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A new pontoniine shrimp (Crustacea: Decapoda: Palaemonidae) from the Ryukyu Islands, Japan

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An unusual new genus and species of pontoniine shrimp, *Nippontonia minirostris* gen. nov., sp. nov., from a sponge host from the Ryukyu Is., Japan, is described and illustrated. The new genus appears not to be closely related to any of the previously described genera. The genus is particularly remarkable for the morphology of the fixed finger of the minor second pereiopod, which is without parallel in the Palaemonidae.

KEYWORDS: Crustacea, Decapoda, Palaemonidae, Pontoniinae, *Nippontonia minirostris* gen. nov., sp. nov., taxonomy, Indo-West Pacific, sponge associate

Introduction

Through the kindness of Keiichi Nomura, of the Kushimoto Marine Park Center, it has been possible to examine some interesting pontoniine shrimps collected during the course of a survey of the marine fauna of the Kerama Is. group, Ryukyu Is. On examination these shrimps could not be referred to any known genus and are now described as new. They represent the only presently known genus of pontoniine shrimp 'endemic' to the Japanese fauna and raise to thirty five the number of pontoniine genera now known from Japan, and add yet another monospecific genus to the Pontoniinae.

Carapace length (CL) refers to the postorbital carapace length.

Nippontonia gen. nov.

Diagnosis

Very small pontoniine shrimps of subcylindrical, vermiform body shape. Carapace smooth, glabrous, with rostrum greatly reduced, almost obsolete, without epigastric, supraorbital, hepatic or antennal spines, orbit obsolete, inferior orbital angle obsolescent, anterolateral angle rounded. Abdomen smooth, glabrous, pleura rounded, posterlateral angle of sixth segment bluntly rounded. Antennule with short stylocerite, statocyst without statolith; flagella short, upper ramus with shorter flagellum single segmented. Antenna with basicerite unarmed, scaphocerite well developed, aciculate, lamella obsolete. Eye well developed, elongate, subcylindrical, cornea very oblique. Mandible without palp; molar process greatly reduced; incisor process large, expanded, multidentate. Maxillula with feebly bilobed palp. Maxilla

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normal, with simple palp, basal endite simple, coxal endite obsolete. First maxilliped with simple palp, basal and coxal endites feebly separate, broad, exopod with reduced flagellum, caridean lobe elongate, narrow, epipod small, suboval. Second maxilliped with normal endopod, dactylar segment narrow, exopod well developed, epipod small, suboval, without podobranch. Third maxilliped normal, ischiomerus fused to basis, broad, exopod well developed, coxa with elongate lateral plate, without arthrobranch. Thoracic sternites narrow, unarmed. First pereiopod robust, chela with fingers subspatulate, distally tridendate. Second pereiopods well developed, unequal, dissimilar; major chela fingers without molar process and fossa; minor chela with microtuberculate cutting edges of fingers; carpo-propodal articulation preterminal, carpus dorsally deeply excavate. Ambulatory pereiopods normal, dactyls with accessory denticles, without basal process. Uropod with protopodite unarmed; exopod distolaterally strongly dentate, with large mobile spine. Telson with two pairs of dorsal spines, three pairs of posterior spines. Associated with Porifera.

Type species

Nippontonia minirostris sp. nov.

Systematic Position

The new genus is most remarkable for the following features: the obsolescent rostrum, the acicular scaphocerite, the marked reduction of the molar process and expansion of the incisor process of the mandible, the tridendate tips of the fingers of the first pereiopod, the preterminal articulation of the carpus and propod of the second pereiopods, the tuberculate cutting edges of the fingers of the minor second periopod, and the strongly dentate distolateral margin of the exopod of the uropod. In combination these features readily distinguish *Nippontonia* from all other pontoniine genera so far described.

With the above suite of characters, *Nippontonia* does not appear particularly closely related to any of the known pontoniine genera. However, many of these features may be found to occur in isolation in several other disparate genera. Thus, the marked reduction of the rostrum may be found in some species of *Onycocaris* or in *Paratypton*; the reduced molar process and expanded incisor process of the mandible in *Hamopontonia boschmai*, the tridentate finger tips of the first pereiopod chela are similar in *Epipontonia spongicola*; the preterminal articulation of the carpus and propod of the second pereiopods in *Ischnopontonia lophos*, and the strongly dentate distolateral margin of the exopod of the uropod in *Anapontonia denticauda*. The acicular scaphocerite and the tuberculate plates along the cutting edges of the fingers of the minor second pereiopod appear to be autapomorphic characters in the Pontoniinae, although the former shows a marked resemblance to the condition found in many species of *Synalpheus*, also sponge associates and, to a much lesser extent, in *Onycocaridella stenolepis*, which also has a greatly reduced rostrum (Holthuis, 1952). However, in the latter species, the mandible is of totally different configuration, with a reduced incisor process and an enlarged molar process, indicating no close relationship. The tuberculation of the fingers of the minor second pereiopod is also unique, but the cutting edges of this appendage in *Orthopontonia ornatus* are tuberculate, but without sharp edges and with sparse transversely orientated oval tubercles crowned with transverse ridges (Bruce, 1982).

Etymology

From *Pontonia*, a generic name first used for a pontoniine shrimp by Latreille (1829), and *Nippon*, a former name of Japan, a reference to the country of first collection. Gender, feminine.

Remarks

The preterminal articulation of the carpus and propod of the second pereiopods, with the characteristic deeply excavate distal carpus, found in common with *Ischnopontonia lophos*, suggest that the chelae are carried in a semi-extended attitude, as in that species. This appears to be an adaptation to backward and forward movement in a very confined space, in the narrow spaces between the corallites of *Galaxia fascicularis* in the case of the latter.

