

A redescription of *Periclimenaeus fimbriatus* Borradaile, 1915, with the designation of a new genus (Crustacea: Decapoda: Palaemonidae)

A. J. BRUCE

*Division of Natural Sciences, Northern Territory Museum,
P.O. Box 4646, Darwin, Australia 5794*

CRUSTACEA LIBRARY
SMITHSONIAN INST.
RETURN TO W-119

Received July 1987, accepted for publication October 1987

Specimens of *Periclimenaeus fimbriatus* Borradaile, 1915, a palaemonid shrimp reported from only three localities in the Western Indian Ocean, are described and illustrated. The species is removed from the genus *Periclimenaeus* Borradaile and a new genus *Paraclimenaeus* is designated for its accommodation. The characteristic features of the genus and its relationships are discussed. The palaemonid shrimp genera associated with sponge hosts are reviewed and a key provided for their identification

KEY WORDS: Crustacea - Decapoda - Palaemonidae - *Paraclimenaeus* gen. nov. - sponge commensal - Indian Ocean.

CONTENTS

Introduction	219
Systematics	220
<i>Paraclimenaeus</i> gen. nov.	220
<i>Paraclimenaeus fimbriatus</i> (Borradaile, 1915) comb. nov.	221
Discussion	230
Key to the Indo-West Pacific sponge-associated palaemonid shrimp genera	231
Acknowledgements	232
References	232

INTRODUCTION

In Borradaile (1915) a brief diagnosis of the genus *Periclimenaeus* is provided and also of the two shrimp species to be included, *P. robustus* and *P. fimbriatus*. Shortly after, more detailed descriptions and illustrations were also provided (Borradaile, 1917). In the initial definition, no mention is made of the morphology of the major second chela. In the subsequent definition it is noted that the major chela has short stout fingers, one of which bears a knob and the other a socket, but without specifying which. Borradaile designated *P. robustus* as the type species for his genus, and in his description and key, as well as his figures, clearly shows that the knob is on the dactylus and the socket on the fixed finger, which situation is reversed in *P. fimbriatus*. Since Borradaile's time, numerous species of *Periclimenaeus* have been described from the tropical seas of

the world. Most have been found in association with sponge hosts, but others occur in association with colonial tunicates. Almost all of these have the fingers of the major chela as in *P. robustus*, but some species are in need of re-examination. The presence of a knob on the dactylus and a socket on the fixed finger is now considered diagnostic of the genus *Periclimenaeus* Borradaile *sensu stricto*, and species lacking these features have been placed in other genera. As *P. fimbriatus* also lacks this feature, and presents other characteristic features, a new genus is here proposed for its reception.

SYSTEMATICS

***Paraclimnæus* gen. nov.**

Diagnosis. Small sized shrimps of subcylindrical body form, abdomen slightly depressed. Rostrum well developed, dorsally dentate, ventrally unarmed, lateral carinae moderately expanded. Carapace smooth, glabrous; inferior orbital angle distinct, orbit slightly developed; supraorbital, epigastric and hepatic spines absent, antennal spine well developed. Abdomen smooth, glabrous; posterior margins of pleura rounded; telson with two pairs of large dorsal spines, three pairs of long posterior spines. Eyes with globular cornea. Antennule normal. Antenna with well developed scaphocerite with moderate distolateral tooth. Epistome unarmed. Mandible without palp, molar and incisor processes normal; maxillula with feebly bilobed palp, laciniae moderately broad; maxilla with broad palp, bilobed endite, narrow scaphognathite; first maxilliped with broad endite, exopod with broad caridean lobe, flagellum with plumose terminal setae, epipod large, feebly bilobed; second maxilliped normal, dactylar segment narrow, exopod with plumose terminal setae, coxa medially produced, epipod subrectangular, without podobranch; third pereopod with slender endopod, ischomerus and basis fused, exopod with plumose terminal setae, coxa with ventromedial process and oval lateral plate, arthrobranch of rudimentary. Fourth thoracic sternite without median process. First pereopods moderately robust, fingers simple, dactylus densely setose dorsolaterally, coxa with small ventral lobe. Second pereopods well developed, chelae large, subequal, dissimilar; major chela with molar process on fixed finger opposing fossa on dactylus; minor chela with fingers narrow, palm with dorsal surface concave. Ambulatory pereopods robust; dactyls short and compressed, biunguiculate, ventral corpus denticulate; propod compressed, strongly denticulate distally. Male second pleopod without appendix masculina. Uropod normal, exopod laterally spinulate.

Type species. *Periclimenaeus fimbriatus* Borradaile, 1915.

Etymology. From Greek, *para*, besides, and *Periclimenaeus*, a generic name first used by Borradaile (1915).

Systematic position of the genus Paraclimnæus

Paraclimnæus is clearly related to the genus *Periclimenaeus* Borradaile, 1915, which originally included two species only, *P. robustus*, the type species of the genus, and *P. fimbriatus*. Borradaile (1917) described *Periclimenes* (*Hamiger*) *novaezealandiae*, which was included in *Periclimenaeus* by Kemp (1922), who considered *Periclimenaeus* to be of subgeneric rank only. Holthuis (1952) included

all three species in *Periclimenaeus* at generic level, together with several other species. *Hamiger* has since been raised to full generic level (Bruce, 1986) and several other species have now been removed from the genus *Periclimenaeus*, which is characterized by the presence of dissimilar second pereopod chelae, one of which is provided with a specialized mechanism capable of sound production using a pit and hammer mechanism. In all species of *Periclimenaeus sensu stricto*, this consists of a dactylar molar process and a fossa on the fixed finger. In *Paraclimenaeus* the molar process is on the fixed finger and the fossa on the dactylus. In most species of *Periclimenaeus sensu stricto*, the minor second pereopod chela is distinctly smaller than the major chela. In *Paraclimenaeus* it is similar in size to the major chela but is markedly different in that the dorsal surface of the palm is strongly flattened or feebly concave, whereas in *Periclimenaeus* the palm is approximately oval in section. The first pereopod has a robust chela with an elongated dactylus, the dorsolateral surface of which bears numerous transverse rows of setae that form a dense brush. A similar chela is found in *Hamiger novaezealandiae*, but is lacking in the species of *Periclimenaeus sensu stricto*, although some species do have a small tuft in this position (e.g. *P. ardeae* Bruce, 1970, 1978).

