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THE OCCURRENCE OF THE NEW GUINEA TURTLE (*CARETTOCHELYS*) IN THE MIOCENE OF PAPUA.[1]

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(Plate x, and Figure 1.)

Introduction.—The fossil forming the subject of the present note was discovered in October, 1940, in a quarry on the road leading from the left bank of the Vailala River (Papua, Gulf Division) near the mouth of Kariava Creek to the drilling site of Australasian Petroleum Company's first exploration well in Papua. The fossil was sent to Port Moresby and handed to the writer by Dr. K. Washington Gray, chief geologist to Australasian Petroleum Company. The quarry was situated 800 feet E. 7° S. from the mouth of Kariava Creek. The writer visited the locality in May, 1941. No further vertebrate fossils were found, but mollusca, corals and foraminifera occur in the same beds the age of which is Upper Miocene.

The fossil remains consisted of the external mould, in medium-grained dark tuffaceous sandstone, of a single highly sculptured bone with a fragment of the bone, $1\frac{1}{2} \times 2$ inches in size, still adhering to the matrix. About one-third of the mould was apparently lost in collecting, but it is likely that only this single detached bone was originally embedded in the rock.

Preliminary examination of the fossil made it clear that it was a fragment of the nuchal plate of a turtle, belonging apparently to the Trionychia but suggesting by its outline the presence of marginal plates in the species. Thus the fossil could not belong to the family Trionychidae, but appeared to be related to the more primitive family Carettochelyidae. The only living representative of this family is the New Guinea Turtle, *Carettochelys insculpta* Ramsay.[2]

Description.—A plaster cast of the mould was made (Pl. x, fig. 1). It shows that the bone was irregularly pentagonal in outline, much wider than long, with a widely arched posterior and postero-lateral margin, a lateral angle of about 120°, shorter, slightly concave, antero-lateral margins and an almost straight long anterior margin which is very slightly concave in outline for about one-fourth of its length on either side of the median line. The preserved bone fragment (Pl. x, fig. 2a, b) belongs to the posterior median part of the plate. On its well-preserved sutural margin we recognize the small, rectangular, median excavation into which the anterior margin of the first neural plate must have been fitted. The arched postero-lateral margins of the nuchal plate were joined to the anterior margins of the costal plates. The well-defined lateral angles and antero-lateral margins indicate the presence of well-developed marginal plates.

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[1] Published by permission of the Directors, Australasian Petroleum Company, Proprietary, Limited, Melbourne, Victoria.

[2] Ramsay.—*Proc. Linn. Soc. N.S.W.*, (2), i, 1886, p. 158. Waite.—REC. AUSTRALIAN MUS., vi, 1905, p. 110. Ogilby.—*Proc. Royal Soc. Queensland,* xix, 1905, p. 1. Longman—*Mem. Queensland Mus.*, ii, 1913, p. 39. de Rooij.—The Reptiles of the Indo-Australian Archipelago. Part i. Lacertilia, Chelonia, Emydosuchia. Leiden, 1915. Walther.—*Nova Guinea,* xiii, 1922, p. 607.

The external surface of the bone is covered with a *Trionyx*-like granulation consisting of isolated small rounded or elliptical mounds separated by narrower or equally wide anastomosing depressions. The general trend of the ornamentation is irregular or transversal about the central part of the plate, changing to radial arrangement near the posterior and postero-lateral margins and, to a lesser extent, near the anterior edge. There are no markings indicating the presence of horny plates on the bone.

On the internal surface of the bone two strong axially elongated projections are symmetrically arranged close to the posterior margin and to the median line. They rise gradually from the central part of the bone forming steeply inclined, elliptical, slightly saddle-shaped, facets directed backward and downward. Reticulate impressions in front of these projections indicate attachment areas of muscles.