Nippontonia minirostris sp. nov.
(Figs 1–8)

Types

The only ovigerous female is selected as the holotype and the dissected male as allotype, both deposited in the collection of the Natural History Museum and

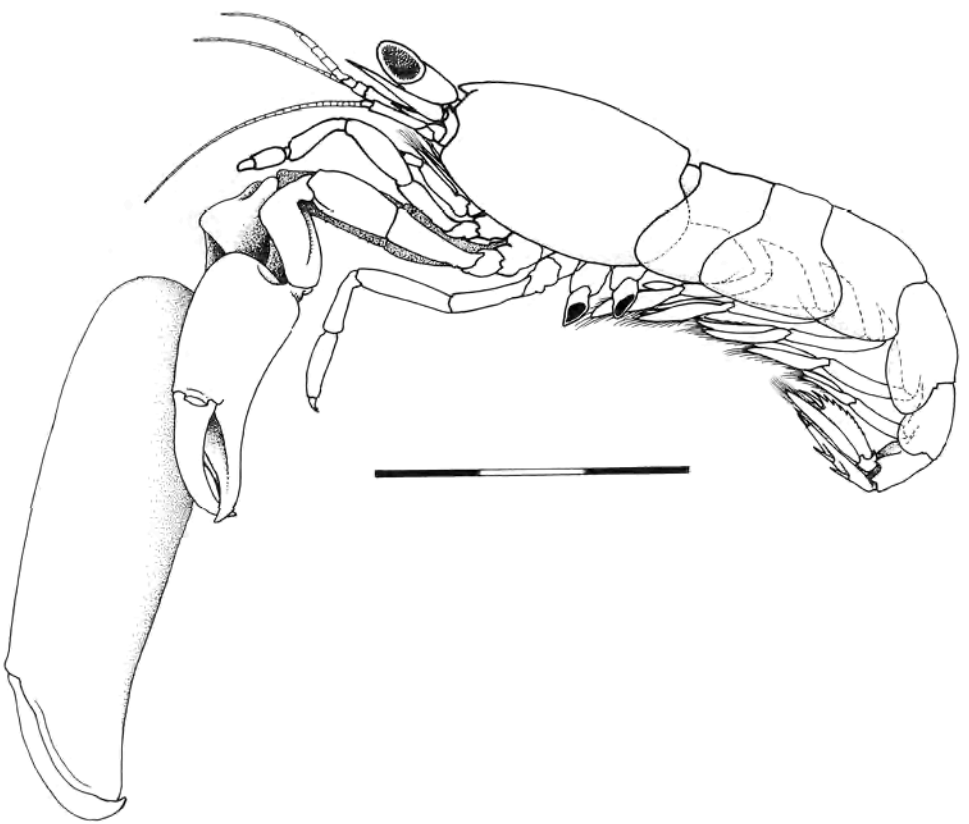

FIG. 1. *Nippontonia minirostris* gen. nov., sp. nov., female paratype, Aka-jima, Ryukyu Is., Japan. Scale bar in mm.

