

## ON THE RELATIONS OF CARETTOCHELYS, RAMSAY

BY G. BAUR.

IN May, 1886, Prof. E. P. Ramsay, (1) of the Australian Museum, Sydney, described a peculiar new tortoise under the name of *Carettochelys insculptus*.<sup>1</sup> The description was based on an adult female (carapace, eighteen inches in a straight line), which was obtained in the Fly River, New Guinea. The new genus was referred to the family Trionychidæ, forming "a link between the river tortoise and the sea turtles." In 1887 Mr. Boulenger (2) placed this genus in a special family (Carettochelydidæ) of the Pleurodira, for the reason that the specimen was found in New Guinea, from which island only Pleurodira are known. The characters of this family were given as: "Plastral bones, nine. No epidermic scutes on the shell. Limbs paddle-shaped, with only two claws."

Prof. Gill, (3) nearly at the same time, wrote a review of Prof. Ramsay's paper, in which he reached the conclusion that the form is the type of a peculiar family, Carettochelyidæ, and that "it may quite likely prove to be a Pleurodire." Prof. Gill makes the following remarks: "But whatever may be the relations of the new genus, whether to the cryptodirous or pleurodirous tortoises, it has many quite peculiar characters. From all known forms it is apparently distinguished by the absence of scuta, the peculiar feet, and other characters. Undoubtedly, therefore, the new genus does not belong to any of the established modern families, and apparently not to any of the extinct ones named, although when more is known of *Carettochelys*, as well as the extinct forms, it may turn out that the Papuan animal is related to one of the families now regarded as extinct."

The family Carettochelydidæ of the Pleurodira was accepted by Mr. Lydekker (4) in the same year, and *Hemichelys* Lydekker, from the Lower Eocene of India, referred to it. In this

<sup>1</sup> In a preliminary note this form had been considered as a species of *Cyclanosteus*. The species must be named *insculpta*, not *insculptus*.

form we have five neuralia in contact with each other, and there was probably a small mesoplastron present, according to Lydekker. To conclude from the figure, it seems that there were eleven peripherals on each side, as in the Pleurodira, for instance. I believe, therefore, that it is more likely a Pleurodiran than a near relative of Carettochelys.

In 1890 I published a short note on Carettochelys, (5) in which I doubted the Pleurodiran nature of the genus. I said: "It is true it belongs the Papuarian region, in which, so far, only Pleurodira have been found. There are some characters, however, not seen in the Pleurodira, but in another group of Chelonians consisting of the families Cinosternidæ, Staurotypidæ, and Pseudotrionychidæ. It is only in this group that we find twenty-one peripheralia (marginal bones), as in Carettochelys; the neural bones are also reduced, and the dermal shields have disappeared entirely, as in Pseudotrionyx; to the latter character, however, I attach little value, as it may occur in any family.

"It seems to me that the systematic position of Carettochelys is far from being clear. How easily could the whole question be settled! Mr. Ramsay would do a great service to science if he would undertake to have the cervicals and the skull extracted, or the cervicals alone, if he fears for the skull. This could be done without injuring the specimen, and the structure of these parts would show at once the affinities of this peculiar genus."

Not doubting that Carettochelys would prove a very important form of the Testudinata, I wrote to Prof Ramsay, asking him if he could not examine the osteology of the animal, and publish a note about it. A short time before I received an answer I read Dr. Alexander Strauch's *Bemerkungen über die Schildkröten-sammlung im zoologischen Museum der kaiserlichen Akademie der Wissenschaften zu St. Pétersburg.* (6)

Dr. Strauch, whose classification of the tortoises is far behind the times, and certainly not accepted by anybody—(he does not distinguish the Pleurodira from the Cryptodira, but places them in one group, Testudinida, of the same rank as the Cheloniida! The unfortunate separation of Dermochelys as a suborder Atheca is still kept up!)—places Carettochelys in a special "Abtheilung"

of the Thecophora, with the name *Carettochelyda*. "Rückenschild herzförmig mit Randknochen. Brustschildknochen zu einer Platte verwachsen. Schale ohne Hornplatten Floasenfüsse mit 2 Krallen. Phalangen der Zehen mit Condylen." Strauch remarks: "Soweit sich nach der allerdings noch sehr unvollkommenen Beschreibung Ramsay's urtheilen lässt, muss seine *Carettochelys insculpta* unbedingt zum Typus einer besonderen, den Trionychiden und den Meerschildkröten gleich werthigen Familie (nach Boulenger also Superfamilie) erhoben und im System zwischen diese beiden gestellt werden."

