

# NEW FOSSIL TURTLES, WITH NOTES ON TWO DESCRIBED SPECIES.

By CHARLES W. GILMORE.

*Associate Curator, Division of Paleontology, United States National Museum.*

## INTRODUCTION.

During the summer of 1918 the Section of Vertebrate Paleontology of the United States National Museum came into the possession of a considerable number of well-preserved turtle specimens. Among these are several that represent undescribed species and others that contribute to a better understanding of the skeletal structure of described forms.

It is the purpose of the present paper to present the facts concerning these specimens, thus making this information available to students of the extinct Chelonia.

## Family PLEUROSTERNIDAE.

**NEURANKYLUS WYOMINGENSIS, new species.**

Plates 29 and 30.

*Type*.—No. 7581, U.S.N.M., consists of the posterior half of the carapace and plastron.

*Type locality*.—Shoshone River, near Cody, Big Horn County, Wyoming.

*Horizon*.—Colorado shale, Upper Cretaceous.

The specimen to be described was collected in the summer of 1912 by Mr. D. F. Hewett, of the United States Geological Survey, from the Colorado shale as exposed in the vicinity of Cody, Wyoming.

A comparison of this somewhat imperfect specimen with the type of *Neurankylus baueri* also in the National Museum collection, leads me to provisionally refer it to that genus. The large size and general proportions of the vertebral and costal scutes, and the close resemblance in the general form of both the carapace and plastron appears to show the correctness of the above determination. If, upon the discovery of more perfect specimens, this provisional assignment proves to be correct, it represents the most ancient member of the

genus *Neurankylus* yet discovered. The other two species, *N. eximus* Lambe, being from the Belly River formation of Canada, and *N. baueri* Gilmore, from the Kirtland formation of New Mexico.

All of the carapace in front of the posterior half of the second vertebral scute is missing; likewise, all of the plastron slightly in advance of the inguinal notches. The shell has been pressed flat dorsoventrally, but the outlines of the part preserved appear to be but little distorted, and undoubtedly give a correct conception of the form of the shell. None of the sutures between the bones can now be observed, all traces being obliterated by their complete coalescence, due, no doubt, to the old age of the individual. The sulci defining the dermal scutes, however, can in most instances be clearly made out, as shown in Plate 29.

The presence of an ornamentation over all the external surfaces of the shell at once distinguishes this form from the two species mentioned above. This sculpture is composed of low, flat-topped ridges and elevations, the ridges usually being wider than the intervening valleys, which are often threadlike. They form rather a uniform roughening of the surface but do not have any definite pattern.

There is no indication of an interrupted median carina such as is present in the neural region of *N. baueri*.

The presence of this ornamentation over the external surfaces of the shell, the relatively narrower vertebrals, and relatively wider posterior plastral lobe with a truncated posterior end, constitute a combination of characters indicating the distinctness of this specimen from the other described forms and the name *Neurankylus wyomingensis* is proposed for its reception.

In form the part of the carapace preserved resembles that of *N. baueri* being broadly but evenly rounded, not scalloped, as in the former species, except that they agree in having a wide posterior median notch. It is estimated that the length of the entire shell was about 530 millimeters; the greatest width is 475 millimeters. The border anterior to the inguinal notches is thickened and rounded, but posteriorly it becomes thinner, though the edges are obtusely rounded, not having the thin acute border of *N. baueri*. There was probably a slight flaring upward of the peripheral bones, though they have been quite flattened by the pressure to which they were subjected.

The sulci are narrow and faintly impressed. The vertebral scutes are relatively narrower than in either *N. eximus* Lambe or *N. baueri* Gilmore. The principal dimensions of these scutes are given in the table.

## Comparative measurements of vertebral scutes in millimeters.

No.	Length.			Width.		
	<i>N. wyomingensis.</i>	<i>N. baueri.</i>	<i>N. eximus.</i>	<i>N. wyomingensis.</i>	<i>N. baueri.</i>	<i>N. eximus.</i>
3	108	110	78	142	167	138
4	96	114	72	115	140	111
5	90 <sup>e</sup>	108	-----	135	117	-----

<sup>e</sup> Estimated.

The supracaudal scute was probably divided as in *Neurankylus baueri*. At the center they measure 17 millimeters in length.

Assuming that in the complete series there are 11 marginal scutes, as in *N. baueri*, in this specimen the sixth to the eleventh of both sides are present. The eighth is 80 millimeters long, 62 millimeters high; ninth, 60 millimeters long, 66 millimeters high; tenth, 65 millimeters long, 53 millimeters high; eleventh, 65 millimeters long, and 52 millimeters high.

Costal scutes three and four are broader than long, whereas in *N. baueri* they are as broad as long. This difference in proportion is indicated by the relatively narrower vertebrae.

The surface of the plastron has practically the same ornamentation as that on the carapace. None of the sutures on this aspect of the shell are now visible, and only the abdominal-femoral sulcus can be made out. At the center it crosses at a point 197 millimeters in advance of the posterior end of the hinder lobe. The posterior lobe at the base has a width of 185 millimeters. Its length at the center is 142 millimeters. The lateral borders converge from the inguinal notches back to the truncated end which measures 90 millimeters in width. This end is undulating as shown in Plate 30. The lateral borders present subacute edges but thicken rapidly toward the center. The posterior end of this lobe reaches within 60 millimeters of the median posterior border of the carapace. The inguinal buttress is attached low down on the costals.

*Neurankylus wyomingensis* is distinguished at once from the other species of the genus in having a sculptured shell, and relatively narrower vertebrae. From *N. baueri* it differs further by the apparent absence of a median dorsal carina, by the evenly rounded posterior border without scallops, the rounded obtuse edges of the posterior peripherals, and the relatively wider and more angular truncated end of the posterior lobe of the plastron.

## Family BAENIDAE.

## BAENA ANTIQUA Lambe.

Plates 31 and 32.

*Baena antiqua* LAMBE, Contrib. Canad. Paleontology. vol. 3, 1902, pp. 44, figs. 10, a, b.—Hay, Fossil Turtles of North America. 1908, pub. Carnegie Institution, Washington, pp. 62-63, text-figs. 37, 38.

A Baenid turtle acquired by the United States National Museum from Mr. C. H. Sternberg is here provisionally identified as pertaining to *Baena antiqua* Lambe. Except for its smaller size, in

so far as a comparison can be made with the rather fragmentary type of the species, it shows close similarity in nearly all details. If the identification is correct, as there is reason to believe, the specimen before me is of importance in contributing much to our knowledge of the skeletal anatomy of this little known species.

The specimen, No. 8801, U.S. N.M., consists of the almost complete carapace and plastron, the latter lacking the anterior lobe. It was collected by Bruce McKee in 1917, 3 miles below Steveville on the Red Deer River, Province of Alberta, Canada, in the Belly River formation, Upper Cretaceous.

The carapace is broadly rounded in front with a narrowed and truncated posterior

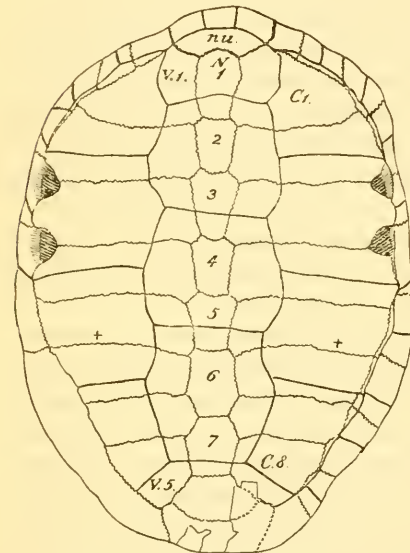


FIG. 1.—CARAPACE OF BAENA ANTIQUA LAMBE. NO. 8801, U.S.N.M. C.1. C.8., COSTAL BONES ONE AND EIGHT; N. 1, 2, 3, 4, 5, 6, 7, NEURAL BONES ONE TO SEVEN; nu., NUCHAL; V. 1., V. 5., VERTEBRAL SCUTES ONE AND FIVE. + INDICATES POSITION OF INGUINAL BUTTRESSES. ONE THIRD NATURAL SIZE.

extremity. It has an extreme length at the center of 222 millimeters, whereas Lambe estimates the type as being 290 millimeters in length. The greatest breadth of No. 8801 is 167 millimeters which is slightly forward of the inguinal notches. In most Baenids the greatest transverse diameter is posterior to this notch. From the inguinal notches the sides of the carapace round in rapidly to a shallow indentation half way to the posterior end, there less rapidly to the straight truncated end. Except for the one indentation mentioned above there are no scallops on the posterior margins. There is a slight median projection of the nuchal plate on the anterior border which is also slightly undulating, as in the type



specimen. The carapace is evenly and broadly arched from side to side.

