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UITGEGEVEN DOOR

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PART XI

THE PALAEMONIDAE

COLLECTED BY THE SIBOGA AND SNELLIUS EXPEDITIONS WITH REMARKS ON OTHER SPECIES II.

SUBFAMILY PONTONIINAE

BY

DR. L. B. HOLTHUIS
(Rijksmuseum van Natuurlijke Historie, Leiden)

With 110 figs. in the text

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INTRODUCTION

In 1917 Borradaile gave a revision of the Pontoniinae, with keys to all genera and species; of every species the most important references to literature were cited. The division of the subfamily into genera adopted by Borradaile in his paper is not very satisfactory. The division given by Kemp (1922) in his study on the Pontoniinae of the Indian Museum at Calcutta, is much more preferable. As a result of the study of the present material, however, I disagree in some points with Kemp's system. Gurney (1938) on account of the study of Pontoniid larvae also raises some objections against the division given by Kemp; he points out that the study of the mouthparts of the present group is much neglected and that these mouthparts may prove to be of large value. As the material at my disposal contains numerous species, belonging to the larger part of the known genera, I had a good opportunity for comparing the mouthparts of the various forms. The results of this study of the mouthparts are given here:

Mandible. The incisorprocess generally ends in three broad teeth, this number sometimes, by reduction of the median tooth, may become two; sometimes the number of teeth may increase to 4,5 or even up to 12, in some species the distal margin of the process is crenulate (figs. 52a, 55a). Moreover the concave margin of the incisor process may be serrate, the teeth, however, generally are inconspicuous (figs. 17a, 71a, 78a). In some species of *Periclimenaeus* and *Typton* the incisorprocess is strongly reduced, while in one species of the latter genus it even is entirely lacking. These differences in the shape of the incisor process in my opinion are of no generic value, as mostly gradual transitions occur and as in closely related forms the incisorprocess may differ largely in shape. Gurney (1938) pointed to the presence or absence of brush-like arranged spines on the molar process as a probable character of generic value. This showed to be not true: in most Pontoniinae these spines are present,

but of the genus *Periclimenes* some species (e.g. *P. hertwigi, P. nilandensis* and *P. seychellensis*) lack these spines, in others (e.g. *P. impar*) only a small number of these spines is present, while in many species (e.g. *P. scriptus)* they are well developed. The molar process shows no large differences in shape, it mostly is broad and blunt and provided with blunt knobs and ridges in the distal part, in *Periclimenes soror,* however, this process is remarkably slender.

Maxillula. According to Gurney the character of a bifid or uncleft palp of the maxillula probably would prove to be of importance. This too showed to be not correct, as all transitions between a cleft and an entire palp occur within various genera. Also it became clear that the character of the broadened or slender inner lacinia of the maxillula, as it is used by Kemp (1922) for distinguishing large groups of genera, is not constant within those genera. Species belonging to genera as *Palaemonella* and *Periclimenes,* it is true, always have the lacinia more or less slender, but in genera as *Anchistus, Paranchistus* and *Pontonia,* in which it should be very broad, it is strongly variable. This character therefore can not be used for the distinction of larger groups.

First maxilliped. Gurney pointed to two characters of this appendage, which might prove to be of generic value, namely the presence or absence of a distinct notch between coxa and basis and the width of the caridean appendage of the exopod. These characters too proved to be too variable to be of generic importance, though they are, as far as I can control, constant within the species.

I come therefore to the conclusion that the most important characters of generic value derived from the oral parts in this subfamily are: the absence or presence of a palp on the mandible, and the absence or presence of the exopod of the maxillipeds. The characters of the mouthparts described above in my opinion only may be considered to be of specific value. As the oral parts of the present subfamily are so insufficiently known, I have described and figured these parts of most species examined by me; this may be helpful to later workers in this group to investigate the variability in the shape of these organs.

The system of the Pontoniinae adopted by me in the present paper differs from that used by Kemp (1922) in the following points:

1. The genus *Urocaridella* Borradaile (1915) is placed by Borradaile (1917a) as well as by Kemp (1922) in the subfamily Pontoniinae. It can, however, not be maintained in that group, but has to be placed in the subfamily Palaemoninae. The third maxilliped namely is provided with a pleurobranch as well as with an arthrobranch, as is distinctly shown by my material of the typespecies *Urocaridella gracilis* Borradaile. *Urocaridella* even shows to be identical with *Leander* Desm. The name of *Urocaridella gracilis* Borr. thus should have to become *Leander gracilis* (Borradaile, 1915); this name, however, is already used for *Leander gracilis* Smith (1869). The former species thus needs a new name for which that of *Leander urocaridella* was proposed (Holthuis, 1950a, p. 28). *Urocaridella borradailei* Stebbing (1923) belongs to the genus *Macrobrachium* Bate, it thus also is a Palaemonid prawn.

2. The subgenus *Periclimenaeus* of the genus *Periclimenes* is considered here to be a distinct genus.

3. The genus *Harpilius* as defined by Kemp, in my opinion forms no unity. In the present paper the species *Harpilius lutescens* Dana is placed in the genus *Periclimenes,* becoming thereby the type of the subgenus in which the dactylus of the last three legs is simple and which was given by Kemp (1922) the name *Ancylocaris* Schenkel (1902); as, namely, the name *Harpilius* Dana (1852) is older than *Ancylocaris,* Dana's name has to be used for the subgenus. The species

Harpilius depressus and *H. beaupresi* differ in so many respects from the other two species, that I follow Borradaile (1917a) in placing them in a separate genus *Harpiliopsis* Borr. For the fourth species placed by Kemp in the genus *Harpilius, H. gerlachei*, a new genus is erected here, the necessity of which was already supposed by Tattersall (1921) and Gurney (1938).

4. As pointed out by Gordon (1935) the genus *Anchistioides* Paulson (1875) belongs to the present subfamily. Gurney (1938) erects a new subfamily for this genus, but in my opinion too little data are known at present to justify such a separation.

5. The following new genera are erected in the present paper: *Vir, Paranchistus, Philarius, Platycaris, Jocaste, Cavicheles,* and *Hamodactylus.*

The material at my disposal is of large value as it contains many species, which up till now were insufficiently known. Furthermore it forms an important contribution to our knowledge of the Pontoniid fauna of the Malay Archipelago. Up to the present time namely only 23 species of Pontoniinae were known from the Malay Archipelago, 22 of which were recorded from Indonesia and only three from the Philippines. At present the total number of forms from the Malay Archipelago has increased to 69 species and 4 varieties, 67 species and 4 varieties of which come from Indonesia and Dutch New Guinea, 10 species from the Philippines (9 of which from the Sulu Archipelago). 53 species and 1 variety are collected by the Siboga Expedition, 29 species and 2 varieties by the Snellius Expedition, while the number of species of Pontoniinae in the collections of the Rijksmuseum van Natuurlijke Historie at Leiden and the Zoological Museum at Amsterdam is relatively small.

During a stay in Turin and Genoa, I examined the indo-westpacific Pontoniinae of the Istituto e Museo di Zoologia della Università in Turin and the Museo Civico di Storia Naturale in Genoa. Some material of the former Museum was received on loan and was studied in Leiden. The results of the examination of the above material is incorporated in the present paper. I wish to express my deepest gratitude to the directors and the staff of these Musea for the kindness and help received during my visit.

The first Pontoniid prawns ever recorded from the indo-westpacific region are Rumphius's "Pinnewachters" from Amboina. Rumphius (1705, 1740, 1741, p. 25) described them as follows: "*Pinnoteres* is een kleen Garneeltje, op het meeste een pink, maar gemeenlyk twee leeden van een vinger lang, week en dun van schaal, gemeenlyk licht of vuurig rood, met witte puntjes gespikkelt, zomtyds ook licht blauw en half doorschynend, gelyk donker kristal, of ys. Ter wederzyden heeft hy drie dunne pootjes, en voor de schaeren by den mond, noch twee kleender. De schaeren zijn voor zeer spits, scherp, en krom als klauwen, waar mede hy zeer fel nypt, laatende zig eer de schaer aftrekken, dan dat hy ze zou loslaaten. Den staert draagt hy meest onder den buik, gekromt, gelyk alle Garneelen, waar aan men subtyle pinnetjes ziet, waar mede hy zyne eyeren bedekt." (*Pinnoteres* is a small prawn, at most of the length of the little finger, but commonly as long as two joints of a finger, with a soft and thin shell, commonly pale or fiery red, speckled with white dots, sometimes pale blue and semitransparent, like dark cristal or ice. At both sides it bears three thin legs (third to fifth pereiopods), and then two smaller legs before the chelae near the mouth (third maxilliped and first pereiopod). The chelae anteriorly are very acute and sharp, curved like claws; it pinches very fiercely with these chelae and rather let itself pull out a chela, than to release its hold. The tail, at which the subtile fins, with which it covers the eggs, are visible, is like in all prawns curved under the belly.) Rumphius found these Pontoniids in "de *Chama Squamata* of

Nagelschulpen" (*Tridacna squamosa* Lam.) [1]). He also mentions the species from *Pinna rumphii* Hanl. [1]) (see pp. 25 and 153 of Rumphius's book) and tells Pliny's fantastic story about the relation between *Pinnotheres* and *Pinna.* At the end of the 23rd chapter Rumphius makes a very interesting statement: "In de Letterschulpen heb ik, in Oogstmaand 1683, tweederlei Wagtertjes gevonden, de eerste was een Garneeltje ter lengte van eenen vingernagel, hoog oranje, geel en half doorschynend, met dunne witte pootjes. Het ander was een Krabbetje..." (In August 1683 I found two species of "Guards" in the Lettershells (*Tapes litterata* L.) [1]), the first was a small prawn of the length of a fingernail, bright orange yellow and semitransparent, with thin white legs. The other was a small crab...). This observation of Rumphius is very interesting as after him no mention has ever been made of a Pontoniid prawn inhabiting a species of *Tapes.* The exact identification of Rumphius's species is not possible, his first species may belong to the genera *Anchistus, Paranchistus* or *Conchodytes,* the second to *Anchistus* or *Conchodytes.*

The most striking feature of the present group is the fact that a large number of its species is associated with other animals. Kemp (1922) gave a survey of the hosts of the Pontoniinae, but as after the publication of Kemp's paper many more facts about this commensalism have become known, I thought it useful to give here in tabular form the relation between the Pontoniinae and animals of other groups as far as it is known to me (see the table at the end of this paper).

Key to the genera and subgenera of Pontoniinae

1.	Mandibular palp present	2
—	Mandibular palp absent	3
2.	Hepatic spine present. Free living or epizootic on Crinoidea	*Palaemonella*
—	Hepatic spine absent. Epizootic on Crinoidea	*Vir*
3.	Scaphocerite well developed	4
—	Scaphocerite rudimentary	31
4.	All maxillipeds provided with exopods	5
—	Exopods absent at least from third maxilliped	23
5.	Dactylus of last three pereiopods without basal protuberance; sometimes the dactylus is broadened in the basal region, but this broadened part disappears in a slit of the propodus, when the dactylus is curved backward	6
—	Dactylus of last three pereiopods with one or two large basal protuberances, which do not disappear from view, when the dactylus is curved backward	17
6.	Pleurae of first five abdominal segments broadly rounded or bluntly pointed, never produced to a sharp point	7
—	Pleurae of at least the fourth and fifth abdominal segments produced to a distinct sharp point	16
7.	Hepatic spine present	8
—	Hepatic spine absent	9
8.	Hepatic spine immovable. Body mostly slender. Rostrum with conspicuous teeth. Free living or epizootic on Porifera, Coelenterata and Echinodermata	*Periclimenes*

1) For the identification of the molluscs in Rumphius's work, Von Martens's (1902) article in the "Rumphius Gedenkboek" is used.

a. Dactylus of last three pereiopods biunguiculate . . . . . subgen. *Periclimenes* s.s.
b. Dactylus of last three pereiopods simple . . . . . subgen. *Harpilius*

— Hepatic spine movable. Body rather clumsy. Rostrum with small teeth, which all are placed close to the apex. Endozootic in Lamellibranchia . . . . . *Paranchistus*

9. Rostrum compressed, mostly provided with teeth 10
— Rostrum depressed or cylindrical, mostly toothless 14

10. Carpus of first pereiopod segmented. First pereiopods unequal . . . . . *Thaumastocaris*
— Carpus of first pereiopod not segmented. First pereiopods equal 11

11. Second pereiopods very unequal in shape and size, larger pereiopod very clumsy. Fingers of larger leg short and broad, with 1-3 teeth, one of which is hammershaped. Outer margin of basal segment of antennular peduncle often triangularly produced before the stylocerite. Endozootic in Porifera and Ascidia, epizootic on corals . . . . . *Periclimenaeus*
— Second pereiopods equal in shape, sometimes more or less unequal in size. Fingers of the second legs elongate, provided with small teeth, never with a hammershaped tooth. Outer margin of basal segment of antennular peduncle without a triangular lateral process 12

12. Rostrum very short, not reaching beyond end of eyestalk, without teeth. Chela of second pereiopod high, fingers with one or two small teeth. Endozootic in Porifera . . . . . *Onycocaris*
— Rostrum reaching distinctly beyond the eyes, mostly provided with teeth. Chela of second pereiopods cylindrical, somewhat swollen, fingers provided with numerous small denticles 13

13. Scaphocerite broad, oval in shape, final tooth failing to reach end of lamella. When teeth are present on the rostrum, then they are very small and placed close to the apex, leaving the larger part of both upper and lower margin entire. Endozootic in Lamellibranchia . . . . . *Anchistus*
— Scaphocerite slender, final tooth reaching beyond lamella. Rostrum with large teeth placed over the entire length of the dorsal margin. Epizootic on corals *Philarius*

14. Telson rather broad, generally with large dorsal spines. One tooth at end of outer margin of uropodal exopod 15
— Telson elongate, with very small dorsal spines. Outer margin of the uropodal exopod ending in two spines, the inner of which is movable. Epizootic on Crinoidea . . . . . *Pontoniopsis*

15. Third maxilliped without arthrobranch. Body not strongly depressed. Antero-lateral angle of basal segment of antennular peduncle pointed. Dactylus of last three pereiopods never strongly curved, mostly with one or more accessory teeth behind apex. Endozootic in Mollusca and Ascidia . . . . . *Pontonia*
— Third maxilliped with arthrobranch. Body very strongly depressed. Antero-lateral angle of basal segment of antennular peduncle rounded. Dactylus of last three pereiopods simple, strongly curved . . . . . *Platycaris*

16. Body clumsy, not depressed. Carapace and abdomen areolated. Lower margin

of rostrum entire. Pleura of third abdominal segment pointed. Epizootic on Pennatularia . . . . . *Dasycaris*

— Body strongly depressed. Carapace and abdomen smooth. Lower margin of rostrum with teeth. Pleura of third abdominal segment broadly rounded. Epizootic on corals . . . . . *Harpiliopsis*

17. Basal protuberance of dactylus of last three pereiopods double. Epizootic on Echinoidea . . . . . *Stegopontonia*

— Basal protuberance of dactylus of last three pereiopods simple 18

18. A row of 3 or 4 spines on the carapace behind the antennal spine. Second legs with the fingers short and depressed . . . . . *Fennera*

— No spines on the carapace except the antennal and the hepatic. Fingers of second legs laterally compressed 19

19. Body strongly depressed. Basal protuberance of last three pereiopods hoof-shaped. Rostrum mostly with teeth 20

— Body clumsy, not strongly depressed. Basal protuberance of last three pereiopods flat. Rostrum mostly without teeth 21

20. Hepatic spine absent. Second pereiopods equal in shape, though sometimes unequal in size. Epizootic on corals . . . . . *Coralliocaris*

— Hepatic spine present. Second pereiopods very strongly differing in shape. Epizootic on corals . . . . . *Jocaste*

21. Rostrum depressed, without teeth. Antennal spine absent. Endozootic in Lamellibranchia . . . . . *Conchodytes*

— Rostrum compressed. Antennal spine present 22

22. Rostrum without teeth. Basal protuberance of dactylus of last three pereiopods rounded, smooth. Arthrobranch present on third maxilliped. Endozootic in Ascidia . . . . . *Dasella*

— Rostrum provided with teeth. Basal protuberance of dactylus of last three pereiopods pointed, provided with small ventral squamae. Arthrobranch absent from third maxilliped . . . . . *Cavicheles*

23. Pleurae of the first five abdominal segments broadly rounded or bluntly pointed 24

— Pleurae of at least the fourth and fifth abdominal segments produced to a distinct sharp point 29

24. Hepatic spine present 25

— Hepatic spine absent 26

25. Antennal spine present. Dactylus of second pereiopod much longer than fixed finger, hookshaped . . . . . *Hamodactylus*

— Antennal spine absent. Dactylus of second pereiopod as long as the fixed finger, chela normal in shape . . . . . *Waldola*

26. Second maxilliped with a well developed exopod. Dactylus of last three legs biunguiculate. Rostrum compressed, with teeth. Postorbital tubercle present. Free living and endozootic in Porifera . . . . . *Anchistioides*

— Second maxilliped without exopod. Dactylus of last three legs simple. Rostrum at least in the basal part depressed. No postorbital tubercle 27
27. Rostrum entirely depressed, without dorsal teeth 28
— Rostrum compressed in the ultimate part, generally with dorsal teeth . . . *Neopontonides*
28. Rostrum anteriorly ending in a distinct point, being acute or tridentate. Posterior orbital margin never with a distinct notch behind the eye; this margin formed by the anterior margin of the carapace . . . . . *Pontonides*
— Rostrum broadly truncated anteriorly, the anterior margin being straight or dentate. Posterior margin of the orbit formed by a carina, which is placed some distance behind the anterior margin of the carapace. A distinct notch is present in this posterior orbital margin . . . . . *Veleronia*
29. Rostrum with dorsal teeth. Postorbital and antennal spines present, furthermore there are some two more spines present in the median and posterior region of the lateral surfaces of the carapace . . . . . *Balssia*
— Rostrum without teeth. Carapace with at most some postorbital, two antennal and two pterygostomian spines 30
30. Pterygostomian and postorbital spines present. Dactylus of last three legs with a basal protuberance . . . . . *Coutièrea*
— Pterygostomian and postorbital spines absent. Dactylus of last three legs without a basal protuberance . . . . . *Pseudocoutièrea*
31. Exopods present on all maxillipeds. Rostrum present. Dactylus of last three pereiopods biunguiculate. Endozootic in Porifera . . . . . *Typton*
— Second and third maxillipeds without exopods. Rostrum absent. Dactylus of last three pereiopods simple. Endozootic in corals . . . . . *Paratypton*

List of all species of Pontoniinae known at present [1])

Palaemonella Dana, 1852

Type: *Palaemonella tenuipes* Dana

asymmetrica Holthuis, 1951a. Distribution: Galapagos Islands [2]).

atlantica Holthuis, 1951. Distribution: Cape Verde Islands.

holmesi (Nobili, 1907). Synonyms: *Anchista tenuipes* Holmes, 1900; *Periclimenes tenuipes* Rathbun, 1904 (non Borradaile, 1899); *Periclimenes holmesi* Nobili, 1907; *Periclimenes* (*Falciger*) *holmesi* Borradaile, 1917; *Periclimenes* (*Ancylocaris*) *holmesi* Kemp, 1922. Distribution. American West coast from S. California to Ecuador and the Galapagos Islands.

lata Kemp, 1922. Distribution: Andaman Islands, Java, Timor. Vid. p. 22.

longirostris Borradaile, 1915. Distribution: Maldive Archipelago, ? Bali. Vid. p. 28.

pottsi (Borradaile, 1915). Synonym: *Periclimenes* (*Falciger*) *pottsi* Borradaile, 1915; *Periclimenes* (*Cuapetes*) *pottsi* Clark, 1921. Distribution: Torres Strait.

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1) As the Zoological Record of 1949 and later could not be consulted, this list may be considered to be complete for species described up to 1948; species described after 1948 have been included as far as they are known to me.

2) Depths only are mentioned if more than 70 m.

tenuipes Dana, 1852. Synonyms: *Palaemonella tridentata* Borradaile, 1898; *Palaemonella elegans* Borradaile, 1915. Distribution: The species is recorded from the entire Indo-Westpacific region, from the Red Sea and Chagos Archipelago to Japan and Hawaii. Some of these records, however, may be based on specimens of the next species. *Palaemonella tenuipes* also has been recorded from the Atlantic (Bermuda), these specimens belong to *Periclimenes* (*Harpilius*) *americanus*. Vid. p. 27.

vestigialis Kemp, 1922. Synonym: *Palaemonella spinulata* Yokoya, 1936. Distribution: Red Sea, Bay of Bengal, Japan, Malay Archipelago, Papua, Hawaii. Vid. p. 24.

Vir nov. gen.

Type: *Palaemonella orientalis* Dana

orientalis (Dana, 1852). Synonym: *Palaemonella orientalis* Dana, 1852. Distribution: Andaman Islands, Sulu Sea, Amboina, Hawaiian Archipelago. Vid. p. 30.

Periclimenes Costa, 1844a

Subgenus *Periclimenes* Costa, 1844a

Synonyms: *Pelias* Roux, 1831 (non Merrem, 1820); *Anchistia* Dana, 1852; *Urocaris* Stimpson, 1860; *Dennisia* Norman, 1861; *Corniger* Borradaile, 1915 (non Agassiz, 1831); *Cristiger* Borradaile, 1915 (non Gistl, 1848); *Laomenes* Clark, 1919.

Type: *Periclimenes insignis* Costa

aesopius (Bate, 1863). Synonyms: *Anchistia aesopia* Bate, 1863; *Urocaris aesopius* Borradaile, 1917a. Distribution: Ceylon, Moluccas, Lesser Sunda Islands, S. Australia. Vid. p. 34.

alcocki Kemp, 1922. Distribution: Laccadive Sea, Japan. Depth 300-730 m.

amethysteus (Risso, 1826). Synonyms: *Alpheus amethystea* Risso, 1826; *Pelias amethysteus* Roux, 1831; *Periclimenes insignis* Costa, 1844a; *Dennisia sagittifera* Norman, 1861; *Anchistia amethystea* Heller, 1863; *Periclimenes* (*Falciger*) *amethysteus* Borradaile, 1917a. Distribution: Eastern Atlantic Ocean from the Channel Islands to the Western Mediterranean. Vid. p. 32.

ceratophthalmus Borradaile, 1915. Synonyms: *Periclimenes* (*Corniger*) *ceratophthalmus* Borradaille, 1915; *Periclimenes* (*Laomenes*) *ceratophthalmus* Clark, 1921; *Periclimenes* (*Ancylocaris*) *ceratophthalmus* Kemp, 1922. Distribution: Maldive Archipelago, Moluccas. Vid. p. 56.

commensalis Borradaile, 1915. Synonym: *Periclimenes* (*Cristiger*) *commensalis* Borradaile, 1915. Distribution: Lesser Sunda Islands, Torres Strait. Vid. p. 53.

curvirostris Kubo, 1940. Distribution: Japan. Depth: 300 m.

gracilis (Dana, 1852). Synonyms: *Anchistia gracilis* Dana, 1852; *Periclimenes* (*Cristiger*) *gracilis* Borradaile, 1917a. Distribution: Sulu Sea.

granulatus Holthuis, 1950b. Distribution: Off Algeria. Depth about 100 m.

harringtoni Lebour, 1949. Distribution: Bermuda, Tortugas (Florida).

hertwigi Balss, 1913. Synonym: *Periclimenes* (*Ancylocaris*) *gracilirostris* Kubo, 1940. Distribution: Japan, Kai Islands. Depth 120-300 m. Vid. p. 43.

impar Kemp, 1922. Distribution: Ceylon, Andaman Islands, Lesser Sunda Islands, Aru Islands. Perhaps identical with *P. incertus*. Vid. p. 38.

incertus Borradaile, 1915. Synonym: *Periclimenes* (*Cristiger*) *incertus* Borradaile, 1915. Distribution: Maldive Archipelago. Perhaps *P. impar* is a synonym.

indicus (Kemp, 1915). Synonym: *Urocaris indicus* Kemp, 1915. Distribution: Eastcoast of India, Nicobar Islands, Lesser Sunda Islands. Vid. p. 39.

infraspinis (Rathbun, 1902a). Synonym: *Urocaris infraspina* Rathbun, 1902a. Distribution: Westcoast of America from San Diego (California) to Costa Rica and the Galapagos Islands.

investigatoris Kemp, 1922. Distribution: Persian Gulf.

iridescens Lebour, 1949. Distribution: Bermuda, Venezuela.

laccadivensis (Alcock & Anderson, 1894). Synonyms: *Palaemonella laccadivensis* Alcock & Anderson, 1894; *Palaemon* (*Brachycarpus*) *laccadivensis* Alcock, 1901. Distribution: Laccadive Sea: depth 770-1265 m. Hawaiian Islands: depth 700-900 m. [1]).

lanipes Kemp, 1922. Distribution: Mergui Archipelago.

latipollex Kemp, 1922. Distribution: Mergui Archipelago, Kai Islands. Depth 112-304 m. Vid. p. 47.

longicaudatus (Stimpson, 1860). Synonym: *Urocaris longicaudatus* Stimpson, 1860. Distribution: Eastcoast of America from North Carolina to Brazil, West Indies.

noverca Kemp, 1922. Distribution: New Caledonia.

obscurus Kemp, 1922. Distribution: Madras.

pandionis Holthuis, 1951a. Distribution: Off Key West, Fla. Depth 180 m.

parvus Borradaile, 1898a. Synonym: *Periclimenes* (*Cristiger*) *parvus* Borradaile, 1917a. Distribution: Makassar Strait, New Britain. Vid. p. 40.

pectiniferus nov. spec. Distribution: Makassar Strait. Vid. p. 48.

perryae Chace, 1942. Distribution: W. Florida.

rex Kemp, 1922. Distribution: Andaman Islands.

scriptus (Risso, 1822). Synonyms: *Alpheus scriptus* Risso, 1822; *Pelias Scriptus* Roux, 1831; *Anchistia scripta* Heller, 1863; ? *Periclimenes elegans* Gourret, 1884 (non Paulson, 1875); *Urocaris de Mani* Balss, 1916; *Periclimenes* (*Cristiger*) *scriptus* Borradaile, 1917a. Distribution: Eastern Atlantic Ocean from the Mediterranean to the French Congo.

signatus Kemp, 1925. Distribution: Andaman Islands.

soror Nobili, 1904. Synonyms: *Periclimenes* (*Cristiger*) *soror* Borradaile, 1917a; *Periclimenes bicolor* Edmondson, 1935. Distribution: Jibuti, Lesser Sunda Islands, Hawaiian Archipelago. Perhaps *P.* (*Harpilius*) *frater* Borradaile is identical with this species. Vid. p. 51.

tenellus (Smith, 1882). Synonyms: *Anchistia tenella* Smith, 1882; *Periclimenes* (*Cristiger*) *tenellus* Borradaile, 1917; *Periclimenes* (*Ancylocaris*) *tenellus* Kemp, 1922. Distribution: Off Massachusetts and off South Carolina, U.S.A. Depth 260 to 410 m.

yucatanicus (Ives, 1891). Synonym: *Palaemonella yucatanica* Ives, 1891. Distribution: S. Florida, and the Atlantic coast of Mexico and Colombia.

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1) Examination of the specimens brought by Rathbun (1906) to "*Palaemonella*" *laccadivensis* showed that the specimen from Kauai Island indeed belongs to *Periclimenes laccadivensis*, the other specimen from Laysan, however, probably belongs to a new species of *Periclimenes*, near *P. diversipes*.

Subgenus **Harpilius** Dana, 1852

Synonyms: *Ancylocaris* Schenkel, 1902; *Falciger* Borradaile, 1915 (non Say, 1824); *Ancyclocaris* Borradaile, 1917a (err. pro *Ancylocaris*); *Cuapetes* Clark, 1919.

Type: *Harpilius lutescens* Dana

affinis Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *affinis* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *affinis* Kemp, 1922. Distribution: Chagos Archipelago.

agag Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *agag* Kemp, 1922. Distribution: Andaman Islands.

akiensis Kubo, 1936. Synonym: *Periclimenes* (*Ancylocaris*) *akiensis* Kubo, 1936. Distribution: Japan.

amamiensis Kubo, 1940. Synonym: *Periclimenes* (*Ancylocaris*) *amamiensis* Kubo, 1940. Distribution: Riukiu Islands.

amboinensis (De Man, 1888). Synonyms: *Anchistia amboinensis* De Man, 1888; *Periclimenes* (*Corniger*) *amboinensis* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *amboinensis* Kemp, 1922. Distribution: Amboina. Vid. p. 60.

americanus (Kingsley, 1878). Synonyms: *Anchistia americana* Kingsley, 1878; *Palaemonella tenuipes* Heilprin, 1888 (non Dana, 1852); *Periclimenes* (*Falciger*) *americanus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *americanus* Kemp, 1922; *Periclimenes* (*Ancylocaris*) *bermudensis* Lebour, 1949; *Periclimenes* (*Ancylocaris*) *rhizophorae* Lebour, 1949a. Distribution: American Eastcoast from Bermuda and Florida to the West Indies. Vid. p. 57.

amymone De Man, 1902. Synonym: *Periclimenes* (*Falciger*) *amymone* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *amymone* Kemp, 1922. Distribution: Nicobar Islands, Malay Archipelago, Samoa. Vid. p. 82.

andamanensis Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *andamanensis* Kemp, 1922. Distribution: Andaman Islands, Sunda Strait. Vid. p. 79.

batei Holthuis, 1950a. Synonyms: *Brachycarpus audouini* Bate, 1888; *Palaemon audouini* Ortmann, 1891 (non Heller, 1862); *Periclimenes* (*Ancylocaris*) *audouini* Kemp, 1925. Distribution: Off New Zealand. Vid. p. 73.

brevicarpalis (Schenkel, 1902). Synonyms: *Palaemonella amboinensis* Zehntner, 1894 (non *Periclimenes amboinensis* (De Man, 1888)); *Ancylocaris brevicarpalis* Schenkel, 1902; *Palaemonella aberrans* Nobili, 1904; *Harpilius latirostris* Lenz, 1905; *Periclimenes potina* Nobili, 1905; *Ancylocaris aberrans* Nobili, 1906; *Periclimenes hermitensis* Rathbun, 1914; *Ancyclocaris brevicarpalis* Borradaile, 1917a; *Ancyclocaris aberrans* Borradaile, 1917a; *Ancyclocaris latirostris* Borradaile, 1917a; *Ancyclocaris hermitensis* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *potina* Kemp, 1922; *Periclimenes* (*Ancylocaris*) *brevicarpalis* Kemp, 1922. Distribution: Throughout the Indo-Westpacific region, from the Red Sea and S.E. Africa to the Riukiu Islands, the Malay Archipelago and Oceania. Vid. p. 69.

brocketti Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *brocketti* Borradaile, 1915; *Periclimenes* (*Cuapetes*) *brocketti* Clark, 1921; *Periclimenes* (*Ancylocaris*) *brocketti* Kemp, 1922. Distribution: Maldive Archipelago.

brocki (De Man, 1888). Synonyms: *Anchistia Brockii* De Man, 1888; *Periclimenes* (*Cristiger*) *brocki* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *brocki* Kemp, 1922. Distribution: Maldive Archipelago, Moluccas. Vid. p. 88.

calmani Tattersall, 1921. Synonym: *Periclimenes* (*Ancylocaris*) *calmani* Kemp, 1922. Distribution: Suez Canal, Red Sea, ? Flores Sea. Vid. p. 64.

compressus Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *compressus* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *compressus* Kemp, 1922. Distribution: Saya de Malha Bank (Western Indian Ocean).

cornutus Borradaile, 1915. Synonyms: *Periclimenes* (*Corniger*) *cornutus* Borradaile, 1915; *Periclimenes* (*Laomenes*) *cornutus* Clark, 1921; *Periclimenes* (*Ancylocaris*) *cornutus* Kemp, 1922. Distribution: Maldive Archipelago.

demani Kemp, 1915. Synonym: *Periclimenes* (*Ancylocaris*) *demani* Kemp, 1922. Distribution: East-coast of India, Mergui Archipelago. Vid. p. 83.

denticulatus Nobili, 1906a. Synonyms: *Periclimenes Petitthouarsi* var. *denticulata* Nobili, 1906a. *Periclimenes* (*Falciger*) *denticulatus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *denticulatus* Kemp, 1922. Distribution: Gatavake (Oceania).

digitalis Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *digitalis* Kemp, 1922. Distribution: Andaman Islands, Flores Sea. Vid. p. 87.

diversipes Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *diversipes* Kemp, 1922. Distribution: Red Sea, Bay of Bengal.

edwardsi (Paulson, 1875). Synonyms: *Anchistia edwardsi* Paulson, 1875; *Periclimenes* (*Falciger*) *edwardsi* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *edwardsi* Kemp, 1922. Distribution: Red Sea.

elegans (Paulson, 1875). Synonyms: *Anchistia elegans* Paulson, 1875; *Periclimenes* (*Falciger*) *dubius* Borradaile, 1917a; *Periclimenes* (*Falciger*) *elegans* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *elegans* Kemp, 1922; *Periclimenes* (*Ancylocaris*) *elegans* var. *dubius* Kemp, 1922. Distribution: Red Sea, Persian Gulf, Minikoi, Bay of Bengal, Malay Archipelago, Queensland. Vid. p. 81.

ensifrons (Dana, 1852). Synonyms: *Anchistia ensifrons* Dana, 1852; *Periclimenes* (*Falciger*) *ensifrons* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *ensifrons* Kemp, 1922. Distribution: N. Borneo, Tuamotu Islands. (Vid. also p. 67).

frater Borradaile, 1915. Synonyms: *Periclimenes* (*Cristiger*) *frater* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *frater* Kemp, 1922. Distribution: Seychelles. Probably identical with *Periclimenes* (*P.*) *soror* Nobili. Vid. p. 52.

galene nov. spec. Distribution: Malay Archipelago. Vid. p. 62.

grandis (Stimpson, 1860). Synonyms: *Anchistia grandis* Stimpson, 1860; *Periclimenes* (*Falciger*) *grandis* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *grandis* Kemp, 1922. Distribution: Indo-Westpacific region from the Red Sea and Zanzibar to Japan and the Malay Archipelago. Vid. p. 79.

inornatus Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *inornatus* Kemp, 1922. Distribution: Andaman Islands.

jugalis nov. spec. Distribution: Aru Islands. Vid. p. 67.

korni (Lo Bianco, 1903). Synonyms: *Anchistia Kornii* Lo Bianco, 1903; *Urocaris korni* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *korni* Kemp, 1922. Distribution: ? Bay of Biscay, off Capri. Depth (740-)1080 m.

leptopus Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *leptopus* Kemp, 1922. Distribution: Andaman Islands. Vid. p. 64.

longimanus (Dana, 1852). Synonyms: *Anchistia longimana* Dana, 1852; *Periclimenes* (*Falciger*) *longimanus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *longimanus* Kemp, 1922. Distribution: Unknown.

longipes (Stimpson, 1860). Synonyms: *Urocaris longipes* Stimpson, 1860; *Periclimenes* (*Ancylocaris*) *longipes* Kemp, 1922. Distribution: Japan.

lucasi Chace, 1937. Synonym: *Periclimenes* (*Ancylocaris*) *lucasi* Chace, 1937. Distribution: Lower California to Panama.

lutescens (Dana, 1852). Synonyms: *Harpilius lutescens* Dana, 1852; *Harpilius consobrinus* De Man, 1902. Distribution: Red Sea, Malay Archipelago, Tongatabu. Vid. p. 88.

magnus Holthuis, 1951a. Distribution: Gulf of Mexico (off Texas).

nilandensis Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *nilandensis* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *nilandensis* Kemp, 1922. Distribution: Maldive Archipelago, Malay Archipelago. Vid. p. 58.

pauper Holthuis, 1951a. Distribution: Off Venezuela.

petitthouarsi (Audouin, 1825). Synonyms: *Palaemon Petitthouarsii* Audouin, 1825; *Anchistia inaequimana* Heller, 1861; *Anchistia Petitthouarsii* Paulson, 1875; *Periclimenes* (*Falciger*) *petitthouarsi* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *petitthouarsi* Kemp, 1922. Distribution: Red Sea, Persian Gulf. Vid. p. 78.

platalea Holthuis, 1951. Distribution: Cape Verde Islands, French Guinea.

platycheles nov. spec. Distribution: Moluccas, W. New Guinea. Vid. p. 85.

proximus Kemp, 1922. Synonym: *Periclimenes* (*Ancylocaris*) *proximus* Kemp, 1922. Distribution: Andaman Islands, Papua [1]).

psamathe (De Man, 1902). Synonyms: *Urocaris psamathe* De Man, 1902; *Periclimenes* (*Ancylocaris*) *psamathe* Kemp, 1922. Distribution: Maldive Archipelago, Chagos Archipelago, Moluccas. Vid. p. 61.

rathbunae Schmitt, 1924a. Distribution: Bonaire, Curaçao.

rotumanus Borradaile, 1898a. Synonyms: *Periclimenes* (*Falciger*) *rotumanus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *rotumanus* Kemp, 1922. Distribution: Rotuma, Samoa [1]).

seychellensis Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *seychellensis* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *seychellensis* Kemp, 1922. Distribution: Red Sea, Seychelles, Bay of Bengal, Malay Archipelago, Papua. Vid. p. 66.

sibogae nov. spec. Distribution: Moluccas. Vid. p. 73.

spiniferus De Man, 1902. Synonyms: *Periclimenes petitthouarsi* var. *spinifera* De Man, 1902; *Periclimenes* (*Falciger*) *spiniferus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *spiniferus* Kemp, 1922. Distribution: Indo-Westpacific region from the Seychelles and Madagascar to the Malay Archipelago, Queensland and Oceania. Vid. p. 76.

suvadivensis Borradaile, 1915. Synonyms: *Periclimenes* (*Falciger*) *suvadivensis* Borradaile, 1915; *Periclimenes* (*Ancylocaris*) *suvadivensis* Kemp, 1922. Distribution: Maldive Archipelago.

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1) The specimen from Beagle Bay, S. E. Papua, identified by Nobili (1899) as *Periclimenes rotumanus,* has been examined by me in the Museo Civico di Storia Naturale in Genoa, Italy. It proved to belong to *Periclimenes proximus.*

tenuipes Borradaile, 1898a. Synonyms: *Periclimenes borradailei* Rathbun, 1904; *Periclimenes* (*Falciger*) *kolumadulensis* Borradaile, 1915; *Periclimenes* (*Falciger*) *borradailei* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *tenuipes* Kemp, 1922. Distribution: Seychelles, Maldive Archipelago, Bay of Bengal, Malay Archipelago, New Britain. Vid. p. 84.

veleronis Holthuis, 1951a. Distribution: Ecuador.

vitiensis Borradaile, 1989a. Synonyms: *Periclimenes* (*Falciger*) *vitiensis* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *vitiensis* Kemp, 1922. Distribution: Fiji. (Vid. also p. 26).

Paranchistus nov. gen.

Type: *Anchistus biunguiculatus* Borradaile

biunguiculatus (Borradaile, 1898a). Synonym: *Anchistus biunguiculatus* Borradaile, 1898a; *Tridacnocaris biunguiculata* Nobili, 1899; *Anchistus oshimai* Kubo, 1949a. Distribution: Moluccas, New Guinea, Palau Islands. Vid. p. 93.

nobilii nov. spec. Distribution: Persian Gulf. Vid. p. 100.

ornatus nov. spec. Distribution: Mozambique. Vid. p. 97.

Anchistus Borradaile, 1898a

Synonyms: *Tridacnocaris* Nobili, 1899; *Marygrande* Pesta, 1911; *Ensiger* Borradaile, 1915.

Type: *Harpilius Miersi* De Man

custos (Forsskål, 1775). Synonyms: *Cancer custos* Forsskål, 1775; *Palaemon custos* Latreille, 1802; *Pontonia inflata* H. Milne Edwards, 1840; *Anchistia aurantiaca* Dana, 1852; *Harpilius inermis* Miers, 1884; *Pontonia pinnae* Ortmann, 1894 (non Lockington, 1878); *Anchistus inermis* Borradaile, 1898a; *Periclimenes* (*Ensiger*) *aurantiacus* Borradaile, 1917a. Distribution: Indo-Westpacific region from the Red Sea and the East African coast to the Malay Archipelago, S. Australia and Oceania. Vid. p. 105.

demani Kemp, 1922. Distribution: Andaman Islands.

gravieri Kemp, 1922. Distribution: Santa Cruz Islands (Oceania).

miersi (De Man, 1888a). Synonym: *Harpilius Miersi* De Man, 1888a. Distribution: From the Red Sea and the Seychelles to Indo-China and Oceania. Vid. p. 110.

misakiensis Yokoya, 1936. Distribution: Japan.

pectinis Kemp, 1925. Distribution: Nicobar Islands.

Thaumastocaris Kemp, 1922

Type: *Thaumastocaris streptopus* Kemp

streptopus Kemp, 1922. Distribution: Malay Archipelago, New Caledonia. Vid. p. 111.

Periclimenaeus Borradaile, 1915

Synonym: *Hamiger* Borradaile, 1916.

Type: *Periclimenaeus robustus* Borradaile

arabicus (Calman, 1939). Synonym: *Periclimenes* (*Periclimenaeus*) *arabicus* Calman, 1939. Distribution: South Arabian coast. Vid. p. 130.

arthrodactylus nov. spec. Distribution: Bali Sea. Vid. p. 122.

ascidiarum Holthuis, 1951a. Distribution: Tortugas (Fla.) and Atlantic coast of Colombia.

atlanticus (Rathbun, 1902). Synonyms: *Coralliocaris atlantica* Rathbun, 1902; *Periclimenes atlantica* Schmitt, 1935. Distribution: Virgin Islands.

bermudensis (Armstrong, 1940). Synonym: *Periclimenes* (*Periclimenaeus*) *bermudensis* Armstrong, 1940. Distribution: Bermudas, Bahamas, Florida.

bouvieri (Nobili, 1904). Synonym: *Typton Bouvieri* Nobili, 1904. Distribution: Red Sea. Vid. p. 131.

caraibicus Holthuis, 1951a. Distribution: Tobago (British West Indies).

fimbriatus Borradaile, 1915. Synonym: *Periclimenes* (*Periclimenaeus*) *fimbriatus* Kemp, 1922. Distribution: Maldive Archipelago. Depth 70 and 90 m. Vid. p. 131.

gorgonidarum (Balss, 1913). Synonym: *Periclimenes gorgonidarum* Balss, 1913. Distribution: Japan. Vid. p. 129.

hancocki Holthuis, 1951a. Distribution: Westcoast of Panama.

maxillulidens (Schmitt, 1936). Synonym: *Periclimenes maxillulidens* Schmitt, 1936. Distribution: Florida, West Indies.

minutus nov. spec. Distribution: Moluccas. Vid. p. 134.

natalensis (Stebbing, 1915). Synonyms: *Palaemonetes natalensis* Stebbing, 1915; *Periclimenes natalensis* Kemp, 1925. Distribution: Natal coast. Depth 800 m. Vid. p. 130.

novae-zealandiae (Borradaile, 1916). Synonyms: *Periclimenes* (*Hamiger*) *novae-zealandiae* Borradaile, 1916; *Periclimenes* (*Periclimenaeus*) *novae-zealandiae* Kemp, 1922. Distribution: New Zealand. Depth 128 m. Vid. p. 130.

pacificus Holthuis, 1951a. Distribution: Westcoast of Panama and Colombia, Galapagos Islands.

pearsei (Schmitt, 1932). Synonym: *Coralliocaris pearsei* Schmitt, 1932. Distribution: Tortugas (Fla.).

perlatus (Boone, 1930). Synonym: *Corallocaris perlatus* Boone, 1930. Distribution: Tortugas (Fla), Haiti, Eastcoast of Panama.

rhodope (Nobili, 1904). Synonym: *Coralliocaris* (*Onycocaris*) *rhodope* Nobili, 1904. Distribution: Red Sea, Persian Gulf, Moluccas. Vid. p. 125.

robustus Borradaile, 1915. Synonym: *Periclimenes* (*Periclimenaeus*) *robustus* Kemp, 1922. Distribution: Amirante Islands. Vid. p. 131.

schmitti Holthuis, 1951a. Distribution: Tortugas (Fla.).

spinosus Holthuis, 1951a. Distribution: Pacific coast of Costa Rica.

spongicola nov. spec. Distribution: Java Sea. Vid. p. 137.

tridentatus (Miers, 1884). Synonyms: *Coralliocaris tridentata* Miers, 1884; *Coralliocaris hecate* Nobili, 1904; *Coralliocaris quadridentata* Rathbun, 1906; *Coralliocaris rathbuni* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *crassipes* Calman, 1939. Distribution: Red Sea, S. Arabian coast, Malay Archipelago, N. Australia, Oceania. Vid. p. 140.

truncatus (Rathbun, 1906). Synonym: *Coralliocaris truncata* Rathbun, 1906. Distribution: Malay Archipelago, Hawaiian Archipelago. Depth 41-90 m. Vid. p. 117.

wilsoni (Hay, 1917). Synonym: *Coralliocaris wilsoni* Hay, 1917. Distribution: North Carolina, Tortugas (Fla.).

Onycocaris Nobili, 1904

Type: *Coralliocaris* (*Onycocaris*) *aualitica* Nobili

aualitica (Nobili, 1904). Synonym: *Coralliocaris* (*Onycocaris*) *aualitica* Nobili, 1904. Distribution: Red Sea. Vid. p. 147.

quadratophthalma (Balss, 1921). Synonym: *Pontonia quadratophthalma* Balss, 1921. Distribution: N.W. Australia, Oceania. Vid. p. 150.
stenolepis nov. spec. Distribution: Sulu Archipelago. Vid. p. 148.

Philarius nov. gen.

Type: *Harpilius gerlachei* Nobili
gerlachei (Nobili, 1905). Synonym: *Harpilius gerlachei* Nobili, 1905. Distribution: Red Sea, South-coast of Arabia, Persian Gulf, Gulf of Manaar, Malay Archipelago, Samoa. Vid. p. 152.
imperialis (Kubo, 1940a). Synonym: *Harpilius imperialis* Kubo, 1940a. Distribution: Bonin Islands.

Pontoniopsis Borradaile, 1915

Type: *Pontoniopsis comanthi* Borradaile
comanthi Borradaile, 1915. Distribution: Lesser Sunda Islands, Torres Strait. Vid. p. 153.

Pontonia Latreille, 1829

Synonym: *Alciope* Rafinesque, 1814.
Type: *Palaemon pinnophylax* Otto
anachoreta Kemp, 1922. Distribution: Gulf of Aden, off the Madras coast.
ascidicola Borradaile, 1898a. Distribution: S.E. Celebes, New Britain. Vid. p. 165.
brevirostris Miers, 1884. Distribution: Seychelles.
californiensis Rathbun, 1902. Distribution: Channel Islands off California.
chimaera Holthuis, 1951a. Distribution: Pearl Islands (off W. Panama).
domestica Gibbes, 1848. Synonyms: *Pontonia occidentalis* Gibbes, 1848 (nom. nud.); *Conchodytes domestica* Rathbun, 1902. Distribution: Madeira, Bahamas and Atlantic coast of the U.S.A. from S. Carolina to Louisiana.
flavomaculata Heller, 1864. Synonyms: *Alciope heterochelus* Rafinesque, 1814; *Pontonia phallusiae* Marion, 1879; *Pontonia diazona* Joliet, 1882. Distribution: Adriatic, Western Mediterranean, Westcoast of Morocco, French Guinea.
katoi Kubo, 1940. Distribution: Japan, Moluccas, Lesser Sunda Islands. Vid. p. 158.
longispina Holthuis, 1951a. Distribution: Gulf of California.
margarita Smith, in Verrill, 1869. Synonyms: *Coralliocaris Camerani* Nobili, 1901; *Conchodytes margarita* Rathbun, 1904. Distribution: Westcoast of America from Lower California to Colombia and the Galapagos Islands; Florida.
medipacifica Edmondson, 1935. Distribution: Midway Island (Pacific Ocean).
mexicana Guérin, 1856. Synonym: *Pontonia grayi* Rathbun, 1902. Distribution: Bahamas, West Indies, Atlantic coast of Mexico.
minuta Baker, 1907. Distribution: South Australia
miserabilis Holthuis, 1951a. Distribution: Porto Rico (West Indies).
okai Kemp, 1922. Distribution: Burma coast, Lesser Sunda Islands. Vid. p. 164.
pinnae Lockington, 1878. Distribution: Westcoast of America from the Gulf of California to Panama.
pinnophylax (Otto, 1821). Synonyms: *Alpheus Tyrhenus* Risso, 1816 (non *Astacus tyrrhenus* Petagna, 1792); *Palaemon pinnophylax* Otto, 1821; *Gnathophyllum tyrhenus* Desmarest, 1823; *Cal-*

lianassa tyrrhena Risso, 1826; *Alpheus pinnophylax* Otto, 1828; *Pontonia parasitica* Roux, 1831; *Pontonia custos* Guérin, 1832 (non *Cancer custos* Forsskål, 1775); *Pontonia heterochelis* Guérin, 1832. Distribution: Mediterranean from the eastcoast of Spain to Greece, Açores, Gabon, N. Angola. Vid. p. 156.

pusilla Holthuis, 1951a. Distribution: Pacific coast of Panama and Ecuador.

simplex Holthuis, 1951a. Distribution: Pacific coast of Mexico.

stylirostris nov. spec. Distribution: Moluccas. Vid. p. 169.

Platycaris nov. gen.

Type: *Platycaris latirostris* nov. spec.

latirostris nov. spec. Distribution: Flores (Lesser Sunda Islands). Vid. p. 173.

Dasycaris Kemp, 1922

Type: *Dasycaris symbiotes* Kemp

ceratops nov. spec. Distribution: Borneo Bank. Vid. p. 176.

symbiotes Kemp, 1922. Distribution: Madras coast, Mergui Archipelago.

Harpiliopsis Borradaile, 1915

Type: *Palaemon Beaupresii* Audouin

beaupresi (Audouin, 1825). Synonyms: *Palaemon Beaupresii* Audouin, 1825; *Harpilius Beaupresii* Heller, 1861; *Pontonia* (*Harpilius*) *dentata* Richters, 1880. Distribution: Indo-Westpacific region from the Red Sea and S.E. Africa to the Malay and Hawaiian Archipelagoes. Vid. p. 181.

depressus (Stimpson, 1860). Synonyms: *Harpilius depressus* Stimpson, 1860; *Periclimenes spinigerus* Borradaile, 1898a (non *Anchistia spinigera* Ortmann, 1890). Distribution: Indo-Westpacific region from the Red Sea and S.E. Africa to the Malay Archipelago and Oceania; Eastpacific region from the Gulf of California to Colombia and the Galapagos Islands. Vid. p. 182.

depressus var. *spinigerus* (Ortmann, 1890). Synonyms: *Anchistia spinigera* Ortmann, 1890; *Harpilius depressus* var. *gracilis* Kemp, 1922. Distribution: Andaman Islands, Celebes, Samoa. Vid. p. 184.

Stegopontonia Nobili, 1906a

Type: *Stegopontonia commensalis* Nobili

commensalis Nobili, 1906a. Distribution: Mauritius, Tuamotu Islands [1]).

Fennera Holthuis, 1951a

Type: *Fennera chacei* Holthuis

chacei Holthuis, 1951a. Distribution: Westcoast of America from Mexico to Colombia.

Coralliocaris Stimpson, 1860

Synonym: *Oedipus* Dana, 1852 (non Berthold, 1827).

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1) The Mauritius record of this species is given by Mortensen (1940, pp. 250, 294).

Type: *Oedipus superbus* Dana

brevirostris Borradaile, 1898a. Distribution: Ellice Islands.

graminea (Dana, 1852). Synonyms: *Oedipus gramineus* Dana, 1852; *Coralliocaris inaequalis* Ortmann, 1890. Distribution: Throughout the Indo-Westpacific region from the Red Sea and the East African Coast to China, Australia and Oceania. Vid. p. 186.

macrophthalma (H. Milne Edwards, 1837). Synonyms: *Pontonia macrophthalma* H. Milne Edwards, 1837; *Oedipus macrophthalmus* Dana, 1852. Distribution: Red Sea, Seychelles.

nudirostris (Heller, 1861).Synonyms: *Oedipus nudirostris* Heller, 1861; *Coralliocaris tahitoei* Boone, 1935. Distribution: Red Sea, Seychelles, Maldive Archipelago, Tahiti. (Vid. also p. 110).

superba (Dana, 1852). Synonyms: *Oedipus superbus* Dana, 1852; *Oedipus dentirostris* Paulson, 1875. Distribution: Red Sea, Andaman and Nicobar Islands, Bonin Islands, Malay Archipelago, ? Christmas Island, Oceania. Vid. p. 189.

venusta Kemp, 1922. Distribution: Red Sea, Ceylon, Malay Archipelago, Samoa. Vid. p. 191.

Jocaste nov. gen.

Type: *Coralliocaris lucina* Nobili

lucina (Nobili, 1901a). Synonyms: ? *Coralliocaris lamellirostris* Stimpson, 1860; ? *Coralliocaris superba* var. *japonica* Ortmann, 1890; *Coralliocaris lucina* Nobili, 1901a; *Coralliocaris japonica* Borradaile, 1917a. Distribution: Throughout the Indo-Westpacific region from the Red Sea and S.E. Africa to the Malay Archipelago and Samoa, probably northwards to Japan. Vid. p. 193.

Conchodytes Peters, 1852

Type: *Conchodytes tridacnae* Peters

biunguiculatus (Paulson, 1875). Synonym: *Pontonia biunguiculata* Paulson, 1875. Distribution: Red Sea, ? S. India, Andaman Islands, Formosa, Moluccas, Lesser Sunda Islands, ? Queensland. Vid. p. 199.

monodactylus nov. spec. Distribution: Formosa, Lesser Sunda Islands. Vid. p. 200.

nipponensis (De Haan, 1844). Synonyms: *Hymenocera nipponensis* De Haan, 1844; *Pontonia nipponensis* De Haan, 1849. Distribution: Japan.

tridacnae Peters, 1852. Synonyms: *Conchodytes meleagrinae* Peters, 1852; *Pontonia Tridacnae* Dana, 1852; *Pontonia meleagrinae* Bate, 1888. Distribution: Throughout the Indo-Westpacific region from the Red Sea and the East African coast to the Malay Archipelago, Australia and Oceania. Vid. p. 195.