Shortly after I had read Dr. Strauch's paper I received an answer from Prof. Ramsay, which I will give in full: "I received your note on *Carettochelys* in due time, but owing to the internal alterations going on in the museum the specimen could not be got at, and it is only now that I have been able to examine it. Alas! there were *no cervical* vertebræ to examine; the animal had served the explorer for food, and the whole of the bones, except the skull, had been cut away. I had this photographed for you, and hope it will help to place the very interesting form in its proper place. I shall be glad to help you in any way; but there is nothing to work on, more than I have given in the Proc. Linn. Soc. N. S. W., Vol. I., 1886, p. 158, with plates."

This was bad news. Nothing left of the bones but the skull! But probably it was possible to determine the systematic position of the interesting animal from the photographs, which were on the way. A few days after the letter the photographs came: 1, two upper views of the entire animal; 2, one lower view; 3, the upper view, and 4th, the lower view of the posterior portion of the skull. To Prof. Ramsay I have to express my best thanks for his great kindness and liberality.

The skull at once showed that this form was no Pleurodiran; that its nearest living relatives appeared to be the Trionychia, its very closest fossil relative the peculiar *Pseudotrionyx* Dollo, from the Eocene, which I always had suspected as such.

The skull is only comparable with that of the Trionychia. As in this group, we have three greatly developed, crest-like posterior processes: the supraoccipital, and on each side the squamosal. The

supraoccipital process is club-shaped and enormously developed, —more than in any other tortoise known. Of course this character alone would not be sufficient to establish absolutely the near affinity of the peculiar form with the Trionychia; such a development of the posterior portion of the skull could take place in the Pleurodira or Cryptodira just as well. But there are other characters which at once show that the form has nothing to do with the Pleurodira. Before all, the pterygoids extend behind between quadrate, basisphenoid, basioccipital, a condition never seen in the Pleurodira. Whether the pterygoids are completely separated by the basisphenoid as in the Trionychia cannot be seen from the photographs; this question, therefore, is still an open one. The quadrate is peculiar. The articular face with the lower jaw is Trionychian, not Pleurodiran; and so is the posterior end of the lower jaw. The quadrate is not completely closed behind, but only on its outer border, as in *Podocnemis*, for instance, but not in such a great degree. As is well known, the quadrate of the Trionychia is completely closed behind; this, of course, is a secondary condition, and there cannot be any doubt that the ancestors of the Trionychia had the quadrate open behind. The quadrate of *Carettochelys* is exactly of such a form which we may expect in the ancestors of the Trionychia. The pterygoids resemble very much the same elements in the Trionychia. The lower jaw is rounded in front and has a short symphysis. The upper side of the skull is very interesting. The greatest peculiarity is that the upper surface of the bones is granulated exactly as the shell. The dermal plates described by Ramsay do not exist; there are no plates on the skull at all. This peculiar condition is only found in the Jurassic *Compsemys plicatulus* Cope. The sutures of the bones of the upper side of the skull, which can be seen, just as the sutures of the elements of the carapace and plastron are visible, must have been taken as indications of dermal plates by Prof. Ramsay.

The interorbital space is very large, the orbits being completely lateral; the postorbital arch is about half of the interorbital space. The whole upper aspect of the skull reminds us of the Dermatemydidae, Staurotypidae, Cinosternidae; and the arrange-

ment of the elements is the same, the frontals being excluded from the orbits. There is no indication in the photograph of free nasal bones. The nose is projected much in front, and must have, when in fresh condition, an appearance very much like that in the *Trionychia*, but not so much pointed. The zygomatic arch is not elevated as in the *Trionychia*, but is in a line with the maxillary and quadrate, as in the *Cinosternidæ*, for instance.

The neck, the vertebræ of which were unfortunately not preserved, was short; but I do not see any reason why the head could not have been retracted, as in the *Chelydridæ*, for instance. Nothing is known about the shoulder-girdle and the pelvis. But one thing seems to be sure: the pelvis was not coössified with the carapace and plastron, but free. If it had been coössified with the shell, as in the *Pleurodira*, it probably would have been preserved with the shell. An important question is the number of phalanges in the fourth digit; as is well known, in all *Trionychia* we have more than three phalanges in the fourth digit. It looks to me, as far as I can conclude from the photographs, that in *Carettochelys* the number three was not surpassed.

