

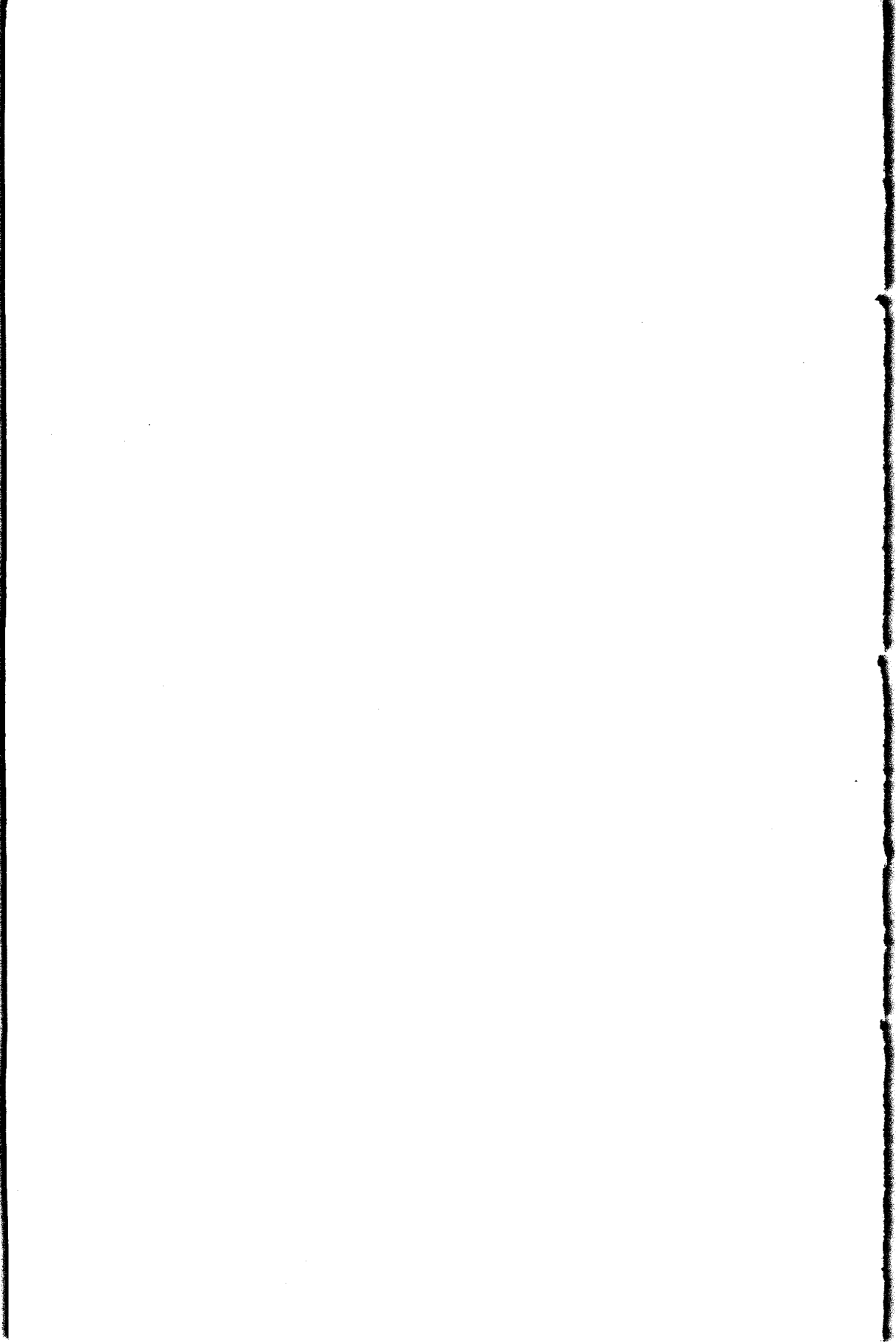
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**On three species of Portunidae (Decapoda, Brachyura)
from the Malay Peninsula**

by

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Acknowledgments.—I have to thank the Director of the Raffles Museum for kindly presenting the specimens described below to the British Museum Collection as well as for permission to include figures and notes on several related species. I am also indebted to the authorities of the Senckenberg Museum, Frankfurt, and to Mr. Lochhead of the Cambridge Museum for sending type and other material on loan.

Lupocyclus rotundatus Adams and White. Fig. 1.

1899. ALCOCK, J. *As. Soc. Bengal.* lxxviii, pt. II, No. 1. p. 23
(ubi. bibl.).

1911. RATHBUN. *Trans. Linn. Soc., London. Zool.* (2), XIV, pt. 2.
p. 210.

1922. BALSS. *Arch. Naturg.* 88, A. 11, p. 113.

Locality.—Off east coast of Malay Peninsula. Sept. 1926,
1 ♀ ($l=28.5$ mm., $b=33$ mm. approx.).

