

ART. XXX.—*On some Fossil Turtles belonging to the Marsh Collection in Yale University Museum; by O. P. HAY.*  
(With Plates XI–XVI.)

THE present paper is the result of a study of some of the extinct turtles in the collections of vertebrate fossils brought together by Professor O. C. Marsh. The privilege of making the investigation was first granted by the late Professor Charles E. Beecher; after his death it was renewed by the acting curator of the collection, Professor L. V. Pirsson. For assistance and courtesy the writer's thanks are due to all the officers having connection with the department of vertebrate paleontology in Yale University. The negatives from which several of the plates have been prepared were furnished by Dr. George R. Wieland. The wash drawings were made by Mr. Erwin Christman, of the American Museum of Natural History.

Further remarks on the species here treated and additional illustrations will, it is hoped, be presented in the writer's forthcoming monograph of the fossil turtles of North America.

*Baëna marshi* sp. nov.

Plate XI; Text-figure 1.

The type of this species was collected in 1889, by Professor J. B. Hatcher, in the Laramie deposits of Converse County, Wyoming, between Buck and Lance creeks.

The specimen has suffered considerable damage. There are present the central region of the carapace and most of the left side, the greater portion of the plastron, and the matrix forming a cast of the interior of the shell. The length of the shell can be determined only approximately. It must have been at least 300<sup>mm</sup>, with a breadth of 220<sup>mm</sup>.

On account of the obliteration of the sutures of the carapace, its structure cannot be made out. The bones along the median region have a thickness of from 10 to 13<sup>mm</sup>. The outer surface is smooth. The sulci between the various dermal scutes are narrow and shallow, and in many places cannot be traced. The second, third, and fourth vertebral scutes varied in width from 64 to 70<sup>mm</sup>.

The posterior extremity of the plastron is missing; hence the length of the plastron cannot be accurately determined, nor the form of the posterior margin. The total length, however, must have been close to 260<sup>mm</sup>. The following table presents the most important dimensions. In order that the distinctness of the species from *B. hatcheri*, which is from the same deposits and locality, may be appreciated, the dimensions of the plastron of the latter are also given.

Dimensions.	<i>Baëna marshi</i> .	<i>Baëna hatcheri</i> .
Length of plastron.....	260 ±	305
Width of bridge.....	120	115
Length of anterior lobe.....	70	106
Width of anterior lobe.....	95	115
Length of posterior lobe.....	65 ±	98
Width of posterior lobe.....	90	120

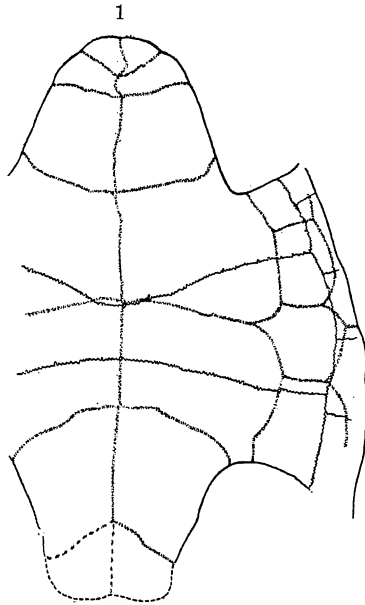


FIGURE 1.—*Baëna marshi*. Diagram of plastron.

It will be observed that, while the plastron of *B. hatcheri* is considerably longer, the bridge is slightly shorter. Further, the lengths of the anterior and posterior lobes of *B. marshi* are much less in proportion to the total length of the plastron than they are in *B. hatcheri*.

The central region of the plastron is concave. This may indicate that the individual was a male. The mesoplastra are large, wedge-shaped bones. They meet along the midline for a distance of 23<sup>mm</sup>, and their outer ends are 65<sup>mm</sup> wide.

The following are the antero-posterior widths of the various plastral scutes: Intergulars, 17<sup>mm</sup>; gulars, 10<sup>mm</sup>; humerals, 46<sup>mm</sup>; pectorals, 50<sup>mm</sup>; abdominals, 47<sup>mm</sup>; femorals, 53<sup>mm</sup>; anals, about 45<sup>mm</sup>. On the bridges there are four inframarginals, of which the inguinal is the largest, and the axillary somewhat the smallest.

This species differs from *B. hatcheri* in the greater thickness of the bones of the carapace and in the shorter lobes of the plastron. It is named in honor of the late Professor Othniel C. Marsh.

*Baëna cephalica* sp. nov.

Plate XII, Figures 1-3.

The name *Baëna cephalica* is given to a fine skull which belongs to the Yale University Museum, and which was collected in the Laramie deposits of Converse County, Wyoming, by Professor J. B. Hatcher. The specimen bears Professor Marsh's receipt number 2110.

In general form the skull is broad behind, and flat above, with pointed snout. The length from the snout to the occipital condyle is 67<sup>mm</sup>; to the end of the supraoccipital spine, 74<sup>mm</sup>. The greatest breadth, just in front of the tympanic chambers, is 65<sup>mm</sup>. From these chambers the width diminishes to the snout. There is first a convexity in the outline, which terminates at the hinder end of the maxilla; a second and longer one which ends behind the premaxilla, and a third one which ends at the premaxillary symphysis. The flat upper surface of the skull descends each way to the perpendicular sides. The sides of the face about the orbits look upward and outward, as well as forward. The tympanic opening is nearly circular, 19<sup>mm</sup> in perpendicular and 15<sup>mm</sup> in horizontal axis. The orbit is circular and small, its diameter being 14<sup>mm</sup>. The nasal opening, as seen from in front, is somewhat heart-shaped, and is directed upward and forward. From the orbit to the tympanic opening is 24<sup>mm</sup>; from the nares to the orbit is 10<sup>mm</sup>.

