

**Article X. — A REVISION OF THE SPECIES OF THE FAMILY OF FOSSIL TURTLES CALLED TOXOCHELYIDÆ, WITH DESCRIPTIONS OF TWO NEW SPECIES OF TOXOCHELYS AND A NEW SPECIES OF PORTHOCHELYS.**

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In the present paper the author proposes to present briefly some of the results of his studies on the species of *Toxochelyidæ*, reserving more complete descriptions, illustrations, and conclusions for his forthcoming monograph on the fossil turtles of North America. This preliminary paper is published with the consent of the Carnegie Institution of Washington, to which the writer is indebted for aid in its preparation.

***Toxochelys latiremis* Cope.**

This is the type species of the genus *Toxochelys*. The type specimen is the property of the American Museum of Natural History. This type consists of the greater portion of the lower jaw and the coracoid bone, of a large specimen. Its number in the Museum's catalogue is 2362. The species was described and illustrated by Professor Cope in his work, 'The Vertebrata of the Cretaceous Formations of the West,' 1875, p. 98, pl. viii, figs. 1, 2. The American Museum possesses also the skulls of this species which were described by Professor Cope in the 'Proceedings of the American Philosophical Society,' volume XVII, p. 176.

***Toxochelys brachyrhinus* Case.**

Dr. E. C. Case described this species in 1898 (Univ. Geol. Surv. Kansas, IV, p. 378, pl. lxxxiv, figs. 1, 2). His description was very brief. The blunter snout and the more nearly parallel lateral outlines of the skull are regarded by him as distinguishing this species from *T. latiremis*.

Through the courtesy of Dr. C. E. McClung, in charge of the palæontological collection of the University of Kansas, I have been permitted to study the types of this species, as well as the other fine chelonian materials in that institution.

The skull of *T. brachyrhinus* is narrower posteriorly in proportion to the length than is that of *T. latiremis*, the width at the quadrates

being only eight-tenths of the length from the snout to the occipital condyle; whereas, in *T. latiremis* the width is nine-tenths of the length.

The constricted portion of the pterygoid region is narrower than it is in *T. latiremis*. In the type this measures 20 mm., the length of the skull to the occipital condyle being 117 mm. In a skull of *T. latiremis*, whose length is 130 mm., the region in question is 36 mm. wide. The interorbital space of *T. brachyrhinus* also is narrower than in *T. latiremis*, being in the type only 19 mm.; whereas, in the specimen of *T. latiremis* just mentioned this space is 24 mm. wide.

### *Toxochelys serrifer* Cope.

The type of this species forms number 1835 of the American Museum of Natural History. It was collected in the Niobrara deposits of Kansas, by Professor Merrill of Topeka, in the year 1865, as shown by Professor Cope's label. The exact locality is not stated. The species was published by Cope in his 'Vertebrata of the Cretaceous Formations,' etc., p. 299, but no illustrations were furnished.

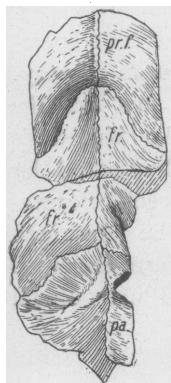


Fig. 1. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Portion of skull seen from above. *fr.*, frontal; *pa.*, parietal; *pr.f.*, prefrontal.

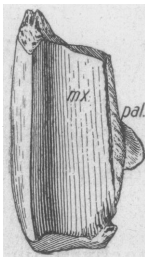


Fig. 2. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Seen from below. *mx.*, maxilla; *pal.*, palatine.

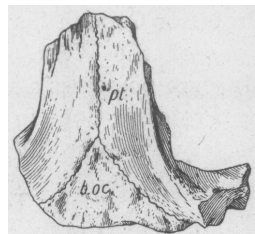


Fig. 3. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Base of skull. *b.oc.*, basi occipital; *pt.*, pterygoid.

The type consists of portions of the skull, the left half of the lower jaw, and two peripherals. Drawings of most of these parts are here presented, all of the natural size.

Figure 1 represents a portion of the upper surface of the skull. The anterior ends of the prefrontals, partly forming the boundary of the nasal aperture and partly joining the ascending processes of the maxillæ, have been crumbled away. The interorbital space has been 17 mm. wide. The frontals have entered widely into the orbits.

