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VOL. VI, No. 1, pp. 1–19 (18 figs.) DECEMBER 1, 1939

A NEARLY COMPLETE TURTLE SKELETON FROM THE UPPER CRETACEOUS OF MONTANA

BY

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UNIVERSITY OF MICHIGAN PRESS
ANN ARBOR

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Editor: EUGENE S. MCCARTNEY

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A NEARLY COMPLETE TURTLE SKELETON FROM THE UPPER CRETACEOUS OF MONTANA

By E. C. CASE

IT IS always a satisfaction to recover an anatomically complete skeleton of a form that has previously been known from fragmentary material. Such good fortune came to the expedition from the Museum of Paleontology of the University of Michigan to the Lance beds near Fort Peck, Montana, in the summer of 1938. The party was engaged in the excavation of a dinosaur when a visitor, Mr. Ralph Nichols, discovered a turtle in a deposit of sand approximately one hundred feet above the beds in which they were working. It was the opinion of the author, at the time, that it was dune sand, perhaps of Fort Union age. This was based on the character of the sand, the nature of its bedding, and the fact that discontinuous patches of similar material lay at different levels, unconformably, upon the Lance clays. The opinion was put in question by the discovery that the specimen had been moved as if by a current. The relaxed limbs of the left side were dragged to the right across the plastron and neck, and those of the right side extended in the same direction. This might have been due to sliding of the cadaver upon the dune sand, but is suggestive of movement by water.

The specimen, number 20490 in the Museum of Paleontology of the University of Michigan, was complete except for a small portion of the posterior end of the carapace, the posterior caudal vertebrae, which had been exposed and lost in the loose sand of a cattle track, and the right anterior foot, which was probably torn off before fossilization. Unfortunately the extension of the right limbs was not recognized in the field, and in cutting out the block the distal phalanges were destroyed on all but the left posterior foot.

The sand was so loose that it could easily be cut with a knife and for the most part could be removed from the specimen by a needle or a stiff brush. Within the shell, however, there were

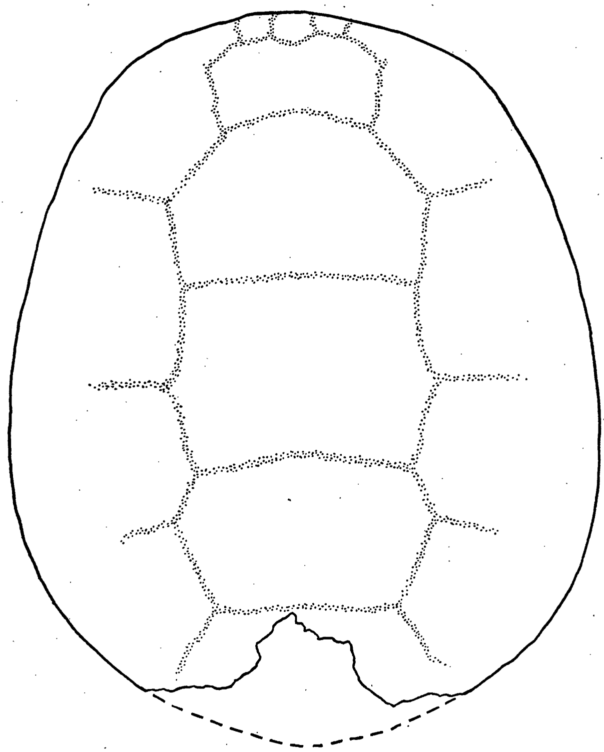

FIG. 1. Restoration of shell, carapacial view, showing outline of the scutes. $\times \frac{1}{3}$

concretions of iron pyrites, which partially enclosed the pelvis and the right half of the shoulder girdle. These parts were cleaned, so far as possible, by a small grinding wheel. The shell and the pelvis were slightly distorted by compression; the other bones are in perfect shape.

The sutures of the shell and of the skull are in large part obliterated, which renders the identification of the specimen uncertain, but, as shown below, the recognizable characters indicate a member of the family Baënidae, and the skull is so similar to that of *Eubaëna* from the same geological horizon, in Wyoming, that it is tentatively referred to that genus.