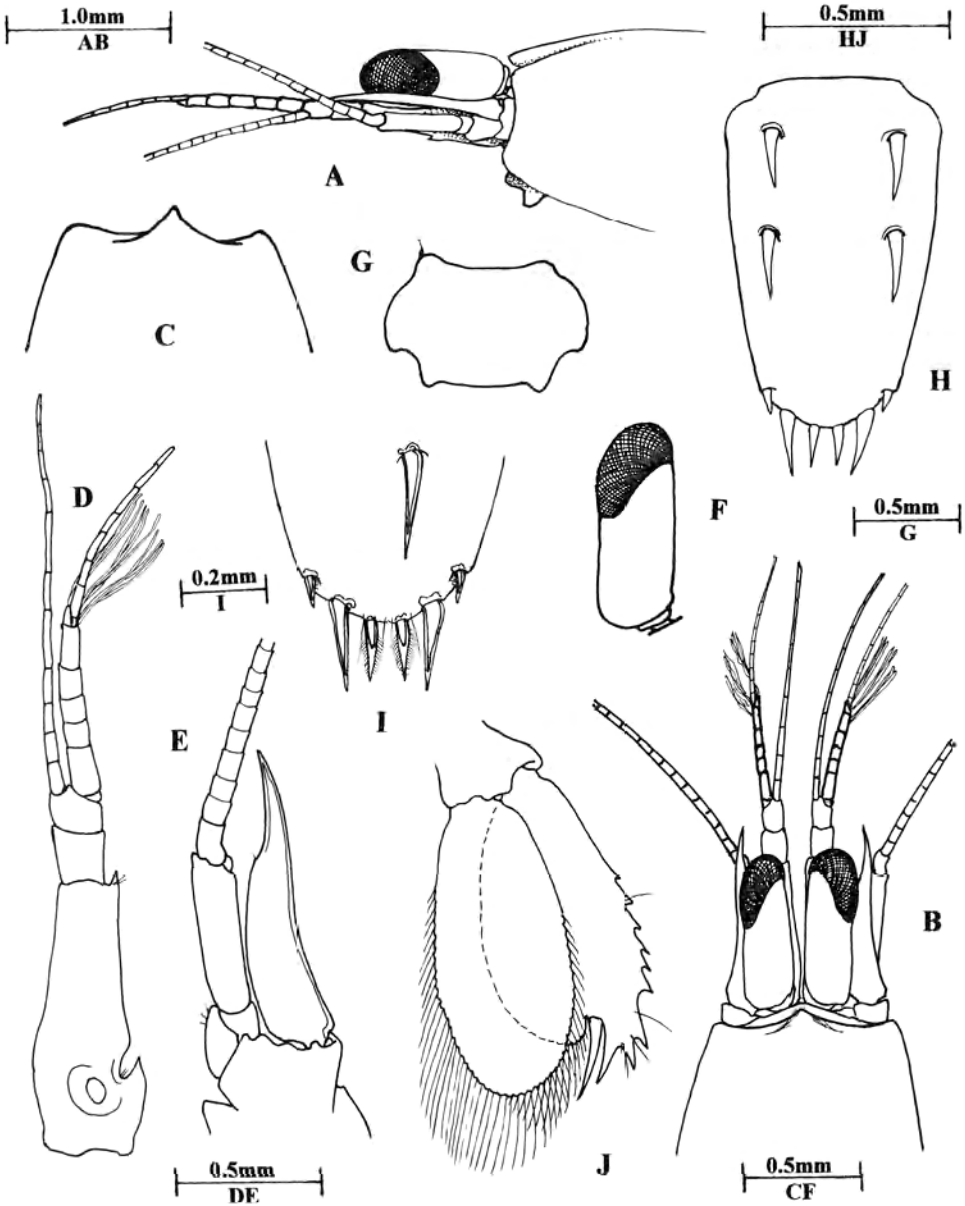

FIG. 2. *Nippontonia minirostris* gen. nov., sp. nov., paratype female: (A) anterior carapace, eyes and antennae, lateral; (B) same, dorsal; (C) rostrum, dorsal; (D) antennule; (E) antenna; (F) eye, dorsal; (G) sixth abdominal segment, dorsal; (H) telson; (I) same, posterior spines, dorsal spine inset; (J) uropod.

Institute, Chiba, Japan, catalogue numbers CBM-ZC3443, 3444. The remaining specimens are paratypes and deposited in the collections of the National Natuurhistorisch Museum, Leiden, (D.47746); National Museum of Natural History, Washington, (USNM 266465); Queensland Museum, Brisbane, (W.21904, 21905) or retained in the author's collection.

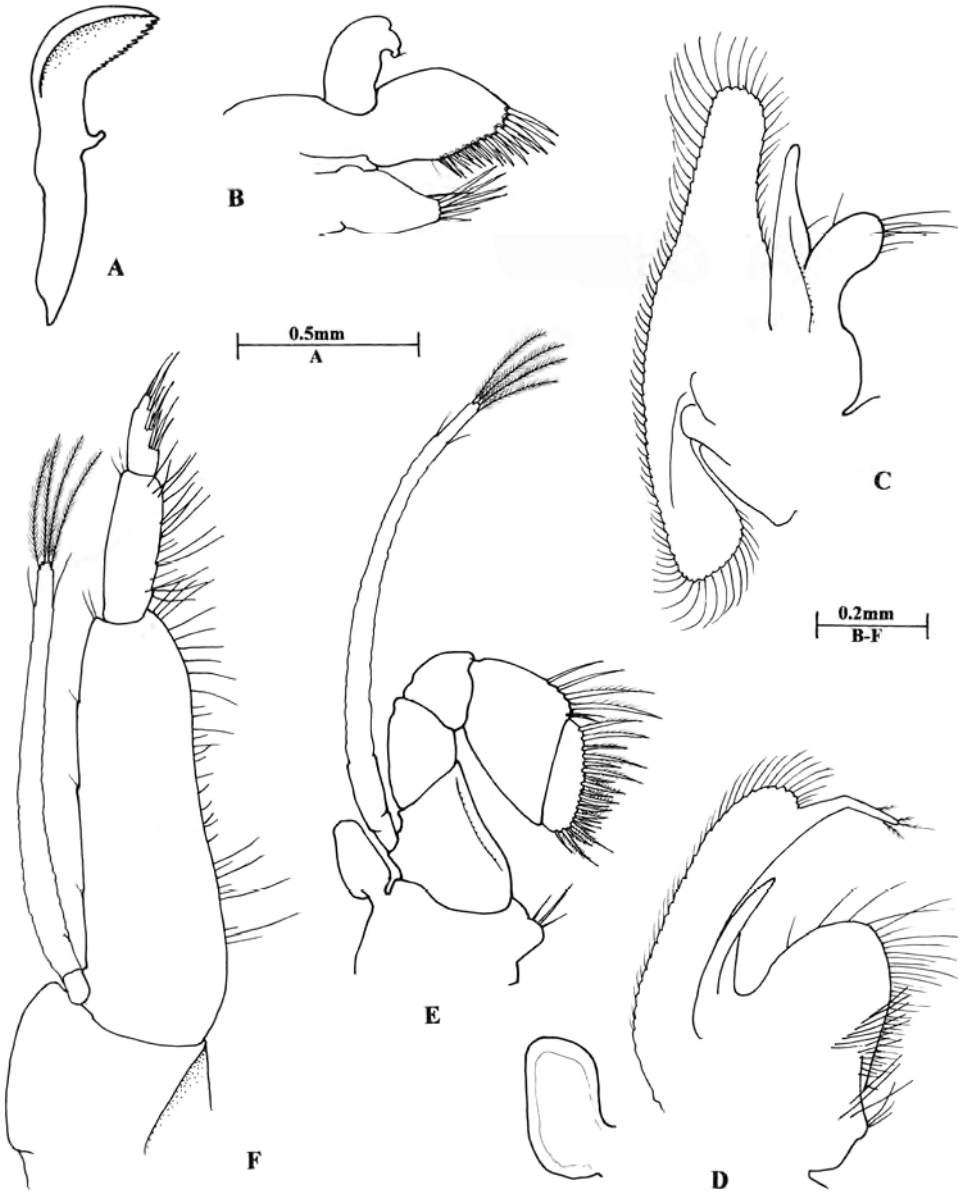

FIG. 3. *Nippontonia minirostris* gen. nov., sp. nov., paratype female: (A) mandible; (B) maxullula; (C) maxilla; (D) first maxilliped, epipod detached in dissection; (E) second maxilliped; (F) third maxilliped.

Material examined

Stn YMP-1231, Nishihama, Aka-jima, Kerama group, Ryukyu Is., Japan, 15 m, 22 April 1994, coll. K. Nomura, 9 spms (1 ovig. ♀).