The nuchal at the center is 19 millimeters long, with a greatest breadth of 40 millimeters. There are only seven neurals determinable, the seventh being the largest the sixth being octagonal. The seventh, in all probability, is the coalesced seventh and eighth, but no suture can be seen crossing it.

In the number of neurals the large size of the seventh and the octagonal shape of the sixth this specimen closely resembles *B. riparia* Hay. As in the type all of the neurals are longer than wide.

*Measurement of neurals of Baena antiqua in millimeters.*

No.	Length.		Width.	
	No. 8801, U.S.N.M.	Type.	No. 8801, U.S.N.M.	Type.
1	30	33	18	27
2	21	30	16	28
3	25	37	17	30
4	21	32	15.5	22
5	22	31	18	26
6	25	.....	17.5	.....
7	25	.....	20.5	.....

The pygal is unusually long, measuring 32 millimeters antero-posteriorly, with a greatest transverse diameter of 44 millimeters. On the free border it is 30 millimeters wide.

There are the usual eight pairs of costals. All except the fifth pair have the distal end wider than the proximal—a peculiarity apparently found in the type of the species as shown by the converging sides of the proximal half, the distal part of which is missing. At the junction of costals 2 and 3, and 3 and 4 with the peripherals, there are two suboval openings through the carapace. The contraction of costal 3 to a broadly pointed end, which is received in a pit largely within peripheral 5, separates these two apertures. The anterior opening is the smaller of the two. These may possibly be attributed to the immaturity of the individual, and in an aged specimen it is not unlikely that these openings would cease to exist.

The axillary buttress is directed upward and forward toward the front of the first dorsal vertebra. Its upper end joins the first rib, which is wide, and with the buttress forms the extended partition bounding the body chamber. The inguinal buttress unites exclusively with the fifth costal on its distal half (see fig. 1). In front of it the body chamber extends far out toward the border of the carapace. There are 11 peripheral bones, all of which are relatively low. The first two are 17 millimeters high; the third, 21 millimeters; the three succeeding increase from 12 to 14 millimeters; the seventh,

21 millimeters; the eighth, 23 millimeters; the ninth, 18 millimeters; the tenth, 13 millimeters; the eleventh, 15 millimeters.

The sulci defining the dermal scutes are shallowly impressed, but all except the posterior part of the costomarginal sulcus can be clearly traced, as shown in figure 1.

The vertebrae, as in all other known Belly River (Judith River) Baenids, are wider than long. The principal dimensions of these as compared with the type are shown in the table:

*Measurements of vertebrae of Baena antiqua, in millimeters.*

No.	Length.		Width.	
	No. 8801, U.S.N.M.	Type.	No. 8801, U.S.N.M.	Type.
1	28	40	49	73
2	47	62	50	70
3	45	66	53	75
4	51		53	
5	39.5		54	

There are four costal scutes on each side. These extend well down on the shell, the costomarginal sulcus along the side, apparently running with the costoperipheral suture, the center though below it in front and apparently also behind.

No supernumerary costal scutes are present. The nuchal is rectangular in shape, 15 millimeters wide and 9 millimeters long.

The plastron lacks the anterior end and can not, therefore, be compared with the typical specimen, which consists only of the anterior lobe. The posterior lobe has a length of 64 millimeters; a width at the base of 72 millimeters. Posteriorly from the inguinal notch the lateral borders of the lobe, which are straight, gradually converge to the truncated posterior end that measures 36 millimeters in width. This end terminates 36 millimeters anterior to the median posterior end of the carapace. The shallow concave surface of the plastron suggests that this individual may have been a male. Behind the inguinal notch the plastron has a thickness of 10 millimeters, but at the posterior extremity it reduces to only 3 millimeters. At the center the plastron has an extreme width of 134 millimeters; the bridge a width of about 91 millimeters. There are well-developed mesoplastrals that meet on the median line for 17 millimeters. The lateral ends expand to a width of about 35 millimeters. The hypoplastrals join along the median line for a distance of 55 millimeters; the xiphoplastrals for 31 millimeters.

The abdominals meet on the median line for 28 millimeters; femorals for 42 millimeters; anals for 34 millimeters. There are four inframarginal scutes on each bridge; these lie almost entirely on the plastral bones.

*Baëna antiqua* Lambe now appears to be distinguished from all other members of the genus, except *B. callosa* Hay, by the proportion of the posterior lobe, especially the straightness of its sides and the squarely truncated end without posterior median notch, and the contracted posterior part of the carapace without a scalloped border. The perforations of the shell at the ends of costals 2, 3, and 4, may also be useful in distinguishing this species if these openings prove not to be a juvenile feature. From *B. callosa* Hay also from beds of equivalent age, the fragmentary character of the type specimen renders its separation somewhat more difficult, though the smaller size and differences in the proportions of the vertebrals and posterior lobe of the plastron would appear to show the distinctness of *B. antiqua*.

**BOREMYS ALBERTENSIS, new species.**

Plates 33 and 34.

In 1906 Mr. L. M. Lambe, of the Geological Survey of Canada, established<sup>1</sup> the genus *Boremys*, selecting as the genotype a specimen from the Belly River formation as exposed on the Red Deer River, Alberta, Canada, previously referred by him to Leidy's genus *Baëna*. The genus *Boremys* was characterized as follows:

"Supramarginal shields present in the carapace; mesoplastra well developed, in contact in the median line for some distance; intergular shield divided; inframarginal shields present on the bridges."

Later the discovery of additional materials enabled Lambe to give a detailed description of the entire carapace of *Boremys pulchra*.<sup>2</sup>

A turtle specimen recently acquired by the United States National Museum from Mr. C. H. Sternberg, which was obtained by him from the Belly River formation, shows characters which definitely distinguish it from Lambe's species, and the name *Boremys albertensis* is here proposed for its reception.

*Type*.—No. 8803, U.S.N.M., consists of the anterior three-fourths of the carapace and practically the complete plastron. Collected by Levi Sternberg, 1917.

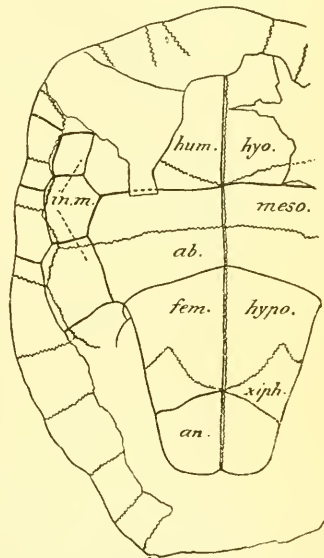


FIG. 2.—PLASTRON OF *BAËNA ANTIQUA* LAMBE. No. 8801, U.S.N.M. *ab.*, ABDOMINAL SCUTE; *an.*, ANAL SCUTE; *fem.*, FEMORAL SCUTE; *hum.*, HUMERAL; *hyo.*, HYOPLASTRON; *hypo.*, HYOPLASTRON; *in. m.*, INFRAMARGINAL SCUTES; *meso.*, MESOPLASTRON; *xiph.*, XIPHIPLASTRON. LESS THAN ONE-THIRD NATURAL SIZE.

<sup>1</sup> Lambe, L. M. Ottawa Naturalist, vol. 19, No. 12, Mar., 1906, pp. 232-234.

<sup>2</sup> Lambe, L. M. Trans. Royal Soc. of Canada, vol. 8, 1914, pp. 13-16; text-fig. 14.

*Type locality.*—South Branch of Sand Creek, Province of Alberta, Canada.

*Horizon.*—Belly River formation ("200 feet below the top"), Upper Cretaceous.

