A MOUNTED SKELETON OF PLATECARPUS

S. W. WILLISTON
The University of Chicago

In the summer of 1903, Professor E. B. Branson, then a student of the University of Chicago, discovered, near the mouth of Hell Creek in Logan County, Kansas, and collected with my aid, a remarkably complete specimen of a species of *Platecarpus*, which I refer, with little hesitation, to *P.* (*Holosaurus*) *abruptus* Marsh. In its vicinity another specimen almost identical with it in size and characters was discovered by Mr. E. Ball of the same party. A brief reference to some of the characters of the more complete of these two specimens was given by me in this *Journal* for January, 1904 (p. 30), and, later, Mr. S. R. Capps, under my advice, made a careful study of the hind extremity, publishing his results in this *Journal* for May, 1907 (p. 350). Since then both of these specimens have been thoroughly worked out of the matrix by Mr. Paul Miller, and one of them has been mounted as a wall specimen in the Walker Museum of the University of Chicago, a photograph of which is given in the present communication. It was first planned to mount the more perfect of the two specimens, but the horizontal flattening of the skull rendered it less adaptable for a plaque mount, and the specimen has been reserved for a free skeletal mount at some later time. The less complete of the two has therefore been placed upon the wall, its missing parts reproduced by casts from the more perfect one; this specimen fortunately had its skull bones preserved separately, in a macerated condition, with but little or no distortion, permitting their articulation in a normal position. The vertebral column was very complete and continuous to about the seventieth vertebra, that is the forty-seventh of the tail. The pectoral girdle, save the right humerus, and most of the hind paddles and pelvic girdle were preserved, in large part, in their natural relations; of the ribs many of the shorter ones were gone; these, together with the distal portion of the tail, have been reproduced from the other specimen, and the left humerus has been used instead

of the right. The specimen, therefore, has very little that is conjectural about it save the terminal phalanges of the paddles. Of the more complete specimen the vertebral column lay with every vertebra articulated and in position from the skull almost to the extreme tip of the tail, the last one preserved measuring about eight millimeters in diameter. Of the many hundreds of specimens of mosasaurs which I have collected, I have seen but very few with the extreme tip of the tail preserved in position; the small nodular terminal centra, feebly attached in life, are almost always dispersed. Of this series of vertebrae seven are cervical, twenty-three are dorsal, the first non-costiferous vertebra being the twenty-fourth. This is one more than I have found positively in other specimens, and in the specimen mounted, and is precisely the number I found in specimens of *Tylosaurus proriger;* while Osborn has recorded twenty-two as the number found by him in a specimen of *Tylosaurus dyspelor.* Of the caudals, six are pygals, one more than I have found in specimens of *Platecarpus coryphaeus.* Seventy caudal vertebrae were preserved in position, to which perhaps six or eight terminal nodular ones may be added, making eighty-five or eighty-six in all, about the number estimated by me as characteristic of *Platecarpus.* The distal caudals have, it is seen, a distinct elevation of the spines, a character I have never seen in other specimens of *Platecarpus.* Osborn has figured the tail of *Tylosaurus dyspelor,*[1] with a distinct elevation of the distal spines. His figures and statements do not need corroboration; the character certainly exists in the figured specimen. On the other hand, v. Huene[2] has recently figured specimens which he refers to the same species, which do not

[1] *Memoirs American Museum,* I, Pt. IV, 178.

[2] *Geologische paleont. Abhandlungen* (1910), VIII, 297.

show this distal expansion of the tail, and which the author denies. He also finds in the tail positive evidence of ninety-six caudal vertebrae (including the pygals), and estimates, though I think on insufficient foundation, twelve or fourteen more. (I may say, parenthetically, that the position in which bones are found in the Kansas chalk has no value as an indication of missing parts.) In the species *T. proriger* I have found eighty-eight as the full number in a specimen, in which every vertebra was found articulated, from the skull, to the minute ones of the tail. This specimen I have recently re-examined in the University of Kansas. There may have been one or two vestigial nodules at the extreme tip missing. In this specimen there was no conjecture, each vertebra as it was taken from its articulated position was numbered, and placed in its original position in the mounted specimen. From all of which facts it would seem to be evident that there may be individual or specific differences as regards the number of vertebrae in the mosasaurs.

In comparison of the paddles as shown in this restoration and as figured by Capps (*op. cit.*) it will be seen that the numbers of phalanges do not quite agree. A further examination of the various paddles of this genus leads me to the conclusion that the supposed missing phalanges in the specimen figured by Capps were not real, and that practically all the phalanges were secured. I think that the numbers for the different toes were essentially those originally given by Marsh for *Platecarpus* (*Lestosaurus*).