Description

A very small sized, slender pontoniine species, of subcylindrical, vermiform body shape.

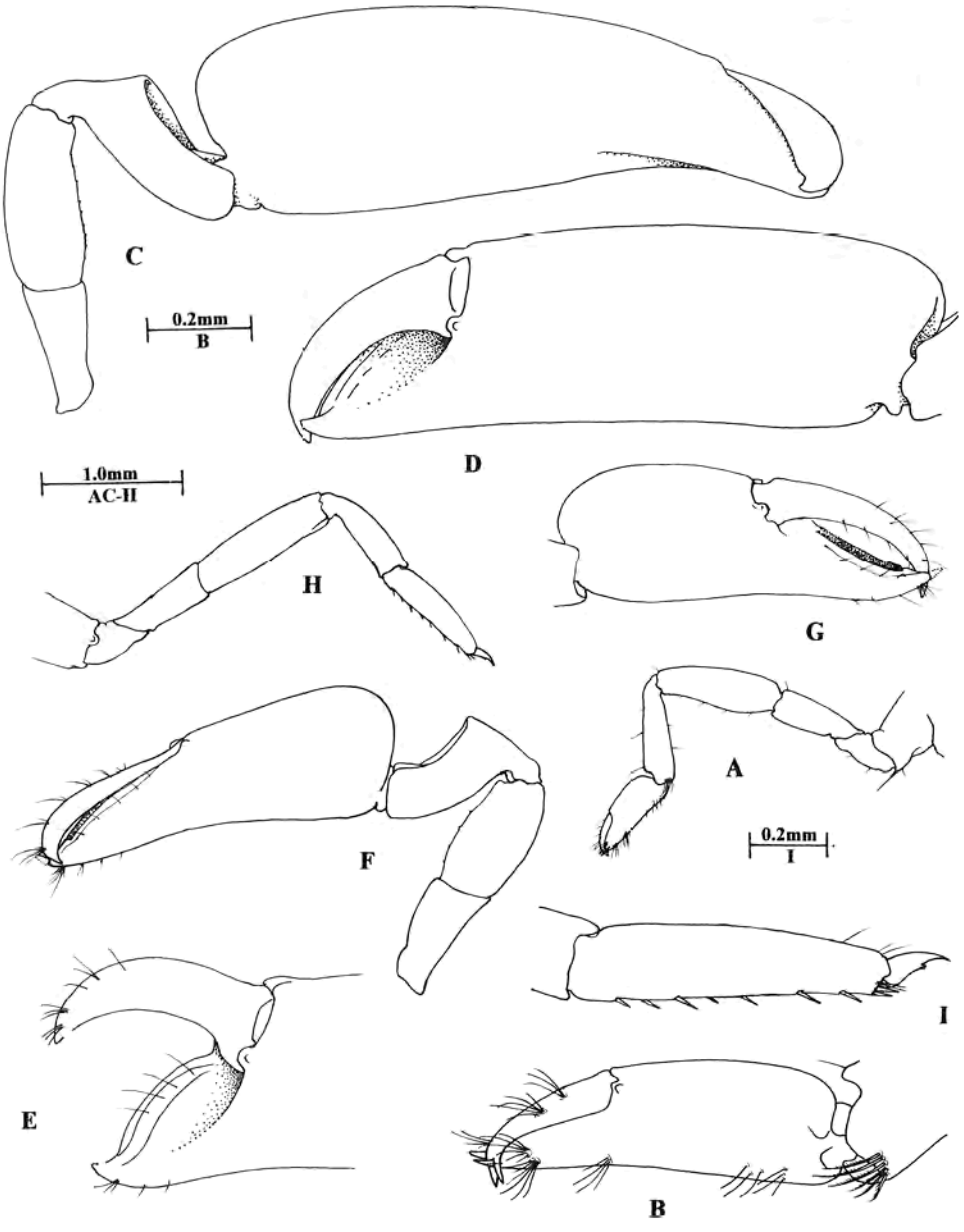

FIG. 4. *Nippontonia minirostris* gen. nov., sp. nov., paratype female: (A) first pereiopod; (B) same, chela; (C) major second pereiopod; (D) same, chela; (E) same fingers; (F) minor second pereiopod; (G) same, chela; (H) third pereiopod; (I) same, propod and dactyl.

Rostrum (Fig. 2a–c) greatly reduced, triangular in dorsal view, blunt in lateral view, without dorsal and ventral carinae, broad lateral carinae, edentate, not concealing ophthalmic segment; carapace smooth, glabrous, orbit and inferior orbital angle obsolete, supraorbital, epigastric, antennal and hepatic spines absent, anterolateral angle of branchiostegite bluntly rounded.

