

The Loggerhead Turtles (Carettidae) of Ceylon

BY

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(With One Plate and Six Text Figures.)

Some herpetologists limit the genus *Caretta* Rafinesque, to a single cosmopolitan species while others subdivide it into three. The latter group consider *Caretta olivacea* (Eschscholtz) the sole representative of this genus in the Indo-Pacific (Smith 1931).

However, it is now discovered that *Caretta gigas* sp. nov. is not uncommon in the Indo-Pacific. Failure to recognize the co-existence of these two forms was probably the chief reason for divergent opinions concerning the number of species and also for attempts to explain how the so-called 'supernumerary' scutes of the young changed into the 'normal' number of the adult. The most important of such attempts was by Gadow (1899) who on the assumption that the genus consisted of a single species, suggested that in the Indo-Pacific more than elsewhere, the young of the loggerhead exhibited a variety of supernumerary costal scutes which were generally reduced to 5 pairs in the adult. He based this opinion mainly on a brood of 20 young *olivacea* from New Britain and had probably seen adults of both forms from the Indian Ocean as suggested by his list of specimens.

It is quite possible that he considered the apparent similarity in colour of the young of the 2 forms as conclusive ground for the opinion that there was only a single species which he termed *Thalassochelys caretta*. Examination of broods of both forms by myself (1930) and by Babcock (1930) show that the young of the 2 forms intergrade in external features. Some broods of *olivacea* possess a few individuals with 5 pairs of costal scutes while similarly broods of *C. caretta* from the Atlantic exhibit a few turtlets with more than 5 such pairs.

External examination at the time, failed to reveal any means of separating such young of one form from their counterparts belonging to

the other and this suggested that their relationship was close, and indeed up till now *C. olivacea* appears to have been differentiated from *C. caretta* by the vague explanation that the former is the more variable of the two.

Examination of series of specimens shows that in the former species there is a small numerical excess of specimens with 18 inner carapace scutes over those with more or less scutes whereas in the latter species specimens with 15 inner carapace scutes numerically far exceed the others with more or less scutes.

Prior to publishing my paper on the Testudinata of Ceylon (1930) I examined 4 reddish brown loggerheads, which possessed only 5 pairs of costals each. Three of these were living adolescents at the Jaffna turtle sheds, the fourth was a larger specimen mounted at the Colombo Museum (Plate V).

In view of Gadow's theory and the intergrading of young from the Atlantic and Indo-Pacific these specimens were considered inseparable from the common Ceylon form and it was then thought that the loggerhead retained its infantile scutation in littoral waters and became olive dorsally while under oceanic conditions it reduced the costals to 5 pairs and became brown red.

Since then investigation of a series of adults as well as several experiments in rearing newly hatched young with 6 to 9 pairs of costals have definitely shown that olive pigment is constant and that the scutes suffer no reduction with age. See Deraniyagala (1932).

This induced me to re-examine the brown-red Ceylon form which local fishermen regard as distinct from the olive. Material for the purpose was collected in March, 1933, from an Island and two fishing villages in the Gulf of Mannar and comprised 10 skulls and 4 carapaces of the brown-red form and 6 skulls and 3 carapaces of the common olive form.

For further comparison Mr. C. Forster-Cooper of Cambridge was so good as to lend me a large *Caretta* skull from the collection of the University Museum while Mr. H. W. Parker of the British Museum kindly compared 4 features indicated in drawings I sent him, with 5 skulls of the Atlantic form.

Dr. A. Loveridge of Harvard also kindly sent me 2 Atlantic young with supernumerary costal scutes. This help enabled me to ascertain that in the Indo-Pacific there are at least 2 species of loggerhead turtle. One of these has hitherto been known only from the Atlantic and appears to grow to gigantic proportions in the tropics more than elsewhere.