The temporal region is roofed over, not so extensively as in some undescribed Bridger skulls of the same genus. On each side of the supraoccipital, this roof is excavated as far as a line joining the anterior borders of the tympanic chambers. The hinder end of the postfrontal is interposed between the parietal and the squamosal.

In general, the sutures of this skull are very distinct, but no trace has been found of those between the frontals and the parietals. There are distinct nasals. The prefrontal of each side joins the postfrontal, so that the area of the frontals is excluded from the orbit. The postfrontal is large, having a length of 32<sup>mm</sup>. The jugal is small, having a length of only 8<sup>mm</sup> and a height of 15<sup>mm</sup>. The squamosal forms the hinder border of the tympanic opening. Superiorly it has a thin crest, a relic of the former backward extension of the temporal roof. There is a prolongation of the tympanic chamber into this bone. The lower border of the zygomatic bar is considerably exca-

vated. Seen from the side, the maxilla is convex on its lower border. The premaxillæ are distinct from each other and from the maxillæ. At the symphysis they are only 3<sup>mm</sup> high, but at their union with the maxillæ, 10<sup>mm</sup> high. As in the Bridger species, there are distinct lachrymal bones. They occupy the position of the descending portion of the prefrontals of other turtles, coming in contact with the vomer.

As seen from below, the maxilla has a broad masticatory surface, its width from the inner border to the cutting edge being 14<sup>mm</sup>. The inner border of this surface is furnished by the palatine bone. The latter forms the whole of the outer border of the choana. The masticatory surface does not extend forward on the premaxilla. In front of the choanæ there is a deep groove, which anteriorly expands on the lower surface of the premaxillæ. Postpalatine foramina are present.

The pterygoids come in short contact with the maxillæ. They have distinct ectopterygoid processes. Where the posterior part of the palate is constricted, it is 18<sup>mm</sup> wide. The pterygoids extend backward to the posterior border of the pedicel of the quadrates, thus separating the latter widely from the basioccipital and basisphenoid. There is a considerable groove on each side between the quadrate and the median bones of the base of the skull. The pterygoids join at the midline for some distance in front of the basisphenoid. On each side of the latter, about the middle of its length, is a foramen.

The pedicels of the quadrates are short. The surface for articulation with the lower jaw is deeply concave from side to side; nearly plane from front to back.

The quadrate bone is notched behind for the passage of the stapedia rod.

There appears to have been a system of epidermal scutes covering the upper surface of the skull. Not all the areas occupied by these can be made out with certainty, but some of them are quite distinct. A pair of these seems to have occupied the space between the orbits. Behind each of these is a smaller one which lies over the hinder border of the orbit. A very large scute, or more probably a pair of them, covers the area of the frontal bones and overlaps on the parietals. The posterior half of this scute or scutes is separated by two scutes occupying the midline. One of these, the anterior, is small and circular; the other is elongated and extends backward on the supraoccipital processes of the parietals. It is, of course, possible that the latter scute was divided along the midline.

The study of this skull confirms the view of Dr. George Baur, drawn from the skull of *Compsemys plicatula*, that there are in the skulls of the Amphichelydia few pleurodiran characters. Nasals are indeed present, but they can hardly be

regarded as distinctive, since there are Cryptodira (Porthochelys) which possess nasals. A short supraoccipital spine is very general among the Pleurodira. The character which especially separates the latter group from the Cryptodira is found in the very broad pterygoids, the posterior ends of which do not separate the quadrates from the basioccipitals. In Baëna, as shown in the present skull and in others from the Bridger beds not yet described, the pterygoids are disposed in the same way as in the Cryptodira.

It appears, in fact, that a considerable number of characters exist in the skulls of Baëna, which belong also to the Athecæ. These are found in the short supraoccipital spine, the large postfrontals, the exclusion of the frontals from the orbits, and the participation of the basioccipital in the formation of the foramen magnum.

The nasals, the lachrymals, and the extensive temporal roof may be regarded as primitive characters.

In Baëna, undoubted pleurodiran characters are seen in the presence of a mesoplastron and in the structure of the cervical vertebræ. The suborder Amphichelydia must thus be regarded as securely founded.

*Baptemys wyomingensis* Leidy.

Plate XIII, Figures 1-3 ; Text-figure 2.

*Baptemys wyomingensis*, Leidy, J., Proc. Acad. Nat. Sci. Phila., 1870, p. 5; Contr. Ext. Fauna West. Terrs., 1873, p. 157, pl. xii, pl. xv, fig. 6.

This species is represented in the Marsh collection by a specimen which was collected in the year 1870, in the Bridger beds, near Millersville, Wyoming. The carapace is almost entire, but somewhat crushed and distorted. The plastron is intact. The nearly complete skull is present; likewise, some of the limb bones. The specimen bears the number 484. It is most valuable on account of furnishing the hitherto unknown skull and the not well-known anterior lobe of the plastron.

When this example is compared with the type some differences are observed, but these are not regarded as of specific value. The most important of these differences is the presence of four, instead of three, inframarginal scutes on each of the bridges.