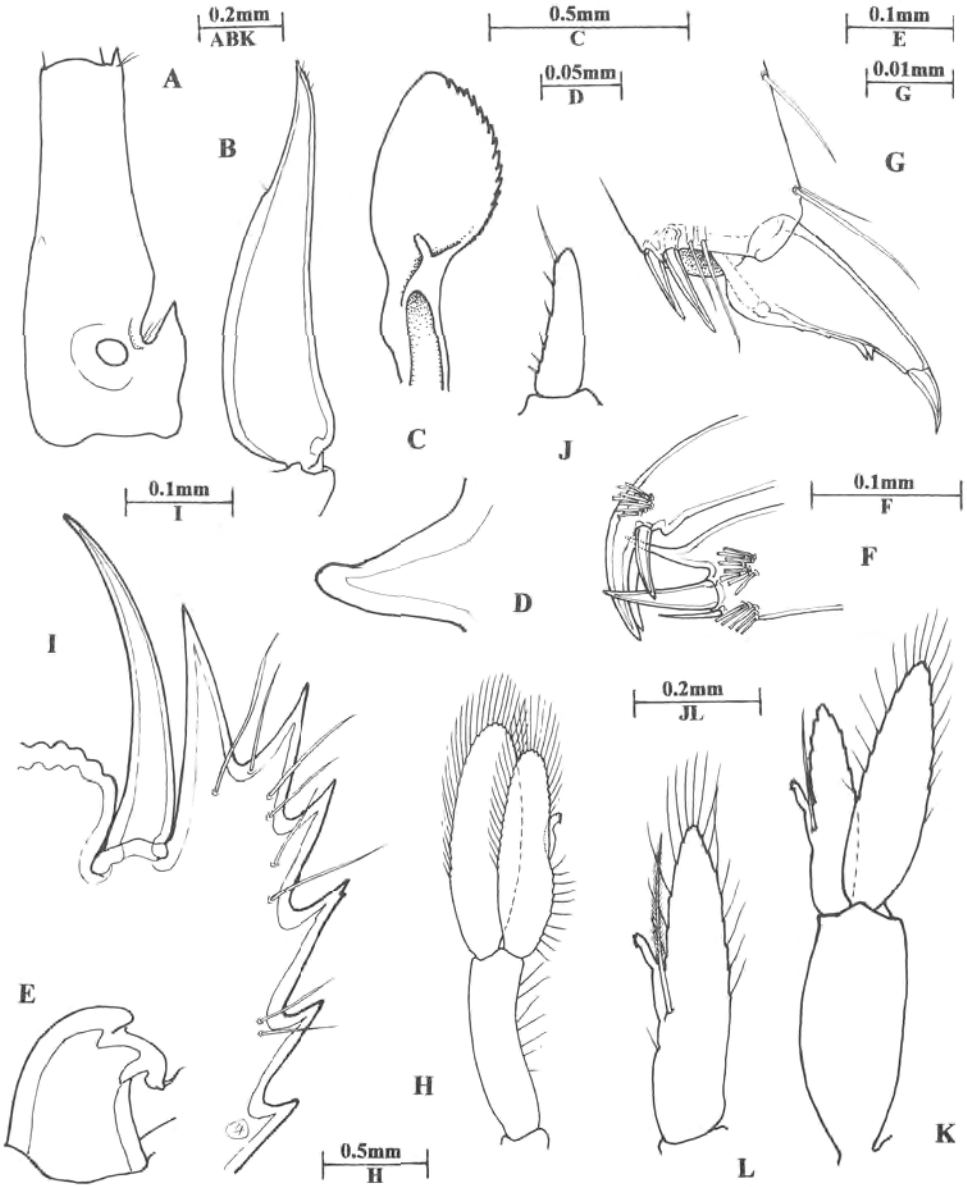

FIG. 5. *Nippontonia minirostris* gen. nov., sp. nov., paratype female: (A) antennular peduncle, proximal segment; (B) scaphocerite; (C) mandible, incisor process; (D) same, molar process; (E) maxillula, palp; (F) first pereiopods, fingers; (G) third pereiopod, distal propod and dactyl; (H) second pleopod; (I) exopod of uropod, posterolateral angle. Allotype male: (J) first pleopod, endopod; (K) second pleopod; (L) same, endopod.

Abdomen smooth, about 1·5 × longer than carapace length, glabrous, third tergite not posterodorsally produced, pleura small, all broadly rounded, sixth segment (Fig. 2g) slightly longer than fifth, about 1·75 × longer than wide, 0·25 of carapace length, posteroventral angle small, bluntly produced, posterlateral angle larger, bluntly produced. Telson (Fig. 2h) about 1·8 × sixth segment length,

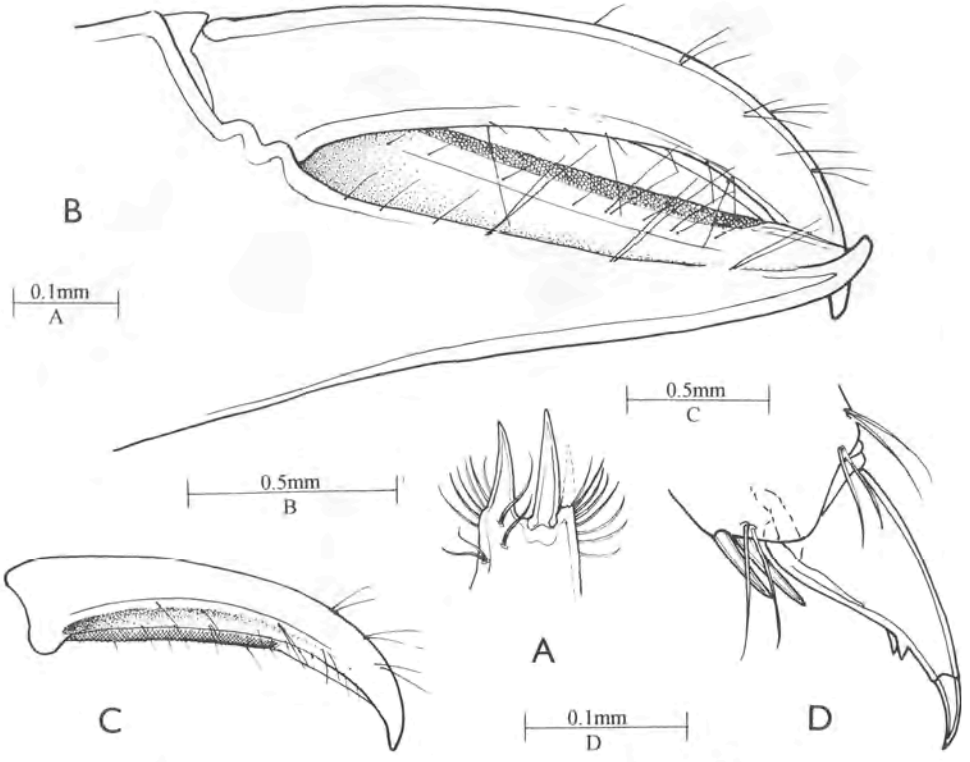

FIG. 6. *Nippontonia minirostris* gen. nov., sp. nov., paratype female: (A) first pereiopod, chela, distal fixed finger; (B) minor chela, fingers, lateral; (C) same, dactylus; (D) third pereiopod, distal propod and dactyl.

