

Re-descriptions of two little-known Indo-West Pacific palaemonid shrimps, *Periclimenes calmani* Tattersall and *P. delagoae* Barnard

A. J. BRUCE

Division of Natural Sciences, Northern Territory Museum, PO Box 4646, Darwin, Australia 5794

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The type material of two little-known Indo-West Pacific palaemonid shrimps *Periclimenes calmani* Tattersall, 1921, and *P. delagoae* Barnard, 1958, is redescribed and illustrated. Their systematic relationships are re-assessed and keys provided for the identification of related species.

KEYWORDS: Taxonomy, Crustacea, Palaemonidae, *Periclimenes*, Indo-West Pacific, Type specimens, Redescriptions.

Introduction

The small shrimp *Periclimenes calmani* was first described by W. M. Tattersall (1921), who reported on four specimens from an unrecorded locality on the Red Sea coast of Sudan. *Periclimenes delagoae* is known only from the HOLOTYPE specimen described by Barnard (1958), from Delagoa Bay, Mozambique. Both descriptions are brief and incompletely illustrated, which has made the systematic position of these shrimps difficult to assess.

Through the kindness of their custodians, Dr Ray Ingle at the British Museum (Natural History) and Mrs M. G. van der Merwe at the South African Museum, the type-material has been made available for study and the results are reported below.

***Periclimenes calmani* Tattersall**

(Figs 1-5)

Periclimenes calmani Tattersall, 1921: 385-386, pl. 27, fig. 11, pl. 28, figs 14-15; Balss, 1927: 223;

Gurney, 1927: 229, 264, figs 66-69; Johnson, 1961: 59-75, 1975: 33.

Periclimenes (Ancylocaris) calmani Kemp, 1922: 176.

Periclimenes Calmani—Monod, 1930: 138; 1932: 66.

Periclimenes (Harpilius) calmani—Holthuis, 1952: 11; 1956, 310.

Periclimenes (Harpilius) ?calmani—Holthuis, 1952: 64-66.

Material examined. Four syntypes, Red Sea coast of Sudan (no precise locality data), non. ovig. ♀♀.

Description. Small-sized, slenderly built shrimps of sub-cylindrical body form.

Carapace smooth and glabrous, with well-developed rostrum, straight, or slightly up-curved, horizontal or directed slightly upwards, strongly compressed, with lateral carinae obsolete, distinctly exceeding post-orbital carapace length; epigastric tooth present, dorsal margin of lamina with seven to eight acute teeth, first situated just over or distal to posterior orbital margin, subequally spaced, decreasing in size distally, interspaces setose; lower margin with four to five acute teeth, with first at about level of fourth dorsal tooth, decreasing in size distally, interspaces and proximal ventral

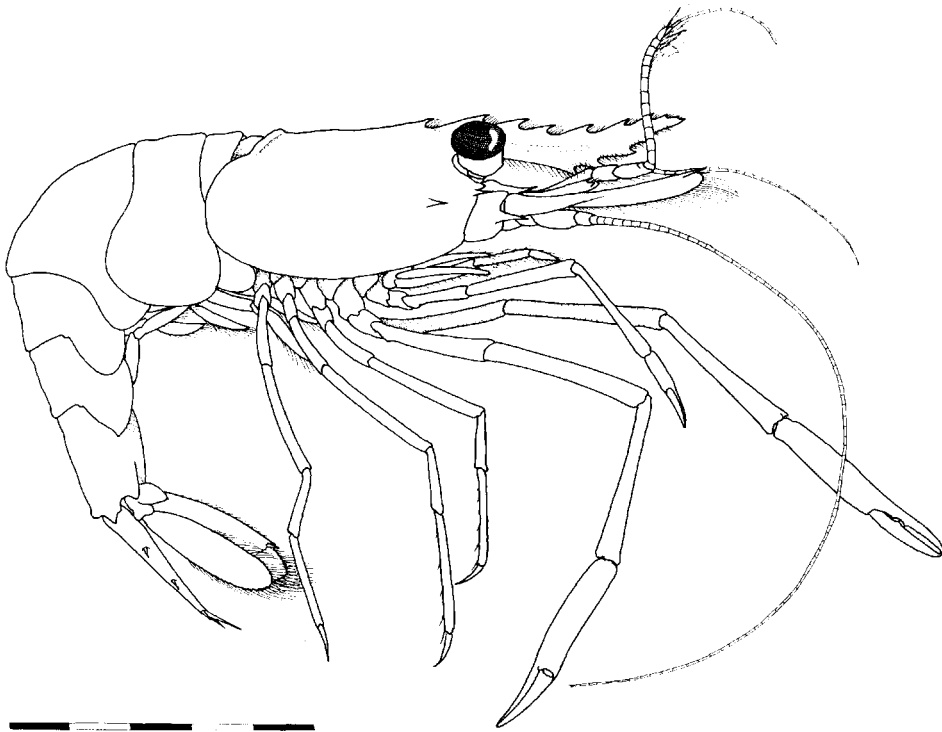


FIG 1. *Periclimenes calmani* Tattersall, female LECTOTYPE. Scale bar in millimetres.

margin setose. Supra-orbital spines absent, orbit feebly developed, inferior orbital angle slightly produced, with reflected inner ventral flange, antennal spine well developed, marginal; hepatic spine present, subequal to antennal, situated at lower level and in advance of level of epigastric spine; antero-lateral angle of carapace not produced, bluntly rounded.

Abdominal segments smooth, glabrous, with third very slightly postero-dorsally produced. Fifth segment about 1.6 times length of sixth, sixth about 1.5 times longer than deep, with postero-lateral angle acute and postero-ventral angle blunt. Pleura of first three segments broadly rounded, fourth posteriorly produced, rounded, and fifth produced and posteriorly acute. Telson about 1.2 times length of sixth segment, tapering distally, about 2.25 times longer than anterior width; posterior margin about 2.7 times that of anterior width, angular with distinct postero-median point; two pairs of small dorsal spines present at about 0.35 and 0.7 times telson length; posterior border with three pairs of spines, small lateral, larger intermediates, about 0.4 times telson length, and setulose submedians, about 0.3 times length intermediate spine length.

Eye well pigmented with large globular cornea, diameter about equal to length of stalk, with small dorsal accessory pigment spot.

Antennular peduncle reaching to about level of fourth or fifth rostral tooth; proximal segment about 1.8 times larger than central width, with well-developed acute stylocerite laterally reaching to about half segment length; antero-lateral angle feebly produced, with acute disto-lateral tooth reaching to near mid-length of intermediate segment; ventro-median border with small acute tooth at half length; statocyst

