



Periclimenaeus echinimanus sp. nov. (Crustacea: Decapoda: Pontoniinae), a new species from the Gulf of Aqaba, Red Sea

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Abstract

A new species of sponge-associated pontoniine shrimp from the northeastern Red Sea is described and illustrated. The new species is closely related to *Periclimenaeus rhodope*, but can be easily distinguished from the latter by the dense spinulation of the second pereopod chelae. The new species is placed in the *Periclimenaeus robustus* species group, on account of the presence of the anterodorsal median lobe on the first abdominal segment. The new species is the first representative of the genus reported from a discrete Red Sea locality.

Key words: Crustacea, Decapoda, Pontoniinae, *Periclimenaeus echinimanus* new species, Red Sea, sponge symbiont

Introduction

The majority of species of the genus *Periclimenaeus* are known as obligatory commensals of sponges or ascidians (Bruce, 2006a). Recent studies of sponges have revealed the presence of previously unreported small and inconspicuous, often highly cryptic, representatives of this genus (Bruce, 2006a,b; Marin, 2007; Ďuriš *et al.*, 2009a,b). *Periclimenaeus* is the second most species-rich genus in the palaemonid subfamily Pontoniinae (De Grave *et al.*, 2009), with almost 60 species occurring in the Indo–West Pacific Area (Ďuriš *et al.*, 2009b). However, the Red Sea remains almost unexplored for Pontoniinae, and there appears to be only one species recorded: *Periclimenaeus nobilii* Bruce, 1974, with ‘Red Sea’, as its type locality, without further specifics (Bruce, 1974). Some other species have been described from older collections from Djibouti: *P. arabicus* (Calman, 1939), *P. djiboutensis* Bruce, 1970, *P. hecate* (Nobili, 1904) and *P. rhodope* (Nobili, 1904), but it is not clear if they are part of the Red Sea fauna or occur in the Gulf of Aden. None of the above species except for *P. djiboutensis* are listed by Bruce & Svoboda (1983) as part of the Red Sea pontoniine shrimp fauna. The inclusion of *P. djiboutensis* is based on the record by Fishelson (1974: 188), who referred to this taxon as ‘recently described by Bruce (1969)’. However, this is a reference to a paper in which only *Periclimenes* species are described, and as Fishelson’s study is on the fauna inhabiting crinoids (which do not act as a host for *Periclimenaeus* species), this record is dubious. For the time being, there are no confirmed records and the inclusion of this record in Bruce & Svoboda (1983) and De Grave (2001) is considered an error.

A series of specimens of an unknown sponge-associated *Periclimenaeus* species were collected during a survey of pontoniine shrimps at Aqaba on the Jordanian coast of the Gulf of Aqaba, northeastern Red Sea. The new species is described and illustrated here.

The following abbreviations are used: # xx Aq09, collection number, Aqaba 2009; CL, postorbital carapace length; (i)–(iv), sample numbers in the material examined listing; MSS, Marine Science Station, Aqaba, Jordan; OUMNH-ZC, Oxford University Museum of Natural History, Oxford, England; RMNH, Nationaal Natuurhistorisch Museum – Naturalis (previously Rijksmuseum van Natuurlijke Historie), Leiden, the Netherlands; TL, total

length of the body (from the tip or rostrum to the posterior end of the telson); UO, University of Ostrava, Czech Republic.

Systematics

Family Palaemonidae Rafinesque, 1815

Subfamily Pontoniinae Kingsley, 1878

Genus *Periclimenaeus* Borradaile, 1915

Periclimenaeus echinimanus sp. nov.

(Figs 1–6)

Type material. Marine Science Station area, Aqaba, Gulf of Aqaba, Jordan, scuba, sandy sublittoral with patch reefs, coll. Z. Ďuriš & I. Horká: (i) 1 female paratype CL 1.4 mm, MSS, coll. # Aq09-6F, 11 Jun. 2009, from dead coral, 8.7 m.—(ii) 4 spms paratypes, RMNH D.53449 (3 males CL 1.2–1.5 mm; 1 female CL 1.7 mm), coll. # Aq09-69, 2 June 2009, from grey keratose sponge about 3 cm thick, with numerous small oscula, overgrowing stone, 6 m.—(iii) 3 spms paratypes OUMNH-ZC.2011-02-060 (2 ovigerous females CL 2.4 and 2.7 mm; 1 female CL 2.4 mm), coll. # Aq09-73A, 2 June 2009, from keratose sponge growing between branches of dead part of *Stylophora* coral, 8 m.—(iv) 1 subadult male paratype CL 1.6 mm, OUMNH-ZC.2011-02-061, coll. # Aq09-87I, 4 July 2009, from dead coral, 2–4 m.—(v) 6 spms (1 male **holotype** CL 2.2 mm, RMNH D.53450; 1 ovigerous female **allotype** CL 2.2 mm, RMNH D.53451, dissected; 4 juveniles paratypes CL 0.8–1.6 mm, RMNH D.53452), coll. # Aq09-101E, 6 July 2009, from sponge growing inside dead part of *Pocillopora* coral, 8–9 m.

Two remaining specimens (in addition to **iii**), damaged, are deposited in authors' (ZĎ, IH) laboratory, UO.

Diagnosis. Rostral dentition 5–9/0–2, most frequently 7–8/1; supraorbital tooth present; antennal spine submarginal; scaphocerite with distolateral spine overreaching lamina; first pereopod fingers narrowly spatulate and about one third of chela length, carpus longer than chela; second pereopods with fingers shorter than palm, palms covered with erect slender spines on margins and medial surface, dorsal carpus and ventral merus and ischium spinose, fingers with cutting edges simple, dactylus of major chela with low plunger; ambulatory dactyli biunguiculate, ventral margins of corpus and unguis concave, with series of 4–5 denticles; first abdominal segment with anterior dorsomedian lobe; telson without posterior median process.

Description of male holotype. Small sized pontoniine shrimp of subcylindrical form (Fig. 1).

Rostrum (Fig. 2A) straight, slightly turned downwards, about 0.7 of CL, height equal throughout, almost reaching end of antennular peduncle, with 9 acute dorsal teeth and two subterminal ventral teeth, ventral lamina straight, upturned distally.

Carapace (Figs 1, 2B) smooth, without epigastric or hepatic spines; supraorbital tooth strong, conical; antennal spine well developed, distinctly submarginal, placed at level of inferior orbital angle; inferior orbital angle not produced but distinct, anterolateral margin of branchiostegite strongly produced, rounded.

Abdomen glabrous, first segment tergite with shallow but distinct anterior median lobe (Fig. 2C); pleura rounded, fourth and fifth posteriorly produced, rounded, sixth segment dorsal length subequal to fifth, posterolateral and posteroventral angles subacute (malformation on left side – Fig. 2D).