Dasella Lebour, 1945

Synonym: *Dasia* Lebour, 1938 (non Gray, 1839).

Type: *Dasia herdmaniae* Lebour

herdmaniae (Lebour, 1938). Synonyms: *Dasia herdmaniae* Lebour, 1938; *Dasella herdmanniae* Lebour, 1945. Distribution: S. India.

Cavicheles nov. gen.

Type: *Cavicheles kempi* nov. spec.

kempi nov. spec. Distribution: Moluccas. Vid. p. 205.

Hamodactylus nov. gen.

Type: *Hamodactylus boschmai* nov. spec.

boschmai nov. spec. Distribution: Ternate, Aru Islands. Vid. p. 209.

Waldola Holthuis, 1951a

Type: *Waldola schmitti* Holthuis

schmitti Holthuis, 1951a. Distribution: Westcoast of America from Mexico to Colombia.

Anchistioides Paulson, 1875

Synonyms: *Palaemonopsis* Borradaile, 1899 (non Stimpson, 1874); *Amphipalaemon* Nobili, 1901.

Type: *Anchistioides compressus* Paulson

antiguensis (Schmitt, 1924b). Synonyms: *Periclimenes antiguensis* Schmitt, 1924b; *Periclimenes barbadensis* Schmitt, 1924b. Distribution: Bermuda, West Indies.

compressus Paulson, 1875. Distribution: Red Sea, Andaman Islands.

seurati (Nobili, 1906a). Synonym: *Amphipalaemon Seurati* Nobili, 1906a. Distribution: Tuamotu Islands.

willeyi (Borradaile, 1899). Synonyms: *Palaemonopsis willeyi* Borradaile, 1899; *Amphipalaemon willeyi* Nobili, 1901; *Amphipalaemon gardineri* Borradaile, 1915; *Amphipalaemon cooperi* Borradaile, 1915; *Amphipalaemon australiensis* Balss, 1921; *Anchistioides gardineri* Gordon, 1935; *Anchistioides cooperi* Gordon, 1935; *Anchistioides australiensis* Gordon, 1935. Distribution: Maldive Archipelago, Malay Archipelago, N.W. Australia, New Britain. Vid. p. 214.

Pontonides Borradaile, 1917a

Type: *Pontonia maldivensis* Borradaile

maldivensis (Borradaile, 1915). Synonym: *Pontonia maldivensis* Borradaile, 1915. Distribution: Maldive Archipelago.

unciger Calman, 1939. Distribution: Red Sea, Lesser Sunda Islands. Vid. p. 219.

Neopontonides Holthuis, 1951a

Type: *Periclimenes beaufortensis* Borradaile

beaufortensis (Borradaile, 1920). Synonyms: *Periclimenes beaufortensis* Borradaile, 1920; *Pontonides beaufortensis* Kemp, 1922. Distribution: Eastcoast of America from North Carolina to Panama, West Indies.

dentiger Holthuis, 1951a. Distribution: Pacific coast of Ecuador.

Veleronia Holthuis, 1951a

Type: *Veleronia serratifrons* Holthuis

laevifrons Holthuis, 1951a. Distribution: Ecuador, Galapagos Islands.

serratifrons Holthuis, 1951a. Distribution: Ecuador, Galapagos Islands.

Balssia Kemp, 1922

Type: *Amphipalaemon gasti* Balss

gasti (Balss, 1921a). Synonym: *Amphipalaemon gasti* Balss, 1921a. Distribution: Western Mediterranean, French Guinea.

Coutièrea Nobili, 1901b

Type: *Coralliocaris Agassizi* Coutière

agassizi (Coutière, 1901a). Synonym: *Coralliocaris Agassizi* Coutière, 1901a. Distribution: Barbados. Depth 170 m.

Pseudocoutièrea Holthuis, 1951a

Type: *Pseudocoutièrea elegans* Holthuis

elegans Holthuis, 1951a. Distribution: Westcoast of America from S. California to Mexico and the Galapagos Islands.

Typton Costa, 1844a

Synonym: *Pontonella* Heller, 1856.

Type: *Typton spongicola* Costa

carneus Holthuis, 1951a. Distribution: Florida, Cuba.

gnathophylloides Holthuis, 1951a. Distribution: Tortugas (Fla.).

hephaestus Holthuis, 1951a. Distribution: Gulf of California.

prionurus Holthuis, 1951a. Distribution: Tortugas (Fla.).

serratus Holthuis, 1951a. Distribution: Pacific coast of Mexico, Galapagos Islands.

spongicola Costa, 1844a. Synonyms: *Pontonia pulsatrix* Nardo, 1847; *Pontonella glabra* Heller, 1856; *Typton spongiosus* Bate, 1868; ? *Pontonia Vagans* Gourret, 1888. Distribution: From the southcoast of England southwards into the Mediterranean up to the Sea of Marmara, Cape Verde Islands, French Guinea, Sierra Leone.

tortugae McClendon, 1910. Distribution: Bermuda, Florida, Gulf of California.

vulcanus Holthuis, 1951a. Distribution: Tortugas (Fla.), Atlantic coast of Colombia.

Paratypton Balss, 1914a

Type: *Paratypton siebenrocki* Balss

siebenrocki Balss, 1914a. Distribution: Red Sea, Marshall Islands, Samoa.

Species incertae:

Anchistia brachiata Stimpson, 1860. Synonyms: *Periclimenes brachiatus* Borradaile, 1898a; *Periclimenes* (*Falciger*) *brachiatus* Borradaile, 1917a. Distribution: Bonin Islands. Stimpson's description is insufficient for identification.

Anchistia Danae Stimpson, 1860. Synonyms: *Periclimenes Danae* Borradaile, 1898a; *Periclimenes* (*Falciger*) *danae* Borradaile, 1917a. Distribution: Tahiti, Funafuti. The identity of both Stimpson's and Borradaile's specimens is not certain, they even may belong to two different species.

Coralliocaris lamellirostris Stimpson, 1860. Distribution: Riukiu Islands. This speciees perhaps is identical with *Jocaste lucina* (Nobili).

Coralliocaris superba var. *japonica* Ortmann (1890). Distribution: Japan. Perhaps identical with *Jocaste lucina* (Nobili).

Harpilius spinuliferus Miers, 1884. Synonym: *Anchistus spinuliferus* Borradaile, 1898a. Distribution: Unknown. The identity of this species, which in all probability belongs to the genus *Anchistus,* cannot be made out from Miers's description.

Marygrande mirabilis Pesta, 1911. Synonym: *Anchistus mirabilis* Borradaile, 1917a. Distribution: Samoa. The specimens described by Pesta (1911) under the name *Marygrande mirabilis* in all probability belong to two different species of *Anchistus.*

Palaemonella affinis Zehntner, 1894. Distribution: Amboina. The species may belong to *Palaemonella* or to *Periclimenes,* the description is too short for identification. Vid. p. 28.

Palaemonella batei Borradaile, 1917a. Distribution: Philippine Islands. Depth 460 m. This species may belong to the genus *Vir,* but as nothing is known about the structure of the mandible, reexamination of the type is necessary to ascertain the real status of the species.

Palaemonella biunguiculata Nobili, 1904. Distribution: Jibuti, ? N.W. Australia. This may be a *Palaemonella,* but in Nobili's description the structure of the mandible is not mentioned.

Pelias Elongatus (Risso, 1826) Hope, 1851. Distribution: Nice, France. *Alpheus Elongatus* Risso, 1826, is a species incerta, which probably is identical with *Hippolyte inermis* Leach, 1815. The species reported upon by Lorenz (1863) as *Pelias elongatus* from the Adriatic may be a species of *Periclimenes.*

Pelias Margaritaceus (Risso, 1816) Hope, 1851. Distribution: Nice, France. *Palemon Margaritaceus* Risso, 1816, is a species incerta, it may be a Hippolytid prawn.

Pelias notatus Heller, 1862a. Synonyms: *Anchistia notata* Heller, 1865; *Periclimenes* (*Cristiger*) *notatus* Borradaile, 1917a. Distribution: Nicobar Islands. Perhaps identical with *Periclimenes lutescens* (Dana).

Periclimenes brevinaris Nobili, 1906. Synonyms: *Periclimenes Borradailei* Nobili, 1905; *Periclimenes* (*Cristiger*) *brevinaris* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *brevinaris* Kemp, 1922. Distribution: Persian Gulf. It is not clear whether this species possesses a hepatic spine or not. In the description this spine is mentioned, but it is absent in the figure. According to Kemp (1922) Nobili's antennal spine is the lower orbital angle, his hepatic spine in reality is the antennal.

Periclimenes elegans Gourret (1884). Distribution: Marseilles. Probably *Periclimenes scriptus* is meant by Gourret; no description is given. Vid. p. 82.

Periclimenes lifuensis Borradaile, 1898a. Synonyms: *Periclimenes* (*Falciger*) *lifuensis* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *lifuensis* Kemp, 1922. Distribution: Loyalty Islands. This species, brought by Borradaile and Kemp to the genus *Periclimenes,* is of such an aberrant type, that in my opinion it can not be retained in that genus. A careful examination of the typespecimen is needed to determine its place among the other Pontoniinae; it may belong to *Periclimenaeus.*

Periclimenes parasiticus Borradaile, 1898a. Synonym: *Periclimenes* (*Cristiger*) *parasiticus* Borradaile, 1917a. Distribution: New Britain. This species shows much resemblance to *Periclimenes soror* Nobili. It has the same size and also is associated with Asteroidea, furthermore many features in both forms are identical. Differences between the two species are:

1. Borradaile (1917a) states that the hepatic spine is wanting in *P. parasiticus,* which also is shown in his (1899) fig. 4a; in his fig. 4b, however, a spine is figured, which is placed a considerable distance from the anterior margin of the carapace; this spine may be the hepatic, as the antennal is placed much more anteriorly.
2. A second difference is the presence of only one anterolateral spine at the basal segment of the antennular peduncle of *P. parasiticus* (vid. Borradaile, 1899, fig. 4b); the presence of 2 or more anterolateral spines, however, may have been overlooked by Borradaile, just as it is done by Nobili in his original description of *P. soror.*
3. The scaphocerite figured by Borradaile for *P. parasiticus* is much more slender than that of *P. soror* figured by Gordon (1939); in his description, however, Borradaile (1899) states: "the scale of the second antenna is broad."
4. The chela of the second pereiopod is much longer in *P. soror* than in *P. parasiticus.*
5. The dactylus of the last three legs are figured more slender in *P. parasiticus,* than in *P. soror,* moreover the dactylus of *P. parasiticus* is figured simple.
Examination of the type of *P. parasiticus* is needed to make certain whether or not the above differences, which for the larger part are obtained by comparing Borradaile's figures with specimens of *P. soror* and with Gordon's description and figures of that species, and which for the larger part are not mentioned in Borradaile's description, actually exist.

The specimen from Beagle Bay, S.E. Papua reported upon by Nobili as *Periclimenes parasiticus,* has been examined by me in the Museo Civico di Storia Naturale in Genoa, Italy, and proved to be a juvenile male of *Leander tenuicornis* (Say), the rostrum of which is slightly abnormal.

Periclimenes pusillus Rathbun, 1906. Synonyms: *Periclimenes* (*Cristiger*) *pusillus* Borradaile, 1917a; *Periclimenes* (*Ancylocaris*) *pusillus* Kemp, 1922. Distribution: Hawaiian Islands. Probably a juvenile specimen of a species of *Philarius.*

Pontonia armata H. Milne Edwards, 1837. Synonym: *Anchistus* (?) *armatus* Borradaile, 1898. Distribution: New Ireland. Probably a species of *Anchistus.*

Pontonia maculata Stimpson, 1860. Distribution: Bonin Islands. Probably a species of *Anchistus.*

Pontonia unidens Kingsley, 1880. Distribution: Florida. Description insufficient to make identification of the species possible.

Species described as Pontoniinae, but not belonging in this subfamily:

Anchistia lacustris (Von Martens, 1857) Heller, 1866 = *Palaemonetes antennarius* (H. Milne Edwards, 1837) (Palaemoninae).

Anchistia migratoria (Heller, 1862) Heller, 1863 vid. *Pelias migratorius* Heller.

Coralliocaris mammillata Edmondson, 1931 = *Gnathophylloides mammillata* (Edmondson) (Gnathophyllidae).

Palaemonella gracilis Paulson, 1875 = *Palaemon elegans* Rathke, 1843 (Palaemoninae).

Palaemonella rathbunensis Borradaile, 1917a = *Brachycarpus* prob. *biunguiculatus* (Lucas, 1849) (Palaemoninae).

Pelias migratorius Heller, 1862 = *Palaemonetes antennarius* (H. Milne Edwards, 1837) (Palaemoninae).

Periclimenes lacustris (Von Martens, 1857) Giordani Soika, 1948 = *Palaemonetes antennarius* (H. Milne Edwards, 1837) (Palaemoninae).

Periclimenes migratorius (Heller, 1862) Pesta, 1912 vid. *Pelias migratorius* Heller.

Periclimenes portoricensis Schmitt, 1933 = juvenile of *Macrobrachium carcinus* (Linnaeus, 1758) (Palaemoninae).

Urocaridella borradailei Stebbing, 1923 = *Macrobrachium equidens* (Dana) (Palaemoninae). Vid. p. 2.

Urocaridella gracilis Borradaile, 1915 = *Leander urocaridella* Holthuis, 1950a (Palaemoninae) Vid. p. 2.

Vanderbiltia rosamundae Boone, 1935 = species incerta. This certainly is no Pontoniid prawn. It shows some resemblance to the Atyidae. It may be juvenile.

REPORT ON THE MATERIAL EXAMINED

Palaemonella Dana, 1852

Many species described as belonging to the present genus still are insufficiently known, as for instance *Palaemonella affinis* Zehntner, *Palaemonella batei* Borr. and *Palaemonella biunguiculata* Nobili. Others are incorrectly assigned to this genus. *Palaemonella elegans* Borr. evidently is an abnormal specimen of *P. tenuipes* as already supposed by Borradaile himself.

The oral parts of the two species of this genus at my disposal show the closest resemblance; the oral parts of *P. vestigialis* are figured here. The mandible bears a two-jointed palp of which the last joint is distinctly longer than the first. The incisor process ends in three distinct teeth, the median of which is slightly shorter than the outer two. The molar process is truncate and bears blunt knobs and teeth, no brushlike arranged spines were observed on the molar process. The maxillula has the two endites of about the same size and breadth, the inner lacinia is rather slender; the palp of the maxillula is distinctly bifid and ends in a sharp point. The maxilla has the inner lacinia deeply cleft, the palp is normal in shape and the scaphognathite is large but not very broad. The maxillipeds are quite normal in shape and all are provided with exopods. The basis and the coxa of the first maxilliped are separated by a distinct notch. In contradiction to Borradaile's (1917a) and Kemp's (1922) statements the podobranch of the second maxilliped is present in my specimens. The third maxilliped is slender, it bears a distinct arthrobranch.

The species till now known under the name *Palaemonella orientalis* has to be placed in a separate genus.

From Indonesian waters at present five species are known, two of which are represented in the collections at hand, both being recorded here for the first time from that region.

Palaemonella lata Kemp (figs. 1, 2,c, d)

Palaemonella lata Kemp, 1922, Rec. Indian Mus., vol. 24, p. 127, textfigs. 3-6.

Siboga Expedition

Station 7, near reef of Badjulmati, E. Java, 7° 55'.5 S, 114° 26' E; reef; March 11, 1899. — 2 specimens (one ovigerous female) 32 and 34 mm.

Snellius Expedition

Near Kupang, Timor; December 8, 1929. — 1 specimen 19 mm.

The rostrum in my specimens has 7 or 8 teeth above and 2 or 3 below. Of the dorsal teeth 2 are placed on the carapace, the third stands above or immediately behind the orbit. The fused portion of the two rami of the upper antennular flagellum seems to be very variable in length and in the number of segments out of which it consists. In Kemp's specimen the fused portion was

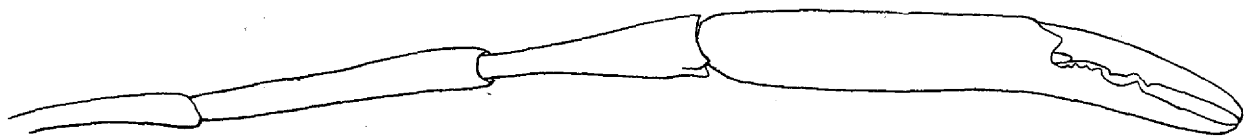

Fig. 1. *Palaemonella lata* Kemp. Second pereiopod. × 7.

formed of 5 segments, in my specimen from Kupang of 7, in those from Badjulmati of 12 and 16 segments respectively. In these last specimens the free portion of the shorter ramus, which as in the other specimens consists of 5 segments, is much shorter than half the fused portion, while in Kemp's specimen the two portions are equal in length. The variability of this character also is

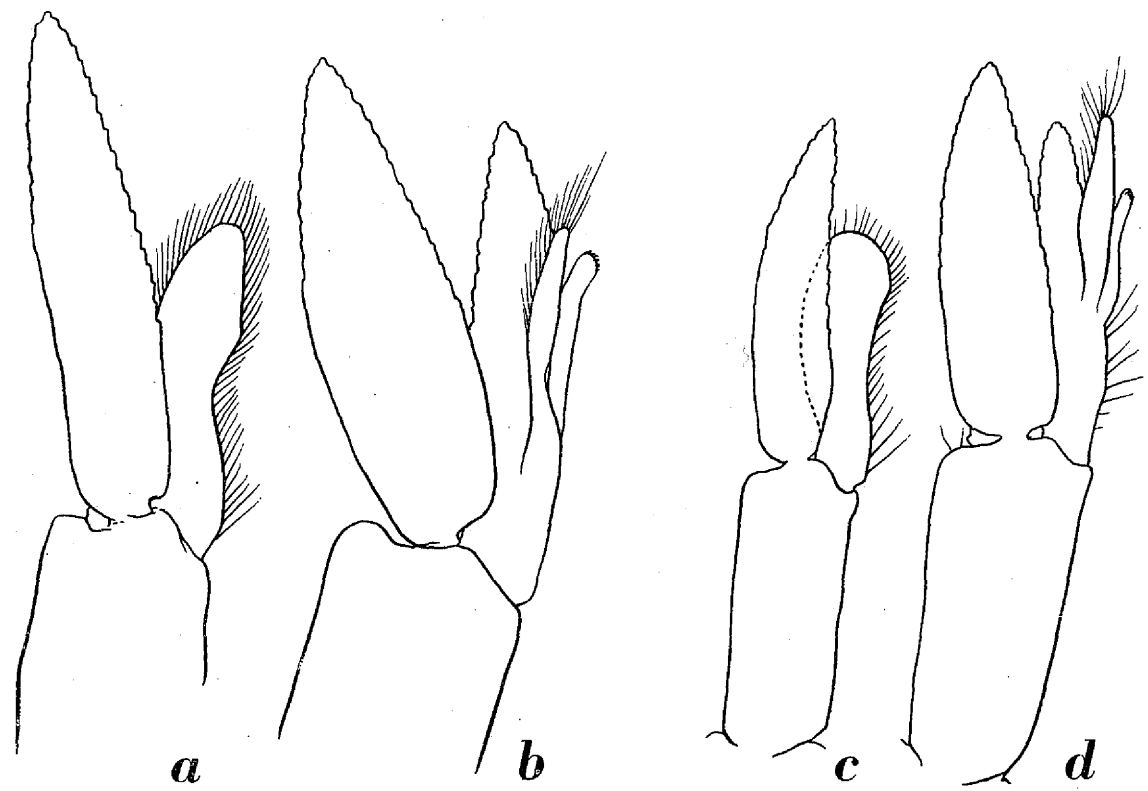

Fig. 2. *Palaemonella vestigialis* Kemp ♂. a, first pleopod; b, second pleopod. *Palaemonella lata* Kemp ♂. c, first pleopod; d, second pleopod. a-d, × 31.

indicated by the fact that in one of my specimens the shorter ramus of the left antennula differs in length from that of the right antennula. The scaphocerite much resembles the figure of Kemp, in my specimens the final tooth even fails to reach the end of the lamella. The fingers of the second pereiopod (fig. 1) are from $^2/_3$ to quite as long as the palm. The cutting edges resemble those of the chela figured by Kemp (fig. 5a, c), only behind the proximal tooth of the fixed finger 2 to 4 much smaller teeth are present, but these teeth sometimes are inconspicuous. The merus in my

specimens, like in that of Kemp, does not possess an anteroventral spine; in the Siboga specimens the anteroventral angle is more blunt than in the Snellius specimen, in which this angle is slightly produced.

The small differences between my specimens and Kemp's description undoubtedly are due to individual variation. Kemp's description has been made after a single specimen. In all important characters, as the total absence of a supraorbital spine (though a distinct postorbital ridge is present), the broad scaphocerite and the unarmed merus, my material entirely agrees with that of Kemp.

The oral parts of the present species are closely similar to those of *Palaemonella vestigialis,* which are figured on p. 26. In my specimens of *P. lata* the podobranch of the second maxilliped and the arthrobranch of the third maxilliped are better developed than in *P. vestigialis.* Kemp mentions that his specimen of the present species has the mandible provided with a palp of which the distal segment is much shorter than the proximal; this feature was thought by Kemp to be an individual abnormality. His opinion is confirmed by the fact that in my material the palp is normal in shape, having the last joint longer than the proximal.

The first and second pleopod of the male are figured here (figs. 2c, d). The first pleopod differs from that of *P. vestigialis* by having the endopod more rounded at the top; the second pleopod differs from that of *P. vestigialis* by having the appendix masculina longer than the endopod; the material at my disposal, however, is too small to ascertain the constancy of these characters.

The specimen from Kupang is provided with a Bopyrid beneath the carapace.

Vertical distribution. The species is a litoral form; Kemp's specimen was collected in a rockpool.

Horizontal distribution. The only record in literature is that of Kemp (1922) from Port Blair, Andaman Islands. The species now is recorded for the first time from the Malay Archipelago.

Palaemonella vestigialis Kemp (figs. 2a, b, 3)

Periclimenes vitiensis Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 234.
Palaemonella tenuipes Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 925.
Palaemonella vestigialis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 123, textfigs. 1, 2, pl. 3 fig. 2.
Palaemonella vestigialis Kemp, 1925, Rec. Indian Mus., vol. 27, p. 321.
Palaemonella spinulata Yokoya, 1936, Japan. Journ. Zool., vol. 7, p. 135, textfig. 4.
Palaemonella vestigialis Calman, 1939, Sci. Rep. John Murray Exped., vol. 6, p. 210.

Siboga Expedition

Station 7, near reef of Badjulmati, E. Java, 7° 55′.5 S, 114° 26′ E; reef; March 11, 1899. — 1 specimen 11 mm.

Station 49a, Sape Strait, east of Sumbawa, 8° 23′.5 S, 119° 4′.6 E; dredge; depth 70 m; bottom coral and shells; April 14, 1899. — 1 specimen 14 mm.

Station 78, Lumulumu shoal, Borneo Bank; reef; depth 34 m; June 10 and 11, 1899. — 1 specimen 23 mm.

Station 80, Borneo Bank, 2° 25′ S, 117° 43′ E; trawl, Hensen quantitative net, Hensen vertical net, electric light in vertical net; depth 50-40 m, quantitative net from 34 m to surface; bottom fine coral sand; June 13, 1899. — 1 specimen 20 mm.

Station 99, anchorage off North Ubian, Sulu Islands, 6° 7′.5 N, 120° 26′ E; dredge, townet; depth 16-23 m; Lithothamnionbottom; June 28-30, 1899. — 1 ovigerous female 16 mm.

Station 129, anchorage off Kawio and Kamboling Islands, Kawio Group, N.E. of Celebes; reef; depth 23-31 m; July 22 and 23, 1899. — 1 ovigerous female 17 mm.
Station 164, between Misool and New Guinea; 1° 42'.5 S, 130° 47'.5 E; dredge; depth 32 m; bottom sand, small stones and shells; August 20, 1899. — 2 specimens 12 and 18 mm.
Station 204, between the islands of Wowoni and Butung, northern entrance of Butung Strait, 4° 20' S, 122° 58' E; dredge and townet; depth from 75-94 m; bottom sand with dead shells; September 20, 1899. — 2 specimens 16 and 18 mm.
Station 273, anchorage off Djedan Island, eastcoast of Aru Islands; pearlbanks; depth 13 m; bottom sand and shells; December 23-26, 1899. — 4 specimens (one ovigerous female) 13-34 mm.
Station 299, Bokai or Cyrus Bay, southcoast of Rotti, 10° 52'.4 S, 123° 1'.1 E; depth up to 36 m; bottom mud, coral and Lithothamnion; January 27-29, 1900. — 1 specimen 10 mm.
Hainsisi, Semau Island (Station 60, April 27 and 28, 1899 or Station 303, February 2-5, 1900); depth 36 m. — 1 ovigerous female 12 mm.

Snellius Expedition

Off Bongao, Tawitawi, Sulu Islands; dredge 27 m; September 9, 1929. — 1 specimen 19 mm.
Kera near Timor; November 11-13, 1929. — 2 ovigerous females 15 and 17 mm.

Museum Amsterdam

Banda; leg. E. van der Velde. — 1 specimen 17 mm.

The specimens at my disposal agree well with Kemp's description and figures. Some characters, however, show a variability not mentioned in Kemp's description. Firstly the strength of the supraorbital spine: this spine in most specimens is vestigial, being of the same shape and size as figured by Kemp (1922, pl. 3 fig. 2); in some specimens, however, the spine is entirely wanting, though the postorbital ridge is distinct; in other specimens on the contrary a distinct, though rather small supraorbital spine is developed. Furthermore the fused portion of the two rami of the upper antennular flagellum according to Kemp consists of 8 to 10 joints. In my material that number varies between 8 and 18. This character like in *Palaemonella lata* thus is very variable and therefore is not to be used for specific distinction. The fixed finger of the second pereiopod often has the cutting edge provided with some small denticles behind the two large teeth. The two lobes in the inner and upper part of the anterior margin of the carpus may vary in sharpness, the upper lobe even may assume the shape of a distinct spine. The situation of the anteroventral spine of the merus of the second pereiopod is not entirely constant, in some specimens it is placed closer to the anterior margin than in others. The relation between the length of propodus and dactylus of the last three pereiopods in my material ranges between 3 and slightly more than 5.

Palaemonella spinulata Yokoya (1936) has the supraorbital spines distinct and the upper lobe of the anterior margin of carpus is developed into a rather strong spine. In all other characters I can find no difference with Kemp's description of *Palaemonella vestigialis*. As the two above mentioned differences fall within the range of variability of Kemp's species, *Palaemonella spinulata* can not be considered a valid species, but only as an extreme form of *Palaemonella vestigialis*, with which species it therefore must be synonymized.

Kemp (1922) already doubted the fact that *Palaemonella vestigialis* and *Palaemonella pottsi* (Borr.) should be two different species. The only differences Kemp could find probably all fall within the range of variation of *P. vestigialis*. For the same reasons as Kemp (the absence of

the second pereiopod in the male type specimen of *P. pottsi,* which perhaps may show some differences and the striking difference in the colourpattern and habitat of the two species) I do not synonymize them. It is necessary that specimens with the typical *pottsi* and *vestigialis* colourpattern be carefully compared before any conclusion on the identity of the species can be made.

The oral parts are shown in figs. 3a-e.

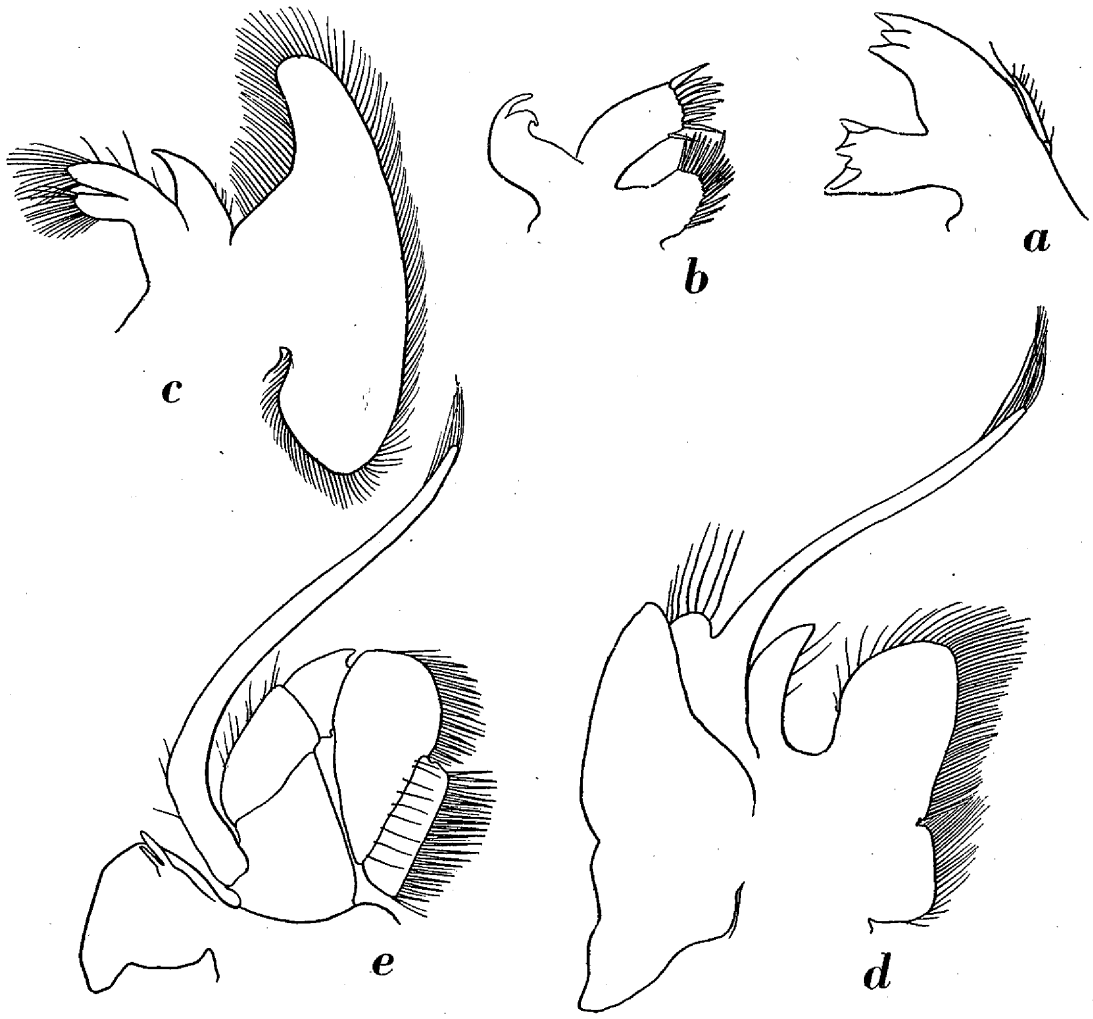

Fig. 3. *Palaemonella vestigialis* Kemp. a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped. a-e, × 28.

The differences between the shape of the first two pairs of pleopods of the male in the present species (figs. 2a, b) and those of the previous species have already been pointed out (p. 24).

The specimen from Beagle Bay, Papua, identified by Nobili (1899) as *Periclimenes vitiensis* still is present in the collection of the Museo Civico di Storia Naturale in Genoa, Italy, where I examined it. It proved actually to be a specimen of *Palaemonella vestigialis.*

In the U.S. National Museum, Washington D.C., I examined the specimen from the south-coast of Molokai brought by Rathbun (1906) to *Palaemonella tenuipes.* This specimen proved to belong to the present species. The specimen said by Rathbun to resemble *Palaemonella tridentata,* is a specimen of *Palaemonella* of which, however, the specific identity cannot be made out because of its imperfectness.

Vertical distribution. The species is a litoral form. The greatest depth from which it is recorded is 70 m (Siboga).

Horizontal distribution. Records in literature are: Tor and Ain Musa, Gulf of Suez (K e m p, 1922), Southern part of the Red Sea, 13° 31'.0 N, 42° 31'.0 E (C a l m a n, 1939), Cheval Paar, Ceylon (K e m p, 1922), Port Blair, Andaman Islands (K e m p, 1922), Nancowry, Nicobar Islands (K e m p, 1925), Cabusa Island, Mergui Archipelago (K e m p, 1922), Misaki, Japan (Y o k o y a, 1936), Beagle Bay, Papua (N o b i l i, 1899), South coast of Molokai, Hawaiian Archipelago (R a t h b u n, 1906). The materials of the Siboga and Snellius Expeditions show that the species is quite common throughout the Malay Archipelago.

The following three species, not present in the collections studied, are known from Indonesia:

Palaemonella tenuipes Dana

Palaemonella tenuipes Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 25.
Palaemonella tenuipes Dana, 1852a, U.S. Explor. Exped., vol. 13, p. 582.
Palaemonella tenuipes Weitenweber, 1854, Lotos Praha, vol. 4, p. 60.
Palaemonella tenuipes Dana, 1855, U.S. Explor. Exped., vol. 13 atlas, p. 12, pl. 38 fig. 3.
? *Palaemonella tenuipes* Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 40.
non *Palaemonella tenuipes* Heilprin, 1888, Proc. Acad. nat. Sci. Philad., 1888, p. 322.
? *Palaemonella tenuipes* De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 551, pl. 22a fig. 4.
non *Palaemonella tenuipes* Heilprin, 1889, The Bermuda Islands, p. 151.
? *Palaemonella tenuipes* Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 527.
? *Palaemonella tenuipes* Zehntner, 1894, Rev. Suisse Zool., vol. 2, p. 208.
Palaemonella tridentata Borradaile, 1898, Proc. zool. Soc. Lond., 1898, p. 1007, pl. 64 fig. 8.
Palaemonella tridentata Anonymus, 1899, Mem. Aust. Mus., vol. 3, p. 518.
non *Palaemonella tridentata* Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
non *Palaemonella tenuipes* Rankin, 1900, Ann. New York Acad. Sci., vol. 12, p. 538.
Palaemonella tenuipes Nobili, 1901a, Annu. Mus. zool. Univ. Napoli, vol. 1 pt. 3, p. 6.
Palaemonella tenuipes var. Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 70.
non *Palaemonella tenuipes* Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 925.
Palaemonella tenuipes Bedot, 1909, Rev. Suisse Zool., vol. 17, p. 166.
Palaemonella tenuipes Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91, suppl., p. 31.
Palaemonella elegans Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 210.
Palaemonella tenuipes Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 358.
Palaemonella elegans Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 359, pl. 53 fig. 4.
Palaemonella tridentata Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 323, 358.
? *Palaemonella tenuipes* Balss, 1921, K. Svenska Vetensk. Akad. Handl., vol. 61 pt. 10, p. 14.
Palaemonella tenuipes Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 383.
? *Palaemonella tennipes* Urita, 1921, Zool. Mag. Tokyo, vol. 33, p. 217.
Palaemonella tenuipes Kemp, 1922, Rec. Indian Mus., vol. 24, p. 129, textfigs. 7b, 8.
Palaemonella tenuipes Verrill, 1922, Trans. Connect. Acad. Arts. Sci., vol. 26, pl. 43 fig. 2 (not p. 149).
Palaemonella tenuipes Edmondson, 1923, Bull. Bishop Mus. Honolulu, n. 5, p. 34.
Palaemonella tenuipes Edmondson, 1925, Bull. Bishop Mus. Honolulu, n. 27, p. 8.
? *Palaemonella tenuipes* Gurney, 1936, Proc. zool. Soc. Lond., 1936, p. 619.
Palaemonella tenuipes Edmondson, 1946, Spec. Publ. Bishop Mus. Honolulu, vol. 22, p. 252, fig. 152a.

The present species is closely related to *Palaemonella vestigialis*. The most distinct difference

between the two forms lies in the presence of a well developed subterminal spine at the upper inner aspect of the carpus of the second pereiopod in *P. tenuipes*. This feature is not mentioned in the old descriptions, Kemp (1922) being the first to point at the importance of this character. As *Palaemonella vestigialis* is much more common than the present species it is very probable that most of the specimens recorded in literature as *Palaemonella tenuipes* from the Indo-Westpacific region in reality belong to *P. vestigialis*. The *P. tenuipes* from the West Indies belongs to *Periclimenes americanus* (Kingsley). The specimen from Beagle Bay reported upon by Nobili, 1899, as *Palaemonella tridentata,* on examination proved to belong to *Periclimenes spiniferus* (De Man). Nobili's material is preserved in the Museo Civico di Storia Naturale in Genoa, Italy. As already pointed out (p. 26) Rathbun's (1906) *P. tenuipes* is a *P. vestigialis*. Examination of other material recorded in literature is badly needed. Of the specimen recorded by De Man from Amboina under the name *Palaemonella tenuipes* the identity will remain uncertain as it lacks both second pereiopods.

Vertical distribution. The species is a litoral form.

Horizontal distribution. Records in literature are: Red Sea (Nobili, 1906b), Eritrea (Nobili, 1901a, 1906b), Dahab, Ras Abu Somer, and Berenice, Red Sea (Balss, 1915), Khor Dongonab, and Suakin Harbour, Red Sea (Tattersall, 1921), Sarso Island, Red Sea (Balss, 1915), Jibuti (Nobili, 1906b), Goidu, Goifurfehendu Atoll, Maldive Archipelago (Borradaile, 1917a), Male Atoll (Ortmann, 1890), S. Nilandu Atoll, Maldive Archipelago (Borradaile, 1917a), Peros Banhos, Chagos Archipelago (Borradaile, 1917a; Kemp, 1922), Salomon Island (Borradaile, 1915, 1917a), Isle du Coin, Chagos Archipelago (Borradaile, 1917a), Kagoshima, Japan (Ortmann, 1890; Urita, 1921), Riukiu Islands (Stimpson, 1860), Sulu Sea (Dana, 1852), Amboina (De Man, 1888; Zehntner, 1894), Cape Jaubert, N.W. Australia (Balss, 1921), Funafuti (Borradaile, 1898; Anonymus, 1899), Wake and Johnston Islands (Edmondson, 1925), Palmyra (Edmondson, 1923).

Palaemonella affinis Zehntner

Palaemonella affinis Zehntner, 1894, Rev. Suisse Zool., vol. 2, p. 208.
Palaemonella affinis Bedot, 1909, Rev. Suisse Zool., vol. 17, p. 166.
Palaemonella affinis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 358.

The description of this species by Zehntner is very short, he gives only its difference with his *Palaemonella amboinensis,* which species at present is placed in the genus *Periclimenes* under the name *P. brevicarpalis*. As Zehntner obviously does not separate the genera *Palaemonella* and *Periclimenes,* it even is not certain whether the specimen described by Zehntner as *Palaemonella affinis* really belongs to the genus *Palaemonella.*

Vertical distribution. The species was found on a specimen of the Crinoid genus *Actinometra* probably in shallow water.

Horizontal distribution. The only record of this species is from Amboina.

? *Palaemonella longirostris* Borradaile

? *Palaemonella longirostris* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 210.
? *Palaemonella longirostris* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 358, 359, pl. 53 fig. 5.
Palaemonella longirostris Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 163, pl. 43.

Boone (1935) described a Pontoniid prawn from Indonesia under the name *Palaemonella longirostris* Borr. According to the figure and description the specimen differs in a good many points so much from Borradaile's type, that it is hardly likely that they belong to the same species. These differences are:

1. The hepatic spine in the type is placed on about the same level as the antennal spine, in Boone's specimen it is on a much lower level.
2. The antennulae in the specimen from Bali are longer and the relation between the length of the three segments of the peduncle is different from that in the type.
3. In Boone's specimen the third maxilliped is much longer and stronger, it reaches distinctly beyond the scaphocerite, while in Borradaile's specimen it even fails to reach the middle of that scale.
4. The fingers of the first pereiopod in Boone's specimen are longer than the palm, in Borradaile's specimen they are about as long as the palm.
5. In Boone's specimen the fingers of the second leg are much longer and the carpus much shorter than in Borradaile's shrimp.
6. The dactyli of the last three pereiopods are biunguiculate in Boone's specimen, simple in that of Borradaile.

This last difference seems to be the most important and it alone seems already sufficient to separate the two forms. Having, however, seen neither of the two specimens, I will not take any decision in this question. In the present genus two species are known to have the dactylus of the last three pereiopods biunguiculate, viz., *P. biunguiculata* Nobili, and *P. batei* Borr. These two species are, however, insufficiently known. Boone's *P. longirostris* differs from *P. biunguiculata* in the shape of the rostrum, and in the shape of the pereiopods; it also shows differences with some of the known characters of *Palaemonella batei.*

Distribution. Boone's specimen was collected at Temukus Roads, Bali, from coral. Borradaile's specimen originated from Naifaro, Fadiffolu Atoll, Maldive Archipelago.

Vir nov. gen.[1])

Definition: Pontoniid prawns living free or epizootic on Crinoidea. Body slender, not depressed. Rostrum well developed, compressed, provided with teeth. Carapace smooth, provided with antennal spines only, hepatic spines absent.

Abdomen slender. Pleurae of the first four segments broadly rounded.

Telson elongate; upper surface with two pairs of spinules; posterior margin with three pairs of spinules.

Eyes normal in shape, cornea hemispherical.

Basal segment of antennular peduncle broad, provided with statocyst. Stylocerite slender. Last two segments of antennular peduncle short. Upper antennular flagellum with two rami.

Scaphocerite well developed, elongate, with a distinct final tooth.

Mandible with (one-jointed ?) palp. Shape of mandible normal.

Exopods present on all maxillipeds.

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1) The present genus is named in honour of the late Dr. J. G. de Man.

First pereiopods slender. Second pereiopods equal in shape, sometimes unequal in size; chela slender, never strongly swollen, fingers elongate. Last three pereiopods slender. Dactylus of the last three pereiopods without basal protuberance.

Type species: *Palaemonella orientalis* Dana.

The species forming the present genus till now was included in the genus *Palaemonella*; the differences which it shows with the typical species of that genus, however, are so important that in my opinion it must be placed in a separate genus.

Vir orientalis (Dana)

Palaemonella orientalis Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 26.
Palaemonella orientalis Dana, 1852a, U.S. Explor. Exped., vol. 13, p. 583.
Palaemonella orientalis Weitenweber, 1854, Lotos Praha, vol. 4, p. 60.
Palaemonella orientalis Dana, 1855, U. S. Explor. Exped., vol. 13 atlas, p. 12, pl. 38 fig. 4.
Palaemonella orientalis De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 552.
non *Palaemonella orientalis* Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 787, pl. 128 fig. 4.
non *Palaemonella orientalis* Rathbun, 1906, Bull. U. S. Fish Comm., vol. 23 pt. 3, p. 925.
Palaemonella orientalis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 358.
Palaemonella orientalis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 131, figs. 9-11.
Palaemonella orientalis Edmondson, 1925, Bull. Bishop Mus. Honolulu, vol. 27, p. 8.
non *Palaemonella orientalis* Estampador, 1937, Philipp. Journ. Sci., vol. 62, p. 48.
Palaemonella orientalis Edmondson, 1946, Spec. Publ. Bishop Mus. Honolulu, vol. 22, p. 252, fig. 152c.

Kemp points to some differences between his specimens and De Man's (1888) description; I think, however, that there is little doubt that De Man's specimens are correctly referred to the present species.

The specimen recorded by Bate (1888) from the Philippines under the name *Palaemonella orientalis* can not belong to the present species as the dactyli of the last three pereiopods are biunguiculate. Borradaile (1917a) therefore renamed it *Palaemonella batei*; as nothing is known about the mandible of that species, it is not certain to which genus it belongs; it is, however, not impossible that the species must be inserted in the present genus.

The specimens from the Hawaiian Archipelago mentioned by Rathbun (1906) under the name *Palaemonella orientalis* too do not belong there. This was already found by Borradaile (1917a), who made those specimens the type of a new species which he named *Palaemonella rathbunensis*. Examination of Rathbun's material, which is preserved in the U.S. National Museum at Washington, D.C., showed it to belong to a species of *Brachycarpus*, in all probability *B. biunguiculatus* (Lucas). As the specimens are not quite adult the identity could not be made fully certain.

Estampador's (1937) record of *Palaemonella orientalis* from the Philippines is based on Bate's specimen.

Vertical distribution. The species is a litoral form.

Horizontal distribution. Records in literature are: Port Blair, Andaman Islands (Kemp, 1922), Sulu Sea (Dana, 1852), Amboina (De Man, 1888), Pearl and Hermes Reef, Hawaiian Archipelago (Edmondson, 1925), Hawaii (Edmondson, 1946).

Periclimenes Costa, 1844

Kemp (1922) united the genera *Urocaris, Ancylocaris, Periclimenaeus* and *Periclimenes,* and the five subgenera of the latter genus, *Corniger, Cristiger, Ensiger, Falciger,* and *Hamiger,* as accepted by Borradaile (1917a), to one large genus *Periclimenes* with three subgenera: *Periclimenes* s.s., *Periclimenaeus,* and *Ancylocaris.* I agree for the larger part with Kemp's conception of the size of the genus *Periclimenes;* in my opinion, however, *Periclimenaeus* is generically distinct from *Periclimenes.*

Kemp (1922), in his paper on the Pontoniinae of the Indian Museum, gives an excellent revision of the present genus; in his study keys to all known species and good descriptions and figures of many forms have been given. According to later investigations the following additions and corrections have to be made to Kemp's paper:

1. After the publication of Kemp's paper the following species of *Periclimenes* have been described as new (not including the new species described in the present paper):

Periclimenes (*Ancylocaris*) *rathbunae* Schmitt, 1924a.

Periclimenes antiguensis Schmitt, 1924b. This species belongs in the genus *Anchistioides.*

Periclimenes (*Periclimenes*) *signatus* Kemp, 1925.

Periclimenes portoricensis Schmitt, 1933. As is shown by the description and figures this is a juvenile specimen of *Macrobrachium carcinus* (L.).

Periclimenes bicolor Edmondson, 1935. This species is identical with *Periclimenes* (*Periclimenes*) *soror* (see p. 53).

Periclimenes (*Ancylocaris*) *akiensis* Kubo, 1936.

Periclimenes maxillulidens Schmitt, 1936. This species belongs in the genus *Periclimenaeus.*

Periclimenes (*Ancylocaris*) *lucasi* Chace, 1937.

Periclimenes (*Ancylocaris*) *crassipes* Calman, 1939. This species is identical with *Periclimenaeus tridentatus* (Miers).

Periclimenes (*Periclimenaeus*) *arabicus* Calman, 1939. This species belongs in the genus *Periclimenaeus.*

Periclimenes (*Periclimenaeus*) *bermudensis* Armstrong, 1940. This species belongs in the genus *Periclimenaeus.*

Periclimenes (*Periclimenes*) *curvirostris* Kubo, 1940.

Periclimenes (*Ancylocaris*) *amamiensis* Kubo, 1940.

Periclimenes (*Ancylocaris*) *gracilirostris* Kubo, 1940. This species is identical with *Periclimenes* (*Periclimenes*) *hertwigi* Balss.

Periclimenes (*Periclimenes*) *perryae* Chace, 1942.

Periclimenes (*Periclimenes*) *harringtoni* Lebour, 1949.

Periclimenes (*Periclimenes*) *iridescens* Lebour, 1949.

Periclimenes (*Ancylocaris*) *bermudensis* Lebour, 1949. This species is identical with *Periclimenes* (*Harpilius*) *americanus* (Kingsley).

Periclimenes (*Periclimenes*) *granulatus* Holthuis, 1950b.

Periclimenes (*Harpilius*) *platalea* Holthuis, 1951.

Periclimenes (*Periclimenes*) *pandionis* Holthuis, 1951a.

Periclimenes (*Harpilius*) *magnus* Holthuis, 1951a.

Periclimenes (*Harpilius*) *pauper* Holthuis, 1951a.
Periclimenes (*Harpilius*) *veleronis* Holthuis, 1951a.

2. *Harpilius lutescens* Dana, the type species of the genus *Harpilius* Dana, 1852, in my opinion must be referred to the genus *Periclimenes;* it has to be placed in the subgenus *Ancylocaris* Schenkel, 1902. As the name *Harpilius* is older than *Ancylocaris,* the former must be used for the subgenus.
3. *Periclimenes ceratophthalmus* Borr., placed by Kemp (1922) in the subgenus *Ancylocaris* (= *Harpilius*) in reality belongs to the subgenus *Periclimenes* s.s. (vid. Kemp, 1925).
4. *Periclimenes hertwigi* Balss, considered by Kemp as a species incerta is a true *Periclimenes* and belongs to the subgenus *Periclimenes* s.s.
5. In Kemp's key to the species of the subgenus *Periclimenes* the species *P. incertus* is wrongly placed near *P. parvus* (vid. p. 39).
6. *Periclimenes* (*Harpilius*) *potina* Nobili is identical with *P. brevicarpalis* (vid. p. 72).
7. *Periclimenes brocki* (De Man) placed by Kemp in the second section of the subgenus *Ancylocaris* (= *Harpilius*) in reality belongs in the first section of that subgenus (vid. p. 88).
8. *Coralliocaris atlantica* Rathb. is referred by Schmitt (1935) to the present genus; in my opinion it belongs to *Periclimenaeus.*
9. *Periclimenes gorgonidarum* Balss, considered by Kemp as a species incerta, belongs in the genus *Periclimenaeus.*
10. *Anchistia aurantiaca* Dana, considered by Kemp as a species incerta is identical with *Anchistus custos* (Forssk.).
11. *Periclimenes tenellus* (Smith) placed by Kemp in his subgenus *Ancylocaris,* in reality belongs to *Periclimenes* s.s. as was shown by examination of material of that species.
12. *Palaemonella yucatanica* Ives is no *Palaemonella* at all but belongs to the subgenus *Periclimenes* s.s.
13. The species named by Kemp (1922) *Periclimenes* (*Ancylocaris*) *holmesi* Nobili proved to be a *Palaemonella.*

Subgenus **Periclimenes** s.s.

The oral parts of the species of the present subgenus examined by me showed in most points a close resemblance to those of *Palaemonella.* Figures of all oral parts (with the exception of the third maxilliped) are given here of *P. amethysteus* (Risso), the type of the genus (fig. 4a-f). The most important characters of the oral parts of the present subgenus are the following: The mandible lacks the palp, the molar process is usually somewhat stronger than the incisor process; the difference, however, never is large. The incisor process is tapering and mostly ends in three, sometimes in more teeth; aberrant are *P. ceratophthalmus,* in which species the incisorprocess widens distally and is provided at the end with about 9 teeth, one of which is very broad, and *P. soror* in which species many small denticles are placed between the two lateral teeth, furthermore in *P. indicus* and *P. soror* the concave margin of the incisor process is more or less distinctly serrate. The molar process of *Periclimenes* bears blunt knobs and ridges, which mostly are provided with brushlike arranged spines; in *P. hertwigi* no such spines are present, while in *P. impar* the number of these spines is very small. *P. soror* is remarkable for the slender molar process, which is more or less cylindrical in shape and bears no knobs. The maxillula has the inner lacinia rather narrow; the upper lacina is more or

less distinctly swollen in the middle. The palp ends in a sharp mostly strongly curved point, it is often bilobed, but the upper lobe may diminish in size till it is entirely absent (cf. *P. hertwigi, P. aesopius, P. pectiniferus*). The maxilla has the inner lacinia distinctly and generally deeply bilobed, the lower lobe is often narrower and sometimes shorter than the upper (in a specimen of *P. amethysteus* examined by me the lacinia is not bilobed, but entire; this evidently is an abnormality as other specimens of the same species from the same locality have the lacinia deeply cleft). The scaphognathite is large and sometimes rather broad. The first maxilliped has the basis and coxa sometimes very distinctly separated by a notch, this notch may become indistinct or even may disappear entirely.

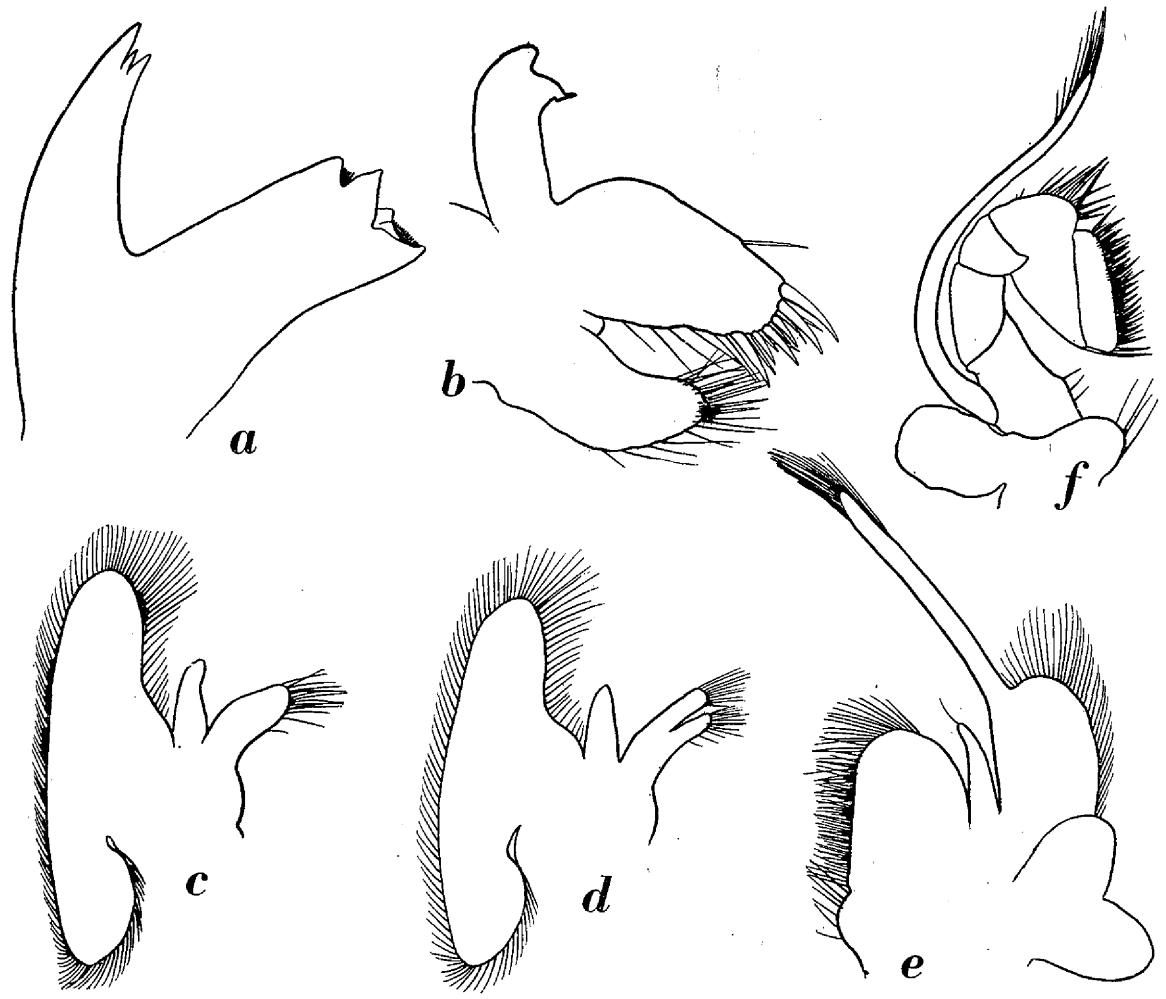

Fig. 4. *Periclimenes amethysteus* (Risso). a, mandible; b, maxillula; c, maxilla, abnormal; d, maxilla, normal; e, first maxilliped; f, second maxilliped. a, × 50; b, × 42; c-f, × 21.