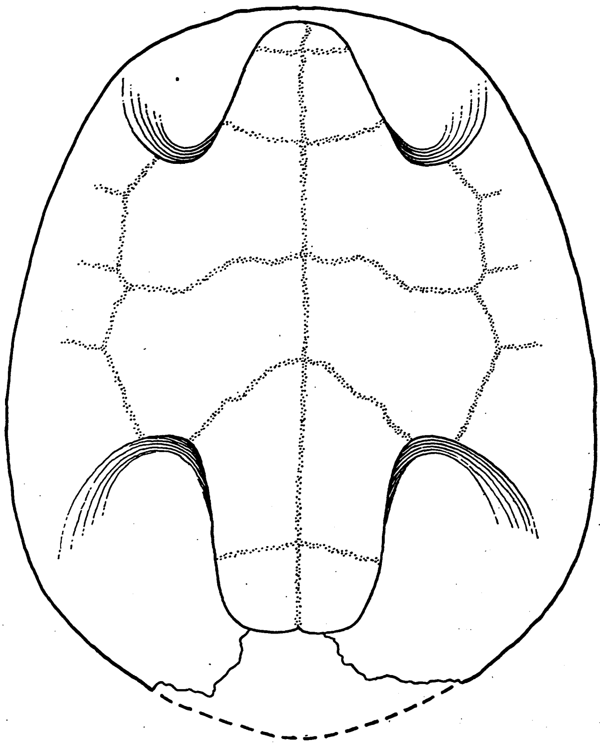

FIG. 2. Restoration of shell, plastral view, showing outline of the scutes. $\times \frac{1}{3}$

As the majority of the turtles from the Lance beds have been described from incomplete shells or fragments of the shell, this portion is discussed first. The form of the shell as preserved is shown in the restoration after correction of a slight distortion (text Figs. 1–2). The ornamentation is a low regular granulation, much reduced by wear on the surface of the carapace; but on unworn areas, such as the posterior lobe of the plastron, there is a suggestion of a vermicular arrangement of the granulation. The ornamentation of the shell is not the same in all parts. Several species described from the ornamentation found on fragments could be identified in this specimen. On the periphery of the carapace the surface shows a textile-like arrangement of the bone fibers such as occurs on the under side of some dorsal scutes in the Triassic phytosaurs and, rarely, in the Crocodilia.

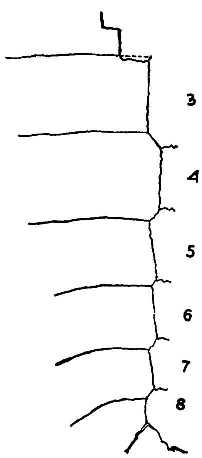

FIG. 3. Outline of the third to eighth vertebral and costal plates as revealed on the under side of the carapace. × $\frac{1}{3}$

The sutures of the shell are not visible upon the exterior, but the approximate outlines of the vertebral and costal [1] plates are determinable on the inner surface (Fig. 3). Unfortunately the sutures of the plastron cannot be made out, but, as mentioned above, so many of the characters of the skeleton correspond with those of the Baënidae that it is believed that a mesoplastron was present.

An attempt was made to determine the presence or the absence of a mesoplastron by taking X-ray photographs in the hope that the course of the closed sutures could be followed. The results were not conclusive. The photographs show centers of os-

[1] In this paper the terminology "vertebral," "costal," and "marginal" is used for the plates of the carapace and "neural," "pleural," and "peripheral" for the scutes.

sification near the axial and inguinal buttresses, and the course of the fibers can be followed. Between the radiating fibers from the two centers there is a space in which the fibers are longitudinal, front and back, and distinguishable from the others. There is no other evidence of the presence of a mesoplastron, and the interpretation is not beyond question. Such as it is, it agrees with other evidence cited, that the specimen is of the superfamily *Amphichelydia* and the family Baënidae. This conclusion is further supported by the facts that vertebral plates were present continuously and that none of the costal plates meet in the midline, as in the majority of the Dermatemydidae.

All scutes but the peripherals are well defined. Their form and position are shown in Figures 1–2. The breadth of the plates and the presence of infraperipherals (inframarginals of Hay) are very characteristic of *Baëna*. Wiman,[2] working on several specimens of *Baëna* and *Basilemys*, has shown how great is the individual variation in the forms and proportions of the scutes; one is reluctant to accept specific identification or separation based on such evidence, especially as the outline of the marginals may be due to distortion of the thin edges of the shell in crushed specimens.

The anterior lobe of the plastron is shorter than the posterior; it reaches almost to the anterior edge of the carapace. The entoplastron and the epiplastra are indistinctly separable by the course of the bone fibers. There is a sharp depression on the upper side of the entoplastron near its anterior edge. The posterior lobe of the plastron ends in a slightly rounded border with a feeble notch at the midline. Each xiphiplastron has a broad shallow depression on the upper surface near the posterior end, which evidently received a portion of the ischium. The surface of the depression is smooth, showing that, though the contact was close, there was no articulation.