Paraclimenaeus is also remarkable for the absence of an appendix masculina on the male second pleopod. Other genera (*Typton* Costa, 1844 and *Onycocaris* Nobili, 1904) show a tendency to a reduction of the appendix masculina, with the corpus becoming very small or obsolete, but the associated spines persist. Little information is available concerning its presence or absence in *Periclimenaeus*, but an appendix masculina is present in *P. spinimanus*, *P. rastrifer*, *P. diplosomatis* and probably other species.

Paraclimenaeus fimbriatus (Borradaile, 1915) **comb. nov.**

(Figs 1–6)

Restricted synonymy

Periclimenaeus fimbriatus Borradaile, 1915: 213; Borradaile, 1917: 324, 379, pl. 55 fig. 19.

Periclimenes (Periclimenaeus) fimbriatus Kemp, 1922: 167.

Periclimenaeus fimbriatus Holthuis, 1952: 131. Bruce, 1974a: 1572, fig. 15B; 1974b: 472.

Material examined. Twenty-two specimens (7 ovigerous ♀♀), off Pangani Bay, Tanganyika, 5°30.0'S, 28°50.0'E, 36–45 m, trawl, 28 April 1961, coll. A. J. Bruce (No. 275).

Description. Small sized shrimps with body subcylindrical, slightly depressed posteriorly. Males generally smaller than females with relatively larger chelae.

Carapace glabrous, smooth; rostrum well developed, acute, horizontal, about 0.37 of postorbital carapace length, extending to about distal border of antennular peduncle, dorsal carina well developed with five to nine acute teeth on distal 0.6 of length, (usually five to six, with first tooth frequently minute), extending onto anterior carapace, ventral margin straight, unarmed, non-setose, lateral carinae expanded posteriorly, orbit feebly developed, with broad inferior orbital angle, slightly produced, antennal spine large, marginal, supraorbital,

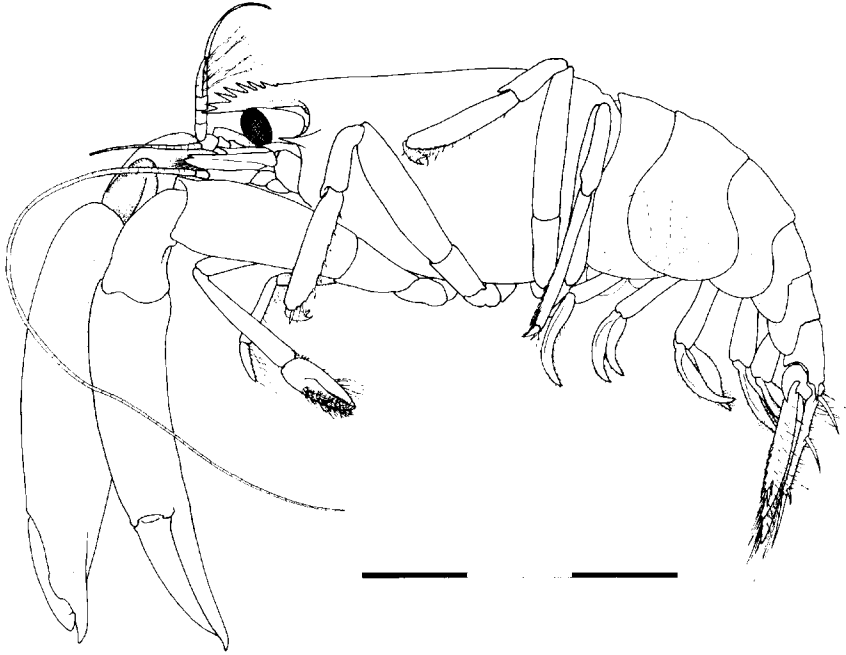


Figure 1. *Paraclimnaeus fimbriatus* (Borradaile, 1915) **comb. nov.**, ovigerous female, Pangani, Tanganyika. Scale divisions in millimetres.

epigastic and hepatic spines absent; anterolateral angle of branchiostegite not produced, broadly rounded.

Abdomen glabrous, smooth, first segment without anteromedian lobe, third segment not produced posteriorly, pleura broadly rounded, first three enlarged in females, fourth and fifth slightly produced posteriorly, rounded; sixth segment about 0.7 times length of fifth, about 0.5 times longer than anterior depth, posterolateral angle with acute spiniform tooth, posteroventral angle broadly acute. Telson about 1.8 times sixth segment length, about 2.5 times longer than greatest width at about 0.25 of length, lateral margins sinuous, convergent, posterior margin about 0.4 of greatest width, two pairs of large erect dorsal spines at 0.25 and 0.5 of telson length, about 0.2 of telson length; lateral posterior spines at 0.9 of telson length, subdorsal, about 0.33 of submedian spine length; posterior margin angular with small median process; intermediate spines about 0.4 of telson length, slender, submedian spines more slender, feebly setulose, about 0.8 of intermediate spine length; dorsal surface of telson with numerous stout erect setae.

Eyes with globular, oblique cornea, without accessory pigment spot; stalk about 1.2 times longer than wide, about 1.6 times longer than corneal diameter.

