

## FURTHER NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

### I. ON TWO NEW SPECIES OF HYMENOSOMATID CRABS, WITH NOTES ON SOME OTHER SPECIES.

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[The series of papers entitled "Notes on Crustacea Decapoda in the Indian Museum" was started by Dr. S. W. Kemp, formerly Superintendent, Zoological Survey of India, and the first paper was published in volume V of the *Records of the Indian Museum* in 1910. Dr. Kemp contributed seventeen papers in this series, including one in collaboration with Lt.-Col. (then Captain) R. B. Seymour Sewell, and all were published in the *Records of the Indian Museum*, the last appearing in volume XXVII of 1925. In the last paper Dr. Kemp gave a list of all the papers that he had published in this series, along with a reference to the volume in which each had appeared. Owing to Dr. Kemp's departure from India in 1925 the series was brought to a close. A fresh series bearing the above title is now being commenced by Dr. B. N. Chopra, who has succeeded Dr. Kemp as officer in charge of the Crustacea collections.

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Since the publication of Kemp's<sup>1</sup> revision of the Indian Hymenosomatidae, a number of specimens of this family have accumulated in the collections of the Zoological Survey of India. In the course of an examination of this small collection we have come across representatives of two species of *Rhynchoplax* so far unknown to science, along with some other specimens that appear remarkable either from the point of their provenance, or some peculiarity of structure, etc. Of the two new species of *Rhynchoplax* described in this paper one comes from Mesopotamia, and is remarkable for the fact that it was obtained in pure fresh water, considerably beyond the reach of tidal influences. Two species of the family are already known to have established themselves in fresh water: *Haliscarcinus lacustris* (Chilton)<sup>2</sup> is known from lakes and streams in New Zealand and Australia, sometimes even at an altitude of 3,000 feet above sea-level, while *Rhynchoplax introversus* Kemp<sup>3</sup> was collected in the Tai Hu Lake in China. The other new species of *Rhynchoplax* appears to be common in the back-waters of Travancore and Cochin; some of the specimens of this species differ so much from typical examples that a new variety has been set up for these. We have also redescribed in some detail Gravely's<sup>4</sup> *Elamena cristatipes*, that had so far been somewhat meagrely characterised.

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<sup>1</sup> Kemp, *Rec. Ind. Mus.* XIII, pp. 243-279 (1917).

<sup>2</sup> Chilton, *Trans. Proc. New Zealand Inst.* XIV, p. 172 (1882). Chilton described this species originally as *Elamena? lacustris*, but later [*ibid.* XV, p. 69 (1883)] referred it to *Hymenosoma*. Tesch [*Siboga Exped. Rep.* XXXIX c, p. 12 (1918)] includes it under *Hymenicus*, while Kemp believes it is a *Haliscarcinus*. Chilton has very fully discussed the distribution and habitat, etc. of this crab in *Trans. New Zealand Inst.* XLVII, pp. 316-319 (1915).

<sup>3</sup> Kemp, *Rec. Ind. Mus.* XIII, pp. 262-264 (1917).

<sup>4</sup> Gravely, *Bull. Madras Govt. Mus.* (n. s.) I, p. 150, pl. xxi, fig. 24 (1927).

Kemp has very ably discussed the position and the limits of the various genera included in the Hymenosomatidae, and has given a descriptive diagnosis of all the Indian species of the family till then known. In his account of the Hymenosomatidae in the Siboga Expedition Report series Tesch<sup>1</sup> has also discussed the position of the various genera, and in several instances has arrived at substantially the same conclusions as Kemp. In the arrangement of genera, etc., we have followed Kemp. Like him we consider *Trigonoplax* as only a subgenus of *Elamena*. Alcock<sup>2</sup> had already expressed this opinion, and though several eminent authors, including Tesch, consider the two as quite distinct,<sup>3</sup> we believe the differences between the two are not sufficiently important to warrant such a distinction.

There appears to be some confusion regarding the structure of the abdomen in the male of *Elamena* (*sensu stricto*). Kemp<sup>4</sup> believes that in all species of the genus the 3rd, 4th and 5th segments are completely fused, leaving no sutures between them, and the abdomen is thus formed of four pieces only. According to Baker's<sup>5</sup> description and figure of the abdomen in *E. truncata* (Stimpson), however, there appear to be five pieces, apparently the third and the fourth segments only being fused. As Kemp had not examined any male specimens of Stimpson's species, he seems to have taken Baker's account with reserve, but we have no reason to believe that it is in any way incorrect, as we have found an exactly similar condition in the male of *Elamena cristatipes* Gravely<sup>6</sup> from South India. In *Elamena sindensis* Alcock,<sup>7</sup> on the other hand, the abdomen of the male is formed of four pieces only and the same is true in all the species of *Elamena* (*Trigonoplax*) that we have examined in the collections of the Indian Museum.

The type-specimens of the new species are in the collections of the Zoological Survey of India, and are preserved in the Indian Museum at Calcutta.

### **Rhynchoplax alcocki** Kemp.

1917. *Rhynchoplax alcocki*, Kemp, *Rec. Ind. Mus.* XIII, pp. 253-256.

*Rhynchoplax alcocki* was so far represented in the Indian Museum collection by a large number of specimens collected by Dr. Kemp in Portuguese India, and by a few specimens collected in the Cochin back-waters near Eranakulam by Dr. F. H. Gravely. We have now referred to this species a large number of additional specimens from the latter locality, as also from Travancore back-waters. These specimens were collected by Dr. H. S. Rao and Mr. M. Sharif.

We have nothing to add to Kemp's detailed and very accurate description of the species. Our specimens agree in all respects with the

<sup>1</sup> Tesch, *Siboga Exped. Rep.* XXXIX c, pp. 3-28 (1918).

<sup>2</sup> Alcock, *Journ. As. Soc. Bengal* LXIX, p. 386 (1900).

<sup>3</sup> Mr. E. W. Bennett of the University of Western Australia, Perth, who is at present working on the Hymenosomatidae of the world, writes to inform us that in his opinion *Trigonoplax* should be upheld as a distinct genus.