Figure 2 represents the hinder portion of the maxilla, seen from the palatal surface. On the right of the figure appears a portion of the palatine. The triturating surface of the maxilla is smooth and flat. The cutting border descends somewhat below the level of the triturating surface.

Figure 3 presents a view of the base of the skull: that is, of the greater portion of the pterygoids and the basisphenoid. The constricted portion of the pterygoid region has a width of 15 mm. The quadrate, not here figured, has an unusually small articu-



Fig. 4. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Left dentary from above.



Fig. 5. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Left dentary from inner side.



Fig. 6. *Toxochelys serrifer* Cope. Type.  $\times 1$ . Section through symphysis of lower jaw.

lar surface for the lower jaw. Posteriorly there is a sharp and deep notch for the passage of the stapedial rod.

The lower jaw is represented by Figures 4-6. The triturating surface (Fig. 4) is slightly concave transversely, strongly concave from the symphysis to the coronoid process. This bone is 48 mm. long. The triturating surface is 9 mm. wide, as wide as that of the jaw of a specimen of *T. latiremis* whose dentary is 87 mm. long. The inner face of the bone (Fig. 5) is occupied by a broad groove. The dentary has been suturally articulated with its fellow at the symphysis. Figure 6 presents a view of the symphysis.

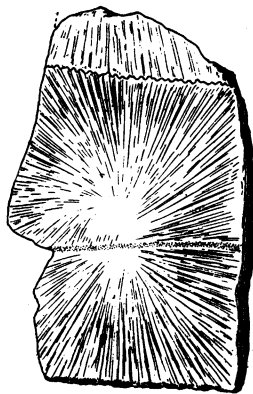


Fig. 7. *Toxochelys serrifer* Cope. Type.  $\times 1$ . A peripheral bone.

One of the peripheral bones is shown by Figure 7, probably the penultimate of the left side. It resembles much the penultimate peripheral of *Colpochelys kempii*, except that the notch is deeper and the pit for the rib is at the hinder end of the inner face of the bone, instead of the front end. The peripherals are thin, only about 7 mm. thick; but this thinness may be partially due to crushing. The specimens described by Dr. E. C. Case under the name of *T. serrifer* are here made the types of a distinct species.

**Toxochelys stenoporus**, sp. nov.

The specimens which form the type of the present species were referred by Dr. E. C. Case (Univ. Geol. Surv. Kansas, IV, p. 379) to Cope's *T. serrifer*. Dr. Case did not have access to Cope's types and it is not surprising that he should have identified his materials as he did. The present writer has had the privilege of studying these materials in the collection of the University of Kansas.

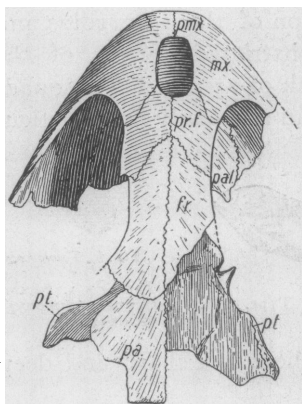


Fig. 8. *Toxochelys stenoporus* Hay. Type.  $\times 1$ . Skull from above. *fr.*, frontal; *mx.*, maxilla; *pa.*, parietal; *pal.*, palatine; *pmx.*, premaxilla; *pr.*, prefrontal; *pt.*, pterygoid.

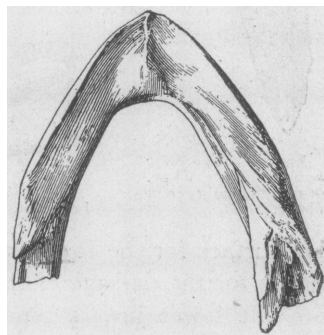


Fig. 9. *Toxochelys stenoporus* Hay. Type.  $\times 1$ . Lower jaw from above.