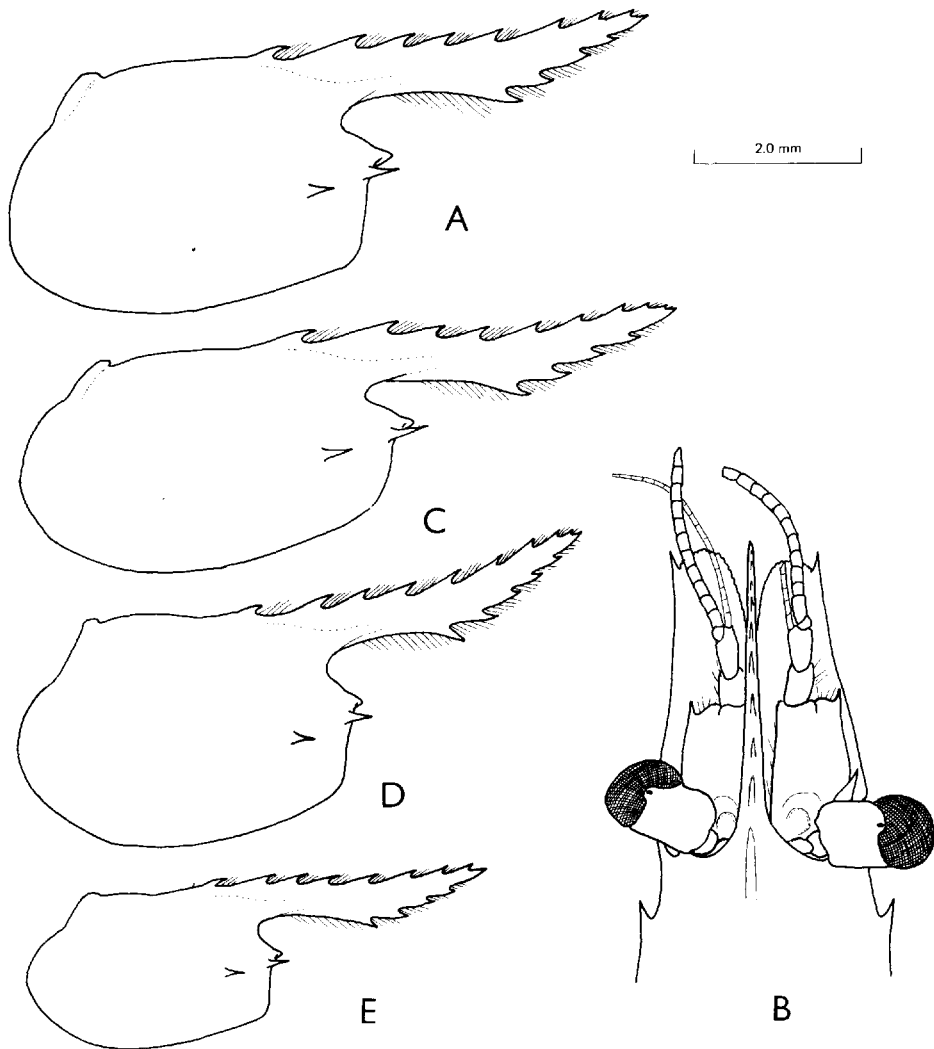


FIG. 2. *Periclimenes calmani* Tattersall. A, Carapace and rostrum, lateral aspect, LECTOTYPE; B, anterior carapace and antennae, dorsal, LECTOTYPE; C-E, carapace and rostrum, PARALECTOTYPES.

normally developed with discoid statolith: intermediate and distal segments short, slender, subequal, together equal to about 0.6 of proximal segment length; upper flagellum slender, biramous, with 11 proximal segments fused; shorter free ramus with two segments only; about 11 groups of aesthetascs present; lower flagellum slender, filiform, largely lacking.

Antennal basicerite with strong, acute lateral tooth; carpoperite short, about 2.5 times longer than broad and not reaching to mid-length of scaphocerite; flagellum well developed and slender. Scaphocerite reaching to about tip of rostrum, about 3.5 times longer than broad, greatest width at 0.3 of length, lamina broadly truncated distally, about level with tip of strong disto-lateral tooth, lateral border feebly concave.

Epistome unarmed. Thoracic sternites moderately narrow, fourth with slender finger-like median process.

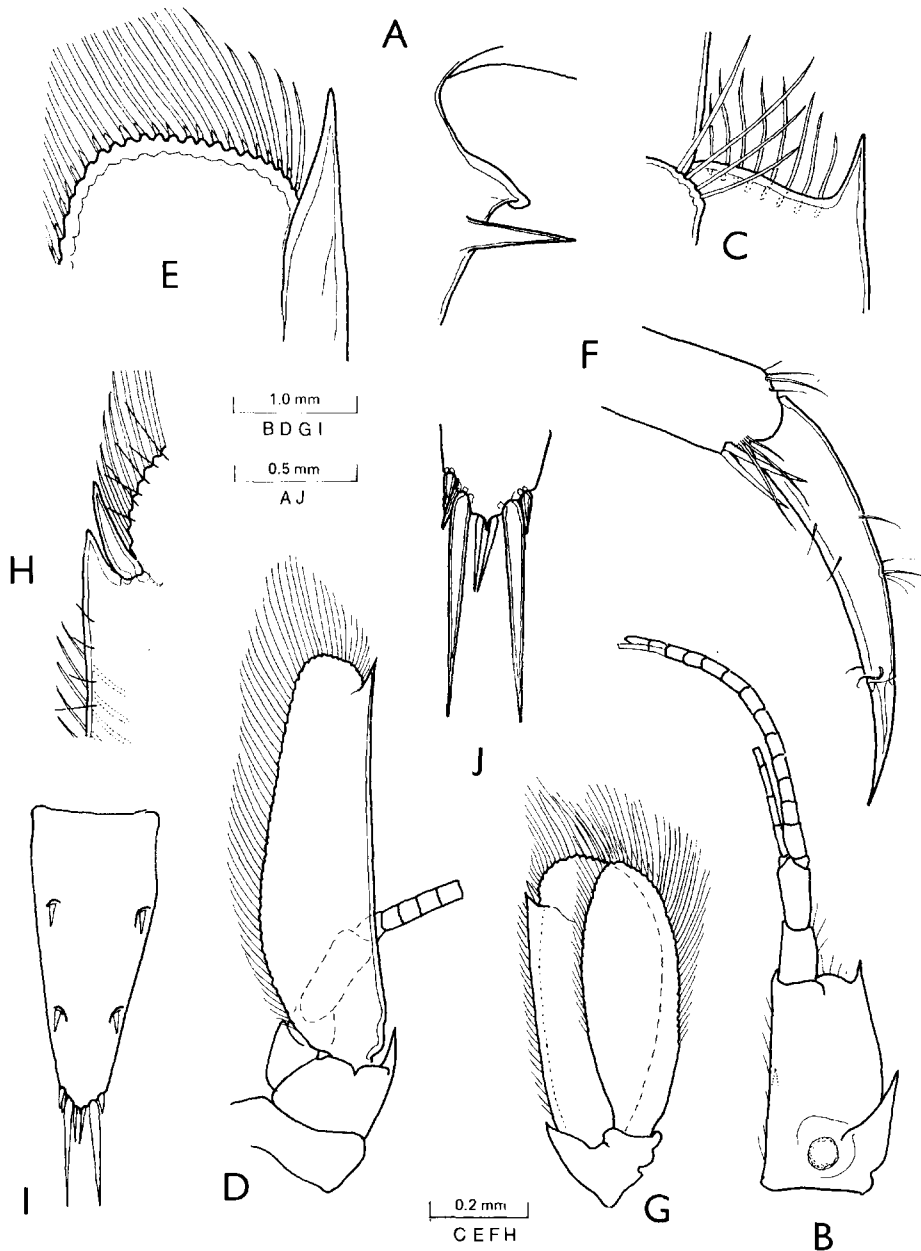


FIG. 3. *Periclimenes calmani* Tattersall, PARALLECTOTYPE. A, Inferior orbital angle; B, antennule; C, same, disto-lateral angle of proximal segment; D, antenna; E, same distal scaphocerite; F, dactyl of third pereiopod; G, uropod; H, same, disto-lateral exopod; I, telson; J, same posterior spines.

Mouthparts generally typical of genus. Mandible robust, without palp; molar process (right) stout, with five large blunt teeth distally, sparsely setose; incisor process short, distally truncate with three acute teeth, central tooth smaller than outer. Maxillula with bilobed palp, lower lobe larger with small uncinatae distally; upper