On the right side of the carapace, almost directly above the depression on the xiphiplastron, the distal end of the ilium is

[2] Wiman, Carl, "Über Schildkröten aus der Oberen Kreide in New Mexico," *Nova Acta Regiae Societatis Scientiarum Upsalensis*, Series IV, Vol. 9, No. 5. 1933.

attached by matrix in a similar shallow depression. The approach to a pleurodiran type of pelvic attachment is evident.

The skull, though smaller than that of the holotype specimen of *Eubaëna cephalica* Hay (Figs. 1–2, Pl. 21, of Hay [3]), corresponds to it very closely in form and proportions. The similarity is shown in the following table. If the total length is assumed to be 100, the relative proportions of the other dimensions are as given in the second column.

	No. 20490 U.M.	*Eubaëna*
Total length of shell..........	65.5 mm. = 100	74 mm. = 100
Total breadth of shell.........	49.0 mm. = 90	65 mm. = 88
Anterior end of skull to anterior end of temporal, inclusive ...	31.0 mm. = 57	50 mm. = 62
Anterior end of skull to posterior edge of orbit...............	19.5 mm. = 36	29 mm. = 36
Interorbital space.............	18.5 mm. = 34	25 mm. = 34

FIG. 4. Upper view of skull, slightly tilted toward observer. × 1

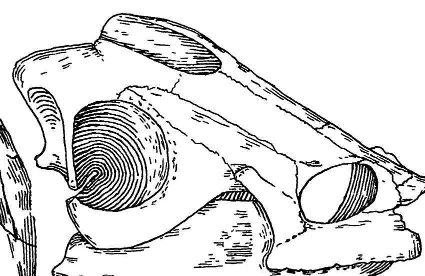

FIG. 5. Lateral view of skull. × 1

The sutures are not clearly distinguishable in all places, and the marks of the scutes are far less clear than on the shell, but enough can be made out to warrant their placement as shown in Figures 4–5.

[3] Hay, O. P., *Fossil Turtles of North America.* Publication 75, Carnegie Institution of Washington, 1908.

The description of the skull of *Eubaëna cephalica* as given by Hay, page 82, and Figure 4, Plate 19, and Figures 1–2, Plate 21, applies so closely to the skull of specimen 20490, except for its slightly larger size, that only such differences as occur need be given, with some addition. The nasal openings look forward, not forward and upward, as do those described by Hay. The premaxillary-maxillary suture is not determinable. The orbits are oval, 18.5 mm. long by 8.5 mm. high. This is quite different from *E. cephalica*, for which Hay gives the same dimensions as 15 mm. and 18 mm., describing the orbits as round. The disparity is due to a slight compression of the skull in the vertical plane. This is particularly obvious on the left side. The tympanic opening is not so nearly circular, but is more flattened posteriorly as the descending portion of the squamosal forces the edge of the quadrate inward. The anterior edge of the temporal excavation is nearly in line with the anterior edge of the tympanic opening.

The nasals cannot be made out as distinct bones, but the roof of the nasal opening reaches so far forward that their presence is very probable. The prefrontals are, as in *Eubaëna*, triangular bones, with the base forming the border of the orbit and the apex forward. The contact of the prefrontals and the postfrontals above the orbit, excluding the frontal from its border, is apparent. The postfrontal is much as in *Eubaëna*, but has a very slight contact with the quadratojugal, from which it is largely separated by the jugal.

The jugal is small, and the outlines are difficult to trace. It sends a long process backward between the postfrontal and the quadratojugal, permitting only a short contact between them. On the right side the separation is complete or nearly so. The jugal is excluded from the orbit by the meeting of the postfrontal and the maxillary. The squamosal has a strong posterior projection; the portion forming the posterior border of the tympanic cavity is nearly vertical.

The outline of the lachrymal is difficult to determine; a slight displacement at the suture, or a slight fracture of the anterior wall of the orbit, is in the position of the suture as given by Hay.

The maxillary has a broad masticatory surface; as the lower jaw is in place it is impossible to determine the width of the surface exactly, but it is not less than 9–10 mm.