The only portion missing from the skull is the roof of the orbits and the nasal cavity. This deficiency is fortunately supplied by a skull collected during the year 1903 by the American Museum expedition into the Bridger beds near Fort Bridger.

The skull is wedge-shaped, being broad behind and pointed in front. The length from the snout to the occipital condyle is 67<sup>mm</sup>; to the end of the supraoccipital spine, 88<sup>mm</sup>. The

width at the upper border of the tympanic cavity is 58<sup>mm</sup>. There is no roof over the temporal region, and there is no parieto-squamosal arch. The postorbital arch is but little more than 7<sup>mm</sup> wide. The zygomatic bar is excavated on its lower border. The interorbital space, as shown by the American Museum specimen, is 23<sup>mm</sup> wide. The orbits are large, having an antero-posterior diameter of about 20<sup>mm</sup>. The nares, as shown by the specimen last mentioned, have a perpendicular diameter of 16<sup>mm</sup>. The upper jaw is convex along its cutting edge, rising in front so as to form a median notch. This edge is sharp throughout its length. In the Yale specimen, the lower jaw conceals a portion of the palate near the cutting edge, but this region is exhibited in the American Museum specimen. Running parallel with the posterior half of the cutting edge, and separated from it by a deep furrow, is a sharp dentated ridge, which has a length of 12<sup>mm</sup>. When the jaws are closed this ridge fits into a groove in the lower jaw.

The choanæ are far forward. The roof of the mouth is vaulted, not greatly unlike that of *Testudo*. The vomer appears to have extended backward nearly to the pterygoids. The distance across the palatines at their posterior ends is 20<sup>mm</sup>. The distance across the constricted portion of the pterygoids is 13<sup>mm</sup>. There are small postpalatine foramina. The outer border of the palatine bone has not been traced with certainty. In the specimen in the American Museum there appears to be a suture running along the bottom of the groove on the outside of the dentated ridge mentioned above. If this is really the case, this ridge lies on the palatine bone.

The tympanic cavity has its posterior wall open, forming a channel for the passage of the stapedia rod. The sutures between the bones of the skull are closed, and some of them can be traced only with difficulty. There appear to have been no nasals. As shown by the American Museum specimen, the frontals are shut out from the borders of the orbits.

The lower jaw appears to have formed a slight beak in front. The anterior half of the efficient border forms a cutting edge which shears against that of the maxilla. Posteriorly the edge divides so as to produce two ridges which enclose between them a deep groove about 4<sup>mm</sup> wide. It is this groove which receives the dentated ridge of the palate.

Portions of the hyoid apparatus remain clinging to the base of the skull. This apparatus resembles closely the same organ in *Chrysemys elegans*, and is much unlike that of *Dermatemys*.

Text-figure 2 shows the form of the plastron, and this agrees with that of the specimen in the American Museum. Leidy (Contr. Ext. Fauna West. Terrs., pl. xv, fig. 6) has figured the anterior end of a plastron which is truncated and slightly exca-

vated. This may be an individual variation, or it may indicate a distinct species. In all the known specimens of this species the intergular and gular scutes are absent, and the humerals extend forward to the front of the plastron.

A comparison of the skull of this species with that of *Dermatemys mawii*, as described and figured by Bienz (Rev. suisse de Zool., iii, 1895, p. 61, pl. ii, figs. 1-5) shows that the two are similar in general form and in the absence of a temporal roof. The structure of the upper and lower jaws is quite dif-

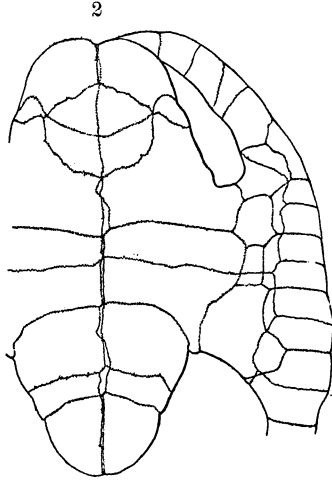


FIGURE 2.—*Baptemys wyomingensis*. Diagram of plastron.

ferent in the two genera. In *Dermatemys* the choanæ are underfloored by the palatal plates of the maxillæ and are pushed well backward. In *Baptemys* they are far forward in the vaulted palate.

*Chrysemys wyomingensis* Leidy.

Plate XIV ; Text-figures 3, 4.

*Emys wyomingensis* Leidy, J., Proc. Acad. Nat. Sci. Phila., 1869, p. 66 ; Contr. Ext. Fauna West. Terrs., 1873, pp. 140, 340, pl. ix, figs. 4, 5, pl. x, figs. 1, 2. Hay, O. P., Bibliog. and Cat. Foss. Vert. N. A., 1902, p. 448.

In the collection of fossil vertebrates made by Professor Marsh in the year 1874, there is an unusually interesting specimen of turtle. This is a nearly complete shell, and was obtained in the Bridger beds at Millersville, a point a few miles east of Fort Bridger, Wyoming. It is referred without doubt to the species above named. It is interesting from the fact that it possesses a number of supernumerary structures. That is, it has nine neurals, instead of eight ; ten pairs of costal

plates, instead of eight pairs; twelve pairs of peripheral bones, instead of eleven pairs; six vertebral scutes, instead of five; five pairs of costal scutes, instead of four pairs; and twelve pairs of marginal scutes, instead of eleven pairs. There is no doubt regarding the presence of any of these extra bones and scutes, since all the sutures and sulci are very distinct.

