A new genus and species of deep-water pontoniine shrimp (Decapoda, Caridea, Palaemonidae) from Taiwan

Masako MITSUHASHI
Tin-Yam CHAN
Institute of Marine Biology, National Taiwan Ocean University,
2 Pei-Ning Road, Keelung (Taiwan, R.O.C.)
tychan@mail.ntou.edu.tw

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ABSTRACT
A new genus and species of pontoniine shrimp, *Patonia mclaughlinae* n. gen., n. sp., is described and illustrated based on a single ovigerous female collected at depths of 209 to 280 m, during a recent deep-sea expedition off Taiwan. This new genus differs from other Pontoniinae genera in a combination of characters: hepatic spine bearing a complete basal suture and possibly mobile, body laterally compressed, rostrum distinctly dentate along entire dorsal margin and unarmed ventrally, basal antennular segment tridentate distolaterally, and second pereiopod very slender with carpus much longer than chela.

KEY WORDS
Crustacea,
Decapoda,
Pontoniinae,
deep-water,
Taiwan,
new genus,
new species.

RÉSUMÉ
Un genre et une espèce nouveaux de crevette Pontoniinae (Decapoda, Caridea, Palaemonidae) d'eau profonde de Taiwan.
Une nouvelle espèce de crevette Pontoniinae appartenant à un nouveau genre, *Patonia mclaughlinae* n. gen., n. sp., est décrite et illustrée en se basant sur une unique femelle ovigère, récoltée entre 209 et 280 m lors d'une campagne récente en eau profonde, au large de Taiwan. Ce nouveau genre diffère des autres genres de Pontoniinae par un ensemble de caractères : épine hépatique présentant une suture basale complète et peut-être mobile, corps comprimé latéralement, rostre distinctement denté sur toute la longueur de son bord dorsal et avec un bord ventral inerme, segment basal antennulaire tridenté distolatéralement et seconds péréiopodes très grêles avec le carpe beaucoup plus long que la pince.

MOTS CLÉS
Crustacea,
Decapoda,
Pontoniinae,
eau profonde,
Taiwan,
nouveau genre,
nouvelle espèce.

INTRODUCTION

During ongoing deep-sea expeditions off Taiwan, an ovigerous female of an unusual pontoniine shrimp was collected from 209-280 m deep. Using the existing keys to the Pontoniiae Kingsley, 1878 (e.g., Chace & Bruce 1993; Holthuis 1993), this specimen keys out to *Zenopontonia* Bruce, 1975 (Chace & Bruce 1993 – hepatic spine with distinct basal suture and possibly mobile, rostrum dentate dorsally and unarmed ventrally) or *Allopontonia* Bruce, 1972 (Holthuis 1993 – hepatic spine with distinct basal suture and possibly mobile, teeth on rostrum well developed and over entire dorsal length, merus of second and third pereiopods without anteroventral tooth). However, the general appearance of the Taiwanese specimen differs considerably from both *Zenopontonia* and *Allopontonia* in the body not cylindrical (but distinctly compressed laterally) and having slender pereiopods with biunguiculate dactyli. On the other hand, the Taiwanese specimen shows close resemblance with *Periclimenes* Costa, 1844 but with the hepatic spine very large and bearing distinct basal suture. Therefore, a new genus is established for this new species. The holotype is deposited in National Taiwan Ocean University, Keelung (NTOU). The carapace length (cl) and body length (bl) are measured dorsally from the postorbital margin to the posterior border of the carapace and the telson, respectively.

SYSTEMATICS

Family PALAEMONIDAE Rafinesque, 1815
Subfamily PONTONIINAE Kingsley, 1878

Genus *Patonia* n. gen.

TYPE SPECIES. — *Patonia mclaughlinae* n. sp., by present designation.

ETYMOLOGY. — The abbreviated form of the first name of Dr Patsy A. McLaughlin, Pat, is used as prefix for this pontoniine genus. The new name is given in honor of her many important contributions to the taxonomy and phylogeny of decapod crustaceans.