Telson (Fig. 2D) about 0.7 of CL, 2.3 times sixth segment dorsal length, 1.8 times longer than anterior width; lateral margins feebly convex, posteriorly convergent; dorsal telson spines about 0.2 of telson length, at 0.14 and 0.5 of telson length; posterior margin broadly convex without median process, lateral posterior spines small, about 0.4 of dorsal spines, intermediate spines well developed, slender, about 0.3 of telson length and 1.5 times dorsal spine length, submedian spines slender, about 0.7 of intermediate spine length, setulose.

Eyes (Fig. 2B) with corneal diameter about 0.2 of CL, corneal length about half of diameter; eye without visible accessory pigmented spot; stalk short, medial length subequal to corneal diameter.

Antennule (Fig. 2B) of usual form for the genus; basal peduncular segment about 2.5 times as long as central width, stylocerite broad, laterally rounded, distolateral margin slightly concave, proximally broadly rounded, and

reaching distal end of second segment, medial margin with minute ventromedial tooth at about 0.5 of segment length; intermediate segment short, about 0.15 of proximal segment length, distinctly wider than long; distal segment 1.5 times longer than preceding, length slightly greater than width; upper flagellum biramous; 4–5 proximal segments fused, short ramus with 3 segments, 8 groups of long aesthetascs; longer ramus slender, with about 15 segments, lower flagellum similar, slender, with about 15 segments.

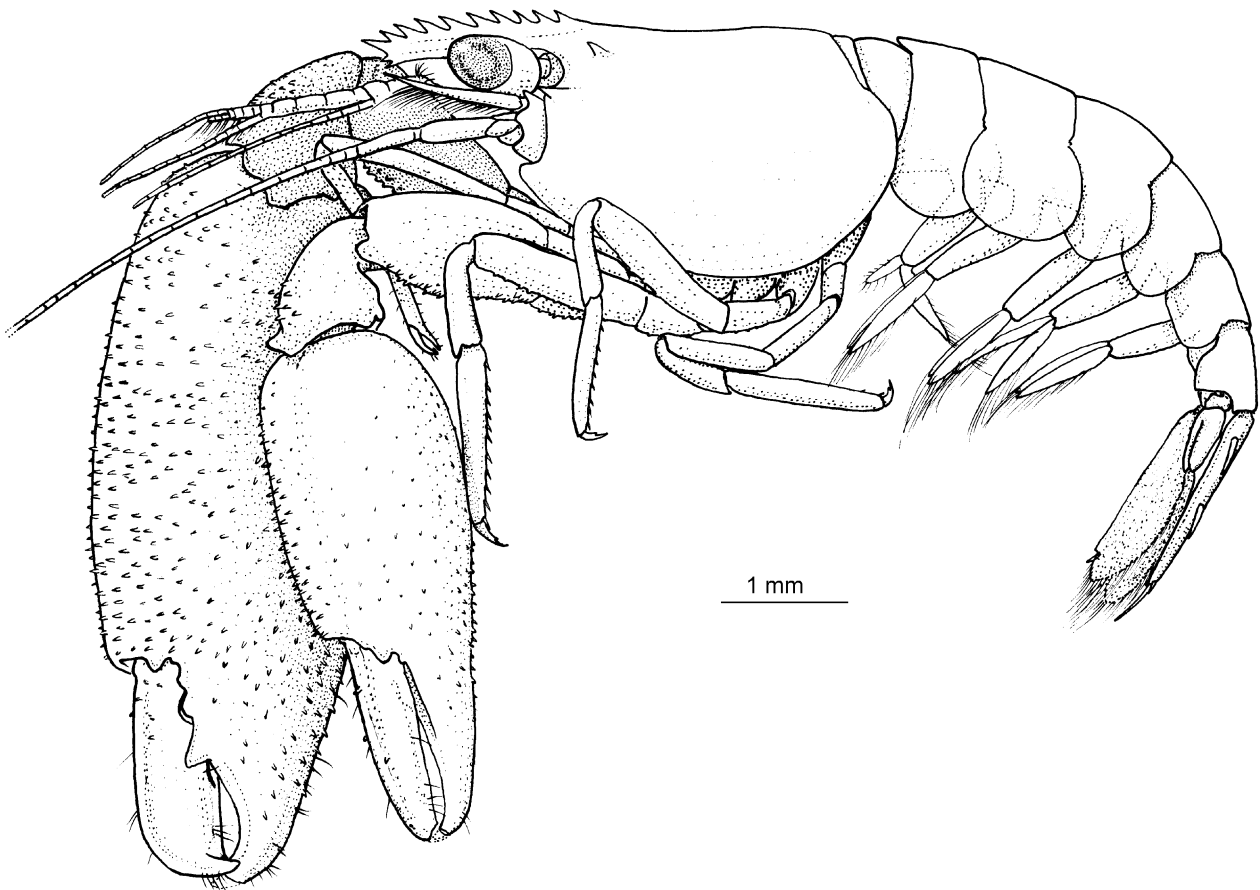


FIGURE 1. *Perclimenaus echinimanus* sp. nov., male holotype, total view, lateral.

Antenna (Fig. 2E) of normal form; basicerite short, laterally and dorsally unarmed; carpocerite subcylindrical, reaching about 0.7 of scaphocerite length; scaphocerite about twice longer than broad, greatest width distally, anterior margin rounded, lateral margin slightly concave, almost straight, with well developed strong distal tooth far overreaching distal margin of lamella.

Thoracic sternites narrow and without special structures.

First pereopods (Fig. 3A) slender, overreaching carpocerite by distal half of merus; chela with palm subcylindrical, about 4 times longer than deep, fingers about half of palm length, narrowly spatulate to acute tip, dactylus somewhat distally hooked, overreaching straight tip of fixed finger; carpus 1.6 times chela length, slender, about 7 times longer than distal width, tapering proximally; merus about subequal to and slightly stouter than carpus; ischium about 0.5 of merus length, stout; basis and coxa ventrally unarmed, coxa with high dorsal lobe over articulation with basis.

Major second pereopod (Fig. 3C,D) well developed, chela about 2.5 times CL, palm 2.3 times longer than maximal depth, slightly swollen proximally, oval in section, covered with erect slender spiniform denticles (Fig. 3D – detail) dorsally, ventrally, and on upper (medial) surface, latter somewhat areolate proximally by rows of spinules; outer surface with scattered low tubercles; fingers (Fig. 3D) about 0.4 of palm length, sparsely setose; dactyl 2.5 times longer than maximal depth, dorsal margin broadly convex, strongly curved distally, with several spiniform denticles proximally on medial surface; tip of dactylus hooked, cutting edge with low elongate molar

process in midlength, distal cutting edge concave, entire; fixed finger shorter than dactylus, tapering distally (tip broken in holotype), with fossa proximally and triangular, anteriorly directed lobe proximomedially on cutting edge; carpus about one-third of palm length, narrow proximally and expanded distally, with several sharp tubercles dorsally; merus about 0.4 of palm length, robust, twice as long as central depth, tuberculate ventrally, with produced rounded distal lobe on ventrolateral margin; ischium 0.6 of meral length, twice as long as distal depth, tapering proximally, with ventral denticles; basis and coxa short, without special features.