A comparison of this carapace with Leidy's figure of *Emys wyomingensis* shows that the whole anterior portion agrees with that figure, only such deviations as might be expected in two individuals of the same species being present. The posterior third, however, leads one into difficulties.

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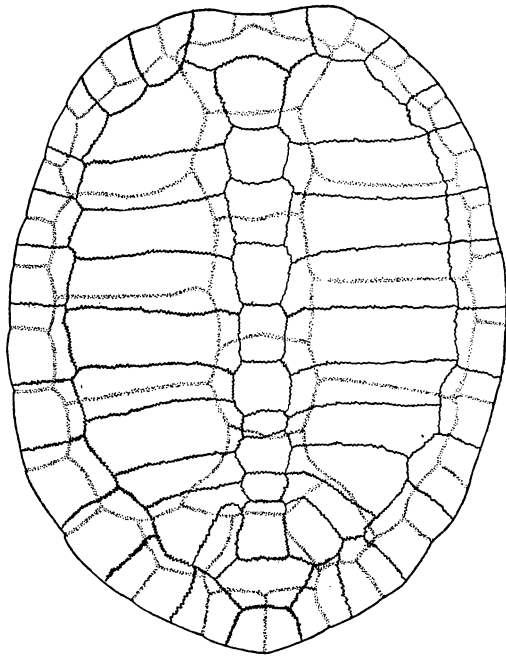


FIGURE 3.—*Chrysemys wyomingensis*. Diagram of carapace of individual possessing supernumerary structures.

The normal number of costal plates is, of course, eight pairs. In some of the living species of North American Trionychidæ the costals are reduced to seven pairs. Dr. Boulenger has stated that in some fossil marine turtles there are nine or ten pairs of costals, but he has not mentioned the species. Such cases may occur, but it is doubtful that they are normal forms. Mr. L. M. Lambe (Contr. Canad. Palaeont., iii, 1902, p. 42, fig. 7) has described as a new genus and species *Neurankylus*



*eximius*, which has nine pairs of costal plates. Dr. George Baur referred to a specimen of *Malacoclemmys geographica* having nine costals. Dr. Boulenger, in his Catalogue, p. 187, states that in a specimen of *Pelomedusa* he found nine pairs of costal plates; in another, nine plates on one side and eight on the other. Is it possible, therefore, to determine which costal and peripheral bones, and which vertebral, costal, and marginal scutes, in the specimen at hand, are the intercalated ones?

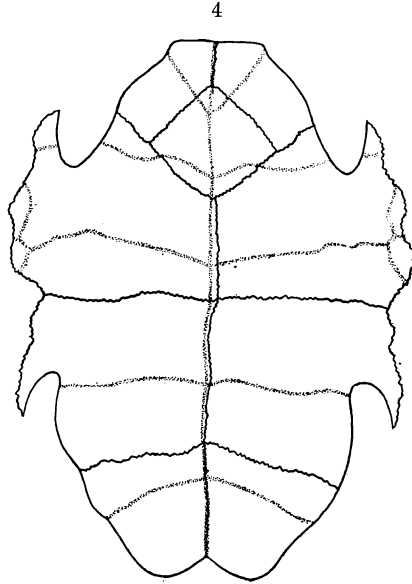


FIGURE 4.—*Chrysemys wyomingensis*. Diagram of plastron of same individual as that of figure 3.

It seems to the writer that there can be no question that the six anterior neural bones and the six anterior pairs of costals, together with the peripherals in contact with the latter, correspond exactly with the six anterior neurals, the six anterior pairs of costals, and the contiguous peripherals, of the type specimen of *Chrysemys wyomingensis*, or, indeed, of any other member of the Emydidae. It appears to be quite as certain that the seventh pair of costals corresponds with the seventh pair in other emyds. Each is crossed at its upper end by a portion of the longitudinal sulcus, and is in contact with a neural, probably the seventh, and with that behind it.

If, now, one begins at the posterior margin of the shell and works forward, certain conditions may be established. As usual, a pygal peripheral is present. In front of this comes a

broad hexagonal suprapygal, the homologue of which is partly shown in Leidy's figure of the type, and is fully shown by a specimen in the American Museum of Natural History. In all three examples mentioned, this suprapygal is crossed near its anterior end by a sulcus bounding the supracaudal scute in front. In Leidy's type, in front of this suprapygal is another which widens backward. A similar bone is found in the American Museum specimen and in the one here described; but, in both of the latter, the bone is somewhat longer, and is crossed by a transverse sulcus. In Leidy's type, the sulcus crosses on the neural immediately in front,—the eighth.

The last pair of costals in the Yale specimen has all the characteristics of the eighth pair in Leidy's type and in the American Museum specimen. They come in contact with the two suprapygals, are crossed at their anterior ends by a transverse sulcus, and are occupied in their length by the lateral sulci of the hindermost vertebral scute. In the specimen here described these costals do not indeed come in contact with the hindermost neural; but it is no unusual thing for the last pair of costals to be pushed out of contact with this neural, or the real eighth neural may be suppressed.

It is concluded, therefore, that the intercalated costal plates of the present specimen are the eighth and the ninth from the front of the carapace.

Since there is only one extra neural present, it appears to be impossible to determine whether this is the eighth or the ninth from the front. It may be, however, as already suggested, that the true eighth has been suppressed, and that the eighth and the ninth, counting from the front, are both intercalated.

It is likewise uncertain which is the intercalated peripheral, the tenth or the eleventh of this specimen; but it is more likely the tenth, since it is in contact with both the intercalated costals.