The palatal surface (see Fig. 6) closely resembles that of *Eubaëna* as figured by Hay. The choanae are far forward, between the orbits. The sutures are not all clear, but, so far as can be made out, are in the position and the relations of those of *E. cephalica.* The contours of the large postpalatine vacuities are as in *Eubaëna,* except that the anterior rim of the vacuity, formed by the posterior edge of the ectopterygoid, is smooth, lacking the projection figured by Hay. Each pterygoid has a distinct ridge on the outer side which runs forward from a large foramen between the basisphenoid and the pterygoid, turns outward on the ectopterygoid and merges with its posterior border near the union of that bone with the maxillary. The foramen, called a venous foramen by Hay, lies on the outer side of the ridge instead of on the inner, as in *Eubaëna,* and is somewhat larger than in the figured specimen of *E. cephalica.*

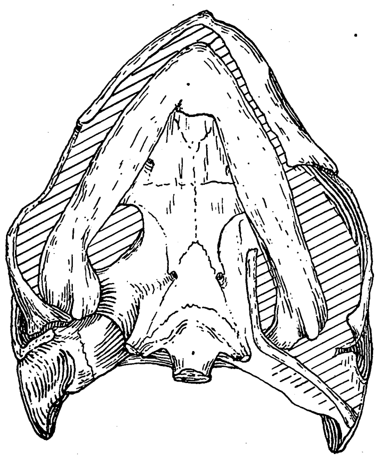

FIG. 6. Lower view of skull. × 1

The tympanic notch is deep and open. The stapes is preserved in position on the right side. It is a strong straight rod, with the distal end in place at the inner extremity of the notch. The distal end of the stapes is visible in the same position on the left side, but the whole bone cannot be demonstrated without destroying the hyoid, which lies in position under it.

It is not possible to determine the posterior edge of the parietal, or to say how much of the occipital crest is formed by it and how much by the supraoccipital.

The lower jaws are in position, tightly closed. They cannot be disturbed without injuring the hyoid of the left side, which lies with the distal end pressed against the inner side of the ramus.

The symphysis is closed, with no determinable suture. The coronoid region is high; it has a large smooth depression on the outer surface for the attachment of powerful muscles.

The hyoids are represented by the posterior cornua. Both were preserved in nearly the normal position, but the right one was removed to expose the palate. They are elongate and bent at nearly a right angle near the middle of their length. The posterior portion is a slender rod, the end lying, in the specimen, on the posterior face of the squamosal just below its apex. The anterior portion is spatulate, the extremity lying a little anterior to the midlength of the palate.

The cervical vertebrae have been described in three members of the Baënidae, *Baëna riparia*, *Chisternon hebraicum*, and *Neurankylus bauri*. Hay's description of all but the first cervical vertebrae of *B. riparia* is brief, and he gives no detailed figures. He describes the vertebrae of *Chisternon hebraicum* and figures the side view of the eight cervicals and anterior and posterior views of the third, fourth, sixth, and eighth. Wiman [4] figures and describes the second to the eighth cervical vertebrae, inclusive, of a form from the Upper Cretaceous of New Mexico, which he identifies as a new species of *Neurankylus*. Both authors agree that the neck was not so flexible as in either the existing Cryptodira or Pleurodira.

B. riparia is described as having transverse processes and a "sharp crest on the lower side, in all the 7 posterior vertebrae," and with "The crests so deep that they would have interfered greatly with any considerable flexure in a perpendicular plane." "The first dorsal has a large concavity to receive the convex surface of the eighth cervical." The face of the first dorsal looks directly forward, as in the Pleurodira. "We must conclude that these turtles could protect their heads hardly more than the sea-turtles."

That *Chisternon* is certainly a different genus from the one here described is shown in the details of the cervical vertebrae and other parts, though there is general similarity, as is to be expected. Particularly noticeable is the fact that the anterior zyga-

[4] *Op. cit.*

pophyses on the fourth to eighth vertebrae of number 20490 are more nearly vertical than those of *Chisternon* and that the most prominent ventral keels are on the fourth and fifth vertebrae.

In *Neurankylus bauri*, as figured and described by Wiman, the cervicals have a general resemblance to *B. riparia* and to the specimen here described, but differ from both in detail. Beginning with the third vertebra, the anterior zygapophyses are nearly erect; the most prominent ventral keels are on the sixth, seventh, and eighth vertebrae; the eighth vertebra has an elevated neural spine quite different from those of all the other vertebrae and from the eighth in *Chisternon* and the present specimen.

