Pontoniine shrimps (Decapoda: Caridea: Palaemonidae) inhabiting boring sponges (Porifera: Demospongia) from Nhatrang Bay, Vietnam, with descriptions of three new species

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Marin, I. Pontoniine shrimps (Decapoda: Caridea: Palaemonidae) inhabiting boring sponges (Porifera: Demospongia) from Nhatrang Bay, Vietnam, with description of three new species.
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Key words: Crustacea; Decapoda; Palaemonidae; Pontoniinae; *Apopontonia, Onycocaridella*, *Onycocaris, Periclimenaeus, Poripontonia*; new species, new records; sponges, symbiosis; Vietnam.
Some further investigations on symbiotic fauna of shallow-water boring demosponges in Nhatrang Bay, Vietnam are given. Three species of pontoniine shrimps are described as new: *Onycocaridella antokha* spec. nov., *Periclimenaeus pachyspinosus* spec. nov., and *Poripontonia cornuta* spec. nov. Four species, *Apopontonia falcirostris* Bruce, 1976, *Onycocaris amasukensis* Fujino & Miyake, 1969, *Periclimenaeus djiboutensis* Bruce, 1970 and *Periclimenaeus rastrifer* Bruce, 1980, are recorded from Vietnam for the first time.

Introduction

The symbiotic fauna associated with shallow-water demosponges is very rich. It is based on the presence of a developed canal system with a continuous flow of water (Bergquist, 1978) and the perfect shelter of the inhabitants by toxicity of the sponges for large predators (Bakhus, 1981). Most of the epibiotic species are hydroids (Puce et al, 2005) and polychaetes (Martin & Britayev, 1998) while endobiotic alpheid (Decapoda: Caridea: Alpheidae) and palaemonid (Decapoda: Palaemonidae) shrimps are the most diverse groups inside sponges. True epibiotic species of caridean shrimps, obligate living on surface of the sponges, are not numerous and presented by highly specialized species such as *Gelastocaris paronae* (Nobili, 1905) (Decapoda: Hippolytidae).

Boring or excavating sponges, mainly of the families Clionaidae d'Orbigny, 1851, Callyspongiidae de Laubenfels, 1936, Halichondriidae Gray, 1867 and Petrosiidae van Soest, 1980 (Porifera: Demospongia), penetrate stones, dead stony corals and shells. They live in connected chambers or galleries excavated in calcareous substrates (e.g. Calcinai et al, 2003) and are very hard to see as usually only a part of emerge papillae or siphon indicates their presence inside coral boulder. Shape and size of chambers considered to be a species or genus-specific (Calcinai et all, 2006) that, probably, determinate the presence of specific symbiotic species as well as their highly specialized morphology. Because of the cryptic life style these sponges and associated fauna are poorly known and any collected animals are of special interest.

During fieldwork in Nhatrang Bay, Vietnam author collected several dozens of specimens of boring sponges with their associates. One of symbiotic species, *Onycocaris*

temiri Marin, 2005, has been already described previously. In this paper some other extracted species of pontoniine shrimps are presented. Unfortunately, hosts remain unidentified.

Postorbital carapace length (pocl, in mm) is used as standard length. Material is deposited in collections of the National Natuurhistorisch Museum, Leiden (RMNH) and the author's collection in the Laboratory of Ecology and Morphology of Marine Invertebrates, A.N. Severtzov Institute of Ecology and Evolution of RAS, Moscow (LEMMI).

Systematic part

Apopontonia falcirostris Bruce, 1976
(fig. 1)

Apopontonia falcirostris Bruce, 1976: 303, figs 1-5 [type locality - Madagascar]; Bruce, 1981b: 3.

Material examined.— 1 ovigerous female, pocl 2.0 mm; 1 juvenile, pocl 1.3 mm (RMNH D 51747); South China Sea, Vietnam, Nhatrang Bay, Dun Island; inside demosponge boring in dead stony coral; 8-10 m; 12.v.2004; collected with *Periclimenaeus djiboutensis* and *P. arabicus*; 1 ovigerous female, pocl 3.0 mm (LEMMI), 1 male, pocl 2.0 mm (LEMMI); South China Sea, Vietnam, Nhatrang Bay, Tre Island, lighthouse; inside demosponge boring in dead stony coral; 10 m; 6.vi.2006; collected with *Periclimenaeus rastrifer*.

Remarks.— The species well agrees with the original description provided by Bruce (1976). The rostrum of the Vietnamese specimens shows four or five dorsal teeth and one curved ventral tooth (Fig. 1a-c).

Distribution.— Also known from Madagascar, the Maldives Islands and Queensland, Australia.

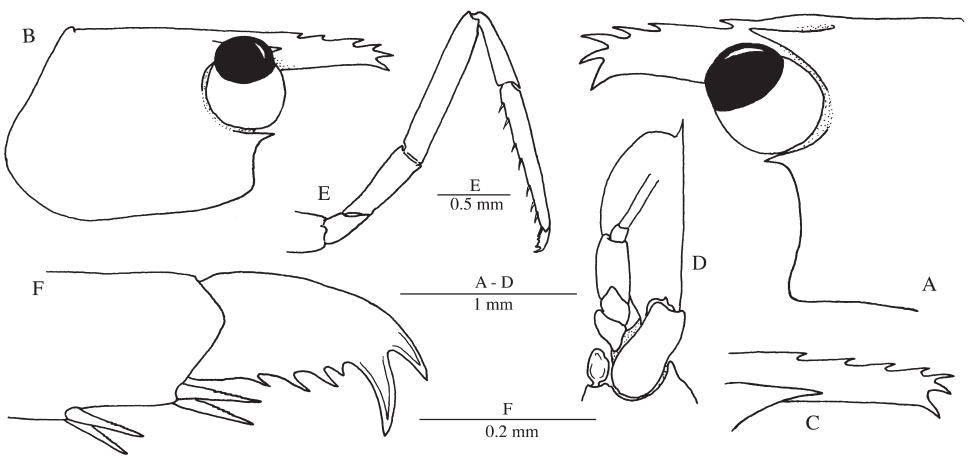

Fig. 1. *Apopontonia falcirostris* Bruce, 1976: A, D, E, F, ovigerous female, pocl 2.0 mm (RMNH D 51747); B, male, pocl 2.0 mm (LEMMI); C, ovigerous female, pocl 3.0 mm (LEMMI). A, B, anterior part of carapace and rostrum; C, rostrum; D, antenna, E, third pereiopod, F, dactylus of third pereiopod.

Onycocaris amasukensis Fujino & Miyake, 1969 (figs 2-4)

Onycocaris quadratophthalma; Miyake & Fujino, 1967: 283, fig. 4, 5 (part) [not *Onycocaris quadratophthalma* (Balss, 1921)].

Onycocaris amasukensis Fujino & Miyake, 1969: 413, figs 6, 8a-c, 9a-c [type locality - Japan]; Bruce, 1981b: 8.

Material examined.— 1 male, pocl 2.3 mm (RMNH D 51748): South China Sea, Vietnam, Nhatrang Bay, Tre Island, west of Dam Bay; inside demosponge boring in dead stony coral; 5-10 m; 23.v.2006; collected with specimens of *Periclimenaeus arabicus*.

Remarks.— The species well agrees with the original description given by Fujino & Miyake (1969). The main diagnostic features of this species are: 1) a triangular blade-like incisor process of mandible bearing very tiny teeth along it distolateral edge (fig. 3b-d); 2) the second pereiopods being similar in size and shape, with a strong spine on the merus (fig. 3g); and 3) serrated margins on the unguis and large accessory tooth of the dactylus of the third pereiopod (fig. 4d).

Closely related species in the genus are *O. quadratophthalma* (Balss, 1921) and *O. bocki* Bruce, 1992, which also possess a short toothless rostrum, a blade-like incisor process on the mandible bearing very tiny teeth, and second pereiopods similar in size and shape. *Onycocaris quadratophthalma* is clearly different from *O. amakusensis* by the absence of a spine on the merus of the second pereiopods (Fujino & Miyake, 1969; Bruce,

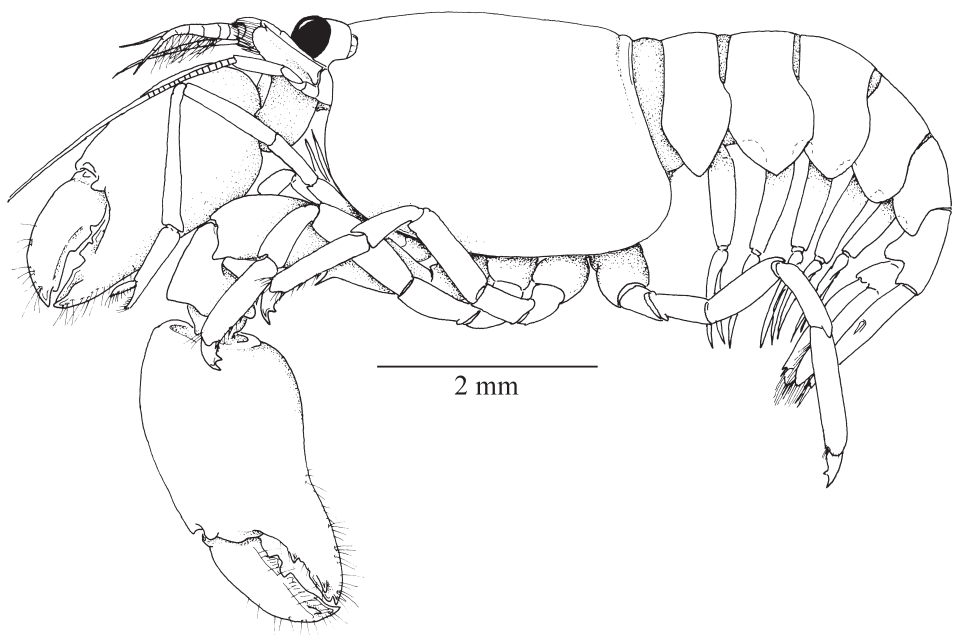

Fig. 2. *Onycocaris amasukensis* Fujino & Miyake, 1969: mature male, pocl 2.7 mm (RMNH D 51748), lateral aspect.