Measurements.—Length of nuchal plate (reconstructed), 75 mm.; width of nuchal plate (reconstructed), 130 mm.; width of anterior margin of nuchal plate, 104 mm.; width of antero-lateral margin (nuchal-marginal suture), 40 mm.; suture joining nuchal and first neural plates, 11 mm.; angle between postero-lateral and antero-lateral margins, 120°; computed length of carapace (based on the proportions of *Carettochelys insculpta* Ramsay), 600 mm.

Comparison.—The peculiar surface sculpture of the bone points to the Trionychia as the only group of turtles in which this type of ornamentation combined with the absence of horny plates is a general distinctive feature. The presence of marginal plates is clearly indicated by the outline of the nuchal plate here described. In the Trionychidae proper, in which the marginal plates are absent, the nuchal plate has no distinct antero-lateral margin and the lateral angle is acute or split into a number of projecting spines. A detailed comparison of the newly discovered bone with the nuchal plate of *Carettochelys insculpta* Ramsay reveals almost complete identity.

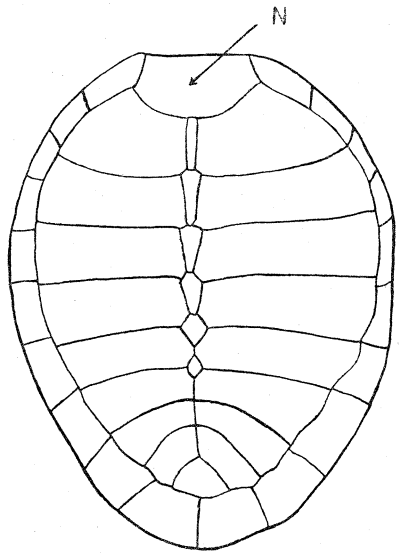


FIGURE I.
Carapace of *Carettochelys insculpta* Ramsay.
Dorsal view. One-fourth natural size. After Hummel. N = Nuchal plate.

Walther[3] describes the nuchal plate of this species as follows: The nuchal plate in *Carettochelys* is wide in its central part and narrower in its posterior part. It is firmly connected with the surrounding elements of the carapace. Its anterior margin is arcuate and vaulted in accordance with the shape of the carapace. The well-expressed granulations of its surface resemble more the sculpture of the marginal than of the costal plates, being circular in outline as in the former. On the posterior part of the

[3] Walther.—*Loc. cit.*, p. 616.

internal surface of the nuchal plate there are two strong protuberances serving as condyli for the eighth cervical vertebra. Together with the strongly raised anterior articular processes of the first pectoral vertebra they form a deep socket in which the peculiar roll of the last cervical vertebra is inserted, articulating with the protuberances. These form some kind of locking device preventing the last cervical vertebra from moving beyond a certain point. Such protuberances are not found in *Trionyx*, but are known in *Anosteira*. In front of these projections we see two depressions with rough surfaces representing areas of attachment for the cervical muscles. They contain on each side a foramen for nerves or blood vessels. The deep depressions extending across to the costal plates in *Trionyx* and according to Ogushi serving as a socket for the scapulae are not clearly developed in *Carettochelys*.

Figures published by Walther and Hummel[4] show the angle between costal and marginal sutures on the nuchal plate of *Carettochelys* to be approximately 120° (Fig. 1), The width of the first neural plate equals about one-twelfth of the width of the nuchal plate in the recent species as well as in the fossil specimen.

These comparisons reveal almost complete identity between the observable features of the fossil specimen and the characters of the corresponding plate of the living *Carettochelys insculpta* Ramsay. While this appears to prove at least generic identity, no other known turtle having a nuchal plate of the same shape and dimensions, specific identification can obviously not be based on the examination of a single bone. Until further remains are discovered the fossil form should therefore be known as *Carettochelys* sp.

Relationships and History of Carettochelys insculpta.—Carettochelys insculpta was discovered in 1885 by the Everill Expedition of the Royal Geographical Society of Australasia on the Strickland River in Western Papua, probably 100–150 miles above its junction with the Fly River.[5] Another specimen was caught about 150 miles further south in the Morehead River,[6] and the species is also known from Netherlands New Guinea,[7] from the Lorentz River, Merauke, Setakwa River, and Lake Jamur. As far as recent forms are concerned, these are the only occurrences of the species, genus and family.