As to the vertebral scutes, the first, second, and sixth seem clearly to correspond with the first, second, and fifth, respectively, of a normal emyd. It appears to be quite as certain that the anterior portion of the fourth corresponds with the same portion of the fourth of any other emyd; and again that the posterior portion of the fifth is homologous with the posterior portion of the fourth vertebral of ordinary turtles. Does not this evidence lead to the conclusion that no new scute has been intercalated, but, rather, that the area occupied by the fourth scute in a normal turtle, having been greatly enlarged, has become divided by a transverse sulcus? In the same way the extra costal scute on each side, as well as the extra marginal, may be explained.

The region immediately in front of the most anterior supra-pygial presents various evidences of having suffered disturbance.

Notwithstanding the possession of ten pairs of costal plates, this specimen is not elongated, as one might expect it to be. Indeed, the width is relatively greater than in the specimen in the American Museum.

The plastron appears in no way different from that of the other known specimens of the species. It is quite complete, and a pen drawing showing its structure is here presented.

The total length of the carapace is 325<sup>mm</sup>; the width is 240<sup>mm</sup>. Leidy's specimen was at least 330<sup>mm</sup> long and close to 235<sup>mm</sup> wide.

*Hadrianus majusculus* sp. nov.

Plate XV ; Text-figure 5.

The shell on which the present species is based was received at the Yale University Museum late in the year 1876. It bears Professor Marsh's receipt number 927. The label has

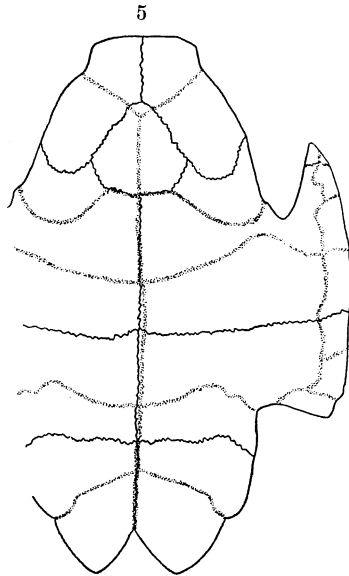


FIGURE 5.—*Hadrianus majusculus*. Diagram of carapace.

the following record: "Turtle from foot of bluff, west side of Murderer's Gap. Nov. 19, 1876. D. Baldwin." Another label states that the specimen came from the "Eocene Bad Lands, Gallina, New Mexico." This locality appears to be in Rio Arriba County, New Mexico. The deposits doubtless belong to the Wasatch epoch.

The upper portion of the shell and one side of it are somewhat damaged. The length of the carapace is 530<sup>mm</sup>; the greatest breadth was at least 440<sup>mm</sup>. In form the shell was rather high and vaulted. Over the limbs the peripheral bones are considerably flared upward. The posterior border is rounded and scalloped. The free borders of all the peripherals have acute edges. The form and dimensions of many of the neurals cannot be determined. There appear to have been three suprapyrgals, the penultimate of which is bifurcate, as in the species of *Testudo*. The anterior four or five costal plates are alternately narrow and wide, but the proximal and the distal ends of each are of about the same width, thus differing from the costals of *Testudo*.

The peripheral bones, conspicuously those over the bridges, are much higher than those in the Bridger species, *H. corsoni*. They rise about 90<sup>mm</sup> above the slight carina which joins the third with the seventh peripheral. The sulci which bound the epidermal scutes are narrow and shallow, but they run in rather deep grooves in the bones. There are two very distinct supracaudal scutes, a right and a left.

The plastron has about the same length as the carapace. There is a distinct lip in front. The rear of the plastron is deeply notched. The antero-posterior extent of the pectoral scutes is considerably greater than in *H. corsoni*.

The large peripherals and the broad pectoral scutes especially distinguish this species from those of *Hadrianus* hitherto described.

Professor Cope has referred some remains of this genus from the Wasatch of New Mexico to *H. corsoni*, but his specimens were too fragmentary for accurate determination.

*Hadrianus majusculus* is interesting because of its being the oldest known member of the Chersites, or Testudinidæ.

#### *Testudo brontops* Marsh.

Text-figures 6, 7.

*Testudo brontops* Marsh, O. C., this Journal (3), xl, 1890, p. 179, pl. viii; Vert. Foss. Denver Basin, in Mon. U. S. Geol. Surv., xxvii, 1897, pp. 523, 527, figs. 95, 96. Dana, J. D., Manual Geol., 1896, p. 901, fig. 1516. Hay, O. P., Bibliog. and Cat. Foss. Vert. N. A., 1902, p. 451.

This species has already been briefly described by Professor O. C. Marsh, as cited. The writer has been enabled to study with some care this fine specimen, and here presents diagrammatic figures illustrating the structure of the carapace and the plastron. The structure has been somewhat obscured by crushing, especially along the midline of the carapace.