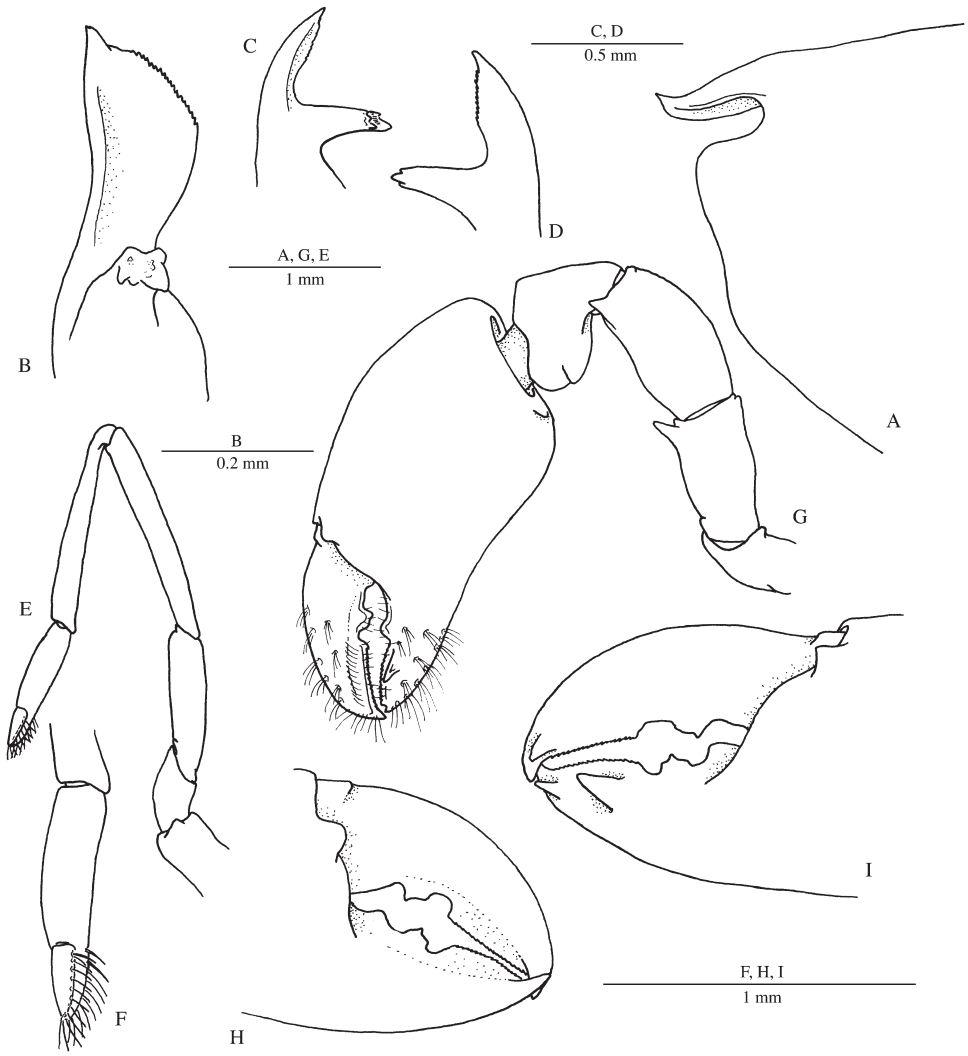

Fig. 3. *Onycocaris amasukensis* Fujino & Miyake, 1969: mature male, pocl 2.7 mm (RMNH D 51748). A, anterior part of carapace and rostrum; B - D, mandible; E, first pereiopod; F, fingers of first pereiopod; G, second pereiopod; H, I, fingers of second pereiopod.

1992). Another species, *O. bocki*, shows some minor differences with *O. amakusensis* in the dentition of the second pereiopods, and having the margin of the unguis of the dactylus of the third pereiopod entire (Bruce, 1992).

Distribution.— Known from Zanzibar, Japan, the Great Barrier Reef, Australia, and Hawaii; associated with sponges, including *Callyspongia* Ridley, 1884 (Callyspongiidae).

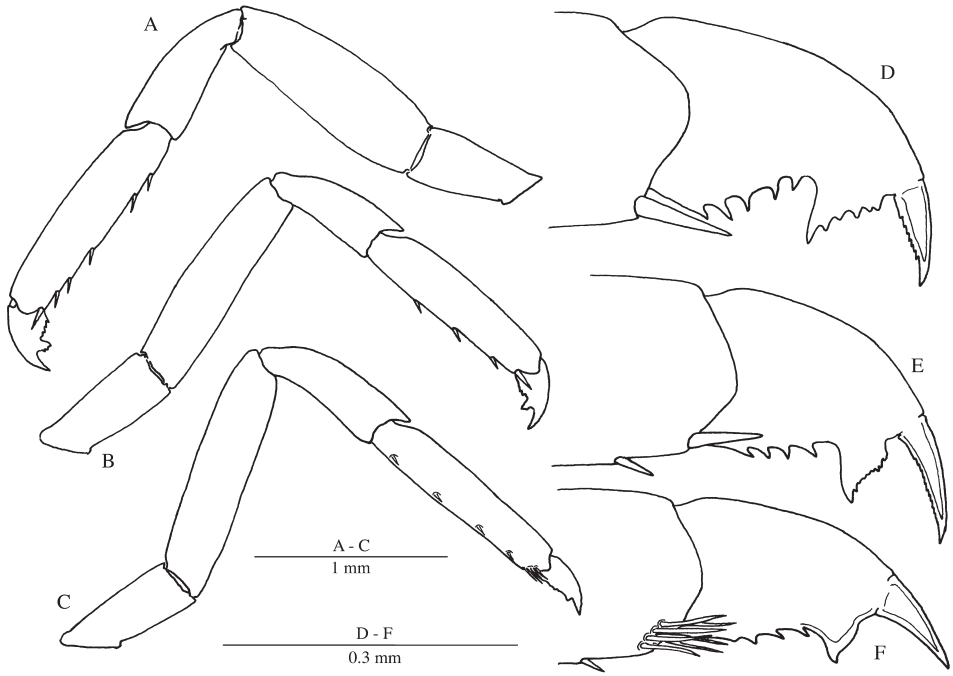

Fig. 4. *Onycocaris amasukensis* Fujino & Miyake, 1969: mature male, pocl 2.7 mm (RMNH D 51748). A, third pereiopod; B, fourth pereiopod; C, fifth pereiopod; D, dactylus of third pereiopod; E, dactylus of forth pereiopod; F, dactylus of fifth pereiopod.

Onycocaridella antokha **spec. nov.**
(figs 5-9)

Material examined.— Holotype, ovigerous female, pocl 2.7 mm (RMNH D 51749); allotype, male, pocl 2.5 mm (RMNH D 51749): South China Sea, Vietnam, Nhatrang Bay, Nok Island; inside petrosiid demosponge boring in dead stony coral; 10 m; 12.v.2006. Paratype, 1 ovigerous female, pocl 2.6 mm, dissected (LEMMI): Mun Island; inside petrosiid demosponge boring in dead stony coral; 15 m; 27.vi.2006; collected by T. Antokhina.

Description.— Small sized swollen shrimp (fig. 5a, b). Carapace smooth, without spines (fig. 6a, b). Rostrum short and slender, turned downward, bearing small subdistal dorsal tooth. Orbits feebly developed; anterolateral angle of carapace broadly rounded.

Abdomen smooth; pleura of all segments rounded; sixth segment with posteroventral angles exposed and acute. Telson about two time longer than wide in proximal part, with two pairs of well developed dorsal, and three pairs of long posterior spines (fig. 9g, h).

Eyes with hemispherical well pigmented cornea, lacking accessory pigment spot, cornea oblique placed on slightly swollen eyestalk.

Antennula (fig. 6d) slightly reduced; basal segment 1.6 times longer than wide, with

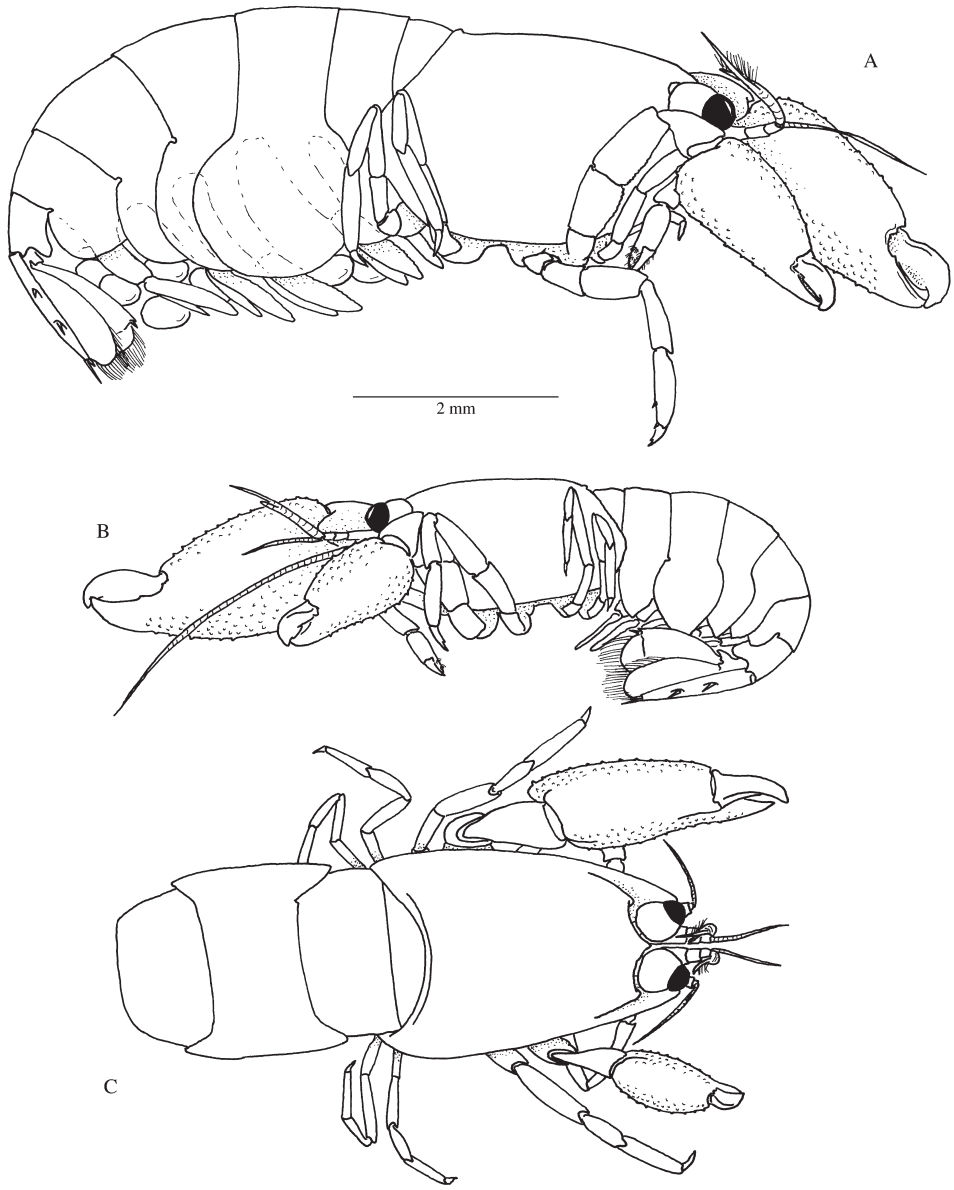

Fig. 5. *Onycocaridella antokha* spec. nov.: A, female holotype, pocl 2.7 mm (RMNH D 51749), lateral view; B, male allotype, pocl 2.5 mm (RMNH D 51749), lateral view; C, female paratype, pocl 2.6 mm (LEMMI), dorsal view.

small rounded distolateral process and small medial ventral tooth; stylocerite short and rounded, reaching about one third of segment length; intermediate and distal segments short and broad, about 1.5 times wider than long; upper flagellum biramous, with stout segments, 7 groups of aesthetascs present.