The palp is rather variable in size. The caridean lobe of the exopod is rather large, it is variable in breadth. The epipod is large, variable in size, sometimes it is distinctly bilobed, but all transitions to an entire epipod occur. The second maxilliped has the same shape as that of *Palaemonella,* the podobranch is usually absent, sometimes a vestige of such a podobranch is visible. The third maxilliped is slender, an arthrobranch is present, though it is sometimes small. All maxillipeds are provided with exopods.

Of five species of the present subgenus the shape of the endopod of the first pleopod of the male is known. In three species (*P. impar, indicus* and *latipollex*) this appendage shows a broad

distally directed tooth at the end of the inner margin, in the other two (*P. parvus* and *soror*) a blunt irregular protuberance is present in the same place.

Of the present subgenus 10 species are known from Indonesia, all of which are represented in the collections at hand, 9 of them recorded for the first time from that region; one of these species is entirely new to science.

Periclimenes (*Periclimenes*) *aesopius* (Bate) (figs. 5, 6)

Anchistia aesopia Bate, 1863, Proc. zool. Soc. Lond., 1863, p. 502, pl. 41 fig. 5.
Anchistia aesopia Haswell, 1882, Catal. Aust. Crust., p. 194.
Urocaris longicaudata Pearson, 1905, Rep. Ceylon Pearl Oyster Fish., vol. 4, p. 78, pl. 1 fig. 5. (non Stimpson, 1860).
Urocaris aesopius Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 354.
Periclimenes aesopius Kemp, 1922, Rec. Indian Mus., vol. 24, p. 142, fig. 12.
Periclimenes aesopius Hale, 1927, Crust. S. Aust., vol. 1, p. 56, fig. 50.
Periclimenes aesopius Hale, 1928, Rec. S. Aust. Mus., vol. 4, p. 95.

Siboga Expedition

Station 33, Bay of Pidjot, Lombok; trawl, dredge and shore exploration; depth 22 m and less; bottom mud, coral and coral sand; March 24-26, 1899. — 1 ovigerous female 25 mm.
Station 164, between New Guinea and Misool, 1° 42'.5 S, 130° 47'.5 E; dredge; depth 32 m; bottom sand, small stones and shells; August 20, 1899. — 1 ovigerous female 26 mm.
Station 240, Banda anchorage; trawl, dredge and reef exploration; depth 45 m and less; bottom black sand, coral, lithothamnion; November 22 till December 1, 1899. — 2 ovigerous females 29 and 31 mm.
Station Banda; depth 9-36 m; November 22 till December 1, 1899. — 1 specimen 28 mm.

Some specimens at my disposal have the rostrum straight, in others it is directed obliquely upward. It does not reach further than the middle of the third segment of the antennular peduncle and sometimes even gets only slightly beyond the end of the basal segment. The upper margin bears 8 to 11 teeth, one or two of which are placed on the carapace behind the orbit; the first tooth is placed farther from the second than the second is from the third, generally the proximal teeth are stronger and more widely spaced than the distals. The lower margin of the rostrum is slightly concave, with one or two teeth placed close to the apex; the rest of the margin is entire and provided with feathered setae. The carapace is smooth and bears antennal and hepatic spines. The antennal spine is placed below the strongly produced and sharply pointed lower orbital angle. The hepatic spine is stronger than the antennal spine, it is situated much behind that spine and on a lower level. The anterolateral angle of the carapace is rectangularly rounded.

The abdomen is smooth. The pleurae of the first five segments are rounded, those of the first three are more broadly rounded than those of the fourth and fifth segments. The third segment bears in the median posterior part a high, blunt, and compressed tooth-like process, which is produced farther posteriorly than the rest of the posterior margin of the segment. The sixth abdominal segment is twice as long as the fifth.

The telson measures about $^2/_3$ of the length of the sixth segment. The dorsal surface of the telson is provided with two pairs of spinules; the anterior pair is situated slightly behind the middle of

the telson. The posterior pair of spines lies between the anterior pair and the posterior margin of the telson, in some specimens it is nearer to the anterior pair, in others nearer to the posterior margin. This posterior margin is provided with three pairs of spinules: the outer pair is shortest, the intermediate pair longest, while the inner pair is somewhat shorter than the intermediate and much more slender than it.

The eyes are well developed and reach $^3/_4$ of the length of the basal segment of the antennular peduncle. The cornea is globular, distinctly broader and much shorter than the ophthalmic peduncle, which in comparison to other species is relatively long.

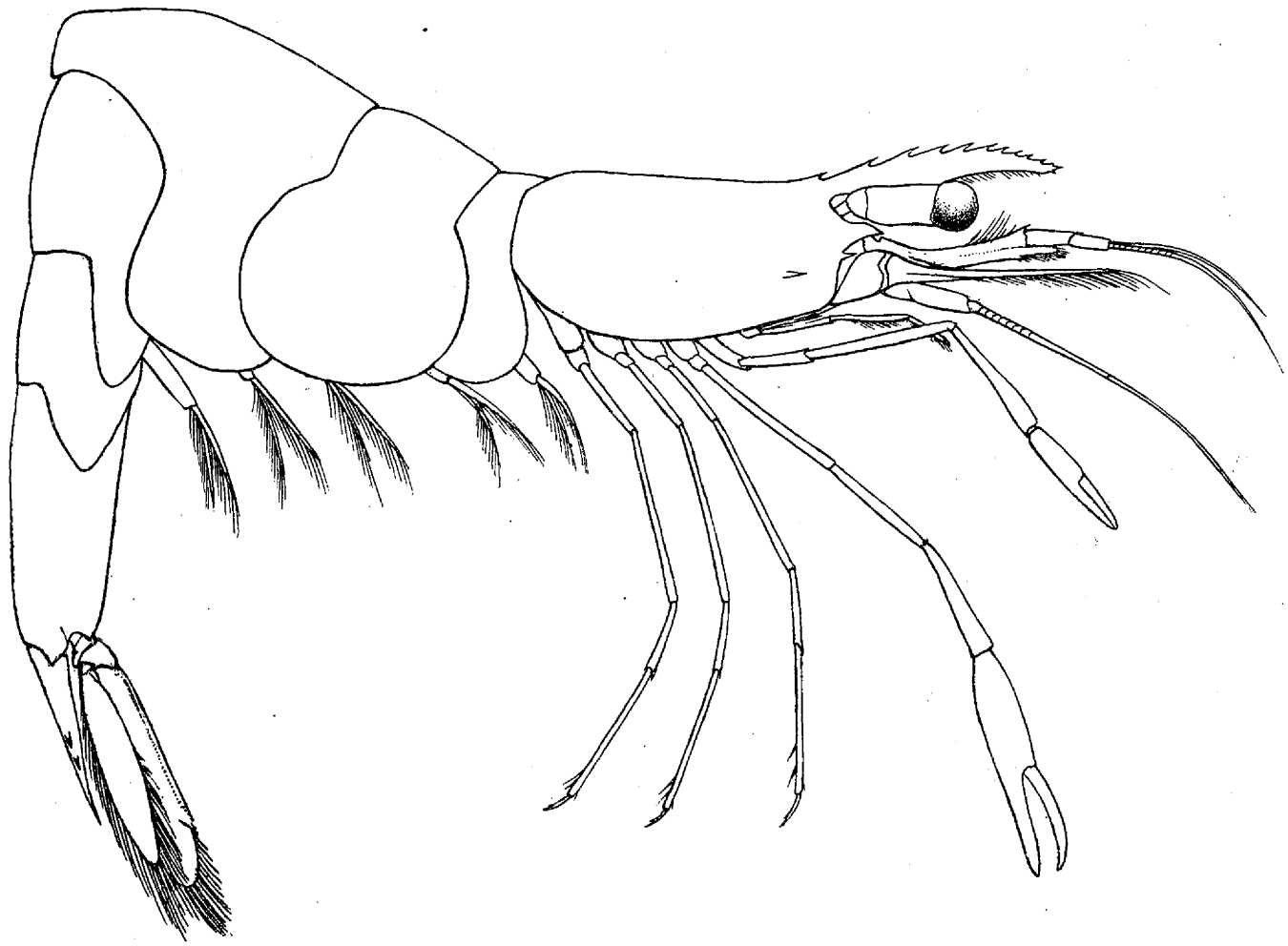

Fig. 5. *Periclimenes aesopius* (Bate). × 11.

The basal segment of the antennular peduncle has the stylocerite rather small, slender and sharply pointed, reaching almost the middle of the basal segment. The anterolateral angle of the basal segment bears a small but distinct tooth. The anterior margin of the segment is strongly forwards produced, reaching about the middle or even the end of the second segment and reaching far beyond the anterolateral tooth of the basal segment. The second segment is slightly longer and distinctly broader than the third segment, together they measure about $^3/_4$ of the length of the basal segment. The upper antennular flagellum has the two rami fused for about seven joints; the free part of the shorter ramus is slightly more than half as long as the fused part.

The scaphocerite reaches to the end of the antennular peduncle; the outer margin is straight

or slightly concave, ending in a strong tooth. The lamella is almost of the same breadth throughout its entire length, it reaches far beyond the final tooth and the inner anterior angle is rather acute. The antennal peduncle bears a small exterior tooth, its last segment fails to reach the middle of the scaphocerite.

The mouthparts are typical. The third maxilliped reaches the end of the antennal peduncle. The ultimate segment is about 3/4 of the penultimate. The antepenultimate segment is somewhat

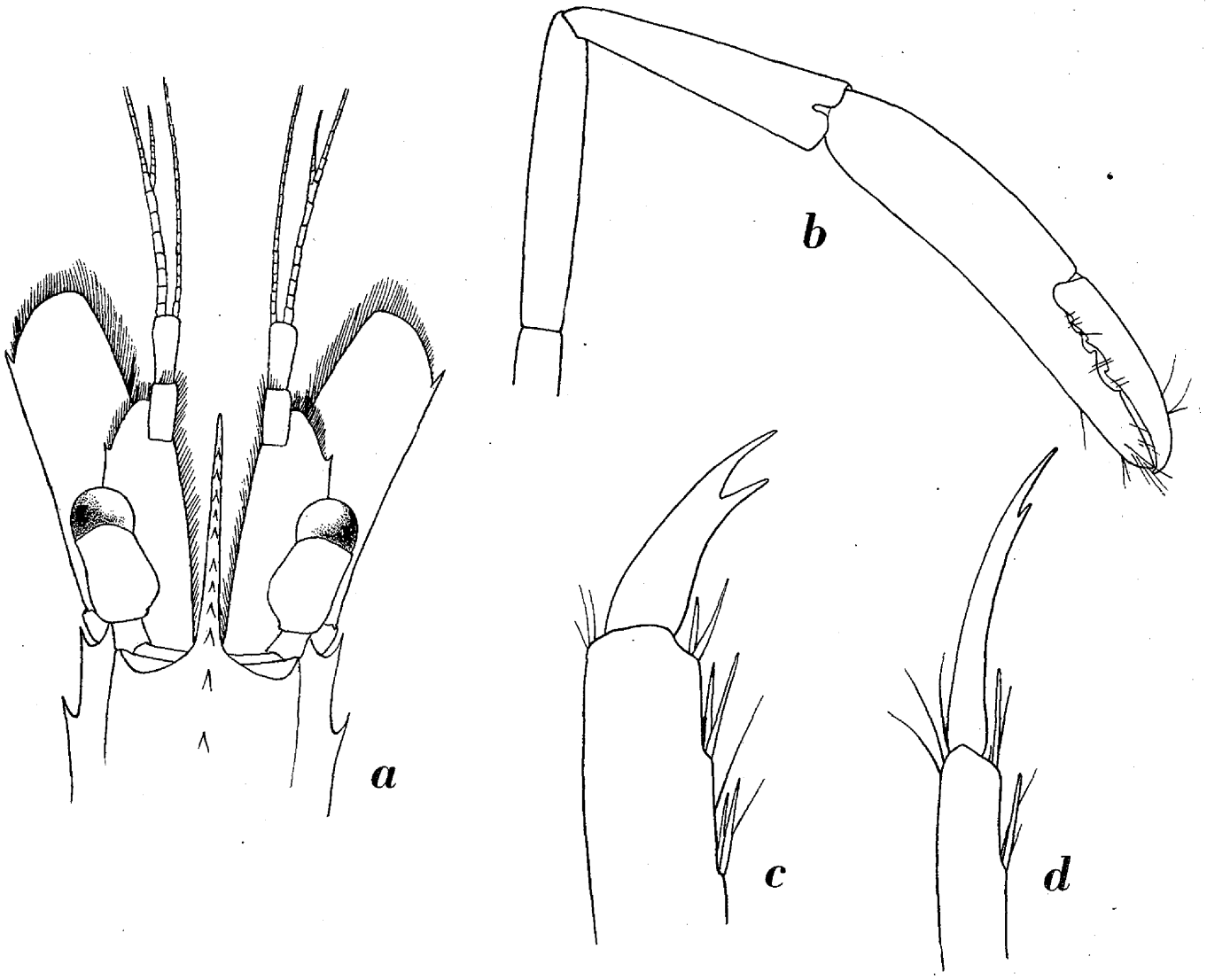

Fig. 6. *Periclimenes aesopius* (Bate). a, anterior part of body, dorsal view; b, second pereiopod; c, dactylus third pereiopod (specimen from Siboga Sta. 240); d, dactylus third pereiopod (specimen from Siboga Sta. 33). a, b, × 15; c, d, × 63.

longer than the penultimate and is distinctly curved. The exopod fails to reach the end of the antepenultimate segment.

The first pereiopod reaches with the fingers, or slightly more, beyond the scaphocerite. These fingers are unarmed and about as long as the palm. The carpus is as long as or slightly longer than the chela, narrowing posteriorly. The merus is somewhat longer than the carpus. The ischium is about half as long as the merus. The second pereiopods (fig. 6b) are equal, slender, reaching with about half the carpus or with the chela only, beyond the scaphocerite. The fingers have the cutting edges unarmed in some specimens, in other specimens, however, two small teeth are present on the cutting

edge of the dactylus and three stronger ones on that of the fixed finger. Between the two teeth on the dactylus generally a distinct gap is visible. The palm is as long as or slightly longer than the fingers. The carpus measures 1/2 to 2/3 of the length of the propodus, it narrows posteriorly and is unarmed. The merus is as long as or longer than the carpus and is unarmed too. The ischium is slightly longer than the merus. The last three pereiopods are slender. The third reaches beyond the scaphocerite. The dactylus is distinctly biunguiculate; the shape of the dactylus is variable: in the ovigerous female from Sta. 33 it is long and slender (fig. 6d), being about 1/4 of the length of the propodus, in the ovigerous females from Sta. 240 it is much shorter and stouter (fig. 6c), measuring somewhat more than 1/6 of the length of the propodus. That this character is variable is shown by an other specimen in which the shape of the dactylus is intermediate between those of the extremes mentioned. The propodus bears some spinules in the distal part of the posterior margin. The carpus is about half as long as the propodus or less. The merus is slightly longer than the propodus and the ischium is somewhat longer than the carpus.

The uropods are longer than the telson. The exopod has the outer margin almost straight or slightly convex, ending into two spines; the lower surface is provided with a longitudinal row of setae near the outer margin.

The specimens at hand differ in some minor respects from the descriptions and figures given in literature. So for instance in the specimens of Bate (1863) and Hale (1927) the rostrum reaches distinctly beyond the antennular peduncle and is provided with three teeth on the carapace behind the orbit. Kemp (1922) states the carpus of the first pereiopod to be 3/4 as long as the chela, which also is figured in Hale's (1927) figure, in my specimens it is distinctly longer than 3/4 of the chela. In Hale's (1927) figure the pleurae are shown with the tips abruptly narrowing into small lobes. This feature is not figured by Bate and is altogether absent in my material. Bate (1863) figures the fused portion of the two rami of the upper antennular flagellum to consist of numerous segments, just like is done by Pearson (1905), in my specimens only 6 or 7 segments are fused, but as already pointed out under *Palaemonella lata* and *vestigialis,* this character often is very variable. These differences between my material and the specimens described in literature are too small to justify specific or even varietal separation, the more so as too little is known about the variability of the various characters.

The specimen from Ceylon, which Pearson (1905) thought to belong to the Atlantic *Urocaris longicaudata,* and which was identified by Kemp (1915) with some hesitation with his *Urocaris indica,* no doubt belongs to the present species, as is shown by the description and figures. In those, namely characters are mentioned as the biunguiculate dactylus, the hump at the third abdominal segment, the produced anterior margin of the basal segment of the antennular peduncle, the elongate eyes and the general shape of the rostrum, which are typical for *P. aesopius.*

Vertical distribution. The species is a litoral form, the greatest depth from which it is known is 32 m (Siboga).

Horizontal distribution. The species is recorded in literature from: Aripu Paar, Ceylon (Pearson, 1905), and from St. Vincent Gulf, S. Australia (Bate, 1863; Haswell, 1882; Borradaile, 1917a; Kemp, 1922; Hale, 1927, 1928). The localities of the Siboga material collected in the Malay Archipelago fill the gap, which existed between the two widely separated localities known in literature.

Periclimenes (*Periclimenes*) *impar* Kemp (fig. 7)

Periclimenes (*Periclimenes*) *impar* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 147, textfigs. 16, 17, pl. 3 fig. 1.
Periclimenes (*Periclimenes*) *impar* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 322.

Siboga Expedition

Station 50, Bay of Badjo, westcoast of Flores; dredge, trawl and shore exploration; depth up to 40 m; bottom mud, sand and shells according to locality; April 16-18, 1899. — 5 specimens 9-15 mm.
Station 273, anchorage of Djedan Island, eastcoast of Aru Islands; pearlbanks; trawl, dredge and divers; depth 13 m; bottom sand and shells; December 23-26, 1899. — 8 specimens 6-13 mm.

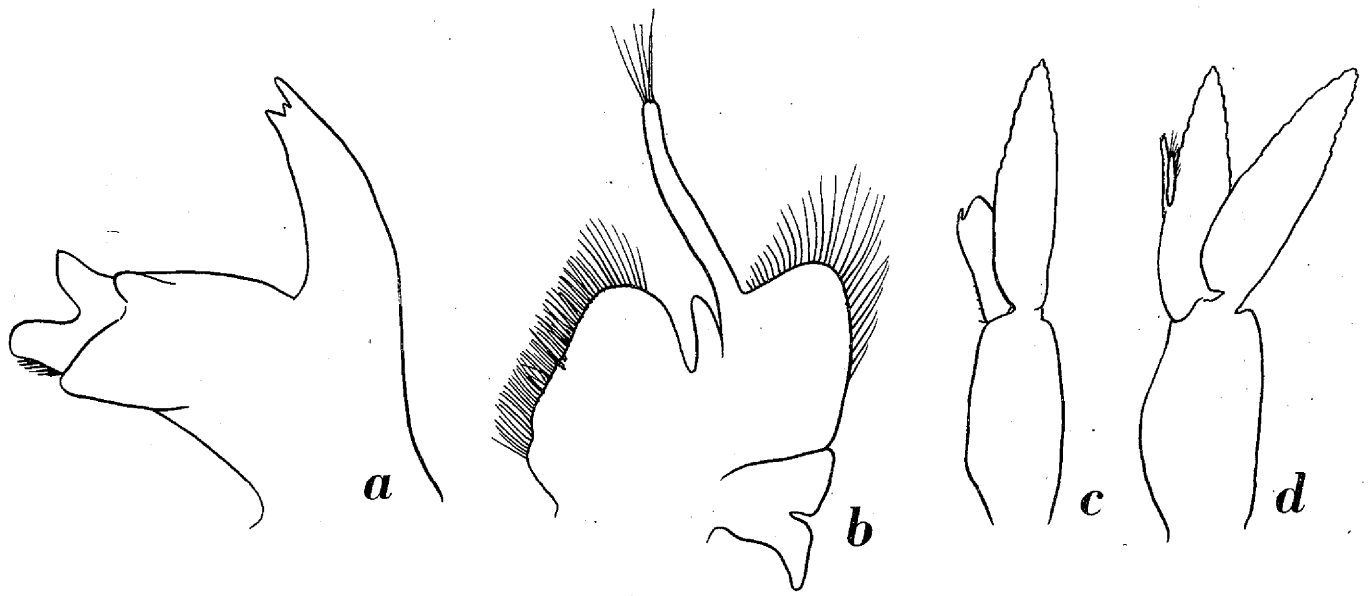

Fig. 7. *Periclimènes impar* Kemp. a, mandible; b, first maxilliped; c, first pleopod of male; d, second pleopod of male; e, chela of second leg. a, × 150; b, × 75; c-e, × 30.

In most respects there is good agreement between my specimens and Kemp's (1922) description and figures. The first tooth of the rostrum mostly is further separated from the second than the third is, like in the specimen described by Kemp (1925). In all specimens examined only one ventral tooth is present in the rostrum. The outer margin of the scaphocerite is about straight and its inner angle is not so broad as figured by Kemp (1922). The first pereiopods are generally more slender. The gape between the fingers of the second pereiopod, as described by Kemp (1922), is very distinct in many specimens (fig. 7e) in others, mostly small specimens, it is less conspicuous or even entirely absent. In my specimens in which both second pereiopods are present, these always are unequal. The third pereiopods reach the end of the scaphocerite, as is shown in Kemp's (1922) pl. 3 fig. 1; in his description he states that the third pereiopod only reaches the end of the first segment of the antennular peduncle. The dactyli of the last three pereiopods are short, just like described by Kemp.

The oral parts of the present species show much resemblance to those of *P. amethysteus*. The spines of the molar process of the mandible (fig. 7a) are smaller in number; the caridean lobe in the first maxilliped is rather broad and the epipod is deeply cleft (fig. 7b).

The first two pleopods of the male are shown in figs. 7c, d. The endopod of the first pleopod is remarkable for the toothlike process at the distal end of the inner margin.

Periclimenes incertus Borr. is separated by Kemp (1922) from *P. impar* by the fact that in *P. impar* at least one tooth of the dorsal series of the rostrum is placed on the carapace, while in *P. incertus* all teeth are situated on the rostrum proper. This is not true: in *P. incertus* namely the first tooth of the dorsal margin of the rostrum is placed behind the orbit. It is possible therefore that *P. incertus* will show to be identical with *P. impar*. There is however too little known about *P. incertus* to make this supposition certain; Borradaile, namely, only mentioned some differences between *P. incertus* and *P. parvus*. Furthermore Borradaile's pl. 53 fig. 7 of *P. incertus* shows the carpus of the first pereiopod much longer than the chela, while in *P. impar* the chela and carpus are of the same length. Examination of Borradaile's type is needed to show either the identity of or the real differences between the two forms.

Distribution. This litoral species is recorded in literature from: Cheval Paar, Ceylon (Kemp, 1925) and Port Blair, Andaman Islands (Kemp, 1922). *P. incertus* has been collected at S. Nilandu Atoll, Maldive Archipelago (Borradaile, 1915, 1917a).

Periclimenes (*Periclimenes*) *indicus* (Kemp) (fig. 8)

Urocaris indica Kemp, 1915, Mem. Indian Mus., vol. 5, p. 275, textfig. 26, pl. 13 fig. 9.
Periclimenes (*Periclimenes*) *indicus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 144, textfig. 13.
Periclimenes (*Periclimenes*) *indicus* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 322.
Periclimenes indica Panikkar & Aiyar, 1939, Proc. Indian Acad. Sci., vol. 9 B, p. 353.

Siboga Expedition

Station 47, Bay of Bima, Sumbawa; trawl, dredge and shore exploration; depth 55 m; bottom mud with patches of fine coral sand; April 8-12, 1899. — 31 specimens (included ovigerous females) 9-14 mm.

Snellius Expedition

Paleleh, Celebes; shore; August 21 and 22, 1929. — 1 specimen 8 mm.

A fine series of 31 specimens, among which several ovigerous females, was obtained by the Siboga Expedition. My specimens entirely agree with Kemp's description and figures.

The mandible of the present species (fig. 8a) shows a row of small teeth along the concave margin of the incisor process, these teeth, however, in some specimens are less distinct than in the mandible figured here. In other respects the oral parts closely resemble those of *P. aesopius*, only the upper lobe of the palp of the maxillula is less distinct.

The endopod of the first pleopod (fig. 8b) in the male shows very much resemblance to that of *P. impar*.

Kemp already pointed to the large resemblance between this species and *Periclimenes* (*Periclimenes*) *infraspina* Rathbun from California.

Distribution. The species is recorded in literature from: Pamban and Kilakarai, Gulf of Manaar (Kemp, 1915, 1922), Ennur backwater and Adyar River near Madras (Kemp, 1915, 1922), Madras (Panikkar & Aiyar, 1939), Chilka Lake, Orissa Coast (Kemp, 1915, 1922),

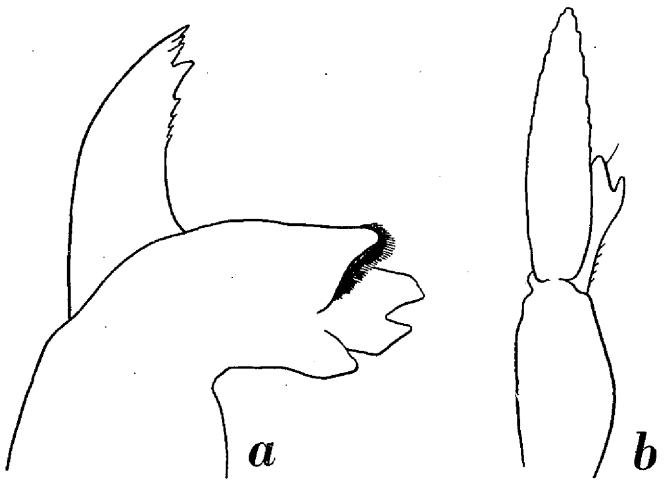

Fig. 8. *Periclimenes indicus* (Kemp). a, mandible; b, first pleopod of male. a, b, × 50.

Camorta Island, Nicobar Islands (Kemp, 1925). It is found in fresh-, brackish as well as in pure seawater. The present records from the Malay Archipelago largely extend the known range of distribution of the species.

Periclimenes (*Periclimenes*) *parvus* Borradaile (figs. 9, 10)

Periclimenes parvus Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 384.
Periclimenes parvus Borradaile, 1899, Willey's Zool. Res., vol. 4, p. 407, pl. 36 fig. 3.
Periclimenes (*Cristiger*) *parvus* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 363.
Periclimenes (*Periclimenes*) *parvus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 149.

Siboga Expedition

Station 79b, Kabala dua Island, Borneo Bank; reef; depth 22 m; June 12 and 13, 1899. — 1 specimen 15 mm.

The present specimen is the second of this species recorded. A full description of the species therefore, will not be superfluous:

The rostrum is short, reaching slightly beyond the antennular peduncle; it is rather high and directed somewhat downward. The upper margin bears six rather broad and aequidistanced teeth, all of which are placed in advance of the posterior margin of the orbit. The lower margin of the rostrum bears one tooth, which is placed near the apex. The carapace is smooth, provided with an antennal and a hepatic spine; the antennal spine is placed below the rather acute lower angle of the orbit, the hepatic spine is situated on a level below and behind the antennal. The anterolateral angle of the carapace is bluntly rectangular.

The abdominal segments are smooth. The pleurae of the first three segments are broadly truncated, those of the fourth and fifth segment are directed posteriorly and rounded. The third

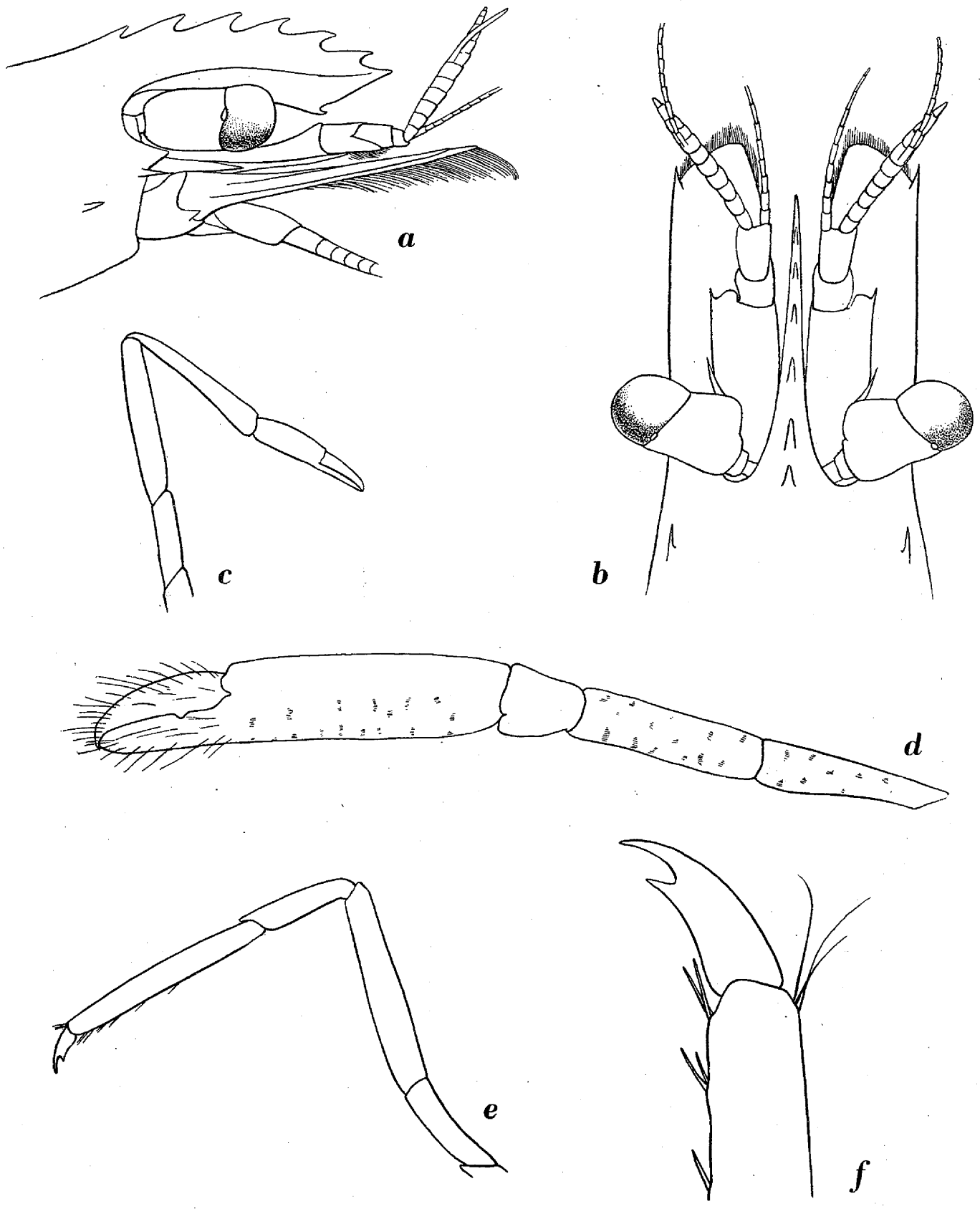

Fig. 9. *Periclimenes parvus* Borr. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, first pereiopod; d, second pereiopod; e, third pereiopod; f, dactylus of third pereiopod. a-e, × 20; f, × 84.

abdominal segment is not produced in the posterior median part. The sixth segment is about one and a half time as long as the fifth.

The telson is longer than the sixth abdominal segment, the dorsal surface is provided with two pairs of spinules: the anterior pair is situated slightly behind the middle of the telson, the posterior pair is placed nearer to the anterior pair than to the posterior margin of the telson. This posterior margin bears three pairs of spinules, the outer of which is shortest, the intermediate longest.

The eyes are well developed, the cornea is as broad as the stalk.

The basal segment of the antennular peduncle is provided with a slender and pointed stylocerite, which reaches about the middle of the basal segment. The anterolateral angle of this segment bears a strong spine, which reaches beyond the middle of the second segment of the peduncle. The second segment is shorter than the third, together they are about half as long as the first. The upper antennular flagellum has the shorter ramus fused with the longer for about five segments; the free part of the shorter ramus is about $^2/_3$ of the length of the fused part.

The scaphocerite reaches distinctly beyond the antennular peduncle and the rostrum. The lamella is broad and reaches beyond the final tooth, the outer margin is straight. The antennal peduncle bears an exterior tooth.

The oral parts show much resemblance to those of *P. aesopius*. The mandible is figured here (fig. 10a). The upper lobe of the palp of the maxillula (fig. 10b) is rather indistinct and the epipod of the first maxilliped is larger and more distinctly cleft than in *P. aesopius*. The third maxilliped reaches the end of the antennal peduncle. The ultimate segment is shorter than the penultimate. The exopod reaches about to the end of the antepenultimate segment. In Borradaile's (1899) pl. 36 fig. 3c the ultimate segment of the third maxilliped is figured longer than the penultimate segment.

The first pereiopod (fig. 9c) reaches with the entire chela beyond the scaphocerite. (Borradaile states it to be shorter than the scaphocerite). The fingers are about as long as the palm. The carpus is about as long as the merus and somewhat longer than the chela. The second pereiopods (fig. 9d) are strong, and equal in shape; they reach with almost the entire chela beyond the scaphocerite. The fingers are half as long as the palm and are provided with many tufts of hairs. The dactylus has the cutting edge provided with one proximal tooth, which fits between two proximal teeth of the cutting edge of the fixed finger. The palm is cylindrical. The carpus is short, and less than half as long as the palm, it is conical in shape. The merus is slightly longer than the ischium. No spines are present on any of the joints; the ischium, the merus and the palm are rugose by numerous small inconspicuous tubercles, which are arranged in short transverse rows and bear short hairs; the carpus and the fingers are smooth or almost smooth. The third to fifth pereiopods are slender; the third (fig. 9e) reaches beyond the scaphocerite, the fifth fails to reach the end of that scale. The dactylus (fig. 9f) is slightly more than twice as long as its proximal breadth, it is biunguiculate, with two distinct claws. The propodus is about six times as long as the dactylus and has the posterior margin provided with spinules. The carpus measures $^1/_3$ of the length of the propodus and is slightly less than half as long as the merus.

The first pleopod of the male is figured here (fig. 10c). The endopod of this first pleopod differs from that of *P. impar* and *P. indicus* by lacking the distally directed tooth; at the place where *P. impar* shows this tooth the present species bears an irregular blunt protuberance, closely resembling thereby *Periclimenes soror*. The second pleopod resembles that of *Periclimenes impar*.

The uropods are longer than the telson. The exopod has the outer margin convex, naked, ending in a fixed and a movable tooth.

The differences between my specimen and Borradaile's description are:

1. In my specimen the last segment of the third maxilliped is shorter than the penultimate, whereas it is longer in Borradaile's figure.

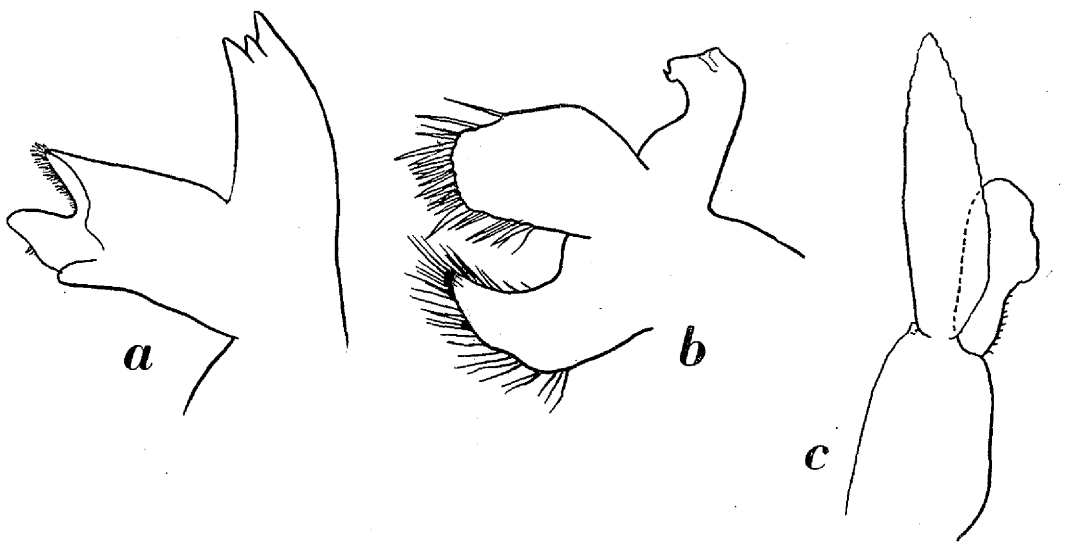

Fig. 10. *Periclimenes parvus* Borr. a, mandible; b, maxillula; c, first pleopod of male. a, b, × 75; c, × 30.

2. The first pereiopods reach beyond the scaphocerite in my specimen, in Borradaile's specimen they fail to reach the end of that scale.

3. In my specimen the second legs outreach the scaphocerite with chela only; according to Borradaile's description in his specimen they outreach that scale with half the merus, in his figure, however, that statement is not confirmed as it shows the second pereiopod as long as in my specimen, or even slightly shorter.

These small differences are either due to variability of the species or to inaccuracy of Borradaile's description and figure. Borradaile's specimens measured 8.5 mm, being thereby considerably smaller than the specimen examined by me.

Distribution. This litoral form previously only has been recorded from Rakaiya, Blanche Bay, New Britain (Borradaile, 1898, 1899, 1917a; Kemp, 1922).

Periclimenes (*Periclimenes*) *hertwigi* Balss (figs. 11, 12)

Periclimenes hertwigi Balss, 1913, Zool. Anz., vol. 42, p. 235.
Periclimenes Hertwigi Balss, 1914, Abh. Bayer. Akad. Wiss., suppl. vol. 2 pt. 10, p. 49, textfigs. 28-30.
Periclimenes hertwigi Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser 2. vol. 17, p. 376.
Periclimenes hertwigi Kemp, 1922, Rec. Indian Mus., vol. 24, p. 138.
Periclimenes (*Ancylocaris*) *gracilirostris* Kubo, 1940, Journ. Imp. Fish. Inst., vol. 34, p. 41, figs. 8-10.

Siboga Expedition

Station 253, off Kai Islands, 5° 48′.2 S, 132° 13′ E; trawl; depth 304 m; bottom grey clay, hard and crumbly; December 10, 1899. — 1 female 15 mm.

This species was regarded by Borradaile (1917a) as well as by Kemp (1922) to be of doubtful affinity; they thought it possible that it even should not belong to the Pontoniinae.

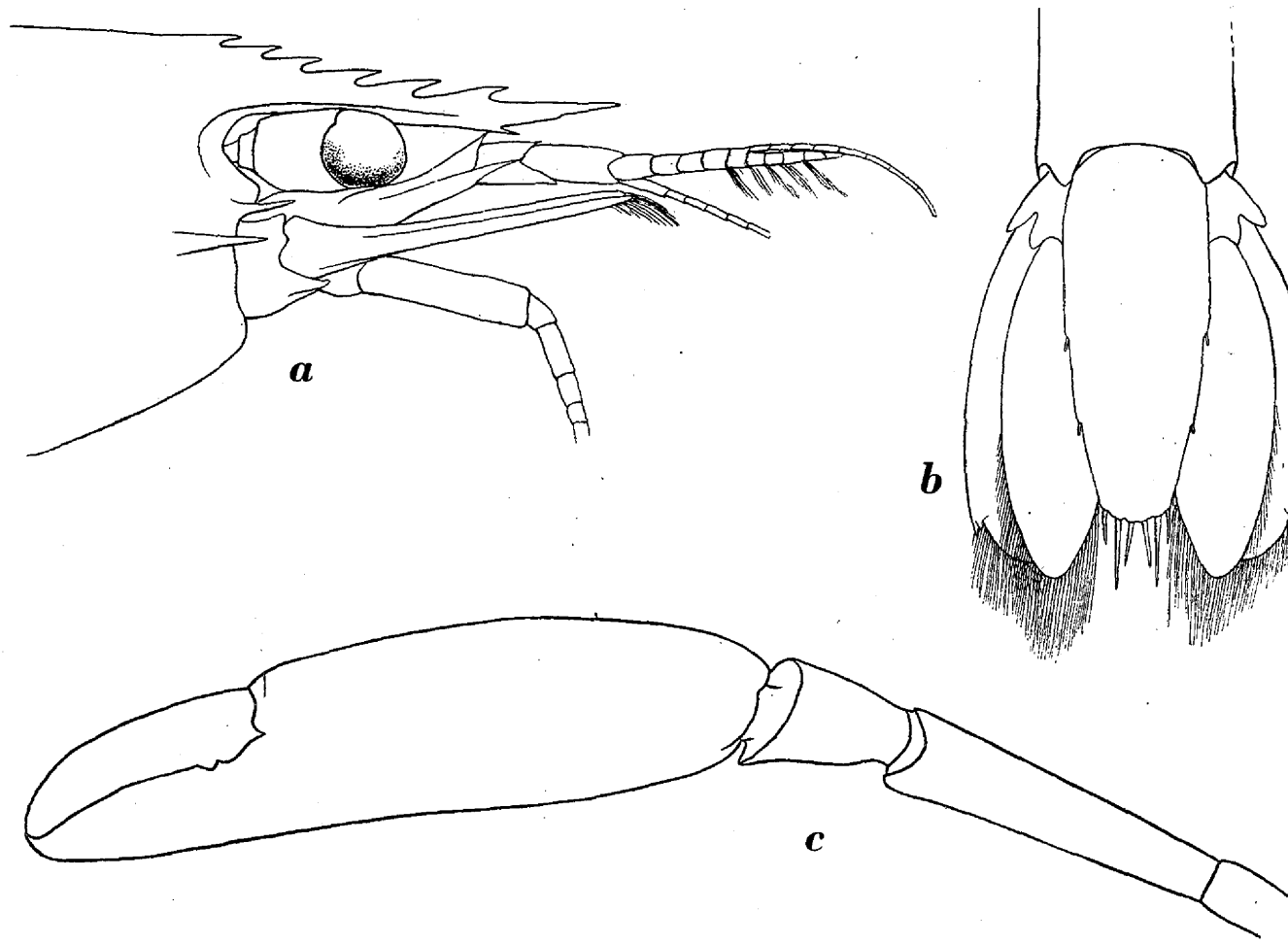

Fig. 11. *Periclimenes hertwigi* Balss. a, anterior part of body, lateral view; b, telson and uropods, dorsal view; c, second pereiopod. a-c, × 20.

Examination of the present specimen, which undoubtedly is identical with Balss's species, shows that it belongs to the Pontoniinae and even is a true *Periclimenes*. This will become clear from the following description:

The rostrum is slender, straight, anteriorly slightly curved upwards and almost reaching the end of the antennular peduncle. Dorsally it bears six teeth, the proximals of which are placed closer together than the distals. The first tooth is placed on the carapace behind the orbit, the second is situated just over the orbit. The lower margin of the rostrum bears two teeth, the proximal one in my specimen is placed below the distal dorsal tooth and is stronger than the second ventral tooth. In Balss's specimen the proximal ventral tooth is situated on a level between the ultimate and penultimate dorsal tooth. The lateral carina of the rostrum does not continue in the orbital margin,

but forms an indistinct ridge behind that margin. The carapace is smooth, provided with antennal and hepatic spines. The antennal spine is placed somewhat below the lower orbital angle. The hepatic spine is stronger than the antennal and placed on a lower level. It is situated slightly behind the antennal, but nevertheless very close to the anterior margin of the carapace. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first three segments are rounded, those of the fourth and fifth segments are more triangular, but have the tip broadly rounded. The sixth abdominal segment is slightly less than twice as long as the fifth.

The telson (fig. 11b) is almost twice as long as the sixth abdominal segment and slightly less than thrice as long as broad. The dorsal surface is evenly convex, with two pairs of dorsal spinules placed close to the lateral margins. The anterior pair is situated in the middle of the telson, the posterior pair lies midway between the anterior pair and the posterior margin of the telson. This posterior margin is provided with the usual three pairs of spinules; the outer pair is short, the intermediate pair is longest, while the median pair is slightly shorter than the intermediate. In B a l s s's (1914) figure the telson is much broader (less than twice as long as broad) and has the broad posterior margin provided with 13 spinules. In all probability the telson in B a l s s's specimen is abnormal.

The eyes are well developed, failing largely to reach the end of the first segment of the antennular peduncle. The cornea is about as broad as, but distinctly shorter than the eyestalk.

The basal segment of the antennular peduncle has the stylocerite ovate and sharply pointed, directed forwards and reaching about to the middle of the basal segment. The anterolateral spine of that segment is strong and reaches almost the end of the second segment. The second segment is half as long as the third. Together they are about as long as the first. The upper antennular flagellum has the two rami fused for five segments (in B a l s s's specimen for 8 segments). The free part of the shorter ramus consists of about five segments and is half as long as the fused portion.

The scaphocerite reaches the end of the antennular peduncle (in B a l s s's specimen it does not reach so far). The outer margin is straight, slightly convex at base, ending in a strong spine, which reaches to or slightly beyond the lamella. The anterior margin of the lamella is broadly rounded. The basal part of the antennal peduncle is provided with a strong outer spine. The antennal peduncle reaches the end of the second segment of the antennular peduncle.

The oral parts are typical. The mandible (fig. 12c), however, bears no brushlike arranged spinules on the molar process. The palp of the maxillula (fig. 12d) is deeply cleft. The caridean lobe at the base of the exopod of the first maxilliped (fig. 12e) is narrow, the palp of the maxilliped is slender. The third maxilliped reaches the end of the basal segment of the antennular peduncle. The last segment is slightly shorter than the penultimate. The antepenultimate segment is about twice as long as the ultimate. The exopod reaches slightly beyond the antepenultimate segment.

The first pereiopod is slender and reaches with the entire chela and the carpus beyond the scaphocerite. The fingers are about as long as the palm, provided with tufts of setae and with the cutting edges entire (only some minute serrations may be observed near the tips). The carpus is somewhat longer than the chela; the merus is slightly longer than the carpus; the ischium is about half as long as the merus. The second pereiopods (fig. 11c) are equal, stronger than the first and reaching with the carpus and the chela beyond the scaphocerite. The fingers measure about half the length of the palm; the dactylus has the cutting edge provided near the base with one ventral tooth,

the fixed finger bears two teeth there; the rest of the cutting edges is entire. The palm is cylindrical and as broad as the two fingers together. The carpus measures about 1/3 of the length of the palm, it is triangular and unarmed. The merus is distinctly shorter than the palm and unarmed too. The ischium is about 3/4 as long as the merus. The third pereiopod reaches with the entire propodus beyond the antennal scale. The dactylus is slender and ends in a curved point. The lower margin is provided with an excavation behind the tip, which gives the dactylus its bifid appearance. When strongly magnified the distal part of the dactylus shows a curious shape: at the place, where in other species the second claw is situated, here the posterior margin of the dactylus shows some shallow lobes, which are hardly visible because the margin of the dactylus is very thin there. In the excavation behind the

Fig. 12. *Periclimenes hertwigi* Balss. a, fourth pereiopod; b, tip of dactylus of fourth pereiopod; c, mandible; d, maxillula; e, first maxilliped. a, × 20; b, × 400; c-e, × 50.

apex a row of denticles or very short hairs are situated, the real nature of which could not be observed with certainty by me, but which I have tried to figure as good as possible (fig. 12b). The propodus is slender, almost five times as long as the dactylus and about 10 times as long as broad, the posterior margin is provided with some spinules. The carpus is about half as long as the propodus. The merus is as long as the propodus, but distinctly broader; it is unarmed. The last two pereiopods are similarly built as the third (fig. 12a).

The uropods (fig. 11b) are distinctly longer than the telson; they are more slender than figured by Balss. The outer margin of the exopod is convex and ends into two spines.

The present specimen agrees with the description and figure given by Balss (1914) in all details, except for the longer scaphocerite and for the shape of the tail fan. The length of the scaphocerite may be variable; the tailfan in Balss's specimen probably is, as already pointed out above, abnormal.

Very characteristic for the present species is the shape of the dactyli of the last three pereiopods, in which feature it differs as far as I know from all other species of the genus *Periclimenes* or of one of the allied genera.

K u b o's (1940) *Periclimenes gracilirostris* evidently is based on a specimen of *Periclimenes hertwigi,* as it agrees with the present species in all respects. K u b o himself already pointed to the close resemblance of the two forms, but thought the fact that B a l s s's type specimen had the posterior margin of the telson provided with 13 spines of enough importance to consider his own specimen as belonging to a different species.

Vertical distribution. B a l s s's specimen was collected at a depth of 120 m, that of K u b o at 305 m, and the specimen of the Siboga Expedition at a depth of 304 m. B a l s s's specimen was found between the spines of a species of *Phormosoma.*

Horizontal distribution. The records in literature are: Boshu and Kagoshima, Sagami Bay, Japan (B a l s s, 1913, 1914), off Kumano-nada, Mie prefecture, Honshu, Japan (K u b o, 1940). The present record from the Kai Islands thus considerably extends the known range of distribution of the species.

Periclimenes (*Periclimenes*) *latipollex* Kemp (figs. 13, 14)

Periclimenes (*Periclimenes*) *latipollex* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 150, textfig. 18, pl. 4 fig. 3.

Siboga Expedition

Station 253, off Kai Islands, 5° 48′.2 S, 132° 13′ E; trawl; depth 304 m; bottom grey clay, hard and crumbly; December 10, 1899. — 2 specimens (one of which an ovigerous female) 18 and 21 mm.

My specimens differ from K e m p's description only in the slightly higher rostrum (fig. 13), which is provided with 2 ventral and 7 or 8 dorsal teeth, two or three of which are placed on the carapace. The rostrum reaches slightly beyond the scaphocerite. Furthermore K e m p states the

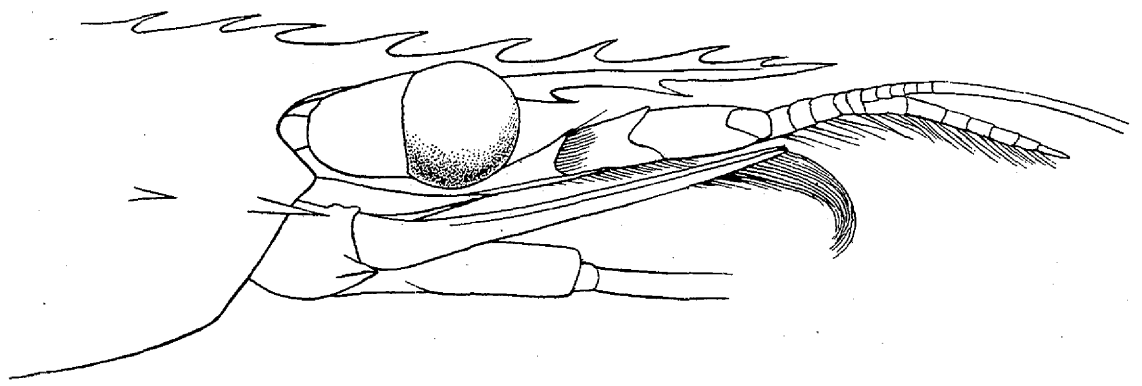

Fig. 13. *Periclimenes latipollex* Kemp. Anterior part of body, lateral view. × 20.

carpus of the first pereiopod to be shorter than the chela, whereas in my specimens it is slightly longer.

The accessory claw of the dactylus is so small that it easily may escape notice; when preliminary identifying the specimens I referred them to the subgenus *Harpilius,* but examination with a microscope revealed the existence of the second claw.

The oral parts are typical (figs. 14a, b), showing no essential differences from those of *P. aesopius*.

The endopod of the first pleopod (fig. 14c) of the male is rather broad and like in *P. impar* and *P. indicus* it bears a broad distally directed tooth at the end of the inner margin.

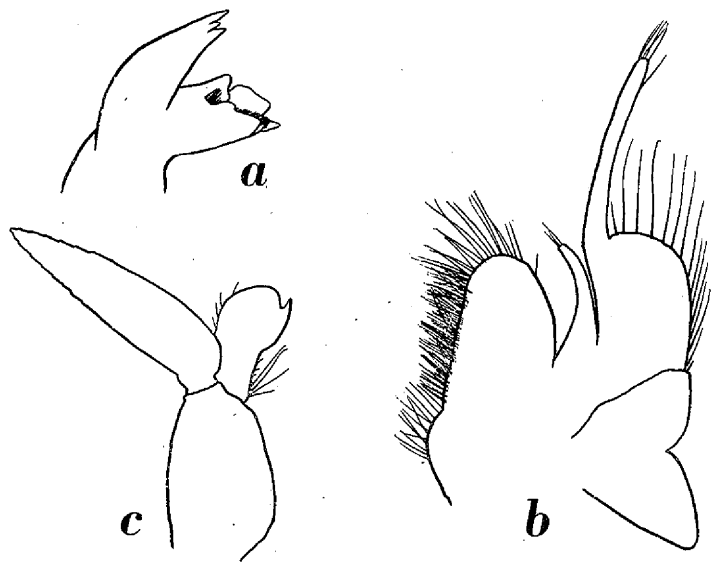

Fig. 14. *Periclimenes latipollex* Kemp. a, mandible; b, first maxilliped; c, first pleopod of male. a, × 50; b, × 40; c, × 20.