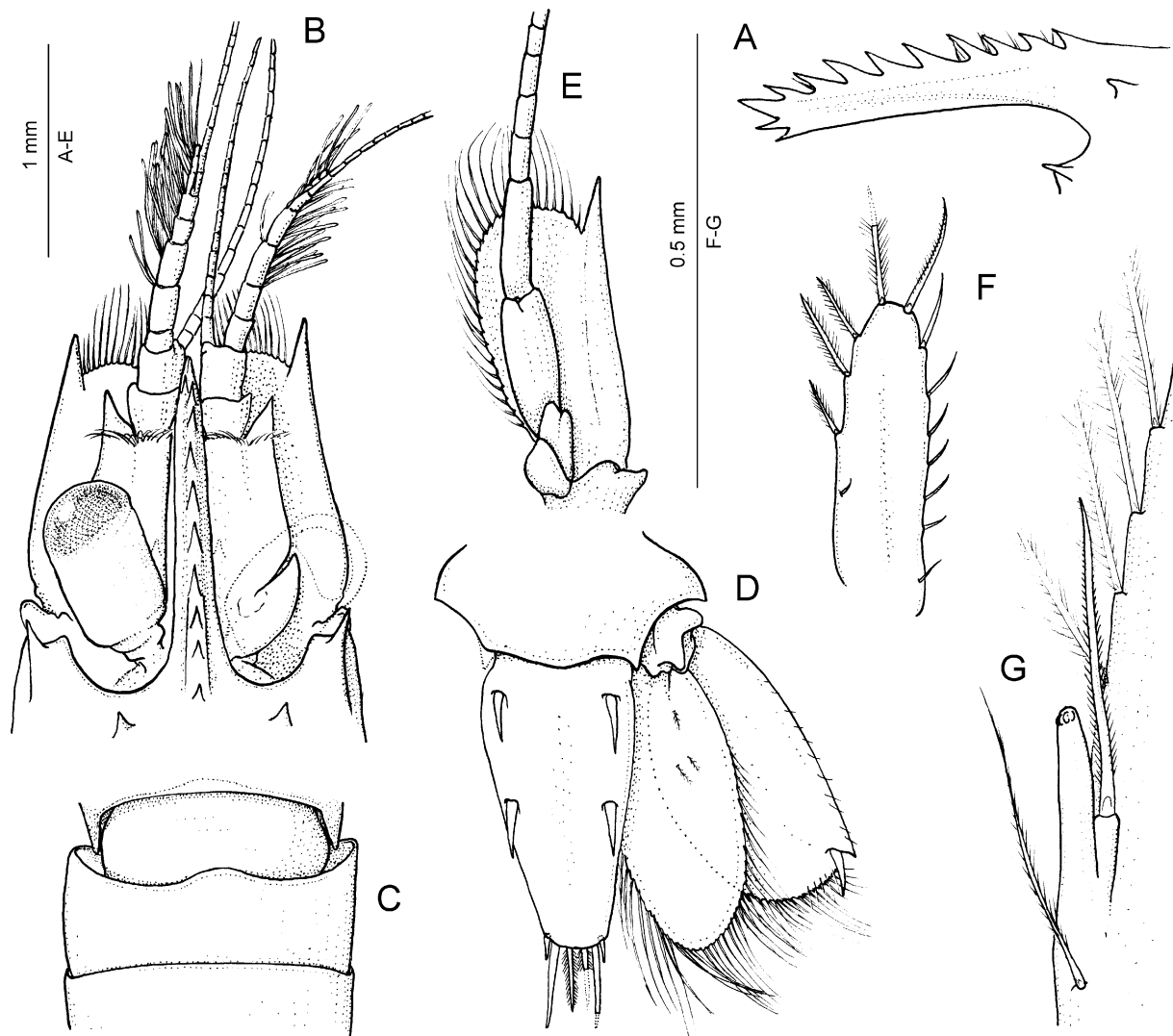


FIGURE 2. *Periclimenaeus echinimanus* sp. nov., male holotype. A, rostrum, lateral. B, anterior carapace and appendages, dorsal. C, first abdominal segment, dorsal. D, sixth abdominal segment, telson and uropod, dorsal. E, left antenna, ventral. F, endopod of first pleopod. G, second pleopod, appendices interna and masculina.

Minor second pereiopod (Fig. 3F,G) chela of ‘shearing’ type, length about 1.5 times CL, with palm (Fig. 3F) spinulose dorsally, ventrally, and on mesial surface, latter areolate proximally by rows of spinules; palm oval in section, 1.5 times longer than central depth, ventral margin convex, outer surface scarcely tuberculate; fingers about 0.7 of palm length, dactylus compressed, about 3.3 times longer than maximal depth, dorsal margin broadly convex, tip broken (hooked in other specimens examined), cutting edge simple; fixed finger basal width 1.5 times dactylus width, straight, tapering distally, tip broken (upturned, subacute in other specimens examined), cutting edge proximally grooved, with inner cutting lamina; carpus about 0.5 of palm length, stout, distally excavate, distal depth somewhat less than carpus length, dorsal surface with group of sharp denticles, ventral margin simple; merus stout, slightly longer than carpus length or half of palm length, almost twice as long as central depth, with produced

rounded distal lobe on ventrolateral margin, ventrally tuberculate; ischium about 0.7 of merus length, ventral margin tuberculate; basis and coxa short, without special features.

Ambulatory pereiopods moderately robust; third pereiopod (Fig. 4A) with dactylus (Fig. 4B) 0.25 of propodus length, biunguiculate; unguis distinctly demarcated, 3 times longer than basal width, slightly curved, with 5 sharp ventral denticles, corpus compressed, about 2.2 times longer than deep basally, dorsal margin broadly convex, ventral margin concave, with 5 sharp, widely separated denticles and larger acute distal accessory tooth reaching to about 0.2 of unguis, accessory tooth slightly divergent from unguis; propodus about 0.6 of CL, 5.5 times longer than rather uniform width, distoventral angle armed with pair of stout spines, about 0.5 of dorsal corpus length, 10 single (one paired) spines regularly spaced along whole ventral margin; carpus as stout as propodus, tapering proximally, 0.6 of propodus length and 3.5 times longer than distal width, unarmed; merus subequal to propodus length, stouter, about 3 times longer than uniform width, ventral margin with series of widely set tubercles; ischium 0.4 of propod length, width subequal to merus width, tapering proximally, ventrally tuberculate; basis and coxa short, without special features.