Remarks.—This specimen, which has been compared with cotypes from the "Samarang" collection, is the largest that has so far been captured. Rathbun (1911, p. 210) commented on the unusual size of her female specimen from the Seychelles

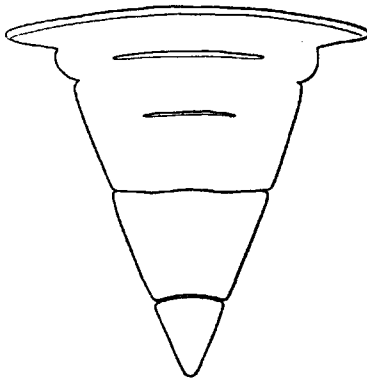


Fig. 1. *Lupocyclus rotundatus* Adams and White.

Male abdomen of largest cotype from Balambangan Is.
segments 3-7 \times approx. 4.

($b=23$ mm.). The smaller cotypes agree with Alcock's description in having the antero-lateral border cut into five coarse teeth (including the outer orbital angle), with in every one of the interdental spaces a minute denticle. In the largest cotype ($b=19.5$ mm.), as well as in the female from Malaya, the denticle in the first interdental space has been replaced by a tooth nearly as large as the second, so that there are six coarse teeth.

The abdomen of the male, which is narrowly triangular, differs very markedly from that of *L. quinquedentatus* Rathbun (1906, Bull. U.S. Fish. Comm. for 1903, p. 869, fig. 28). There are three high keels on the fused segments 3-5 as represented in fig. i.

Thalamita malaccensis n.sp. Fig. 2, 3.

Locality.—Lat. $3^{\circ} 48' 10''$ N., long. $100^{\circ} 14' 50''$ E., 43 fms., from cable 21/10/33. 1 ♀ (holotype, $l=15.5$, $b=22.3$ mm.) and 1 immature ♀.

Description.—The length of the carapace is a little more than two-thirds of the maximum width, including the posterior pair of antero-lateral spines. Apart from the transverse ridges and some granulation near the antero-lateral border, the dorsal



Fig. 2. Anterior portion of carapace, in dorsal aspect, to show orbit and front.

- a. *Thalamita sexlobata* Miers. Holotype.
- b. *Thalamita sexlobata* var. ? de Man.
- c. *Thalamita malaccensis* n.sp. Holotype.
- d. " " Paratype.

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surface of the carapace is smooth; small patches of a fine feathered tomentum, which probably covered the entire dorsal surface, remain.

The arrangement of the granular ridges is as follows:— a sinuous ridge between the posterior pair of antero-lateral spines, interrupted by the cervical groove; in front of this, on the gastric region, is a fine ridge with a short median break; a crescentic series of four short granular lobules defines the gastric region anteriorly; a short distance behind the median transverse groove is a series of four very short ridges, two on the cardiac and one on each mesobranchial region¹; finally, there are a few granules on each branchial lobe¹.

The front is six-lobed, although the separation of the small external lobule from the wide intermediate lobe is rather slight (*see below under remarks*). The orbit is represented in fig. 2c; in the smaller specimen the inner dorsal suture is a wide V-shaped notch (fig. 2d.); there is a small notch on the ventral margin, where it meets the outer orbital tooth.

In the holotype the orbits have scarcely any dorsal inclination; their major diameter is almost exactly one third of the

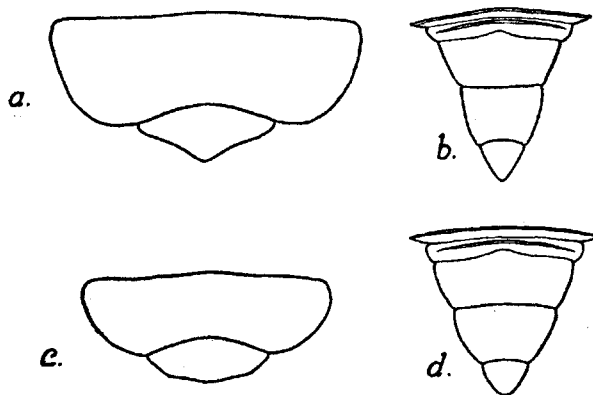


Fig. 3. *Thalamita malaccensis* n.sp. a. Two terminal abdominal segments of holotype. b. Abdominal segments 3-7 of paratype.

Thalamita sexlobata Miers. c. Two terminal abdominal segments of holotype.

Thalamita sexlobata var. ? de Man. d. Abdominal segments 3-7.