Of the bones figured by Dr. Case, the skull, pl. lxxxii, figs. 4, 5, the peripherals of pl. lxxxiii, fig. 1, and the hypoplastron, pl. lxxx; fig. 3, are marked with the number 2060; while the elements furnishing the hypoplastron and the xiphiplastron of pl. lxxx, fig. 4, and the neurals and suprapygals of pl. lxxxiii, fig. 1, belong to number 1270, of the catalogue of the collection. There is no reason for doubting that all belong to the same species. It may be remarked that Dr. Case's figure representing the plastron of this species has been inverted.

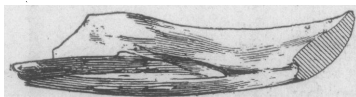


Fig. 10. *Toxochelys stenoporus* Hay. Type.  $\times 1$ . Dentary from inner side.



Fig. 11. *Toxochelys stenoporus* Hay. Type.  $\times 1$ . Section through symphysis of lower jaw.

A new figure is here presented of the skull seen from above (Fig. 8). The most remarkable feature of the skull is the narrow nasal opening. This appears to be the natural condition, there being no evidence of crushing. The skull has evidently been relatively broad. The distance between the hinder ends of the maxillæ has



Fig. 12. *Toxochelys latiremis* Cope. Section through symphysis of lower jaw.

The distance between the hinder ends of the maxillæ has

equalled the distance from the snout to the middle of the basisphenoid; whereas, in *T. latiremis* the maxillary width reaches back only to the narrowest portion of the pterygoids. The masticatory surfaces of the jaws have been relatively broader than those of *T. latiremis*. Perhaps the most important differences between the two species, *T. serrifer* and *T. stenoporus*, are to be found in the lower jaws. The tip of the lower jaw of *T. serrifer* is rather blunt; that of *T. stenoporus* (Fig. 9) has been beaked. The length of the masticatory surface of the lower jaw of *T. serrifer* is 48 mm.; that of the type of *T. stenoporus* 33 mm. Notwithstanding this difference of length, the height of the inner face of the dentary of the two specimens is the same, 7 mm. Figure 10 shows the left dentary seen from the inner side. Figure 11 shows the form of the symphysis, and is to be compared with Figure 6, the symphysis of *T. serrifer*, and with Figure 12, the symphysis of *T. latiremis*.

***Toxochelys procax*, sp. nov.**

*Toxochelys procax* is based on a large skull which was found by Mr. H. T. Martin, in the Niobrara Cretaceous deposits along the Smoky Hill River, Kansas, in 1901. This was purchased for the American Museum of Natural History and now bears the number 234. The bones forming the roof of the skull behind the orbits are now missing, and the pterygoids are somewhat damaged. Only the tip of the lower jaw is present. The individual has been a large one, the length of the skull

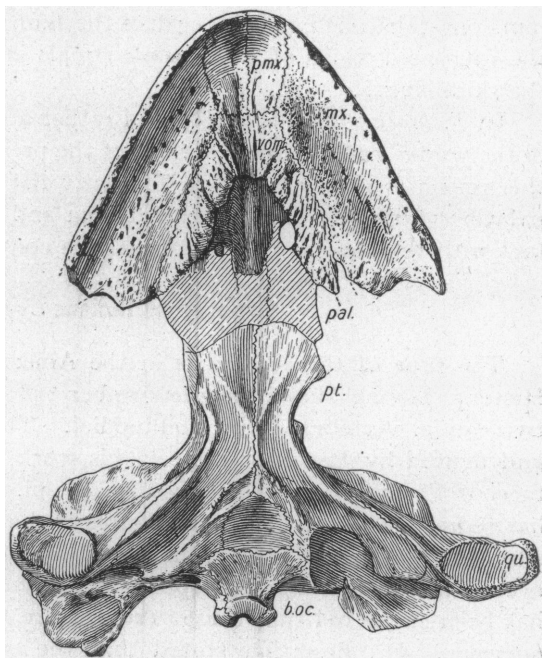


Fig. 13. *Toxochelys procax* Hay. Type.  $\times \frac{1}{4}$ . Skull from below. *boc.*, basioccipital; *mx.*, maxilla; *pal.*, palatine; *pmx.*, premaxilla; *pt.*, pterygoid; *qu.*, quadrate; *vom.*, vomer.

from the snout to the occipital condyle being 165 mm. The bones are rather massive and rough.