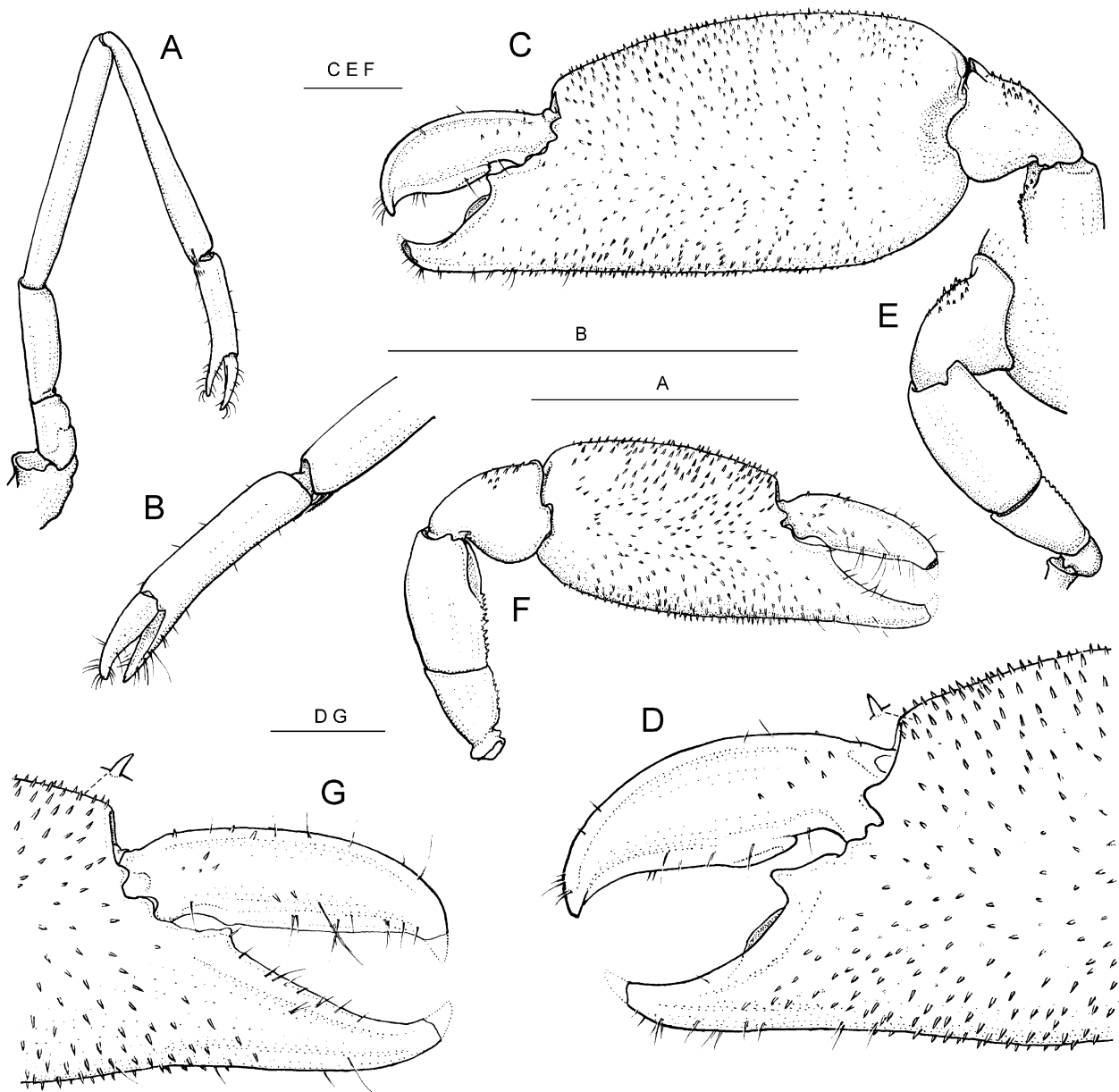


FIGURE 3. *Periclimenaeus echinimanus* sp. nov., male holotype. A, first pereiopod. B, same, chela. C, major second pereiopod, chela and carpus, medial. D, same, distal palm and fingers, medial. E, same, carpus to basis, lateral. F, minor second pereiopod, medial. G, same, distal palm and fingers, medial. Scale bars: 1 mm.