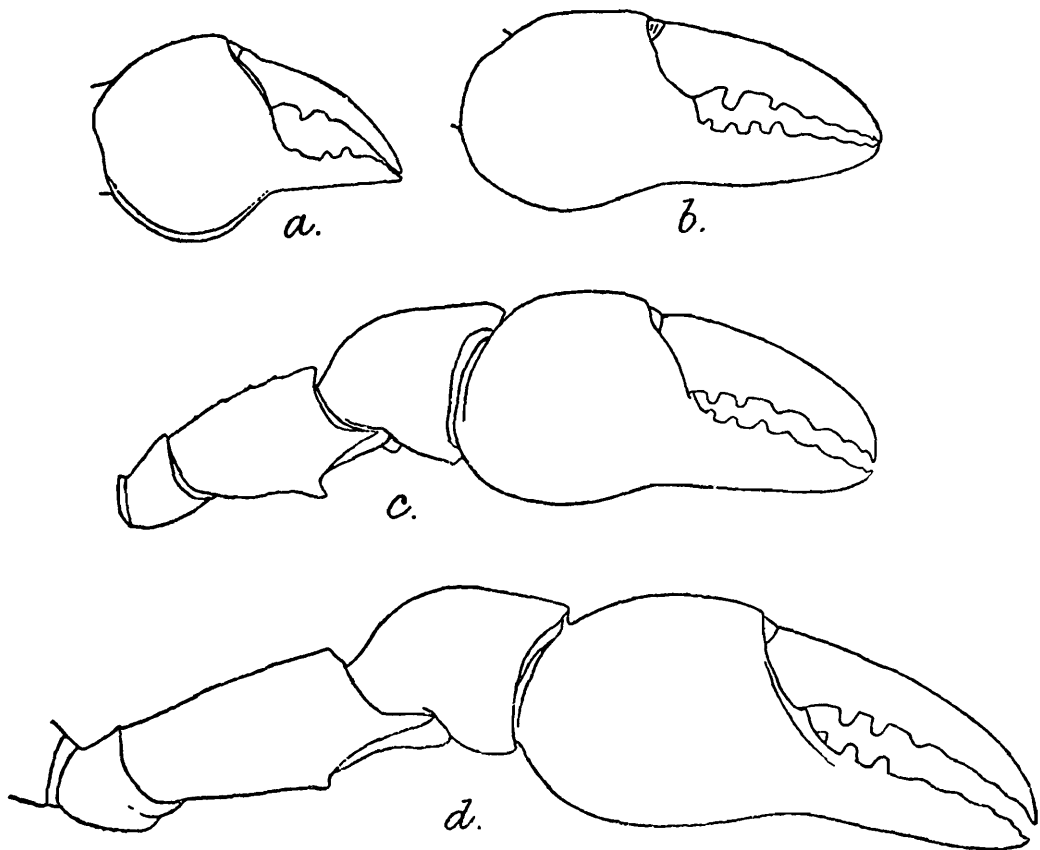
<sup>4</sup> Kemp, *Rec. Ind. Mus.* XIII, p. 273 (1917).

<sup>5</sup> Baker, *Trans. Roy. Soc. S. Australia* XXX, pp. 112, 113, pl. ii, fig. 2b (1906).

<sup>6</sup> Gravely, *Bull. Madras Govt. Mus.* (n. s.) I, p. 150, (1927).

<sup>7</sup> Alcock, *Journ. As. Soc. Bengal* LXIX, p. 386 (1900).

type-specimens, as also with the published account. There is one point, however, that needs special mention. The chela of a fully grown male



TEXT-FIG. 1.—*Rhynchoplax aleocki* Kemp.  
 a. Chela of adult male.  
 b. Chela of a young male 3·8 mm. long.  
 c. Cheliped of a young male 2·5 mm. long.  
 d. Cheliped of an ovigerous female.

has been figured by Kemp ; the palm is greatly compressed, the chela being about  $1\frac{1}{2}$  times only as long as high, the fingers are widely gaping near the base, and the dactylus is provided with one large and one small tooth near the base. In younger specimens, however, the condition is vastly different. The palm is not very much compressed, and is considerably less high than in older specimens, being in some cases even less than half the length of the chela. The dactylus is proportionately shorter and the fingers do not gape as much as shown in Kemp's figure. In very young males the fingers are more or less apposed throughout their length. There are also a larger number of teeth, regularly placed, and the tips of the fingers are somewhat sharply hooked. In somewhat older specimens the gap increases, and the number of teeth gets reduced. The condition of the male chela at different ages is clearly seen in the accompanying illustration. The figures have been drawn from specimens in the collection from Portuguese India, but the condition is identical in Cochin and Travancore specimens also. We have included a figure of a chela of a fully grown female also, to show the similarity between it and the chela of a young male.

The teeth on the upper border of the merus of the male cheliped also show considerable modification due to age. In the adult male there

are five well-formed teeth on this margin, while in very young males these are obscure.

In young specimens the median lobe of the rostrum also appears to be proportionately longer.

A large number of specimens, collected at different places in the backwaters of Cochin and Travancore, are referred to this species. Both the sexes are well represented in the collection, and both adults and young specimens are present. In some instances comparatively small males, with the carapace (including rostrum) a little over 3 mm. in length, have the adult type of chela, while in others, larger specimens, with the carapace over 4 mm. long, have their chelae resembling those of the young males.

Judging from the condition of the chela, it seems to us possible that the males of *Rhynchoplax alcocki* are dimorphic, as in the case of *Inachus scorpio*<sup>1</sup> and some other crabs, but we are unable to express any definite opinion in the matter at present.

C 1467/1	Pallurutti, Cochin.	..	..	..	H. S. Rao, Dec., 1927.
C 1468/1	East Kumblam, Cochin.	..	..	..	H. S. Rao, Dec., 1927
C 1469/1	Cheppanam, Cochin.	..	..	..	H. S. Rao, Jan., 1928.
C 1470/1	Back-water between Eranakulam and Edapatti, Cochin.	..	..	..	H. S. Rao, Jan., 1928.
C 1471/1	Vaikom, Travancore.	..	..	..	H. S. Rao and M. Sharif, Jan., 1928.
C 1472/1	Alleppey, Travancore	..	..	..	H. S. Rao and M. Sharif, Jan., 1928.
C 1473/1	Back-water between Paravur and Kappil, Travancore.	..	..	..	H. S. Rao, Feb., 1928.
C 1474/1	Shertallai, Travancore.	..	..	..	H. S. Rao and M. Sharif, Feb., 1928.

### **Rhynchoplax kempi, sp. nov.**

The possession of a large forwardly-directed tooth on either side of the carapace at the base of the first walking leg places the present species in the group which includes *Rhynchoplax wood-masoni* (Alcock)<sup>2</sup>, *R. alcocki* Kemp and *R. octagonalis* Kemp<sup>3</sup>. Another species characterised by the presence of a similar tooth is described in this paper under the name of *Rhynchoplax tuberculata*, sp. nov.

The carapace is ovate in outline and is widest a little behind the middle. The surface is sunken and the margins are somewhat upturned; they are continuous from side to side across the base of the rostrum. The surface is slightly tomentose and the grooves are fairly well marked. The length of the carapace, including the rostrum, appreciably exceeds its maximum breadth, while excluding the rostrum the breadth falls short of the length only very slightly.

