is no visible distortion in the specimen except at the anterior end of the dentary; the sculpturing is pronounced although definitely not in rows, and the sutures are, in general, easily distinguishable. On the basis of arrangement and shape of the skull bones, this animal appears most closely related to *Labidosaurus*, although it appears to be much more advanced than that genus. Little can be told concerning the premaxillaries because only a small portion of those immediately anterior to the nasals has been preserved.

Comparison with *Labidosaurus hamatus*, which this animal closely resembles, will be of value. The orbits and nares are elliptical, with the longer diameter extending antero-posteriorly. In the type of *L. hamatus*, the long axis of the orbit "enters the length of the cranium posterior to it twice, and one and three quarters times the length anterior to it . . ." (Case, 1911, p. 46). In the Crescent specimen, these measurements are 2.5 and 3 plus times respectively. Thus the orbits in the Crescent specimen are relatively much smaller and not so centrally placed. There is considerable difference, too, between the ratios of maximum orbit diameter to total maximum skull length. In the Crescent specimen, this figure is six, while in the Williston specimen it is about $4 \frac{5}{6}$. The pineal opening is six by nine millimeters. Between the orbits and slightly behind them, the cranium is a curved plane which, in a lateral aspect, appears slightly depressed. The posterior portion of the skull forms an arc of a circle; the mandible is not visible from above in *Limnoscelis* while in this specimen it is readily seen from above, apparently not as a result of distortion.

The most noticeable superficial difference between this specimen and the one described by Case (1911, pp. 47, 111) is its size, as may be seen in the following table of measurements.

Comparative Measurements in Millimeters

	—Labidosaurus hamatus Cope—			Labidosaurikos
	Williston	Univ. of Chicago* #641	Broilli	meachami n. sp. This Specimen
Maximum length of cranium ..	162	155 (est.)	185	295
Maximum width of cranium ..	147+			240
Interorbital width	32	26	27	49
Diameter of orbit:				
Anteroposterior	36	23**	4	54
Vertical	22	12**	3	40
Width of muzzle at posterior border of nares	29	30 (approx.)		48
Depth of muzzle at posterior border of nares	21	13**		30
Depth of cranium at middle of the orbit	35	26**		72
Length of crown of large premaxillary tooth		9**		16±
Maximum diameter of large premaxillary tooth		3**		8
Depth of mandible at middle of orbit	20	18**		42
Length of mandible	170	150		273+
Length of crown of large dentary tooth				15
Diameter at base of large dentary tooth				10

* These measurements are considerably greater than those indicated by the figures in plate 12 of the Case report.

** Taken from figure.

The frontal bones are a little more than one third the total length of the skull, have parallel sides and terminate posteriorly in a line perpendicular to the antero-posterior axis of the skull. This suture in the Cope specimen forms a "V" with its point directed anteriorly. The postfrontals and post-orbitals are short and differ slightly in size, while the prefrontals are long and slender, and the lacrimals are wide at

the orbit and extend forward in a narrow wedge to the nares. The postfrontals articulate with the frontals above, the parietals behind, and the postorbitals and orbit below. The postorbitals are bordered behind by the parietals and squamosals, and by the squamosals and jugals below (plate 1, fig. a).

The external nares are not well shown in the Crescent specimen, but the posterior margin of the right naris is present. A small narial opening is indicated. Its greatest diameter lacks four and one half, and possibly as many as five times, of being as large as the greatest diameter of the orbit; thus differing from the Williston specimen, in which a little more than two and one half diameters equal the diameter of the orbit.

The nasals form the superficial region for only a little more than half the distance between the tip of the rostrum and the orbits. In *Labidosaurus*, the posterior margin of these bones is only a short distance in front of the orbits and is in contact posteriorly with the frontal, prefrontal, and lacrimal.

Williston says: "On the posterior or occipital side there are two cranial roof bones on each side, clearly and positively shown in all specimens, one bordering the hind margin of the parietal, and the other the squamosal, called by Cope respectively the supraoccipital and the tabulare—that is, the so-called epiotic of authors. They differ from the bones of the upper surface of the skull in lacking the superficial markings or pittings, and are suturally united with the superior bones at an angle of nearly ninety degrees" (Williston, 1910, p. 75).