Vertical distribution. Kemp's specimens were obtained from a depth of 112 m, those of the Siboga Expedition from 304 m.

Horizontal distribution. The only previous record is from the Mergui Archipelago, 12° 15'.3 N, 97° 10'.2 E (Kemp, 1922).

Periclimenes (*Periclimenes*) *pectiniferus* nov. spec. (figs. 15, 16)

Siboga Expedition

Station 79b, Kabala dua Island, Borneo Bank; reef; depth 22 m; June 12 and 13, 1899. — 2 ovigerous females 13 and 16 mm.

The rostrum is strong, reaching beyond the antennular peduncle and almost extending as far as the end of the scaphocerite. It is directed downward, only the tip is somewhat curved upward. The dorsal margin bears nine teeth, one or two of which are placed on the carapace behind the orbit. The lower margin is provided with one single tooth near the apex. The lateral carina of the rostrum posteriorly continues in the orbital margin. The carapace is smooth and provided at each side with an antennal as well as with a hepatic spine. The antennal spine is placed below the rather acute lower orbital angle; the hepatic spine is situated behind the antennal on a lower level. The anterolateral angle of the carapace is rounded.

The abdomen is smooth, the pleurae of the first three segments are broadly rounded, those of the fourth and fifth are narrower, but the tip is rounded too. The sixth abdominal segment is one and a half times as long as the fifth.

The telson is about one and a half times as long as the sixth abdominal segment. The dorsal

surface is provided with two pairs of spinules: the anterior pair is situated in the middle of the telson, the posterior midway between the anterior pair and the posterior margin of the telson. This margin is provided with three pairs of spinules, the outer pair being shortest, the intermediate longest.

The eyes have the cornea broader than the stalk, the ocellus, which is fused with the cornea, is distinct.

The basal segment of the antennular peduncle is broad, the stylocerite is sharply pointed and reaches about the middle of the segment; the anterolateral angle of the segment ends in a strong spine, which reaches beyond the middle of the second segment; the anterior margin of the first segment runs straight inward from the anterolateral spine and near the peduncle it abruptly curves posteriorly. The third segment is narrower and longer than the second, together the two segments are somewhat longer than half the basal segment. The two rami of the upper flagellum are fused for four segments, the free part of the shorter ramus is slightly shorter than the fused portion.

The scaphocerite reaches distinctly beyond the antennular peduncle, it is slightly narrower at the tip than in the middle, being about thrice as long as the greatest width. The final tooth is strong and nearly reaches the end of the lamella. The anterior inner angle of the lamella is rather acute. The antennal peduncle bears a distinct spine.

The oral parts are quite typical (figs. 16a, b); the palp of the maxillula is uncleft; the upper lobe of the inner lacinia of the maxilla is slightly broader than the lower; the first maxilliped resembles that of *P. impar,* it only has the palp slightly longer. The third maxilliped reaches the end of the antennal peduncle. The ultimate segment is about $^3/_4$ of the length of the penultimate. The antepenultimate segment is longest and distinctly curved. The exopod fails to reach the end of the antepenultimate segment.

The first pereiopod (fig. 15c) is slender, it reaches with the entire chela and a small part of the carpus beyond the scaphocerite. The fingers are as long as the palm, they are broad with the outer margin curved and with the cutting edge provided with a fine pectination on the larger part of its length. The palm is less than twice as long as broad. The carpus is about as long as the merus and about one and a half times as long as the chela, it is broad anteriorly and narrows posteriorly. The ischium is about half as long as the merus. The second pereiopods (fig. 15d) are strong, equal, they reach with almost the entire chela beyond the scaphocerite. The fingers are shorter than the palm, being almost $^2/_3$ of its length. The cutting edges bear no teeth at all. The carpus is about as long as the dactylus, the anterior margin bears no teeth; the shape of the carpus is conical with the narrower part posteriorly. The merus and the ischium are of about the same length, being slightly shorter than the palm; they are not provided with ventral spines. The third pereiopod (fig. 15f) reaches slightly beyond the scaphocerite. The dactylus (fig. 15e) is short, measuring $^1/_6$ of the length of the propodus; it is narrower than the distal part of the propodus; its posterior margin is provided with a small accessory spine behind the final tooth. The propodus is slightly broader distally than proximally; its posterior margin is provided with spinules, in its distal part some tufts of setae are present. The carpus is about half as long as the propodus. The merus is about as long as the propodus and twice as long as the ischium. The fourth and fifth pereiopods are similarly built as the third.

The uropods are longer than the telson. The outer margin of the exopod is slightly convex, naked and ends into two spines, the inner of which is movable. The endopod is shorter than the exopod.

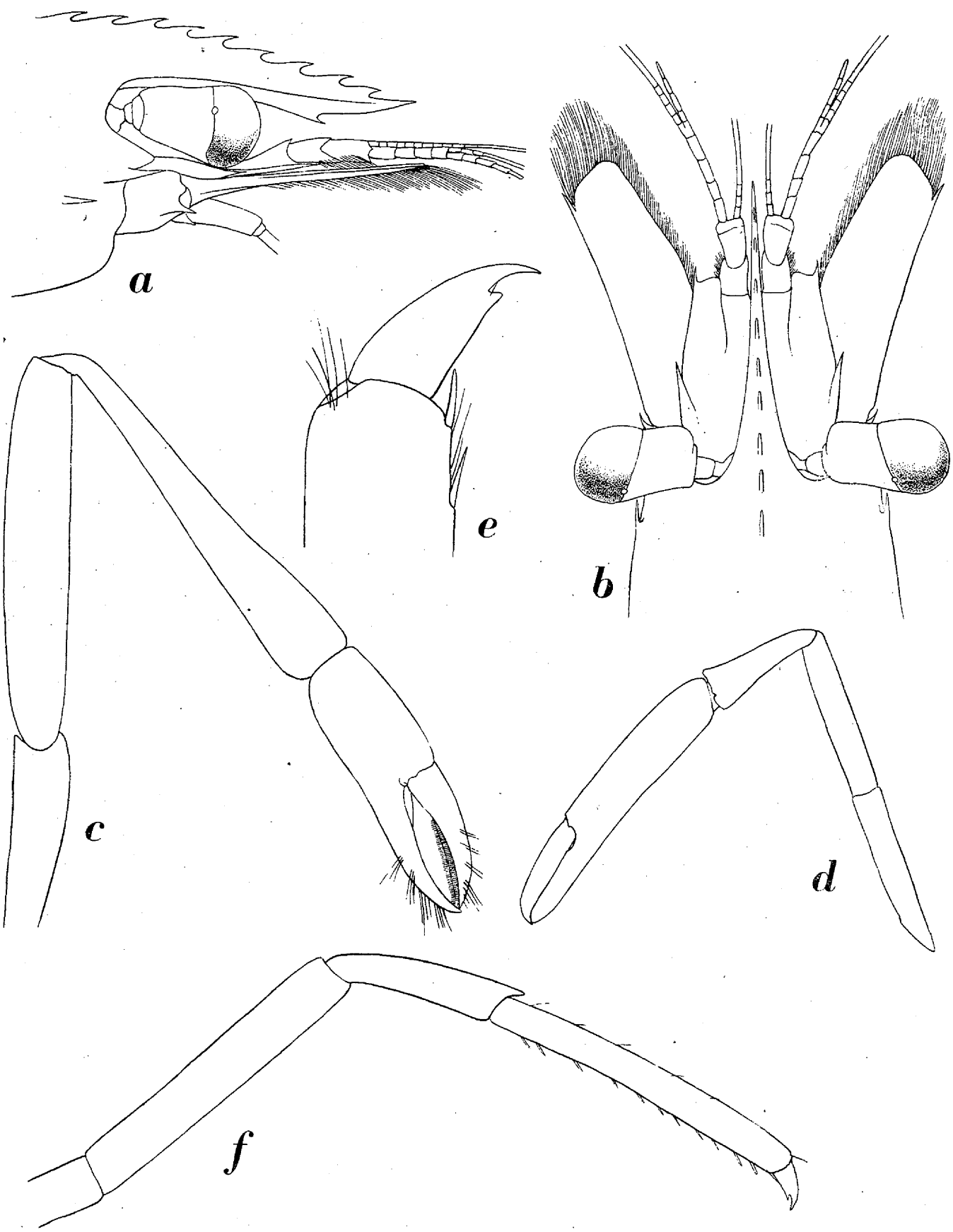

Fig 15. *Periclimenes pectiniferus* nov. spec. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, first pereiopod; d, second pereiopod; e, dactylus of third pereiopod; f, third pereiopod. a, b, d, × 17; c, × 47; e, × 170; f, × 35.

The present species is most closely related to *Periclimenes soror* Nobili and *P. noverca* Kemp; together with these two species it forms the group of the subgenus *Periclimenes,* in which the fingers of the first pereiopod are pectinate. From *Periclimenes noverca* the new species differs by having the merus of the last three pereiopods without an anteroventral spine, by having one or two of the dorsal teeth of the rostrum situated behind the posterior margin of the orbit and by the more slender first pereiopods. In *P. soror* our species finds its nearest relative. The differences between the two

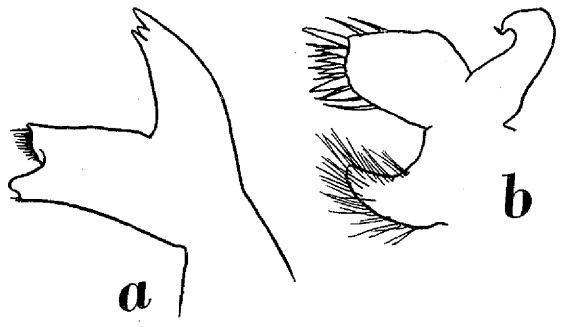

Fig. 16. *Periclimenes pectiniferus* nov. spec. a, mandible; b, maxillula. a, b, × 60.

species are: The dorsal teeth of the rostrum in *P. soror* all are placed on the rostrum proper, while in our species at least one tooth is situated on the carapace. *P. pectiniferus* has 9 dorsal teeth on the rostrum, *P. soror* 11-13; the ventral margin of the rostrum in *P. soror* is entire, while in *P. pectiniferus* one tooth is present there. The basal segment of the antennular peduncle in *P. soror* is provided with two or three anterolateral teeth, only one such tooth is present in *P. pectiniferus.* The first legs are shorter in *P. soror* and do not reach beyond the scaphocerite. The fingers of the second legs in *P. soror* measure about $^1/_3$ of the length of the palm, while in *P. pectiniferus* they are about $^2/_3$ of the length of the palm.

Periclimenes (*Periclimenes*) *soror* Nobili (fig. 17)

Periclimenes soror Nobili, 1904, Bull. Mus. Hist. nat. Paris, vol. 10, p. 232.
Periclimenes soror Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 50, pl. 2 fig. 6.
? *Periclimenes* (*Cristiger*) *frater* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 210.
Periclimenes (*Cristiger*) *soror* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 363.
? *Periclimenes* (*Cristiger*) *frater* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 364, pl. 53 fig. 6.
Periclimenes (*Periclimenes*) *soror* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 165.
Periclimenes bicolor Edmondson, 1935, Occ. Pap. Bishop Mus., vol. 10 pt. 24, p. 10, fig. 3.
Periclimenes soror Gordon, 1939, Ann. Mag. nat. Hist., ser. 11 vol. 4, p. 395, figs. 1-3.

Snellius Expedition

Sipankot, near Sibutu, Sulu Islands; between seagrass near the shore; September 11, 1929. — 3 specimens (1 ovigerous female) 8-12 mm.

Gordon (1939) gave an extensive description of the present species, with figures of various parts of the body. This description largely extends our knowledge of the species, the more as the type specimens could be examined by the English author.

Some of the oral parts of this species are rather aberrant. The mandible (fig. 17a) has both incisor and molar process slender; between the two lateral teeth of the incisor process numerous

(about 8) small denticles are present, the inner margin of the process bears a distinct denticle close to the inner lateral tooth. The molar process is more or less cylindrical and bears no knobs or ridges, it is provided in the distal part with a crown of spines. The maxillula (fig. 17b) is rather typical; the palp shows only a faint trace of the upper lobe. The maxilla (fig. 17c) has the palp short and broad, the scaphognathite is rather wide, the inner lacinia is composed of two short and rather broad lobes, the lower lobe being shorter and narrower than the upper. The maxillipeds are quite typical; the caridean lobe of the exopod of the first maxilliped (fig. 17d) is rather broad.

Gordon (1939, fig. 2b) figures the first pleopod of the male of the present species; the endopod of this pleopod shows remarkably much resemblance to that of *P. parvus*.

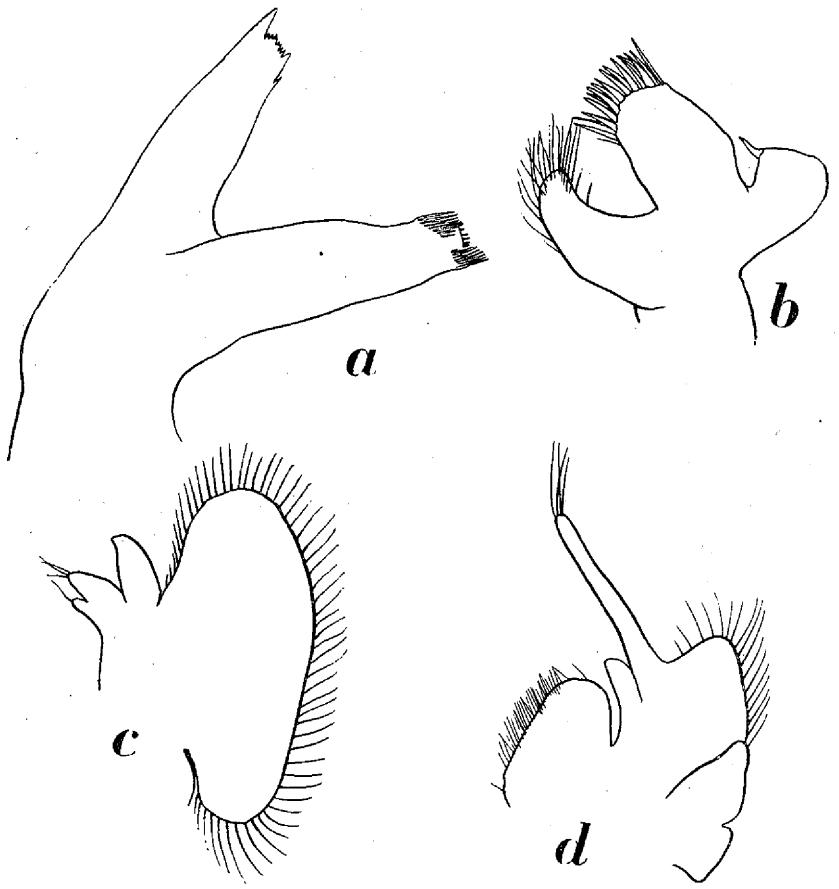

Fig. 17. *Periclimenes soror* Nobili. a, mandible; b, maxillula; c, maxilla; d, first maxilliped. a, × 240; b, × 120; c, d, × 60.

According to Borradaile (1917) his *Periclimenes frater* differs from *P. soror* in the following four characters:

1. "The teeth on the upper edge of the rostrum [in *P. frater*] are closer set towards the tip than near the base".
2. "there are two distal spines on the first joint of the antennule".
3. "the antennal scale decidedly outreaches the first leg".
4. "there is no accessory denticle on the dactylopodites of the last three legs".

Comparison with Gordon's (1939) description makes it clear that the first three points are no differences at all, as these characters, which Borradaile thinks to be specific for *P. frater* also

are present in *P. soror* (even in the syntypes examined by G o r d o n), the proximal teeth of the dorsal margin of the rostrum are wider spaced than the distals, the basal segment of the antennular peduncle has two or three anterolateral spines and the first pereiopods do not reach the end of the scaphocerite. The only remaining difference being the uniunguiculate dactylus of the last three legs in *P. frater* and the biunguiculate in *P. soror.* The accessory spine on the dactylus, as shown by G o r d o n's figure is very inconspicuous and easily may escape notice. I think it therefore very well possible that *P. soror* and *P. frater* are identical, but confirmation by means of the examination of B o r r a d a i l e's type is needed. *P. bicolor* Edmondson no doubt is identical with the present species, which becomes clear, when comparing E d m o n d s o n's description and figures with those of G o r d o n.

Vertical distribution. The species is a litoral form and lives in association with Asteroids: E d m o n d s o n records it in association with *Linckia multifora* (Lam.), G o r d o n reports it from *Protoreaster nodosus* (L.).

Horizontal distribution. The species is recorded from: Jibuti (N o b i l i, 1904, 1906b), Sanur, southcoast of Bali (G o r d o n, 1939), Kaneohe Bay, Oahu, Hawaiian Archipelago (E d m o n d s o n, 1935). *Periclimenes frater* Borr. was collected at Egmont Reef, Seychelles (B o r r a d a i l e, 1915, 1917a).

Periclimenes (*Periclimenes*) *commensalis* Borradaile (figs. 18, 19).

Periclimenes (*Cristiger*) *commensalis* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 211.
Periclimenes commensalis Potts, 1915, Pap. Dept. mar. Biol. Carnegie Inst., vol. 8, p. 82.
Periclimenes (*Cristiger*) *commensalis* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 364.
Periclimenes (*Periclimenes*) *commensalis* Clark, 1921, Bull. U. S. Nat. Mus., vol. 82 pt. 2, p. 628.
Periclimenes (*Periclimenes*) *commensalis* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 166.

Siboga Expedition

Station 50, Bay of Badjo, westcoast of Flores; dredge, trawl and shore exploration; depth up to 40 m; bottom mud, sand and shells, according to locality; April 16-18, 1899. — 1 ovigerous female 10 mm.

My specimen agrees in all important characters with B o r r a d a i l e's description. The rostrum is rather high, directed slightly downward, reaching a little beyond the antennular peduncle, but failing to reach the end of the scaphocerite. The upper margin is provided with 6 (in B o r r a d a i l e's specimen with 5) teeth, which all are placed on the rostrum proper. The lower margin bears two teeth, which are situated below the fourth and fifth dorsal tooth respectively. The carapace is smooth, provided with supraorbital, antennal and hepatic spines. The supraorbital spine is well developed; the antennal spine is placed below the slightly produced and narrowly rounded lower orbital angle; the hepatic spine, which is stronger than the antennal is placed behind it and on a lower level. The anterolateral angle of the carapace is rectangularly rounded.

The abdomen is smooth. The pleurae of the first five segments are rounded, those of the fourth and fifth segments are rather narrow. The third segment is not produced in the median part of the posterior margin. The sixth segment is almost one and a half times as long as the fifth.

The telson is slightly less than one and a half times as long as the sixth abdominal segment.

The dorsal surface of the telson is provided with two pairs of minute spinules, the first of which lies somewhat behind the middle of the telson, the second about midway between the first pair and the posterior margin of the telson. This posterior margin is provided with three pairs of spinules, the outer of which is very short, the intermediate is longest and the median pair is about half as long as the intermediate.

The eyes are well developed and reach almost to the end of the basal segment of the antennular peduncle. The cornea is hemispherical and about as broad as, but distinctly shorter than the eyestalk. The ocellus is small but distinct.

The basal segment of the antennular peduncle is broad and has the stylocerite small and sharply pointed, it reaches almost the middle of the basal segment. The outer anterolateral angle of the basal segment ends in a strong spine; the anterior margin of the segment is produced forward into a sharp point, which reaches beyond the middle of the second segment of the antennular peduncle; the basal segment therefore appears to end into two distal spines. The second segment is shorter than the third, together they are more than half as long as the first segment. The upper antennular flagellum has the two rami fused for only three joints in my specimen.

The scaphocerite reaches distinctly beyond the antennular peduncle. The outer margin is slightly convex, ending in a strong tooth. The lamella is broad and reaches distinctly beyond the final tooth. The basal part of the antennal peduncle is provided with an outwards directed tooth; the last segment of the peduncle fails to reach the middle of the scaphocerite.

The oral parts show much resemblance to those of *P. aesopius*. The incisor process of the mandible (fig. 19a) in my specimen bears five teeth at the distal margin. The upper lobe of the palp of the maxillula (fig. 19b) is feebly developed. There is a notch between the basis and the coxa of the first maxilliped. The third maxilliped reaches the end of the antennal peduncle. The last segment measures $^3/_4$ of the penultimate segment. The antepenultimate is one and a half times as long as the penultimate, it is distinctly curved. The exopod reaches beyond the articulation between the antepenultimate and the penultimate segments.

The first pereiopod (fig. 18c) is slender and reaches with the fingers beyond the end of the scaphocerite. The fingers are about as long as the palm and unarmed. The carpus is distinctly longer than the chela. The merus is about as long as the carpus. The ischium is about half as long as the merus. The second pereiopods both are lacking in my specimen. The third pereiopod (fig. 18e) reaches slightly beyond the scaphocerite. The dactylus (fig. 18d) is curved and biunguiculate; the upper margin of the dactylus is provided with a movable spine. The propodus is about 5 times as long as the dactylus, it is provided with some scattered hairs, and bears some minute spinules along the posterior margin; near the base of the dactylus some serrate spines are present. The carpus is about half as long as the propodus. The ischium is more than half as long as the merus. The last two pereiopods are similarly built as the third.

The uropods are longer than the telson. The outer margin of the exopod is slightly convex and ends into two spines.

The present specimen entirely agrees with Borradaile's description and I do not hesitate to refer it to this very characteristic species, though the second pereiopods are lacking. About the type specimen of *Periclimenes commensalis* Kemp (1922) gives the following remark: "I have examined the type of this species and think that Borradaile is mistaken in stating that there are

two spines at the distal end of the basal antennular segment. The margin between the outer spine

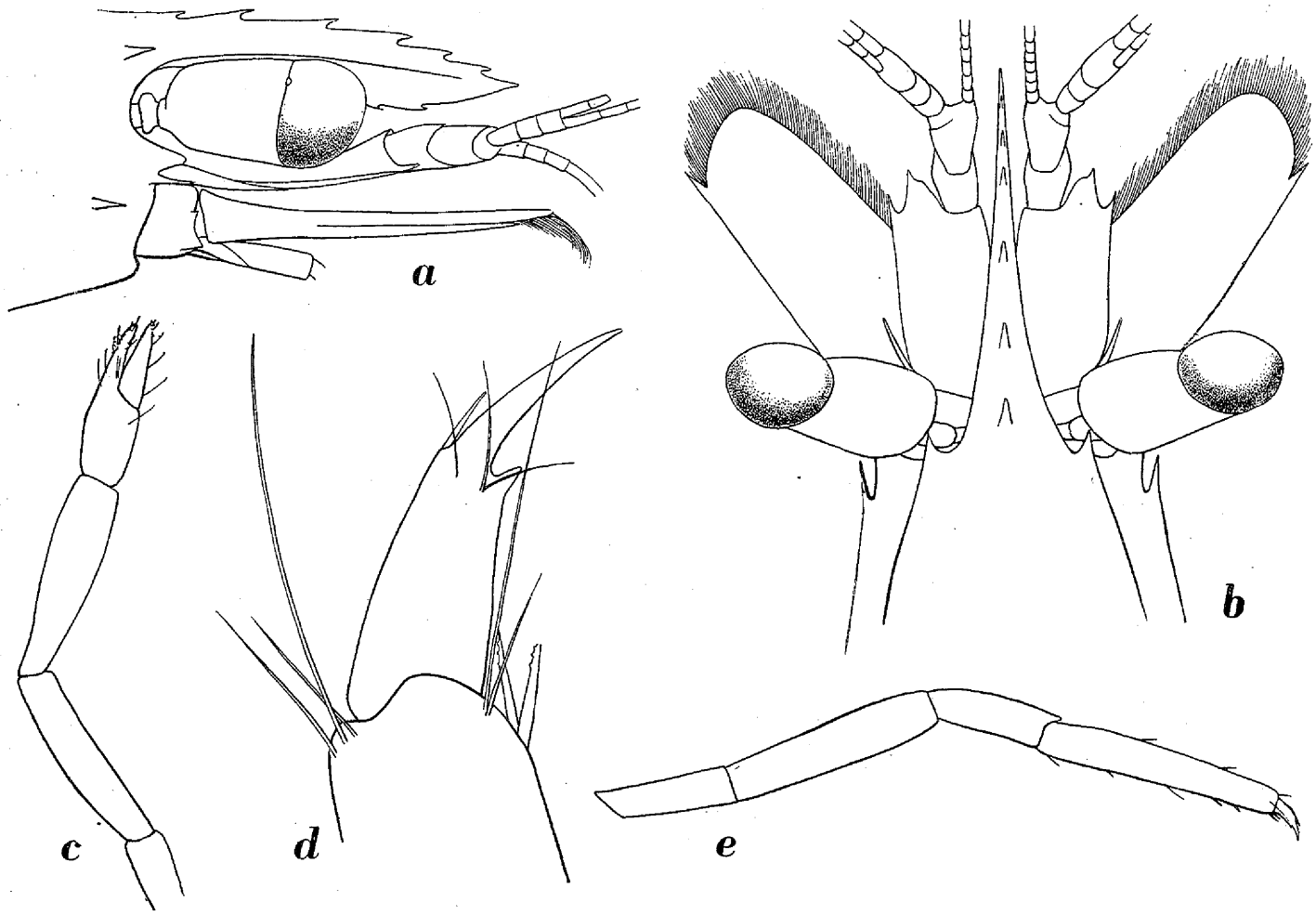

Fig. 18. *Periclimenes commensalis* Borr. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, first pereiopod; d, dactylus of third pereiopod; e, third pereiopod. a-c, e, × 27; d, × 130.

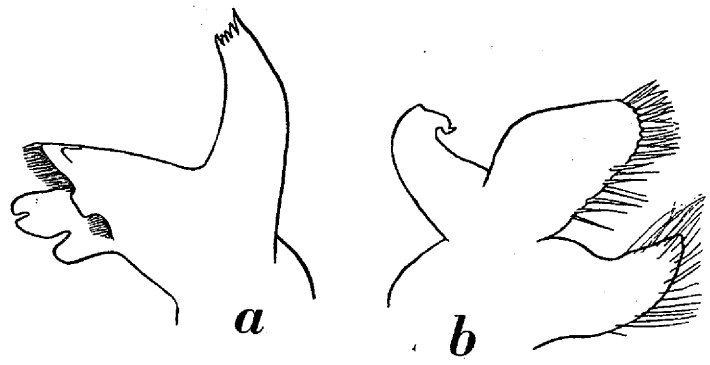

Fig. 19. *Periclimenes commensalis* Borr. a, mandible; b, maxillula. a, b, × 75.

and the articulation of the second segment is somewhat more produced than usual, but is rounded and does not end in a spine." In my specimen, just like described in Borradaile's description and in contradiction with Kemp's statement, the anterior margin of the first segment of the

antennular segment between the outer spine and the articulation with the second segment is produced into a distinct tooth.

Vertical distribution. The species is a litoral form. Borradaile's specimen was found on the Crinoid *Comanthus timorensis* (J. Müller) (= *C. annulatum* (Bell)), a species of which a specimen was collected also by the Siboga Expedition from the same locality as the present specimen of *Periclimenes commensalis*.

Horizontal distribution. The type of the species, the only specimen known up till now, was collected at Murray Island, Torres Straits. The species is new for the Malay Archipelago.

Periclimenes (*Periclimenes*) *ceratophthalmus* Borradaile (fig. 20)

Periclimenes (*Corniger*) *ceratophthalmus* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 211.
Periclimenes (*Corniger*) *ceratophthalmus* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 365, pl. 54 fig. 9.
Periclimenes (*Laomenes*) *ceratophthalmus* Clark, 1921, Bull. U. S. Nat. Mus., vol. 82 pt. 2, p. 629.
Periclimenes (*Ancylocaris*) *ceratophthalmus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 172.
Periclimenes (*Periclimenes*) *ceratophthalmus* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 324, fig. 18.

Snellius Expedition

Obi latu; shore and reef; April 27, 1930. — 1 ovigerous female 13 mm.

In my specimen the rostrum reaches slightly beyond the antennular peduncle and is outreached by the scaphocerite; it bears, as in Kemp's (1925) specimen, 5 teeth at the upper margin; the ultimate, however, is small and placed close to the apex. The first leg as in Kemp's specimen

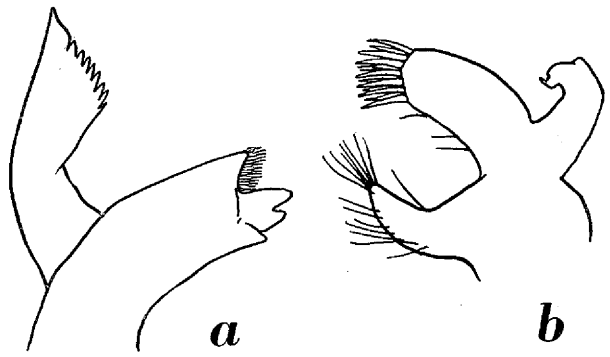

Fig. 20. *Periclimenes ceratophthalmus* Borr. a, mandible; b, maxillula. a, b, × 75.

outreaches the scaphocerite by more than its chela. The relation between the joints also is as indicated by Kemp and differs from Borradaile's description. The dactylus and the fixed finger of the second leg each bear three shallow teeth on the cutting edge. The situation of the hepatic spine and the shape of the cornea are entirely similar to those in Kemp's specimen. A character of the present species, which is mentioned neither by Borradaile (1917a) or by Kemp (1925) is the fact that the two pairs of spinules on the dorsal surface of the telson are extremely small and placed close to the lateral margins. The anterior pair as in most species of the present genus is placed in the middle of the telson, the posterior pair midway between it and the posterior margin.

The mandible (fig. 20a) is aberrant in the shape of the incisor process, this process namely widens distally; the distal margin of the incisor process bears about 9 teeth, the outer of which is

very broad. The rest of the oral parts is quite typical. The upper lobe of the palp of the maxillula (fig. 20b) is small. The epipod of the first maxilliped is more distinctly bilobed than in *P. aesopius.*

Vertical distribution. The species is a litoral form. Both specimens recorded in literature were found in association with Crinoids.

Horizontal distribution. Records in literature are: Hulule, Male Atoll, Maldive Archipelago (Borradaile, 1915, 1917a), West of Heratera Island, Maldive Archipelago (Kemp, 1925). The present record from the Malay Archipelago forms a considerable extension of the known range of distribution of the species.

Subgenus **Harpilius** Dana

The present subgenus, which is characterized by the possession of simple dactyli at the last three pereiopods, is named by Kemp (1922) *Ancylocaris.* As however the type species of the genus *Harpilius, H. lutescens,* is included here in the present subgenus, the name *Harpilius* Dana, 1852 becomes a synonym of *Ancylocaris* Schenkel, 1902; as Dana's name is older it must be used.

The oral parts in the present subgenus show the closest resemblance to those of the preceding.

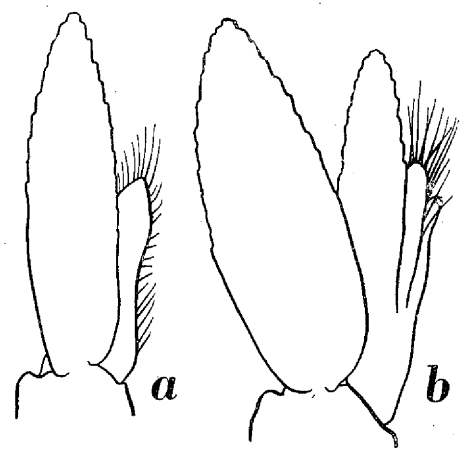

Fig. 21. *Periclimenes americanus* Kingsley ♂. a, first pleopod; b, second pleopod. a, b, × 42.

The shape of most parts, however, is more constant than in *Periclimenes* s.s. The incisor process of the mandible in my specimens of *Harpilius* for instance almost always ends in 3 (seldom 4 or 5) teeth. The molar process mostly bears brush-like arranged spinules, these spinules are absent in *P. nilandensis* and *P. seychellensis,* in other species they are few in number. The upper lobe of the palp of the maxillula varies in size, in *P. nilandensis* it is well developed, in *P. lutescens* it is much less distinct. The inner lacinia of the maxillula is rather slender. The maxilla shows no difference with that of *Periclimenes* s.s.; the maxillipeds too are closely similar to those of the preceding subgenus.

The shape of the endopod of the first pleopod of the male is, as far as I could control, rather uniform in the species of the present subgenus; the endopod namely is oval in shape and broadened near the apex, the inner margin is more or less distinctly concave. In none of the specimens of *Harpilius,* which I examined a tooth or irregular protuberance is present in the distal part of the inner margin of the endopod. For comparison with the other species, figures of the first two pleopods of *P. americanus* are given here (figs. 21a, b).

The present subgenus, the larger of the two subgenera forming the genus *Periclimenes,* is

represented in the collections at hand by 18 species, 4 of which are new to science. 19 species of this subgenus are known from Indonesia; three of these species could not be examined by me.

Periclimenes (*Harpilius*) *nilandensis* Borradaile (fig. 22)

Periclimenes (*Falciger*) *nilandensis* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 211.
Periclimenes (*Falciger*) *nilandensis* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 372, pl. 54 fig. 13.
Periclimenes (*Ancylocaris*) *nilandensis* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 172.

Siboga Expedition

Station 47, Bay of Bima, Sumbawa; trawl, dredge and shore exploration; depth up to 55 m; bottom mud with patches of fine coral sand; April 8-12, 1899. — 1 ovigerous female 16 mm.
Station 50, Bay of Badjo, westcoast of Flores; dredge, trawl and shore exploration; depth up to 40 m; bottom mud, sand and shells, according to locality; April 16-18, 1899. — 1 ovigerous female 11 mm.
Station 144, anchorage north of Salomake (= Damar) Island; dredge, townet and reef exploration; depth 45 m; coralbottom and lithothamnion; August 7-9, 1899. — 1 ovigerous female 15 mm.

The rostrum is rather broad and has the ultimate portion curved upward, it reaches to or beyond the scaphocerite. The dorsal margin is provided with 8 or 9 teeth, the proximal two of which are placed on the carapace behind the orbit, the ultimate tooth is situated close to the apex of the rostrum. The lower margin bears 3 or 4 teeth. Between the dorsal teeth and laterally of the ventral ones plumose setae are present. The lateral surface of the rostrum bears a longitudinal carina, which starts at the orbital margin and becomes weaker towards the tip of the rostrum. The carapace is smooth, provided with supraorbital, antennal and hepatic spines. The supraorbital spine is distinct and placed below the second tooth of the rostrum, it is situated more behind than above the orbit. The antennal spine is stronger than the supraorbital, it is placed below the acute lower orbital angle. The hepatic spine even is stronger than the antennal and is placed obliquely behind it on a lower level. The anterolateral angle of the carapace is rounded.

The abdominal segments are smooth. The pleurae of the first three segments are broadly rounded, those of the fourth segment are narrower but also rounded, while the pleurae of the fifth segment end in an acute posteriorly directed point. The posterior margin of the third segment is broadly produced in the middle, thereby somewhat overlapping the fourth segment. The sixth abdominal segment is about one and a half times as long as the fifth.

The telson is one and a half times as long as the sixth abdominal segment. Dorsally it bears two pairs of spinules; the anterior pair is situated before the middle of the telson, the posterior pair midway between the anterior pair and the posterior margin of the telson. This posterior margin bears three pairs of spinules, the outer pair is very short, the intermediate longest (about six times as long as the outer pair), the inner pair is slightly less than half as long as the intermediate pair.

The eyes are well developed. The cornea is hemispherical and about as broad as, but distinctly shorter than the stalk. The ocellus is rather inconspicuous. Two lines of black pigment are visible on the cornea.

The first segment of the antennula is broad, with a distinct, sharply pointed stylocerite, which just fails to reach the middle of the segment. The anterolateral angle of the basal segment of the

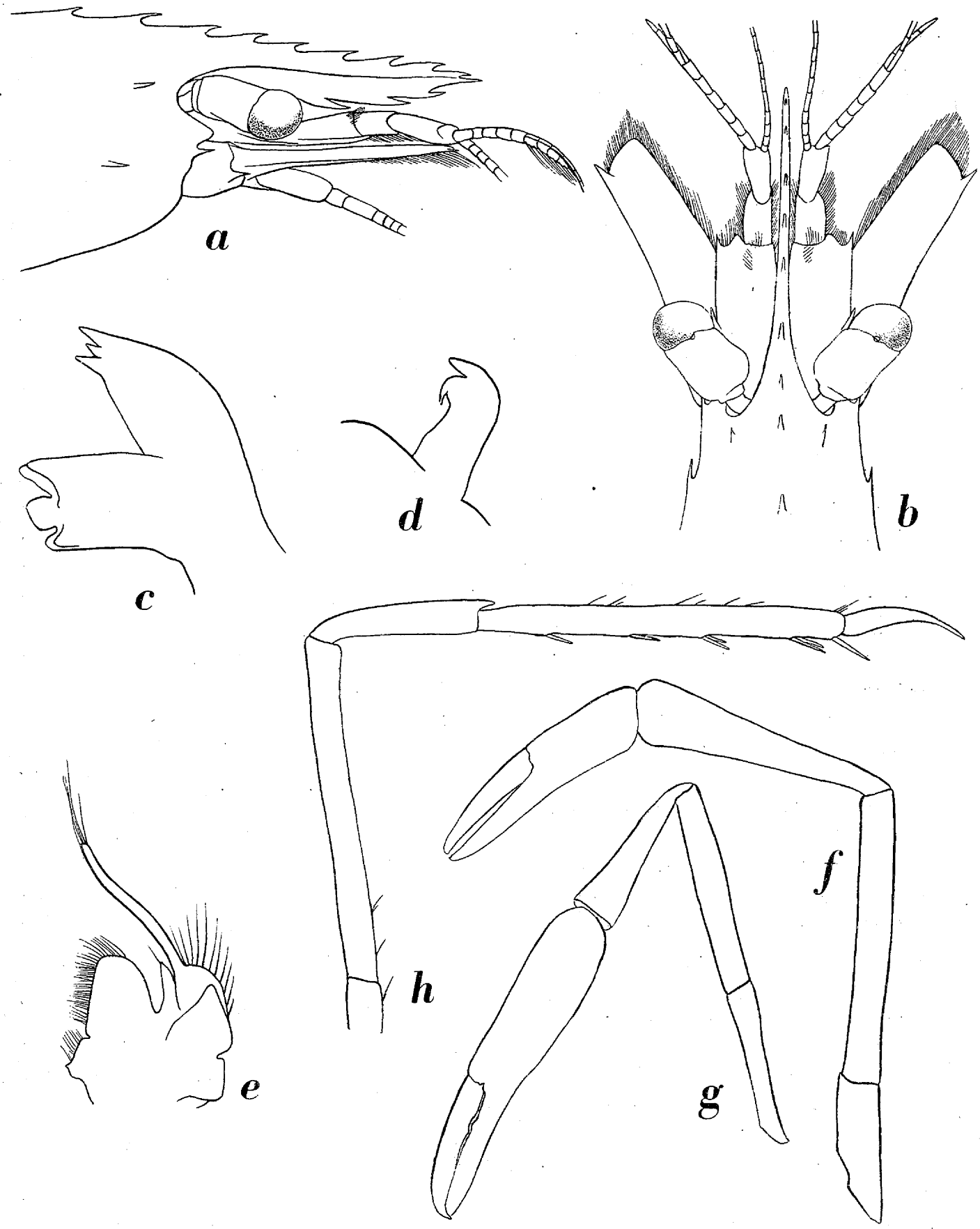

Fig. 22. *Periclimenes nilandensis* Borr. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, mandible; d, palp of maxillula; e, first maxilliped; f, first pereiopod; g, second pereiopod; h, third pereiopod. a, b, g, × 18; c, d, × 86; e, f, h, × 36.

antennula bears a strong spine, which does not extend as far as the middle of the second segment of the peduncle. The anterior margin of the basal segment is strongly convex. The second segment is broader than and about as long as the third segment. The first five or six segments of the two rami of the upper antennular flagellum are fused; the free part of the shorter ramus is about $^2/_3$ of the length of the fused portion.

The scaphocerite is broad and reaches slightly beyond the antennular peduncle. The anterior margin of the lamella is rounded. The outer margin of the scaphocerite is straight or slightly concave, it ends in a strong tooth which reaches to or slightly beyond the end of the lamella. The antennal peduncle is provided with a distinct tooth.

The oral parts offer no striking features. The molar process of the mandible (fig. 22c) bears no spines. The palp of the maxillula (fig. 22d) is deeply cleft. The coxa of the first maxilliped (fig. 22e) ends in a lateral tooth. The third maxilliped reaches distinctly beyond the antennal peduncle. The ultimate segment measures about $^2/_3$ of the penultimate, which is slightly shorter than the antepenultimate segment. The exopod nearly reaches the end of the antepenultimate joint.

The first pereiopod (fig. 22f) is slender, reaching slightly beyond the scaphocerite. The fingers are as long as the palm, unarmed. The carpus is longer than the chela and as long as the merus. The ischium is much shorter than the merus. The pereiopods (fig. 22g) are equal or slightly unequal, reaching with the chela or even with part of the carpus beyond the scaphocerite. The fingers measure $^2/_3$ of the length of the palm, both fingers bear two teeth on the proximal part of the cutting edge. The carpus is broadest anteriorly, narrowing towards the base, it is slightly shorter than the palm, the anterior margin bears no spines. The merus possesses no anteroventral spine, it is slightly longer than the carpus. The ischium is shorter than the merus. The last three pereiopods are slender. The third (fig. 22h) reaches slightly beyond the scaphocerite. The dactylus is slender, rather broad at base, and ending in a long slightly curved point. The propodus is three to four times as long as the dactylus and has the posterior margin provided with movable spinules. The carpus is about half as long as the propodus. The merus is about as long as the propodus. The ischium is about as long as the carpus. The fourth and fifth pereiopods are similarly built as the third.

The uropods are longer than the telson proper, but fail to reach the tips of the intermediate pair of spinules of the posterior margin of the telson. The outer margin of the exopod is straight or slightly convex, provided with setae and ending into two spines, the inner of which is movable. The upper surface of the endopod bears some scattered hairs.

My specimens differ from Borradaile's (1917a) description and figure in the following details:

1. The second joint of the antennular peduncle in my specimens is not longer than the third, generally even slightly shorter.
2. In my specimens the first two legs are stronger than figured by Borradaile, and the fingers are provided with teeth.

Distribution. This litoral species is recorded in literature only from S. Nilandu Atoll, Maldive Archipelago (Borradaile, 1915, 1917a).

Periclimenes (*Harpilius*) *amboinensis* (De Man)

Anchistia amboinensis De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 546, pl. 22a fig. 2.

Periclimenes amboinensis Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 383.
Periclimenes (*Corniger*) *amboinensis* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 366.
Periclimenes (*Ancylocaris*) *amboinensis* Kemp, 1922, Rec. Indian Mus., vol. 24. p. 172.

The species is not represented in the material examined, but nevertheless is mentioned here, as it is recorded in literature from Indonesia.

Distribution. The only record of the present species is that by De Man (1888) from Amboina.

Periclimenes (*Harpilius*) *psamathe* (De Man) (fig. 23)

Urocaris psamathe De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 816, pl. 25 fig. 51.
Urocaris psamathe Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 323, 354, pl. 53 fig. 3.
Periclimenes (*Ancylocaris*) *psamathe* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 173.

Siboga Expedition

Station 164, between Misool and New Guinea, 1° 42′.5 S, 130° 47′.5 E; dredge; depth 32 m; bottom sand, small stones and shells; August 20, 1899. — 4 specimens 15-24 mm.

Snellius Expedition

Amboina; pier, 0-2 m; May 6, 1930. — 3 specimens (included ovigerous female) 17-25 mm.
Ternate; divinghood, 2-4 m; June 6, 1930. — 1 specimen 19 mm.

The length of the rostrum in my specimens varies between once and twice the length of the carapace. The teeth of the rostrum are arranged just like in De Man's figure. The hepatic spine

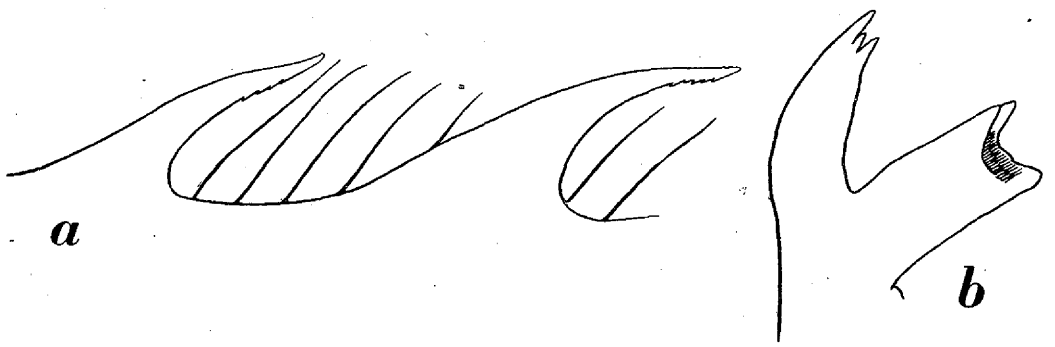

Fig. 23. *Periclimenes psamathe* (De Man). a, basal dorsal teeth of rostrum; b, mandible. a, b, × 75.

is placed at the same level as the antennal, sometimes even slightly higher than it. De Man states that the antennal peduncle is unarmed, in all my specimens, however, a small external tooth is present.

The teeth of the dorsal margin of the rostrum (fig. 23a) show a feature not noted by De Man or Borradaile: the upper part of the anterior margin of these teeth namely is finely serrate.

The oral parts are typical (fig. 23b).

Distribution. This litoral species is recorded in literature from: N. Male Atoll, Maldive Archipelago (Borradaile, 1917a), Diego Garcia, Chagos Archipelago (Borradaile, 1917a), Ternate (De Man, 1902).

Periclimenes (*Harpilius*) *galene* nov. spec. (fig. 24)

Snellius Expedition

Amboina; pier, 0-2 m; May 6, 1930. — 1 ovigerous female 16 mm.
Islet near Menado; September 25, 1930. — 2 specimens (juveniles) 11 and 12 mm.

The rostrum reaches slightly beyond the scaphocerite; the lower margin is straight, unarmed. The rostrum is highest above the eyes, sloping down towards the apex. One dorsal tooth is placed on the carapace behind the orbit and a considerable distance behind the second dorsal tooth. This second tooth is placed just above the orbit on the highest point of the rostrum; between this tooth and the apex of the rostrum six more dorsal teeth are present, the proximals placed close together, the distals being more spaced. The ultimate tooth is situated close to the apex. The carapace is smooth and provided with antennal and hepatic spines. The antennal spine is situated a large distance below the rounded lower orbital angle. The hepatic spine lies behind the antennal, on about the same level or even slightly above it. The anterolateral angle of the carapace is broadly rounded.

The abdomen is smooth. The pleurae of the first five segments are rounded. The posterior margin of the third segment is slightly produced in the median. The sixth abdominal segment is slightly more than twice as long as the fifth.

The telson is shorter than the sixth abdominal segment. The dorsal surface is provided with two pairs of small spinules, which are placed close to the lateral margins. The anterior pair of spinules is situated slightly before the middle of the telson, the posterior lies slightly closer to the anterior pair than to the posterior margin of the telson. This posterior margin is provided with three pairs of spinules; the outer pair is shortest, the intermediate pair longest and the inner pair is intermediate in length between the two other pairs.

The eyes are well developed. The cornea is as broad, but about half as long as the stalk; it is hemispherical and in my specimens of a bluish grey colour with two circular spots of dark pigment, one at the upper and one at the lower surface of the cornea. The eyes reach about $^3/_4$ of the basal segment of the antennular peduncle.

The basal segment of the antennular peduncle is long and not very broad, it reaches beyond the middle of the scaphocerite; the stylocerite is sharply pointed and directed slightly outward, it almost reaches the middle of the basal segment. The outer margin of the basal segment is convex and ends in a sharp tooth; the anterior margin is strongly convex. The second and third segments are subequal, together they are longer than half the basal segment. The two rami of the upper antennular flagellum are fused for 5 segments. The free part of the shorter ramus is about half as long as the fused part.

The scaphocerite has the inner margin almost parallel to the outer. The inner anterior angle of the lamella is more or less acute. The outer margin of the scaphocerite is slightly concave and ends in a strong tooth, which does not reach the end of the lamella. The scaphocerite reaches about to the end of the antennular peduncle. The basal part of the antennal peduncle is provided with a small external tooth. The last segment of the peduncle just fails to reach the end of the basal antennular segment.

The oral parts are quite typical.

The third maxilliped is small and narrow, reaching about to the base of the scaphocerite. The ultimate segment is as long as the penultimate. The antepenultimate segment is longest, the exopod fails to reach its apex.

The first pereiopod (fig. 24e) is slender, it fails to reach the end of the scaphocerite. The

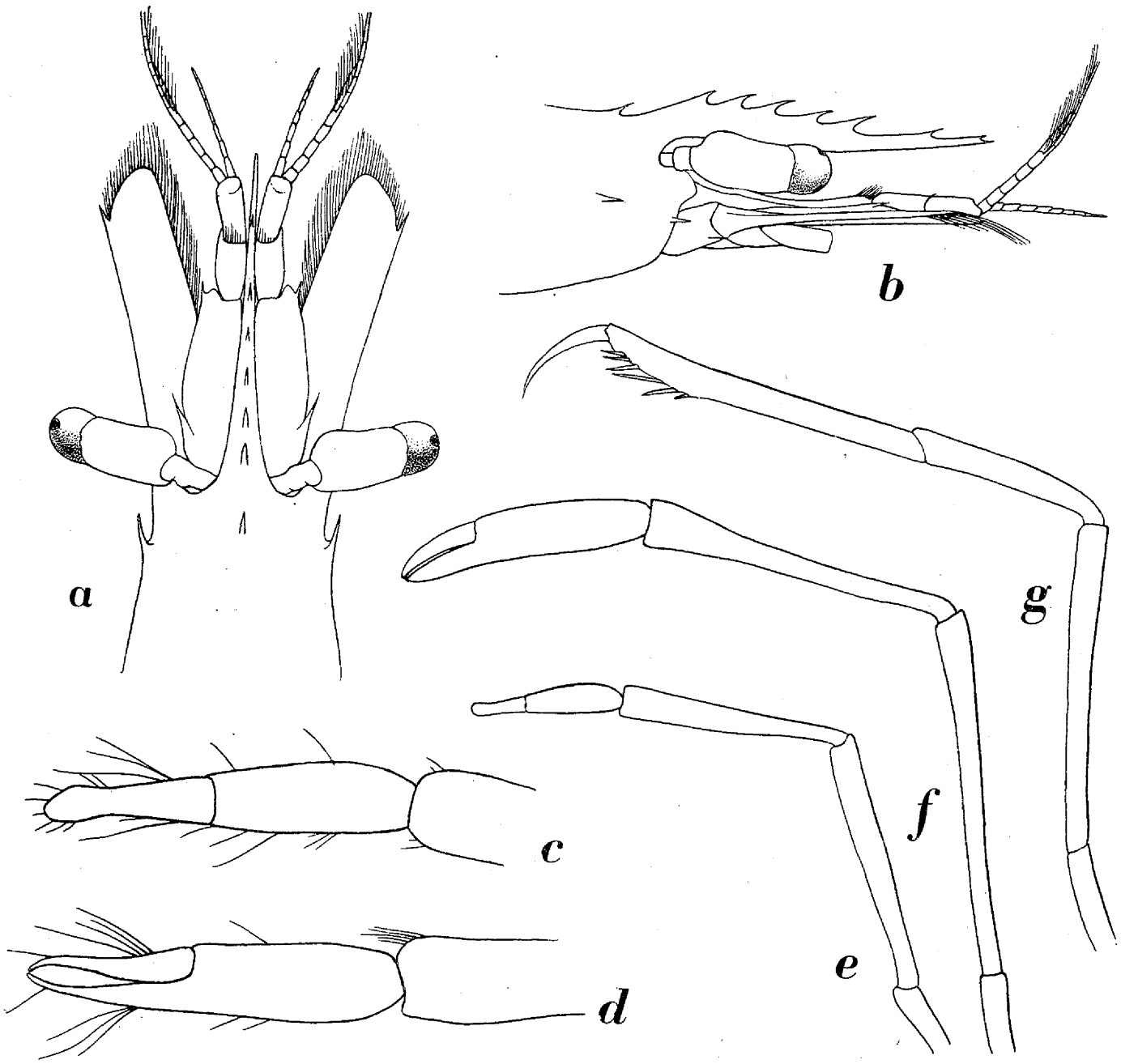

Fig. 24. *Periclimenes galene* nov. spec. a, anterior part of body, dorsal view; b, anterior part of body, lateral view; c, chela of first pereiopod, dorsal view; d, chela of first pereiopod, lateral view; e, first pereiopod; f, second pereiopod; g, fifth pereiopod. a, b, × 18; c, d, × 86; e-g, × 36.

fingers (figs. 24c, d) are shorter than the palm and have a peculiar shape: when seen from above they are rather narrow, depressed, and suddenly, like a spoon, broadened near the apex. The carpus is almost one and a half time as long as the chela. The merus is somewhat longer than the carpus. The second pereiopods (fig. 24f) are longer than the first, reaching almost with the entire chela

beyond the scaphocerite; they are not much stronger than the first pair. The fingers are half as long as the palm. The carpus is about one and a half time as long as the chela. The merus is unarmed and longer than the carpus. The ischium is about half as long as the merus. The last three pereiopods (fig. 24g) are slender. The third almost reaches the end of the scaphocerite. The dactylus is simple, long, strongly curved, being about one third of the length of the propodus. The propodus is distinctly broadened in the distal third and the posterior margin there is provided with about 8 very long and movable spines, the rest of the posterior margin is unarmed. This broadened and spinulate distal part and the strongly curved dactylus give the pereiopod a subprehensile appearance. The carpus is about $^2/_3$ of the length of the propodus. The merus is longer than the propodus. The ischium is short. The fourth and fifth legs are similarly built as the third.