This species is to be distinguished from *T. latiremis* by the straighter outlines of the anterior half of the head (Fig. 13), the narrower ptery-



Fig. 14. *Toxochelys procax* Hay. Type.  $\times 4$ . Top of lower jaw seen from above. Section through the symphysis.

goids at the constricted portion, the somewhat more posteriorly placed choanæ, the broader articulation between the vomer and the maxillary processes of the palatines, and the broader and flatter symphysis of the lower jaw. As may be seen on examining Figure 14, the symphysis of *T. procax* is long and flat on the upper surface, and the hinder face stands at right angles with it and is traversed by a groove; while the symphysis of *T. latiremis* (Fig. 12) is slightly concave above and slopes downward and backward, and the hinder face is almost a continuation of the upper, sloping downward and backward, but more rapidly.

The narrowest portion of the pterygoid region has a width of 22 mm., one-thirteenth of the length of the skull to the condyle; whereas, the pterygoid width of *T. latiremis* equals about one twenty-third of the skull length.

In *T. procax* there is a deep and rather abrupt longitudinal groove in the vomer and the lower surface of the premaxillæ. In *T. latiremis* this region is nearly flat. In *T. procax* the maxillary process of the palatine extends in front of the choana and forms an extensive contact with the vomer; in *T. latiremis* the contact is narrow.

### ***Cynocercus incisus* Cope.**

The type of this species is in the American Museum of Natural History, having the catalogue number 1583. This type consists of two caudal vertebræ and a metapodial. These have been described and figured by Professor Cope in his work, 'Vertebrata of the Cretaceous Formations of the West,' p. 96, pl. viii, figs. 3-5. Dr. Case has redrawn and published the figures of the vertebræ in the 'University Geological Survey of Kansas,' IV, p. 369. No new facts have been learned regarding this species since its original publication. It has been suspected that these vertebræ are the caudals of *Toxochelys latiremis*. Dr. Baur has stated that the caudals of *Toxochelys* are procœlous; but this statement may rest on the assumption that *Cynocercus* is a synonym of *Toxochelys*. Dr. Case has stated that the locality where this species was discovered was not given by Cope; but this is an error. In the 'Proceedings of the American Philosophi-

cal Society,' XII, 1872, p. 308, Professor Cope says that it was found on Butte Creek, south of Fort Wallace.

***Porthochelys laticeps* Williston.**

This fine species was described by Dr. S. W. Williston in the 'Transactions of the Kansas Academy of Science,' XVII, B. 1901, p. 195, pls. xviii-xxii. It was collected in the Niobrara deposits, on the Saline River, in Trego County, Kansas. It is represented by the skull, a large portion of the carapace, most of the plastron, and a humerus. The skull is remarkable for the massiveness of the jaws and for the breadth, this being equal to the length from the snout to the occipital condyle. The writer has nothing to add to the description, except that nasal bones are certainly present.

***Porthochelys browni*, sp. nov.**

This species evidently attained a large size. The type materials were collected in 1903, by Mr. Barnum Brown, of the American Museum of Natural History, at a locality twenty miles south of Edgemont, South Dakota. From invertebrate remains collected at the same locality it has been determined that the deposits belong to the Pierre formation. The number of the specimen is 6080. This specimen includes the nearly complete skull and lower jaw, portions of the shoulder girdle, a humerus, the ulna and radius, a portion of the pelvis, a femur, and a tibia, together with some