DIAGNOSIS

Body moderately compressed laterally. Rostrum well developed, exceeding eye, lateral carina well marked, almost entire dorsal margin serrated with distinct teeth, some bearing basal suture; lower margin unarmed. Carapace glabrous; inferior orbital angle distinct; antennal spine submarginal; supraorbital and epigastric spines absent; hepatic spine large, with distinct basal suture and possibly mobile. Abdomen smooth, third somite not posteriorly produced, pleura rounded. Telson elongate, with two pairs of dorsal and three pairs of posterior spines. Eyes well developed. Antennule slender, anterolateral end of basal segment multidentate. Antenna bearing basicerite spine, scaphocerite well developed. Epistome unarmed. Fourth thoracic sternite without median projection. Mandible without palp. Maxillula with bilobed palp, lower lacinia slender. Maxilla with simple palp, basal endite deeply bilobed, distally setose. First maxilliped with long and slender palp, exopod with large caridean lobe, flagellum well developed, coxal endite fused with basal endite, epipod large and bilobed. Second maxilliped with normal endopod, exopod distally setose, epipod subrectangular, podobranch absent. Third maxilliped with slender endopod, ischiomerus fused with basis, arthrobranch rudimentary. All pereiopods slender. First pereiopod similar to second pereiopod but much shorter. Second pereiopods similar, segments unarmed; chela with fingers simple, closing entirely, with cutting edges unarmed; carpus longer than chela. Third to fifth pereiopods with biunguiculate dactyli; ventral margins of propodi bearing few minute spinules; meri lacking distal tooth. Uropod with protopodite unarmed posterolaterally, exopod with small distolateral spine accompanied with larger movable spine medially.

SYSTEMATIC POSITION

The large hepatic spine with a complete basal suture and possibly mobile in this new genus is remarkable amongst the subfamily Pontoniinae. Only four pontoniine genera have movable hepatic spines. They are *Dasella* Lebour, 1945, *Paranchistus* Holthuis, 1952, *Allopontonia* Bruce, 1972 and *Zenopontonia* Bruce, 1975 (see Chace & Bruce 1993; Holthuis 1993; Bruce 1994). The new genus differs from *Dasella*

FIG. 1. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm, Taiwan (NTOUM00664).

and *Paranchistus* in having the dorsal border of the rostrum entirely serrated with distinct teeth. *Dasella* and *Paranchistus* have the dorsal margin of the rostrum smooth or only armed distally. *Allopontonia* differs from the new genus in having a ventrally dentate rostrum, much stouter second pereiopod with the carpus only about 1/3 the length of the palm, and the distal two segments of the posterior pereiopods densely serrated with ventral spinules. The new genus has a laterally compressed body, whereas *Zenopontonia* has a subcylindrical body. Moreover, *Zenopontonia* also has stout second pereiopods with the carpus much shorter than the chela, and the dactyli of the posterior pereiopods terminate in a single spine.

Except for the basal suture of the hepatic spine, *Patonia mclaughlinae* n. gen., n. sp. might be placed under *Periclimenes* Costa, 1844 as defined by Chace & Bruce (1993) and Bruce (1994). *Periclimenes* now includes over 140 species and is extremely diverse in morphology (Li 2000; Bruce 2004; Bruce *et al.* 2005). The monophyly of *Periclimenes* has been questioned, and some species have already been separated (e.g., Duris & Bruce 1995; Bruce 2004; Bruce *et al.* 2005). Two species of *Periclimenes*, *P. perturbans* Bruce, 1978 and *P. priodactylus* Bruce, 1992, have a "possibly mobile" (Bruce 1978: 253) or "? mobile" (Bruce 1992: 53) hepatic spine, respectively. Whether these two could be assigned to *Patonia* n. gen. will require studies of more specimens, as well as a phylogenetic evaluation of the family.

Patonia mclaughlinae n. sp.
(Figs 1-6)

MATERIAL EXAMINED. — Holotype: Taiwan northeastern coast, TAIWAN 2003, R/V *Ocean Researcher 1*, stn CP 216, 24°34.71'N, 122°4.02'E, beam trawl, 209-280 m, 27.VII.2003, 1 ovig. ♀ cl 4.0 mm, bl 18.2 mm (NTOUM00664).

ETYMOLOGY. — The specific name again honors Dr Patsy A. McLaughlin, in recognition of her important contributions to the knowledge of decapod crustaceans.