The uropods are oval, and longer than the telson. The outer margin of the exopod is slightly convex, and naked, it ends into two spines, the inner of which is movable.

The young specimens from Menado differ from the adult female, of which the description is given above, by the much shorter rostrum, which reaches about to the end of the basal segment of the antennular peduncle and by bearing 5 or 6 teeth only on the dorsal margin of the rostrum proper. In one of the juveniles no tooth is placed on the carapace behind the orbit.

The present species shows a great affinity to *Periclimenes psamathe* De Man among specimens of which it was collected at Amboina, and firstly was considered by me to be an aberrant specimen of that species. It may, however, be distinguished at once by the shape of the rostrum and that of the pereiopods.

Periclimenes galene is closely related to *Periclimenes platalea* Holthuis from West Africa. The differences between these two species have already been pointed out in the original description of the Atlantic species (Holthuis, 1951, p. 160).

Periclimenes (*Harpilius*) ? *calmani* Tattersall

Periclimenes calmani Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 385, pl. 27 fig. 11, pl. 28 figs. 14, 15.
Periclimenes (*Ancylocaris*) *calmani* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 176.
? *Periclimenes* (*Ancylocaris*) *leptopus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 173, figs. 31-33.
Periclimenes calmani Balss, 1927, Trans. zool. Soc. Lond., vol. 22, p. 223.
Periclimenes calmani Gurney, 1927, Trans. zool. Soc. Lond., vol. 22, pp. 229, 264, figs. 66-69.
Periclimenes Calmani Monod, 1930, Zool. Anz., vol. 92, p. 138.
Periclimenes Calmani Monod, 1932, La Terre et la Vie, vol. 2, p. 66.

Siboga Expedition

Station 65a, off Tanah Djampeah, Flores Sea, about 7° 0′ S, 120° 34′.5 E; dredge; depth 120-400 m; bottom pale grey mud, changing during haul into coral bottom; May 6, 1899. — 1 ovigerous female 12 mm.
Station 213, Salajar anchorage and surroundings, including Pasitanete Island; trawl, townet and reef exploration; depth up to 36 m; bottom coralreefs, mud and mud with sand; September 26-October 26, 1899. — 1 specimen 11 mm.

The present specimens show affinities to *Periclimenes calmani* Tattersall as well as to *Periclimenes leptopus* Kemp. From both species they differ in some points so much that I hesitate to

identify them with one of these species. On the other hand the differences are not so important in my opinion that the foundation of a new species is justified.

The rostrum is straight or slightly curved downward, reaching slightly beyond the antennular peduncle, but failing to reach the end of the scaphocerite. The upper margin bears seven teeth, the first of which is placed on the carapace behind the orbit, it is more remote from the second tooth than the third is. The second tooth is placed slightly beyond, almost over, the orbit. The lower margin bears two teeth. Both margins are provided with setae. The carapace is smooth, provided with antennular and hepatic spines, which are placed on almost the same level, just like in Kemp's figure of *Periclimenes leptopus* and in Tattersall's figure of *P. calmani.* The anterolateral angle is rounded.

The abdomen is smooth. The pleurae of the first five segments are rounded. The third abdominal segment is slightly produced in the median part of the posterior margin.

The telson bears two pairs of dorsal spinules, the first pair is placed before the middle of the telson, the second midway between the first pair and the posterior margin of the telson. The posterior spines of the telson are as in *P. leptopus.*

The eyes are broad; the cornea is hemispherical and as broad as, but shorter than the stalk. The ocellus is distinct and fused with the cornea.

The antennulae are shaped as in *P. leptopus.*

The scaphocerite reaches beyond the antennular peduncle. The outer margin is concave and ends in a strong tooth, which reaches beyond the lamella. The lamella is narrowed towards the top. In the specimen from Station 213 the lamella is somewhat broader than in the specimen from Sta. 65a.

The oral parts are typical for the genus.

The third maxilliped reaches slightly beyond the antennal peduncle. The last segment measures $^3/_4$ of the penultimate. The antepenultimate segment is longest and curved. The exopod reaches almost the end of the antepenultimate segment.

The first pereiopod reaches with the entire chela and part of the carpus beyond the scaphocerite. The fingers are longer than the palm and are unarmed. The carpus is about one and a half time as long as the chela. The merus is distinctly shorter than the carpus and slightly longer than the ischium. The second pereiopod reaches with the chela and the larger part of the carpus beyond the scaphocerite. The fingers are slender, distinctly shorter than the palm; the cutting edge in the specimen of Sta. 65a is unarmed, the specimen from Sta. 213 has the cutting edge in the larger leg as in *P. calmani,* in the smaller leg no teeth are visible. The length of the carpus is intermediate between that of the palm and the chela; the carpus is broadest anteriorly, narrowing posteriorly, unarmed. The merus is shorter than the carpus and longer than the ischium, it is unarmed. The last three pereiopods are slender. The dactylus is long, slender, curved and about $^1/_3$ of the length of the propodus. The propodus is provided with movable spines on the posterior margin, in the specimen from Sta. 213 these spines are not very distinct. The carpus is about half as long as the propodus. The merus is of the same length as the propodus, while the ischium is as long as the carpus.

The specimens differ from *P. calmani* in the following points:

1. Rostral formula: My specimens both have two ventral teeth, while Tattersall's specimen has four teeth on the lower margin.
2. The first pereiopods are longer, but the relation between their joints are as in *P. calmani.*

From *Periclimenes leptopus* they differ in the following points:

a. The merus of the first pereiopod is shorter than the carpus and not longer.
b. The fingers of the second pereiopods are shorter than the palm.
c. The carpus of the second pereiopod is shorter than the chela.
d. The propodi of the last three legs are provided with posterior spinules.

In the characters mentioned under 1 and 2 my specimens agree with *P. leptopus,* in those mentioned under a, b and c they agree with *P. calmani,* being thereby more or less intermediate between the two species. K e m p (1922) mentions the presence or absence of denticulations on the fingers as a character for distinguishing the two species, as shown by my material this character is not specific as in the specimen from Sta. 213 the larger leg is provided with such teeth on the fingers, the smaller leg being devoid of them. I think it therefore well possible that *P. leptopus* and *P. calmani* belong to one variable species; this, however, only can be proven by more material.

Vertical distribution. G u r n e y (1927) mentions that *Periclimenes calmani* in the Suez Canal occurs in water of about 2 meters deep, but never is found in quite shallow water along the shore. K e m p's specimens of *P. leptopus* are collected between 3.5 and 9 m depth.

Horizontal distribution. *Periclimenes calmani* is known from: Port Said (B a l s s, 1927), Lake Timsah, Suez Canal (B a l s s, 1927), near Kabret, Suez Canal (B a l s s, 1927), Sudan coast, Red Sea (T a t t e r s a l l, 1921). *P. leptopus* is known from Brigade Creek, Port Blair, Andaman Islands (K e m p, 1922).

Periclimenes (Harpilius) seychellensis Borradaile (fig. 25)

Periclimenes ensifrons Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 234.
Periclimenes tenuipes p.p. Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
Periclimenes (Falciger) seychellensis Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 212.
Periclimenes (Falciger) seychellensis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 375, pls. 54, 55 fig. 14 a-i.
Periclimenes (Ancylocaris) seychellensis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 176, textfigs. 34, 35, pl. 6 fig. 7.

Siboga Expedition

Near Station 76, southern entrance of Makassar Strait, about 4° 22′.1 S, 118° 16′.9 E; in floating *Sargassum*; June 9, 1899. — 3 specimens (1 of which is an ovigerous female) 10-12 mm.
Station 230, Banda Sea south of Amboina, 3° 58′ S, 128° 20′ E; in floating *Sargassum*; November 14, 1899. — 1 ovigerous female 13 mm.

Snellius Expedition

Station 64, Sulu Sea, 7° 41′.0 N, 121° 01′.5 E; surface, handnet; September 6, 1929. — 2 ovigerous females 14 and 15 mm.
Sipankot, near Sibutu, Sulu Islands; between seagrass near the shore; September 11, 1929. — 4 specimens (one of which is an ovigerous female) 12-16 mm.
Kera near Timor; depth 0-1 m; November 11-13, 1929. — 2 specimens 10 and 12 mm.
Station 363, Banda Sea, 6° 02′.0 S, 131° 52′.0 E; October 23, 1930. — 5 specimens 6-17 mm.

The specimens agree well with K e m p's description. The tubercle on the eyestalk is distinct in all specimens. The carpus of the second pereiopods often is slightly longer than the palm.

The oral parts are typical; the molar process of the mandible (fig. 25) bears no spines.

Two specimens of this species are preserved in the collection of the Museo Civico di Storia Naturale in Genoa, Italy, both originating from Beagle Bay, Papua. The smaller of the two specimens (11 mm long) has been reported upon by Nobili (1899) under the name *Periclimenes ensifrons.* The other, an ovigerous female of 12 mm, formed part of the material identified by Nobili (1899) as *Periclimenes tenuipes*; the other specimens brought by Nobili to the latter species proved to belong to *Leander tenuicornis* (Say).

Fig. 25. *Periclimenes seychellensis* Borr. mandible. × 75.

Vertical distribution. Kemp (1922) states that he collected the species among weeds in shallow water. Most specimens from the Siboga and from the Snellius Expedition are found among floating weeds on high sea.

Horizontal distribution. The species is recorded from: Ain Musa and Tor, both in the Gulf of Suez (Kemp, 1922), Praslin, Seychelles (Borradaile, 1915, 1917a), Kilakarai and Pamban, both in the Gulf of Manaar (Kemp, 1922), Port Blair, Andaman Islands (Kemp, 1922), Beagle Bay, Papua (Nobili, 1899). The present records from the Malay Archipelago extend the known range of distribution of the species.

Periclimenes (*Harpilius*) *jugalis* nov. spec. (fig. 26)

Siboga Expedition

Station 273, anchorage off Djedan Island, eastcoast of the Aru Islands; pearl banks; trawl, dredge and divers; depth 13 m; bottom sand and shells; December 23-26, 1899. — 1 specimen 16 mm.

The rostrum is straight, it almost reaches the end of the antennular peduncle. It is not very high; the upper margin is provided with 9 teeth, which are placed at about equal distances from each other; only the first, which is placed on the carapace, is situated closer to the second than the third is. The second tooth is placed just over the posterior margin of the orbit. The lower margin of the rostrum is straight and provided with two small teeth in the anterior part; the posterior of these teeth, which is largest, is placed slightly before the penultimate dorsal tooth; the anterior ventral tooth, which is extremely small, lies on a level between the apex and the ultimate dorsal tooth. The posterior part of the ventral margin of the rostrum is provided with a row of setae. The carapace is smooth and provided with antennal and hepatic spines. The antennal spine is placed below the lower orbital angle, which is strongly forwards produced so as to form a narrow lobe. The hepatic spine is situated

behind the antennal and lies on a much lower level. The anterolateral angle of the carapace is rectangular, and rounded at the top.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are narrower, but with rounded tips. The third abdominal segment is slightly produced in the median posterior part. The sixth abdominal segment is almost twice as long as the fifth.

The telson is slightly longer than the sixth abdominal segment, its dorsal surface is provided with two pairs of very small spinules in the posterior half. The posterior pair lies midway between the anterior pair and the posterior margin of the telson. This posterior margin is provided with three pairs of spinules, the intermediate of which are longest.

The eyes are well developed. The hemispherical cornea is as broad as and distinctly shorter than the stalk. The ocellus is fused with the cornea, and is rather distinct.

The first segment of the antennular peduncle is broad; the stylocerite is small, sharply pointed and reaches about to the middle of the basal segment. The anterolateral spine of the basal segment is strong and reaches the middle of the second segment; the anterior margin of the basal segment is strongly convex. The second segment is distinctly shorter and broader than the third, together they measure about $^2/_3$ of the first segment. The upper antennular flagellum has the fused part of the two rami consisting of about 5 segments, the free portion of the shorter ramus is broken at both sides in my specimen.

The scaphocerite reaches distinctly beyond the antennular peduncle. The lamella is rather broad, reaching beyond the final tooth. The anterolateral angle of the lamella is rather acute. The outer margin of the scaphocerite is straight or somewhat concave. The antennal peduncle bears a stout spine.

The oral parts are typical.

The third maxilliped does not reach the end of the antennal peduncle. The last segment is about $^2/_3$ of the length of the penultimate. The antepenultimate segment is longest, slender, with the exopod failing to reach its distal end.

The first pereiopod (fig. 26c) is rather stout and reaches with the fingers only beyond the scaphocerite. The fingers are shorter than the palm and unarmed, their tips are provided with tufts of hair. The carpus is slightly longer than the chela and about as long as the merus. The second pereiopod (fig. 26d) is strong, reaching with the carpus and the chela beyond the scaphocerite. The fingers are short, being less than half as long as the palm, the tips are crossing. The cutting edge of the dactylus bears one, that of the fixed finger two proximal teeth, the upper tooth fits between the two lower; the rest of the edges is unarmed. The carpus is about half as long as the chela and is slightly broadened anteriorly. The anterior margin bears no teeth. The merus is intermediate in length between the carpus and the palm, it is as long as the ischium; no anteroventral tooth is present on the merus. As only one of the second pereiopods is present in my specimen it is not known whether the right and left legs are equal. The last three pereiopods are slender. The third (fig. 26e) just fails to reach the end of the scaphocerite. The dactylus is about $^1/_5$ to $^1/_6$ of the length of the propodus, it is simple with a slender, curved tip. The propodus is provided with some posterior denticles and some long hairs. The carpus is more than half as long as the propodus. The merus is broader than the other joints and is as long as the propodus or slightly longer than it. The ischium is about half as long as the merus.

The uropods reach beyond the end of the telson, the endopod, however, fails to reach the end of the posterior spinules of the telson. The exopod has the outer margin straight, provided with a row of setae along the lower border and ends into two spines the outer of which is rather inconspicuous.

The present species is most closely related to *Periclimenes diversipes* Kemp, but differs from that species in the shape of the rostrum, in the strongly produced lower orbital angle and in the shape

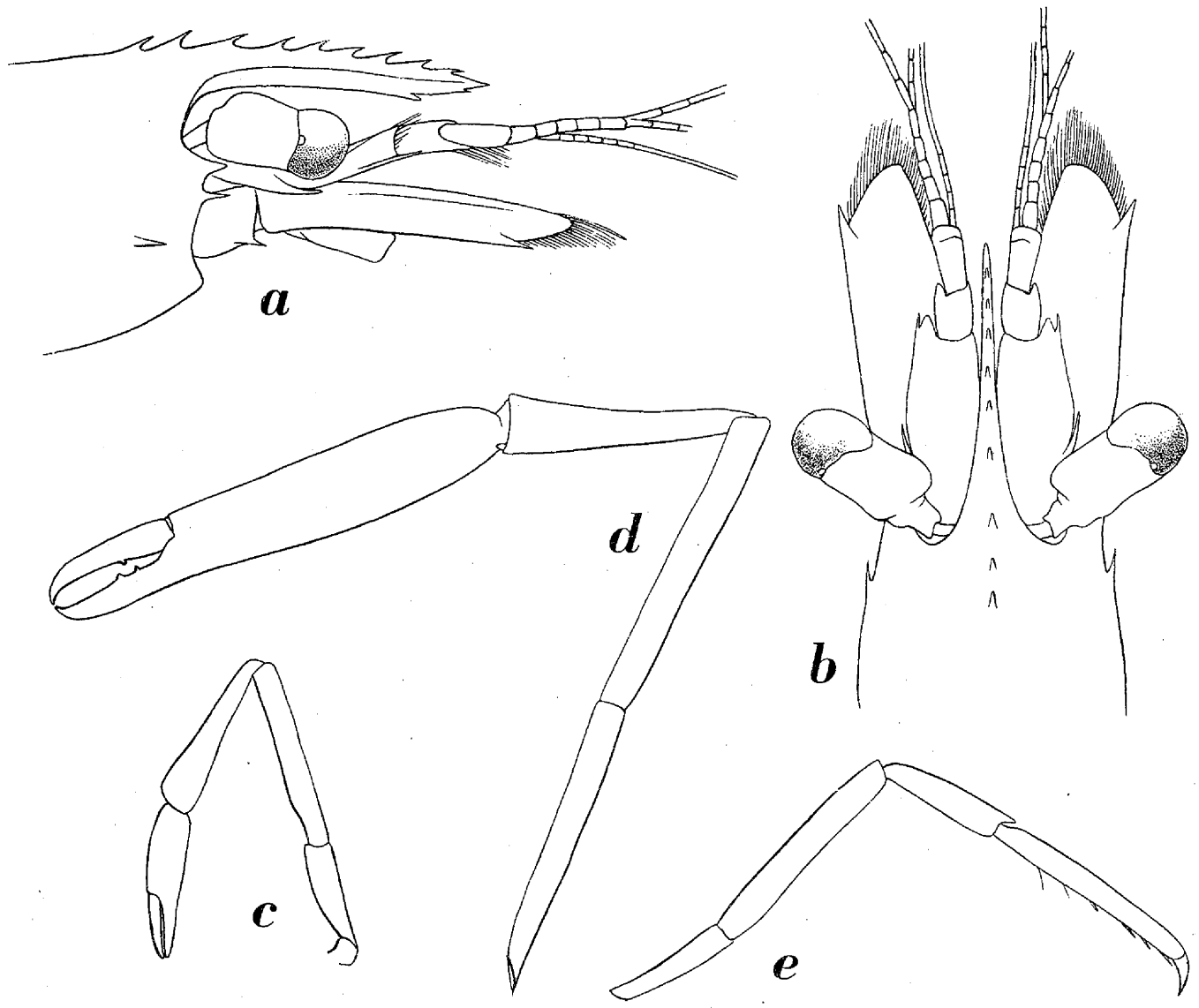

Fig. 26. *Periclimenes jugalis* nov. spec. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, first pereiopod; d, second pereiopod; e, third pereiopod. a-e, × 18.

of the second pereiopods, which is entirely different from each of the four types, which may be found in *P. diversipes*.

Periclimenes (*Harpilius*) *brevicarpalis* (Schenkel) (fig. 27)

Nicht bestimmte Palaemonide Richters, 1880, Beitr. Meeresfauna Mauritius, pl. 18 figs. 10, 11.
Palaemon sp. Saville-Kent, 1893, Barrier Reef of Australia, p. 145, chromopl. 2.
Palaemonella amboinensis Zehntner, 1894, Rev. Suisse Zool., vol. 2, p. 206, pl. 9 fig. 27.
Bithynis spec. Coutière, 1898, Bull. Mus. Hist. nat. Paris, vol. 4, p. 198.
Palaemonella amboinensis De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 811.

Ancylocaris brevicarpalis Schenkel, 1902, Verh. naturf. Ges. Basel, vol. 13, p. 563, pl. 13 fig. 21.
Palaemonella aberrans Nobili, 1904, Bull. Mus. Hist. nat. Paris, vol. 10, p. 234.
Harpilius latirostris Lenz, 1905, Abh. Senckenb. naturf. Ges., vol. 27, p. 380, pl. 47 fig. 14.
Periclimenes potina Nobili, 1905, Bull. Mus. Hist. nat. Paris, vol. 11, p. 159.
Periclimenes potina Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 44, pl. 3 fig. 8.
Ancylocaris aberrans Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 52, pl. 4 fig. 9.
Ancylocaris aberrans Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 64.
Palaemonella amboinensis Bedot, 1909, Rev. Suisse Zool., vol. 17, p. 166.
Periclimenes hermitensis Rathbun, 1914, Proc. zool. Soc. Lond., 1914, p. 655, pl. 1 figs. 1-3.
Ancylocaris aberrans Kemp, 1916, Rec. Indian Mus., vol. 12, p. 389.
Ancyclocaris brevicarpalis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 355.
Ancyclocaris aberrans Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 356.
Ancyclocaris latirostris Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 356.
Ancyclocaris hermitensis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 356.
Palaemonella amboinensis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 358.
Periclimenes potina Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 363.
Periclimenes (*Ancylocaris*) *potina* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 184.
Periclimenes (*Ancylocaris*) *brevicarpalis* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 185, textfigs. 40-42, pl. 6 fig. 8.
Periclimenes (*Ancylocaris*) *brevicarpalis* McCulloch & McNeill, 1923, Rec. Aust. Mus., vol. 14, p. 58, fig. 2.
Periclimenes brevicarpalis Gravely, 1927, Bull. Madras Govt. Mus., n. ser. vol. 1, p. 137, pl. 19 fig. 3.
Periclimenes brevicarpalis Stephenson, Stephenson, Tandy & Spender, 1931, Sci. Rep. Great Barrier Reef Exped., vol. 3, pp. 47, 73.
Periclimenes brevicarpalis Roughley, 1936, Wonders Great Barrier Reef, p. 271.
Periclimens (*Ancylocaris*) *brevicarpalis* Yu, 1936a, Chin. Journ. Zool., vol. 2, p. 91.
Periclimenes (*Ancylocaris*) *brevicarpalis* Kubo, 1940, Journ. Imp. Fish. Inst., vol. 34, p. 46, figs. 13, 14.
Periclimenes (*Ancylocaris*) *brevicarpalis* Barnard, 1947, Ann. Mag. nat. Hist., ser. 11 vol. 13, p. 391.
Periclimenes (*Ancylocaris*) *brevicarpalis* Nayar, 1947, Proc. Indian Acad. Sci., sect. B vol. 26, p. 168, figs. 1-10.
Periclimenes (*Ancylocaris*) *brevicarpalis* Barnard, 1950, Ann. S. Afr. Mus., vol. 38, p. 794, fig. 150e-h.

Siboga Expedition

Station 50, Bay of Badjo, westcoast of Flores; dredge, trawl and shore exploration; depth up to 40 m; bottom mud, sand and shells, according to locality; April 16-18, 1899. — 2 ovigerous females 15 and 16 mm.
Station 76, southern entrance of Makassar Strait, 4° 22'.1 S, 118° 16'.9 E; in *Sargassum*; June 9, 1899. — 1 specimen 11 mm.
Station 93, Sanguisiapo Island, Tawitawi Group, Sulu Archipelago; reef; depth 12 m; June 24 and 25, 1899. — 1 ovigerous female 20 mm.
Station 149, anchorage off Fau Island, westcoast of Gebe Island; reef; depth 31 m; August 10 and 11, 1899. — 1 specimen 26 mm.
Station 313, anchorage east of Dangar besar, Saleh Bay, Sumbawa; reef; depth up to 36 m; in Actinian; February 14-16, 1900. — 2 specimens 20 and 21 mm.

Snellius Expedition

Red Sea, 17° 30' N, 40° 30' E; surface, handnet; April 17, 1929. — 2 specimens 9 and 10 mm.
Maratua; reef; August 14-18, 1929. — 2 specimens (one of which is an ovigerous female) 29 and 35 mm.

Station 64, Sulu Sea, 7° 41′.0 N, 121° 01′.5 E; surface, handnet; September 6, 1929. — 2 specimens 8 and 12 mm.
Station 330, Ceram Sea, 2° 22′.5 S, 128° 00′.5 E; September 8, 1930. — 5 specimens 11-17 mm.
Station 363, Banda Sea, 6° 02′.0 S, 131° 52′.0 E; October 22, 1930. — 1 specimen 10 mm.

Museum Leiden

Bay of Djakarta (= Batavia); 1927; leg. W. C. van Heurn. — 1 ovigerous female 20 mm.
Amboina; 1877; leg. J. E. Teysmann. — 1 specimen 34 mm.
Amboina; 1879; leg. Schorel. — 1 specimen 36 mm.
Waigeo, northwest of New Guinea; 1864; leg. H. A. Bernstein. — 1 specimen 30 mm.

Museum Amsterdam

Inhaca, Portuguese E. Africa; leg. C. J. van der Horst. — 1 specimen 32 mm.
Serute Island, north of E. Flores, 123° 1′ 29″ E, 8° 9′ 7″ S; from coralreefs, exposed during springtide (lowtide); November 11, 1908; leg. G. A. J. van de Sande. — 1 specimen 22 mm.

The oral parts of *P. brevicarpalis* are quite typical, the maxillula is figured here (fig. 27a). The mandible bears spines on the molar process.

The endopod of the first pleopod of the male has the inner margin not distinctly concave (fig. 27b).

Kemp (1922) extensively dealt with the present species and pointed to its variability. He also showed the identity of *Ancylocaris aberrans, hermitensis* and *latirostris* with the present species.

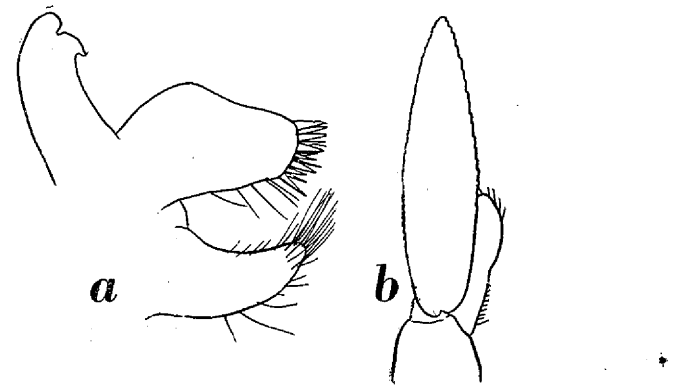

Fig. 27. *Periclimenes brevicarpalis* (Schenkel). a, maxillula; b, first pleopod of male. a, × 50; b, × 21.

He referred *Palaemonella amboinensis* Zehntner with some doubt to this species. In my opinion there is no reason for this doubt as the small number of points in which Zehntner's figure of *Palaemonella amboinensis* differs from *Periclimenes brevicarpalis* are probably due to inaccuracy of the drawing, as also is stated by De Man (1902); almost the same inaccuracy is shown in Lenz's figure of *Harpilius latirostris,* here namely the antennular peduncle and the scaphocerite also are not entirely correctly drawn.

As Zehntner's (1894) description of *Palaemonella amboinensis* is published before Schenkel's (1902) *Ancylocaris brevicarpalis,* the specific name *amboinensis* should have priority over *brevicarpalis* and the new combination *Periclimenes amboinensis* (Zehntner) should have to be used; this latter name, however, is preoccupied by the name *Periclimenes amboinensis* (De Man, 1888) Borradaile, 1898, so that *Periclimenes brevicarpalis* remains the correct name for the present species.

Nobili (1905, 1906) described a new species, *Periclimenes potina* from floating weeds off the South Arabian coast. Kemp (1922) in his key separates this species from *Periclimenes brevicarpalis* on the supposed longer carpus of the second pereiopod: this carpus in *P. potina* should be longer, in *P. brevicarpalis* shorter than half the length of the palm. Now Nobili (1906) in his description of *P. potina* states: "Le carpe [of the second pereiopod] est très court, à peine plus long que le quart de la main entière." Because the palm, as stated by Nobili, in *P. potina* is slightly longer than the fingers, the carpus must be about half as long as the palm. Now in *P. brevicarpalis* the carpus not always is distinctly shorter than half the palm, sometimes (especially in younger specimens) it is as long as half the palm or even slightly longer, which also is shown in Kemp's pl. 6 fig. 8. Nevertheless the shortness of the carpus remains a very good character to distinguish *P. brevicarpalis* from species as *P. calmani* and *P. seychellensis*. When comparing Nobili's description of *P. potina* with that of Kemp of *P. brevicarpalis* I only could find following differences:

1. the first pereiopod in *P. potina* is shorter, it does not reach the end of scaphocerite.
2. the second pereiopod in *P. potina* is shorter too.
3. the fingers of the first pereiopod in *P. potina* are gaping.

The first two characters are of a juvenile nature as also is shown in my material of young specimens of the present species. The last character may be explained by the fact that the margin of each finger near the cutting edge is very thin and transparent in young specimens, so that when seen from aside the fingers indeed seem to be gaping, but when seen in oblique view it becomes clear that they in reality are closed over their entire length. It is therefore obvious that *Periclimenes potina* Nobili is nothing else but a juvenile stage of *Periclimenes brevicarpalis*.

According to a note of the collector, the specimen from Serute Island (Museum Amsterdam) was collected after being drugged by "tuba" (*Derris elliptica* Benth.) a well known fishpoison.

Vertical distribution. The species is a litoral form and the adult specimens live in association with sea-anemones of the genera *Thalassianthus* and *Stoichactis*; in literature the latter genus often is mentioned under the name *Discosoma* Ehr. The records are: *Stoichactis* spec. (Kemp, 1916, 1922; Borradaile, 1917; McCulloch & McNeill, 1923; Barnard, 1950), *Stoichactis giganteum* (Forssk.) (Coutière, 1898; Nobili, 1906a, b; Gravely, 1927; Nayar, 1947), *Stoichactis haddoni* (Saville-Kent) (Saville-Kent, 1893), *Stoichactis kenti* (Hadd. & Sh.) (Stephenson, Stephenson, Tandy & Spender, 1931; Kubo, 1940), *Thalassianthus hypnoides* (Saville-Kent) (Stephenson, Stephenson, Tandy & Spender, 1931). Young specimens are found among floating weeds on high sea.

Horizontal distribution: Records in literature are: Jibuti (Coutière, 1898; Nobili, 1904, 1906b), Bawi and Kokotoni, Zanzibar (Lenz, 1905), Delagoa Bay, S.E. Africa (Barnard, 1947, 1950), Mauritius (Richters, 1880), off the southcoast of Arabia, 16° 35′ N, 54° 26′ E (Nobili, 1905, 1906), Bahrein Island, Persian Gulf (Nobili, 1906), Gulf of Manaar (Nayar, 1947), Krusadai Island, Gulf of Manaar (Gravely, 1927), Kilakarai, Gulf of Manaar (Kemp, 1922), Spike Island, Great Coco Island and Port Blair, Andaman Islands (Kemp, 1922), Hai-kiu-sche, Hainan, S. China (Yu, 1936a), Isigaki Island, Okinawa Group, Riukiu Islands (Kubo, 1940), Makassar, Celebes (Schenkel, 1902), Ternate (De Man, 1902), Amboina (Zehntner, 1894), Hermite, Monte Bello Islands, W. Australia (Rathbun, 1914), Torres Straits (Borradaile,

1917), Murray Island, Torres Straits (McCulloch & McNeill, 1923), Great Barrier Reef (Saville-Kent, 1893; McCulloch & McNeill, 1923; Stephenson, Stephenson, Tandy & Spender, 1931; Roughley, 1936), Hope Island, off Cooktown, N. Queensland (McCulloch & McNeill, 1923), Port Denison, Queensland (McCulloch & McNeill, 1923), Saddleback Island, off Port Denison (McCulloch & McNeill, 1923), Santa Cruz Islands, Oceania (Kemp, 1922).

Periclimenes (Harpilius) batei Holthuis

Brachycarpus audouini Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 798, pl. 129 fig. 5.
Palaemon audouini Ortmann, 1891, Zool. Jb. Syst., vol. 5, p. 728 (non Heller, 1862).
Brachycarpus Audouini Thomson, 1903, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 8, p. 451.
Brachycarpus audouini Hutton, 1904, Index Faun. Nov. Zeal., p. 255.
Brachycarpus audouini Thomson, 1913, Trans. Proc. New Zeal. Inst., vol. 45, p. 240.
Periclimenes (Ancylocaris) audouini Kemp, 1925, Rec. Indian Mus., vol. 27, p. 326.
Periclimenes batei Holthuis, 1950a, Siboga Exped., mon. 39 a 9, p. 22.

The present species, of which no material is at my disposal, for the first time was described by Bate (1888) under the name *Brachycarpus audouini.* Ortmann (1891) transferred the species to the genus *Palaemon.* As the name *Palaemon audouini* is used already as early as 1862 by Heller for a species of *Macrobrachium,* Bate's name may not be used as it is a younger homonym. Kemp (1925) showed that the species of Bate in reality belongs to the genus *Periclimenes.* As no other specific name than *audouini* had been used for the species, and as this name is invalid I proposed the new name *Periclimenes batei* for it in my 1950a paper.

Vertical distribution. The species is reported by Bate (1888) and by Thomson (1903) from a depth of 18 m, Thomson (1903) remarks that "it is apparently common in shallow waters round the coasts."

Horizontal distribution. The species is only known from New Zealand. The records in literature are: Cook Strait, 41° 4′ S, 174° 19′ E (Bate, 1888), Tasman Bay and Blueskin Bay, Middle Island (Thomson, 1903), Otago Harbour, Middle Island (Thomson, 1913).

Periclimenes (Harpilius) sibogae nov. spec. (figs. 28, 29)

Siboga Expedition

Station 240, Banda anchorage; trawl, dredge and reef exploration; depth 9-36 m; bottom black sand and coral, lithothamnion bank in 18-36 m; November 22 to December 1, 1899. — 1 specimen 16 mm.

The rostrum is long and slender, reaching beyond the antennular peduncle, but failing to reach the end of the scaphocerite. The upper margin is provided with seven teeth, the first of which is situated on the carapace behind the posterior margin of the orbit; the distal teeth are placed closer together than the proximals. The lower margin of the rostrum bears two teeth, which are placed a considerable distance before the apex. The carapace is smooth and provided with antennal and hepatic spines only. The antennal spine is placed some distance below the rounded lower orbital angle. The

hepatic spine is smaller than the antennal and placed behind it on a lower level. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first four segments are broadly rounded, that of the fifth segment ends in a posteriorly directed tooth. The sixth segment is short, being only slightly longer than the fifth. The telson in my specimen is broken close to the base. In the remaining part no spinules are visible.

The eyes are well developed. The cornea is hemispherical and a small but distinct ocellus is present; the pigment of the cornea seems to be arranged so that it leaves two rather large spots, one in the upper and one in the lower part of the cornea without pigment. The eyestalk is narrower than the cornea.

The basal segment of the antennular peduncle is broad; the stylocerite is small and sharply pointed, it reaches almost the middle of the segment. The anterolateral spine of the basal segment is strong and reaches beyond the middle of the second segment of the peduncle. The second and third peduncular segments are small and narrow, subequal in length and together less than half as long as the first segment of the peduncle. The upper flagella are very unequal: the left has the two rami fused for about 15 segments, the right for about 6 segments. In both the free part of the shorter ramus is rather short and consists of about three joints.

The scaphocerite is slender, narrowing towards the top, being there about half as broad as at the base. The final tooth reaches distinctly beyond the lamella. The outer margin of the scaphocerite is concave. The basal part of the antennal peduncle is provided with a strong outwards directed spine. The end of the peduncle reaches about $^1/_3$ of the scaphocerite.

The oral parts are typical.

The third maxillipeds reach about to the base of the scaphocerite, they fail to reach the end of the antennal peduncle. The ultimate segment is short, measuring about $^2/_3$ of the penultimate segment, which is about half as long as the antepenultimate; the latter is slender and curved. The exopod reaches distinctly beyond the end of the antepenultimate segment.

The first pereiopods (fig. 28c) are slender and reach with part of the carpus beyond the scaphocerite. The chela is broad, the fingers are distinctly longer than the palm, both are provided at the cutting edges with a series of pectinations. The palm is about quadrangular. The carpus is more than twice as long as the chela, it is narrow at its base, broadening rapidly in the anterior third. The merus is slightly shorter than the carpus. The second legs (fig. 28d, e) are robust, the left leg is stronger than the right. The dactylus of the left leg is compressed, highest anteriorly and provided at the lower margin with two small blunt teeth; the fixed finger is slender, the cutting edge provided with about seven blunt teeth. The tips of the fingers are strongly curved and crossing. The palm is about twice as long as the fingers, it is somewhat swollen, cylindrical. The carpus is less than half as long as the palm, narrow at its base, gradually broadening anteriorly. The anterior margin of the carpus bears three very strong spines, one in the dorsal, one in the ventral and one in the inner part of the margin. The merus is slender and measures one and a half times the length of the carpus, it does not possess any anteroventral spine. The right pereiopod differs from the left by the more slender shape of all joints; furthermore the dactylus is as slender as the fixed finger; the fingers are only slightly shorter than the palm. The last three pereiopods are slender. The dactylus of the third leg (fig. 28f) is simple and about one fourth to one fifth of the length of the propodus. The propodus

is provided with spinules at the posterior margin. The carpus is slightly less than half as long as the propodus, the anterior margin forms a lobe over the articulation with the propodus as in many species

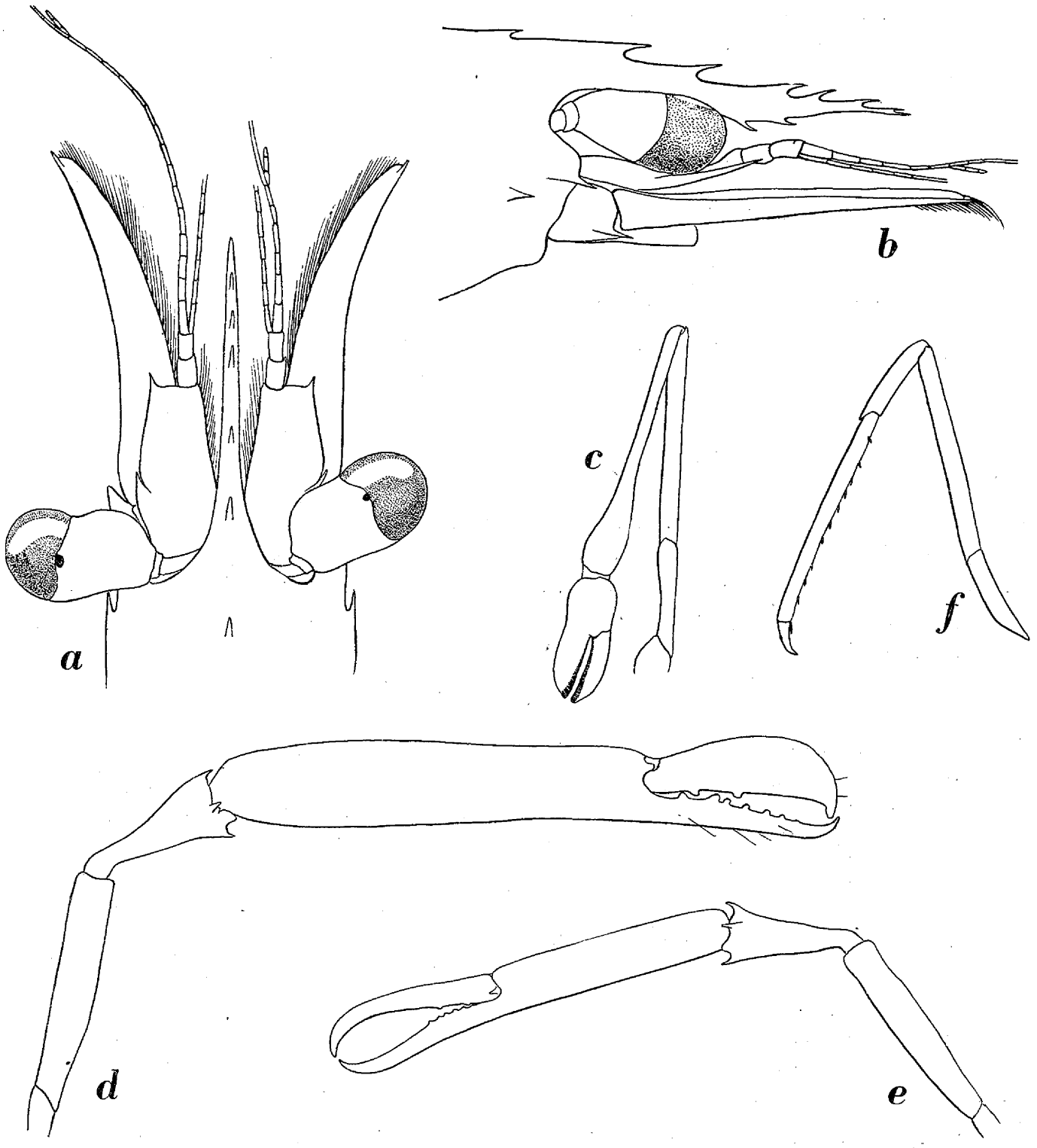

Fig. 28. *Periclimenes sibogae* nov. spec. a, anterior part of body, dorsal view; b, anterior part of body, lateral view; c, first pereiopod; d, left second pereiopod; e, right second pereiopod; f, third pereiopod. a-c, f, × 15; d, e, × 10.

of the present genus. The merus is twice as long as the carpus. The fourth and fifth legs are similarly built as the third.

The first two pleopods of the male are shown in figs. 29a, b.

The uropods are ovate; the exopod has the outer margin straight and ending into two spines, it is provided with a row of setae along its lower border.

The present species shows most affinity to *Periclimenes frater,* which is the only other species of the subgenus *Harpilius,* which has the fingers of the first pereiopod pectinate and the merus of

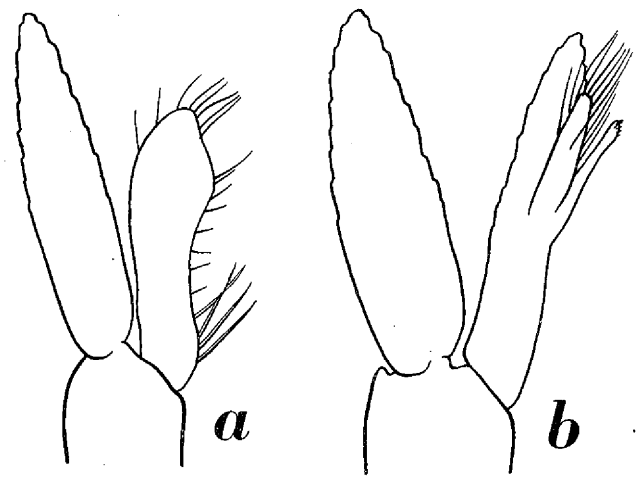

Fig. 29. *Periclimenes sibogae* nov. spec. ♂. a, first pleopod; b, second pleopod. a, b, × 56.

the second pereiopod without an anteroventral tooth. Furthermore it agrees with that species in the absence of a supraorbital spine, in the presence of a hepatic spine, in the short carpus of the second legs. It differs from *P. frater* by having only one spine at the anterolateral angle of the basal segment of the antennular peduncle and by the different rostral formula. As already pointed out (pp. 52, 53) *P. frater* probably is a synonym of *P. soror,* in which case it has to be referred to the subgenus *Periclimenes* s.s.

Periclimenes (*Harpilius*) *spiniferus* De Man (fig. 30)

Anchistia inaequimana Heller, 1865, Reise Novara Zool., ser. 2 vol. 3, p. 109.
Periclimenes Petitthouarsii De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 541.
Palaemonella tridentata Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
Periclimenes petitthouarsii var. *spinifera* De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 824.
Periclimenes Petitthouarsii var. *spinigera* Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 49.
Periclimenes Petitthouarsi var. *spinifera* Lenz, 1910, Voeltzkow's Reise Ost-Afrika, vol. 2, p. 567.
Periclimenes petitthouarsi var. *spinifera* Pesta, 1914, Denkschr. Akad. Wiss. Wien, vol. 89, p. 675.
Periclimenes (*Falciger*) *spiniferus* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 369, pl. 52 fig. 1.
Periclimenes (*Ancylocaris*) *spiniferus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 195.
Periclimenes spiniferus Balss, 1925, Wiss. Ergebn. Valdivia Exped., vol. 20, p. 293.
Periclimenes (*Falciger*) *spiniferus* Edmondson, 1925, Bull. Bishop Mus. Honolulu, n. 27, p. 8.
Periclimenes (*Ancylocaris*) *spiniferus* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 322.
Periclimenes (*Ancylocaris*) *spiniferus* McNeill, 1926, Aust. Zool., vol. 4, p. 300.
Periclimenes spiniferus Gravely, 1927, Bull. Madras Govt. Mus., n. ser. vol. 1, p. 137, pl. 19 fig. 4.
Periclimenes spiniferus Stephenson, Stephenson, Tandy & Spender, 1931, Sci. Rep. Great Barrier Reef Exped., vol. 3, p. 47.
Periclimenes (*Ancylocaris*) *spiniferus* Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 165, pl. 44.
Periclimenes (*Ancylocaris*) *spiniferus* Armstrong, 1941, Amer. Mus. Novit., n. 1137, p. 12.

Siboga Expedition

Station 78, Lumulumu shoal, Borneo Bank; reef; depth 34 m; bottom coral and coralsand; June 10 and 11, 1899. — 4 specimens 13-22 mm.
Station 79b, Kabala dua Island, Borneo Bank; reef; depth 22 m; bottom coralsand; June 12 and 13, 1899. — 1 ovigerous female 16 mm.
Station 115, eastside of Pajunga Island, Kuandang Bay; reef; July 9-11, 1899. — 1 specimen 14 mm.
Station 172, anchorage between Geser and Ceramlaut, reef; depth 18 m; coral- and lithothamnion-bottom; August 26-28, 1899. — 1 specimen 11 mm.

Snellius Expedition

Maratua; reef; August 14-18, 1929. — 3 specimens 13-15 mm.
Kera near Timor; November 11-13, 1929. — 2 specimens 15 and 16 mm.
Sarappo, Spermonde Archipelago, near Makassar; shore; March 1, 1930. — 1 specimen 12 mm.
Bone Tambung, Spermonde Archipelago, near Makassar; shore and reef; March 2, 1930. — 1 specimen 17 mm.
Obi latu; shore and reef; April 27, 1930. — 3 specimens 13-17 mm.
Ake Selaka, Kau Bay, Halmaheira; May 28, 1930. — 1 specimen 18 mm.
Karaton, Nenusa Islands; shore; May 20, 1930. — 4 specimens (included ovigerous females) 8-20 mm.
Beo, Karakelong, Talaud Islands; 6-10 m; June 14-21, 1930. — 1 specimen 11 mm.

Museum Amsterdam

Berhala Island, eastcoast of Sumatra; December 26, 1929; leg. J. C. van der Meer Mohr. — 7 specimens (included ovigerous females) 8-23 mm.

The cornea in all my specimens is provided with a ring of black pigment, as is also observed by Kemp (1922) in his material; the ring is interrupted at the place where it touches the line that separates the cornea from the eyestalk; inside the ring no pigment could be observed, outside pigment is present, but there the cornea still is much paler than the ring.

The oral parts of the species are quite typical, they have already been figured by Borradaile (1917a).

The first two pleopods of the male are figured here (figs. 30a, b), the endopod shows the shape typical of the members of *Harpilius*.

Boone's (1935) statement that the typeseries of the present species should be preserved in the Leiden Museum is quite erroneous; firstly there is no typeseries but only a typespecimen, namely the specimen described by De Man in 1902; furthermore the typespecimen in all probability is preserved in the Senckenberg Museum and the specimens described by De Man (1888) as *Periclimenes petitthouarsii* according to Lenz (1910) are deposited in the Lübeck Museum.

The specimen from Beagle Bay identified by Nobili, 1899, as *Palaemonella tridentata* still is present in the collection of the Museo Civico di Storia Naturale in Genoa, Italy, where it was examined by me in June 1950. It proved to belong to *Periclimenes spiniferus*.

Distribution. This litoral species is recorded in literature from: Tamatave Reef, E. Madagascar (Lenz, 1910), Coetivy, Seychelles (Borradaile, 1917a), Mahé, Seychelles (Balss, 1925), Goidu, Goifurfehendu Atoll, Maldive Archipelago (Borradaile, 1917a), Hulule, Male Atoll, Maldive Archipelago (Borradaile, 1917a), Salomon Island and Diego Garcia, Chagos Archipelago (Borradaile, 1917a), Pamban, Gulf of Manaar (Kemp, 1922), Krusadai Island,

Gulf of Manaar (Gravely, 1927), off Sentinel Island, Andaman Islands (Kemp, 1922), Port Blair, Andaman Islands (Kemp, 1922), Camorta Island, Nicobar Islands (Kemp, 1925), off Reed Point, Nancowry Island, Nicobar Islands (Kemp, 1925), Edam Island, Java Sea (De Man, 1888), Ternate (De Man, 1902), Amboina (De Man, 1888), Beagle Bay, Papua (Nobili, 1899), Northwest Islet, Capricorn Group, Queensland (McNeill, 1926), Great Barrier Reef (Stephenson, Stephenson, Tandy & Spender, 1931), Samoa (Pesta, 1914; Kemp, 1922; Boone, 1935), Savaii, Samoa Islands (Armstrong, 1941), Tahiti (Heller, 1865), Wake Island (Edmondson, 1925).

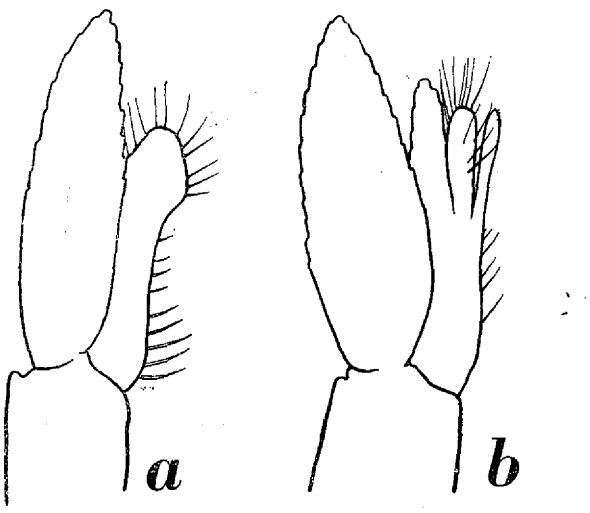

Fig. 30. *Periclimenes spiniferus* (De Man) ♂. a, first pleopod; b, second pleopod. a, b, × 56.

Periclimenes (*Harpilius*) *petitthouarsi* (Audouin)

Without name Savigny, 1809, Descr. Egypte, atlas, Crust., pl. 10 fig. 3.
Palaemon Petitthouarsii Audouin, 1825, Descr. Egypte, ed. 1, Hist. nat. vol. 1 pt. 4, p. 91.
Palaemon Petitthouarsii Audouin, 1827, Descr. Egypte, ed. 2 vol. 22, p. 276, atlas Crust., pl. 10 fig. 3.
Palemon Petithouarsii Roux, 1831, Mém. Class. Crust. Salic., p. 16.
Anchistia inaequimana Heller, 1861, Verh. zool.-bot. Ges. Wien, vol. 11, p. 28.
Anchistia inaequimana Heller, 1862, S. B. Akad. Wiss. Wien, vol. 44 pt. 1, p. 283.
non *Anchistia inaequimana* Heller, 1865, Reise Novara, Zool., vol. 2 pt. 3, p. 109.
Anchistia Petitthouarsii Paulson, 1875, Invest. Crust. Red Sea, p. 114.
Anchistia Petitthouarsi Kossmann, 1880, Zool. Ergebn. Reise Roth. Meeres, p. 83.
non *Anchistia petitthouarsi* ? Miers, 1884, Rep. zool. Coll. Alert, p. 293.
non *Anchistia Petitthouarsii* De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 541.
Periclimenes Petitthouarsi Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 381.
Periclimenes Petitthouarsi Nobili, 1901a, Annu. Mus. zool. Univ. Napoli, n. ser. vol. 1 pt. 3, p. 6.
Periclimenes Petitthouarsi Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 41.
Periclimenes Petitthouarsii Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 49.
Periclimenes Petitthouarsi Lenz, 1912, Ark. Zool., vol. 7 pt. 29, p. 2.
Periclimenes Petitthouarsii Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 25.
Periclimenes (*Falciger*) *petitthouarsi* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 369.
Periclimenes petitthouarsii Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 385.
Periclimenes (*Ancylocaris*) *petitthouarsi* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 196.
Periclimenes petitthouarsi Balss, 1927, Trans. zool. Soc. Lond., vol. 22, p. 223.
Periclimenes petitthoursii Ramadan, 1936, Bull. Fac. Sci. Egypt. Univ., vol. 6, p. 22.

Museum Leiden

Jidda, Red Sea; 1881; leg. J. A. Kruyt. — 9 specimens (included ovigerous females) 14-18 mm.

The present specimens agree well with the descriptions and figure given in literature of this typical Red Sea species. The figure of Savigny is the only I could find in literature; this figure is so accurate that it hardly can be corrected, only the shape of the third maxilliped is not quite correct as has already been observed by Kossmann (1880).

The oral parts of the present species very strongly resemble those of the preceding. Also the first two pleopods of the male strongly resemble those of the previous species.

The specimen from Port Molle referred by Miers (1884) with some doubt to the present species, is specifically different from it; the specimen shows much affinity to *Periclimenes grandis,* but differs from that species in the shape of the second pereiopod.

The collection of the Museo Civico di Storia Naturale in Genoa possesses a specimen of this species from Arat Island, Red Sea.

Distribution. This litoral species is known from: Red Sea (Heller, 1861, 1862; Paulson, 1875; Kossmann, 1880; Balss, 1927), Egypt (Savigny, 1809; Audouin, 1825), Tor, Sinai Peninsula (Lenz, 1912; Balss, 1915; Kemp, 1922), Sherm Sheikh, Sinai Peninsula (Balss, 1915), Ghardaqa (Ramadan, 1936), Sherm Sheikh, Africa (Balss, 1915), Berenice, Halaib, Jidda, Raveiya, and Aqiq, Red Sea (Balss, 1915), Khor Dongonab, and Suakin Harbour (Tattersall, 1921), Eritrea (Nobili, 1901a, 1906b), Massawa (Nobili, 1906b; Balss, 1915), Kamaran Island (Balss, 1915), Jibuti (Nobili, 1906b), Perim (Nobili, 1906b), N.E. of Arzana Island, Gulf of Persia (Nobili, 1906). The species is restricted to the Red Sea and the Persian Gulf, in the rest of the Indo-Westpacific region it is represented by *Periclimenes spiniferus* De Man.

Periclimenes (Harpilius) andamanensis Kemp

Periclimenes (Ancylocaris) andamanensis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 204, figs. 54-57.
Periclimenes andamanensis Dammerman, 1929, Krakatau, p. 117.
Periclimenes andamanensis Dammerman, 1948, Verh. Kon. Nederl. Akad. Wetensch., sect. 2 vol. 44, p. 511, fig. 43.

Though the present species is not represented in the collections at hand, it is mentioned here as it is recorded in literature from Indonesia.

I am not quite convinced that the present species is distinct from *P. elegans.* The differences mentioned by Kemp are very small and based on characters, which in many species prove to be variable.