We have now to consider the carapace and plastron. Both have been figured by Ramsay, but there was some doubt about the presence or absence of a mesoplastral element. In regard to the carapace, I have nothing new to add. There is no trace of dermal scutes on the shell. The number of neurals is six; they are very slender and all separate from each other. The first six pleuralia meet in the middle line behind, being separated in front by the neuralia. The seventh and eighth neuralia touch each other completely in the middle line. There is only one postneural. The number of the peripheralia (marginal bones) is ten on each side, besides the single pygal. The most interesting new point to be noted in the plastron is the presence of a small distinct mesoplastral element. The structure of the plastron is best seen from the figure.

I have stated above that *Pseudotrionyx* is the nearest relative of *Carettochelys*. *Pseudotrionyx* was described by Dollo (6) in 1886. The portions found in the Middle Eocene of Belgium consisted of the posterior part of the carapace, and the nearly complete hyo-

hypo-, and xiphiplastron of the right side. The sculpturing of the shell is the same as in *Carettochelys*. There is no trace of dermal scutes. The number of the peripheralia is the same as in *Carettochelys*. There is only one postneural, of the same shape as in this form. There is a difference in the neuralia, however. There are seven slender neuralia in *Pseudotrionyx*, which are all connected with each other, separating the first six pleuralia completely; the seventh pleuralia meet behind, and the eighth are entirely connected. In all the pleuralia the rib heads are well developed. If we now compare the plastron of *Carettochelys* with the portions preserved in *Pseudotrionyx*, we are struck at once by the enormous resemblance. The hyoplastra of both are nearly identical in shape. I may call especial attention to the border connecting the hyoplastron with the endo- and epiplastron. But to conclude from Dollo's figure, it seems to me that the hyoplastron was not entirely united to these elements, but only connected with them by ligament, as in the *Cinosternidæ*. The most interesting point, however, is that *Pseudotrionyx* doubtless also had a distinct mesoplastral element as *Carettochelys*. Dollo held the opinion that there was a small fontanelle at the outer border of the hypo- and hypoplastra (*Échancrure naturelle, reste d'une fontanelle latérale*, N. Fig. I., Pl. II.) Besides, he thinks that the line of the connection between carapace and plastron was very short. There cannot be any doubt, however, that *Pseudotrionyx* showed about the same conditions as *Carettochelys*.

*Pseudotrionyx* is placed by Dollo, Zittel, and Lydekker among the *Chelydridæ*. A skull originally referred by Sir R. Owen to *Platemys* is considered by Lydekker (8) as belonging to *Pseudotrionyx*. It is stated that it agrees essentially with that of *Macrochelys*; and that this reference is confirmed by the total absence of the impression of horny shields, indicating that the skull, as in the *Trionychidæ*, was merely covered with skin. I think it is at least doubtful whether this skull belongs to *Pseudotrionyx*.

We have now to consider the relations of *Carettochelys*. Its nearest relative is, as I have shown, *Pseudotrionyx*. There is no idenceev from the present material that *Pseudotrionyx* belongs to

a different family from *Carettochelys*. I do not hesitate, therefore, to place both genera in one family, *Carettochelyidæ* Boulenger, 1887, which name has the priority before *Pseudotrionychidæ* Boulenger, a family established in the *Encyclopedia Britannica*, (Vol. XXIII.), p. 457, to contain *Pseudotrionyx* Dollo and *Anostira* Leidy.

This family may be characterized in the following way:

#### CARETTOCHELYIDÆ.

Shell without epidermal shields. Plastron composed of eleven elements, two small mesoplastra being present, which are separated from each other. Only ten peripherals on each side, besides the single nuchal and pygal. (*Carettochelys*, *Pseudotrionyx*.)

Upper surface of skull covered with small, round, raised rugosities exactly as the shell, with three posterior processes, as in *Trionychia*; skull resembling in shape that of the *Cinosternidæ*, but snout more projecting. Limbs paddle-shaped; digits much elongate, only the two inner clawed. (*Carettochelys*.)

How far *Pseudotrionyx* agrees with *Carettochelys* in the latter characters, new finds have yet to determine.

