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A report on a collection of pontoniine shrimps from Madagascar and adjacent seas

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A collection of 41 species of pontoniine shrimp from the Madagascar region is reported upon. Most of the material has been collected from the north-west of Madagascar in the vicinity of Nosy Bé. Six new species, belonging to four different genera, are described: ***Palaemonella crosnieri, Periclimenes lepidus, P. granulimanus, P. perturbans, Periclimenaeus lobiferus*** and ***Onycocaris trullata***. A key to the species of *Onycocaris* is also given. Nineteen species are recorded from Madagascar for the first time, and four species, *Periclimenes perlucidus, Periclimenaeus djiboutensis, Pontonia sibogae* and *Coralliocaris viridis* are reported for the second time only in the Indo-West Pacific region. *Pontonides unciger* Calman is considered to be distinct from *P. unciger* Holthuis and also is recorded for the second time only.

The records of pontoniine shrimp previously reported from Madagascar are briefly summarized. A total of 61 species are now known to be represented in the fauna of Madagascar, indicating a diversity almost as rich as the Indonesian region, with 69 species.

Une collection de quarante et une espèces de crevettes pontoniine de la région de Madagascar est analysée. La plus grande partie du matériel provient du nord-ouest de Madagascar, dans le voisinage de Nosy Bé. Six espèces nouvelles appartenant à quatre genres différents sont décrites: ***Palaemonella crosnieri, Periclimenes lepidus, P. granulimanus, P. perturbans, Periclimenaeus lobiferus*** et ***Onycocaris trullata***. Une clé des espèces du genre *Onycocaris* est aussi donnée. Dix-neuf espèces sont notées à Madagascar pour la première fois, et quatre espèces ne sont notées que pour la seconde fois dans la region Indo-Pacifique occidentale. *Pontonides unciger* Calman est consideré être distinct de *P. unciger* Holthuis, 1952, et n'est aussi noté que pour la seconde fois.

Les rapports notant l'occurrence de crevettes pontoniines à Madagascar sont rapidement resumés. Un total de soixante-et-une espèces sont maintenant connues dans la faune de Madagascar, indiquant une diversité presque aussi riche que celle de la region Indonesienne, qui possède soixante-neuf espèces.

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INTRODUCTION

The first species of pontoniine shrimp to be recorded from the region of Madagascar was *Coralliocaris graminea* (Dana), which was reported from Juan de Nova Island in the central Mozambique Channel by Lenz in 1905. Subsequently, in 1910, Lenz reported *Periclimenes spiniferus* (De Man) from the reefs of Tamatave on the east coast of Madagascar proper. Few further species were noted until studies on the reef fauna in the region of Tulear were started. These studies have provided information on many commensal species, those found in association with pinnid lamellibranchs having been studied in particular detail in a series of papers by Hipeau-Jacquotte (1967-1973) and Jacquotte (1964). Studies by Ledoyer (1964, 1968) of the fauna associated with the sea grass beds have also provided records of several free-living species. Monod (1971) has also reported upon a few species from Tulear. Thus the fauna of south-western Madagascar has been studied for some years but there have been virtually no observations from the rest of the island.

This deficiency of records can now be partially rectified due to interesting collections made by the Mission O.R.S.T.O.M. at Nosy Bé.* These collections are mainly of material from the region of Nosy Bé, but also includes places

* Nossi Bé.

further afield such as the Iles Glorieuses and La Réunion. One species from this collection has already been described (Bruce, 1976).

Also included is an account of a number of specimens obtained by the F.R.V. "Manihine", Cruise 328, of the East African Marine Fisheries Research Organization, Zanzibar, which visited Nosy Bé in July 1971.

The types of new species described and most of the other material reported upon, are deposited in the collections of the Muséum National d'Histoire Naturelle, Paris.

LIST OF SPECIES COLLECTED

PALAEMONIDAE Samouelle

PONTONIINAE Kingsley

Palaemonella Dana, 1852	(1) *P. tenuipes* Dana, 1852
	(2) *P. rotumana* (Borradaile, 1898)
	(3) *P. spinulata* Yokoya, 1936
	(4) ***P. crosnieri*** **sp. nov.**
Periclimenes Costa, 1844	(5) *P. petitthouarsi* (Audouin, 1825)
	(6) *P. lutescens* auct.
	(7) *P. grandis* (Stimpson, 1860)
	(8) *P. brevicarpalis* (Schenkel, 1902)
	(9) *P. psamathe* (De Man, 1902)
	(10) *P. soror* Nobili, 1904
	(11) *P. incertus* Borradaile, 1915
	(12) *P. nilandensis* Borradaile, 1915
	(13) *P. alcocki* Kemp, 1922
	(14) *P. diversipes* Kemp, 1922
	(15) *P. lanipes* Kemp, 1922
	(16) *P. imperator* Bruce, 1967
	(17) *P. perlucidus* Bruce, 1969
	(18) ***P. granulimanus*** **sp. nov.**
	(19) ***P. lepidus*** **sp. nov.**
	(20) ***P. perturbans*** **sp. nov.**
	(21) *Periclimenes* sp.
Thaumastocaris Kemp, 1922	(22) *T. streptopus* Kemp, 1922
Periclimenaeus Borradaile, 1915	(23) *P. djiboutensis* Bruce, 1970
	(24) ***P. lobiferus*** **sp. nov.**
Onycocaris Nobili, 1904	(25) ***O. trullata*** **sp. nov.**
Anchistus Borradaile, 1898	(26) *A. custos* (Forsskal, 1775)
	(27) *A. miersi* (De Man, 1888)
Paranchistus Holthuis, 1952	(28) *P. ornatus* Holthuis, 1952
Conchodytes Peters, 1852	(29) *C. meleagrinae* Peters, 1852
	(30) *C. biunguiculatus* (Paulson, 1875)
Pontonia Latreille, 1829	(31) *P. sibogae* Bruce, 1972
Philarius Holthuis, 1952	(32) *P. gerlachei* (Nobili, 1905)
Jocaste Holthuis, 1952	(33) *P. japonica* (Ortmann, 1890)
Coralliocaris Stimpson, 1860	(34) *C. superba* (Dana, 1852)
	(35) *C. venusta* Kemp, 1922
	(36) *C. viridis* Bruce, 1974

Harpiliopsis Borradaile, 1917	(37) *H. depressa* (Stimpson, 1860)
Hamodactylus Holthuis, 1952	(38) *H. boschmai* Holthuis, 1952
Pontonides Borradaile, 1917	(39) *P. unciger* Calman, 1939
	(40) *Pontonides* sp.
Anchistioides Paulson, 1875	(41) *A. willeyi* (Borradaile, 1899)

SYSTEMATIC ACCOUNT

Palaemonella tenuipes Dana

Restricted synonymy:

Palaemonella tenuipes Dana, 1852: 25. Holthuis, 1952: 8, 27-28, (full synonymy). Bruce, 1970: 274-276, fig. 1.

Material examined. 2♂, Isles Glorieuses, Comoro Islands, September 1958, coll. A. Crosnier.

Remarks. The two specimens have been previously recorded by Bruce (1970). Both specimens were obtained from intertidal pools.

Distribution. Type locality, Sulu Sea. Also recorded from the Red Sea, Farquhar Island, Chagos Archipelago, Maldive Islands, Fiji, Ellice Islands, Marshall Islands and Line Islands. Other records from the literature need re-examination.

Palaemonella rotumana (Borradaile)

Restricted synonymy:

Periclimenes (*Falciger*) *rotumanus* Borradaile, 1898; 1005, pl. 63 figs 5-5b.

Palaemonella vestigialis Kemp, 1922: 123-126, figs 1-2, pl. 3 fig. 2. Holthuis, 1952: 8, 24, fig. 3. Barnard, 1958: 11, 14, fig. 3. Bruce, 1971: 2, 4.

Palaemonella rotumana Bruce, 1970: 276-279, fig. 2, pl. 1e, f; 1975: 182-183, 184, fig 6h.

Material Examined. (1) 1 ovig.♀, 2 juv., Baie di Ampasindava, Nosy Tanga, 40 m, 29 October 1970, coll. P. Laboute. (2) 1 ovig.♀ (# 1526), 1♀ (# 1521), Trois Frères, Nosy Bé, Stn 117, 11 July 1971, coll. A. J. Bruce. (3) 1♂, (# 1522) Castor Bank, Mozambique Channel, 12 July 1971. (4) 1♂, NW coast of Madagascar, 12°49.5′S, 48°30.0′E trawl, 55 m. 2 August 1973, coll. A. Crosnier.

Habitat. Sheltered coral reef, one specimen from *Seriatopora hystrix* at 1 fm. and the other from *Galaxea clavus* at 2 fm. The Castor Bank specimen from 10 fm, from coral caught in handline.

Remarks. The specimens are quite typical. In most cases the rostral dentition is 8/2, with the first two teeth situated on the carapace. The supra-orbital ridge and tubercle are also distinct, without any indication of a supra-orbital spine. The deeper water specimen, a large male, Cl 3.6 mm, has a rostral dentition of 7/2, with a very feebly developed supra-orbital ridge that lacks a tubercle. The merus of the second pereiopod is distinctly longer than the carpus and the ambulatory pereiopods are not particularly slender. The specimen therfore is distinct from that referred to *P.* aff. *rotumana* by Bruce (1974a). One ovigerous ♀ has 7/1 and two juveniles have 7/3 rostral teeth.

Distribution. Type locality, Rotuma Island, Fiji. Previously recorded from the western Indian Ocean from Delagoa Bay, Mozambique (Barnard, 1958), Zanzibar (Bruce, 1965), the Comoro Islands, Tanzania, Seychelle Islands and Aden (Bruce, 1970, 1971). Common throughout the whole Indo-West Pacific region to Hawaii, and also present in the eastern Mediterranean Sea. This species has not been previously recorded from Madagascar.

Palaemonella spinulata Yokoya (Fig. 1)

Palaemonella spinulata Yokoya, 1936: 135-137, fig. 4. Bruce, 1970: 274 (key), 285-286, fig. 1; Bruce; 1975: 177-181, 183, 184, figs 6-7.

Material examined. 1 ovig.♀, 1 juv., Souris Chaude, La Réunion, 40 m, December 1973, coll. J. Benneteau.

Remarks. The two specimens were collected from among calcareous algae. The female specimen has a rostral dentition of 6/1 and the juvenile 4/0. In both specimens the supra-orbital spines are well developed, slender and acute, and without any distinct supra-orbital ridge. The juvenile is without hepatic spines. On account of the supra-orbital spines this species resembles *P. crosnieri* but can be distinguished from that species by its much smaller adult size and the lack of a distal spine on the ischium of the second pereiopods. Although not from Madagascar, this species, which was included in the original collection of material, is for convenience included in the present report.

Distribution. Type locality, near Misaki, Japan. The only other record of this species is from Kisiti Island, Kenya.

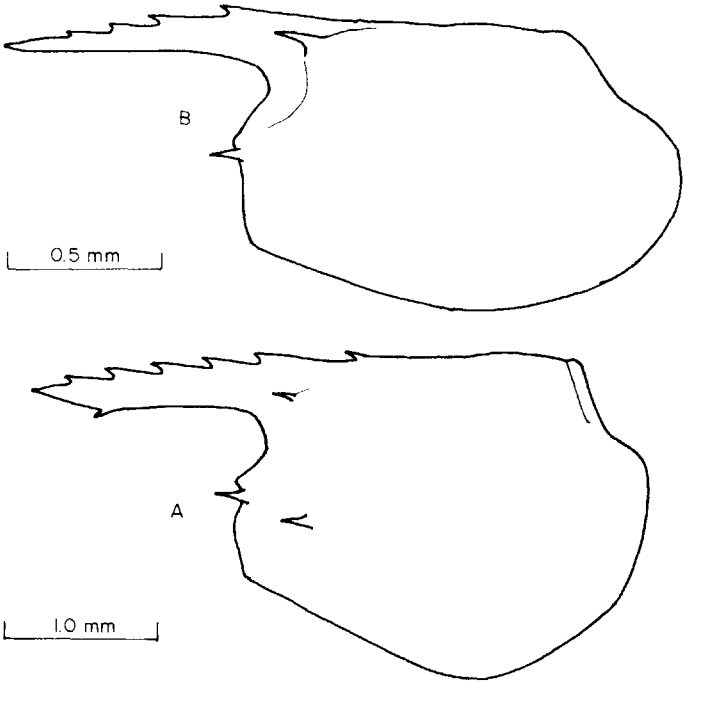

Figure 1. *Palaemonella spinulata* Yokoya. Carapace and rostrum: A, ovigerous female; B, juvenile.

Palaemonella crosnieri sp. nov. (Figs 2 to 4)

Material examined. 1♂; Iles Glorieuses, 11°28.1'S, 27°21.1'E, dredge, 20 m, January 1973, coll. C. Jonnanic.

Description. A moderately large sized species of *Palaemonella*, closely resembling *P. rotumana* (Borradaile) in its general features, and not requiring a full, detailed description.

The rostrum is slender, slightly exceeding the antennular peduncle and is feebly up-curved. The upper margin bears eight teeth. A single tooth is situated on the carapace and seven more acute teeth are present along the dorsal edge of the rostrum. The first of these occurs just in front of the orbital margin and the last is small and close to the tip. The convex ventral border bears three acute teeth beneath the fifth to seventh teeth of the dorsal border. The orbit is feebly developed. Supra-orbital ridges are lacking but a slender acute supra-orbital spine is present. The inferior orbital angle is feebly produced and acute in lateral view. The antennal spine is large and acute, extending well beyond the inferior orbital angle. The hepatic spine is smaller than the antennal spine and situated at a lower level, slightly posteriorly to the level of the supra-orbital spine. The antero-lateral angle of the carapace is not produced.

The abdomen and caudal fan are as in *P. rotumana*.

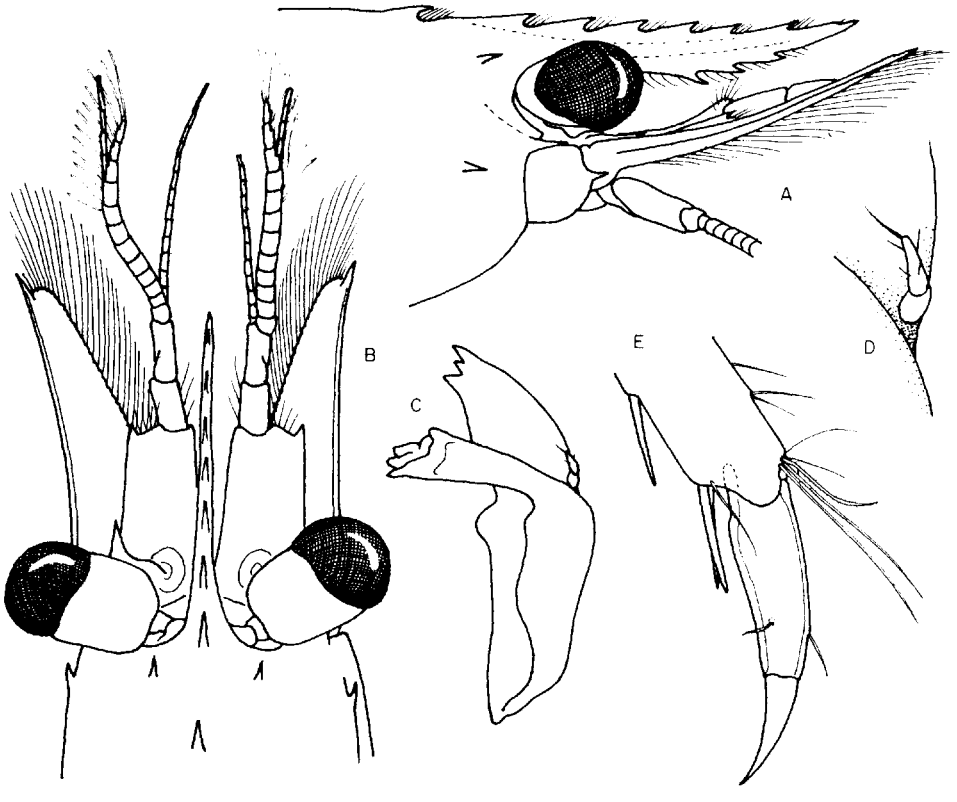

Figure 2. ***Palaemonella crosnieri*** sp. nov., holotype male. Anterior carapace, rostrum and antennae: A, lateral and B, dorsal; C, mandible; D, mandibular palp; E, dactyl of third pereiopod.

The eyes are well developed with a large globular cornea with an inconspicuous dorsal ocellus. The stalk is approximately equal to the diameter of the cornea.

The proximal segment of the antennular peduncle is about 2.3 times longer than the distal width, tapering slightly distally and with a short broad disto-lateral tooth that scarcely exceeds the anterior margin. The stylocerite is

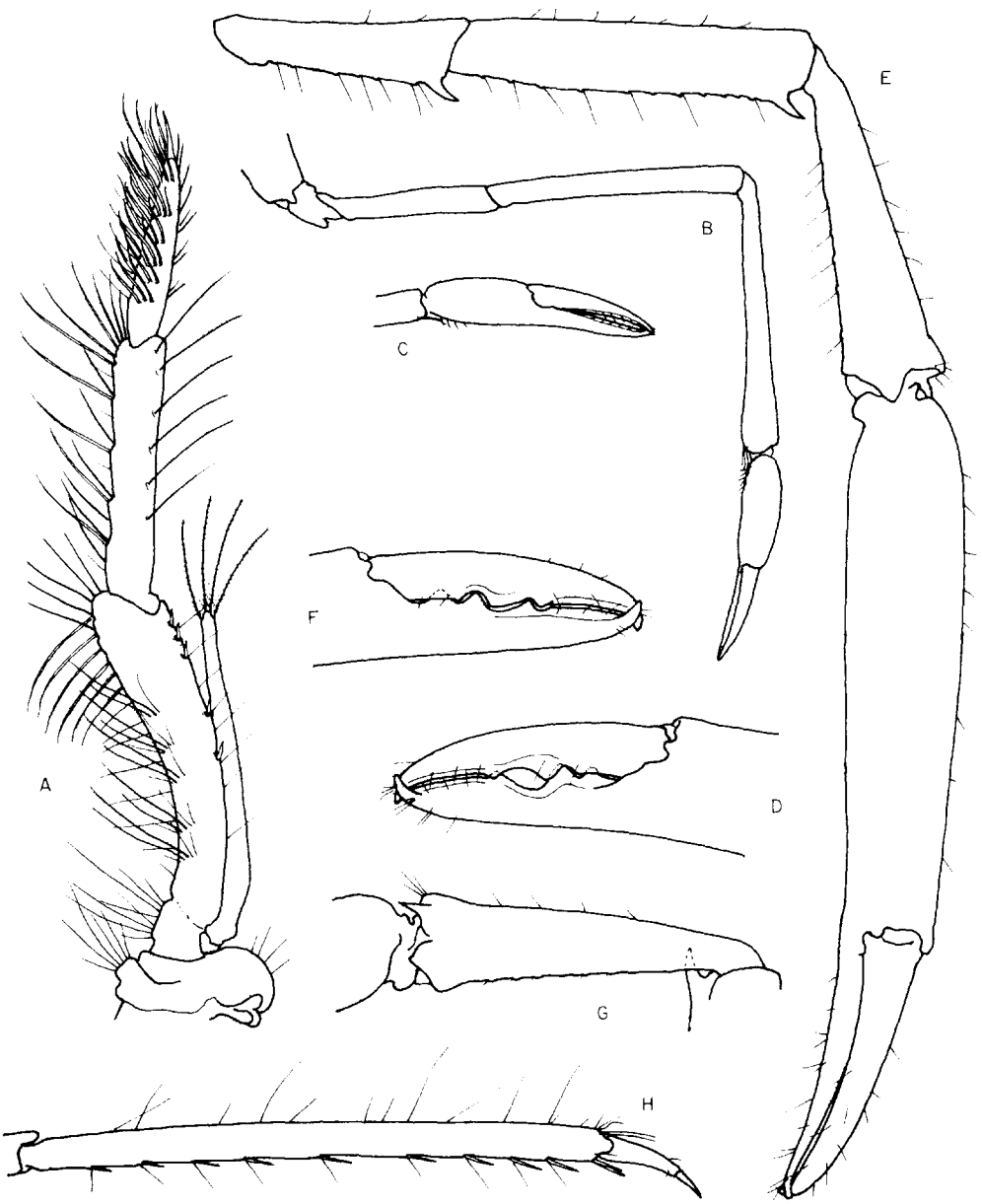

Figure 3. *Palaemonella crosnieri* sp. nov., holotype male. A, Third maxilliped; B, first pereiopod; C, chela of first pereiopod; D, second pereiopod; E, fingers of chela of second periopod, major chela; F, fingers of chela of minor second pereiopod; G, carpus of second pereiopod; H, propod and dactyl of third pereiopod.

short and acute, not exceeding the middle of the segment. The statocyst contains a circular statolith. The intermediate and distal segments are together equal to 0.6 of the length of the proximal segment, the distal segment being slightly longer and more slender than the intermediate segment. The upper flagellum has the two rami fused for the first nine segments. The longer rami are both incomplete.

The scaphocerite extends well beyond the antennular peduncle and the tip of the rostrum, and is nearly four times longer than broad. The lamella tapers strongly distally and is distinctly exceeded by the well developed, acute disto-lateral tooth. The lateral margin is feebly concave. The carpocerite is subcylindrical, and does not extend beyond one third of the length of the scaphocerite. The basicerite is robust, with a well developed acute lateral tooth.

The mandible and the third maxilliped only have been detached. The mandible is robust with a small, two segmented palp. The proximal segment

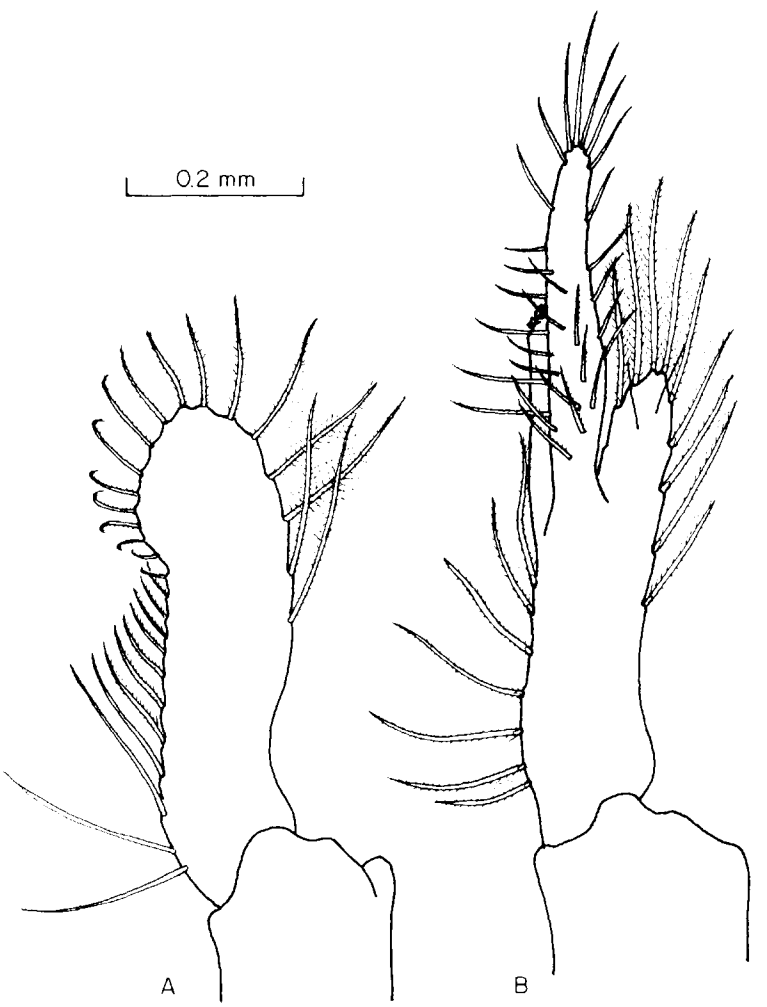

Figure 4. *Palaemonella crosnieri* sp. nov., holotype male. A, Endopod of first pleopod; B, endopod of second pereiopod.

is short and stout, without setae. The distal segment is twice as long, more slender and tapering distally, with several short setae and a longer stouter simple terminal seta. The molar process is stout, with five large teeth. The incisor process is robust, with three teeth distally. The epipod of the second maxilliped bears a small podobranch. The third maxilliped extends beyond the carpocerite by most of the length of the terminal segment. The antepenultimate segment of the endopod is almost completely fused to the basis, and is strongly bowed, about five times longer than broad, with 5-6 small spines along the distal lateral border. The medial border bears several groups of slender setae, with a longitudinal row of stouter setae disto-dorsally. The penultimate segment is about 0.8 of the length of the antepenultimate and about six times longer than broad, with long stout setae along both medial and lateral margins. The terminal segment is about 0.6 of the length of the penultimate segment, tapering distally to a strong terminal spine, with six groups of shorter, stouter setae, finely serrate, along the medial border. The basis bears a few long setae medially and the coxa has a small setose median process. The exopod is normally developed, reaching almost to the distal border of the antepenultimate segment of the endopod, and bears four plumose setae distally. The coxa bears a rounded epipod and a small arthrobranch is present.

The fourth thoracic sternite bears a long slender median process between the coxae of the first pereiopods. The fifth thoracic sternite bears a pair of large acute submedian teeth, posterior to the coxae of the second pereiopods. The eight thoracic sternite bears a stout acute anteriorly directed median process.

The first pereiopods are slender and extend beyond the scaphocerite by the chela and two thirds of the length of the carpus. The fingers are slender and unarmed, with feebly hooked tips. The palm is subcylindrical, 2.1 times longer than wide, and slightly shorter than the fingers. The carpus is about 1.4 times the length of the chela, 7.5 times longer than the maximum width, and increasing in size distally. The merus is slightly shorter than the carpus, and about 1.4 times the length of the ischium. Basis and coxa are normal, with a small disto-medial lobe on the basis.

The second pereiopods are large, subequal and generally similar. The whole chela and carpus extend beyond the tip of the scaphocerite. The fingers are moderately slender, compressed, and approximately half the length of the palm. The tips of the fingers are hooked and the distal thirds of the cutting edges are entire. Proximally each finger bears three stout teeth, with the central tooth larger than the others. In the larger chela a diastema is present distally to the larger teeth, which is lacking on the smaller chela. The palm is subcylindrical, 4.5 times longer than wide, tapering slightly distally and smooth with sparse setae. The carpus is about 0.6 of the palm length and markedly expanded distally. The disto-lateral margin bears a broad blunt tooth. The distal medial margin has a long slender acute dorsal spine with a broader blunter tooth ventrally. The ventral border of the carpus is feebly tuberculate. The merus is subequal to the carpus, of uniform width, with a strong disto-ventral spine and numerous small tubercles along the ventral border. The ischium is about 0.6 of the length of the merus, compressed, and expanded distally, with a large acute disto-ventral spine. The ventral border is also sparsely tuberculate. The basis and coxa present no special features.

The ambulatory pereiopods are slender and the third extends beyond the

carpocerite by the length of the propod and dactyl. The dactyl is slender and simple, about 0.2 of the length of the propod. The unguis is distinct and the corpus bears a small anterior seta as well as lateral setae. The propod is about 15 times longer than broad, with nine well developed spines along the ventral border, and a pair of long slender disto-ventral spines. The carpus, merus and ischium present no special features, and the fourth and fifth pereiopods are similar to the third.

The endopod of the first pleopod is about four times longer than the central width, with the distal portion expanded medially. The proximal two thirds of the medial border, which is straight, bears eleven setae, which change from long slender simple setae proximally to short, more robust setae with fine serrulations. The distal part of the endopod bears seventeen setae which intergrade from short, stout hooked serrulate setae medially to plumose setae laterally. The proximal half of the lateral border is without setae.

The endopod of the second pleopod is small and bears a well developed appendix interna, which extends far beyond the tip of the ramus. The appendix masculina is very large and conspicuous, and extends far beyond the appendix interna. A row of six stout setae are present along the proximal two thirds of the medial border, with eight further setae on the terminal third of the appendix, while a further thirteen are present on the proximal ventral and intermediate lateral portions.

Type. The single specimen available is designated as thy holotype, and is deposited in the collections of the Muséum d'Histoire Naturelle, Paris, catalogue number 2584.

Measurements.		
	Post-orbital carapace length	2.6 mm
	Carapace and rostrum	5.3 mm
	Total length	14.5 mm
	Major chela length	6.2 mm
	Minor chela length	6.1 mm

Remarks. Palaemonella crosnieri may be immediately distinguished from all other species of the genus *Palaemonella* Duna, by the presence of a distinct disto-ventral spine on the ischium of the second pereiopods. The tuberculation along the ventral border of the carpus, merus and ischium of the second pereiopods has also not been reported in any other species.

P. crosnieri is most closely related to *P. rotumana* (Borradaile) and *P. spinulata* Yokoya. *P. rotumana* lacks a supra-orbital spine but does bear a distinct supra-orbital ridge with a small tubercle. *P. crosnieri* does not show any trace of a similar ridge. *P. spinulata* is a much smaller species, which does have a distinct supra-orbital spine, and also has a more strongly developed distal dorso-medial spine of the carpus of the second pereiopods, with a more feebly developed ventro-medial tooth. The rostral dentition in *P. spinulata* is normally 6-7/2 (Bruce, 1975a), in comparison with *P. crosnieri* with 8/3.

Seven species of *Palaemonella* are now known to occur in the Indo-West Pacific region (Bruce, 1970, 1975a), and all except *P. pottsi* (Borradaile) have been found to occur in the western Indian Ocean. *P. pottsi* is an associate of comatulid crinoids, but thy other species of the genus are thought to be free-living micro-predators. There is no evidence to suggest that *P. crosnieri* has any commensal associations. The form of the chelae of the second pereiopods and the third maxilliped strongly suggest that it is also a predator.

Periclimenes petitthouarsi (Audouin) (Fig. 5)

Restricted synonymy:
Palaemon petitthouarsii Audouin, 1825: 91.
Anchistia petitthouarsii Paulson, 1875: 114.
Periclimenes petitthouarsi Borradaile, 1898: 381. Bruce, 1971: 2, 4-5.
Periclimenes (*Harpilius*) *petitthouarsi* Holthuis, 1952: 12, 78-79 (full synonymy).

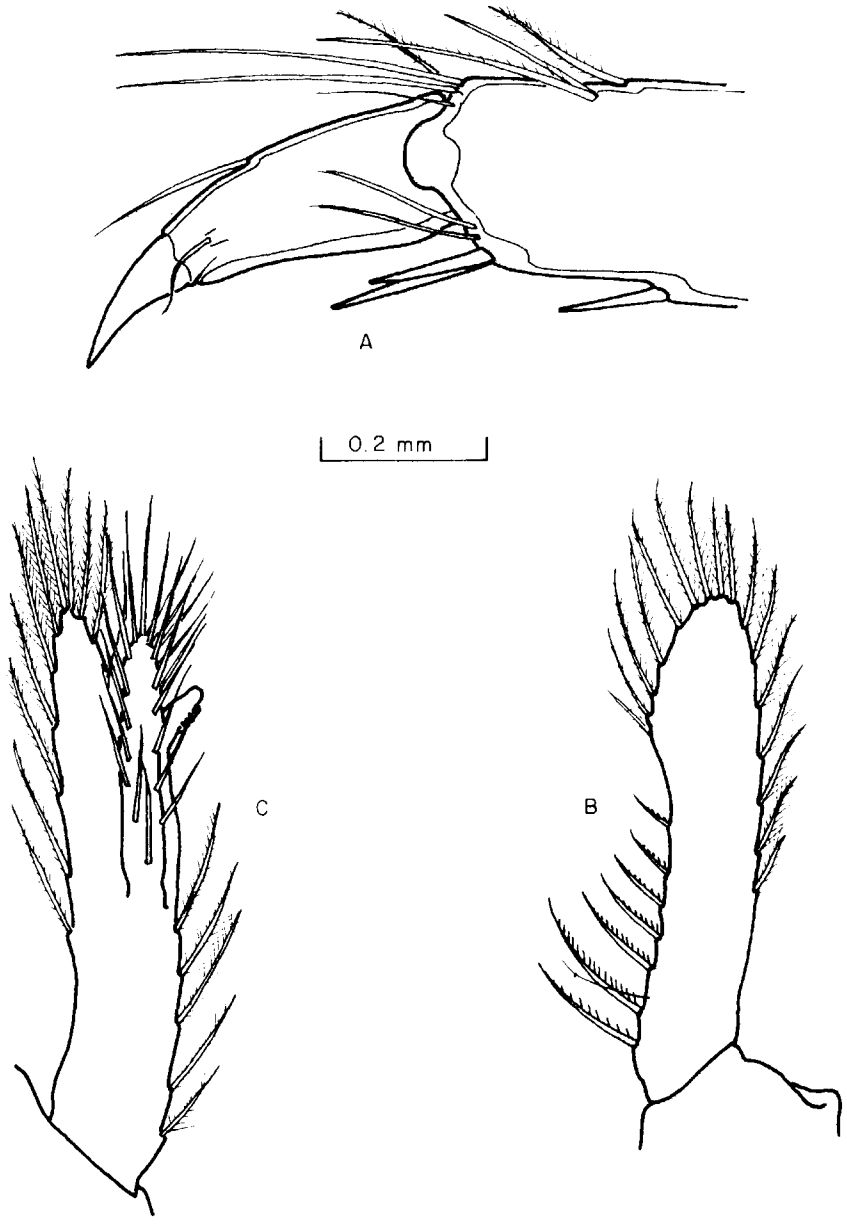

Figure 5. *Periclimenes petitthouarsi* Audouin. A, Dactylus of third pereiopod; B, endopod of male first pleopod; C, endopod of male second pleopod.

Material examined. (1) 2♂, 2 ovig.♀, 1 juv., Trois Frères, Nosy Bé. F. R. V. *Manihine*, Cruise 328, Stn 117, 13°25.7'S, 48°20.2'E, 3 m, 28.0°C, 11 July 1971, coll. A. J. Bruce, (2) 2♂, 3 ovig.♀, Nosy Bé, 30 m. No further data. (3) 2♂, 4 ovig.♀, Mayotte, October 1952.

Habitat. The first two lots of specimens were obtained from colonies of *Seriatopora hystrix* (Dana).

Remarks. The specimens are quite typical and without any trace of a supra-orbital spine. The rostral dentition is 7/4-5 in males, all ovigerous females havi 7/4 and the juvenile female 7/3.

The dactyls of the ambulatory pereiopods are robust, strongly compressed and with a sharp ventral cutting edge. The unguis is quite distinct from the corpus and slightly less than half its length. The dorsal margin of the corpus bears a long slender seta.

The male first pleopods closely resemble those of *P. spiniferus* De Man (Holthuis, 1952). The endopod is narrow, about 5.5 times longer than wide at the base, with the medial margin feebly concave and the distal end slightly expanded. The proximal half of the medial border bears a row of spiniform setae, decreasing in length distally, with coarse setules along the distal margin. The distal end of the endopod and half of the lateral border bear 16 marginal plumose setae. The appendix masculina of the second pleopod is rather robust, about five times longer than broad, distinctly exceeding the appendix interna but slightly exceeded by the tip of the endopod. The dorsal aspect bears two longitudinal rows of slender simple spines, with further spines ventrally near the tip.

Distribution. Type locality, Egypt. Also reported from numerous localities in the Red Sea, the Gulf of Aden and the Persian Gulf. In the western Indian Ocean, this species has only been previously reported from Mounimeri and Bandeli, Ile Mayotte, Comoro Islands and the present record indicates that this species also extends to northern Madagascar. Elsewhere this species is replaced by *P. spiniferus* De Man, which has been reported from Tulear and Tamatave (Hipeau-Jacquotte, 1973) and also from Aldabra and the Seychelle Islands (Bruce, 1971).