Here too, as is conclusively shown by a comparison of the paddles of the American Museum specimen of *Tylosaurus dyspelor* with that of *Tylosaurus proriger* of the University of Kansas, there are either individual or specific differences.

Huene finds in one of his specimens of *T. dyspelor* what he believes to be vestigial nasal bones. I quite agree with him that the nasal bones in the mosasaurs are not fused with the extremity of the premaxillae, but I have never found in any of the numerous specimens of mosasaurs any vestigial bones that seem beyond doubt to be the real nasals, such as Huene figures. I have seen in several skulls remains of the suture between the post-orbitals and post-frontals, but almost invariably the suture is wholly obliterated, and it may be possible that the nasal bones are thus indistinguishably fused in most specimens of

Platecarpus. Quite certain it is that in the specimens under consideration there are no such separate bones. Incidentally I may mention that in *Pteranodon* among pterodactyls the fibula is supposed to be absolutely wanting, yet in a specimen in our collection I find distinct remains of it fused with the tibia.

I have for some time agreed with Thyng and v. Huene in their conclusion that the real squamosal bone of the mosasaurs (and lizards) is that connecting the post-orbital with the so-called supratemporal bone, though Thyng, not reading my text but examining my figure alone, goes to considerable trouble to prove that I was wrong (see *Biological Bulletin*, VII, 189 ff.). But I agree with neither of these authors in considering the posterior element, that intercalated between the squamosal and exoccipital and pro-otic, as the so-called supratemporal. It is a matter of surprise to me how persistently all students of the temporal arch of the mosasaurs and lizards have ignored the description and figures of this bone given by Cope and myself. From Baur to the present time, save Merriam and myself, no one has paid any heed to Cope's descriptions. At the risk of being discursive I will quote what I have previously published in the article already quoted:

> Baur vigorously urged that the bone at the end of the suspensorium is the squamosal, but Baur never fully understood the relations of this bone in the mosasaurs, as is evidenced by his faulty description of it.[1] As Cope has repeatedly affirmed and as I have confirmed,[2] this so-called squamosal (supratemporal Huene) of the mosasaurs is intercalated between the exoccipital and the pro-otic, extending far inward, nearly to the surface of the braincase. It needs but a moment's consideration by any one familiar with the relations of this bone in these animals and in the mammals to be convinced that such remarkably different conditions cannot be those of the same bone. The inner part of the (squamosal) [deeply wedged in as it is between two cartilage bones] corresponds quite well with the outer part of the opisthotic, which was not found in the lizard embryo by Parker. "In some of the genera of Stegocephala the paroccipital is free from the exoccipital; in others (*Mastodonsaurus*) it is co-ossified with the exoccipital. The paroccipital is in relation to a dermal plate which is very improperly called the epiotic. I propose the name paroccipital plate for it."[3]

[1] *Journal of Morphology* (1892), VII, 14.

[2] Cope, *Trans. Amer. Phil. Soc.* (1892), XVII, 19; Williston, *Univ. Geol. Survey* (1898), IV, 121.

[3] Baur, *Journal of Morphology* (1889), III, 469.

It may be objected that the presence of an epiotic bone in the lizards is a far too primitive character, but we are now quite certain that the lizards are an extremely old group, probably dating from the Permian, and that they have not a few primitive characters, etc.

In a recent paper[1] I have again expressed the opinion that the squamosal of Baur, the supratemporal of Thyng, v. Huene, and others, is in reality the "epiotic," paroccipital plate, intercalare, tabulare, or post-temporal (for these are some of the names the bone has received) of the stegocephs.

In his discussion of the elements of the mandible I do not think that v. Huene does Baur justice. Baur it was who, for the first time, correctly made out the structure of the reptilian mandible. His mistake was in starting with the turtles as the basis of his revised nomenclature, instead of the crocodile, to which the names of the bones were originally given. This fact I tried to make clear in *Science*, and in my paper on the plesiosaurs,[2] where I introduced, for Baur's angular, the name prearticular, now generally used. Kingsley, later, overlooking this term (very naturally, for it was hidden away), reached the same conclusion, but gave the name dermarticular for the element in question, a term in some respects more appropriate than mine, but, because of doubtful homologies, not to be unreservedly recommended. The prearticular occurs as an independent bone in many, if not all dinosaurs, the chelonia, plesiosaurs, pelycosaurs, and probably all the old reptiles and stegocephs.

[1] *American Journal of Anatomy*, X, 82.

[2] *Field Columbian Museum Publications*, No. 73, p. 30.