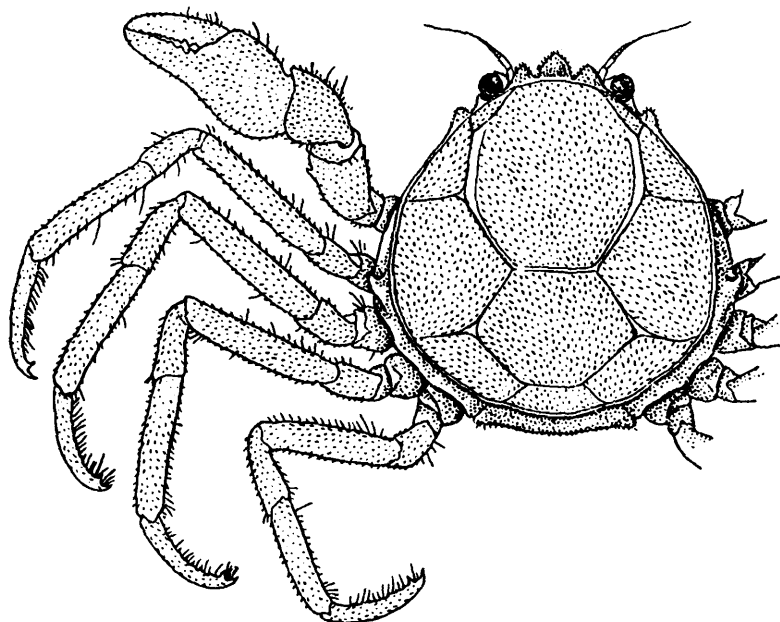
The greater part of the eye is visible from above and the cornea is quite large. A prominent post-ocular tooth is seen just behind the eye and is clearly visible in the dorsal view. Placed close behind the

<sup>1</sup> Smith, *Mitt. Stat. Neapel* XVII, pp. 312-318 (1905).

<sup>2</sup> Alcock, *Journ. As. Soc. Bengal* LXIX, p. 388 (1900), and *Illus. Zool. 'Investigator'*, pl. lxiv, fig. 4 (1902).

<sup>3</sup> Kemp, *Rec. Ind. Mus.* XIII, pp. 256-258 (1917).

post-ocular tooth on the margin of the carapace is another larger tooth corresponding to the anterior tooth in *R. wood-masoni* (Alcock); the second tooth present on the margin of Alcock's species is altogether missing in the present form. Near the base of the first walking leg, below the margin of the carapace, is a very conspicuous tooth-like process, which is directed forwards and outwards. This tooth is somewhat acutely pointed at the tip and is hooked.

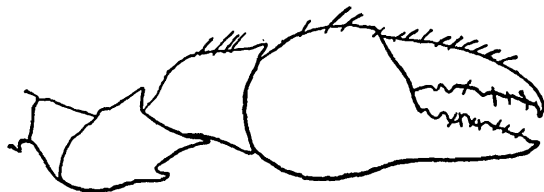


TEXT-FIG. 2.—*Rhynchoplax kempfi*, sp. nov.

As is usual, the rostrum is formed of three lobes, the median lobe being the largest of the three. All the three lobes are rounded, the median more broadly than the lateral ones; its apex is deflexed and lies at a lower level than that of the lateral lobes.

The antennules, when folded, are not completely concealed beneath the rostrum, and are separated at their bases by a septum. The external maxillipeds do not completely close the buccal cavern; in shape they resemble those of *R. alcocki* Kemp or *R. demeloi* Kemp.

The chelipeds are stouter than the walking legs in both the sexes, and are somewhat more so in the male than in the female. In the male the merus bears a sharp, forwardly-directed tooth, a little above the middle of its lower margin, but there are no teeth on the upper margin.

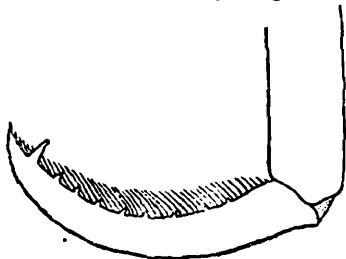


TEXT-FIG. 3.—*Rhynchoplax kempfi*, sp. nov.  
Cheliped of adult male.

The carpus is without any teeth. The chela is not as much compressed as it is in *R. alcocki*; in a large example it is about twice as long as high. The borders of the palm are not carinate, and the upper border is considerably shorter than the dactylus. The fingers gape near the base,

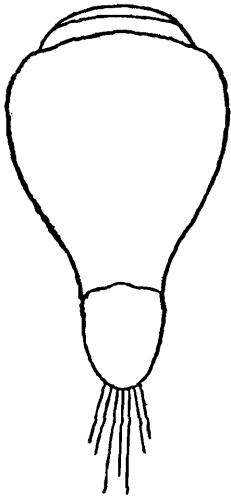
but meet for about the distal half of their length. The dactylus is provided with five or six small teeth, the proximal two of which are separated by a considerable gap from the rest. There are five or six small regular teeth on the fixed finger also. The tips are somewhat hooked and appear to be slightly spooned. In the female the tooth on the merus is obscure and the fingers show a smaller gap.

The walking legs are rather stout, and those of the second pair are the longest; these are a little less than twice as long as the carapace and the rostrum. There is an obscure tooth at the end of the upper border of the merus and another in a similar position on the carpus. The dactylus is curved and there are two large recurved teeth at the tip; the dactyli of the last three pairs have, in addition, a series of small curved teeth, more or less evenly distributed on almost the entire posterior border. The number of teeth, however, appears to be somewhat less than that in *R. alcocki*. The legs, as also the chelipeds, are sparsely clothed with hairs.



TEXT-FIG. 4.—*Rhynchoplax kempi*, sp. nov.  
Dactylus of walking leg.

The abdomen of the male is like that of *R. alcocki*, but the terminal segment is longer than broad. The portion preceding it is also proportionately broader and its sides, near the base, are regularly curved. The abdomen is markedly constricted near the base of the terminal segment.



TEXT-FIG. 5.—*Rhynchoplax kempi*, sp. nov.  
Abdomen of male.

The largest female specimens in the collection are about 5 mm. long from the tip of the rostrum to the posterior margin of the carapace, though some ovigerous examples are of a considerably smaller size also. The males are smaller, some of the larger specimens being 3.8 mm. long only.

*Locality*.—The species is described from a large number of specimens, including several ovigerous females, collected by Lt.-Col. H. J. Walton, at Basra (Shat-al-Arab) about 70 miles from the sea in November, 1918. The specimens were “clinging in large numbers to a weed entangled in anchor,” and were obtained in fresh water.

C 1475/1 Basra (Shat-al-Arab), Meso- H. J. Walton, Nov., Several; TYPES  
potamia. 1918. and COTYPES.