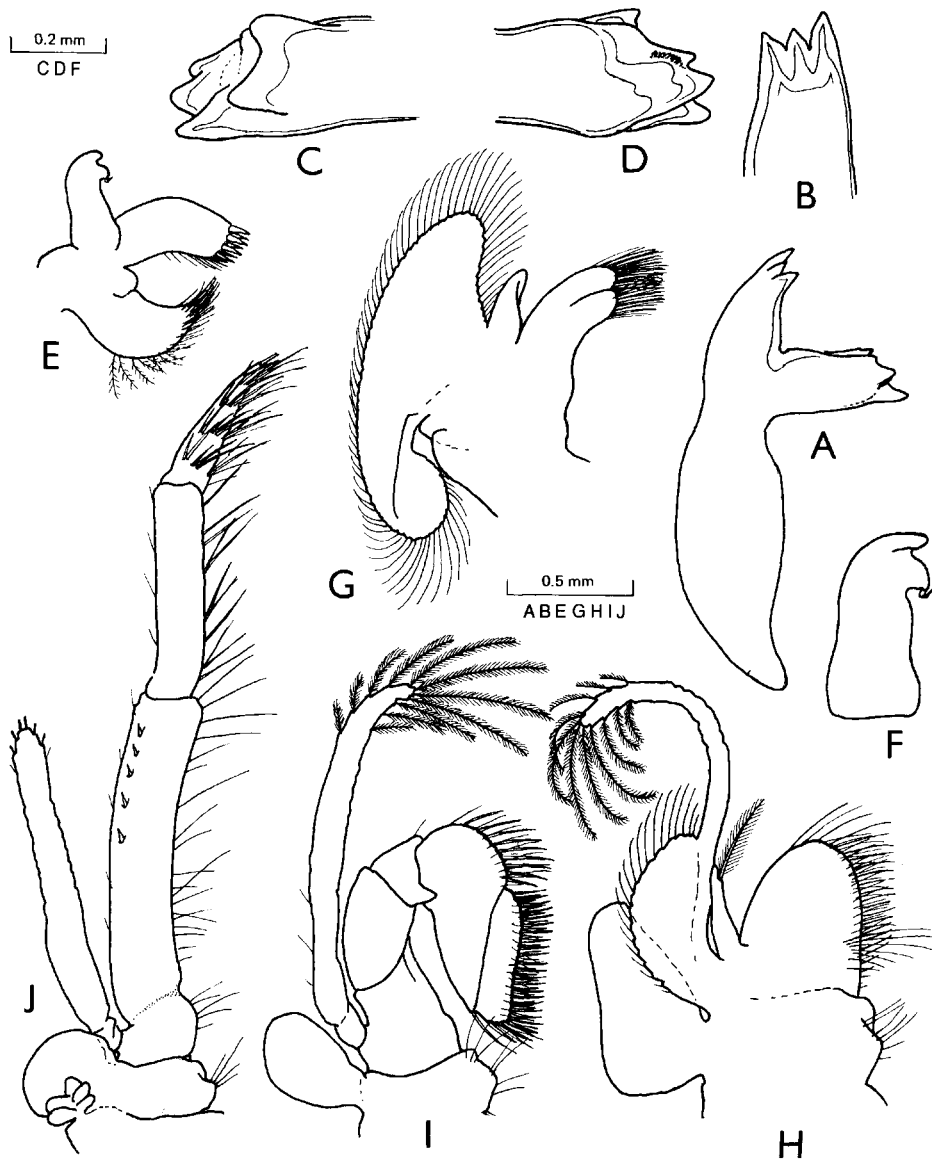


FIG. 4. *Periclimenes calmani* Tattersall, PARALECTOTYPE. A, Mandible; B, same, incisor process; CD, molar process; E, maxillula; F, same, palp; G, maxilla; H, first maxilliped; I, second maxilliped; J, thrid maxilliped.

lacinia narrow with nine simple spines distally and numerous short setae; lower lacinia of similar size, tapering distally with numerous slender spines distally and plumose setae ventrally. Maxilla with short stout non-setose palp; basal endite deeply bilobed, lobes subequal, distal lobe with about 25 slender simple setae distally, proximal lobe with about 20; coxal endite obsolete, medial border feebly concave; scaphognathite broad, about 3.0 times longer than anterior width, posterior lobe narrower, about half length of anterior; anterior with medial margin feebly concave. First maxilliped with slender palp with single pre-terminal plumose seta, basal endite broad and rounded,

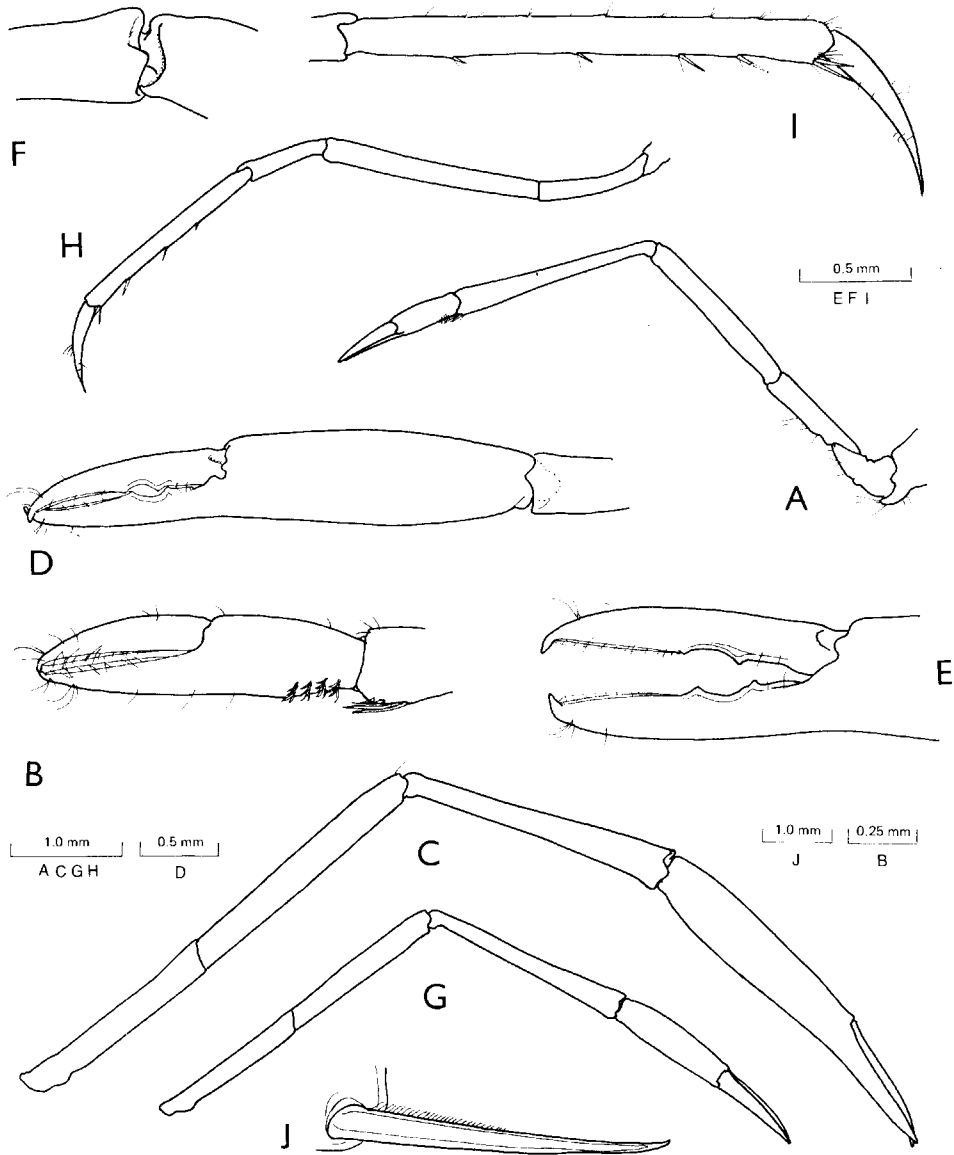


FIG. 5. *Periclimenes calmani* Tattersall, PARALECTOTYPE. A, First pereiopod; B, same, chela; C, second pereiopod; D, same, chela; E, same, fingers; F, carpo-propodal joint; G, juvenile second pereiopod; H, third pereiopod; I, same, dactyl and propod.

moderately setose medially, exopod well developed with small broad caridean lobe; flagellum with numerous plumose setae distally; coxal endite feebly bilobed medially, sparsely setose, large triangular epipod present laterally. Second maxilliped of normal form, dactylar segment moderately broad, densely armed with serrate spines medially; carpal segment with antero-medial angle with serrate spines distally and simple setae proximally; exopod well developed with numerous plumose setae distally; coxa feebly produced and setose medially, with rounded epipod laterally without podobranch.

Third maxilliped moderately robust, extending to about middle of carapocerite; ischiomerus feebly separated from basis, about 5.0 times longer than broad, uniform, sparsely setose medially, with about five small spines disto-laterally; carpal segment about 4.5 times longer than broad, about 0.6 times of ischiomer length, sparsely spinose medially; terminal segment about half ischiomer length, tapering distally, with numerous groups of serrated spines; basis medially convex, sparsely setose, with well-developed exopod laterally; coxa feebly produced medially, with rounded lateral plate and small anthrobranch laterally.