The characters which distinguish *Boremys albertensis* from *B. pulchra* Lambe may be summarized as follows: Larger size (nearly one-third); additional supramarginal scute separating first costal from marginals; supramarginals wider than long; diameter of costal

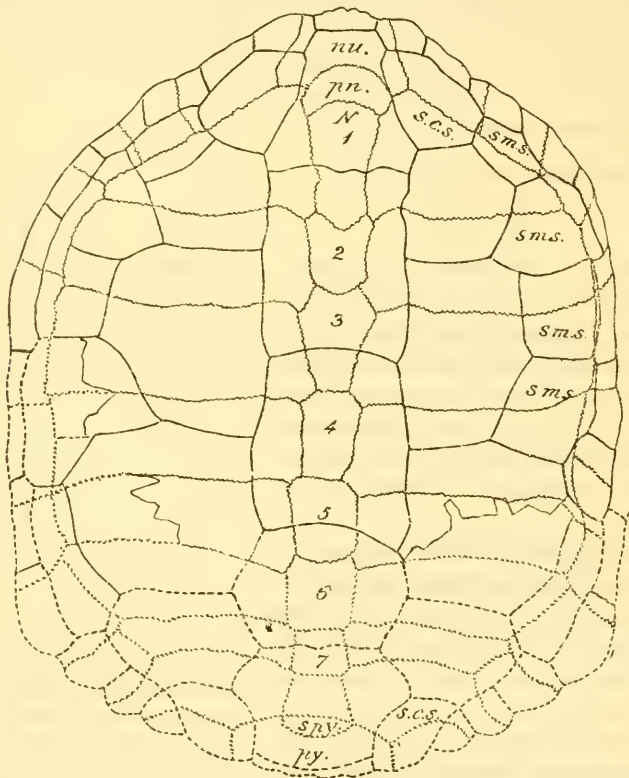


FIG. 3.—CARAPACE OF *BOREMYS ALBERTENSIS*, NEW SPECIES. TYPE No. 8803, U.S.N.M. N. 1, 2, 3, 4, 5, 6, 7, NEURAL BONES ONE TO SEVEN; *nu.*, NUCHAL; *pn.*, PRENEURAL; *py.*, PYGAL; *s. c. s.*, SUPERNUMERARY COSTAL SCUTES; *s. m. s.*, SUPRAMARGINAL SCUTES; *spy.*, SUPRAPYGAL. ABOUT TWO-FIFTHS NATURAL SIZE. RESTORED.<sup>1</sup>

scutes reduced transversely, median scute longer than wide; first vertebral elongated; carapace more pointed, not broadly rounded in front, first neural greatly elongated; inframarginals wider than long; intergulars overlapping entoplastron.

Except for the parts that are missing the carapace is well preserved. All the sutures between the bones and the scutes can be clearly made out.

<sup>1</sup> The posterior end of carapace restored from *Boremys pulchra* Lambe; see fig. 14., Trans. Royal Soc. of Canada, vol 8, 1914, pp. 13-16.



Compared with *B. pulchra* the carapace has a more pointed anterior end and a less sinuous margin. It is estimated that the shell had a greatest length of about 280 millimeters with a greatest width of 244 millimeters. It is moderately arched transversely. The surface of the carapace is slightly sculptured by a combination of nodes and ridges. A low rounded inconspicuous, interrupted, longitudinal ridge extends along the median line of the neural bones. On several of the neurals there are on either side numerous oblique ridges and grooves all faintly indicated. Several node-like elevations occur here and there along the front peripheral margin, and less well-defined ones are scattered over the surfaces of the costal bones. The plastron is smooth.

The nuchal has a greatest width of 44 millimeters, which is reduced to 31 millimeters on the margin; the length is 20 millimeters. It is broadly excavated behind for the reception of the broad convex end of the preneural. Neurals 1 to 5 are present in this specimen, and all are wide in front, but with much narrowed posterior ends. The first, as compared with *B. pulchra*, is greatly elongated. Their principal dimensions are given in the table:

*Measurement of neurals in millimeters.*

No.	Length.	Width.
Preneural.....	13	29
Neural 1.....	41	24
Neural 2.....	20	21
Neural 3.....	31	24
Neural 4.....	30	22
Neural 5.....	28	22

The fifth costal narrows to its distal end as in *B. pulchra*. The peripheral bones present are mostly quadrangular in shape, except the first, which is triangular and very small. The second and third are about as long as high, but the succeeding ones, including the eighth, are longer than their height.

The nuchal scute is smaller than in *B. pulchra*, measuring 20 millimeters wide and 7 millimeters fore and aft.

The first vertebral scute is as broad as long, whereas in *B. pulchar* it is nearly twice as broad as long. This scute is also characteristic in being greatly narrowed toward the front. Posteriorly it has a greatest width of 49 millimeters, which reduces to 19 millimeters at the anterior end.

*Measurements of vertebrae, in millimeters.*

No.	Length.	Width.
1	49	49
2	56	47
3	59	50

The costal scutes are reduced in size, due to the enlargement of the supramarginals. The second is much longer (fore and aft) than broad, whereas this same scute in *B. pulchra* is wider than long. The area of the first costal scute is also greatly reduced, due principally to the presence of an extra supramarginal which separates it from contact with the marginals. There is a large subtriangular supernumerary costal scute (see *s. c. s.*, fig. 3) as in *B. pulchra* and such as is often present in other members of the Baenidae.

The supramarginal scutes are in a row, alternating with the costal scutes, between them and the marginals. These are exceptionally wide, all except the first being wider than long. In the genotype the opposite condition prevails.

The marginal scutes are all longer than high, and those bordering the supramarginals appear relatively wider than in *B. pulchra*. The marginal-supramarginal sulcus back as far as the eighth runs well below the costo-peripheral suture. On the fourth costal this sulcus suddenly rises above this suture.

The plastron (fig. 4) is longer than wide, with rather narrow lobes. It has a greatest length of 222 millimeters, with a greatest breadth at the center of 186 millimeters. The bridge has a width fore and aft of

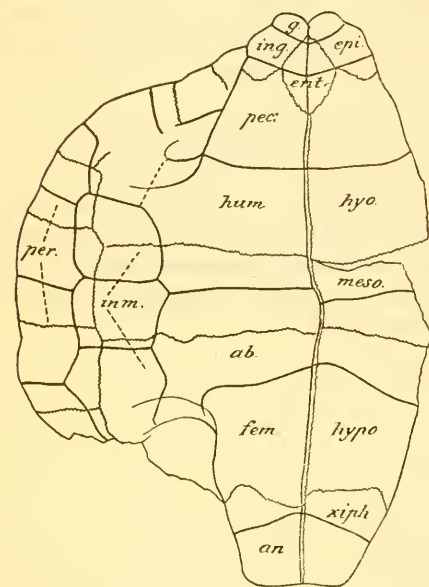


FIG. 4.—PLASTRON OF *BOREMYS ALBERTENSIS*, NEW SPECIES. TYPE. NO. 8803, U.S.N.M. *ab.*, ABDOMINAL SCUTE; *an.*, ANAL SCUTE; *ent.*, ENTOPLASTRON; *epi.*, EPIPLASTRON; *fem.*, FEMORAL SCUTE; *g.*, GULAR SCUTE; *hum.*, HUMERAL SCUTE; *hypo.*, HYOPLASTRON; *hypo.*, HYOPLASTRON; *ing.*, INTERGULAR; *in. m.*, INFRA-MARGINAL SCUTES; *meso.*, MESOPLASTRON; *pec.*, PECTORAL SCUTES; *per.*, MEDIAN PERIPHERALS; *xiph.*, XIPHIPLASTRON. ONE-THIRD NATURAL SIZE.

101 millimeters. The anterior lobe is 64 millimeters long and 94 millimeters wide at the base. The width diminishes quite rapidly from the base anteriorly, the end being rounded with sinuous borders caused by indentations where the sulci come to the edge. The posterior lobe is 70 millimeters long and 84 millimeters wide at the base. The lateral borders are nearly straight and convergent to the squarely truncated end, that has a width of 45 millimeters. The lateral edges are obtuse, but the bone thickens rapidly toward the median line. Just behind the inguinal notch it reaches a thickness of 14 millimeters; near the posterior extremity, 7 millimeters.

The entoplastron is diamond-shaped, as in *B. pulchra*. It is 30 millimeters long and 20 millimeters wide. At the center the hyoplastrals meet on the mid line for 58 millimeters. The mesoplastra are large. At the center the right element is wider (32 millimeters) than the left (24 millimeters). The right element has a greatest transverse diameter of 93 millimeters. At the outer end it measures 28 millimeters fore and aft. The hypoplastrals join on the midline 64 millimeters; the xiphiplastrals for 34 millimeters.

The small intergulars slightly overlap the anterior end of the entoplastron. The larger gulars meet on the median line for 13 millimeters; the humerals for 38 millimeters; the pectorals for 45 millimeters; the abdominals for 33 millimeters; the femorals for 50 millimeters; and the anals for 29 millimeters. In having the anal scutes confined exclusively to the xiphiplastral bones *Boremys* differs from most of the other members of the Baenidae, *Baena haicheri* being one of the notable exceptions.

On the bridge are four large inframarginal scutes, as in *B. pulchra*, but they differ from those of that species in that all are wider than long. These scutes lie principally on the plastral bones, only extending over slightly on the median peripherals.

As has been previously pointed out it is in the arrangement and proportion of the dermal scutes that the principal characters are found for distinguishing this species from *Boremys pulchra* Lambe, but these appear to be sufficient to indicate their dissimilarity.