Periclimenes lutescens auct.

Restricted synonymy:

?*Harpilius lutescens* Kemp, 1922: 235-237, figs 72-73.

Periclimenes (*Harpilius*) *lutescens* Patton, 1966: 275, 288 (tab. 1), 290 (tab. 2).

Periclimenes lutescens Bruce, 1971: 2, 5: 404-407, 409, 411, 412 (key), fig. 1a.

Material examined. 1 ovig.♀, Banc Tethys, Nosy Bé, Madagascar. 2 January 1952.

Habitat. Noted as obtained from coral at 11 m.

Remarks. The single specimen is quite typical. The rostral dentition is 6/2 and the second maxilliped is as illustrated by Bruce (1972, fig. 1a). A well developed median finger-like process is present on the fourth thoracic sternite and the eighth is unarmed.

Distribution. Type locality, Tongatabu, Tonga Islands. This species has been

recorded from the Red Sea to the Australian Great Barrier Reef. It has not been previously recorded from Madagascar, but has been reported from the Comoro Islands (Bruce, 1971, partim). One of the Comoro Islands records, from *Pocillopora*, proved upon re-examination to belong to the closely related species *P. consobrinus* (De Man). There have been no other records from the western Indian Ocean.

Periclimenes grandis (Stimpson)

Restricted synonymy:

Anchistia grandis Stimpson, 1860: 34.

Periclimenes (*Ancylocaris*) *grandis* Kemp, 1922: 171 (key), 210-214, figs 58-59, pl. 7 fig. 10.

Periclimenes (*Harpilius*) *grandis* Holthuis, 1952: 11, 79-81 (full synonymy), Barnard, 1958: 48.

Periclimenes grandis Bruce, 1971: 2, 6; 1972: 446, fig. 1; 1973: 132-133.

Material examined. (1) 1♂, Majunga. No further data. (2) 1 ovig.♀, Iles Glorieuses, intertidal, 30 January 1971, coll. A. Crosnier. (3) 1♂, Nosy Bé, Madagascar, intertidal zone, August 1973, coll. A. Crosnier.

Remarks. The Majunga specimen lacks both second pereiopods and cannot therefore be identified with absolute certainty. The rostral dentition is 7/3 and the supra-orbital spines are distinct. Comparison with other specimens of *P. grandis* show no differences of note and there seems no reason to doubt that this specimen is correctly referred to *P. grandis* (Stimpson). The other specimens have a rostral dentition of 7/2, 7/4. The second pereiopods are present but have very feebly developed carpal teeth, probably due to incomplete limb regeneration after autotomy. The Nosy Bé specimen was obtained from a colony of *Xenia*, but this association is considered accidental.

Distribution. Type locality, Oshima, Japan, Previously recorded from Suez in the northern Red Sea, to Delagoa Bay, Mozambique, as far east as Japan and Indonesia. In the western Indian Ocean, this species has been recorded from Dar es Salaam, and Zanzibar, Tanzania (Ortmann, 1895; Lenz, 1905); the Comoro Islands (Bruce, 1971) and from the Seychelle Islands (Bruce, 1973). This species has not been previously recorded from Madagascar.

Periclimenes brevicarpalis (Schenkel) (Fig. 6)

Restricted synonymy:

Ancylocaris brevicarpalis Schenkel, 1902: 563, pl. 13 fig. 21.

Periclimenes (*Ancylocaris*) *brevicarpalis* Kemp, 1922: 169 (key), 185-191, figs 40-42, pl. 6, fig. 8.

Periclimenes (*Harpilius*) *brevicarpalis* Holthuis, 1952: 10, 69-73, fig. 27 (full synonymy). Monod, 1971: 183, fig. 80.

Periclimenes brevicarpalis Bruce, 1971: 2, 7-8. Hipeau-Jacquotte, 1973: 103-104, 106, fig. 5.

Material examined. 1 ovig.♀, Tulear, Madagascar. 15 October 1951.

Host. The specimen was obtained from a giant anemone *Stoichactis* sp., apparently in association with two specimens of *Thor amboinensis* De Man.

Remarks. The specimen is a large ovigerous female with a rostral dentition of

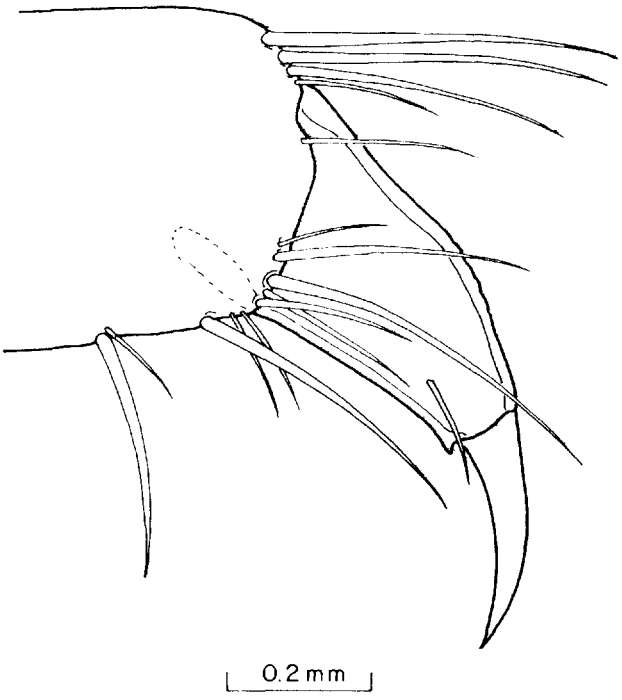

Figure 6. *Periclimenes brevicarpalis* (Schenkel). Dactylus of third pereiopod.

6/1 and with the characteristic humped appearance of the carapace and with very small dorsal spines on the telson. It differs from the previous descriptions of that species in that dactyls of the ambulatory pereiopods bear a small accessory tooth on the ventral margin. There is no trace left of the characteristic colour pattern. The post-orbital carapace length is 8.5 mm. This species has been previously reported from Tulear, in association with a stichodactyline anemone by Monod (1971) and with *Cryptodendron adhesivum* Klunz. by Hipeau-Jacquotte (1973).

Distribution. Type locality, Macassar, Celebes, Indonesia. This well known species is common throughout the Indo-West Pacific region, having been recorded from the Red Sea and Mozambique to the Santa Cruz Islands. Other records from the western Indian Ocean include Zanzibar (Lenz, 1905), Mauritius (Richters, 1880) and the Seychelle Islands (Bruce, 1971, 1973).

Periclimenes psamathe (De Man) (Fig. 7)

Urocaris psamathe De Man, 1902: 816-822, pl. 25, fig. 51. Borradaile, 1917: 323, 354, pl. 53, fig. 3.

Periclimenes (*Ancylocaris*) *psamathe* Kemp, 1922: 173.

Periclimenes (*Harpilius*) *psamathe* Holthuis, 1952: 12, 61, fig. 23.

Periclimenes psamathe Bruce, 1966: 21, figs 3c, 4c-d; 1970: 541-543, fig. 3.

Material examined. (1) 7♂, 1 ovig.♀, 4♀, 6 juv., south-west coast of Nosy Bé, 6 September 1970. (2) 1♂, 1 ovig ♀, 4♀, north-west coast of Nosy Bé, 9 September 1970. (3) 11♂, 4 ovig.♀ 5♀, north-west coast of Nosy Bé, 10

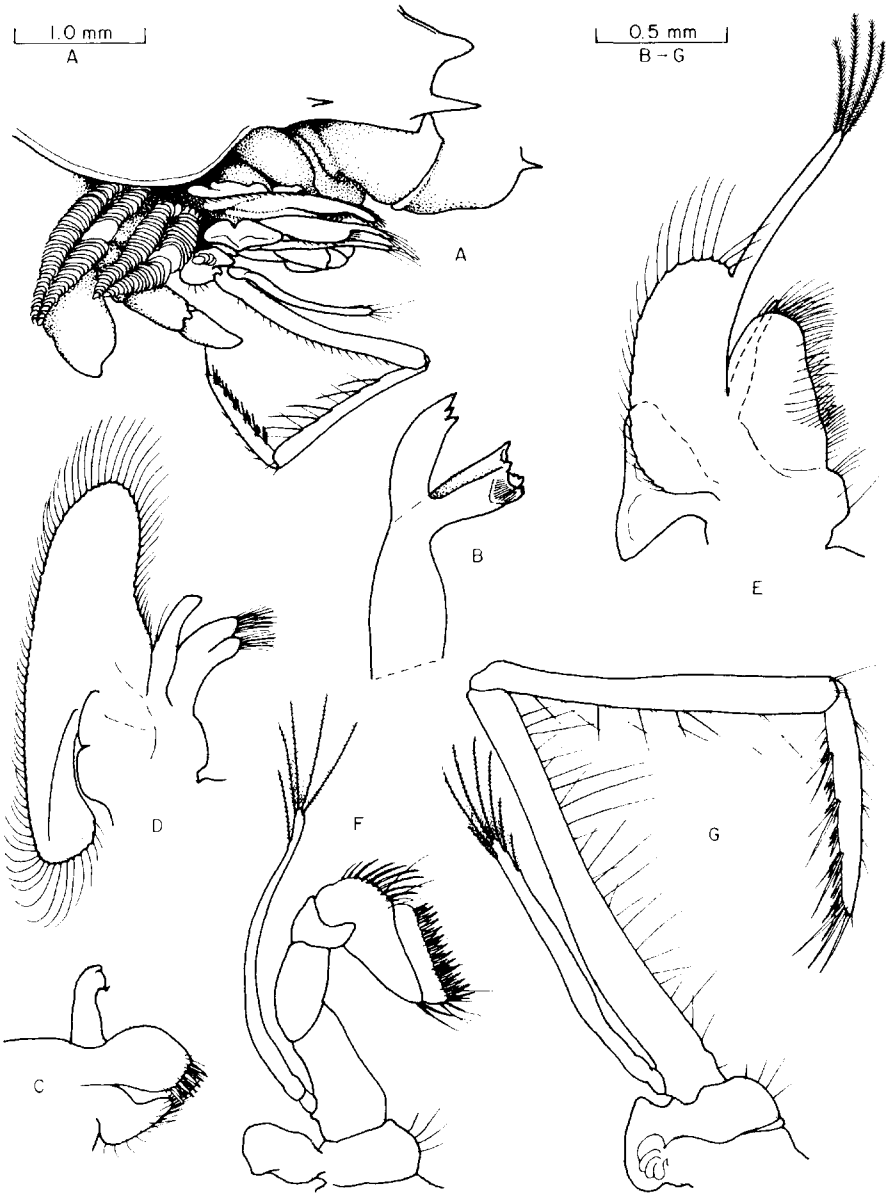

Figure 7. *Periclimenes psamathe* (De Man). A, Lateral aspect of mouthparts, with pterygostomial part of branchiostegite removed; B, mandible; C, maxillula; D, maxilla; E, first maxilliped; F, second maxilliped; G, third maxilliped.

eptember 1970. (4) 2♂, 5 ovig.♀, north-west coast of Nosy Bé, 10 September 970. (5) 1♂, 2♀, Baie d'Ampasindava, Nosy Tanga, 29 October 1970. (6) 1♂, ♀, Baie d'Ampasindava, Nosy Tanga, 29 October 1970. (7) 3 ovig.♀, 4♀, Baie 'Ampasindava, Nosy Tanga, 29 October 1970. (8) 1 juv. north-west coast of Nosy Bé, 30 October 1970. Coll. P. Laboute.

Hosts. Hosts include *Morchellana gilva* (Henderson) (Nephtheidae, Gorgoncea) (1, 8) and *Acalycigorgia densiflora* (Kukenthal and Gorzansky) (Acantho-

gorgiidae) (2), both new host records. The other specimens were from unidentified antipatharians.

Remarks. The 64 specimens obtained from alcyonarian, gorgonian and antipatharian hosts clearly establish the association of this shrimp with those coelenterates. *P. psamathe* was first reported in association with the gorgonian *Mopsella ellisi* Hickson by Bruce (1970), but most of the other records have been of isolated specimens collected without information concerning associations.

The Madagascar specimens range from juveniles with a carapace length of 1.0 mm to adult males and females, with carapace lengths of 4.1 and 3.9 mm respectively. The rostral dentition is generally 6/0. Three specimens had damaged rostra and one male and one female were provided with 7/0 rostral teeth.

Periclimenes psamathe is of particular interest on account of the isolated systematic position it occupies in the genus, without any close relatives, except possibly *P. antonbruunii* Bruce. The very long slender up-curved rostrum, far exceeding the antennular peduncle and devoid of ventral teeth, is most characteristic. The curved postrostral teeth of the carapace with their small ventral serrations, are also unusual in the Pontoniinae, although they are also known in the palaemoniinid shrimps *Leander urocaridella* Holthuis and *Leandrites cyrtorhynchus* Fujino & Miyake.

The mouthparts of this species have not been fully described. The mandible is robust and without a palp. The molar process is stout, with the anterior aspect concave. The distal end is subquadrate, with a large tooth at each corner. The lateral aspect bears a fringe of setae distally and a smaller group of setae is present on the posterior margin. The incisor process is strongly developed with three acute teeth distally, of which the lateral tooth is the largest and the central tooth the smallest. The maxillula bears a feebly bilobed palp. The larger lower lobe is rounded and bears a small short hooked seta. The upper lacinia is short and broad and bears four stout simple spines distally with numerous robust setae. The lower lacinia is short, slender and tapering distally, with three long simple terminal spines and numerous simple setae. The maxilla has a stout palp with a single seta on the proximal lateral margin. The distal endite is well developed, with two subequal distal lobes, the proximal lobe bearing about nine simple terminal setae and the distal lobe 15 similar setae. The proximal endite is absent and the medial border is rounded proximally. The scaphognathite is well developed, narrow, about three times longer than broad. The first maxilliped has a long slender non-setose palp that extends beyond the distal margin of the basal endite which is broadly rounded distally, with a slightly sinuous medial border bearing numerous slender finely serrulate setae. The coxal endite is slightly produced and sparsely setose, separated by a distinct notch, from the basal endite. The exopod is well developed with a slender flagellum with four plumose terminal setae. The caridean lobe is large and extends anteriorly beyond the margin of the basal endite. The epipod is well developed, triangular in shape and not bilobed. The second maxilliped shows no special features. The dactylar segment is narrow and provided with several rows of short, finely denticulated spines along its medial aspect, with a ventral row of longer and more slender spines. The propod is broad, with a rounded anterior border with nine long finely serrulate spines. The carpus, merus and

ischio-basis are normal. The exopod is slender, with five plumose setae distally. The coxa is broadly rounded medially, with a few simple setae, and bears a subrectangular epipod, without a podobranch, on its lateral aspect. The endopod of the third maxilliped is slender and extends to about the middle of the carpocerite. The ischio-merus is completely fused with the basis, the junction being marked by a small notch near the proximal end of the medial border. The segment is about 8.5 times longer than wide and tapers gradually distally. The medial border is sparsely provided with long simple setae. The penultimate segment is about 0.8 of the length of the antepenultimate segment and is armed with longer, very feebly setulose setae along the medial border, with some groups of short setae disto-laterally. The terminal segment is slender and tapering, equal to about half of the length of the antepenultimate segment. The medial border is armed with six groups of short stout densely denticulate spines and some long feebly denticulate setae. The terminal seta is simple. The exopod is slender with seven plumose setae distally. The coxa is rounded medially and feebly setose, with a well developed epipod laterally, with a subacute distal border, and a small multilamellar arthrobranch.

The sternites of the second to fifth thoracic segments are broad and unarmed but the fifth bears a shallow transverse ridge posteriorly, with a small subquadrate notch. The eighth sternite is also unarmed. The coxa of the first pereiopods is not provided with a medial setose process.

The mouthparts of *Periclimenes psamathe* are typical of the genus *Periclimenes* Costa and closely resemble those of *P. amethysteus* Risso (Holthuis, 1952), rather than those of *P. lutescens* auct. (Holthuis, 1952). Both these species are now known to be commensally associated with coelenterates, the former with actinians (Dr B. Svoboda, *in litt.*) and the latter with corals of the genus *Acropora* (Bruce, 1973). The main differences in the mouthparts are that in *P. psamathe*, the epipod of the first maxilliped is not bilobed as in *P. amethysteus*, and that the palp is without a terminal seta. Also the exopods are less well provided with setae distally. In comparison with *P. lutescens*, the upper lacinia of the maxillula is broad and the lower lacinia narrow; the maxilla has the palp more elongated and the scaphognathite much less broadened; the first maxilliped has the palp much less reduced, with a less elongated basal endite and a much less reduced caridean lobe and the epipod is not bilobed. The second maxilliped has the two distal segments less elongated and the other segments less broadened. The exopods are again much less densely setose distally. *P. psamathe* also resembles *P. amethysteus* in the absence of a median process on the fourth thoracic sternite, which is conspicuous in *P. lutescens* (pers. obs.).

Distribution. Type locality, Ternate, Indonesia. Also reported from Amboina, Indonesia, between Misool and New Guinea, and from Noumea, New Caledonia. In the Indian Ocean, this species has been recorded previously from the Maldive Islands and the Chagos Archipelago but not from Madagascar.

Periclimenes soror Nobili

Restricted synonymy:

Periclimenes soror Nobili, 1904: 232; 1906: 50, pl. 2, fig. 6. Gordon, 1939: 395-400, figs 1-3. Jacquotte, 1964: 180-181. Monod, 1971: 183, fig. 81. Hipeau-Jacquotte, 1973: 104, fig. 5. Bruce (in press).

Material examined. (1) 1 ovig.♀, Trois Frères, Nosy Bé, Madagascar. Stn. 117, 13°25.7'S, 48°20.2'E, 3 m, 28.0°C, 11 July 1971, coll. A. J. Bruce. (2) 4 ovig.♀, Nosy Bé, Madagascar, March 1972, coll. M. Chavanne.

Hosts. Culcita schmiedeliana (Retzius) and unidentified asteroids.

Remarks. The specimens are quite typical and present no special features. *P. soror* has been previously recorded from Tulear, Madagascar by Jacquotte (1964) and Monod (1971).

Distribution. Type locality, Djibouti. Common throughout the Indo-West Pacific region. Also recorded from Kenya and the Seychelles, Comoro and Chagos Islands, Indonesia, New Caledonia, the Australian Great Barrier Reef to Hawaii. It has also been recently found to occur in the eastern Pacific region at Panama.

Periclimenes incertus Borradaile

Restricted synonymy:

Periclimenes (*Cristiger*) *incertus* Borradaile, 1915: 210, 1917, 364, pl. 53, fig. 7.

Periclimenes (*Periclimenes*) *impar* Kemp, 1922: 140 (Key), 147-149, figs 16-17, pl. 3, fig. 1.

Material examined. (1) Tany Kely, NW Madagascar, 23 m, 30 Sept. 1970, coll. P. Laboute. (2) 30 spms, Trois Frères, Nosy Bé, Madagascar, 13°25.7'S, 48°20.2'E, F. R. V. *Manihine* Cr. 328, Stn 117, #1525, 3 fm, 28.0°C, 11 July 1971, Coll. A. J. Bruce.

Host. The Trois Frères specimens were all collected from the surface of a single specimen of sponge, *Siphonochalina* sp. (Haplosclerida; Porifera).

Remarks. The specimens agree closely with the description provided by Kemp (1922). The Trois Frères specimens were found on the same host that also had in association specimens *Thaumastocaris streptotus* and *Gelastocaris paronae* Nobili. The characteristic shape of the ischium, basis and coxa of the first pereiopods, as illustrated by Kemp (fig. 17a) is clearly discernible.

Distribution. Type locality, Maldive Islands. Also known from Aden, Ceylon, Andaman Islands, Lesser Sunda and Aru Islands.

Periclimenes nilandensis (Figs 8 to 9)

Periclimenes (*Falciger*) *nilandensis* Borradaile, 1915: 211; 1917: 324, 372, pl. 54, fig. 13.

Periclimenes (*Ancylocaris*) *nilandensis* Kemp, 1922: 172.

Periclimenes (*Harpilius*) *nilandensis* Holthuis, 1952: 12, 58-60, fig. 22.

Material examined. (1) 3♂, 4♀, 20 ovig.♀, 1 juv. (2) 1♂, 1 ovig.♀; NW coast near Nosy Bé. 10 September 1970. Coll. P. Laboute. (3) 229 spms including 88 ovig.♀. (4) 5 juv., Baie d'Ampasindava, Nosy Tanga, 29 September 1970, coll. P. Laboute.

Description. The specimens agree closely with the information provided by Holthuis (1952). In a sample of 30 specimens, the rostal dentition varied from 8-10/3-5, with most specimens having 9-10/4. The most posterior dorsal tooth is situated on the carapace well behind the posterior margin of the orbit and

the second tooth is either over the margin or slightly posterior to it. The antero-ventral region of the carapace is provided with numerous long setae.

The mouthparts of *P. nilandensis* have not been fully described. The mandible is robust and without a palp. The molar process is stout, expanded distally, with blunt anterior and posterior teeth and a truncated dorsal tooth, with an isolated angular tooth ventrally. There are no noticeable patches of setae. The incisor process is also broad and stout, with three acute teeth distally, of which the lateral is the largest. The maxillula has a bilobed palp with a slender upper lobe. The lower lobe bears a small short hooked seta

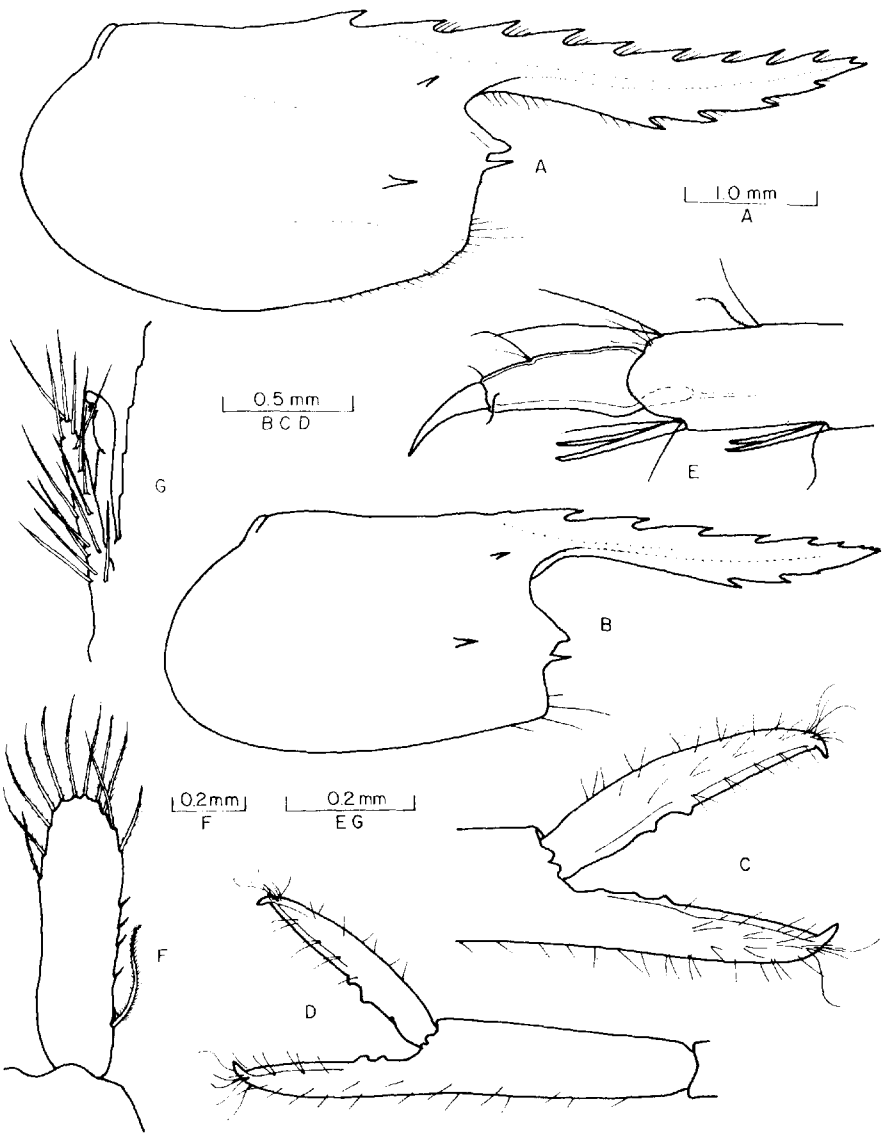

Figure 8. *Periclimenes nilandensis* Borradaile. Carapace and rostrum: A, adult; B, ?post-larval juvenile; C, fingers of major chela of second pereiopod; D, fingers of minor chela of second pereiopod; E, dactyl of third pereiopod; F, endopod of male first pleopod; G, appendix masculina and appendix interna of male second pleopod.

posteriorly with a longer seta medially. The upper lacinia is narrow with eight stout, finely serrate teeth distally. The lower lacinia is short, stout and tapering with numerous slender setae distally and ventrally. The maxilla has a slender tapering non-setose palp. The basal endite is bilobed, with the distal lobe distinctly larger than the proximal, each bearing about 12 fine distal setae. The coxal endite is lacking, its position indicated by a rounded eminence. The scaphognathite is broad, especially the posterior lobe, and is about 2.5 times

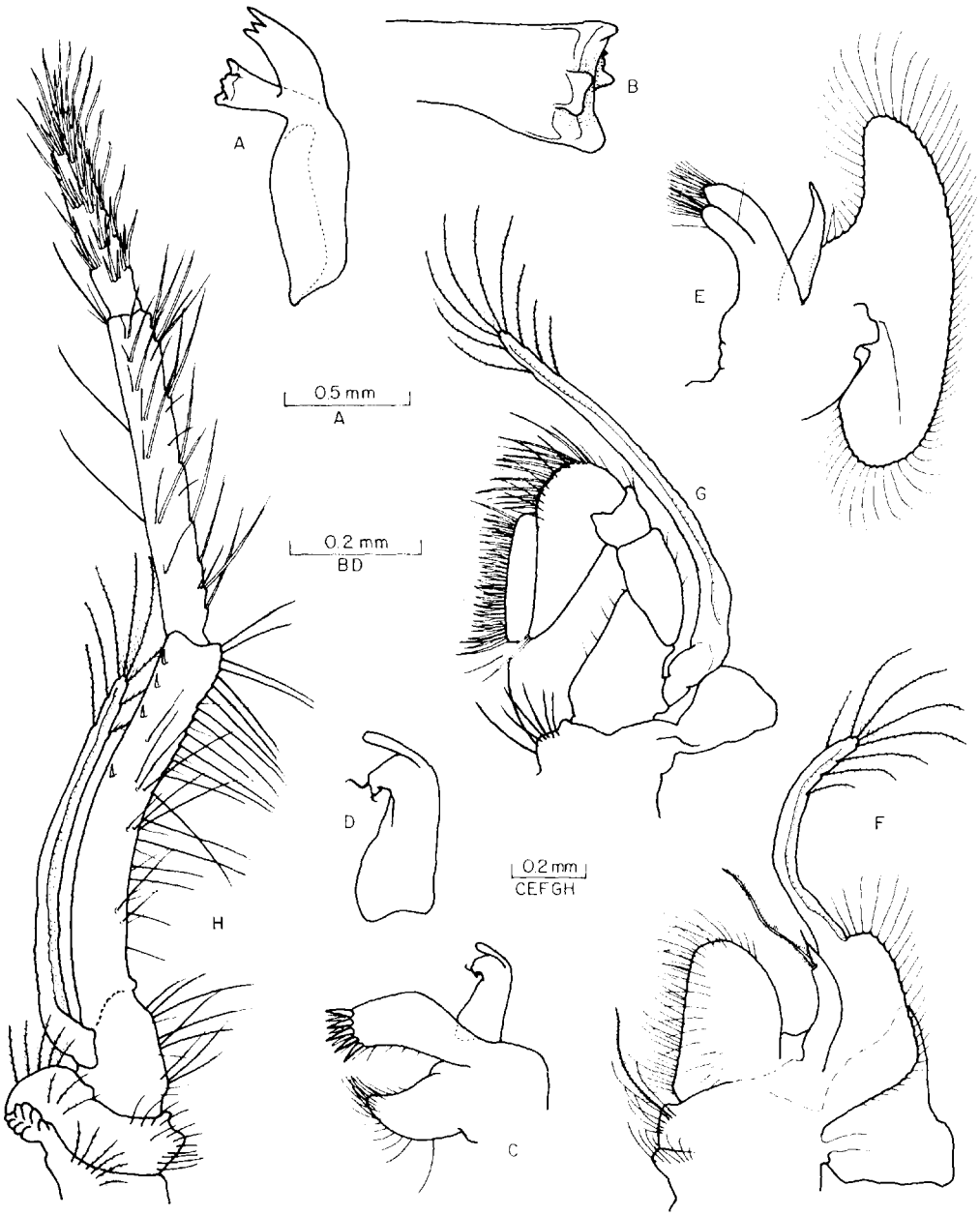

Figure 9. *Periclimenes nilandensis* Borradaile. A, Mandible; B, molar process; C, maxillula; D, palp of maxillula; E, maxilla; F, first maxilliped; G, second maxilliped; H, third maxilliped.

longer than wide. The first maxilliped has a slender palp that tapers to an acute point bearing a short simple seta. The medial border of the palp bears a long densely plumose preterminal seta. The basal endite is remote from the base of the palp and about 1.7 times longer than wide, with a rounded anterior margin and straight medial border, both with numerous slender simple setae. A distinct notch separates the coxal and basal endite and the lower part of the medial border is also produced, bearing a transverse row of short stout setae on the ventral surface. The upper part also bears an oblique row of longer setae with a single long stout setulose seta. The exopod bears a small caridean lobe and a large, feebly bilobed epipod is also present. The second maxilliped is of normal form. The dactylar segment is narrow, about four times longer than wide, with dense rows of finely serrulate spines along the medial border. The propodal segment is broad, strongly rounded anteriorly with numerous long slender setulose spines. The carpus, merus and ischio-basis are normal. The coxa is slightly produced, with a row of long strong setae. The epipod is small and simple, without a podobranch. The third maxilliped is slender with the ischio-merus largely fused to the basis but the suture is visible and indicated by a small protuberance on the proximal medial border. The ischio-merus is about eight times longer than broad, strongly bowed and not tapering distally. The medial border bears many long slender simple setae, most numerous and longest distally, with a few groups of setae on the ventral aspect. The distal part of the lateral border bears 3-4 small isolated spines. The penultimate segment of the endopod is slender, feebly tapering distally, about seven times longer than broad and slightly shorter than the ischio-merus. The medial border bears numerous robust setae, with similar setae also present ventrally. The terminal segment is two thirds of the length of the penultimate and tapers distally to a stout simple spine. It is densely provided with numerous groups of robust finely serrulate spines, longest along the ventro-medial border. The basis has the medial border slightly produced, bearing several long slender setae. The coxa is also angularly produced medially and setose. A well developed rounded epipod, with plumose marginal and ventral setae, is present laterally and a small multi-lamellar arthrobranch is distinct. The exopods of the maxillipeds are well developed with broad flagella, with 8-9 plumose setae distally.

The fourth thoracic sternite bears a distinct acute median ventral spine. The first periopods present no special features. The second pereiopods are nearly all detached. In the few specimens where both second pereiopods are still present, one is usually distinctly larger than the other but the general morphology is similar. In some small specimens the second pereiopods were subequal. The minor chela is generally about the same length as the palm of the major chela.

The dactylus of the ambulatory pereiopods is robust and simple. The unguis is distinct from the corpus and is nearly three times longer than wide at the base. The corpus is 2.5 times longer than wide, feebly tapering, with a concave ventral border. The dorsal margin bears a pair of setae at 0.6 of its length, one well developed, the other short and slender. The propodus bears several spines ventrally, the disto-ventral and preceding groups consisting of paired long slender spines, the other spines being single.

The endopod of the first pleopod is about three times longer than broad, uniform in width, distally rounded and without any medial lobule. The distal third bears eleven short sparsely plumose setae. The central part of the medial

border bears a few short curved spines and a single plumose seta arises from the proximal part. On the second pleopod the appendix masculina is slightly exceeded by the appendix interna. The appendix masculina is about seven times longer than broad and bears about fifteen subequal spines in longitudinal rows along its dorsal aspect.

A very small juvenile, probably the first post-larval stage, has the rostrum distinctly exceeding the post-orbital carapace length, with eight dorsal spines all situated well in advance of the posterior orbital margin, and three ventral spines. The supra-orbital spine is distinct and the antennal spine is similar to the adult, but the hepatic spine is situated above the level of the antennal spine. The antero-ventral angle of the carapace bears a few long setae.

Hosts. All specimens were obtained from unidentified antipatharians.

Remarks. The present collections clearly establish that *Periclimenes nilandensis* is an associate of antipatharian hosts. It appears to be only distantly related to the other species of *Periclimenes* that have been found in association with these hosts. The mouthparts show a close resemblance to those found in the predatory "*P. grandis* group", and this relationship is also supported by the presence of a median ventral sternal spine on the fourth thoracic sternite and the type of dactylus on the ambulatory pereiopods.

In comparison with the mouthparts of *Periclimenes grandis* (Stimpson) the mandible is similarly robust, but the incisor process is relatively longer and more slender. The occlusal surface of the molar process is similarly truncate with large blunt teeth. The maxillulae in both species have a well produced upper lobe to the palp, with the upper lacinia narrow and the lower laciniae are of the same rather short blunt shape. The maxillae show little evidence of specialization. The scaphognathite in both is rather broad, and the distal lobe of the basal endite is longer than the proximal. The first maxillipeds are of particular similarity. The palp is slender, distally acute, with a long densely plumose preterminal medial seta. The basal endite is clearly separated from the coxal endite, which shows some indication of division into two lobes. The caridean lobe is small, but the epipod is large and triangular, very feebly bilobed. The second maxillipeds are similar but show no special features. The medial border of the coxa is produced and strongly setose in both species. The endopods of the third maxillipeds are long and slender, densely provided with numerous long slender spines, particularly the two distal segments. The ischio-merus is distinct from the basis, and the disto-lateral half of its border is spinose. The coxa is produced medially and setose. Medially a relatively large rounded epipod is present and a small functional arthrobranch. The exopods of the maxillipeds have broad flagella with more than the minimal terminal four plumose setae. In these respects *P. nilandensis* shows considerable affinity with *P. grandis* and contrasts strongly with *P. perlucidus* and *P. granulimanus* with *P. psamathe* occupying an intermediate position.

Periclimenes nilandensis differs from the other members of the "*P. grandis*" group, as defined by Kemp (1922) in the broader antennal scale and the absence of a disto-ventral spine on the merus of the second pereiopod. The species is also remarkable for the presence of a series of conspicuous melanophones, which are persistent in preserved material, along the ventral aspect of the abdomen of all specimens.

Distribution. Type locality, South Nilandu Atoll, Maldive Islands. The only

other records are from Sumbawa, Flores and Salamoke Islands, Indonesia. Not previously recorded from East Africa.

Periclimenes alcocki Kemp (Fig. 10)

Periclimenes (Periclimenes) alcocki Kemp, 1922: 141 (key), 154-156, figs 21-24. Kubo, 1940: 33-35, figs 1-2. Holthuis, 1952: 8.

Material examined. 1♀, off Cape Amber, Madagascar, 12° 34′S, 40° 15′E, 13 September 1972, coll. A. Crosnier, P3, chalutage (trawling) 31.

Habitat. No data, depth 395 m.