¹ According to the diagram in Rathbun, 1930, Smithsonian Inst. U.S. Nat. Mus. Bull. 152, p. 2, fig. 1. This diagram differs somewhat in the terminology of the branchial region from that of Pearson, 1908, L.M.B.C. Memoirs, XVI, *Cancer*, p. 11, fig. 2.

interorbital space; in the smaller specimen they are relatively larger.

The antero-lateral border is armed with five claw-shaped teeth, as represented in fig. 2c; the fourth is the smallest but is nevertheless quite well developed in both specimens. The ridge that is continued posteriorly from the last (or fifth) tooth becomes granular before it fades out.

The posterior border, which is rather longer than the front (excluding the inner orbital angles), forms a wide curve with the postero-lateral border.

The basal antennal joint is a trifle less than the major diameter of the orbit, and bears a crescentic granular ridge which commences near the point of insertion of the second joint and terminates about the middle of the orbital prolongation.

In the holotype the abdomen covers most of the postoral cephalothoracic sterna between the walking legs; all the sutures are equally distinct and there is a long median crest on each of segments 2-4. The two terminal segments are represented in fig. 3a for comparison with those of *Th. sexlobata* Miers. The abdomen of the paratype is narrowly triangular and bears a decided resemblance to that of the male; the pleopods, however, show that the specimen is a female. All three crests are present, the suture between segments 4 and 5 is fainter than either of the two more distal sutures.

The chelipeds are subequal and their surface is, for the most part, covered with fine squamiform markings. The merus is armed with three spines, the first of which is minute, on its anterior upper border; there is, in addition, a spinule near the distal articulation on its anterior lower border. The posterior border is unarmed. The inner angle of the carpus is produced as a long slender spine from which a curved granular costa runs backwards; there are on the outer surface three small teeth from two of which granular costæ run backwards to unite near the articulation with the merus. The palm is armed with five teeth or spines, 2 pairs on the upper border and one near the articulation with the carpus. On the outer surface of the palm are three costæ, the upper of which is indistinct on the right, more clearly marked on the left chela; there is also a rather faint costa along the middle of the inner palmar surface. The fingers are considerably longer than the upper border of the palm and each has a series of uneven teeth on the cutting edge.

Peræopods 2-4 are unarmed and the slender dactylus exceeds the propodus in length. The last, or paddle-shaped, leg has a spine on the posterior border, followed by a spinule at the distal articulation, of the merus; there is in addition a series of minute denticles along the posterior border of the propodus.

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Remarks.—Alcock (1899, J. As. Soc. Bengal, Calcutta. lxxviii pt. II, No. 1, p. 74) divided those species in which the extreme extent of the basal antennal joint is equal to, or less than the major diameter of the orbit into three groups:—those with six, four and two frontal lobes respectively, exclusive of the inner supra-orbital angle. It now appears that several species are rather intermediate between the six-lobed and the four-lobed groups. In the holotype of *Th. sexlobata* Miers the outer lobe is half as long again as the inner, and its outer angle is ever so slightly separated from the rest of the lobe (fig. 2a). In *Thalamita malaccensis* this angle is still more clearly defined, and is more deeply separated from the rest of the lobe in the paratype than in the holotype (fig. 2c., d). In the specimens referred doubtfully by de Man to *Th. sexlobata* var. ? (and for which he proposed the varietal name *plicatifrons*, 1902, Abh. Senckenb. Ges., Frankfurt XXV, 3, pp. 651–653),¹ the front is as represented in fig. 2b. In *Th. exetastica* Alcock (Ill. Zool. 'Investigator', pl. xlvii, fig. 2), on the other hand, the outer lobe is completely separated from the intermediate lobe by a deep fissure. Many intermediate stages appear, therefore, to exist between two such extreme forms as *Th. hanseni* and *Th. exetastica* (Ill. Zool. 'Investigator' pl. xlvii, figs. 4 and 2). Is one to regard specimens with the front as represented in fig. 3a-c as having six or four, frontal lobes?

Thalamita malaccensis is intermediate between *Th. sexlobata* Miers and *Th. investigatoris*, *imparimanus* and *exetastica* (Alcock, 1899, J. As. Soc., Bengal, lxxviii pt. 2, p. 75). It differs from *Th. sexlobata* chiefly as regards the front of the carapace and the terminal segments of the abdomen (c.f. figs. 2 a, c, d and 3a, c). It is closely allied to, but not identical with, de Man's *Th. sexlobata* var. *plicatifrons*; the abdomen in the immature paratype is much more narrowly triangular than in immature specimens of the latter (c.f. fig. 3b and d, at the same magnification).

*Neptunus*² (*Achelous*) sp. ? aff. *orbitosinus* Rathbun. Fig. 4.