### Family DERMATEMYDIDAE.

#### AGOMPHUS ALABAMENSIS, new species.

#### Plate 35.

*Type*.—No. 8806, U.S.N.M., consists of the anterior half of the carapace and plastron. Collected by Dr. E. H. Sellards, 1908.

*Type locality*.—Moscow Landing, Tombigbee River, Alabama.

*Horizon*.—Midway formation. Lower Eocene.

The specimen to be described is of more than ordinary interest on account of coming from a geological formation in which but few vertebrate specimens have been found. The carapace as preserved without crushing is highly arched both transversely and antero-posteriorly. The posterior half of the shell is missing, being cut off obliquely at the posterior end of the fourth neural, so that there is much more of the left side of the carapace preserved than there is of the right. At the center, the height of the shell is 185 millimeters. It is estimated that its greatest width was about 280 millimeters. It will be observed from these measurements that this specimen is a considerably larger individual than the type of *Agomphus oxyter-*

*num*<sup>1</sup> (Cope) from this same formation, as exposed near Montezuma, Macon County, Georgia.

The sulci defining the first vertebral scute and the costo-marginal contact are the only ones that can be traced, though the sutures between the bones can nearly all be clearly made out as shown in figure 5.

The shell, both carapace and plastron, are thick and heavy. The free border in front, is obtuse and flares upward. The nuchal plate has a length antero-posteriorly of 52 millimeters; a greatest width of about 64 millimeters. The neurals are especially elongated, hexagonal in shape, with the widest end forward, all being longer than wide, whereas in *A. oxysternum* they are wider than long. The principal dimensions of the neurals are given in the table.

*Measurements of neurals, in millimeters.*

No.	Length.	Width.
1	54	21 <i>c</i>
2	40	23
3	46	24
4	46 <i>c</i>	21

*c* Estimated.

The first costal has a greatest length of 92 millimeters, a width of 72 millimeters; the second is 100 millimeters long, and 42 millimeters wide at the proximal end; third is 120 millimeters long, and 44 millimeters wide at proximal end; fourth 126 millimeters long, and 42 millimeters wide; fifth is about 125 millimeters long. Excepting the first, the other costals present in the type are remarkably uniform in the widths of the proximal and distal ends.

The peripherals are high and all unite closely and strongly by suture with the distal ends of the costals. At about their centers they are crossed by the costo-marginal sulcus. On the ventral side of this sulcus the bone swells abruptly outward forming a prominent offset along the side of the shell, but not a ridge as in the genus *Hoplochelys*. Peripheral 6 has a width fore and aft of 42 millimeters; 7 is 43 millimeters wide.

The surface of the shell is without ornamentation, except for a broad rounded median longitudinal keel which is paralleled on each side, at a distance of 35 millimeters, by lateral keels. The median keel appears to rise close to the anterior border of the nuchal plate. These keels resemble somewhat those found on the carapace of *Hoplochelys saliens* Hay, but are less prominent, being lower and more rounded, as contrasted with the higher and sharper keels of that species.

<sup>1</sup> See Hay, O. P., Fossil Turtles of North America, 1908, p. 256, fig. 256.



The first vertebral scute is 71 millimeters long and its anterior end is 57 millimeters wide. The sulci bounding the other vertebrals can not be observed.

The plastron is rather poorly preserved, lacking the whole of the posterior lobe and much of the right side. The anterior lobe narrows rapidly from the base to the blunt anterior end, as in *A. masculinas* Wieland. The anterior lobe has a length of about 75 millimeters, a width at the base of 116 millimeters. The epiplastrals are narrow. The entoplastron is broadly rounded behind and pointed in front, as in *A. oxysternum* (Cope). It measures 42 millimeters in length and 40 millimeters in width. The bridge has a width of 90 millimeters. The anterior lobe in front turns up slightly from the level of that portion between the bridges. None of the sulci on the plastron or the sutures posterior to the entoplastron can be made out.

Seven species belonging to the genus have been described, all based on rather fragmentary materials. Excepting *A. oxysternum* (Cope), from the Midway formation of Georgia, all the others have been founded on specimens from the Upper greensand bed, Upper Cretaceous of New Jersey. The presence in *Agomphus alabamensis*

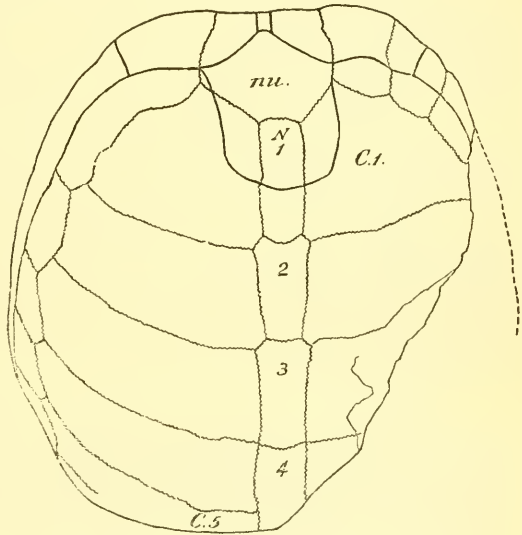


FIG. 5.—ANTERIOR HALF OF CARAPACE OF AGOMPHUS ALABAMENSIS, NEW SPECIES. TYPE No. 8806, U.S.N.M. C. 1, C. 5, COSTAL BONES ONE AND FIVE; N. 1, 2, 3, 4, NEURAL BONES ONE TO FOUR; nu., NUCHAL BONE. ONE-THIRD NATURAL SIZE.

of three low broad, parallel, longitudinal keels, and with neurals longer than wide appears to distinguish this form from all other described species. Its much larger size may also prove of assistance in distinguishing this species from *A. oxysternum*, the species to which the present specimen is in all probability most nearly related.

### Family EMYDIDAE.

#### ECHMATEMYS MEGAULAX (Cope).

Plate 36.

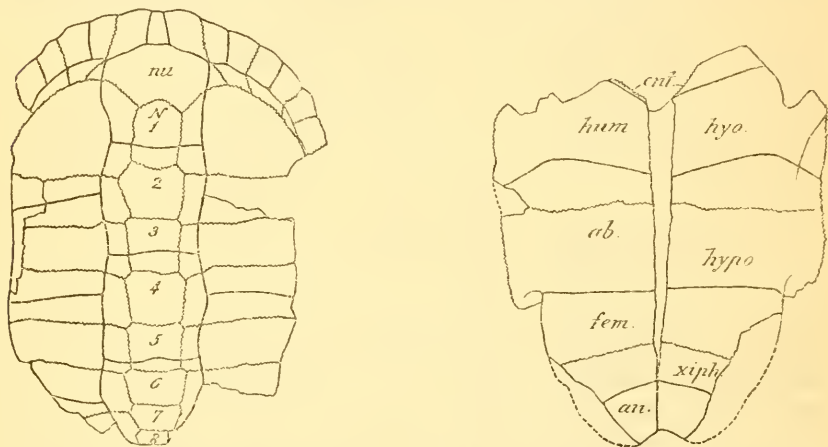
In 1872 Cope<sup>1</sup> described the above species, basing it on five or six fragmentary specimens. Portions of some of these are now in the

<sup>1</sup> Sixth Ann. Rept. U. S. Geol. Surv. Terr., 1872 (1873) p. 628.

American Museum of Natural History and at least two, Nos. 4061 and 4121, the former, which was figured<sup>1</sup> by Cope, now belongs to the United States National Museum collections. These cotypes and other specimens were collected in the Green River beds of the Wasatch formation, at Black Buttes, Wyoming.

In 1908 Hay<sup>2</sup> redescribed these cotypes and other materials and figured some additional parts.

The typical material is quite inadequate so far as giving a clear conception of the bony structure and the true relationships of the species, and the provisional recognition of a more perfect specimen in the United States National Museum collections here referred to



FIGS. 6 AND 7.—ECHMATEMYNS MEGAULAX (COPE). NO. 7316 U. S. N. M. (6). CARAPACE. N. 1, 2, 3, 4, 5, 6, 7, 8, NEURAL BONES ONE TO EIGHT *nu.* NUCHAL (?), PLASTRON, *ab.*, ABDOMINAL SCUTE, *an.*, ANAL SCUTE; *ent.*, SUTURAL SURFACES FOR ENTOPLASTRON; *fem.*, FEMORAL SCUTE; *hum.*, HUMERAL SCUTE; *hypo.*, HYOPLASTRON; *xiph.*, XIPHIPLASTRON. BOTH FIGURES ONE-HALF NATURAL SIZE.