This condition differs from that of the Crescent specimen in several important ways. The parietals do not extend to the posterior margin of the skull. Those bones are in contact with the dermosupraoccipital and tabulare on top of the skull at a distance of about 18 millimeters in front of the angle. The median pair, that is the dermosupraoccipitals (the postparietals of authors), apparently form the posterior roof of the brain case, the suture with the opisthotic being quite close to the *foramen magnum*. The tabulares extend downward about 12.5 centimeters at an angle of 90 degrees in a sort of apron. No suture is visible at the angle, and hence the paroccipital is not present as a separate bone. The squamosal joins the parietal and tabulare mesially and extends downward at the posterior angle in the same way and to

about the same extent as the tabulare. The quadratojugal is thus not present behind and below the squamosal as a single bone as shown by Williston (1910, plate 2, fig. 2). The quadratojugal is lateral to the squamosal and turns down the posterior margin very much in the same manner as the squamosals.

The jugals begin well in front of the orbit and not in front of their middle as described by Williston (1910, p. 77). They articulate behind with the squamosal and quadratojugal in a distinct suture instead of extending "nearly to the hind margin of the skull." No quadratojugal was recognized in *Labidosaurus* by Williston and Case. Williston said, "If there is a distinct bone here on the lateral margin of the squamosal), I suppose that it must be the real quadratojugal, notwithstanding it has no articulation with the quadrate" (Williston, 1910, p. 74). In the present specimen the suture between the quadratojugal and jugal is unmistakable.

The description of *Labidosaurus* given by Case (1911, p. 45) does not agree with this specimen in several points. The maxillae of this specimen terminate laterally a little in front of the posterior margin of the orbits. The nasals terminate about midway between the orbits and nares and not "a little in advance of the orbits." The prefrontals are similar in the two specimens but here terminate anteriorly at about the same place as the frontals and not in front of the frontals as in the Williston specimen. The lacrimals and frontals are essentially as in the Case specimen. The relative size and relationship of the postfrontals and postorbitals are similar in the two specimens. The jugals are quite different in the Crescent form, terminating in front at the anterior margin of the orbits. The posterior margin of these bones is broadly in contact with the squamosals and quadratojugal at about one third of the distance between the orbit and posterior margin of the skull. Case (1911, p. 103) considered the possibility of sutures in this position on specimens 4427 and 4876 of the American Museum of Natural History and numbers 641 and 642 of the University of Chicago, but concluded that the supposed sutures were fractures in the same place on each side. In the Crescent specimen, however, the sutures in this position are distinct and show feathering off of the squamosal and quadratojugal on top of the jugal.

The parietals are large, rectangular bones that terminate posteriorly on top of the skull and not at the angle as in *Labidosaurus* and *Dimetredon*. Immediately posterior to these bones are the well-sculptured tabulars and supraoccipitals. These two bones were recognized in *Labidosaurus* by Williston (1910, p. 75), but they did not extend upward beyond the angle of the skull. Furthermore, in the Williston specimen the entire parietal was bounded behind by the supraoccipital and the squamosal by the tabulare.

The Crescent specimen differs from *Limnoscelis* in many essential features, but is only slightly larger. The orbits of the latter are more elongate, and there are six large, elongate, recurved rake-like teeth in the anterior part of the mouth, while there are only two in this specimen. In *Limnoscelis*, the stapes and postorbital slightly overhang the squamosal, while in *L. meachami* the posterior part of the skull forms an arc of a circle.

Most of the comparisons above have been made with *Labidosaurus*, although there are many features of the Crescent specimen that are suggestive of *Captorhinus*. The general contours of the skulls of the two animals are similar. Both have hook-like anterior teeth. Both have batteries of short, peg-like teeth in the upper and lower jaws. Both have tiny teeth in about the same position in the roof of the mouth. But the great difference in the size of the two animals precludes generic relationship.

The generic name *Labidosaurikos* was given to the Crescent specimen because its general appearance is so much like that of *Labidosaurus*. The specific name, *meachami*, is in honor of Dean E. D. Meacham who has been consistently helpful to faculty and graduate students engaged in research at the University of Oklahoma.

During the past few years, three exceptionally large Permian vertebrates have been discovered in north central Oklahoma. The present specimen, *L. meachami*, is the largest captorhinid known to the writer. In a previous paper, the writer reported what appears to be the largest known American Permian reptile, and in January of 1948 he reported an unusually large embolomeroous amphibian (Stovall, 1937, 1948).

All of these specimens came from the same general area and within a few hundred feet of each other vertically. It has not

been determined whether there is any significance in this fact. Some possibilities suggest themselves. Can these excessive sizes be accounted for by special conditions that influenced the evolution of these animals, or may their large size be accounted for by the lingering on of favorable Permian habitats in this area? *Cotylorhynchus romeri*, the large reptile referred to above, appears to be the most recent of the Permian vertebrates. Since the area has not been completely worked, additional exploration should prove profitable, especially if stratigraphic or paleontologic evidence can be found to correlate this area with the north Texas and southern Oklahoma region.

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