A re-description of Periclimenaeus robustus Borradaile, the type species of the genus Periclimenaeus Borradaile, 1915 (Crustacea: Decapoda: Pontoniinae)

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Abstract: The type material of the pontoniine shrimp Periclimenaeus robustus Borradaile, 1915, is re-examined and the specimens re-described and illustrated. This species is the type species of the genus Periclimenaeus Borradaile, 1915, the second most speciose pontoniine genus, and is known only from the type material, which is now found to consist of two Periclimenaeus species.


Keywords: Periclimenaeus robustus Borradaile, 1915; Palaemonidae, Pontoniinae, Type material re-described.
The genus as a whole may have a paraphyletic origin. As the type species of the genus, *Periclimenaeus robustus* is of particular taxonomic importance and the opportunity is now taken to provide a more detailed illustrated account of its morphology.

Re-examination of the type material readily indicated that it consisted of two distinct species. A larger species was clearly identifiable with Borradaile’s descriptions and figures and a smaller species, which unfortunately remains undentifiable.

The type material is held in the collections of the Zoology Museum, Cambridge, U.K., and I am most grateful to Dr R. Preece for the opportunity to examine Borradaile’s specimens. Unfortunately the specimens are in poor and incomplete condition.

Abbreviations used: CL, postorbital carapace length; UMZC, University Museum of Zoology, Cambridge, U.K.; QM, Queensland Museum, Brisbane.

**Systematics**

Family PALAEMONIDAE Rafinesque, 1815  
Subfamily Pontoniinae Kingsley, 1878  
Genus *Periclimenaeus* Borradaile, 1915

*Periclimenaeus robustus* Borradaile, 1915

(Figs 1-3)

*Periclimenaeus robustus* Borradaile, 1915: 213.  
*Periclimenaeus robustus* – Borradaile, 1917: 324, 378, pl. 55, fig. 20; Holthuis, 1952: 131; Bruce, 1984: 146; Müller, 1993: 62; Li, 2000: 134, fig. 161  
nec *Periclimenaeus robustus* – Bruce, 1976: 473

**Material**

1 ovig. ?, Amirante Islands, Seychelle Islands, 71 m, UMZC 1.9593.1

The specimen is in an incomplete fragmentary state. Carapace and antennae are separated from the thoracic sternites, which are fragmented, and from the abdomen; all mouthparts are missing; one detached incomplete first pereiopod, both second pereiopods and two ambulatory pereiopods and right uropod only are preserved.

**Diagnosis**

A medium sized *Periclimenaeus*. Rostrum well developed, lamina deep, strongly dentate, dentition 9/0, carapace without supraorbital spines or tubercles; inferior orbital angle distinct; first abdominal tergite with well developed anteromedian lobe; first pereiopod slender, carpus shorter than merus, less than double chela length; major second pereiopod large, with well developed dactylar molar process, cutting edge distally entire, and fixed finger with fossa, medial surface of palm spinulate, merus ventrally spinulate; minor second pereiopod small, dactyl semicircular, cutting edge convex, entire, tip acute, fixed finger angular with grooved entire cutting edge, palm strongly compressed, ventral margin markedly convex, medial surface densely spinulate, merus ventrally spinulate; ambulatory pereiopods with dactyls biunguiculate, corpus with ventral margin entire, propods with paired short stout distoventral spines and ventral spines; uropod with exopod laterally unarmed, with acute tooth and large mobile spine medially; telson with two pairs of small dorsal spines at 0.1 and 0.5 of telson length, posterior spines missing.

**Description**

A medium sized species of *Periclimenaeus* of subcylindrical body form.

Rostrum (Fig. 1B) well developed, about 0.37 of CL, slightly depressed, straight, reaching to distal margin of intermediate segment of antennular peduncle (Fig. 1A), with stout midrib, dorsal carina well developed, with nine long slender semi-erect distally directed teeth, first tooth situated posterior to orbital margin, increasing in size distally from first tooth to eighth, ninth tooth slightly smaller than eighth, reaching to level of stout acute rostral tip, proximal dorsal margin of teeth with 2-3 long slender simple setae, lateral carinae obsolete, ventral margin straight, un-armed, non-setose. Carapace glabrous, smooth, without supraorbital spines or tubercles (Fig. 1A), inferior orbital angle distinct, small, antennal spine well developed, acute, marginal, anterolateral angle bluntly rectangular, not produced.