*Echmatemys megalax* (Cope) is a welcome addition to our knowledge of this species.

This specimen (No. 7316) was collected by Mr. D. F. Hewett of the United States Geological Survey in 1911 from the Wasatch formation, in sec. 9, T. 50 N., R. 99 W., near Wiley, Big Horn County, Wyoming. It consists of a considerable portion of the carapace and plastron as shown in Plate 36, as well as the humerus and ulna of the right side.

The principal portions missing are all of the peripherals posterior to the third, posterior half of the eighth neural, suprapygal, pygal, seventh and eighth costals of the right side and the eighth of the left side;

<sup>1</sup> Vert. Tert. Form. West., 1884, pp. 129, 132, pl. 18, figs. 26-33.

<sup>2</sup> Fossil Turtles of North America, Pub. Carnegie Institution, 1908, pp. 301, 303, pl. 45, figs. 14, 15, text fig. 380-383.

the plastron lacks the entoplastron and the greater parts of the epiplastra, also much of the lateral borders of the posterior lobe.

The carapace as now preserved is highly arched transversely, the front of the shell descends quite rapidly from the posterior end of the first neural to the nuchal scute. The contour of the anterior end is broadly rounded and without median emargination. It is estimated that when complete the shell had a greatest length of about 135 millimeters. The carapace presents a smooth undulating surface, except for the growth lines of the horny scutes that formerly covered the peripherals and costals. I find similar growth markings on the typical specimens. Immediately outside of the costo-vertebral sulci, the costals are strangely swollen, a feature in which this species resembles *Echmatemys testudinea* (Cope). Cotype No. 4121, U.S.N.M., which has the sixth costal of the left side present, clearly indicates the presence of this swollen "hump." The sulci run in grooves, but where they cross the posterior neurals they are abruptly and deeply impressed, as in some of the typical specimens.

The nuchal is angularly convex transversely. It is 28 millimeters long; 22 millimeters wide on the free border, which is acute. The greatest breadth is 35 millimeters.

The neurals posterior to the first, which is suboval, are all hexagonal, with the widest end forward. The posterior neurals (sixth, seventh, and eighth) are keeled. It will be noted from the table of measurements that all of the neurals except the first are wider than long.

*Measurements of neurals, in millimeters.*

No.	Length.	Width.
1	17	13
2	12	15
3	13	15
4	13	15
5	12.5	14
6	9	16
7	7.5	14
8	-----	14 <sup>e</sup>

<sup>e</sup> Estimated.

The median costals are remarkably uniform in the width of the proximal and distal ends. Their upper ends as mentioned previously are conspicuously swollen outside of the deep costo-vertebral sulcus. Except at the swollen portion the costals are comparatively thin. The distal end of the fifth measures but 4 millimeters in thickness. On the inner surface of the first costal the sutural scar for the axillary buttress is 5 millimeters wide and 17 millimeters long.

It extends about halfway up to the midline of the shell. The posterior buttress articulates about equally with the fifth and sixth costals, but extends upward only about halfway to the center of the

shell. The first and second peripherals are relatively thin with acute free edges. The third thickens rapidly toward its posterior border. Its greatest thickness is 10 millimeters; the greatest thickness of the first is 4.5 millimeters. It extends inward from the free border 16 millimeters. The upper surfaces of all have growth lines on the marginals, as shown in figure 1 on plate 36. All flare upward from the costomarginal sulcus, toward the free border.

The nuchal scute is wedge-shaped, the narrow end being forward. On the free border it measures 2.5 millimeters in width; the posterior end, 5 millimeters; length is 7 millimeters.

The vertebral scutes are about as broad as long and rather uniform in size. The sides are nearly parallel, with only a suggestion of being bracket-shaped at the point where the costal sulcus is given off. The principal dimensions of the vertebral scutes present are given in the table:

*Measurements of vertebrals, in millimeters.*

No.	Length.	Width.
1	32.5	27
2	25	26
3	27	27
4		29

The first marginal is 18 millimeters wide, and extends mesiad 11 millimeters; the second and third, 15 millimeters wide and 10 millimeters high, respectively. The sulci are moderately impressed, no broad and deep as in the posterior peripherals of cotype No. 4061 U.S.N.M.

The plastron has a greatest width at the center of about 80 millimeters. On account of the missing portions of the anterior and posterior lobes its length can not be determined. The angular concavity of the inferior surface suggests that this specimen was a male.

The anterior lobe at its base had a greatest width of 60 millimeters. The notched sutural border at the center of the anterior ends of the hyoplastrals shows the missing entoplastron to have been angularly rounded behind. At this point the bone is 6 millimeters thick.

The gulo-humeral sulcus reaches the posterior border of the entoplastron but does not appear to have crossed that bone. In this respect it agrees with the entoplastron of *Emys pachylomus* Cope, which is made a synonym of *E. megaraulax* by Hay in his Fossil Turtles of North America (p. 301).

The bridge is 50 millimeters wide. The posterior lobe is 65 millimeters wide at the base and 40 millimeters in length at the center. There is a median V-shaped posterior notch.

The hypoplastrals meet on the midline for 28 millimeters; hypoplastrals for 37 millimeters; xiphoplastrals for 23 millimeters.



The humerals meet on the midline for a distance of 19 millimeters; abdominals for 32 millimeters; femorals for 24 millimeters; and anals for 13 millimeters.

*Echmatemys megaraulax*, as known at this time, in many respects closely resembles both *E. testudinea* and *E. euthneta*. From the former it appears to be distinguished by the thinness of the shell and the much narrower beveled surface on the superior lateral borders of the hinder lobe immediately posterior to the inguinal buttresses.

In the type of *E. testudinea* the bevelled surface on the mesiad side drops abruptly downward to the level of the plastral surface, whereas in *E. megaraulax* it is not only much narrower (as shown by specimen No. 7316, U.S.N.M.), but lies entirely below the level of the median plastral surface, from which it is separated by a very shallow groove. The specimen before me now shows that the swollen costals, outside of the costovertebral sulci, thought by Hay to be distinctive of *E. testudinea*, is a feature common to both species.

While the specimen here considered is like *E. euthneta* in having a thin shell and a narrow beveled surface on the lateral borders of the plastron, it differs in having all neurals except the first wider than long and a greater depression of the sulci.

From *E. cibollensis*, also from the Wasatch, it differs in having the humeral-pectoral sulcus crossing behind the entoplastron, and also in being of much smaller size.

### Family TRIONYCHIDÆ.

#### ASPIDERETES LATUS, new species.

Plate 37.

*Type*.—No. 8802, U.S.N.M., consists of the carapace, which lacks the nuchal, preneural, and first neural. Collected by Levi Sternberg, 1917.

*Type locality*.—Sand Creek, Province of Alberta, Canada.

*Horizon*.—Belly River formation, Upper Cretaceous.

The turtle carapace described below is provisionally referred to the genus *Aspideretes*, as the absence of the nuchal, preneural, and first neural renders a positive genus determination impossible at this time.

Except for the loss of the parts mentioned this specimen is in an excellent state of preservation. Certain peculiarities show it to be an undescribed species, and the name *Aspideretes latus* is here proposed.

The carapace has been flattened by pressure so that its natural transverse convexity has been largely eliminated. The shell is wider than long, the greatest diameter across the third costals being 290 millimeters. It is estimated that the greatest length at the center was about 240 millimeters.

The carapace is subquadrangular in outline, broadly rounded behind with a narrow median notch. The loss of the nuchal does not permit a description of the anterior outline of the shell. The median anterior portions of the first pair of costals are deeply and broadly excavated, as shown in figure 8, indicating that a considerable portion of the nuchal extended well posterior into the disk. The lack of sutural edges along these borders would appear to show that the bony connection of the nuchal with the remainder of the disk was entirely with the preneural, and that its lateral branches were probably free, as in *Aspideretes puercensis*, at the most only overlapping the projecting ribs extending from the first costal plates.

