

B R E V I O R A

Museum of Comparative Zoology

CAMBRIDGE, MASS.

APRIL 23, 1953

NUMBER 13

FOSSILS AND THE DISTRIBUTION OF CHELYID TURTLES

1. "*Hydraspis*" *leithii* (Carter) in the Eocene of India is a Pelomedusid

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For 80 years a fossil turtle from the Eocene of India has been referred to the Recent South American chelyid genus *Hydraspis* (not of Bell 1828, correctly called *Phrynops* according to Stejneger 1909, and Lindholm, 1929). In spite of the zoogeographical interest of this record the evidence for this assignment has not previously been re-examined critically.

In view of the prevalent idea that the family reached Australia from Asia, the occurrence of a chelyid in the Eocene of India would be neither surprising nor unwelcome. Reference, however, of an Eocene Indian fossil to a modern South American genus is more suspect and obviously calls for re-investigation. Examination of the original description leads to a verdict unfavorable to both the generic and the family assignment.

The fossil in question was brought to scientific attention just over 100 years ago. In 1852 H. J. Carter in a study of the geology of the island of Bombay described as *Testudo leithii** the remains of a small turtle from the Intertrappean beds. Carter was not deceived as to the affinities of the form; he was using the generic name *Testudo* in a Linnaean sense and explicitly stated that he regarded his fossil as close to "*Sternothaerus*" (= *Pelusios*). He published two good plates giving a reconstruction of the fossil made from nine partial specimens. These

* *Testudo leithii* Carter 1852 preoccupies *Testudo leithii* Günther 1869 for the tortoise of Egypt. The available and correct name of the latter then appears to be *Testudo kleinmanni* Lortet 1883.

plates and his text description are the basis of all subsequent discussion. The type material cannot now be located in India and has never been restudied.

On the basis of the 1852 description, Gray in 1871 reassigned the Indian fossil. He remarked: "The description and figure of the carapace induce me to believe that the fossil is nearly allied to some of our existing South American species of the restricted genus *Hydraspis*; and the remains of the head, which are unfortunately imperfect, lead to the same conclusion. . . ." This determination has been very generally copied, in spite of the zoogeographical anomaly upon which Gray himself commented.

I find it necessary to disagree with Gray on the basis of the figured morphology of both shell and skull. Plates 1 and 2 are reproductions of Carter's plates X and XI with a few inessential modifications for clarity.

According to Carter's plate X (though the area is given in dotted lines only) and according to his express statement in the text there is no nuchal scute in the Indian fossil. Lydekker (1889b, p. 170) stated: "The omission of a nuchal shield in the restoration of the anterior border of the carapace is probably incorrect." Perhaps, however, Lydekker made this statement only on the ground that if the form were *Hydraspis* it should possess a nuchal scute. Absence of a nuchal scute would rule out all Recent genera of Chelyidae except *Chelodina* and *Emydura* (in both of which the scute may be present or absent) and *Elseya* (in which it is regularly absent). The latter genera are all natives of the Australian region.

In Carter's fossil the first vertebral is much smaller than the second vertebral. This precise condition is not met with in the living Chelyidae. In most Recent South American forms including most of the species of *Hydraspis* (= *Phrynops*) the first vertebral is on the contrary much larger than the second. There is, it is true, an approach to the condition of the fossil in the Australian genera *Emydura*, *Pseudemydura* and *Elseya* and in the South American *Hydraspis tuberosa* (specimens in the British Museum) and perhaps in some specimens of the South American genus *Hydromedusa*, but in the latter only if the anterior median scute is interpreted as a nuchal withdrawn from the margin rather than as a transversely divided first vertebral. In none of these, however, is the first vertebral as much smaller than the second as it is in the fossil.

In the Indian fossil the gulars are small, and the very broad inter-

gular extends from the anterior margin to the humero-pectoral sulcus, separating the humerals in the midline. This pattern of scutes on the anterior plastral lobe is different from any which is known in the modern Chelyidae. In all the genera except *Chelodina*, *Pseudemydura*, and rarely in *Emydura* (Siebenrock, 1907) the humerals meet in the midline for a significant distance behind the intergular. The intergular also is rarely as broad as in the fossil. In *Chelodina* the intergular is very large and separates the humerals, indeed extending deep into the area of the pectorals, and, except in *C. intergularis* Fry, it does not reach the anterior plastral margin, the gulars meeting in front of it. In *Pseudemydura* (Siebenrock, 1907) the intergular is like that of the Indian fossil in its breadth but as in *Chelodina* dips deeply between the pectorals. The gular-intergular pattern in the exceptional *Emydura subglobosa* in which Siebenrock found the intergular separating the humerals is also quite unlike that of the Indian fossil, the intergular being narrow and of quite different shape.

The feeble xiphiplastral notch is another feature in which the fossil differs from *Hydraspis* and other chelyids except the forms of the Australian region and *Batrachemys*.