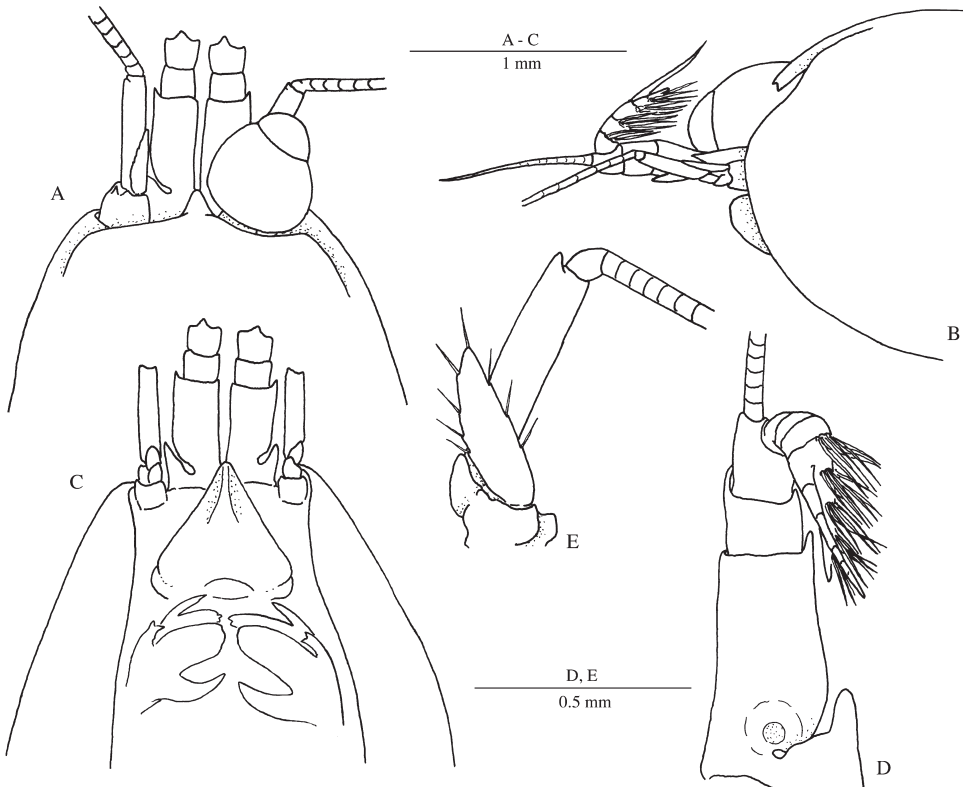

Fig. 6. *Onycocaridella antokha* spec. nov.: female paratype, pocl 2.6 mm (LEMMI). A, anterior part of carapace, dorsal aspect; B, same, lateral aspect; C, same, ventral view; D, antennula; E, antenna.

Antenna (fig. 6 e) with unarmed basicerite; merocerite and ischiocerite normal; carpocerite slender, exceeding scaphocerite with more than 1.5 times its length; scaphocerite greatly reduced, about 3 times longer than broad, without distolateral tooth, with few marginal setae.

Epistome (fig. 6c) highly developed, triangular in shape, distinctly exposed under antenna. Mouthparts typical for the genus. Mandible (fig. 7a) without palp; molar process stout, distally truncate; incisor process tapering distally, with five distal teeth (fig. 7b). Maxillula (fig. 7c) with bilobed palp, with single simple seta; upper lacina broad, with numerous stout spines; lower lacina tapering, with setulose setae distally. Maxilla (fig. 7d) with well developed palp and scaphognathite; with two partially fused broad endites, upper endite larger than lower. First maxilliped (fig. 7e) with well developed broad exopod, slightly reduced caridean lobe, well developed rounded palp and large bilobed epipod; basal endite well developed, medial margin with numerous setulose setae; coxal endite feebly developed. Second maxilliped (fig. 7f) with well-developed broad exopod and triangular epipod; distal segment of endopod broad, spinose medially. Third maxilliped (fig. 7g) with well developed exopod, significantly reduced lobe-like epipod and robust endopodal segments; ischio-merus and basal segment fused,

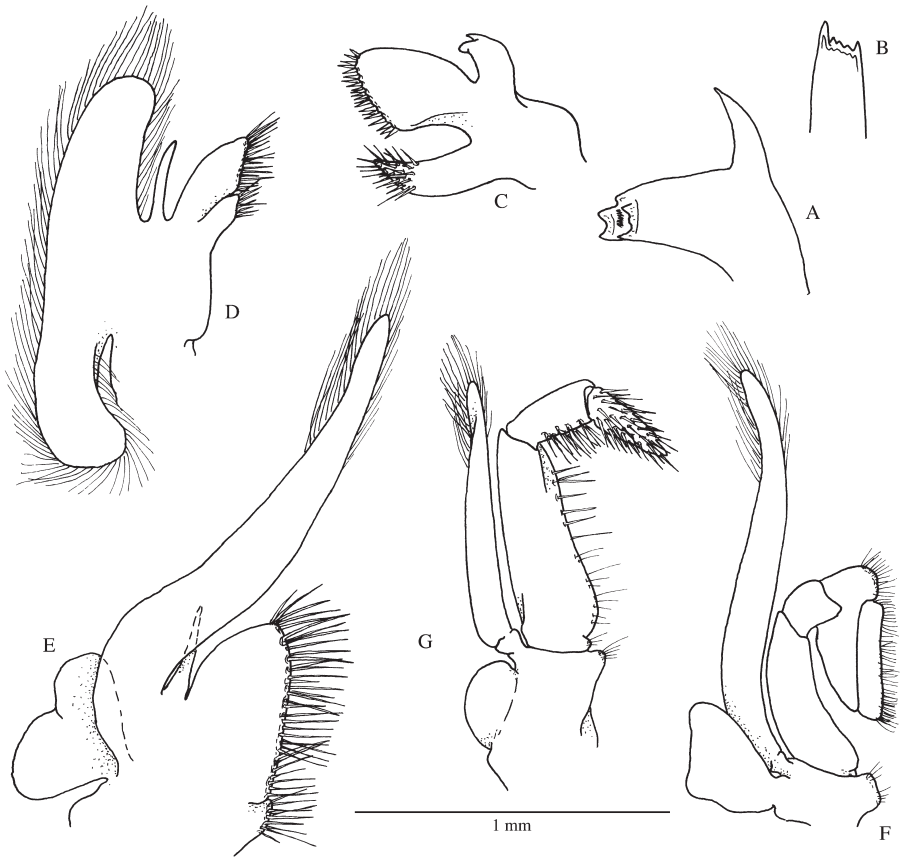

Fig. 7. *Onycocaridella antokha* spec. nov.: female paratype, pocl 2.6 mm (LEMMI). A, mandible; B, distal margin of incisor process of mandible; C, maxillula; D, maxilla; E, first maxilliped; F, second maxilliped; G, third maxilliped.

tapering distally, about 3.5 times as long as wide, with long setae along median margin; penultimate segment about twice as long as wide, with numerous serratulate spines; ultimate segment subequal in length to penultimate segment, tapering, with several groups of serratulate spines.

First pereiopods (fig. 8a) with robust segments, reaching beyond antennular peduncle; chela with subcylindrical robust palm, about two times as long as wide and 1.7 times as long as finger length; fingers stout, hooked, with well marked entire cutting edges (fig. 8b, c).

Second pereiopods well developed, distinctly unequal in size and similar in shape in both sexes; left chela largest in holotype female (fig. 5a). Allotype male with right chela largest (fig. 5c). Major chela (Fig. 8d) with robust segments; palm compressed, about 1.7 times as long as its maximum depth, with tiny tubercles; dactylus robust, slightly shorter than half of palmar length, curved, with short hooked tip and entire cutting edge; fixed finger slightly smaller than dactylus, pointed distally, with cutting