The question now is, To which group of tortoises does this family belong? In a former paper I distinguished four groups of tortoises: the *Amphichelydia*, *Cryptodira*, *Pleurodira*, and *Trionychia*. Of one thing we are sure: it does not belong to the *Pleurodira*. Unfortunately we do not know the structure of the cervicals, which is so characteristic of the three remaining groups. From all that is at present known, it appears to me that the *Carettochelyidæ* are nearest to the *Trionychia*, but show at the same time characters of a group of *Cryptodira*, composed of the families *Staurotypidæ* and *Cinosternidæ*. I expressed a few years ago the opinion that the *Trionychia* did come from forms which had the peripherals complete, and carapace and plastron closed; that the *Trionychia* are not an original, but a highly specialized group. *Carettochelys* shows in the structure of the skull, especially of the posterior portion, *Trionychian* affinity. I believe that the ancestors of the *Trionychia* consisted of forms

which in the structure of carapace and plastron were very much like *Carettochelys*. On the other hand, there seem to be connections through *Anostira* with the groups of *Cryptodira* named above. These affinities are shown in the shape of the skull and plastron, and the peculiar number of peripherals. Until the cervicals and pelves are known, I think it is impossible to determine the correct systematic position of the *Carettochelyidæ*. The most probable view seems to be this: The *Carettochelyidæ* came from a group of tortoises related to the stock from which *Staurotypidæ* and *Cinosternidæ* developed. It is probable that the *Carettochelyidæ* are very close to the ancestors of the *Trionychia*, of which they are only survivals. For the ancestors of the *Trionychia* we have to look in the Jurassic and Lower Cretaceous; for I have shown in another paper that the *Trionychia* of the Upper Cretaceous (Laramie) are typical forms, in which the peripheralia had been already entirely reduced. I have little doubt that these started from the *Amphichelydia*.

There are some points which could be made out by examination of the unique type specimen of *Carettochelys*; the entire structure of the skull, for instance, the condition of the first dorsal, which is probably preserved. It would be very important to know whether the premaxillary is small and single, as in the *Trionychia*, or whether it is developed, as in the *Staurotypidæ*, for instance. It would be interesting to know whether the anterior part of the centrum of the first dorsal vertebra is modified as in the *Trionychidæ* or not.

I can only hope that new specimens will be collected soon in New Guinea. They doubtless exist there in great numbers, and I think the time will not be very far away when we will know the whole anatomy of this most interesting tortoise.

