COTYLORHYNCHUS ROMERI, A NEW GENUS AND SPECIES OF PELYCOSAURIAN REPTILE FROM OKLAHOMA.

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ABSTRACT.

A new pelycosaur related to *Casea* is described as *Cotylorhynchus romeri*, gen. et sp. nov., on the basis of a skull, interclavicle and manus from the Permian (Hennessey shales) of Oklahoma.

Although much of Oklahoma is underlain by Permo-carboniferous "redbeds," few vertebrate specimens have been found in these deposits within the state. Such discoveries as have been made, however, have usually proved of interest, including a number of forms not recognized in the more abundant Texas fauna. To this statement the Oklahoma materials described below are no exception, consisting as they do of remains of a new type of pelycosaurian reptile.

The specimen described in this paper was collected by W. S. Strain, graduate assistant in vertebrate paleontology at the University of Oklahoma, in January of 1937 on the farm of Mr. L. D. Ross (NW¼-S4-T15N-R4W), about four and three-quarters miles west of Navina, Logan County, Oklahoma. Discovery was made in a pit from which shale and rock were being removed for use on the roads of the region.

It is unfortunate that only the three parts of the skeleton figured and described here were saved, for doubtless an almost or quite complete individual was present but was destroyed by a grading machine.

The specimen came from the Hennessey shales, about 200 feet above the top of the Garber. The Hennessey at the site shows the typical maroon color with bands of gray sandy shale measuring from a fraction of an inch to more than a foot in thickness. Scattered through the maroon shale there are grayish spheres from one-half inch to five inches in diameter. Throughout the matrix and sometimes beneath and replacing part of the bone there were small solution pits partly filled with selenite.

A second apparently closely related specimen was discovered in the same pit about 50 yards to the north. A third individual which may belong to the same group has more recently been

discovered three and one-half miles northeast of Norman. In both cases, preparation has not progressed far enough to warrant more than a few very general conclusions concerning their affinities. Both of these later discoveries are larger. The second specimen consists of a skull and several associated vertebrae and ribs. In the third specimen, most of the skeleton from a short distance back of the skull appears to be present.

Description of Material. The portion of the skull preserved in this specimen includes a large part of the right side of the face, the rest of the skull having been removed by the grading machine. The orbit is complete. The greater part of the bone surrounding the external naris is preserved. This opening was of relatively enormous size and immediately invites comparison with the conditions found in *Casea*.[1] The narial opening is surrounded by a depressed and somewhat cup shaped bony area which in life was occupied, presumably, by an outer portion of the cavity of the nostril. The main body of the premaxilla is preserved; the ascending process uniting with the nasals has been destroyed. (Figs. 1 and 2) The suture separating the premaxilla and maxilla is clearly seen on both the external and internal surfaces. The maxilla rises in a sharp peak high up on a narrow bridge of bone between the nostril and orbit. Internally, the lacrimal descends to considerably overlap the maxilla. Both premaxilla and maxilla are pierced by a number of foramina for nerves and blood vessels, a particularly prominent one being situated below the posterior margin of the naris. The jugal appears to be preserved in its entirety. In relation to the large size of the orbit and, seemingly, to the temporal fenestra as well, it is a small bone. Externally, it forms but a small area of the lower margin of the orbit, but rises to form a portion of the postorbital bar. Internally, however, it is buttressed strongly upon the dorsal surface of the maxilla and extends forward nearly to the lacrimal. (Figs. 1 and 2)

Postero-ventral to the jugal is an element which appears to be the quadratojugal. The quadrate is, unfortunately, absent and details here are obscure. The upper boundary of the lacrimal cannot be determined, but this element presumably occupied most of the bar between the nostril and orbit and ventrally overlaps the maxilla widely on the interior aspect.

[1] Williston, S. W.: *New Permian Reptiles: Rhachitomous Vertebrae*, Jour. of Geol., Vol. 18, pp. 590, 1910.