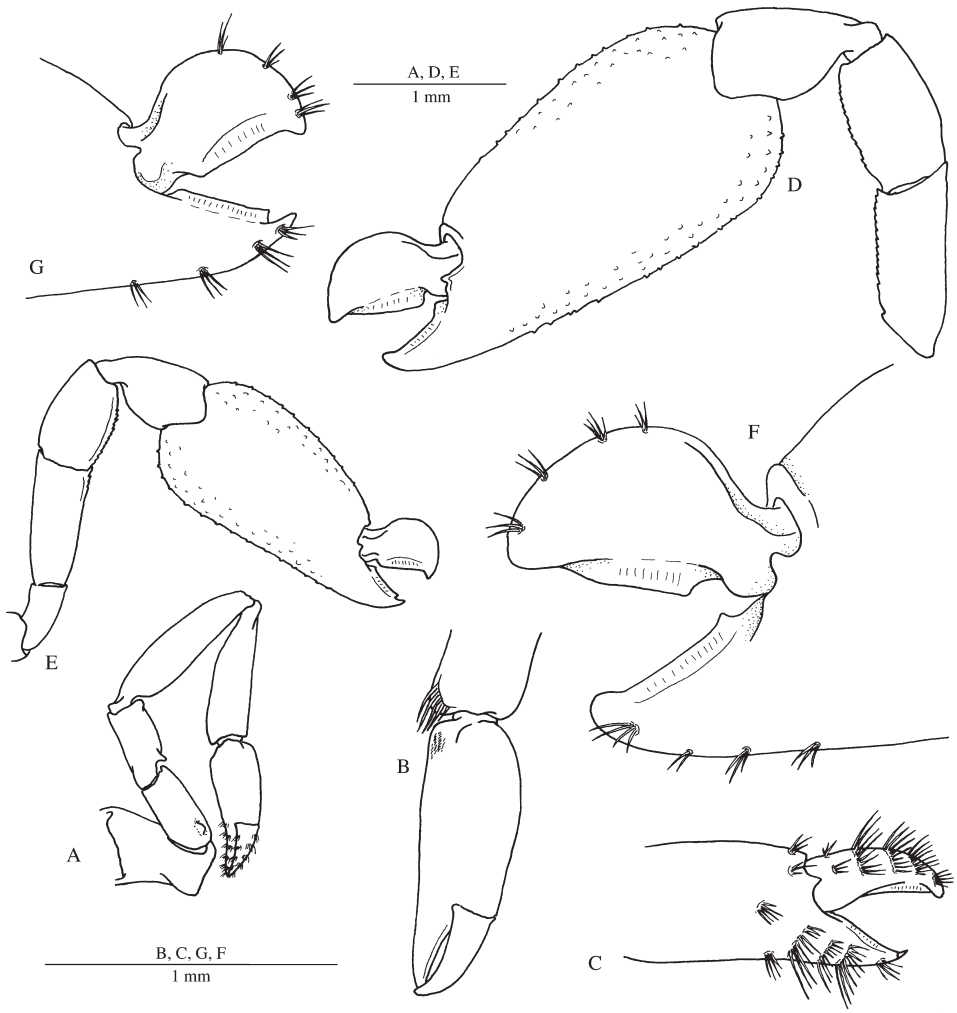

Fig. 8. *Onycocaridella antokha* spec. nov.: female paratype, pocl 2.6 mm (LEMMI). A, first pereiopod; B, C, chela of first pereiopod; D, major second pereiopod; E, minor second pereiopod; F, dactylus of major second pereiopod; G, dactylus of minor second pereiopod.

edge concave medially and with broad acute tooth proximally (fig. 8f). Minor chela (fig. 8e) with robust segments; chela tuberculate, about two times shorter than palm of major chela, about twice as long as it maximum depth; dactylus and fixed finger similar to that of major chela, distal tooth of fixed finger more developed (fig. 8g).

Ambulatory pereiopods dissimilar in size. Third pereiopods (fig. 9a) with robust unarmed segments; ischium about 1.5 times as long as wide; merus about twice as long as wide, slightly tapering distally; carpus 2.5 times as long as its maximum width; propodus about 3 times as long as wide, with disto-lateral spine and small spines in distal part of ventral margin; dactylus (fig. 9d) robust, subcylindrical, 3.5 times shorter than propodus, with sharp curved unguis and sharp accessory tooth. Fourth and fifth

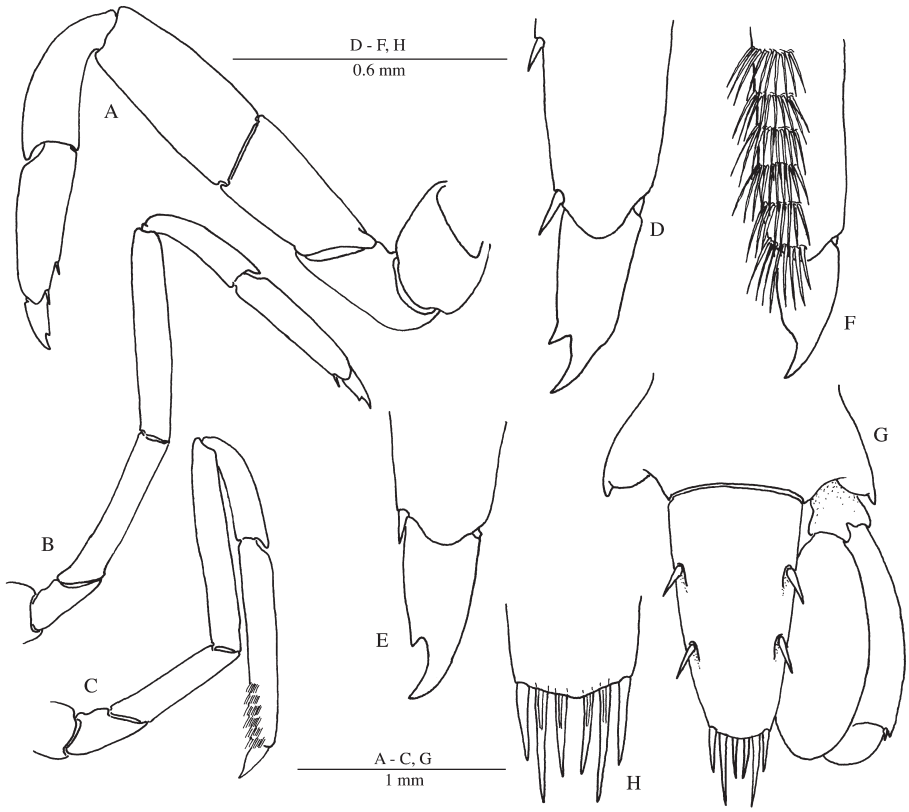

Fig. 9. *Onycocaridella antokha* spec. nov.: female paratype, pocl 2.6 mm (LEMMI). A, third pereiopod; B, fourth pereiopod; C, fifth pereiopod; D, dactylus of third pereiopod; E, dactylus of fourth pereiopod; F, dactylus of fifth pereiopod; G, distal part of last abdominal segment and telson; H, distal part of telson.

pereiopods distinctly more slender than third. Fourth pereiopods (fig. 9b) with ischium 3.5 times as long as wide, merus five times as long as wide, carpus 3.5 times as long as wide, and propodus 4 times as long as wide, dactylus less robust than in third pereiopods, with less developed accessory tooth (fig. 9e). Proportions of segments of fifth pereiopods similar to those of fourth, propodus with 4-5 rows of long setae distally (figs 9c, f).

Uropods with exopod about twice longer than broad, lateral margin convex, with well developed sharp distolateral tooth and spine; endopod equal in length to exopod.

Allotype male.— Morphologically similar to female, differing in its smaller size, more slender body and better developed second pereiopods. First pleopod with endopod tapering distally, with seven setae distributed along medial margin and a terminal seta. Endopod of second pleopod with normal appendix interna; appendix masculina with corpus greatly reduced, with single long distal serrulated spine.

Colouration in life.— Body and appendages are whitish (for color photo see Marin & Savinkin, in press, fig. 92D).

Host.— The species was found inside one of the galleries of a whitish sponge boring in the boulder of stony coral.

Etymology.— The name is given in honor of author's friend and colleague, Tatiana Antokhina, who helped during fieldwork in Vietnam and collected paratype specimens of this species.

Distribution.— Known from the type locality only.

Systematic position.— The species clearly belongs to the genus *Onycocaridella* Bruce, 1981, by the short rostrum with one subdistal tooth, unequal second pereiopods without hammer-shaped process and an opposing fossa on the fingers, and the special dentition of the dactylus of the ambulatory pereiopods. The most closely related genus is *Epipontonia* Bruce, 1977, which can be clearly distinguished from *Onycocaridella* by the well-developed rostrum bearing dorsal teeth.

The present species differs from other species of the genus, *O. prima* Bruce, 1981, *O. stenolepis* Holthuis, 1952 and *O. monodoa* Fujino & Miyake, 1969, by the very short curved rostrum and highly developed epistome. *O. stenolepis* and *O. monodoa* clearly distinguishing by the presence of an acutely produced orbital angle. The most closely related species is *O. prima*, which can be separated by the better developed rostrum which is turned upward, the less developed epistome, the reduced incisor process of the mandible, the fused endites of the maxilla, the well developed scaphocerite with a distolateral spine, and the dactylus of the third pereiood with a reduced accessory tooth (Bruce, 1981a).

Periclimenaeus arabicus Calman, 1939

Periclimenes (*Periclimenaeus*) *arabicus* Calman, 1939: 210, fig. 4 [type locality - S. Arabian Coast].
Periclimenaeus arabicus; Bruce, 1974: 1563, figs 3c-f, 4-6, 7c-h; 1980: 25, fig. 11; 1981c: 81, fig. 3; 1982: 265, fig. 20; 1991: 253, fig. 17.
Periclimenaeus oshimai Miyake & Fujino, 1967: 275, fig. 1 [type locality - Japan].

Material.— 2 ovigerous females, pocl 3.0; 3.1 mm, 2 males, pocl 2.8; 2.6 mm (LEMMI): South China Sea, Vietnam, Nhatrang Bay, Mun Island; inside unidentified demosponge boring in coral boulder; 15 m; 12.viii.2006; collected with *Apopontonia falcirostris*.

Distribution.— Previously reported from Nhatrang Bay (Bruce, 1993). Known from Arabian coasts, Vietnam, Hong Kong, Japan, Queensland, New Caledonia, and Fiji. Associated with sponges, including genera *Gellius* Gray, 1867 (Haliclonidae), *Callyspongia* (Callyspongiidae) and *Acarnus* Gray, 1867 (Acarnidae).

Periclimenaeus djiboutensis Bruce, 1970
(fig. 10)

Periclimenaeus djiboutensis Bruce, 1970: 307 [type locality – Djibouti]; 1974: 1568, figs 8, 9, 13 A-D; 1978: 256; 1981b: 11.

Material.— 1 ovigerous female, pocl 3.6 mm (RMNH D 51750): South China Sea, Vietnam, Nhatrang Bay, Dun Island; inside unidentified demosponge boring in dead stony coral; 8-10 m; 12.v.2004; collected with *Apopontonia falcirostris* and *Periclimenaeus arabicus*.

Remarks.— The species agrees well with the original and following descriptions (Bruce, 1970; 1978). Three main diagnostic features clearly distinguish this species from congeners are the presence of a lobe on the proximal antennular segment (fig. 10a-c); the long distal segment of the antennular stalk, and the position of the dorsal spines in the proximal part of telson (fig. 10m).

Distribution.— Previously known from Djibouti and Queensland, Australia.