The length of the carapace is 711<sup>mm</sup>; the greatest breadth is 651<sup>mm</sup>. The carapace is truncated in front and broadly

rounded behind. Over the limbs the peripheral bones are considerably flared upward. The sutures separating the nuchal from the first peripherals cannot be traced with certainty. The greatest width of the bone is 175<sup>mm</sup>; and the length along the midline, 150<sup>mm</sup>. The first neural bone is oval; the second and fourth, octagonal; the third, hexagonal. The fifth was probably hexagonal, but it is somewhat crushed. The sixth, seventh, and eighth are approximately hexagonal. The anterior suprapygals are bifurcate. The costals of the second, third, fourth,

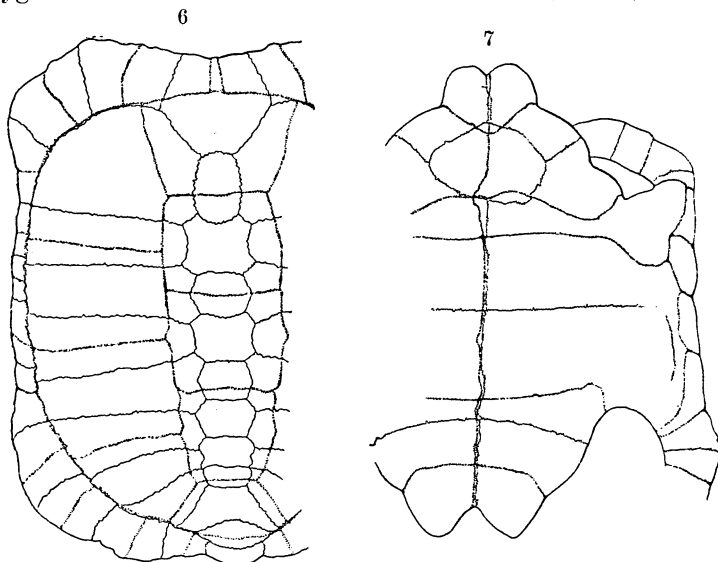


FIGURE 6.—*Testudo brontops.* Diagram of carapace.

FIGURE 7.—*Testudo brontops.* Diagram of plastron.

fifth, and sixth pairs are alternately narrow and wide at their proximal ends, and alternately wide and narrow at their distal ends. The following table gives the dimensions of the costals, excluding the first:

Costal.	Width at proximal end.	Width at distal end.
2	56	106
3	100	73
4	56	90
5	94	56
6	61	95
7	40	75
8	43	62

The second and third vertebral scutes had a width of about 190<sup>mm</sup>. The sulci of the region of the bridge ran in deep valleys, thus giving a scalloped appearance to the border.

The plastron is quite concave. The lip of the anterior lobe projected boldly beyond the general border of the plastron and beyond the front of the carapace. There is a considerable notch in the posterior end of the plastron. The pectoral scutes are about 55<sup>mm</sup> wide at the midline; the abdominals, 240<sup>mm</sup>.

This large and fine species was found in the Titanotherium beds of Indian Creek, Pennington County, South Dakota. It is especially interesting because of its being the oldest known species of the genus. Although so old, it appears to have been as highly differentiated in all respects as are the modern forms of the genus.

*Aspideretes beecheri* sp. nov.

Plate XVI.

*Trionyx foveatus* Baur, G., Proc. Acad. Nat. Sci. Phila., 1891, p. 418 (not Leidy).

In the Marsh collection there is a fine specimen of a Trionychid to which the above name is given. It was collected in the year 1889 by Professor J. B. Hatcher and Dr. C. E. Beecher, in the Laramie beds of Converse County, Wyoming, on the east side of Lance Creek. The specific name is given in honor of one of the collectors, Dr. Beecher, whose untimely death has wrought such injury to the science of paleontology.

This specimen was examined by Dr. George Baur and identified by him as Leidy's *Trionyx foveatus*. The present writer does not agree with this determination. Dr. Leidy's species was based on rather scant material, but the ornamentation of the costal bones is characteristic and has led to the identification of the species by Mr. L. M. Lambe (Geol. Surv. Canada, Summ. Rept., 1901, p. 81, pls. i, ii; Contr. Canad. Palaeont., iii, 1902, p. 33, pl. i, figs. 1, 2) in finely preserved and quite complete remains. The latter indicate a Trionychid quite different from the one here described.

The type of *A. beecheri* presents the limbs nearly complete, a portion of the neck, the tail, the shoulder girdle, a large portion of the carapace, and the whole of the plastron.

The carapace had a length close to 325<sup>mm</sup> and a width of 310<sup>mm</sup>. At each end of the nuchal, the border has been somewhat excavated. The lateral margins are slightly sinuous, and the posterior border has probably been slightly concave.

The outer ends of the nuchal appear to have overlapped the first costal. The nuchal has its whole upper surface covered with a sculpture like that of the costals. There is a preneural bone, whose anterior border has occupied a notch in the hinder border of the nuchal. The author has elsewhere proposed the name *Aspideretes* for the Trionychidæ possessing a pre-

neural, the type of the proposed genus being *Trionyx gangeticus* Cuvier. The first neural of *A. beecheri* is hexagonal, with the narrow end directed forward. There is present a second neural of similar form and a portion of a third. The remaining neurals are missing. In all probability there were eight pairs of costal plates, but the eighth is represented in this specimen by the free portion only of the corresponding rib.

The sculpture of the carapace consists of a network of ridges enclosing rather deep pits. Usually these pits are without definite arrangement, but on the distal ends of the costals they arrange themselves in rows parallel with the free borders of the carapace. The walls surrounding the pits rise abruptly from the bottoms of the latter; whereas, in *A. foveatus*, the walls slope upward gradually from the centers of the pits. Furthermore, in the latter species, the pits on the proximal ends of the costals are likely to have quite wide flat spaces between them.

