

A report on some pontoniid shrimps collected from the Seychelle Islands by the F.R.V. *Manihine*, 1972, with a review of the Seychelles pontoniid shrimp fauna

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A collection of pontoniid shrimps, principally from the Islands of Mahé and Praslin, in the western Indian Ocean, is described. Twenty-four species were collected, including two new species, *Periclimenes difficilis* and *Periclimenaeus manihinei*. Twenty-two species are considered to be commensals and the hosts of many are identified. The early juvenile stages of several species were collected and are described for the first time. The incidence of regeneration in the second pereiopods is studied in detail in *Coralliocaris graminea*. The pontoniid shrimp fauna of the Seychelle Islands is reviewed and its geographic distribution summarized. Two of the species reported are new records for the Indian Ocean and eight are newly added to the Seychelles fauna.

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INTRODUCTION

In February 1972, the Fisheries Research Vessel *Manihine*, of the East African Marine Fisheries Research Organization, Zanzibar, on its 336th cruise in the western Indian Ocean, visited several of the islands in the Seychelles group, including the principal islands, Mahé and Praslin. During the course of this cruise opportunities were taken to make brief collections of the shallow-water caridean fauna and some further samples were collected from deeper water by means of dredges and an Agassiz trawl. Part of the material collected, from the Isle of Farquhar, has already been reported upon (Bruce, in press, a) and the present report completes the account of the pontoniid shrimps obtained and also summarizes the information at present available on the pontoniid shrimps recorded from the Seychelle Islands, and their geographical distribution. The islands of Coetivy, Agalega and Aldabra were also visited but no shore collections were made and dredging failed to produce any pontoniid shrimps. The cruise track of the F.R.V. *Manihine* for cruise 336 is illustrated in Fig. 1, which also indicates the localities referred to in the review

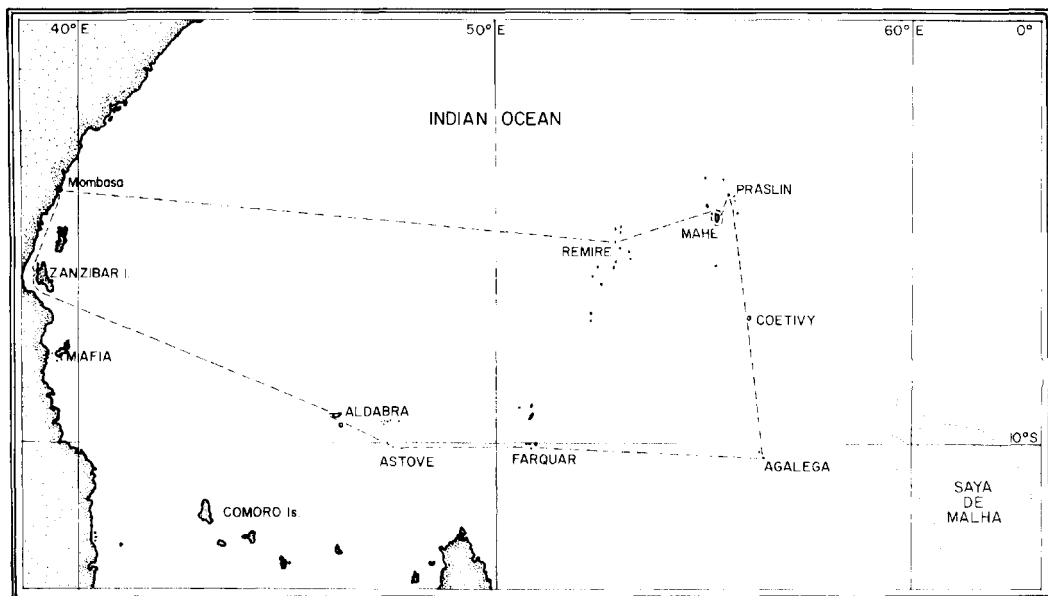


Figure 1. Islands of the western Indian Ocean, with track of F.R.V. *Manihine*, Cruise 336.

of the Seychelles pontoniid fauna. The position of localities on Mahé and Praslin are illustrated in Figs 2 and 3.

The specimens reported upon have been deposited in the collections of the British Museum (Natural History). The synonymies are given in full for the rarer species and restricted synonymies only given for the better known species. Full synonymies for most species are to be found in Holthuis (1952). In both cases, references to occurrences in the Seychelle Islands are included. The measurements given refer to the postorbital carapace length in millimetres (CL).

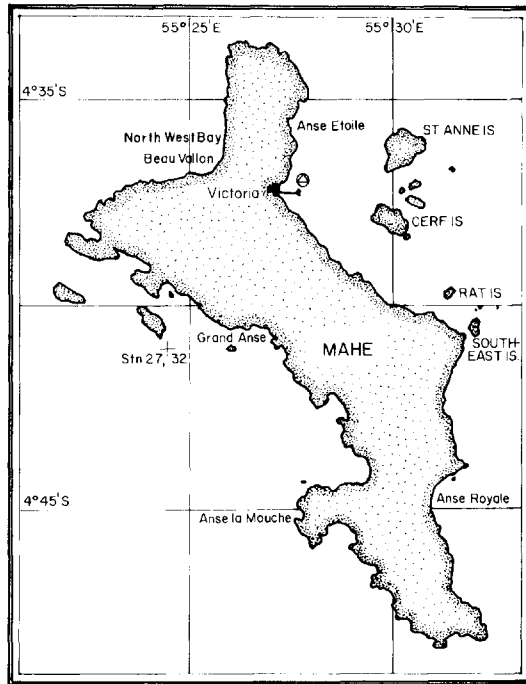


Figure 2. Mahé, Seychelle Islands, with localities referred to in text.

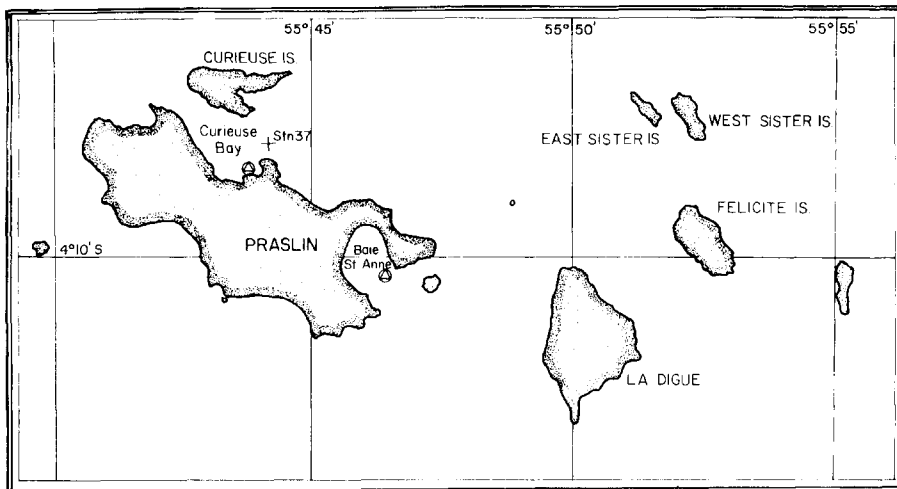


Figure 3. Praslin, Seychelles, with localities referred to in text.

SPECIES COLLECTED BY THE F.R.V. *MANIHINE*,
CRUISE 336, FEBRUARY 1972

PALAEEMONELLA Dana, 1852

1. *Palaemonella rotumana* (Borradaile, 1898)

VIR Holthuis, 1952

2. *Vir orientalis* (Dana, 1852)

PERICLIMENES Costa, 1844

3. *Periclimenes lutescens* auct.
4. *Periclimenes spiniferus* De Man, 1902
5. *Periclimenes diversipes* Kemp, 1922
6. *Periclimenes inornatus* Kemp, 1922
7. *Periclimenes tosaensis* Kubo, 1951
8. *Periclimenes zanzibaricus* Bruce, 1967
9. *Periclimenes mahei* Bruce, 1969
10. *Periclimenes hirsutus* Bruce, 1971
11. *Periclimenes difficilis* sp. nov.

ANCHISTUS Borradaile, 1898

12. *Anchistus miersi* (De Man, 1888)

PHILARIUS Holthuis, 1952

13. *Philarius gerlachei* (Nobili, 1905)

ISCHNOPONTONIA Bruce, 1966

14. *Ischnopontonia lophos* (Barnard, 1962)

PARATYPTON Balss, 1914

15. *Paratypton siebenrocki* Balss, 1914

HARPILIOPSIS Borradaile, 1915

16. *Harpiliopsis beaupresii* (Audouin, 1825)
17. *Harpiliopsis depressus* (Stimpson, 1960)
18. *Harpiliopsis spinigerus* (Ortmann, 1890)

JOCASTE Holthuis, 1952

19. *Jocaste japonica* (Ortmann, 1890)
20. *Jocaste lucina* (Nobili, 1901)

CORALLIOCARIS Stimpson, 1860

21. *Coralliocaris graminea* (Dana, 1852)
22. *Coralliocaris superba* (Dana, 1852)
23. *Coralliocaris venusta* Kemp, 1922

PERICLIMENAEUS Borradaile, 1915

24. *Periclimenaeus manihinei* sp. nov.

Table 1. F.R.V. *Manihine*, Cruise 336. Stations referred to in the report

	Date	Stn nos.	Operation	Locality	Position	Depth (fm)
1	12-2-72	15(149)	SS-1	Remire Island	5°06.7'S 53°16.0'E	0-2
2	15-2-72	25(150)	SS-2	Port Victoria, Mahé	4°37.0'S 55°27.7'E	0-3
3	17-2-72	27	AT-2	Grande Anse, Mahé	4°41.0'S 54°24.5'E	23
4	17-2-72	32	AT-6	Grande Anse, Mahé	4°41.0'S 54°24.5'E	23
5	19-2-72	35(152)	SS-4	Baie St. Anne, Praslin	4°21.0'S 55°56.0'E	0-3
6	19-2-72	37	AT-8	Curieuse Bay, Praslin	4°19.9'S 55°44.1'E	15
7	20-2-72	38(153)	SS-5	Curieuse Bay, Praslin	4°18.3'S 55°43.8'E	0-3
8	27-2-72	65	HL	Astove Island	10°03.5'S 47°45.5'E	6

SS, Shore station; AT, Agassiz trawl; HL, hand line.

SYSTEMATIC ACCOUNT

1. *Palaemonella rotumana* (Borradaile, 1898) (Fig. 4)

Restricted synonymy:

Periclimenes (Falciger) rotumanus Borradaile, 1898: 383.

Palaemonella vestigialis Kemp, 1922: 123-6, figs 1-2, pl. 3. fig. 2; Holthuis, 1952, 8, 24, fig. 3; Barnard, 1958, 11, 14, fig. 3; Holthuis & Gottlieb, 1958: 26; Bruce, 1965: 388, figs 1-2; 1971: 4.

Palaemonella rotumana Bruce, 1970: 276-279, fig. 2 pl. 1. e-f.

Pontoniinae EM9 Williamson, 1967: 40-41, fig. 5.

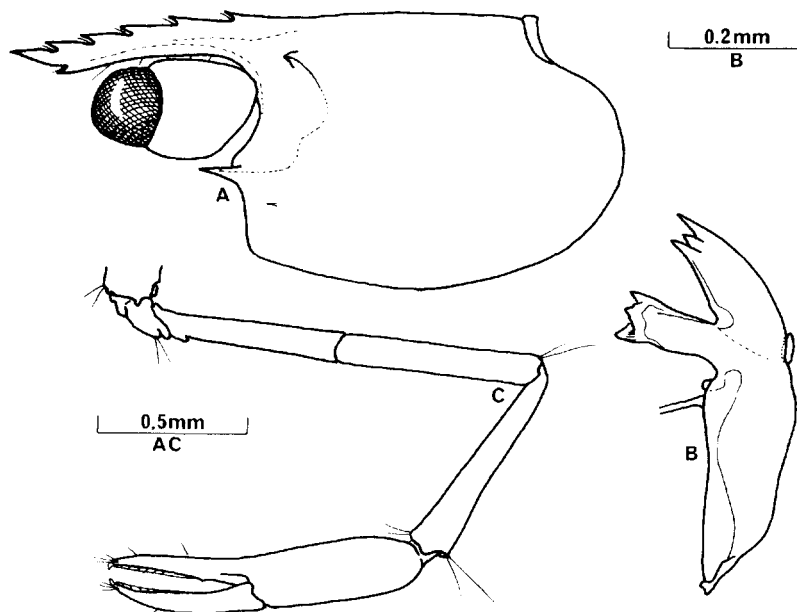


Figure 4. *Palaemonella rotumana* (Borradaile). Juvenile, CL 0.9 mm: A, carapace, rostrum and eye; B, mandible; C, second pereiopod.

Material examined. Port Victoria, Mahé, Stn 150, #1883, 1 ♂, CL 2.1 mm; Baie St. Anne, Praslin, Stn 152, # 1887, 1 ♂, CL 2.4 mm; # 1902 ov. ♀, CL 2.5 mm; #1907, 2 ♂, CL 2.1 mm, 1.7 mm; 1 ov. ♀, CL 2.7 mm; 1 juv., CL 0.9 mm; #1927, 2 ov. ♀, CL 2.3, 2.2 mm;

Habitat/host. The specimens were collected from corals taken from 2-3 fm depth. The corals include *Stylophora pistillata* (Esper), *Seriatopora hystrix* (Dana), *Acropora tubicinaria* (Dana), *A. variabilis* (Klunz.) and *Porites nigrescens* (Dana),

Remarks. Although the present specimens were all taken from corals, it is considered that there is no specific association with the corals as hosts. *P. rotumana* is one of the commonest of shallow-water pontoninid shrimps and is most frequently found in rock pools, under coral-rock slabs or amongst dead coral colonies. The present association with corals is considered to be only incidental and the specimens may well have come from the dead bases of the corals.

In all specimens the supra-orbital ridge was well developed with a distinct tubercle. The rostrum, in the adult specimens, had a dentition of 7/2 in all males. In the females, the dentition was 6-7/2. The male rostrum generally slightly exceeds the antennular peduncle but in the female it is usually slightly shorter, with the distal tooth minute.

The juvenile specimen has only 5/1 rostral teeth. The mandible has a small single-segmented, non-setose palp and the supra-orbital ridge is particularly well marked. In dorsal view it does not show a tubercle. The antennal spine is robust and the hepatic spine is minute. The fourth thoracic sternite bears a long slender median process. The second pereopods have the fingers subequal to the length of the palm. The cutting edges are simple with a minute tooth proximally on the fixed finger. The tips of the fingers are distinctly hooked and short peg-like setae are present along the cutting edges. The carpus, merus and ischium are all approximately equal in length. The carpus is unarmed and the disto-ventral meral spine, present in the adult, is also lacking.

The juvenile specimen closely resembles the specimen EM9 considered by Williamson (1967) to probably be the megalopa of *P. rotumana*. The carapace lengths of the two specimens are very similar and it is possible that the present specimen is the first post-larval stage. It differs from the megalopa in having an additional dorsal rostral tooth but it lacks the anterior and posterior dorsal tubercles on the carapace and the tooth on the posterior ventral margin of the branchiostegite. In addition, the mandible does possess a distinct palp instead of just a minute tubercle. The supra-orbital ridge, antennal and hepatic spines are very similar in the two specimens, which confirms Williamson's tentative identification of his material with this species.

All the females, except one, had freshly laid undeveloped ova. All specimens except one, had both second pereopods present and normally developed. The one exception (ov. ♀ #1927) had a well developed regenerating limb bud.

Distribution. Type locality, Rotuma Island, north of the Fijian Islands. Widely distributed throughout the Indo-West-Pacific region, from the Red Sea to Mozambique, as far as the Hawaiian Islands. The species has recently become successfully established in the eastern Mediterranean Sea after having migrated through the Suez Canal (Holthuis & Gottlieb, 1958).

2. *Vir orientalis* (Dana, 1852)*Restricted synonymy:*

Palaemonella orientalis. Dana, 1852a: 26; 1852b: 583; 1855, 12, pl. 38, fig. 4; Kemp, 1922: 131-4, figs 9-11.

Vir orientalis Holthuis, 1952: 8, 30; Bruce, 1972: 65-7, fig. 1; 1972a: 403-5, 411 (key).

Material. Baie St. Anne, Praslin, Stn 152, # 1896, 1 ov. ♀, CL 2.0 mm.

Habitat/host. Collected from a depth of 2 fm from the coral *Pocillopora verrucosa* (Lam.), which represents a new host record.

Remarks. The single specimen agrees closely with the previously published information. The rostrum is slender and feebly upturned, with a dentition of 6/0. The left second pereopod has been freshly autotomized. The fourth thoracic sternite bears a well developed median process. The ova are all undeveloped.

The species has been previously recorded in association with *Pocillopora damicornis* (L.) and is an obligate coral associate. The association with a crinoid reported by De Man (1888) is considered to be erroneous. The specimen is no longer extant (P. Kuenzer, *in litt.*)

Distribution. Type locality, Sulu Sea. Also, recorded from the Andaman, Fijian and Hawaiian Islands. Not previously recorded from the Seychelle Islands.

3. *Periclimenens spiniferus* De Man, 1902 (Figs 5 and 6)*Restricted synonymy:*

Periclimenes petitthouarsi var. *spiniferus* De Man, 1902: 824.

Periclimenes (Falciger) spiniferus Borradaile, 1917: 324, 369, pl. 52, fig. 1.

Periclimenes (Ancylocaris) spiniferus Kemp, 1922: 195-6.

Periclimenes (Harpilius) spiniferus Holthuis, 1952: 12, 76-7, fig. 30, (full synonymy).

Periclimenes spiniferus Balss, 1925: 293; Bruce, 1971: 7; 1972: 67-8; 1972a: 400-1.

Material examined. Port Victoria, Mahé, Stn 150, # 1878. 1 ♀ CL 2.1 mm; # 1881, 2 ♂, 2 ov ♀, 1 ♀, CL 2.2, 2.1, 2.7, 2.2, 1.7 mm; # 1884, 4 ♂, 2 ov. ♀, 2 ♀, 2 juv., CL 2.7(3), 2.3; 2.7, 2.6; 2.0, 1.6; 1.0, 0.9 mm. Curieuse Baie, Praslin, Stn 153, # 1919, 1. ♂, 2 ov. ♀, CL 3.2, 2.4, 2.3 mm; # 1923, 2 ♂, CL 2.7 mm (2); # 1926, 1 ov. ♀, 1 juv., CL 2.1, 1.1 mm.

Habitat/host. The specimens were obtained from corals collected from 2-3 fm. These include *Pocillopora verrucosa* (Ellis & Solander), *Seriatopora hystrix* (Dana), *Acropora variabilis* Klunz. *A. squarrosa* (Ehrenberg) and *Pavona* sp. This species is considered to be a free-living browser as it is commonly found in pools on reef flats that are devoid of corals. It is frequently found in numbers by day in various live or dead corals and appears to use these as a refuge.

Remarks. Kemp (1922) has noted the wide range of variation in the rostral dentition in this species. Most of the adult specimens of the present collection (85%), have a rostral formula of 7/3-4. One female has 8/5. Borradaile (1917) illustrated most of the morphological features of this species, including the

fingers of the major chela, which were also commented upon by Kemp. The cutting edges are provided with cup-like fossae with which the shrimps can make a striking snapping sound. The mechanism is quite different from that found in other sound-producing pontoninids. *Coralliocaris graminea* has the fingers of both the second pereiopods provided with a "pit and hammer", the pit being situated on the dactylus. A similar mechanism is found on the major chela of most species of *Periclimeneus*, where the pit is generally on the fixed finger. In the snapper shrimps of the genera *Alpheus* and *Synalpheus*, the mechanism is also that of a "pit and hammer". In *P. spiniferus* the minor chela is without these sound producing fossae. The chelae in male and female are similar but in the females they are much less robustly developed. The fourth thoracic sternite is provided with a low transverse ridge with a very small rounded median tubercle.

The smallest juvenile specimen, CL 0.9 mm, has a well developed, slender rostrum with five dorsal and one ventral tooth. The antennal spine is robustly developed and the supra-orbital and hepatic spines are also well developed. The epigastric spine is lacking. The fourth thoracic sternite bears a slender median process. The second pereiopods are sub-equal in size and the distal meral and inner carpal spines are well developed. The fingers are simple, with only a single tooth on the cutting edge and are only slightly shorter than the palm. In the next smallest juvenile, CL 1.0 mm, the rostrum has six dorsal teeth, including a small epigastric tooth, and two ventral teeth. Both these small juveniles show

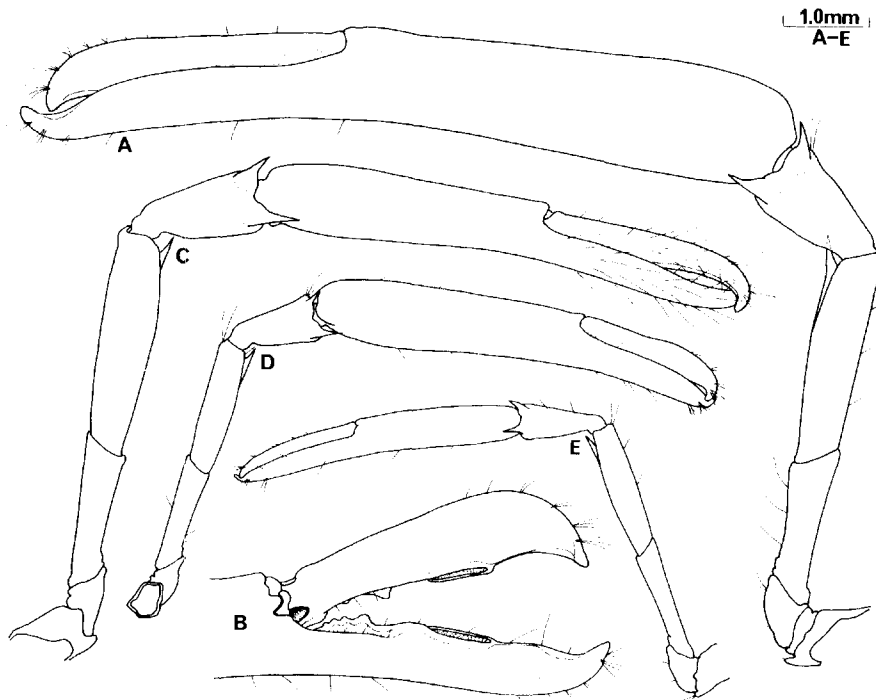


Figure 5. *Periclimenes spiniferus* De Man. Male: A, major second pereiopod; B, fingers of major second pereiopod; C, minor second pereiopod. Female: D, major second pereiopod; E, minor second pereiopod.

the black ring of pigment on the cornea as described by both Kemp and Holthuis for the adults. The smaller specimen probably is the first post-larval stage of this species.

Six of the seven females had freshly laid undeveloped ova. Nineteen specimens possessed both second pereiopods, three had one pereiopod freshly autotomized and in one it was in an early stage of regeneration.

Distribution. Type locality, Ternate, Indonesia. Common and widespread throughout the Indo-West-Pacific region, excluding the Red Sea, Persian Gulf and most of the northern East African coast; as far North as Wake Island and east to Tahiti. There are numerous records from the Indian Ocean and the species has been previously recorded in the Seychelle Islands from Coetivy (Borradaile); Mahé, (Bals, 1925) and Anse Royale and Cerf Island, Mahé, (Bruce, 1971).

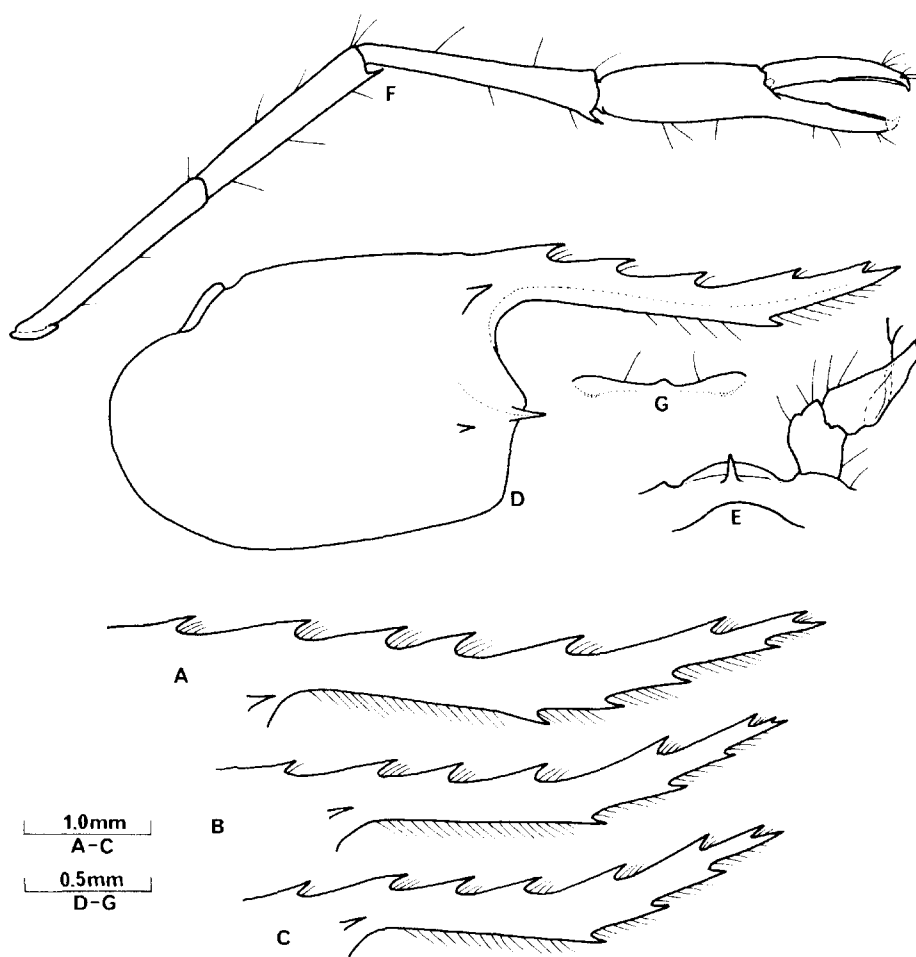


Figure 6. *Periclimenes spiniferus* De Man. Rostral variation in adults: A, female; B, female; C, male. Juvenile, CL 1.9 mm: D, carapace and rostrum; E, fourth thoracic sternite; F, second pereiopod; G, fourth thoracic sternite of adult.