1·65 × longer than anterior width, lateral margins feebly convex, convergent, with two pairs of large dorsal spines, about 0·2 of telson length, at about 0·15, 0·45 of length, posterior margin (Fig. 2i) about 0·65 of anterior width, angular, broadly convex, without median point, lateral spines small, subdorsal, about 0·4 of dorsal spine length, intermediate spines stout, slightly shorter than dorsal spines, submedian spines robust, setulose, about 0·65 of intermediate spine length.

Antennular peduncle normal (Fig. 2d), extending well beyond anteroverted cornea, proximal segment (Fig. 5a) slender, about 2·4 × longer than proximal width, with small acute ventromedial tooth, distolateral angle with small stout acute lateral tooth, statocyst without statolith, stylocerite short, acute, reaching to about 0·3 of segment length, intermediate and distal segments normal, short, combined lengths about 0·3 of proximal segment length, upper flagellum with proximal five segments of rami fused, shorter free ramus single segmented, with 3 groups of aesthetascs, longer ramus and lower flagellum short, slender, filiform.

Antenna (Fig. 2e) with basicerite unarmed, carpocerite not exceeding proximal segment of antennular peduncle, about 3·5 × longer than central width, reaching to about 0·6 of scaphocerite length, flagellum well developed; scaphocerite (Fig. 5b) about 5·0 × longer than proximal width, lateral margin sinuous, with very strong distolateral tooth, far exceeding carpocerite, anteroverted cornea, reaching to distal end of intermediate segment of antennular peduncle, lamella obsolete, medial margin non-setose.

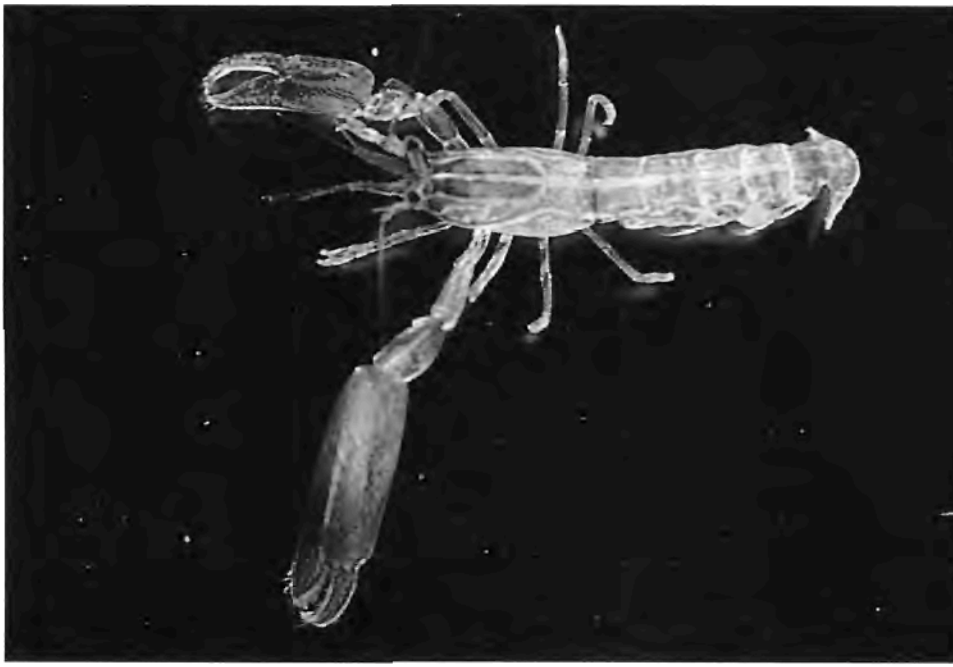

FIG. 7. *Nippontonia minirostris* gen. nov., sp. nov., from colour transparency by Mr K. Nomura, (YMP-1231).

Eye (Fig. 2f) well developed, about 0·4 of carapace length, with large very oblique globular cornea, occupying half the length of lateral aspect of peduncle, diameter about 0·5 of peduncle length, without accessory pigment spot, stalk subcylindrical, flattened medially, about 2·1 × longer than wide, 1·2 × longer than corneal length.

Mouthparts protuberant. Mandible (Figs 3a, 5c) without palp; molar process (Fig. 5d) greatly reduced, obsolescent, without teeth or setae; incisor process well developed (Fig. 5c), expanded, markedly scaphoid, with about 20 small acute teeth marginally, decreasing in size proximally. Maxillula (Fig. 3b) with feebly bilobed palp, lower lobe with single small simple seta (Fig. 5e), laciniae normal, spinose. Maxilla (Fig. 3c) with slender tapering simple palp, basal endite simple, bluntly rounded, sparsely setose, coxal endite obsolete, scaphognathite normal, narrow, 4·0 × longer than wide, with slender anterior lobe. First maxilliped (Fig. 3d) with slender simple non-setose palp, basal endite broad, rounded, sparsely setose, coxal endite distinct, feebly setose, exopod with flagellum reduced, caridean lobe narrow, elongate, epidpod small, simple. Second maxilliped (Fig. 3e) with endopod of normal form, dactylar segment narrow, densely spinose, exopod well developed with four plumose terminal setae, coxa medially produced, with few simple spines, epipod small simple, without podobranch. Third maxilliped (Fig. 3f) with endopod reaching to about one third of proximal segment of antennular peduncle, ischiomerus and basis completely fused, combined segment broad, flattened, about 3·1 × longer than proximal width, tapering slightly distally, medial margin feebly setose, penultimate segment subcylindrical, 3·0 × longer than central width, about 0·35 of antepenultimate segment length, medially setose, terminal segment about 0·5 of penultimate