Beginning shortly after its discovery and continuing up to recent years, there has been a considerable amount of discussion on the relations of this family to other living and fossil turtles. The question was lately reviewed by Hummel in his comprehensive study of the fossil Trionychia. The family Carettochelyidae includes the Eocene genus *Anosteira* Leidy. According to Hummel, *Pseudotrionyx* Dollo and possibly several other incompletely known Eocene forms belong to *Anosteira*. Morphologically the Carettochelyidae are more primitive than the Trionychidae which are known already from the Upper Cretaceous, and appear to provide a link between them and the typical Cryptodira.

Although we have still no definite knowledge of the antiquity of *Carettochelys* in New Guinea, it is an interesting fact that the genus existed there in Miocene times. Discussing the history of the family Carettochelyidae for which he assumes an Asiatic origin, Hummel[8] states: "*Carettochelys* exists in New Guinea probably as a relic of the Upper Mesozoic, like the Australian marsupials; the known species of *Anosteira* occur in the Eocene. They lived at a time when New Guinea and Asia were already disconnected. That *Carettochelys* did not migrate to New Guinea in Cainozoic time like *Pelochelys* is shown by the fact that *Carettochelys* is restricted to New Guinea while *Pelochelys* is widely distributed on the Asiatic continent."

The latter contention gains further weight by our new discovery, as it is unlikely, in the present writer's opinion, that any part of the island of New Guinea was land connected with or close to either Asia or Australia at any time between the Eocene and

[4] Hummel.—*Geologische und Palaeontologische Abhandlungen*, (n.s.), xvi, 1929, fig. 11a.
[5] Ramsay.—*Loc. cit.* Waite.—*Loc. cit.*
[6] Longman.—*Loc. cit.*
[7] de Rooij.—*Loc. cit.* Walther.—*Loc. cit.*
[8] Hummel.—*Loc. cit.*, p. 94. The translation is mine.—M.F.G.

the late Pliocene or Pleistocene. The regressive phase at the boundary between Cretaceous and Tertiary is the most likely time of immigration for a non-marine species existing in New Guinea in Miocene time.

Ecology of Carettochelys.—Carettochelys is a typical river-turtle, and does not appear to differ in its habits from the Trionychidae. Walther considers migration along the coast from one river to another as possible, and Hummel,[9] speaking of the Trionychia in general, remarks: "The sea does not form an impassable barrier for the Trionychia. Repeatedly, as for example in the harbour of Wladiwostok and on the coast of West Africa, living *Trionyx* have been observed in the sea. Trionychia can also live in lagoons. . . . It is likely, however, that *Trionyx* makes such excursions into the sea only rarely and probably not altogether voluntarily. . . . It cannot be definitely decided whether the wide range of *Trionyx* throughout the islands of the Western Pacific and Indonesia has any connection with the ability of these animals to swim across the arms of the sea. . . ." The present writer,[10] having examined the occurrence of fossil turtles in the Miocene of Central Europe, came to the conclusion that it has to be assumed that *Trionyx vindobonensis* had its regular habitat in the littoral swamps or brackish lagoons of the Sarmatian sea.

It is perfectly clear that the occurrence of the single detached bone of *Carettochelys* found in the marine Miocene of Papua does not indicate that this turtle lived exactly at the place and in the environment in which its remains have been buried and found. The beds which contain marine foraminifera, corals, and mollusca, consist of interbedded coarse and fine terrigenous material rich in comminuted lignitic plant remains. Current action during deposition is evident in many places. These currents must have brought the bone from the swampy shore or brackish lagoon, possibly connected with a river estuary which was the probable habitat of the fossil *Carettochelys*.

EXPLANATION OF PLATE X.

Carettochelys sp. Upper Miocene, Kariava Creek, Vailala River, Gulf Division, Papua.