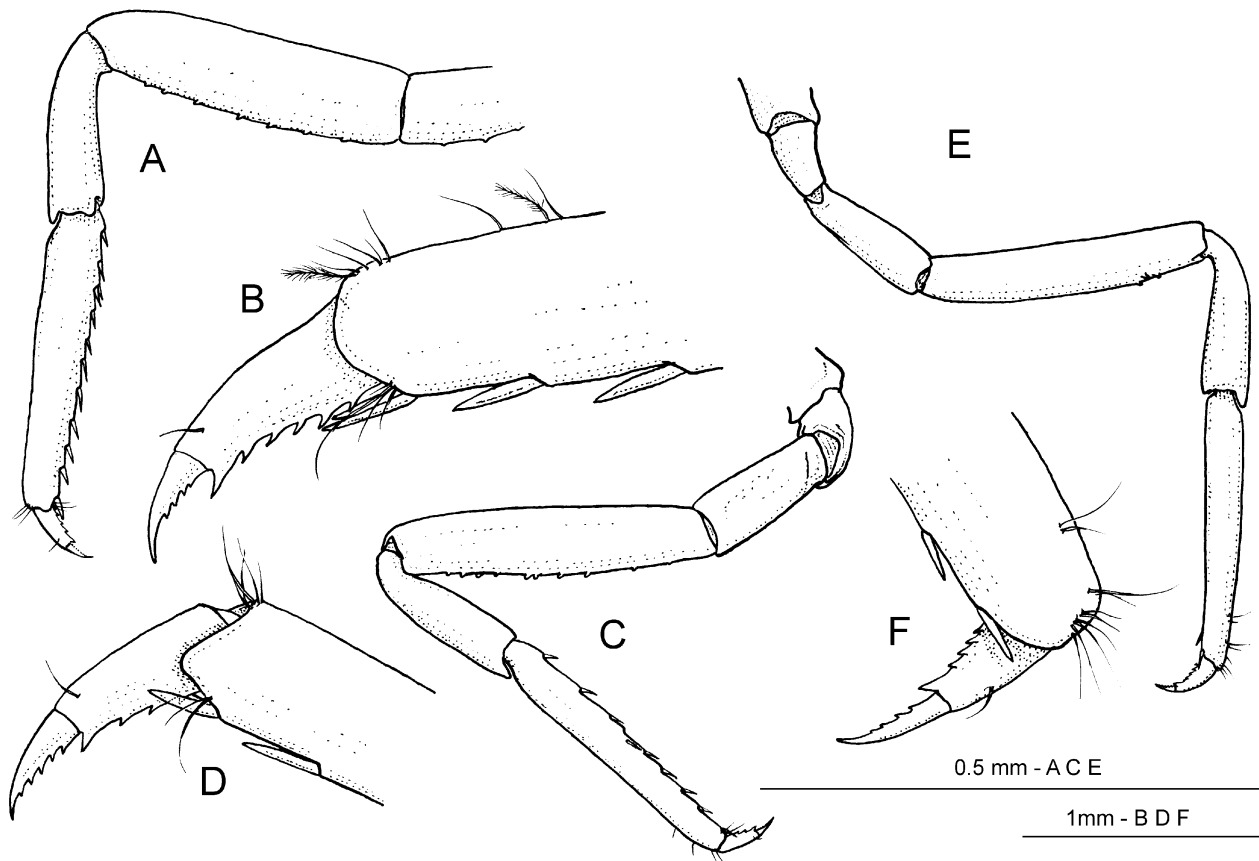


FIGURE 4. *Periclimenaeus echinimanus* sp. nov., male holotype. A, third pereopod, lateral. B, same, dactylus and distal propodus, medial. C, fourth pereopod, lateral. D, same, dactylus and distal propodus, lateral. E, fifth pereopod, medial. F, same, dactylus and distal propodus, medial.

Fourth pereopod (Fig. 4C,D) similar and subequal to third pereopod, but segments slightly more slender, dactylar corpus with 4 ventral tubercles, more feebly developed, propodal spinulation reduced to 8 spines in addition to distoventral pair, merus ventrally tuberculate, ischium smooth.

Fifth pereopod (Fig. 4E,F) with segments slender in comparison to preceding legs (propodus and merus width about 0.6 of those of third pereopod), dactylus less curved, almost straight, with unguine and corpus ventral denticles (4 on each) low but distinct, propodus lacking ventral spination except distoventral pair and single subdistal spine, merus with group of about 3 tubercles distally on ventral margin, ischium smooth.

First male pleopod with endopod (Fig. 2F) 3.4 times longer than wide, medial margin straight, with 6 short slender spinules and one longer simple subterminal seta, apex and distolateral margin with 5 setulose setae, lateral margin with single short submarginal spinule at 0.4 of endopod length.

Second male pleopod with endopod bearing appendices (Fig. 2G) at 0.3 of medial margin length, appendix interna far exceeding corpus of appendix masculina, with few distomedial cincinnuli, corpus of appendix masculina short, about 0.4 of appendix masculina length, 3 times longer than width, with long stout setulose terminal spiniform seta, about 4 times corpus length.

Uropods (Fig. 2D) with protopodite posterolaterally unarmed; rami subequal to telson length; exopod about 2 times longer than broad, lateral margin convex, unarmed, feebly setose, with acute triangular tooth distally and adjacent feebly curved spine about twice as long as tooth; endopod ovate, 2.2 times longer than broad.

Mouthparts (Fig. 5) (allotype specimen, ovigerous female (v)). Mandible (Fig. 5A–G) without palp; incisor process (Fig. 5C,F) slender with apex bearing series of 11 minute denticles in obliquely convex line; molar process (Fig. 5D,G) slender, with apex truncate, subquadrate, with 3 or 4 subacute teeth at marginal angles and 2 patches of dense brushes of short setae. Mandibular asymmetry (Fig. 5A,D,E,G) expressed in terminal truncation plane of molar processes, in their distal margin denticulation (3 denticles between 2 larger terminal teeth on right mandible, vs. unarmed between terminal teeth on left mandible), and in extension of setal patches on molar areas (small, widely separated patches on right mandible, vs. larger proximal patch almost reaching distal patch).

Maxillula (Fig. 5H–J) with feebly bilobed palp, lower lobe short, with small spinule; upper lacinia broad, dorsal margin convex, distal margin with about 8–9 strong spines bearing series of 1–4 strong subterminal serrules on one side, and several slender spiniform setae; lower lacinia elongate, curved, tapering distally, with dense group of slender terminal and subterminal setae.