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Cytology has demonstrated that the component species of a genus differ from each other over a large number of genes which together with other differences generally render interspecific unions sterile. The exceeding paucity of specimens of *olivacea* with 5 pairs of costals as well as the extreme rarity of specimens with 15 inner carapace scutes in this turtle, apparently denote that the 2 Indo-Pacific forms do not interbreed, although they converge in most respects over a large series. Hence they are entitled to specific rank. Apparently in this region the linked characters of olive pigment and more than 5 costals are more successful than the linked characters of brown-red and 5 pairs of costals as the numbers of both forms would imply. The Atlantic forms seem to favour 5 pairs of costals and the 2 subspecies with this scutation are distinctly predominant in this region. In spite of this feature, both the most, and the least specialized species occur together in the Indo-Pacific in greater numbers than elsewhere, hence it is reasonable to assume that this is the original home of the genus *Caretta*.

The genus *Caretta*, (fully defined, Deraniyagala 1930), has 5 to 9 pairs of costal scutes of which the first are contiguous with the nuchal.

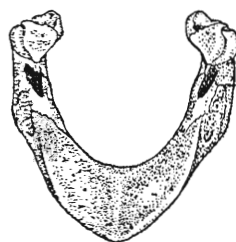
KEY TO KNOWN SPECIES OF *Caretta*

- A. Total number of inner carapace scutes 15, enlarged inframarginals 6.
 Costals commonly 5 pairs
 - (1) Carapace brown-red *C. caretta* or *gigas*
 - (2) Carapace dusky-grey *C. kempi*¹
- B. Total number of inner carapace scutes 16-25, enlarged inframarginals 8.
 Costals commonly more than 5 pairs
 - Carapace olive *C. olivacea*

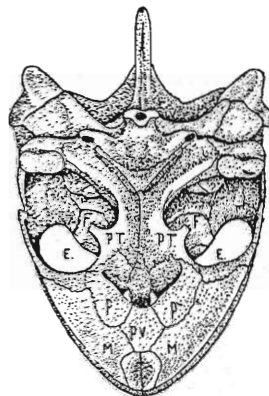
***Caretta olivacea* (Eschscholtz) Figs. 1, 2, 3.**

- Chelonia olivacea* Eschscholtz, 1829. Zool. Atlas pt. I. pl. III.
Lepidochelys olivacea Fitzinger, 1843. Systema Reptilium.
Caouana olivacea Günther, 1864. Reptiles of British Ind.
Thalasseochelys caretta Gadow, 1899 (in part). Zoo. Results (Willey) pt. III.
Caretta remivaga Hay, 1908. Proc. U. S. Nat. Mus. Vol. 34, p. 194.
Caretta caretta de Rooij, 1915 (in part). Reptiles of Indo-Austral. Archipel. Vol. I.
Caretta caretta Deraniyagala, 1930 (in part). Ceylon J. Sci. (B) XVI. Pls. XII, XIII.
Caretta caretta var. *olivacea*? Deraniyagala, 1930. Ceylon J. Sci. (B) XVI, pp. 82-83.
Caretta caretta olivacea Smith, 1931. Fauna of British India. Reptilia and Amphibia, Vol. I.
 Local names: Mada kāsāva = mud turtle, Gal kāsāva = rock turtle, Kanādi kāsāva = spectacled turtle, Eramudhu kāsāva = myrtle tree turtle (Sinhalese), Kangamattaiāmai (Tamil).

¹ The specimen examined by me in 1930 at the London aquarium, in a tank labelled *C. kempi* was probably *C. c. caretta* with which it agreed in all respects. According to de Sola (1931 and 1933) *C. c. kempi* (Garman) is dusky brown, has 5 pairs of costals, 3 claws on each fore limb and a bony ridge across its palate. See Hay (1908). It is the smallest subspecies and is about 2 ft. long. Habitat Gulf of Mexico.