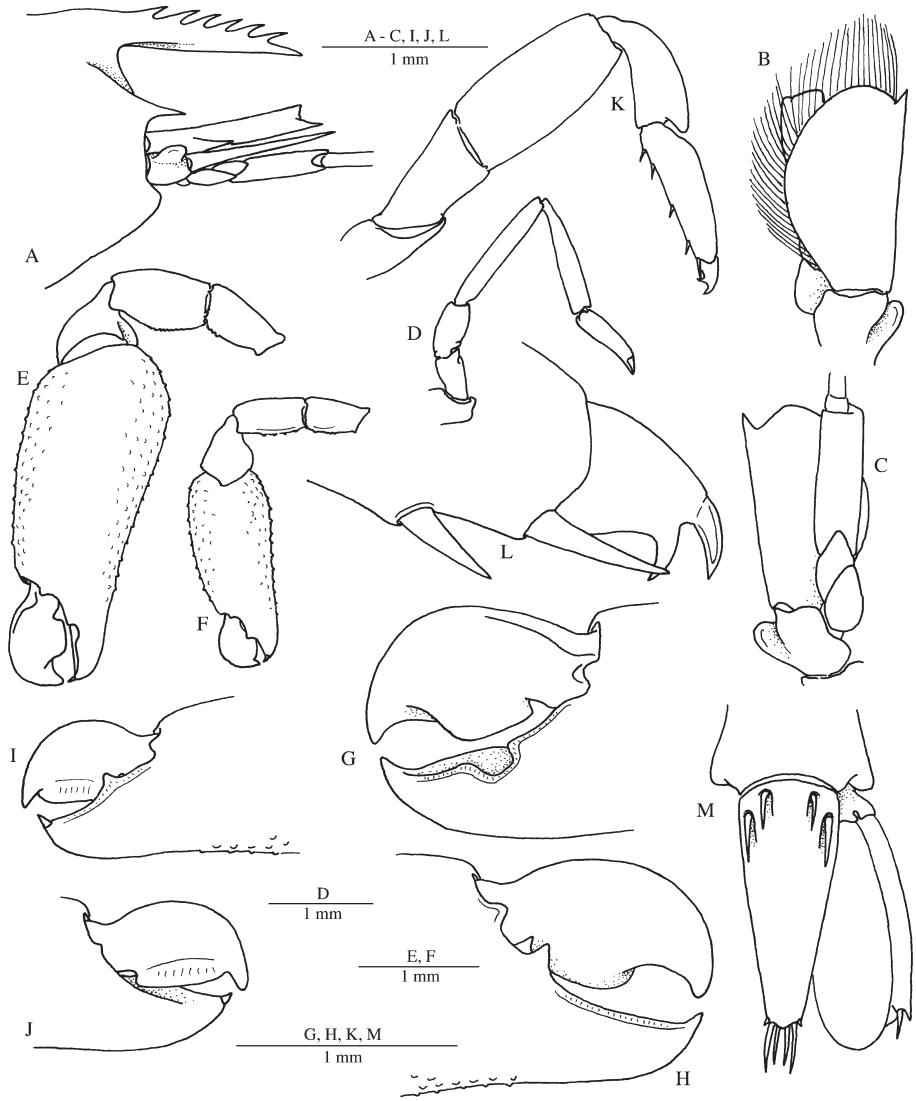

Fig. 10. *Periclimenaeus djiboutensis* Bruce, 1970: ovigerous female, pocl 3.6 mm (RMNH D 51750). A, anterior part of carapace and rostrum; B, C, antenna; D, first pereiopod; E, major second pereiopod; F, minor second pereiopod; G, H, dactylus of major second pereiopod; I, J, dactylus of minor second pereiopod; K, third pereiopod; L, dactylus of third pereiopod; M, telson.

Periclimenaeus rastrifer Bruce, 1980
(fig. 11)

Periclimenaeus rastrifer Bruce, 1980: 27, figs 12, 13a, b [type locality - Nouméa, New Caledonia]; 1982: 267, fig. 21; 1983: 18: 205; 1991: 257, fig. 20.

Material.— 1 male, pocl 2.0 mm (RMNH D 51751): South China Sea, Vietnam, Nhatrang Bay, Tre Island, lighthouse; inside unidentified demosponge boring in dead stony coral; 15 m; 6.vi.2006; collected with *Apopontonia falcirostris*.

Remarks.— The species is similar to Bruce's (1980) original description; the palm of the first pereiopod is about 1.5 times longer than the fingers (fig. 11b); the dactylus of the third pereiopod has four triangular accessory spines (fig. 11e). A minor difference is the rostrum having nine well-developed sharp dorsal teeth and one ventral tooth spines in the present specimen (fig. 11a), while the previously reported specimens of this species possess seven dorsal teeth at a maximum. Additionally, the rostrum of the Vietnamese specimen is turned downward. As most of the morphological features are identical to those of holotype of *P. rastrifer* (Bruce, 1980), the rostral form and it formula of the present specimen are considered as an individual morphological variation.

Distribution.— Known from Hong Kong, Queensland, Australia and New Caledonia. It was found in association with sponges of the following genera: *Siphonochalina*

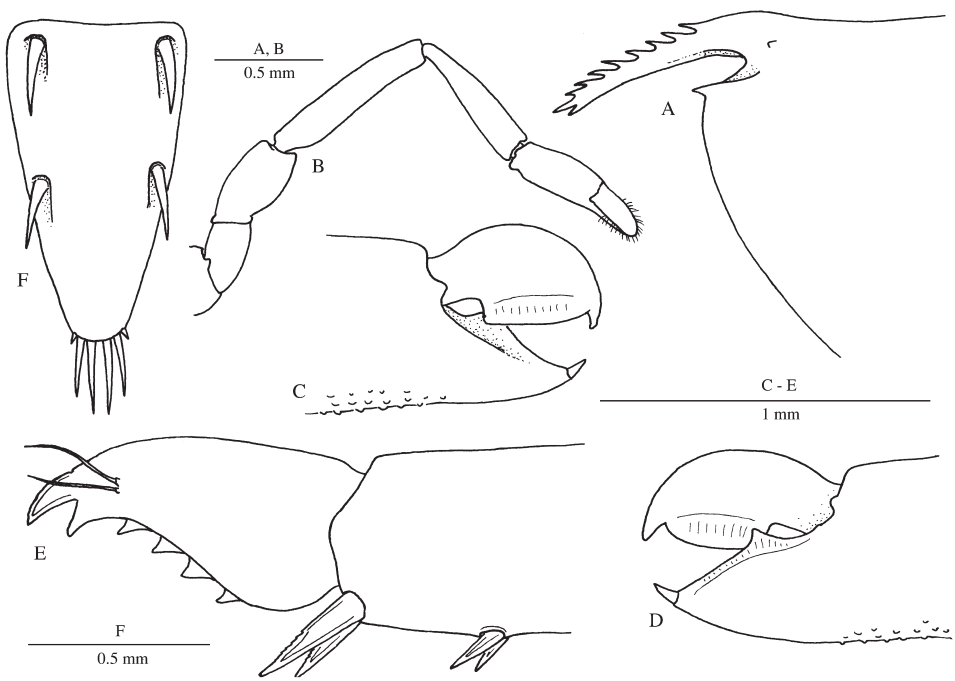

Fig. 11. *Periclimenaeus rastrifer* Bruce, 1980: male, pocl 2.0 mm (RMNH D 51751). A, anterior part of carapace and rostrum; B, first pereiopod; C, D, dactylus of minor second pereiopod; E, dactylus of third pereiopod; F, telson.

Schmidt, 1868 (Callyspongiidae), *Tedania* Gray, 1867 (Tedaniidae), *Mycale* Gray, 1867, *Ulosa* de Laubenfels, 1936 (Mycalidae), and *Dysidea* Johnston, 1842 (Dysideidae).

Periclimenaeus pachyspinosus **spec. nov.**
(figs 12-15)

Material.— Holotype, mature male, pocl 2.2 mm (RMNH D 51752): South China Sea, Vietnam, Nhatrang Bay, Nok Island; inside unidentified demosponge boring in dead stony coral; 15-20 m; 6.viii.2006.

Description of holotype male.— A small sized shrimp with subcylindrical body (fig. 12). Carapace smooth, swollen, with acute antennal spine, with supraorbital tubercle; inferior orbital angle rounded. Rostrum (fig. 13a) well developed, depressed, with acute tip, with six dorsal teeth and one subdistal tooth, ventral rostral margin straight.

Abdomen with smooth segments, without special features, posterolateral angle of sixth segment produced, subacute. Telson (fig. 13h) about twice as long as maximum width, lateral margins convex, not tapering posteriorly; with two pairs of long dorsal spines, slightly shorter than 0.3 of telson length, placed at 0.08 and 0.5 of telson length, posterior margin convex, without median point, with three pairs of posterior spines, lateral pair shortest, about five times shorter than intermediate pair.

Eyes hemispherical, well pigmented; without discernible accessory pigment spot.

Thoratic sternites unarmed.

Antennules (fig. 13b) with basal segment two times longer than wide, with long sharp distolateral process, reaching to middle of intermediate segment, with sharp medial ventral tooth situated at middle of segment; stylocerite short and sharp, reaching middle of segment; intermediate segment about 1.5 times as long as wide; distal segment as long as wide; upper flagellum biramous, shorter ramus with 11 segments, with seven or eight groups of aesthetascs.

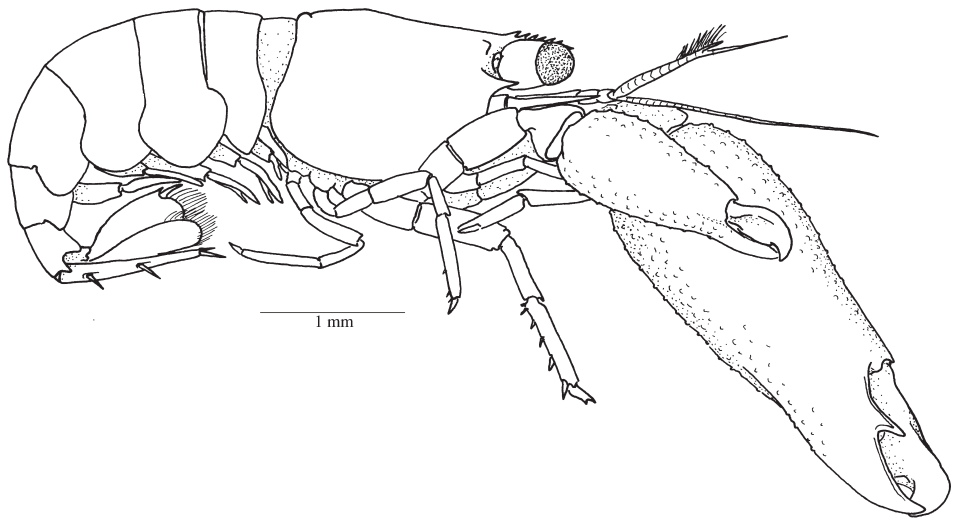

Fig. 12. *Periclimenaeus pachyspinosus* spec. nov: male holotype, pocl 2.2 mm (RMNH D 51752), lateral view.

Antenna (fig. 13c) with short unarmed basicerite; merocerite and ischiocerite normal; carpocerite slender, about twice as long as wide, not exceeding scaphocerite; scaphocerite well developed, about as long as broad, with sharp distolateral tooth, blade with concave lateral margin, slightly produced forward.