First pereopod slender, extending anteriorly to exceed scaphocerite by most of chela. Chela with fingers slender, tapering, with small acute hooked tip and entire cutting edges, subequal to palm length; palm slightly compressed, about 2.0 times longer than deep, uniform, with four transverse rows of cleaning setae proximo-ventrally; carpus slender, about 1.5 times length of chela, about 7.5 times longer than distal width, tapered proximally and with four to five slender cleaning setae disto-ventrally; merus about 0.8 times carpal length, uniform, 7.5 times longer than wide; ischium about half length of propod, about 4.7 times longer than distal width, sparsely setose ventrally; basis without special features; coxa with feeble median process.

Second pereopods slender, subequal and similar, exceeding antennular peduncle by carpus and chela. Chela with palm smooth, subcylindrical, slightly compressed and swollen centrally, about 3.0 times longer than deep; fingers slender tapering, with acute hooked tips, dactylus about 7.0 times longer than deep, cutting edges entire over distal halves, with single low acute tooth proximally on dactylus and two, separated by low notch on fixed finger, fingers sparsely setose; carpus about 1.1 times length of palm, about 7.5 times longer than wide, slightly expanded distally, with feeble medial lobe distally, otherwise unarmed; merus subequal to carpus, about 8.0 times meral length, unarmed, about 7.8 times longer than deep; basis and coxa without special features.

Ambulatory pereopods moderately slender. Third pereopod exceeding carapocerite by dactyl and most of propod; dactyl equal to about 0.4 of corpus length; propod unguis distinct, slender, about 0.45 times longer than wide and 0.4 of corpus length; corpus about 4.3 times longer than proximal depth, curved, compressed, with distal sensory setae medially and laterally, with additional short setae on dorsal margin; ventral border sparsely setose; propod about 2.6 times dactylar length, about 2.0 times longer than deep, with two well-developed disto-ventral spines, pectinate along the proximal dorsal border, with four single spines spaced along the ventral border, anterior spines pectinate as disto-ventral spines; carpus about 0.38 of propod length, unarmed, about 5.0 times longer than distal width; merus subequal to propod, about 9.5 times longer than distal width, slightly broader distally, unarmed; ischium about half length of merus, 5.5 times longer than distal width, slightly broadened distally, unarmed; basis and coxa without special features. Fourth and fifth pereopods similar to third, fourth propod about 1.1 times length of third, fifth about 1.2 times, fifth propod with transverse rows of serrated cleaning setae distally.

Uropod with propodite postero-laterally acute; exopod about 2.2 times longer than broad, lateral border feebly convex with well-developed row of ventral sub-marginal setae, posteriorly with acute tooth with strong articulated spine medially; endopod slightly shorter than exopod, about 2.8 times longer than broad.

Types. The largest intact female, post-orbital carapace length 3.2 mm, complete, with both second pereopods attached, is designated as LECTOTYPE, catalogue number BMNH 1921.12.19.44 The three remaining syntypes are also designated as PARALECTOTYPES, numbers BMNH 1921.12.19.45-47.

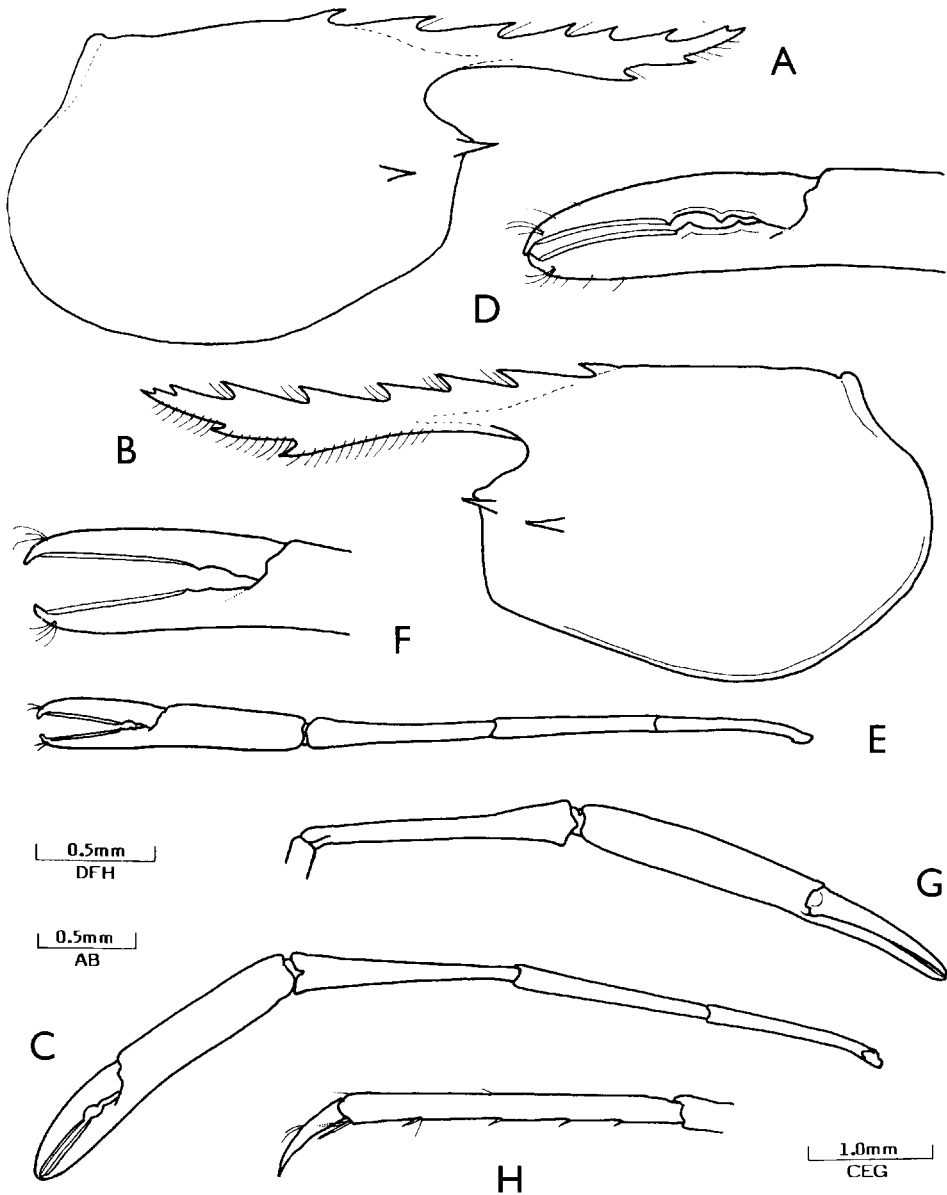


FIG. 6. *Periclimenes* sp., aff. *calmani*, Siboga Expedition. A, B, Carapace and rostrum; C, major second pereiopod; D, same, fingers; E, minor second pereiopod; F, same, fingers; G, second pereiopod; H, ambulatory pereiopod, dactyl and propod. A, C-F, H, ovigerous female, Stn 65a; B, G, female, Stn 213.

Measurements

	LECTOTYPE	PARALECTOTYPES		
		no. 44	no. 45	no. 46
Post-orbital carapace length	3.2	4.6	3.0	2.1
Chela of major second pereiopod	3.5	—	3.3	1.9
Chela of minor second pereiopod	3.5	—	3.2	—

Variations. As noted in the descriptions above, the rostral dentition in the type-specimens varies from 7/4 to 8/5. The immature specimen shows a relatively longer and more slender carpus in the second pereiopods, subequal to the length of the chela, whereas in the adults the carpus is conspicuously shorter than the chela.