*The Olive Loggerhead Turtle.*To scale with skull of *C. gigas*

P. D. del.

Fig. 1. Lower jaw of *Caretta olivacea* $\times \frac{1}{2}$ 

P. D. del.

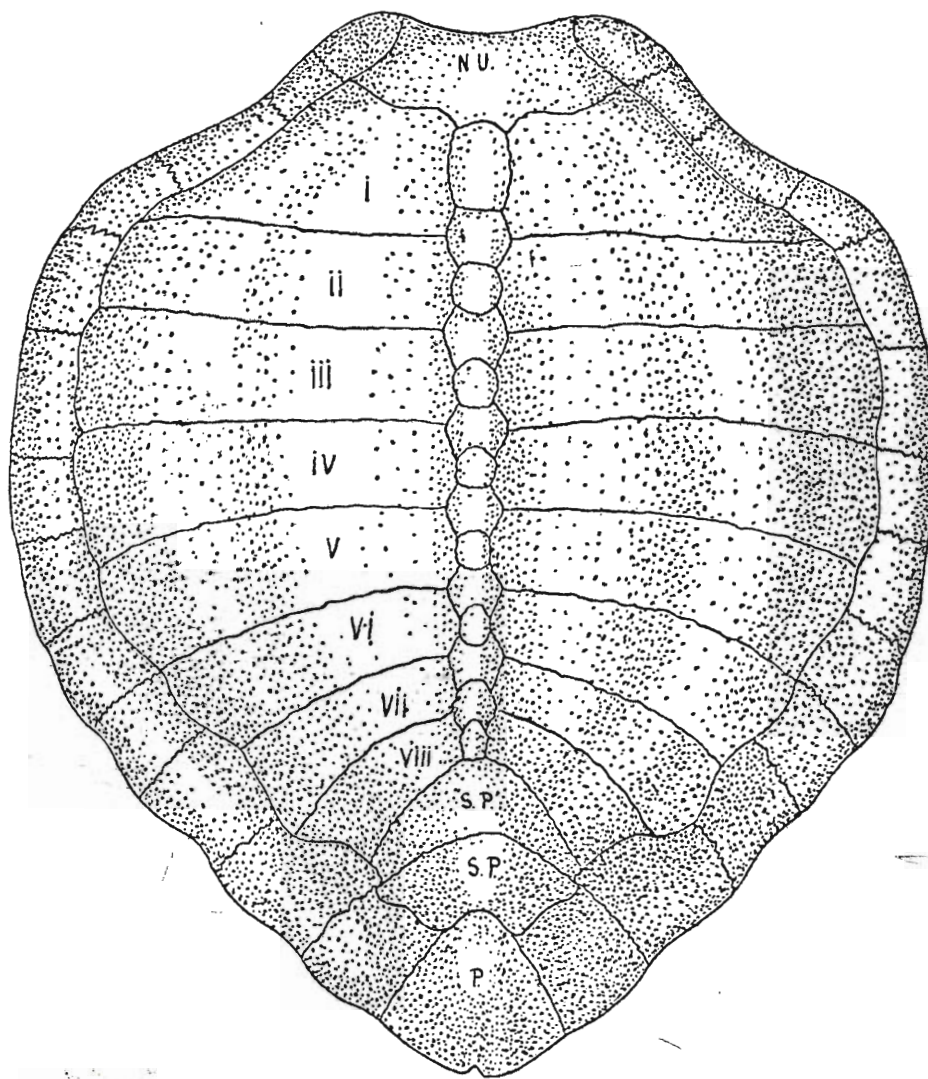
Fig. 2. Skull of *Caretta olivacea*; ventral view $\times \frac{1}{2}$

F = frontal, PT = pterygoid, E = eye, PV = prevomer, M = maxillary.

Dorsally adolescents and adults are a uniform olive, ventrally white or pale yellow; scutes thin, usually 17-23 on carapace with the costals generally in 6-9 pairs or in an odd number; vertebrals 5-9 usually 6-7. Skull more or less obtusely triangular generally neorbital, rarely palaeorbital,¹ its prefrontal suture contained 2.5-6 times in frontal suture, fronto-parietal suture 'V' shaped. Maxillaries separated by

¹ One out of 6 skulls was palaeorbital.

premaxillaries and prevomer. Posterior width of choanal opening equals distance from this opening to tip of premaxillaries. Each pterygoid expanded anteriorly and with a strong ectopterygoid process. Parasphenoid low, in an obtuse angle, basioccipital with thick lateral wings. Jaws convex externally. Eight enlarged inframarginals.