The condition described by Wiman in the seventh vertebra of *Neurankylus*, where the anterior end of the centrum extends beyond the neural arch and underlies the arch of the sixth, is, so far as the author knows, unique; the figures suggest a pathological condition. Wiman notes the anterior as well as downward direction of the articular faces of the posterior zygapophyses of the eighth as marking a beginning of the retractile neck of the Cryptodira, but the author finds a very similar inclination of the faces in the Pleurodiran *Emydura macquaria*.

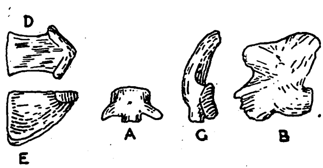

FIG. 7.

A. Lower view of preatlas intercentrum. × 1
B. Lateral view of neural arch of atlas. × 1
C. Anterior view of neural arch of atlas. × 1
D. Upper view of centrum of atlas. × 1
E. Lateral view of centrum of atlas. × 1

The neural arch and the intercentrum of the atlas of the Baënidae have not been figured, and as the cervical series of number 20490 differs in detail from those known, they are here figured (Figs. 7–8), and the main characters noted briefly. The cervical series is complete and, except for the second, third, and fourth, which have the transverse processes and anterior zygapophyses somewhat crushed, very little distorted. The form of the preatlas intercentrum is best appreciated from Figure 7A. It does not differ greatly from the same bone in most living turtles.

The neural arches are separate. The upper edge of each arch is thickened for attachment to the opposite arch. The posterior edge is thin. There is a short posterior zygapophysis with a face for articulation with the axis. The sides descend somewhat obliquely forward, with a thickened distal end and a surface for attachment to the intercentrum. The centrum is simple and concave posteriorly.

The axis (Fig. 8, 2) has a low but elongate neural spine, which rises anteriorly and extends over the neural arch of the atlas for

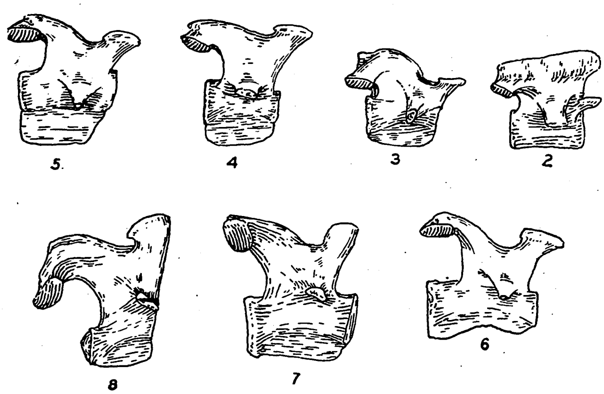

FIG. 8. Lateral view of second to eighth cervical vertebrae. × 1

a short distance. Neither *Chisternon* nor *Neurankylus* is figured as having anterior zygapophyses upon the axis, but they are well developed in 20490. There is a strong transverse process; there is no ventral keel.

The third vertebra has the low, practically obsolete neural spine and broad posterior zygapophyses characteristic of the Baënidae. There is a transverse process, as in all the cervicals, and the anterior zygapophyses extend upward and forward; there is a ventral keel.

The fourth vertebra has the neural arch much elevated, with the anterior zygapophyses inclined upward at a low angle. The keel is prominent but short.

The fifth has the largest keel of the series, fully as prominent as that on the fourth and longer. The anterior zygapophyses rise at a sharp angle.

The sixth has a long but less prominent keel; the anterior zygapophyses are more nearly erect.

The seventh has the keel as in the sixth; the anterior zygapophyses are erect; the neural arch is elevated posteriorly and extended backward, raising the posterior zygapophyses far above the neural canal and placing them posterior to the border of the centrum.

The eighth has the anterior zygapophyses erect, and the articular faces look more inward than upward. The neural arch is long posteriorly, and the posterior zygapophyses are sharply decurved, the facet looking more forward than downward; there is a short, prominent keel. The body of the centrum is inclined downward toward the rear, the posterior face being below the anterior.

It is impossible to determine the nature of the articular faces of all the centra. So far as can be made out they are: atlas convex-concave, axis concavo——?, third ?——convex, fourth concavo-plane, fifth concavo-plane, sixth concavo-plane, seventh biconcave?, eighth plano-convex.

The measurements of the cervicals are:

	Total length of centrum
1st —	5.8 mm.
2d —	11.0
3d —	12.0
4th —	10.0
5th —	12.0
6th —	13.0
7th —	13.0
8th —	8.0
Total	84.8 mm.

The total length of the skull is 54.5 mm., more than half the length of the neck. It appears that it was impossible for the animal to conceal the head in either the pleurodiran or the cryptodiran manner.