Antennule small, peduncle with proximal segment broad, about 1.6 times longer than wide, lateral margin convex, with large distolateral lobe with acute distolateral tooth, ventral medial margin with small acute tooth; stylocerite broad, acute, reaching to about 0.6 of segment length; statocyst normally developed with granular statolith; intermediate and distal segments small, subequal, together equal to about 0.5 of proximal segment length; upper flagellum biramous, proximal three segments fused, short free ramus of one or

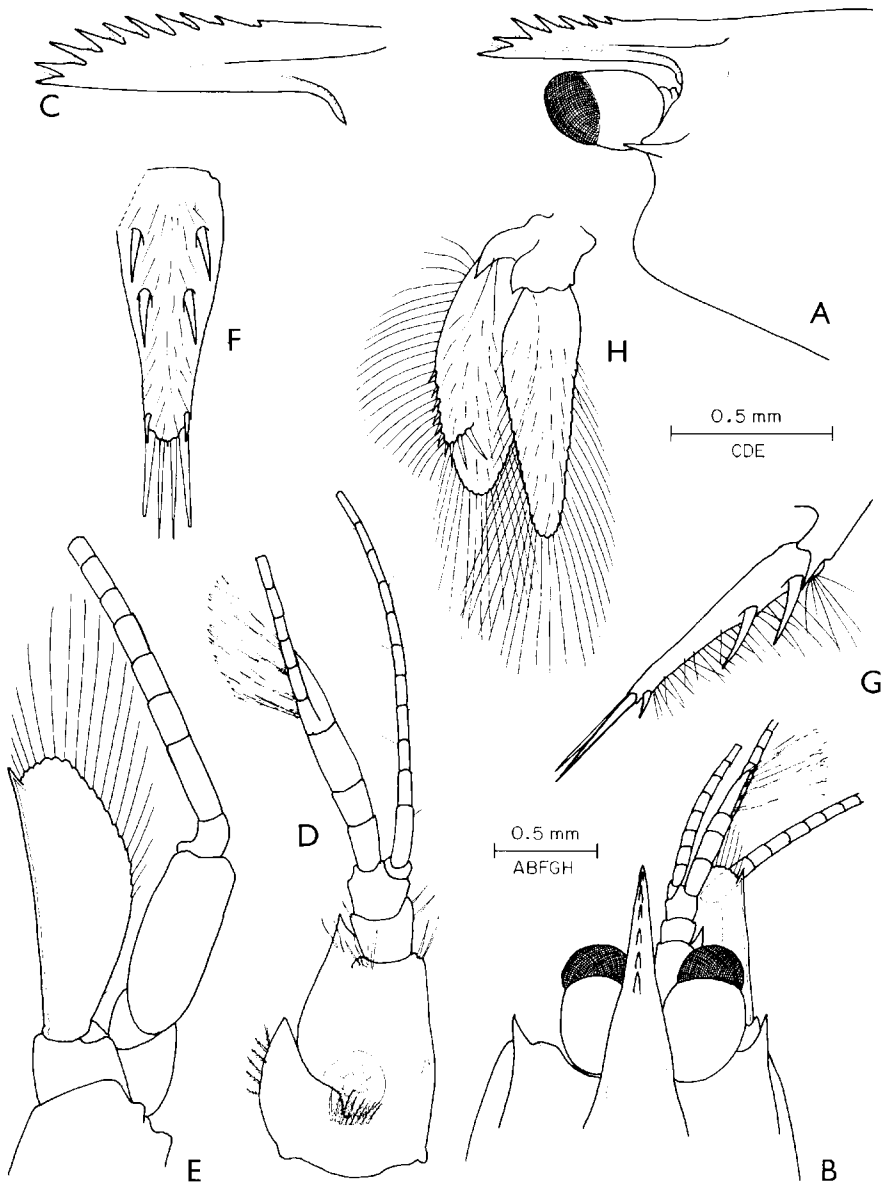


Figure 2. *Paralimnæus fimbriatus* (Borradaile, 1915) **comb. nov.** A, Anterior carapace and rostrum, lateral. B, Anterior carapace and right antennae, dorsal. C, Rostrum. D, Antennule. E, Antenna. F, Telson, dorsal. G, Same, lateral. H, Uropod.

two segments, demarcation indistinct, with four groups of aesthetascs, longer free ramus with about 15 segments; lower ramus filiform, with about 17 segments.

Antenna with robust, unarmed basicerite, ischiocerite and merocerite normal, carpuccerite stout, reaching to about 0.6 of scaphocerite length, about 2.4 times longer than wide, flagellum short, about 2.0 times postorbital carapace length; scaphocerite well developed, slightly exceeding antennular peduncle, about 3.0 times longer than broad, lateral margin feebly concave, with small distolateral