Locality.—Siplap, Singapore. 1 ♂ (*l*=15, *b*=21.5 mm.).

Description.—This specimen is so closely allied to *Neptunus* (*A.*) *orbitosinus* Rathbun that reference should be made to de Haan's figure of that species in Siebold, Fauna Japonica, pl. 18, fig. 1, 1837 (as a variety of *Amphitrite gladiator*).

1. The three cotypes of *Th. sexlobata* var. *plicatifrons*, which were obtained on loan from the Senckenberg Museum, Frankfurt, all proved to be immature females, not males, as stated by de Man. They belong, in all probability, to a species distinct from *Th. sexlobata*.

2. = *Portunus* Weber nec Leach.

The carapace is rather hexagonal in outline and the length is almost exactly three quarters of the maximum width, inclusive of the last pair of antero-lateral spines. The dorsal surface is covered, except on the granular summits of the areoles, by a fine tomentum which almost conceals the depressions. When this tomentum is removed the areolation is seen to be very distinct and almost exactly as in *N. (A.) orbitosinus*.

The antero-lateral border is armed with *eight* teeth, including the outer orbital angle, as represented in fig. 4*a*. The third tooth on both sides is broader than any of the others and of an

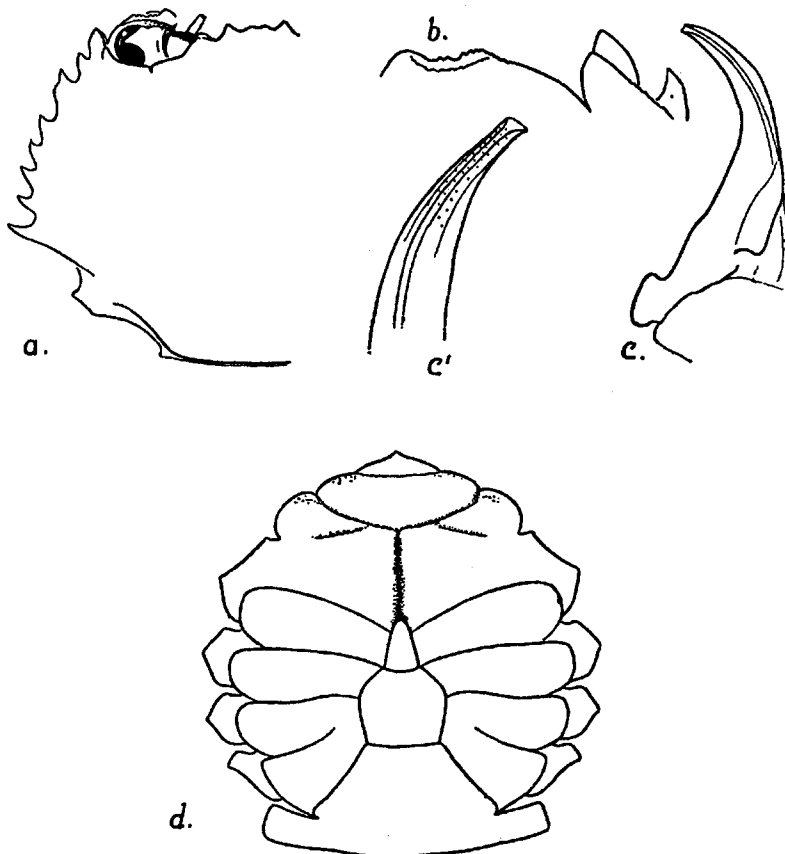


Fig. 4. *Neptunus (Achelous)* sp. ? aff. *orbitosinus* Rathbun.

- a. Left half of carapace, dorsal aspect.
- b. Suborbital border to show suborbital sinus.
- c. First pleopod of male, sternal aspect.
- c'. Apex of same more highly magnified.
- d. Postoral cephalothoracic sterna and abdomen.

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unusual form, with a slight protuberance on the posterior margin; it may correspond to two fused teeth. The next four teeth are subequal and not much smaller than the last one.

The front, excluding the inner supra-orbital angles, is about one sixth of the maximum width of the carapace; it is divided into the usual four lobes, the outer being longer and more advanced than the inner pair (fig. 4a). The outer fissure on the supra-orbital margin is closed, the inner nearly so. The suborbital sinus is deep and wide as in *N. (A.) orbitosinus* (fig. 4b).

The postoral cephalothoracic sterna and male abdomen are also very similar to those of *N. (A.) orbitosinus* (c.f. figs. 5 and 6d). The first pleopod, however, is relatively shorter and stouter, with the apex less curved (c.f. figs. 4c and 5f-f').