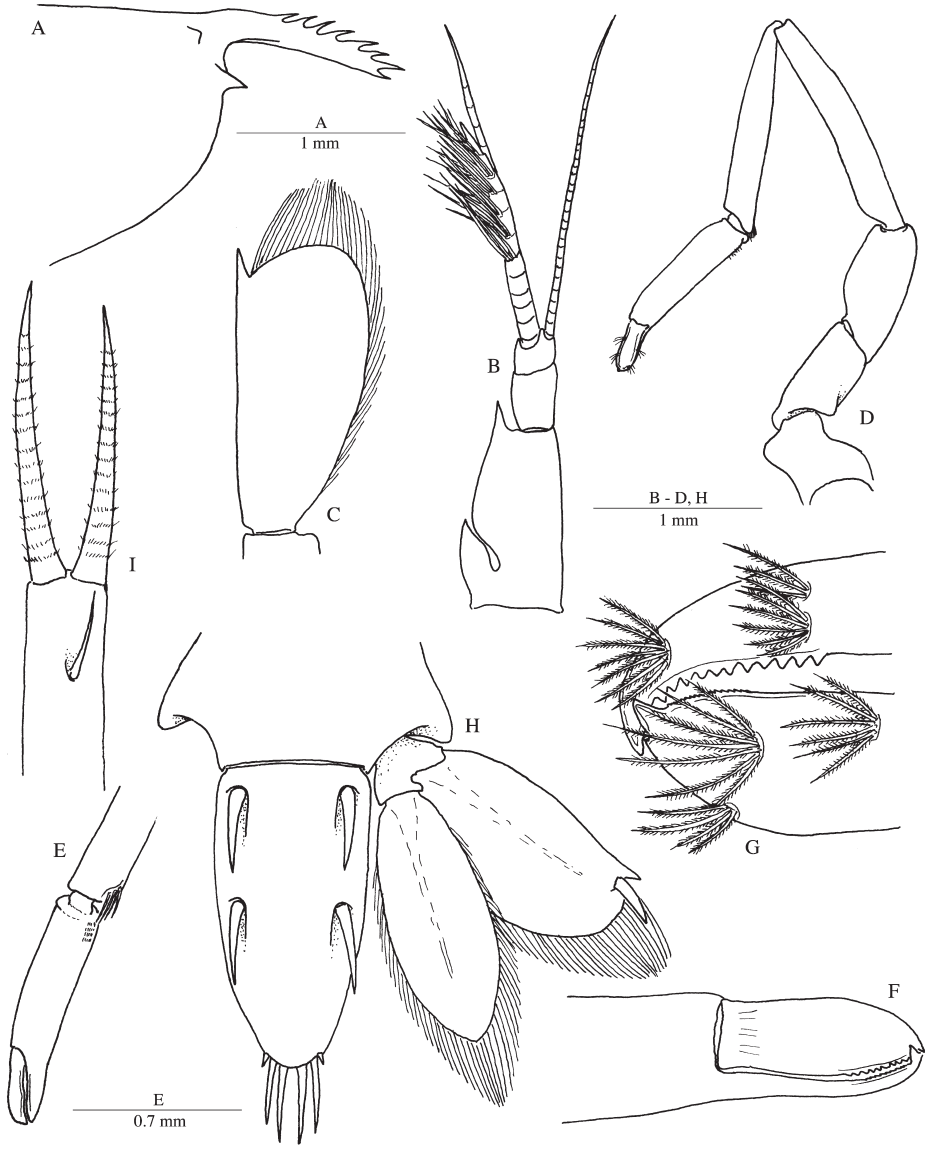

Fig. 13. *Periclimenaeus pachyspinosus* spec. nov: male holotype, pocl 2.2 mm (RMNH D 51752). A, anterior part of carapace and rostrum; B, antennula, C, antenna, D, first pereiopod; E, chela of first pereiopod; F, dactylus of first pereiopod; G, anterior margin of dactylus of first pereiopod; H, telson; I, tip of appendix masculina.

Mouthparts not dissected. Third maxilliped reaching to about end of carpocerite, with ischio-meral segment fused to basis, combined segment about three times longer than wide; penultimate segment about 2.5 times as long as wide, with numerous ser-

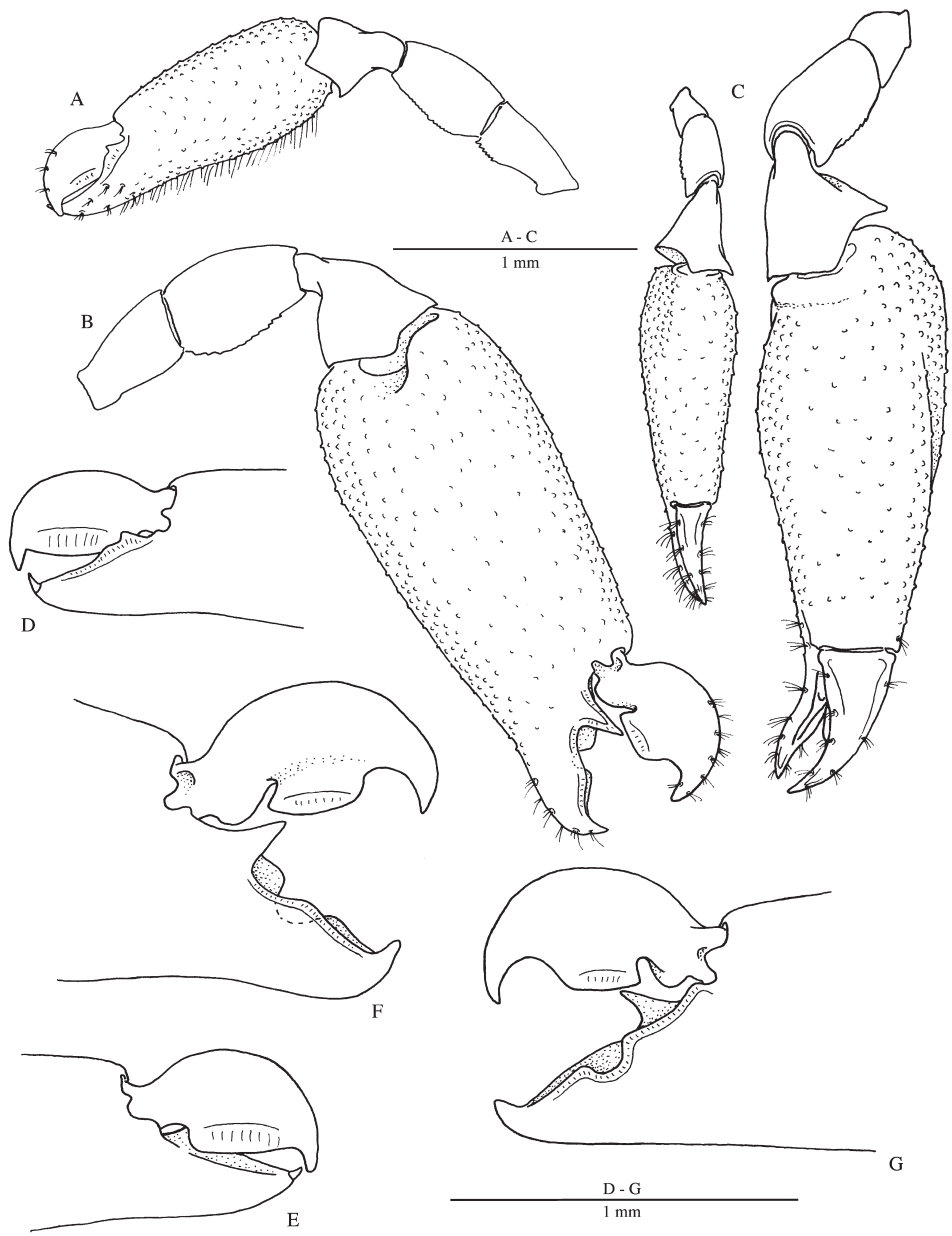

Fig. 14. *Periclimenaeus pachyspinosus* spec. nov: male holotype, pocl 2.2 mm (RMNH D 51752). A, minor second pereiopod; B, major second pereiopod; C, both second pereiopod, dorsal view; D, E, dactylus of minor second pereiopod; F, G, dactylus of major second pereiopod.

ratulate spines; ultimate segment subequal in length to penultimate segment, tapering, with several groups of serratulate spines.

First pereiopod (fig. 13d) with robust proximal, and slender distal segments; exceeding carpocerite by carpus and chela length. Dactylus (fig. 13f) about 2.5 times as long as wide, spatulate, with distal margin serrated, with marked distal tooth (fig. 13g); fixed finger similar to dactylus in size, spatulate, with distal margin finely serrated, with marked distal tooth; chela (fig. 13e) subcylindrical, about 4 times as long as deep and 2.5 times longer than fingers; carpus about 5.5 times longer than wide; merus equal to carpus, 5.5 times as long as wide; ischium robust, about twice as long as wide; basal segment robust, twice as long as wide, unarmed; coxa without ventromedial process.

Second pereiopods unequal (fig. 14c). Major chela (fig. 14b) with dactylus semicircular, 1.5 times longer than maximal depth, about one-third of palm length, dorsal margin strongly convex, with stout acute hooked tip, cutting edge with well developed molar process proximally, distal cutting edge strongly concave, entire (figs 13f, g); fixed finger subequal to dactylus, tapering, with developed fossa, lateral inner margin entire, with strong sharp proximal tooth, lateral outer margin with rectangular cavity in middle; palm compressed, covered with small denticles, sparsely setose, about 1.8 times longer than maximal depth, slightly swollen proximally, oval in section; carpus short, about 0.2 of palm length, narrow proximally, expanded distally, unarmed; merus robust, 1.5 times longer than central depth, with denticles ventrally; ischium 1.2 times longer than distal width, tapering proximally, without ventral denticles; basis and coxa normal, without special features. Minor chela (fig. 14a) shorter than major chela, about 0.6 of major chela length; dactylus (figs 14d, e) semicircular, compressed, twice as long as maximal depth, about half of palm length, with strong acute hooked tip, cutting edge straight and entire; fixed finger, twice as long as deep, with small acute hooked tip, cutting edge grooved, medial edge with blunt tooth proximally; palm compressed, covered with small denticles, about 1.8 times longer than maximal depth, tapering distally; carpus expanded distally, unarmed; merus robust, twice as long as wide, with serrated ventral margin; ischium 2.5 times longer than distal width, with serrated distoventral margin; basis and coxa without special features.