Distribution. The species is recorded by Kemp (1922) from Port Blair, Andaman Islands in depths between 3 and 8 fathoms. Dammerman (1929, 1948) in his papers on the new fauna of Krakatau mentions a specimen from a brackish water lake on Verlaten Island, a small islet situated in the Sunda Strait between Java and Sumatra. The specimen was identified by the late J. Roux.

Periclimenes (Harpilius) grandis (Stimpson)

Anchistia grandis Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860, p. 39.
Anchistia ensifrons Müller, 1887, Verh. naturf. Ges. Basel, vol. 8, p. 471.

Anchistia ensifrons De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 545.
Anchistia grandis Sharp, 1893, Proc. Acad. nat. Sci. Philad., 1893, p. 118.
Anchistia ensifrons Ortmann, 1894, Denkschr. med. naturw. Ges. Jena, vol. 8, p. 16.
Periclimenes grandis Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 382.
Periclimenes ensifrons De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 826.
Periclimenes ensifrons Lenz, 1905, Abh. Senckenb. naturf. Ges., vol. 27, p. 380.
Periclimenes vitiensis Pearson, 1905, Rep. Ceylon Pearl Oyster Fish., vol. 4, p. 78.
Periclimenes ensifrons Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 49.
Periclimenes ensifrons Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 26.
Periclimenes (Falciger) grandis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 370.
Periclimenes (Ancylocaris) grandis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 210, textfigs. 58, 59, pl. 7 fig. 10.
? *Periclimenes ensifrons* Sendler, 1923, Abh. Senckenb. naturf. Ges., vol. 38, p. 46.
Periclimenes grandis Balss, 1927, Trans. zool. Soc. Lond., vol. 22, p. 223.
Periclimenes (Ancylocaris) grandis Ramadan, 1936, Bull. Fac. Sci. Egypt. Univ., vol. 6, p. 22.
Periclimenes grandis Gurney, 1938, Sci. Rep. Great Barrier Reef Exped., vol. 6, p. 16, figs. 54-60.

Siboga Expedition

Station 225, 5700 m N, 279° E from southpoint of South Lucipara Island; reef; November 8, 1899. — 1 ovigerous female 23 mm.
Station 323, Sangkapura roads, Bawean Island; depth 12 m; bottom mud; February 24 and 25, 1900. — 1 specimen 17 mm.

Snellius Expedition

Beo, Karakelong, Talaud Islands; June 14-21, 1930. — 3 specimens 11-21 mm.

Museum Amsterdam

Berhala Island, off the eastcoast of Sumatra; December 26, 1929; leg. J. C. van der Meer Mohr. — 1 ovigerous female 18 mm.
Larantuka, Flores; June, 1909; leg. G. A. J. van de Sande. — 1 ovigerous female 24 mm.

The species is very closely related to *Periclimenes (Ancylocaris) elegans* (Paulson). The differences given by Kemp (1922) prove to be constant. In *P. elegans* the carpus of the second pereiopod bears an upper and an inner spine. In some specimens the inner spine is reduced, but the upper always is strong, at least stronger than the inner spine. In *P. grandis* only the inner spine is well developed, the upper is visible only as a rounded lobe. The species also is nearly related to *P. andamanensis* Kemp; in the characters mentioned by Kemp for the distinction of these two species my specimens entirely agree with *P. grandis*.

The oral parts are typical.

Distribution. This litoral species is recorded in literature from: Port Taufiq near Suez (Balss, 1927), Dahab, Red Sea (Balss, 1915), Ghardaqa, Red Sea (Ramadan, 1936; Gurney, 1938), Obok (Nobili, 1906b), Zanzibar (Lenz, 1905), Dar es Salaam (Ortmann, 1894), Pamban and Kilakarai,Gulf of Manaar (Kemp, 1922), Cheval Paar, Ceylon (Pearson, 1905; Kemp, 1922), S.E. of Modragam, Ceylon (Pearson, 1905), Cochin backwater near Ernakulam, S. India (Kemp, 1922), Trincomali (Müller, 1887), Paway Island, Mergui Archipelago (Kemp, 1922), Oshima, Japan (Stimpson, 1860), Chinese coast (Sharp, 1893), Ternate (De Man, 1902), Edam Island, Java Sea (De Man, 1888). A specimen of *Periclimenes* recorded by Sendler (1923) from

Palau was identified by Dr. d e M a n in 1914 as *P. ensifrons*; at that time the real differences between *P. ensifrons* and *P. grandis* were not yet clearly stated, so that it is possible that S e n d l e r's specimen in reality belongs to the present species.

Periclimenes (*Harpilius*) *elegans* (Paulson) (fig. 31)

Anchistia elegans Paulson, 1875, Invest. Crust. Red Sea, p. 113, pl. 17 fig. 1.
non *Periclimenes elegans* Gourret, 1884, Ann. Mus. Hist. nat. Marseille, vol. 2 mem. 2, p. 15.
Anchistia elegans Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 52.
? *Periclimenes elegans* Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 26.
Periclimenes (Falciger) dubius Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 211.
Periclimenes (Falciger) elegans Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 371.
Periclimenes (*Falciger*) *dubius* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 373, pl. 54 fig. 12.
Periclimenes (*Ancylocaris*) *elegans* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 215, textfigs. 60-62.
Periclimenes (*Ancylocaris*) *elegans* var. *dubius* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 218, textfig. 63.
Periclimenes (*Ancylocaris*) *elegans* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 322.
Periclimenes (*Ancylocaris*) *elegans* var. *dubius* McNeill, 1926, Aust. Zool., vol. 4, p. 300.

Siboga Expedition

Station 129, anchorage off Kawio and Kamboling Islands, Kawio Group, N.E. of Celebes; reef; July 22 and 23, 1899. — 3 specimens (included one ovigerous female) 24-28 mm.
Station 152, Wunoh Bay, N.W. coast of Waigeo; reef; depth 32 m; Lithothamnion-bottom; August 12 and 13, 1899. — 1 specimen 14 mm.
Station 248, anchorage off Rumahlusi, northpoint of Tioor Island; reef; December 4 and 5, 1899. — 1 specimen 24 mm.
Station 273, anchorage off Djedan Island, eastcoast of Aru Islands; pearlbanks; depth 13 m; December 23-26, 1899. — 6 specimens (included ovigerous females) 14-22 mm.

Snellius Expedition

Mamudju, Celebes; shore and reef; August 4-5, 1929. — 4 specimens (included ovigerous females) 20-26 mm.
Ternate; pier, about 4 m; divinghood; April 1, 1930. — 1 specimen 16 mm.
Amboina; pier, 0-2 m; May 6, 1930. — 6 specimens (included ovigerous females) 14-22 mm.

Museum Leiden

Jidda; 1881; leg. J. A. Kruyt. — 3 specimens 16-21 mm.
Locality unknown. — 4 specimens 15-18 mm.

The oral parts are typical.

The first two pleopods of the male are figured here (figs. 31a, b).

The specimen from Siboga Station 152 is doubtfully referred to the present species; its correct identity could not be made certain as it lacks both second pereiopods. The specimen is infested on the legs with parasites, which probably are Rhizocephala.

K e m p (1922) separates specimens of the present species, which have the carpus of the second pereiopod three to barely four times as long as broad as a distinct variety *dubius* Borr. from the main species, which has the carpus four to four and a half times as long as broad. In my material the length of the carpus too is subject to variation, but I am not able to separate the specimens into two distinct groups and therefore I am inclined to consider the form *dubius* as a synonym of *elegans,* the more so as the differences mentioned by K e m p are extremely small and as in other species of the present genus the shape of the joints of the second pereiopod often are subject to a rather large variability.

G o u r r e t (1884) in his study on the pelagic fauna of the Gulf of Marseilles mentioned a species under the name *Periclimenes elegans* Costa. As far as I know C o s t a never described a species

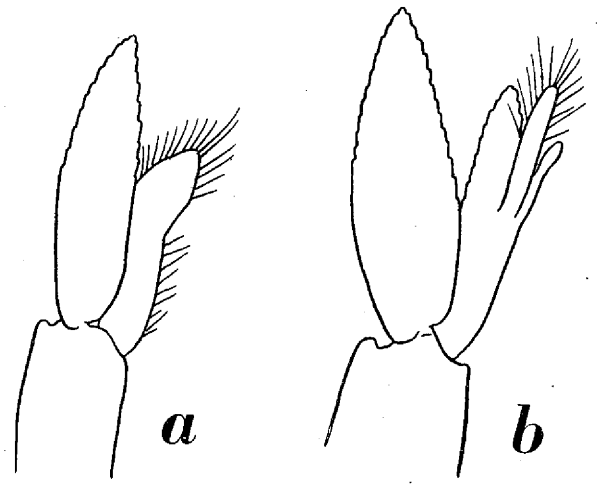

Fig. 31. *Periclimenes elegans* (Paulson) ♂. a, first pleopod; b, second pleopod. a, b, × 56.

under that name, and in my opinion it is most probable that G o u r r e t by error used this name instead of *Periclimenes insignis* Costa (= *P. amethysteus* (Risso)). As, however, G o u r r e t gave no further particulars about the species mentioned by him, the name *Periclimenes elegans* Gourret (1884) is a nomen nudum.

Distribution. This litoral species is reported in literature from: Red Sea (P a u l s o n, 1875), Tor, Sinai Peninsula (K e m p, 1922), Koweit Harbour, Persian Gulf (K e m p, 1922), Minikoi (B o r r a d a i l e, 1915, 1917a), Madras Harbour (K e m p, 1922), East Island, Andaman Islands (K e m p, 1922), Port Blair, Andaman Islands (K e m p, 1922), Camorta Island, Nicobar Islands (K e m p, 1925), Northwest Islet, Capricorn Group, Queensland (M c N e i l l, 1926). It is doubtful whether B a l s s's (1915) specimen from St. John Island, Red Sea, belongs to the present species, as the carpus of his specimen is stated to be unarmed. The species now for the first time is recorded from the Malay Archipelago.

Periclimenes (*Harpilius*) *amymone* De Man (fig. 32)

Periclimenes amymone De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 829, pl. 25 fig. 53.
Periclimenes (Falciger) amymone Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 371.
Periclimenes (*Ancylocaris*) *amymone* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 219.
Periclimenes (*Ancylocaris*) *amymone* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 326.
Periclimenes (*Ancylocaris*) *amymone* Armstrong, 1941, Amer. Mus. Novit., n. 1137, p. 12.

Siboga Expedition

Station 78, Lumulumu Shoal, Borneo Bank; reef; June 10 and 11, 1899. — 2 specimens 14 and 18 mm.

Snellius Expedition

Kera near Timor; November 11-13, 1929. — 19 specimens 11-19 mm.
Obi latu; shore and reef; April 27, 1930. — 5 specimens 12-22 mm.

The specimens agree with De Man's description. In the specimens in which both second pereiopods are present, one is much longer and stouter than the other, also differing from it in the dentition of the cutting edge of the fingers, which in the smaller pereiopod is just like that described by De Man. The stronger pereiopod (fig. 32) has the posterior half of the cutting edge of the dactylus provided with about four teeth, the most distal of which is largest, the three proximal being much smaller; distally of the large tooth the cutting edge presents a deep gap, which is provided at the anterior end with a small distinct tooth; between this tooth and the curved apex of the dactylus the cutting edge is straight and entire. The fixed finger, like the dactylus, is provided with a gap, which anteriorly ends in a small tooth; behind this gap two to five teeth are present, the proximals of which often are very small. This feature is mentioned also by Kemp (1925).

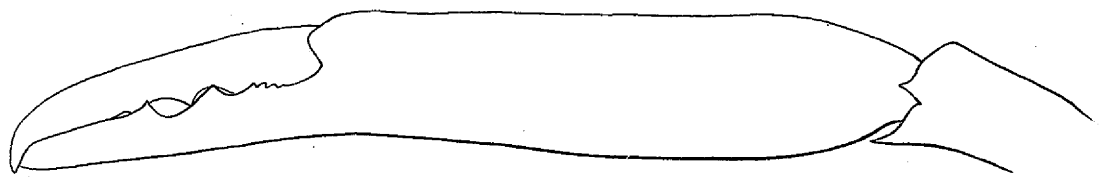

Fig. 32. *Periclimenes amymone* De Man. chela of second pereiopod. × 18.

The rostrum in my specimens is provided dorsally with 6 to 8 teeth, ventrally with 2 to 4, in an abnormal specimen the rostral formula is $\frac{5}{0}$.

The telson dorsally is provided with two pairs of spinules, the anterior of which is placed slightly before the middle of the telson, the posterior midway between the anterior pair and the posterior margin of the telson.

The oral parts are quite typical.

The first two pleopods of the male do not differ from those of *P. elegans*.

In the specimens from the Snellius Expedition the tips of the fingers in the second pereiopods are coloured brown, this feature is no more visible in the very much older Siboga specimens; it probably is a remainder of the original colourpattern of the animals.

One of the specimens from Kera is provided with a Bopyrid parasite.

Distribution. This litoral species in literature has been recorded from: Octavia Bay, Nancowry Harbour, Nicobar Islands (Kemp, 1925), Ternate (De Man, 1902), Savaii, Samoa Islands (Armstrong, 1941).

Periclimenes (*Harpilius*) *demani* Kemp

Periclimenes demani Kemp, 1915, Mem. Indian Mus., vol. 5, p. 279, textfig. 27, pl. 13 fig. 10.
Periclimenes (*Ancylocaris*) *demani* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 219, fig. 64.

Museum Amsterdam

Chilka Lake, Orissa coast; ? syntypes. — 3 specimens 20-23 mm.

The present specimens, in all probability syntypes of this species, were presented by the Chilka Survey to Dr. J. G. de Man, whose collection after his death in 1931 was transferred to the Zoological Museum at Amsterdam.

Distribution. This litoral species, which lives in brackish as well as in pure seawater, is recorded from: Chilka Lake (Kemp, 1915), Adyar River and Ennur backwater near Madras (Kemp, 1915), Jack and Una Island, Mergui Archipelago (Kemp, 1922).

Periclimenes (*Harpilius*) *tenuipes* Borradaile

Periclimenes tenuipes Borradaile, 1898b, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 384.
Periclimenes tenuipes Borradaile, 1899, Willey's Zool. Res., p. 406, pl. 36 fig. 2.
non *Periclimenes tenuipes* Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
non *Anchistia tenuipes* Holmes, 1900, Occ. Pap. California Acad. Sci., vol. 7, p. 216.
non *Periclimenes tenuipes* Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 34, fig. 12.
Periclimenes borradailei Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 34.
non *Periclimenes Borradailei* Nobili, 1905, Bull. Mus. Hist. nat. Paris, vol. 11, p. 159.
Periclimenes borradailei Nobili, 1907a, Annu. Mus. zool. Univ. Napoli, ser. 2 vol. 2 pt. 21, p. 5.
Periclimenes (*Falciger*) *kolumadulensis* Borradaile, 1915, Ann. Mag. nat. Hist., ser. 8 vol. 15, p. 213.
Periclimenes (*Falciger*) *kolumadulensis* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 376, pl. 54 fig. 17.
Periclimenes (*Falciger*) *borradailei* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 372.
non *Periclimenes tenuipes* Schmitt, 1921, Univ. Calif. Publ. Zool., vol. 23, p. 39, fig. 24.
Periclimenes (*Ancylocaris*) *tenuipes* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 220, pl. 8 fig. 11.
non *Periclimenes tenuipes* Schmitt, 1924, Proc. Calif. Acad. Sci., ser. 4 vol. 13, p. 386.

Siboga Expedition

Station 7, near reef of Badjulmati, E. Java, 7° 55'.5 S, 114° 26' E; dredge and shore exploration; depth 15 m and more; bottom coral and stones; March 11, 1899. — 1 ovigerous female 26 mm (damaged).
Station 71, Makassar; dredge, townet and shore exploration; depth up to 32 m; bottom mud, sand with mud and coral; May 10 till June 7, 1899. — 1 ovigerous female 24 mm.
Station 240, Banda anchorage; trawl, dredge and reef exploration; depth from 9 to 45 m; bottom black sand and coral, lithothamnion bank in 18-36 m; November 22 till December 1, 1899. — 1 ovigerous female 27 mm.
Station 285, anchorage southcoast of Timor, 8° 39'.1 S, 127° 4'.4 E; dredge; depth 34 m; bottom on the limit between mud and coral, lithothamnion; January 18, 1900. — 1 specimen 24 mm.

The specimens at my disposal entirely agree with Kemp's excellent description. The specimen from Station 285 is provided with parasites, which probably belong to the Rhizocephala.

The oral parts of the species are typical.

The first two pleopods of the males do not differ from those of *P. americanus*.

The specimens from Beagle Bay brought by Nobili (1899) to the present species were examined by me in the Museo Civico di Storia Naturale in Genoa, Italy. One of the specimens proved

to be an ovigerous female of *Periclimenes seychellensis,* the two other specimens are *Leander tenuicornis* (Say).

Distribution. In literature the species is recorded from: Mahé, Seychelles (K e m p, 1922), Kolumadulu Atoll, Maldive Archipelago (B o r r a d a i l e, 1915, 1917a), Haddumati Atoll, Maldive Archipelago (B o r r a d a i l e, 1917a), off Ceylon, 6° 01′ N, 81° 16′ E (K e m p, 1922), Port Blair, Andaman Islands (K e m p, 1922), Ralun, New Britain (B o r r a d a i l e, 1898a, 1899). The species is litoral, the greatest depth from which it is recorded is 60 m.

Periclimenes (*Harpilius*) *platycheles* nov. spec. (fig. 33)

Siboga Expedition

Station 149, anchorage off Fau Island, westcoast of Gebe Island; reef; depth 31 m; August 10 and 11, 1899. — 1 ovigerous female 15 mm.

Station 169, anchorage off Atiationin, westcoast of New Guinea; trawl, dredge, townet and reef exploration; depth up to 57 m; bottom mud; August 23-25, 1899. — 1 specimen 16 mm.

The rostrum is slender and reaches slightly beyond the scaphocerite, the apex is slightly curved upward. The upper margin bears seven teeth, while the lower is provided with five or six. The first dorsal tooth is placed on the carapace behind the orbit, it stands slightly closer to the second tooth than the third. The second tooth is placed just over the orbit; the other teeth are regularly divided over the rostrum. Both upper and lower margin of the rostrum are provided with setae. The carapace is smooth and provided with antennal and hepatic spines only. The antennal spine is situated slightly below the rounded lower angle of the orbit; the hepatic spine is placed behind the antennal on a slightly lower level. The anterolateral angles of the carapace are rounded.

The abdomen is smooth; the pleurae of the first four segments are rounded, that of the fifth ends in a sharp posteriorly directed point. The third segment is a little produced in the median part of the posterior margin. The sixth segment is $1^1/_2$ times as long as the fifth.

The telson is somewhat longer than the sixth abdominal segment. The dorsal surface is provided with two pairs of spinules; the first pair is situated slightly before the middle of the telson, the other lies midway between the first pair and the posterior margin of the telson. This posterior margin is provided with three pairs of spinules, the intermediate of which is very long.

The eyes are well developed. The cornea is hemispherical, as broad as and slightly shorter than the stalk, it is provided with two bands of black pigment. The ocellus is distinct.

The basal segment of the antennular peduncle is broad; the stylocerite is short and rather broad, it fails to reach the middle of the basal segment. The anterolateral spine of the basal segment is very small, greatly failing to reach the middle of the second segment. The anterior margin of the basal segment is almost straight. The second segment is slightly shorter and broader than the third, together they are about half as long as the basal segment. The fused part of the two rami of the upper antennular flagellum consists of about 20 segments, being about twice as long as the antennular peduncle. The free part of the shorter ramus is extremely short.

The scaphocerite reaches with slightly less than half its length beyond the antennular peduncle;

it is narrow, the anterior margin is truncate, the outer margin strongly concave. The final tooth reaches beyond the lamella. A strong spine is present on the basal part of the antennal peduncle.

The oral parts show no important differences from those of the preceding species. The third

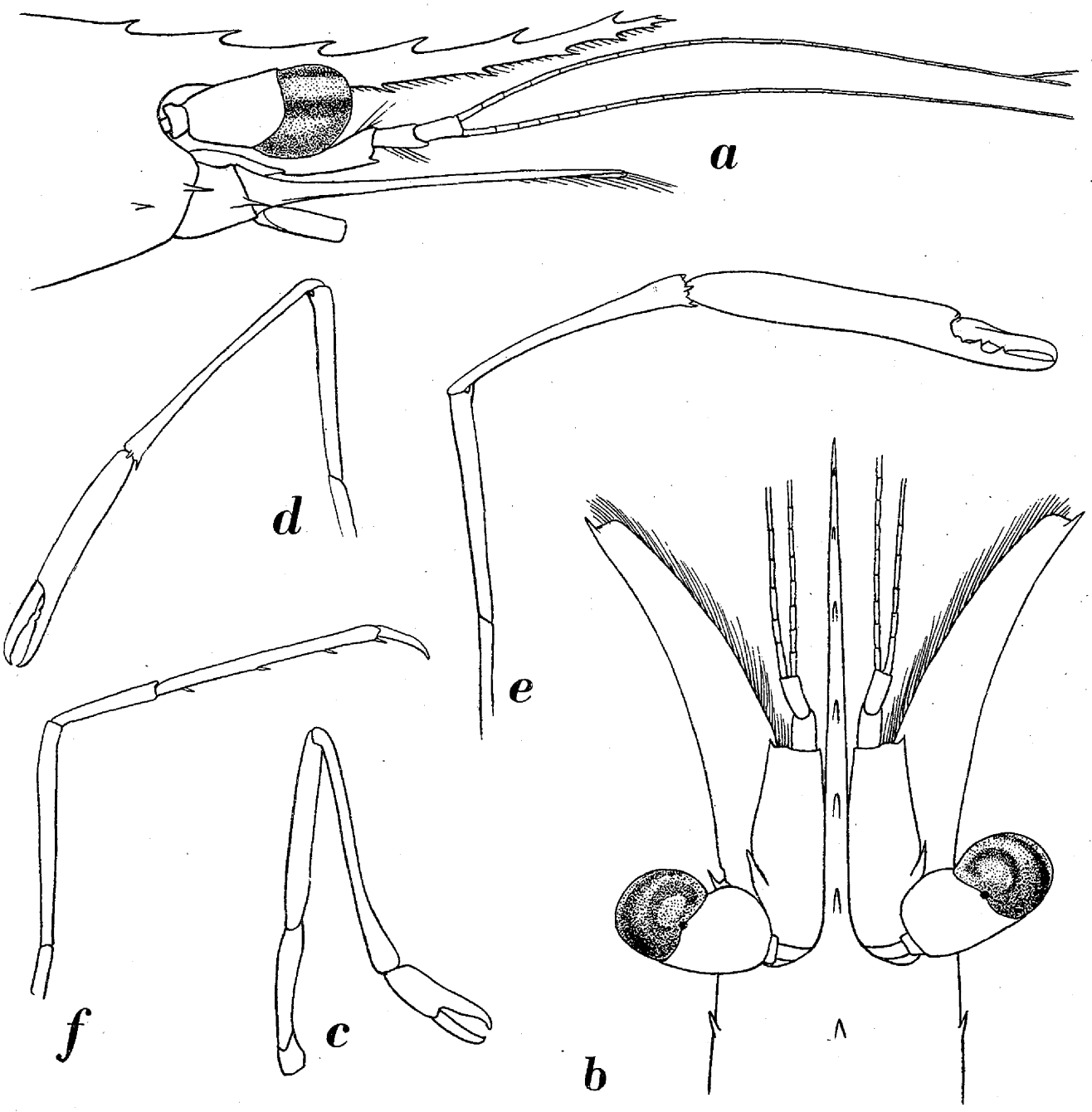

Fig. 33. *Periclimenes platycheles* nov. spec. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, first pereiopod; d, right second pereiopod; e, left second pereiopod; f, third pereiopod. a-c, f, × 18; d, e, × 12.

maxilliped fails to reach the end of the antennal peduncle. The ultimate segment measures $^2/_3$ of the penultimate; the antepenultimate segment is longest, it is slightly overreached by the exopod.

The first pereiopod (fig. 33c) is slender, it reaches with the entire chela beyond the scaphocerite. The chela is broad, the fingers are only slightly longer than the palm, they are broad, with convex upper and lower margins; the cutting edge is entire. The palm is less than twice as long as

broad. The chela shows the same robust shape as may be observed in species as *P. petitthouarsi, P. spiniferus,* and other species which have the fingers pectinate, but this pectination is absent here. Some tufts of setae are present on the fingers. The carpus is twice as long as the chela, it is slender and anteriorly broadened. The merus is shorter than the carpus, but distinctly broader. The ischium is as long as the chela. The second pereiopods (figs. 33d, e) are unequal and slender, they reach with the carpus and the chela beyond the scaphocerite. The left pereiopod has the fingers about half as long as the palm; both dactylus and fixed finger are provided with two broad teeth in the proximal part of the cutting edge. The teeth of the dactylus are placed slightly before those of the lower finger; between the two teeth a distinct excavation is visible. The upper margin of the dactylus is provided with a flange along the external side, like in *Periclimenes* (*Periclimenes*) *latipollex.* The carpus is about as long as the palm, it is broadened anteriorly and has the anterior margin provided with two distinct spines, one at the lower and one at the inner side. The merus is almost as long as the carpus and ends in a distinct anteroventral tooth. The ischium is shorter than the merus. The right leg is shorter than the left, the teeth of the chela are less conspicuous than in the left leg, the carpus is much longer than the chela and than the merus, the ischium is longer than the merus. The last three pereiopods are slender, all reaching slightly beyond the scaphocerite. The dactylus in the third leg (fig. 33f) is simple, curved and slender. The propodus is about four times as long as the dactylus and has the posterior margin provided with some spinules, the most distal of which is the strongest. The carpus is about half as long as the propodus and as long as the ischium. The merus is about as long as the propodus. The fourth and fifth legs are similarly shaped as the third.

The uropods are longer than the telson, but the endopod does not reach the end of the intermediate pair of spinules of the posterior margin of the telson. The exopod has the outer margin straight, provided with a row of setae along the lower border and ending into two teeth.

The present species is most closely related to *P. tenuipes* Borr., but differs from it in the shorter rostrum, which is provided with less teeth, in the broad chela of the first pereiopods, in the entirely different shape of the fingers of the second pereiopods, in the presence of two strong spines at the anterior margin of the carpus of the second pereiopod, in the different relation between the joints of these pereiopods and in the last three pereiopods, which have the propodus not subdivided.

Periclimenes (Harpilius) digitalis Kemp (fig. 34)

Periclimenes (*Ancylocaris*) *digitalis* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 224, textfig. 65, pl. 8 fig. 12.

Siboga Expedition

Station 43, Saraso Island, Postiljon Group, Flores Sea; dredge and Hensen vertical net; depth up to 36 m; bottom coral; April 4 and 5, 1899. — 1 ovigerous female 15 mm.

The present specimen agrees in all important points with Kemp's description and figures. The rostrum bears 8 teeth above and 2 below. The vestigial supraorbital spine is lacking in my specimen, but a distinct supraorbital ridge is present. The exopod of the third maxilliped reaches somewhat beyond the antepenultimate segment. The second pereiopod in my specimen is slightly shorter than that described by Kemp, it only reaches with the chela and part of the carpus beyond the scaphocerite.

The oral parts are typical in shape, only the inner lacinia of the maxilla (fig. 34) has the lower lobe very much shorter than the upper lobe; both lobes are rather short and broad.

Distribution. The only record of this species in literature is that of Kemp, who reports it from Port Blair, Andaman Islands, from a depth of 5.5 to 9 m.

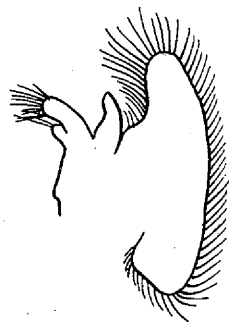

Fig. 34. *Periclimenes digitalis* Kemp. maxilla. × 25.

Periclimenes (*Harpilius*) *brocki* (De Man)

Anchistia Brockii De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 548, pl. 22a fig. 3.
Periclimenes Brocki Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 383.
Periclimenes (*Cristiger*) *brocki* Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 363, pl. 53 and 54 fig. 8.
Periclimenes (*Ancylocaris*) *brocki* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 226.

The species is not represented in the collections at hand.

Kemp (1922), who examined a specimen from Suvadiva Atoll, which was identified by Borradaile with De Man's species, states that he has nothing to add to De Man's description. Kemp placed the species in the second section of the subgenus *Ancylocaris,* which is characterized by the presence of an anteroventral tooth at the merus of the second pereiopod, while De Man in his description of the second pereiopod states: "Sämmtliche Glieder sind glatt, gänzlich unbewehrt, und zeigen weder Zähne noch Stacheln". According to De Man's description therefore the species has to be placed in the first section of the subgenus. Also Borradaile (1917a) states that in the subgenus *Cristiger,* in which he placed De Man's species, the second leg is unarmed, except in *Periclimenes* (*Cristiger*) *gracilis.*

Distribution. *Periclimenes brocki* is recorded from: Suvadiva Atoll, Maldive Archipelago (Borradaile, 1917a; Kemp, 1922), and from Amboina (De Man, 1888). The specimen from the Maldive Archipelago was collected at a depth of up to 78 m, it was associated with a seaurchin.

Periclimenes (*Harpilius*) *lutescens* (Dana) (fig. 35)

Harpilius lutescens Dana, 1852, Proc. Acad. nat. Sci. Philad., 1852, p. 25.
Harpilius lutescens Dana, 1852a, U.S. Explor. Exped., vol. 13, p. 576.
Harpilius lutescens Weitenweber, 1854, Lotos Praha, vol. 4, p. 37.
Harpilius lutescens Dana, 1855, U.S. Explor. Exped., vol. 13 atlas, p. 12, pl. 37 fig. 4.
Harpilius lutescens De Man, 1888, Arch. Naturgesch., vol. 53 pt. 1, p. 536.
Harpilius lutescens Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 386.
Harpilius lutescens Nobili, 1901a, Annu. Mus. zool. Univ. Napoli, n. ser. vol. 1 pt. 3, p. 3.
Harpilius lutescens Thompson, 1901, Catal. Crust. Mus. Dundee, p. 19.
Harpilius consobrinus De Man, 1902, Abh. Senckenb. naturf. Ges., vol. 25, p. 836, pl. 26 fig. 54.

Harpilius lutescens Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 63.
Harpilius consobrinus Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91 suppl., p. 27.
Harpilius lutescens Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 381.
Harpilius consobrinus Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 381.
Harpilius depressus Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 389, pl. 28 fig. 7.
? *Harpilius lutescens* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 235, figs. 72, 73.
Harpilius consobrinus Kemp, 1922, Rec. Indian Mus., vol. 24, p. 237.
? *Harpilius lutescens* Boone, 1935, Bull. Vanderbilt mar. Mus., vol. 6, p. 167, pl. 45.

Siboga Expedition

Station 78, Lumulumu Shoal, Borneo Bank; reef; depth 34 m; bottom coral and coralsand; June 10 and 11, 1899. — 2 specimens (one of which ovigerous) 15 and 17 mm.

Snellius Expedition

Kera near Timor; November 11-13, 1929. — 1 specimen 18 mm.
Amboina; shore and reef; divinghood; depth 0-2 m; May 6, 1930. — 1 ovigerous female 17 mm.
Ake Selaka, Kau Bay, Halmahera; shore and reef; May 28, 1930. — 1 ovigerous female 22 mm.
Beo, Karakelong, Talaud Islands; depth 6-10 m; June 14-21, 1930. — 4 specimens (included ovigerous female) 11-17 mm.
Ternate, pier; divinghood; depth about 4 m; August 1, 1930 [1]). — 1 ovigerous female 18 mm.

Museum Amsterdam

Sinabang, Simalur, off the westcoast of Sumatra; February and March, 1913; leg. E. Jacobson. — 2 specimens 23 and 24 mm.

All oral parts of the present species are figured here (figs. 35a-e), they are rather typical. The first maxilliped has the palp rather short; the second maxilliped differs from most other species by having the last joint long and narrow, being about of the same width over its entire length.

The first two pleopods of the male are figured here too (figs. 35f, g), they show no essential differences from those of the other species of the present subgenus.

Kemp (1922) considered the present species to be the type of a separate genus *Harpilius,* which included the species *H. lutescens, H. gerlachei, H. beaupresi* and *H. depressus.* As Kemp already stated the genus was closely related to *Periclimenes,* differing only in the more depressed shape, which, however, showed a large variation within the genus, and in other characters, which varied in both genera; he therefore remarked that it was not improbable that the two genera had to be fused. In 1917 Borradaile had placed the species united by Kemp in the genus *Harpilius* in two separate genera, *Harpiliopsis* and *Harpilius. Harpiliopsis* contained the species *H. beaupresi* and *H. depressus, Harpilius* consisted of the two other species. According to Borradaile the two genera differ in the shape of the second maxilliped and in the presence or absence of an arthrobranch on the third maxilliped. The first difference is based, as already pointed out by Tattersall (1921) and Kemp (1922), on the incorrect figure of Dana of the second maxilliped of *H. lutescens;* the second difference was based on a statement of Sollaud (1910) that in *Harpilius* the arthrobranch of the third maxilliped is absent; Sollaud does not mention, which species he examined but this obviously is *H. gerlachei* as that species is the only member of *Harpilius* s.l. without this arthrobranch.

1) This date probably is incorrect as the Snellius Expedition on August 1, 1930 was not in Ternate, but in Surabaya.

The differences mentioned by Borradaile thus are quite erroneous, therefore Tattersall (1921) as well as Kemp (1922) considered *Harpiliopsis* a synonym of *Harpilius*. In my opinion *Harpiliopsis* indeed must be separated from *Harpilius,* though on other characters than those mentioned by Borradaile (1917a); the most important of these characters are the very strongly depressed shape of the body in *Harpiliopsis* and the fact that in that genus the pleurae of the fourth and fifth abdominal segments are strongly pointed inferiorly; also the second pereiopods show an

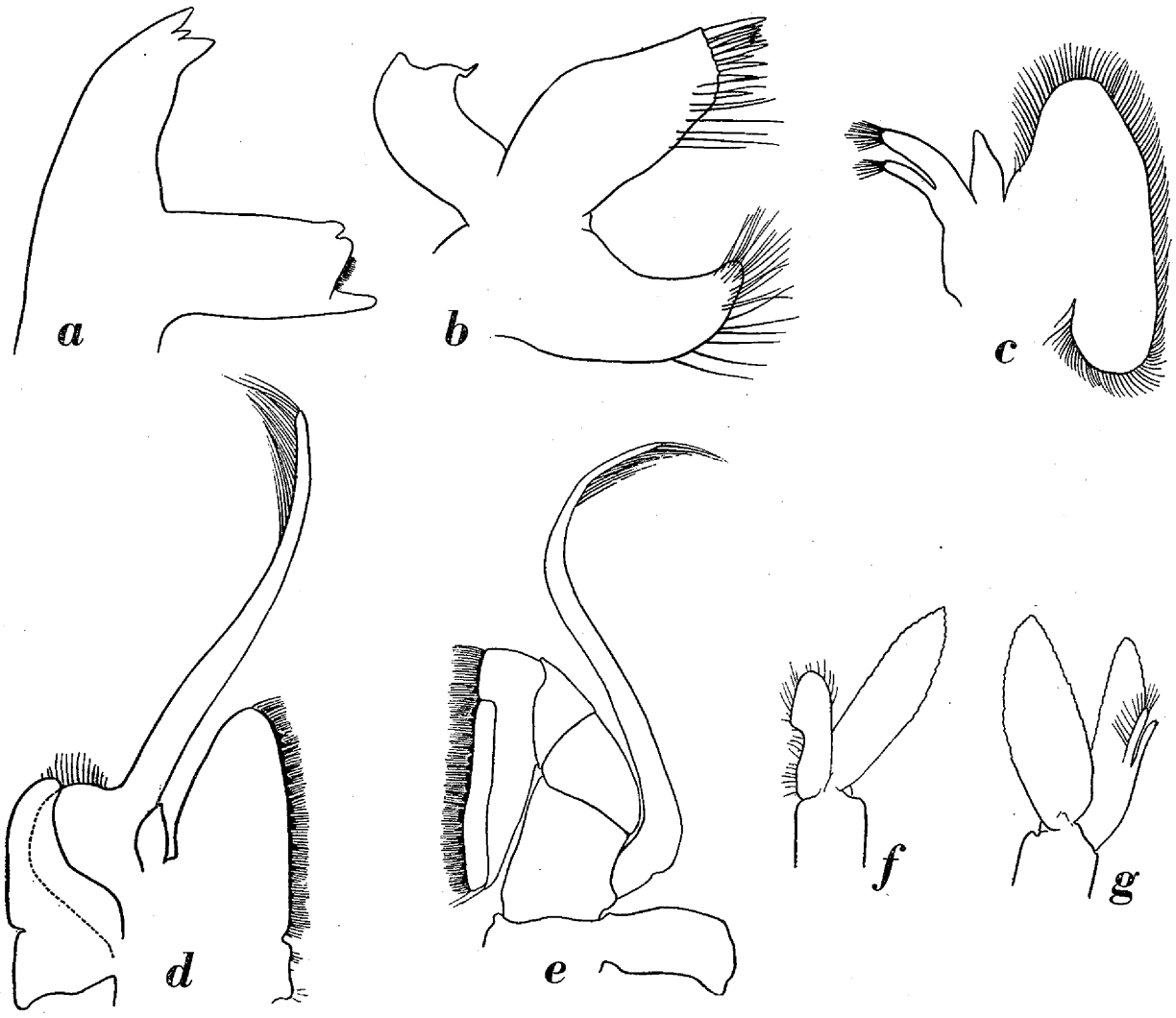

Fig. 35. *Periclimenes lutescens* (Dana). a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped; f, first pleopod of male; g, second pleopod of male. a, b, × 50; c-g, × 21.

entirely different shape. *Harpilius lutescens* in my opinion can not be separated from *Periclimenes* and therefore is now inserted in that genus. For the fourth species of Kemp's *Harpilius, H. gerlachei* a new genus is erected here as the species shows some features, which make it impossible to place it in one of the known genera.

My specimens agree in all important points with Kemp's (1922) description of the specimens, which he with some doubt refers to *Harpilius lutescens.* The rostrum in my specimens bears 7 or 8 dorsal teeth, the lower margin of it is provided with 2 or 3 teeth. The differences of Kemp's and my specimens with Dana's figure, in all probability are due to inaccuracy of the latter and I do not hesitate therefore to identify the specimens with Dana's species.

According to Kemp (1922) *Harpilius consobrinus* De Man is closely related to the present species, but nevertheless is distinct. Kemp mentions some minor differences between the two species, the most important being the fact that in *H. consobrinus* the hepatic spine is situated on the anterior margin of the carapace, while in *H. lutescens* it is remote from that margin. This difference, however, does not exist; Kemp wrongly interpreted De Man's (1902) description. De Man (1902, p. 837) states namely: „Bei allen Exemplaren trägt der Cephalothorax ... einen ... nach aussen gerichteten Hepaticalstachel, der ein wenig unter dem ersteren [the antennal spine] liegt, aber nicht weit vom Vorderrande." In the description of specimens which he in 1888 brings to *Harpilius lutescens,* but which in his 1902 description of *H. consobrinus* are included in the latter species, De Man (1888, p. 537) states: „Der Vorderrand des Cephalothorax trägt einen kleinen Antennalstachel; ein wenig unter diesem Stachel und auf geringer Entfernung vom Vorderrande bemerkt man einen zweiten Stachel, den Hepaticalstachel". From these two sentences it is clear that in *H. consobrinus* the hepatic spine is not placed on the anterior margin, but is slightly remote from it. Kemp in all probability based his statement on the following sentence in De Man's (1902, p. 837) description: „Betrachtet man die Cephalothorax von oben, so entspringt die Spina hepatica unmittelbar am Seitenrande des Rückenschildes, bei *Harp. lutescens* dagegen erscheint sie in dieser Lage ein wenig vom Seitenrande entfernt (Dana, Fig. 4c). Dies ist ein wichtiger Unterschied zwischen beiden." Here De Man means to indicate that *H. lutescens* is more depressed than *H. consobrinus* and that in dorsal view therefore the hepatic spine in *H. lutescens* is remote from the lateral (not anterior!) margin of the carapace, while in *H. consobrinus* in dorsal view the hepatic spine is situated just on the lateral margin of the carapace. My specimens, and probably also those of Kemp, have this feature in common with De Man's specimens. In my opinion therefore there is no reason to separate *H. lutescens* and *H. consobrinus,* which in consequence are considered here to be synonyms. The other differences mentioned by Kemp for distinguishing the two species namely are so small that they fall within the range of variability of the species.

Boone's (1935) specimens differ from the specimens at hand in the longer fingers of the second legs, in the longer ischium of the same appendage, in the slenderer last three pereiopods and in the different shape of the rostrum; in the figure furthermore the anterolateral angle of the carapace is not rectangular, a carina is indicated behind the antennal spine and the scaphocerites are drawn broader than they are in my specimens of the present species. It is possible therefore that Boone's specimens do not belong to *Periclimenes lutescens.*

Distribution. The species is associated with Madreporaria. In literature it is recorded from: Tor, Sinai Peninsula (Balss, 1915), Ras Abu Somer, Dahab and Yenbo, Red Sea (Balss, 1915), Suakin, Red Sea (Tattersall, 1921; Kemp, 1922), Eritrea (Nobili, 1901a; 1906b), Noordwachter Island, Java Sea (De Man, 1888), Ternate, Moluccas (De Man, 1902), Tongatabu, Tonga Archipelago (Dana, 1852), Samoa (Thompson, 1901), Venus Point Reef, Tahiti ? (Boone, 1935), Anaho Bay, Nuka Hiva, Marquesas Islands? (Boone, 1935).

Paranchistus nov. gen.

Definition: Pontoniid prawns living endozootic within Lamellibranchia. The body is clumsy, but not depressed. The rostrum is well developed, compressed and provided with small teeth near

the apex. The carapace is smooth, it is provided with an antennal and a hepatic spine at either side. The hepatic spine is movable.

The abdomen is smooth, not geniculate. The pleurae of the first four segments are broadly rounded. The sixth segment is short.

The telson is elongate, the upper surface is provided with 2 pairs of small spines; the posterior margin bears three pairs of spines.

The eyes are well developed, normal in shape, with the cornea hemispherical.

The basal segment of the antennular peduncle is broad, the stylocerite is rather broad and often blunt. The last two segments of the peduncle are short. The upper flagellum ends in two rami.

The scaphocerite is large, broadly ovate. The antennal peduncle bears no spine.

The mandible bears no palp. The incisor process ends in three teeth, the molar process is provided with blunt knobs and ridges, brushlike arranged spines are present on the molar process. The maxillula has the inner lacinia slender or broadened, the palp is bilobed or entire. The maxilla is provided with a distinctly bilobed inner lacinia, the lobes may be broad or narrow; the scaphognathite is large, but not very broad. The first maxilliped resembles strongly that of the species of *Periclimenes,* the palp is well developed, the caridean process of the exopod is of varying breadth, the separation of the coxa and basis is more or less distinct. The second maxilliped is normal in shape, no podobranch is present. The third maxilliped is slender, it is provided with an arthrobranch. Exopods are present on all maxillipeds.

The first pereiopods are slender; the carpus and merus are of about the same length, being much longer than the other joints. The second pereiopods are equal in shape, the palm is cylindrical, not much swollen; the fingers are elongate, slender, with small teeth on the cutting edge. The last three pereiopods are slender; the dactylus is biunguiculate or simple, sometimes provided with horny tubercles.

The endopod of the first pleopod of the male bears a broad distally directed tooth at the end of the inner margin. The second pleopod of the male has the appendix masculina slightly shorter than the appendix interna.

Uropods broad.

Type: *Anchistus biunguiculatus* Borradaile.

The genus is closely related to *Anchistus* Borr. The most important difference between the two genera is the fact that in *Paranchistus* the hepatic spine is present, while this spine is lacking in *Anchistus.*

Three species may be referred to the present genus, two of them are new to science, both originating from the western part of the Indian Ocean; the third species is known from the Malay Archipelago. These three species, all of which are represented in the present collections, may be separated as follows:

1. Rostrum gradually narrowing towards the top, distinctly curved downward. Cutting edges of the fingers of the first pereiopods pectinate. Dactyli of the last three pereiopods not flattened anteriorly 2
— Rostrum somewhat broadening near the apex, straight or slightly curved downward. Cutting edges of the fingers of the first pereiopods entire. Dactyli of the last three pereiopods flattened anteriorly, biunguiculate . . . . . *nobilii*

2. Dactylus of second pereiopod much longer than fixed finger, curved into a hook at the apex. Dactyli of last three pereiopods biunguiculate, without horny tubercles . . . . . *biunguiculatus*
— Dactylus of second pereiopod of about the same length as the fixed finger, not strongly hookshaped. Dactyli of last three pereiopods simple, provided with horny tubercles . . . . . *ornatus*

Paranchistus biunguiculatus (Borradaile) (figs. 36-38)

Anchistus biunguiculatus Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 387.
Anchistus biunguiculatus Borradaile, 1899, Willey's Zool. Res., vol. 4, p. 408, pl. 36 fig. 5.
Tridacnocaris biunguiculata Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
Anchistus biunguiculatus Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 388.
Anchistus oshimai Kubo, 1949a, Bull. biogeogr. Soc. Japan, vol. 14, p. 26, figs. 1, 2.

Snellius Expedition

Obi latu; shore and reef; April 23-27, 1930. — 1 specimen 24 mm.

The rostrum is compressed and directed downward, it reaches the middle of the second segment of the antennular peduncle. The upper margin of the rostrum is obscurely serrate in the distal half, the tip is slightly emarginate. The lower margin is slightly convex, entire and provided with setae. The ventral part of the base of the rostrum is broadened and projects over the bases of the eyestalks. The carapace is smooth. The lower orbital angle is rather broad and pointed. The antennal spine is placed some distance below the lower orbital angle, it is rather strong. The hepatic spine is small and movable, it is placed much behind the antennal spine and at a lower level. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth abdominal segment is proportionately short and high, being only a little longer than the fifth segment.

The telson (fig. 36c) is about $1^1/_2$ times as long as the sixth abdominal segment, it is rather high at its base. The dorsal surface of the telson is provided with two pairs of small spinules, which are placed in the posterior third of it. The posterior pair lies midway between the anterior pair and the posterior margin of the telson. This posterior margin is provided with three pairs of spinules, the intermediate of which is longest; the outer pair is $^1/_3$ to $^1/_2$ as long as the intermediate, while the submedian spines are more than half as long as the intermediates.

The eyes are well developed. The cornea is hemispherical, it is narrower and much shorter than the stalk. The ocellus is fused with the cornea, and it is distinct.

The first segment of the antennular peduncle is very broad. The stylocerite is small and ends in a blunt point, it does not reach the middle of the first segment of the peduncle. The outer margin of the first segment is straight or slightly convex and ends in a minute spine; the anterior margin is strongly convex, reaching beyond the anterolateral spine. The second segment is broader and shorter than the third, its lateral part reaches as a rounded lobe beyond the articulation with the third segment. The second and third segments together measure about $^2/_3$ of the length of the first segment. The upper antennular flagellum has the two rami fused for 6 joints; the free part of the shorter ramus consists of 3 joints, it is shorter than half the fused portion.

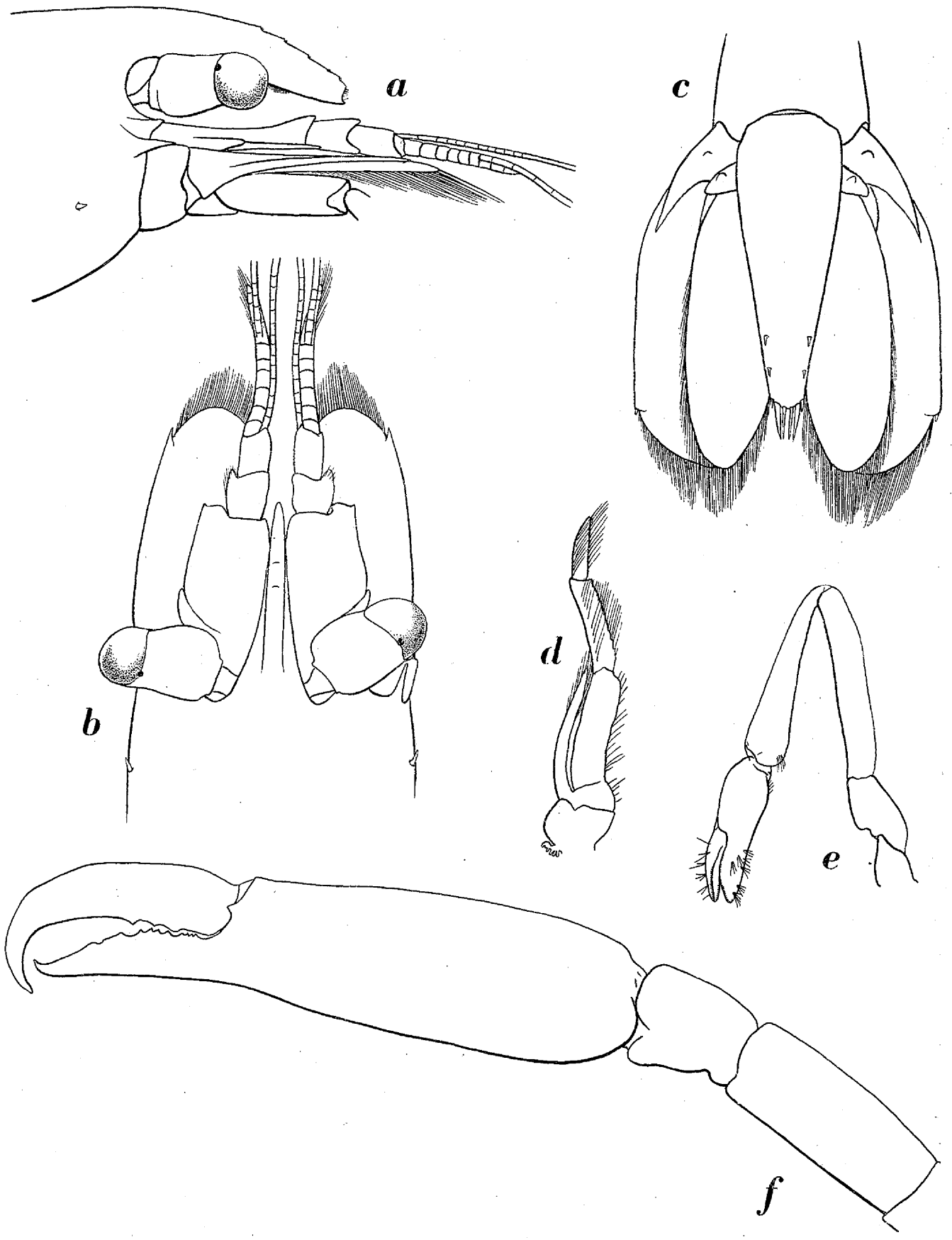

Fig. 36. *Paranchistus biunguiculatus* (Borr.). a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, telson and uropods, dorsal view; d, third maxilliped; e, first pereiopod; f, second pereiopod. a-e, × 15.

The scaphocerite reaches distinctly beyond the antennular peduncle, it is broad and has the anterior margin rounded. The outer margin is convex and ends in a strong tooth, which is overreached by the lamella. The antennal peduncle does not possess a spine.

The mandible (fig. 37a) is typical. The maxillula (fig. 37b) has the inner lacinia slender; the palp has the upper lobe indistinct. The inner lacinia of the maxilla (fig. 37c) is deeply cleft, the two lobes are narrow, the lower being narrower than the upper. The first maxilliped (fig. 37d) has the caridean process broad. The second maxilliped of the specimen from Obi latu (fig. 37e)

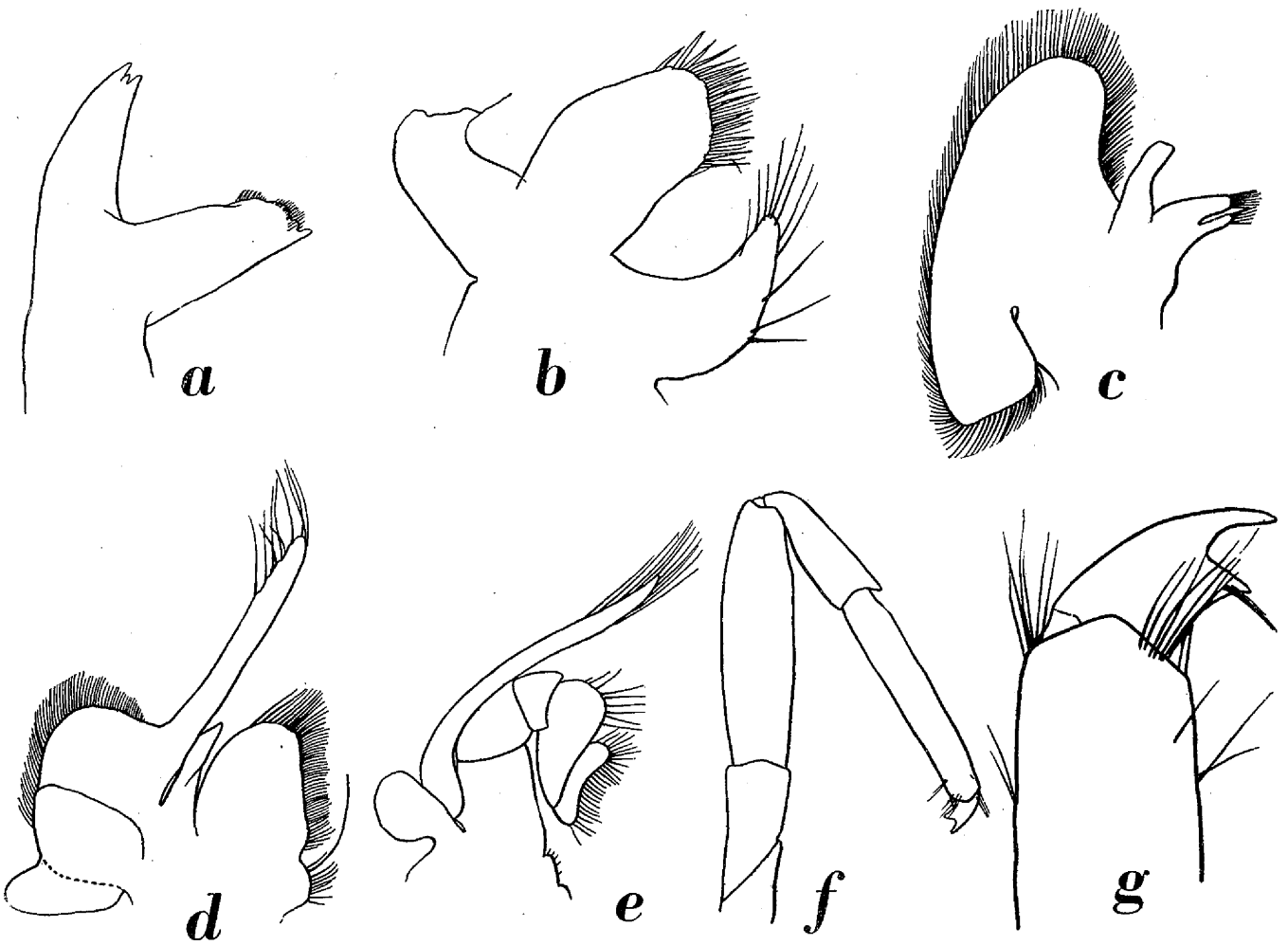

Fig. 37. *Paranchistus biunguiculatus* (Borr.). a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped; f, third pereiopod; g, dactylus third pereiopod. a, b, g, × 68; c-e, × 28; f, × 14.

closely resembles that figured by Borradaile for his specimen; it too shows the distal margin of the last joint strongly concave. The third maxilliped (fig. 36d) fails to reach the end of the antennal peduncle. The penultimate segment is 1½ times as long as the ultimate. The antepenultimate segment is distinctly longer than the penultimate and bears a longitudinal groove on the lower surface. The exopod reaches slightly beyond the end of the antepenultimate segment.