The chelipeds are slightly unequal, and are about two and a half times as long as the carapace and granular, the granules tending to be squamiform on the lower margin of the inner palmar surface. The posterior border of the merus is expanded and armed with two teeth, one terminal, the other submedian; there are five or six teeth of unequal size on the anterior border. The inner and outer angles of the carpus are both spiniform. The palm and the fingers are strongly costate, and some, but not all, of the costæ are granular. There are only two small spines on the palm, one at the carpal articulation the other near the distal end of the upper border. The three pairs of walking legs are slender and unarmed; the dactylus is rather longer than the propodus and both are longitudinally grooved. The last pair, the swimming paddles, are also unarmed.

Remarks.—This specimen is very closely related to *N. (A.) orbitosinus* Rathbun from which it differs in having eight instead of nine antero-lateral teeth, and a more robust, less curved first pleopod. For the present, as only one specimen is available, I have not referred it to a new species. The number, shape and relative proportions of the antero-lateral teeth tend to be very constant in many Portunidæ. Should the number of antero-lateral teeth prove to be constant, it may be necessary to establish a new species for it¹. In 1882 Haswell (Proc. Linn. Soc. N.S. Wales. VI, p. 8, and "Catalogue of the Australian Stalk- and Sessile-eyed Crustacea" Sydney p. 8) described *Neptunus tomentosus* as having the "antero-lateral borders with eight acute forward-curved teeth,² the last nearly twice as long as the others". Haswell's description is very brief but his species would appear to differ from the present specimen in (1) the spinulation of the chelipeds and (2) the front, which is

1. The name *N. octodentata* might be used.

2. Haswell, however, has probably excluded the outer orbital angle.

probably very similar to that of *N. pubescens* (Dana), with which Haswell compares *N. tomentosus*.

Rathbun (1911, Trans. Linn. Soc. London, Zool. (2), XIV, p. 205) found that two distinct species had been combined under the specific name "*N. (A.) granulatus*". Cotypes of *N. (A.) orbitosinus* and specimens of *N. (A.) granulatus* determined by Rathbun (1911) were sent on loan from the Cambridge Museum. I agree with Miss Rathbun that these are two very distinct species. I also re-examined all the "*granulatus*" material in the British Museum Collection and found that both species are well represented, as the following lists show.

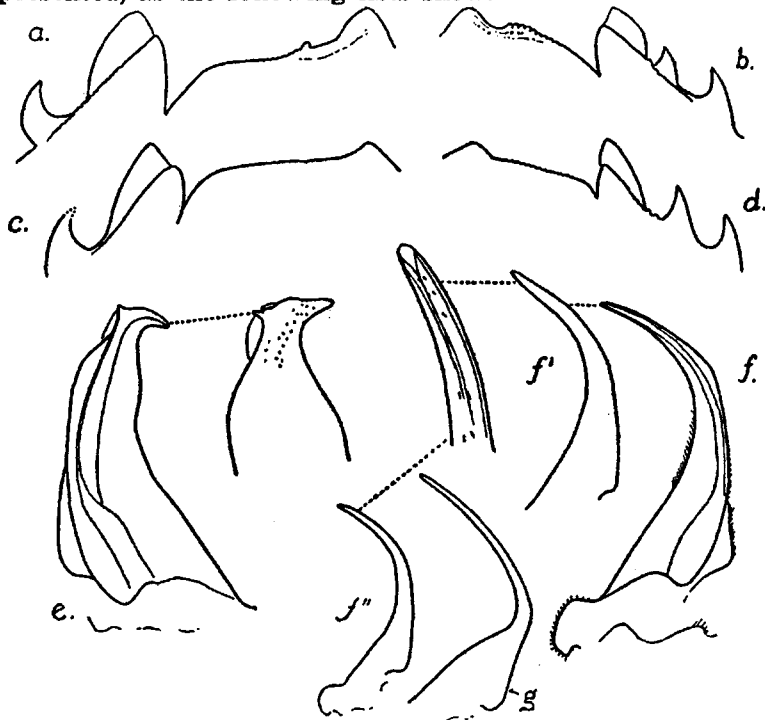


Fig. 5. *Neptunus (Achelous) orbitosinus* Rathbun.
 a. and b. Suborbital border of a male ($l=16.7$) and of a female ($l=12$ mm.) respectively.
 f-f''. First male pleopod of a cotype, and two smaller specimens with apex more highly magnified.
 g. First male pleopod of male near to *orbitosinus* from Admiralty Is. ("Challenger" Colln.).
Neptunus (Achelous) granulatus (Milne-Edwards).
 c. and d. Suborbital border of a male ($l=16.5$ mm.) and female ($l=11$ mm.) respectively.
 e. First pleopod of male, with apex more highly magnified.