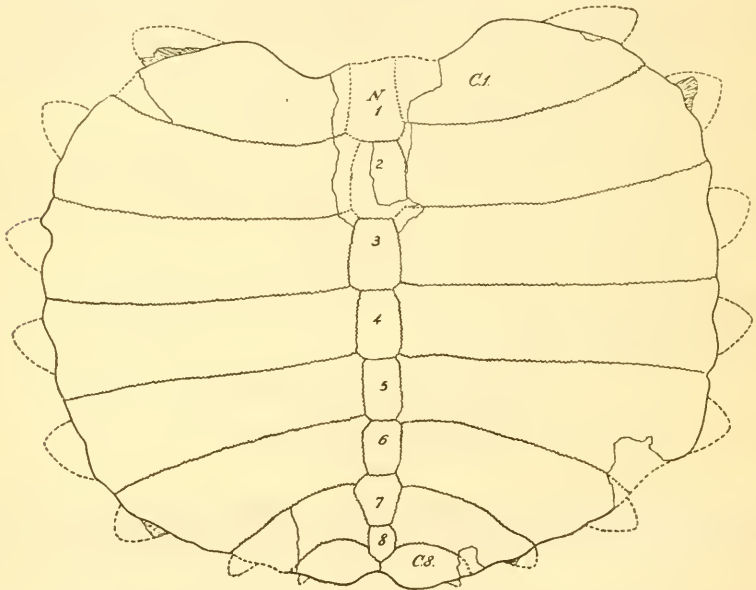


FIG. 8.—CARAPACE OF *ASPIDERETES LATUS* NEW SPECIES. TYPE. NO. 8802, U.S.N.M. C. 1, C. 8, COSTAL BONES ONE AND EIGHT; N. 1, 2, 3, 4, 5, 6, 7, 8, NEURAL BONES ONE TO EIGHT. ABOUT ONE-THIRD NATURAL SIZE.

In the complete shell there were eight neurals; the first, however, is missing in the type-specimen. It is the only Trionychnid known to the writer to have a full complement of neurals, as usually one and often two posterior neurals are absent; thus six and seven being the usual number of these bones. The eighth neural, though reduced in size, lies partially between the eighth pair of costals and extends nearly to the median posterior border. The second, third, and fourth neurals are hexagonal, longer than wide, with the broad end posterior, as in all Trionychnids. The fifth is a parallelogram and only in contact with the fifth pair of costals as in *Aspideretes foveatus* (Leidy). The sixth and seventh are hexagonal with the broad end in front. The

eighth is reduced in size and suboval in form. Their principal dimensions are given in the accompanying table.

*Measurements of neurals in millimeters.*

Neurals.	Length.	Width.
2	..	23
3	30 <sup>ε</sup>	24
4	29	21
5	25	15
6	23	14
7	21	18
8	14	11

<sup>ε</sup> Estimated.

The first costals differ from those of all other members of the genus in being narrower than the second pair of costals at their proximal ends. From the second to the eighth the costals become successively narrower on the proximal end. The eighth pair meet on the midline behind the eighth neural for only 8 millimeters.

The ornamentation of the carapace resembles somewhat that of *Aspideretes splendidus*, consisting of abrupt and sharp-topped ridges which by their union inclose pits and furrows of irregular size and form. They are largest on the middle of the lengths of the costals, extending over nearly the whole surface of the reduced posterior costals. There are usually 4 or 5 of these pits or furrows in a 10-millimeter line. The pits diminish slightly in size along the middle of the shell, but toward the free borders the pits grow smaller, finally disappearing altogether, thus having a smooth band around the border, extending somewhat inward from the beveled surface, especially on the median costals. The scalloped borders of the disk are beveled off from the top side to a sharp edge. The ribs projected beyond the ends of the costals, but their exact extension can not be determined in the type, as all are missing.

The presence of eight neurals, the comparatively narrow and deep median excavation of the anterior end of the disk for the nuchal and the apparently loose articulation of that bone with the first costals, the presence of a full complement of neurals, is an assemblage of characters differing from all described species.

It resembles the other known species of *Aspideretes* from the Judith River, Belly River deposits, in having the shell broader than long and in the general character of the ornamentation of the shell.

EXPLANATION OF PLATES.

PLATE 29.

Carapace of *Neurankylus wyomingensis*, No. 7581, U.S.N.M. Type. Superior view.  
About one-third natural size.

## PLATE 30.

Plastron of *Neurankylus wyomingensis*, No. 7581, U.S.N.M. Type. Ventral view. About one-third natural size.

## PLATE 31.

Carapace of *Baëna antiqua* Lambe, No. 8801, U.S.N.M. Superior view. About two-thirds natural size.

## PLATE 32.

Plastron of *Baëna antiqua* Lambe, No. 8801, U.S.N.M. Ventral view. About two-thirds natural size.

## PLATE 33.

Carapace of *Boremys albertensis*, No. 8803, U.S.N.M. Type. Superior view. About one-half natural size.

## PLATE 34.

Plastron of *Boremys albertensis*, No. 8803, U.S.N.M. Type. Ventral view. About one-half natural size.

## PLATE 35.

Shell of *Agomphus alabamensis*, No. 8806, U.S.N.M. Type. Viewed from the left side. More than one-half natural size.

## PLATE 36.

FIG. 1. Carapace of *Echmatemys megalax* (Cope), No. 7316, U.S.N.M. Superior view.  
2. Plastron of same. Ventral view. Both figures slightly less than natural size.

## PLATE 37.

Carapace of *Aspiderctes latus*, No. 8802, U.S.N.M. Type. Superior view. More than one-half natural size.