Systematic position. The re-examination of the syntypes of *P. calmani* has confirmed the presence of a long finger-like median process on the first thoracic sternite. This very characteristic feature is conspicuous in the shrimps of Kemp's "*Periclimenes grandis* group" (Kemp, 1922), a group of active free-living micropredators. Subsequent studies have shown that other apparently free-living species, not normally included in the "*P. grandis* group", such as *P. darwiniensis* Bruce, also possess this feature and it is to these that *P. calmani* is most closely related. Although most species are probably free-living (there is little confirmed data), some species are known to be associates of other marine invertebrates. *Periclimenes amymone* is the only member of the *P. grandis* group, sensu Kemp, that is a confirmed commensal and is an associate of branching corals. *Periclimenes lutescens* and *P. consobrinus* are also associated with *Acropora* and *Pocillopora* respectively. *Periclimenes kororensis* is also a known coral associate, found on fungiid and other corals. The only other known obligatory commensal in this group, sensu latu, is *P. nilandensis*, which is an associate of antipatharians (Bruce, 1978). *Periclimenes tenuipes* is generally collected under circumstances that suggest that it is free-living, but Reed (1974) has suggested that it may be a facultative associate of actiniarians.

Through the kindness of Dr Platvoet, it has been possible to examine the Siboga Expedition specimens reported upon by Holthuis (1952) and referred to *Periclimenes (Harpilius) ?calmani*. The specimens (Fig. 6) are now in a rather fragmentary state with many appendages missing. They differ from the type-material of *P. calmani*, particularly in the much shallower development of the rostrum, with the presence of only two ventral teeth. The rostrum is also distinctly shorter than the post-orbital carapace length, whereas in *P. calmani* this is considerably longer. The second pereiopods are essentially similar, The ambulatory pereiopods are largely detached and have a dactyl that is less than 0.3 of the propod length, whereas in *P. calmani* it is more than 0.3 of the propod length. The fourth thoracic sternite is armed with a median process as in *P. calmani*. The Siboga specimens are considered to represent a distinct taxon from *P. calmani* Tattersall, but to be insufficiently complete to be described as a new species.

Through the kindness of Mrs Yang Chan Man, some of the Singapore specimens referred by Johnson (1961, 1976) to *P. calmani* have been re-examined. They can not be referred to Tattersall's species, do not belong to the *P. grandis* group and are being reported on in detail elsewhere.

Recently, also through the kindness of Mrs Yang Chan Man, two specimens of *Periclimenes akiensis* Kubo from Singapore have been examined and found to have a fourth thoracic sternal spine, and this species is therefore added to the *P. grandis* group. The undamaged specimen, an ovigerous female, has a rostral dentition of nine dorsal and four ventral teeth, with two teeth situated behind the post-orbital margin. The rostrum is moderately up-curved and the ventral margin is strongly bilaterally setose. The second pereiopods have the carpus distinctly longer than the chela, equal to about twice the palm length. Kubo's figure (Kubo, 1936, pl. IVa) appears to show a short carpus and a very big merus or a two-segmented carpus and a short merus. *Periclimenes akiensis* appears to be most closely related to *P. seychellensis*, from which it may be most readily distinguished by the absence of a conspicuous dorsal eyestalk tubercle.

If these shrimps are all included in an expanded version of Kemp's "*Periclimenes grandis* group", the species may be separated by the following key. The species marked with an asterisk are associates of other marine invertebrates.

It is possible that the species *P. lutescens*, *P. consobrinus* and *P. bayeri* should be considered as a specialized subgroup on account of their very short, strongly hooked ambulatory dactyls and coral associations. They appear morphologically very similar to the species of *Philarius* Holthuis, 1952, except for the presence of an hepatic spine.

Periclimenes grandis species-group

- | | |
|--|---|
| 1 Merus of second pereiopod with strong disto-ventral tooth | 2 |
| – Merus of second pereiopod disto-ventrally unarmed | 16 |
| 2 Supra-orbital spines present | 3 |
| – Supra-orbital spines absent | 11 |
| 3 Distal spine of scaphocerite not, or scarcely exceeding lamella, R. 1 + 6-7/1-3 | |
| – Distal spine of carpuccerite distinctly exceeding lamella | <i>P. demani</i> Kemp 4 |
| 4 Rostrum shallow; ambulatory pereiopods long and slender, fifth exceeding scaphocerite | 5 |
| – Rostrum moderately deep; ambulatory pereiopods relatively stout, fifth not exceeding scaphocerite | 8 |
| 5 Single conspicuous spine on inner side of carpus of second pereiopod | 6 |
| – Carpus of second pereiopod without conspicuous spine on inner distal margin | 7 |
| 6 Carpus of male second pereiopod subequal to or shorter than merus; R. 1 + 6-8/2-4 | |
| – Carpus of male second pereiopod conspicuously longer than merus; R. 1 + 5-6/2 | <i>P. andamanicus</i> Kemp
<i>P. suvativensis</i> Borradaile |
| 7 First pereiopod carpus at least 1.75 times length of chela; male second pereiopod with chela not more than 1.25 times carpal length; in females subequal to carpus or slightly shorter; R. 1 + 6-8/1-3 | <i>P. agag</i> Kemp |
| – First pereiopod carpus less than 1.5 of chela length; chela of second pereiopod more than 1.3 of carpus length in both sexes; R. 1 + 5-6/2-3 | <i>P. longirostris</i> Borradaile |
| 8 Distal margin of carpus of second pereiopod devoid of spines; R. 1 + 6-7/3 | <i>P. ensifrons</i> (Dana) |
| – Distal margin of second pereiopod carpus with 1-2 acute spines | 9 |
| 9 Second pereiopod carpus with only a single distal spine: R. 1 + 5-9/2-5 | <i>P. grandis</i> (Stimpson) |
| – Second pereiopod carpus with two acute distal spines | 10 |
| 10 Ambulatory pereiopods with propods strongly spinulate; chela of second pereiopods tuberculate; R. 1 + 5-7/2-3 | <i>P. elegans</i> (Paulson) |
| – Ambulatory propods devoid of spines; chelae of second pereiopods not tuberculate; R. 1 + 6-7/3 | <i>P. amymane</i> De Man* |
| 11 Ambulatory pereiopods with propods slender, dactyls not short and strongly curved | 12 |
| – Ambulatory pereiopods with propods robust, dactyls short and hooked | 14 |
| 12 Rostrum greatly exceeding scaphocerite, teeth uniformly distributed; ambulatory propods segmented, non-spinulate; R. 1 + 8-11/6-9 | <i>P. tenuipes</i> Borradaile |
| – Rostrum subequal to scaphocerite; ambulatory pereiopods not segmented | 13 |
| 13 Rostrum 1 + 6/3, with epigastric first and three dorsal teeth grouped and enlarged; ambulatory pereiopods with distal ventral spine only, R. 1 + 6-7/3-4 | <i>P. kororensis</i> Bruce* |
| – Rostrum 12. 6/5-6, dorsal teeth similar and evenly distributed; ambulatory pereiopods ventrally spinulate, R. 1 + 6/5-6 | <i>P. platycheles</i> Holthuis |

- 14 Medial margins of terminal and pre-terminal segments of endopod of first maxilliped forming simple straight border; R. 1+6-7/2-3 *P. lutescens* auct.*
 – Medial margins of these segments not forming straight continuous border 15
- 15 Rostrum slender, distinctly exceeding scaphocerite, upcurved; R. 1+6-7/3-5
 *P. bayeri* Holthuis
 – Rostrum deep, not or scarcely exceeding scaphocerite, straight; R. 1+7/1-3
 *P. consobrinus* De Man*
- 16 Supra-orbital spines present; R. 1.7-9/3-5 *P. nilandensis* Borradaile*
 – Supra-orbital spines lacking 17
- 17 Robust species, with two teeth situated on carapace posterior to orbital margin 18
 – Slender species, with one tooth situated on carapace posterior to orbital margin 19
- 18 Eyestalk with conspicuous dorsal tubercle; carpus of second pereopod distinctly shorter than chela; R. 2+6-8/2-5 *P. seychellensis* Borradaile
 – Eyestalks without dorsal tubercle; carpus of second pereopod distinctly longer than chela; R. 2+6-7/3-4 *P. akiensis* Kubo
- 19 Post-orbital ridge distinct; R. 1+6-7/2 *P. darwiniensis* Bruce
 – Post-orbital ridge lacking; R. 1+7-8/4-5 *P. calmani* Tattersall

Two species that were thought to be probable members of the group were *P. digitalis* Kemp and *P. leptopus* Kemp. It has recently been confirmed by H. C. Ghosh (personal communication), by examination of the type-material in the collections of the Zoological Survey of India, that both these species lack a finger-like median process on the fourth thoracic sternite and therefore cannot be included in this group.