*Clark University, Worcester, Mass., April 5th, 1891.*

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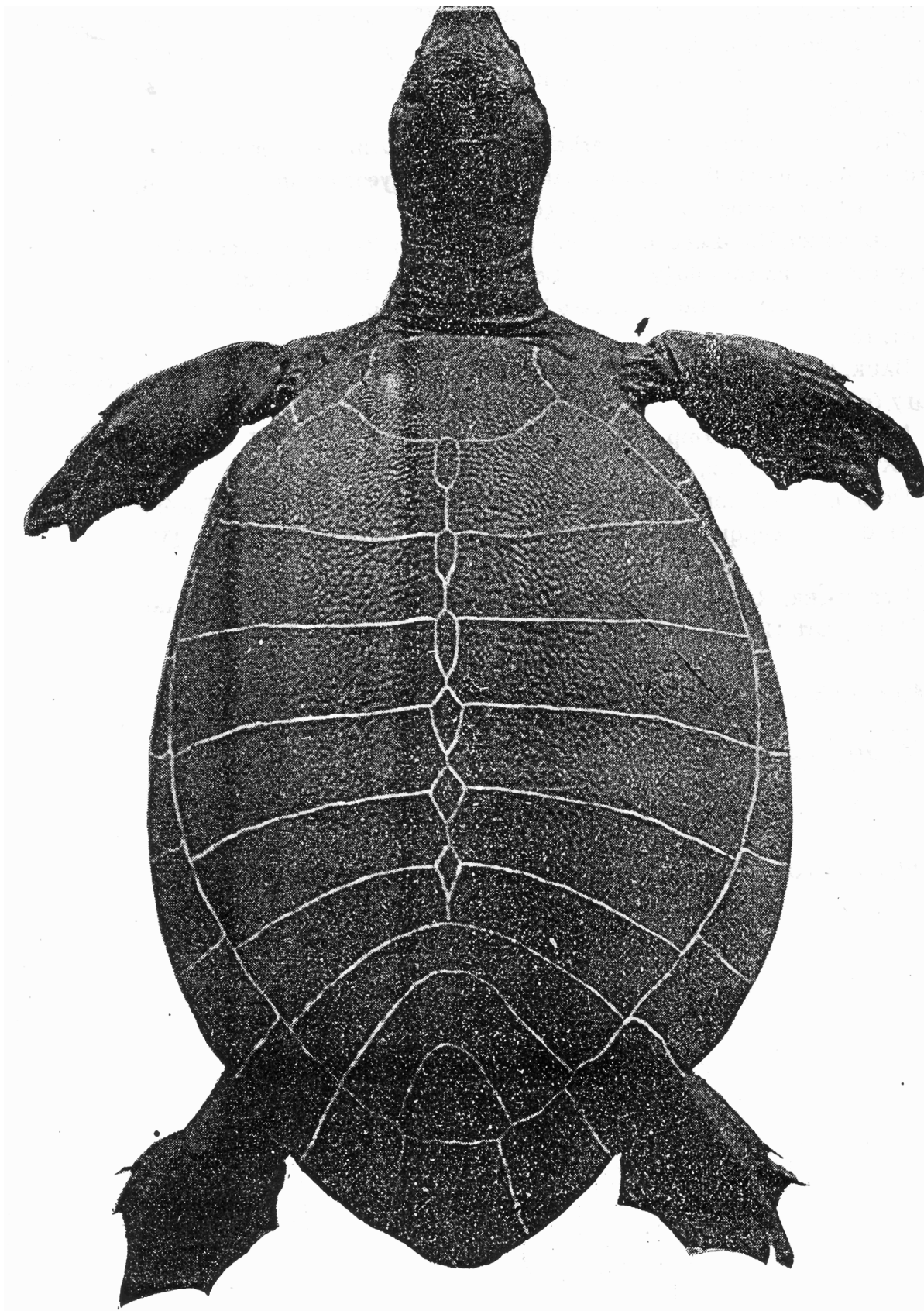
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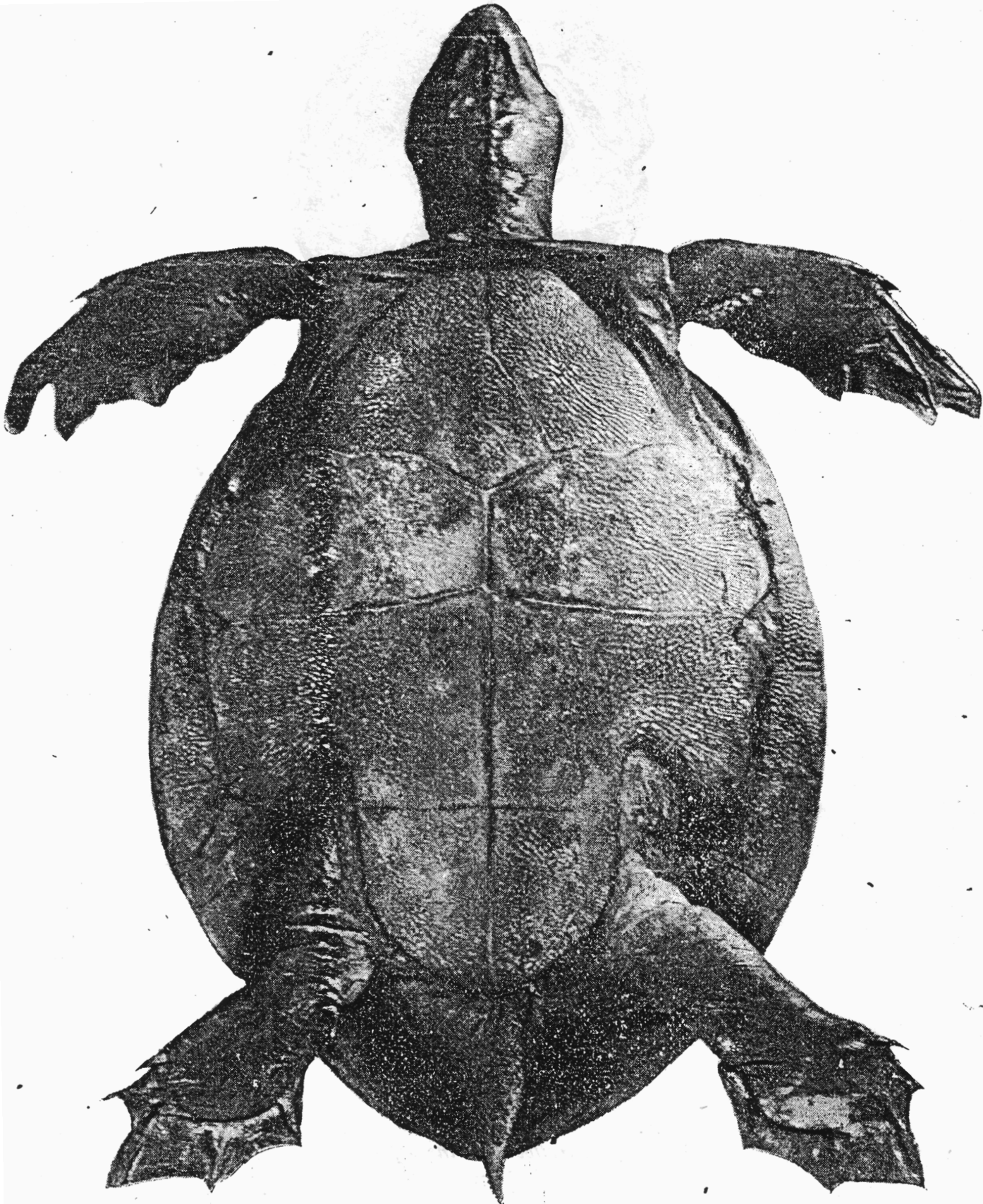
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PLATE XIV.