Remarks. The single specimen has a post-orbital carapace length of 7.4 mm. The rostrum is generally similar to those shown in the figures of Kemp and

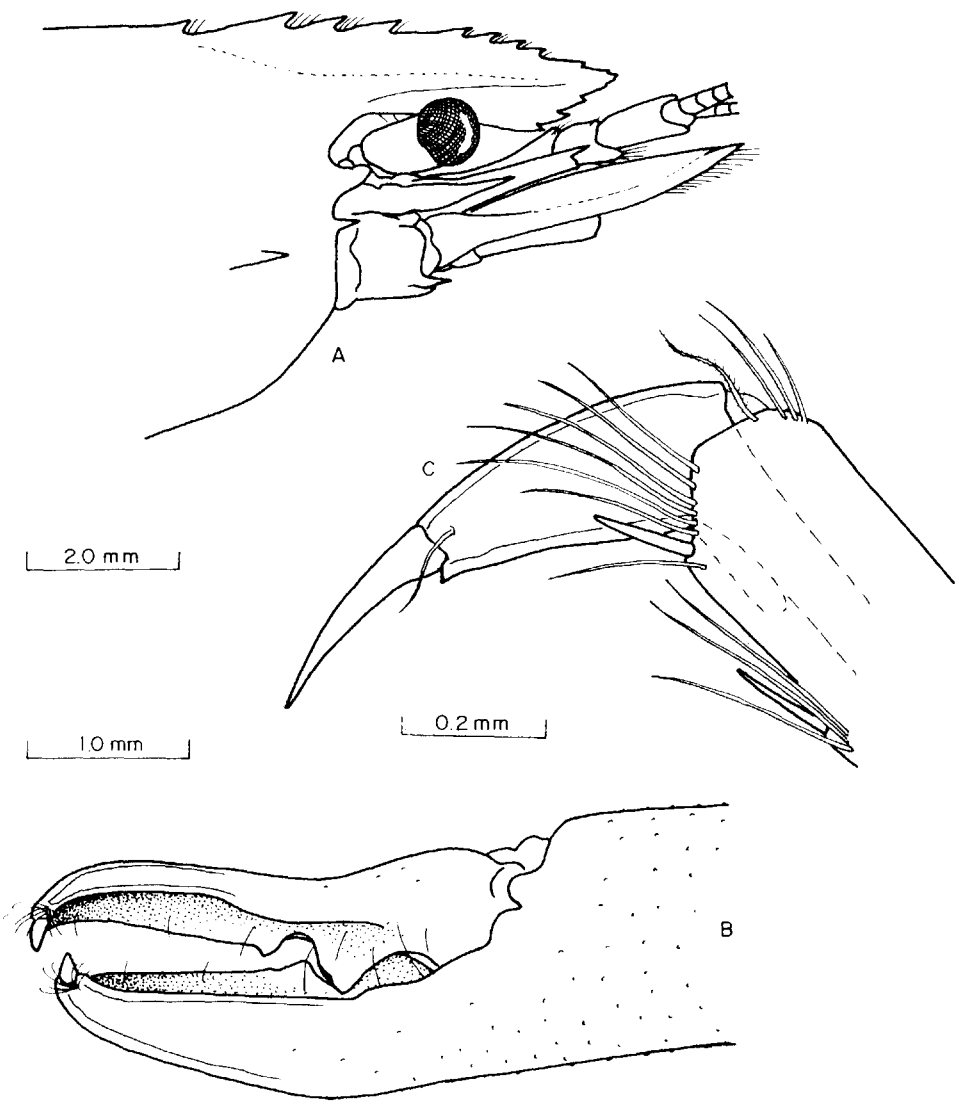

Figure 10. *Periclimenes alcocki* Kemp. A, Anterior carapace and antennae; B, fingers of second pereiopod; C, dactyl of third pereiopod.

Kubo but is shorter, slightly exceeding the intermediate segment of the antennular peduncle and not exceeding the distal segment as in the previously described material, and the distal part of the lamina is distinctly deeper than in those specimens. The tip of the rostrum extends a little beyond the intermediate segment of the antennular peduncle and the dentition is 10/3, with two teeth situated on the carapace. The two distal dorsal teeth are very small. The cornea also appears distinctly larger than in Kemp and Kubo's material. Other small differences are also noticeable but are not considered to amount to specific value, although discovery of further material may indicate that the present specimen should be referred to a separate species. The telson in the present specimen bears only three pairs of lateral dorsal spines instead of four as in the previously described specimens. Also the dactyl of the third pereiopod bears only a very small accessory spine, which can not be discerned on the fourth and fifth pereiopods. As reported by Kemp, the body of the shrimp is rather soft and membraneous, and does not appear to be the result of a recent ecdysis.

Distribution. Type locality, the Laccadive Sea, at 743 m. The only other record of this species is from Kumano-nada, Mie Prefecture, Japan, at 310 m.

Periclimenes diversipes Kemp.

Restricted synonymy:

Periclimenes (*Ancylocaris*) *diversipes* Kemp, 1922: 170 (key), 179-184, figs 36-39.

Periclimenes (*Harpilius*) *diversipes* Holthuis, 1952: 11.

Periclimenes diversipes Bruce, 1971: 2, 9-10; 1972: 403, 405, 408-410, 413 (key); 1972: 93.

Material examined. 2 ovig.♀, Trois Frères, Nosy Bé, 13° 12.5'S, 48° 20.2'E. F. R. V. *Manihine*, Cruise 328, 11 July 1971, coll. A. J. Bruce.

Host. Galaxea clavus (Dana) (Scleractinea) from 3 fm.

Remarks. The specimens show no special features. Both specimens have a rostral dentition of 6/0, with second pereiopods belonging to Kemp's *a d* types. The dactyls are distinctly longer and more slender than those illustrated by Kemp's fig. 39c, being about 0.42 of the length of the propodus in the case of the third pereiopod. In Kemp's description the dactylus is reported to vary from one third to one fourth of the propod length.

Periclimenes diversipes has been reported in association with a wide variety of coral hosts and has been previously found in association with *Galaxea clavus*.

Distribution. Type locality, Kilakarai, Gulf of Manaar. Also known from Ghardaga, Red Sea; Aden; Maziwi Island, Tanzania; Mayotte, Comoro Islands; Port Blair, Andaman Islands and the Australian Great Barrier Reef. Not previously recorded from Madagascar.

Periclimenes lanipes Kemp (Fig. 11)

Periclimenes (*Periclimenes*) *lanipes* Kemp, 1922: 156-158, pl. 4, fig. 4. Holthuis, 1952: 9.

Periclimenes lanipes Bruce, 1971: 2, 9. 1971a: 11-15, figs 3, 4, 5c-d.

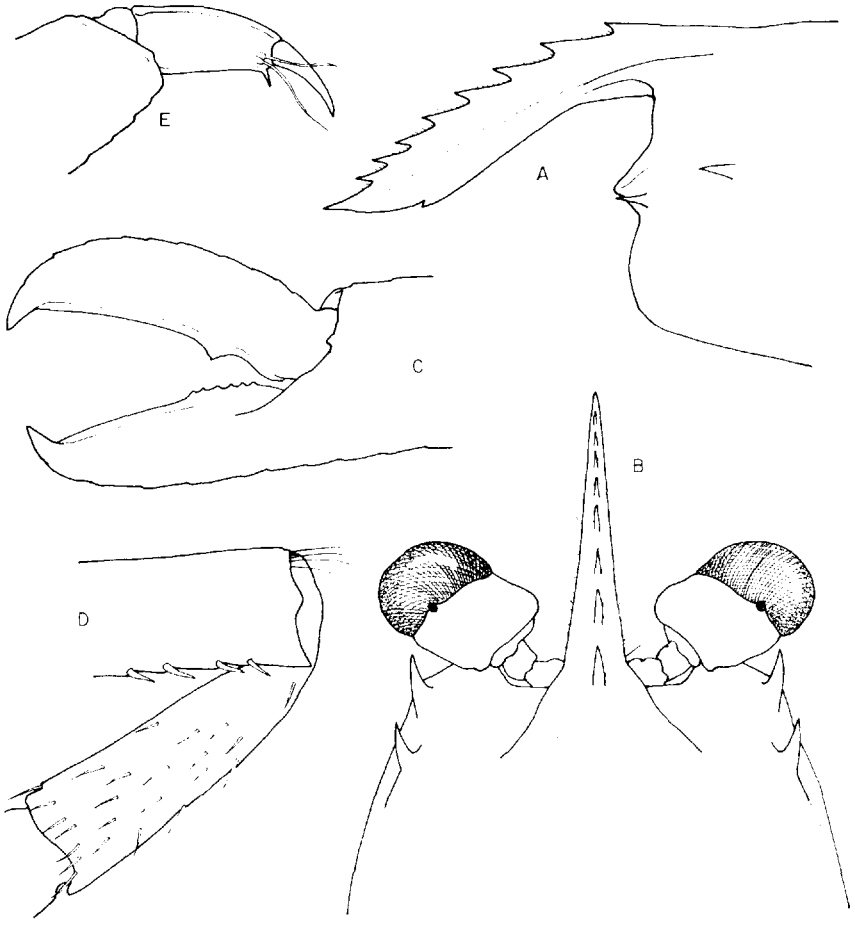

Figure 11. *Periclimenes lanipes* Kemp. A, Anterior carapace and rostrum lateral aspect; B, dorsal aspect; C, fingers of chela of second pereiopod; D, carpo-meral region of third pereiopod; E, dactyl of third pereiopod, setae of propod omitted.

Material examined. 1♂, NW coast of Madagascar, 12°44.5'S, 48°25.2'E, trawl, 73 m, 2 August 1973, coll. A. Crosnier.

Remarks. The single specimen is provisionally referred to Kemp's species but a number of points of difference, which may be of specific value, have been noted.

The rostrum is generally similar to Kemp's material in lateral view, with eight dorsal and a small ventral tooth. In dorsal view the lateral lamina of the rostrum is well developed but not nearly as broad as in the Australian specimens illustrated by Bruce (1971), in which the bases of the eyes are concealed. Kemp's illustration shows a well developed orbit, which is not apparent in the present specimen. A further point noted by Kemp was that hepatic and antennal spines were in the same horizontal level. In the present specimen, the hepatic spine is situated at a distinctly higher level.

In the Australian specimens the coxa of the first pereiopod bears a conspicuous medial process that is lacking in the Madagascar specimen. Kemp states that, in the second pereiopods, the fingers close with a scissor-like action.

This does not appear to occur in the present specimen. In this specimen, on the major pereiopod, the dactylus bears a small acute tooth, and the proximal part of the cutting edge of the fixed fingers bears a row of six very small teeth. There is no fossa to house the acute dactylar tooth and the cutting edges meet without shearing. The other second pereiopod is much smaller, similarly but more feebly armed on the fingers, and is possibly in the course of regeneration.

Kemp has remarked upon the small spines present disto-ventrally on the merus of the ambulatory pereiopods proximal to the acute disto-ventral angle. In the Madagascar specimen each of these appendages bears four such spines. The carpus bears numerous spiniform setae laterally and similar setae are also numerous on the propods, especially among the longer slender setae along the ventral border. The longer setae are not particularly woolly. The dactylus is slender with a distinct slender unguis, equal to about 0.6 of the length of the corpus, which bears a short, very slender, acute preterminal accessory spine.

Periclimenes lanipes has previously been reported in association with gorgonocephalid ophiuroids of the genera *Astroboa*, *Astroglymna* and *Euryale*. The host of the present specimen was not recorded.

Distribition. Type locality, Mergui Archipelago, 12°48.0'N, 98°16.10'E. Otherwise recorded only from Mozambique; Ras Binnah, Somalia and off eastern Queensland, Australia.

Periclimenes imperator Bruce

Restricted synonymy:

Periclimenes imperator Bruce, 1967: 87: 53-62, figs 23-35. 1971: 2, 10-11.

Material examined. 1♂, Mitsio, Madagascar, June 1950, coll. A. Crosnier.

Remarks. The single specimen, a paratype, has been previously reported upon in the original description of the species. The specimen has 26 teeth along the dorsal rostral margin and has one disto-lateral tooth on the proximal segment of the antennular peduncle and two on the other.

The host of the presnt specimen was not recorded but most adults have been found in association with the nudibranch *Hexabranchus marginatus* Quoy & Gaimard. Other hosts include the nudibranch *Dendrodoris* sp. and the holothurian *Stichopus chloronotus* Brandt.

Distribution. Type locality, Zanzibar. Also recorded from the Red Sea, Mozambique, Comoro Islands, Seychelle Islands, Australia, New Caledonia, Loyalty Islands and Hawaii.

Periclimenes perlucidus Bruce (Figs 12 to 15)

Periclimenes perlucidus Bruce, 1969: 268-270.

Material examined. (1) 1♀, damaged, Nosy Iranja, 28 m, 27 June 1969. (2) 1 ovig.♀, 2 juv., NW coast near Nosy Bé, 30 m, coll. P. Laboute., 10 September 1970. (3) 32 spms, including 7 ovig.♀, extensively damaged, Tany-Kely, NW coast near Nosy Bé, 23 m, coll. P. Laboute, 10 September 1970. (4) 2♂, 3 ovig.♀, NW coast near Nosy Bé, 35 m, coll. P. Laboute, 30 October 1970. (5) 3♂, 2 ovig.♀, NW coast near Nosy Bé, 35 m, coll. P. Laboute, 30 October 1970.

Description. The rostrum is straight, with a deeper lamina in males than in females, and, in non-juvenile specimens, is longer than the post-orbital carapace

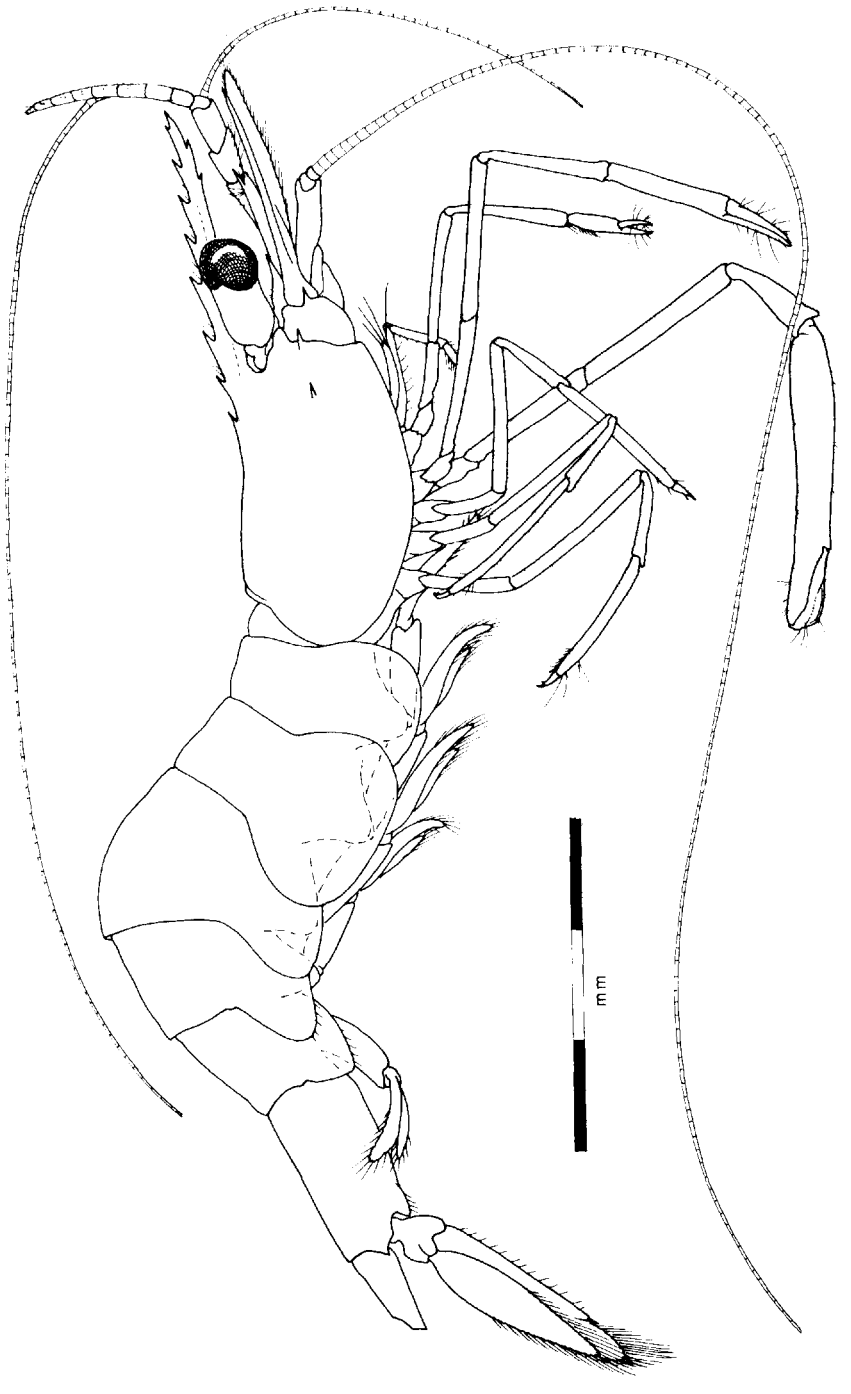

Figure 12. *Periclimenes perlucidus* Bruce, adult male.

length, generally also exceeding the antennular peduncle. The rostral dentition is variable with more numerous teeth in the female. The rostra of many specimens are damaged but in the intact specimens the males vary from 7-8/0-2 and the ovigerous females from 8-10/2-3, eight specimens out of 23 having the modal dentition of 8/2. In about half the specimens the epigastric spine is absent, and the dorsal series of teeth commences with the first tooth situated

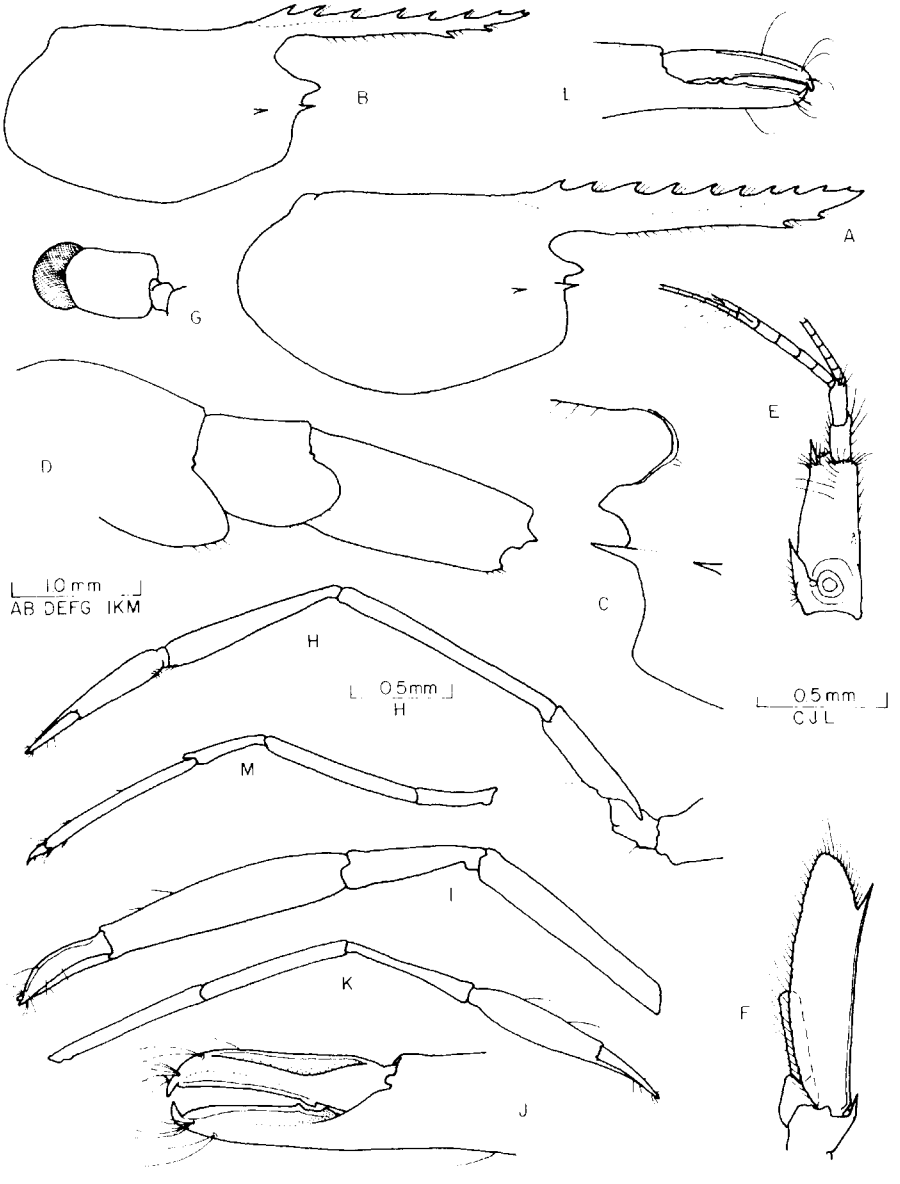

Figure 13. *Periclimenes perlucidus* Bruce. Carapace and rostrum: A, ovigerous female; B, male; C, inferior orbital region; D, fourth, fifth and sixth abdominal segments; E, antennule; F, antenna; G, eye; H, first pereiopod; I, major second pereiopod; J, fingers of chela of major second pereiopod; K, minor second pereiopod; L, fingers of chela of minor second pereiopod; M, third pereiopod.

above the posterior orbital margin. The epigastric spine, when present, is situated at about 0.12 of the carapace behind the orbital margin.

The antennular peduncle has the proximal segment about 2.4 times longer than broad. The stylocerite is acute and does not exceed the half length of the segment. A ventral spine is present half way along the medial border. The

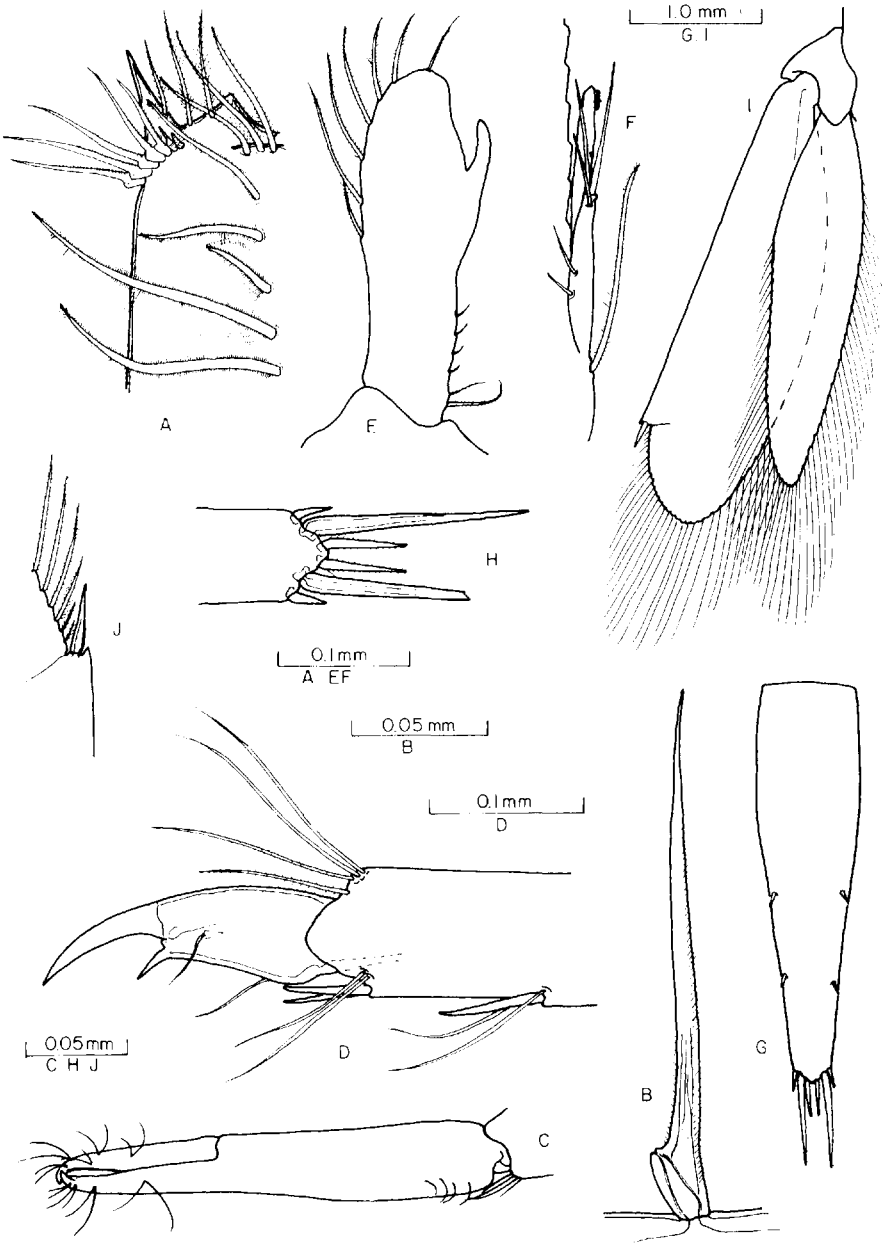

Figure 14. *Periclimenes perlucidus* Bruce. A, Disto-lateral region of proximal segment of antennular peduncle; B, disto-lateral seta from same; C, chela of first pereiopod; D, dactyl of third periopod; E, endopod of male first pleopod; F, appendix masculina and appendix interna of male second pleopod; G, telson; H, terminal telson spines; I, uropod; J, disto-lateral spine of exopod of uropod.

disto-lateral angle is produced and bears a long slender lateral tooth. A transverse row of unusual setae is present on the dorsal aspect of the disto-lateral lobe. These setae are longest laterally, very finely setulose along the median margin with a similar short row of setules proximally on the lateral border, distal to a swelling of the proximal lateral part of the seta. The dorsal surface of the segment also bears several short densely plumose setae dorsally.

The mandible is moderately slender. The palp is lacking and the molar process on the right side has an oblique distal surface with two strong teeth posteriorly, separated by a process with numerous short setae. The anterior aspect bears a large blunt tooth with a dense group of setae on its anterior aspect. The incisor

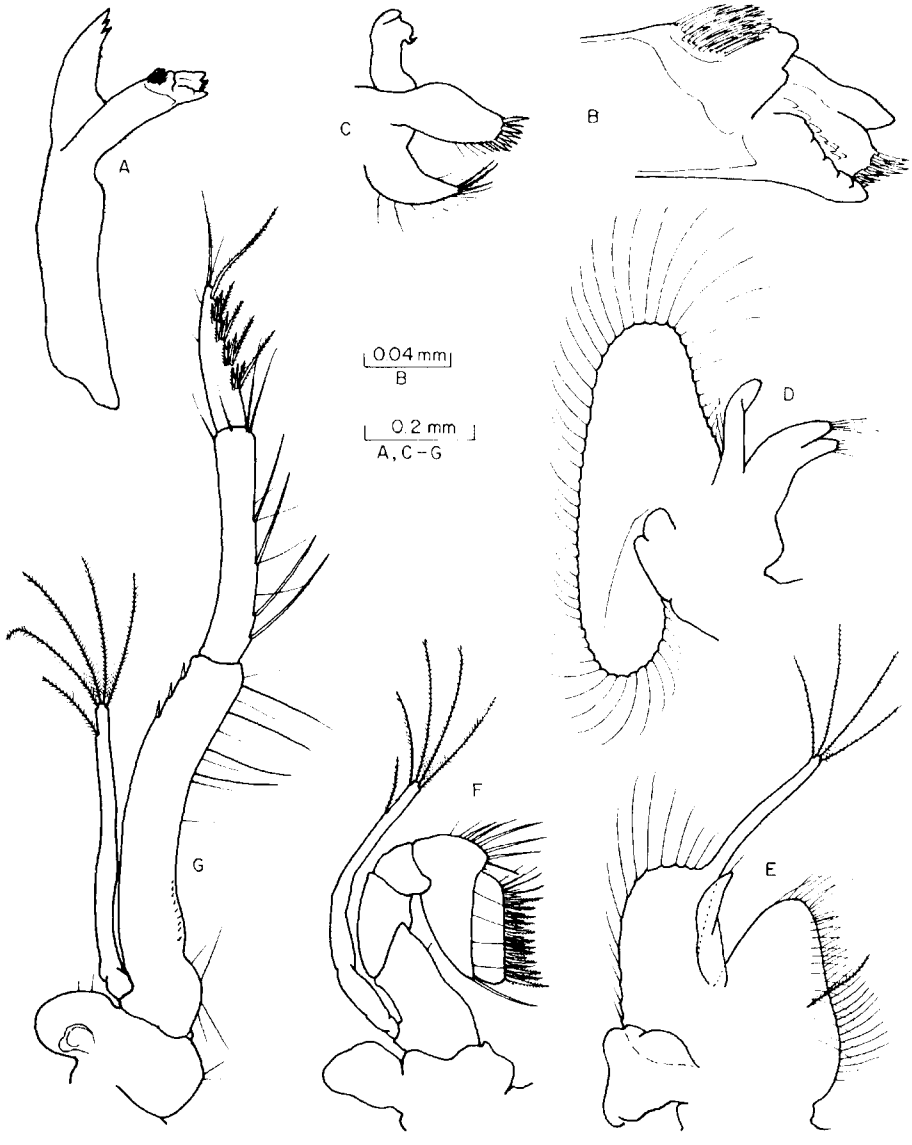

Figure 15. *Periclimenes perlucidus* Bruce. A, Mandible; B, molar process; C, maxillula; D, maxilla; E, first maxilliped; F, second maxilliped; G, third maxilliped.

process is slender with the cutting edge oblique, bearing three acute teeth of which the lateral is the largest. Three minute denticles are also present on the medial border of the incisor process. The maxillula bears a bilobed palp, the lobe having a small hooked seta on its lower border. The upper lacinia is narrow, slightly expanded proximally with nine feebly serrated spines distally and some short setae ventrally. The lower lacinia tapers strongly distally to end in a small group of slender, finely setulose spines. The ventral border is also sparsely setulose. The maxilla has a well developed palp, lacking a terminal or subterminal seta, but with a few plumose setae proximally on its lateral border. The basal endite is well developed, subdivided distally into two subequal lobes, each bearing five slender simple setae. The coxal endite is lacking, its position indicated by a small rounded process. The scaphognathite is well developed, moderately broad centrally and about 2.5 times longer than wide. The first maxilliped has a slender palp with a short simple terminal seta. The basal endite is produced but does not exceed the tip of the palp. The medial border is straight and fused, without a notch, with the coxal endite. The medial border is sparsely provided with finely setulose setae, marginally and submarginally. A single longer stouter, coarsely setulose seta is also present half way along the ventral surface. The flagellum of the exopod is slender with four plumose terminal setae. The caridean lobe is also well developed and extends slightly beyond the tip of the palp. A single epipod is present. The second maxilliped is of normal form. The dactylar segment is densely provided with rows of short stout coarse serrulate spines. The propodal segment is moderately broad and the antero-medial angle bears seven long simple spines, with a similar spine at the postero-medial angle. The carpus, merus and ischio-basis show no special features. The exopod has a slender flagellum with four plumose terminal setae and a short preterminal lateral seta. The coxa is slightly produced medially and bears a small simple epipod, without a podobranch, laterally. The third maxilliped is slender and extends approximately to the middle of the carpocerite. The ischio-merus is completely fused with the basis, but the junction is indicated by a distinct notch of the median border. The segment is bowed, about six times longer than the width of the basis and scarcely tapering distally. The medial border bears a few long slender simple setae distally. The lateral border bears 3-4 small spines distally and a row of short spines is present ventrally on the proximal medial part of the ischial region. The penultimate segment is about 0.6 of the length of the antepenultimate segment, about five times longer than wide, with four long finely serrulate spines on the medial border, together with a few setae. The terminal segment is tapering, about 0.6 of the length of the penultimate segment. Four groups of short, coarsely serrulate setae are present on the medial border, with some longer setae subterminally and a simple terminal seta. The exopod is similar to that of the second maxilliped. The coxa is broadly rounded medially and bears a well developed rounded epipod laterally, with a rudimentary arthrobranch.

The first pereiopods are slender and slightly exceed the tip of the scaphocerite. In the male the carpus is about 1.4 times the length of the chela and in the female, about 1.1. The chela is slender, with the fingers equal to 0.4 of the palm length. The fingers are simple, with entire cutting edges, devoid of teeth. In the male, merus and carpus are subequal, but in the female, the merus is 1.3 times the length of the carpus.

The second pereiopods are largely missing and only one specimen has both present. In this specimen the appendages are markedly unequal. This unequality of the second pereiopods is also apparent among the detached appendages and appears to be the normal conditon. The major second pereiopod has a smooth subcylindrical palm which is about 2.3 times longer than the fingers and tapers gradually distally. The dactylus has a single acute recurved tooth on the proximal part of the cutting edge and a strongly hooked acute tip. The lateral aspect of the dactylus bears a well developed carina. The fixed finger has also a strongly hooked tip and two small acute teeth on the proximal part of the cutting edge. The carpus is about half the length of the palm, slightly more in the female and slightly less in the male, and is moderately expanded distally and unarmed. The merus is about 1.8 times the length of the carpus and is also unarmed. The minor second pereiopod is distinctly smaller than the larger, the whole chela being a little shorter than the palm of the major chela, and much more slender, in both sexes. The palm is about 4.0 times longer than wide and about 1.75 times longer than the fingers. The carpus is slender, feebly expanded distally, slightly longer than the length of the palm in males and slightly shorter in females. The merus is unarmed and 1.2 to 1.3 times longer than the carpus.

The fourth and fifth thoracic sternites are unarmed.

The ambulatory pereiopods are slender. The dactylus is about 0.18 of the length of the propodus. The unguis of the dactylus is distinct from the corpus and is robust and slightly curved. The corpus is compressed, 1.3 times the length of the unguis, and bears a slender acute accessory spine distally. The propodus is about 12 times longer than wide, and bears a pair of spines disto-ventrally with a single longer subterminal spine. Some simple setae and a few feebly plumose setae are present distally and, on the fifth pereiopod, some finely serrulate setae are also present disto-ventrally.

The male first pleopod has a slender endopod, about 4 times longer than wide proximally, slightly expanded distally with a long slender process on the medial border at about two thirds of its length. The distal lateral border bears a row of four short curved spines, with two feebly plumose setae proximally. On the second pleopod, the appendix masculina of the endopod is far exceeded by the appendix interna. The appendix masculina is about six times longer than broad, tapering gradually distally to end with one strong simple spine and a more slender seta. A shorter subterminal seta is also present and two ventral lateral setae are situated at the middle of its length.

The telson and uropods show no special features and are as previously described.

Hosts. Hosts include *Roxasia speciosa* (Kükenthal), *Morchellana gilva* (Henderson) and *M. nova* Tixier Durivault (Nephtheidae; Alcyonacea), all new host records. The holotype was recorded from *Verrucella sanguinolenta* (Grey).

Remarks. The material available is unfortunately in a rather fragmentary state with most appendages detached and many missing. The specimens agree closely in most respects with the original description of the species.

The rostrum shows considerable variation but in none of the specimens does it resemble that found in *P. latipollex* (Kemp, 1922), which is clearly a closely related species found in deeper water. In *P. latipollex* also the chelae of the second pereiopods are equal or subequal. In *P. perlucidus* it appears normal

that these chelae are markedly unequal and in addition the carpus is relatively much longer than in *P. latipollex* in which it is about one fourth or less of the length of the palm. However, in some juveniles the differences between the two second pereiopods and the dactylar flange are much less well marked than in adults.

Distribution. Type locality, the northern South China Sea. There have been no subsequent reports of this species.