4. *Periclimenes lutescens* auct.*Restricted synonymy:*

?*Harpilius lutescens* Dana, 1852: 25; 1852a, 576; 1855: 12, pl. 39, fig. 4.

Harpilius lutescens Kemp, 1922: 235-7, figs 72-73.

Periclimenes (Ancylocaris) amamiensis Kubo, 1950: 41 (key), 44-6, figs 11-12.

Periclimenes (Harpilius) lutescens Holthuis, 1952: 12, 88-91, fig. 35; Patton, 1966: 275, tabs 1-2.

Periclimenes lutescens Bruce, 1971: 5; 1972a: 404-7, 409, 411, 412, 141, (fig. 1a).

Material. Baie St. Anne, Praslin, Stn 152, #1888, 1 ov. ♀. CL 5.2 mm.

Habitat/host. *Acropora tubicinaria* (Dana) collected from 2 fm.

Remarks. This species agrees closely with the published data provided by Kemp (1922) considered *P. consobrinus* to be a distinct species from the second maxilliped, which distinguishes this species from the closely related *P. consobrinus* De Man (Bruce, 1972a; fig. 1b). The single specimen has a rostral dentition of 8/2. The ova are numerous and small, length 0.5 mm, and are undeveloped. This species is normally found occurring in breeding pairs but the male in this case was presumably lost in the course of collection.

The species is a well known obligate associate of the coral genus *Acropora*, having been found in association with *A. convexa* (Dana), *A. kenti* (Brook) and *A. paniculata* Verrill. The association with *A. tubicinaria* (Dana) constitutes a new host record.

Due to the confusion of this species with *P. consobrinus* De Man, its exact distribution is difficult to discern from the published records. The records from Samoa, Tahiti and the Marquesas Islands are in particular need of confirmation. Kemp (1952) considered *P. consobrinus* to be a distinct species from *P. lutescens*, but he had no material for comparison. Holthuis (1952) relegated *P. consobrinus* to the synonymy of *P. lutescens*. The distinguishing features of the two species have been outlined and illustrated (Bruce, 1972) and it may be noted that the two species are most readily separated in the field by their characteristic colour patterns and host preferences. *P. lutescens* is primarily an associate of the genus *Acropora* and *P. consobrinus* of the genus *Pocillopora*. In this connection, it can be added that the ovigerous female specimen of *P. lutescens* from Moroni, Grand Comoro Islands, which was found in association with *Pocillopora hemprichi* (Ehrenberg) (Bruce, 1971) has been re-examined and found to belong to *P. consobrinus* De Man. Its colour pattern was noted in the field to be mainly transparent but densely covered with small reddish dots or rings.

The illustrations provided by Kubo (1940) for *P. amamiensis* show that it should be referred to *P. lutescens*, even though the second pereopods of the only specimen are lacking. The form of the dactylus of the ambulatory pereopods is characteristic of *P. lutescens* and *P. consobrinus* (De Man) but the shape of the distal segments of the endopod of the second maxilliped are diagnostic and clearly indicate that it must belong to *P. lutescens* and that *P. amamiensis* Kubo is a junior synonym. The presence of nine spines on the posterior margin of the telson is probably an abnormality without taxonomic value.

Distribution. Type locality, Tongatabu, Tonga Islands. Also known from the

Red Sea, Comoro Islands, Indonesia and the Australian Great Barrier Reef. Also recorded from Japan as *P. amamiensis* (Kubo, 1940). This species has not been previously recorded from the Seychelle Islands.

5. *Periclimenes diversipes* Kemp, 1922 (Figs 7 to 9)

Restricted synonymy:

Periclimenes (Ancylocaris) diversipes Kemp, 1922: 169 (key), 179-84, figs 36-39.

Periclimenes diversipes Bruce, 1971: 9-10; 1972a: 403, 405, 408, 409, 410, 413, (key).

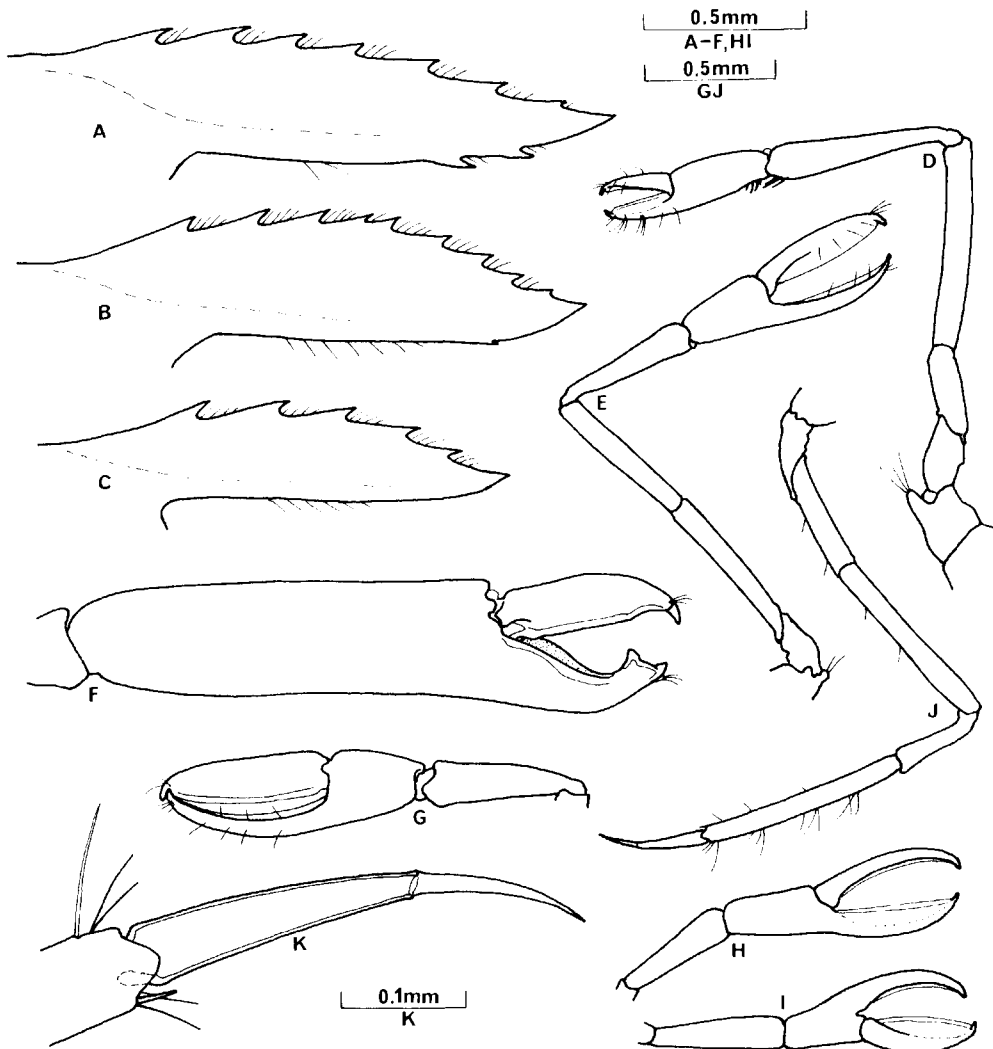


Figure 7. *Periclimenes diversipes* Kemp. Rostral variation in adults: A, ♀, CL 1.8 mm; B, ♀, CL 1.5 mm; C, ♂, CL 1.3 mm; D, first pereiopod; E, second pereiopod, male; F, chela of major second pereiopod, female; G, chela of minor second pereiopod, female; H, major chela and carpus, male; I, minor chela and carpus, male; J, third pereiopod, female; K, dactylus of third pereiopod, female.

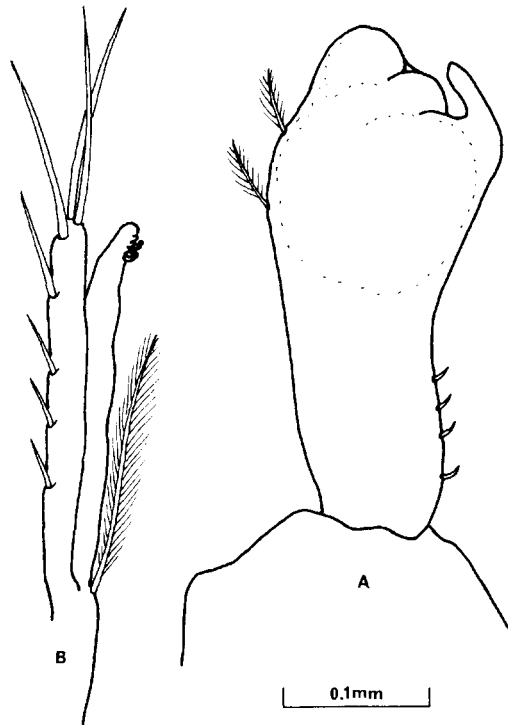


Figure 8. *Periclimenes diversipes* Kemp. Male: A, endopod of first pleopod; B, appendix interna and appendix masculina, second pleopod.

Material examined. Port Victoria, Mahé, Stn 150, #1880, 3 ov. ♀, CL 1.7, 1.7, 1.6 mm, #1885, 2 ♂, 5 ov. ♀, 3 ♀, 1 juv., CL 1.4, 1.4; 2.0, 1.8, 1.5, 1.5, 1.4; 1.6, 1.3, 1.2 mm; Baie St. Anne, Praslin, Stn 152, #1908, 2 ♂, 1 ov. ♀, 1 ♀, CL 1.8, 1.6; 2.5; 1.5 mm; Curieuse Baie, Praslin, Stn 153, # 1918, 3 ov. ♀, CL 1.8, 1.7, 1.5 mm.

Habitat/host. All specimens were obtained from shallow-water corals collected from depths 1-3 fm. The host corals are #1880, *Pocillopora damicornis* (L.), # 1885, *Acropora variabilis* (Klunzinger), # 1908 *Porites nigrescens* (Dana), and # 1918 *Pavona* sp. This species has not been previously found in association with the corals *Acropora variabilis* and *Porites nigrescens*.

Remarks. The adult specimens agree in general with the description provided by Kemp (1922). In two features the present specimens differ from the original description. (1) the cutting edges of the fingers of the first pereopods are entire and without any trace of pectinations. (2) The dactylus of the ambulatory pereopods are much longer and more slender than in Kemp's material, as shown in his fig. 39. It is possible that Kemp's illustration shows the (?) fifth pereopod of *P. kemp* Bruce, and not *P. diversipes* sensu stricto Kemp does state, however, that the dactyls are moderately stout, from one third to one quarter of the length of the propod. In the Seychelles material the dactylus is distinctly long and slender, equal to half the length of the propod in most specimens. The unguis is clearly demarcated and is particularly slender. Only a single small disto-ventral spine is present on the propod.

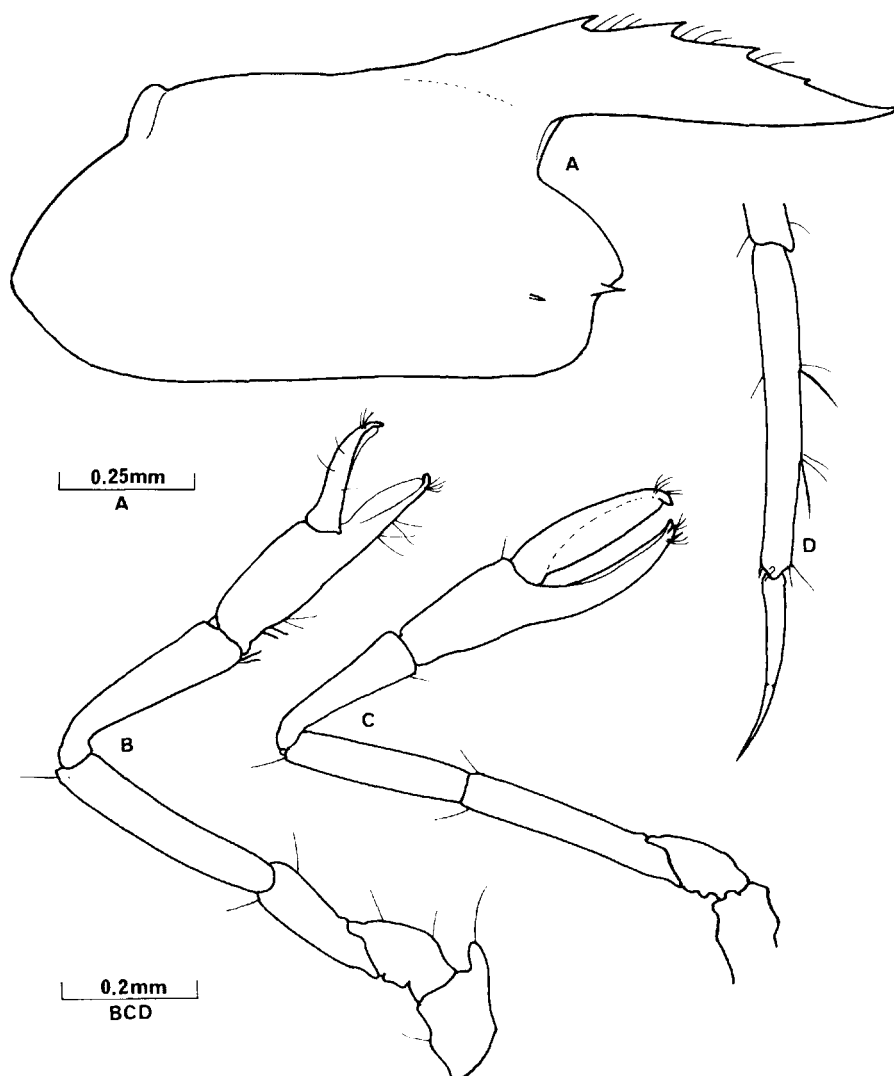


Figure 9. *Periclimenes diversipes* Kemp. Juvenile, CL 0.75 mm: A, carapace and rostrum; B, first pereiopod; C, second pereiopod; D, propod and dactylus of third pereiopod.

The rostrum shows considerable variation but is generally very similar to Kemp's illustration. The rostral formula is 5-9/0-2 and shows the following variations (Table 2), some of which are illustrated in Fig. 5. In all specimens the most posterior tooth lies close to the level of the posterior margin of the orbit.

The second pereiopods were attached in all specimens and a more complete analysis of this small population can be provided with regard to the distribution of the different types of chela. No chela referable to Kemp's type *c*, which is probably limited to *P. kemp*, was found in the present collection. More material is required to clarify the growth changes in the chelae of this species. The distribution of chelae combinations following Kemp's types *abd* are outlined in Table 3.

Table 2

R	$\frac{5}{0}$	$\frac{6}{0}$	$\frac{6}{1}$	$\frac{7}{0}$	$\frac{7}{1}$	$\frac{7}{2}$	$\frac{8}{1}$	$\frac{9}{1}$
♂	1	2	1	—	—	—	—	—
♀	3	0	0	0	1*	—	—	—
ov.♀	4	1	1*	2	2	2	3	1

* Ventral tooth minute.

Table 3

<i>Kemp's chelae types</i>	ad	bd	dd
♂	5	2	1
♀	3	1	2
ov.♀	12	11	0
Total	20	14(70%)	3(15%)

From the above table it is clear that combination *ad* is typical of the ovigerous females as noted by Kemp, but that it does also occur in the males. Although both males and females are recorded as having *d*-type chelae, these are not identical in shape. In the female, the fingers are about twice the length of the palm, which is 1.3 times longer than wide. In the male, the fingers are only 1.4-1.6 times the length of the palm, which is 1.6-2.2 times longer than wide. In the *d*-type chela the cutting edges are entire. The dactylus has a small but robust hooked tip that fits when closed, into a small notch in the tip of the fixed finger, which has two small stout distal teeth. In the single ovigerous female specimen with *dd*-type chelae, both chelae are of the typical female *d* form. It is probable that in this specimen the *a* chela has been lost and replaced by the regeneration of a *d* chela. The *a*-type chela is the normal fully developed form for the major chela. The palm is about 2.5 times the length of the fingers, and 3.5 times longer than wide. The dactylus is robust with a strongly hooked tip and a sharp cutting edge along its whole length, with feeble indications of a small tooth at 0.6 of its length. The fixed finger is deeply grooved along its inner aspect, with a sharp cutting edge on the inner surface, continuous with the stout strongly curved tip. The tip of the fixed finger is truncated with anterior and posterior teeth. The tip of the dactylus fits into the notch between the two teeth, the anterior tooth being laterally inclined and the posterior tooth medially inclined. The dactylus cannot be fully closed against the fixed finger and a large gap is apparent when the fingers are fully opposed. Some shearing cutting action occurs between the cutting edge of the dactylus and the proximal part of the inner edge of the fixed finger, which bears an obtuse tooth proximally.

The endopod of the male first pleopod is about three times longer than the central width. The distal half is expanded and swollen, with well developed disto-median lobular process. The proximal median border bears four short curved spines and the disto-lateral border bears two short plumose setae.

The appendix masculina is slender and is slightly exceeded by the appendix interna, which has only 4-5 terminal concinni. Two long slender simple terminal setae are present on the appendix masculina, with a row of five simple setae, increasing in length distally, along the lateral border.

A single small juvenile specimen, possibly the first post-larval stage was obtained. The rostrum is well developed, with an elevated crest, as in the adult, with four dorsal teeth and no ventral teeth. Two very small tubercles are present on the epigastric region. The inferior orbital angle is broadly depressed and slightly produced. The antennal spine is well developed, marginal, with a small, slender downwardly directed hepatic spine situated at a similar level. The fourth thoracic sternite is without a median spine.

The first pereopods are slender with the chela and merus subequal, equal to about 1.2 of the carpal length. The fingers are distinctly subspatulate, with entire cutting edges, equal to 0.8 of the length of the palm. The tip of the dactylus is strong and hooked and opposes into a slot at the tip of the fixed finger. The coxa bears a well developed median process with a single terminal seta.

The second pereopods are similar in size and shape. The chela is 1.7 times the length of the merus and almost twice the length of the carpus. The palm is slightly shorter than the fingers and is twice as long as wide. The fingers are subspatulate with entire cutting edges. The tip of the dactylus is strongly hooked and the tip of the fixed finger bears two small stout teeth. The coxa is without a medial process.

The ambulatory pereopods are similar to the adult, with a long slender dactylus equal to more than half the length of the propod, which bears only a single small disto-ventral spine. The unguis is more than two thirds of the length of the corpus of the dactylus.

The *d* type chela of the juveniles is generally similar to that of the adults but differs in its proportions, which may be summarized as follows:

- juvenile: palm twice as long as wide, subequal to length of fingers.
- male: palm 1.6-2.2 times longer than wide, 0.7-0.8 times length of fingers.
- female: palm 1.2 times longer than wide, 0.5 times length of fingers.

The juvenile form of *d* chela requires little in the way of growth changes to become modified into the male *d* chela or the female *d* chela. It may be similarly modified into the male or female *a* chela, with the *b* chela representing an intermediate stage.

Of the 12 ovigerous females, four had undeveloped ova, seven had advanced ova and one had early-eyed ova. The ova are approximately 0.5 mm in length.

Distribution. Type locality, Kilakarai, Gulf of Manaar. Also known from Ghardaqa, Red Sea; Aden: Comoro Islands, Andaman Islands and the Australian Great Barrier Reef. This species has not been previously reported from the Seychelle Islands.

6. *Periclimenes inornatus* Kemp, 1922 (Figs 10 and 11)

Restricted synonymy:

Periclimenes (Ancylocaris) inornatus Kemp, 1922: 170, 191-4, figs 43-46.

Periclimenes (Harpilius) inornatus Holthuis, 1952: 11; Miyake & Fujino, 1968: 413-4, 431, fig. 3 g-h.

Periclimenes inornatus Bruce, 1971: 2, 10.

Material examined. Baie St. Anne, Praslin, Stn 152, # 1910, 1 ♂, 1 ♀, 1 ov. ♀, 1 juv.; CL 1.7, 2.2, 2.0, 1.5 mm.

Habitat/host. Collected from coral reef at 3 fm, on the anemone *Radianthus ritteri* (Kwietniewski).

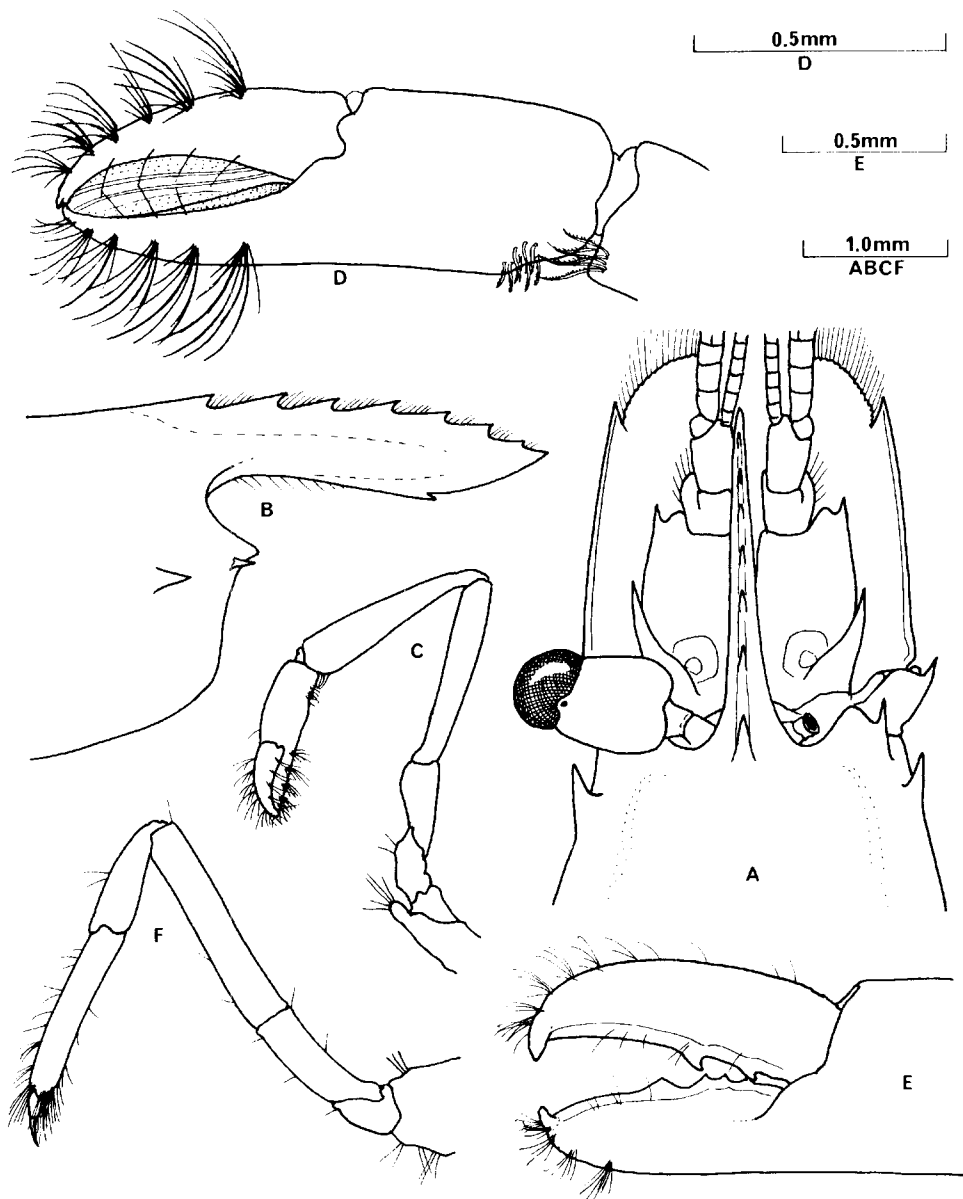


Figure 10. *Periclimenes inornatus* Kemp. Female, CL 2.6 mm: A, anterior carapace, rostrum and antennal peduncles, dorsal aspect; B, anterior carapace and rostrum, lateral aspect; C, first pereopod; D, chela of first pereopod; E, fingers of chela of major second pereopod; F, third pereopod.

Remarks. The specimens agree closely with the description and figures of Kemp but show some differences from Miyake & Fujino's material.

The rostral dentition in the present specimens is 6-8/0-2; 8/0 in the male, 7/0 in the female, 7/1 in the ovigerous female and 6/2 in the juvenile. The first pereiopods have a distinctly subspatulate chela with the fingers subequal to the length of the palm. Each finger bears about five groups of serrated setae on each side. The coxa has a small setose median process. The fourth thoracic sternite bears a low transverse ridge with a small median notch. Kemp states that the palm of the chela is twice the length of the fingers and does not mention that they are subspatulate. The British Museum (Natural History) possesses a syntype of Kemp's species and Dr R. W. Ingle has kindly confirmed that in the B.M. (N.H.) specimen, the fingers are subspatulate and subequal to the palm. The tips of the fingers each bear a small hooked tooth. The ambulatory pereiopods are robust. The propodus is devoid of spines but its distal end bears several groups of long simple setae. The dactylus is about one third of the length of the propod, with a long slender ungius, subequal to the length of the carpus.