On the lacrimal, a pronounced vertical ridge extends down the anterior margin of the orbit. The lacrimal duct presum-

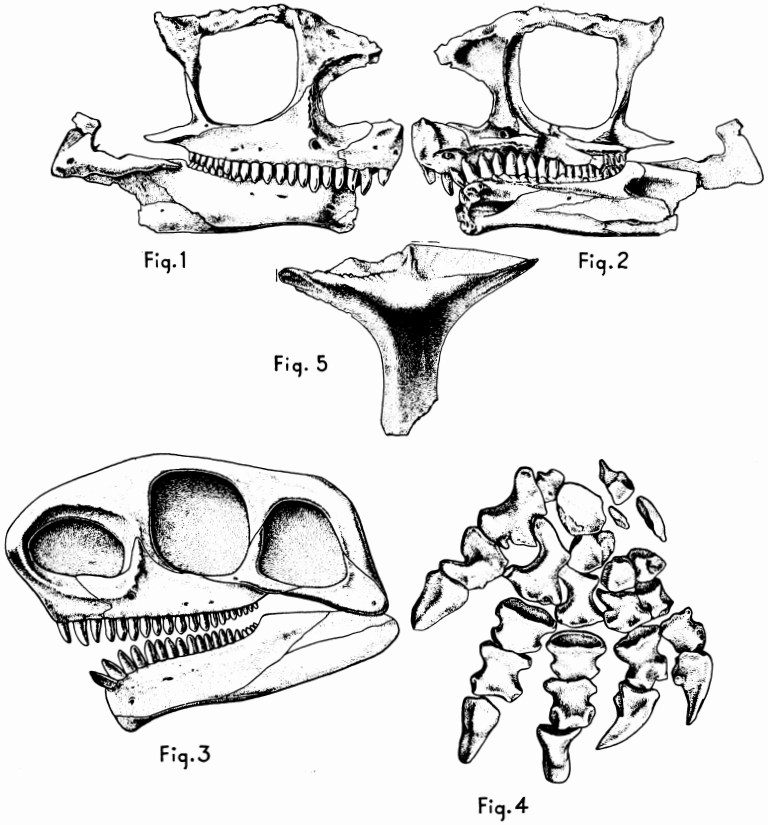

Plate I.

Fig. 1. Right side of face of *Cotylorhynchus romeri.* Length, 147 mm.
Fig. 2. Inside view of Fig. 1.
Fig. 3. Attempted restoration of skull of *Cotylorhynchus romeri.*
Fig. 4. Left manus of *Cotylorhynchus romeri.* Length, 130 mm. (This would be somewhat longer, if the toes were straightened out.) Width, 123 mm.
Fig. 5. Interclavicle of *Cotylorhynchus romeri.* Length 76 mm. Width, 114 mm.

ably passed forward in the notch below this ridge. A fragment of the palatine is attached to the maxilla.

There is no evidence of the small teeth present on the coronoid as in *Casea.* The posterior part of the surangular is

broken; the fragment remaining lies behind the coronoid and above the pre-articular and the angular. The posterior portion of the pre-articular is relatively wide, the anterior half occupying a re-entrant in the splenial. The anterior end of the angular terminates at a point beneath the fifteenth tooth in the dentary. (Fig. 2)

At the symphysis of the mandible, the dentary and splenial portions are distinctly separated. This feature is shared by this form with *Casea*[2] and *Edaphosaurus*.[3]

The dentition of the present form, as in *Casea*, is essentially isodont; and the teeth are blunt. There are, however, certain differences. In *Casea*, the teeth are described as simply conical, but in the present specimen they are somewhat bulbous, rather as in *Edaphosaurus*, and chisel-like at the tips. In *Casea*, there are two teeth in the premaxilla, nine in the maxilla and eleven in the dentary. Here the number is much greater, with three in the premaxilla, seventeen in the maxilla and about nineteen in the dentary. The number of teeth may, of course vary slightly from time to time in the same individual; here the sixth maxillary tooth from the rear is considerably smaller than its neighbor and is thus apparently being replaced.

The second specimen shows that the remaining portions of the skull had a considerable resemblance to *Casea*, in the great breadth posteriorly and in the large pineal opening, for example. In Fig. 3 is shown an attempted restoration of the skull in side view. The dorsal outlines from this other specimen indicate a somewhat flattened condition of the skull in the region above and behind the orbits.