Periclimenes granulimanus sp. nov. (Figs 16 to 19)

Material examined. 1 ovig.♀, Tany-Kely, NW coast near Nosy Bé, on grey sand with foraminifera, 30 September 1970, coll. P. Laboute.

Description. A small slenderly built pontoniine shrimp. The rostrum is moderately long, about 0.8 of the post-orbital carapace length and slightly exceeding the proximal segment of the antennular peduncle. The lamina is horizontal, tapering gradually distally and feebly curved. The dorsal border bears several small acute equally spaced teeth, which decrease gradually in size distally. A single small ventral tooth is present, slightly in advance of the most distal dorsal tooth. A slender epigastric spine is present at 0.24 of the post-orbital carapace length. The epigastric spine and the first tooth on the dorsal margin appear feebly articulated. The ventral margin of the rostrum is feebly concave, with plumose setae.

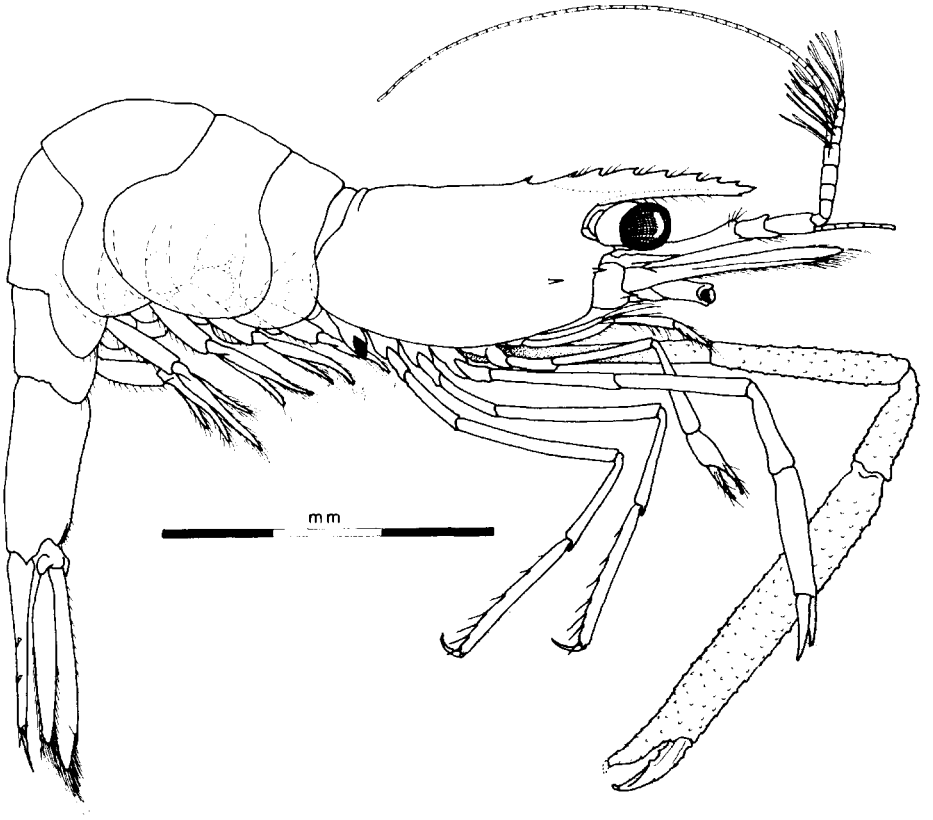

Figure 16. *Periclimenes granulimanus* sp. nov., holotype female.

The carapace is smooth and the orbit is obsolescent. The inferior orbital margin is convex and the superior orbital angle is bluntly produced. Supra-orbital spines are lacking. The antennal spine is slender, acute, submarginal and situated well below the level of the inferior orbital angle. The hepatic spine is slightly larger than the antennal spine and situated at a slightly lower level, corresponding to a position midway between the epigastric and first dorsal rostral spines. The antero-lateral angle of the carapace is not produced and is bluntly subrectangular.

The abdominal segments are smooth. The third segment is not produced in the dorsal midline. The sixth segment is about twice as long as the fifth and 2.3 times longer than deep. The pleura of the first three segments are broadly rounded. The pleuron of the fourth segment is rounded and produced. The pleuron of the fifth segment is feebly produced and bluntly angulated. The

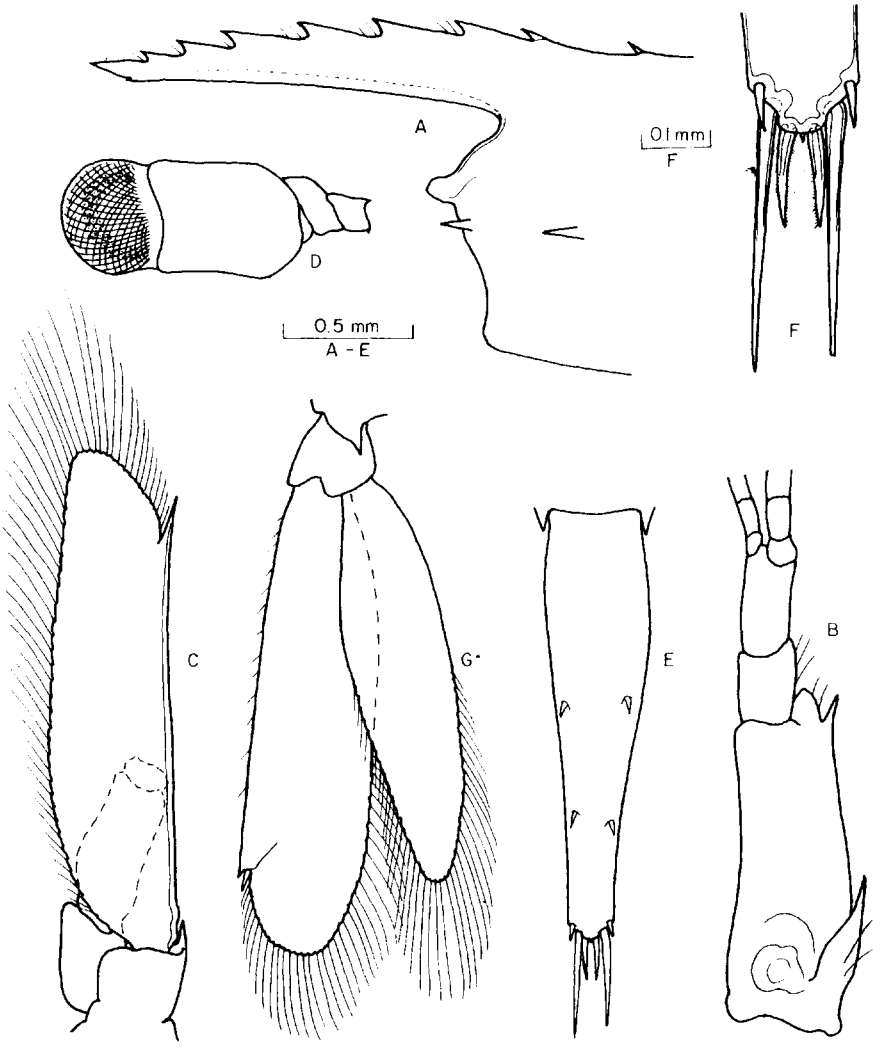

Figure 17. ***Periclimenes granulimanus*** **sp. nov.**, holotype female. A, Anterior carapace and rostrum; B, antennule; C, antenna; D, eye; E, telson; F, terminal telson spines; G, uropod.

posterior ventral angle is blunt but the upper lobe of the posterior lateral angle is acute.

The telson is subequal to the length of the sixth abdominal segment and is four times longer than wide. The anterior third is slightly expanded and the posterior two thirds tapering to an obtuse point. Two pairs of small dorsal spines are present at approximately 0.43 and 0.7 of the telson length. The posterior margin bears a pair of small lateral spines, subequal to the dorsal spines, and a long slender intermediate spine, equal to one quarter of the telson

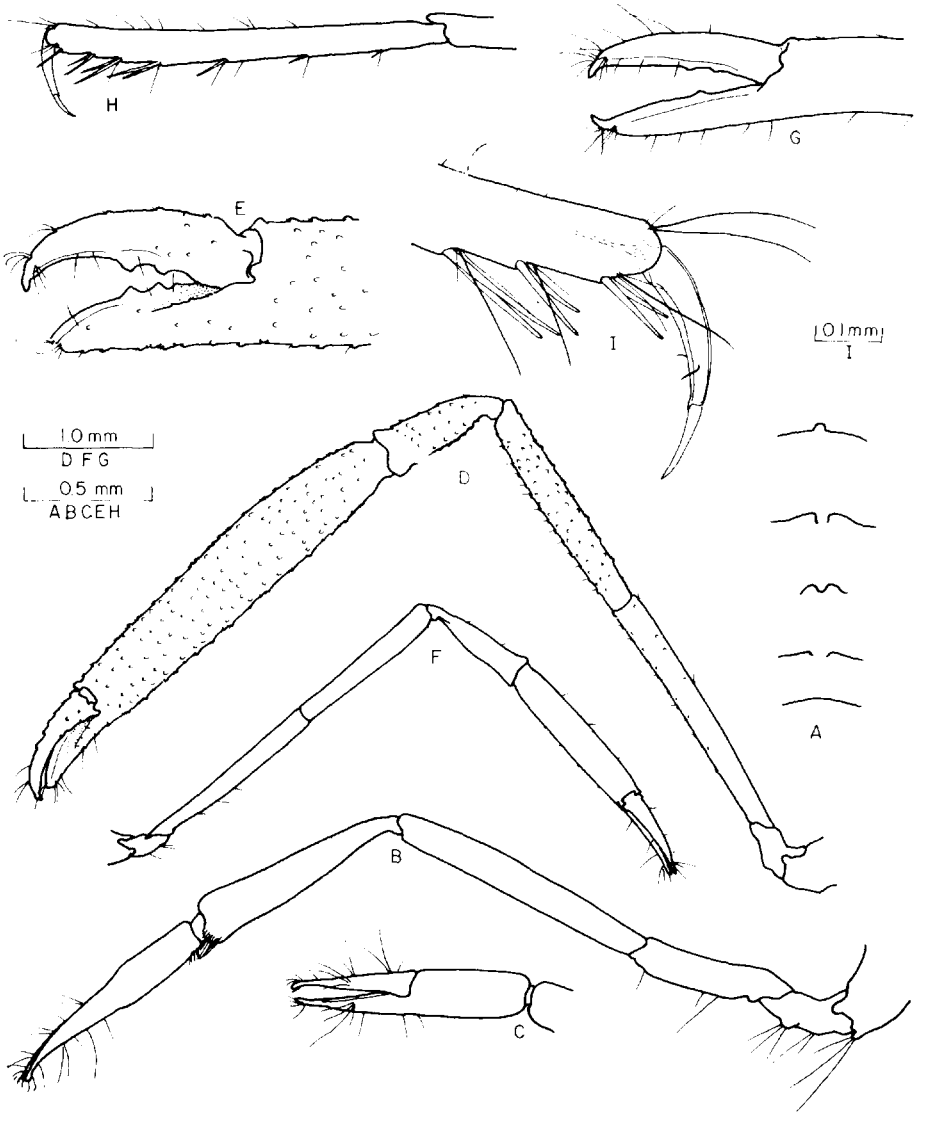

Figure 18. *Periclimenes granulimanus* sp. nov., holotype female. A, Thoracic sternites 1-5; B, first pereiopod; C, chela of first pereiopod; D, major second pereiopod; E, fingers of chela of major second pereiopod; F, minor second pereiopod; G, fingers of chela of minor second pereiopod; H, dactyl and propod of third pereiopod; I, dactyl and distal end of propod of third pereiopod.

length. The submedian spines are about half the length of the intermediate spines, more slender and densely setulose medially.

The antennule is slender. The proximal segment of the peduncle is about 2.5 times longer than broad. The medial border is straight and the lateral margin is feebly convex. The stylocerite is slender and acute, not exceeding the middle of the segment. The statocyst is well developed with a circular statolith. The

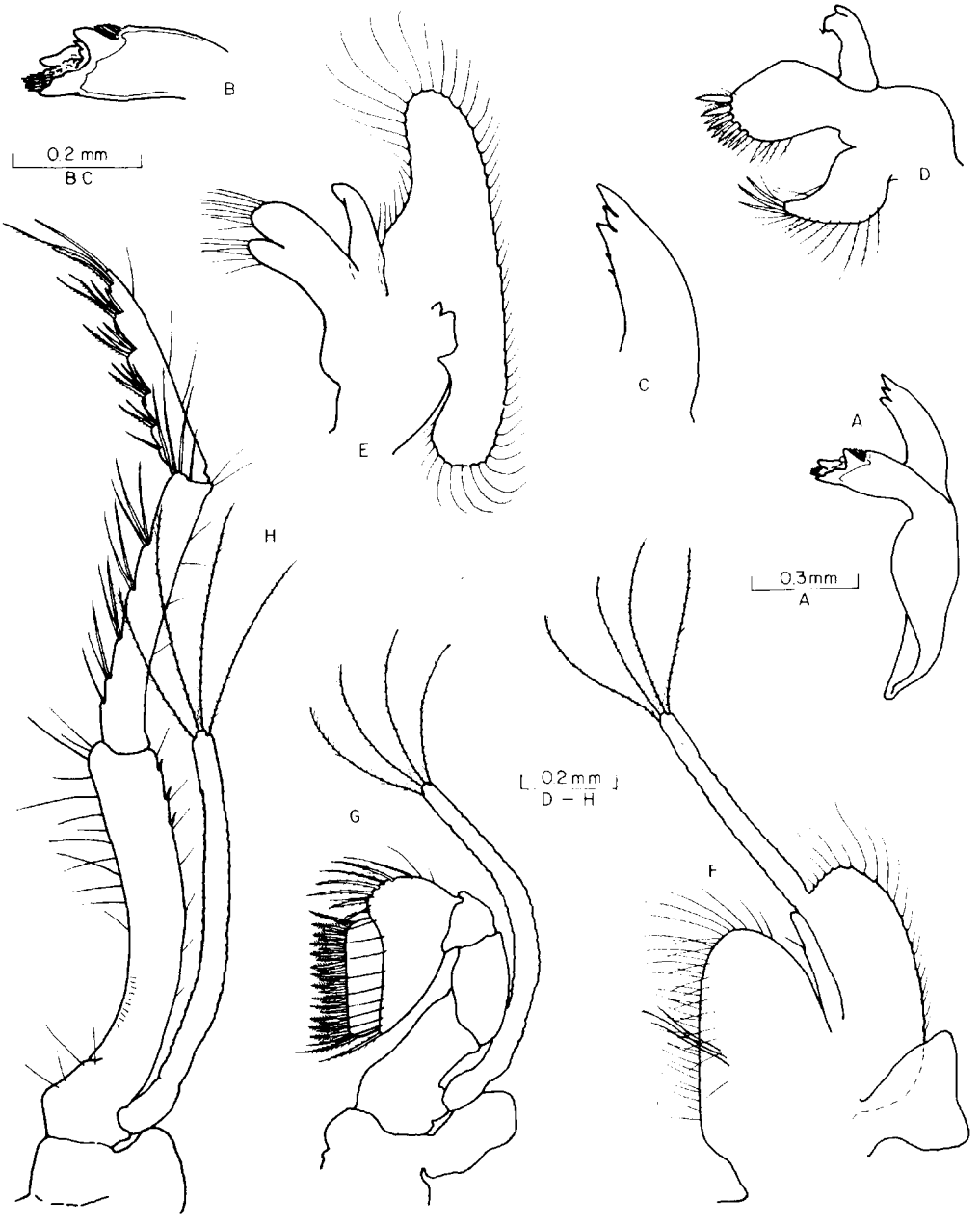

Figure 19. ***Periclimenes granulimanus*** **sp. nov.**, holotype female. A, Mandible; B, molar process; C, incisor process; D, maxillula; E, maxilla; F, first maxilliped; G, second maxilliped; H, third maxilliped.

antero-lateral margin is produced medially into a well marked lobe that reaches to the level of the middle of the intermediate segment and the tip of the slender, acute divergent disto-lateral spine. The intermediate segment is as long as wide, with a feebly developed lateral lobe, and equal to one fifth of the length of the proximal segment. The distal segment is slender, twice as long as wide, about one third of the length of the proximal segment. The upper flagellum is biramous, with the four proximal segments of each ramus fused. The shorter free ramus consists of three segments only. The longer ramus is filiform and equal to about 2.5 times the post-orbital carapace length.

The antennae show no special features and the flagella are lacking. The basicerite is robust with an acute disto-lateral spine. The carpocerite is about twice as long as wide and slightly compressed. The scaphocerite extends well beyond the antennular peduncle. The lamina is narrow, with subparallel sides, four times longer than broad. The lateral border is feebly concave, almost straight and the tip of the lamina is produced well beyond the tip of the slender, acute distolateral spine.

The eyes are normal with a globular cornea. In dorsal view the stalk is as wide as the cornea and 1.3 times longer than broad. No accessory pigment spot is discernible.

The mouthparts are typical of the genus *Periclimenes*. The mandible is robust and without a palp. The right molar process is robust with an oblique cutting surface. The dorsal aspect bears a large blunt tooth anteriorly and a smaller more distal tooth posteriorly, with some small intermediate teeth. The ventral aspect bears a single more acute tooth. The anterior margin bears a group of short stout setae proximally and a similar group of longer setae is present posteriorly between the ventral tooth and the posterior dorsal tooth. The incisor process is well developed, obliquely truncated distally, with three acute teeth of which the lateral is the largest and the central tooth the smallest. Two small teeth and minute denticle are also present on the medial margin. The maxillula has a bilobed palp, with a small upper lobe. The larger lower lobe bears a small hooked seta. The upper lacinia is moderately broad, tapering slightly and broadly rounded distally, bearing 9-10 stout finely serrulate spines, with a few setae ventrally. The lower lacinia is also broad, tapering strongly distally to a point bearing 4-5 slender serrulate spines. Several long finely setulose spines are present ventrally. The maxilla has a well developed palp, without a terminal or subterminal seta. The lateral margin bears a single plumose seta. The basal endite is well developed, deeply bilobed, with the distal lobe longer than the proximal lobe, and bearing finely setulose setae. The proximal lobe bears six similar setae. The coxal endite is lacking, its position indicated by a low rounded protuberance. The scaphognathite is narrow, about 3.2 times longer than broad, with the anterior lobe attenuated. The first maxilliped has a slender palp, with a short, simple preterminal medial seta, that extends slightly beyond the anterior margin of the dorsal endite. The basal endite is well developed, broad and rounded anteriorly, completely fused with the coxal endite, forming a straight medial border that is provided with numerous setae which are longer and finely setulose anteriorly, changing to shorter and more coarsely setulose setae proximally. The flagellum of the exopod is robustly developed, with four plumose setae distally. The caridean lobe is well developed and broad, and a simple triquetral epipod is also present.

The second maxilliped is of normal form. The dactylar segment is moderately broad, three times as long as wide, with numerous stout strongly serrated spines along its medial margin. The propod has the disto-medial angle broadly rounded, with six long slender sparsely serrulate spines and a few simple spines proximally. The dorsal medial margin also bears a row of long slender setae with a strong finely serrulate spine at the proximal angle. The carpus, merus and ischiobasis show no special features. The exopod is similar to that of the first maxilliped. The coxa has the medial margin broadly rounded and bears a subrectangular epipod, without a podobranch, laterally. The third maxilliped is slender and extends beyond the carpocerite by half the length of the terminal segment. The ischio-merus is fully ankylosed with the basis. The length of the antepenultimate segment is about 6.5 times the width at the distal end, and the whole segment is strongly bowed. The lateral margin bears a few simple setae, with three small spines distally. The distal half of the medial border is sparsely provided with long simple setae and a few are also present on the basal region. The second fourth of the medial border bears a submarginal row of ten short setae on the dorsal aspect. The penultimate segment is about 0.6 of the length of the antepenultimate segment, with six small groups of long strong setae. A few simple setae are present laterally. The terminal segment is six times longer than wide proximally and tapers distally to end in a strong simple spine. The segment is about 0.8 of the length of the penultimate segment and has six groups of short densely serrated setae along its medial border and a few long simple setae laterally. The exopod is well developed, the flagellum extends to the distal end of the antepenultimate segment of the endopod, and bearing four plumose setae distally. The coxa is not produced medially, and bears a well developed rounded epipod laterally. No arthrobranch was seen but it may have been lost in dissection.

The fourth thoracic sternite bears a minute median tubercle and the fifth a pair of submedial lobes. The first pereiopod is moderately slender and extends anteriorly almost to the tip of the antennular peduncle. The chela is slender, with the palm slightly compressed, 2.5 times longer than wide and of uniform width. The fingers are slender, tapering strongly and curved medially, subequal to the length of the palm. The tips are slightly dilated and feebly hooked and the cutting edges are entire. Numerous long simple setae are present in groups on the fingers. The carpus is equal to the length of the chela, about 4.5 times longer than wide distally and more than twice as wide distally as proximally. The merus is about 8.4 times longer than broad, uniform in width and about 1.2 times the length of the carpus. The ischium is 0.6 of the length of the merus and twice the length of the basis. The coxa is simple, with a very small medial ventral process.

The second pereiopods are very asymetrical and dissimilar. The major second pereiopod extends beyond the carpocerite by thelength of the chela, carpus and merus, and is almost twice the post-orbital carapace length. The palm of the chela is subcylindrical and covered with scattered rounded tubercles. The width is comparatively uniform throughout the length. The palm is about five times longer than wide and 3.5 times longer than the fingers, which are moderately compressed and also tuberculate. The dactylus is about 3.5 times longer than wide and feebly curved, with a small hooked tip. The proximal half bears two blunt teeth. The fixed finger lacks the tip but is generally similar to the dactylus. The carpus is one third of the length of the palm of the chela and

is three times longer than broad, slightly expanded distally and unarmed, but provided with numerous tubercles similarly to the chela. The merus is 1.8 of the length of the carpus, similarly tuberculate, about seven times longer than wide and unarmed. The ischium is slender, feebly tuberculate, eleven times longer than broad, 1.1 times the length of the merus. The basis is normal and the coxa is without a medial process.

The minor second pereiopod is slender and exceeds the carpocerite by the chela, carpus and distal third of the merus. The chela is slightly shorter than the post-orbital carapace length, subcylindrical, uniform, about 4.3 times longer than wide, and with a few minute scattered tubercles only. The fingers are slender, slightly exceeding half the length of the palm. The dactylus is five times longer than wide, with a distinctly hooked tip. The cutting edge is almost straight, entire, with two low teeth situated on the second fourth of its length. The fixed finger is similar but has only a single tooth situated opposite the two on the dactylus. The carpus is two thirds of the length of the palm and almost four times longer than wide, unarmed and without tubercles, and slightly expanded distally. The merus is equal to the palm length, seven times longer than wide, smooth and unarmed. The ischium is more slender than the merus, about 1.2 times as long and similarly unarmed and smooth. Basis and coxa show no special features.

The ambulatory pereiopods are slender. The third pereiopod exceeds the carpocerite by half the length of the carpus, propodus and dactylus. The dactylus is slender, strongly curved and simple. The unguis is distinctly demarkated and about six times longer than the width at the base. The corpus is about 4.5 times longer than the width at the base and is compressed. The propodus is compressed and is broadest at about 0.7 of its length, eleven times longer than the greatest width. The ventral border is strongly spinose with four pairs of long slender spines on the distal fourth, a large and a small spine together near the middle of the length and two isolated single spines on the proximal half. The carpus is slender and unarmed, about 0.6 of the length of the propodus. The merus is also slender, about ten times longer than wide and devoid of spines. The ischium is a little less than half the length of the merus, and, like the basis and coxa, presents no special features. The fourth pereiopods are similar to the third and of similar length and proportions. The fifth pereiopods are both lacking.

The uropods present no special features. The postero-lateral angle of the protopodite is rounded. The exopod is four times longer than broad, with a straight entire setose lateral margin terminating in a small acute tooth with a mobile spine medially, and extending posteriorly to the level of the tip of the intermediate telson spines. The endopod is shorter, just exceeding the tip of the telson, and is also four times longer than broad.

Type. The single specimen available is designated as the holotype and is deposited in the collection of the Muséum National d'Histoire Naturelle, Paris, catalogue number 2580.

Measurements.

Post-orbital carapace length	2.0 mm
Carapace and rostrum	3.6 mm
Total length (approx.)	9.5 mm
Major chela length	3.7 mm
Minor chela length	2.0 mm
Diameter of ovum	0.45 mm

Host. The single specimen was obtained from an unidentified antipatharian.

Associations. The single specimen was found in association with specimens of *Periclimenes nilandensis* and *P. incertus.*

Remarks. The new species *Periclimenes granulimanus* is readily distinguished from all other species of the genus by the characteristic granulation and morphology of the second pereiopods. Almost all species of *Periclimenes* have second pereiopods that are smooth and devoid of granulations. As noted by Kemp (1922) some species of the subgenus *Ancylocaris* (now *Harpilius*) do have small tubercles. For example, the males of *P. grandis* (Stimpson) and *P. elegans* (Paulson), when the chelae reach their maximal development, are provided with numerous minute granulations. The "*P. grandis* group" of species are predators and have similar, symetrical chelae on the second pereiopods, with a long finger-like median process on the fourth thoracic sternite, that is lacking from almost all commensal species of the genus. The only other species so far reported to have granulations on the second pereiopods is *Periclimenes alcocki* Kemp (see above) but this species also appears to be only remotely related to *P. granulimanus.* In *P. alcocki* the chelae of the second pereiopods are both covered throughout with small tubercles and the fingers are subequal to half the length of the palm. The tuberculations in *P. granulimanus* also appear to be much more robust than in *P. alcocki,* which also has a markedly reduced eye.

The mouthparts of *P. granulimanus* provide little useful evidence in assessing its systematic position and they closely resemble those of *P. perlucidus.* The only noteworthy differences are that in *P. granulimanus* the maxilla is provided with a broader scaphognathite and the distal lobe of the basal endite is distinctly larger than the proximal lobe.

The chela of the first pereiopods show also a slight resemblance to those of *P. galene* Holthuis and *P. platalea* Holthuis. In both these species the fingers are provided with dilated tips, although much more conspicuously than is found in *P. granulimanus* (Holthuis, 1951, 1952).

The ambulatory pereiopods show a characteristic arrangement of spines on the ventral border of the propodus, which appears to indicate that the dactylus can be flexed to form a prehensible mechanism. A similar mechanism is also found in *P. psamathe* and, even more strongly developed in *P. galene* Holthuis (1952).

The morphology of the thoracic sternites is also unusual. The small median tubercle on the fourth sternite is characteristic and no similar appearance has been reported in any other species. In most commensal species this sternite is completely unarmed, but in a few, a broad linguiform process may be present.

Periclimenes lepidus sp. nov. (Figs 20 to 24)

Material examined. (1) 1♂, 1 ovig.♀. NW coast of Madagascar near Nosy Bé, 40 m, 6 September 1970, coll. P. Laboute. (2) 5 ovig.♀, Baie d'Ampasindava, 40 m, 29 October 1970, coll. P. Laboute.

Description. A small slenderly built species of *Periclimenes.* The carapace is smooth with a well developed rostrum, slightly longer than the post-orbital carapace length in the female and slightly shorter in the male. The rostrum is compressed, tapering, with a feebly developed lateral carina, and slightly

up-curved. The dorsal margin is slightly convex and bears eight small acute teeth in the female and seven in the male. The third tooth is the largest and the most anterior teeth are reduced in size. The ventral margin is feebly convex. Two small teeth are present on the distal fourth in the female and one on the distal fifth in the male. A slender epigastric spine is present at about 0.22 of the carapace length, at the commencement of the dorsal rostral carina. Supra-orbital spines are lacking. The inferior orbital angle is distinctly produced in a broad pointed triangular lobe. The antennal spine is slender and marginal, situated well below the inferior orbital angle. The hepatic spine is also slender, subequal to the antennal spine, but situated at a distinctly lower plane, slightly in advance of the level of the epigastric spine. The antero-lateral angle of the carapace is rounded in the female and bluntly rectangular in the male.

The abdominal segments are smooth. The third segment is slightly produced posteriorly in the dorsal midline but not elevated. The fifth segment is subequal to the length of the fourth and about 0.45 of the length of the sixth, which is strongly compressed and about 2.5 times longer than deep. The depth decreases slightly posteriorly, to a subrectangular postero-lateral angle and a small blunt postero-ventral angle.

The telson is 0.6 of the length of the sixth abdominal segment and four times longer than wide. The lateral margins are subparallel for the anterior two fifths and straight and tapering over the posterior three fifths. The posterior margin is about 0.4 of the anterior width, angularly tapered, with a produced central portion. The dorsal spines are small, submarginal, the anterior pair slightly larger than the posterior, and situated just posteriorly to the midlength of the telson. The posterior pair are half way between the anterior pair and the

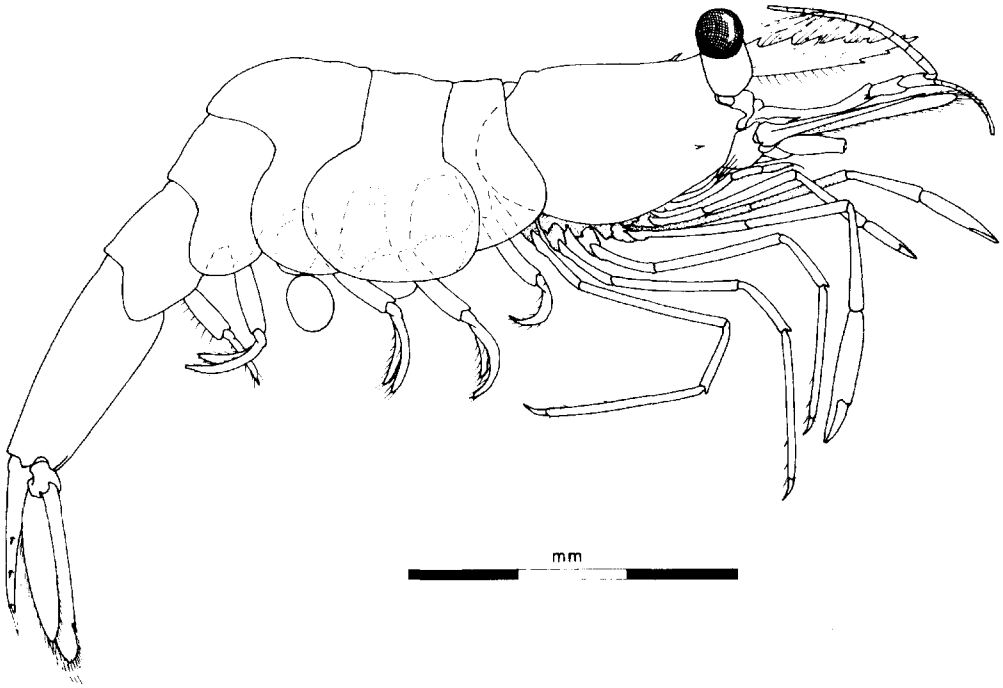

Figure 20. *Periclimenes lepidus* sp. nov., holotype female.

posterior margin. Three pairs of posterior spines are present. The lateral spines are small, short and stout, similar to the dorsal spines. The intermediate spines are well developed, long and slender, equal to one fifth of the telson length. The submedian spines are robust, less than half the length of the intermediate spines, plumose along the medial margins with a few setules laterally.

The antennule is slender, and the peduncle slightly exceeds the rostrum. The proximal segment is 2.5 times longer than broad, with a small spine at the middle of the ventro-medial margin. The lateral border is slightly sinuous and feebly tapered distally. The stylocerite is slender and does not reach the level of the middle of the medial margin. The statocyst is normally developed with a subcircular statolith. The disto-lateral angle is produced with a large rounded lobe medially and a slightly shorter slender, acute tooth laterally. The intermediate segment is slender, twice as long as wide, with a poorly developed

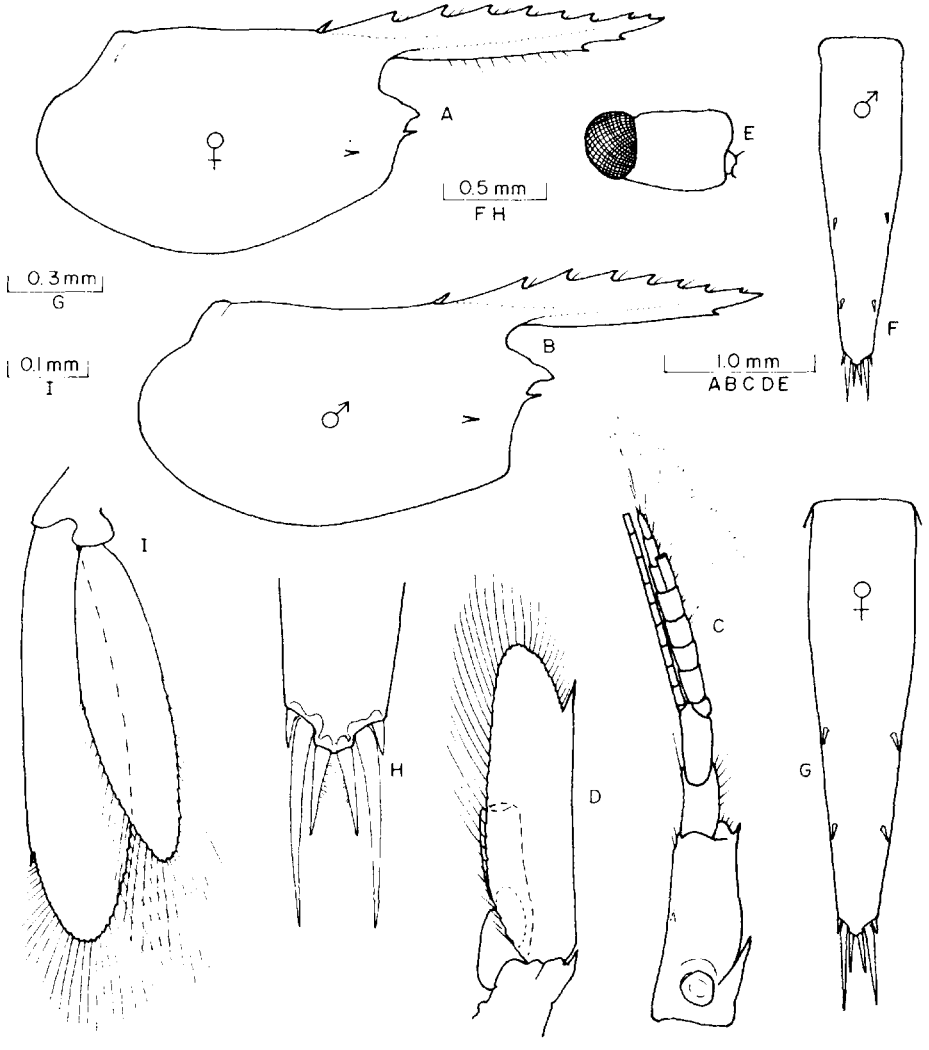

Figure 21. ***Periclimenes lepidus*** **sp. nov.**, paratypes. Carapace and rostrum: A, female; B, male; C, antennule; D, antenna; E, eye; F, male telson; G, female telson; H, terminal telson spines; I, uropod.

setose lateral lobe. The distal segment is slightly longer and narrower than the intermediate and the two together are subequal to 0.6 of the length of the proximal segment. The lower flagella are slender and filiform and are incomplete. The upper flagellum is biramous with the first four segments of the rami fused. The shorter free ramus consists of three segments only. The longer ramus is filiform and slender. Eight groups of aesthetascs are present in the male.