The endopod of the male first pleopod is about three times longer than its central width. The distal half is slightly wider than the proximal half, bluntly

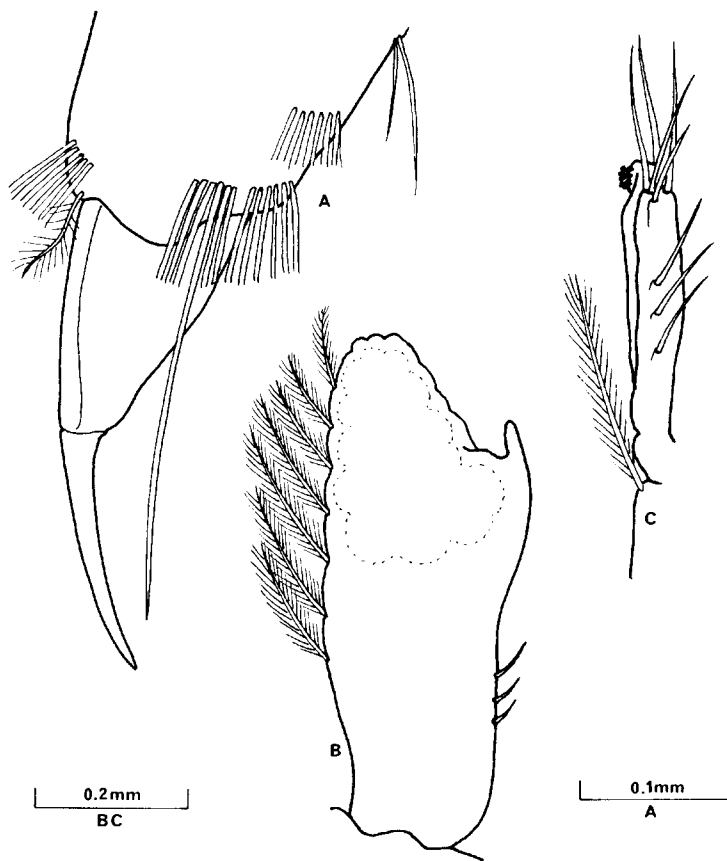


Figure 11. *Periclimenes inornatus* Kemp: A, dactylus of third pereiopod, female; B, endopod of male first pleopod; C, appendix interna and appendix masculina of male second pleopod.

pointed distally and distinctly swollen. The median border bears three simple curved spines proximally, and a small blunt process distally. The distal two thirds of the lateral border bears a row of seven plumose setae. The appendix masculina is rather short and stout with three simple setae on the middle third of the ventral surface. Three long setae are present distally, with two more setae subterminally. The appendix interna slightly exceeds the appendix masculina and bears about nine or ten concinni.

Three of the specimens are intact. The female has the first, second and fifth pereopods in an early stage of regeneration on the right side the ova are at an early eyed stage and are 0.55 mm in diameter.

Kemp's material was collected from actinians, like the present specimens. The specimens reported upon by Miyake and Fujino were collected from corals and appear to differ slightly from the Seychelles specimens. The most noticeable difference is the size of the eye, which appears reduced in the Palau specimens illustrated, in which it does not reach beyond the lateral margin of the carapace in dorsal view. In the Seychelles ovigerous female, the whole cornea extends clearly beyond the bascerite when the eye is extended laterally. In the Palau specimen the antennal spine appears broad and feebly demarcated from the carapace, not exceeding the inferior orbital angle. The hepatic spine is not shown. The basicerite lacks a distinct lateral tooth and the disto-lateral spine of the scaphocerite appears relatively small. In the Seychelles specimens the antennal spine is well developed, slender and acute, clearly demarcated from the carapace and distinctly exceeding the inferior orbital angle just as shown by Kemp. The hepatic spine in Kemp's figure, in contrast to the Seychelles specimen in which it is particularly stout, appears less robust than the antennal. The lateral tooth of the basicerite and the disto-lateral spine of the scaphocerite are also closely similar to Kemp's material in the Seychelles specimens.

Distribution. Type locality, Port Blair, Andaman Islands. Other records from the Maldiv Islands, the Comoro Islands, and Palau. Previously recorded from Mahé, Seychelle Islands by Bruce (1971).

7. *Periclimenes tosaensis* Kubo, 1951 (Fig. 12)

Periclimenes (Ancylocaris) tosaensis Kubo, 1951: 268-71, figs 7-8, tab. 2.

Periclimenes (Harpilius) tosaensis Bruce, 1966: 15-22, figs 1-4.

Material examined. Grande Anse Baie, Mahé, Stn 27, # 1742, 1 ♂; Stn 32, # 1742a, 1 ov. ♀, CL 2.8, 3.6 mm.

Habitat. Both specimens were obtained from 23 fm on sandy bottom.

Remarks. The specimens were obtained separately by trawl and are slightly damaged. The ovigerous female has an intact rostrum with ten dorsal teeth and a single ventral tooth. The specimens agree closely with the previously published data. The inferior orbital angle is directed more upwards than in the South China Sea specimens. The plumose setae along the central border of the rostrum are particularly well developed. The fourth thoracic sternite is without a median process. The ova are 0.5 mm in length and were freshly laid. There is no evidence of any regeneration of the second pereopods.

The host of this species has not been identified but is probably a

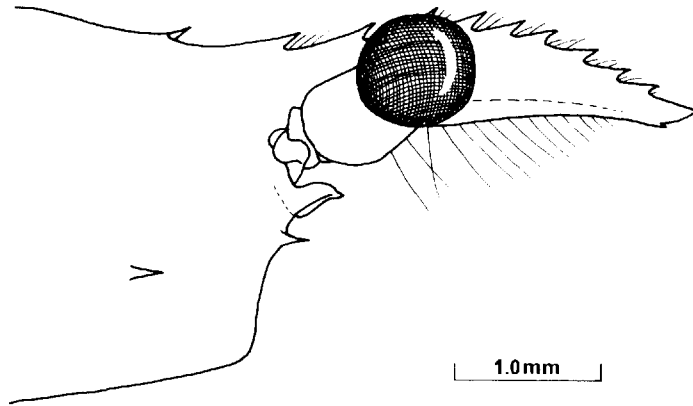


Figure 12. *Periclimenes tosaensis* Kubo. Anterior carapace and rostrum, female.

coelenterate. The closely related *P. holthuisi* Bruce has been found in association with actinians and scyphozoans.

Distribution. Type locality, near Usa, Kochi Prefecture, Japan. The only other records of this species are from the northern South China Sea. The occurrence of *P. tosaensis* in the western Indian Ocean therefore represents a very great increase in the recorded distribution of this species.

8. *Periclimenes zanzibaricus* Bruce, 1967 (Fig. 13)

Periclimenes zanzibarica Bruce, 1965: 492-3.

Periclimenes zanzibaricus Bruce, 1967: 62-72, figs 26-29; 1971: 11.

Material examined. Baie St. Anne, Praslin, Stn 152, #1911, 1 ♀, CL 2.0 mm; Curieuse Baie, Praslin, Stn 153, #1913, 2 ♂; 1 ♀, 1 ov. ♀, CL 2.0, 1.6; 1.5; 2.5 mm; #1914, 4 ♂, 2 ov. ♀, 1 juv., CL 1.5, 1.5, 1.6, 1.8, 2.0; 1.2 mm; #1928, 1 juv. CL 1.1 mm.

Habitat/host. All hosts were obtained from coral reef at 2-3 fm. The hosts were *Diadema setosum* (Leske), (#1914); *D. savignyi* (Michelin), (#1911, #1928); and *Echinothrix calamaris* (Pallas), (#1913).

Remarks. The present specimens conform closely to the original description, except that in one male specimen (#1913) a small ventral rostral tooth is present. The males had either three or four dorsal teeth and all females had four dorsal teeth.

A single small juvenile specimen also closely resembles the adults, particularly in the form of the carapace and rostrum, which has four dorsal teeth. The disto-lateral part of the proximal segment of the antennular peduncle is produced and bears a small acute tooth as in the adult. In the first pereopods, the carpus is slightly shorter than the chela (0.8) and the palm is about three-quarters of the length of the fingers which have finely serrated cutting edges, most distinct proximally. The second pereopods are similar but relatively smaller than in the adults. The fingers of the chelae are without large teeth but the anterior halves of the cutting edges are finely toothed with small acute recurved teeth, about 20 in number on the fixed finger and rather larger

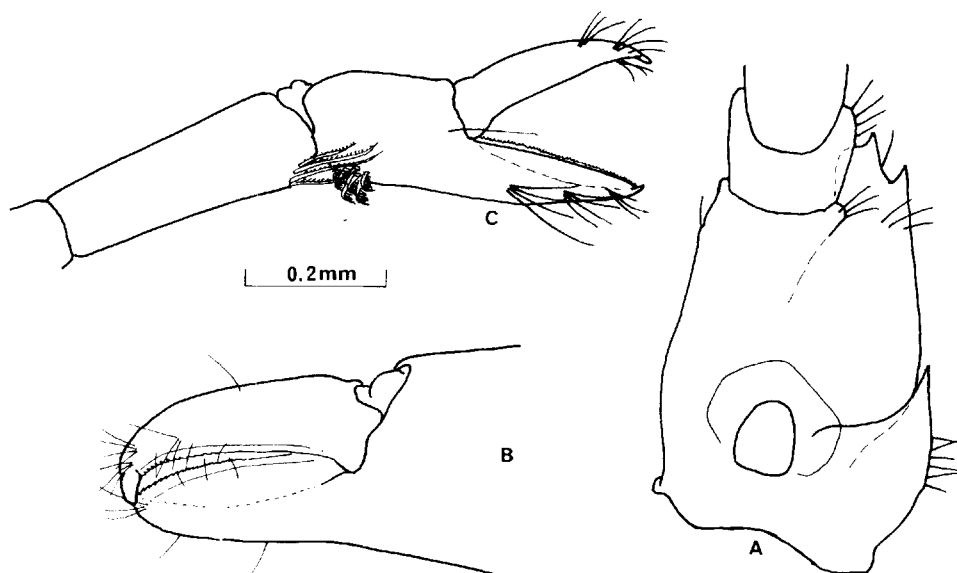


Figure 13. *Periclimenes zanzibaricus* Bruce., Juvenile, CL 1.1 mm: A, proximal segment of antennular peduncle; B, chela and carpus of first pereiopod; C, fingers of chela of second pereiopod.

and blunter teeth on the dactylus. The ambulatory pereiopods and the dactyls are very similar to the adult.

One male specimen had one second pereiopod undergoing regeneration. Of the three ovigerous females, one had undeveloped ova and two had advanced ova. The ova are 0.5 mm in length.

This species is a common associate of diademid echinoids in the Indian Ocean and the association with *Diadema setosum* and *Echinothrix calamaris* have been previously recorded. It is also found in association with *Astropyga radiata* (Leske) and *Centrostephanus tenuispinis* H. L. Clark (Bruce, 1973) and its expected occurrence in association with *D. savignyi* is now confirmed.

9. *Periclimenes mahei* Bruce, 1969 (Fig. 14)

Periclimenes mahei Bruce 1969a: 263-4; 1971, 11; 1972a: 401, 404, 410, 413 (key).

Material examined. Remire Island, Amirante Islands, Stn 149, #1872, 2 ov. ♀, CL 1.5, 1.7 mm.

Host/habitat. Both specimens were obtained from a small colony of the coral *Acropora corymbosa* (Lam.), collected from a depth of 3 fm. The association with this host constitutes a new host record.

Remarks. Both specimens have a rostrum with seven dorsal teeth and no ventral rostral teeth. The ova are undeveloped and 0.5 mm in length. There are no limbs in the course of regeneration.

The two specimens are remarkable in that in one specimen both hepatic spines are completely lacking and in the other the right sided spine is totally absent. The specimen first examined, lacking both hepatic spines, was initially

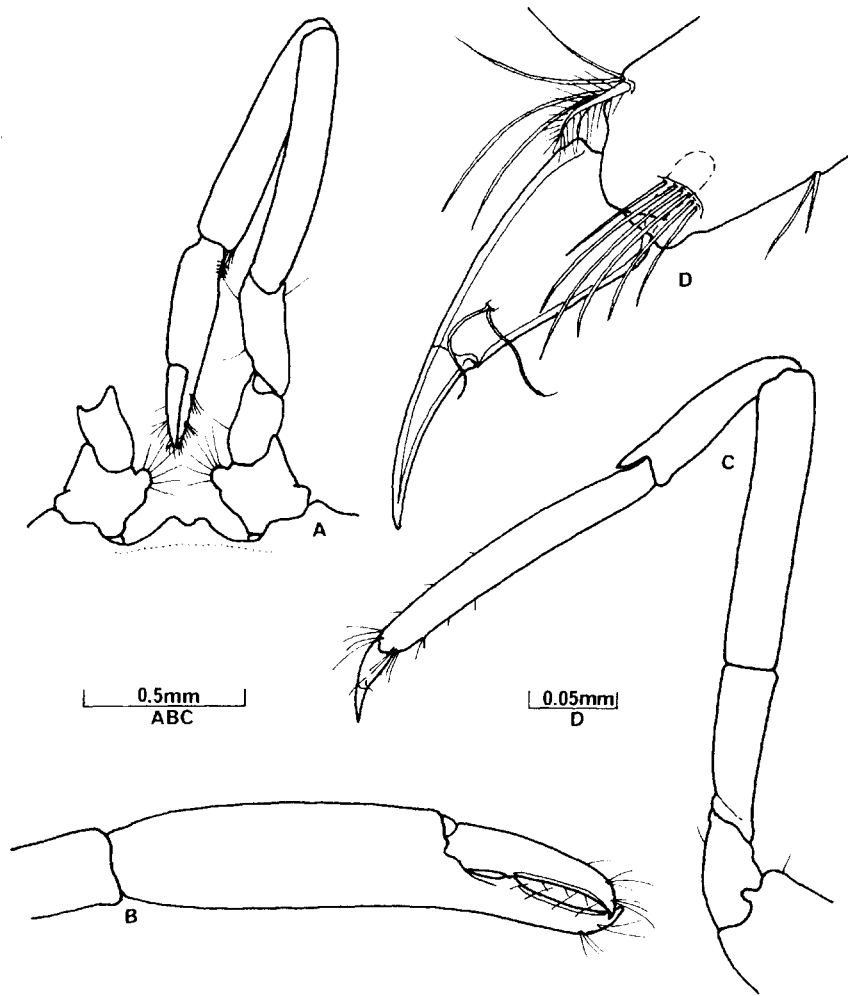


Figure 14. *Perclimenes mahei* Bruce. Ovigerous female: A, first pereiopod and fourth thoracic sternite; B, chela of second pereiopod; C, third pereiopod; D, dactylus of third pereiopod.

considered to belong to another genus, possibly *Philarius*. The specimens were compared with another sample of *P. mahei* in which it was found that, out of 13 ovigerous females, CL 1.6-2.1 mm, two specimens lacked hepatic spines on both sides and three specimens lacked the hepatic spine on one side only. Of six males in the sample, only one lacked the hepatic spine on one side only. A single non-ovigerous female also had both hepatic spines present. Out of a total of 20 individuals, 30% lacked a hepatic spine on one side at least. In the type specimens, all the adults, 1 ♂, 5 ov. ♀, the hepatic spines were present on both sides of the body. This variation may indicate how the evolution of some of the coral-associated pontoniinid genera, that mostly lack hepatic spines, has occurred. However it is considered unlikely that *Philarius*, which has a well developed median process on the fourth thoracic sternite, could have been derived from an ancestor of *P. mahei* or a related species, but a similar loss of hepatic spines from *P. lutescens* auct., would give rise to a *Philarius*-like genus.

For comparison with *P. difficilis* sp. nov., described below, which was initially identified with this species, some further details and illustrations of the appendages of *P. mahei* are provided. The first pereopod is moderately slender. The palm of the chela is subcylindrical, tapering slightly distally, about three times longer than wide. The fingers are slender, a little over a half the length of the palm, with slightly hooked tips. The cutting edges are entire. The carpus is 1.2 times the length of the chela and about 0.9 of the length of the merus. The ischium is about half the length of the merus, without a distinct carina along the median border and very sparsely setose. The basis is three quarters of the length of the ischium and is without any crest or lobes medially and is almost devoid of setae. The coxa bears a small rounded medial process with several short simple setae. The fourth thoracic sternite is feebly raised in a transverse ridge bearing two small rounded submedian processes.

The chelae of the second pereopods are similar and subequal. The palm is subcylindrical, about three times longer than wide and almost twice the length of the fingers. The fingers have feebly hooked tips and the cutting edge bears a single small acute tooth at one third of its length. Between these teeth and the tips, the cutting edges are concave so that the fingers gape when closed.

The ambulatory pereopods are slender. The ventral borders of the propods are without distinct spines but a few slender setiform spines are present. The distal end of the propod bears several groups of short slender simple setae and a few short plumose setae, but lacks any long filamentous setae. The dactylus, equal to about 0.25 of the propod length, is slender with a distinct long slender unguis, equal to three quarters of the length of the corpus, which is about twice as long as wide at the base, with a pair of small setae distolaterally.

The type specimens of this species were found in association with *Pocillopora* and the specimens from the Comores were found on *Seriatopora*. This species had not been previously found in association with the genus *Acropora*.

Both specimens were without evidence of limb regeneration. The ova were undeveloped and 0.5 mm in length.

Distribution. Type locality, North-West Bay, Mahé, Seychelle Is. The only other recorded occurrence of this species is from Mounimeri Is., Mayotte, Comoro Islands.

10. *Periclimenes hirsutus* Bruce, 1971

Periclimenes hirsutus Bruce, 1971a: 91-9, figs 1-6.

Material examined. Off Grande Anse Bay, Mahé, Stn 27, AT. 2, # 1741, 4 ♂, 2 ov. ♀, CL 4.0, 3.6, 3.3, 2.9; 5.0, 2.9 mm. Curieuse Bay, Stn 37, AT. 8, # 1743, 1 ♂, 2 ♀, 2 ov. ♀, CL 4.3; 4.5, 4.0; 5.2, 4.4 mm.

Habitat/host. Both lots of specimens were trawled from coarse sand bottom at 15-23 fm. Each catch contained numerous specimens of *Astropyga radiata* (Leske).

Remarks. The Seychelles specimens agree very closely with the original description of a male from Fiji. The rostral dentition is 7-9/0-1. The males are mostly 8/0. In one male the rostrum had been lost and in another, (7/0) the tip was missing. All specimens were adult and no juveniles were obtained, probably having been lost through the trawl.

Eight specimens had both second pereiopods present and one specimen had one, with the other in an early stage of regeneration. Where both were present they were subequal in size in both sexes. In two specimens, a male and an ovigerous female, they were slightly unequal, with the smaller chela distinctly more slender than the larger, probably in a late stage of regeneration.

The characteristic intermediate terminal spines of the telson were noted in the Seychelle specimens. The carapace was found to be considerably less hirsute than in the holotype, in most cases almost glabrous. This may have been due to abrasion in the trawl catch, as several specimens showed signs of recent damage.

Of the four ovigerous females three had freshly laid ova and one had larvae on the point of hatching. The early ova are 0.45 mm in length and the later ova about 0.65 mm.

The host of the holotype was not precisely determined but it was considered, from the collectors' description, most likely to be *Astropyga radiata*. The collection of two separate lots of this shrimp with *Astropyga radiata* confirms the association between these two animals. The original record was reported from only shallow water and these new records indicate a wider bathymetric range for this species.

Distribution. Type locality, Nukulau Is, Viti Levu, Fiji. Known only from the holotype specimen from Fiji, the occurrence of this species in the western Indian Ocean represents a very great increase in the range of distribution of this species.

11. *Periclimenes difficilis* sp. nov. (Figs 15 to 17)

Material examined. Baie St. Anne, Praslin, Stn 152, # 1909, 1 ♂, 3 ov. ♀, 1 juv., CL 1.7; 1.6, 1.7, 1.8; 1.1 mm.

Description. A small sized shrimp, generally similar to *Periclimenes mahei* in appearance. The body is subcylindrical in shape.

The carapace has a well-developed rostrum, with a moderately deep lamina and a distinct lateral carina. The dorsal lamina, which is elevated slightly posteriorly to the posterior orbital margin, is feebly convex and bears from five to seven acute teeth, which are proximally equally spaced. The ventral lamina bears a single small acute tooth, situated at about one third of the rostral length from the tip. Posterior to the ventral tooth, the lower border of the rostrum is almost straight. The tip of the rostrum extends anteriorly to the level of the end of the antennular peduncle or slightly beyond. The orbit is feebly developed and the inferior orbital angle is acutely produced in lateral view. The antennal spine is distinct, slender and acute, submarginal, situated closely below the inferior orbital angle. The hepatic spine is larger and situated well behind the posterior orbital margin and at a lower level than the antennal spine. Supra-orbital spines are lacking.

The abdomen presents no special features. The third segment is not produced postero-dorsally and the pleura of all segments are broadly rounded. The sixth segment is twice the length of the fifth and about twice as long as deep. The postero-lateral angle is well developed and broadly acute. The postero-ventral angle is also acute, but smaller. The telson is narrow, about 3.3 times longer than broad and subequal to the length of the sixth abdominal

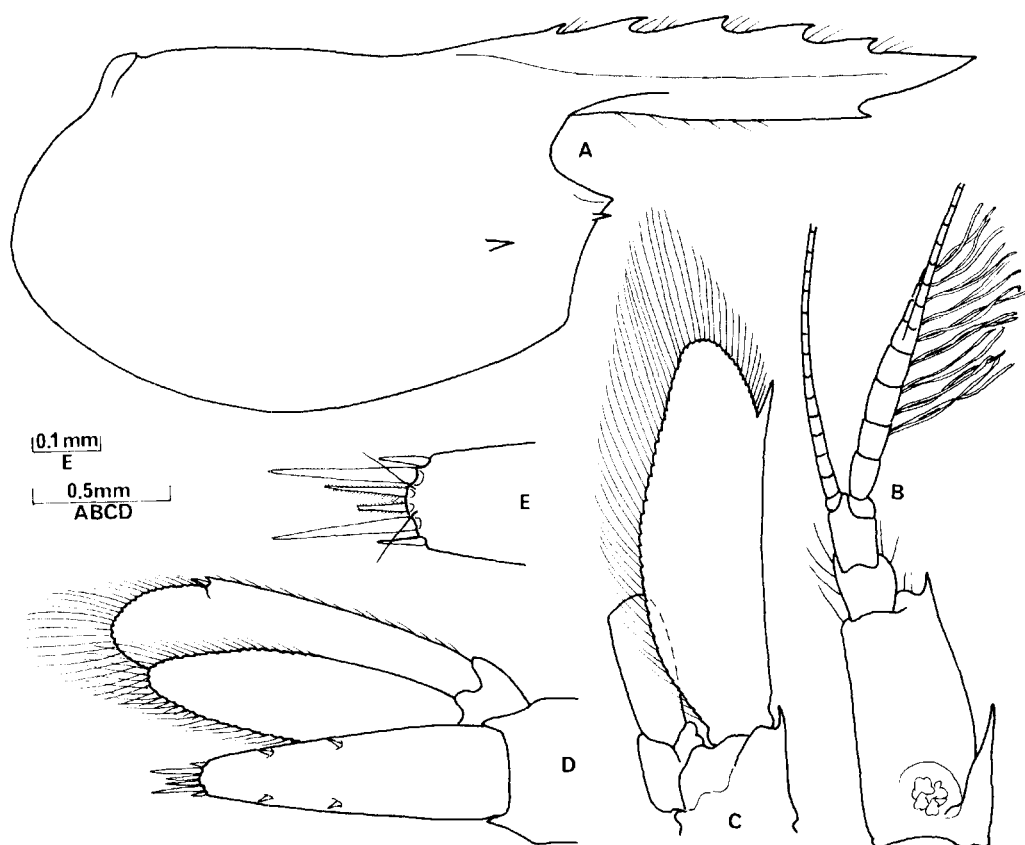


Figure 15. *Periclimenes difficilis* sp. nov. Ovigerous female: A, carapace and rostrum; B, antennule; C, antenna; D, telson and left uropod; E, terminal telson spines.

segment. The lateral margins are almost straight and converge posteriorly. Two pairs of dorsal spines are distinct, situated at approximately 0.54 and 0.76 of the telson length. Three pairs of posterior telson spines are present. The lateral spines are short, and similar to the dorsal spines. The intermediate spines are robust and three times the length of the lateral spines. The submedian spines are slender and finely plumose, equal to a little more than half the length of the intermediate spines.