Abdomen with large semicircular anteromedian dorsal lobe on first tergite (Fig. 1GH). Posterior segments normal, pleura broadly rounded, sixth segment with posteroventral angle large, subacute.

Telson (Fig. 1I) about 0.57 of CL, 2.1 times longer than anterior width, with two pairs of small dorsal spines, about 0.1 of telson length, at about 0.1 and 0.5 of telson length, lateral margins feebly convex, converging to rounded posterior margin, about 0.4 of anterior width, posterior marginal spines mainly missing, lateral spines about half length of dorsal spines, submedian spine robust, broken.

Antennule (Fig. 1D) normal, without special features; proximal segment of peduncle with well developed distolateral tooth, reaching to half length of intermediate segment, stylocerite short, broad, acute, reaching to half segment length; intermediate and distal segments short, subequal, combined length about half proximal segment length, upper flagellum biramous, with four proximal segments fused, short ramus with two free segments.

Figure 2. Periclimenaeus robustus Borradaile, ovigerous female holotype. A. Major second pereiopod, dorsal. B. Same, lateral. C. Same, chela, ventral. D. Same, palmar spine. E. Minor second pereiopod, dorsal. F. Same, chela, ventral.

Figure 3. *Periclimenaeus robustus* Borradaile, ovigerous female holotype. A. First pereiopod. B. Same, chela. C. Third pereiopod. D. Same, propod and dactyl. E. Same, distal propod and dactyl. F. Fourth pereiopod. G. Same, propod and dactyl.

Antenna (Fig. 1E) with basi-cerite unarmed, carpocerite subcylindrical, about four times longer than central width, not reaching distolateral spine of scaphocerite; scapho-cerite (Fig. 1F) normal, small, reaching to about middle of distal segment of antennular peduncle, about 2.5 times longer than greatest width, at about half scaphocerite length, with small broad acute distolateral tooth at 0.85 of length.

Eye normal, with well pigmented hemispherical, slightly oblique cornea.

All mouthparts now missing.

First pereiopod (Fig. 3A) slender; chela (Fig. 3B) with palm strongly compressed, about twice as long as deep, dorsal margin strongly convex, ventral border straight, with sparse slender cleaning setae proximally, dactylus missing, fixed finger slender, about 0.6 of palm length, not subspatulate, with small hooked tip, cutting edge entire; carpus subcylindrical, about 1.85 times chela length, 8.0 times longer than central width, slightly expanding distally; merus subequal to carpus length, about 6.5 times longer than central width; ischium about 0.6 of merus length; basis and coxa without special features.

Second pereiopods well developed, markedly unequal and dissimilar. Major second pereiopod (Fig. 2AB) (right) with chela (Fig. 2C) massive, about 1.88 times CL, palm oval in section, twice as long as maximal depth, tapering slightly distally, medial surface and dorsal and ventral margins densely covered by semi-reticulate pattern of small acute distally directed tubercles (Fig. 2D); fingers up-curved (Fig. 2B), without tubercles; dactylus compressed, about half palm length, 2.2 times longer than maximal depth, dorsal margin convex, ventral margin with low molar process on central third, poorly demarkated distally, distal cutting edge entire, tip with stout hooked tooth; fixed finger about 1.5 times longer than basal width, with well developed fossa proximally, dorsal margin of fossa with acute tooth, distal cutting edge carinate, entire, with small feebly hooked acute tip; carpus short, about 0.33 of palm length, broadly expanded distally, proximal width about 0.33 of distal width, non-tuberculate; merus robust, about 0.33 of palm length, twice as long as central depth, ventral surface tuberculate as in palm, ischium similar, subequal to meral length, about 2.4 times longer than distal width, tapering proximally, ventrally tuberculate. Minor second pereiopod (left) (Fig. 2E) with chela (Fig. 2F) about 0.77 of CL, 0.8 of major chela length, palm about 1.4 times longer than deep, dorsal and ventral margins strongly convex, ventral border subcarinate, medial surface and dorsal and ventral margins densely tuberculate as in major chela; dactylus semicircular, strongly compressed, non-tuberculate, about 0.5 of palm length, slightly over reaching fixed finger, dorsal margin strongly convex, cutting edge near straight, unarmed, tip, stout, acute, feebly hooked; fixed finger triangular, about 1.7 times longer than basal width, non-tuberculate, distally acute, cutting edge deeply grooved; carpus short, broadly expanded distally, about 0.5 of palm length, strongly tapered proximally, non-tuberculate; merus and ischium robust, subequal, about 0.57 of palm length, merus ventrally tuberculate, ischium with single tubercle.