The antenna is normally developed, the tip of the scaphocerite extending slightly beyond the antennular peduncle. The basicerite is robust with an acute lateral spine. The carpocerite is subcylindrical and reaches to the middle of the length of the lamina of the scaphocerite, which is about 3.5 times longer than broad, with the greatest width in the proximal half. The lateral margin is feebly

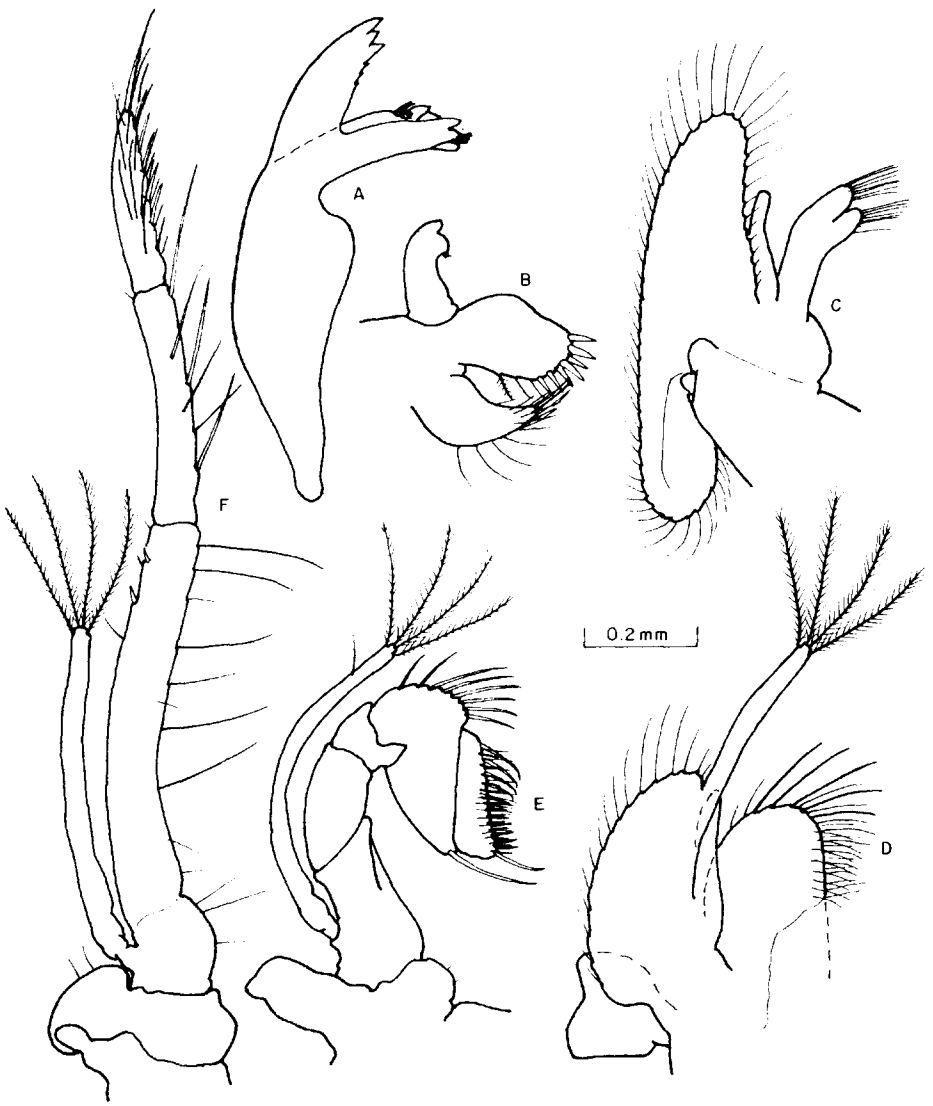

Figure 22. ***Periclimenes lepidus*** **sp. nov.**, paratype. A, Mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped.

concave with a long slender disto-lateral spine. The anterior margin of the lamina is rounded and strongly produced, extending well beyond the tip of the disto-lateral spine.

The eyes are normal with a globular transverse cornea with a distinct accessory pigment spot. The peduncle is about 1.25 times longer than broad, slightly tapering distally, subequal to the diameter of the cornea.

The mouthparts are typical of the genus *Periclimenes*. The mandible is moderately robust and without a palp. The molar process is obliquely

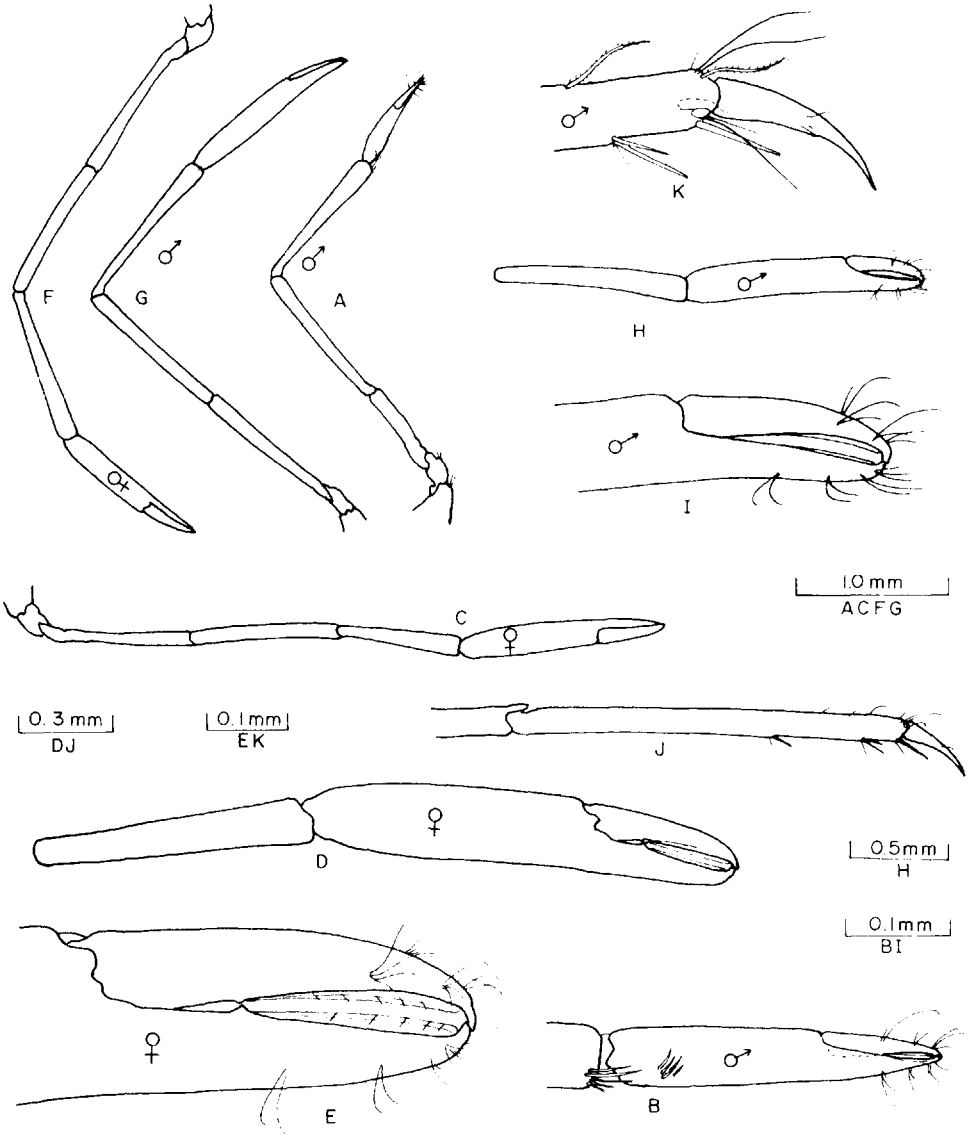

Figure 23. ***Periclimenes lepidus*** sp. nov., paratype. A, First pereiopod, male, B, chela of first pereiopod, male; C, major second pereiopod, female; D, carpus and chela of major second pereiopod, female; E, fingers of chela of major second pereiopod, female; F, minor second pereiopod, female; G, second pereiopod, male; H, carpus and chela of second pereiopod, male; I, fingers of chela of second pereiopod, male; J, propod and dactyl of third pereiopod; K, dactyl of third pereiopod.

truncated distally, with two large blunt teeth disto-posteriorly separated by a process with numerous setae. Another large tooth is present proximo-dorsally, with a tuft of setae anteriorly. A smaller tooth is also present proximo-ventrally. The incisor process is well developed with three strong teeth distally, of which the lateral is distinctly larger than the other two. The medial margin is also provided with three small denticles distally. The maxillula bears a bilobed palp. The upper lobe is smaller than the lower which bears a small process with a short hooked seta ventrally. The upper lacinia is moderately broad, 1.5 times longer than wide, expanded centrally with seven simple spines distally and a

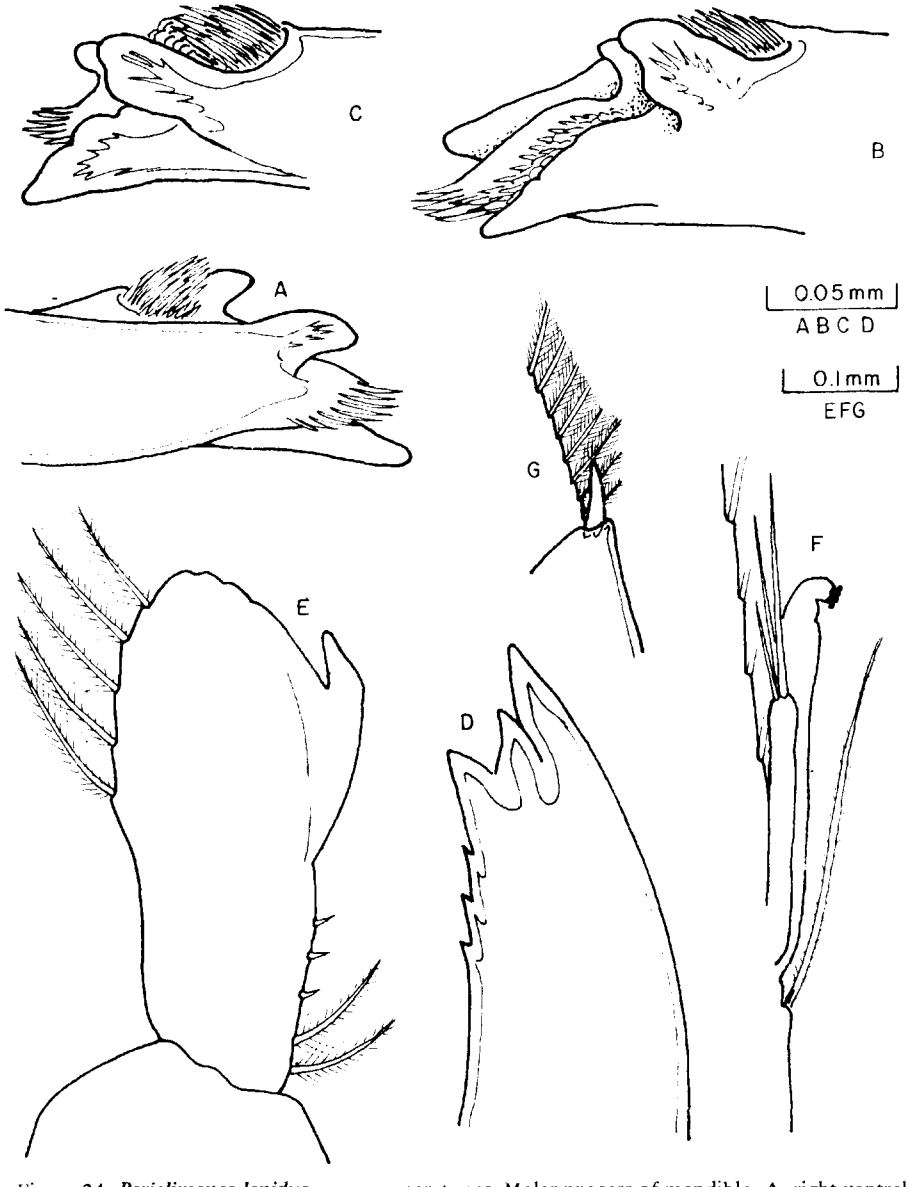

Figure 24. *Periclimenes lepidus* sp. nov., paratypes. Molar process of mandible: A, right ventral; B, right dorsal; C, left ventral; D, incisor process; E, endopod of male first pleopod; F, appendix mesculina and appendix interna of male second pleopod.

few setae ventrally. The lower lacinia is more slender and tapering with numerous long setae distally and also ventrally. The maxilla has a subcylindrical, tapering, non-setiferous palp. The distal endite is well developed, elongated, deeply divided into two subequal lobes, each with numerous simple setae distally. The proximal endite is absent and the medial border is strongly convex. The scaphognathite is rather narrow, about 3.6 times longer than broad. The anterior part is scarcely narrowed. The first maxilliped has subcylindrical, non-setose palp. The basal endite is broad, rounded distally with robust marginal setae. The proximal portion is missing. The exopod has a slender flagellum with four plumose terminal setae. The caridean lobe is normally developed. A small feebly bilobed epipod is also present. The second maxilliped is of normal form. The dactylar segment is about 3.0 times longer than broad and tapering anteriorly. A strong spine is present at the proximal medial angle. The medial border bears rows of stout strongly serrated spines, with plumose spines submarginally. The propodal segment is broad, with a rounded anterior border bearing eight long, robust, finely serrulate spines. The proximal medial angle also bears a long simple spine. The carpus bears an acute ventro-medial lobe. The ischio-merus and basis present no special features. The exopod is similar to that of the first maxilliped. The coxa has a slightly produced, rounded medial border and bears a small subrectangular epipod, without a podobranch, laterally. The third maxilliped is slender, extending anteriorly just beyond the proximal end of the carpocerite. The separation between ischio-merus and basis is clearly indicated by a deep notch on the medial margin. The ischio-merus is slender and feebly tapering, about six times longer than wide, feebly bowed, with two small spines on the disto-lateral margin and a few long slender, very feebly setulose setae along the medial border. The penultimate segment is more slender than the preceding, about five times longer than broad, with a few long, minutely serrulate spines along the medial border. The distal segment is about 0.75 of the length of the penultimate, tapering distally and bearing a stout simple spine distally. The ventro-medial aspect bears about six groups of finely dentate setae. The basis has a broadly rounded medial margin and bears a slender exopod laterally, with four plumose terminal setae. The coxa is feebly produced medially but bears a large rounded epipod laterally. A small arthrobranchial vestige, with a single lamella, is also present.

The thoracic sternites are narrow, and unarmed, and the coxae of the pereiopods are contiguous.

The first pereiopods are moderately slender and extend beyond the scaphocerite by the length of the fingers. The palm is slender, subcylindrical, tapering very feebly distally, about 3.4 times longer than wide. The fingers are also slender, slightly greater than half the length of the palm, tapering to finely hooked tips. The cutting edges are entire and gape slightly distally. The carpus is about seven times longer than broad, slightly broader distally, unarmed, and about 1.5 times the length of the chela. The merus is similarly slender and subequal to the carpal length. The ischium and basis show no special features. The coxa bears only a minute medial protuberance.

The second pereiopods are slender and feebly developed, similar and slightly unequal. Both are present in the female only, where the minor chela is 0.75 of the length of the major chela. In the major second pereiopod the palm of the

chela is subcylindrical, 4.0 times longer than wide, smooth, slightly compressed distally. The fingers are equal to half the length of the palm. The dactylus is slender, moderately compressed and tapering, about five times longer than deep, with a small slender hooked tip. A very small tooth is present at about 0.3 of the length of the cutting edge, which is entire distally. The fixed finger is similar but with a slightly larger tooth situated opposite that on the dactylus. The carpus is subequal to the palm length, six times longer than wide, increasing gradually in width distally and unarmed. The merus and ischium are slender and unarmed, subequal, equal to about 1.1 of the palm length. The basis and coxa are slender and unarmed. The minor second pereiopod is generally similar to the major pereiopod but has the palm of the chela about 4.5 times longer than wide and the fingers equal to half the palm length, without small teeth on the cutting edges. The carpus is 1.4 of the palm length and subequal to the chela and the ischium. The merus is slightly shorter, about 0.9 of the carpal length. The single male second pereiopod, (probably the minor appendage), is also similar, with the palm about 4.2 times longer than wide. The fingers are about half the palm length, also without teeth on the cutting edges. The carpus is 1.5 times the palm length and slightly longer than the chela and the merus and ischium, which are subequal.

The ambulatory pereiopods are slender and similar. The third pereiopod exceeds the carpocerite by the length of propodus and dactylus. The dactylus is slender and slightly curved, acute, about five times longer than wide at the base. The unguis is indistinguishable but an indication of a junction is present at a small indentation just beyond the middle front of the ventral border. The propodus is slender, about 13.5 times longer than wide and five times the length of the dactylus. The distal half of the ventral border bears a single spine and a pair of spines, with a single long disto-ventral plumose seta. The disto-dorsal region bears two short plumose setae. The carpus is about half the length of the propodus and is unarmed. The merus is subequal to the propodus and is also unarmed. Ischium, basis and coxa present no special features. The fourth and fifth pereiopods are similar. The propodi are distinctly longer and the fourth bears two single ventral spines and a single disto-ventral spine. Two groups of finely serrate setae are also present disto-laterally on the fifth pereiopod.

In the male, the endopod of the first pleopod is about 2.4 times longer than broad, with the distal half expanded and bearing a small pointed process on the medial margin. The proximal half of the medial margin bears two plumose setae and three small spines. The distal half of the lateral margin bears five short plumose setae. On the second pleopod, the appendix masculina is slender, about nine times longer than wide, with three single terminal spines, the longest twice the length of the shortest. The appendix interna extends well beyond the appendix masculina and bears only a few terminal concinni.

The uropods are normal. The protopodite is rounded disto-laterally. The exopod is slender, four times longer than broad, with a feebly convex lateral margin. The disto-lateral tooth is obsolescent but a well developed mobile spine is present. The endopod is also four times longer than broad and reaches to the level of the distolateral spine of the exopod, and slightly exceeds the tips of the posterior telson spines.

Types. The female Nosy Bé specimen is designated as the holotype and the

male as allotype. Both specimens, with dissected appendages, are deposited in the collections of the Muséum National d'Histoire Naturelle, Paris, catalogue number 2583.

Measurements:	Holotype	Allotype
Post-orbital carapace length	1.7 mm	1.9 mm
Carapace and rostrum	3.6 mm	3.6 mm
Total length (approx.)	11.0 mm	13.4 mm
Major chela length	1.35 mm	–
Minor chela length	1.05 mm	1.2 (?) mm
Diameter of ovum	0.55 mm	–

Host. Associated with *Morchellana gilva* (Henderson) (Nephtheidae; Alcyonacea) and an unidentified antipatharian.

Remarks. The new species *Periclimenes lepidus* show few special features and is distinguished mainly by the absence of the characteristic features found in other species of the genus.

P. lepidus shows the closest morphological resemblance to *P. madreporae* Bruce (1969), an associate of scleractinian corals, so far known only from the Australian Great Barrier Reef. Both species possess a simple dactylus on the ambulatory pereiopods. The two species may be best separated by differences in the rostrum and second pereiopods, but in addition *P. lepidus* is a much slenderly built species with comparatively narrow thoracic sternites, so that the coxae of the pereiopods are in close opposition, whereas in *P. madreporae* these sternites are broad and the coxae widely spaced.

The rostra are in general similar but in *P. lepidus* an epigastric spine is present on the carapace, slightly posteriorly to the level of the hepatic spine and separated by a marked interval from the first tooth on the dorsal rostral lamina, which is slightly in advance of the level of the posterior margin of the orbit. In *P. madreporae* there is no epigastric tooth, and the first tooth of the dorsal rostral lamina lies in advance of the hepatic spine but posterior to the level of the posterior orbital margin. In addition, the inferior orbital angle is broader and more produced in *P. lepidus* than in *P. madreporae*, with the antennal spine separated by a larger interval and with the hepatic spine at a lower level.

The second pereiopods in *P. lepidus* are much more slender than in *P. madreporae*, and may be readily distinguished by the carpus, which is of similar length to the palm of the chela or distinctly longer. In *P. madreporae*, the carpus is comparatively short and stout, much less than half the palm length in the major chela and only slightly more than half the palm length at the most, in the minor chela.

Although *P. lepidus* shows a marked similarity to *P. madreporae*, it is considered that its systematic position is probably closest to the *P. obscurus* species group (Bruce, 1969). These species all have a distinctly biunguiculate dactylus on the ambulatory pereiopods, usually with an epigastric spine on the carapace and slenderly built second pereiopods. In *P. lepidus* the dactylus of the ambulatory pereiopods is simple but this condition appears to be due to the secondary loss of the accessory spine, the position of which is feebly indicated by the presence of a small articulation on the ventral border, although no distinct unguis is present as in *P. madreporae*.

Periclimenes perturbans sp. nov. (Figs 25 and 26)

Material examined. 1♂, NW coast of Madagascar, near Nosy Bé, 40 m, 6 September 1970, coll. P. Laboute.

Diagnosis. Closely resembling ***P. lepidus*** sp. nov. Rostrum with seven dorsal and one small ventral teeth. A minute epigastric tooth is also present. Inferior orbital angle as in *P. lepidus* but the slender antennal spine is situated more closely to the inferior orbital angle in lateral view than in *P. lepidus* and the hepatic spine is slender and erect, possibly mobile. Abdomen as in *P. lepidus* but telson with two pairs of very small dorsal spines at 0.6 and 0.9 of the telson length. Antennae and mouthparts as in *P. lepidus*. First pereiopod extending to tip of scaphocerite. Chela with palm subequal to fingers, which are slender, unarmed and slightly gaping. The carpus is equal to 0.7 of the length of the chela, while the merus is subequal to the chela. The ischium and basis are as in *P. lepidus* but the coxa bears a well developed median lobe. The second pereiopods are feeble, subequal and similar. The chelae are slender with the unarmed fingers subequal to the palm, which is four times longer than wide distally. The carpus is two thirds of the length of the chela and is unarmed. The merus is slender, about ten times longer than wide, without a disto-ventral tooth and subequal to the length of the chela. The ischium is subequal to the carpus. The ambulatory pereiopods are slender with the propodus less heavily spinose and the disto-ventral spines distinctly shorter than in *P. lepidus*. The dactylus is

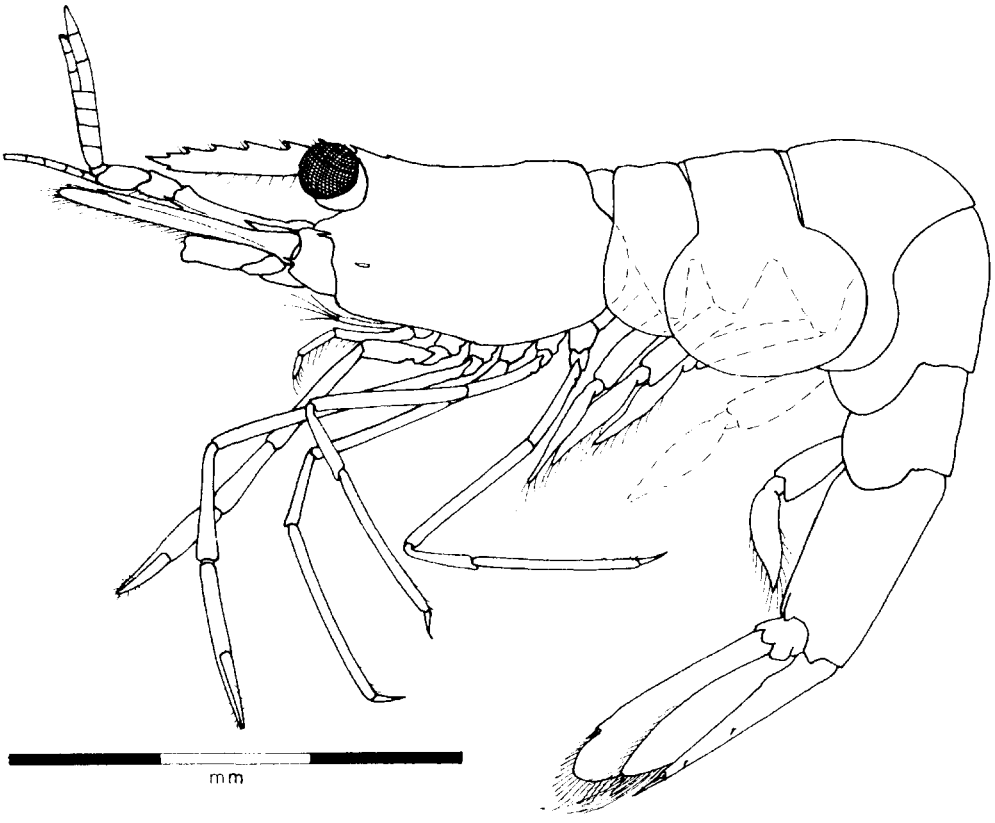

Figure 25. ***Periclimenes perturbans*** sp. nov., holotype, male.

similar but with a distinctly demarkated unguis that is subequal to the length of the corpus. The uropods are as in *P. lepidus*.

Type. The single specimen is designated as the holotype and is deposited in the collections of the Muséum National d'Histoire Naturelle, Paris, catalogue number 2581.

Measurements.		
	Post-orbital carapace length	1.5 mm
	Carapace and rostrum	2.9 mm
	Total length (approx.)	9.0 mm
	Major chela length	1.11 mm
	Minor chela length	1.1 mm

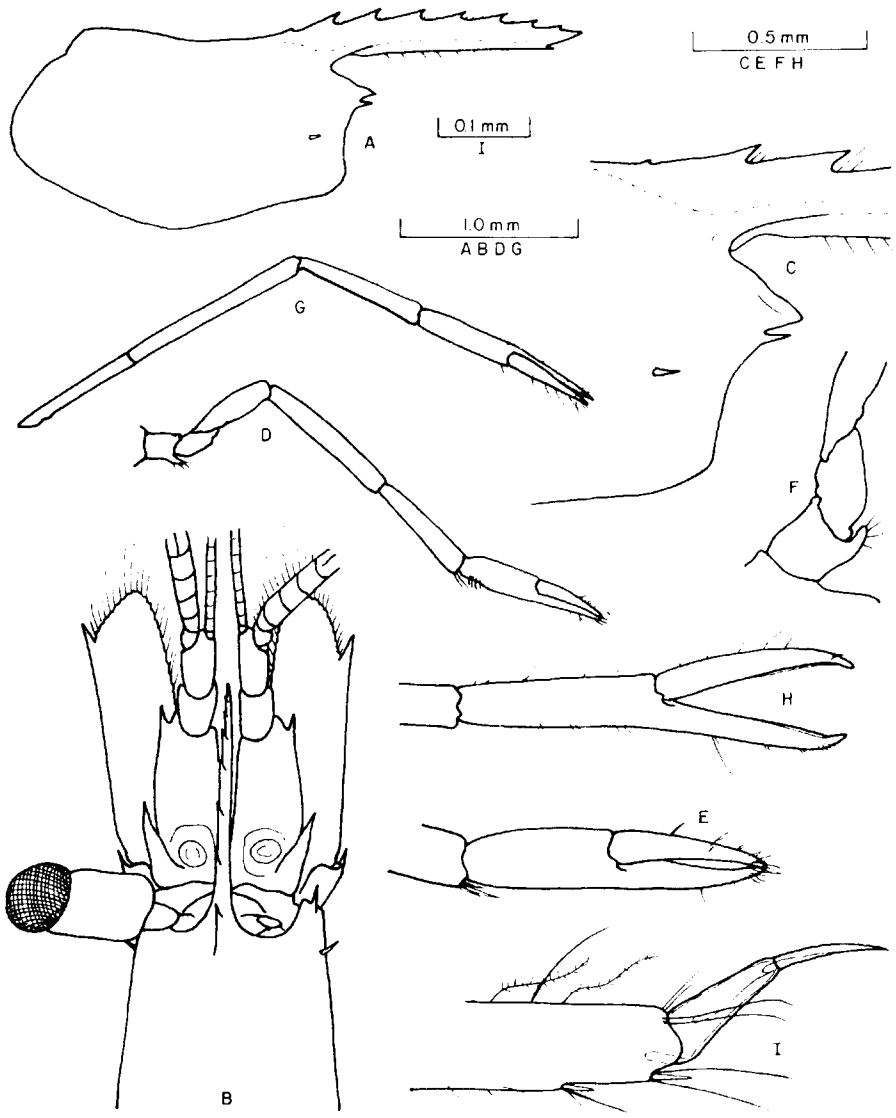

Figure 26. ***Periclimenes perturbans*** sp. nov., holotype, male. A, Carapace and rostrum, lateral; B, anterior carapace, rostrum and antennae, dorsal; C, inferior orbital region; D, first pereiopod; E, chela of first pereiopod; F, basis and coxa of first pereiopod; G, second pereiopod; H, chela of second pereiopod ; K, distal propod and dactyl of third pereiopod.

Host. The specimen was obtained from the alcyonarian *Morchellana gilva* (Stimpson) (Nephtheidae; Alcyonacea).

Remarks. The single specimen was found in association with the two specimens of *P. lepidus* described above. The two species are closely similar in their general morphology. The present specimen is slightly smaller than the *P. lepidus* specimens but has a well developed appendix masculina on the second pereiopod and is therefore not considered to be a juvenile. The two species are to be separated by the presence of a small epigastric tooth in *P. perturbans,* instead of a well developed spine, the slender erect, possibly mobile, hepatic spine and the differences in the proportions of the segments of the first and second pereiopods, other differences are found in the positions of the dorsal telson spine and the propodal spines and dactylus of the ambulatory pereiopods.

The existence of two closely related species of shrimp on the same host animal is unusual but not without parallel. In the case of other pontoniine shrimps *Harpiliopsis depressa* Stimpson and *H. spinigera* (Ortmann) and also *Jocaste japonica* (Ortmann) and *J. lucina* (Nobili) are commonly found together as species pairs on their appropriate hosts.

Periclimenes sp. (Fig. 27)

Material examined. 2 spms, damaged. Tany-Kely, NW Madagascar, 23 m, 30 September 1970, coll. P. Laboute.

Remarks. The specimens show a strong resemblance to *P. indicus* (Kemp) or *P. obscurus* Kemp, particularly the latter species with reference to the appendages. The rostrum closely resembles *P. indicus* but the antennal spine is submaringal instead of distinctly post-marginal and the inferior orbital angle is strongly produced as a bluntly rounded process, rather than a small acute angle. The inferior orbital angle is very similar to that of *P. indicus,* although in this species the antennal spine appears to be also slightly post-marginal. The rostrum of *P. indicus* appears quite distinct from the present specimens. The epigastric spine is mobile. The specimens were obtained from an unidentified antipatharian.

Thaumastocaris streptopus Kemp

Thaumastocaris streptopus Kemp 1922: 244-247, figs 78-80. Holthuis 1952: 13, 111-114, figs 46-47.

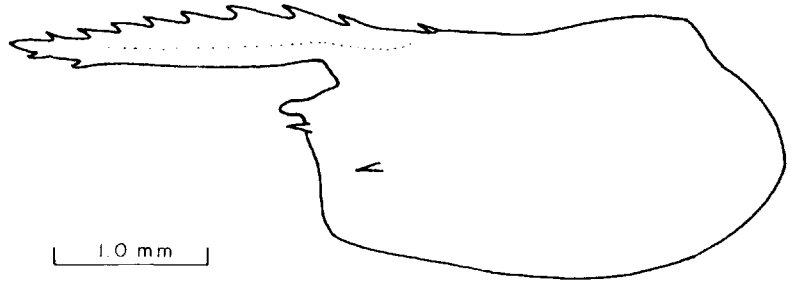

Figure 27. *Periclimenes* sp., carapace and rostrum.

Material examined. (1) 4♂, 2 ovig.♀, 1 juv., Trois Fréres, Nosy Bé, Stn 117, # 1524, 11 July 1971, coll. A. J. Bruce. (2) 1 ovig.♀, NW coast of Madagascar, 13°07.3'S, 48°25.8'E, 30 m, trawl. 2 August 1973, coll. A. Crosnier.

Host. Siphonochalina sp., (Porifera: Haplosclerida), from coral reef, 3 fm depth.

Remarks. The specimens agree closely with the information provided by Kemp (1922) and Holthuis (1952). The males have a rostral dentition of 10/3, except for one smaller specimen with 9/3. The Nosy Bé females are 10/3 and 11/3, and the 30 m female has 9/3. The juvenile has an abnormal rostrum. The asymmetry of the first pereiopods noted by Holthuis is conspicuous in these specimens and is similar in males and females. The sternite of the fourth thoracic segment is moderately narrow and is unarmed. The host of this species has not been previously recorded.

Distribution. Type locality, Noumea, New Caledonia. The only other records are from three localities in Indonesia, and the present specimens indicate the occurence of this species in the Indian Ocean for the first time.

Periclimenaeus djiboutensis Bruce (Figs 28 and 29)

Periclimenaeus djiboutensis Bruce, 1970: 307-308; 1974: 1568-1572, figs 8-9, 13a-d.

Material examined. 1 ovig.♀, off Fort Dauphin, 25°09.0'S, 47°14.2'E. Chalutage 73. 3 March 1973, coll. A. Crosnier.

Host/habitat. Collected from 80-85 m. No further details.

Remarks. The discovery of a further specimen of this species is of particular interest. The original description was based upon some specimens from the Muséum National d'Histoire Naturelle, Paris, and the only available data was the locality, Djibouti. Subsequently, in the course of the re-examination of Nobili's types of *Periclimenes rhodope*, it was found that four separate species were included. These all originated from Djibouti, and included further specimens of *P. djiboutensis*. There is little doubt that the type specimens of *P. djiboutensis* were also part of Nobili's material. Most of the specimens had the pereiopods detached and much mixing had occurred, so that few appendages could be attributed to the appropriate bodies with absolute certainty. The present specimen enables any doubts to be eliminated as all appendages are still attached to the body. It was considered that *P. djiboutensis* was probably an intertidal species, but the capture of a specimen at 80 m indicates that it may normally inhabit deeper water. The host unfortunately has yet to be identified, but it is probably a sponge rather than a tunicate.

The present specimen agrees closely with the original descriptions and is immediately identifiable by the very characteristic basicerite, first pereiopod and telson. The rostrum bears seven dorsal teeth, all in front of the orbital margin and the ventral border is convex and devoid of teeth.