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N. (A.) granulatus

<i>Locality</i>	<i>Reg. No.</i>	<i>No. of specimens</i>	
Spirit Colln.			
Red Sea (Playfair's colln.) ..	74.89	1 ♂	1 ♀
Sandwich Is. ..	59.79	1 ♂	
Loyalty Is. (Whitmee) ..	77.24	1 ♂	
Cocos Keeling Is. ..	1926.8.24.12-16	6 ♂	
Philippines, Sambilan ('Challenger') ..	84.31	1 ♂	
Rodriguez (Gulliver coll.) ..	76.10	1 ♂	
Seychelles (Wright) ..	75.20	1 ♂	
Ceylon, Galle ..	82.19		1 ♀
" ..	76.11	1 ♂	
Muscat ..	87.16	1 ♂	? 1 ♀
Dry Colln.			
Fiji Is. ..	56.105	1 ♂	
Australian Seas ..	62.35	1 ♂	
Isle de France ..		2 ♂	
Philippines, Zebu ..	43.6	1 ♂	
Eastern Seas ..	47.21	1 ♂	

N. (A.) orbitosinus

<i>Locality</i>	<i>Reg. No.</i>	<i>No. of specimens</i>	
Spirit Colln.			
Ceylon (Herdman Colln.) ..	1907.5.22.315-319	8 ♂,	9 ♀
" ..	1934.1.16.133	1 ♂	
Andaman Is. (Ind. Mus.) ..	1911.1.17.45-46	1 ♂	1 ♀
Seychelles ('Alert') ..	82.24		1 ♀
Friday Is. ('Alert') ..	82.7	1 ♂	
Seychelles (Wright) from ..	75.20	2 ♂	
Gulf of Suez ..	64.49		1 juv. ♀ (?)
Admiralty Is. ('Challenger') ¹ ..	84.31	1 ♂	

In addition to the differences listed by Rathbun the first pleopods of the male and the shape of the abdomen in both sexes differ quite markedly (*see* figs. 5*e*, *f*, and 6*a*, *b* and *c*, *d*).

¹. The Admiralty Island specimen is very near to *N. (A.) orbitosinus*, but the first pleopod is as represented in fig. 5*g*, with the apical portion relatively much longer, very slender and more bent.

N. (A.) orbitosinus reaches a larger size than *N. (A.) granulatus* and in the older specimens depressed areoles may be present on the abdomen, in both sexes. Those of the female are represented in fig. 6c. In the largest male, a cotype from Cargados Carajos, ($l=21.5$, $b=31$ mm.) there are two pairs of areoles on the sixth, 3 pairs on the fused fourth and fifth, abdominal segments. In addition, there is a long areole immediately posterior to each of the paired sutures or grooves on the postoral cephalothoracic sterna. These thin areas are covered with a very fine tomentum.