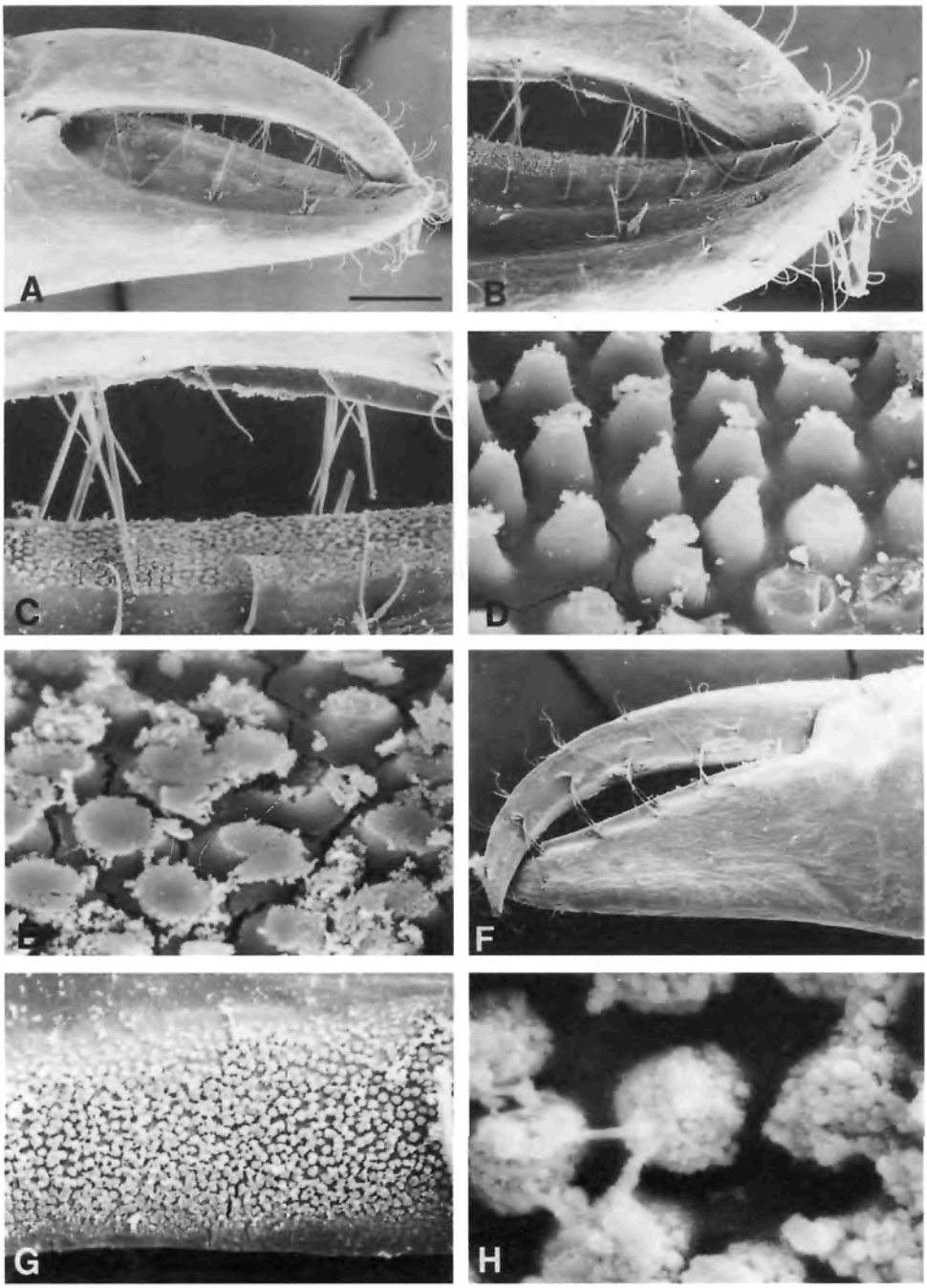

FIG. 8. *Nippontonia minirostris*, gen. nov., sp. nov., paratype female: (A) fingers, minor chela, lateral; (B) same, tips of fingers; (C) tubercle field (below) on cutting edge of propodal finger; (D) same, conical tubercles; (E) same, flat-topped tubercles; (F) fingers of minor chela, medial; (G) same, field of rounded tubercles from distal part of dactylar finger; (H) same, rounded tubercles at higher magnification. Scale bar (in Fig. A) is 250 μm, equal to 118 μm in (B), 62 μm in (C), 7 μm in (D), 6 μm in (E), 250 μm in (F), 14 μm in (G), and 1 μm in (H).

segment length, tapering, spinose, exopod well developed, with four plumose terminal setae, coxal segment stout, not medially produced, with elongate low epipod laterally, without arthrobranchs. Paragnath lost in dissection.

Thoracic sternites very narrow, unarmed.

First pereiopods slender (Fig. 4a), robust, merus reaching to distal end of carpocerite, chela (Fig. 4b) with palm subcylindrical, moderately compressed, about 2·0 × longer than deep, tapering slightly distally, fingers slender, compressed, about 0·7 of palm length, tips acute, tridentate, central tooth robust, articulate, dactylus strongly hooked, fixed finger with teeth projecting distally (Fig. 6a), cutting edges poorly developed, entire, laterally situated; carpus about 1·1 × chela length, subcylindrical, about 3·5 × longer than distal width; merus distinctly longer than carpus, about 1·4 times chela length, swollen proximally, 3·0 × longer than maximal width; ischium about 0·75 of merus length; basis normal; coxa with small setose ventral lobe.