Ambulatory pereiopods without special features. Third pereiopod (Fig. 3C) with dactyl biunguiculate (Fig. 3E), about 0.18 of propod length, unguis distinct from corpus, twice as long as basal width, without ventral denticulations, corpus 1.5 times longer than maximal depth, strongly compressed, dorsal margin moderately convex, ventral margin with broad, acute distal accessory tooth, proximal ventral border convex, entire, without acute basal process, without sensory setae; propod (Fig. 3D) about 0.35 of CL, 5.5 times longer than proximal depth, tapering slightly distally, with pair of short robust spines distally, ventral margin with five similar spines along length; carpus about 0.7 of propod length, 4.0 times longer than central width, unarmed; merus robust, about 1.2 times propod length, 3.4 times longer than central width, unarmed; ischium, subequal to carpal length, 2.7 times longer than distal width, tapering proximally. Fourth pereiopod (Fig. 3F, G) smaller, less robust than third pereiopod, generally similar, propod about 0.8 of third propod length, 5.5 times longer than width, with similar paired distoventral spines and four ventral spines.

Pleopods all without rami.

Uropod (Fig. 1I) with protopodite unarmed posterolaterally; exopod subequal to telson length, twice as long as broad, lateral margin convex, unarmed, with small acute tooth and large curved mobile spine distally; endopod length similar to exopod, 2.6 times longer than broad.

Measurements
Postorbital carapace length, 3.2 mm; major second pereiopod chela, 6.15 mm; minor second pereiopod chela, 2.6 mm; length of ovum, 0.55 mm.

Host and colouration
Unknown.

Distribution
Known from the single type specimen.

Remarks
Periclimenaeus robustus is unfortunately still only known from the type specimen, but a reasonably complete description can now be presented. Borradaile (1917) provided illustrations of the maxillae and maxillipeds, but unfortunately not of the mandibles, which are no longer preserved.
Of the mouthparts of *Periclimenaeus* species these are the most taxonomically useful structures. In particular, the incisor process may show significant reduction or expansion in different species. Its host was also not recorded. It is most likely to have been a sponge as some of the related species are known to be sponge associates (*P. ardeae*, *P. djiboutensis*, *P. orontes* and *P. palauensis*) and none have been reported from ascidians.

The Kenyan specimen referred to *P. robustus* by Bruce (1976) has been re-examined and found to be incorrectly identified and will be reported upon elsewhere.

*Periclimenaeus* sp.

(Fig. 4)

**Material examined**

1 ♀, Amirante Islands, Seychelle Islands, 71 m, UMZC 1.9593.2

The specimen has a CL of 0.95 mm and has all pereiopods detached, with only two second pereiopods preserved (There are two similar minor second pereiopods, indicating that there was a further specimen).

**Remarks**

The rostrum (Fig. 4B) is slender and reaches to the middle of the proximal segment of the antennular peduncle, with six small acute dorsal teeth and a small distal ventral tooth; carapace (Fig. 4A) with small supraorbital tubercles, inferior orbital angle distinct; first abdominal tergite without anterodorsal lobe; antennule (Fig. 4C) with well developed distolateral tooth on proximal segment; scaphocerite (Fig. 4D) with well developed distolateral tooth reaching almost to distal margin of lamella, which exceeds the carpocerite; major second pereiopod (Fig. 4E) with palm of chela sparsely tuberculate, fingers with well developed molar process and fossa, merus ventrally spinulate, minor second pereiopod (Fig. 4F) similar, dactylus (Fig. 4G) slightly over-reaching fixed finger, semicircular, cutting edge convex, entire, fitting into deep groove on fixed finger; appendix masculina with corpus obsolete, with single long spine; exopod of uropod (Fig. 4H) laterally with acute distal tooth and large spinule medially, telson (Fig. 4I) with two pairs of dorsal spines at about 0.1 and 0.5 of telson length, posterior dorsal spines larger than anterior spines, posterior marginal spines with lateral spines minute, intermediate and submedian spines well developed, submedian longer than intermediate spines.