P. D. del.

Fig 3. Carapace of *Caretta olivacea* $\times \frac{1}{5}$

NU = nuchal, SP = suprapygals, P = pygal. Roman numerals on costal plates.

Carapace cordate, more circular in some than in others; generally with 13-15 neural plates¹ in a continuous series between nuchal and the 2 suprapygal plates. Generally 3 neurals between each 2nd to 6th pairs of costal plates, 2 between the others. Costal plates 8 pairs.

Dimensions. (Ordinary adult) skull length to end of supraoccipital, 187 mm., straight carapace length 720 mm. Costoperipheral fontanelles completely obliterated. Some adult skulls showing length into width in mm. are as follows:

175 × 125, 185 × 120, 195 × 120, 196 × 133.

Average size 187.75 × 124.5 mm.

Reproduction. Eggs and young common in Ceylon, Maldives and Japan. Diameters of eggs 42-44 mm.

Distribution. Definitely known from tropical and temperate regions of the Indo-Pacific and East Atlantic, Ceylon, India, Japan, Phillipines, China, Ventosa Bay (West Mexico). Baur (1890) says he examined a skull from West Africa. This would extend its habitat to the Atlantic. It is quite possible that *C. olivacea* worked its way down the East African coast to the East Atlantic and probably the so-called abnormal specimens of *Caretta caretta* from Banana, Congo, mentioned by Babcock (1930) belong to *olivacea*.

C. remivaga Hay (1908) is doubtless a synonym for this turtle. The presence of this turtle (*C. remivaga*) in Ventosa bay and the occurrence of *Caretta kempfi* (Garman) which resembles *C. olivacea* to a remarkable degree, in the Gulf of Mexico suggests that the ancestral stock of both forms was originally Indo-Pacific and entered the Gulf through a former strait across Panama. After the strait disappeared this stock gradually gave rise to *kempfi* which appears to be restricted to the Gulf region.

Caretta gigas, sp. nov. Plate V. Text Figs. 4, 5, 6.

Thalassochelys caretta Gadow, 1901 (in part). *Cambridge Nat. Hist.* Vol. VIII.

Caretta caretta de Rooij, 1915 (in part). *Reptiles of Indo-Austral. Archipel.* Vol. I.

Caretta caretta Deraniyagala, 1930 (in part). *Ceylon J. Sci. (B)* XVI.

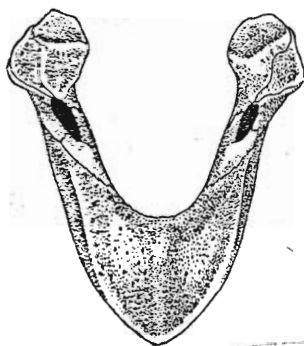
Caretta caretta var. *caretta*? Deraniyagala, 1930. *Ceylon J. Sci. (B)* XVI, pp. 82-83.

Local names. Olugedi kāsāva = large headed turtle (Sinhalese), Perunthalai pankini āmai = large headed turtle, Nāi āmai = dog turtle (Tamil).

¹ This number is rarely equalled by the most primitive fossil testudines, yet *C. kempfi* has 11-14 neurals. (Hay 1908.) Hence both may be placed in the genus *Lepidochelys* Fitzinger.

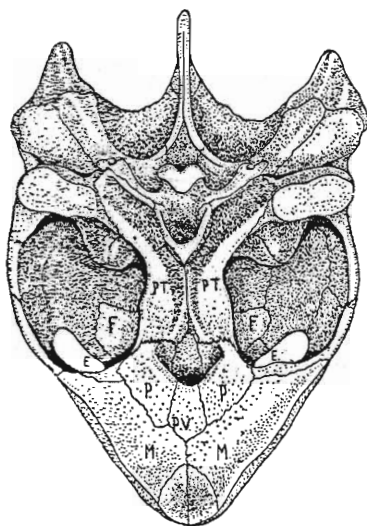
The Brown-red Loggerhead Turtle.