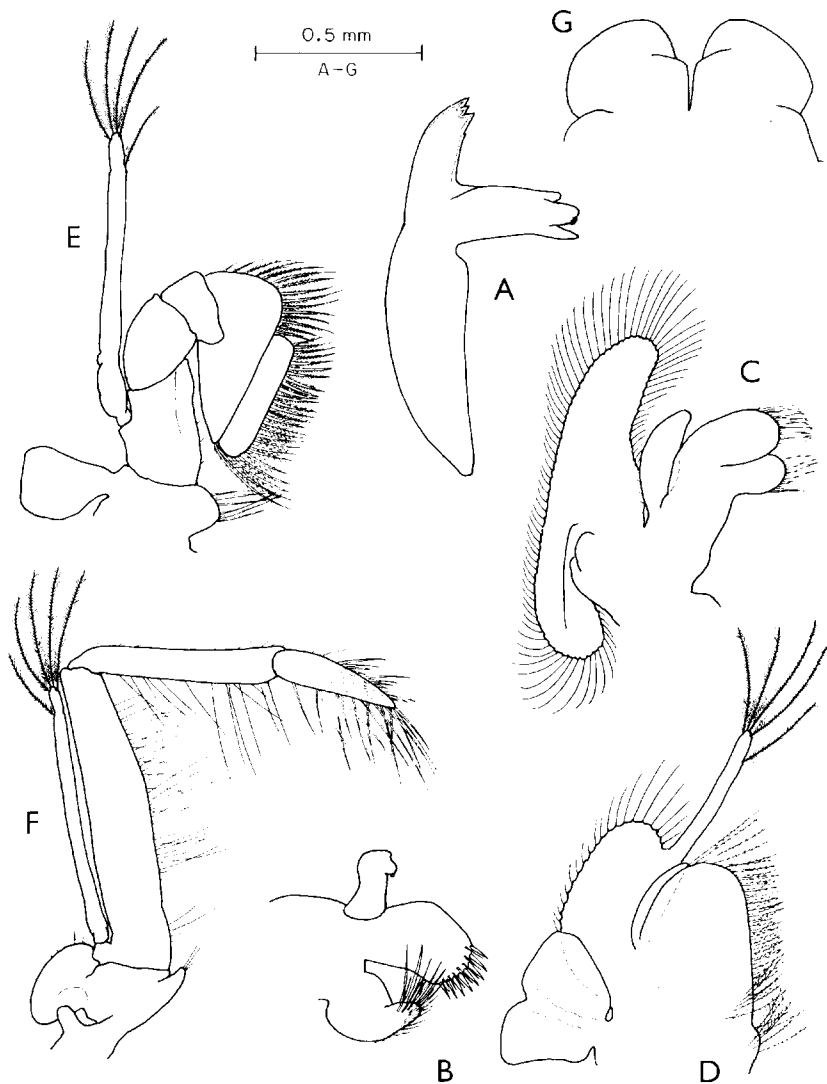


Figure 3. *Paraclimenaeus fimbriatus* (Borradaile, 1915) **comb. nov.** A, Mandible. B, Maxillula. C, Maxilla. D, First maxilliped. E, Second maxilliped. F, Third maxilliped. G, Paragnath.

tooth, reaching to about distal margin of lamella, distal half of medial margin with plumose setae.

Epistome unarmed.

Mandible (left) with corpus moderately stout, without palp; molar process robust, with stout blunt distal teeth and groups of short setae; incisor process normal, with three acute teeth distally. Maxillula with palp feebly bilobed, upper lobe small, lower lobe with small ventral process, with short seta; upper lacinia moderately broad with eight short simple spines, with plumose setae interspersed, lower lacinia robust with long serrulate spines distally; maxilla with broad, blunt palp, with five short plumose setae proximolaterally, basal endite well developed, strongly bilobed, lobes expanded, distal lobe larger than

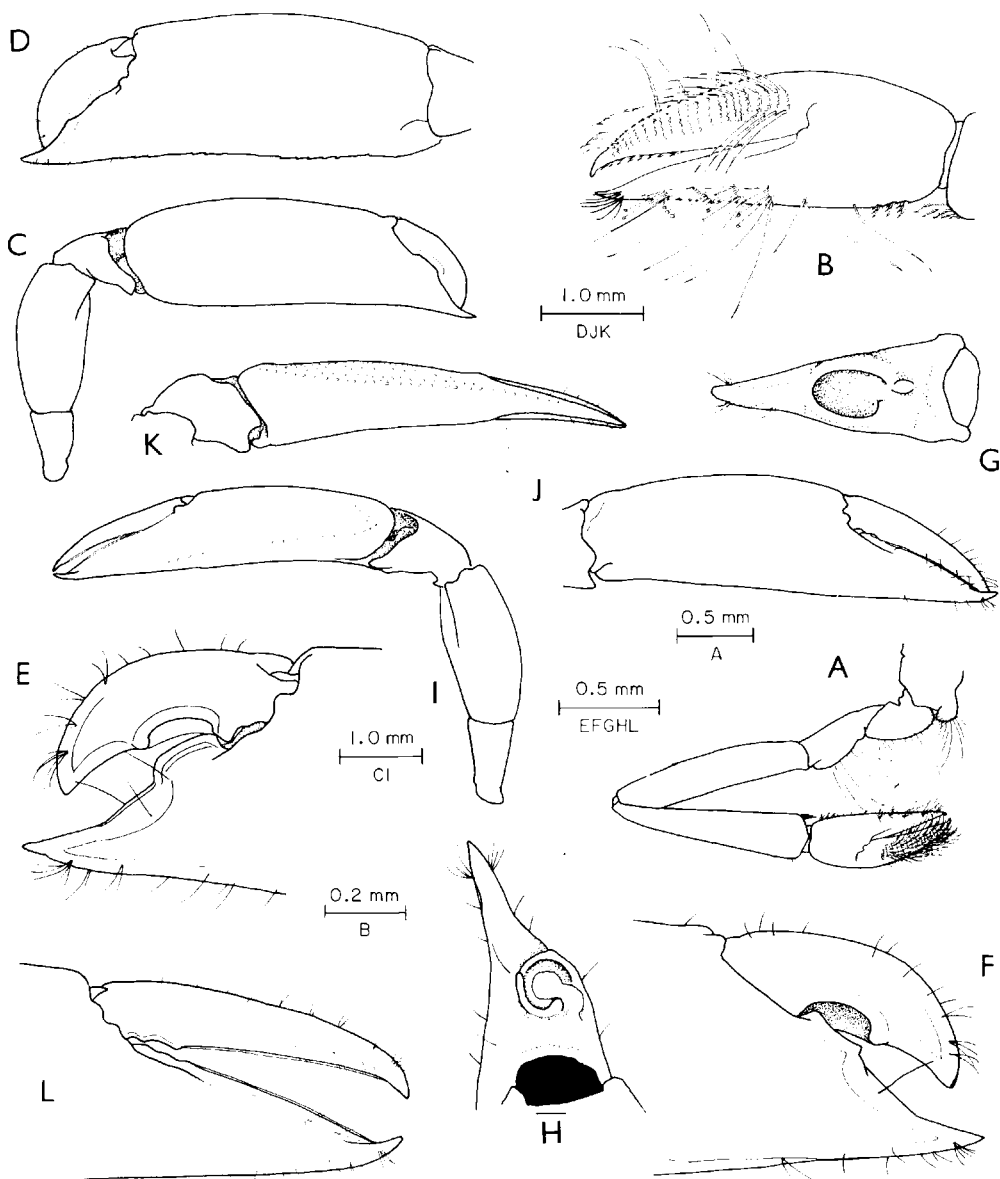


Figure 4. *Paraclimnacus fimbriatus* (Borradaile, 1915) **comb. nov.** A, First pereiopod, B, Same, chela. C, Major second pereiopod. D, Same, chela, ventral. E, Same, fingers ventral. F, same, dorsal. G, Same, dactylus, cutting surface. H, Same, fixed finger, cutting surface. I, Minor second pereiopod. J, Same, chela (approximate cross section of palm indicated). K, Same, ventral. L, Same, fingers.