The plastron is complete. The entoplastron is truncated in front, with a slight notch at the midline. The branches include between them less than a right angle. The epiplastra are broad at their anterior ends. They resemble greatly the same bones in *Aspidonectes muticus*. The hyoplastra are not coossified with the hypoplastra. Between the inner ends of the hyoplastra is a large fontanelle which is bounded in front by the entoplastron. Between the inner ends of the hypoplastra is another fontanelle which extends backward to the xiphoplastra. There is no fontanelle between the latter bones. The bridge, where narrowest, has a width of 64<sup>mm</sup>.

The whole lower surface of the hyoplastra, the hypoplastra, and the xiphoplastra, is covered with a sculpture like that of the carapace, except that it is finer.

The cervical vertebra seen in Plate XVI is probably the fifth. Its length is about 60<sup>mm</sup>. Seven caudal vertebræ are preserved, forming a series 122<sup>mm</sup> long; but there were others which have been destroyed. They are very similar to those of *Aspidonectes spiniferus*. The shoulder girdle, the fore limbs, the pelvis, and the hind limbs present no important differences when compared with those of modern Trionychidæ.

It appears probable that this individual was a female of mature age.

The U. S. National Museum possesses a Trionychid which was collected by one of Professor Marsh's parties, while he was vertebrate paleontologist to the U. S. Geological Survey. It was obtained in Converse County, Wyoming, and is referred to *A. beecheri*. It shows the carapace to have been high and convex; also, that it had a preneural, six neurals, and eight pairs of costal plates.

EXPLANATION OF PLATES.

PLATE XI.

*Baëna marshi* Hay; view of the plastron.  $\times \frac{1}{2}$ .

On the left side of the figure is seen a portion of the matrix which filled the shell and from which the bone has been removed. On the opposite side, posteriorly, is seen some matrix filling the inguinal notch. From photograph.

PLATE XII.

*Baëna cephalica* Hay.

- FIGURE 1.—Skull seen from above.  $\times \frac{3}{4}$ .  
FIGURE 2.—Skull seen from below.  $\times \frac{3}{4}$ .  
FIGURE 3.—Skull seen from left side.  $\times \frac{3}{4}$ .

PLATE XIII.

*Baptemys wyomingensis* Leidy.

- FIGURE 1.—Skull seen from above.  $\times \frac{3}{4}$ .  
FIGURE 2.—Skull seen from below.  $\times \frac{3}{4}$ .  
FIGURE 3.—Skull seen from left side.  $\times \frac{3}{4}$ .

PLATE XIV.

*Chrysemys wyomingensis* (Leidy); carapace, showing supernumerary bones and scutes.  $\times \frac{2}{3}$ . From photograph.

PLATE XV.

*Hadrianus majusculus* Hay; shell seen from the left side.  $\times \frac{1}{2}$ . From photograph.

PLATE XVI.

*Aspideretes beecheri* Hay; skeleton seen from above.  $\times \frac{1}{2}$ . From photograph.



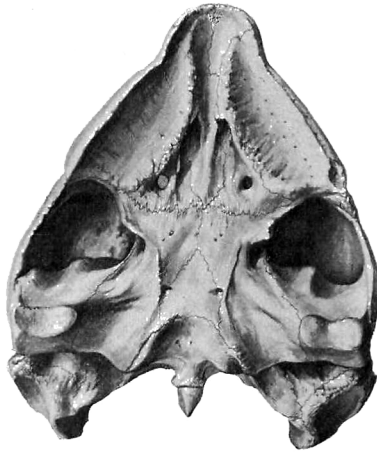


BAËNA MARSHI Hay.