Ambulatory pereiopods dissimilar in size, third pair more robust. Third pereiopod (fig. 15a) with robust unarmed segments; ischium about three times as long as wide; merus broad, about 2.5 times as long as wide; carpus 2.5 times as long as its maximum width; propodus about four times as long as wide, with 4 single moderately developed spines along ventral margin, one pair of stout spines subdistally, and a pair of stout distolateral spines, about 0.5 of dactylus length; dactylus robust, subcylindrical, 1.5 times as long as proximal width, 4 times shorter than propodus, with sharp curved unguis, sharp accessory tooth, five acute small triangular teeth along its ventral margin (fig. 15d). Fourth and fifth pereiopods distinctly more slender than third. Fourth pereiopod (fig. 15b) with ischium five times as long as wide; merus 5 times as long as wide; carpus 3.5 times as long as wide; and propodus six times as long as wide, with one single spine and one pair of ventral spines in distal half, one pair of distolateral spines; dactylus (fig. 15f) robust, with less strongly developed accessory tooth, without ventral teeth. Proportions of segments of fifth pereiopod similar to fourth (fig. 15c), propodus with three rows of long setae distally; dactylus with feebly developed accessory tooth, ventral margin unarmed (fig. 15e).

First pleopod with endopod tapering distally, with seven setae distributed along medial margin and one terminal seta. Endopod of second pleopods with normal appendix interna; appendix masculina with two long distal serrulated spines and one small simple subdistal spine (fig. 13i).

Uropods with exopod about 2.5 times longer than broad, lateral margin convex, with well developed sharp distolateral tooth and long curved spine; endopod as long as exopod.

Colouration in life.— Body and appendages are transparent whitish.

Etymology.— The name refers to robust distoventral propodal spines of the third pereiopod; (from *pachy*, Latin for thick, robust; *spinosus*, adjective from spina, spine).

Distribution.— Known from the type locality only.

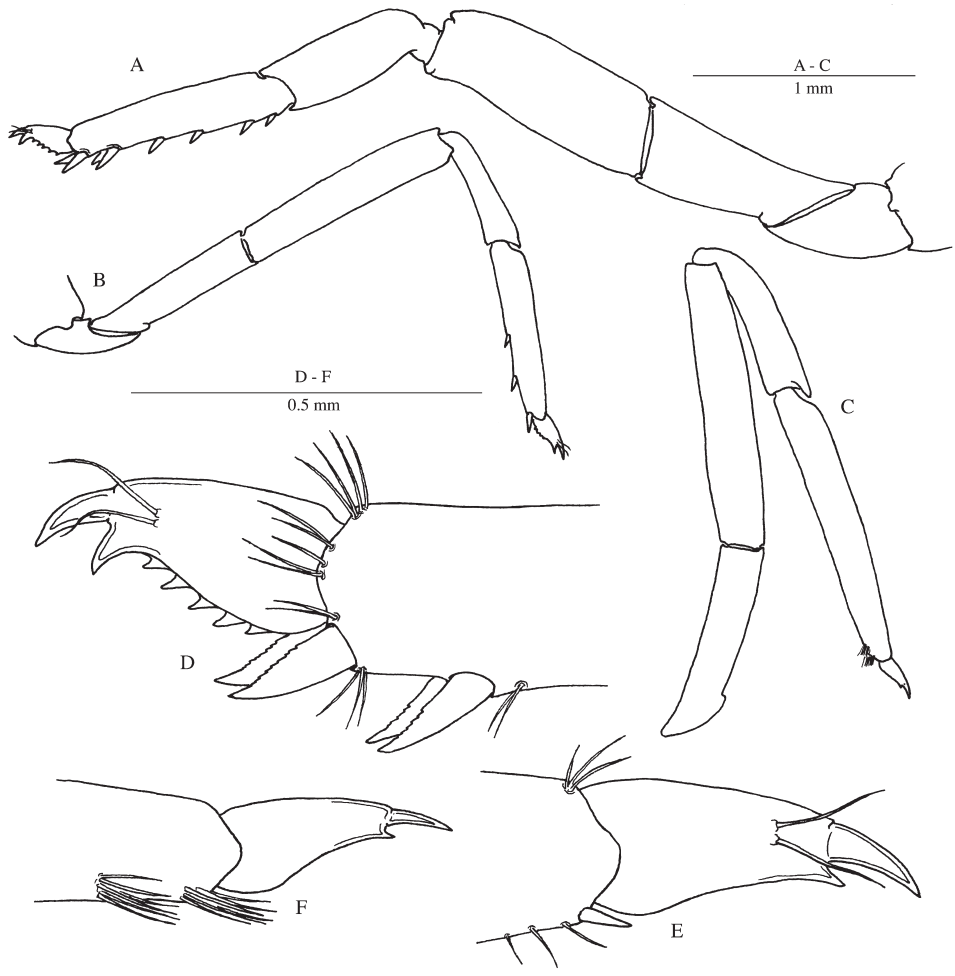

Fig. 15. *Periclimenaeus pachyspinosus* spec. nov: male holotype, pocl 2.2 mm (RMNH D 51752). A, third pereiopod; B, fourth pereiopod; C, fifth pereiopod; D, dactylus of third pereiopod; E, dactylus of forth pereiopod; F, dactylus of fifth pereiopod.

Systematic position.— The species is most similar to *P. rastrifer* but clearly differs from the latter by more slender and longer palm of the chela of the first pereiopod; the well developed robust distoventral propodal spines on the third pereiopod; the dactylus of the third pereiopod which has five triangular accessory spines (vs. four in *P. rastrifer*), and more swollen and convex telson, not tapering posterior.

Poripontonia cornuta **spec. nov.**
(figs 16-18)

Material examined.— Holotype, ovigerous female, pocl 2.5 mm (RMNH D 51753): South China Sea, Vietnam, Nhatrang Bay, Nok Island; inside petrosiid demosponge boring in dead stony coral; 10 m; 6.ix.2006.

Description of holotype female.— A small sized shrimp, with subcylindrical body (fig. 16). Carapace smooth, with strong antennal spine. Rostrum well developed, slightly exceeding antennular peduncle, with three well developed sharp triangular dorsal teeth and one upward directed, curved, ventral tooth; tip of rostrum sharp and turned upward; tip or rostrum and tips of distal dorsal and ventral teeth arranged in the shape of a trident (fig. 17a). Inferior orbital and anteroventral angles rounded.

Abdomen smooth; posterolateral angles of sixth segment rounded, posteroventral angles slightly produced and pointed.

Telson (fig. 17h) twice as long as proximal width, with lateral margin concave; with two pairs of long dorsal spines, about 0.2 of telson length, situated at 0.25 and 0.6 of the telson length; with three pairs of posterior spines, lateral spines shortest, about 0.25 of length of intermediate pair.

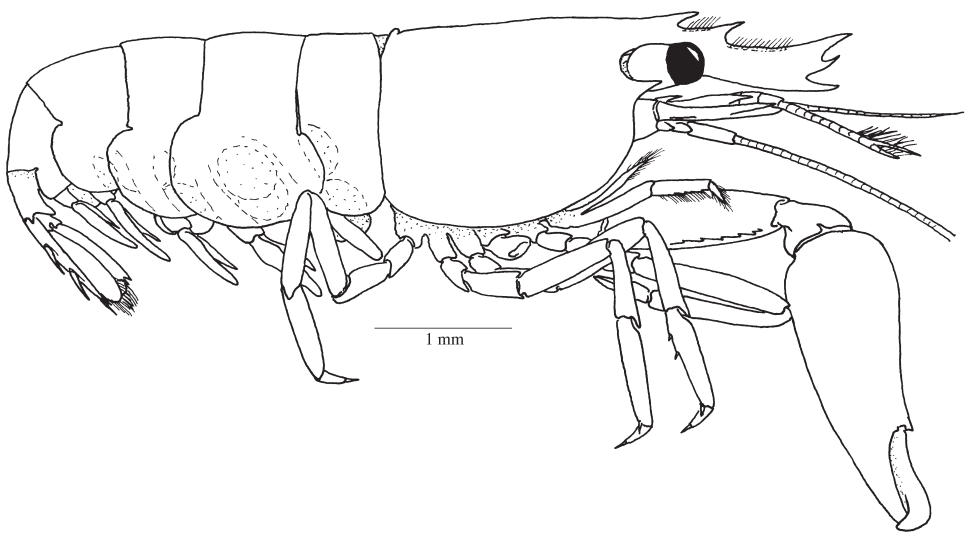

Fig. 16. *Poripontonia cornuta* spec. nov: female holotype, pocl 2.5 mm (RMNH D 51753), lateral view.

Eyes hemispherical, well pigmented; without discernible accessory pigment spot.

Antennules (figs 17f, e) well developed; basal segment twice as long as wide, with long sharp distolateral process, exceeding distal margin of intermediate segment, with