The antennae are typical of the genus *Periclimenes*. The proximal segment of the antennular peduncle is twice as long as broad, tapering slightly distally with a straight medial and feebly convex lateral border. The antero-lateral lobe is distinct and bears a well developed disto-lateral spine, which extends beyond the level of the middle of the intermediate peduncular segment. The ventral medial border bears a small spine at half its length. The stylocerite is slender and reaches to the middle of the segment. The intermediate segment is short, about two thirds of the length of the distal segment, with a small lateral lobe. The terminal segment is 1.6 times longer than wide, and about one third of the length of the proximal segment. The upper flagellum is well developed, biramous, with the five proximal segments fused. The shorter ramus bears three

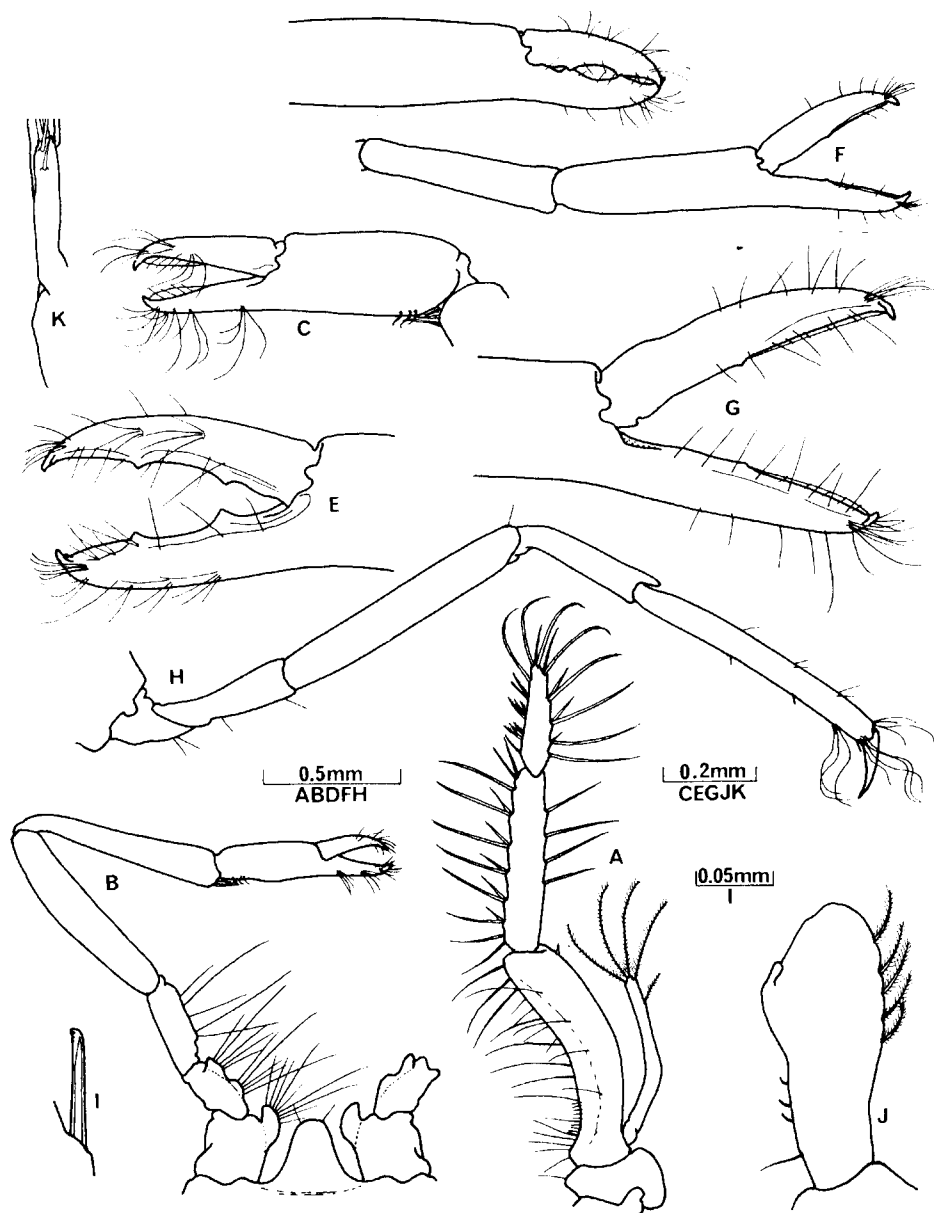


Figure 16. *Perichimenes difficilis* sp. nov. Ovigerous female: A, third maxilliped; B, first pereiopod and fourth thoracic sternite; C, chela of first pereiopod; D, chela of major second pereiopod; E, finger of chela of major second pereiopod; F, chela and carpus of minor second pereiopod; G, fingers of chela of minor second pereiopod; H, third pereiopods; I, ventral spine of propod of third pereiopod. Male: J, endopod of first pleopod; K, appendix interna and appendix masculina of second pleopod.

free segments and has nine groups of aesthetascs. The longer ramus is filiform, similar to the slender lower flagellum.

The antenna is well developed with the lamina of the scaphocerite extending well beyond the antennular peduncle. The basicerite bears a small acute lateral tooth. The carpuccerite is subcylindrical, almost three times longer than broad,



Figure 17. *Periclimenes difficilis* sp. nov. Ovigerous females: A, distal propod and dactylus, typical specimen; B, distal propod and abnormal dactylus of third pereiopod; C, dactylus of fourth pereiopod; D, dactylus of fifth pereiopod.

and reaches to the level of the proximal end of the intermediate segment of the antennular peduncle. The flagellum is slender, about eight times the carapace length. The scaphocerite is slender, 3.3 times longer than wide, with a feebly concave lateral margin ending in a slender disto-lateral spine. The lamina has the medial margin feebly convex and anteriorly extends well beyond the tip of the disto-lateral spine.

The epistome is unarmed and the mouth parts are normal. The third maxilliped has the ischio-merus and basis completely fused, forming a robust, feebly flattened segment. The lateral border bears a small spine distally. The medial border is slightly concave, with numerous long slender simple setae along the outer margin, with a few similar setae also along the inner margin. A row of about ten small plumose setae is also present at the medial proximal end

of the ischio-meral portion. The penultimate segment is about three quarters of the length of the antepenultimate segment, and five times longer than wide. The medial border is armed with about eight groups of long stout setae and shorter spines and about four similar setae are present on the lateral margin. The terminal segment is about 3.5 times longer than wide, tapering distally, and half the length of the antepenultimate segment. The medial border bears three groups of short finely serrated spines and eight long simple setae present at the distal end and along the lateral border. The coxa is feebly produced medially and bears an oval epipod laterally. The exopod is small and slender, not exceeding the antepenultimate segment, with four well developed plumose setae distally and a small preterminal lateral seta.

The eyes are well developed. The cornea is globular, with a diameter slightly greater than the length of the peduncle, which is as wide as long. The accessory pigment spot is only feebly developed.

The first pereopod is slender and extends beyond the carpoperite by the chela and one fourth of the length of the propod. The palm of the chela is subcylindrical, twice as long as wide. The fingers are moderately slender, about four fifths of the length of the palm, with slightly hooked tips. The cutting edges are laterally situated, distinct over the distal halves of the fingers only, and entire. The carpus is 1.2 times the length of the chela, slightly expanded distally, where its width is about one sixth of the length. The merus is subequal to the length of the carpus. The ischium is about half the length of the merus and is feebly carinate along the medial border, which bears several long slender simple setae. The basis is about three quarters of the length of the ischium with a distinct bilobed crest along the medial border, each lobe bearing about five long slender setae. The coxa is stout with a large oval medial process bearing nine to ten long slender setae. The fourth thoracic sternite bears a conspicuous linguiform process between the coxae of the first pereopods.

The second pereopods are well developed, unequal and dissimilar. In the major second pereopod, which exceeds the antennal peduncle by the length of the chela, the palm is smooth, subcylindrical, about 3.8 times longer than wide. The fingers are slightly less than half the length of the palm and feebly compressed, with feebly hooked tips. The cutting edge bears distinct acute teeth at 0.3 and 0.6 of the length with a well marked diastema between the teeth, on each finger. The carpus is short and stout, unarmed, twice as long as wide, and a quarter of the length of the chela. The minor second pereopod has the chela equal to about four fifths of the length of the chela of the major second pereopod. The palm is subcylindrical, smooth, slender, 3.5 times longer than wide. The fingers are about three quarters of the length of the palm with slightly hooked tips. The cutting edges are almost straight with a very small tooth at half the length. The fingers have numerous long setae and the tips are feebly notched. The carpus is four times longer than wide, and sub-equal to the length of the palm. The merus and ischium are unarmed. The merus is about half the length of the carpus of the major pereopod and 4.5 times longer than wide. The ischium is more slender and about 1.2 times the length of the merus. The basis and coxa present no special features.

The ambulatory pereopods are slender. In the ovigerous female, the third pereopod extends beyond the carpoperite by the length of the dactylus and propodus. The dactylus is moderately slender, the length equal to about four

times the width at the base. The unguis is distinct and slender, about 0.4 of the length of the whole dactylus. The corpus is feebly compressed, about 2.3 times longer than wide with a pair of small setae disto-laterally. The ventral margin is almost straight, but tapers noticeably at the junction with the unguis. There is not trace of any accessory spine. The propodus is about four times the length of the dactylus and ten times longer than wide. The distal end bears several groups of long filamentous setae, with short feathery setules distally, as well as a few short plumose setae. The ventral margin bears four isolated short spines which have blunt, dorsally feebly serrated tips. The carpus is about half the length of the propodus, unarmed, with a distinct distal dorsal lobe. The merus is devoid of spines or setae, subequal to the length of the propodus and slightly more robust. The ischium is also unarmed and half the length of the merus. Basis and coxa are without special features. The fourth and fifth pereopods are similar to the third, with filamentous setae on the propods. The disto-ventral propodal spine on the fourth pereopod is longer and more slender and non-dentate. On the fifth pereopod a group of five slender finely serrated spines is present distoventrally.

The endopod of the male first pleopod is expanded distally, about 2.3 times longer than broad and with a distinct small lobule on the distomedial margin. The proximal half of the lateral border bears five short plumose setae. The appendix masculina of the second pleopod is about 5.5 times longer than wide, with two short disto-ventral spines and two similar longer terminal spines. The appendix interna distinctly exceeds the body of the appendix masculina and bears a few disto-medial concinni only.

The protopodite of the uropod is rounded postero-laterally. The lateral border of the exopod is almost straight, sparsely setose, with a small acute tooth distally, with a large mobile spine medially. Both rami are narrow and extend well beyond the posterior end of the telson, the exopod further exceeding the endopod.

The ova are moderately numerous, of normal size, about 0.5 mm in length.

Types. An ovigerous female is selected as holotype and the only male as allotype, registration number 1976:68. The two other ovigerous females are paratypes and one has been deposited in the collection of the Rijks-museum van Natuurlijke Historie, Leiden.

Host. The specimens were collected together from a colony of *Porites nigrescens* Dana, from a depth of 3 fm.

Colouration. Mainly transparent, no special features noted.

Systematic position. *Periclimenes difficilis* is considered to be most closely related to *P. incertus* Borradaile, on account of the morphology of the first pereopods and the chela of the major second pereopods. The characteristic setal ridges on the ischium and basis and the long setose medial process on the coxa are very similar in two species and have not been reported in any other species of the genus. The fingers of the chela of the major second pereopods are also very characteristic and similar in the two species, with the conspicuous central distema on the cutting edges. *Periclimenes incertus* is generally placed in the subgenus *Periclimenes* on account of the presence of distinct accessory spines on the dactyls of the ambulatory pereopods, a feature that is lacking in *P. difficilis* (see below). In *P. difficilis* also, all the rostral teeth are situated in advance of the posterior margin of the orbit, which is in contrast to *P. incertus*,

in which the posterior rostral teeth are situated on the carapace behind the orbital margin, with a larger gap between the first and the second than between the others, so that the first spine is epigastric in position.

P. difficilis is here reported in association with a coral, *Porites* sp. *P. incertus* has been reported in association with sponges (Kemp, 1922, as *P. impar*) and specimens in the author's collection have also been found on sponges.

Remarks. The third maxilliped is unusually robust and strongly spined in comparison with most other species of *Periclimenes* and appears to have a raptorial function. The strongly setose ridges of the ischium and basis and the process of the coxa of the first pereopods, together with the remarkable tongue like median process of the fourth thoracic sternite are probably part of the same feeding mechanism. In the field, the specimens of *P. difficilis* were first thought to be *P. mahei*. The differences in the first pereopods and the fourth thoracic sternite can easily be seen by comparing Figs 12A and 14B.

P. difficilis also shows some small differences from *P. incertus* in the first pereopods. The medial setae appear much longer and more rigid, the distal part of the basal carina is shorter and less acute and the coxal process is more rounded distally than in *P. incertus*. In the ambulatory pereopods the ventral spines of the propod are acute and not blunt distally and the longer filamentous setae are not indicated (Kemp, 1922).

One of the major characteristics reported above in distinguishing *P. difficilis* from *P. incertus* is the absence of accessory spines on the dactyls of the ambulatory pereopods in the former species. One of the ovigerous females of *P. difficilis* was found to have a well developed slender accessory spine on the dactyls of both third pereopods (Fig. 15B). The dactyls of fourth and fifth pereopods were simple and no other differences between this female and the other specimens could be detected. The presence or absence of an accessory spine is the characteristic used to separate the sub-genera *Periclimenes* Costa s.str. and *Harpilius* Dana. Nominally the closely related species *P. difficilis* and *P. incertus* should be referred to separate sub-genera. It may also be noted that the fourth thoracic sternite of *P. incertus* resembles that of *P. mahei*, but the submedian processes are slightly larger and more acute. There is no median process resembling that found in *P. difficilis*. There was no evidence of regeneration of the second pereopods.

12. *Anchistus miersi* (De Man)

Restricted synonymy:

Harpilius miersi De Man, 1888: 274-7, pl. 17, figs 6-10.

Anchistus miersi Borradaile, 1898: 387; Kemp, 1922: 255-6, fig. 85; Kubo, 1940: 51-4, figs 18-20; Holthuis, 1952: 13, 110-1, fig. 45; 1953: 56; Johnson, 1961: 59, 62, 63, 76, tab 1; Miyake & Fujino, 1968: 414-5, 431; Bruce, 1972: 219, 226, fig. 5; 1973: 219, fig. 5.

Material examined. Curieuse Bay, Praslin, Stn 153, #1912, 2 ♂, 2 ♀, CL 2.8, 2.5 and 6.0, 3.8 mm.

Host. Both pairs were obtained from *Tridacna squamosa* Lam., length 228 and 157 mm respectively, from a depth of 2 fm.

Remarks. The two pairs present no special features. The rostral dentition varied from 4/1, 5/1 in the males and 4/0, 4/1 in the females. The ventral tooth

was minute when present. In all specimens, the lateral posterior telson spines were situated subterminally on the dorsum of the telson as illustrated by Holthuis (1952). This species has been previously reported in association with *Tridacna squamosa* by Borradaile (1917) and this has been confirmed by Miyake & Fujino (1968), who also reported its association with *T. crocea* Lam., *Hippopus hippopus* (L.) and *Pinctada maxima* Jameson. Nobili (1906) and Tattersall (1921) have also recorded its association with *Pinna* in the Red Sea, which needs to be confirmed. The specimen examined by Tattersall are apparently no longer in existence.

Borradaile (1917) recorded the occurrence of this species from Egmont, Seychelles. There is no such locality in the Seychelle Islands and this record presumably refers to Egmont Island, one of the Six Isles (06° 39'S, 71° 21'E) part of the Chagos Archipelago. The present specimens are therefore the first to be recorded from the Seychelle Islands.

The females are without ova and all specimens possess both second pereopods.

Distribution. Type locality, Elphinstone Island, Mergui Archipelago. Further records from the Red Sea, Maldive and Andaman Islands; Singapore and Pulo Condore, Vietnam; Indonesia, New Guinea and Papua; Palau, Ellice and Marshall Islands and Gambier Archipelago. This species has not been previously recorded from the Seychelle Islands.

13. *Philarius gerlachei* (Nobili, 1905) (Fig. 18)

Restricted synonymy:

Harpilius Gerlachei Nobili, 1905: 160; 1906: 45, pl. 4, fig. 10.

Harpilius gerlachei Tattersall, 1921: 390, pl. 28, fig. 9; Kemp, 1922: 238-9, figs 74-75.

Philarius gerlachei Holthuis, 1952: 15, 152-3, fig. 69; 1953: 57; Patton, 1966: 276, 288, 290; Bruce, 1972a: 406, 407, 413 (key).

Material examined. Remire Is., Amirante Islands, Stn 149, #1871, 1 ♂, CL 3.0 mm.

Habitat/host. Collected from fringing reef flat with scattered corals, at a depth of 3 fm from *Acropora corymbosa* (Lam.), which constitutes a new host record.

Remarks. The single male specimen was taken in isolation but it is probable that the associated female was lost in the course of collection. The rostrum has four dorsal teeth and one ventral tooth and closely resembles the illustration given by Kemp. The right second pereopod has been lost and is represented by a regenerating limb bud. The carpus of the left pereopod is without distal spines. The ambulatory pereopods are robust and the dactylus is strongly compressed and hooked, deeply recessed into the heavily setose distal end of the propod.

The male first and second pleopods have not been described. The endopod of the first pleopod is about four times longer than the width of the proximal half. The distal half is expanded medially and is without any small median lobule. The medial border bears about 13 long slender spines, that are setulose along their distal sides, along the proximal two thirds, with longer coarsely plumose setae around the margin of the distal third.

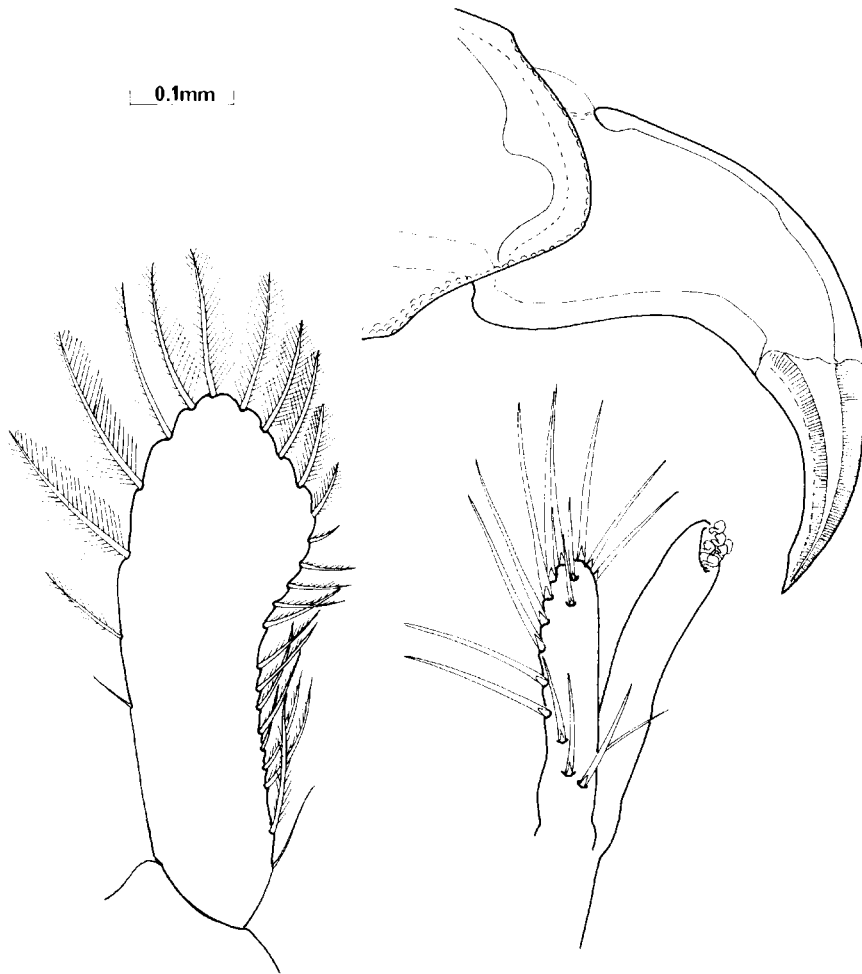


Figure 18. *Philarius gertachei* Nobili. Male: A, dactylus of third pereopod; B, endopod of first pleopod; C, appendix interna and appendix masculina of second pleopod.

The appendix masculina is moderately stout, about 4.5 times longer than wide, and is distally exceeded by the appendix interna, which bears only six terminal concinni. The medial border of the appendix masculina bears a slender spine on the proximal half, and the lateral border bears six long stout simple spines. The tip bears four similar spines. The anterior aspect bears three stout spines on the proximal third and two small slender spines distally.

It may also be noted that the fourth thoracic sternite is provided with a stout median process.

The species is an obligate associate from branching corals, as reported by Nobili and Patton, who confirmed that it is confined to corals of the genus *Acropora*, including *A. digitifera*, *A. formosa*, *A. humilis*, *A. hyacinthus* and *A. nana*.

Distribution Type locality, off Arzana Is., Persian Gulf. This species has been reported from several localities in the Red Sea; the Gulf of Manaar, Indonesia and Borneo, the Australian Great Barrier Reef, the Marshall, Gilbert

and Samoan Islands. It has not been previously recorded from the Seychelle Islands.

14. *Ischnopontonia lophos* (Barnard, 1962)

Philarius lophos Barnard, 1962: 242-3, fig. 2.

Ischnopontonia lophos Bruce, 1966: 585-95, figs 1-5; 1971: 19-20; 1972a: 401, 402, 409, 413 (key); Hipeau-Jacquotte, 1973: 104, fig. 5.

Material examined. Curieuse Bay, Praslin, Stn 153, #1917, 1 ♂, CL 1.9 mm.

Habitat/host. Coral reef, depth 2 fm, from *Galaxea fascicularis* (L.).

Remarks. The single specimen agrees fully with the previously published information. The rostrum bears ten dorsal teeth of which four are post-orbital. Both second pereopods are fully developed. No female was found and was presumably lost in the course of collection. Specimens of *Racilius compressus* Paulson were also found in association with this specimen, which is known only from the host *Galaxea fascicularis* (L.).

Distribution. Type locality, Inhaca Island, Delagoa Bay, Mozambique. Also recorded from coral reefs off Zanzibar, Tanzania and the Comoro Islands; Tulear, Madagascar; Aldabra, Farquhar Islands and Mahé, Seychelle Islands; Singapore, Malaya and the Australian Great Barrier Reef.

15. *Paratypton siebenrocki* Balss 1914 (Figs 19 and 20)

Paratypton siebenrocki Balss, 1914: 84, fig. 1; 1915: 30-31, figs 18-25; Borradaile, 1921: 1-9, figs 1-11; Kemp, 1922: 286; Holthuis, 1952: 19; Patton, 1966: 273; Bruce, 1969: 171-86, figs 1-5, pl.1; 1972a: 402, 407, 408, 414, (key); in press, b: fig. 6; Hipeau-Jacquotte, 1973: 113.

Material examined. Remire Island, Amirante Islands, Stn 149, #1746, 2 ♂, 2 ov. ♀, CL 2.5, 2.8, 2.8, 4.0 mm.

Host. The two pairs were obtained from cysts in two separate colonies of the coral *Acropora massawensis* von Marenzeller, which constitutes a new host record. This species has previously been recorded in association with five other species of *Acropora*, *A. hyacinthus* (Dana), *A. palmerae* Wells, *A. squamosa*, Brook, *A. squarrosa* (Ehrenberg) and *A. variabilis* (Klunzinger).

Remarks. In reporting upon specimens from Farquhar Is. Bruce (in press, a) noted the distinctly swollen appearance of the carpus of the first pereopod. This feature is even more conspicuous in the Remire Island specimen. The Farquhar Island specimens were considered to be immature, but the Remire Island specimens are fully adult. As the carpus in the specimens from the Red Sea, Great Barrier Reef and Marshall Islands were also adult and had a slender carpus, it is possible that these two forms may represent separate species of *Paratypton*. Insufficient information on host preferences is available but the two groups show no overlap in host choice, but the cysts also show some differences in that, in the Pacific and Red Sea material, the cyst is deeply situated in the base of the corals, and even beneath the surface of an encrusting coral (*A. palmerae*) but in the Indian Ocean material, it may be more superficially situated among the branches of the coral (*A. variabilis*).

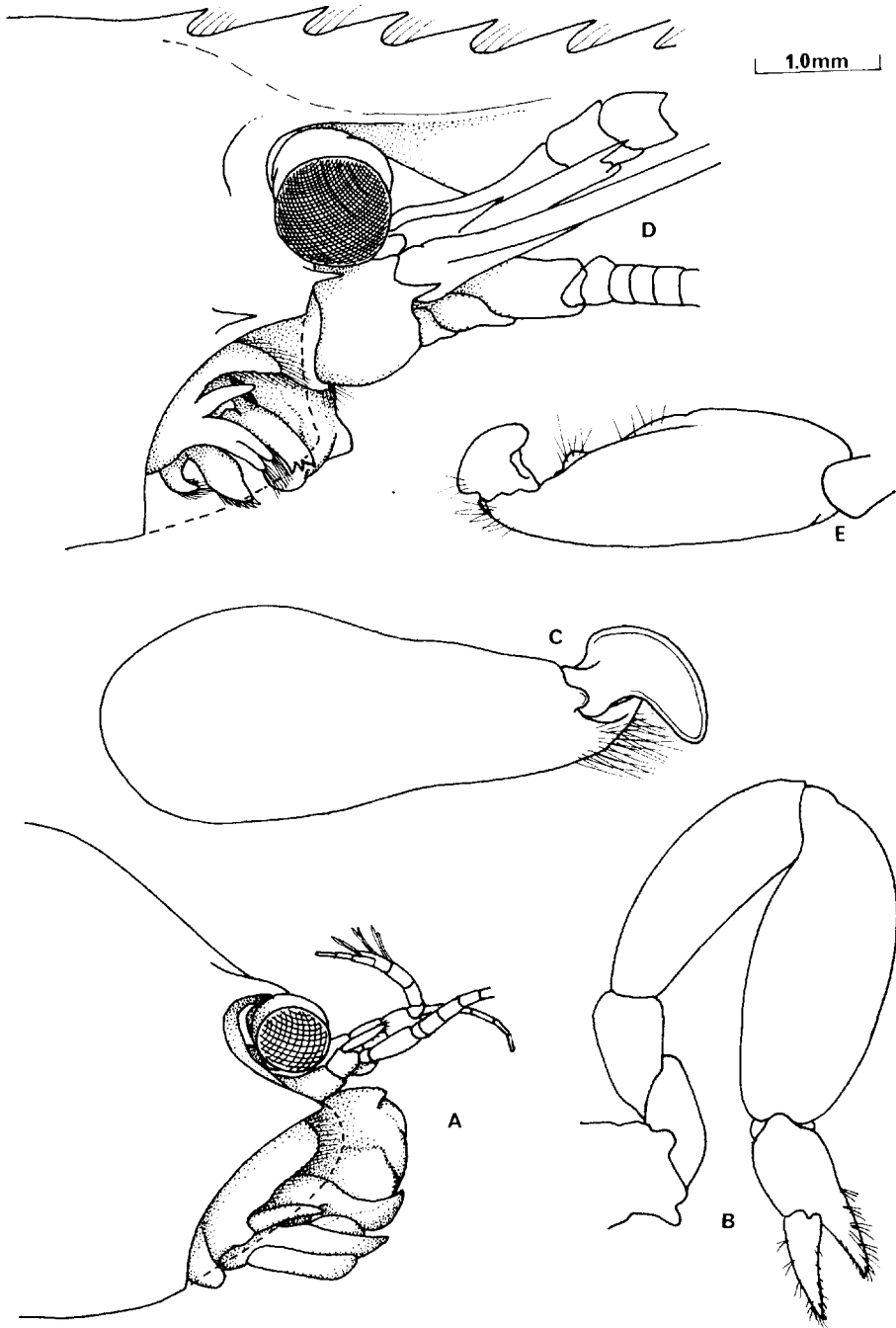


Figure 19. *Paratypton siebenrocki* Balss: A, anterior carapace and appendages, antero-lateral angle of carapace removed; B, first pereiopod; C, chela of second pereiopod. D, *Periclimenes lutescens* auct., anterior carapace and appendages, antero-lateral angle of carapace removed. E, *Alpheus obesomanus* Dana, major chela of first pereiopod.