Without the ambulatory pereiopods the specimen cannot be identified. From the features available it appears close to *Periclimenaeus rastrifer* Bruce, 1980, *P. leptodactylus* Fujino and Miyake, 1968 and *P. tchesunovi* Duris, 1990. From these related species *Periclimenaeus leptodactylus* differs in having a rostral dentition of 8/1 and the anterior and posterior dorsal telson spines of similar size (Miyake & Fujino, 1968) versus 6/1, posterior telson spines larger than anterior. *Periclimenaeus rastrifer* and *P. tchesunovi* both differ in having the lamella of the scaphocerite clearly exceeding the tip of the distolateral tooth (Bruce, 1980; Duris, 1990) versus not exceeding the distal margin of the lamella.

**Discussion**


*Periclimenaeus djiboutensis* is rather isolated from the other species in the presence of a distinct dorsolateral lobe on the basicerite, a feature not reported in any other species of the genus. The minor second pereiopod dactyl is distally bidentate. The dorsal telson spines are all situated on the proximal fifth of the telson. The distoventral surface of the dorsal telson spine has minute serrations, only otherwise known in *P. uropodialis* Barnard, a not closely related species (Barnard, 1958).

*Periclimenaeus lobiferus* has the rostrum not depressed, with the ventral margin convex; the dorsal telson spines are all on anterior half, but not the anterior fifth, the first pereiopod is robust, dactyl less than half the palm length and without a dorsal setal tuft; the third pereiopod is robust, the propod with very stout spines and the dactyl ventrally denticate. Host unknown.

*Periclimenaeus orontes* has similarly robust first pereiopod chela, but the fingers are about half the palm length. The dactyl of the minor second pereiopod is subcircular with the distodorsal edge produced into a sharp carina and the ambulatory dactyls have the accessory tooth minute.

*Periclimenaeus ardeae* and *P. palauensis* are closely related and both have slender first pereiopods. In both, the dactylus bears a characteristic dense tuft of fine setae, not known in any other species (Bruce, 1978b, fig. 31E). In *P. palauensis* the palm and dactyl of the first pereiopod are compressed and expanded, characters not found in *P. ardeae* (Bruce, 1970; Miyake & Fujino, 1968). The second pereiopod chelae are also non-tuberculate in *P. palauensis*.

*Periclimenaeus ardeae* is similar to *P. robustus* in many features. On account of the damaged nature of the only first pereiopod, it is not known if the dactyl in *P. robustus* is provided with a setal tuft as in *P. ardeae*. In *P. ardeae* the rostrum (Fig 5A) is less stout, more lanceolate, and the dactyl...

of the minor second pereiopod about 0.4 of the palm length, with the palm about 1.5 times longer than the maximal depth. The third pereiopod dactyl is also similar but the accessory tooth is more slender, less triangular and distally curved (Fig. 5B). (Bruce, pers. obs.). *Periclimenaeus ardeae* may prove to be synonymous with *P. robustus* but in view of the fact that the former is a shallow water coral reef species from the western Pacific region and the latter a deeper water inter-recifal species from the western Indian Ocean, it is considered advisable to maintain their separate status until further material of *P. robustus* is available for study.

*Periclimenaeus spinimanus* is readily separated from the other species of this group by the presence of a dense spinulation of the in-life upper surfaces of the second pereiopod chelae, with long slender spines.

**Key to the species of the *Periclimenaeus robustus* species group**  
(First abdominal tergite with anterodorsal lobe)

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<td>Dorsal telson spines all on anterior half of telson, basicerite with well developed dorsolateral lobe, R. 7-9/0</td>
<td><em>P. djiboutensis</em> Bruce</td>
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<td>- Dorsal telson spines not all on anterior half of telson, basicerite without well developed dorsolateral lobe</td>
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<td>Ambulatory dactyls with corpus ventrally denticulate, R. 9/0</td>
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<td>Second pereiopod dactyls distodorsally sharply carinate, R. 5/0</td>
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<td>5</td>
<td>Dorsal surfaces of second pereiopod chelae densely covered with long slender spines, including dorsal margin of dactylus, R. 9/1</td>
<td><em>P. spinimanus</em> Bruce, 1969</td>
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<td>Rostral midrib slender, lanceolate, dorsal carina shallow, tip slenderly acute, ventral margin smoothly convex, R. 8-9/0</td>
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<td>- Rostrum midrib robust, deep, tip broadly acute, ventral margin straight, R. 9/0</td>
<td><em>P. robustus</em> Borradaile</td>
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**References**

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Castro, 4: 3-23, figs. 1-7.