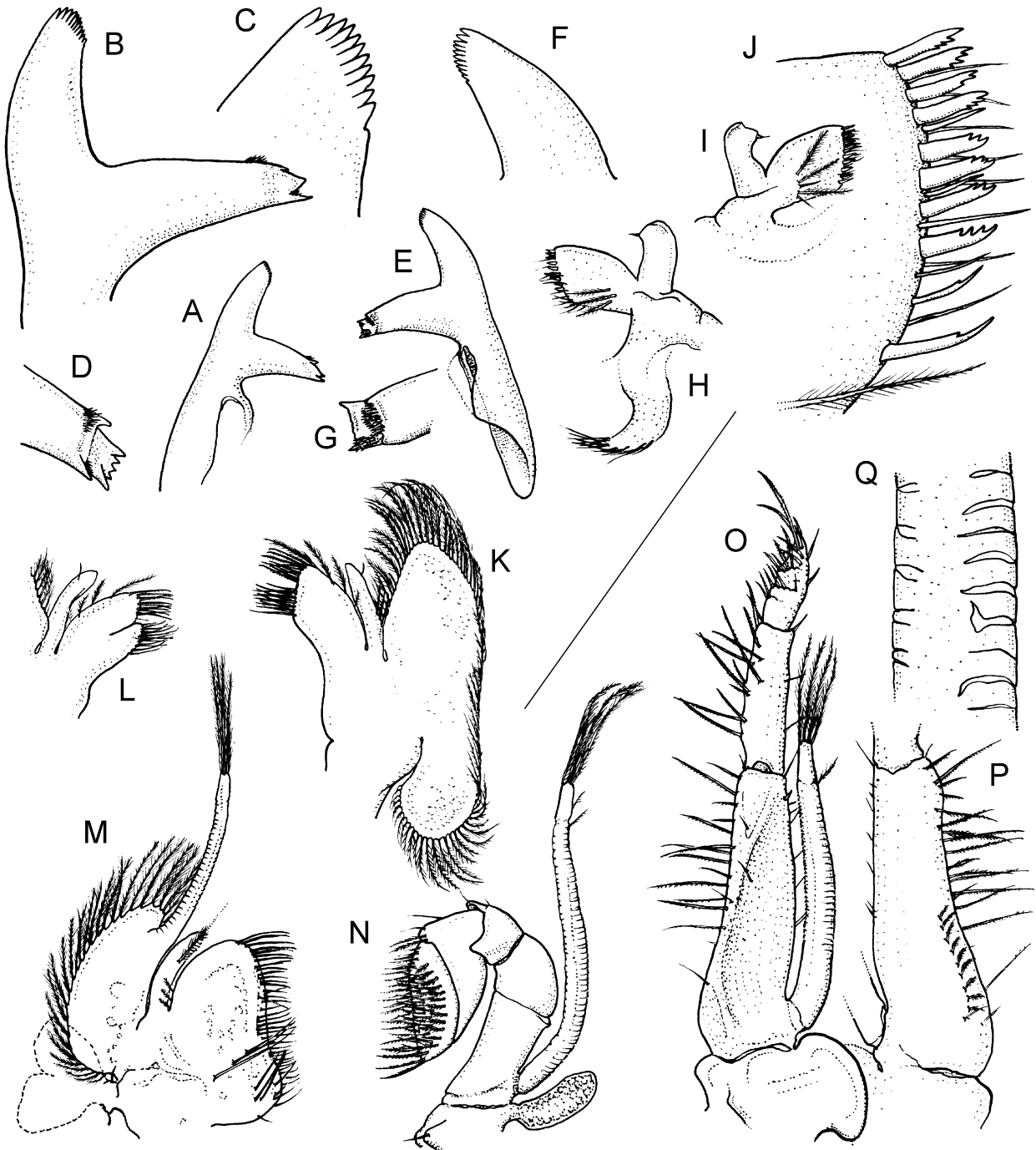


FIGURE 5. *Periclimenaeus echinimanus* sp. nov., ovigerous female allotype, mouthparts. A, right mandible. B, same, molar and incisor processes. C, same, incisor process. D, same, molar process, anterior view. E, left mandible. F, same, incisor process. G, same, molar process, anterior view. H, right maxillula. I, left maxillula. J, same, distal margin of upper lacinia. K, left maxilla. L, right maxilla, palp and endites. M, left first maxilliped. N, left second maxilliped. O, left third maxilliped, lateral. P, same, proximal segments, medial. Q, same, central part of exopod. Scale bars: 1 mm (A,E,H,I,K–P), 0.5 mm (B,D,F,G), 0.25 mm (C,J,Q).

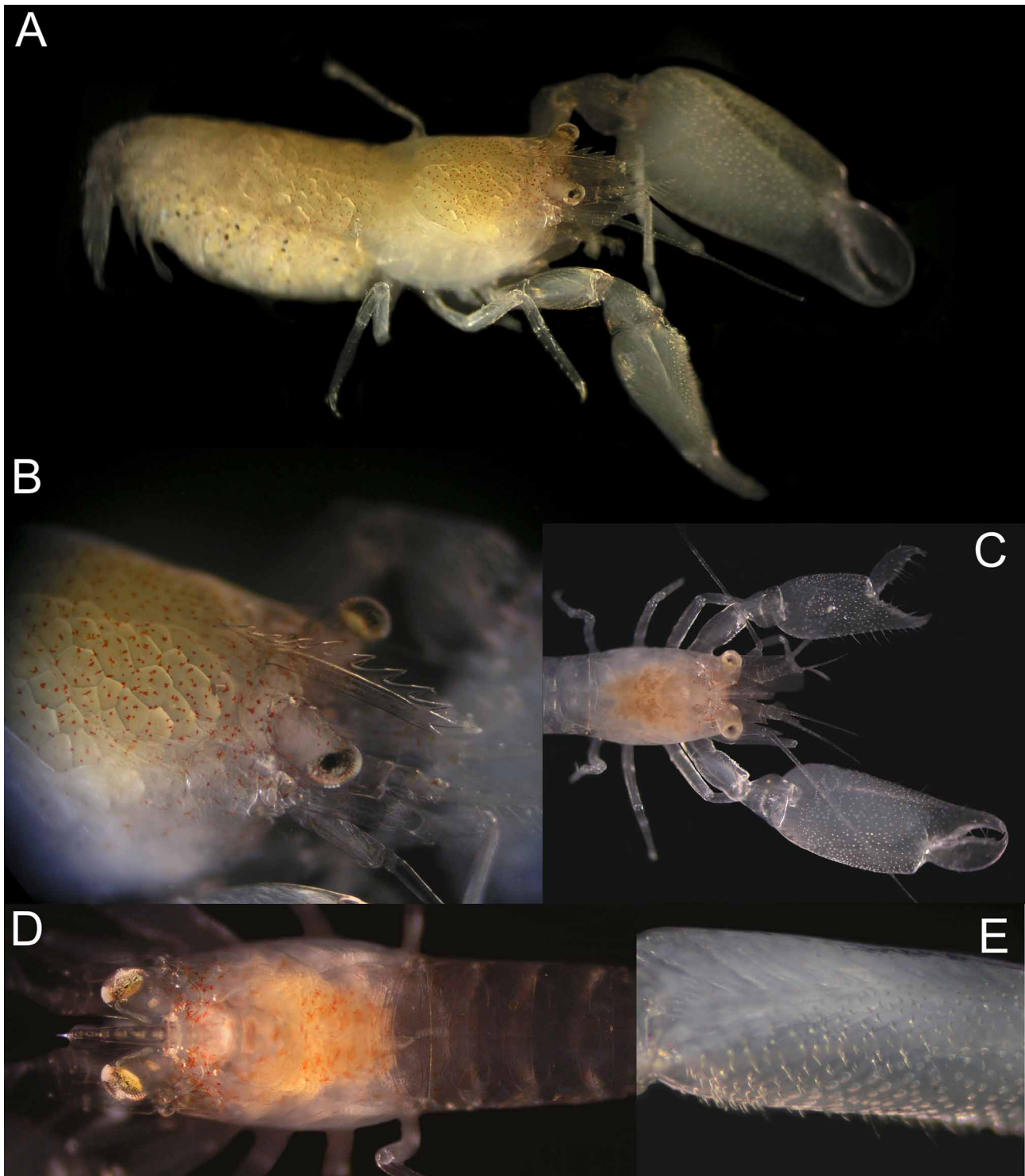


FIGURE 6. *Periclimenaeus echinimanus* sp. nov., colour pattern and morphology. A, ovigerous female CL 2.7 mm (iii), total view, dorsolateral. B, same, anterior cephalothorax. C, male CL 1.4 mm (ii), anterior part of body and appendages, dorsal view. D, female CL 2.4 mm (iii), cephalothorax and abdomen, dorsal. E, ovigerous female CL 2.4 mm (iii), palm of minor chela, dorsolateral view showing medial spinulation (central region with spinules undeveloped in this specimen, but their position indicated by rounded tubercles).

Maxilla (Fig. 5K,L) with simple palp with short simple subterminal seta and tapering rounded apex, basal endite overreaching palp, deeply bilobed on right maxilla but with lobes completely fused on left maxilla, both lobes with numerous distal setae, distolateral margin of basal endite with 4 plumose setae; coxal endite obsolete, non-setose; scaphognathite normal, 4 times longer than central width, anterior lobe about 1.2 times longer than basal width, posterior lobe well developed, scaphognathite with short plumose marginal setae.