proximal, with about 25 and 20 slender, serrulate setae distally respectively; coxal endite obsolete; scaphognathite narrow, about 3.4 times longer than wide, anterior lobe about 1.9 times longer than wide, medial margin concave; first maxilliped with simple flattened, non-setose palp, basal endite broadly rounded, medial margin fringed with finely setulose setae, coxal endite convex with few long plumose setae, exopod with broad caridean lobe, flagellum with five long plumose terminal setae distally, epipod well developed, feebly bilobed; second

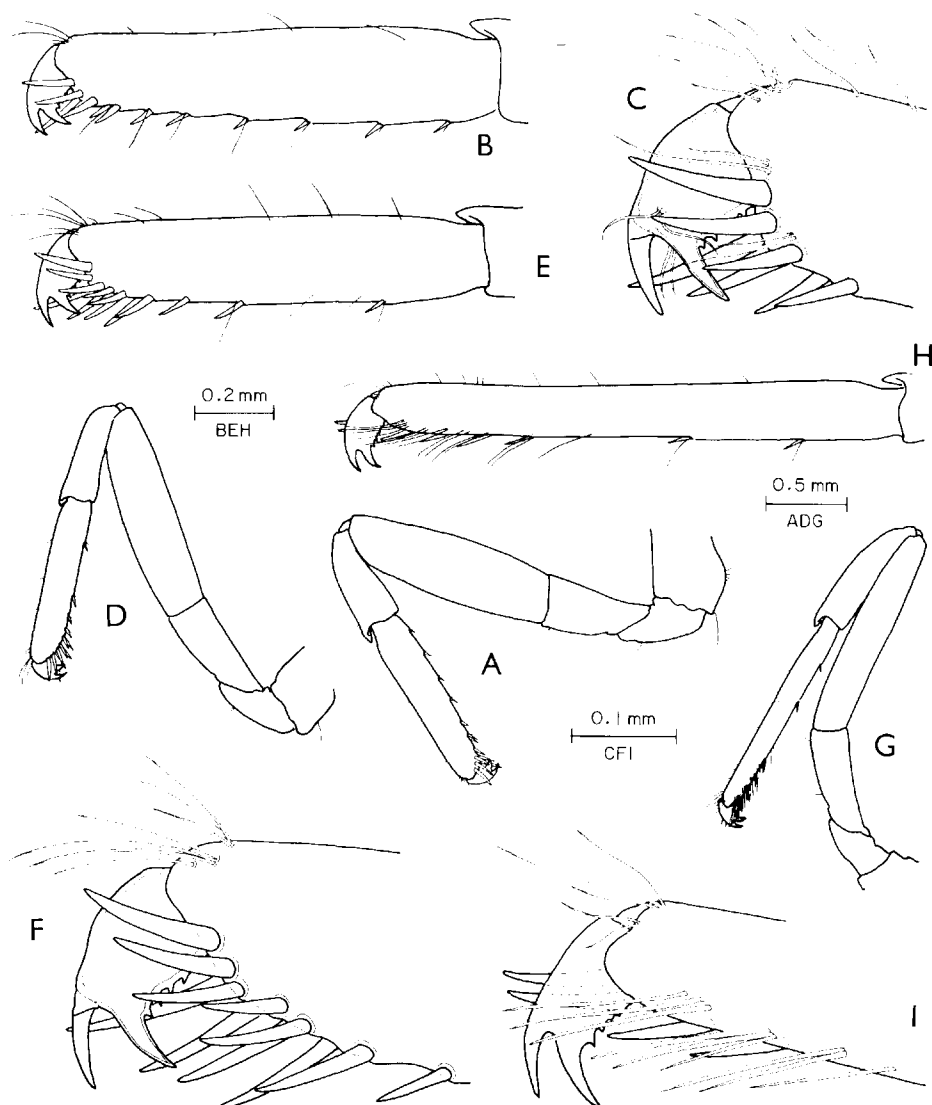


Figure 5. *Paraclimnacus fimbriatus* (Borradaile, 1915) **comb. nov.** A, Third pereiopod. B, Same, propod and dactyl. C, Same, distal propod and dactyl. D, Fourth pereiopod. E, Same, propod and dactyl. F, Same, distal propod and dactyl. G, Fourth pereiopod. H, Same, propod and dactyl. I, Same, distal propod and dactyl.

maxilliped normal, dactylar segment narrow, about 4.5 times longer than broad, with rows of serrulate spines along medial margin, propodal segment broadly rounded distomedially with numerous long coarsely serrulate marginal spines, exopod flagellum with five plumose terminal setae, epipod small, subrectangular, without podobranch; third maxilliped with endopod slender, ischiomerus and basis fused, antepenultimate segment about 5.0 times longer than central width, slightly tapered distally, lateral margin unarmed, medial margin sparsely setose, basal region convex, sparsely setose, penultimate segment about 6.6 times longer than broad, about 0.66 of antepenultimate, segment, sparsely setose ventrally, terminal segment about 0.4 of antepen-