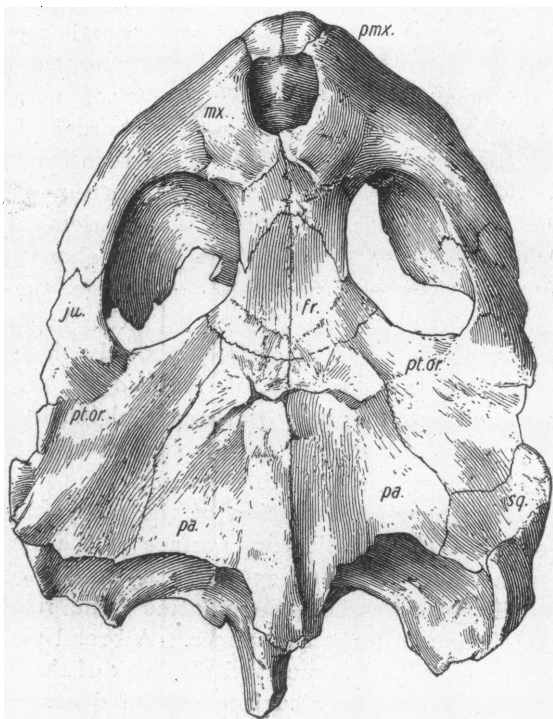


Fig. 15. *Porthochelys browni* Hay. Type.  $\times \frac{1}{2}$ . Skull from above. *fr.*, frontal; *ju.*, jugal; *mx.*, maxilla; *pa.*, parietal; *pmx.*, premaxilla; *pt. or.*, postfrontal; *sq.*, squamosal.

other fragmentary bones. All of these bones have suffered considerable crushing during fossilization, and are covered with a coating of gypsum. The sutures of the skull are mostly obscure.

The skull is large and broad (Fig. 15). It has apparently been rather depressed; but in the present condition of the specimen this

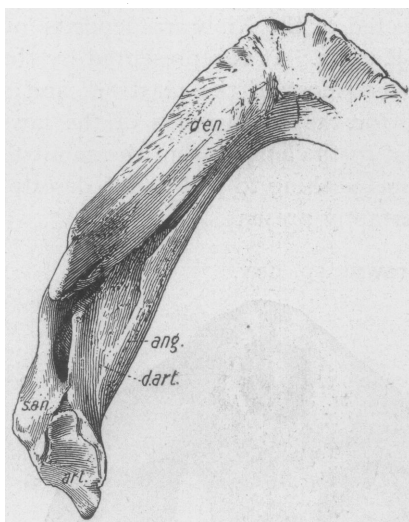


Fig. 16. *Porthochelys browni* Hay. Type.  $\times \frac{1}{2}$ . Lower jaw from above. ang., angular; art., articular; d.art., dermarticular; den., dentary; s.an., surangular.

cannot be determined with certainty. The length from the snout to the occipital condyle is 160 mm.; the width from the outside of one quadrate to the outside of the other is 142 mm. It will be seen, therefore, that the skull has not been relatively so broad as in *P. laticeps*, of the Niobrara formation. The temporal region is broadly roofed over, the posterior border of the roof permitting only a narrow border of the paroccipital to be seen from above. The suture between the squamosal and the parietal appears to have a length of about 20 mm. The orbits are large, the length being 50 mm., the height, 35 mm. Since the

height of the orbits has almost exactly the same ratio to the length as is found in a specimen of *Chelonia mydas*, it seems probable that the skull was originally not much higher in the region of the orbits than now, and that the orbits looked strongly upward. The inter-orbital space has a width of 30 mm.

The constricted portion of the pterygoid region has a width of 39 mm. The masticatory surface of the upper jaw is concave and has a width of about 25 mm. As in the other Toxochelyidæ, the maxillary process of the palatine bone reaches forward outside of the choana to meet the vomer. A broad pit in the lower surface of the premaxillæ has received the beak of the lower jaw.

The masticatory surface of the dentary bone (Fig. 16) has a length of 85 mm. This rises rapidly toward the coronoid process. This surface has been convex transversely and been 17 mm. wide. Its width does not increase backward, as it did in *P. laticeps*.

The humerus has a length of 157 mm. It appears to have re-



sembled closely that of *Toxochelys latiremis*. The ulna measures in length 77 mm.; the radius, 85 mm. Thus these bones are respectively .49 and .54 of the length of the humerus. These ratios are close to those found in *Amyda spinifera*, although the ulna is a little more shortened. In the species just mentioned the ulna and radius are respectively .50 and .53 of the humeral length.

The femur has a portion of its distal end missing. The portion remaining has a length of 135 mm., hence the length could have been little short of that of the humerus. The tibia has a length of 110 mm. These measurements show that the hinder limb had suffered no reduction. The femur and tibia taken together were longer than the humerus and radius combined. This condition is what we find in *Chelydra*.