The mouthparts have been removed from the left part. The corpus of the mandible was lost in dissection but the molar process is stout, with several robust teeth and groups of setae. The incisor process is normally developed with eight small acute teeth distally. The maxillula has the palp feebly bilobed with the lower lobe bearing a slender simple seta anteriorly and a small short hooked seta ventrally. The upper lacinia is broad, with about 14 short stout

simple spines laterally and some slender setae medially. The lower lacinia is slender, with numerous simple setae. The maxilla has a stout palp which bears a few short setae on the proximal part of its lateral border. The endite is moderately broad, simple and with about nineteen simple distal setae. The proximal part of the medial border bears a rounded protuberance. The scaphognathite is narrow in the anterior and posterior parts and is about three times longer than the central width. The first maxilliped has a slender non-setose palp. The basal endite is broadly rounded with a straight medial

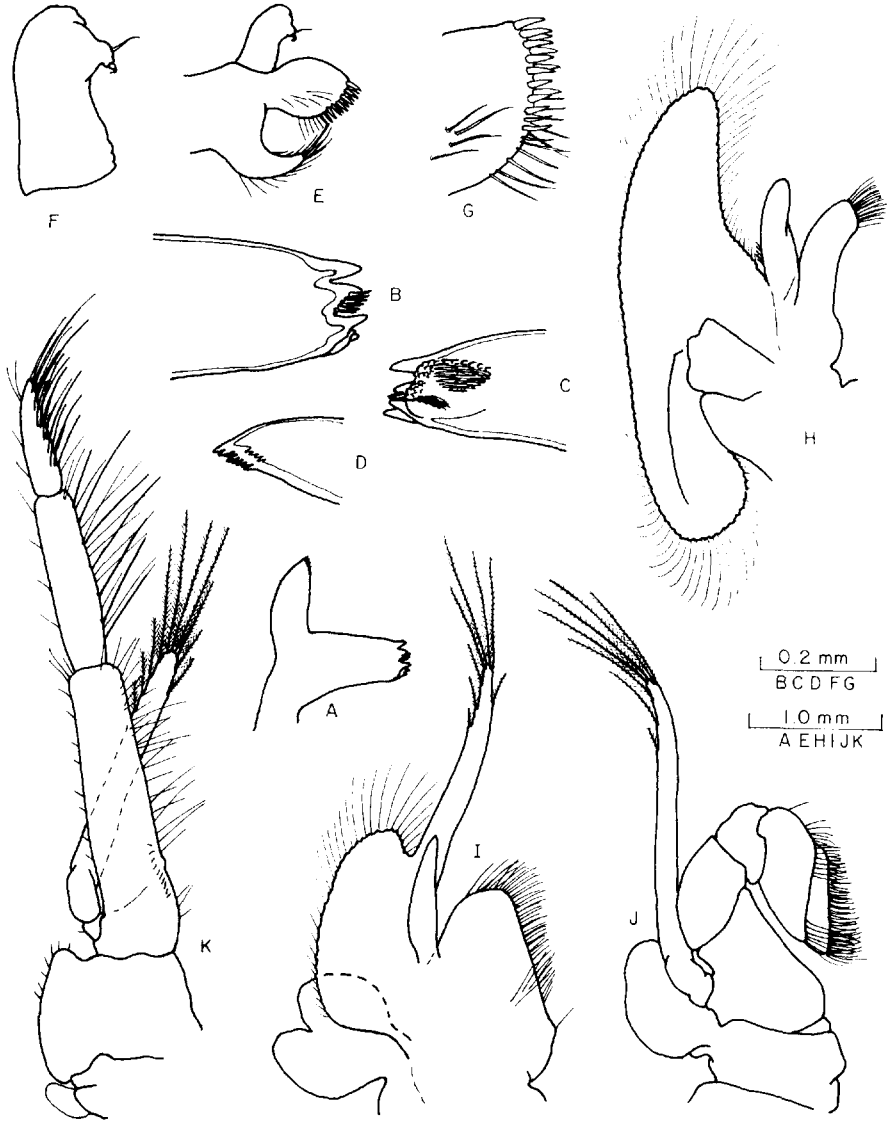

Figure 28. *Periclimenaeus djiboutensis* Bruce. Ovigerous female: A, mandible; B, molar process ventral; C, molar process dorsal; D, incisor process; E, maxillula; F, palp maxillula; G, distal end of upper lacinia of maxillula; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped.

border with numerous simple setae. The distal setae are finely setulose. The coxal endite is slightly produced and not distinctly separated from the basal endite. Only a single seta is present. The exopod is well developed with a moderately large caridean lobe. Four long plumose terminal setae are present with a few shorter marginal setae. A large subcircular bilobed epipod is also present. The second maxilliped shows no special features. The dactylar segment bears many short simple setae. The exopod is well developed, the flagellum

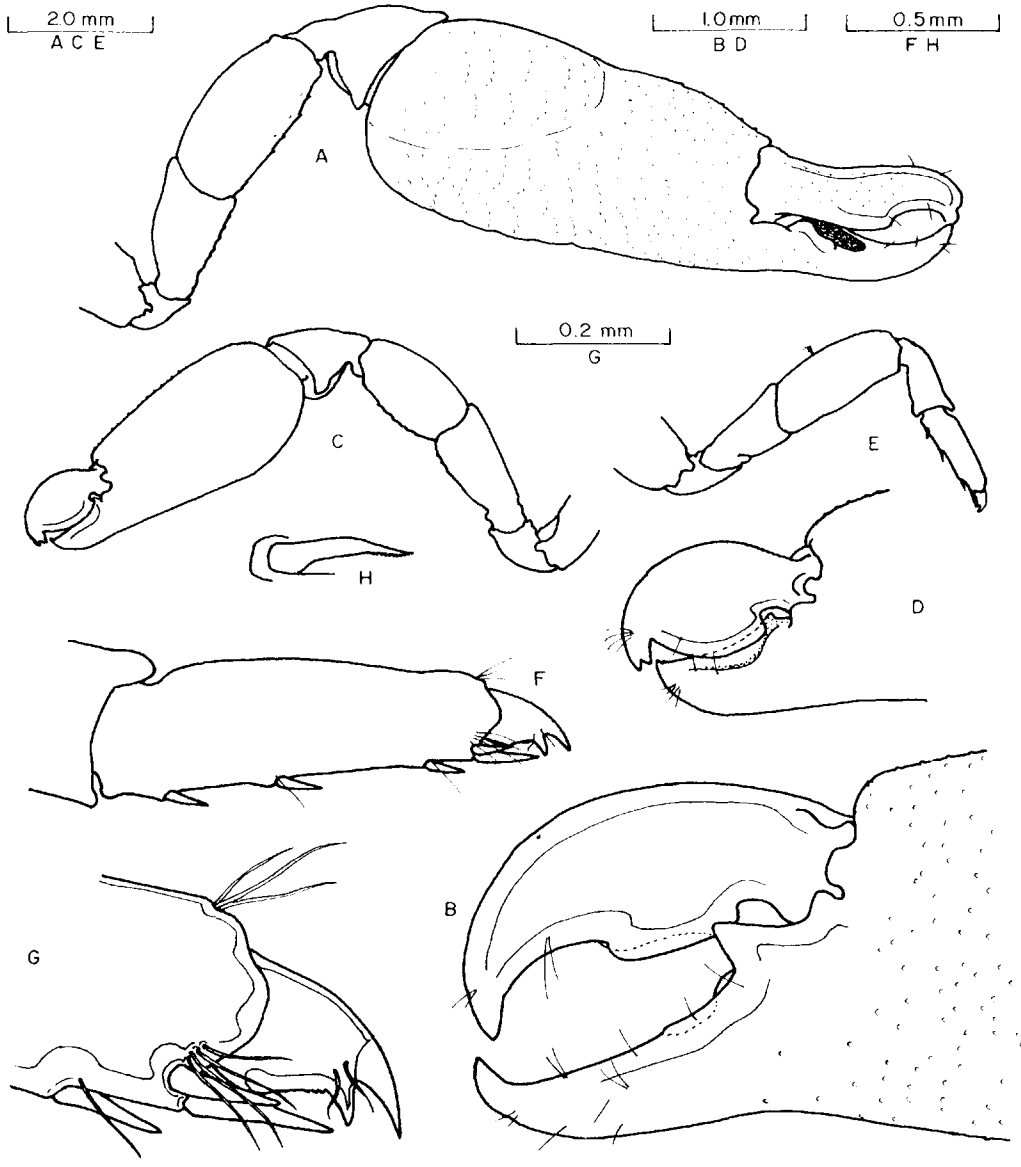

Figure 29. *Periclimenaeus djiboutensis* Brue. Ovigerous female: A, major second pereiopod; B, fingers of chela of major second pereiopod; C, minor second pereiopod; D, fingers of chela of minor second pereiopod; E, third pereiopod; F, propod and dactyl of third pereiopod; G, distal propod and dactyl of third pereiopod.

similar to that of the first maxilliped. A large simple suboval epipod, without a podobranch, is present. The third maxilliped is slender, and extends a little beyond the middle of the carpocerite. The ischio-merus is fused to the basis, with a small tubercle marking the junction on the medial margin. The combined segment is four times longer than the maximum width and tapers gradually distally. The medial border bears many long simple setae. The lateral border is sparsely setose. A row of ten short stout submarginal setae is present on the second fifth of the medial border. The penultimate segment is slender, about 3.5 times longer than wide, with many long slender simple setae. The terminal segment is about two thirds of the length of the penultimate segment, with six groups of stout setae, the most distal being finely setulose. The exopod is well developed with four long plumose terminal setae and several distal marginal setae. The coxa bears an elongated oval epipod and a small arthrobranch with a single lamella.

The second pereiopods clearly indicate that those attributed to this species by Bruce (1974b) were correctly allocated. The chelae of the present specimen have the palms covered with large numbers of small tubercles which tend to be arranged in short curved rows, on the ventral aspects. Some similar small tubercles are also present on the ventral margins of the merus and ischium.

The third pereiopod is robust and extends anteriorly beyond the carpocerite by about one third of the length of the propod. The dactyl is short and stout, and strongly curved, about one quarter of the length of the propod. The unguis is distinct and acute. The ventral border bears a large acute accessory spine distally with a few small blunt tubercles immediately proximally. The corpus bears a pair of small setae laterally and a single seta medially. The propod is almost 3.5 times longer than wide and tapers gradually distally. The ventral border bears three large stout spines, with three similar spines distoventrally, of which the central spine is much larger than the others. The carpus is short, about 0.8 of the length of the propod. The merus is robust, about 2.3 times longer than wide. The ischium is slightly longer than the carpus. Carpus, merus and ischium are all unarmed. The fourth and fifth pereiopods are generally similar to the third but are much more slender, particularly the fifth.

The uropods are as previously described and the telson is also similar. The anterior dorsal spines are distinctly shorter than the posterior dorsal spines and the distal third of the ventral aspect is finely serrated. The ova are numerous and 0.45 mm in diameter. There is a close general agreement with the previous description of *P. djiboutensis*, particularly with reference to the more unusual morphological features of this species but there are a number of small points of differences that may indicate that the present material may belong to a closely related species or the differences may be due to geographical variation. The differences are: (1) the smaller number of rostral teeth, with a convex ventral margin to the rostrum, (2) the distinctly tuberculate palms of the chelae of the second pereiopods; (3) the distal ventral part of the dorsal telson spines is finely serrated. Similar serrations are present on the dorsal telson spines of *P. uropodialis* Barnard and the mouthparts show a close resemblance to those of *P. bouvieri* (Nobili), both species inhabitants of sponges.

Distribution. Type locality, Djibouti. This species has not been recorded from any other locality.

Periclimenaeus lobiferus sp. nov. (Figs 30 to 35)

Material examined. 1♀, Mozambique Channel, 15°21.7'S, 46°12.6'E. P4, chalutage (trawling) 72, 80-85 m, 3 March 1972.

Description. A moderately small species of *Periclimenaeus* of normal body shape.

The carapace is smooth and not swollen. The rostrum is well developed, horizontal, compressed, with a feebly indicated lateral carina, extends anteriorly to the anterior margin of the antennular peduncle. The dorsal margin is feebly convex, with nine teeth all situated well in advance of the posterior orbital margin. The first tooth is short and acute and the teeth become progressively longer and more slender distally, excluding the ninth tooth, which extends beyond the short acute tip. The ventral margin is concave and without teeth. Supra-orbital and hepatic spines are absent. A feebly developed inferior orbital angle is present medially to the large acute antennal spine. The antero-lateral angle of the carapace is feebly curved and not produced. The posterior branchiostegite is broadly rounded. The posterior dorsal region of the carapace bears a distinct short broad median depression.

The abdominal segments are smooth. The first segment bears a tongue-shaped median lobe projecting forward from the central part of the anterior dorsal margin, which corresponds to the posterior median depression on the carapace. The fifth segment is subequal to the length of the sixth segment which is about as broad as long and half as deep. The pleuron of the first segment is slightly produced antero-ventrally, the second to fifth pleura are broadly rounded. The postero-ventral and postero-lateral angles of the sixth segment are bluntly produced.

The telson is about 2.25 times longer than broad, more than twice as broad anteriorly than posteriorly, with feebly convex convergent lateral borders. The posterior margin is broadly rounded. Two pairs of medium sized subequal dorsal spines are present, remote from the lateral margin at 0.12 and 0.38 of the telson length. Three pairs of posterior spines are present. The lateral spines are small, short and stout and incurved. The intermediate spines are large, about 0.12 of the telson length, 4.5 times longer than wide. The submedian spines are slender, slightly longer than the intermediate spines and finely plumose.

The antennules are small and short. The proximal segment is about 1.7 times longer than the width across the base. The lateral margin is concave and strongly tapering with a large acute ventral tooth. The stylocerite is broad, acute distally and reaching the level of the middle of the median margin. The statocyst is normally developed with a granular statolith. The intermediate and distal segments are subequal, short and about as long as wide, together equal to almost half the length of the proximal segment. The lower flagellum is slender and filiform, with 14 segments, about 1.3 times the length of the peduncle. The upper flagellum is biramous with the first three segments stout and coalesced. The shorter free ramus consists of two segments only and the longer of twelve, slightly exceeding the lower flagellum. Eight groups of aesthetascs are present.

The antennae are feebly developed. The basicerite is robust, unarmed laterally. The carpocerite is subcylindrical, about 3.5 times longer than wide and reaching slightly beyond the proximal segment of the antennular peduncle.

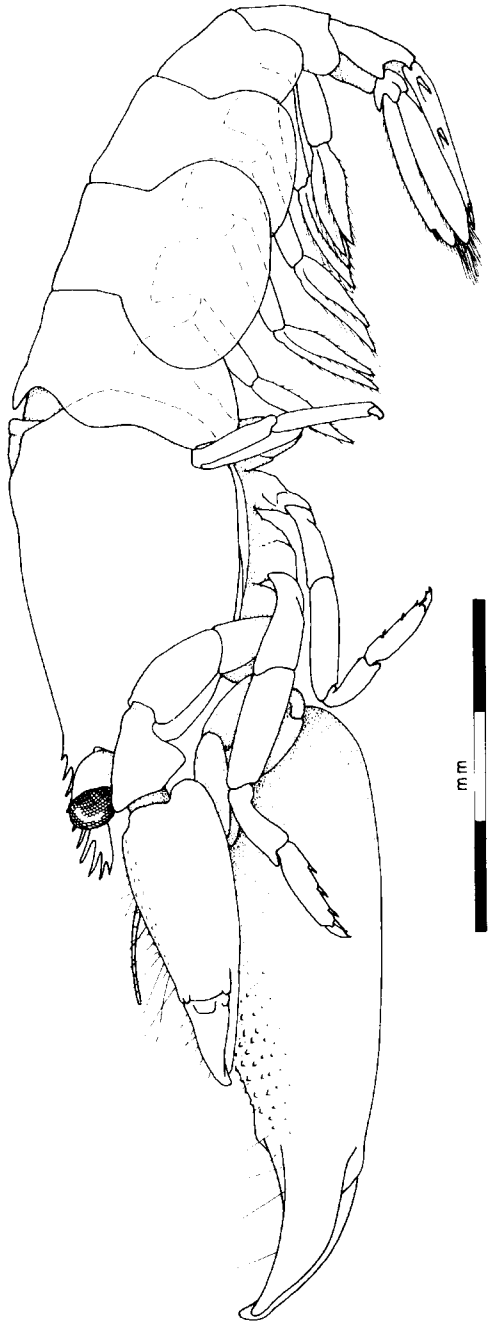

Figure 30. *Periclimenaeus lobiferus* **sp. nov.**, holotype, female.

The flagella are lacking. The scaphocerite is small, extending approximately to the level of the tip of the rostrum and antennular peduncle, nearly three times longer than broad. The lateral margin is feebly concave with a strong disto-lateral tooth which just fails to exceed the rounded anterior margin of the lamina. The opening of the antennal gland forms a small rounded protuberance on the coxal part of the peduncle.

The eye is normally developed. The cornea is hemispherical, oblique and without an accessory pigment spot. The peduncle is subcylindrical, about 1.2 times longer than broad in dorsal view.

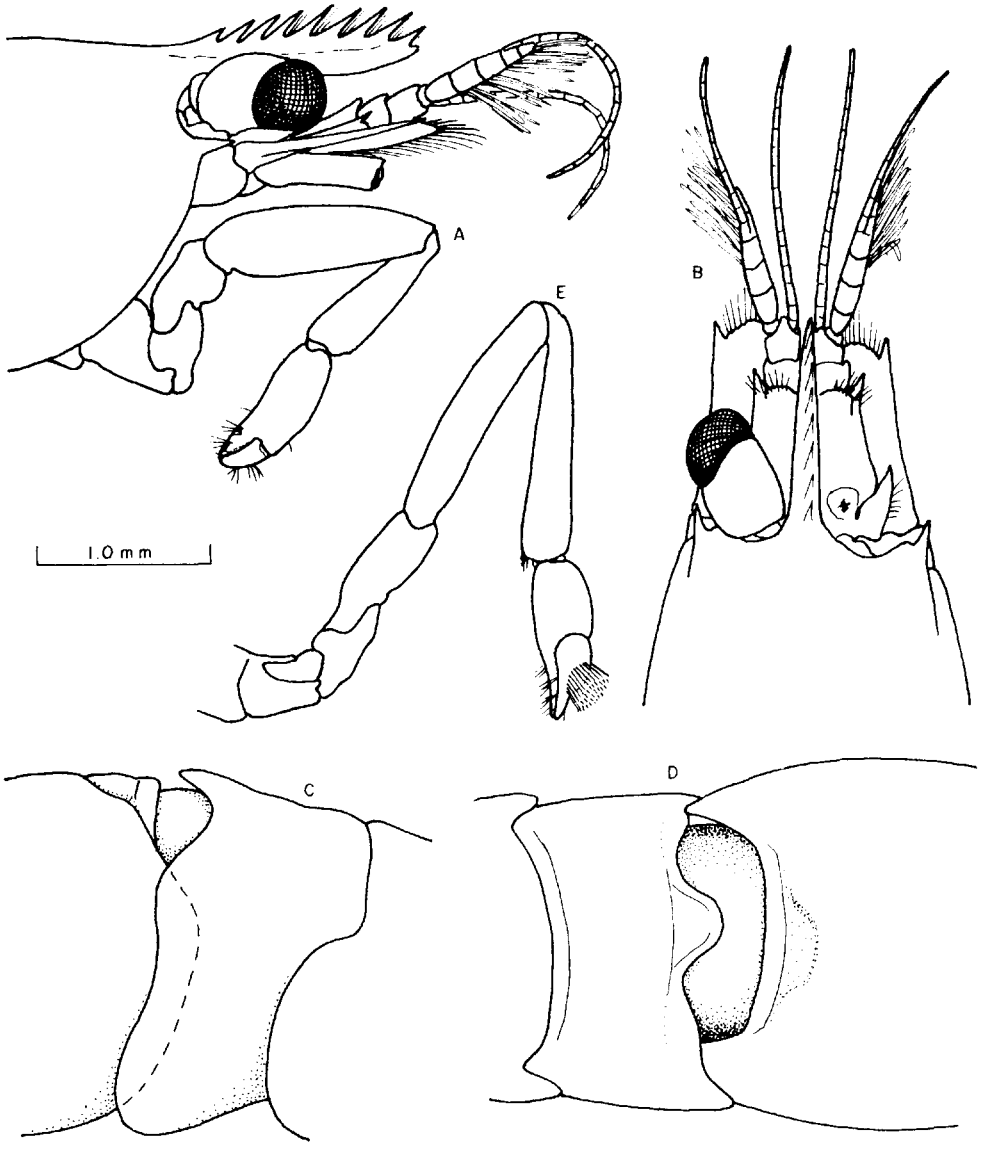

Figure 31. *Periclimenaeus lobiferus* sp. nov., holotype female. A, Anterior carapace and rostrum, antennae and first pereiopod; B, anterior carapace and rostrum, and antennae, dorsal aspect. Posterior carapace and first abdominal segment: C, lateral aspect; D, dorsal aspect. *Periclimenaeus ardeae* Bruce, holotype. E, First pereipod.

The mouthparts are generally typical of the genus. The body of the mandible is stout, with a robust molar process and a feebly developed incisor process. The mandibular palp is absent. The molar process is obliquely truncated distally and bears three blunt carinae, the dorsal and intermediate ending medially in large blunt teeth and the ventral consisting of four blunt teeth. A

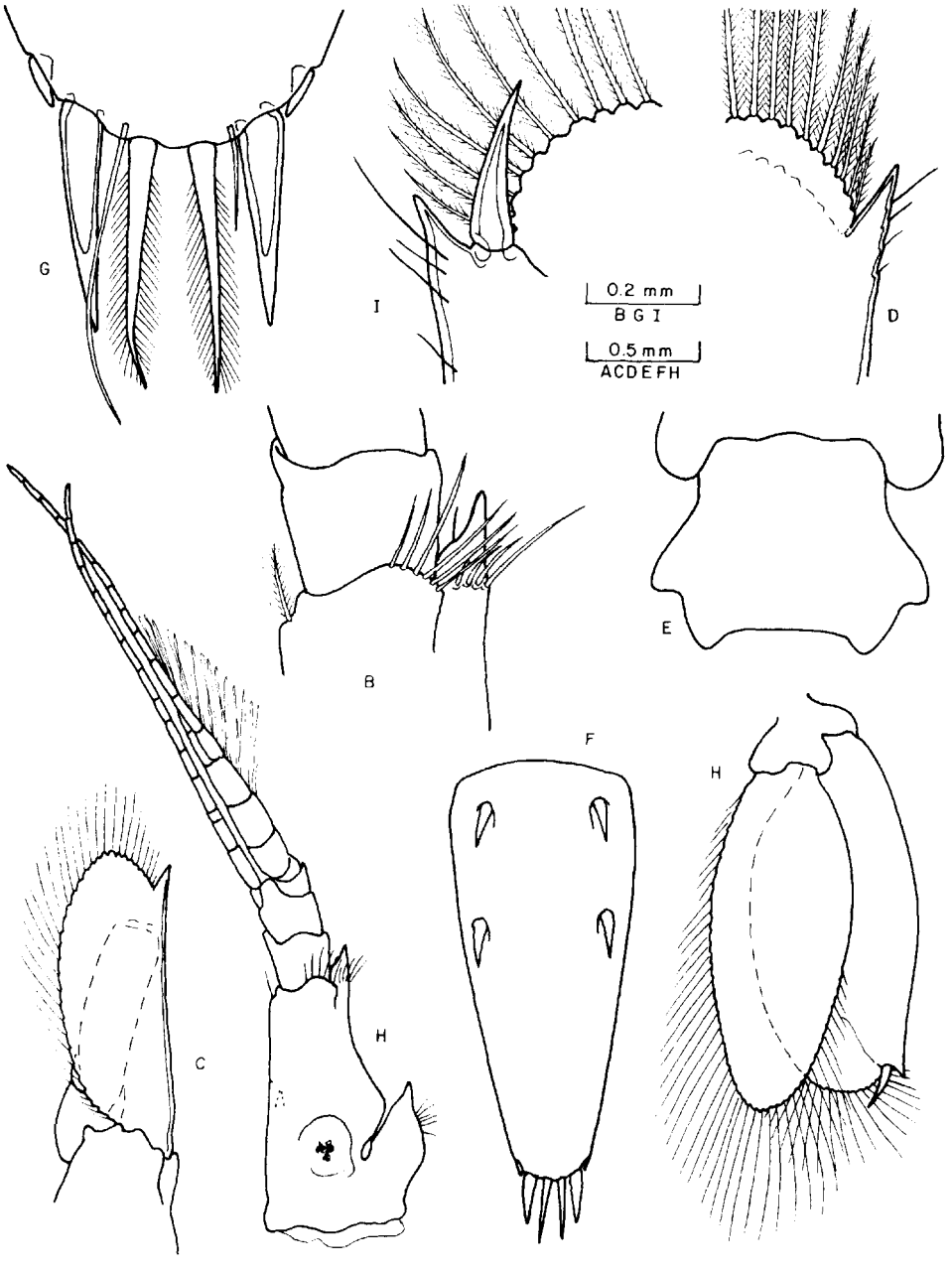

Figure 32. *Periclimenaeus lobiferus* sp. nov., holotype female. A, Antennule, B, disto-lateral angle of proximal segment of antennular peduncle; C, antenna; D, disto-lateral spine of scaphocerite; E, sixth abdominal segment, dorsal aspect; F, telson; G, posterior telson spines; H, uropod; I, disto-lateral angle of exopod of uropod.

small group of setae is present antero-laterally and a few more occur between the teeth of the upper and intermediate carinae. The incisor process is thin with a strongly convex lateral margin ending in a single small blunt tooth. The maxillula has a stout feebly bilobed palp. The upper lobe is small and the lower lobe is feebly produced and without a terminal seta. The upper lacinia is about 1.7 times longer than wide, with nine short feebly serrated spines distally and

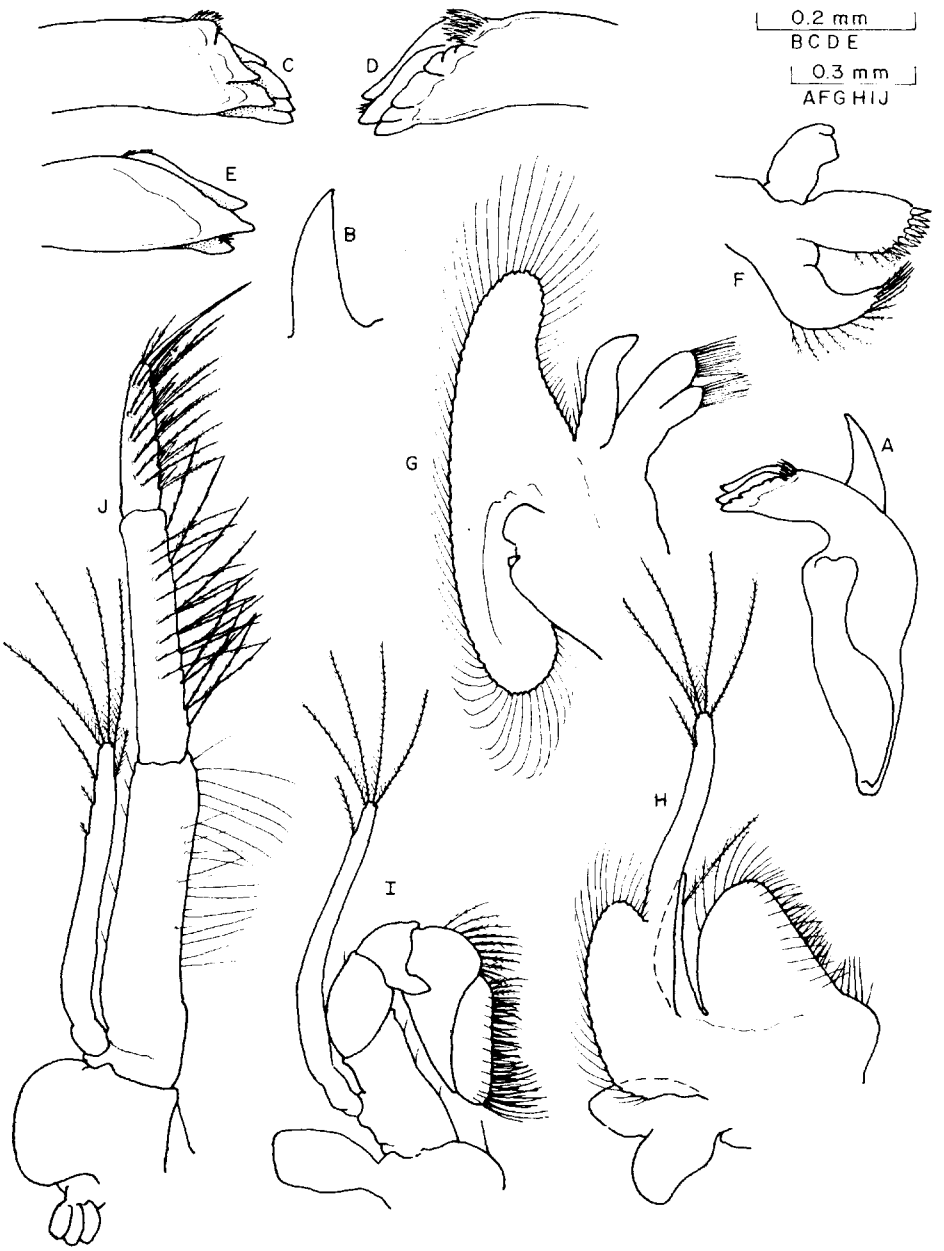

Figure 33. *Periclimenaeus lobiferus* sp. nov., holotype female. A, Mandible; B, incisor process. Molar process: C, ventral; D, dorsal; E, posterior; F, maxillula; G, maxilla; H, first pereiopod; I, second pereiopod; J, third pereiopod.

some plumose setae ventrally. The lower lacinia tapers strongly with several long setulose setae distally and feebly plumose setae ventrally. The maxilla has a robust tapering palp with an angulated tip. The proximal half of the lateral margin bears some short plumose setae. The distal endite is deeply bilobed, with the upper lobe slightly broader than lower lobe, with numerous simple

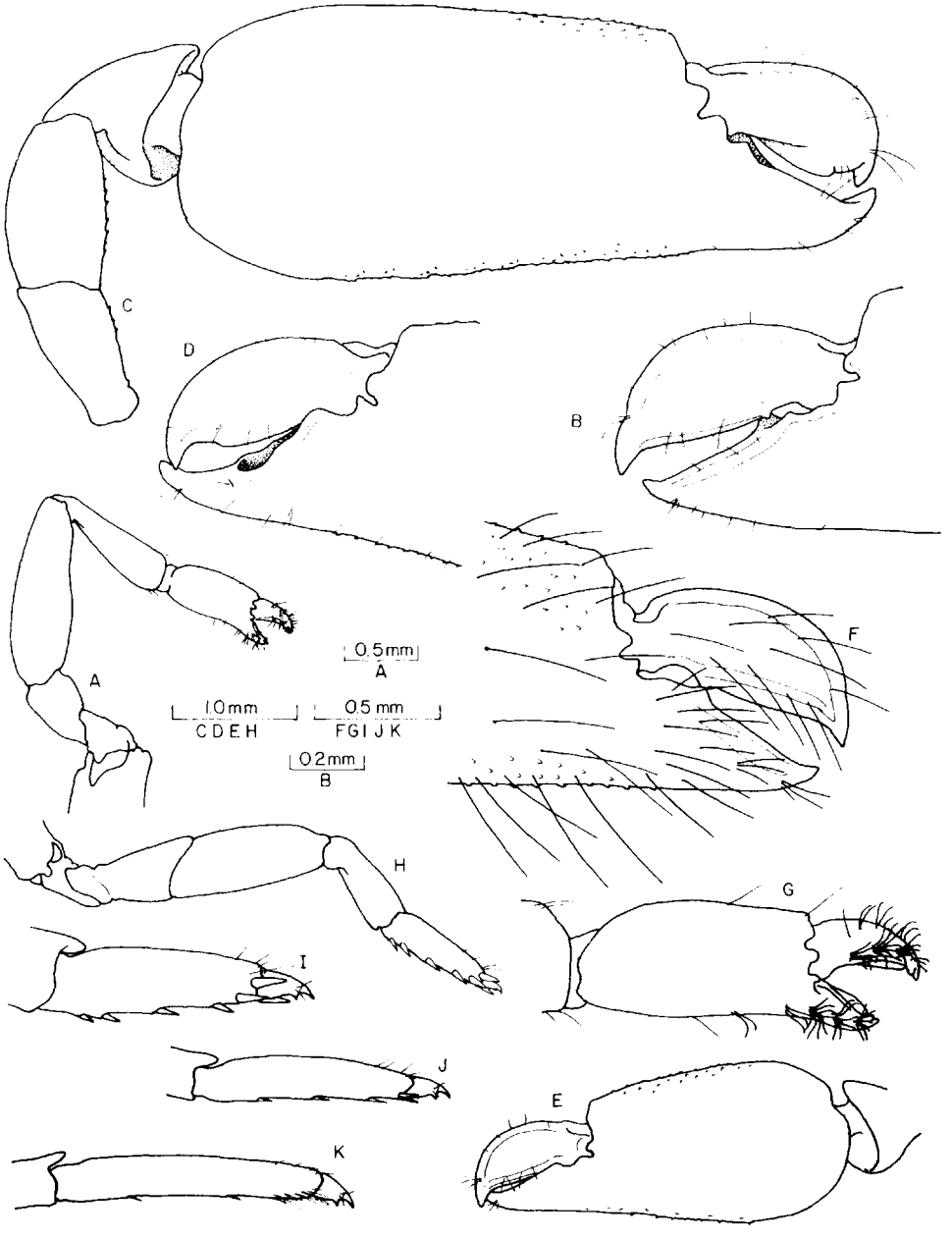

Figure 34. ***Periclimenaeus lobiferus*** **sp. nov.**, holotype female. A, First pereiopod; B, chela of first pereiopod; C, major second pereiopod; D, fingers of chela of major second pereiopod; E, chela of minor second pereiopod. Fingers of chela of minor second pereiopod: F, dorsal; G, ventral; H, third pereiopod; I, propod and dactyl of third pereiopod; J, propod and dactyl of fourth pereiopod; K, propod and dactyl of fifth pereiopod.

setae distally on each lobe. The proximal endite is absent and the medial border is feebly convex. The scaphognathite is moderately narrow, 3.4 times longer than broad, extending well beyond the tip of the palp, narrowed anteriorly with the medial margin concave. The first maxilliped has a slender palp with a long preterminal plumose seta. The basal endite has a strongly convex antero-lateral margin and straight medial margin, with numerous slender coarsely setulose setae. The coxal endite is not separated by a distinct notch

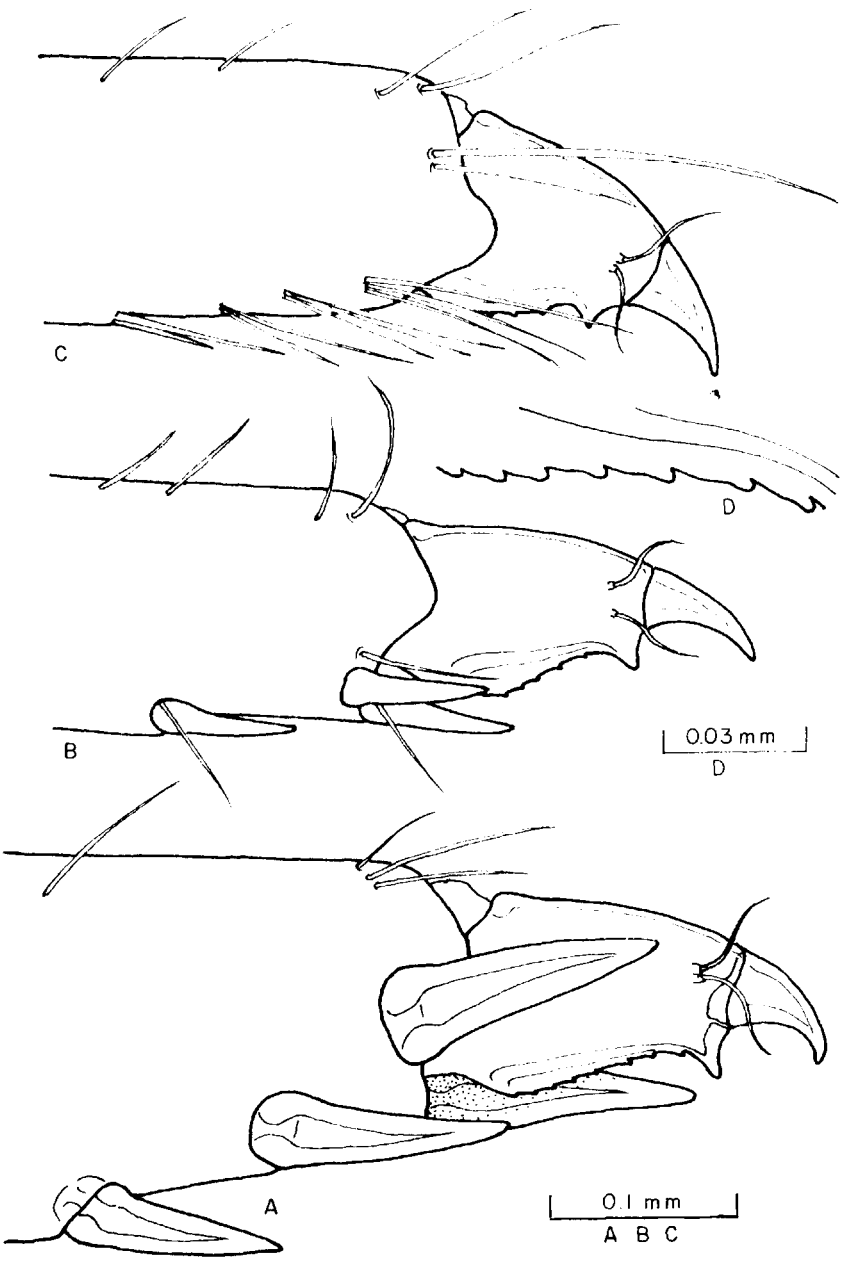

Figure 35. ***Periclimenaeus lobiferus*** **sp. nov.**, holotype female. Distal propod and dactyl: A, third pereiopod; B, fourth pereiopod; C, fifth pereiopod; D, ventral border of carpus of dactyl of fifth pereiopod.

and is slightly produced, convex medially with a few setae distally. The exopod is normally developed with a small narrow caridean lobe. The flagellum bears four plumose setae distally with a single preterminal lateral seta. A deeply bilobed epipod is also present. The second maxilliped is normally developed. The dactylar segment is about three times longer than broad with numerous stout spiniform setae marginally. The ventral setae are densely setulose and the inner setae are stouter, coarsely dentate along the anterior margin and more finely serrated along the posterior border. The anterior border of the propodal segment is broadly rounded, with about 12 long slender finely plumose setae. The carpus bears a large ventro-medial lobe. The ischio-merus and basis present no special features. The exopod is similar to that of the first maxilliped and a subrectangular epipod, without a podobranch, is also present. The third maxilliped is moderately slender and extends to the level of the middle of the carpocerite. The ischiomerus is almost completely fused with the basis, a slight notch indicating the point of junction on the medial border. The combined segment, which tapers slightly distally and is feebly bowed ventrally, is about four times longer than the greatest width. The medial margin is sparsely provided with slender feebly setulose setae. The penultimate segment is about 0.8 of the antepenultimate segment length, and about five times longer than wide. The medial margin and the ventro-medial aspect bear rows of long setae. The proximal setae are coarsely setulose and the more distal setae are finely serrulated. The terminal segment, equal to about half the length of the penultimate, bears a stout terminal spine, with five groups of stout serrulate setae along the ventral and medial borders. The exopod is well developed, slightly exceeding the anterior margin of the antepenultimate segment of the endopod. The flagellum bears four plumose terminal setae with three preterminal lateral setae and one medial seta. The coxa is stout, not produced medially, with a large rounded epipod laterally. A small lamellar arthrobranch is also present.