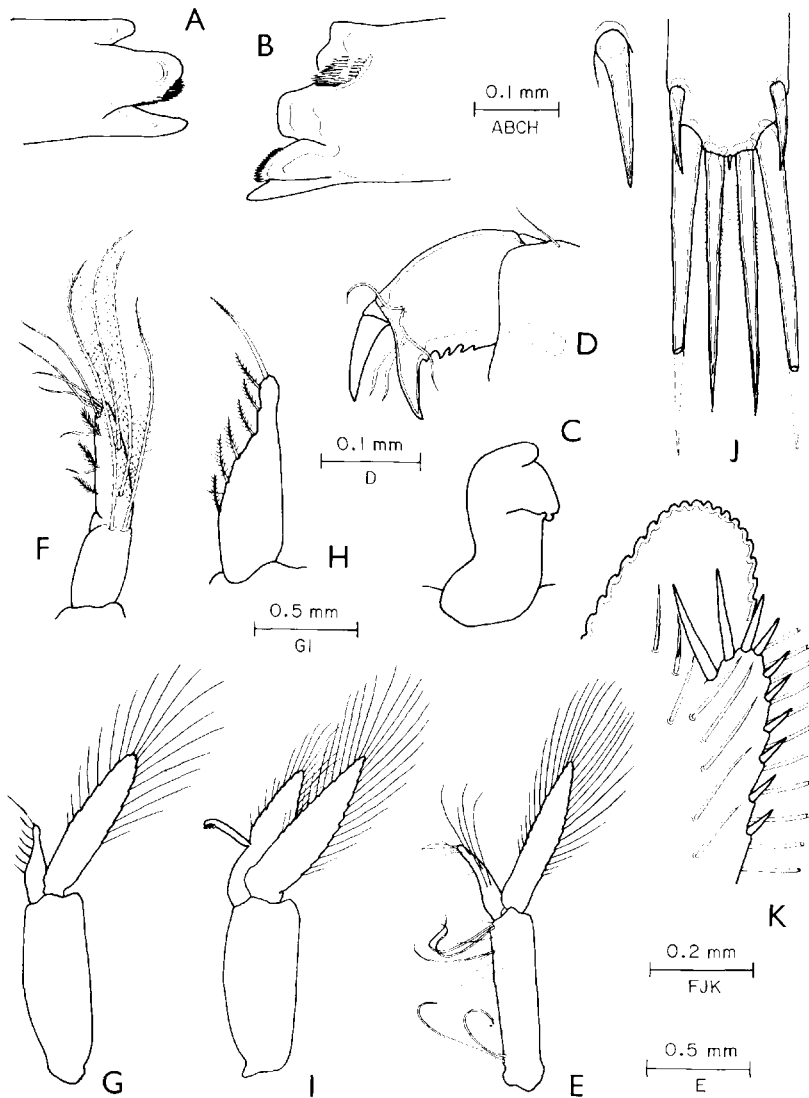


Figure 6. *Paraclimnacus fimbriatus* (Borradaile, 1915) **comb. nov.** A, B, Molar process of mandibles. C, Maxillula, palp. D, Third pereiopod, dactylus. E, Female first pleopod. F, Same, endopod. G, Male first pleopod. H, Same, endopod. I, Male second pleopod. J, Posterior telson spines; inset, dorsal telson spine. K, Exopod of uropod, distolateral spines.

ultimate, tapering distally with several transverse rows of serrulate setae distomedially and numerous long slender ventral spines, exopod flagellum with five plumose setae distally, coxa with small setose ventral process, oval lateral plate and rudimentary arthrobranch.

Fourth thoracic sternite without slender median process. Posterior sternites narrow and unarmed.

First pereiopods moderately robust, exceeding carpocerite by distal third of merus; chela heavily built, palm about as long as deep, compressed, sparsely setose, three transverse rows of short serrulate cleaning setae proximoventrally, fingers about 1.6 times longer than palm, with small hooked tips, dactylus

slightly swollen with about 20 transverse rows of numerous, short curved setae dorsolaterally, forming dense brush, with short distally directed spinules along distal cutting edge, fixed finger with four to five transverse rows of few long simple setae; carpus about 1.5 times length of chela, 4.2 times longer than distal width, distal width about 0.9 of palm depth, with serrulate cleaning setae distoventrally; merus subequal to carpus length, about 5.25 times longer than central width; ischium about 0.5 of merus length, ventrally carinate with long simple setae, obliquely articulated with basis; basis ventrally setose; coxa with rounded setose distoventral lobe.

Second pereopods well developed, robust, with large chelae. Major chela about 1.5 times postorbital carapace length, palm subcylindrical, moderately compressed, dorsally slightly flattened and tuberculate, moderately tuberculate along ventral border, about 2.1 times longer than deep, slightly swollen centrally; dactylus about 3.3 times longer than central depth, curved, with bluntly pointed tip, cutting edge distally entire, thickened, centrally with large deep, oval fossa with thickened rim, posteriorly with small blunt tooth; fixed finger about 1.4 times longer than deep, distally pointed, acute, extending well beyond closed dactylus, distal cutting edge blunt, central region with raised molar process, with thickened rim surrounding central depression, with proximolateral gap; carpus about 0.4 of palm length, 1.4 times longer than deep, enlarged distally, obliquely excavate, unarmed; merus about 0.6 of palm length, 2.0 times longer than central depth, slightly swollen centrally, unarmed; ischium about 0.45 of merus length, expanded distally 1.75 times longer than distal width; basis and coxa without special features. Minor second pereopod about 1.2 times postorbital carapace length, about 0.9 of major chela length, palm about 2.4 times longer than central depth, slightly expanded centrally, ventral surface convex, dorsal surface feebly concave, feebly tuberculate, most marked ventrally; dactylus about 0.66 of palm length, 5.3 times longer than proximal depth, almost straight, with feebly hooked, acute tip, cutting edge entire, sharp, with small tooth proximally; fixed finger about 1.9 times longer than deep, with feebly hooked acute tip, cutting edge entire, sharp, with feeble indications of two small teeth proximally; carpus, merus and ischium, similar to major pereopod; basis and coxa without special features.