The shell, therefore, is not a good match for that of any known genus of chelyid. It is perhaps most like those of the Australian genera but differs from all of these in significant details, for example, in the presence of neurals, which are lacking in all the Australian genera.

The skull and mandible in their turn provide conclusive evidence against chelyid affinities. The mandible, although incomplete, is stouter and broader than in any known chelyid. The symphysis must have been long, in strong contrast to the condition in chelyids. The skull, shown by Carter only in dorsal view, is radically different from that of any chelyid. The skull roof has undergone emargination from behind as in the Pelomedusidae or most Cryptodira. As a result, the parieto-squamosal arch is absent, but a jugal-quadratojugal bar is present. In the Chelyidae and in no other turtles the skull is emarginated from the ventral margin only, and a parieto-squamosal connection is (except in *Chelodina*) always preserved. In chelyids the quadratojugal and the bar of which it was a part are always absent. These are as crucial and clearcut differences as it is possible to obtain between skulls of turtles. Carter's fossil cannot be a chelyid.

It is most probable that it is a pelomedusid. Reference to this family would, it will be recalled, be a return to the opinion of the original describer, who thought the fossil was closest to the African

pelomedusid genus *Pelusios*. The characters of the shell fit such a reference extremely well. The nuchal scute is almost always absent in pelomedusids. The first vertebral is almost always smaller than the second (exception in *Palaeaspis* Gray, and sometimes in *Pelusios*). An intergular separating the humerals is found in *Stereogenys podocnemoides* and in *Elochelys perfecta* as well as in occasional individuals of *Podocnemis expansa*. The xiphiplastral notch is very variable in pelomedusids. Vertebral shields 2 to 4 of the Indian fossil have strikingly convex anterolateral borders, conspicuously concave posterolateral borders, as in some Recent *Podocnemis* and a number of fossil pelomedusids.

A final feature which, as described and figured by Carter, is anomalous, may be clinching proof of the pelomedusid affinity of this form. Gray mentioned that Carter's form was "peculiar also for the underside of the marginal opposite the (pectoral-humeral) suture being rather broader than the rest and angular on the inner edge, which I have not seen in any of the Recent species." If we have to do here with sulci between scutes, the situation is indeed peculiar and unique, but it is noteworthy that the lateral marginal scute boundaries are represented by dotted lines in Carter's original reconstruction (solid lines in plate 2 here) except for the anomalous "marginal" in question. It is noteworthy also that the ventral view of the lateral marginals in Carter's plates does not match the dorsal view of the same marginals. It is evident that Carter was not certain of the exact scute boundaries here, and it is possible that he has figured as the anomalous "marginal" the sutures between bones rather than the sulci between scutes. The lines drawn solidly by Carter in this region are in nearly the right position and have the right aspect to represent in their lateral portions the sutures bounding small mesoplastra and medially the hyo-hypoplastral suture. This interpretation is the more probable because Carter's figure is a reconstruction from nine specimens, one of which may have shown the sutures in this critical region and not the sulci. If small laterally placed mesoplastra were present, this fact would definitely place the Indian form in the Pelomedusinae of Zangerl (1948) with which, on the basis of other resemblances in its shell, it is most plausibly linked.

Carter's turtle is, therefore, most probably a new genus of pelomedusine. I cannot distinguish it from all previously proposed genera of pelomedusines because not all of these are themselves well-delimited. Thus I cannot distinguish it from *Rosasia* (Carrington da Costa 1940)

because at present that genus does not seem to be definable. (On its known characters *Rosasia* might be a synonym of any one of several genera. The carapacial shield, which alone is known, is not sufficiently diagnostic.) I cannot distinguish the Indian fossil from *Dacochelys* (Lydekker, 1889a) because there are no comparable parts, that genus having been founded on a mandibular symphysis, a part that is missing in Carter's fossil. There is also no evidence that *Dacochelys* is a pelomedusid.* I distinguish Carter's form, with some hesitation, from *Elochelys* Nopcsa 1931 because the gular-intergular pattern is not quite that of *E. perfecta*, the type of the genus, and I am not persuaded that the other species referred by Nopcsa to that genus (*E. major*) belongs there. The critical feature of *Elochelys* also, the absence of a suprapygial, is not determinable in Carter's form. A possibly trivial feature, the feeble xiphiplastral notch, distinguishes the Indian fossil from *Stereogenys podocnemoides* (Reinach, 1903), but with Schmidt (1940) I do not believe that *podocnemoides* belongs to the genus *Stereogenys*. *Podocnemoides* and *leithii* may indeed belong to the same genus, but that genus is then unnamed.

From the better defined genera of the Pelomedusidae the Indian form is distinguished by the following combination of characters:

CARTEREMYS, new genus

Type. *Testudo leithii* Carter 1852.