The dorsal vertebrae, being mere shells in the specimen, are so fragile that they could not be cleaned, but it can be shown that there was a sharp ventral edge and that the ribs articulated by short strong heads in the intervertebral position.

The caudal series of vertebrae is represented by the first seven, in series, and two from the middle of the tail found free in the sand wash. The last dorsal, the sacral, and the first caudal were enclosed in a nodule of pyrite and could be only partially cleaned; only the ribs of the last dorsal and the sacral can be made out. The second, third, and fourth caudals were thrust forward beneath the sacral and the first caudal. The sacral rib is strong and broad,[5] but the distal end is lost. There is no facet for the sacral

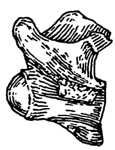

FIG. 9. Lateral view of seventh caudal vertebra. × 1

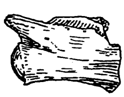

FIG. 10. Lateral view of a midcaudal vertebra. × 1

rib upon the inner side of either ilium; the attachment was by cartilage.

The first caudal has an elongate rib rapidly tapering to a point. The next three are in connection, but lie beneath the sacral and first caudal. The ribs diminish in length toward the rear. The neural arches are high. There are swellings on the posterior edge of the lower surface, but no facets for chevrons. They are all opisthocoelous, with well-developed cups and heads. This condition prevailed throughout the series, as it is clearly present in the two vertebrae from the middle of the tail. The four free vertebrae, fourth, fifth, sixth, and seventh, may be arranged in series by the increasing length of the centrum, the shortening of the transverse processes, and the increase in size of the neural spine. Facets for the chevron appear on the fifth (see Fig. 9). A chevron lacking part of one arm is present, but cannot be placed in position. It is short and terminates in an expansion flattened upon the distal surface as if for the attachment of a dermal pellicle.

[5] Nopsca notes that the broad sacral rib is characteristic of *Baēna*.

The two vertebrae from the middle of the tail (Fig. 10) are elongate, with the base of the neural spine preserved. The anterior zygapophyses are preserved on one and facets for chevrons on both.

The opisthocoelous condition of the caudal vertebrae is interesting. Hay says (p. 79) of the caudals of *Baëna riparia,* the only one in which they are described: "so far as known convexo-concave." Of the Dermatemydidae he says (p. 223): "Caudal

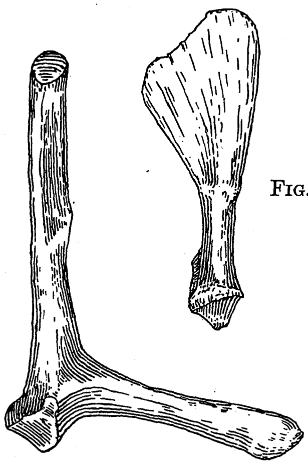

FIG. 11 (left). Right scapula. × 1

FIG. 12. Right coracoid. × 1

vertebrae in all the known forms procoelous." This is added evidence for the reference of the specimen to the Baënidae.

The shoulder girdle of the right side is perfectly preserved; that of the left side was partly embedded in a pyrite nodule. The scapula and proscapula (acromion) are slender; the angle between them is slightly greater than a right angle (see Fig. 11). The articular face is set upon a process without a noticeable constriction between it and the body of the scapula. The coracoid (Fig. 12) is flat and distally expanded, but not abruptly so. Nopsca says the coracoid of *Baëna* is medially expanded. There are no indications, such as a scar or a thickening of the bone, on the plastron to indicate attachment of a ligament from the proscapula or the coracoid.

The pubic portion of the pelvis is involved in a nodule of pyrite, and there is some compression in the vertical direction, disturbing slightly the original relationships of the bones to each other and to the shell (see Figs. 13–14).

The ilium was vertical or nearly so. The posterior edge of the distal end is expanded backward and, as noted in the description of the carapace, was received in a slight depression of the carapace, but was not attached otherwise than by cartilage. The