Ambulatory pereopods moderately robust, strongly compressed, third pereopod merus reaches to level of distal basicerite. Third pereopod with dactyl short, recurved and strongly compressed, unguis distinctly demarked from corpus, curved, about 3.2 times longer than proximal width, simple; corpus about 1.4 times longer than depth, dorsal border strongly convex, ventral border with large distal accessory tooth, subequal to unguis, recurved, ventral margin straight with five small acute denticles, with two sensory setae distolaterally and two submarginal setae distomedially; propod about 4.5 times longer than proximal depth, slightly tapered distally, with four strong distolateral spines, three strong distomedial spines, six smaller spines along proximal ventral border; carpus about 0.45 of propod length, 2.4 times longer than distal width, tapered proximally, unarmed; merus about 1.2 times propod length, 3.3 times longer than central width, slightly swollen centrally, unarmed; ischium about 0.5 of merus length, 2.0 times longer than distal width, tapered proximally, obliquely articulated with basis; basis about 0.95 of ischium length; coxa robust, without special features. Fourth pereopod similar to third, propod

about 0.9 of third propod length, 4.7 times longer than deep, uniform, with six strong distolateral and four distomedial spines, ventral border with three smaller spines; carpus about 0.6 of propod length; merus 1.3 times propod length, 4.0 times longer than deep. Fifth pereopod with dactylus more slender than third or fourth; propod about 1.2 times third propod length, 8.8 times longer than proximal depth, slightly tapered distally with two distomedial spines and six ventral spines; carpus about 0.6 propod length; merus subequal to propod length, about 6.0 times longer than wide, unarmed.

Male first pleopod with basipodite about 2.8 times longer than wide; exopod 0.9 of basipodite length, about 4.4 times longer than wide, with numerous long plumose marginal setae; endopod about 0.4 of basipodite length, about 3.1 times longer than proximal width, tapering distally, distal process with single distally serrulate spine, medial border with six short setulose setae. Second pleopod with basicerite 0.9 of length of first pleopod basipodite 2.3 times longer than broad; exopod subequal to basipodite length, 4.0 times longer than broad, with numerous long, plumose marginal setae; endopod about 0.9 of basipodite length with well developed appendix interna at about 0.45 of medial border length, appendix masculina absent, distal margins setose. Female first pleopod with basipodite about 4.4 times longer than wide, with two proximal, one preterminal and two terminal medial marginal ovigerous setae; exopod about 0.9 of basipodite length, with numerous plumose marginal setae; endopod about 0.45 of basipodite length, 4.0 times longer than proximal width, tapering distally, with four simple spiniform setae distally, medial margin with three short plumose and two simple setae, dorsolaterally with four long plumose setae.

Uropod with protopodite robust, with posterolateral angle acutely produced, dorsomedial lobe laterally acute; exopod short, reaching to 0.75 of endopod, subequal to endopod length, about 2.4 times longer than broad, lateral margin convex, with dense fringe of long submarginal plumose setae, distal half with about 10 articulated spines, size increasing distally, without posterolateral angle, dorsal surface with many robust erect setae; endopod reaching to middle of posterior telson spines, broadest proximally, about 3.0 times longer than wide, with numerous erect setae dorsally.

Measurements. Female: total body length (approx.) 8.25 mm; carapace and rostrum, 3.9 mm; postorbital carapace length, 2.9 mm; major chela, 4.2 mm; minor chela, 3.7 mm; length of ova, 0.5 mm. Male: total body length (approx.), 6.5 mm; carapace and rostrum, 2.8 mm; postorbital carapace length, 2.05 mm; major chela, 3.5 mm; minor chela, 2.8 mm. Largest specimen, postorbital carapace length 3.2 mm.

Types. Borradaile's type specimens from the Maldiv Islands and specimens from the Seychelle Islands are held in the collection of the Zoology Museum, University of Cambridge. Specimens will be deposited in the collections of the British Museum (Natural History), United States National Museum, the Rijksmuseum van Natuurlijke Historie and the Northern Territory Museum, NTM. Cr.005247.

Host. The Pangani specimens were collected from single unidentified sponge host.

Colouration. No data.

Parasites. Two specimens were infected by branchial bopyrid parasites.

Associated fauna. One ovigerous female of *Orthopontonia ornata* (Bruce, 1969) was also found in the same sponge host.

Distribution. Known only from the type material from Providence Island, Seychelle Islands and Mukalu Atoll, Maldive Islands, apart from the present specimens, first reported by Bruce (1974a).

Remarks. The further examination of *P. fimbriatus* confirms the general accuracy of the description provided by Borradaile (1917), who recorded the unusual armament of the fingers of the major second pereopod. The ambulatory pereopods, in the arrangement of the dactyl and distal propod, with its heavy spinulation, present a strongly prehensile appearance, potentially capable of taking a strong hold in the host's tissues. Such an arrangement is not conspicuous in other sponge associates, living in the host spongocoel. A generally similar, although much less robust arrangement, occurs in some species of *Periclimenes*, such as *P. psamathe* De Man, found in association with gorgonians, but living exposed to the force of the local water currents on the surface of its host.

The endopod of the male first pleopod is also unusual in the presence of a distally serrulate terminal spine. Other species in which this appendage has been described have plumose setae in this situation. A serrulate spine is more appropriate to the appendix masculina, lacking in this species, thereby suggesting that some of the functions of the appendix masculina are carried out by the endopod of the first pleopod in this species.

DISCUSSION

The designation of the genus *Paraclimnæus* raises to 11 the number of palaemonid shrimp genera known to be associated with Porifera in Indo-West Pacific waters. The recently described genus *Exopontonia* Bruce (1988) is also thought to be an associate of sponges, as is the New Zealand deep-water genus *Hamiger* Borradaile (Bruce, 1986), which might well be found to occur in Indo-West Pacific waters. The genus *Periclimnæus* Borradaile is remarkable in that some of the species occur normally in the common cloacal cavity of colonial ascidians and not in sponges. Only the genera *Periclimnæus* and *Typton* occur outside the Indo-West Pacific region. A key to these genera is presented below.

Only two genera of palaemonid sponge-associated shrimps are known from outside the Indo-West Pacific region. *Periclimnæus* is the most speciose genus, with some 37 described species in the Indo-West Pacific region, of which 24 are now definitely known to associate with sponges. Several species are known from the type material only and the hosts have often not been recorded or identified. The genus *Typton* is now represented by seven Indo-West Pacific species with ten species outside that region. *Onycocaris* now has 11 species, *Apopontonia* and *Onycocaridella* each have three species and are known only from the Indo-West Pacific region. The remaining seven genera are all monotypic and confined to the Indo-West Pacific.