Periclimenes delagoae Barnard

(Figs 7-9)

Periclimenes (*Periclimenes*) *delagoae* Barnard, 1958; 14-16, fig. 4B.

Periclimenes (*Periclimenes*) *delagoae* Kensley, 1972; 48, fig. 21c; 1974; 75.

Material examined. Ovigerous female HOLOTYPE, dissected, with slide of left mouth parts, Delagoa Bay, Mocambique.

Description. A small shrimp of subcylindrical body form. Carapace detached from thorax, distorted, smooth and glabrous; rostrum slightly shorter than post-orbital carapace length, curved and slightly depressed (?); dorsal carina well developed with nine fairly evenly distributed small acute teeth, elevated, first tooth situated at level of posterior orbital margin, greatest depth of carina at level of fourth tooth; lateral carinae feebly developed; ventral carina obsolete; ventral margin concave, setose, with two small acute teeth distally. Epigastric spine present; supra-orbital spines absent; orbit feebly developed; inferior orbital angle slightly produced, rounded, with reflected inner flange; antennal spine well developed, marginal and acute; hepatic spine well developed, subequal to antennal, at lower level, anterior to level of epigastric spine; antero-lateral angle of carapace bluntly obtuse.

Abdomen detached from thorax, third segment not postero-dorsally produced; pleura of first three segments broadly rounded, fourth and fifth bluntly posteriorly produced; postero-lateral angle of sixth segment acute; postero-ventral angle missing, posterior portion of sixth segment detached. Telson about 3-5 times longer than anterior width, distal portion tapered, posterior margin about 0.3 times anterior width, angulate, with acute median point; two pairs of small dorsal spines at 0.56 and 0.72 of length; lateral posterior spines similar to dorsal spines; intermediate spines 0.18 of

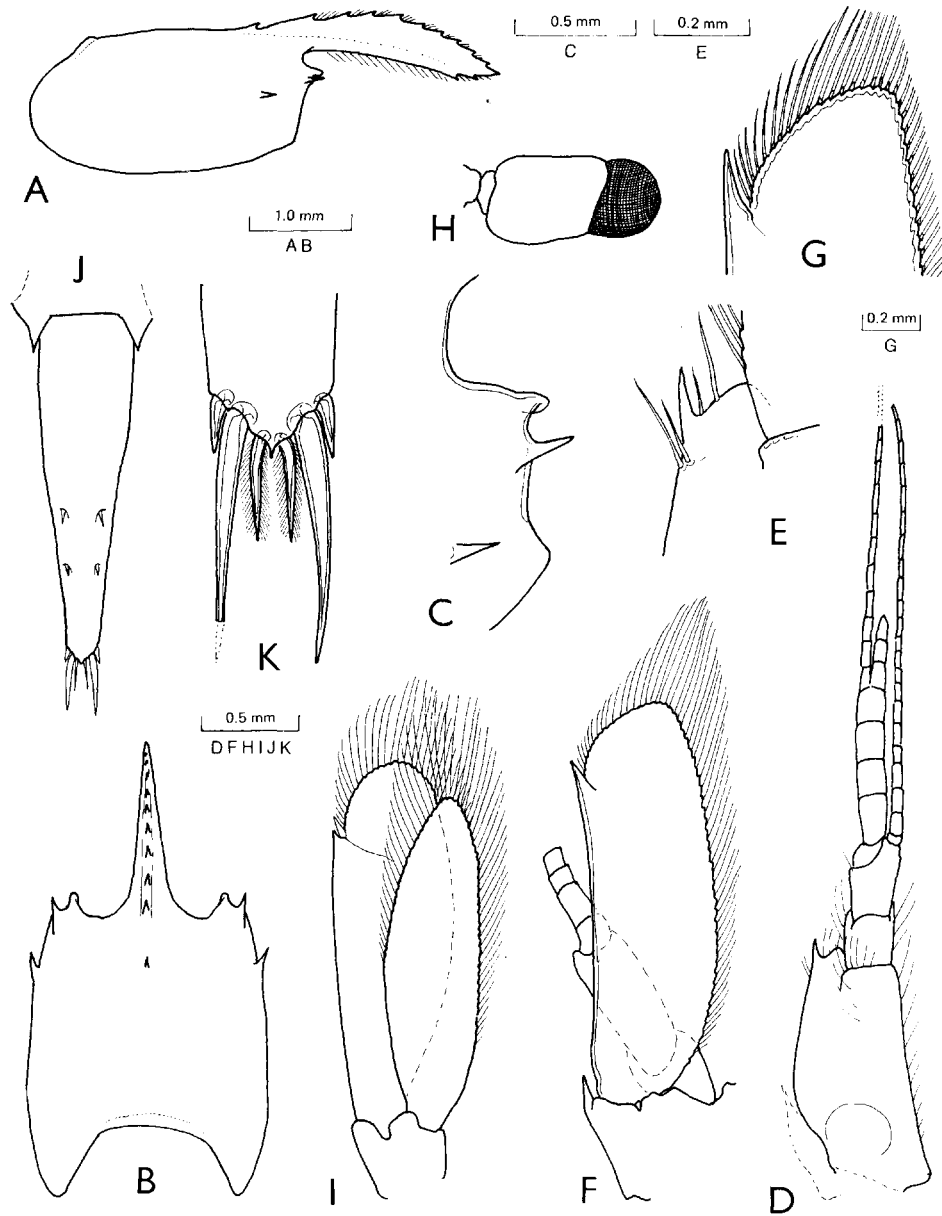


FIG. 7. *Periclimenes delagoae* Barnard, ovigerous female HOLOTYPE. A, Carapace and rostrum (restored), lateral; B, same, dorsal; C, same, inferior orbital angle; D, antennule; E, same, disto-lateral angle of proximal segment; F, antenna; G, same, distal scaphocerite; H, eye, dorsal; I, uropod; J, telson; K, same, posterior spines.

telson length, slender, non-setulose; submedian spines 0.4 times intermediate spine length, about 2.0 times lateral spine length, strongly setulose.

Eye with globular cornea, without discernible accessory pigment spot, diameter slightly less than stalk width; stalk about 1.3 times longer than broad proximally, feebly tapered distally.