CARAPACE OF NEURANKYLUS WYOMINGENSIS

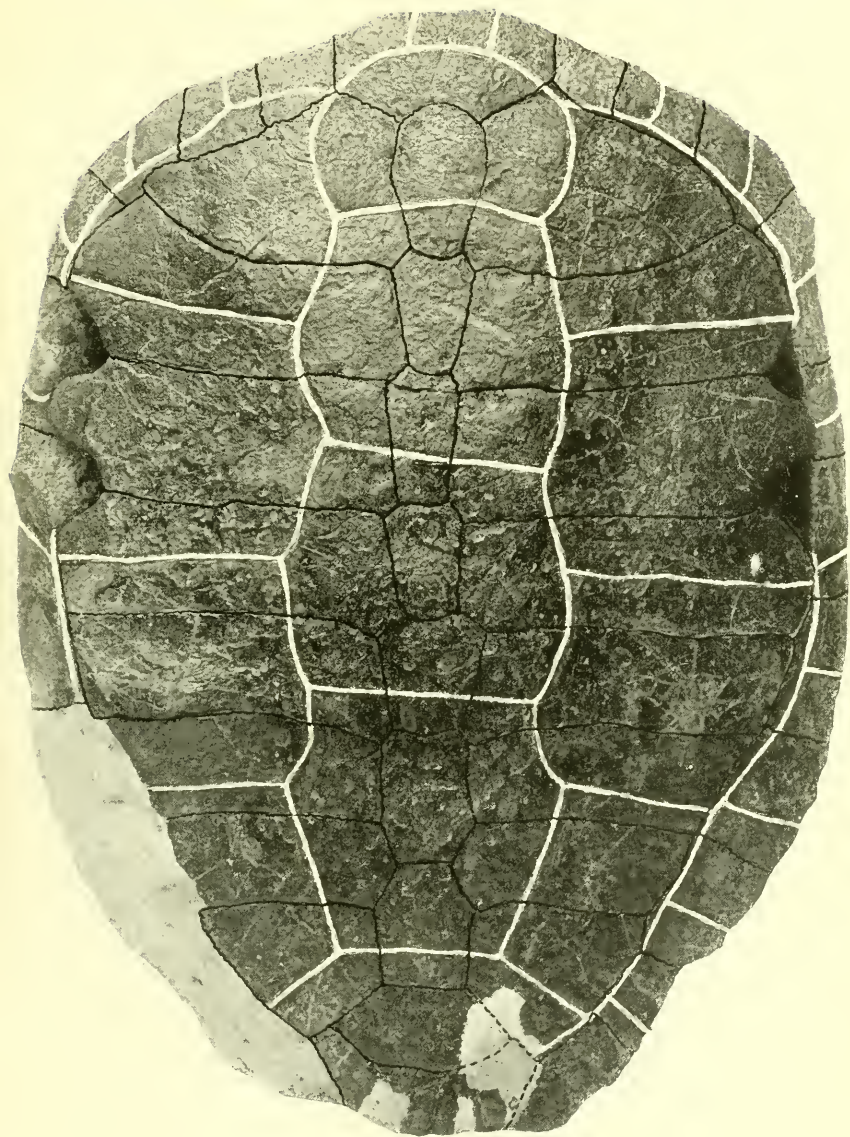
FOR EXPLANATION OF PLATE SEE PAGE 131



PLASTRON OF NEURANKYLUS WYOMINGENSIS

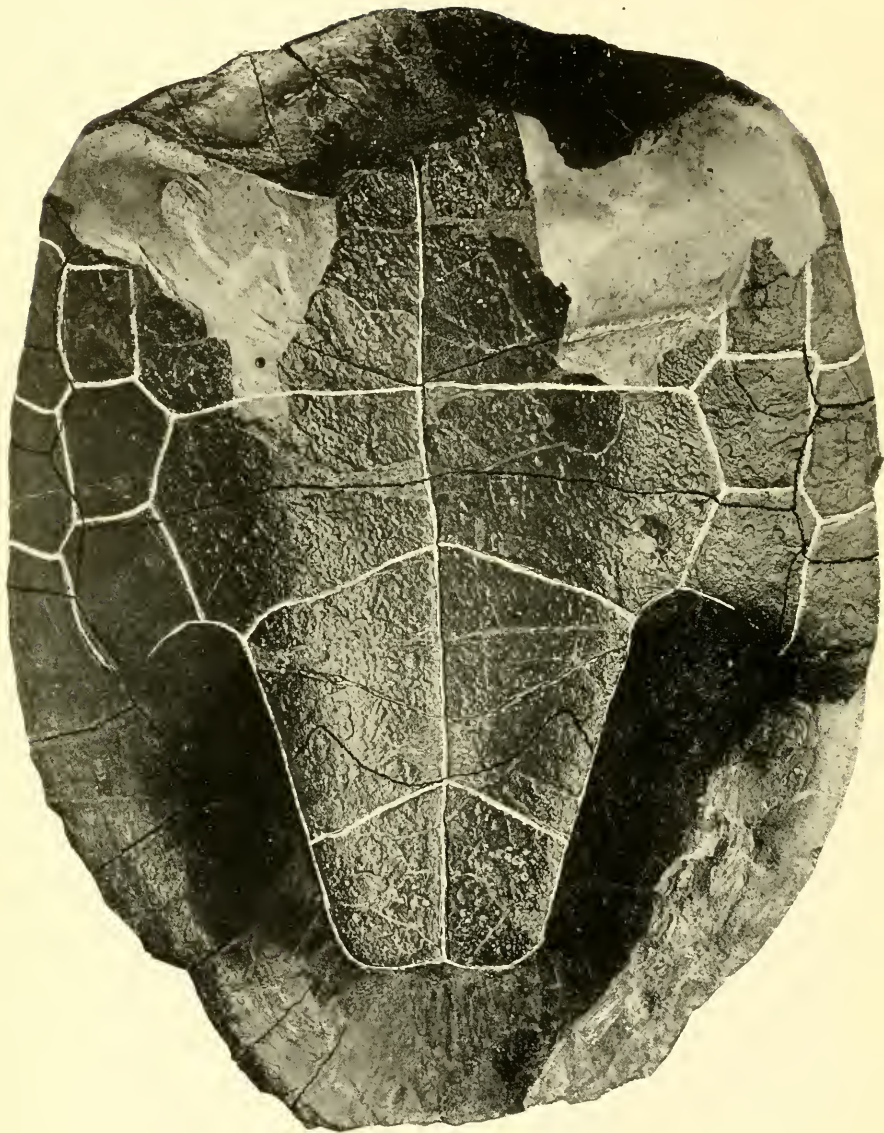
FOR EXPLANATION OF PLATE SEE PAGE 132





CARAPACE OF BAENA ANTIQUA

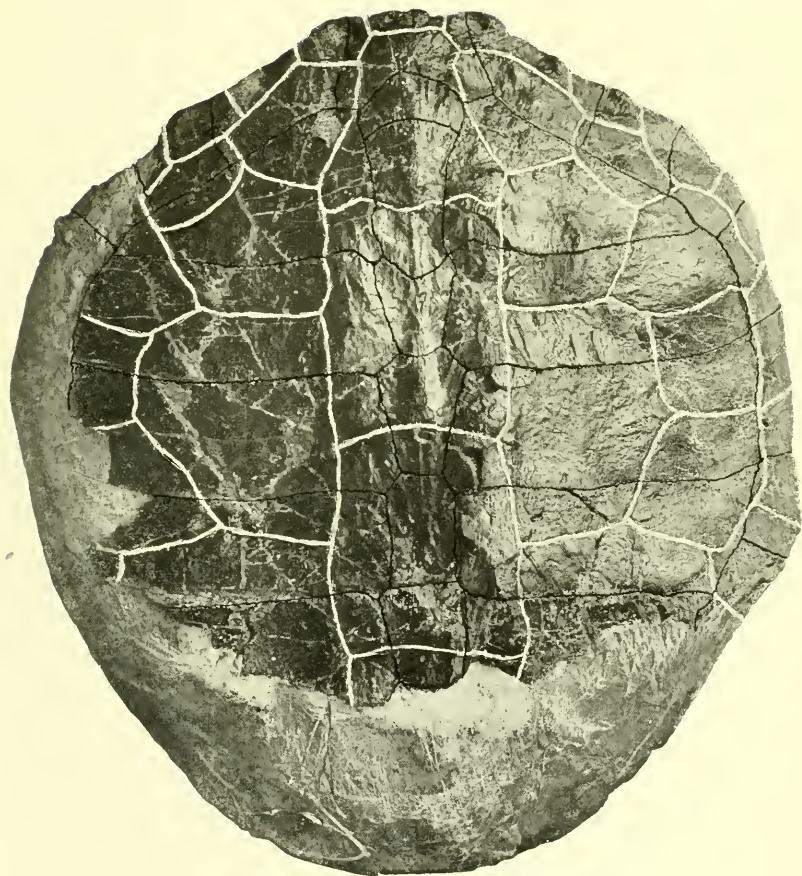
FOR EXPLANATION OF PLATE SEE PAGE 132



PLASTRON OF BAENA ANTIQUA

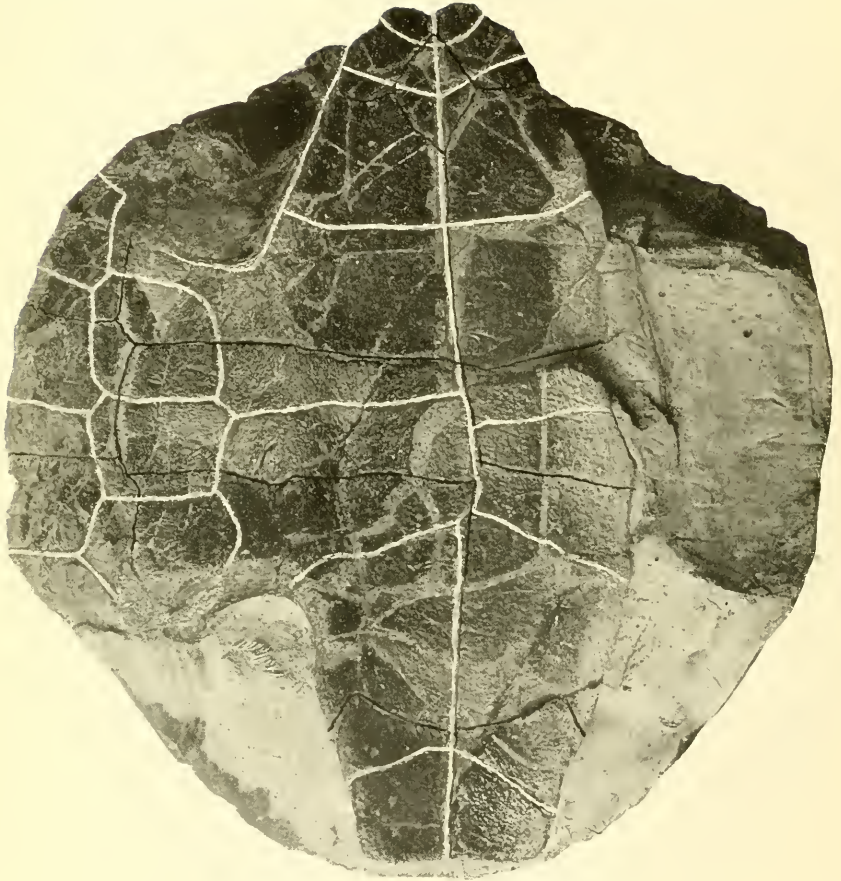
FOR EXPLANATION OF PLATE SEE PAGE 132





CARAPACE OF *BOREMYS ALBERTENSIS*