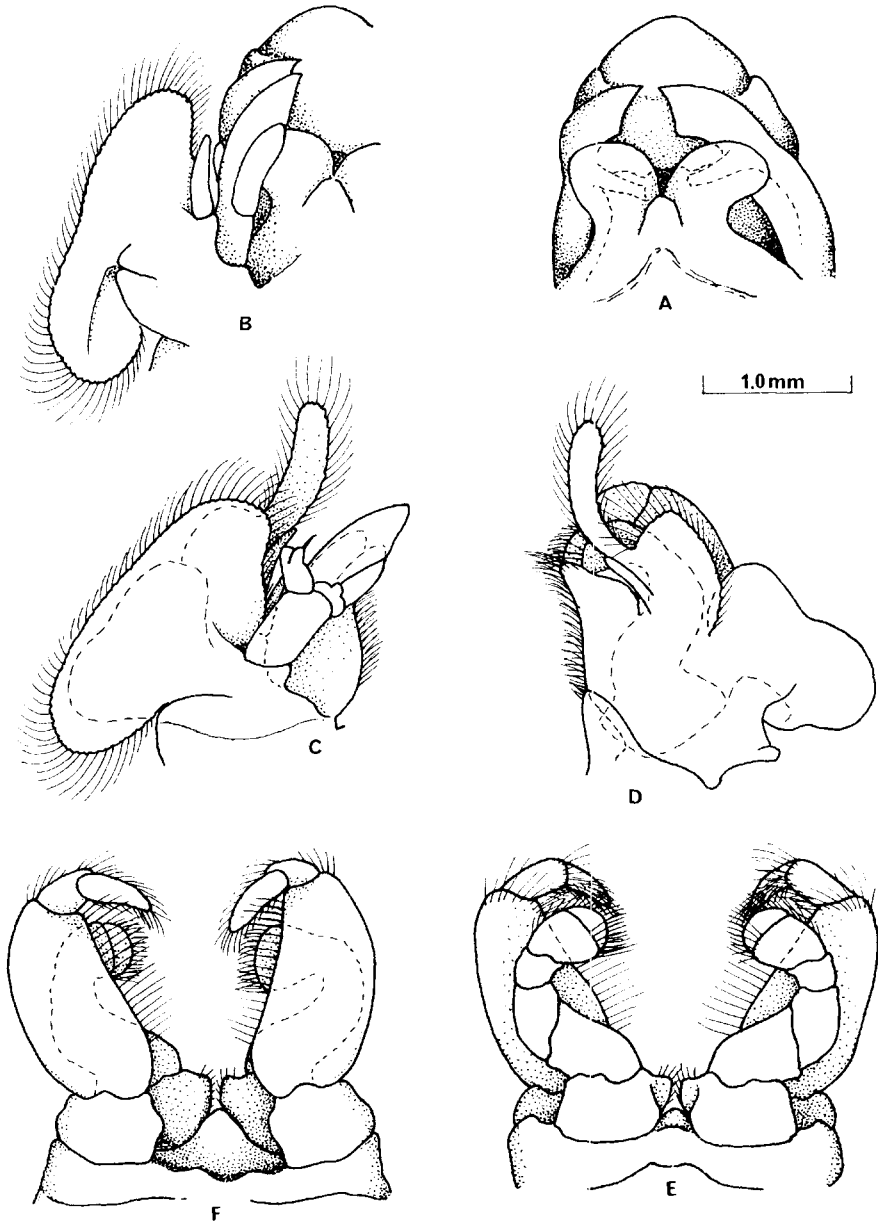


Figure 20. *Paratypton siebenrocki* Balss, mouthparts of ovigerous female: A, labrum, mandible and paragnath; B, labrum, mandible, paragnath, maxillula and maxilla; C, maxillula, maxilla and first maxilliped; D, first, second and third maxillipeds; E, second and third maxillipeds; F, third and second maxillipeds. ABF, Ventral view; CDE, dorsal view.

As previously described, the third pereiopods are markedly asymmetrical in both males, one side being particularly elongated.

The mouthparts of *Paratypton* are of particular interest and the individual appendages have been described in detail by Balss (1915), Borradaile (1921) and Bruce (1969). The Remire Island specimens show no significant differences. The relationships between the different appendages are illustrated in Fig.

20. From these figures it can be seen that the third maxillipeds are widely separated at their bases. When adducted, with the terminal and penultimate segment flexed, they do not form an operculum, although the antepenultimate segments are particularly broad. The gap between the third maxillipeds can be closed by the second maxillipeds, when the distal segments are flexed and adducted. Any aperture remaining unsealed between the third and second maxilliped is completely occluded by the basal part of the endite of the first maxilliped. Although the exopods and epipods of the second and third maxilliped are completely absent those of the first maxilliped are very well developed. The epipod is half the size of the scaphognathite and the flagellum of the exopod is clearly fully functional, as it is broad and provided with numerous short plumose setae all round its margins.

The labrum is relatively large in *Paratypton* and projects anteriorly. The mandibles and maxillulae are also orientated anteriorly, the whole forming a projection in front of the carapace, immediately below the greatly reduced antennae. This arrangement of the mouthparts is in contrast to the condition found in the majority of pontoniinid shrimps, in which these appendages are directed more ventrally and situated beneath, rather than in front of the anterior carapace. The typical condition, as shown by *Periclimenes lutescens* is illustrated in Fig. 19D. The prognathous arrangement found in *Paratypton* has not been noticed in any other genus of pontoniinid shrimp and it seems probable that it may be associated with the cysticolous habits of the shrimp. When examined in lateral view, the labrum and inner mouthparts appear to be suitably orientated for browsing on the inner surface of the cyst wall. Hipeau-Jacquotte (1973) has suggested that *Paratypton* may be feeding upon mucus secreted by the host, and the cyst occupied by one pair of specimens was noted to be bright green inside, due to the growth of algae, which could also form a source of nourishment for the shrimps. In addition to supplying a source of food, browsing upon the host's tissues could interfere with their growth, and if the shrimps remain in a fixed position on the host, the recurrent focal damage to the coral and peripheral growth would result ultimately in the formation of the cyst.

The morphology of the chela of the second pereopods (Fig. 19C) in *Paratypton* is also without parallel in the Pontoniinae. An approximately similar chela is found in certain alpheid shrimps, although in these it is the major chela of the first pair of pereopods that is modified (Fig. 19C). An example is *Alpheus obesomanus* (Dana). A pair of specimens was obtained from Farquhar Island during Cruise 336 of the F.R.V. *Manihine*, where they were found in a small, almost sealed cavity in *Millepora tenera* Boschma. The niche occupied is therefore very similar to that occupied by *Paratypton*, and the resemblance between the chelae of the two species is probably a convergent adaptation to cysticolous life. Both chelae show a proximally swollen palm, tapering distally, with a greatly reduced fixed finger. The free finger is well developed but is elongated and bluntly and smoothly rounded, without any teeth or cutting edges.

In all four specimens, both second pereopods were fully developed. In the females the ova were at an early stage of development.

Distribution. Type localities, Senafir and Koseir, Egypt; Mersa Sheik, South Arabia and Jaluit, Samoa.

Also recorded from the Australian Great Barrier Reef (Patton, 1966), Pago Pago, Samoa (Borradaile, 1921), and Rigili Island and Eniwetok Island, Marshall Islands (Bruce 1969). Previously recorded in the Indian Ocean from the Island of Farquhar. (Bruce, in press a.).

16. *Harpiliopsis beaupresii* (Audouin, 1825) (Figs 21 and 22)

Restricted synonymy:

Palaemon Beaupresii Audouin, 1825: 91.

Harpilius Beaupresi Heller, 1861: 27.

Pontonia (Harpilius) dentata Richters, 1880: 165.

Harpiliopsis beaupresi Borradaile, 1917: 324, 379, pl. 55, fig. 21; Kemp, 1922: 229-31, figs 67-68; Barnard, 1950: 797, fig. 161 f-h; Holthuis, 1952: 16, 181-2, fig. 89, (full synonymy); 1953: 57 1958: 10; Johnson, 1961: 60, 62, 63, 1962: 288; Patton, 1966: 276, 291; Bruce 1972a: 401, 403-5, 408, 413 (key); (in press, a).

Material examined. Port Victoria, Mahé, Stn 150, #1802 1 ov. ♀, CL 2.4 mm. Baie St. Anne, Praslin, Stn 152, #1904, 5 ♂, 2 ov. ♀, 6 ♀, CLs 3.1, 1.5, 4.4-3.5, 2.4-1.9 mm, #1906, 2 ♂, 3 ♀, post-larva, CL 2.9, 2.4; 3.3, 2.6, 2.5; 1.2 mm. Curieuse Bay, Praslin, Stn 153, #1922, 3 ♂, 2 ov. ♀, 2 ♀, 2 juv. CL 2.9, 2.1; 2.6; 2.3, 1.8, 1.7 mm, #1925, 2 ov. ♀, with 15 juv. CL 2.1, 2.2; 1.0 mm. upwards.

Host. The specimens were obtained from colonies of *Stylophora palmata* (Blainville) (#1904); and *S. pistillata* (Esper), *Pocillopora damicornis* (L.) (#1882); *P. verrucosa* (Ellis & Solander) (#1906); and *Seriatopora hystrix* (Dana) (#1922, #1925), collected from 2-3 fm. *Stylophora palmata* constitutes a new host record.

Remarks. The specimens agree well with the previous description of Kemp (1922) and Holthuis (1952). In the adults the rostral dentition is 4-6/1-3, with most specimens 4-5/2. In many of these specimens the most posterior tooth is spiniform and appears feebly mobile. The dactylus of the ambulatory pereopods in this genus are remarkable and distinct from those of all other genera of the Pontoniinae. In addition to being strongly carinate, they are markedly twisted laterally (Fig. 21B).

The endopod of the adult male first pleopod is about four times longer than wide, with subparallel sides and rounded distally. The distal end and disto-medial borders bear eight short plumose setae. The proximal half of the medial border is devoid of setae. The proximal half of the lateral border bears three longer plumose setae basally and four short feebly plumose setae more distally. In more juvenile specimens the number of distal plumose setae is reduced, and only a single plumose seta with two simple setae is present on the proximal lateral border. On the second pleopod the appendix masculina is about half the length of the appendix interna. The body of the appendix is about six times longer than wide, and bears a terminal group of four simple spines, with a further six similar spines along the ventro-medial border. In more juvenile specimens, the appendix masculina is similar but the number of spines is reduced. In the smallest specimen dissected only the four terminal spines are present.

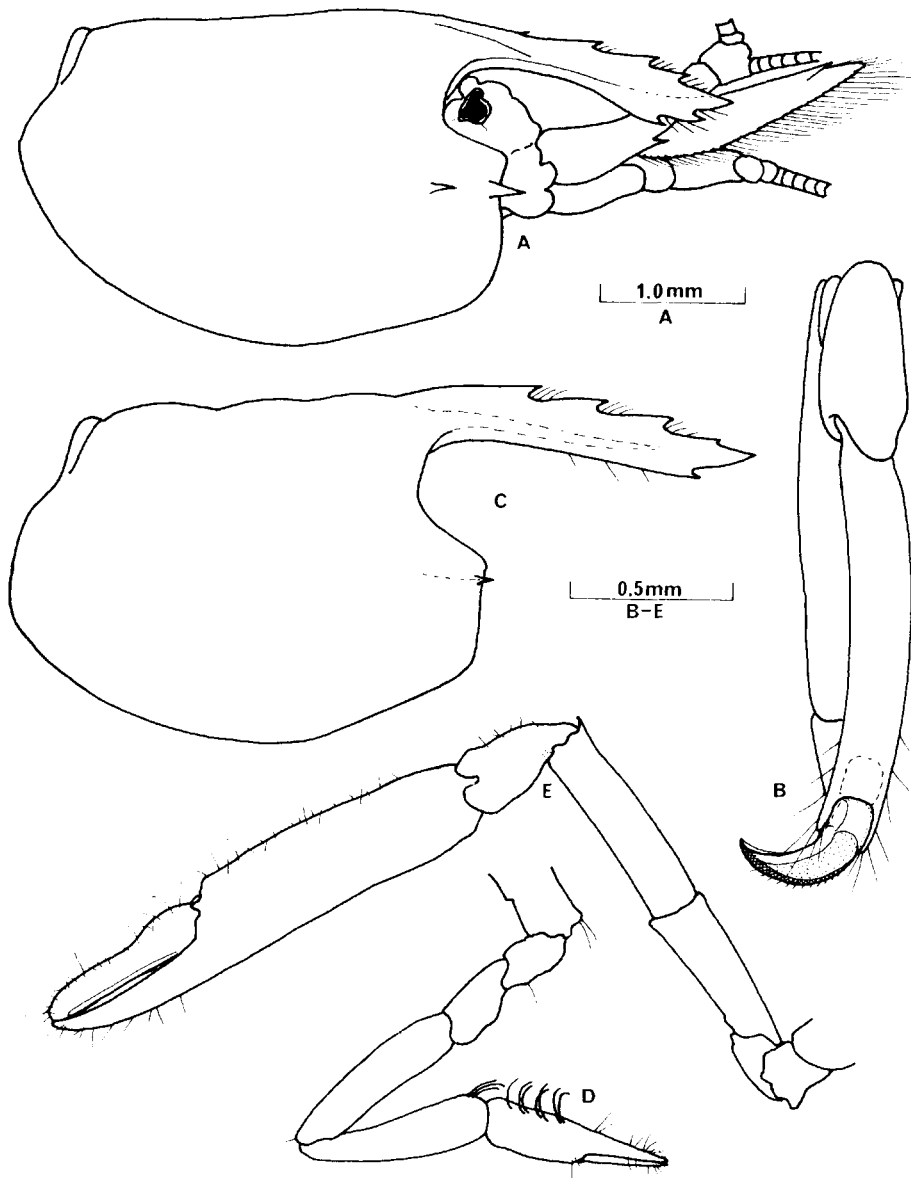


Figure 21. *Harpiliopsis beaupresii* (Audouin). Ovigerous female: A, anterior carapace and rostrum, antennal peduncles, lateral aspect; B, third pereiopod, anterior aspect of propod and dactylus. Juvenile, CL 1.1 mm: C, carapace and rostrum, lateral aspect; D, first pereiopod; E, second pereiopod.

The post-larval juveniles have a well developed rostrum with four dorsal teeth and a single distal ventral tooth. The spiniform posterior tooth present in the adults is absent in these specimens. The antennal spine is small but distinct, but the hepatic spine is lacking in the smallest specimens. The first pereiopod is relatively stout, and the chela, carpus and merus are all subequal in length. The fingers of the chela are slender and slightly shorter than the palm. The chela of the second pereiopods is similar to the adults and the characteristic swollen base of the dactylus is readily discernible. The cutting edges of the finger differ

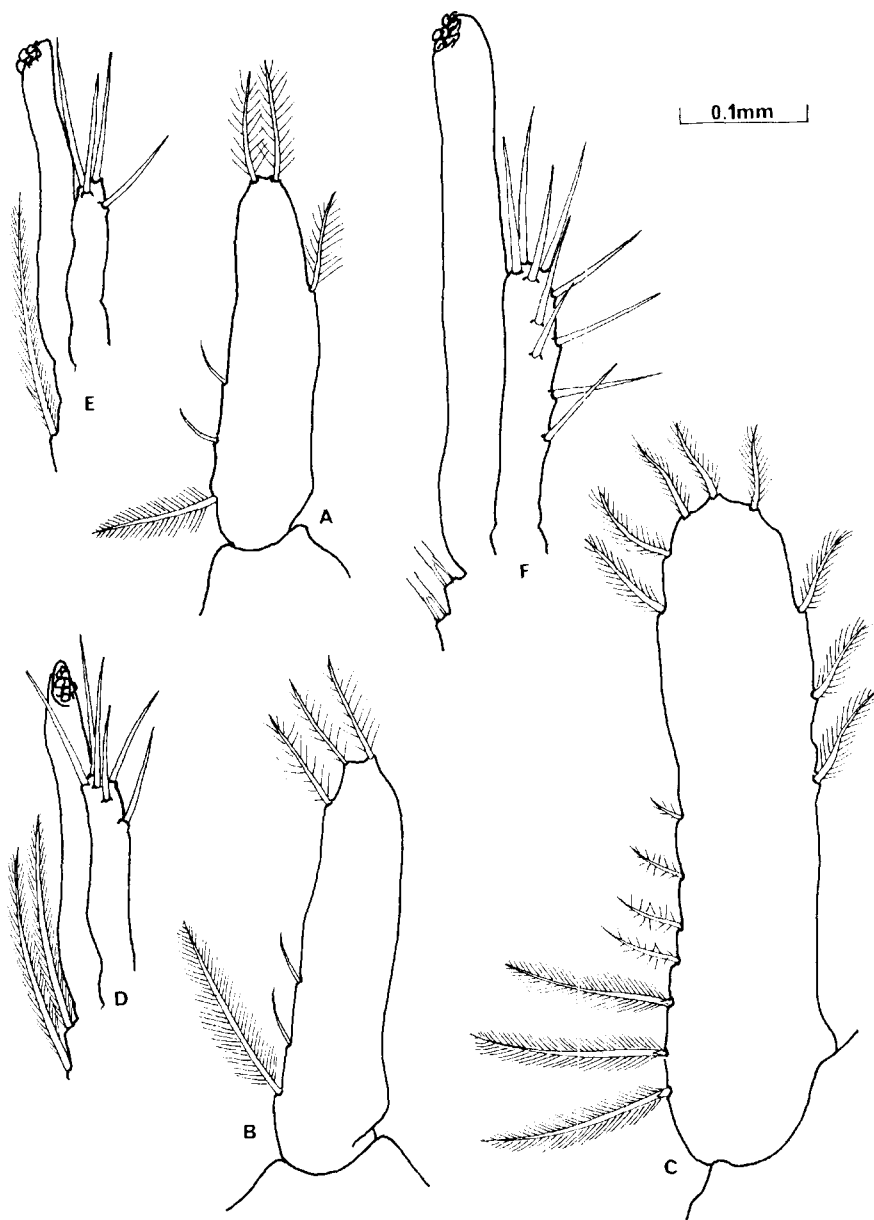


Figure 22. *Harpiliopsis beaupresii* (Audouin). Males: A-C, endopod of first pleopods; D-F, appendix interna and appendix masculina of second pleopods. Juveniles, CL 1.5 mm (A,D); CL 1.7 mm (B,E) and adult (C,F.).

from the adults in the lack of teeth. The carpus and ischium are without the spines that are characteristic of the adult chela but the distal end of the merus bears small lateral and ventromedial spines. The dactylus of the ambulatory pereiopod is similar to that of the adult.

The absence of the hepatic spine in the post-larval juvenile is of interest. In reporting on the specimens of *Periclimenes pusillus* Rathbun from Hawaii it was suggested that these should be referred to the genus *Harpiliopsis* on

account of the similarity of the pereopods to *H. depressus* (Stimpson), although it was noted that the hepatic spine was absent (Bruce, 1970). The absence of this spine in the related *H. beaupresii* confirms this tentative identification and this spine is probably absent from the post-larval stages of all *Harpiliopsis* species.

Distribution. Type locality, Egyptian coast of the Red Sea. Numerous other occurrences have been noted from the Red Sea, Gulf of Aden and the western Indian Ocean, including Aden and Djibouti; Mozambique, Mauritius, Seychelle Islands, Chagos and Maldivé Archipelagos and the Andaman Islands. Also known from Singapore and Indonesia but only from the Marshall Islands, and Hawaii in the Pacific Ocean.

17. *Harpiliopsis depressus* (Stimpson)

Restricted synonymy:

Harpilius depressus Stimpson, 1860: 38

Harpiliopsis depressus Borradaile, 1917: 380, pl. 65, fig. 22; Kemp, 1922: 231-4, figs 69-70; Holthuis, 1951: 70-5, pl. 21-2 (full synonymy); 1952: 16, 182-4, fig. 90; 1953: 57; Patton, 1966: 276, 291, tabs 1-3; Bruce, 1972a: 401, 403-5, 408, 413 (key).

Material examined. Baie St. Anne, Praslin, Stn 152, #1905, 1 ♂, 1 juv. ♀, CL 3.7, 2.7 mm.

Host. The specimens were obtained from *Pocillopora damicornis* (L.) and *P. verrucosa* (Ellis & Solander) from a depth of 3 fm.

Remarks. The two specimens are quite typical and correspond closely to the description of Kemp (1922). Both specimens have six dorsal and four ventral rostral teeth. The chela of the second pereopod in the male is stout, 0.21 times longer than the width of the palm but this is less marked in the juvenile female, where it is only 0.18 times as long. The pleura of the fourth and fifth abdominal segments are all acutely pointed. There is no evidence of regeneration in the second pereopods.

Distribution. Type locality, Hawaii. Now also recorded from numerous localities throughout the Indian and Pacific Oceans and also from the Eastern Pacific region where it has been recorded from the Galapagos Island, Columbia, Panama, Costa Rica and Mexico. It is very probable that many of the Indo-West-Pacific records refer to the species below. Previously reported from Coetivy, the Seychelle Islands by Borradaile, (1917).

18. *Harpiliopsis spinigerus* (Ortmann)

Anchistia spinigera Ortmann, 1890: 511, pl. 26, fig. 23.

Harpilius depressus var. *gracilis* Kemp, 1922: 234-5, fig. 71.

Harpiliopsis depressus var. *spinigerus* Holthuis, 1952: 16, 184-185.

Harpiliopsis sp. Bruce, (in press, a).

Material examined. Remire Island, Amirante Islands, Stn 149, #1929, 1 ♀, 5 juv. (damaged) CL 3.8 mm Baie St. Anne, Praslin, Stn 152, #1903, 1 ♀, CL 1.9 mm. Astove Island, #1930, 1 ♂, CL 2.4 mm.

Host. All specimens were obtained from *Stylophora palmata* (Blainville) (#1903, #1930) and *S. pistillata* (Esper) (#1929). The hosts of this shrimp

have not been previously recorded. The specimen from Astove Island was found in a coral caught by handline from a depth of 6 fm and the other specimens were obtained from 3 fm.

Remarks. Many of the records of *H. depressus* probably refer to *H. spinigerus* and the specimens upon which these records are based need re-examination in order to ascertain the distribution of these two closely related species. These specimens have been compared with one of Ortmann's specimens of *Anchistia spinigera*, from Dar-es-Salaam, and now preserved in the collection of the Zoological Museum, Strasbourg. This specimen, however, is not the type and attempts to locate Ortmann's types have been unsuccessful. The Samoan specimen of Ortmann, from the Museum Godefroy, now in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, has been examined and is correctly referred to *H. spinigerus* (Ortmann) and not *H. depressus* (Stimpson). It is probable that this specimen was originally part of the material from Samoa, a portion of which was studied by Ortmann, but it was not one of the specimens actually available to him for his description of *Anchistia spinigera* (Holthuis, in litt.)

One specimen had one second pereopod at a very early stage of regeneration and two others had one second pereopod about half the size of the fully developed limb.

Distribution. Type locality Samoa. Known with certainty only from Dar-es-Salaam, Tanzania; Andaman Islands and Mamudju, Celebes. Probably widespread throughout the Indo-West Pacific region.

19. *Jocaste japonica* (Ortmann) (Figs 23A, B and 24)

Restricted synonymy:

Coralliocaris superba var. *japonica* Ortmann, 1890: 509.

Coralliocaris japonica Borradaile, 1917: 324, 384, pl. 56, fig. 23.

Coralliocaris lucina Barnard, 1950: 799-800, fig. 151 i-m.

Jocaste japonica, Patton, 1966: 279-80, tabs 1-2, fig. 3b; Miyake and Fujino, 1968: 425-6, 431; Bruce, 1969: 229, 300, fig. 1; 1972a: 403, 405, 408, 414 (key): in press, a.