*Rhynchoplax kempi* differs in a number of well-marked characters from the other species of the genus, having a tooth on the side of the carapace at the base of the first walking leg. It can be readily distinguished from *R. octagonalis* Kemp, by the different shape of the carapace; in Kemp's species the carapace, as the name suggests, is octagonal in outline and has no tooth on the margin below the eye, while in the present form it is ovate or subcircular and has one distinct tooth on the margin. The rostrum in the two species is also different. From *R.*

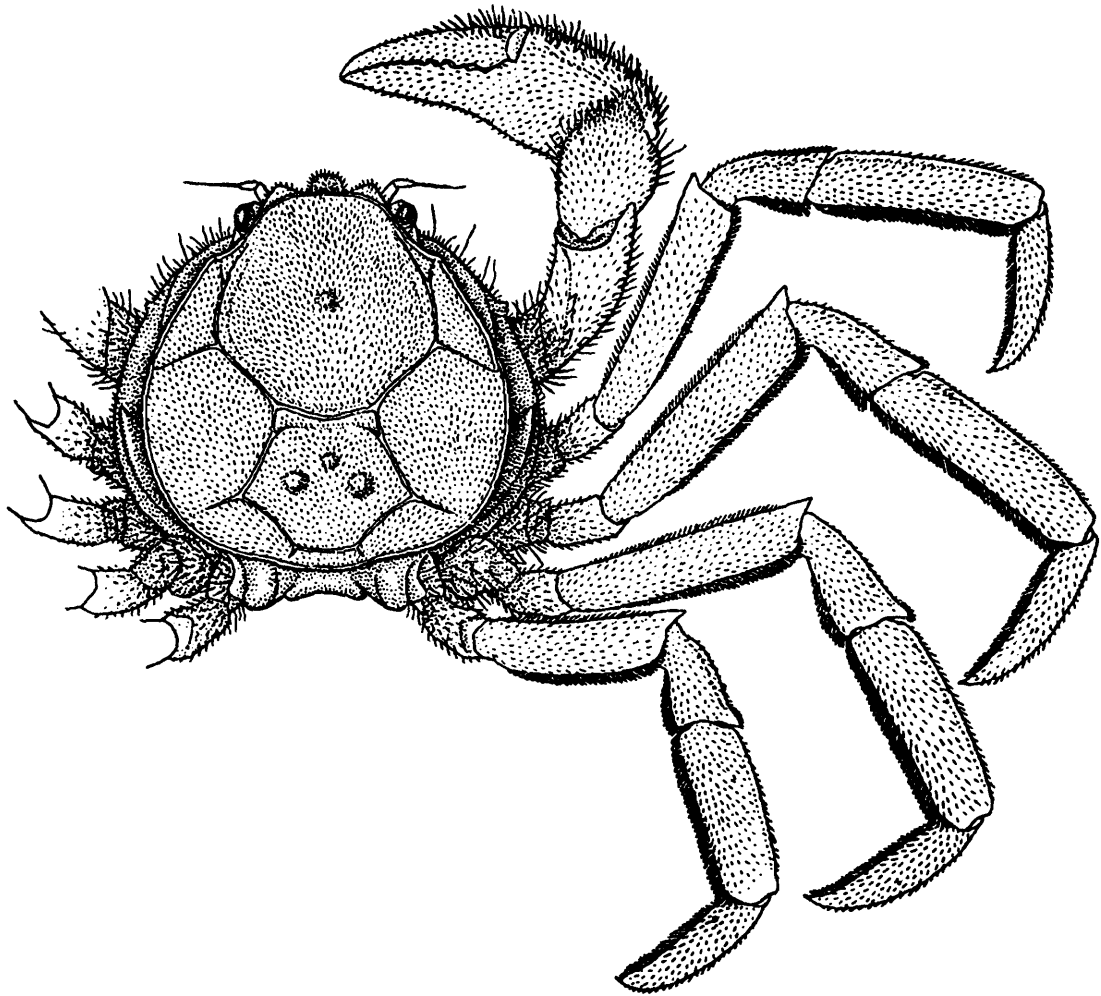
*wood-masoni* (Alcock) the present species differs, among other characters, in having the carapace proportionately broader, in having the lobes of the rostrum shorter and apically rounded, in having a single tooth on the side of the carapace below the eye, and in the merus of the male cheliped having no teeth on the upper margin. *R. kempfi* seems to resemble most closely *R. alcocki* Kemp, but even from this it differs in several important respects. The principal characters in which *R. kempfi* differs from Kemp's species may be enumerated as follows :—

1. The lobes of the rostrum are much shorter and the median lobe is more bluntly rounded.
2. The tooth-like process at the base of the first walking leg is somewhat sharp and procurved.
3. The chela of the male is less compressed, being almost twice as long as high. The fingers are less gaping and the dactylus is provided with a larger number of teeth.
4. The merus of the male cheliped is not dentate on the upper border.
5. The walking legs are stouter and shorter, those of the second pair being a little less than twice as long as the carapace.
6. The terminal segment of the male abdomen is longer than broad.

#### ***Rhynchoplax tuberculata*, sp. nov.**

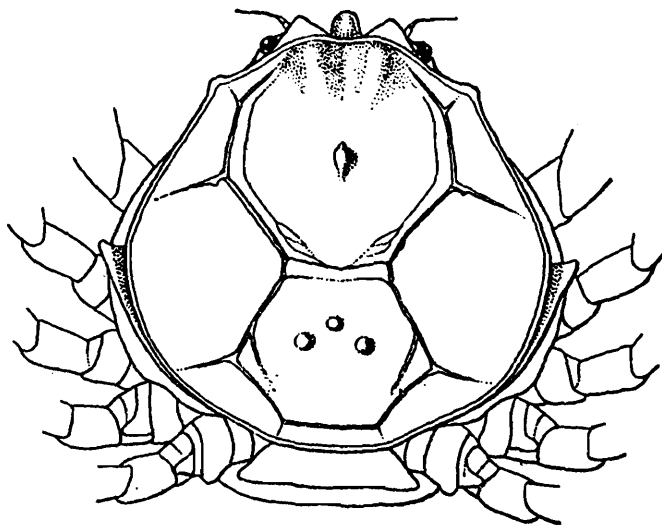
The carapace is somewhat ovate in outline, being considerably narrower in front than behind, and is broadest a little behind the middle. The length of the carapace, including the rostrum, is a little greater than the breadth of its upper surface, while, excluding the rostrum, the breadth almost equals the length. The margins of the carapace are upturned, and are continuous from side to side across the base of the rostrum. The dorsal surface is flat and the different regions are clearly marked. The carapace is finely granular and has also several large tubercles on the surface. In the middle of the gastric area there is a large tubercle, the upper surface of which is raised in a blunt spine, and there are three other tubercles forming a triangle at about the middle of the hepatic region. Of these latter two are large, while the third, the median one, which is anteriorly placed, is smaller. These tubercles, though present on all the specimens, are better seen in large examples, and in some of the large females are very conspicuous. In some specimens the spine on the gastric region is somewhat sharp, and has the appearance of a short narrow crest. In the larger specimens the anterior border of the carapace just behind the front is raised in two short longitudinal ridges, and between these the carapace is somewhat depressed. The antero-lateral borders of the carapace are arched, except close behind the front, where they are more or less deeply concave. The posterior border is straight or slightly arched. In larger specimens the outline of the carapace is distinctly more angular than in smaller forms. This is clearly seen in text-figure 7. There is a large tooth-like process directed forwards and outwards, below the margin of the carapace on each side, at the base of the first walking leg,

and another small blunt tooth is present on the antero-lateral margin of the carapace in the position of the first similar tooth of *R. woodmasoni* (Alcock)<sup>1</sup>. The second tooth present in Alcock's species is not



TEXT-FIG. 6.—*Rhynchoplax tuberculata*, sp. nov.

represented here. A small postocular tooth is visible from above. The eyes are small, and are only partially seen in the dorsal view.