To scale with skull of C. olivacea



P. D. del.

Fig. 4. Lower jaw of *Caretta gigas* $\times \frac{1}{2}$



P. D. del.

Fig. 5. Skull of *Caretta gigas*; ventral view $\times \frac{1}{2}$

F = frontal, PT = pterygoid, E = eye, PV = prevomer, M = maxillary.

Dorsally adolescents and adults are a uniform yellowish or reddish brown, occasionally the two colours may be mixed with very indistinct black streaks visible in the dried scutes removed from the carapace. Ventrally a pale orange. Scutes strong, usually 15 on carapace. The costal scutes generally in 5 pairs,¹ rarely more, while there is a tendency for the nuchal to be occluded from the costals in some few specimens. Skull generally palae-orbital¹ its prefrontal suture contained 1.75 to 2.5 times in frontal suture. Fronto-parietal suture comparatively straight. Maxillaries contiguous. Posterior width of choanal opening contained at least twice into distance from this opening to tip of premaxillaries.² Pterygoids usually not expanded anteriorly and usually without a prominent ectopterygoid process. Parasphenoid high, in an acute

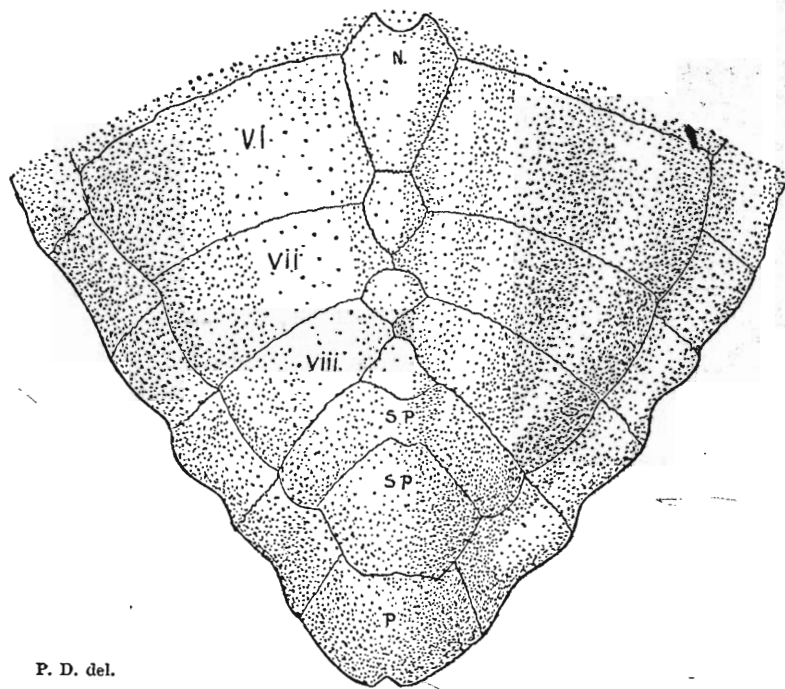


Fig. 6. Posterior end of carapace of *Caretta gigas*, sp. nov.

N = neural, SP = suprapygal, P = pygal. Roman numerals on coastal plates.

¹ No Ceylon specimens examined were otherwise, although I have seen Atlantic forms which differed.

² The skull of a large adult from Australia? in the Cambridge University Museum shows this width contained 2.75 times.

angle. Basioccipital with thin lateral wings. Jaws rather compressed anteriorly, the lower comparatively elongate, its sides straight or feebly concave externally. Six enlarged inframarginals.

Carapace more or less cordate and in young generally inclined to be somewhat narrower at its anterior and posterior extremities and more serrate along the posterior margin than in *C. olivacea*; generally with 9 or 10 neural plates between nuchal and the 2-3 suprapygal plates. The last 2 or 3 neurals are generally separated from each other by contiguous costals.¹ Generally 2 neurals between each pair from 2nd to 8th costal plates, 1 between first 2 costals.

Dimensions. (Ordinary adult) skull length 255 mm., straight carapace length 870 mm. A mounted specimen in the Colombo Museum with costoperipheral fontanelles incompletely closed measured as follows:—Head length 250 mm., straight carapace length 900 mm., carapace width 700 mm., plastral length 630 mm., axilla to groin 280 mm. (Plate V).