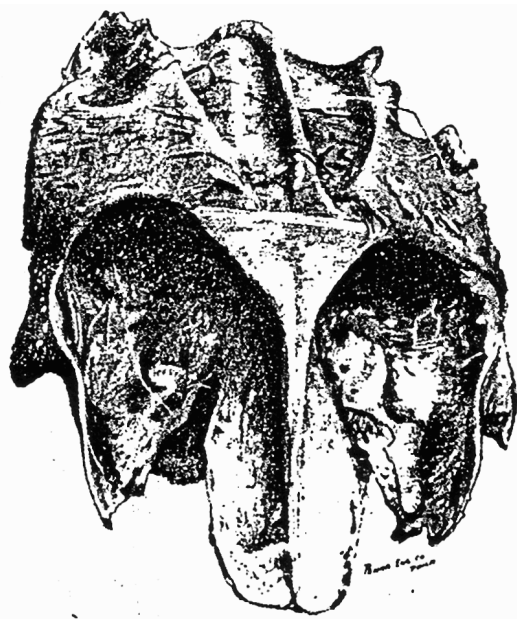
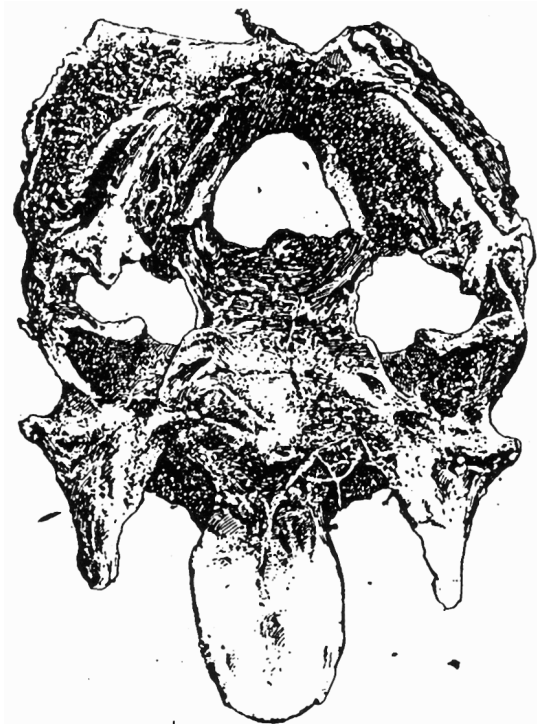
*Carettochelys insculpta.*

PLATE XV.



*Carettochelys insculpta.*

PLATE XVI.



*Carettochelys insculpta.*