1



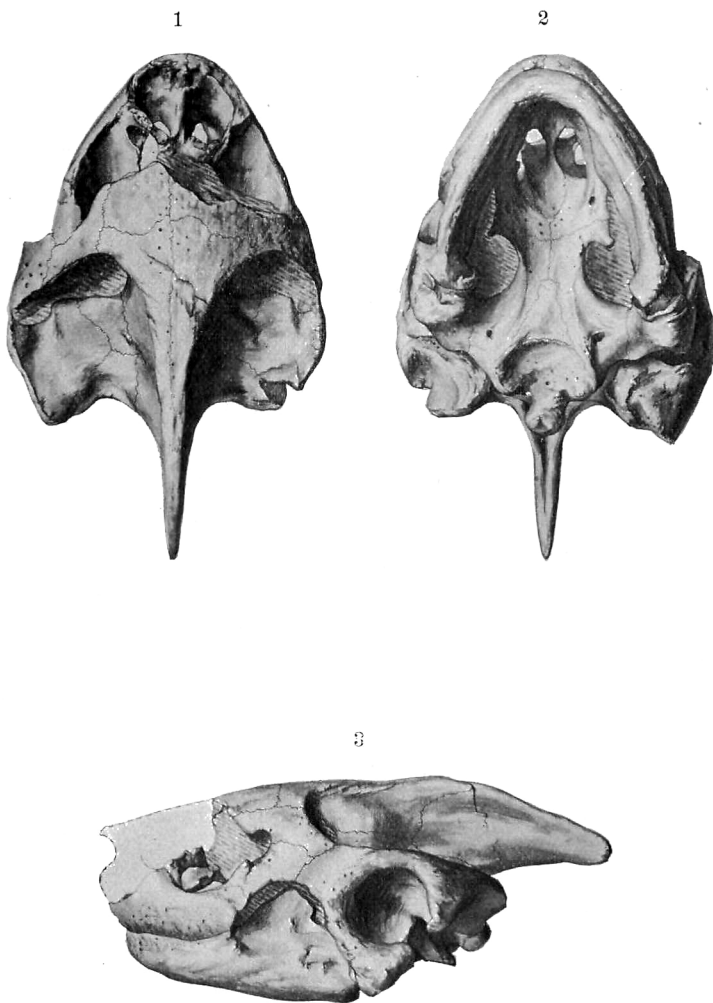
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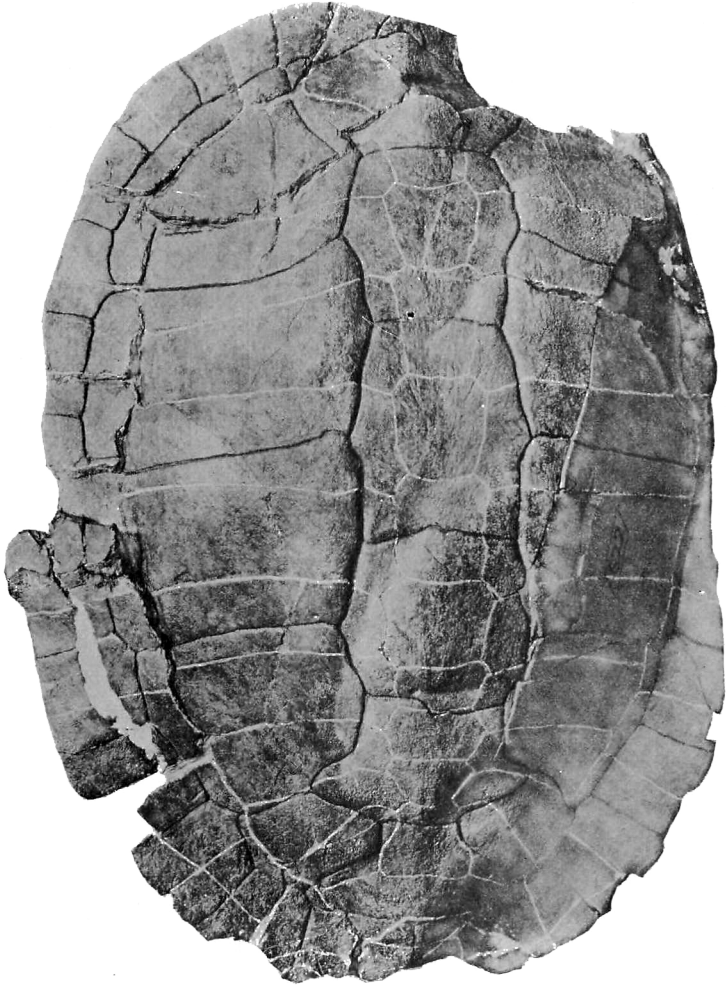
3



BAËNA CEPHALICA Hay.



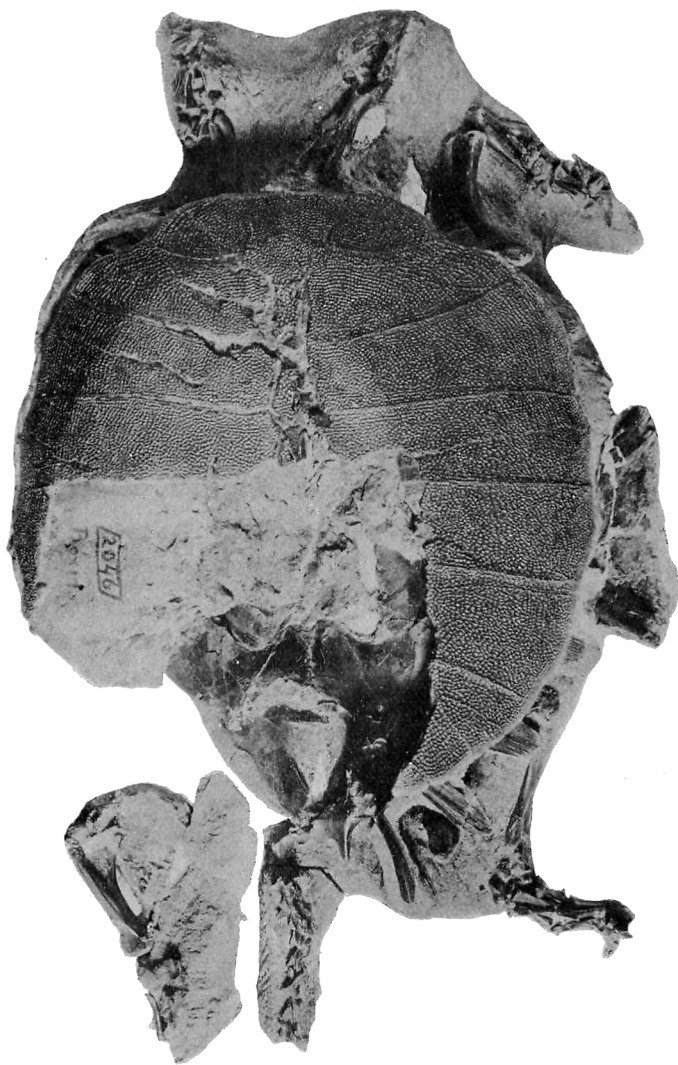
BAPTEMYS WYOMINGENSIS Leidy.



*CHRYSEMYS WYOMINGENSIS* (Leidy).

*HADRANTUS MAJUSCULUS* HAY.





ASPIDERETES BEECHERI Hay.