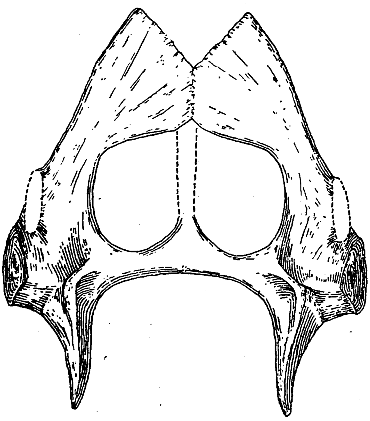

FIG. 13. Lower surface of pelvis, partly restored. × $\frac{2}{3}$

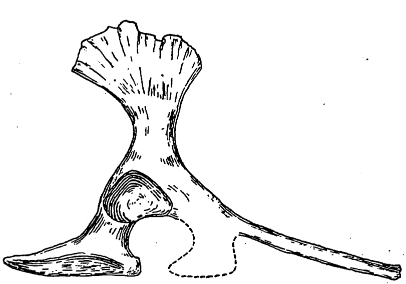

FIG. 14. Right side of pelvis, partly restored. × $\frac{2}{3}$

ischium has a strong posterior projection of the distal end, terminating in a point. The anterior end has a forward projection, much shorter than the posterior one. The bones of the two sides meet in a narrow bar. As described above, the long distal edge of the ischium was received in a slight depression in the xiphiplastron. The left pubis is pushed slightly forward. The pubes are shorter than in most of the figured specimens of the pelvis of *Baëna*, resembling most closely those of *B. arenosa*. A cartilaginous prepubis of considerable size must have been present. There is a lateral process on the pubis, but its form is obscured by the pyrite and by compression. No bar separating the puboischiadic fenestrae can be demonstrated; such a bar is present in the pelvis of *Baëna* and, in all probability, was present in this specimen, but it has been so thoroughly pyritized that it cannot be distinguished.

The attitude of the pelvis cannot be exactly determined because of the compression, but it appears that the ischium, the lateral process of the pubis, and the epipubis lay in a line parallel to, and closely approximated to, the plastron.

The humerus (Fig. 15) is not greatly curved. The proximal end is broad, largely because of the development of the external process. The main axis of the head is nearly parallel to that of the whole bone; its extension would just touch the inner edge of the distal end. The external process terminated in a flattened face. The entepicondylar canal opens into a long groove on the anterior face and ends in a simple foramen near the distal end on the posterior face. The radial head and ulnar groove are well developed on the posterior side of the distal end. The ulna (Fig. 16) has an oblique, cupped facet on the proximal end, and there is rugosity on the inner side near the middle of the bone. The distal end is expanded and carries faces for the ulnare and the intermedium. The radius (Fig. 16) carries faces for the intermedium and radiale.

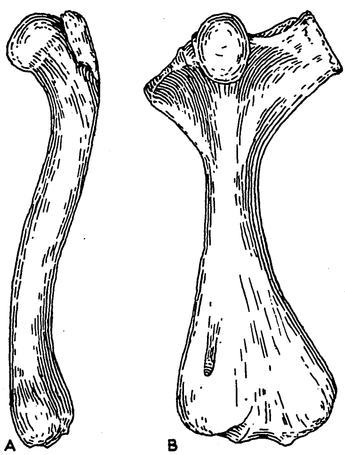

FIG. 15. Left humerus. A. Lateral view. B. Anterior view. Both ×1

The carpus (Fig. 16) resembles closely that of *Podocnemys* as figured by Williston.[6] The ulnare and the intermedium are large; the radiale is a small bone at the end of the radius. There is a pisiform on the ulnar side, followed by five carpals, gradually decreasing in size toward the first. There are two centrals, the ulnar small, the radial larger and elongate. The radial central touches the intermedium and radiale proximally and the second, third, and fourth carpals.

[6] Williston, S. W., *Osteology of the Reptilia*, p. 188, Fig. 154F.

The first metacarpal is short and broad; the others are longer and more slender; the fifth is the most slender, but almost as long as the third. Only the first digit is complete; it is short and terminates in a short, rather blunt ungual phalange. Because of the great similarity of the feet to those of *Podocnemys* and *Emydura*

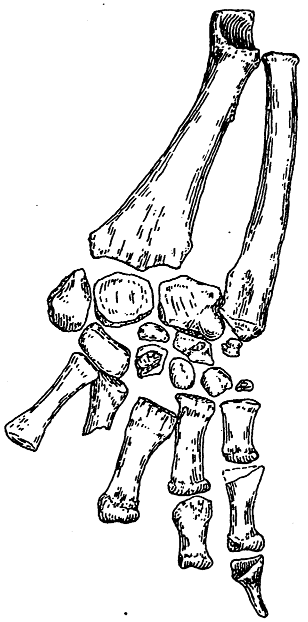

FIG. 16. Left radius, ulna, and front foot. Lower surface. × 1

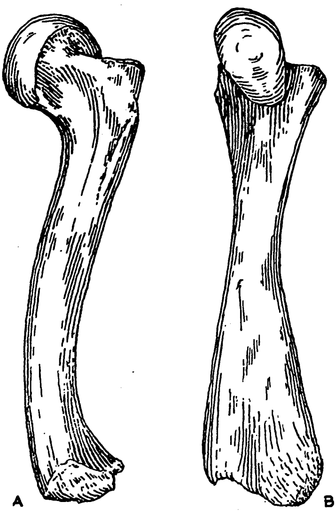

FIG. 17. Left femur. A. Lateral view. B. Anterior view. Both × 1

in other respects it is probable that the phalangeal formula of the front foot was the same — 2, 3, 3, 3, 3.