Diagnosis. Skull roof much emarginate from behind; opisthotics prolonged backwards in sharp crests; mandible with a moderately long symphysis; nuchal absent; first vertebral not divided transversely; intergular large and very broad, separating humerals; xiphiplastral notch narrow and shallow; pubic and ischial scars distinctive in shape and position.

* An ingenious device by which Lydekker avoided the possibility of a change in the trivial name of *Dacochelys* has been the source of confusion in regard to this point. The type of the genus is *Dacochelys delabechei* Lydekker 1889, but Lydekker considered his form probably synonymous (largely on size alone) with *Emys conybearii* Owen and therefore (according to Lydekker and Boulenger 1887) with *Emys delabechei* Bell. No name change is necessary if this synonymy is correct and, since the shell of *Emys conybearii* shows small lateral mesoplastra (Lydekker and Boulenger 1887), *Dacochelys delabechei* is then a pelomedusine. But the only valid physical type of *Dacochelys* (the type of the species upon which the genus is based) is the very peculiar mandibular symphysis, which I regard as quite impossible to assign to family. Lydekker's device has most unfortunately brought the name *Dacochelys* into the literature (for example in Zangerl, 1948) as a pelomedusine — which it may be but which it certainly cannot at present be proved to be.

It should be mentioned that if *Dacochelys delabechei* were in fact a synonym of *E. delabechei* Bell as Lydekker assumed, and if *E. conybearii* Owen were a synonym of *E. delabechei* Bell as Lydekker also assumed, *Dacochelys* Lydekker 1889 would be a straight synonym of *Palaeaspis* Gray 1870, type *Emys conybearii* Owen.

Horizon. Intertrappean Eocene of Bombay.

Comment may now be made on other records and alleged records of this form.

In 1890 Lydekker reported an entoplastron showing half of an intergular scute from the Intertrappean beds in the Nagpur district as a second occurrence of "*Hydraspis leithii*." The new fragment was much larger than typical *Carteremys leithii* and differed also in the much narrower intergular. Lydekker passed over the differences casually with a mention of variability in *Hydraspis* (= *Phrynops*) *hilarii*. It is unlikely that he had in hand any member of the genus *Hydraspis* or *Carteremys leithii*. It is probable that he had some other pelomedusid, and he had himself previously (1887) described a *Podocnemis indica* in the Eocene of India.

Sukheswala (1947, an abstract only) has reported a find of a shell of *Testudo* (= *Carteremys*) *leithii* in the Intertrappean of Worli Fill, Bombay. Here, as in the case of the specimens described by Carter, remains of frogs (*Indobatrachus pusillus*) were associated. In this instance there is no doubt of the identification.

Dr. Sukheswala has kindly sent me a photograph of this specimen (plate 3). The outline of the shell (somewhat different from that figured by Carter) is clearly shown, as is also the characteristic sculpture of the surface (mentioned by Carter), which while somewhat like that of some chelyids also resembles that of, for example, the American pelomedusine genus *Taphrosphys*. More important is the evident presence of several neurals, the first vertebral clearly much smaller than the second, and (less certainly) the absence of a nuchal shield. The plastron and the skull are unfortunately missing. As with Carter's specimens the new shell is small, eight inches long by six wide. The specimen is now in the possession of the Geological Survey of India.

Two other specimens have since been found by Dr. Sukheswala and have been sent by him to the Geological Survey of India. These are recorded in the general report of the Survey for 1948 (West, 1950). These specimens, while recognizable, afford no additional information.

Also recorded by the Survey in the same report was a possible young shell of *Carteremys leithii* from the carbonaceous shales of an Intertrappean band near Raibasa in the Chhindwara district, Central Provinces, India. The Survey has generously sent me a photograph of this specimen. The identification must be pronounced doubtful as, indeed, the Survey has regarded it. While this new locality may be

thought of hopefully, it would appear that *Carteremys leithii* is at present known with certainty only from the Intertrappean of the island of Bombay.

Acknowledgments. Dr. A. S. Romer, Dr. P. J. Darlington, Dr. P. E. Vanzolini, Dr. Karl F. Koopman, Dr. W. E. Swinton and Mr. L. I. Price have read the manuscript and given critical advice. The allocation of the Carter fossil has been discussed with Dr. Rainer Zangerl. Mr. Arthur Loveridge, Mr. C. M. Bogert and Dr. H. W. Parker have permitted the examination of Recent skeletal material in their departments. I wish to thank also the authorities of the Bombay Natural History Society for endeavoring to locate Carter's types, the Geological Survey of India for furnishing me all the information in their possession in regard to the new specimens of *Carteremys* and for photographs of certain of them, and especially Dr. R. N. Sukheswala of St. Xavier's College, Bombay, for his prompt and courteous replies to my insistent questions and for the gift of the photograph reproduced as plate 3.

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