The first pereiopod (fig. 36e) reaches with the chela and part of the carpus beyond the scaphocerite. The fingers are about as long as the palm, the outer margins are convex, the cutting edge is provided with a row of fine pectinations similar to those in various species of *Periclimenes* (e.g. *P. soror, pectiniferus, petitthouarsi, spiniferus, sibogae*). The carpus is 1½ times as long as the

chela, it is broadened anteriorly, becoming narrower posteriorly. The merus is about as long as the carpus. The ischium is very short. The second pereiopods (fig. 36f) are subequal in shape, the left is slightly more slender than the right; they reach with the chela beyond the scaphocerite. The fingers measure about $^2/_3$ of the length of the palm; the dactylus has the apex strongly curved downward, the extreme tip even is slightly curved backwards again. The fixed finger is straight and much shorter than the dactylus. The cutting edge of the dactylus is provided in the proximal half with three broad teeth, that of the fixed finger with many (up to 14) small teeth. The carpus is very short, measuring about $^1/_3$ of the length of the palm; the anterior margin is entire. The carpus bears no spines and is narrower posteriorly than anteriorly. The merus is about twice as long as the carpus, it bears no spines. The ischium is as long as the carpus. The third pereiopod (fig. 37f) reaches to or slightly beyond the end of the scaphocerite. The dactylus (fig. 37g) is short and provided with two strong claws. The propodus is about five times as long as the dactylus and about six times as long as broad. No posterior spines are present on the propodus, except one near the base of the dactylus. The carpus is slightly more than half as long as the propodus. The merus is about as long as the

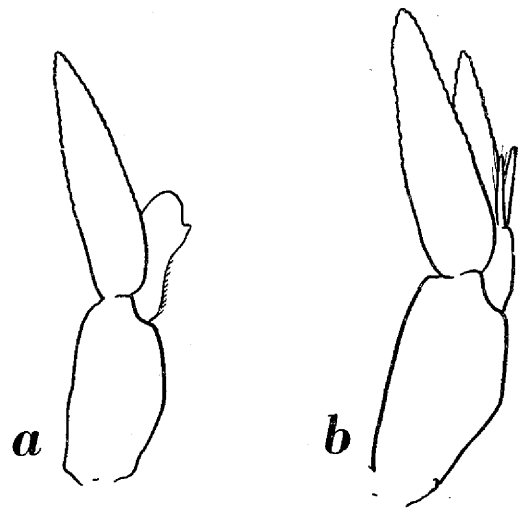

Fig. 38. *Paranchistus biunguiculatus* (Borr.) ♂. a, first pleopod; b, second pleopod. a, b, × 15.

propodus. The ischium is about half as long as the merus. Both pereiopods of the fourth pair are lacking in my specimen. The fifth pereiopod is similarly built as the third, it fails to reach the end of the antennular peduncle.

The first two pleopods of the male are shown in figs. 38a, b.

The uropods reach slightly beyond the end of the telson. The basal segment of the uropods is provided with two dorsal tubercles, one near its base and one near the base of the uropodal endopod; over the base of the exopod it is produced into a long slender process. The exopod has the outer margin straight or slightly convex, provided with setae and ending in a small tooth.

I identify my specimen with Borradaile's *Anchistus biunguiculatus,* as it agrees with Borradaile's description and figure in almost every respect. Borradaile does not mention the hepatic spine, this, however, perhaps is due to the fact that this spine is small and easily overlooked.

The specimens recorded by Nobili (1899) from Batanta and Mefoor (= Noemfoor), 2 ovigerous females from the former and one from the latter locality, still are present in the collection

of the Museo Civico di Storia Naturale in Genoa, Italy, and were there examined by me. These three specimens are about 38 to 45 mm long.

Comparison of K u b o's (1949a) description of his *Anchistus oshimai* with the present species shows them to be identical.

Vertical distribution. The species is a litoral form. B o r r a d a i l e and N o b i l i record it to be associated with molluscs of the genus *Tridacna*. K u b o (1949a) reports the species from *Tridacna gigas* (L.).

Horizontal distribution. The species in literature only is recorded from: Batanta, N. New Guinea (N o b i l i, 1899), Mefoor (= Noemfoor), Geelvink Bay, New Guinea (N o b i l i, 1899), Tubetube, Engineer Group, Papua (B o r r a d a i l e, 1899), Helen Atoll, Palau Islands (K u b o, 1949a).

Paranchistus ornatus nov. spec. (figs. 39, 40)

Museum Amsterdam

Mozambique. — 1 ovigerous female 20 mm. (holotype).

The rostrum is more or less compressed, and gradually narrows towards the top; it is swollen at the base and directed downward, the tip reaches almost to the end of the second segment of the antennular peduncle. The tip is truncate, it is provided with one ventral and 4 dorsal teeth, which all are very small and placed close to the apex. Both upper and lower margin are slightly convex. The carapace is smooth and swollen. The lower orbital angle is rounded. The antennal spine is strong and placed some distance below the orbit. The hepatic spine is small, movable and placed slightly behind the antennal spine and on a lower level than it. The anterolateral angle of the carapace is rounded.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth segment is slightly longer than the fifth, it is rather broad.

The telson (fig. 39b) is about 1.5 times as long as the sixth abdominal segment and is rather high at the base. The dorsal surface is provided in the posterior half with two pairs of spinules. The posterior pair of these spinules lies slightly nearer to the posterior margin of the telson than to the anterior pair. The posterior margin of the telson bears three pairs of spinules: the outer pair is extremely short, being about $^1/_4$ of the length of the intermediate pair. The submedian pair is more than half as long as the intermediate.

The eyes are well developed, the cornea is shorter and narrower than the eyestalk. The ocellus is distinct.

The first segment of the antennular peduncle is broad. The stylocerite reaches almost to the middle of the segment, it is rather broad and ends in a distinct point. The outer margin of the first antennular segment is straight or slightly convex, it ends in a small anterolateral spine, which is overreached by the convex anterior margin of the segment. The second segment is shorter and broader than the third, its outer part is produced into a lobe, which overreaches the articulation with the third segment. The second and third segments together measure about $^2/_3$ of the length of the first. The upper antennular flagellum has both rami fused for 4 to 6 joints. The free part of the shorter ramus consists of 2 or 3 joints and is slightly longer than half the fused portion.

The scaphocerite reaches distinctly beyond the antennular peduncle. Its outer margin is slightly

convex and ends in a broad tooth. The lamella is broad; the anterior margin is rounded and reaches slightly beyond the final tooth of the scaphocerite. The antennal peduncle bears no spine, its last segment reaches beyond the middle of the scaphocerite.

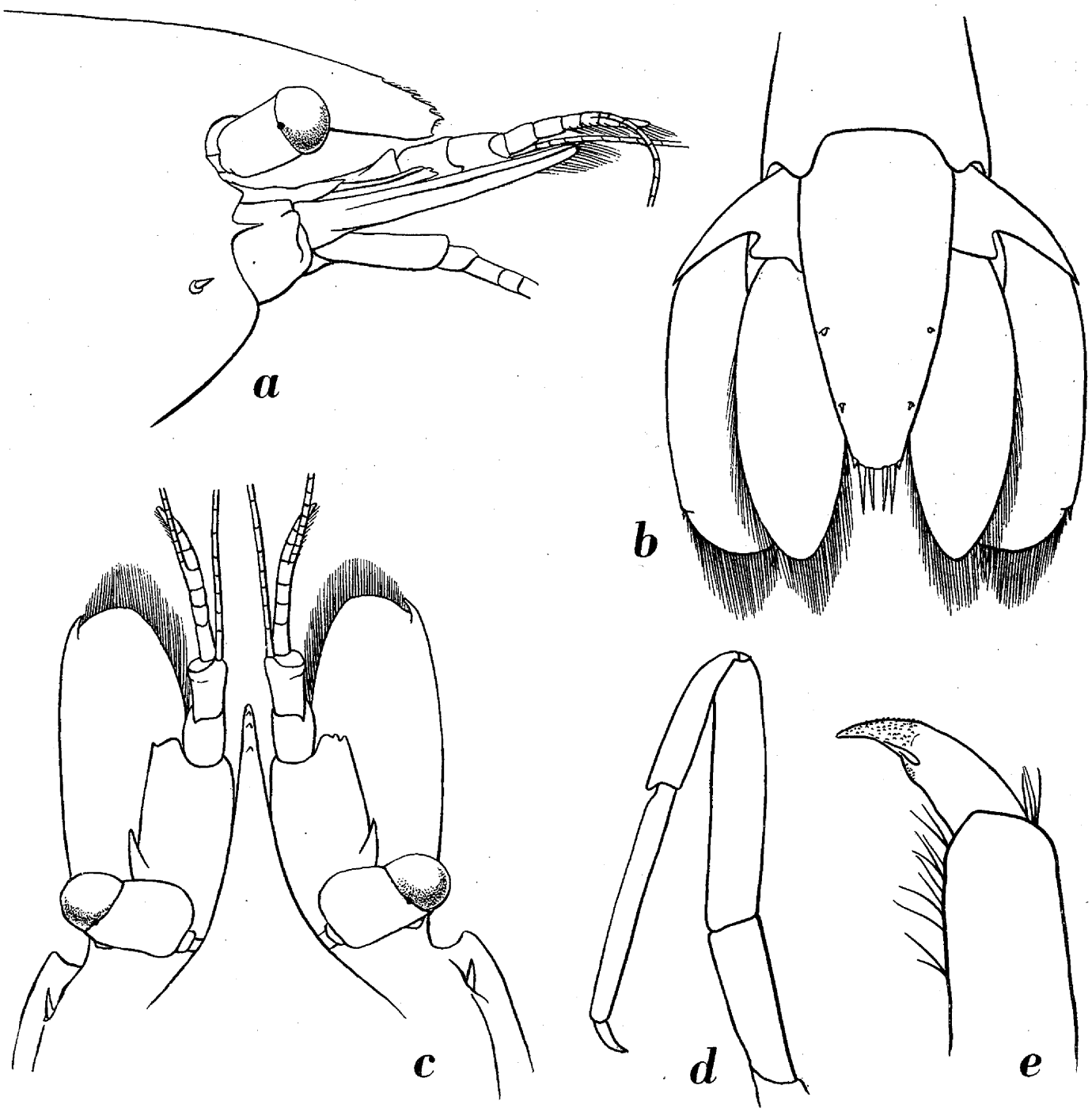

Fig. 39. *Paranchistus ornatus* nov. spec. a, anterior part of body, lateral view; b, telson and uropods, dorsal view; c, anterior part of body, dorsal view; d, third pereiopod; e, dactylus third pereiopod. a-d, × 14; e, × 86.

The mandible is typical in shape. The maxillula (fig. 40a) has the two laciniae broadened, the inner lacinia is distinctly broader than the upper; the upper lobe of the palp is absent. The maxilla (fig. 40b) has the inner lacinia divided into two broad lobes; the palp is rather short. The

first maxilliped (fig. 40c) is typical in shape. The second maxilliped (fig. 40d) differs from that of the preceding species by having the distal margin of the last joint straight or slightly convex. The third maxilliped (fig. 40e) fails to reach the end of the antennal peduncle. The ultimate segment is slightly longer than half the penultimate. The antepenultimate segment is about as long as the ultimate and penultimate combined. The exopod reaches to or slightly beyond the end of the antepenultimate segment. The latter is divided into two parts.

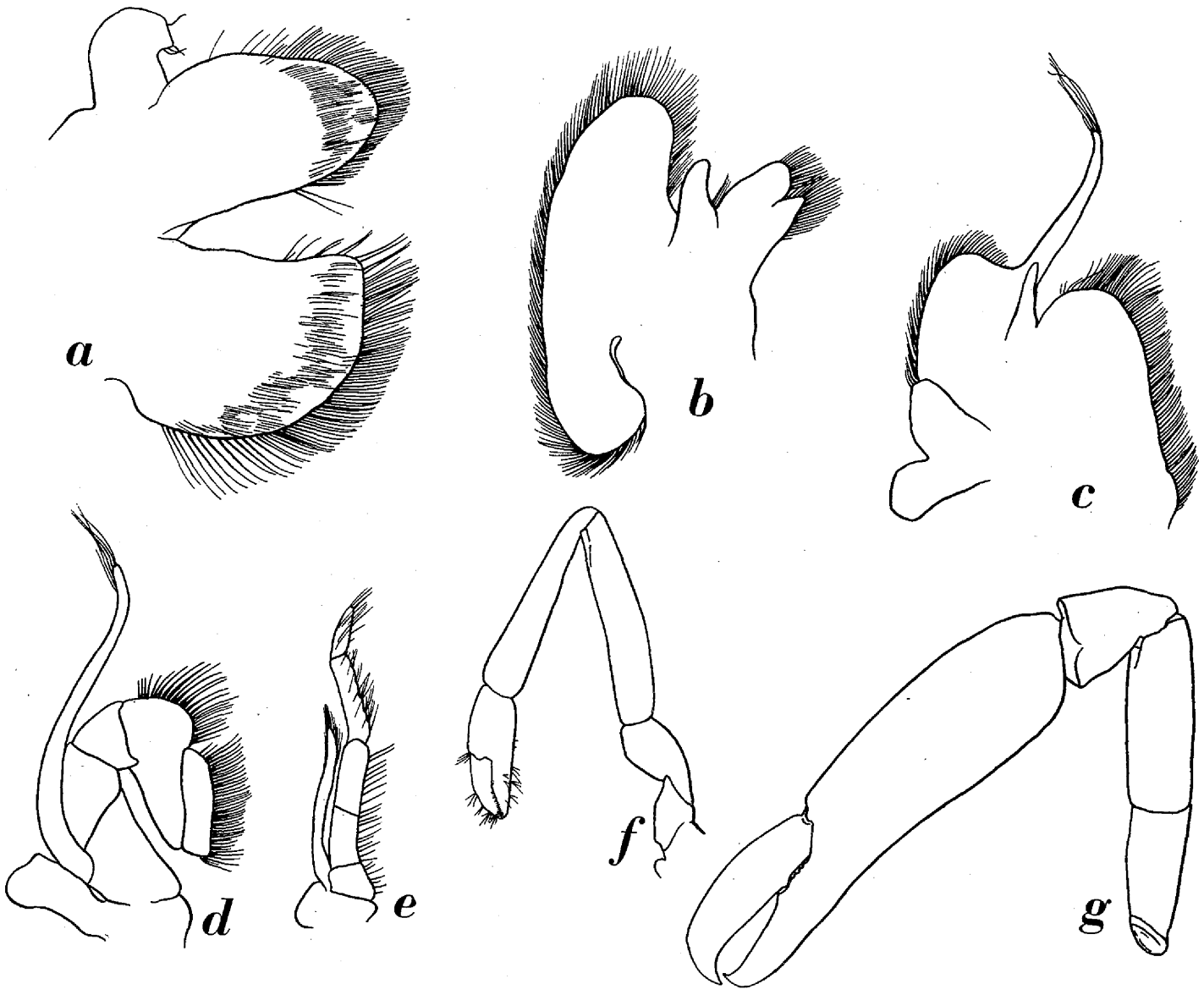

Fig. 40. *Paranchistus ornatus* nov. spec. a, maxillula; b, maxilla; c, first maxilliped; d, second maxilliped; e, third maxilliped; f, first pereiopod; g, second pereiopod. a, × 47; b-d, × 93; e-g, × 11.

The first pereiopod (fig. 40f) reaches with the chela beyond the scaphocerite. The fingers are about as long as the palm and have the cutting edge finely pectinate. The palm is broad. The carpus is 1.5 times as long as the chela, it narrows posteriorly. The merus is as long as the carpus. The ischium is less than half as long as the merus. The second pereiopods (fig. 40g) are strong and equal, they reach with almost the entire chela beyond the scaphocerite. The fingers are of the same length, being about $^2/_3$ as long as the palm, the tips of the fingers are crossing. The dactylus bears

one strong tooth in the proximal part of the cutting edge, the fixed finger is provided with five or six small teeth, the distal of which mostly is distinctly larger than the rest. The carpus measures about 1/3 of the length of the palm, it has the anterior margin entire and is strongly narrowing posteriorly. The merus is about as long as the fingers and is less than three times as long as broad. The ischium is about 4/5 of the length of the merus. The third pereiopod (fig. 39d) fails to reach the end of the antennal peduncle. The dactylus (fig. 39e) is slender, it measures about 1/5 of the length of the propodus; it is simple, with a small gibbosity in the middle of the posterior margin, the anterior side of the apex bears some very small tubercles; a distinct pit is visible on the lateral surface. The propodus bears no spines at the posterior margin, some hairs are present in the distal part of that margin. The carpus is slightly longer than half the propodus. The merus is about as long as the propodus. The ischium measures 3/4 of the length of the merus. The fourth and fifth pereiopods are similarly built as the third.

The uropods reach beyond the end of the telson. The basal segment of the uropods is produced in a slender spine, which reaches over the basal part of the exopod. The outer margin of the exopod is convex, naked and ends in a small tooth.

The species is most closely related to the next species, *P. nobilii,* from which it differs by having the cutting edges of the first pereiopods pectinate, by the shape of the rostrum and by the shape of the dactylus of the last three pereiopods, moreover the posterior margin of the propodus of the last three legs does not possess any spines in the present species, while in *P. nobilii* some spines are present in the distal part of this posterior margin. The main differences between the present species and *P. biunguiculatus* may be found in the shape of the second pereiopods and in that of the dactylus of the last three pereiopods.

Paranchistus nobilii nov. spec. (figs. 41, 42)

Anchistus Miersi Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 48.
Anchistus Miersi Pérez, 1920, C. R. Soc. Biol. Paris, vol. 83, p. 1027.

Museum Amsterdam

Arzana Island, Rakas Zakoum Bank, Persian Gulf; out of *Spondylus gaederopus* L.; 1901; leg. C. Pérez; coll. J. G. de Man. — 4 specimens (two of which ovigerous females) 16-21 mm.

The rostrum is compressed in the distal part, and is straight or directed slightly downward; it is spatulate in lateral view, being broadest slightly before the tip. The apex of the rostrum reaches almost the end of the second segment of the antennular peduncle, in one of my specimens it reaches slightly beyond that segment. The tip is truncate and provided with some setae, the upper margin bears 3 to 5, the lower margin 2 or 3 teeth, which all are placed close to the apex of the rostrum. The carapace is smooth and slightly swollen, antennal and hepatical spines are present. The antennal spine is rather small and is placed some distance below the rounded lower orbital angle, which is slightly produced anteriorly. The hepatic spine is movable and is placed behind the antennal spine on a much lower level. The anterolateral angle of the carapace is rounded and produced anteriorly.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth segment is somewhat longer than the fifth.

The telson (fig. 41c) is about 1.5 times as long as the sixth abdominal segment and is some-

what more than twice as long as broad. The dorsal surface is provided with two pairs of spines, the anterior of which is situated some distance behind the middle of the telson, the posterior pair lies about midway between the anterior pair and the posterior margin of the telson. The posterior margin

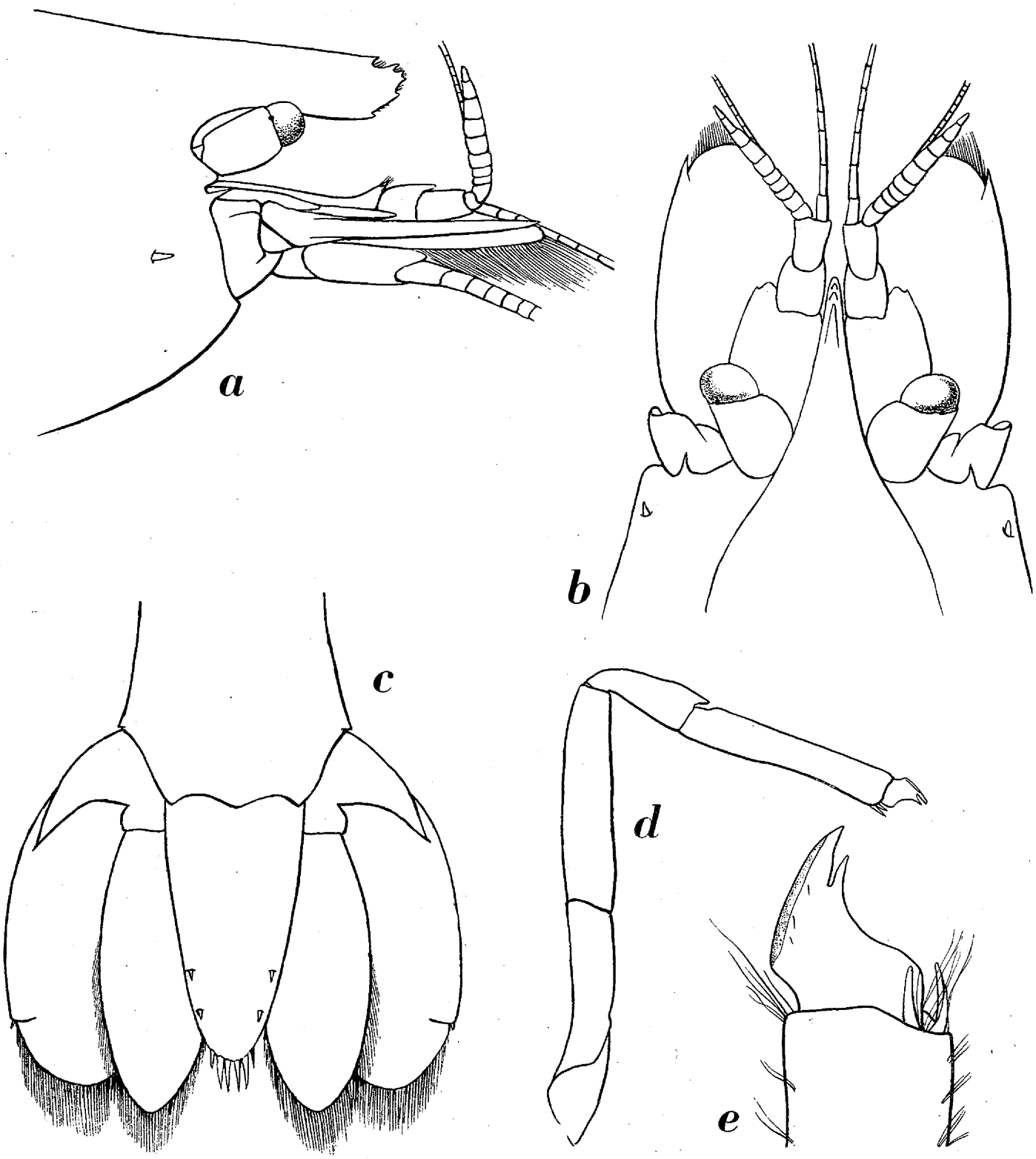

Fig. 41. *Paranchistus nobilii* nov. spec. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, telson and uropods, dorsal view; d, third pereiopod; e, dactylus of third pereiopod. a-d, × 14; e, × 86.

of the telson bears three pairs of spinules. The outer pair is very short, the two inner pairs are subequal in length, though the intermediate spines are stronger than the submedians.

The eyes are well developed. The hemispherical cornea is shorter and narrower than the stalk; a distinct ocellus is present.

The first segment of the antennular peduncle is broad. The stylocerite is strong and ends in a distinct point, it reaches about to the middle of the segment. The anterolateral spine of the first antennular segment is small and distinctly overreached by the convex anterior margin. The second segment is about as long as and distinctly broader than the third. The second and third segments together measure about $^2/_3$ of the length of the first. The upper antennular flagellum has the two rami fused for about 5 joints. The free portion consists of 2 or 3 joints and is about half as long as the fused part.

The scaphocerite is broad, it reaches distinctly beyond the end of the antennular peduncle. The outer margin is convex and ends in a distinct final tooth, which has the tip curved inward. The lamella is ovate and reaches about as far as the tip of the final tooth. The antennal peduncle reaches beyond the middle of the scaphocerite. No spine is present at the base of the antennal peduncle.

The oral parts closely resemble those of *P. ornatus*. The inner lacinia of the maxillula (fig. 42a) perhaps is even slightly more broadened; the upper lobe of the palp of the maxillula is rather distinct. The third maxilliped (fig. 42b) fails to reach the end of the antennal peduncle. The last segment is somewhat more than half as long as the penultimate segment. The antepenultimate segment is about as long as the penultimate and the ultimate together. The exopod reaches distinctly beyond the end of the antepenultimate segment. Like in the previous species, the antepenultimate segment is divided into two parts.

The first pereiopod (fig. 42c) reaches with a large part of the carpus beyond the scaphocerite. The fingers are about as long as the palm and bear many tufts of setae, the cutting edges are not pectinate. The carpus is 1.5 times as long as the chela and about as long as the merus; proximally the carpus is much narrower than distally. The ischium is about half as long as the merus. The second pereiopods (fig. 42d) are subequal, one of them being generally somewhat more slender than the other. The fingers are of about the same length, the dactylus being somewhat longer and more curved than the fixed finger. The cutting edge of the dactylus bears one tooth in the proximal part; the cutting edge of the fixed finger is provided with one tooth slightly behind the middle and 3 to 5 smaller ones proximally of that tooth. The upper margin of the dactylus is provided with many small tufts of short hairs. The palm is slightly more than twice as long as the fingers, it is swollen and cylindrical and is much broader than the carpus. The length of the carpus is about $^1/_4$ of that of the palm. The merus is less than twice as long as the carpus. The ischium is compressed, more or less triangular in shape and about as long as the carpus. The carpus, merus as well as the ischium are unarmed. The third pereiopod (fig. 41d) reaches about to the middle of the scaphocerite. The dactylus (fig. 41e) is short, it is distinctly biunguiculate; the distal part of the anterior surface is broad and flat and is provided with small tubercles. The propodus is about 5 times as long as the dactylus; the posterior margin is provided with some spines near the base of the dactylus. The carpus is about half as long as the propodus. The merus is about as long as, but distinctly broader than the propodus. The length of the ischium is more than half of that of the merus. The fourth and fifth pereiopods are similarly built as the third.

Like in *P. biunguiculatus* the endopod of the first pleopod of the male shows a distinct distally directed tooth at the distal part of the inner margin (fig. 42e). This tooth is more blunt than in *P. biunguiculatus*. The second pleopod of the male closely resembles that of *P. biunguiculatus*.

The uropods are broad and ovate, they reach beyond the end of the telson. The process of the basal segment is slender and pointed. The outer margin of the exopod is convex, naked and ends in a minute movable tooth.

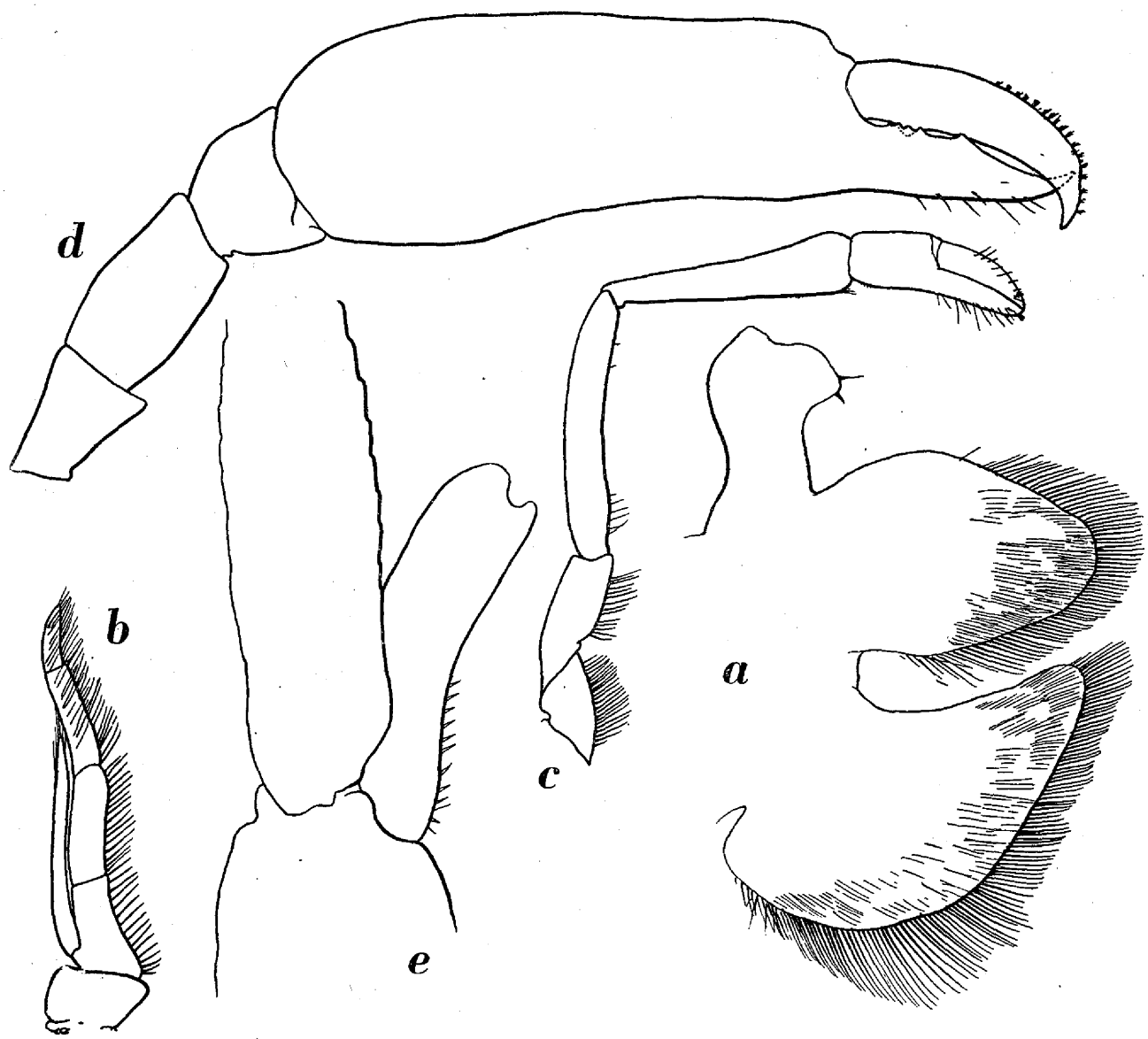

Fig. 42. *Paranchistus nobilii* nov. spec. a, maxillula; b, third maxilliped; c, first pereiopod; d, second pereiopod; e, first pleopod of male. a, × 63; b-d, × 15; e, × 75.

The present species is most closely related to *P. ornatus*; the differences between the two species have already been mentioned in the description of the latter species (p. 100). From *P. biunguiculatus,* the third member of the genus *Paranchistus, P. nobilii* differs in the shape of the rostrum and that of the second pereiopods, moreover the cutting edge of the fingers of the first pereiopods in *P. nobilii* are not pectinate as they are in *P. biunguiculatus*. Also the shape of the dactylus of the last three legs in the two species is different.

In a paper on Decapod and Stomatopod Crustacea collected by Bonnier and Pérez in the Persian Gulf, Nobili (1906) referred some prawns to *Anchistus miersi* (De Man). Part of this material was presented to Dr. J. G. de Man, in whose private collection they were preserved. After the death of Dr. de Man his collection was presented to the Zoological Museum at Amsterdam. When studying these specimens I found that they are specifically different from *A. miersi* and that, by the presence of a hepatic spine, they belong in the genus *Paranchistus*. The specimens in my opinion belong to a still undescribed species, which I propose to dedicate to the Italian carcinologist, who for the first time reported upon this material.

The present species is the only Pontoniid species known to live associated with bivalves of the genus *Spondylus*.

Anchistus Borradaile, 1898a

Of the present genus ten species are known. Four of these species have an incertain status, namely *Anchistus armatus* (H. Milne Edwards), *A. maculatus* (Stimpson), *A. spinuliferus* (Miers) and *A. mirabilis* (Pesta). Of *Anchistus armatus,* described by Milne Edwards under the name *Pontonia armata,* too few characters are known to make its identity certain; according to the author the species attains a length of almost 50 mm, which is remarkably large for a species of the present genus. *Anchistus maculatus* was described by Stimpson as *Pontonia maculata* and was obtained from a bivalve of the genus *Tridacna.* Stimpson's remark that the shape of the body is more elongate in his species than in *Conchodytes tridacnae* and that the rostrum is more slender than in that species makes it almost certain that his species belongs in the genus *Anchistus,* which is confirmed by the fact that Stimpson when describing the dactyli of the last three pereiopods does not mention anything about the large basal protuberance. In all probability Stimpson's species is identical either with *A. miersi* or with *A. demani,* which both live in *Tridacna.* With *A. miersi* it agrees in the length of the body (18 mm), in the colourpattern and in the fact that the dactylus of the last three pereiopods is distinctly biunguiculate. Stimpson does not mention the presence of an antennal spine. *Anchistus spinuliferus,* described by Miers as *Harpilius spinuliferus,* is insufficiently known; it may be identical with *A. miersi* or *A. gravieri.* As already pointed out by Kemp (1922) *Anchistus mirabilis,* described as *Marygrande mirabilis* by Pesta, in all probability is based on material consisting of two different species of the present genus.

Kemp (1922) gave a key to four species of the present genus; this key included all species of *Anchistus* known at that time, the species incertae and *A. biunguiculatus,* which now is inserted in the genus *Paranchistus,* excluded. After the publication of Kemp's paper two new species have been described, namely *Anchistus pectinis* Kemp (1925) and *Anchistus misakiensis* Yokoya (1936). These two species are closely related, if they are not identical. The only differences I could find are:

1. Yokoya in his description states that *A. misakiensis* is provided with a pterygostomian spine, a feature not yet known in the present genus.
2. The last three pereiopods in *A. misakiensis* are more slender than in *A. pectinis* and the dactylus is more distinctly biunguiculate.

The first character is not distinctly visible in Yokoya's figure, the anterolateral angle of the carapace is figured more or less pointed, but that also may be due to the fact that the lower margin of the carapace is turned inward; no distinct spine at least is visible. The supposition that

the two species are closely related or identical also is strengthened by the fact that both inhabit Pectinid bivalves. *Anchistus pectinis* namely is recorded from *Pecten* spec., *Anchistus misakiensis* from *Amussium japonicum* (Gmel.). Both species differ from other species of the genus *Anchistus* by the long and curved dactylus of the second pereiopods.

The oral parts of the present genus much resemble those of *Paranchistus*. The mandible has the incisor process ending in three teeth, the molar process bears blunt knobs and ridges and is provided with brushlike arranged spines. The inner lacinia of the maxillula in both species of the present genus examined by me, are broadened, the upper lacinia too is somewhat broadened. The shape of the maxillipeds is normal. The second maxilliped lacks the podobranch; an arthrobranch is present at the base of the third maxilliped.

Anchistus custos (Forsskål) (figs. 43, 44)

Cancer custos Forsskål, 1775, Descript. Anim., pp. xxi, 94.
non *Cancer custos* Forsskål, 1775, Descript. Anim., p. 89.
Palaemon custos Latreille, 1802, Hist. nat. Crust. Ins., vol. 6, p. 337.
non *Pontonia custos* Guérin, 1832, Expéd. sci. Morée, Zool., vol. 2, p. 36, pl. 27 fig. 1 [1]).
Pontonie enflée H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 360.
Pontonia inflata H. Milne Edwards, 1840, Hist. nat. Crust., vol. 3, p. 633.
Anchistia aurantiaca Dana, 1852, Proc. Acad. nat. Sci. Philad., vol. 6, p. 25.
Anchistia aurantiaca Dana, 1852a, U.S. Explor. Exped., vol. 13, p. 581.
Anchistia aurantiaca Weitenweber, 1854, Lotos Praha, vol. 4, p. 60.
Anchistia aurantiaca Dana, 1855, U.S. Explor. Exped., vol. 13 atlas, p. 12, pl. 38 fig. 2.
Pontonia inflata Tennent, 1861, Sketch. Nat. Hist. Ceylon, p. 479, 486.
Harpilius inermis Miers, 1884, Rep. zool. Coll. Alert, p. 291, pl. 32 fig. B.
Harpilius inermis Müller, 1887, Verh. naturf. Ges. Basel, vol. 7, p. 471.
Pontonia pinnae Ortmann, 1894, Denkschr. med.-naturw. Ges. Jena, vol. 8, p. 16, pl. 1 fig. 3.
Anchistus inermis Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 387.
Pontonia pinnae Borradaile, 1898a, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 389.
Anchistus inermis Lanchester, 1901, Proc. zool. Soc. Lond., 1901, p. 565.
Anchistus inermis Pearson, 1905, Rep. Ceylon Pearl Oyster Fish., vol. 4, p. 77.
Pontonia pinnae Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 49, pl. 4 fig. 11.
Pontonia pinnae Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 65.
Anchistus inermis Rathbun, 1914, Proc. zool. Soc. Lond., 1914, p. 656.
Periclimenes (Ensiger) aurantiacus Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 376.
Anchistus inermis Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 388.
Pontonia pinnae Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 391.
Anchistus inermis Tattersall, 1921, Journ. Linn. Soc. Zool., vol. 34, p. 391, pl. 27 fig. 4.
Anchistia aurantiaca Kemp, 1922, Rec. Indian Mus., vol. 24, p. 138.
Anchistus inermis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 249, fig. 81.
Anchistus inermis Hedley, 1924, Rec. Aust. Mus., vol. 14, p. 146.
Anchistus inermis Kemp, 1925, Rec. Indian Mus., vol. 27, p. 322.
Anchistus inermis Barnard, 1926, Trans. Roy. Soc. S. Afr., vol. 13, p. 121.
Anchistus inermis Gravely, 1927, Bull. Madras Govt. Mus., n. ser. vol. 1, p. 137, pl. 19 fig. 5.
Anchistus inermis Hale, 1927, Crust. S. Aust., vol. 1, p. 57, fig. 52.
Anchistus inermis Kubo, 1940, Journ. Imp. Fish. Inst. Tokyo, vol. 34, p. 48, figs. 15-17.
Anchistus inermis Barnard, 1950, Ann. S. Afr. Mus., vol. 38, p. 792, fig. 150 a-d.

1) In this list no further references are given of authors, who following Guérin (1832) used the trivial name *custos* for the Mediterranean *Pontonia pinnophylax* (Otto).

Siboga Expedition

Station 125, anchorage off Sawan, Siau Island, Sangihe Group; reef; depth 27 m; July 18 and 19, 1899. — 1 specimen 24 mm.

Station 258, Tual anchorage, Kai Islands; reef exploration and dredge; depth 22 m; bottom lithothamnion, coral and sand; December 12-16, 1899. — 2 specimens (one ovigerous female) 27 and 28 mm.

Snellius Expedition

Kera near Timor; November 11-13, 1929. — 1 ovigerous female 32 mm.

Museum Leiden

Takao, South Formosa; out of *Pinna* spec.; September 15, 1907; leg. H. Sauter. — 1 ovigerous female 32 mm.

Locality unknown; out of *Pinna* spec.; leg. M. J. Landauer. — 1 specimen 24 mm.

Museum Amsterdam

Bay of Djakarta (= Batavia); leg. C. P. Sluiter. — 1 specimen 21 mm.

Lesser Sunda Islands; December 18, 1909; leg. H. J. M. Laurense. — 3 specimens 22-30 mm.

The present specimens agree with K e m p's description. The antepenultimate segment of the third maxilliped not always is as broad as figured by K e m p and the lateral margins of the chela of the first pereiopod in some specimens are not so strongly curved inward as in others, though this character always is present.

The oral parts all are figured here (figs. 43a-e).

The endopod of the first pleopod of the male shows a laterally directed triangular process in the distal part of the inner margin. This process, however, is not equally distinct in the specimens at my disposal (figs. 44a, b). The second pleopod resembles that of the specimens of the preceding genus.

The trivial name *inermis* cannot be used for the present species as it is preoccupied by three other names, the oldest being F o r s s k å l's name *custos*. F o r s s k å l's *Cancer custos* was collected in the Red Sea and was living in a species of *Pinna*. The only four genera of Pontoniinae known to be associated with Lamellibranchs are *Pontonia, Conchodytes, Paranchistus* and *Anchistus*. The genera *Pontonia* and *Paranchistus* may be excluded here as no Indo-Westpacific species of these ever have been found in a species of *Pinna,* while moreover the species of *Pontonia* never attain the length of 37 mm mentioned by F o r s s k å l for his species. F o r s s k å l in his description states the rostrum of *Cancer custos* to be elongate, conical and measuring one third of the length of the carapace. In *Conchodytes* the rostrum is broadly triangular and depressed, it is distinctly shorter than one third of the carapace. In *Anchistus,* however, the rostrum indeed is elongate, conical at base and compressed in the anterior part and easily attains one third of the length of the carapace. The only genus therefore in which F o r s s k å l's species may belong is *Anchistus*. According to F o r s s k å l's description the rostrum is unarmed, a feature in the genus *Anchistus* only shown by *Anchistus inermis*. We therefore may safely identify *Cancer custos* with *Anchistus inermis* the more as all other characters mentioned by F o r s s k å l for his species may be found in *Anchistus inermis*. This species namely may attain a

size of 39 mm (vid. K e m p, 1922), its body is smooth and the colour mentioned by F o r s s k å l "flavicans, albopunctatus" also is found in *Anchistus inermis* according to K e m p's (1922) remark

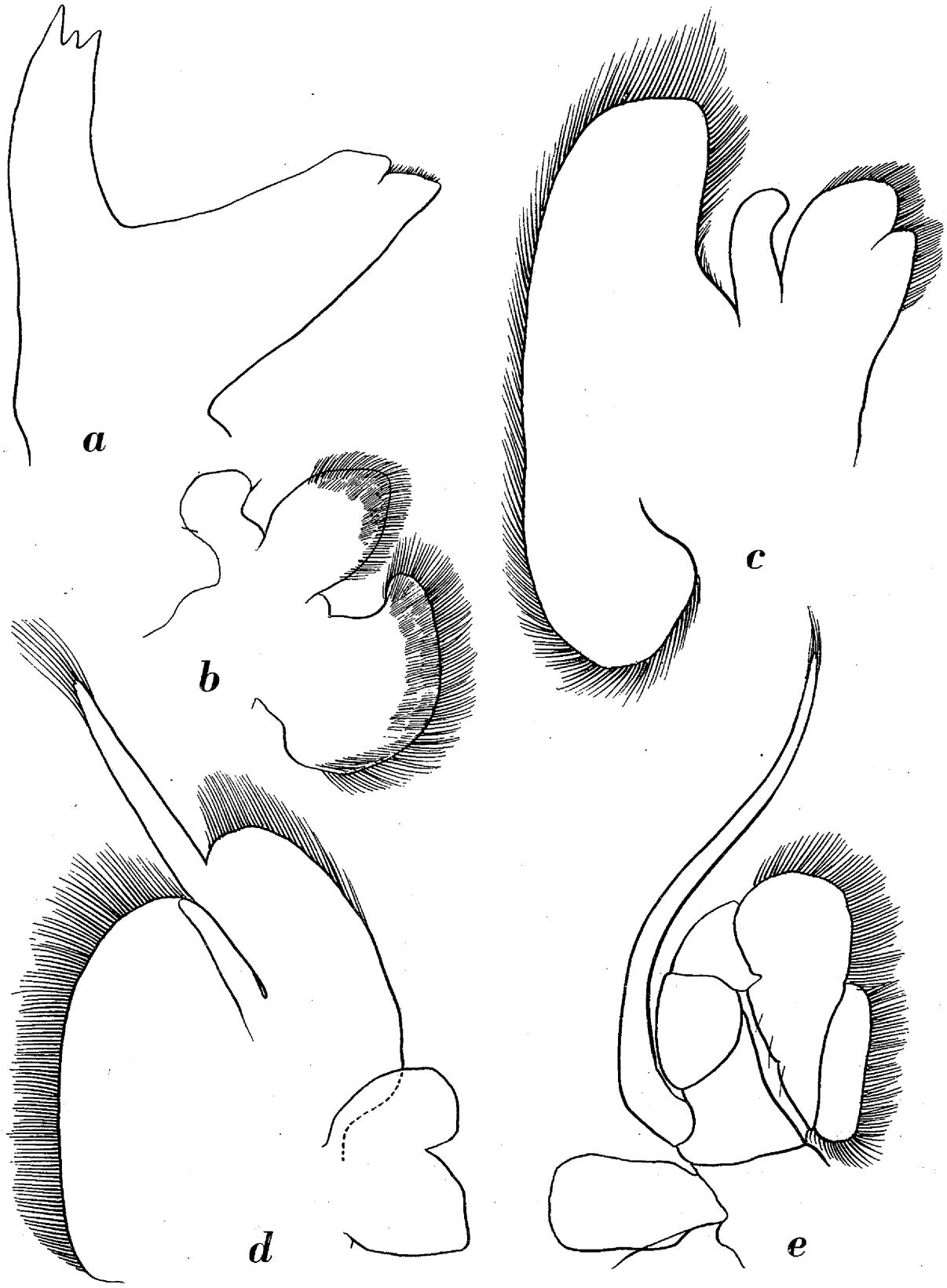

Fig. 43 *Anchistus custos* (Forsskål). a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped. a, × 75; b-e, × 31.

"Living specimens vary in colour from pale straw to bright orange yellow. In females the entire body and legs are covered with minute white dots", this colour, however, also may be observed in *Conchodytes biunguiculatus*. The other characters, mentioned by Forsskål, too are present in *Anchistus inermis,* the most important being that of the shape of the rostrum, the cylindrical and slender chelae and the shape of the fingers; in my material often the dactylus of the second legs is slightly longer than the fixed finger, and also often the second pereiopods are equal in shape, though they frequently are unequal as is stated by Kemp (1922) for his specimens. With *Conchodytes biunbuiculatus, Anchistus inermis* is the most common inhabitant of bivalves of the genus *Pinna,* though *Anchistus miersi* also is recorded to live sometimes in association with these bivalves. *Anchistus inermis* is known from the Red Sea, so that the identity of *Cancer custos* with *Anchistus inermis* may be accepted without any doubt. The species must be named therefore *Anchistus custos* (Forsskål). Nobili (1906) already pointed to the probable identity of *Cancer custos* with the present species, named by

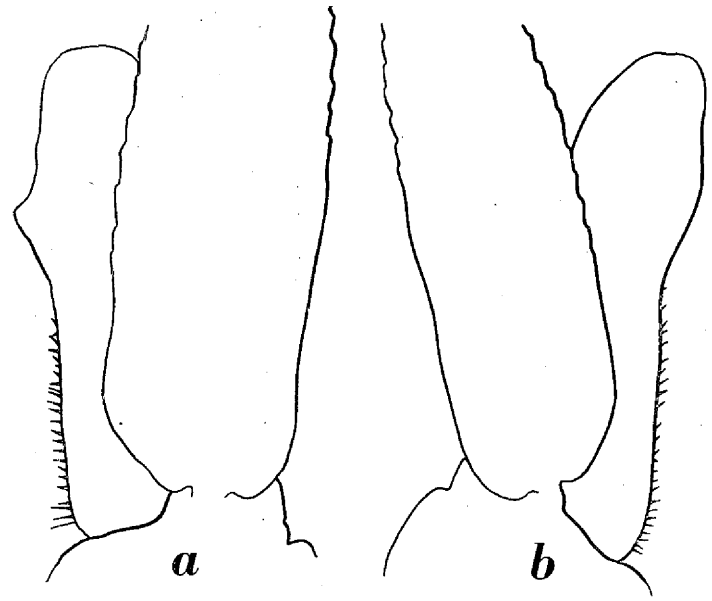

Fig. 44. *Anchistus custos* (Forsskål) ♂. a, b, endopod of first pleopod, showing different shapes. a, b, × 50.

him *Pontonia pinnae.* This author, however, thought that Forsskål's name *custos* may not be used for the present species as it is preoccupied by the name *Cancer custos* used by Forsskål (probably by mistake) for a Pinnotherid species, which is printed some pages before the name for the shrimp. Nobili is mistaken here, as the name *Cancer custos* is used for the first time in Forsskål's work on p. xxi in the review of the species, which is printed at the beginning of the work, and this name, as is clear from the indications accompanying it, is intended for the Macruran, the name for the crab being not mentioned in the review. Therefore the name *custos* for the Macruran preoccupies that for the Brachyuran. Guérin (1832) identified Forsskål's species with the Mediterranean species at present known as *Pontonia pinnophylax* (Otto), his error is corrected by later authors, though one still often will find Forsskål's name used for *Pontonia pinnophylax.*

The present species has been described for the second time as new by H. Milne Edwards (1837) under the name Pontonie enflée. The following characters given by Milne Edwards for his species make the identity pretty certain:

1. The compressed rostrum, which is directed downward and almost reaches the end of the

scaphocerite. As Milne Edwards mentions nothing about the dentition of the rostrum, it in all probability is unarmed.
2. The absence of the antennal spine.
3. The swollen carapace.
4. The large and cylindrical chelae of the second pereiopods.
5. The length of 25 mm.

Milne Edwards does not give a latin name to this species in the second volume of his Histoire naturelle des Crustacés, probably it is omitted by accident. In the index to the species, genera, families etc. given at the end of the third volume of his work Milne Edwards (1840) mentions the name *Pontonia inflata* and refers to the page containing the description of his Pontonie enflée; there can be little doubt that his *Pontonia inflata* is the same as his Pontonie enflée.

Kemp (1922) considered Dana's *Anchistia aurantiaca,* which was placed by Borradaile (1917a) in a separate subgenus *Ensiger* of the genus *Periclimenes,* as a species incerta. In this respect I do not agree with Kemp, as in my opinion *Anchistia aurantiaca* shows all characters of *Anchistus custos,* which is distinctly shown by Dana's figure; Dana's statement "Pedes antici superficie manus internâ prope basin densè laxèque pubescentes" in all probability refers to the peculiar shape and pubescence of the chela of the first pereiopods characteristic for *Anchistus custos.* The fact that Dana observed only two spines on the posterior margin of the telson probably is due to the small size of the spines; he perhaps took the others to be hairs. The orange colour of the species also is in accordance with Kemp's above cited statement on the colour of *Anchistus inermis.*

Vertical distribution. The species is a litoral form. It is recorded in literature to live in association with: *Pinna* spec. (Miers, 1884; Ortmann, 1894; Nobili, 1906, 1906b; Rathbun, 1914; Kemp, 1922; Gravely, 1927; Barnard, 1950), "Black Pinna" (Tattersall, 1921), *Pinna bicolor* Chemn. (Kemp, 1922), *Pinna dolabrata* Lam. (= *P. inermis* Tate) (Hale, 1927), *Pinna madida* Reeve (Hedley, 1924), *Pinna nigra* Chemn. (Forsskål, 1775; Kemp, 1925), *Pinna nigra* Chemn. (as *P. nigrina* Lam.) (Kemp, 1922), *Pinna saccata* L. (Forsskål, 1775), *Pinna vexillum* Born. (Kemp, 1922). Furthermore it is recorded by Lanchester from the "infra branchial chamber of a large Gastropod".

Horizontal distribution. The species is recorded in literature from: Red Sea (Nobili, 1906b), Suakin Harbour, Red Sea (Tattersall, 1921), Loheia, Red Sea (Forsskål, 1775), Jibuti (Nobili, 1906b), Dar es Salaam, Tanganyika (Ortmann, 1894), Delagoa Bay, Portuguese East Africa (Barnard, 1926, 1950), N.E. of Arzana Island, Persian Gulf (Nobili, 1906; Kemp, 1922), Gulf of Manaar (Pearson, 1905), Pamban, Gulf of Manaar (Kemp, 1922), Kutikal, Krusadai Island, Gulf of Manaar (Gravely, 1927), Ceylon (H. Milne Edwards, 1837; Tennent, 1861), Cheval Paar, Ceylon (Pearson, 1905; Kemp, 1922), Trincomali, Ceylon (Müller, 1887), Andaman Islands (Kemp, 1922), Port Blair, Andaman Islands (Kemp, 1922), Octavia Bay, Nancowry Harbour, Nicobar Islands (Kemp, 1925), Paway Island, Mergui Archipelago (Kemp, 1922), Pulau Bidan, Penang (Lanchester, 1901), Palau (Kubo, 1940), Hermite, Monte Bello Islands, West Australia (Rathbun, 1914), Sharks Bay, West Australia (Miers, 1884), St. Vincent Gulf, S. Australia (Hale, 1927), Port Molle, Queensland (Miers, 1884), Bowen, Queensland (Hedley, 1924), Vanikoro, Santa Cruz Islands (H. Milne Edwards, 1837; Kemp, 1922), Fiji Archipelago (Dana, 1852). The species now for the first time is recorded from the Malay Archipelago.