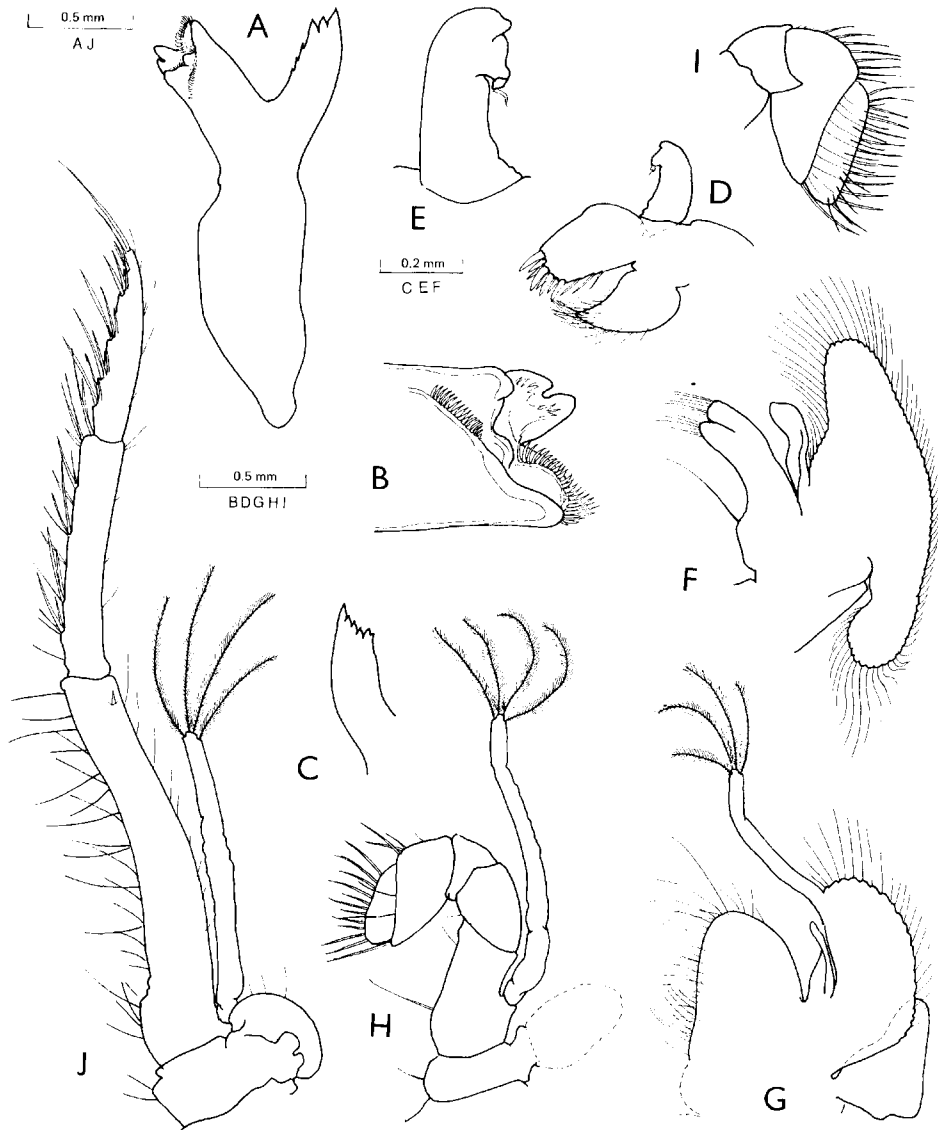


FIG. 8. *Periclimenes delagoae* Barnard, ovigerous female, HOLOTYPE. A, Mandible; B, same, molar process (flattened); C, same, incisor process; D, maxillula; E, same, palp; F, maxilla; G, first maxilliped; H, second maxilliped; I, same, distal endopod; I, uropod; J, third maxilliped.

Antennules detached, one preserved, lacking stylocerite. Proximal segment of peduncle twice as long as wide; medial margin with small acute ventral tooth at about 0.4 of length; antero-lateral margin strongly produced with acute lateral tooth; intermediate segment with feeble lateral lobe, about 0.2 of proximal segment length; distal segment about 1.5 times length of intermediate; upper flagellum slender, biramous, rami fused for four proximal segments, shorter free ramus with three segments, longer ramous incomplete, with numerous slender segments, aesthetascs

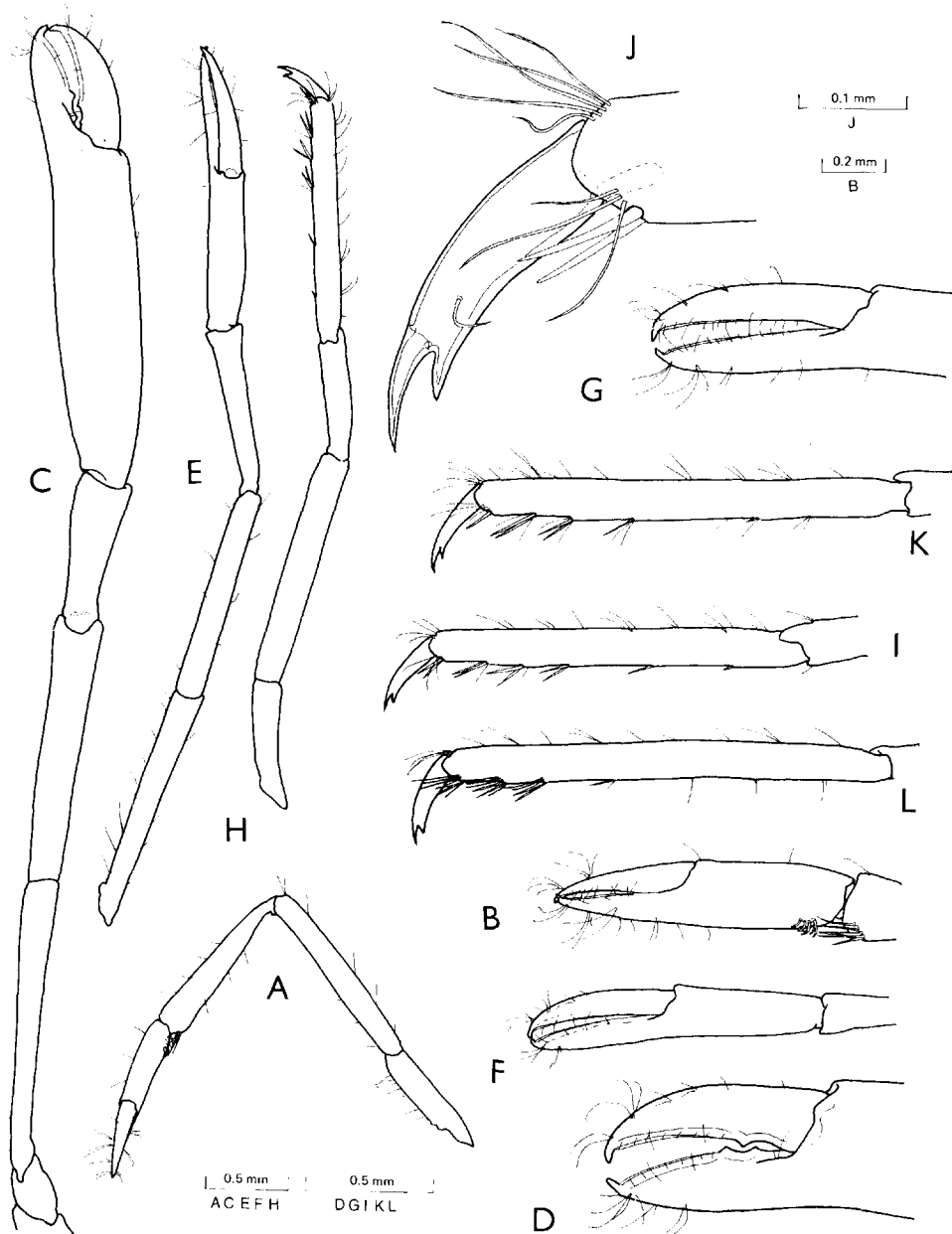


FIG. 9. *Periclimes delagoae* Barnard, ovigerous female, HOLOTYPE. A, First pereiopod; B, same, chela; C, major second pereiopod; D, same, fingers; E, minor second pereiopod; F, same, chela; G, same, fingers; H, third pereiopod; I, same, propod and dactyl; L, same, fifth pereiopod.

largely missing, about eight groups; lower flagellum slender, filiform, about 20 segments, about twice length of shorter upper ramus.

Antennal basicerite with short acute lateral tooth; carpopocerite about 2.5 times longer than wide, reaching almost to half length of scaphocerite, flagellum well

developed; scaphocerite about 3.1 times longer than broad, uniform, feebly tapered distally, lamella extending far beyond disto-lateral spine, bluntly angulated distally; lateral margin feebly concave.

Epistome unarmed. Thoracic sternites narrow, fourth without finger-like median process, with low transverse plate with median notch.