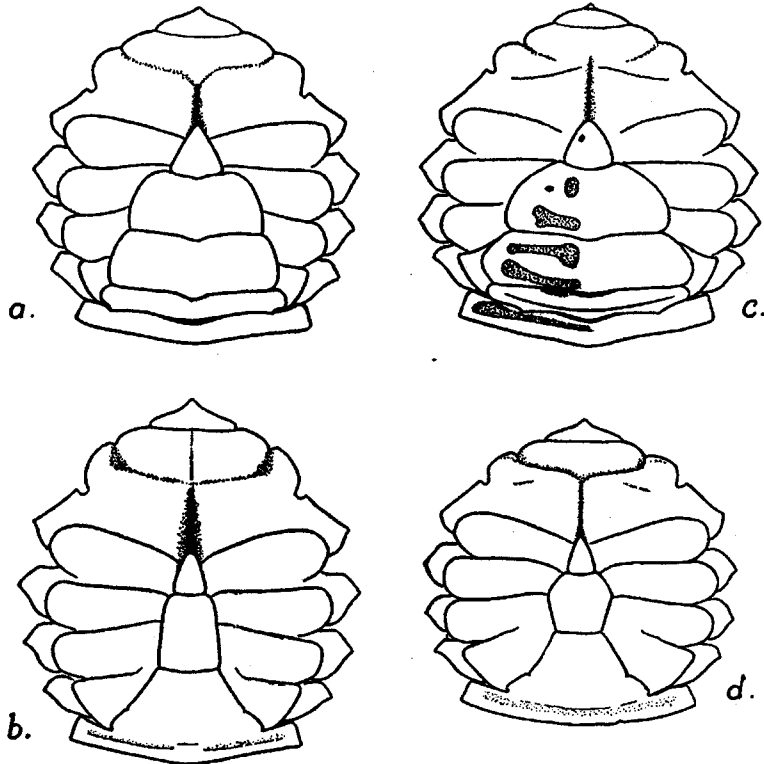
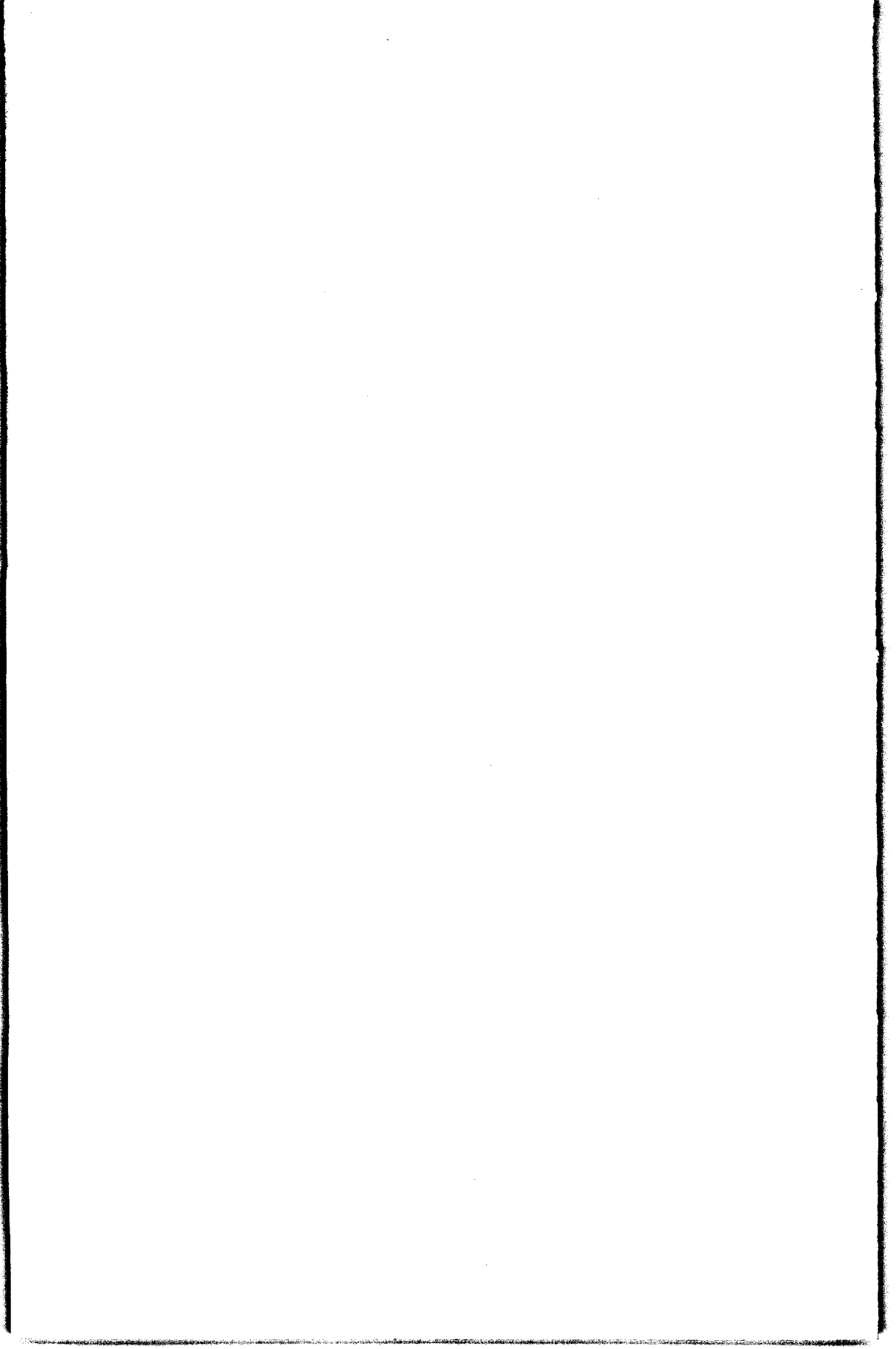
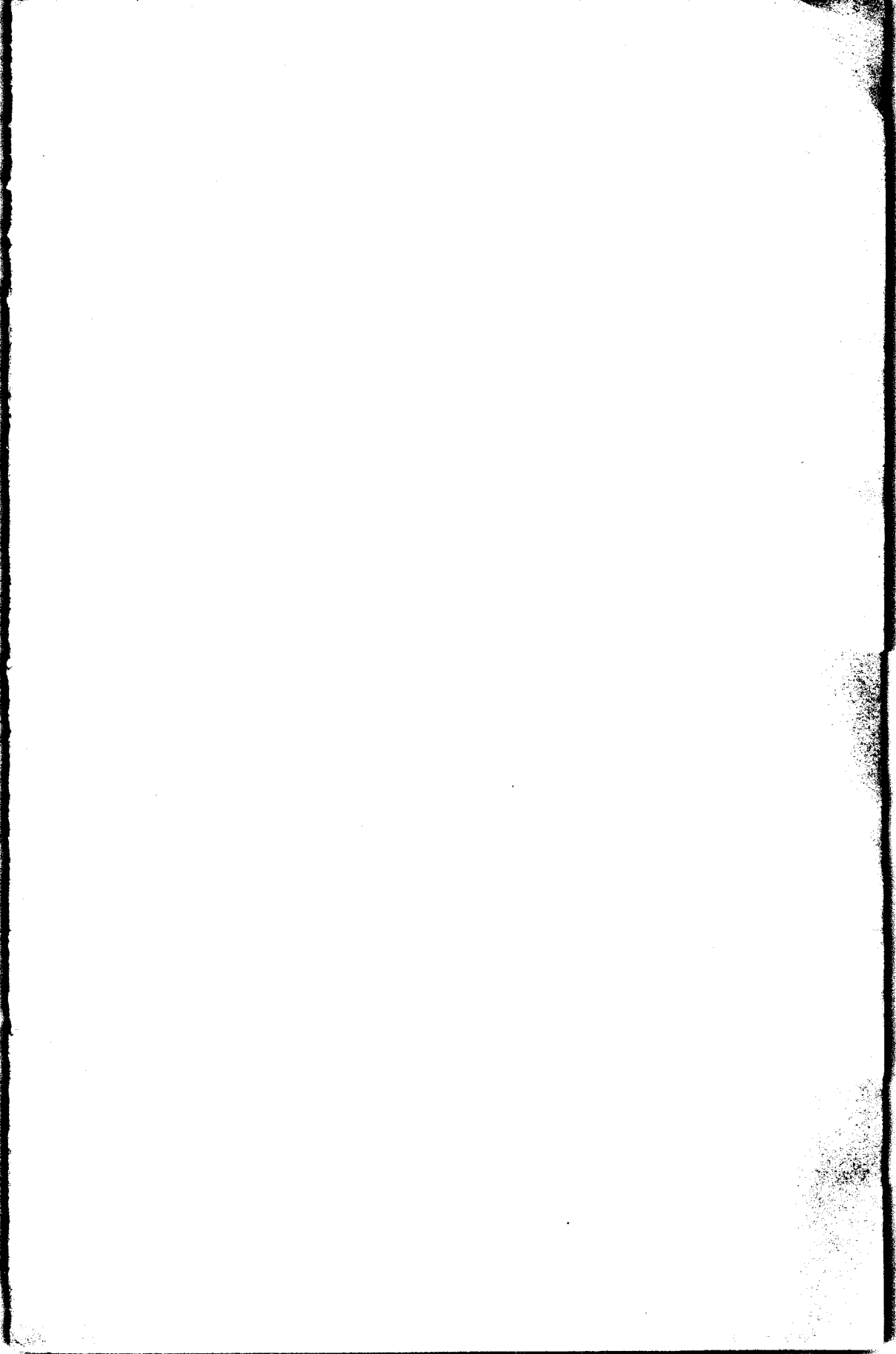