1. Nuchal plate, dorsal side. Plaster cast taken from natural mould. Outline restored (dotted line).

2*a*. Nuchal plate. Posterior median fragment. Dorsal view.

2*b*. Same specimen, ventral view.

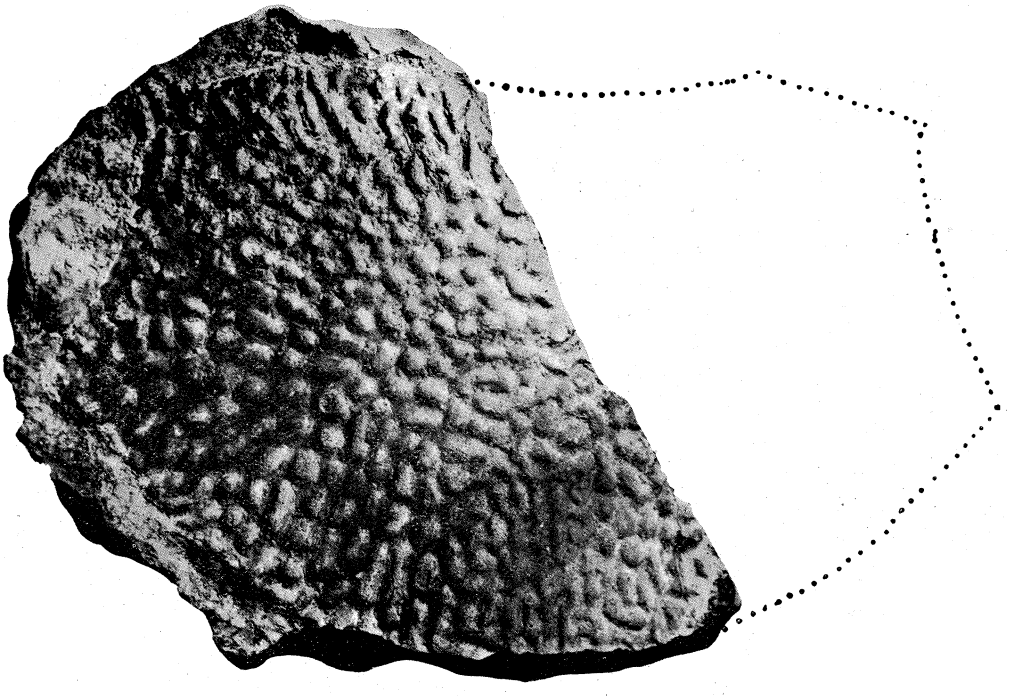
All figures natural size.

Specimens in the Palaeontological Collection of the Australian Museum, Sydney, Reg. Nos. F 39826-7.

Photographs by G. C. Clutton.

[9] Hummel.—*Loc. cit.*, p. 72. The translation is mine.—M.F.G.

[10] Glaessner.—*Neues Jahrbuch für Mineralogie, Geologie, und Paläontologie.* Beilage, lxix, B, 1933, p. 374.



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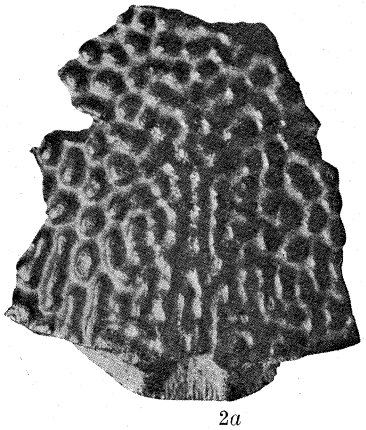
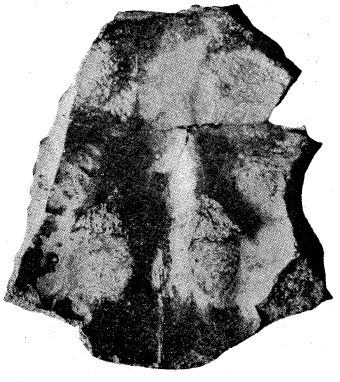


2*a*



2*b*