Dr C. B. Goodhart has confirmed that the type material, so labelled by Borradaile, from Makalu Atoll, Maldive Islands, has the molar process on the second pereopod fixed finger and the fossa on the dactylus. The syntypes

include a male and a female which are in good condition, complete and undissected. The female specimen is now selected as the holotype and the male is designated as allotype. There are also seven additional specimens in a more fragmentary state, two of which have been dissected. The Seychelle Islands specimens, not labelled as types by Borradaile, consist of two lots of specimens, both from Providence Island, at 71 and 91 m and are in a much more fragmentary state.

KEY TO THE INDO-WEST PACIFIC SPONGE-ASSOCIATED PALAEMONID SHRIMP GENERA

- 1 Major second pereiopod with fingers of chela bearing sound-producing pit and hammer mechanism 2
- 1' Fingers of second pereiopods without pit and hammer mechanism 3
 - 2 Dactyl of second pereiopod with molar process, fixed finger with fossa
Periclimenaeus Borradaile
 - 2' Dactyl of second pereiopod with fossa, fixed finger with molar process
Paraclimenaeus gen. nov.
- 3 Scaphocerite greatly reduced or rudimentary *Typton* Costa
- 3' Scaphocerite well developed 4
 - 4 Rostrum well developed, strongly compressed, dorsally and ventrally dentate 5
 - 4' Rostrum small or very small, with few dorsal and no ventral teeth 7
- 5 Carpus of first pereiopods segmented *Thaumastocaris* Kemp
- 5' Carpus of first pereiopods simple 6
 - 6 Second pereiopods markedly unequal, major chela large, with flanged dactyl, fixed finger with large bidentate proximo-lateral process (Note: association with sponges probable, not confirmed) *Hamiger* Borradaile
 - 6' Second pereiopods, small, subequal, similar *Epipontonia* Bruce
- 7 Chela of second pereiopods generally high, strongly compressed, fixed finger generally with lateral accessory flange *Onyccaris* Nobili
- 7' Chela of second pereiopods not strongly compressed, generally oval in section, fingers without accessory flange 8
 - 8 Dactyl of third ambulatory pereiopod, long and slender, simple, dactyls of fourth and fifth pereiopods, short and stout, biunguiculate *Onyccaridites* Bruce
 - 8' Dactyls of ambulatory pereiopods all similar 9
- 9 Cutting edges of fingers of both second pereiopods minutely dentate *Periclimenoides* Bruce
- 9' Cutting edges of fingers of second pereiopods not minutely dentate 10
 - 10 Cutting edges of fingers of minor second pereiopod with minute transversely ribbed tubercles *Orthopontonia* Bruce
 - 10' Cutting edges of fingers of second pereiopod without tubercles 11
- 11 Exopod of uropod with distolateral tooth with single mobile spine medially; lateral rostral carinae not broadly expanded 12
- 11' Exopod of uropod with numerous distolateral spines; lateral rostral carinae broadly expanded *Apopontonia* Bruce
- 12 Second pereiopods of basically similar form, dactyls compressed, distally acute
Onyccaridella Bruce
- 12' Second pereiopods markedly different, major chela with dactyl distally swollen, hammer-like, minor chela with dactyl compressed, dentate (Note: association with sponges probable, not confirmed) *Exopontonia* Bruce

ACKNOWLEDGEMENTS

I am most grateful to Dr C. B. Goodhart, Zoology Museum, Cambridge, for helpful information on Borradaile's shrimp specimens.

REFERENCES

- BORRADAILE, L. A., 1915. Notes on Carides. *Annals and Magazine of Natural History*, 15: 205-213.
- BORRADAILE, L. A., 1917. On the Pontoniinae. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the leadership of Mr J. Stanley Gardiner. *Transactions of the Linnean Society of London, Zoology*, 17: 323-396, pls 52-57.
- BRUCE, A. J., 1970. Further preliminary descriptions of new species of the genus *Periclimenaeus* Borradaile, 1915, (Crustacea, Decapoda Natantia, Pontoniinae). *Zoologisches Mededelingen, Leiden*, 44: 305-315.
- BRUCE, A. J., 1974a. A synopsis of the pontoniinid shrimp fauna of central East Africa. *Journal of the Marine Biological Association of India*, 16: 462-490.
- BRUCE, A. J., 1974b. Observations upon some specimens of the genus *Periclimenaeus* Borradaile (Decapoda Natantia, Pontoniinae) originally described by G. Nobili. *Bulletin du Museum National d'Histoire Naturelle, Paris (Zoologie, 180)*, 258: 1557-1583, figs 1-15.
- BRUCE, A. J., 1978. A report on a collection of pontoniine shrimps from Madagascar and adjacent seas. *Zoological Journal of the Linnean Society*, 62: 205-290, figs. 1-44.
- BRUCE, A. J., 1986. A re-examination of *Periclimenes* (*Hamiger*) *novae-zealandiae* Borradaile, with recognition of a new genus *Hamiger* Borradaile, 1916. *Journal of Natural History*, 20: 911-919, figs 1-4.
- BRUCE, A. J., 1988. *Exopontonia malleatrix* new genus, new species, a palaemonid shrimp from Ashmore Reef, Western Australia. *Journal of Crustacean Biology*, 8: 122-130, figs. 1-5.
- HOLTHUIS, L. B., 1952. The Palaemonidae collected by the Siboga and Snellius Expeditions with remarks on other species. II. Subfamily Pontoniinae. *Siboga Expedition Monograph*, 39a 10: 1-253, figs 1-110, tab. 1.
- KEMP, S., 1922. Notes on Crustacea Decapoda in the Indian Museum, XV. Pontoniinae. *Records of the Indian Museum*, 24: 113-288, figs 1-105, pls 3-9.