Material examined. Remire Is., Amirante Islands, Stn 149, #1869, 1 ov. ♀, CL 2.8 mm; #1870, 1 ov. ♀, CL 2.1 mm; #1874, 2 ♂, 2 ov. ♀, 1 juv., CL 2.5, 2.8; 2.7, 3.1; 1.1 mm; #1875, 4 ♂, 2 ov. ♀, 1 ♀, CL 1.9-2.5; 2.3-2.4; 2.0 mm; #1977, 1 ♂, 1 ov. ♀, 1 ♀, CL 2.2; 3.0; 2.3 mm. Baie St. Anne, Praslin, Stn 152, #1891, 1 juv., CL 1.4 mm, #1894, 1 ♂, 2 ov. ♀, CL 2.7; 3.0, 3.1 mm, #1895, 1 ♂, 1 ov. ♀, CL 2.8, 2.9 mm.

Host. All specimens were obtained from colonies of *Acropora* collected from depths of 2-3 fm including *A. digitifera* (Dana), *A. haimeii* (M.-Edwards & Haine), *A. nana* (Studer) and *A. variabilis* (Klunzinger). Other specimens were collected from *Acropora abrotanoides* (Lam.), *A. assimilis* (Brook), *A. corymbosa* (Lam.) *A. disticha* (Brook), *A. valida* (Dana), and *A. massawensis* (von Marenzeller) which constitute new host records.

Remarks. With one exception, the criteria given by Patton (1966) for separating *J. japonica* (Ortmann) and *J. lucina* (Nobili), enabled the specimens obtained to be readily distinguished. The present specimens had a rostral dentition of 2-5/1-2. Most of the males (77%) were 4-5/1-2 and the females

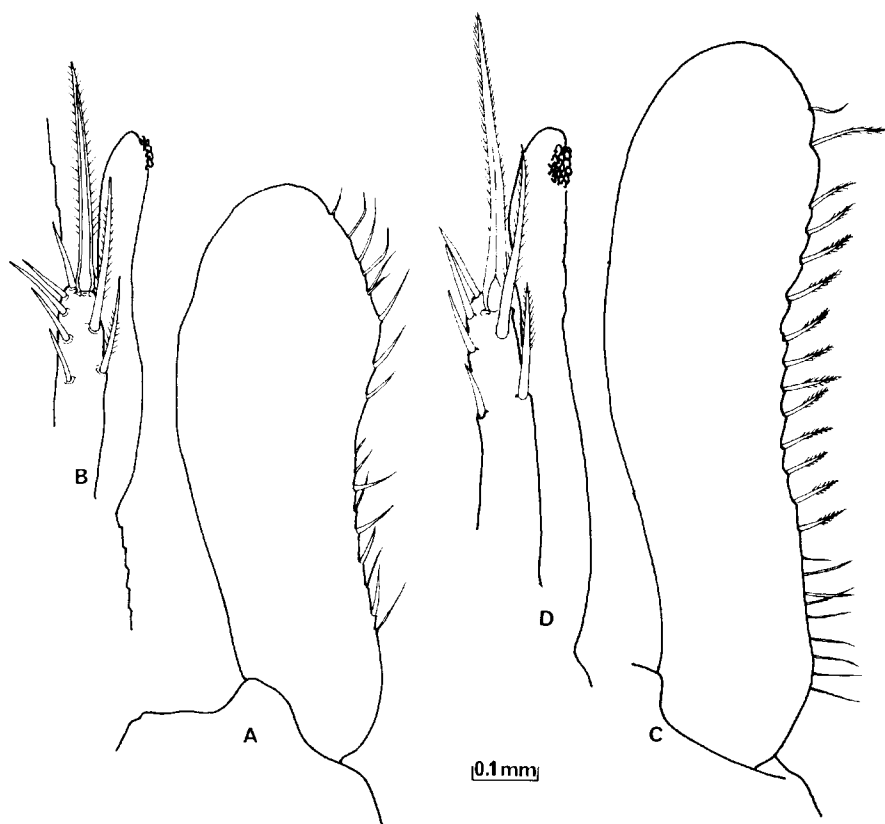


Figure 23. *Jocaste japonica* (Ortmann). Male: A, endopod of first pleopod; B, appendix interna and appendix masculina of second pleopod. *Jocaste lucina* (Nobili). Male: C, endopod of first pleopod; D, appendix masculina and appendix interna of second pleopod.

(75%). The upper margins of the orbit are broadly rounded and the dactylus of the major chela, when present, bears only a single tooth. The single exception is the male specimen #1895 which has a rostral dentition of 6/3. As it was associated with a typical ovigerous female of *J. japonica*, and has rounded supra-orbital margins and a single dactylar tooth on the major chela, it is considered also to belong to the same species.

A single small juvenile or early post-larval specimen was obtained with several adults (#1874). In this specimen the rostrum bears four dorsal and a single small distal ventral tooth. The supra-orbital margins are rounded. The antennal spine is small and distinct, but the hepatic spine is absent. The first pereopod is slender, with carpus and merus subequal and about 1.2 times the length of the palm. The fingers of the chela are slender and about half the length of the palm, with numerous short recurved setae distally. The second pereopods are already markedly unequal and dissimilar as in the adults but the fingers of the major chela are unarmed, and the carpus, merus and ischium are also unarmed. The ambulatory pereopods are robust and the propod is without any ventral spines. The dactyl is moderately compressed, with the ventral process acutely produced and provided with squames along its lower surface.

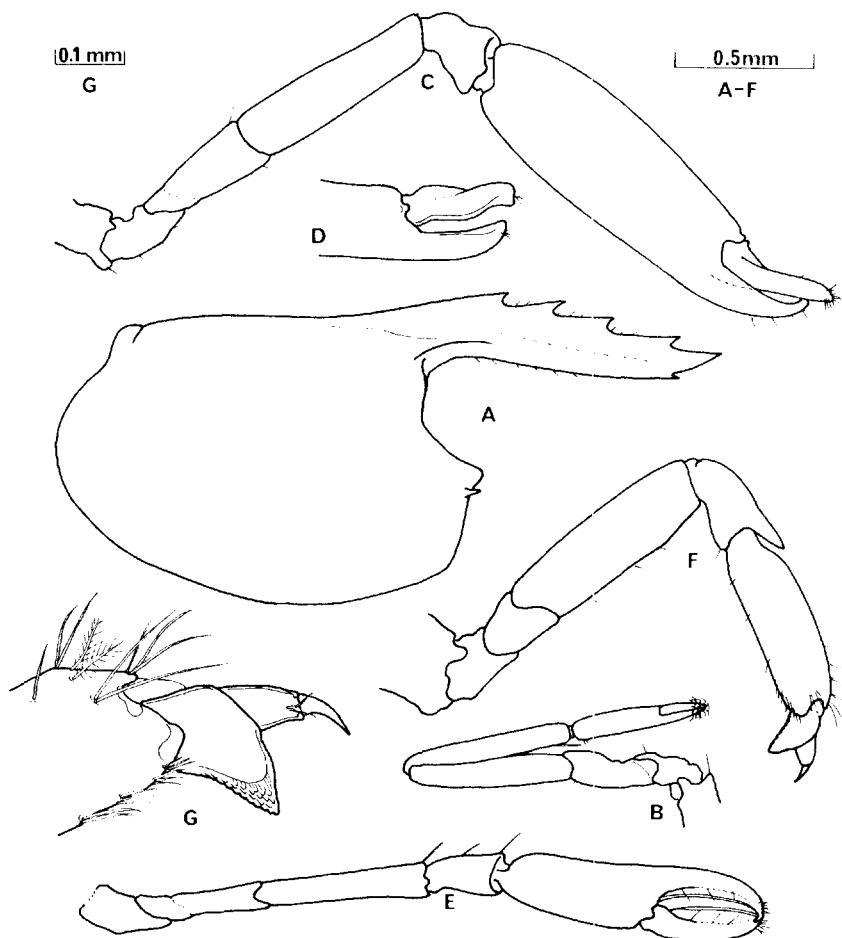


Figure 24. *Jocaste japonica* (Ortmann). Juvenile, CL 1.1 mm: A, anterior carapace and rostrum; B, first pereiopod; C, major second pereiopod; D, fingers of chela of major second pereiopod; E, minor second pereiopod; F, third pereiopod; G, dactylus of third pereiopod.

The unguis is long and slender and distinctly separated from the corpus of the dactylus.

The morphology of this small juvenile specimen reveals a very close similarity to that of *Cavicheles kempfi* Holthuis. The rostrum is very similar and the absence of the hepatic spine and the shape of the dactylus of the ambulatory pereiopod resemble closely the condition found in *C. kempfi*. The holotype of *C. kempfi* is particularly small with a total length of only 7 mm. The shape of the chelae of the second pereiopods leave no doubt that the specimens described above are referable to *Jocaste*, and that the hepatic spine is lacking in juvenile stages (vide infra, under *J. lucina*). *Cavicheles kempfi* is known from only one other occurrence in addition to the holotype, (Bruce, 1966), where two specimens were reported from the Comoro Islands. Both specimens were obtained from *Acropora* corals and one specimen was found in association with *Jocaste*.

Distribution. Type locality, Kagoshima, Japan. Previously recorded from the Seychelle Islands at Coetivy by Borradaile (1917) and Aldabra, Remire and Mahé by Bruce (1969). Widely distributed in the western Indian Ocean, but not recorded from the Arabian Sea or Red Sea, to the Marshall Islands and New Caledonia.

20. *Jocaste lucina* (Nobili) (Fig. 23 C, D)

Restricted synonymy:

Coralliocaris lamellirostris Stimpson, 1860: 38.

Coralliocaris lucina Nobili, 1901: 5; 1906: 57; Borradaile, 1917: 384; Tattersall, 1921: 390; Kemp, 1922: 276-8, fig. 102; 1925: 322.

Jocaste lucina Holthuis, 1952: 193-5, fig. 94 (partim), (full synonymy); Patton, 1966: 278-9, tabs 1-2, fig. 3a; Bruce, 1969: 299-301, fig. 2; 1972a: 404, 405, 407, 414, (key); (in press).

Material examined. Remire Is., Amirante Islands, Stn 149, # 1874, 1 juv., CL 1.4 mm; 1 ♂, CL 4.0 mm, # 1901, 1 ov. ♀, CL 3.0 mm.

Host. All specimens were obtained from colonies of *Acropora* collected from a depth of 2-3 fm, including *A. corymbosa* (Lam.), *A. variabilis* (Klunzinger) and *A. haimeii* (Milne-Edwards & Haine), the latter constituting a new host record for this species.

Remarks. As noted under *J. japonica* all specimens of *J. lucina* were readily distinguished according to the criteria given by Patton (1966). All three adult specimens present had a rostral dentition of 5/3, with distinctly angulated supra-orbital margins and two acute teeth on the dactylus of the major second pereopod. The juvenile specimen, while distinctly larger than the juvenile of *J. japonica* described above, also had two small teeth on the dactylus of the major second pereopod, with distinctly angulated supra-orbital margins and a rostral dentition of 5/2, but the carapace was without a hepatic spine, as reported in the *J. japonica* juvenile.

Distribution. Type locality, Eritrea, Red Sea. Previous records from the Seychelle Islands at Aldabra and Mahé by Bruce (1969). Also reported from a numerous localities from western Indian Ocean and Red Sea to Tahiti.

21. *Coralliocaris graminea* (Dana) (Figs 25 to 28).

Restricted synonymy:

Oedipus graminea Dana, 1852: 25; 1852a: 574; 1855: 12, pl. 37, fig. 3.

Coralliocaris graminea Stimpson, 1860: 38; Miers, 1884: 563; Borradaile, 1917: 324, 383; Kemp, 1922: 269; figs 96-97; Balss, 1925: 294; Kubo, 1940: 70, figs 33-35; Holthuis, 1952: 17, 186-9, fig. 91, (full synonymy); Patton, 1966: 277, tabs 1,2,4; Miyake & Fujino, 1968: 423, 431, fig. 7 a-c; Taylor, 1968: 186, 189; Bruce 1972a: 400-8, 414 (key).

Material examined. Remire Is., Amirante Islands, Stn 149, # 1975, 1 ♂, 2 ov. ♀, CL 3.5; 3.8, 4.1 mm. Port Victoria, Mahé, Stn 150, # 1879, 1 ♂, 2 ov. ♀, 1 ♀, 1 juv., CL 2.7, 2.5, 2.7; 1.9; 1.3 mm, # 1886, 1 ♂, 2 ov. ♀, 6 ♀, 4 juv., CL 4.3, 2.9, 3.4, 3.7; 2.0 2.3, 2.4, 2.4, 2.4, 2.6; 1.6, 1.7, 2.0 mm. Baie St. Anne, Praslin, Stn 152, # 1890, 1 ♂, 3 ov. ♀, CL 5.1, 4.8, 5.0, 5.7 mm, # 1893, 1 ♂, 6

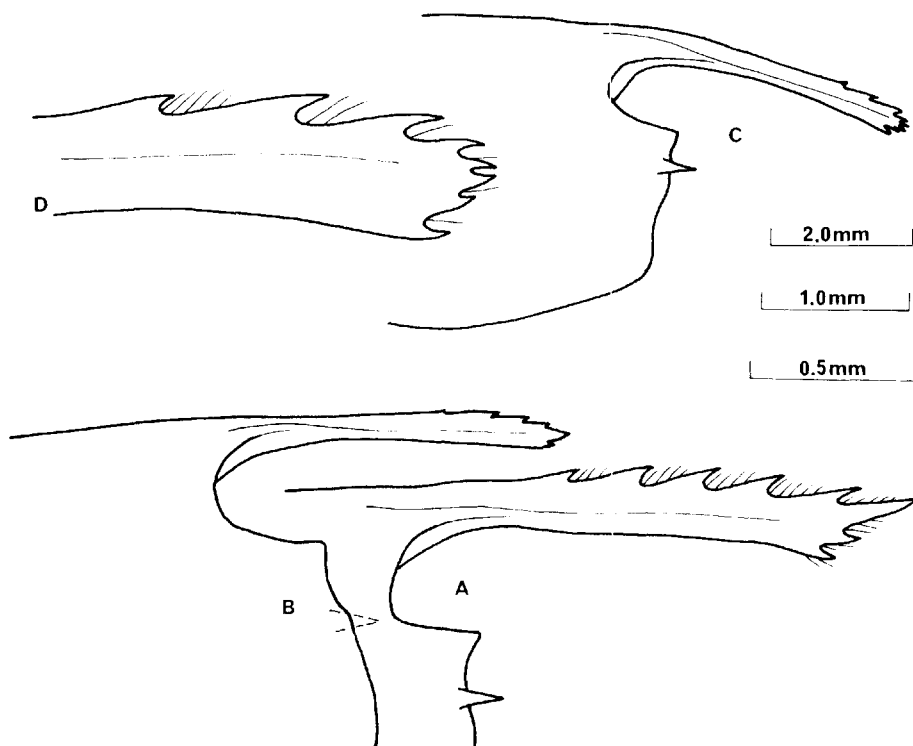


Figure 25. *Coralliocaris graminea* (Dana). Ovigerous females, variation in rostra: A, large toothed form; B, small toothed form; C, abnormal form; D, tip of abnormal rostrum.

ov. ♀, 1 juv., CL 5.1, 3.6, 4.6, 4.9, 5.0; 5.0; 1.8 mm. #1897, 2 ♂, 7 ov. ♀, 3 ♀, 2 juv., CL 4.9, 5.0; 4.0, 4.5, 4.8, 4.9, 5.0 mm, #1900, 1 ♂, 2 ov. ♀, 1 ♀, 1 juv., CL 5.0; 4.0, 4.2, 3.3; 2.1 mm. Curieuse Bay, Praslin, Stn 153, #1915, 1 ♂, 5 ov. ♀, CL 3.7; 3.3, 3.5, 3.9, 3.9, 4.6 mm, #1921, 1 ♂, 2 ♀, CL 2.3; 2.0, 2.2 mm, #1924, 3 juv. CL 0.9, 1.2, 1.8 mm.

Host. With the exception of #1921, #1924, which were obtained from *Seriatopora hystrix* (Dana), all specimens were obtained from colonies of *Acropora* collected from a depth of 2-3 fm. These include *A. corymbosa*, (Lam.), *A. digitifera*, (Dana), *A. haimeii*, (Milne Edwards & Haime), *A. nana*, (Studer), *A. squarrosa* (Ehrenberg) and *A. variabilis*, (Klunzinger). *A. digitifera* and *A. squarrosa* are new host records.

Remarks. A total of 66 specimens of *Coralliocaris graminea* were collected from ten coral colonies. The colonies of *Acropora* all contained primarily adult populations, but the six specimens collected from the colonies of *Seriatopora* were all early post-larval stages or very immature. Garth (in press) has indicated that the presence of breeding adults is one of the criteria of the association of commensals with their definitive host animal and in the present case, *Seriatopora* is considered to be only a paratenic host, in which post-larvae may settle and survive to undergo some growth but on which they are unable to mature.

Thirty-one of the sample were ovigerous females, the smallest of which had a carapace length of 2.5 mm. Taking all females above this size as adult, the population sample consists of 10 males and 35 females, i.e. a sex rate of 1:3.5.

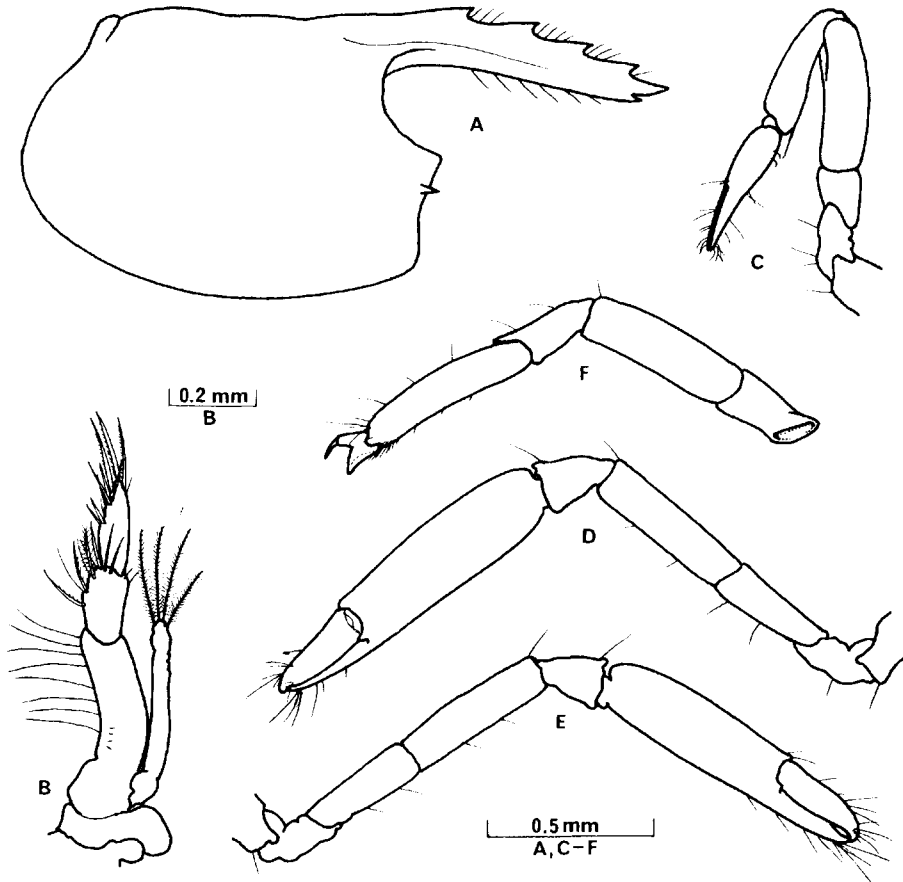


Figure 26. *Coralliocaris graminea* (Dana). Juvenile, CL 0.9 mm: A, anterior carapace and rostrum; B, third maxilliped; C, first pereiopod; D, major second pereiopod; E, minor second pereiopod; F, third pereiopod.

This rate contrasts markedly with the 1:1 ratio found in several other genera of commensal pontoniinid shrimp where usually only a single male and female are found in association. The shrimps in *Acropora* colonies do not therefore appear to consist of a number of pair units. The sex ratio varied considerably between the colonies ranging from 1:2 to 1:9, the distribution in the eight colonies, excluding the juveniles, being 1:2(2); 1:3(2); 1:4(1); 1:5(2); 1:9(1). In four of the eight colonies all the females were ovigerous and in the other colonies the percentage of ovigerous females varied from 75-66%.

In general the specimens agree closely with the descriptions and illustrations given by Kemp (1922) and Kubo (1940). The rostral dentition in the present specimens is 3-5/1-2. The distribution of the various combinations is given in the table below:

Table 4

Ventral rostral teeth	Dorsal rostral teeth		
	3	4	5
1	2(3%)	25(38%)	8(12%)
2	1(1.5%)	12(18%)	17(26%)

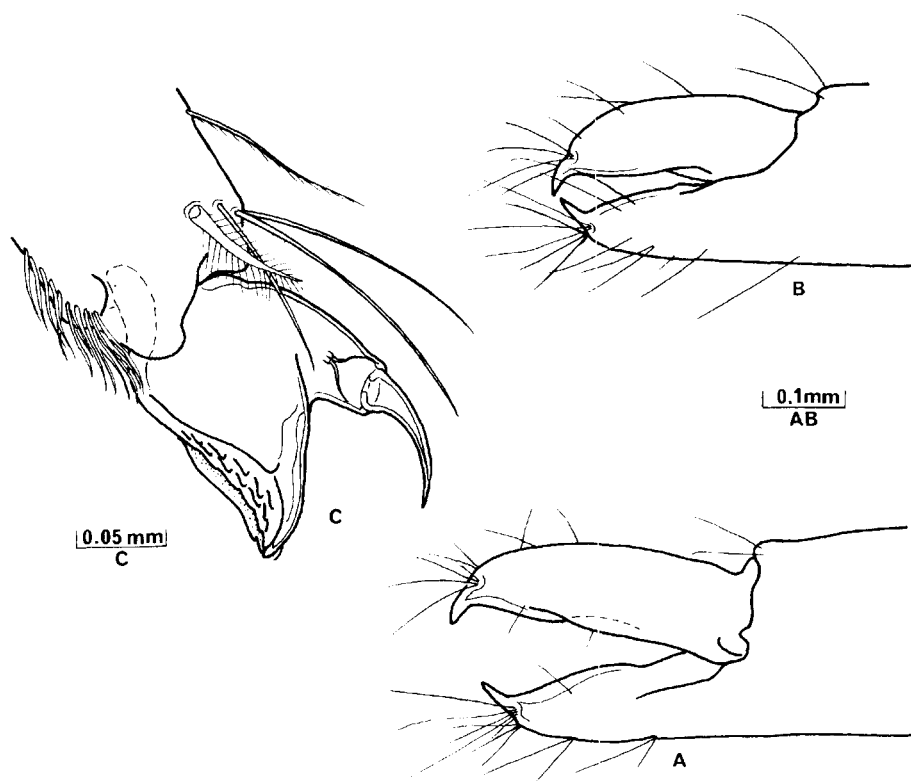


Figure 27. *Coralliocaris graminea* (Dana). Juvenile, CL 0.9 mm: A, fingers of chela of major second pereiopod; B, fingers of chela of minor second pereiopod; C, dactylus of third pereiopod.

The shape of the rostrum generally falls readily into two main types. In one (Fig. 25A), the rostral lamina is shallow, shorter, reaching only to the middle of the second segment of the antennular peduncle, with small teeth situated mainly on the distal third. In the other (Fig. 25B) the lamina is deeper, longer, reaching beyond the antennular peduncle, with larger teeth distributed over the distal two-thirds. A few juveniles of an intermediate type were also present and one with an abnormal tip (Fig. 25C, D), which has been treated as 4/2 in the above table. It has been noted that all the shrimps from one coral host tend to have the same type of rostrum. Although always basically bright green, it has also been found that two types of colour pattern exist. In one, the body chromatophores are arranged in fine longitudinal striae and in the other there are no such striae. Details of the colour patterns of these specimens are not available and cannot be correlated with the type of rostrum but it seems quite possible that these specimens may represent a closely related species-pair, similar to *Jocaste lucina* and *J. japonica* or *Harpiliopsis depressus* and *H. spinigerus*. Dana's (1855) illustrations of the type specimen show the striate colour pattern and the rostral form illustrated in Fig. 25A*. None of the specimens show any resemblance to the closely related *C. macrophthalmia* (H.

* Note added in proof: the non-striate form with slender rostrum has recently been designated as a distinct species, *C. viridis* (Bruce, 1973, *Crustaceana*, 26(2) 222-4, fig. 1).

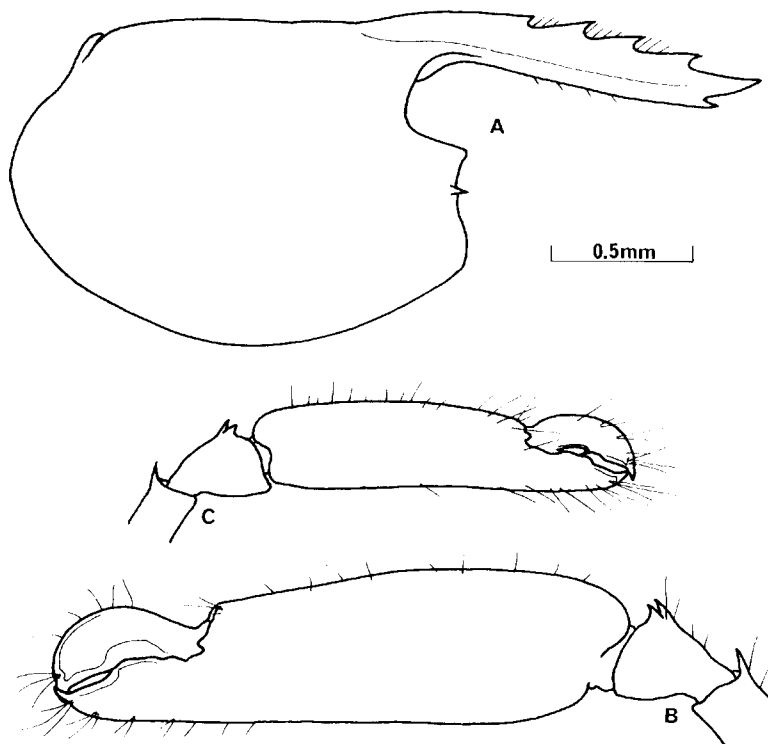


Figure 28. *Coralliocaris graminea* (Dana). Juvenile, CL 1.1 mm: A, carapace and rostrum; B, chela and carpus of major second pereiopod; C, chela and carpus of minor second pereiopod.