TEXT-FIG. 7.—*Rhynchoplax tuberculata*, sp. nov.  
Carapace of a large female.

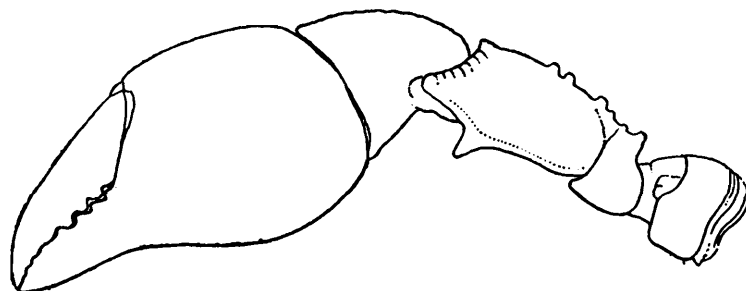
<sup>1</sup> Alcock, *Journ. As. Soc. Bengal* LXIX, p. 388 (1900), and *Illus. Zool. 'Investigator,'* pl. lxiv, fig. 4 (1902).



The rostrum is trilobed, the lateral lobes are sharply rounded anteriorly, while the median is truncate. The latter is situated at a considerably lower level than the lateral lobes, and is slightly longer than these. The margins of all the three lobes appear to be slightly fringed.

The antennules, when folded, are completely hidden beneath the rostrum, and are not visible from the dorsal view. At their bases they are separated by a spine-like septum. The epistome is of moderate length, and the external maxillipeds do not completely close the buccal cavern. In structure they closely resemble those of *Rhynchoplax alcocki* Kemp; the ischium is produced at its inner-distal angle and the merus is prominently expanded antero-externally, partially concealing the exognath.

In both sexes the chelipeds are stouter than the walking legs, and those of the male are particularly large. In the large male the merus bears a prominent, conical tooth near the end of its lower margin. The upper margin is also toothed, there being five or six small blunt teeth.

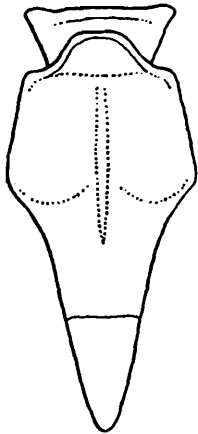


TEXT-FIG. 8.—*Rhynchoplax tuberculata*, sp. nov.  
Cheliped of a large male.

Some of these teeth are more or less ridge-like. The basium also bears two such teeth on its superior margin. The carpus is unarmed. The chela is not greatly compressed and is almost twice as long as high. The anterior border is slightly arched, and is somewhat shorter than the height of the palm. The palm in lateral view is somewhat like that of *R. woodmasoni*, and its lower border, which is convex, is not prominently keeled. The fingers meet throughout their length and do not gape. The dactylus is slightly longer than the height of the palm and is considerably longer than the length of its upper border. The fingers bear five or six interlocking teeth, diminishing in size from behind forwards. There are no teeth near the tips, which are not sharply hooked. In the female cheliped the teeth on the superior border of the merus are somewhat obscure, while that on the lower border is fairly well developed. The chela is proportionately narrow, being considerably more than twice as long as high. The dactylus is also proportionately longer. The fingers gape slightly near the base, and are armed with a number of interlocking teeth. The proportions of the different parts of the chela are shown in the following table:—

Total length of chela	..	..	..	♂	4.5	♀	4.2
Height of palm	..	..	..		2.3		1.7
Length of upper border of palm	..	..	..		2.0		1.6
Length of dactylus	..	..	..		2.6		2.6

The walking legs are not very slender; those of the second pair are the longest, and are about  $2\frac{1}{2}$  times the length of the carapace and rostrum.



TEXT-FIG. 9.—*Rhynchoplax tuberculata*, sp. nov.  
Abdomen of male.

The anterior borders of the merus and carpus end in prominent teeth, and the anterior border of the propodus is finely crenulate. The dactyli are curved, and at their apices have a sharp curved tooth. The posterior margins of the legs are densely hairy.

The abdomen of the male is like that of *Rhynchoplax demeloi* Kemp,<sup>1</sup> but is narrower. The ultimate segment is much longer than broad, and is more or less acutely pointed at the tip. The preceding portion, which is believed to be composed of three fused segments, is much broader at the base than distally; about the middle of its length the margin is distinctly angular, and in front of this point is concave. It is grooved in the median line, and its posterior margin is regularly and broadly rounded.

A large male is about 5 mm. in length from the tip of its rostrum to the posterior border of the carapace, though the largest specimen is as much as 6.2 mm. long. Some of the female specimens are larger, the largest in the collection being 7.2 mm. long, though several ovigerous females are even smaller than 5 mm. The carapace and legs are densely hairy, and particles of mud, etc. are found sticking between the hairs.

*Locality*.—A large number of specimens, collected at different places in the back-waters of Cochin and Travancore, are in the collection. The water at all these places, at the time of collecting, was distinctly brackish, though at other times of the year it is said to be more or less fresh.

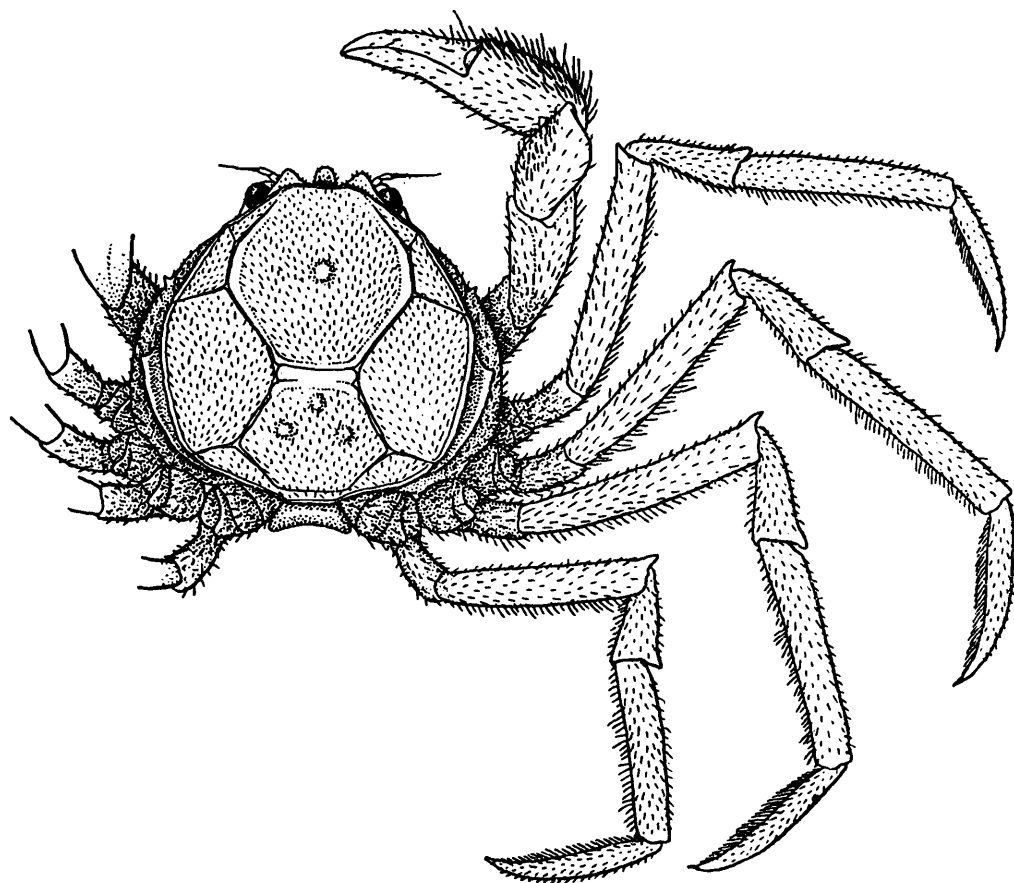
C 1476/1	Back-water between Ernakulam and Edapatti, Cochin State.	H. S. Rao, Jan., 1928.	4 ♂♂ and 3 ♀♀ TYPES.
C 1477/1	West Narakhal, Cochin State.	H. S. Rao, Jan., 1928.	Several ♂♂ and ♀♀
C 1478/1	Quillon, Travancore.	.. H. S. Rao and M. Sharif.	
C 1479/1	Puttankari, Travancore.	.. H. S. Rao and M. Sharif.	
C 1480/1	Back-water between Paraven and Kappil, Travancore.	H. S. Rao, Feb., 1928.	