An adolescent with large costoperipheral fontanelles has a carapace length of 670 mm. Measurements of skulls showing length x width in mm. are as follows:—

255 x 182, 268 x 191, 270 x 188, 275 x 182, 285 x 214.

Average skull 270.6 x 191.4 mm.

The Ceylon and other tropical skulls appear to be larger than the usual subtropical skull. The large skull from the Bell collection (1856) at Cambridge University is thought to be Australian. It measures 355 x 285 mm.

The large skull (b) from Mr. Parker's list is from British Honduras while the largest skull examined by Hay (1908) p. 193, came from the Caribbean sea.

The dimensions of the carapace before closure of the costoperipheral fontanelles is further indication of the large size attained to in the tropics. This feature and the separation of the last neural plates by the costals¹, a feature uncommon in the Cryptodira may eventually place the tropical loggerhead in a separate race *gigas*. Fig. 6.

Reproduction. Unknown from Ceylon, although both eggs and young of its relative *olivacea* are very common. Local fishermen state that ovigerous females are sometimes taken in the Gulf of Mannar where the animal is not uncommon as seen by the skulls and carapaces

¹ The last neurals were separate in all the Ceylon carapaces examined. Since this article went to press Mr. C. de Sola informs me that '*Caretta caretta* specimens taken from the Atlantic have an uninterrupted series of neural bones'. This ranks the Indo-Pacific form as a new species, which I now name *Caretta gigas*. The type, head 178 mm. and carapace 660 mm. long will be in the British Museum.

collected. *Caretta gigas* and *Chelonia mydas* a common Ceylon form are the only marine turtles which do not breed on the Ceylon beaches except possibly on rare occasions.

The eggs of both seem to occur frequently at the Maldives. In December, 1932, I examined 2 nests of a large turtle on Gulifalu island (Maldives). One nest had 124 eggs which were 42-44 mm. in diameter. As I had already obtained young and eggs of *Chelonia mydas* from Minicoy comparison showed that the latter eggs were larger being 47-48 mm. The dimensions of 42-44 mm. agreed with the egg diameter in *C. olivacea* (Deraniyagala 1932). As the flipper tracks indicated a much larger turtle than this species it could have been none other than *Caretta gigas*.

Distribution. Cosmopolitan, in all tropical and temperate seas. It is probable that the tropical form may eventually rank as a separate giant race. Not uncommon in the Gulf of Mannar. Seldom seen in the markets as the fishermen affirm that the flesh of both loggerheads possesses a fishy odour and fetches poor prices. They consequently keep them for their personal use. The brown-red snaps viciously and is termed Nāi āmai, a name descriptive of its ferocity. The size of this animal makes it a dangerous companion in a canoe and it is usually stunned before it is taken aboard. As a result, the majority of skulls were fractured on one side.

This turtle appears to range across the Indo-Pacific; de Rooij (1915), fig. 117, shows a specimen, with 5 pairs of costals. As she only recognized a single species it is not known whether this is an Atlantic specimen or no.

Babcock (1930) mentions 3 young from Shark's Bay, Australia, which had 5 pairs of costals. These probably belonged to this species while the large skull kindly sent me by Mr. C. Forster-Cooper of Cambridge University is also thought to be from Australia. Skulls and carapaces were obtained from Karaduva Island, Mariccukkatti and Talaimannār in the Gulf of Mannar, Ceylon.

Caretta skulls.

British Museum specimens listed by Mr. H. W. Parker.

(a) Locality ? Atlantic.

- (1) Frontal, excluded orbit*, (2) Pt. process not well developed,
- (3) approximately twice; (4) Fr-par. suture straight.

* (1) Nature of orbit, (2) Pt. = pterygoid, (3) choanal width into distance from choana to end of premaxillaries, (4) Fr-par. = Fronto-parietal suture.

(b) British Honduras, (Belize) ? (very large)

(1) Frontal, excluded orbit, (2) Pt. process not well developed, (3) Approximately $2\frac{1}{2}$, (4) straight.

(c) El Arish, Levant.