First maxilliped (Fig. 5M) with elongate palp, about 5 times longer than central width, not exceeding anterior margin of basal endite, with single plumose seta on distal third of its length; basal endite with distal margin produced, rounded, medial margin rounded, with numerous spiniform setae; coxal endite divided from basal endite by shallow concavity, with several spiniform and 3 long simple setae medially; exopod with caridean lobe large, produced, overreaching distal margin of basal endite, with lateral margin broadly rounded, marginal setae plumose; flagellum subequal to caridean lobe length, flattened, with segmented-like margins and four plumose terminal setae, epipod well developed, distinctly bilobed, lobes broad, distally rounded.

Second maxilliped (Fig. 5N) with normally developed endopod, dactylar segment robust, about 2.5 times longer than central width, medial margin with numerous serrulate setae; propodal segment with distomedial margin feebly produced, with 2 serrulate setae and 2 simple setae; carpus, merus and ischiobasis without special features, merus feebly divided from ischium; coxa medially rounded, with produced outer tubercle bearing single terminal seta; exopod far overreaching carpus, flattened, with segmented-like margins and four plumose terminal setae; epipod small, elongate, rounded distally, without podobranch.

Third maxilliped (Fig. 5O–Q) stout, with endopod overreaching end of ischiomerus; coxa with rounded distoventral lobe, lateral plate short, broadly rounded, arthrobranch absent; basis with ventral margin rounded, ischiomerus fused to basis, without suture, combined segment about 3.8 times longer than basal width, with row of 10 short plumose setae along inner side and proximally along medial margin (Fig. 5P), with long serrulate setae along distomedial margin and single small distolateral spine; penultimate segment about 0.5 of ischiomerus and basis length combined, about 3 times longer than wide, with ventromedial row of long spiniform setae; terminal segment about 0.6 of penultimate segment length, stout, tapering distally, with pair of strong terminal spines and scattered spiniform setae ventrally and on sides of ventral margin; exopod normally developed, slightly overreaching ischiomerus, flattened, with segmented-like margins (Fig. 5Q) and four plumose terminal setae.

Variation. The series of 17 specimens examined exhibits some morphological variation. The rostral formula varies within the range 5–9/0–2, with the most posterior dorsal tooth being postorbital in some specimens; 7–9/1–2 in adults (CL over 2 mm) and 5–6/0–1 in juveniles up to CL 1.3 mm; the posteriormost dorsal rostral tooth is never positioned postorbitally in juveniles.

The largest specimens are the ovigerous females, with a CL of 2.2–2.7 mm and TL about 9–11 mm (**iii**; **v**), the male holotype (only complete adult male available) (**v**), has a CL of 2.2 mm and TL about 9.5 mm. The male appendix masculina is recognizable already in two subadult specimens at CL 1.6 mm (**iv**; **v**). Adult females are morphologically very similar to males, only the second pereopod chelae are relatively smaller; the major chela of the largest ovigerous female (CL 2.7 mm) is about 2.2 times longer than its CL (versus 2.5 times in the holotype male).

Although the ventral rostral dentition is reduced in juveniles (absent in one specimen), supraorbital spines are well developed in them. The spinulation of the second cheliped, is sometimes less dense than in adults, but still comprises of distinct, erect spiniform denticles; only in the smallest juvenile (**v**: CL 0.8 mm, rostral formula 5/0) there is no trace on the supraorbital spines, and both the chelipeds are elongate, similar, equal; both being of the cutting type without a molar process/fossa structures, with the chelae surfaces smooth, lacking spiniform denticles.

The posterior telson margin lacks the median process in all specimens examined but an individual of CL 2.2 mm (**iii**: sex undetermined through specimen damage) possesses a minute, inconspicuous median process.

Color. Generally semitranslucent, whitish when alive, with white cornea and a wide diffuse longitudinal line on inner side of eyestalks; internal organs inside the cephalothorax somewhat purple (**i**), inconspicuous scattered red dots dorsally on the carapace (**ii**; **iv**), sometimes feeble spots also on chelae (**iv**), or easily visible dense red dots over the whole carapace and abdomen, with the female ovaria yellowish (**iii** – ovigerous female CL 2.7 mm; **iv**).

Host. Unidentified sponges [Demospongia: Keratosa] (Fig. 7) growing between branches of the dead part of corals *Pocillopora* and *Stylophora* [Scleractinia], among branches of dead corals, or on the reef surface. Live sponge surface was grayish brown, with upturned short cylindrical oscula about 0.5–1 cm in diameter (Fig. 7B,D). Sponges, or dead corals with the host sponges, were collected from depths of 2–9 m from patch reefs on a sandy sublittoral slope down from the fringing reef.

Associated fauna. In sample (**ii**), the host sponge was growing over a solid rock surface, and its collected part only harboured 4 specimens of the new species. In other samples, when the host sponge was growing amongst the branches of dead part of live coral, *Alpheus bucephalus* Coutière, 1905, *A. cf. paracrinitus* Miers, 1881, *Synalpheus fossor* Paulson, 1875, *S. tumidomanus* (Paulson, 1875), *Saron marmoratus* (Olivier, 1811), *Thor amboinensis* (De Man, 1888), *Exoclimenella sudanensis* (Đuriš & Bruce, 1995), *Cuapetes* spp., and gonodactylid stomatopods, were frequently or occasionally encountered.

Etymology. A combination of the Greek *echinos* [ἔχινος] (= hedgehog; sea urchin) and the Latin *manus* (= hand), referring to the unique erected spinules covering the chelae, like the spinose armament in sea urchins and hedgehogs.

Distribution. Known only from the type locality, Aqaba, Gulf of Aqaba, northeastern Red Sea.