Anchistus miersi (De Man) (fig. 45)

Harpilius Miersi De Man, 1888a, Journ. Linn. Soc. Lond. Zool., vol. 22, p. 274, pl. 17 figs. 6-10.
Harpilius miersi Whitelegge, 1897, Mem. Aust. Mus., vol. 3, p. 148.
Anchistus miersi Borradaile, 1898, Ann. Mag. nat. Hist., ser. 7 vol. 2, p. 387.
Anchistus miersi Anonymus, 1899, Mem. Aust. Mus., vol. 3, p. 518.
Coralliocaris nudirostris Nobili, 1899, Ann. Mus. Stor. nat. Genova, vol. 40, p. 235.
Anchistus miersi Borradaile, 1899, Willey's Zool. Res., vol. 4, p. 408.
non *Anchistus Miersi* Nobili, 1906, Bull. sci. France Belg., vol. 40, p. 48.
Anchistus Miersi Nobili, 1906b, Ann. Sci. nat. Zool., ser. 9 vol. 4, p. 63.
Anchistus Miersi Nobili, 1907, Mem. Accad. Sci. Torino, ser. 2 vol. 57, p. 359.
Anchistus miersi Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, pp. 324, 388, pl. 56 fig. 25.
non *Anchistus Miersi* Pérez, 1920, C. R. Soc. Biol. Paris, vol. 83, p. 1027.
Anchistus miersi Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 391.
Anchistus miersi Kemp, 1922, Rec. Indian Mus., vol. 24, p. 255, fig. 85.
Anchistus miersi Ramadan, 1936, Bull. Fac. Sci. Egypt. Univ., vol. 6, p. 23.
Anchistus miersi Kubo, 1940, Journ. Imp. Fish. Inst. Tokyo, vol. 34, p. 51, figs. 18-20.

Siboga Expedition

Station 78, Lumulumu Shoal, Borneo Bank; in *Tridacna* spec.; shore exploration; depth 34 m; bottom coral and coralsand; June 10 and 11, 1899. — 1 specimen 25 mm.

The specimen agrees well with De Man's description. The chelae of the second legs have the dactylus provided with one large ventral tooth, the fixed finger bears some small denticles in the proximal part of the cutting edge. The telson (fig.45) differs from the description given by Kemp (1922) in having the outer pair of spinules of the posterior margin placed some distance before the intermediate and submedian pairs, resembling in this feature *Conchodytes nipponensis* (De Haan), in which species, however, the character is much more distinct. The scaphocerite of my specimen shows the same shape as in Kemp's specimen of *Anchistus demani*.

The oral parts of the present species show no essential differences from those of *Anchistus custos*. In Borradaile's (1917a) paper most of the oral parts of *A. miersi* are figured.

The specimens described by Nobili (1906) as belonging to the present species could be examined by me and proved to belong to a new species, described here (p. 100) as *Paranchistus nobilii*; the same specimens are mentioned by Pérez (1920).

The specimen, an ovigerous female of 19 mm, from Mefoor (= Noemfoor), N.W. New Guinea, which Nobili (1899) identified as *Coralliocaris nudirostris* (Heller), was examined by me in the Museo Civico di Storia Naturale in Genoa, Italy, and proved to belong to *Anchistus miersi* (De Man).

Vertical distribution. The species is a litoral form and is found to live in association with: a mollusc (Nobili, 1899), *Tridacna squamosa* Lam. (Borradaile, 1899), *Tridacna* spec. (Kemp, 1922; present publication), *Pteria* (= *Meleagrina*) spec. (Nobili, 1907), and *Pinna* spec. (Nobili, 1906b; Tattersall, 1921).

Horizontal distribution. Records in literature are: Red Sea (Nobili, 1906b), Ghardaqa, Red Sea (Ramadan, 1936), Suakin Harbour, Red Sea (Tattersall, 1921), Egmont Reef, Seychelles (Borradaile, 1917a), Hulule, Male Atoll, Maldive Archipelago (Borradaile,

1917a), Port Blair, Andaman Islands (Kemp, 1922), Elphinstone Island, Mergui Archipelago (De Man, 1888a; Kemp, 1922), Pulu Condore, Indo China (Kemp, 1922), Palau (Kubo, 1940), Djakarta (= Batavia) (Kemp, 1922), Mefoor (= Noemfoor), Geelvinck Bay, N.W. New

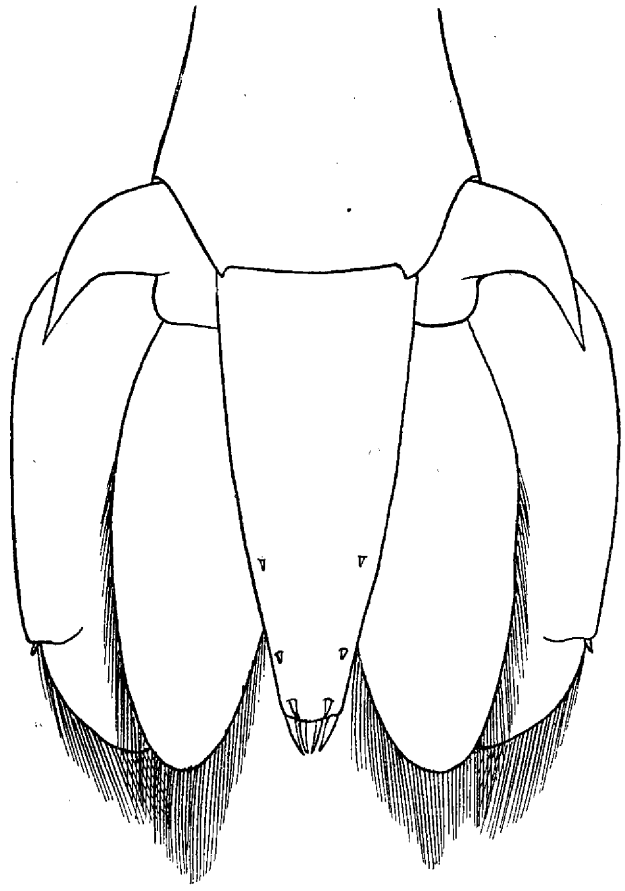

Fig. 45. *Anchistus miersi* (De Man). telson and uropods, dorsal view. × 16.

Guinea (Nobili, 1899), Dobu, d'Entrecastaux Group, Papua (Borradaile, 1899), Funafuti, Ellice Islands (Whitelegge, 1897; Anonymus, 1899), Mangareva-Tearia, Gambier Archipelago (Nobili, 1907).

Thaumastocaris Kemp, 1922

The only species known of the present genus, *Thaumastocaris streptopus,* is represented by rather abundant material in the present collections.

Thaumastocaris streptopus Kemp, 1922 (figs. 46, 47)

Thaumastocaris streptopus Kemp, 1922, Rec. Indian Mus., vol. 24, p. 244, figs. 78-80.

Siboga Expedition

Station 258, Tual anchorage, Kai Islands; reef exploration and dredge; depth 22 m; bottom Lithothamnion, sand and coral; December 12-16, 1899. — 1 specimen 26 mm.

Station 282, anchorage between Nusa Besi and the N.E. point of Timor, 8° 25'.2 S, 127° 18'.4 E; trawl, dredge and reef exploration; depth 27-54 m; bottom sand, coral and Lithothamnion; January 15-17, 1900. — 4 specimens (one of which is an ovigerous female) 18-36 mm.

Snellius Expedition

Amboina; September 11-17, 1930. — 4 specimens 11-14 mm.

In my specimens the rostrum is provided with 9 to 11 dorsal and with 3 ventral teeth. The lateral carina of the rostrum does not continue in the orbital margin, but forms a postorbital ridge,

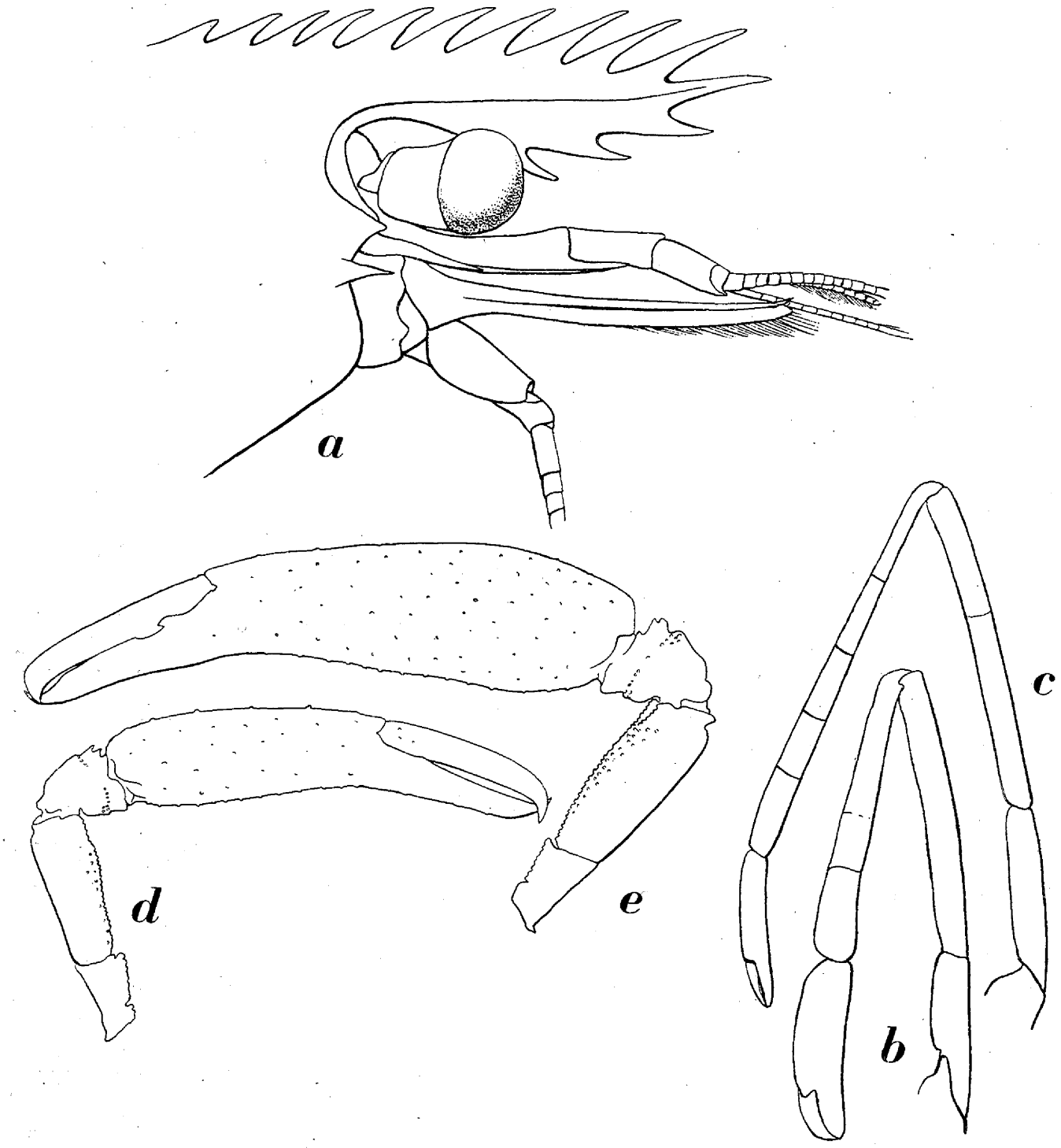

Fig. 46. *Thaumastocaris streptopus* Kemp. a, anterior part of body, lateral view; b, shorter first pereiopod; c, longer first pereiopod; d, smaller second pereiopod; e, larger second pereiopod. a, × 17; b, c, × 12; d, e, × 6.

which ends below the lower orbital angle in a blunt tooth of the anterior margin of the carapace (fig. 46a).

The oral parts resemble those of the species of *Periclimenes*. The mandible (fig. 47a) lacks the palp, the incisor process ends in two teeth, the molar process bears blunt teeth and some spines.

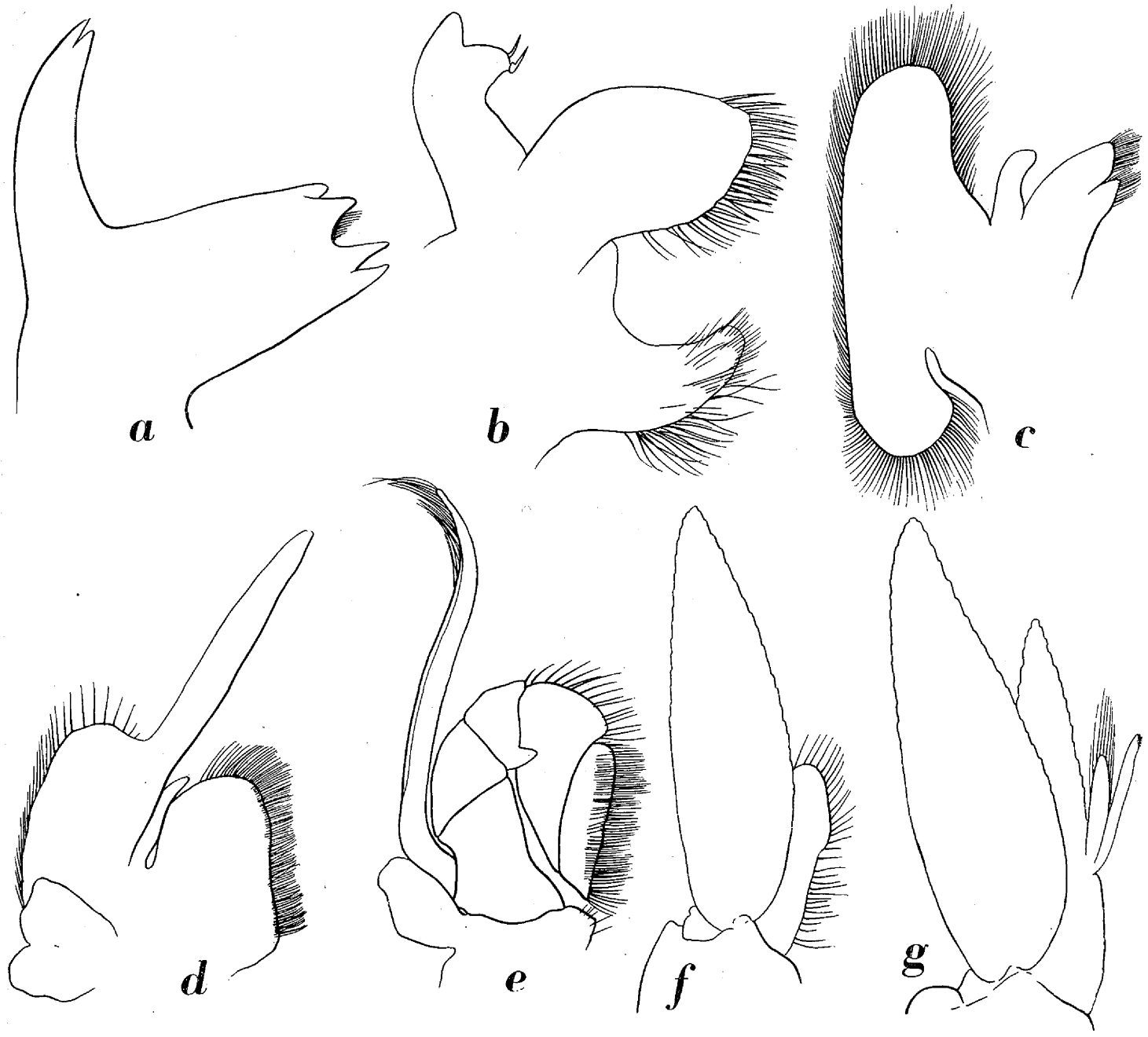

Fig. 47. *Thaumastocaris streptopus* Kemp. a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped; f, first pleopod of male; g, second pleopod of male. a, b, × 47; c-g, × 23.

The maxillula (fig. 47b) has the inner lacinia slender, the upper lacinia is slightly broadened and the palp is distinctly bilobed, the lower lobe ending in two sharp points. The maxilla (fig. 47c) has the inner lacinia cleft, the palp is well developed, the scaphognathite is large, but not very broad. The maxillipeds (figs. 47d, e) are quite normal in shape, all are provided with exopods. No podobranch is present at the second maxilliped; the third maxilliped is provided with an arthrobranch.

The first pereiopods (figs. 46b, c) in my specimens always are unequal, one of them is longer and slenderer than the other. The chela in the longer leg has the fingers about 1/3 of the length of the palm, in the other leg they are relatively longer, but in none of my specimens the fingers exceed half the length of the palm; they mostly are more clumsy than figured by K e m p.

The two largest specimens from Siboga Station 282 are an adult male and an ovigerous female. In both specimens the second pereiopods (figs. 46d, e) are present. These pereiopods are slightly unequal, the right being somewhat larger than the left. The larger second leg in my specimens agrees with K e m p's description of the only second leg present in his specimen. The only differences I could find are: in my specimens all limbs are more strongly tuberculated and the anterior margin of the carpus bears two distinct teeth between the excavation at the inner side and the crenulation at the upper margin. The fingers generally are longer, being about as long as or slightly longer than half the palma. The left leg is slightly shorter and more slender than the right. The fingers are somewhat shorter than the palm. The shape of the other joints of this leg is similar to that of the right leg.

The first two pleopods of the male are figured here (figs. 47f, g); they do not show essential differences from those of the species of the subgenus *Harpilius* of the genus *Periclimenes.*

In all other respects my specimens closely agree with K e m p's excellent description and figures.

Distribution. The only previous record of this species is that by K e m p (1922) from Noumea, New Caledonia.

Periclimenaeus Borradaile, 1915

Definition: Pontoniid prawns living in association with Porifera, Gorgonaria and Ascidia. Body clumsy, compressed, rather high. Rostrum distinct, with teeth. Carapace smooth, with antennal and sometimes with supraorbital spines. Hepatic spines always absent; sometimes a postorbital ridge is present.

Abdomen smooth, straight, not geniculate and as high as the thorax. Pleurae of the first four segments broadly rounded. Sixth segment slightly if at all longer than the fifth.

Telson rather broad, upper surface with two pairs of spinules; posterior margin with three pairs of spinules.

Eyes distinct with hemispherical cornea.

Basal segment of antennular peduncle broad, outer margin before the stylocerite generally produced into a triangular process. Stylocerite mostly short, broad, directed obliquely outward, sometimes slender. Last two segments of antennular peduncle short. Upper antennular flagellum with two rami, free portion of the shorter ramus sometimes very short.

Mandible without palp; molar process with or without spines, mostly with blunt knobs; incisor process variable in shape, sometimes very short (*P. pearsei, P. bermudensis*), often ending into 2-5 (mostly 2) teeth (*P. truncatus, minutus, atlanticus, tridentatus*); in some species (*P. rhodope, arthrodactylus*) the distal margin of the cutting edge is crenulate. Maxillula with the inner lacinia narrow, tapering towards the tip, upper lacinia rather broad, and provided with spines at the distal margin, palp of maxillula bilobed or entire. Maxilla provided with a large though not very broad scaphognathite; as in the previous genera the palp is distinct; the inner lacinia is simple (*P. robustus,*

maxillulidens, pearsei, atlanticus, tridentatus) or distinctly bilobed (*P. truncatus, rhodope, arthrodactylus; minutus*). The first maxilliped has the basis and coxa sometimes distinctly separated, sometimes the notch between basis and coxa is indistinct or even absent; palp well developed, exopod with a caridean lobe of varying breadth, epipod rather small. Second maxilliped of the same shape as in *Periclimenes,* podobranch absent. Third maxilliped slender, provided with a small arthrobranch. All maxillipeds with exopods.

First pereiopods slender, reaching beyond scaphocerite. Second pereiopods strongly unequal, the larger leg very strong, resembling the large cheliped in *Alpheus*; palm cylindrical, swollen; fingers short and blunt, provided with 1 to 3 teeth, one of which is truncate, hammershaped and fits in a pit of the other finger; the other second leg is shorter and more slender, it is differently built. Third to fifth pereiopods slender. Shape of the dactylus of these legs very variable, sometimes uni-, sometimes biunguiculate, often provided with many accessory denticles along the posterior margin, sometimes with a movable tip. Basal part of posterior margin of dactylus, though sometimes more or less broadened never transformed into a distinct process as in *Coralliocaris, Conchodytes* or one of the allied genera: when the dactylus is curved backward this broadened part disappears in a slit of the propodus.

Uropods ovate in shape, rather broad. Outer margin of exopod ending into two or more spines.

Type: *Periclimenaeus robustus* Borradaile (1915).

In literature various species of the genus *Periclimenaeus* have been placed in a number of quite different genera. The cause of this may be found in the fact that the present genus shows some characters, which at first sight seem to be intermediate between characters, which in the present subfamily are thought to be of generic value; furthermore characters, which in other genera prove to be very constant are variable in the present genus. So for instance: the basal part of the dactylus of the last three pereiopods in some members of *Periclimenaeus* is more or less broadened, in others this broadening is entirely absent. As the character of the presence or absence of one or more basal tubercles at the base of the dactylus of these pereiopods is of the first importance for the separation of the genera of Pontoniinae, it is not surprising to find part of the species now inserted in *Periclimenaeus,* in literature referred to the genus *Periclimenes* (which has the dactyli without basal protuberance) and part to the genus *Coralliocaris* (in which this basal tubercle is very distinct). When, however, we compare species of *Periclimenaeus,* in which this basal part of the dactylus is swollen, with species belonging to genera as *Coralliocaris* and *Conchodytes,* it becomes evident that they do not belong in the same section of the Pontoniinae. The basal widening in *Periclimenaeus* namely, though sometimes distinct, never is developed to such a degree as in the genera of the section containing *Coralliocaris* and *Conchodytes*: the broadened part of the dactylus is concealed in a slit of the posterior margin of the propodus when the dactylus is curved backward, which certainly is not the case in genera as *Coralliocaris* and *Conchodytes.* Also the proximal ventral angle of the dactylus of some species of *Periclimenaeus* may be taken for a basal tubercle: when namely the dactylus is curved far forward, this angle becomes visible as a more or less distinct process, it is, however, again concealed by the slit of the propodus, when the dactylus takes its normal position.

The variability of the shape of the dactylus of the last three pereiopods in the present genus is remarkable; not only in the presence or absence of a basal widening, but also by being uni- or biunguiculate or even entirely aberrant. Many species have distinctly biunguiculate dactyli, while

others have the dactyli simple. *P. tridentatus,* however, shows all transitions between a simple and a biunguiculate claw. *P. arthrodactylus* has the dactylus entirely aberrant, here namely the tip has the shape of a saw and is movably connected with the rest of the dactylus which possesses no teeth.

Twenty five species described in literature now are placed in the present genus, some of them, however, are synonyms. The large confusion in regard to the systematic place of those species is best illustrated by the fact that 9 of them have been placed in the genus *Coralliocaris* (one of which in the subgenus *Onycocaris*), 10 have been placed in the genus *Periclimenes* (five in the subgenus *Periclimenaeus,* one in the subgenus *Ancylocaris*, and one in the subgenus *Hamiger*), one in the genus *Typton,* 14 in the genus *Periclimenaeus* and one even in the genus *Palaemonetes.* In the present paper three new species are described. This brings the total number of representatives of the present genus, known at present, at 25 species. Of these 25 species 9 inhabit the West Indies, 3 the Pacific coast of America, while the other species are Indo-Westpacific forms. Six species are known at present from the Malay Archipelago, none of them being recorded before from that region.

Key to the Indo-Westpacific species of *Periclimenaeus*

1. Supraorbital spines present 2
— Supraorbital spines absent 7
2. Supraorbital spine very large, reaching beyond the base of the cornea. Outer margin of uropodal exopod with many denticles in the distal part . . . . *truncatus*
— Supraorbital spine small, not reaching the base of the eye. Only two spines at the end of the outer margin of the uropodal exopod 3
3. Fingers of first pereiopod as long as or longer than palm . . . . . *tridentatus*
— Fingers of first pereiopod less than $^2/_3$ as long as palm 4
4. Dactylus of last three pereiopods about $^1/_3$ as long as propodus or shorter, biunguiculate, posterior margin of tip not dentate 5
— Dactylus of last three pereiopods about half as long as propodus, very slender, with movable tip, which has the posterior margin dentate . . . . . *arthrodactylus*
5. Dactylus of last three legs distinctly biunguiculate. Propodus of all three walking legs with posterior spines, carpus of all these legs without such posterior spines. One or two teeth of the rostrum placed behind the posterior orbital margin . . . . . *rhodope*
— Dactylus of last three legs very indistinctly biunguiculate. Propodus and carpus of third and fourth leg with, those of fifth leg without posterior spines. All teeth of the rostrum placed before the posterior limit of the orbit 6
6. Rostrum with ventral teeth, rostral formula being $\frac{2}{2}$. Dactylus of first leg less than half as long as palm . . . . . *gorgonidarum*
— Rostrum without ventral teeth, rostral formula $\frac{6}{0}$. Dactylus of first leg slightly more than half as long as palm . . . . . *arabicus*
7. Lower margin of rostrum provided with teeth 8
— Lower margin of rostrum without teeth 9
8. Fingers of first pereiopod about twice as long as the palm . . . . . *novae-zealandiae*
— Fingers of first pereiopod subequal in length with the palm . . . . . *natalensis*

9. Both pairs of dorsal spines of the telson situated in the anterior part of the telson. Outer pair of spinules of the posterior margin of the telson placed distinctly before the submedian and intermediate pairs . . . . . *fimbriatus*
— Posterior dorsal pair of spines of the telson situated in or behind the middle of the telson. Outer pair of spinules of the posterior margin of the telson on the same level as the submedian and intermediate pairs 10
10. First two teeth of the rostrum placed on the carapace behind the posterior limit of the orbit . . . . . *robustus*
— All dorsal teeth of the rostrum placed anteriorly of the posterior limit of the orbit 11
11. Lower margin of merus of second pereiopod with a row of granules or spines 12
— Lower margin of merus of second pereiopods entire 13
12. Scaphocerite slender, somewhat narrower distally than proximally. Rostrum with two dorsal teeth [1]) . . . . . *bouvieri*
— Scaphocerite rather broad, widest anteriorly. Dorsal margin of rostrum with five teeth [1]) . . . . . *minutus*
13. Rostrum with 6 dorsal teeth [1]). Last three pereiopods with the dactylus distinctly biunguiculate and provided with minute denticles on the proximal part of the posterior margin . . . . . *spongicola*
— Rostrum with 3 or 4 dorsal teeth [1]). Last three pereiopods with the dactylus simple or indistinctly biunguiculate, but never with denticles on posterior margin . . . . . *tridentatus*

Periclimenaeus truncatus (Rathbun) (figs. 48-50)

Coralliocaris truncata Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23 pt. 3, p. 920, textfig. 70, pl. 24 fig. 2.
Coralliocaris truncata Borradaile, 1917a, Trans. Linn. Soc. Lond. Zool., ser. 2 vol. 17, p. 385.

Siboga Expedition

Station 260, 2.3 miles N., 63° W. from the Northpoint of Nuhu Jaan, Kai Islands, 5° 36'.5 S, 132° 55'.2 E; Blake dredge; depth 90 m; bottom sand, coral and shells; December 16 and 18, 1899 — 1 specimen 12 mm.

Snellius Expedition

Ternate, pier; divinghood, about 4 m depth; April 1, 1930. — 1 juvenile specimen 6 mm.

In my adult specimen the rostrum reaches beyond the antennular peduncle, the basal part is straight, the tip is strongly curved downward. The upper margin bears seven teeth, which all are placed on the rostrum proper; the ultimate teeth are largest and placed more closely together than the others. The lower margin bears no teeth. In the juvenile specimen the rostrum shows exactly the same shape as in R a t h b u n's figure. The carapase is smooth and provided with supraorbital and

1) The tip of the rostrum not included.

antennal spines. The supraorbital spine is very strong, broad, and sharply pointed, it reaches the line of separation between the cornea and the ophthalmic peduncle; when seen from above it covers the basal part of the eyes. The lower orbital angle is narrowly rounded. The antennal spine is strong and slightly remote from the anterior margin of the carapace. The anterolateral angle of the carapace is rounded.

The abdomen is smooth, the pleurae of the first three segments are rounded, those of the

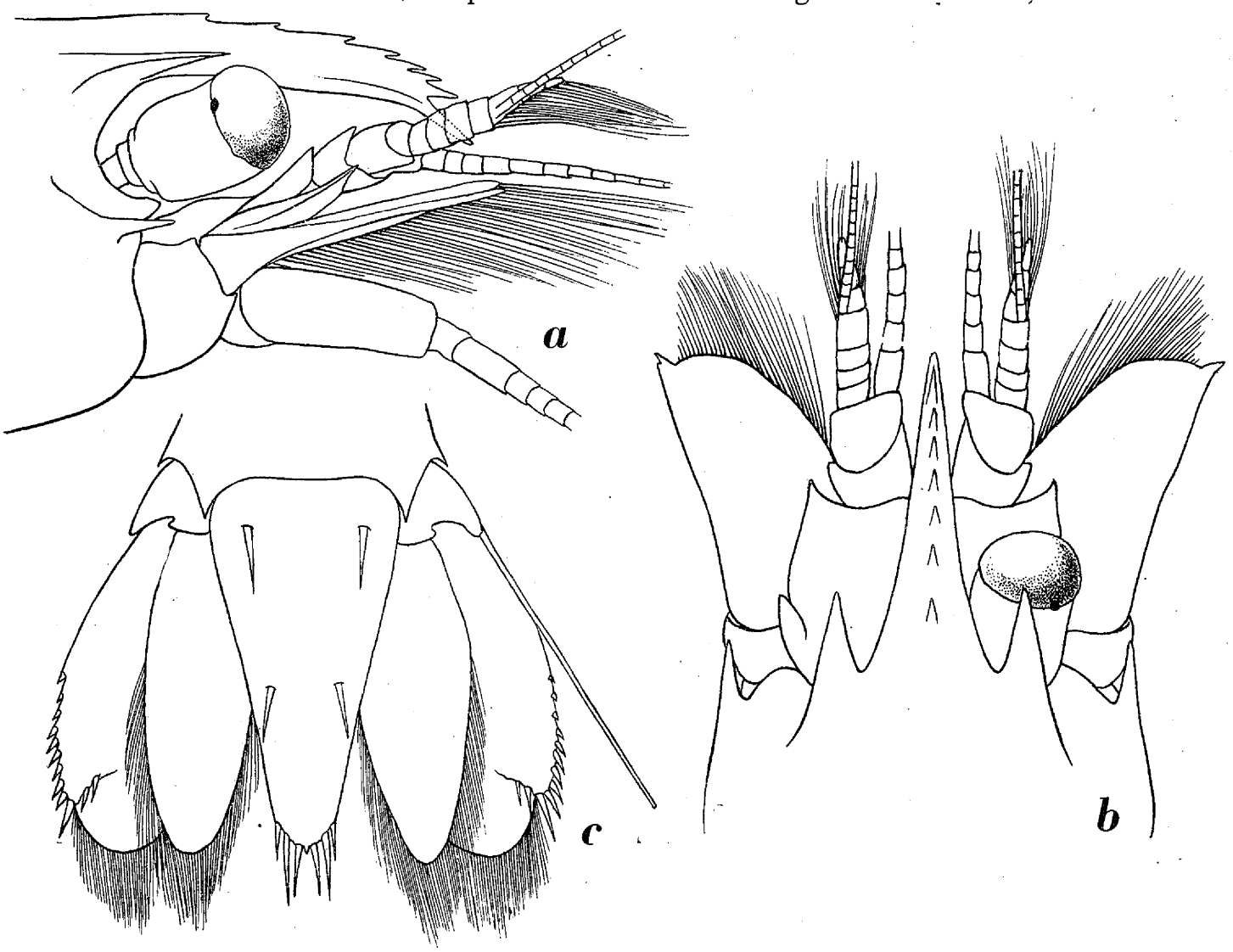

Fig. 48. *Periclimenaeus truncatus* (Rathbun). a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, telson and uropods, dorsal view. a-c, × 30.

fourth and fifth segments are bluntly topped. The posterolateral angle of the sixth abdominal segment, as well as its pleura are pointed. The sixth abdominal segment is longer than the fifth.

The telson (fig. 48c) is about twice as long as the sixth abdominal segment. The dorsal surface of it is provided with two pairs of very strong spines, the anterior of which is placed close to the anterior margin of the telson, the other pair is situated midway between the anterior pair and the posterior margin of the telson; the spines are distinctly remote from the lateral margins. The posterior margin of the telson is rounded, with a small acute median point; it bears three pairs of spines, the outer of which are shortest; the two inner pairs subequal.

The eyes are well developed and almost reach the end of the basal segment of the antennular peduncle. The cornea is hemispherical, distinctly shorter and somewhat broader than the stalk. The ocellus is small but distinctly visible.

The basal segment of the antennular peduncle has the stylocerite ovate, ending in a distinct point and directed obliquely outward. The outer margin of the segment is produced anteriorly of the stylocerite; a distinct anterolateral spine, which reaches to the middle of the second segment of the antennular peduncle, is present. The second and third segments are subequal and together somewhat more than half as long as the first segment. The upper antennular flagellum has the two rami

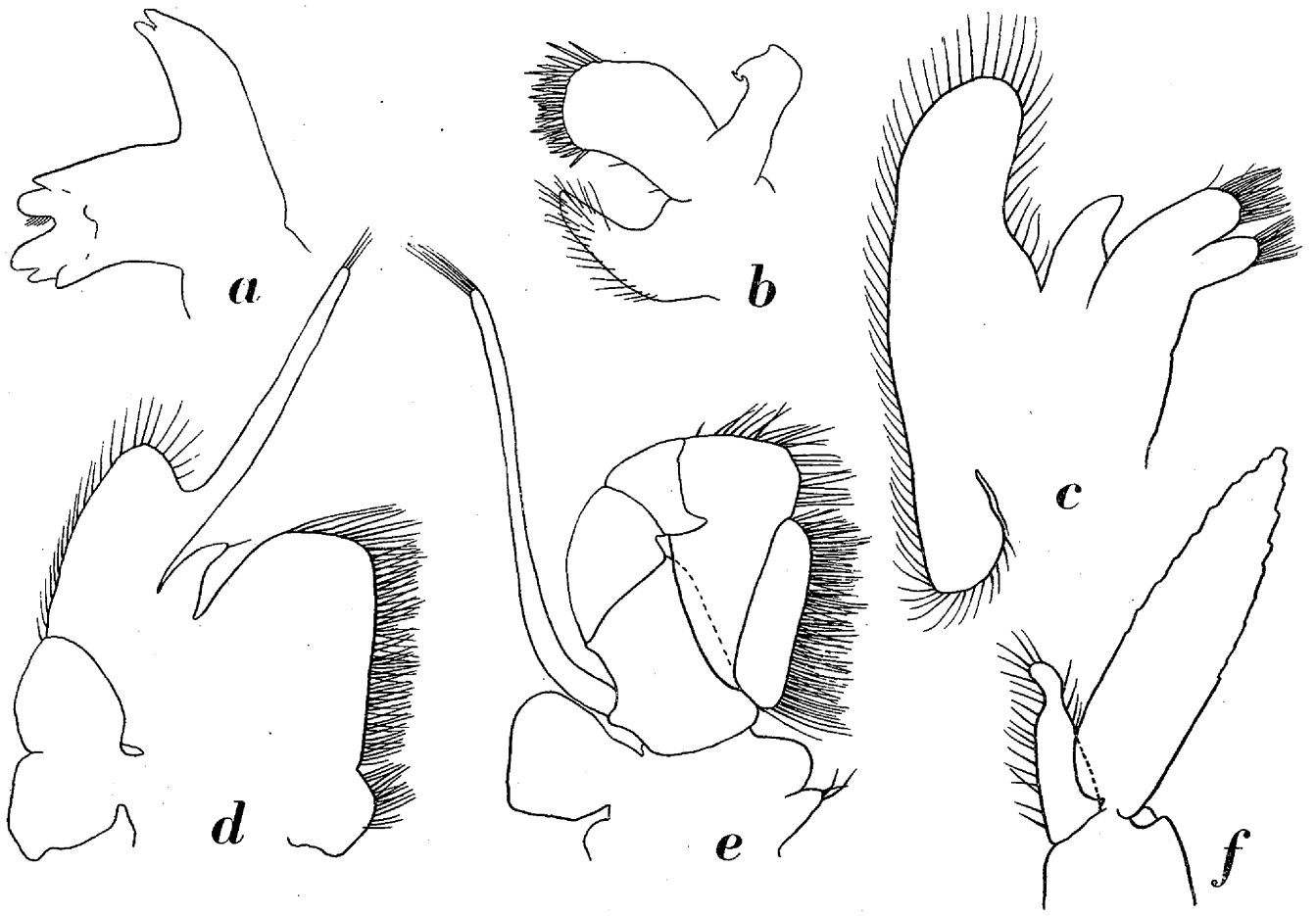

Fig. 49. *Periclimenaeus truncatus* (Rathbun). a, mandible; b, maxillula; c, maxilla; d, first maxilliped; e, second maxilliped; f, first pleopod of male. a-e, × 60; f, × 25.

fused for 4 segments; the free part of the shorter ramus is slightly shorter than fused part, it consists of three segments and is provided with many long hairs.

The scaphocerite reaches slightly beyond the rostrum. The outer margin is slightly sinuate. The lamella is broadest in the middle, the anterior margin is rounded. The final tooth is strong; in the left scaphocerite of the Siboga specimen it is provided near its base at the outer side with a small accessory denticle; it outreaches the lamella. The last segment of the antennal peduncle is long and reaches about $^2/_3$ of the length of the scaphocerite.

The oral parts are figured here. The incisor process of the mandible (fig. 49a) ends in two teeth, between which a minute third tooth is visible; the molar process bears blunt knobs and a

very small number of spines. The maxillula (fig. 49b) has the upper lobe of the palp rather distinct. The inner lacinia of the maxilla (fig. 49c) is distinctly bilobed. The first and second maxillipeds (figs. 49d, e) are normal in shape. The third maxilliped reaches somewhat beyond the last segment of the antennal peduncle. The last segment is ovate, measuring about $^2/_3$ of the length of the penultimate segment. The antepenultimate segment is slightly longer than the penultimate, it is curved. The exopod almost reaches the end of the antepenultimate segment.

The first pereiopod (fig. 50a) reaches with slightly more than its chela beyond the scaphocerite.

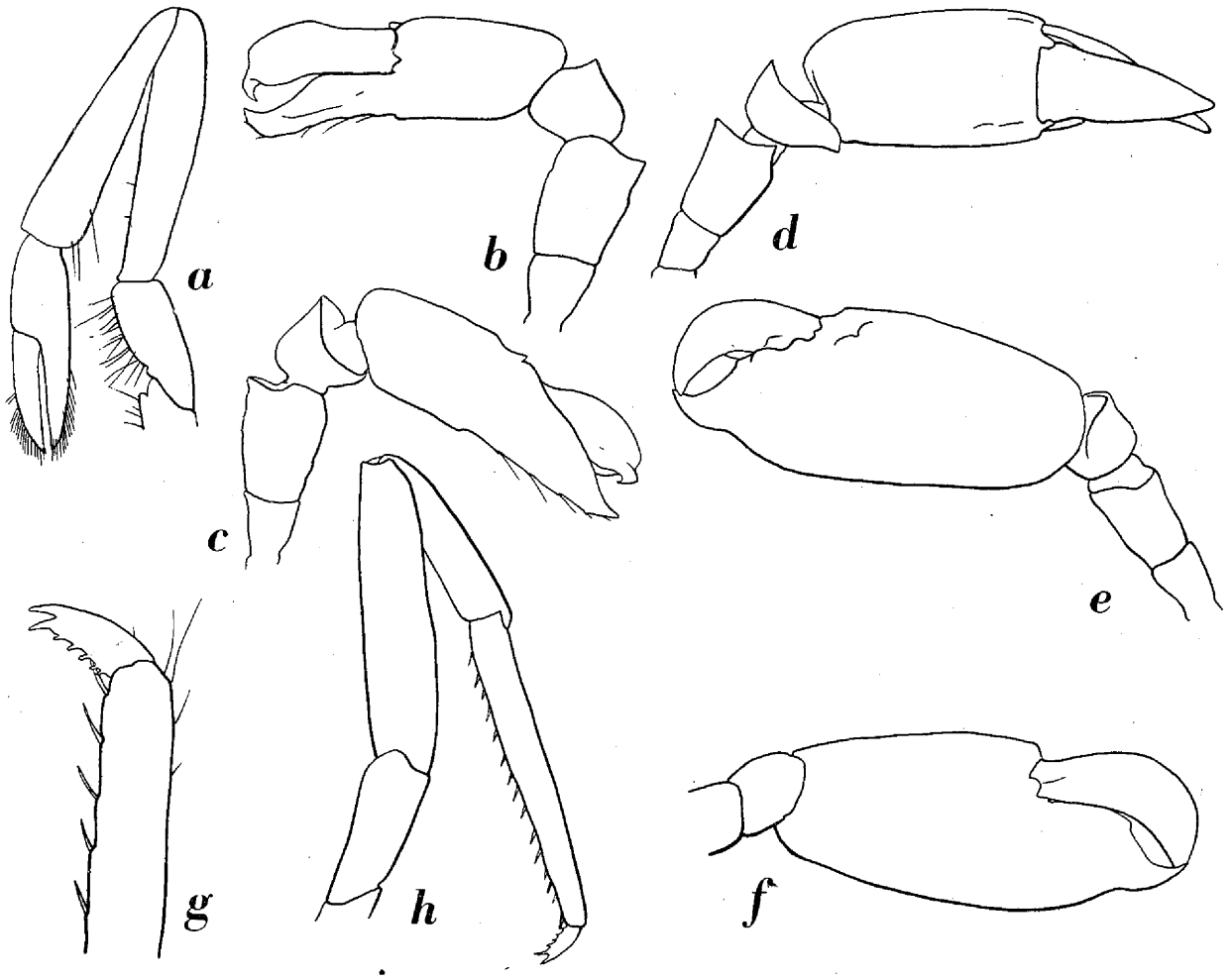

Fig. 50. *Periclimenaeus truncatus* (Rathbun). a, first pereiopod; b, left second pereiopod, external view; e, left second pereiopod, internal view; d, right second pereiopod, dorsal view; e, right second pereiopod, external view; f, right second pereiopod, internal view; g, dactylus third pereiopod; h, third pereiopod. a, h, × 28; b, c, × 12; d-f, × 10; g, × 67.

The fingers are slightly longer than the palm, the tips are provided with tufts of hair. The carpus is distinctly longer than the chela and about as long as the merus. The ischium is short. The second pereiopods (figs. 50b-f) are very unequal. In my specimen the right is much larger than the left, it reaches with entire chela beyond the scaphocerite. The fingers are about half as long as the palm, the tips are crossing. The dactylus is strongly curved and provided at its outer side with a pit for the reception of a blunt tooth of the fixed finger; at its inner side it is provided with a blunt process, which fits in a cavity of the fixed finger. The palm is swollen, and slightly granulate, its distal part and the basal part of the fixed finger are abruptly thickened in the lower region. Two blunt tubercles are present on the outer side of the palm near the articulation between the propodus and the dactylus.

The carpus is very short, measuring about 1/3 of the length of the palm; anteriorly it is hollowed, so that the posterior part of the palm, which in the external part is produced posteriorly, fits in it. The merus is slightly longer than broad and is longer than the carpus. The ischium is short. The left pereiopod reaches with part of the chela beyond the scaphocerite. The fingers are slightly longer than the palm, peculiarly shaped, and in all probability not fit for nipping purposes. The dactylus is flat and broad, its tip is placed obliquely on the main body of the dactylus, giving this joint thereby a twisted appearance. The lower finger is flat, very broad at its base, at first gradually and finally abruptly narrowing in the erect tip. The palm is cylindrical. The carpus has a triangular shape, is about half as long as the palm, and is hollowed anteriorly. The merus is 1.5 times as long as the carpus. The ischium is slightly more than half as long as the merus. The third pereiopod (fig. 50h) reaches slightly beyond the scaphocerite. The dactylus (fig. 50g) is biunguiculate and has the posterior margin provided with about four minute denticles. The propodus is about 6 times as long as the dactylus, its posterior margin is provided with many spines. The carpus is somewhat more than half as long as the propodus. The merus is as long as the propodus, but is distinctly broader. The ischium is slightly shorter than the carpus. The fourth pereiopod is similarly built as the third, though it is more slender. Both fifth pereiopods are lacking in my specimens.

The endopod of the first pleopod of the male is peculiarly constricted before the apex (fig. 49f). The appendix masculina of the second pleopod in the male is shorter than the appendix interna.

The uropods are about as long as the telson. The exopod has the outer margin slightly convex and provided with many setae; the posterior part of this external margin bears a row of spines, which continues for a small distance on the diaeresis. The right uropod in the Siboga specimen bears a very long spine, which starts from below the process of the basal segment of the uropods, which overhangs the articulation of this segment with the exopod; this spine reaches almost the end of the exopod, but the tip is broken. In the left uropod this spine is missing; in the Snellius specimen no such spine is present either.

The Snellius specimen is small and lacks several of the pereiopods. The remaining characters, however, show its identity without any doubt.

This species occupies a very isolated position in the present genus. It may be easily recognized by the enormous supraorbital spines, by the shape of the second pereiopods and by that of the uropods. A similar denticulation of the outer margin of the exopod is mentioned by N o b i l i for *Onycocaris aualitica.*

The only differences I could find between my specimen and R a t h b u n's description are:

1. The shape of the rostrum is slightly different in my large specimen; in my smaller specimen, however, it closely resembles R a t h b u n's figure.
2. R a t h b u n mentions two spines at the outer distal margin of the merus of the second pereiopod. No such spines could be found in my specimens.

It is possible that examination of R a t h b u n's type will reveal more differences, as her description is rather short and the photograph of the type is quite useless. Until the time that examination of the type is possible I regard my specimen to be identical with R a t h b u n's species.

Distribution. The only record in literature is from: Southcoast of Molokai, Hawaiian Archipelago (R a t h b u n, 1906) from a depth of 41 to 43 m.

Periclimenaeus arthrodactylus nov. spec. (figs. 51-53)

Siboga Expedition

Station 37, Sailus ketjil, Paternoster Islands; dredge; depth up to 18 m; bottom coral and coralsand; March 30 and 31, 1899. — 1 ovigerous female 10 mm.

The rostrum is slender and directed downward, the tip is slightly curved upward; it reaches slightly beyond the end of the basal segment of the antennular peduncle. The upper margin bears

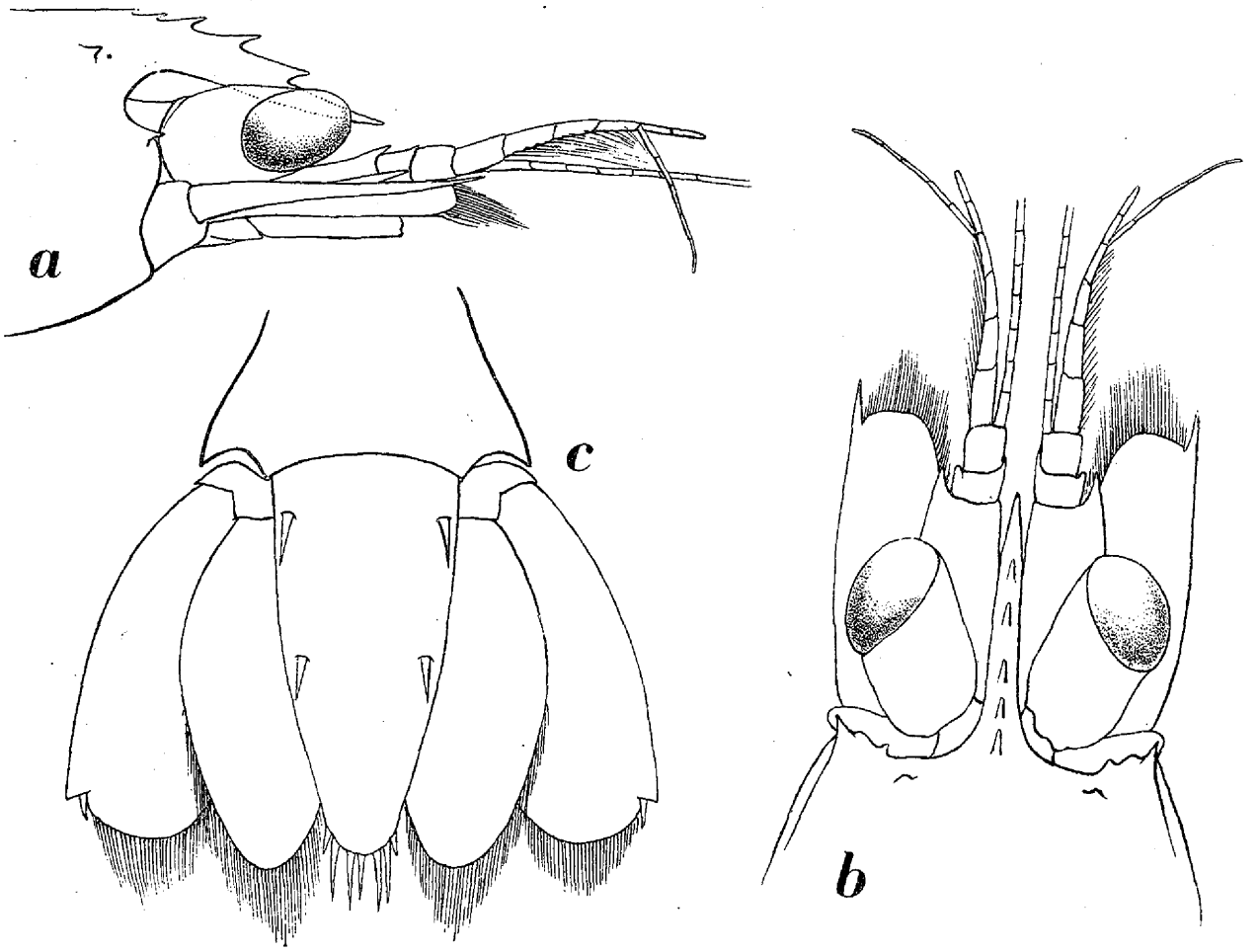

Fig. 51. *Periclimenaeus arthrodactylus* nov. spec. a, anterior part of body, lateral view; b, anterior part of body, dorsal view; c, telson and uropods, dorsal view. a-c, × 36.

five teeth, the first of which is situated over the posterior margin of the orbit. The distance between the distal tooth and the tip of the rostrum is much larger than the distance between the distal and the penultimate tooth. The lower margin of the rostrum is entire, convex. The carapace is smooth, slightly swollen and provided with a small supraorbital and a stronger antennal spine. The antennal spine is placed below the very narrow lower orbital angle and is slightly remote from the anterior margin of the carapace. The anterolateral angle of the carapace is rectangularly rounded.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth segments are narrower and shorter, that of the fourth segment is rounded, that of the fifth ends in a blunt point. The pleura of the sixth segment is bluntly triangular, the posterolateral angle of the segment is rounded. The sixth segment is as long as the fifth.

The telson (fig. 51c) is about twice as long as the sixth abdominal segment, and also twice as long as broad. The upper surface is provided with a shallow groove and with two pairs of long spines. The first pair is placed near the anterior margin of the telson, the posterior pair is slightly nearer to the anterior pair than to the posterior margin of the telson. This posterior margin is provided with four pairs of spinules. The outer pair is shortest, the three inner pairs all are about of the same length. The presence of an additional pair of spines at the posterior margin of the telson probably is an abnormality.

The eyes are well developed, they reach almost the end of the basal segment of the antennular peduncle. The cornea is as broad as, but shorter than the stalk.

The first segment of the antennular peduncle is broadened. The stylocerite is rather broad and suddenly ends in a sharp point, it is directed outward and fails to reach the middle of the basal segment. The outer anterolateral angle of this segment is provided with a strong spine, which reaches almost the end of the second segment. The second segment is shorter than and about as broad as the third, it has the outer anterolateral angle produced into a narrow rounded lobe, which reaches beyond

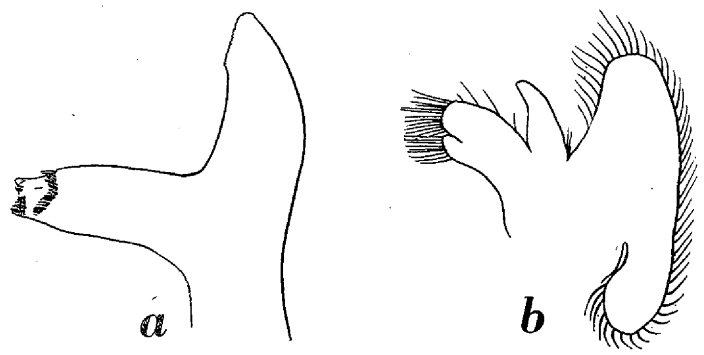

Fig. 52. *Periclimenaeus arthrodactylus* nov. spec. a, mandible; b, maxillula. a, × 100; b, × 42.

the articulation with the third segment. The upper antennular flagellum has the two rami fused for about four segments. The free portion of the shorter ramus consists of two segments and is slightly less than half as long as the fused part.

The scaphocerite reaches beyond the end of the antennular peduncle. The outer margin is straight or slightly convex and ends in a strong final tooth, which reaches far beyond the lamella. The lamella is about twice as long as broad and has the anterior margin rounded, it is broadest in the anterior part. The last segment of the antennal peduncle reaches about $^3/_4$ of the length of the scaphocerite; no spine is present at the base of the antennal peduncle.

The oral parts closely resemble those of the following species (figs. 52a, b). The third maxilliped reaches about the middle of the basal segment of the antennular peduncle. The ultimate segment measures about $^3/_4$ of the penultimate, which is broader distally than proximally. The antepenultimate segment is almost three times as long as the ultimate, it is broadest at its base and about three times as long as broad. The exopod reaches slightly beyond the end of the antepenultimate segment.

The first pereiopod (fig. 53a) is long and slender, and reaches with the carpus beyond the scaphocerite. The fingers are short, slender, and provided with tufts of setae. The palm is elongate, it is about 2.5 times as long as the fingers. The carpus is slender and somewhat more than twice as long as the palm. The merus is about as long as the carpus. The ischium is about $^2/_3$ of the length