The first pereiopods are short and stout, extending beyond the antennular peduncle by the length of chela and carpus. The chela is robust with a stout subcylindrical palm, about twice as long as wide in lateral view, and tapering only slightly distally. The fingers are short and stout, also equal to about half the palm length. The dactylus is about 2.3 times longer than deep, broad, with two small blunt teeth distally. The cutting edge is blunt, concave, and distally thickened. The fixed finger is similar and both bear numerous groups of short coarsely setulose setae. The carpus is about 1.2 times the length of the chela, 3.5 times longer than wide, and tapered proximally. The merus is robust, 3.3 times longer than wide, with the proximal half swollen. The ischium and basis are normal. The coxa is robust with a very small non-setiferous median process.

The second pereiopods are well developed, very unequal and dissimilar. The major second pereiopod has a greatly enlarged chela, equal to 1.8 times the post-orbital carapace length. The palm is subcylindrical, tapering and flattening distally, 1.9 times longer than wide, with numerous scattered small conical tubercles on the dorsal aspect. The dactylus is robust, slightly compressed, about 0.3 of the palm length, with a large low feebly demarkated molar process on the proximal cutting edge and an acute hooked tip. The fixed finger has a large blunt tip, with a fossa on the proximal cutting edge. A small subacute tooth is present on the ventral part of the cutting edge proximally and a

rounded lobe on the dorsal side. The carpus is short and stout, expanded and excavated distally with unarmed margins. The merus is robust, about 1.7 times longer than wide, broadest centrally, equal to one third of the length of the palm and with numerous small acute tubercles on the ventral margin. The ischium is subequal to the meral length, tapering proximally, with a few tubercles on the ventral border. The basis and coxa are very robust but without special features. The minor second pereiopod has the chela slightly shorter than the carapace length and a little less than half the length of the major chela. The palm is 1.6 times longer than wide, tapering strongly distally, with many small conical tubercles dorsally and also with numerous long simple setae, especially distally. The dactylus is about half the length of the palm, 2.5 times longer than wide, with a strongly convex lateral border and the greatest depth at half the length. A large acute moderately hooked tip is present distally. The cutting edge bears a small acute tooth at one third of the length, the distal two thirds being feebly convex and entire. The fixed finger is similar, with a smaller blunter tip. The cutting edge is entire with a small acute tooth present dorsally, opposing the dactylar tooth, and with a smaller blunter tooth also present more proximally ventrally. Both fingers bear numerous long simple setae dorsally and are without tubercles. The carpus, merus and ischium are similar to those of the major appendage but slightly smaller.

The third ambulatory pereiopod is moderately robust and extends beyond the carpocerite by half the length of the carpus, propodus and dactylus. The dactylus is robust, strongly carinate ventrally, about 1.8 times longer than deep. The unguis is short and stout, strongly curved, acute and without denticles on the ventral margin, about half the length of the corpus. The corpus bears a large pointed accessory tooth distally on the ventral margin, which is feebly convex and bears eight small rounded tubercles. A pair of sensory setae are present laterally. The propodus is stout, 3.2 times longer than wide and tapering gradually distally. The ventral border bears 3-4 large very stout spines. The two disto-ventral spines are particularly robust and are situated above and below the base of the dactylus. The carpus is unarmed, subequal to the length of the propodus. The merus is robust, 1.7 times the length of the propodus, 2.6 times longer than broad and ventrally unarmed. The ischium is also ventrally unarmed, tapered proximally and 1.25 times the length of the propodus. The basis is moderately slender and the coxa is unarmed. The fourth pereiopod is generally similar. The dactylus is slightly more slender and bears only five small tubercles on the ventral border. The propodus is subequal to that of the third pereiopod but is more slender, 5.0 times longer than wide, with three long slender ventral spines and two similar disto-ventral spines. In the fifth pereiopod, the dactylus is stouter with only three tubercles on the ventral border and the propodus is relatively longer, 1.3 times that of the third pereiopod, 6.7 times longer than wide. Three slender spines are present on the ventral border. The disto-ventral spines are absent but four groups of slender setae are present laterally.

The pleopods present no special features. An appendix interna is present on the second to fifth endopod.

The uropods are normal. The protopodite is bluntly rounded laterally. The broad exopod distinctly exceeds the telson and is about twice as long as wide. The lateral border is unarmed, strongly convex, ending in a well developed,

acute tooth with a large curved mobile spine medially. The endopod slightly exceeds the exopod and is about 2.4 times longer than wide.

Type. The single specimen available is designated as the holotype and is deposited in the collections of the Muséum National d'Histoire Naturelle, Paris, catalogue number 2582.

Measurements.		
	Post-orbital carapace length	3.1 mm
	Carapace and rostrum	4.2 mm
	Total length (approx.)	11.5 mm
	Major chela length	5.5 mm
	Minor chela length	2.8 mm

Remarks. The systematic relationships of *Periclimenaeus lobiferus* is indicated by the presence of the antero-lateral lobe on the first abdominal segment. This unusual feature has only been reported in one other species of the genus, *P. ardeae* (Bruce, 1970). In general, a close resemblance exists between the two species but *P. lobiferus* may be distinguished from *P. ardeae* by differences in the morphology of several of the appendages. The most marked differences occur in the first pereiopod, which is much shorter and stouter than in *P. ardeae*. The chela has the stout fingers equal to about half the palm length. In *P. ardeae* the fingers are subequal to the palm and the dactylus is swollen proximally, where it bears a circular tuft of setae, and slender distally (Fig. 31E). The circular brush-like tuft of setae is quite lacking in *P. lobiferus*. The dactyls of the ambulatory pereiopods in *P. lobiferus* are provided with small tubercles along the ventral margin of the corpus, posterior to the accessory spine. These tubercles are absent in *P. ardeae*, in which the propodus is also much less robust on the third pereiopod, with more slender, shorter spines, closely resembling that of the fourth pereiopod in *P. lobiferus*.

The colouration and host of *P. lobiferus* are not known. *P. ardeae* was found in association with a sponge and it is most likely that *P. lobiferus* was similarly associated. The specimen is clearly adult as a well developed ovary is visible in the preserved specimen.

The function of the dorsal lobe on the first abdominal segment appears to be that of a locking mechanism between carapace and abdomen. It is apparent that the process fits into the depression on the postero-dorsal surface of the carapace and not under the posterior rim of the carapace. A precisely similar depression of the posterior dorsal carapace is present in the holotype specimen of *P. ardeae*, in which the dorsal lobe of the first abdominal segment is also rather better developed and more subquadrate than in *P. lobiferus*.

Onycocaris trullata sp. nov. (Figs 36 to 41)

Material examined. 1 ovig.♀, Tany-Kely, Madagascar, 13°28′S, 48°12′E, trawl, 28 m, 26 February 1971.

Description. A small, squat, stoutly built pontoniine shrimp, with a subcylindrical, slightly depressed body form.

The carapace is smooth and slightly swollen. The rostrum is short and without teeth, narrowly triangular in dorsal view and distinctly extending beyond the level of the tips of the inferior orbital angle but not reaching the anterior margin of the eyes. The rostrum is feebly convex dorsally. The orbit is well defined and shallow. The inferior orbital angle is acute and triangular in lateral

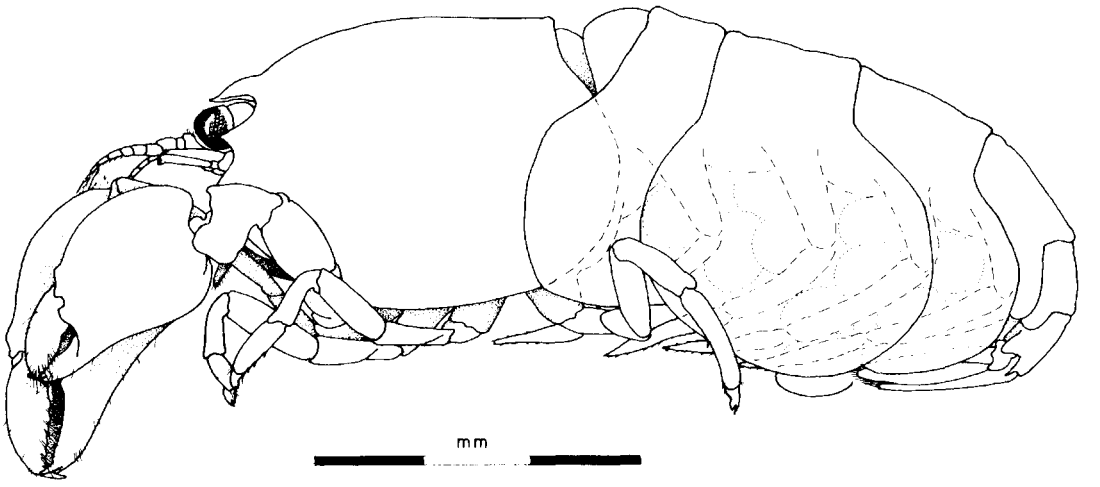

Figure 36. *Onycocaris trullata* sp. nov., holotype ovigerous female.

view. Supra-orbital, hepatic and antennal spines are absent. The antero-lateral angle of the carapace is broadly rounded, slightly produced, barely exceeding the tips of the inferior orbital angle in dorsal view.

The abdominal segments are smooth and moderately depressed, the fifth and sixth segments more strongly flattened, subequal in length. The sixth segment has the postero-ventral angle broadly acute and the postero-lateral angle is also acute in lateral view. The pleura of the first three segments are greatly enlarged and broadly rounded. The fourth and fifth pleura are smaller, produced posteriorly and rounded.

The telson is about twice the length of the sixth abdominal segment and 1.75 times longer than wide. The anterior half of the lateral border is slightly convex and the posterior half straight, tapering strongly to a small rounded posterior margin. The two pairs of dorsal spines are small and situated on the lateral margins at 0.3 and 0.5 of the telson length. The lateral posterior spines are twice the size of the dorsal spines. The intermediate spines are stout, swollen, about three times the length of the lateral spines and slightly longer than the submedian spines, which are slender and non-plumose.

The antennules are small. The proximal segment is twice as long as wide, with a well developed disto-lateral tooth. The median border is without a ventral spine. The stylocerite is normally developed, acute, reaching to the middle of the segment. The statocyst is poorly defined and contains a granular statolith. The intermediate segment is short, one and a half times broader than long, slightly wider than the distal segment, which is as long as wide, the two segments together slightly exceeding half the length of the proximal segment. The lower flagellum is short, slender and filiform, slightly exceeding the length of the peduncle, with nine segments. The upper flagellum is biramous, with the five proximal segments fused. The shorter free ramus consists of two segments and the longer of five. The longer ramus is subequal to the lower flagellum. Five groups of aesthetascs are present.

The antennae are reduced. The basicerite is robust and unarmed laterally. The carpocerite is four times longer than wide and is compressed, extending

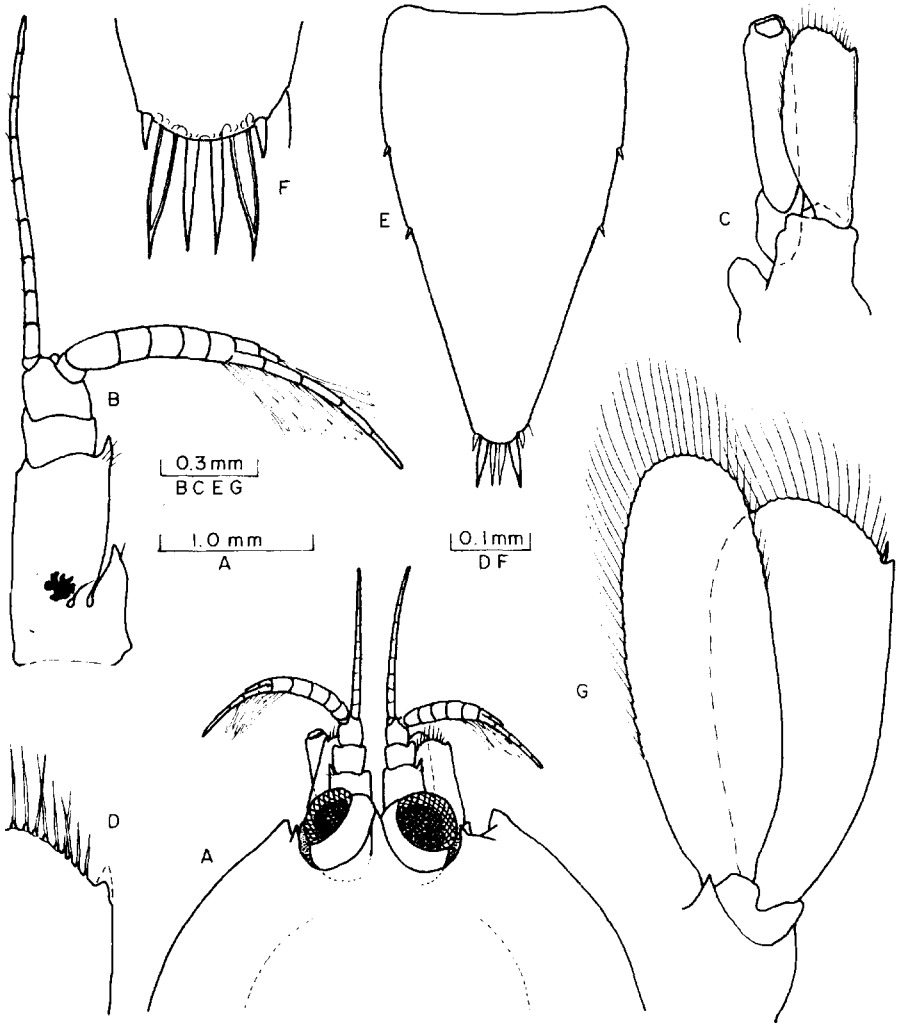

Figure 37. *Onycocaris trullata* sp. nov., holotype ovigerous female. A, Anterior carapace, rostrum and antennae, dorsal; B, antennule; C, antenna; D, disto-lateral spine of scaphocerite; E, telson; F, posterior telson spines; G, uropod.

slightly beyond the scaphocerite. The flagella are lacking. The scaphocerite is small, not exceeding the antennular peduncle or carpocerite. The lateral margin is straight, ending in a small acute tooth that is distinctly exceeded by the rounded anterior margin of the lamina, which is about 2.7 times longer than wide. The opening of the antennal gland forms a large ventro-medial protuberance on the coxal part of the peduncle.

The eyes are very short and stout. The cornea is hemispherical, obliquely situated on the peduncle, which is globular, and about 1.4 times the diameter of the cornea.

The mouthparts are typical of the genus. The mandible is slender and without a palp. The incisor process is narrow with an enlarged lateral tooth with nine smaller teeth medially. The molar process is slender, obliquely truncate distally with a peripheral fringe of fine setae. The maxillula has a

slender, feebly bilobed palp. The upper lobe is small and the lower lobe produced, with a single straight terminal seta. The upper lacinia is twice as long as broad, with five short spines distally, feebly serrate along their upper margins, and a few sparsely plumose setae. The lower lacinia is slender and tapering with numerous longer feebly plumose setae distally. The maxilla has a well developed, non-setose, tapering pointed palp. The distal endite is broad and simple with eight simple terminal setae. The proximal endite is absent and

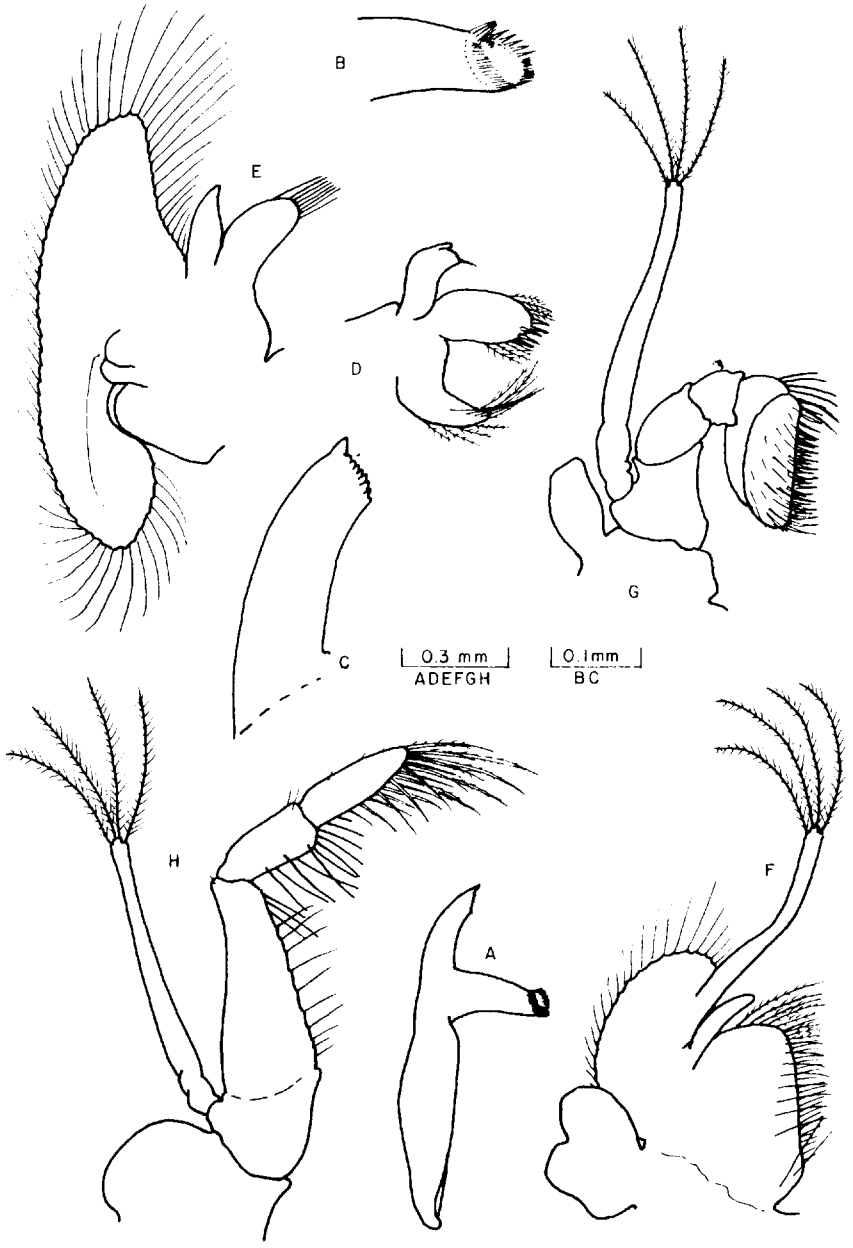

Figure 38. ***Onycocaris trullata*** **sp. nov.**, holotype ovigerous female. A, Mandible; B, molar process; C, incisor process; D, maxillula; E, maxilla; F, first pereiopod; G, second pereiopod; H, third pereiopod.

the medial margin is feebly convex. The scaphocerite is well developed, about 2.8 times longer than broad, with the disto-medial margin feebly concave. The first maxilliped has a slender, subcylindrical non-setose palp. The basal and coxal endites are completely fused, forming a broad lamina with a rounded anterior and straight medial border, bearing numerous slender setae. The proximal setae are shorter and simple and the more distal setae longer and feebly setulose. The exopod bears a well developed caridean lobe. The flagellum is slender with four plumose terminal setae. The epipod is well developed and bilobed. The second maxilliped is of normal form. The dactylar segment is broad, 2.4 times longer than wide, with numerous stout serrate spines along the medial border and on the ventro-medial surface. The propodal

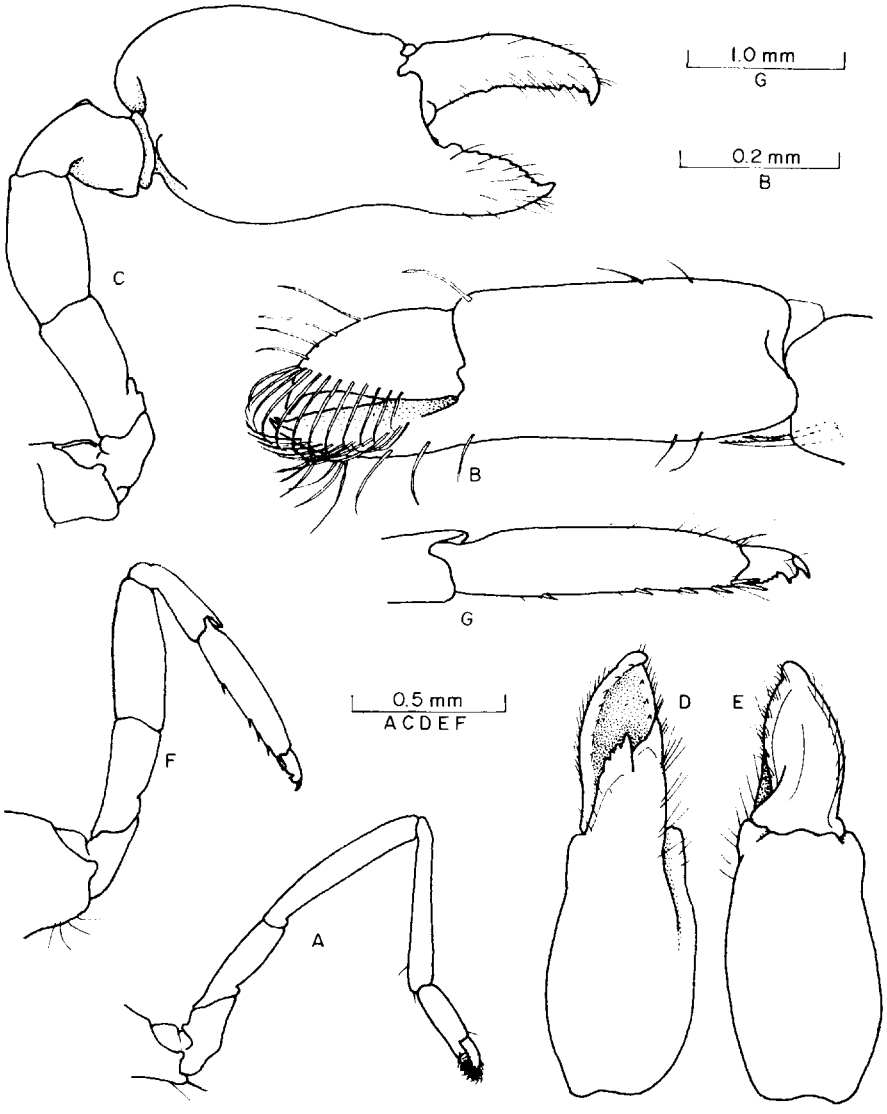

Figure 39. ***Onycocaris trullata*** **sp. nov.**, holotype, ovigerous female. A, First pereiopod; B, chela of first pereiopod; C, left second pereiopod, medial aspect. Chela of left second pereiopod: D, ventral; E, dorsal; F, third pereiopod; G, propod and dactyl of third pereiopod.

segment is also broad, with six slender spines antero-medially. The carpus, ischio-merus and basis present no special features. The exopod is slender with four plumose terminal setae. The coxa is not produced medially and bears a subrectangular epipod, without a podobranch, laterally. The third maxilliped is rather feebly developed and extends only to the base of the carpocerite. The ischio-merus and basis appear almost completely fused, a small notch indicating the junction on the medial margin. The ischio-meral portion is 2.4 times longer than broad and tapers strongly distally, with a slightly sinuous lateral margin and a straight medial border bearing about ten feeble simple setae. The penultimate segment is twice as long as wide, slightly broadened distally with about six stronger setae along the medial border and a transverse row of six setae across the distal dorsal margin. The terminal segment is subequal to the

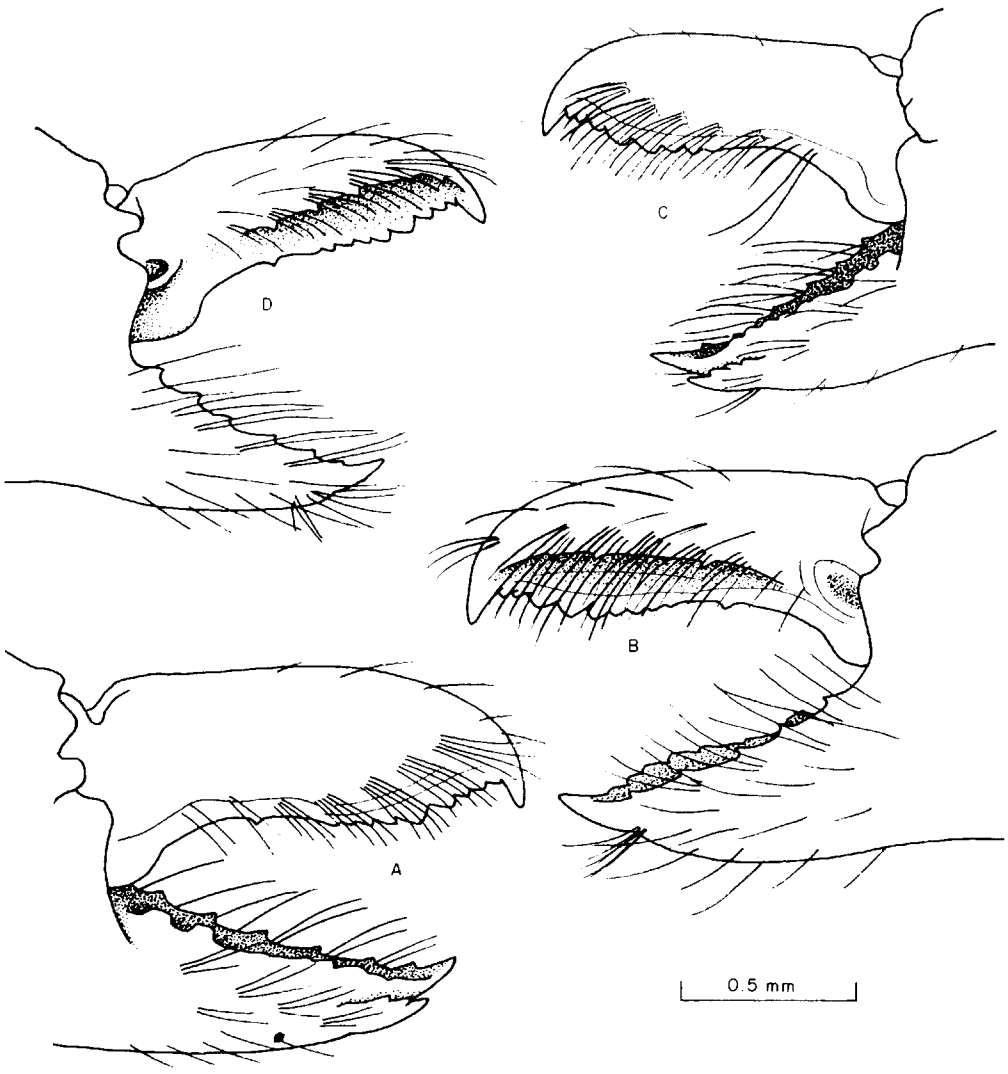

Figure 40. *Onycocaris trullata* sp. nov., holotype, ovigerous female. Fingers of chelae of second pereiopods; A, right lateral; B, right medial; C, left lateral; D, left medial.

penultimate and tapers gradually distally. The two segments together are subequal to the ischio-merus. The medial border bears five groups of long finely setulose setae. The medial border of the basis is half the length of the ischio-merus, feebly convex and non-setose. The lateral border is much shorter and bears a slender exopod with four plumose terminal setae. The coxa is concave medially, non-setose, and bears a large rounded epipod laterally. There is no arthrobranch.

The sternites of the second and third thoracic segments are broad and unarmed. The succeeding sternites are narrow so that the coxae of first and second pereiopods are closely opposed. The fourth sternite is also unarmed.

The first pereiopod is also slender, the distal third of the merus exceeding the carpocerite. The palm of the chela is subcylindrical, slightly compressed, about twice as long as wide. The fingers are broad, about half thelength of the palm. The dactylus has a distinct hooked tooth distally which opposes a pair of terminal teeth situated distally on the fixed finger. The inner and outer margins of the fingers bear a row of numerous simple curved projecting setae, forming a basket-like arrangement. The carpus is about 1.7 of the length of the chela, seven times longer than broad and slightly expanded distally. The merus is slightly longer than the carpus, more robust and feebly bowed. The ischium

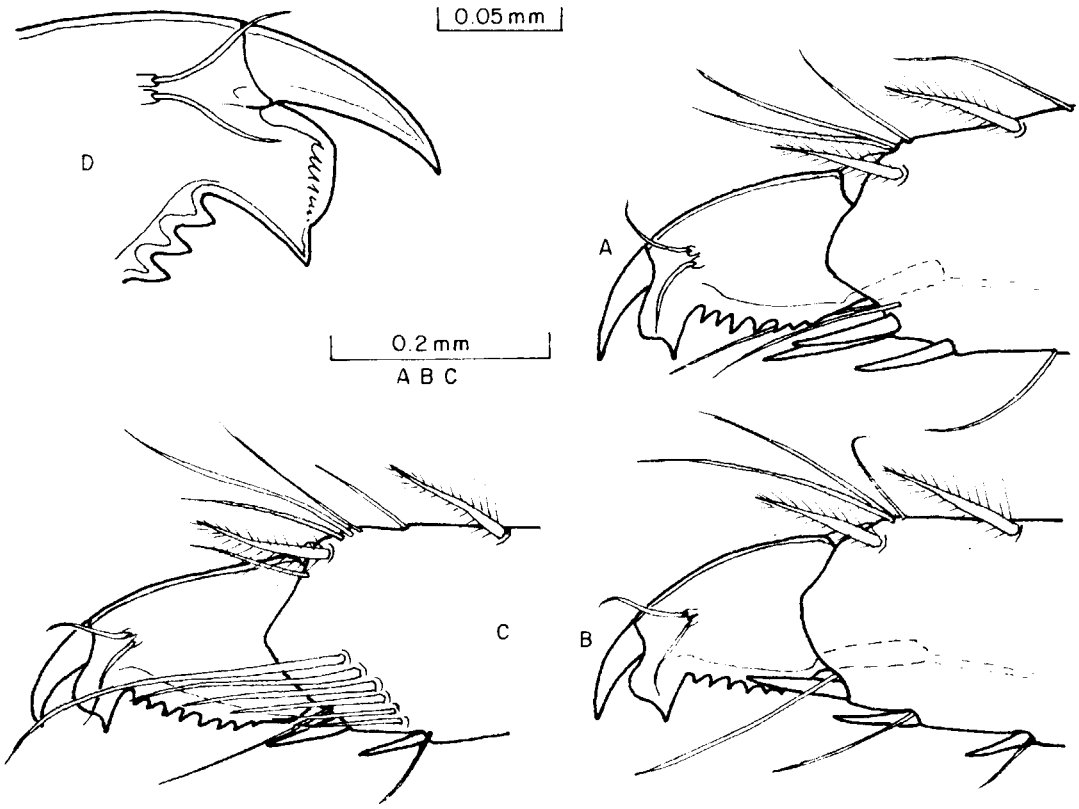

Figure 41. *Onycocaris trullata* sp. nov., holotype, ovigerous female. Dactyls of ambulatory pereiopods: A, third pereiopod; B, fourth pereiopod; C, fifth pereiopod; D, unguis and distal corpus of third pereiopod.

is 0.6 times the length of the merus and 1.2 times the length of the basis. The coxa bears a very small median ventral protuberance with a single seta.

The second pereiopods are well developed, similar and moderately unequal. In the major chela, the palm is smooth, high and strongly compressed, about 1.5 times longer than deep. The fingers are equal to about 0.6 of the palm length. The dactylus is three times as long as deep, and is broad, deeply excavated ventrally with a strongly hooked acute tip distally. The lateral cutting edge bears about nine rather large coarse irregular teeth along the distal half, with a single small acute tooth at one third of the length. The medial cutting edge is less distinct and bears five small acute teeth. The fixed finger is similar but bears two stout, flat-topped teeth proximally on the lateral cutting edge and the distal teeth are more irregular. The medial edge also bears five acute teeth. The tip of the fixed finger is deeply notched and bears a small lateral accessory lobe, which has an acute distal tooth and two more blunt proximal teeth. The outer aspects of the dactylus are provided with five or six groups of submarginal setae on each side and numerous long setae are also present on the fixed finger. The chela of the minor second pereiopod is generally similar but slightly smaller, the palm equal to 0.75 of the larger chela. The lateral cutting edge of the dactylus lacks the small acute tooth present in the larger chela. The carpus is stout, with a large disto-lateral lobe and unarmed, equal to about 0.45 of the palm length. The merus is robust, nearly twice as long as broad, moderately swollen centrally, smooth and unarmed. The ischium is without a disto-ventral spine, twice as long as broad and slightly widened distally, subequal to the length of the merus. The basis is normal and the coxa is stout, without a medial lobe.