Milne-Edwards), with a rostral dentition of 1/0, and which was recorded from the Seychelles by Borradaile (1917) on the Saya de Malha Bank.

Several very small juveniles or early post-larval stages were included in the material collected. The smallest specimen has a carapace length of 0.9 mm. The rostrum is subequal to the carapace length, compressed, with a moderately deep lamina bearing four distinct acute dorsal teeth along its distal three-quarters, with a single small subterminal tooth ventrally. The inter-spaces between the dorsal teeth and the ventral border bear short plumose setae. The inferior orbital angle is well developed and the antennal spine is distinct. There is no hepatic spine. The third maxilliped has a small exopod, feebly developed in comparison with the adult, extending to the distal margin of the antepenultimate segment only, with four plumose terminal setae only. The segments of the endopod are of similar proportions to the adult but are much more sparsely setose and without a distinct setal "basket" on the dorsal aspect of the penultimate segment as is found in the adult (Bruce, in press, b), although a few setae are present in this situation. The epipod is similar to the adult but the arthrobranch is underdeveloped. The first pereiopod is relatively stout. The fingers of the chela are slender, sparsely setose and subequal to the palm. The carpus is subequal to the chela and slightly longer than the merus. The coxa is without a medial process. The second pereiopods are similar and slightly unequal. The larger chela is about 1.2 of the carapace length. The palm is subcylindrical, 3.3 times longer than wide. The dactylus is stout and about half

the length of the palm. The dactylus is about three times longer than deep, with an incipient fossa ventrally, and devoid of teeth. The fixed finger shows no sign of any teeth or molar process. The tips of the fingers are acute and both fingers bear numerous long simple setae. The smaller chela is generally similar, only 0.9 of the length of the larger and slightly less robust. The carpus is short and stout and unarmed, and the merus is similarly without a disto-lateral tooth and compared with the adults, rather slender, about four times longer than wide. The ambulatory pereopods are robust and the propod, about four times longer than wide, with numerous short setae disto-ventrally and devoid of spines. The dactylus bears a distinct unguulate ventral process, which is excavated ventrally with irregular protuberances, with thin laminar margins and a thickened distal tip. The main part of the carpus is slender and bears a pair of small setae laterally. The unguis is distinct from the carpus and is strongly curved, long and slender.

A slightly larger juvenile, carapace length 1.2 mm was also examined. In this specimen the rostrum was essentially similar to the smaller specimen with 4/1 dentition, but was less distinctly setose. The fingers of the chelae of the second pereopods are deeper and show the early development of the sound-producing molar process and fossa. The carpus bears two distinct teeth laterally and a well developed disto-lateral tooth is present on the merus.

In *Coralliocaris graminea* the chelae of the second pereopods are of particular interest as they are modified for sound production and are particularly large in proportion to the size of the animal. When fully developed the chelae are sub-equal in size and similar, although usually larger in males than in females. In the present collection it was found that relatively few specimens had both chelae fully developed and the incidence of regeneration in the chelae was very high. An analysis of the frequency of regeneration in the chelae was made as the specimens were almost all complete and only six showed recent autotomy of a chela.

The chelae were classified into a series of size categories:-

- , recent autotomy, probably during collection;
- 0, a very small regeneration bud, probably less than 24 hours old;
- 1, a large regeneration bud, chela morphologically distinct but non-functional;
- 2, a small functional chela;
- 3, chela about half full-size;
- 4, chela well developed, but markedly smaller than full size;
- 5, full size chela.

Out of the 66 specimens, 64 were considered to have one fully developed chela (5), and two without a fully developed chela were both small juveniles (CL 1.7, 1.6 mm) that were difficult to classify with certainty. Seven specimens showed recent autotomy, probably on collection, and are not considered. Of these 57 specimens, 17 (30%) also had the second chela fully developed. Categories 0-3 combined, showing major regenerative growth, account for 29 specimens (51%). In the adult males, 8 (80%) have both chelae fully developed but in the adult females only 9 (23%) have the chelae fully developed and the incidence of regeneration of a chela is clearly much higher in females than in males. The distribution of regenerative changes in the chelae is summarized in the following table:-

Table 5

P2 chelae	5:5	5:4	5:3	5:2	5:1	5:0	5:—	<i>n</i>
♂	8	2						(10) 10
♀ ov.	7	6	4	2	7	3	1	(29) 30
♀	2	2	6				3	(10) 13
juv.		1	5	2			3	(8) 11
<i>N</i> = 64	17	11	15	4	7	3	7	
			Major regenerative growth				Autotomy	

The number of shrimps present in a coral colony depends upon the size of the colony and also the species, as well as other factors (Bruce, 1972). Many of the largest colonies of *Acropora* do not have any associated *Coralliocaris* but in suitable species, the shrimp population is probably largely related to the size of the colony. The population from the present samples of *Acropora* ranged from 3 to 14 specimens, with an average number of 6.25 specimens per colony. The sex ratio varied with the size of the colony, the relative number of males to females decreasing as the size of the population unit increases. Thus in the small populations of 3-5 specimens the sex ratio is from 1:2 to 1:4 but in the larger populations, from 6-13 adults or subadults, the ratio is from 1:5 to 1:9 males to females. In addition to the change in sex ratio with the increase in size of the population unit, the incidence of major regeneration in the chelae of the second pereopods shows similar changes, being lowest in the small population units and higher in the larger units, as summarized in Table 6.

Table 6

Number of populations	3	2	2	1	1	1
Population size	3	4	5	6	10	13
Major regeneration incidence (Categories 5:0-5:3)	23%	50%	60%	30%	60%	77%

The increased incidence of the loss of chelae in the larger populations suggests that this may be due to intra-specific encounters, particularly between the females, as most of the males retain still fully developed chelae.

Distribution. Type locality, Rewa, Viti Levu, Fiji. This species has been recorded on several occasions from the Seychelles. The first report was by Miers (1884), confirmed by Kemp (1922). Borradaile (1917) reported its presence in Coetivy and Balss (1925), Taylor (1968) and Bruce (1972) on Mahé. The species is well known from the Red Sea to the Mozambique Channel, to Samoa, Johnson, Palmyra and Wake Islands in the Central Pacific Ocean.

22. *Coralliocaris superba* (Dana)

Restricted synonymy:

Oedipus superbus Dana, 1852: 25; 1852a: 573; 1855: 12, pl. 37 fig. 2.

Coralliocaris superba Stimpson, 1860: 38; Borradaile, 1917: 390; Kemp, 1922:

272-4, figs 98-99; Kubo, 1940: 67-70, figs 30-32; Holthuis, 1952: 17, 190, 191, fig. 92, (full synonymy); Patton, 1966: 77, 288, figs 1,2,4; Miyake & Fujino, 1968: 424-5, 431, fig. 7 b-d; Bruce, 1972a: 400, 401-2, 405-8, 414 (key); (in press, a).

Material examined. Baie St. Anne, Praslin, Stn 152, # 1889, 1 ♂, CL 2.0 mm, # 1892, 1 ov. ♀, CL 3.8 mm.

Host. Both specimens were obtained from colonies of *Acropora* collected from 2-3 fm depth. # 1889 was from *A. variabilis* (Klunzinger) and # 1892 from *A. convexa* (Dana), both representing new host records.

Remarks. The male has a rostral dentition of 5/2 and the female of 4/1. It is probable that both were originally paired and that the partners were lost in the course of collection. The specimens agree closely with the previously published descriptions (Kemp, 1922; Kubo, 1940) and with the coloured illustrations of Dana (1855).

Both second pereopods are present in the male, and are lacking, freshly autotomized, in the female, which carries ova at an early stage of development.

Distribution. Type locality, Tongatabu, Tonga Islands. This species has not been previously recorded from the Seychelle Islands, but has been reported from numerous localities in the Red Sea, the Andaman and Nicobar Islands; Indonesia; Bonin Islands; Great Barrier Reef, Australia; Palau, Marshall Islands, Samoa, Tahiti and the Society Islands.

23. *Coralliocaris venusta* Kemp

Coralliocaris venusta Kemp, 1922: 274-6, figs 100-101; Ramadan, 1936: 23; Armstrong, 1941: 13; Holthuis, 1952: 17, 191-2, fig. 93; Patton, 1966: 277-8, tab. 1; Bruce, 1972a: 405-6, 414 (key).

Material examined. Remire Island, Amirante Islands, Stn 149, 1973, 1 ♀, CL 2.17 mm.

Host. Obtained from a colony of *Acropora convexa* (Dana) collected from a depth of 2-3 fm.

Remarks. The single specimen has a slender rostrum extending to the middle of the second segment of the antennular peduncle. There are no dorsal rostral teeth, and a single subterminal ventral tooth only is present. Both second pereopods are typical. The association with *A. convexa* has been previously reported (Bruce, 1972a).

Distribution. Type locality, Tholayram Paar, Gulf of Manaar. Not previously recorded from the Seychelle Islands. Also reported from Ghardaqa, Red Sea; Indonesia, Samoa and the Great Barrier Reef.

24. *Periclimenaeus manihinei* sp. nov. (Figs 29 and 30)

Material examined. Baie St. Anne, Praslin, Stn 152, 1973, 1 ov. ♀, CL 2.0 mm.

Description. A small species with an elongated subcylindrical body form.

The carapace bears a well developed rostrum, with a slender lamina that extends anteriorly slightly beyond the proximal segment of the antennular peduncle. The dorsal margin is feebly convex and bears six slender acute teeth, of which the second is the largest, and the first stands well in advance of the

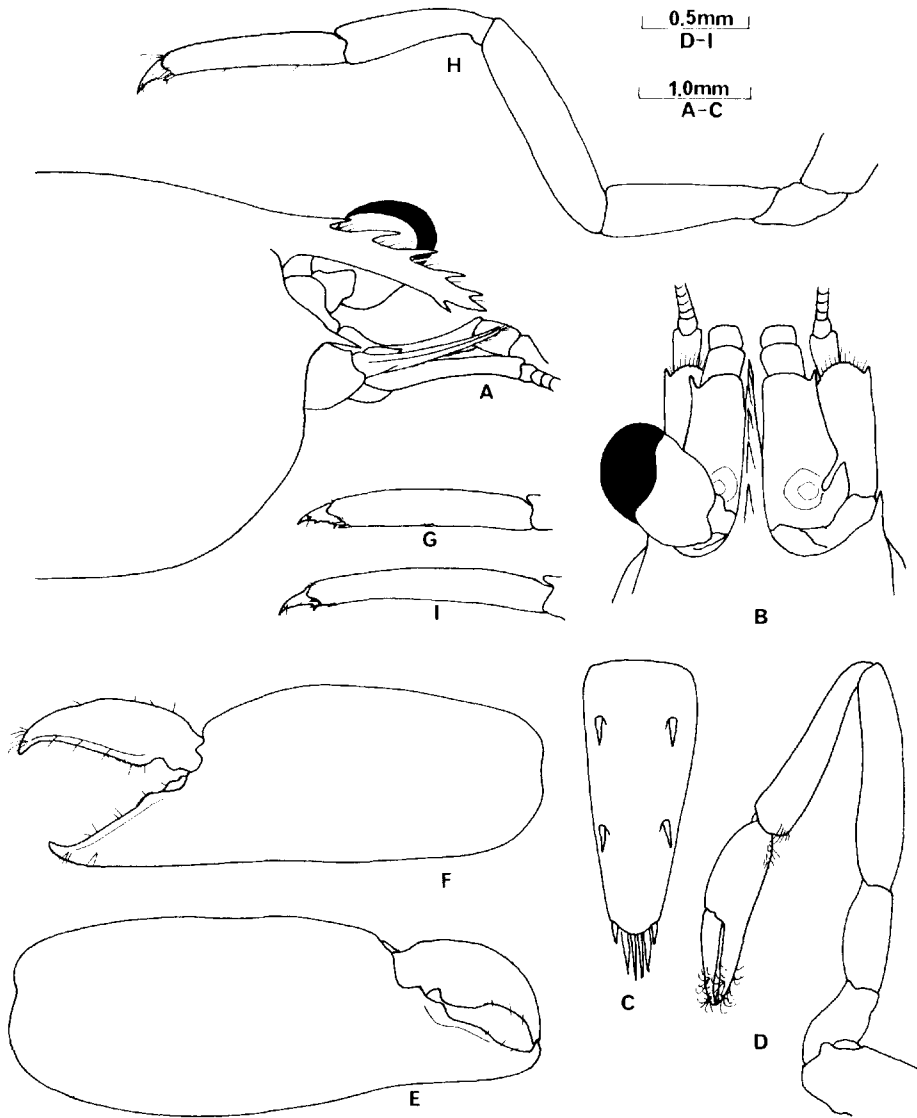


Figure 29. *Periclimenaeus manihinei* sp. nov. Ovigerous female, holotype. anterior carapace and appendages: A, lateral view; B, dorsal view; C, telson; D, first pereiopod. Second pereiopods: E, major chela, F, minor chela. G, Propod and dactylus of third pereiopod. H, Fourth pereiopod. I, Propod and dactylus of fifth pereiopod.

orbital notch. The tip is acute. The ventral margin is feebly concave with a single slender acute tooth situated beneath the interspace between fourth and fifth dorsal teeth. The rostrum is slightly depressed. Supra-ocular and supra-orbital spines or tubercles are lacking. The orbit is poorly developed but the antennal spine is large and acute. The inferior orbital angle is obsolete. The antero-lateral angle of the carapace is broadly rounded and not projecting anteriorly.

The abdomen presents no special features. The pleura are all broadly rounded. The sixth segment is about twice as long as deep in lateral view, with

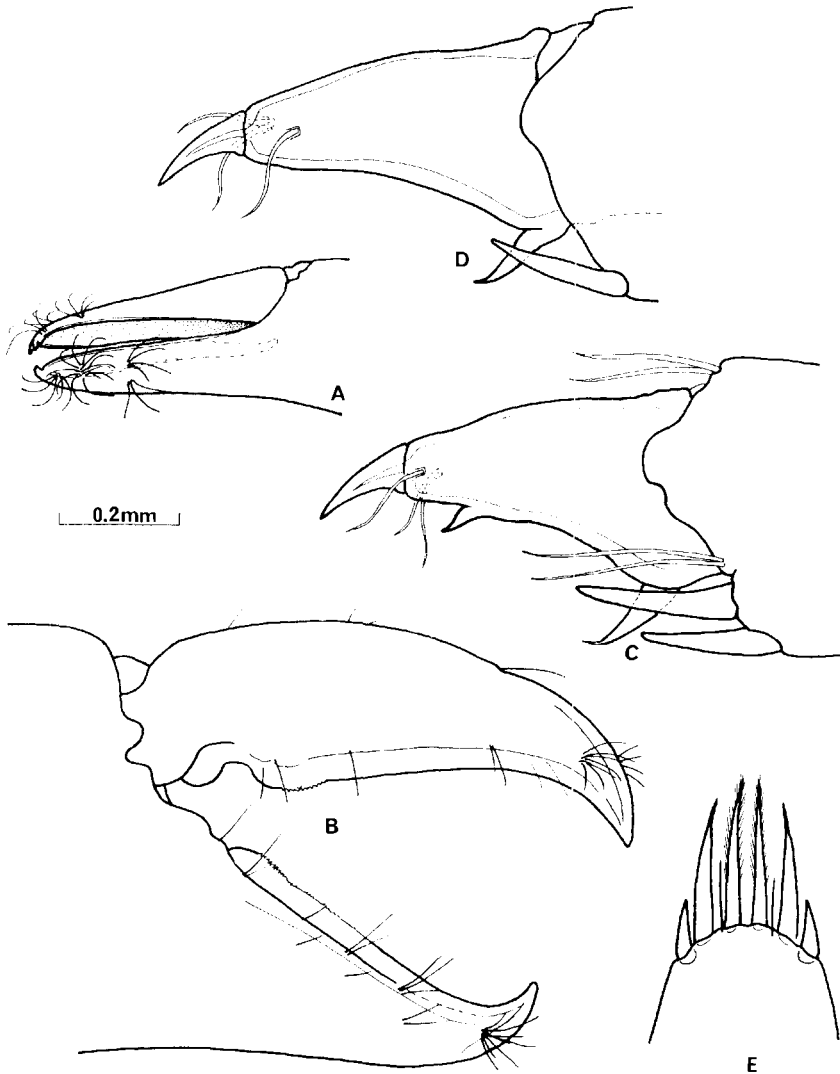


Figure 30. *Periclimenaeus manihinei* sp. nov. Ovigerous female, holotype: A, fingers of first pereiopod; B, fingers of minor second pereiopod; C, dactylus and distal end of propod of third pereiopod; D, dactylus and distal end of propod of fifth pereiopod, setae omitted.

the posterior ventral angle broadly acute and the postero-lateral angle narrowly acute. The telson is moderately narrow, about 2.4 times longer than the greatest width, and with the straight sides converging posteriorly to a rounded posterior border. Two pairs of medium sized, subequal dorsal spines are present, situated at about 0.2 and 0.6 of the telson length. The posterior border bears three pairs of spines. The lateral spines are short and stout, about three times longer than wide, and a little less than half the length of the intermediate and submedian spines. The intermediate spines are robust for the proximal two-thirds with a slender distal portion. The submedian spines are more slender and taper gradually throughout their length, the distal two-thirds being finely setulose.

The antennae are normal. The proximal segment of the antennular peduncle has a short leaf-like stylocerite, and the lateral margin feebly concave and ending in a small acute tooth. The basicerite of the antenna is unarmed and the scaphocerite is small, with the lamina extending to the level of the distal end of the proximal segment of the antennular peduncle. The lateral border is straight with a small disto-lateral tooth that does not extend beyond the lamina, which is broadly rounded distally. The carpopocerite is long and slender and extends well beyond the scaphocerite.

The eye is normally developed with a short, broad peduncle, and an oblique hemispherical cornea. No accessory pigment spot is discernible.

The mouthparts have not been examined.

The first pereopods are neither particularly stout nor slender. The palm of the chela is subcylindrical, about twice as long as deep and also subequal to the length of the fingers. The fingers are slender and tapering, with distinct medial and lateral entire cutting edges. The fixed finger has a small hooked tip distally and the dactylus bears two small acute teeth. Numerous groups of short, coarsely setulose setae are present on the fingers. The carpus is slightly longer than the chela and twice as wide distally as proximally. The merus is a little longer than the carpus and tapers feebly distally. The ischium and basis are subequal in length, about half the length of the carpus. The coxa is without a median process.

The second pereopods are small, subequal and dissimilar. In the major second pereopod the palm of the chela is without tubercles or spines and is twice as long as wide, distinctly compressed and of approximately uniform width. The dactylus is about 0.2 of the palm length, with a strongly convex outer border and a slender pointed tip. The cutting edge bears a small feebly demarcated molar process proximally and is strongly concave distally. The fixed finger projects slightly beyond the dactylus and has a shorter, more strongly hooked tip. The cutting edge is sinuous, with a small fossa proximally. The chela of the minor second pereopod is slightly shorter than the major chela but the palm is only 0.9 of the length of the palm of the larger chela and is more slender, particularly proximally, and is more strongly compressed. The dactylus is longer and more slender than that of the major chela, almost 1.2 times as long, with a less strongly convex outer margin. The cutting edge has a low rounded tooth proximally, bearing a row of minute denticles, with an entire concave edge over the distal three-fourths. The fixed finger has a stout hooked tip. The cutting edge bears a low rounded denticulate tooth proximally, similar to and opposite to that of the dactylus. The distal portion of the cutting edge is entire and almost straight. The carpus, merus and ischium show no special features and are without spines and tubercles.

The ambulatory pereopods are relatively slender and the third pereopod extends beyond the carpopocerite by about half the length of the carpus. The dactylus is about twice as long as its width across the base, feebly curved and tapering to a short acute unguis. The ventral border bears a short slender acute accessory spine at about two-thirds of its length, well in advance of the base of the unguis. At the extreme proximal end of the ventral border a large slender acute spine is present. The propod is about five times longer than its greatest width, and about 4.2 times longer than the dactylus. The disto-ventral extremity is armed with stout medial, ventral and lateral spines, and single

smaller spine is present at the middle of the ventral border. The carpus is 0.8 of the length of the propod and is unarmed. The merus is nearly 1.3 times the length of the propod and is without spines or tubercles. The ischium is almost 0.8 of the length of the merus. The basis and coxa present no special features. The fourth and fifth pereopods are generally similar to the third except that the dactyls are without any traces of accessory spines. The propod of the fourth pereopod is slightly shorter and more slender than the third, and the fifth is distinctly longer and slimmer, about 1.2 times longer and 7.2 times longer than wide. The disto-ventral end of the fourth propod is similar to the third, but that of the fifth bears only the disto-ventral spine. The ventral spine half way along the ventral border is lacking in both fourth and fifth pereopods.

The uropods are normal. The protopodite is rounded disto-laterally. The lateral border of the exopod is feebly convex and unarmed, with an acute triangular tooth distally and a stout spine medially. Both endopod and exopod are broad and the endopod extends posteriorly well beyond the exopod.

The ova are numerous and rather large, in advanced stage of development, about 0.7 mm in length.

Type. The single specimen is designated as the holotype, registration number 1976:69.

Host. Unknown. The specimen was found free among coral debris.

Colouration. Transparent, feebly spotted with white on body.

Systematic position. *Periclimenaeus manihinei* is considered to be most closely related to *P. tridentatus* (Miers) and *P. nobilii* Bruce as both these species are provided with an acute spine at the base of the dactyls of the ambulatory pereopods (Bruce, in press, c). In *P. tridentatus* the dactyl is very short and stout and the distal accessory spine appears to be situated at the base of the unguis. In *P. nobilii*, the distal accessory spine is acute, but short and stout, not long and slender, as in *P. manihinei*.

In addition to the differences in the dactyls of the ambulatory pereopods, *P. nobilii* and *P. tridentatus* have the dactyl of the minor second pereopods with a well developed row of small teeth along the cutting edge, particularly well marked distally. In *P. manihinei*, the distal part of the cutting edge is devoid of teeth, but a low rounded tooth with numerous small denticles is present proximally, a feature that has not so far been reported in any other species of this genus.

Both *P. tridentatus* and *P. nobilii* have rostra that are without ventral teeth and have only three or two dorsal teeth respectively.

Remarks. The single specimen, although complete, is in poor condition and is rather macerated, as a result of its death during an attempt to hatch the ova. All parts of morphological interest, with the exception of the mouthparts, could be adequately examined.

Although its host was not noted in the field, it is considered most likely that it would be a colonial tunicate. The closely related *P. hecate* (Nobili) is known to live in association with *Diplosoma* sp.

The fingers of the first pereopods are unusual and appear distinct from those of all *Periclimenaeus* spp. so far described. The inner and the outer cutting edges, separated by distinct trough, on both fixed finger and dactylus, form a slenderly spatulate chela.

The hosts of the coral-associated species collected are here summarized in the following table. New host records are indicated by an open circle.

Table 7

Shrimps	Coral hosts																				
	<i>Pocillopora danicornis</i> (Linn.)	<i>Pocillopora verrucosa</i> (Ellis & Solander)	<i>Stylophora palmata</i> (Blainville)	<i>Stylophora pistillata</i> (Esper)	<i>Seriatopora hystrix</i> (Dana)	<i>Acropora abrotanoides</i> (Lam.)	<i>Acropora assimilis</i> (Brook)	<i>Acropora convexa</i> (Dana)	<i>Acropora corymbosa</i> (Lam.)	<i>Acropora digitifera</i> (Dana)	<i>Acropora disticha</i> (Brook)	<i>Acropora haimi</i> M-Edw. & Haime	<i>Acropora massawensis</i> von Marenzeller	<i>Acropora nana</i> (Studer)	<i>Acropora squarrosa</i> (Ehrenberg)	<i>Acropora tubicinaria</i> (Dana)	<i>Acropora valida</i> (Dana)	<i>Acropora variabilis</i> (Klunzinger)	<i>Porites nigrescens</i> Dana	<i>Pavona</i> sp.	<i>Galaxea fascicularis</i> Linn.
1 <i>Palaemonella rotumana</i>	-	-	-	▲	▲	-	-	-	-	-	-	-	-	-	-	▲	-	▲	▲	-	-
2 <i>Vir orientalis</i>	-	0	-	-	▲	-	-	-	-	-	-	-	-	-	-	-	-	▲	-	▲	-
3 <i>Periclimenes spiniferus</i>	▲	-	-	-	▲	-	-	-	-	-	-	-	-	-	▲	-	-	▲	-	▲	-
4 <i>Periclimenes lutescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
5 <i>Periclimenes diversipes</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	▲	-
6 <i>Periclimenes mahei</i>	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
7 <i>Periclimenes difficilis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
8 <i>Philarius gerlachei</i>	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
9 <i>Ischnopontonia lophos</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	▲
10 <i>Paratypton siebenrocki</i>	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-
11 <i>Harpiliopsis beaupresii</i>	▲	▲	0	▲	▲	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 <i>Harpiliopsis depressus</i>	▲	▲	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13 <i>Harpiliopsis spinigerus</i>	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14 <i>Jocaste japonica</i>	-	-	-	-	-	0	0	-	0	▲	0	▲	0	▲	-	-	0	▲	-	-	-
15 <i>Jocaste lucina</i>	-	-	-	-	-	-	-	-	▲	-	-	0	-	-	-	-	-	▲	-	-	-
16 <i>Coralliocaris graminea</i>	-	-	-	-	0	-	-	-	▲	0	-	▲	-	▲	0	-	-	▲	-	-	-
17 <i>Coralliocaris superba</i>	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0	-	-	-
18 <i>Coralliocaris venusta</i>	-	-	-	-	-	-	-	▲	-	-	-	-	-	-	-	-	-	-	-	-	-

SYNOPSIS OF THE PONTONIINID SHRIMP FAUNA
OF THE SEYCHELLE ISLANDS

The first pontoniinid shrimp reported from the Seychelle Islands was *Platyponetia brevirostris*, recorded by Miers in 1884. Although recently found for the second time in the Seychelles, it has not yet been found to occur anywhere else. Borradaile (1917), reporting upon the shrimps obtained by Professor Stanley Gardiner's two expeditions to the western Indian Ocean, recorded thirteen further species, mainly from the Island of Coetivy. These do not include *P. frater* Borradaile (as *P. soror* Nobili) or *Anchistus miersi* (De Man) which he reported from Egmont, Seychelles, as Egmont is situated in the

Six Isles in the Chagos Archipelago and not in the Seychelle Islands. Kemp (1922) reported upon a few further specimens in the Alluud Collection in the Museum National d'Histoire Naturelle, Paris, and Balss, in 1925, added a further record from the Valdivia Expedition. The Yale-Seychelles Expedition in 1957-58, added two more species to the Seychelle Islands fauna (Bruce, 1973). The International Indian Ocean Expedition, 1964, provided further material which was reported upon by Bruce (1971). Recently the voyages of the F.R.V. *Manihine* have provided numerous new records from the island of Farquhar (Bruce, in press, a) and the material studied in the present report. Several short reports on individual species have also been published.