(1) Frontal entering orbit at a point, (2) Pt. process not well developed, (3) Approximately twice, (4) Fr-par. straight.

(d) Locality ? Atlantic.

(1) Frontal, excluded orbit, (2) Pt. process not well developed, (3) Twice, (4) Fr-par. slightly curved.

(e) Locality ? Atlantic.

(1) Frontal, excluded orbit, (2) Pt. process moderately well developed, (3) $2\frac{1}{2}$, (4) Fr-par. straight.

(f) Ceylon.

(1) Frontal entering orbit at a point, (2) Pt. process well developed, (3) $1\frac{1}{2}$, (4) Fr-par. curved.

Cambridge University skull.

Bell collection 1856.

Locality Australia. ?

Numbered 176. R. 4606.

Size of skull 355 x 285 mm.

Choanal width contained 2.75 in distance from choanal opening to tip of premaxillaries. Skull palaeorbital, no ectopterygoid process, height of nasal opening contained 2 in length of premaxillary suture.

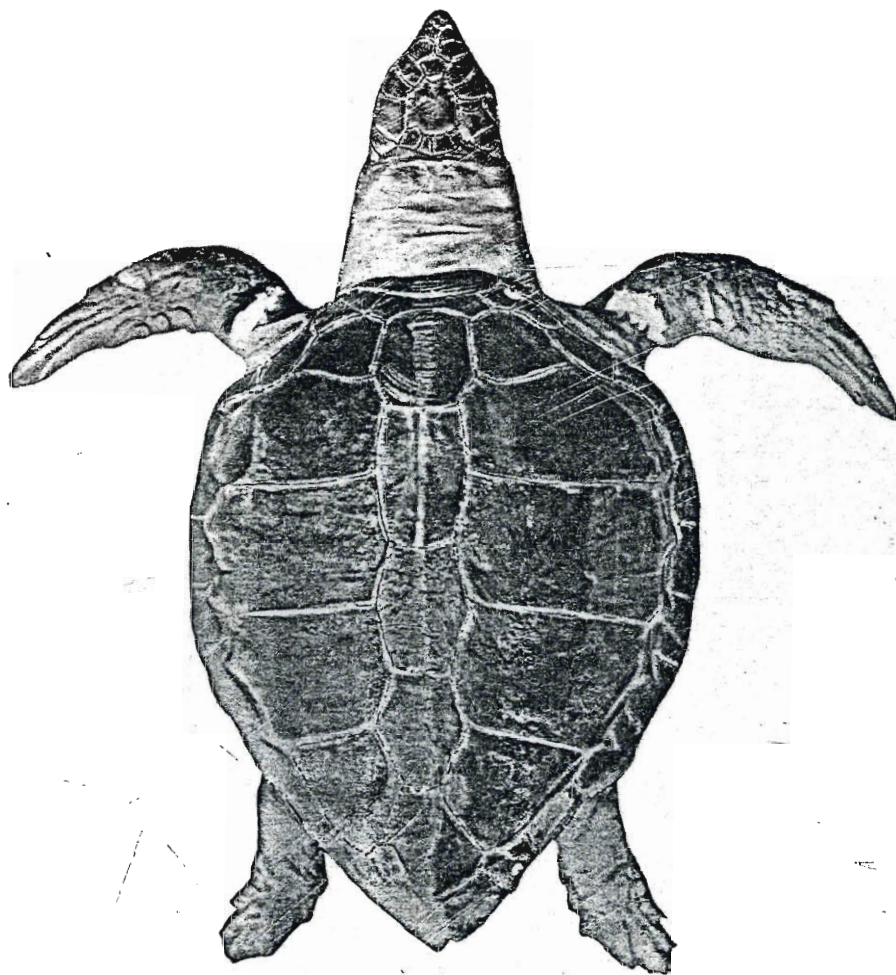
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EXPLANATION OF PLATE V

PLATE V. *Caretta gigas*, sp. nov., specimen mounted in Colombo Museum $\times \frac{1}{10}$



Caretta gigas sp. nov. $\times \frac{1}{10}$