The femur (Fig. 17) is slightly less curved in lateral view than the humerus. The head and the trochanters are large. There are well-formed facets on the distal end for the tibia and fibula. The tibia (Fig. 18) is straight; the distal end is in contact with the inner side of the large astragalus. The fibula (Fig. 18) is more slender; it touches the upper and outer side of the astragalus. The tarsus (Fig. 18) has a large single element in the proximal row; this occupies the place of the large astragalus (= radiale and intermedium) and the small calcaneum of *Podocnemys* and *Emydura*. The distal row is composed of five tarsals; the first, second, and third are small and were associated with the corresponding digits. This is apparent in the right tarsus, which is

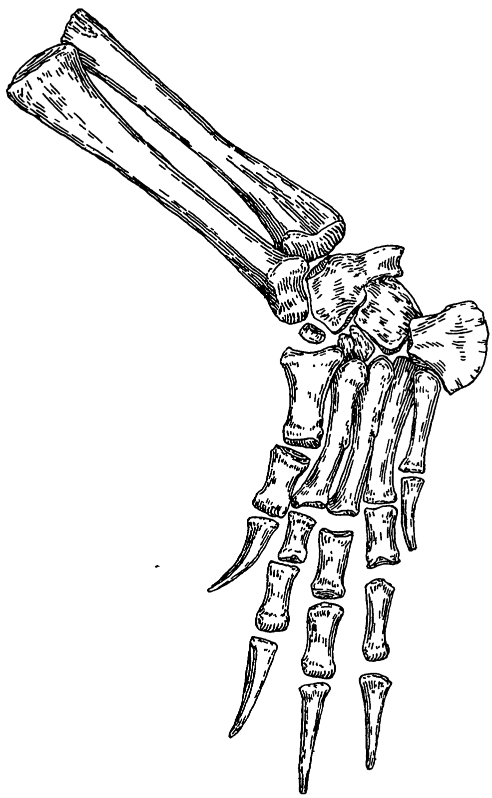

FIG. 18. Left tibia, fibula, and posterior foot. Upper view. × 1

exposed from the lower side; the left tarsus, exposed from the upper side, has the second and third tarsals of the distal row so closely pressed together as to appear united. The fourth and fifth are large. The fourth probably includes central elements. The fifth is large and fan-shaped and carries the fifth digit.

The first metatarsal is short and broad. The second and third are longer, with slight rugosities on the fibular side; the fourth is nearly as long as the second and third, but is more slender; the fifth is shorter and more slender than the fourth. The phalangeal formula is 2, 3, 3, 3 for the first four digits. There is but one phalange preserved in the fifth; its end is obtuse and rugose. Either the digit was rudimentary or it had suffered injury in life or in fossilization.

The ungual phalanges of both fore and hind feet are long and curved, and terminate in rather blunt points.

Measurements

	Mm.
Length of carapace, as preserved	272
Breadth of carapace, as preserved	228
Length of plastron	246
Length of bridge, right side	118
Length of scapula, from upper edge of glenoid space	47
Length of proscapula, from upper edge of glenoid space	34.6
Length of coracoid	42.5
Length of right humerus	57.5
Length of left humerus	57.5
Length of right femur	67
Length of left femur	65
Length of left ulna	36
Length of left radius	41.6
Length of left tibia	47
Length of left fibula	43
Length of lower jaw	42.5
Height of lower jaw at coronoid region	12.5

So much fragmentary material of turtles has been described from the upper Cretaceous of North America and so many genera and species have been founded on inadequate evidence that it is impossible to identify specimens with any certainty. The description and figures in this paper could be, in large measure, reproduced from published figures and descriptions of several genera and species based on fragments and isolated bones. Though this specimen may eventually be proved to belong to another genus and species than the one determined by the author, it lacks so little of being anatomically complete that it may serve as a satisfactory basis of comparison.