Mandible robust, without palp. Molar process (strongly flattened on slide) shows five blunt teeth distally with two bands of short spiniform setae. Incisor process (left) distally oblique with three acute teeth, medial edge with three acute denticles; (right) distally oblique with bifid proximal tooth and three intermediate teeth, median edge without denticles. Maxillula with bilobed palp, upper lobe smaller than lower lobe, lower lobe with small curved seta; upper lacinia slightly broadened centrally, distal margin with about eight stout simple spines with sparse setae; lower lacinia short, tapering, with numerous spiniform setae distally. Maxilla with slender non-setose palp; basal endite distinctly bilobed, sparsely setose with six simple setae on upper lobe, seven on lower; coxal endite obsolete, margin feebly convex with single long simple seta; scaphognathite normally developed, about 2.6 times longer than central width, posterior lobe small, anterior lobe distally narrow with medial margin concave. First maxilliped with slender tapering non-setose palp; basal endite broadly expanded, sparsely setose; exopod with normal flagellum with four plumose distal setae, caridean lobe well developed; coxa region damaged medially, triangular epipod present laterally. Second maxilliped with distal segments of left endopod damaged or regenerating; right with dactylar segment broad, with numerous slender spines medially, propodal segment with antero-medial angle spinulose; ischiomerus and basis normal; exopod well developed, with four plumose setae distally; coxa rounded medially with small oval epipod laterally, without podobranch. Third maxilliped with endopod moderately slender, ischiomerus and basis fused, point of junction indicated by notch and tubercle on median margin; combined segment about 6.0 times longer than width at base of ischial region, tapering slightly distally, with single small pre-terminal disto-lateral spine, medial border sparsely setose; penultimate segment about 6.0 times longer than broad, uniform, with several groups of serrate spines medially, about 0.6 times length of anti-penultimate segment; terminal segment about 0.8 times length of penultimate, about 5.2 times longer than proximal width, tapering distally, with numerous groups of serrated spines; basis medially convex, sparsely setose, with well-developed exopod laterally; coxa feebly produced medially, with rounded lateral plate and small anthrobranch laterally.

First pereiopod slender; chela with palm slightly compressed, about 2.3 times longer than deep, uniform, with three rows of cleaning setae proximo-ventrally; fingers slender, tapering, dactylus about 5.0 times longer than proximal depth, with small acute hooked tips, cutting edges distinct distally, entire, carpus subequal to length of chela, about 5.0 times longer than distal width, tapered proximally, with several serrulate cleaning setae disto-ventrally; merus about 1.2 times carpus length, uniform, about 7.2 times longer than wide, unarmed; ischium about 0.6 times meral length, sparsely setose ventrally; basis and coxa without special features.

Second pereiopods markedly unequal and dissimilar, detached from body. Major second pereiopod with chela robust, palm smooth, subcylindrical, about 4.0 times longer than deep; fingers equal about 0.3 of palm length, dactylus about 3.4 times longer than proximal depth, with single small acute tooth at 0.3 of cutting edge length, opposing two small acute teeth on fixed finger, both fingers with strongly hooked acute tips and entire distal cutting edges; carpus robust, about 2.5 times longer than distal

width, 0.4 times length of palm, completely unarmed distally and slightly tapering proximally; merus also unarmed distally, about 0.74 times palm length and 6.5 times longer than central width, slightly tapering proximally; ischium 1.1 times merus length, slender, unarmed, tapering, about 9.0 times longer than proximal width; basis and coxa normal. Minor second pereopod slender, chela equal to 0.8 of length of major chela palm; chela smooth, moderately compressed, and slightly broadened distally about 3.5 times longer than wide; fingers slender, tapering, equal to 0.8 of palm length, dactylus about 6.0 times longer than proximal width, with acute hooked tip and distinct cutting edge distally, entire; fixed finger similar; carpus subequal to palm length, slightly expanded and unarmed distally, about 7.5 times longer than central width; merus 1.25 times carpal length, uniform, about 7.0 times longer than wide, unarmed; basis and coxa normal.

Ambulatory pereopods moderately robust, all detached, except right third and fourth. Third pereopod dactylus with corpus about 3.2 times longer than proximal depth, compressed, ventral border sinuous with strong acute distal accessory tooth, sensory setae present disto-medially and laterally; unguis slender and acute, about half length of dorsal margin of carpus, 4.0 times longer than basal width and twice length of accessory tooth; propod about 4.2 times dactylar length, about 10.0 times longer than deep centrally, feebly tapered distally, distal ventral margin with three pairs of spines, proximal ventral margin with two single spines only, dorsal border sparsely setose; carpus without special features, about half propod length; merus subequal to propod, about 7.2 times longer than deep, uniform, devoid of spines; ischium slightly longer than half merus length, unarmed; basis and coxa without special features. Fourth pereopod similar to third, propod 1.1 of third propod length. Fifth pereopod 1.2 times third propod length, with fewer ventral spines but groups of serrulate cleaning setae disto-laterally.

Uropod with protopod postero-laterally rounded; exopod about 3.0 times longer than broad, distinctly exceeding endopod, lateral border almost straight, sparsely setose proximo-ventrally with small acute tooth distally with larger articulated spine medially; endopod about 3.5 times longer than broad.

Type. The dissected ovigerous female specimen and mouth parts slide are catalogued under the SAM A10643.

Measurements (mm). Post-orbital carapace length 2.2, carapace and rostrum 4.2, major second pereopod chela 5.3, minor second pereopod chela 3.2, length of ovum 0.4.

Remarks. In his brief description of this species Barnard (1958) states that only a single second pereopod is present. In the material preserved two second pereopods are preserved. Barnard's description clearly refers to the major pereopod, which was possibly still attached at the time of his examination. The minor second pereopod is entirely consistent with having come from the same specimen and was possibly detached and remained unexamined in the specimen's container.

There have been no subsequent reports of *Periclimenes delagoae* in the zoological literature.

Systematic position. Barnard (1958) considered *P. delagoae* most closely related to *P. laccadivensis* (Alcock and Anderson), but also noted a relationship to *P. impar* Kemp, now generally referred to *P. incertus* Borradaile. Re-examination of the type-specimen confirms that *P. delagoae* is related to species of the "*P. incertus* group" (Bruce, 1969), but not particularly to *P. incertus* itself, as this species is particularly characterized by having the accessory tooth of the dactyls of the ambulatory

pereiopods noticeably robust and comparable in size to the unguis. *Periclimenes impar* also has a conspicuous medial process on the first pereiopod coxa that is not found in other species of the group. *Periclimenes delagoae* appears more closely related to *P. obscurus* Kemp in the same group. Kemp (1922) states that the second pereiopods in that species are "often a little unequal", whereas in *P. delagoae* they are conspicuously unequal, also that, in ovigerous females, "the carpus is slightly shorter, as long as, or rather longer than the palm", and clearly not less than half the palm length as occurs in the major chela of *P. delagoae*. Kemp's figures of the carapace of *P. obscurus* also show the antennal spine in a distinctly post-marginal position, but it is likely that is a drawing error.

The species of the "*Periclimenes obscurus* group" may be identified from the following key.

***Periclimenes obscurus* species-group**

- | | |
|--|-------------------------------|
| 1 Carapace with isolated epigastric spine | 2 |
| – Carapace without epigastric spine | 6 |
| 2 Ambulatory dactyls robust, with accessory tooth, stout, subequal to unguis; R. 1.5/1 | <i>P. incertus</i> Borradaile |
| – Ambulatory dactyls slender, accessory tooth slender, smaller than unguis | 3 |
| 3 Second pereiopods subequal, similar, carpus of similar length to palm; R. 1.6–8/1–2 | <i>P. obscurus</i> Kemp |
| – Second pereiopods markedly unequal, carpus much shorter than palm | 4 |
| 4 Rostral lamina deep, 13–17 dorsal teeth, 3–4 ventral | <i>P. hongkongensis</i> Bruce |
| – Rostral lamina not deep, rostral teeth less than 11 dorsal, three ventral | 5 |
| 5 Dorsal telson spines minute; major chela palm more slender, about 4.3 times longer than wide; inferior orbital angle strongly produced; R. 1.8/1 | <i>P. toloensis</i> Bruce |
| – Dorsal telson spines normal; major chela palm stouter, 4.0 times longer than deep; inferior orbital angle feebly produced R. 1.9/2 | <i>P. delagoae</i> Barnard |
| 6 First pereiopod with carpus subequal to palm, much shorter than chela; R. 6/1 | <i>P. batei</i> (Borradaile) |
| – First pereiopod with carpus much longer than palm, subequal to chela; R. 9 10/2 | <i>P. sinensis</i> Bruce |

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