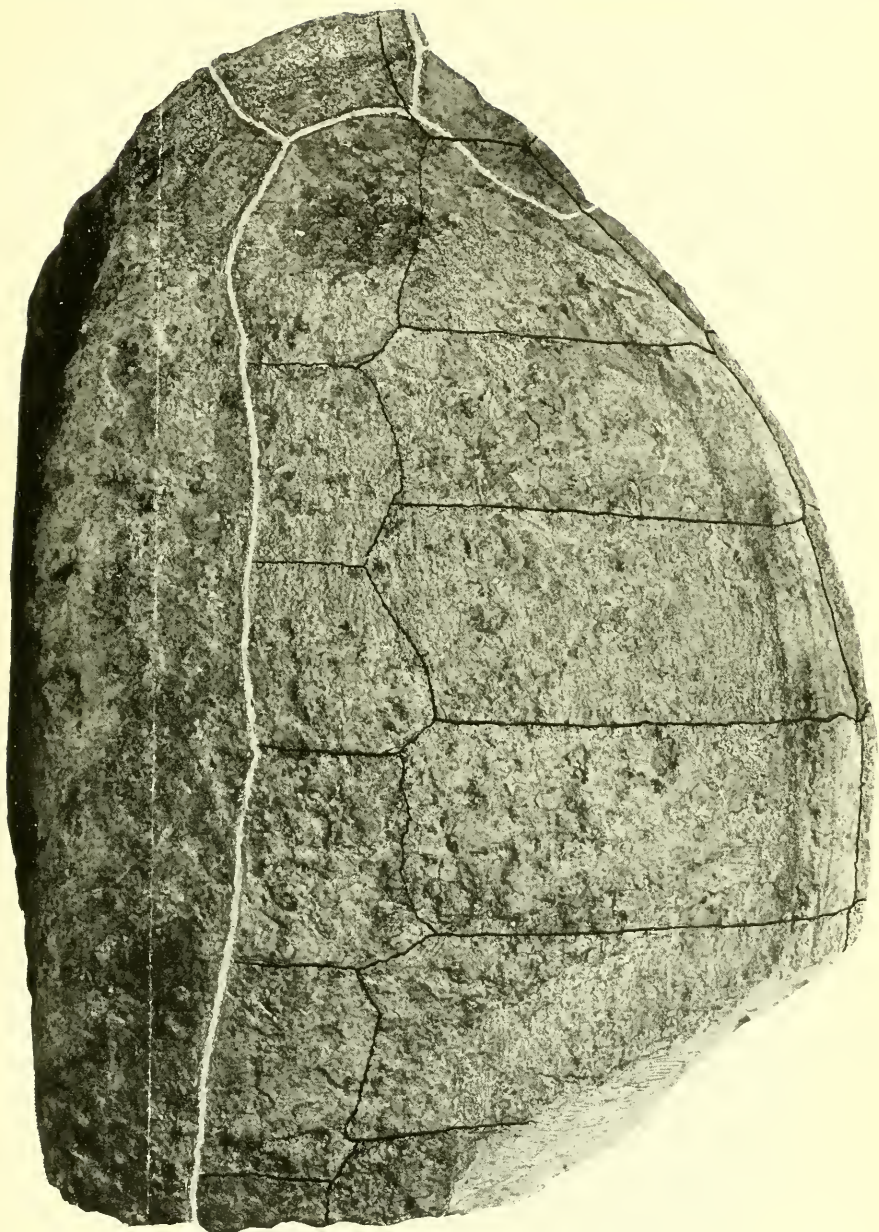
FOR EXPLANATION OF PLATE SEE PAGE 132



PLASTRON OF *BOREMYS ALBERTENSIS*

FOR EXPLANATION OF PLATE SEE PAGE 132





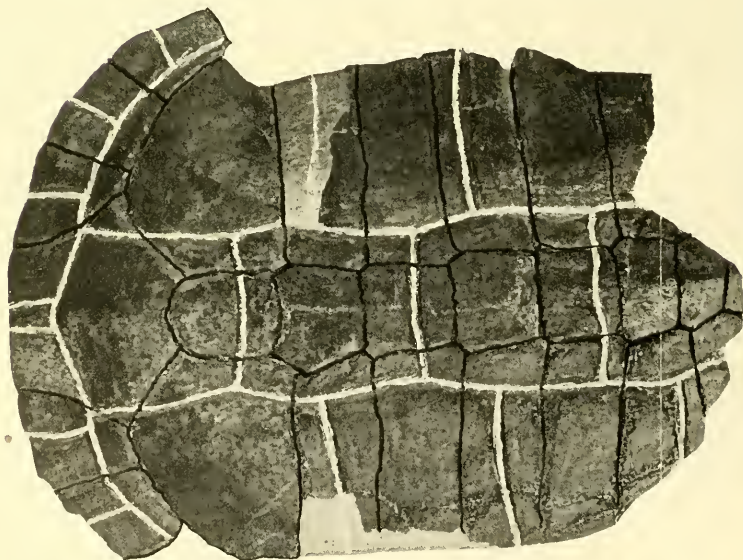
SHELL OF AGOMPHUS ALABAMENSIS

FOR EXPLANATION OF PLATE SEE PAGE 182

2



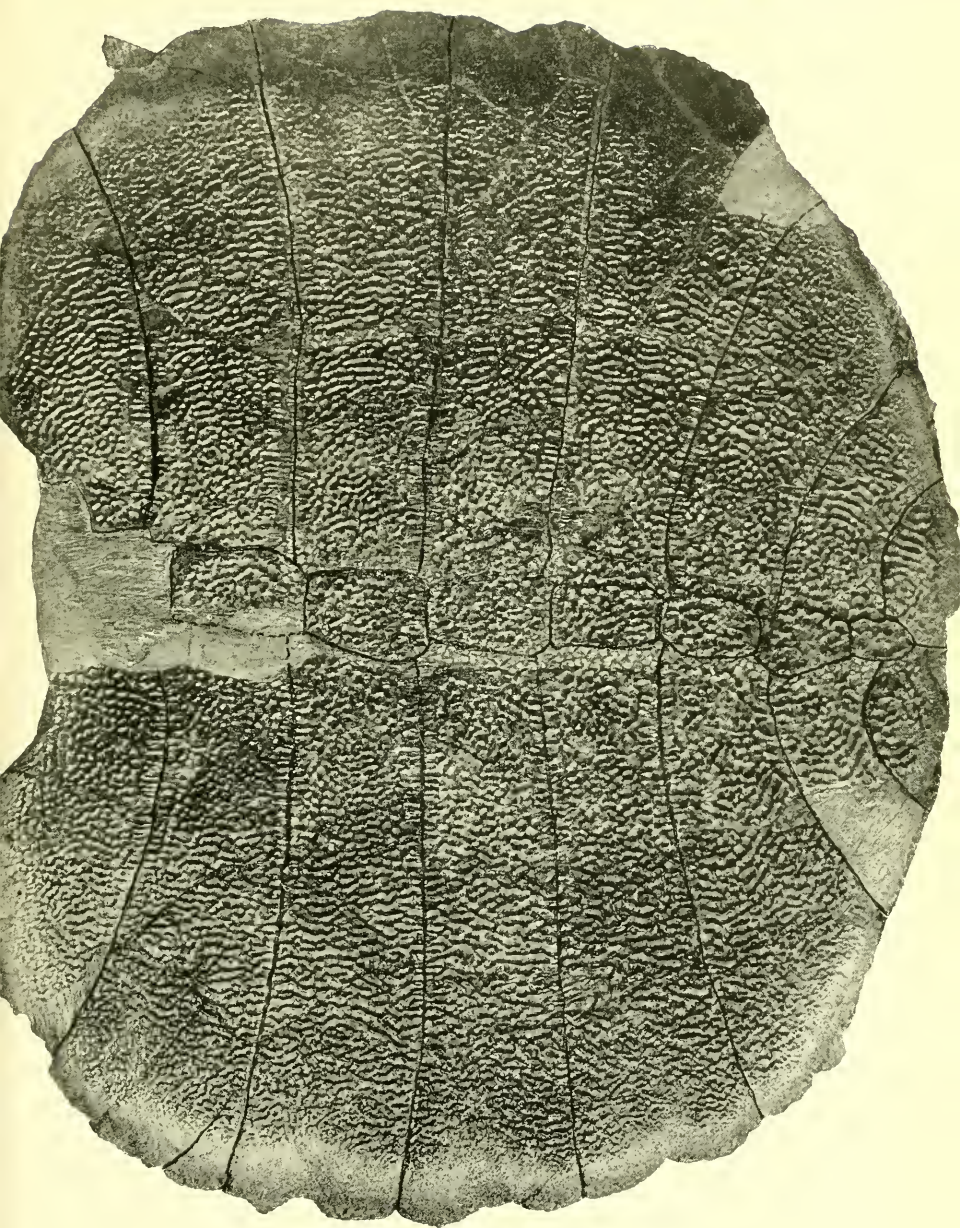
1



CARAPACE (1) AND PASTRAN (2) OF ECHMATEMY'S MEGALUX

FOR EXPLANATION OF PLATE SEE PAGE 132





CARAPACE OF *ASPIDERETES LATUS*

FOR EXPLANATION OF PLATE SEE PAGE 132