The foot, shown in Fig. 4, seemed to be definitely from the same individual as the skull as was stated above. It still rests on the matrix just as found except that the presumed fifth toe, found turned sharply beneath the fourth, has been shifted out into its approximate normal position. The foot was right side up, but directed away from the skull, from which it was separated by about fifteen inches. The interclavicle lay between the skull and foot.

It is obvious that the foot is unlike that of any ordinary pelycosaur; and, hence, one would at first sight tend to suspect that the association is incorrect. Nevertheless, the evidence outlined above, plus the high degree of ossification of the ele-

[2] Ibid.
[3] Case, E. C.: Bull. Mus. Nat. Hist., Vol. 22, pp. 19-26, 1906.

ments, unlike that of most contemporary amphibians and cotylosaurs, tends to confirm the association.

The lack of any remains other than fragments of proximal podial elements makes it uncertain whether the specimen is manus or pes, right or left. The most reasonable interpretation, however, is that it represents the left manus. It is thus described on that assumption.

Proximal to the metacarpals are elements assumed to represent distal carpals 1, 3, 4, and 5. The large element is assumed to be a centrale and distal carpal 2 presumably occupied the empty space between the centrale and metacarpal 2.

The metacarpals and phalanges are unique among the known pelycosaurs for their short stout build. The first, second, and particularly the third unguals are stout, recurved and only moderately compressed as if they bore a hoof-like structure. The fourth and fifth are also stout and recurved but are more claw like. The unguals are, in general, of pelycosaur type. The phalangeal formula of 2, 3, 3, 2, 2 is unlike that of any known contemporary reptile in its reduction, although paralleled to some extent among the later pareiasaurs and therapsids. The outer digits have undergone strong reduction in length, and in correlation it may be noted that the metacarpals decrease both in length and stoutness from the center to the outer side.

If the foot be interpreted as pertaining to the right side, the distal carpals can be made to fit into a more normal series, the element here assumed to be a centrale being interpreted as the normally large fourth distal carpal. But this interpretation involves, it is obvious, as great or greater difficulties than the alternate view here adopted.

Casea and *Trichasaurus*[4] have been figured by Williston as having the normal primitive reptilian formula of 2, 3, 4, 5, 3; but it will be noted that the restoration is entirely arbitrary; few contacts were actually present in the material of those forms. It may be that this group of pelycosaurs were undergoing a reduction in phalangeal formula comparable to that of their collateral descendents among the therapsid groups.

The interclavicle, found associated with this material is of essentially pelycosaurian type, as far as preserved. It is unusual for the width, relative to length, of the expanded anterior portion.

It is obvious that this material represents a form allied to

[4] Williston, S. W.: Op. cit.

Casea but generically distinct. Among the numerous skull remains from Texas, nothing resembling the present specimen has ever been found. *Trichasaurus* (*Trispondylus*) from the Clear Fork group is, as Williston notes, presumably a larger relative of *Casea*. Since the *Trichasaurus* remains include only the posterior part of the body and the material here described only the anterior portion, it is possible that the present material pertains to that genus. But this is incapable of proof, and the other known contrasts between Oklahoma and Texas faunas render it probable that even were our knowledge more complete, the two would prove to be distinct.

The description of the present form as representing a new genus seems justified under the circumstances. The writer therefore considers this a genus and species of pelycosaurian reptile allied to *Casea* Williston but differing, as far as known, from that form in (1) more pronounced cup-like character of the naris; (2) larger size; (3) narrower bars between nostril and orbit and between orbit and temporal opening; (4) marginal teeth more numerous, three on premaxilla, seventeen on maxilla, about nineteen on dentary; (5) teeth somewhat bulbous; (6) no coronoid teeth. The writer proposes the generic name of *Cotylorhynchus* because of the marked cup-like character of the naris and the species name of *romeri* in honor of Prof. Alfred Sherwood Romer, of Harvard University, whom he wishes to thank for a very careful study of and excellent notes on this specimen. He also is greatly indebted to Mr. L. I. Price, assistant to Professor Romer, for the preparation of the unusually fine drawings accompanying this paper.

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