The ambulatory pereiopods are moderately robust. The third pereiopod exceeds the base of the carpocerite by the carpus, propodus and dactylus. The dactylus has the unguis distinct, curved and without accessory denticles on the ventral margin. The corpus has the dorsal border about twice the length of the dactylus and is compressed with a sharp convex ventral margin. The distal end of the ventral margin bears a large accessory process with a strongly convex anterior margin and an acutely pointed posterior tooth. Proximally the ventral border bears eight small acute teeth. The propodus is slightly compressed, about 4.7 times longer than wide and 4.5 times the length of the dactylus. The ventral border bears four short spines with a pair of longer disto-ventral spines. The distal dorsal margin bears two short plumose setae. The carpus is about 0.6 of the propodus length and is unarmed. The merus is subequal to the propodus, almost three times longer than wide, tapering slightly distally and unarmed. The basis is 0.7 of the length of the ischium. The coxa is short and very robust. The fourth and fifth periopods are generally similar but more slender. The dactyls bear eight small acute teeth along the ventral margin proximal to the accessory spine. The propodus of the fourth pereiopod has a pair of disto-ventral spines with three more along the ventral border, while the fifth has a single disto-ventral spine with a subterminal lateral row of six long simple setae and spines along the ventral border.

The pleopods present no special features. An appendix masculina is present on all except the first.

The uropods have the lateral margin of the protopodite unarmed. The exopod is broad, about 2.2 times longer than broad, with the lateral border

entire, strongly convex, terminating in a small acute tooth with a mobile spine medially. The endopod is narrower, about 3.0 times longer than broad and exceeds the exopod.

The ova are relatively few in numbers and large.

Type. The single specimen available is designated as the holotype and is deposited in the collections of the Muséum National d'Histoire Naturelle, Paris, catalogue number 2585.

Measurements.

Post-orbital carapace length	2.8 mm
Carapace and rostrum	3.2 mm
Total length (approx.)	10 mm
Major chela length	3.1 mm
Minor chela length	2.2 mm
Diameter of ova	0.7 mm

Remarks. The systematic position of *Onycocaris trullata* is indicated by the short edentate rostrum, and the unarmed ischia of the second pereiopods. The only other species of the genus with these characters is *O. quadratophthalma* Balss, recently redescribed by Fijino & Miyake (1969). These authors note that in Balss' species, the second maxilliped is without an epipod, as is found in most of the other species of the genus apart from *O. monodoa* Fujino & Miyake, and *O. seychellensis* Bruce. The presence or absence of this epipod in *O. aualitica* (Nobili) and *O. zanzibarica* Bruce is not known. Holthuis (1952) described the first two pairs of maxillipeds as normal in *O. stenolepis,* which presumably therefore possess this epipod on the second maxilliped. Other differences between *O. trullata* and *O. quadratophthalma* are the absence of the quadrate antero-medial margins on the eyestalks and the distinctly spatulate fingers on the chelae of the sond pereiopods. However, it may be noted that Fujino and Miyake indicated considerable variation in the material they referred to *O. quadratophthalma,* particularly with reference to the eye shape, the size of the disto-lateral spine of the scaphocerite, the chela of the first pereiopod, the dactyls of the ambulatory pereiopods and the dorsal telson spines, all features that are often of considerable diagnostic importance at specific level. *O. trullata* seems generally more closely related to *O. quadratophthalma sensu stricto.*

No data are available on the colouration or host of the holotype specimen. *Onycocaris* species are only known from associations with sponges and it is presumed that *O. trullata* is also a sponge associate.

The genus *Onycocaris* Nobili, which is known only from the Indo-West Pacific region, now contains eleven species. The two closely related species *O. monodoa* and *O. stenolepis* appear to be the least specialized, with relatively unmodified chelae on the second pereiopods and simple dactyls on the ambulatory pereiopods, with only a small accessory spine on the posterior border. The other species form a homogenous group showing progressive reduction of the rostrum, with increasing modification of the chela of the second pereiopods and the dactyls of the walking legs. The species known at present may be separated by the key below. It may be noted that *O. oligodentata* Fujino and Miyake is only doubtfully separable from *O. aualitica* (Nobili), recently redescribed by Bruce (1973), but re-examination of the mouthparts of *O. aualitica* is necessary to decide whether or not these species are synonymous.

A key to the species of the genus Onycocaris *Nobili, 1904*

1. First pereiopods with fingers subequal to palm, chela subequal to carpus. Second pereiopods with palms feebly compressed, not particularly deep. Ambulatory pereiopods with ventral borders of dactyls devoid of denticles proximally to small accessory spine 2
   First pereiopods with fingers much shorter than palm, chela shorter than carpus. Second pereiopods with palm compressed, deepened. Ambulatory pereiopods with ventral borders of dactyls denticulate proximally to well developed accessory spine 3
2. Rostrum reaching to anterior margin of eyes, with single dorsal tooth . . . . . *O. monodoa* Fujino & Miyake
   Rostrum very short and toothless . . . . . *O. stenolepis* Holthuis
3. Ischium of second pereiopod with developed disto-ventral spine . . 4
   Ischium of second pereiopod without a well developed disto-ventral spine 7
4. Second pereiopods with an inner row of teeth on fingers . . . . . *O. callyspongiae* Fujino & Miyake
   Seond pereiopods without an inner row of teeth on fingers . . . 5
5. Dactylus of second pereiopods with distal half of cutting edge finely denticulate. Unguis of ambulatory pereiopods denticulate over almost whole length. Incisor process of mandible with 22-23 denticles distally . . . . . *O. amakusensis* Fujino & Miyake
   Dactylus of second pereiopods coarsely dentate distally. Dactyls of ambulatory pereiopods with base of unguis feebly denticulate only. Incisor process with less than 14 denticles distally 6
6. Ambulatory pereiopods with dactyls bearing 4-5 acute spinules on ventral border of unguis . . . . . *O. aualitica* (Nobili)
   Ambulatory pereiopods with dactyls bearing a few blunt denticles on approximal ventral border of unguis only . . . . . *O. oligodentata* Fujino & Miyake
7. Rostrum with dorsal teeth 8
   Rostrum without dorsal teeth 9
8. Rostrum distinctly exceeding inferior orbital angle, with four dorsal teeth. Chela of second pereiopods unequal, dissimilar, palm minutely tuberculate . . . . . *O. seychellensis* Bruce
   Rostrum not exceeding inferior orbital angle, with 2-3 dorsal teeth. Chelae of second pereiopods subequal, similar; palm smooth . . . . . *O. zanzibarica* Bruce
9. Ventral margin of merus and ischium of second pereiopods with stout spines . . . . . *O. spinosus* Fujino & Miyake
   Ventral margin of merus and propodus of second pereiopods without stout spines 10
10. Second maxilliped without epipod. Second pereiopods without spatulate fingers, subequal to palm. Scaphocerite with disto-lateral spine reaching or exceeding anterior margin of lamina. Dactylus of ambulatory pereiopod with relatively slender accessory spine . . . . . *O. quadratophthalma* Balss
    Second maxilliped with epipod. Second pereiopods with deeply

excavate fingers, shorter than palm. Scaphocerite with distolateral spine not reaching anterior margin of lamina. Dactylus of ambulatory pereiopod with broad accessory spine . . . . . ***O. trullata* sp. nov.**

Anchistus custos (Forsskål)

Restricted synonymy:

Anchistus custos Holthuis, 1952: 13, 105-109, figs 43-44 (full synonymy), Hipeau-Jacquotte, 1967: 153-166, figs 1-2.

Material examined. 22 specimens (12 ovig.♀), Tulear, SW Madagascar, May 1973, coll. Mange.

Remarks. The specimens were collected from *Pinna bicolor* and *P. muricata.* This species is well known from Tulear and has been extensively studied by Hipeau-Jacquotte.

Distribution. Throughout most of the Indo-West Pacific region as far east as Fiji and Santa Cruz Islands.

Anchistus miersi (De Man)

Restricted synonymy:

Harpilius miersi De Man, 1888: 274-277, pl. 17 figs 6-10.

Anchistus miersi Holthuis, 1952: 13, 110-111, fig. 45 (full synonymy), Miyake & Fujino, 1968: 414-415, 431.

Material examined. 2 ovig.♀, Nosy Bé, Madagascar, December 1958, coll. W. Macnae.

Remarks. The specimens show no special features and the host, presumably *Tridacna* sp. was not recorded. Not previously recorded from Madagascar.

Distribution. Type locality, Elphinestone Is., Mergui Archipelago. Also known from Red Sea, Chagos and Maldive Is., to the Gambier Islands.

Paranchistus ornatus Holthuis

Restricted synonymy:

Paranchistus ornatus Holthuis, 1952: 13, 93 (key), 97-100, figs 39-40. Hipeau-Jacquotte, 1967, 153-166, figs 1-2.

Material examined. 1 ovig.♀, Nosy Bé, Madagascar, December 1958, coll. W. Macnae. 3♂, 4 ovig.♀, Tulear, SW Madagascar, May 1973, coll. Mange.

Remarks. The Tulear specimens were collected from *Atrina vexillum.* Also well known from Tulear and extensively studied by Hipeau-Jacquotte.

Distribution. Type locality, Mozambique. So far reported only from zambique and Madagascar.

Conchodytes meleagrinae Peters

Restricted synonymy:

Conchodytes meleagrinae Peters, 1852: 594; Bruce, 1973: 139.

Conchodytes tridacnae Holthuis, 1952: 17, 195-199, fig. 95 (partim), Miyake & Fujino, 1968: 426-428, fig. 8 (partim).

Material examined. 2♂, 3 ovig.♀, Isle Europa, 6 May 1952. No details.

Remarks. The present specimens, whose host was not recorded, are consistent with earlier descriptions, having the carpus distinctly shorter than the merus.

Distribution. Type locality, Ibo, Mozambique. Not previously recorded from Madagascar but probably widespread throughout the Indo-West Pacific region as far as Hawaii.

Conchodytes biunguiculatus (Paulson)

Restricted synonymy:

Pontonia biunguiculata Paulson, 1875: 111-112, pl. 15, figs 1-1n.

Conchodytes biunguiculatus Holthuis, 1952; 17, 199-200 (full synonymy), Hipeau-Jacquotte, 1967: 153-166, figs 1-2.

Material examined. 1♂ 1 ovig.♀, Tulear, Madagascar, May 1973, coll. Mange.

Remarks. The specimens were collected from a specimen of *Pinna.* This species is also well known from Madagascar, Tulear, and has been extensively studied by Hipeau-Jacquotte.

Distribution. Type locality, Red Sea. Also known from the Andaman Islands, Formosa, Ambon and Timor, together with several dubious records (Holthuis, 1952), from South India, Ceylon and NE Australia.

Pontonia sibogae Bruce

Pontonia katoi Holthuis, 1952: 15, 158-164, figs 73a-b, 74b, 75a, c-f (partim).

Pontonia sibogae Bruce, 1972: 182-185, fig. 1.

Material examined. 1 juv., off Nosy Bé, F. R. V. *Manihine*, Cr. 328, 13°27.0'S, 47°56.0'E; handline, # 1523, 8 July 1973, coll. A. J. Bruce.

Host. Unidentified. Captured free, from coral rock at 25 m.

Remarks. The rostrum of this small specimen, post-orbital carapace length 1.4 mm, extends almost to the end of the antennular peduncle and is feebly notched distally. The inferior orbital angle is well produced but the antero-lateral angle of the carapace is less markedly produced than in the adult. The telson bears the characteristic five pairs of conspicuous dorsal spines and the posterior spines are slender.

The host of this specimen was not identified but the previous records have been in association with acidians, and the type specimens are found in *Styela whiteleggei* Herdman.

Distribution. Type locality, Curtis Island, Queensland, Australia. The only other record is from off Damar Island, Moluccas, Indonesia. The present record is the first occurrence in the Indian Ocean.

Philarius gerlachei (Nobili)

Restricted synonymy:

Harpilius gerlachei Nobili, 1905: 160.

Philarius gerlachei Holthuis, 1952: 15, 152-153, fig. 69, (full synonymy). Bruce, 1972: 406-407, 413 (key); 1973: 178.

Material examined. 1♂, 1 juv., Geyser Reef, 12°23'S, 46°24'E, F. R. V. *Manihine*, Cr. 328, Stn 118, # 1529, 4 fm, coll. A. J. Bruce.

Remarks. The specimens were found in association with *Coralliocaris superba* in an *Acropora* colony.

Distribution. Type locality, off Arzana Island, Persian Gulf. The only previous record from the western Indian Ocean is from Maziwi Island, Tanzania. Otherwise sparsely recorded from the Red Sea, Gulf of Manaar, Indonesia, Great Barrier Reef, and the Samoan, Marshall and Gilbert Islands.

Jocaste japonica (Ortmann)

Restricted synonymy:

Coralliocaris superba var. *japonica* Ortmann, 1870: 509.

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

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

Jocaste lucina (partim) Holthuis, 1952: 17, 193-195, fig. 94 (full synonymy).

Jocaste japonica Patton, 1966: 279-280, tab. 1-2, fig. 3b. Miyake & Fujino, 1968: 425-426, 431. Bruce, 1969a: 229, 300, fig. 1; 1972: 403, 405-408, 414 (key).

Material examined. (1) 1♂, 3 ovig.♀, Banc Tethys, Nosy Bé, 2 February 1952. (2) 1 ovig.♀, Ile Europa. No further details. (3) 3 spms (2 ovig.♀), Ile Europa. No details. Coll. P. Foumanoir.

Host/habitat. Coral, 11 m (Bank Tethys).

Remarks. All specimens have broadly rounded supra-orbital margins. The four Nosy Bé specimens each have a single tooth on the dactylar cutting edge of the major second pereiopod. The single specimen from Ile Europa lacks second pereiopods. The females from Nosy Bé have a rostral dentition of 4/2, 4/2 and 5/2 respectively and the Ile Europa specimen is also 5/2. The single male specimen has a dentition of 6/2.

Distribution. Type locality, Kagoshima, Japan. Common and widespread throughout most of the Indo-West Pacific region. Previously recorded from numerous localities in the western Indian Ocean, including Nosy Bé and Ile Europa.

Coralliocaris superba (Dana)

Restricted synonymy:

Oedipus superba Dana, 1852.

Coralliocaris superba Stimpson, 1860: 38. Holthuis, 1952: 17, 189-191, fig. 92 (full synonymy). Bruce, 1972: 400, 402-403, 403-408, 414 (key). Hipeau-Jacquotte, 1973: 104, fig. 5.

Material examined. (1) 1♂, Geyser Reef, 12° 23′S. 46° 24′E, FRV Manihine, Cr. 328, Stn 118, #1528, 4 fm. Coll. A. J. Bruce. (2) 1 juv., Zelée Bank, 12° 28′S, 46° 15′E, F. R. V. *Manihine*, Cr. 328, Stn 118a, #1532, 5 fm, coll. A. J. Bruce.

Remarks. Both lots of specimens were obtained from *Acropora* spp.

Distribution. Type locality, Tongatabu, Tonga Islands. Common and widespread throughout the Indo-West Pacific region, but sparsely recorded from the western Indian Ocean. Previously recorded from Madagascar at Tulear (Hipeau-Jacquotte, 1973).

Coralliocaris venusta Kemp (Fig. 42)

Coralliocaris venusta Kemp, 1922: 274-276, figs 100-101. Ramadan, 1936: 23. Armstrong, 1941: 13. Holthuis, 1952: 191-192, fig. 93. Patton, 1966: 277-278, tab. 1. Bruce, 1972: 405-406, 414 (key).

Material examined. (1) 1 ovig.♀, #213, Ile Europa, June 1952. No details. (2) 1♂, 2 ovig.♀, 2 juv., Geyser Reef, 12°23'S, 46°24'E, F. R. V. *Manihine*, Cr. 328, Stn 118, #1531, 4 fm, coll. A. J. Bruce.

Remarks. The single Europa specimen, which has a carapace length of 3.13 mm has a very short rostrum in comparison with Kemp's illustration. The tip does not reach the proximal end of the intermediate segment of the antennular peduncle and bears only a single minute tooth. The fingers of the second pereiopods are as illustrated by Kemp (1922), but the ventral spine of the carpus is more blunt and the dorsal margin is without denticles. The third maxilliped is also as illustrated by Kemp. The Geyser Reef specimens were a transparent greenish colour, heavily dotted and steaked with patches of opalescent white. The ovary and ova were dark olive green.

Distribution. Type locality, Tholayiram Paar, Gulf of Manaar. This species has not been previously reported from Madagascar but is known from the Red Sea, Indonesia, Samoa and the Australian Barrier Reef.

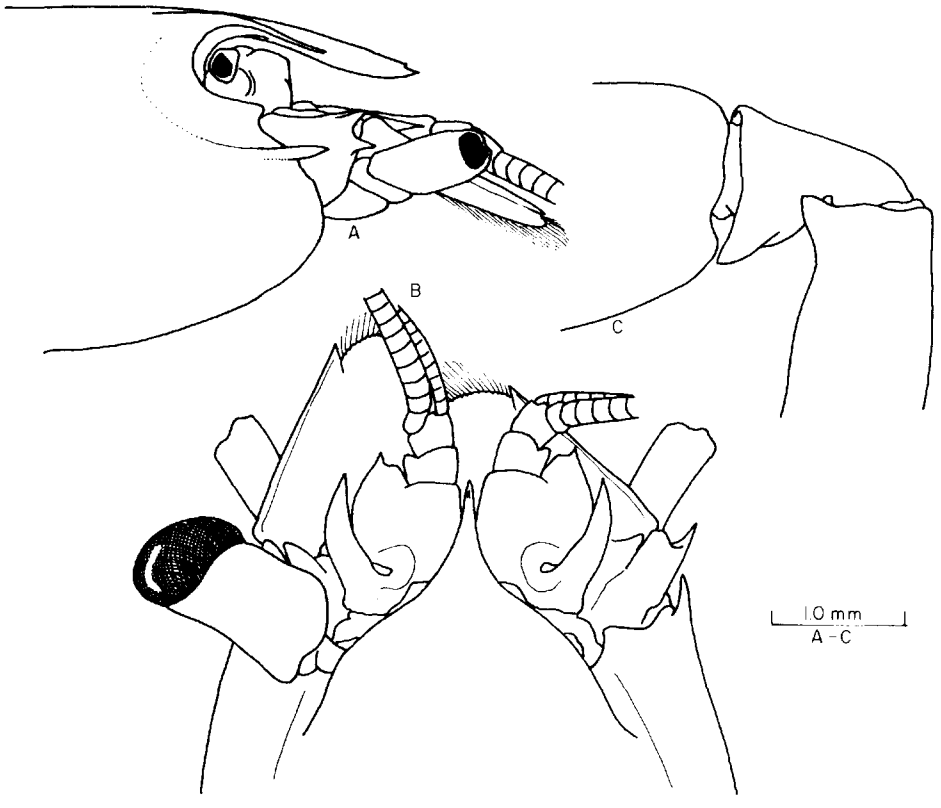

Figure 42. *Coralliocaris venusta* Kemp. Anterior carapace and rostrum, and antennae: A, lateral aspect; B, dorsal aspect; C, carpo-meral region of second pereiopod, ventral.

Coralliocaris viridis Bruce

Coralliocaris viridis Bruce 1974: 222-224, fig. 1.

Material examined. 2♂, 7♀ (5 ovig.), Ile Europa. No further data.

Remarks. The form of the rostrum agrees closely with the original description, with a narrow rostral lamina. Seven specimens have a rostral dentition of 4/1 and one male and one female have 5/1. No trace of the colour patterns has been preserved. The largest specimen, an ovigerous female has a carapace length of 4.2 mm.

The recent discovery that the two closely related species have been included under the name *C. graminea* (Dana) has cast doubt upon the validity of many of the published records of *C. graminea,* which has been previously recorded from Tulear by Hipeau-Jacquotte (1973).

Distribution. Type locality, Mombasa Island, Kenya. There have been no other confirmed reports of this species, which is probably common throughout the whole Indo-West Pacific region.

Harpiliopsis depressa (Stimpson)

Restricted synonymy:

Harpilius depressus Stimpson, 1860: 38.

Harpiliopsis depressus Borradaile, 1917: 380, pl. 65, fig. 22. Kemp, 1922; 231-234, figs 69-70. Holthuis, 1951: 70-75, pls 21-22 (full synonymy); 1952: 16, 182-184, fig. 90; 1953: 57. Patton, 1966: 276, 291, tabs 1-3. Bruce, 1972: 401, 403-405, 408, 413 (key). Hipeau-Jacquotte, 1973: 103.

Material examined. 1♂, 1 ovig.♀, Isles Glorieuses, January 1973, coll. C. Jouannic.

Habitat. No details, dredged from 10 m.

Remarks. The two specimens agree closely with the information and figures given by Kemp. Both male and female have rostral dentition of 7/3, with the two proximal spines slender and mobile. The fourth and fifth abdominal pleura both end in acute points and the single second pereiopod preserved, from the male, has a stout palm, about four times longer than wide.

Distribution. Type locality, Hawaii. This species is one of the most widely distributed pontoniine shrimps, occurring throughout the Indo-West Pacific region and extending also to the Galapagos Islands and Columbia, Panama, Costa Rica and Mexico. Previously recorded in the western Indian Ocean from Coetivy, Seychelle Islands, by Borradaile (1917) and from Tulear, Madagascar, by Hipeau-Jacquotte (1973).

Hamodactylus boschmai Holthuis

Hamodactylus boschmai Holthuis, 1952: 18, 209-212, figs 102-104. Bruce, 1970a: 538-539.

Material examined. (1) 1♀, 1 ovig.♀, Nosy Bé, 40 m, 6 September, coll. P. Laboute. (2) 3♀, Nosy Be, 42 m, 9 September 1970, coll, P. Laboute.

Host. Associated with *Morchellana gilva* (Henderson) (Nephtheidae; Alcynacea) and *Acalycigorgia densiflora* (Acanthogorgiidae; Gorgonacea) (Kükenthal & Gorzansky), both new host records.

Remarks. The first two females have a rostral dentition of 4/0 and the other three females have 6/0, 6/0 and 5/0, and agree closely to the original description. The ova are 0.5 mm in diameter. The characteristic hamate dactyl on the second pereiopod has been preserved in three specimens.

This species has been previously recorded in association with the gorgonian *Mopsella ellisi* Hicks.

Distribution. Type localities, Djedan Is., Aru Islands and Ternate, Indonesia. Otherwise only recorded from Noumea, New Caledonia. The present specimens are the first to be recorded in the Indian Ocean.

Pontonides unciger Calman

Pontonides unciger Calman, 1939: 213-215, fig. 7.

?*Pontonides unciger* Holthuis, 1952: 18, 219-223, figs 108-109. Miyake & Fujino, 1969a: 87-92, fig. 1.

Material examined. 1♂, 1♀, Baie d'Ampasindava, Nosy Tanga, 40 m, 29 October 1970, coll. P. Laboute.

Remarks. The specimens agree precisely with the description provided by Calman, and show numerous differences from the material reported upon by Holthuis (1952) and Miyake & Fujino (1969), which is considered to be specifically distinct. The specimens will be described in detail in a review of the genus in preparation. *P. unciger* may be recognized by the absence of areolation of the body, and lack of a dorsal tubercle on the eyestalk and the presence of flattened elongated setae on the lateral aspects of the ischial portions of the second and third maxillipeds and absence of such setae from the ischia of the second pereiopods.

It is of interest that the present specimens were found in association with an antipatharian host, whereas the specimens reported upon by Miyake & Fujino were found on the coral *Dendrophyllia ijamai* Yabe.

Distribution. Type locality, southern Red Sea, 13°31'N, 42°31'E. There have been no further records of this species.

Pontonides sp. (Fig. 43)

Material examined. 3♂, 9 ovig.♀, NW coast of Madagascar, 13°42.5'S, 47°51.2'E, trawl, 33 m, 31 July 1973, coll. A. Crosnier.

Remarks. These specimens show a close resemblance to *P. unciger* Calman, but there are a number of points of differences that make the taxonomic status of this material difficult to assess without re-examination of the type specimen of *P. unciger.* The specimens will be reported upon in more detail in a future publication. They appear to differ from *P. unciger* in having broader lateral rostral carinae, that distinctly cover the base of the eyestalks, but do not extend to the tip of the rostrum, with a more elevated posterior dorsal rostral carina with more convex dorsal margin, and with acute points on the posterior margins of the fourth and fifth pleura, which are particularly well developed in the males. The eyestalk is without a dorsal tubercle.

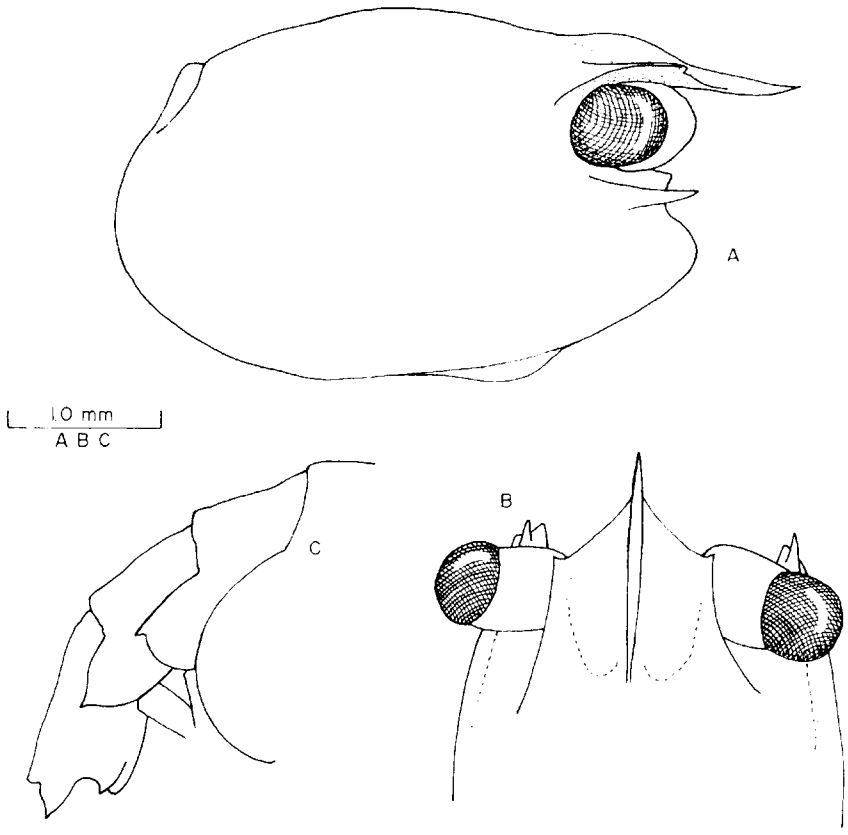

Figure 43. *Pontonides* sp. A, Carapace and rostrum, lateral; B, anterior carapace and rostrum, dorsal; C, posterior abdomen, lateral.

Anchistioides willeyi (Borradaile) (Fig. 44)

Restricted synonymy:

Palaemonopsis willeyi Borradaile, 1897: 410-411, pls 36, 37, fig. 7.

Anchistioides willeyi Gordon, 1935: 344-345, figs 23a, 24a. Holthuis, 1952: 18, 214-219, figs 106, 107. Bruce, 1971a: 22-24, fig. 8.

Material examined. (1) 2♂, 1 ovig.♀, Madagascar, near Tany-Kely, trawl, 28 m, 26 February 1971, coll. A. Crosnier. (2) 1 ovig.♀, 12° 55.2′S, 48° 28.3′E, trawl, 42 m, 2 August 1973, coll. A. Crosnier. (3) 1♂, 12° 59.9′S, 48° 28.2′E, trawl, 42 m, 2 August 1974, coll. A. Crosnier. (4) 1♂, 13° 07.3′S, 48° 25.8′E, trawl, 30 m, 2 August 1974, coll. A. Crosnier.

Remarks. The specimens are of particular interest as they fall into two groups that may represent separate species, but the study of further material is necessary before this is confirmed. The differences between the two forms lie in the rostrum and the chela of the second pereiopod. In one group the rostrum is elongated, extending well beyond the scaphocerite and with more numerous teeth, in association with a second pereiopod chela that is comparatively slender, particularly the fingers, which are distinctly longer than the palm. In this group, represented by four specimens, the carapace and rostral dentition are as follows: ♂, CL 8.4, 11/6; ♂, CL 6.0, 8/6; ♂, CL 4.8, 11/6; ovig.♀, CL 6.0, 13/6. The second form is represented by two specimens only, ♂, CL 6.5, 6/3; ♀,

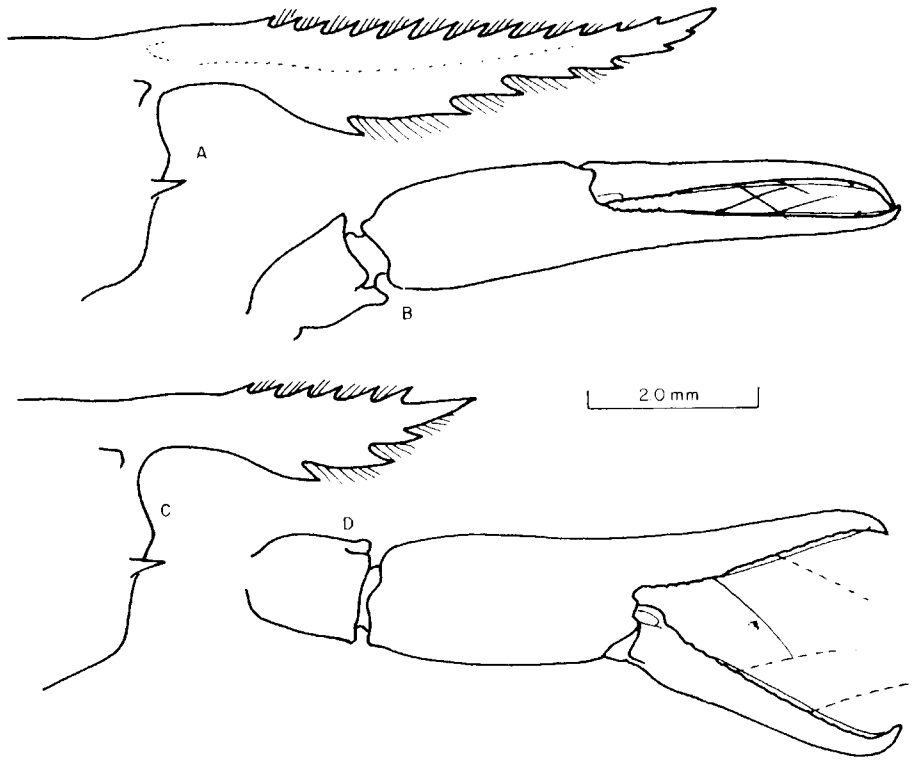

Figure 44. *Anchistioides willeyi* (Borradaile). Long rostrum form: A, anterior carapace and rostrum, B, chela of second pereiopod. Short rostrum form: C, anterior carapace and rostrum; D, chela of second pereiopod.

CL 10.0, 7/4. In these specimens the rostrum presents a bare distal portion, whereas this portion is distinctly dentate in the former group. In the ♂ with a dentition of 8/6, the rostrum extends well beyond the tip of the scaphocerite and there is no bare tip. The differences between the rostra of the two groups may be summarized as (i) 8-13/6, and (ii) 6-7/3-4.

The specimen reported by Bruce (1971a: fig. 8) from the Great Barrier Reef, closely corresponds to the short rostrum-robust chela form. The holotype of Borradaile's species also clearly belongs to the short rostrum form, with a dentition of 6/4, and in his illustration (1898: pl 35, fig. 7a) the palm of the chela of the second pereiopod appears stout and of similar length to the fingers.

Distribution. Type locality, Ralun, New Britain. Subsequently reported from the Aru Islands, Sulu Archipelago and Bornea Bank; the Great Barrier Reef, and from the Maldive Islands. Not previously recorded from the southern Indian Ocean.

THE PONTONIINE SHRIMP FAUNA OF MADAGASCAR

In addition to the 41 species reported upon above, twenty other species have been recorded from Madagascar or adjacent waters. The records of these species are summarized below.

1. *Periclimenes edwardsi* (Paulson, 1875). Reported from Tulear by Ledoyer (1968).

2. *Periclimenes elegans* (Paulson, 1875). Noted as occurring at Tulear (Hipeau-Jacquotte, 1973).
3. *Periclimenes spiniferus* (De Man, 1902). First reported from Tamatave by Lenz (1910) and subsequently from Tulear by Ledoyer (1968) and Hipeau-Jacquotte (1973).
4. *Periclimenes seychellensis* Borradaile, 1915. Recorded from Tulear by Ledoyer (1968, 1970).
5. *Periclimenes andamanensis* Kemp, 1922. Reported from Tulear by Ledoyer (1970).
6. *Periclimenes rex* Kemp, 1922. Reported from Tulear in association with holothurians, actinians and asteroids (Jacquotte, 1964; Hipeau-Jacquotte, 1972, 1973).
7. *Anchistus demani* Kemp, 1922. From *Tridacna maxima* at Tulear, (Hipeau-Jacquotte, 1973).
8. *Neoanchistus cardiodytes* Bruce. Recorded from Nosy Bé, in association with *Cardium pectiniforme*, Born (Bruce, 1975c).
9. *Platypontonia hyotis* Hipeau-Jacquotte, 1971. First recorded in association with *Pycnodonta hyotis* from southwest Madagascar (Hipeau-Jacquotte, 1971, 1973).
10. *Dasella* sp. Recorded from Tulear by Hipeau-Jaquotte (1973).
11. *Pontonia ascidicola* Borradaile, 1898. Reported from Tulear by Hipeau-Jacquotte (1973).
12. *Pontonia katoi* Kubo, 1940. Reported from Tulear by Hipeau-Jacquotte (1973).
13. *Harpiliopsis beaupresii* (Audouin, 1825). Reported from Tulear by Hipeau-Jacquotte (1973).
14. *Ischnopontonia lophos* (Barnard, 1962). Reported from Tulear by Hipeau-Jacquotte (1973).
15. *Coralliocaris graminea* (Dana, 1852). Reported from Juan de Nova by Lenz (1905) and from Tulear by Hipeau-Jacquotte (1973).
16. *Jocaste lucina* (Nobili, 1901). Reported from Tulear by Ledoyer (1968).
17. *Zenopontonia noverca* (Kemp, 1922). Reported from Nosy Bé in association with *Culcita schmiedeliana* Retzius (Bruce, 1975b).
18. *Tulechiocaris holthuisi* Hipeau-Jacquotte, 1965. First recorded from Tulear in association with *Stomopneustes variolaris* (Lam.), and *Echinometra mathaei* (De Blainville), (Hipeau-Jacquotte, 1965, 1973).
19. *Tulechiocaris zanzibarica* Bruce, 1967. Reported from Nosy Bé and Nosy Tanikely on *Diadema setosum* by Fricke & Hentschel (1971).
20. *Apopontonia falcirostris* Bruce. Known only from 73 m off NW Madagascar (Bruce, 1976a).

The subfamily Pontoniinae is therefore now represented in Madagascar waters by a total of 61 species. Undoubtedly many more remain to be discovered, as many common and widespread Indian Ocean species, such as *Periclimenes zanzibaricus*, have not yet been recorded. The fauna is richer than that reported from the Seychelle Islands (Bruce, 1976b) which consists of 50 species, and is considerably richer than that so far reported from Australia, including the Great Barrier Reef, which has a total of only 43 species (Patton, 1966; McNeil, 1968; Bruce, 1971). In comparison the fauna of Indonesia and the Philippine Islands, reported upon by Holthuis (1952) in the Siboga

Expedition monographs, consists of 69 species. Of the 61 Madagascar species, 29 have also been reported from the Indonesian region.

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