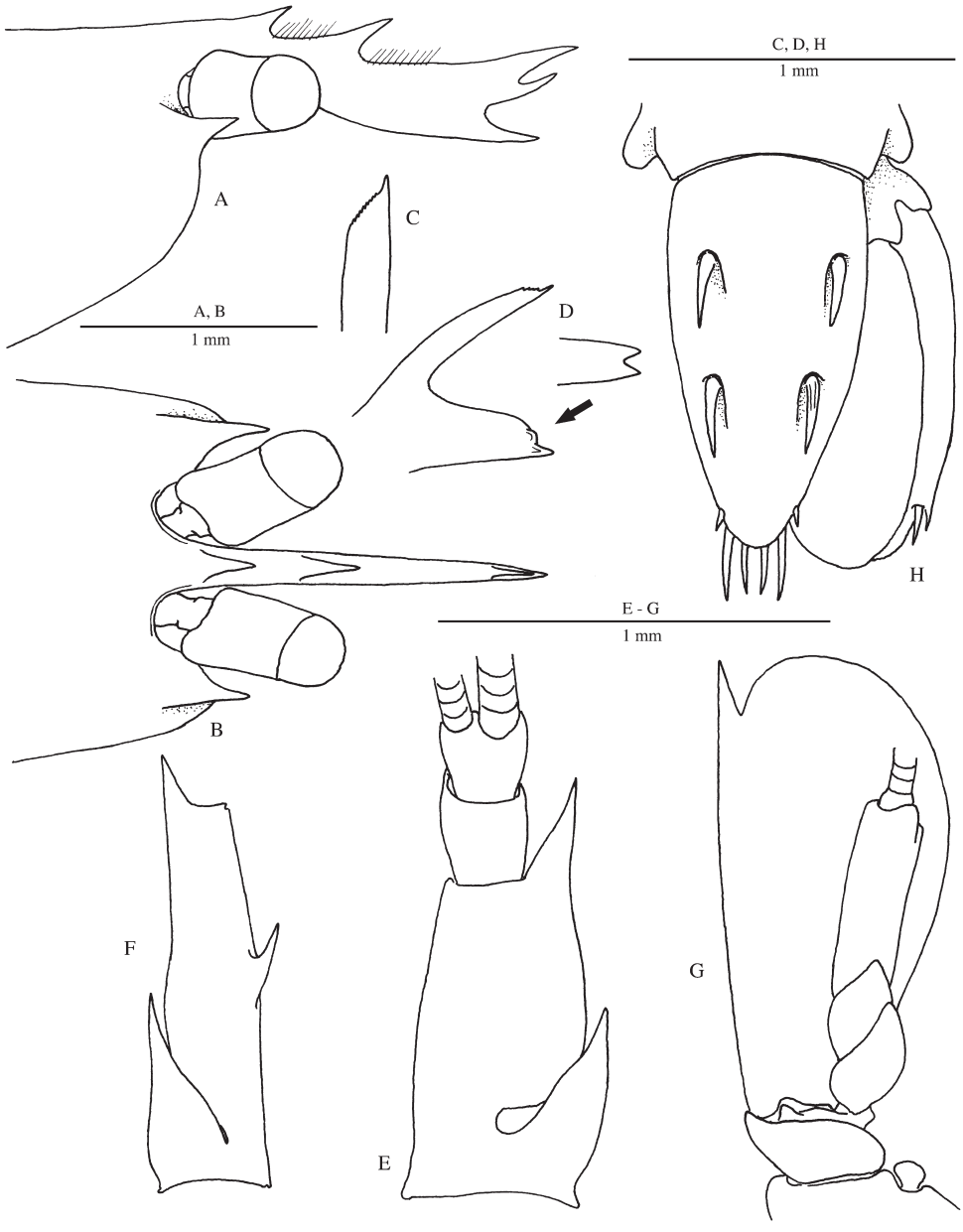

Fig. 17. *Poripontonia cornuta* spec. nov: female holotype, pocl 2.5 mm (RMNH D 51753). A, anterior part of carapace and rostrum, lateral aspect; B, same, dorsal aspect; C, distal part of incisor process of mandible; D, mandible; E, antennula; F, same, basal segment, lateral aspect; G, antenna; H, telson and uropod.

well developed sharp medial ventral tooth situated at middle of segment; stylocerite short and sharp, reaching middle of segment; intermediate and distal segments with equal length and width; upper flagellum biramous, with shorter ramus with nine segments, eight or nine groups of aesthetascs present.

Antenna (fig. 17g) with short unarmed basicerite; merocerite and ischiocerite normal; carpocerite slender, about three times longer than wide, not exceeding scaphocerite; scaphocerite well developed, about twice longer than broad, with sharp distolateral tooth, blade with concave lateral margin.

Thoratic sternites unarmed.

Mouthparts typical for the genus. Mandible (fig. 17d) without palp; molar process slender, with bifurcated distoventral margin; incisor process slender, tapering distally, with six small distal teeth (fig. 17c). Maxillula with bilobed palp, lower lobe larger than upper, with single simple seta; upper lacina broad, with numerous stout spines; lower lacina tapering, with long setulose setae distally. Maxilla with well developed palp and scaphognathite; with two broad endites bearing setulose long setae, upper endite larger than lower. First maxilliped with well-developed exopod and caridean lobe, stout rounded palp and bilobed epipod; basal endite well developed, medial margin with numerous setulose setae; coxal endite reduced. Second maxilliped with well developed broad exopod, triangular epipod present; distal segment narrow, convex, strongly spinose along medial margin. Third maxilliped with well developed exopod, distinctly rounded epipod; fused ischio-merus and basal segments, combined segment about five times as long as wide, with slender setae along median margin; penultimate segment about three times as long as wide, with serratulate spines; ultimate segment shorter than penultimate segment, tapering, with several groups of serratulate spines.

First pereiopod (fig. 18a) normal, with slender unarmed segments, exceeding antennular peduncle by carpus and chela; fingers (fig. 18b) slender, with acute hooked tips and entire cutting edges; chela subcylindrical, about twice as long as deep and subequal to finger length; carpus about 6 times longer than wide; merus as long as carpus; ischium about three times as long as wide, basal segment twice as long as wide, unarmed; coxa without ventromedial process.

Only left second pereiopod present; dactylus (fig. 18e) about 2.5 times as long as wide and twice shorter than palm length, with entire cutting edge and feebly marked proximal tooth; fixed finger as long as dactylus, tapering, with entire cutting edge and well developed proximal tooth; palm (fig. 18c, d) smooth and compressed, about twice as long as its maximum depth, with margins straight; carpus with two lobes, inner lateroventral lobe larger than anterolateral lobe; merus serrated ventrally, about twice as long as wide; ischium 2.5 times as long as wide, with small tubercles along distoventral margin.

Ambulatory pereiopods subequal in size, third pereiopod slightly longer than fourth and fifth. Third pereiopod (fig. 18f) with robust segments; ischium about 2.5 times as long as wide; merus about 3.5 times as long as wide; carpus 2.5 times as long as its maximum width; propodus about three times as long as wide, tapering distally, with distolateral spine and two small spines in proximal half of its ventral margin; dactylus long, slender and curved, about half length of propodus, with sharp curved unguis, without accessory tooth. Fourth and fifth pereiopods with similar proportions of segments; propodus of the fifth pereiopod without ventral spines, with two rows of setae distally.

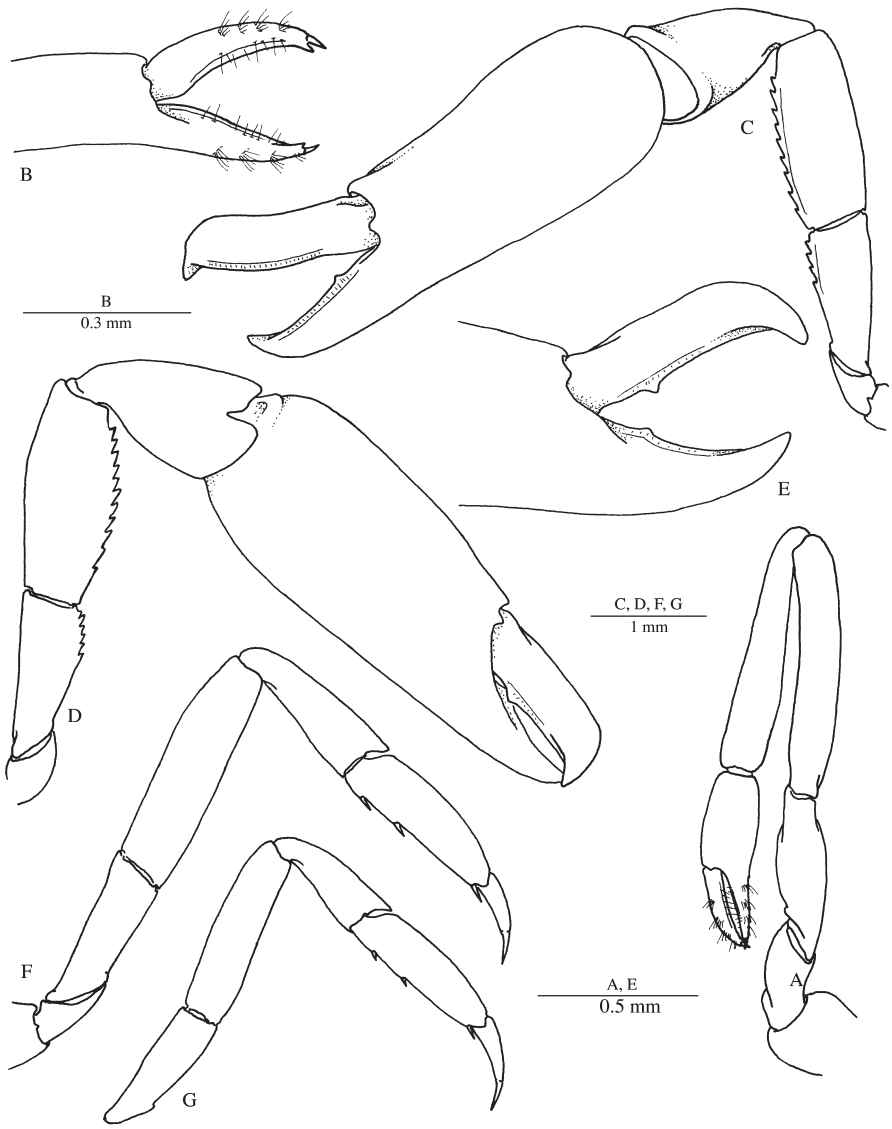

Fig. 18. *Poripontonia cornuta* spec. nov: female holotype, pocl 2.5 mm (RMNH D 51753). A, first pereiopod; B, chela of first pereiopod; C, D, left second pereiopod, outer view; E, dactylus of left second pereiopod; F, third pereiopod; G, fourth pereiopod.

Uropods with exopod about two times longer than broad, lateral margin convex, with well developed sharp distolateral tooth and spine; endopod equal to exopod.
Total body length of specimen about 8.5 mm. Fifteen large eggs (0.8 X 0.5 mm) observed under abdomen.

Colouration in life.— Body and appendages whitish, covered with tiny red chromatophores.

Etymology.— The name refers to unusual form of the rostrum; *cornu* [us, n], Latin for horn; *cornutus* [a, n] - horned.

Distribution.— Known from the type locality only.

Systematic position.— The species is clearly different from the other species of the genus, *P. dux* Fransen, 2003, by the short stout rostrum with a more slender curved upward tip, with more slender distal dorsal and ventral teeth; the concave lateral margin of the blade of the scaphocerite, and the long dorsal non-marginal spines on the telson. *Poripontonia cornuta* **spec. nov**. is probably a smaller species than *P. dux*.

The discovery of the second species of the genus *Poripontonia* shows that the strange form of the rostrum is typical for the genus and "is not a result of damage followed by partial regeneration" (Fransen, 2003). The shape of the rostrum in the genus *Apopontonia*, especially in *A. falcirostris* (fig. 1a) similar to that of the genus *Poripontonia that* could indicate a close phylogenetic relationship of these genera or morphological convergence of the groups living in similar ecological niches. Nevertheless, genus *Apopontonia* can be clearly distinguished from *Poripontonia* by the presence of supraocular tooth and a well-marked orbital fossa (fig. 1a, b) and biunguiculate dactylus (fig. 1f).

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