The following systematic list outlines the occurrences of the pontoniid shrimps so far reported from the Seychelle Islands. Fifty species are recorded, of which one is still of dubious taxonomic status. Of these, six species are known only from the Seychelle Islands and have yet to be found elsewhere. The incidence of commensalism is high and 36 (74%) species are known to have commensal associations with other marine invertebrates. Undoubtedly many more species remain to be found in the Seychelles, as many common Indo-West Pacific species, such as *Anchistus custos* (Forsskål) and *Platycaris latirostris* Holthuis have not yet been recorded, although it is highly probable that they are present.

Seychelle Islands Pontoniinae check-list

1. *Palaemonella tenuipes* Dana, 1852

This species has been reported twice from Farquhar Island, where a few specimens were found on the outer reef flat at low water, and in the central lagoon at shallow water (Bruce, 1970, 1971, in press.)

2. *Palaemonella rotumana* (Borradaile, 1898)

First recorded from Mahé by Kemp (1922), this species has since been reported from Anse Royale and Cerf Is. by Bruce (1971) and Anse Étoile, Mahé (Bruce, 1972) and is here reported from Port Victoria, Mahé and Praslin.

3. *Palaemonella* sp. aff. *rotumana* (Bruce, in press)

A single specimen of uncertain systematic position was reported by Bruce (in press, a) from Farquhar Island, and may represent an undescribed species.

4. *Vir orientalis* (Dana, 1852)

Here recorded for the first time from the Seychelles Islands, from Baie St. Anne, Praslin. Generally found in association with pocilloporid corals in shallow water.

5. *Eupontonia noctalbata* Bruce, 1971

This species is known at present only from the holotype collected from Anse Etoile, Mahé (Bruce, 1971). It appears to be a free-living inhabitant of the intertidal muddy flats.

6. *Periclimenes lutescens* auctorum

Now recorded for the first time from the Seychelle Islands. An associate of corals of the genus *Acropora*, mainly in shallow water.

7. *Periclimenes ensifrons* (Dana, 1952)

Two specimens, 1 ♂, 1 ovigerous ♀, reported from Aldabra, from small pools in coral reef flats (Bruce, 1971.)

8. *Periclimenes grandis* (Stimpson, 1860)

This species has been found at Resource Is., in the Amirante group, where three ovigerous females and five juveniles were collected from shallow reef pools (Bruce, 1971). It has been collected from Beau Vallon on Mahé (Bruce, 1973a).

9. *Periclimenes tenuipes* Borradaile, 1898

Recorded from the Seychelle Islands by Kemp (1922), who reported on two specimens from Mahé, now in the collection of the Muséum National d'Histoire Naturelle, Paris.

10. *Periclimenes vitiensis* Borradaile, 1898

Borradaile (1917) reported the occurrence of this species on Coetivy Is. There have been no subsequent records of this species. The holotype of this species is in the collection of the Zoology Museum, Cambridge, and appears only doubtfully separable from *P. grandis* (Stimpson).

11. *Periclimenes brevicarpalis* (Schenkel, 1902)

This species has been reported from two localities on Mahé; Cerf Is., and between Rat and South East Is., and also from Cosmoledo (Bruce, 1971, 1973a).

12. *Periclimenes spiniferus* De Man, 1902

First recorded in the Seychelle Islands from Coetivy Is. by Borradaile (1917). This species has since been reported from Mahé by Balss (1925) and from Anse Royale and Cerf Island (Bruce, 1971) and Anse Etoile (Bruce, 1972a). It has also been reported from Aldabra (Bruce, 1971).

13. *Periclimenes soror* Nobili, 1904

This species has been recorded on Aldabra (Bruce, 1971) and Anse la Mouche and Cerf Island, Mahé (Bruce, 1971, 1973a), in association with the asteroids *Protoreaster lincki* (Blainville) and *Protoreaster nodusus* (L).

14. *Periclimenes longirostris* (Borradaile, 1915)

Reported from the Isle of Farquhar (Bruce, in press, a), a single ovigerous female was dredged from 8 fm.

15. *Periclimenes ceratophthalmus* (Borradaile, 1915)

Five specimens were obtained from the crinoid *Stephanometra spicata* Carpenter from the central lagoon of Farquhar Island (Bruce, in press, a).

16. *Periclimentes compressus* (Borradaile, 1915)

This species was reported from Saya de Malha by Borradaile (1915), from a depth of 145 fm. It is known only from the holotype specimen.

17. *Periclimentes seychellensis* (Borradaile, 1915)

First discovered in Praslin by Borradaile (1915), but subsequently reported from Port Victoria, Mahé by (Bruce 1971). This species is a common inhabitant of *Sargassum* or *Cymodocea* beds, where specimens were also found on Farquhar Island (Bruce, 1973).

18. *Periclimentes diversipes* (Kemp, 1922)

Here recorded for the first time from the Seychelle Islands. This species is a common associate of a wide variety of shallow water corals.

19. *Periclimentes inornatus* (Kemp, 1922)

Recorded in the Seychelle Islands only from Cerf Island, Mahé, (Bruce, 1971) where specimens were found in association with the anemone *Radianthus ritteri* Kwietnowski.

20. *Periclimentes tosaensis* (Kobo, 1951)

Now recorded for the first time from the Seychelle Islands and the Indian Ocean. The host of this species is unknown, but is probably a coelenterate.

21. *Periclimentes imperator* (Bruce, 1967)

Reported once only from Anse la Mouche, Mahé (Bruce, 1973) where a single specimen was collected. The usual host for this species is the nudibranch *Hexabranchnus marginatus* Quoy & Gaimard.

22. *Periclimentes zanzibaricus* (Bruce, 1967)

Reported from Port Victoria and Anse Royale, Mahé, in association with echinoids *Diadema setosum* (Leske) and *Astropyga radiata* (Leske) (Bruce, 1971).

23. *Periclimentes mahei* (Bruce, 1969)

First described from specimens collected from North West Bay, Mahé (Bruce, 1969). An associate of colonies of *Seriatopora* (Bruce, 1971).

24. *Periclimentes hirsutus* (Bruce, 1971)

Here reported from the Seychelle Islands and the Indian Ocean for the first time. Found in association with echinoid *Astropyga radiata* (Leske).

25. *Periclimentes difficilis* sp. nov.

A new species described here from Praslin, in association with the coral *Porites*.

26. *Periclimentenaeus fimbriatus* (Borradaile, 1915)

Recorded by Borradaile (1915) from Providence Island. No further occurrences in the Seychelle Islands have been reported. Probably an associate of sponges, from a depth of 39-50 fm.

27. *Periclimenes*^{de Meis} ~~es~~ *robustus* (Borradaile, 1915)

Known only from Borradaile's (1915) original records from two stations in the Amirante Islands, collected at depths of 29 and 39 fm. Also probably an associate of sponges.

28. *Periclimenaeus manihinei* nov. sp.

A new species described here from Praslin.

29. *Onyccaris seychellensis* (Bruce, 1971)

Known only from the type specimens collected from a shallow water sponge, *Adocia cinerea* (Grant). There have been no subsequent reports of this species. Found at Anse Étoile, Mahé.

30. *Anchistus miersi* (De Man, 1888)

Here recorded for the first time from the Seychelle Islands.

31. *Anchistus demani* Kemp, 1922.

A single male was reported in *Tridacna maxima* (Röding) in the central lagoon of Farquhar Island by Bruce, 1973.

32. *Platypontonia brevirostris* (Miers, 1884)

This species is known only from the Seychelle Islands where it has been twice found, from an unidentified locality (Miers, 1884; Bruce, 1968) and from Farquhar Island, (Bruce, 1973), where a pair were in association with the ostreid bivalve *Lopha cristagalli* (L).

33. *Conchodytes tridacnae* Peters, 1852.

Recorded only from Bird Island, where it was collected from *Tridacna* sp. (Bruce, 1973).

34. *Conchodytes melaegrinae* Peters, 1852

First reported from Farquhar Island by Borradaile (1917), its presence has since been confirmed in association with *Meleagrina margaritifera*, and it has also been found at Anse la Mouche, Mahé (Bruce, 1973).

35. *Philarius gerlachei* (Nobili, 1905)

Here recorded for the first time from the Seychelle Islands. Generally an associate of the coral genus *Acropora*.

36. *Ischnopontonia lophos* (Barnard, 1962)

Previously reported from Aldabra, Farquhar Island, and Port Victoria, Mahé, always in association with the coral *Galaxea fascicularis* (L).

37. *Fennera chacei* Holthuis, 1951

So far only reported from *Pocillopora* collected from the central lagoon of Farquhar Island (Bruce, in press, a).

38. *Metapontonia fungiicola* Bruce, 1967

Reported only from the central lagoon of Farquhar Island, in association with the faviid coral *Goniastrea pectinata* (Ehrenberg) (Bruce, in press, a).

39. *Paratypton siebenrocki* Balss, 1914

Found on cysts in coral *Acropora variabilis* (Klunzinger) in the central lagoon of Farquhar Island (Bruce, in press, a) and now recorded from the Amirante group, in association with a different host, *A. massawensis* von Marenzeller.

40. *Harpiliopsis beaupresii* (Audouin, 1825)

First reported from Mahé by Kemp (1922) and subsequently from the Island of Farquhar, in association with the coral *Stylophora palmata* (Blainville) by Bruce (in press, a). Also reported from Anse Etoile, Mahé, on *Stylophora erythraea* von Marenzeller (Bruce, 1972a).

41. *Harpiliopsis depressus* (Stimpson, 1860)

Recorded by Borradaile (1917) from Coetivy Island, but the specimens need re-examination to confirm that they do not belong to the next species which was considered by Borradaile to be synonymous. As *H. depressus* is a common widespread species in the Indian Ocean, although not otherwise reported from the Seychelles, the record is probably correct. Known also from Anse Étoile, Mahé, also on *Stylophora erythraea* von Marenzeller (Bruce, 1972a).

42. *Harpiliopsis spinigerus* (Ortmann, 1890)

Reported from Farquhar Island by Bruce (1973) as *Harpiliopsis* sp., from 8 fm on the outer reef and from the central lagoon. Also now reported from Remire, Praslin and Astove Islands.

43. *Jocaste japonica* (Ortmann, 1890)

Reported by Borradaile (1917) from Coetivy Island and 26 fm on the Saya de Malha Bank. Later reported from Remire Is., Amirante Islands and from Mahé (Bruce, 1969).

44. *Jocaste lucina* (Nobili, 1901)

Reported from Aldabra and Mahé, Seychelle Islands by Bruce (1969) and subsequently from Farquhar Island (Bruce, in press, a).

45. *Coralliocaris macrophthalma* (H. Milne-Edwards, 1837)

A single specimen reported from Saya de Malha by Borradaile (1917), also illustrated by Bruce (1972a). Otherwise known only from the Red Sea.

46. *Coralliocaris graminea* (Dana, 18522)

First reported by Borradaile (1917) from Coetivy Island and later from Mahé by Kemp (1922) and Balss (1925). More recently reported from Mahé by Taylor (1968) and from Anse Étoile and North West Bay, Mahé, (Bruce, 1972a). Associated with corals of the genus *Acropora*. Probably common on all reefs. (See footnote p. 134.)

47. *Coralliocaris superba* (Dana, 1852)

So far reported from Farquhar Island (Bruce, in press) in association with

Acropora humilis (Dana). Probably common on all reefs, on corals of the genus *Acropora*.

48. *Coralliocaris nudirostris* (Heller, 1861)

Reported by Borradaile (1917) from Coetivy Island. There have been no subsequent reports of the species from the Seychelle Islands.

49. *Coralliocaris venusta* Kemp, 1922

First recorded in the Seychelle Islands in this report.

50. *Propontonia pellucida* Bruce

Originally reported from Remire Island in the Amirante group, there have been no subsequent reports of this species, which is an associate of alcyonarians of the genus *Sarcophyton*.

The zoogeographical distribution of the Seychelles Pontoniinae

The distribution of many Indo-West Pacific pontoniinid shrimps is so poorly known that as yet no definite conclusions can be drawn concerning the Seychelles fauna, especially as it is certain that many more species still remain to be found. Of the 56 species so far recorded, nine have not been found outside the Seychelles region. Although some of these are recently discovered species that will probably be found elsewhere, some species such as *Platypontonia brevirostris* have been known for a long time and have not been collected from other localities. The apparent rarity of many of the species of pontoniinid shrimp is often artificial, due to their cryptic commensal habits. Once the host animals are known, many of these "rare" species can be found in considerable numbers. This factor is illustrated by the presence of *Periclemenes hirsutus* in association with the echinoid *Astropyga radiata*. Previously known only from the Fijian Islands, it is likely that this species can now be found at many localities within the range of distribution of the host. Although its host has not yet been identified, it is probable that the distribution of *Periclemenes tosaensis* is similarly widespread, at least from Japan and the South China Sea to the Indian Ocean.

Of the 12 species added to the Seychelles fauna in this report, two are new species and the other ten are common species of widespread occurrence, with the exception of *Periclemenes diversipes*, which has so far only been recorded as far as the Great Barrier Reef in the Western Pacific Ocean. Excluding the nine species so far known only from the Seychelle Islands, the remaining 41 species are also widely distributed throughout the Indo-West Pacific region, 17 species having been reported from the Hawaiian, Tuamoto and Society Islands in the Pacific Ocean.

Three species represented in the Seychelles fauna are of particularly wide distribution and have been found in the Eastern Pacific region. These species, *Periclemenes soror*, *Fennera chacei* and *Harpiliopsis depressus*, are all commensals and all occur on the western seaboard of America. Although *Fennera chacei* was first discovered in the Eastern Pacific region (Holthuis, 1951) and only subsequently found in the Indo-West Pacific (Bruce, 1965, in press, a; Patton, 1966), it is most likely to have originated from the Indo-West Pacific

region. It is a very small species, even when fully adult, and unless specially searched for can readily be overlooked. The transportation of the pelagic larval stages of these species by the warm Equatorial Counter Current would result in their arrival on the western coasts of central America. The wider distribution of the pontoniid shrimps that have been reported from the Seychelle Islands are summarized below in Table 8.

The region whose pontoniid fauna has been examined in most detail is the Indonesian archipelago. This vast region, which was studied during the Siboga expeditions and was reported upon by Holthuis (1952) was found to have a total fauna of 68 species, of which eight have not been subsequently reported from other parts of the Indo-West Pacific region. The 50 species found in the Seychelle Islands therefore compares favourably in richness of species with the Indonesian fauna. In the Seychelles region, the choice of habitat, mainly oceanic coral reefs and lagoons, is much more restricted than in Indonesia and sheltered bays with muddy substrates, suitable for bivalve hosts such as *Pinna* are poorly represented. Of the two faunae, 22 species are common to both regions. It may be noted that *Pontonia*, one of the larger genera that is particularly well represented in Indonesian waters, with five species, associates of ascidians, is completely without representatives in the Seychelles. In the case of the 12 coral associated species found in Indonesia, all except two have also now been recorded from the Seychelle Islands. During the cruise of the F.R.V. *Manihine* to the Seychelle Islands very few sponges or ascidians were seen or collected but corals were sampled without difficulty. Similarly poorly represented in the Seychelles fauna so far studied are the associates of gorgonians and crinoids.

As noted above, 74% of the Seychelles pontoniid fauna are commensals and their distribution must inevitably be correlated with the distribution of their hosts or related species. Eleven of the species found in the Seychelle Islands are considered to be truly free-living species, either predators or browsers. Two species are thought to be commensals but their hosts are as yet unknown. *Periclimenes tosaensis* is probably an associate of alcyonarians or related coelenterates and the deep water species *P. compressus* is probably an associate of gorgonians. The associations of the thirty seven remaining species are summarized in Table 9.

Table 9. Hosts of the Seychelles pontoniid shrimps

Spongida	4	11%		4	11%
Coelenterata	23	62%	Actinaria	2	5.4%
			Alcyonaria	1	2.7%
			Scleractinea	20	54%
Echinoderma	4	11%	Asteroidea	1	2.7%
			Echinoidea	2	5.4%
			Crinoidea	1	2.7%
Mollusca	6	16%	Gastropoda	1	2.7%
			Lamellibranchia	5	4.0%

SUMMARY

Twenty-four species of pontoniid shrimp, collected from the Seychelle Islands in February 1972, by the F.R.V. *Manihine*, of the East African Marine

Fisheries Research Organization, Zanzibar, are reported upon. Two new species are described, *Periclimenes difficilis* sp. nov., an associate of the coral *Porites nigrescens* Dana, and *Periclimenaeus manihinei* sp. nov., host unknown. Two species, *Periclimenes tosaensis* Kubo and *Periclimenes hirsutus* Bruce are recorded from the Indian Ocean for the first time. Eight species, *Vir orientalis* (Dana), *Periclimenes lutescens* (Dana), *Periclimenes diversipes* Kemp, *Philarius gerlachei* (Nobili), *Harpiliopsis spinigerus* (Ortmann), *Coralliocaris superba* (Dana) and *Coralliocaris venusta* Kemp, are now recorded from the Seychelle Islands for the first time. All species, except two, are considered to be commensals and the hosts are, in most cases, identified. The early juvenile stages of several species are described for the first time: *Palaemonella rotumana* (Borradaile), *Periclimenes spiniferus* De Man, *Periclimenes diversipes* Kemp, *Periclimenes zanzibaricus* Bruce, *Harpiliopsis beaupresi* (Audouin), *Jocaste japonica* (Ortmann), and *Coralliocaris graminea* (Dana). The development of the sound-producing mechanism and the incidence of regeneration of the second pereopods in *Coralliocaris graminea* is outlined and it is noted that the genus *Cavicheles* Holthuis is probably an early juvenile stage of *Jocaste* Holthuis. It is also considered probable that *Coralliocaris graminea* auct. represents two distinct species.

The pontoniinid shrimp fauna of the Seychelle Islands is reviewed. Fifty species have so far been reported, of which nine are not known outside this region. Most of the species are well known and widely distributed throughout the Indo-West Pacific region. The distribution of eleven species extends to the Hawaiian and Society Islands and three species extend to the central western America seaboard.

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Table 8.

Species	Localities see Fig 1.																															
	1. Red Sea	2. South Arabia	3. East Africa	4. Madagascar	5. Mascarene Is.	6. Seychelles Is.	7. Persian Gulf	8. West India	9. Maldive & Laccadive Is.	10. Ceylon	11. Bay of Bengal	12. Singapore	13. Indonesia	14. South China Sea	16. Japan & Bonin Is.	17. New Guinea	18. Western Australia	19. Northern Australia	20. Eastern Australia	22. Pulau Marianna Is.	24. Solomon Is. etc.	25. New Caledonia etc.	26. Marshall Is.	27. Gilbert & Ellis Is.	28. Fiji & Tanga Is.	29. Samoan Is.	31. Society & Marquesa Is.	32. Hawaiian Is.				
1. <i>Palaemonella tenuipes</i>	▲	•	•	•	•	▲	•	•	▲	•	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
2. <i>Palaemonella rotumana</i>	▲	▲	▲	▲	•	▲	•	•	▲	•	▲	▲	▲	•	•	▲	•	•	•	▲	•	•	▲	•	•	•	•	•	•			
3. <i>Palaemonella</i> sp. aff. <i>rotumana</i>	•	•	•	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
4. <i>Vir orientalis</i>	•	•	•	•	•	○	•	•	•	•	▲	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	▲			
5. <i>Eupontonia noctalbata</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
6. <i>Periclimenes lutescens</i>	▲	•	▲	▲	•	○	•	•	▲	•	•	▲	▲	•	▲	•	•	•	▲	•	•	•	•	•	•	•	•	•				
7. <i>Periclimenes ensifrons</i>	•	•	•	▲	▲	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
8. <i>Periclimenes grandis</i>	▲	▲	▲	▲	▲	▲	•	•	▲	•	•	•	•	▲	▲	•	•	•	•	•	•	•	•	•	•	•	•	•				
9. <i>Periclimenes tenuipes</i>	•	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
10. <i>Periclimenes vitiensis</i>	•	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
11. <i>Periclimenes brevicarpalis</i>	▲	▲	▲	▲	▲	▲	•	•	▲	•	▲	▲	▲	•	▲	•	▲	•	▲	•	•	•	•	•	•	•	•	•				
12. <i>Periclimenes spiniferus</i>	•	•	•	▲	▲	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	•	•	•	•	•	•				
13. <i>Periclimenes soror</i> #	•	▲	▲	▲	•	○	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
14. <i>Periclimenes longirostris</i>	•	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
15. <i>Periclimenes ceratophthalmus</i>	•	•	•	•	•	•	•	•	•	•	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
16. <i>Periclimenes compressus</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
17. <i>Periclimenes seychellensis</i>	▲	•	▲	▲	•	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•				
18. <i>Periclimenes diversipes</i>	▲	▲	•	▲	▲	○	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	•	•	•	•	•	•				
19. <i>Periclimenes inornatus</i>	•	•	•	▲	▲	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
20. <i>Periclimenes tosaensis</i>	•	•	•	•	•	○	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
21. <i>Periclimenes imperator</i>	▲	•	▲	▲	▲	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	▲	•	•	•	•	•	•				
22. <i>Periclimenes zanzibaricus</i>	•	•	▲	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	▲	•	•	•	•	•	•	•	•	•				
23. <i>Periclimenes mahei</i>	•	•	•	▲	▲	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
24. <i>Periclimenes hirsutus</i>	•	•	•	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	▲	•	•	•				
25. <i>Periclimenes difficilis</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
26. <i>Periclimenaeus fimbriatus</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
27. <i>Periclimenaeus robustus</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
28. <i>Periclimenaeus manihinei</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
29. <i>Onycozaris seychellensis</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
30. <i>Anchistus miersi</i>	▲	•	•	•	•	○	▲	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
31. <i>Anchistus demani</i>	•	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
32. <i>Platypontonia brevisrostris</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
33. <i>Conchodytes tridacnae</i>	▲	▲	▲	•	•	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
34. <i>Conchodytes meleagrinae</i>	▲	▲	▲	•	•	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
35. <i>Philarius gerlachei</i>	▲	•	•	•	•	○	▲	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
36. <i>Ischnopontonia lophos</i>	•	•	▲	▲	•	▲	•	•	▲	•	•	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
37. <i>Fennera chacei</i> #	•	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
38. <i>Metapontonia fungiacola</i>	•	•	▲	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
39. <i>Paratypton seibenrocki</i>	▲	•	•	•	•	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
40. <i>Harpiliopsis beaupresii</i>	•	▲	▲	▲	▲	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
41. <i>Harpiliopsis depressus</i> #	▲	▲	▲	▲	▲	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
42. <i>Harpiliopsis spinigerus</i>	•	•	▲	•	•	○	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
43. <i>Jocaste japonica</i>	•	•	▲	▲	▲	▲	•	•	▲	•	•	•	•	▲	•	•	•	•	▲	•	•	•	▲	•	•	•	•	•				
44. <i>Jocaste lucina</i>	▲	▲	▲	▲	▲	▲	•	•	▲	•	•	•	•	▲	•	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
45. <i>Coralliocaris macrophthalmia</i>	▲	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
46. <i>Coralliocaris graminea</i>	▲	•	▲	▲	•	▲	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
47. <i>Coralliocaris superba</i>	▲	▲	•	▲	•	○	•	•	▲	•	▲	▲	▲	•	▲	•	•	•	▲	•	•	•	▲	•	•	•	•	▲				
48. <i>Coralliocaris nudirostris</i>	▲	•	•	•	•	▲	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
49. <i>Coralliocaris venusta</i>	▲	•	•	•	•	○	•	•	▲	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
50. <i>Propontonia pellucida</i>	•	•	•	•	•	●	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				

#, also recorded from the Eastern Pacific region; ○, new to Seychelles; ●, known only from the Seychelles Islands