### ***Rhynchoplax tuberculata* var. *attenuipes*, nov.**

There are a number of specimens in the collection that differ in one or two respects from the description given above. In all other respects they resemble the other specimens so closely that they can at most be considered to represent a distinct variety. The legs are considerably thinner than in the typical form; in the latter the propodus of the second walking leg is about 4 times as long as broad, while in the variety the

<sup>1</sup> Kemp, *Rec. Ind. Mus.* XIII, p. 259, fig. 9 (1917).

greatest breadth is even less than one-sixth of the length. In the propodus of the third pair of walking legs this difference is still more



TEXT-FIG. 10.—*Rhynchoplax tuberculata* var. *attenuipes*, nov.

apparent; in the *forma typica* the breadth is to length as  $1 : \frac{7}{2}$ , while in the variety the breadth is only one-sixth of the length. A similar attenuation is visible in other segments of the legs also. The walking legs in the variety are also proportionately longer; those of the second pair are the longest, and are  $2\frac{2}{3}$  times as long as the carapace and the rostrum combined. In the typical form the second legs are a little less than  $2\frac{1}{2}$  times the length of the carapace and rostrum.

*Locality.*—The variety, like the *forma typica*, is known from the backwaters of Cochin and Travancore. It is described from 7 specimens.

C 1481/1	West Narakhel, Cochin.	..	H. S. Rao, Jan., 1928.	2 ♂♂ and 1 ♀
				TYPES.
C 1482/1	East Kumblam, Cochin.	..	H. S. Rao, Dec., 1927.	1 ♀
C 1483/1	Back-water between Paraven and Kappil, Travancore.		H. S. Rao, Feb., 1928.	1 ♂ and 2 ♀♀

*Rhynchoplax tuberculata* belongs to the group of species that are characterised by the presence of a large tooth-like process on the side of the carapace above the first walking leg. This group comprises *R. wood-masoni* (Alcock), *R. alcocki* Kemp, *R. octagonalis* Kemp, and *R. kempi*, described as a new species in this paper. From the last two species it differs, among other characters, in having distinct teeth on the upper border of the merus of the male cheliped. It can also be easily distinguished from *R. wood-masoni* in having only one tooth on the margin

of the carapace below the eye and in the altogether different shape of the rostrum. Within the group, therefore, *R. tuberculata* shows the greatest resemblance to *R. alcocki*, but the two may be distinguished with the help of the following table:—

<i>Rhynchoplax alcocki.</i>	<i>Rhynchoplax tuberculata.</i>
1. Upper surface of carapace without any tubercles.	1. Upper surface of carapace with a number of large tubercles.
2. Median lobe of rostrum bluntly pointed, considerably longer than the lateral lobes.	2. Median lobe of rostrum distally truncate, only slightly longer than the lateral lobes.
3. Chela of male greatly compressed, $1\frac{1}{2}$ times as long as high.	3. Chela of male not greatly compressed, almost twice as long as high.
4. Fingers of male chela widely gaping, with a few irregularly placed teeth.	4. Fingers of male chela not gaping, with five or six regular, interlocking teeth.
5. Dactyli of walking legs armed with a large number of teeth.	5. Dactyli of walking legs armed with a single apical tooth.
6. Upper borders of merus and carpus of walking legs not ending in conspicuous teeth.	6. Upper borders of merus and carpus of walking legs ending in distinct teeth.
7. Terminal segment of male abdomen as long as broad, apically rounded; margins of preceding portion not distinctly angular.	7. Terminal segment of male abdomen much longer than broad, apically pointed; margin of preceding portion distinctly angular about the middle.

### *Elamena truncata* (Stimpson).

1917. *Elamena truncata*, Kemp, *Rec. Ind. Mus.* XIII, pp. 272-274.

1918. *Elamena truncata*, Tesch, *Siboga Exped. Rep.* XXXIX c, pp. 22-24, pl. i, fig. 4.

Besides the three specimens referred to by Kemp, one from the Nicobars and two from the Andamans, there are now another two specimens of this species in the collection. They are both from the Andamans and are females. All the five specimens in the collection of the Indian Museum are females; an examination of male specimens is desirable on account of the doubt expressed by Kemp with regards to the number of segments forming the male abdomen.

C 1484/1	Ross Island Reef, Port Blair, Andamans.	S. W. Kemp, March, 1921.	1 ♀
C 1485/1	Port Blair, Andamans. ..	R. F. Lewis ..	1 ♀

### *Elamena sindensis* Alcock.

1917. *Elamena sindensis*, Kemp, *Rec. Ind. Mus.* XIII, p. 274.

1918. *Elamena sindensis*, Tesch, *Siboga Exped. Rep.* XXXIX c, p. 24.

The species was so far known from Karachi only. We are now referring to it a number of specimens from the Persian Gulf, as also several additional examples from Karachi.

Nothing need be added to the fairly detailed description given by Alcock and amplified by Kemp. The Persian Gulf examples are smaller than the specimens from Karachi, and there are no ovigerous females in the collection. The walking legs, which are broken in most cases, appear to be somewhat more compressed than those in the types, and the characteristic teeth at the end of the upper border of merus and carpus are smaller. The dactylus, as usual, is trianguiculate.

The Karachi specimens agree with the types in all respects.

The record of the species from the Persian Gulf extends its range considerably. The species perhaps occurs more extensively in the Arabian Sea than the present records show.