Second pereiopods markedly unequal, dissimilar (Fig. 4c–f); major chela (Fig. 4d) about 1·9 × carapace length, chela with palm smooth, non-setose, subcylindrical, slightly compressed distally, about 2·5 × longer than central width, slightly swollen proximally, fingers (Fig. 4e) robust, about 0·35 of palm length, dactyl stout, curved, with acute tip, cutting edge concave, blunt, without teeth, about 4·0 × longer than deep, fixed finger as wide as long, broadly concave with stout lateral entire cutting edge, stout acute tip; carpus articulating preterminally with propod, length about 0·45 of palm length, distally expanded, dorsal aspect deeply excavate, enveloping proximal end of propod, unarmed; merus about 0·85 of carpus length, equal to 0·4 of palm length, unarmed, 2·4 × longer than central width, with about 20 minute tubercles ventrally; ischium about 0·7 of merus length, 2·0 × longer than distal width; basis and coxa robust, without special features. Minor chela (Fig. 4g) smooth, non-setose, slightly longer than carapace length, 0·55 of the major chela length; palm about 1·5 × longer than central width, compressed, fingers (Figs 6b, 8a, 8f) gaping, about 0·9 of palm length, dactyl (Figs 6c, 8a) slender, curved, about 4·8 × longer than proximal width, tapering, distally acute, crossing medially to tip of fixed finger (Fig. 8b), cutting edge uniformly concave, without teeth, laterally smooth, distally sharp, medially with proximal half with coarsed flat topped tubercles, distal half densely covered with minute rounded tubercles (Fig. 8f, g), many covered with minute granules (Fig. 8h), possibly adventitious accretions; fixed finger scaphoid, about 1·8 × longer than proximal width, tip acute, cutting edge sinuous, sharp, but less so than on dactylus, except on distal 0·15 of length, densely tuberculate laterally (Fig. 8c), proximal third with tubercles acute, conical (Fig. 8d), with tendency to lie in transverse rows in central region, central third with tubercles longitudinally carinate for first three or four rows adjacent to cutting edge, those below flat topped (Fig. 8e), distal third with tubercles flat topped; carpus, merus and ischium similar to major chela.

Ambulatory pereiopods slender; third pereiopod (Fig. 4h) exceeding carpocerite by propod and dactyl, with dactyl (Fig. 5g) slender, about 0·2 of propod length, compressed, corpus about 2·0 × longer than proximal depth, curved, tapering strongly distally, dorsal margin convex, ventral margin concave, with one or two small acute teeth (Fig. 6d) at about 0·75 of ventral margin length, slightly off-set, with minute acute denticles more proximally, unguis distinct, about 0·3 of corpus length, curved acute, unarmed; propod (Fig. 4i) about 0·33 of carapace length, 4·0 × longer than proximal depth, tapering slightly distally, sparsely setose, ventral border with seven well developed slender spines, slightly off-set, with similar pair of distoventral spines

(Fig. 5g), carpus 0·8 of propod length, unarmed; merus 1·2 × propod length, unarmed; ischium 0·75 of propod length, unarmed, basis and coxa normal. Fourth and fifth pereiopods similar to third, with reduced spinulation on propods and dactyls.

Female pleopods (Fig. 5h) normal, rami slightly broadened. Male first pleopod with endopod (Fig. 5j) 3·5 × longer than wide, tapering distally to rounded tip, lateral margin non-setose, medial margin without accessory lobe, with five short spinules proximally, single subterminal distal spine. Second pleopod (Fig. 5k) with appendices of endopod at about 0·45 of medial margin length; appendix masculina with corpus reduced, with single long robust, setulose distal spine, reaching to end of ramus, appendix interna, with few distal cincinnuli, reaching to 0·6 of ramus length.

Uropod (Fig. 2j) with protopod unarmed; rami extending far beyond posterior margin of telson; exopod about 1·9 × longer than wide, lateral margin with distolateral angle strongly produced (Fig. 5i) with three large acute teeth, with very large curved, mobile spine medially, far exceeding distal end of ramus, with six smaller teeth along distal lateral border, dieresis obsolete; endopod about 1·1 × exopod length, about 2·2 × longer than wide.

Measurements

The holotype female has a CL of 2·2 mm. The dissected paratype female has a CL of 2·5 mm and a total body length *ca.* 7·2 mm, with the major second pereiopod chela 5·6 mm and minor 2·7 mm. The allotype male has a CL of 1·9 mm with the major second pereiopod chela 4·2 mm and the minor 2·1 mm. Length of ovum, 0·62 mm.

Coloration

(From transparency). Semi-transparent, with dorsal carapace and abdomen rusty red-brown, with narrow whitish median line throughout length, with similar lines along upper border of branchiostegite and across posterior margin of each abdominal segment dorsally. Antennae, branchiostegite, caudal fan and pereiopods mainly transparent; first pereiopod with carpus red-brown, second pereiopods with fingers red-brown, otherwise feebly speckled with small red chromatophores. Eyestalk red-brown, with pale longitudinal lines dorsally.

Host

All specimens were obtained from a single unidentified black sponge.

Etymology

From *rostrum* (Latin). a beak, *and minor* (Latin), smaller.

Remarks

The minor second pereiopod presents a remarkable appearance, quite without parallel amongst the diverse forms of this appendage found in the Pontoniinae. The minutely tuberculate cutting edges of the fingers must enable the shrimp to obtain a very secure grip on the objective of this wrench-like mechanism, if that is its purpose. The flat topped tubercles may represent worn down tubercles. The aggregations of more minute granules on some of these dactylar tubercles are assumed to be bacteria or similar micro-organisms, but might be a flocculent precipitate resulting

from preservation or subsequent treatment. However, their presence on the crown of tubercles and almost complete absence between tubercles is surprising.

Acknowledgements

We are most grateful to Mr Keiichi Nomura for the opportunity to examine these interesting shrimps. This report is Contribution No. 55 of the USL Laboratory for Crustacean Research.

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