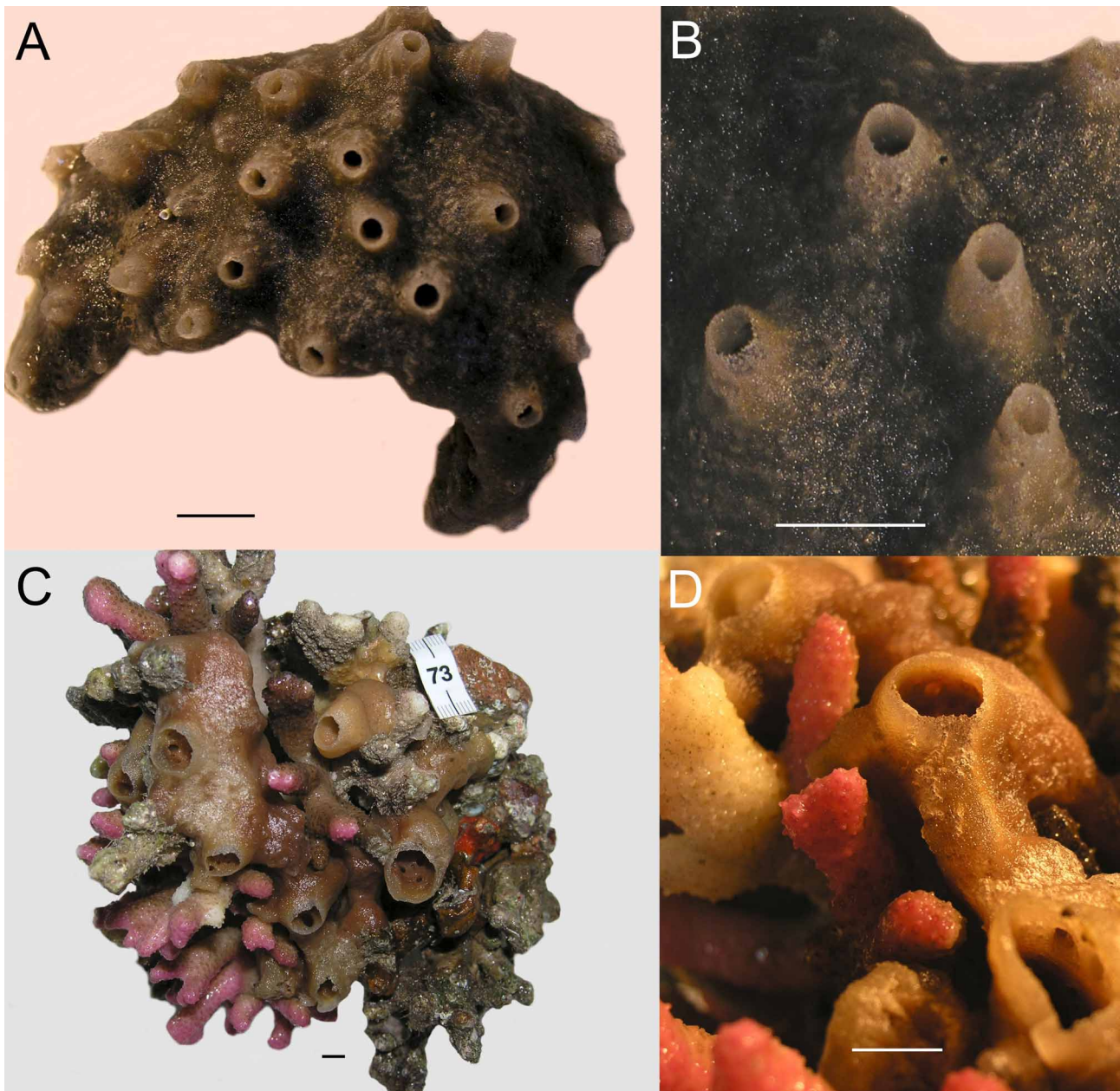


FIGURE 7. Host sponges of *Periclimanaeus echinimanus* sp. nov. A–B, sponge (ii) from solid coral rock surface. C–D, sponge host (iii) overgrowing dead branches of *Stylophora* spp. coral. 10 mm (ABD), 5 mm (C).

Discussion

Periclimanaeus echinimanus sp. nov. is closely related to *P. rhodope*, a species originally described by Nobili (1904) from Djibouti, a country at the entrance of the Red Sea. Amongst the characters shared by both species are a similar dorsal rostral dentition, strong supraorbital spine, triangular distolateral tooth of the first antennular segment, strong distolateral tooth of the scaphocerite far overreaching lamina, general shape of the chelipeds and pereiopods, and telson shape and spinulation (Bruce, 1974). *Periclimanaeus rhodope* has the second pereiopod chelae granulated, but not spinulose, as in *P. echinimanus* sp. nov. Both species can also be distinguished as fol-

lows: (1) proportionally more slender rostrum without ventral lamina but with well-developed 1–2 distoventral teeth in *P. echinimanus* (vs. with distinct ventral lamina without distoventral teeth, or with a single minute tooth in *P. rhodope*); (2) pterygostomial angle of the carapace distinctly produced, rounded in *P. echinimanus* (vs. produced, angulate in *P. rhodope*); (3) second pereopods chelae have the fingers more slender, more than twice longer than high in the major one and more than 3 times in the minor one in *P. echinimanus* (vs. less for *P. rhodope*); (4) third pereopod dactylus has five ventral spinules on the corpus, larger and widely separated, half size of the distoventral tooth in *P. echinimanus* (vs. depressed, closely set and more numerous, minute in comparison with the distoventral tooth in *P. rhodope*); (5) posterior telson margin lacking median projection in *P. echinimanus* (vs. median projection present in *P. rhodope*). Additionally, the first pereopod fingers are narrow and spatulate in *P. echinimanus*, but with a simple cutting edge in *P. rhodope*.

The most characteristic feature, distinguishing the present new species from all other congeners, is the spinulation of the second pereopod chelipeds. As in *P. rhodope*, conspicuously granulated chelae are known from several Indo-West Pacific species: e.g. *P. arabicus*, *P. djiboutensis*, *P. lobiferus* Bruce, 1978b, *P. nielbrucei* Bruce, 2006a, *P. nufu* Ďuriš, Horká & Hoc, 2009b; *P. rastrifer* Bruce, 1980, *P. robustus* Borradaile, 1915 (Bruce, 1974, 1978b, 1980, 2005, 2006a; Ďuriš *et al.*, 2009a), but can also be found in some western Atlantic representatives of the genus: e.g. *P. bermudensis* (Armstrong, 1940), *P. brucei* Cardoso & Young, 2007, *P. caraibicus* Holthuis, 1951, and *P. pectinidactylus* Ďuriš, Horká & Sandford, 2009a. None of these, however, has the tubercles long, slender, spiniform and erected at an almost right angle to the palm surface, as in the new species. A somewhat similar spinulation is found in *Anisomenaeus spinimanus* (Bruce, 1969), recently transferred from *Periclimenaeus* (Bruce, 2010) as the species lacks the molar process and fossa on the major second pereopod chela. The chelae spinulation of *A. spinimanus* is as dense as in *P. echinimanus* **sp. nov.**, but with stronger, and somewhat anteriorly directed, spinules (see: Bruce, 1978a).

The anterodorsal lobe on the first abdominal segment in *Periclimenaeus* species has been discussed previously (Bruce, 1986, 2005; Ďuriš *et al.*, 2009b). Based on the presence of this lobe, several species were placed into a *P. robustus* species-group by Bruce (2005), in which ten species should now be included (Ďuriš *et al.*, 2009b). As pointed by Bruce (1986), some other previously described *Periclimenaeus* species could be included in this group after closer examination of new or older material, since the lobe may have been overlooked in the older descriptions. The group, however, was found by Ďuriš *et al.* (2009b) to be a rather artificial assemblage of generally not closely related species, and it is assumed that this lobe has independently evolved in several natural species-groups of the genus *Periclimenaeus* and related genera, or is an independently lost ancestral character.

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