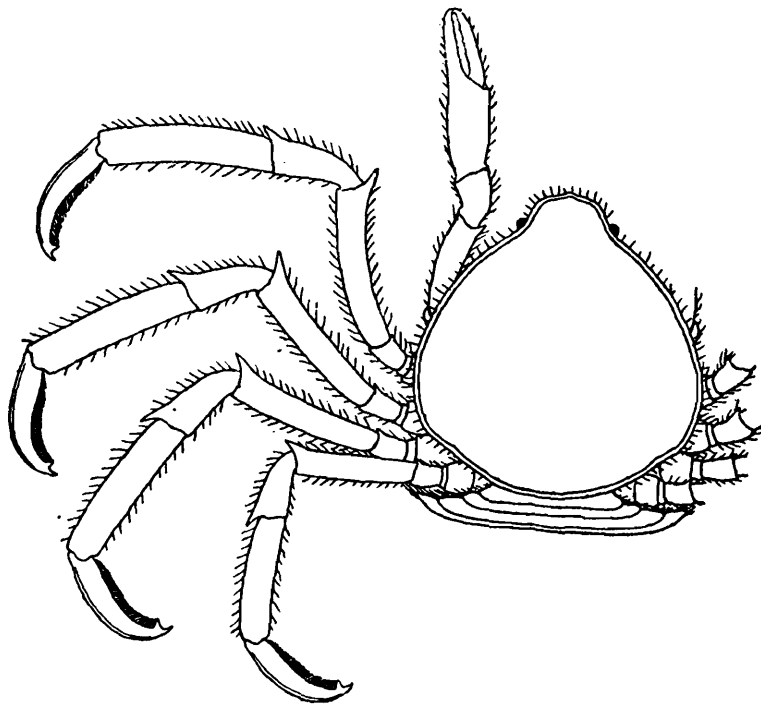
- |          |  |                                |               |
|----------|--|--------------------------------|---------------|
| 6556/10  | Koweit Shores, Persian Gulf.                 | R. E. Lloyd, 18th Oct., 1908.  | 4 ♂♂ and 3 ♀♀ |
| C 1486/1 | Under stones, near high-water mark, Karachi. | H. J. Walton, 12th Oct., 1918. | 4 ♂♂ and 5 ♀♀ |

***Elamena cristatipes*** Gravely.

1893. *Elamena truncata*, Henderson, *Trans. Linn. Soc. London*, (2) Zoology, V, p. 395.

1927. *Elamene cristatipes*, Gravely, *Bull. Madras Govt. Mus. (n. s.)* I, p. 150, pl. xxi, fig. 24.

*Elamena cristatipes* was described by Gravely from two specimens, one male and one female, collected off Krusadai Island, in the Gulf of Manaar. The description given by Gravely is rather meagre; we have now amplified it by an examination of Gravely's type-specimens, as also from fresh material from Madras.



TEXT-FIG. 11.—*Elamena cristatipes* Gravely.  
Outline of dorsal view of female type-specimen.

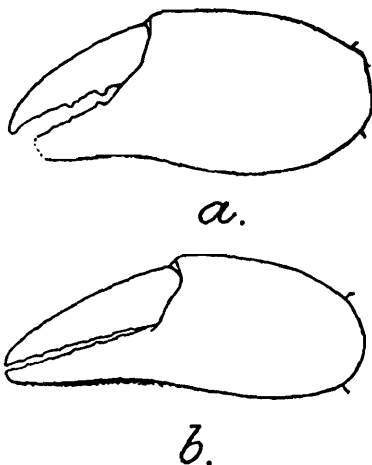
The species closely resembles *Elamena truncata* (Stimpson), but, as remarked by Gravely, can be easily distinguished from it by its rounded

front and the biunguiculate tarsi of the walking legs. The strong crest on the propodus, to which the specific name refers, is also a characteristic feature of the present species. The last two segments of the legs are also more flattened than in Stimpson's species.

The carapace is flat, with the margins strongly upturned, and, as usual in the genus, the various regions are not demarcated. The carapace, including the rostrum, is longer than broad, and is more or less pyriform in outline. The antero-lateral borders are longer than the postero-lateral, and both are regularly arched. The posterior margin is somewhat more rounded than shown in Gravely's figure. The rostrum is broad and its anterior margin is arched and is not truncate as in *E. truncata*. There is a small acute point about the middle of the anterior margin. The eyes are slightly visible from above, and the post-ocular tooth is greatly reduced and can be seen only from below.

The antennules are entirely concealed by the rostrum, and are not visible in the dorsal view. The vertical keel on the lower surface of the rostrum, between the bases of the antennules is well developed, and the rostrum seen from in front presents a T-shaped appearance.

The chelipeds in the male are considerably stouter than the walking legs. The merus has a blunt tooth on the distal end of its margin, and a



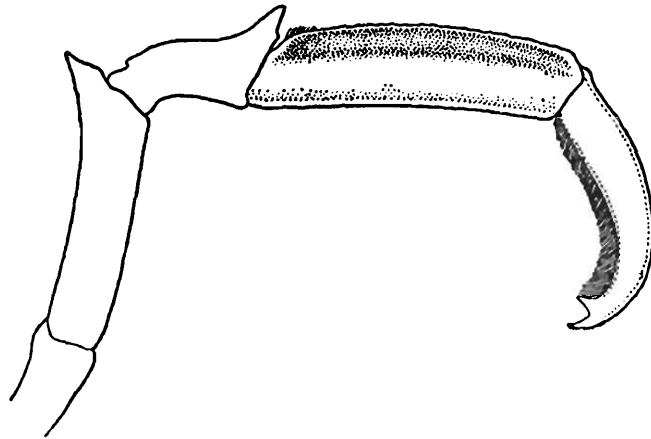
TEXT-FIG. 12.—*Elamena cristatipes* Gravely.  
a. Chela of male type-specimen.  
b. Chela of a young male from Madras.

blunt tubercle is present in a similar position on the carpus. The palm is greatly inflated, being, in the type-specimen, a little less than half the length of the chela. In another specimen, somewhat smaller than the type, the height is proportionately less. A low keel runs longitudinally on the upper surface of the palm. The fingers do not gape, and are provided with a number of very minute teeth, interspersed with a few larger ones. The fingers are somewhat blunt at the tips. The chelipeds in the female are not much stouter than the walking legs, and the chela is proportionately much less high. The fingers gape a little throughout their length and meet only at the tips, which are more or less sharply hooked. The larger teeth on the fingers seem

to be evenly distributed.

The walking legs are not slender. The last two or three segments being considerably more flattened than in the other species of the genus. The legs of the second pair are slightly the longest, and are a little less than twice the length of the carapace and rostrum. A strong spine is present at the distal extremity of the upper border of the merus, and another in a similar position on the carpus; the propodus is flat, and is very strongly compressed all along its length, below the upper margin. We have, however, failed to see the "strong crest," that according to Gravely's figure is present a little below the upper margin on the dorsal surface of the propodus. A thickened ridge-like structure running longitudinally some distance below the upper margin is present on the ventral side of the propodus, and as

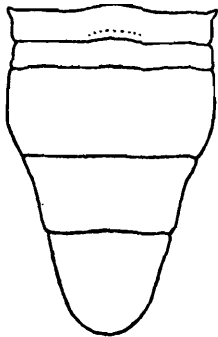
the portion between this and the upper margin is greatly compressed, this may have been taken for a crest by Gravelly. We give



TEXT-FIG. 13.—*Elamena cristatipes* Gravelly.  
Walking leg, ventral surface.