Fig. 6. *Neptunus (Achelous) granulatus* (Milne-Edwards).
 a. Postoral cephalothoracic sterna and abdomen of female ($l=11.5$, $b=16$ mm.).
 b. Postoral cephalothoracic sterna and abdomen of male ($l=14$, $b=20$ mm.).
Neptunus (Achelous) orbitosinus Rathbun.
 c. Postoral cephalothoracic sterna and abdomen of female ($l=14.4$, $b=21$ mm.).
 d. Postoral cephalothoracic sterna and abdomen of male ($l=12$, $b=17$ mm.).

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The specimen from Prince of Wales Channel, which Miers (1884, London. Report on the Zoological Collections of H.M.S. "Alert", p. 230) described as *N. (A.) granulatus* var. *unispinosus* must belong to a much larger species. The last antero-lateral tooth is considerably more prominent than in *N. (A.) granulatus* while the preceding 7 are less claw-like and separated by narrower intervals. The median pair of frontal lobes is slightly in advance of, not considerably behind, the line joining the apices of the lateral frontal lobes. The abdomen is narrowly triangular, with a keel on each of segments 2, 3 and 4. Segments 3-5 are not fused and three pairs of biramose pleopods are present; the specimen, which measures 17×25.4 mm., must therefore be an immature female. In both *N. (A.) granulatus* and *N. (A.) orbitosinus* females of much smaller size ($b=15-18$ mm.) are ovigerous.





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