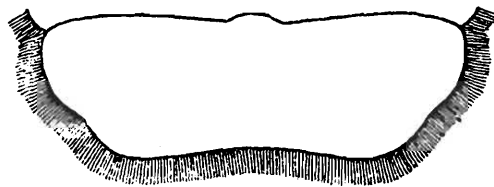
here a figure of the ventral surface of a walking leg and this shows the structure of the propodus very clearly. The upper margin of the propodus is somewhat serrated; the dactylus is flattened and curved, and is provided with two curved teeth at the tip.

The abdomen of the male is formed of five pieces; the third and the fourth segments only appear to have been fused. In this respect the abdomen of *E. cristatipes* resembles the description and figure given by Baker<sup>1</sup> for *E. truncata*, and does not correspond with Kemp's account of the other species. The abdomen is triangular with the sides somewhat sinuous and the terminal segment is broadly rounded. The terminal segment of the female abdomen is strongly sinuous and is concave about the middle.



TEXT-FIG. 14.—*Elamena cristatipes* Gravelly.  
Abdomen of male type-specimen.

The female type-specimen is about 5.5 mm. long from the tip of the rostrum to the posterior border of the carapace, while the male is about 6 mm. long. Of the four specimens from Madras the largest female is a little over 5 mm. long, while the single male is also 5 mm. in length.



TEXT-FIG. 15.—*Elamena cristatipes* Gravelly.  
Terminal segment of abdomen of female type-specimen.

The type-specimen is numbered C 1254/1 in the registers of the Zoological Survey of India, and is preserved in the Indian Museum.

<sup>1</sup> Baker, *Trans. Roy. Soc. S. Australia* XXX, p. 113, pl. ii, fig. 2a (1906).

*Locality*.—The types were collected at Krusadai Island in the Gulf of Manaar, while the four additional specimens now referred to the species are from Madras Harbour. All these latter specimens were collected by Dr. Kemp in May, 1918, at a depth of 4-5 fathoms. According to Dr. Kemp's station-book the carapace, in life, is "dark, with red streaks running inwards on either side postero-laterally."

C 1487/1	Madras Harbour: on large blocks at end of harbour extension, submerged in 5 fathoms of water.	S. W. Kemp, May, 1918.	1 ♂
C 1488/1	Madras Harbour: in angle between new extension and old arm of harbour, 4-5 fathoms.	S. W. Kemp, May, 1918.	2 ♀♀
C 1489/1	Madras Harbour: on old blocks hauled from bottom at end of harbour wall, 4-5 fathoms.	S. W. Kemp, May, 1918.	1 ♂

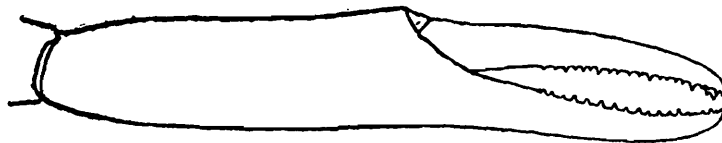
### **Elamena (Trigonoplax) unguiformis de Haan.**

1917. *Elamena (Trigonoplax) unguiformis*, Kemp, *Rec. Ind. Mus.* XIII, pp. 277, 278.

1918. *Trigonoplax unguiformis*, Tesch., *Siboga Exped. Rep.* XXXIX c, pp. 25, 26.

This species seems to be very common at Port Blair, for, besides the specimens recorded from there by Wood-Mason and Kemp, there are in the present collection five other examples from the same locality.

The species has been very well described by several authors. The chela in both the sexes has the fingers gaping, and besides the minute



TEXT-FIG. 16.—*Elamena (Trigonoplax) unguiformis* de Haan  
Chela of male.

teeth there are a few bigger and blunter teeth near the tips of the fingers, which, as mentioned by Alcock, are spooned.

C 1490/1	Ross Channel, Port Blair, Andamans, 2-9 fathoms.	S. W. Kemp	3 ♂♂ and 2 ♀♀
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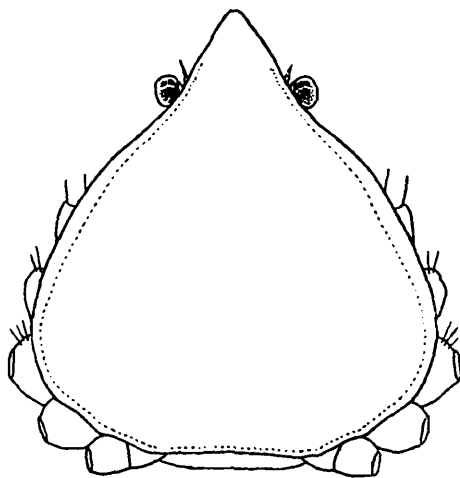
### **Elamena (Trigonoplax) sp.**

There is a single specimen of *Trigonoplax* in the collection, that we find difficult to refer to any of the known species. In most of the important characters it resembles *E. (T.) xavieri* Kemp<sup>1</sup> from Portuguese India, but differs from it in one or two noteworthy characters. In Kemp's species the carapace is longer than broad, but in our specimen the length is proportionately a little greater than that in Kemp's form. The antero-lateral borders are also less strongly arched than in *E. (T.)*

<sup>1</sup> Kemp, *Rec. Ind. Mus.* XIII, pp. 275-277 (1917).



*xavieri*. Further the rostrum appears to be proportionately a little longer, and its sides are more or less straight, and not arched, as in Kemp's



TEXT-FIG. 17.—*Elamena (Trigonoplax)* sp.  
Outline of carapace.

species. The sharp forwardly-directed tooth on the ventral surface of the rostrum is better developed in our specimen than shown in Kemp's figure of *E. xavieri*. The chelipeds and the legs agree in all material respects with Kemp's description. The walking legs, however, are not appreciably roughened as described by Kemp.

In the shape of the carapace the present specimen seems to be intermediate between *E. xavieri* and *E. (T.) cimex* Kemp,<sup>1</sup> but it differs from the latter, among other characters, in the shape of the rostrum, in the presence of a septum between the antennules and of a forwardly-directed tooth on the ventral side of the rostrum. The dactyli of the walking legs are also differently armed.

The single specimen described above was collected by Dr. Kemp in the Andaman Islands. It is a male, 4.2 mm. long, and has most of its legs detached.

C 1491/1 In channel, north of Viper  
Island, Port Blair, Andamanis.

S. W. Kemp

1 ♂

<sup>1</sup> Kemp, *Mem. Ind. Mus.* V, pp. 216-218, pl. xii, fig. 3 (1915).