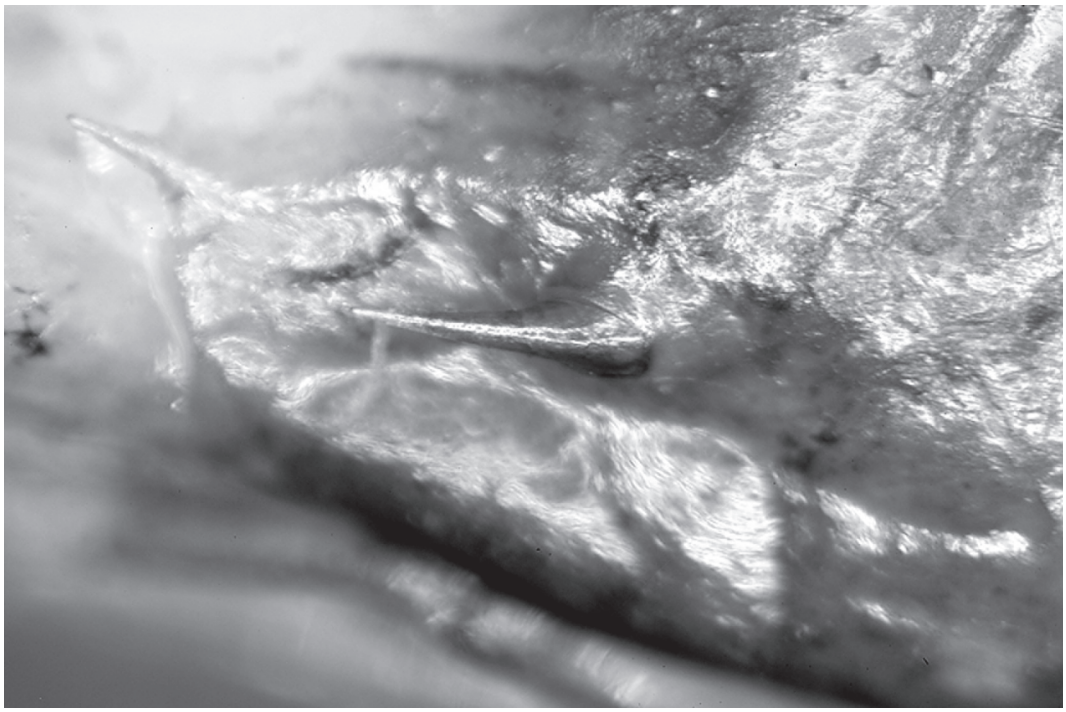

FIG. 2. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm, Taiwan (NTOUM00664), hepatic spine, stained with methylene blue.

DESCRIPTION

A small size shrimp with laterally compressed body.

Rostrum (Figs 3; 4B) well developed, laterally compressed, slightly curving down distally, just exceeding antennular peduncle; lateral carina well defined and continuous with orbital margin; dorsal border armed with eight distinct, evenly spaced teeth, posterior three teeth with indistinct basal suture; two postorbital teeth present, with distinct basal sutures; ventral border unarmed and convex.

Carapace (Figs 3; 4A, B) moderately compressed laterally, glabrous, epigastric and supraorbital spines absent; orbit well developed; inferior orbital angle strongly produced, blunt, slightly exceeding antennal spine; antennal spine well developed, submarginal; hepatic spine (Fig. 2) large, at level much lower than antennal spine, with distinct basal suture, possibly movable; branchiostegite angle blunt, and not produced.

Abdomen (Fig. 3) laterally compressed and smooth, about three times longer than carapace length; third tergite not posterodorsally produced; pleura broadly rounded; second pleuron greatly expanded in ovigerous female holotype, and covering almost entire third pleuron; sixth somite 1.5 times longer than fifth somite and 1.8 times longer than width, posterolateral and posteroventral angles acute. Telson (Fig. 4D) 1.2 times as long as sixth somite, four times longer than maximum width, tapering posteriorly; two pairs of dorsolateral spines situated at distal 1/2 and 1/4; posterior margin with minute median denticle, and three pairs of movable spines, intermediate pair largest, lateral pair smallest.

Antennular peduncle (Fig. 4A, C) extending to 2/3 of scaphocerite; proximal segment 2.3 times longer than width, with ventromedial tooth; distolateral angle strongly produced and bearing three acute teeth, extending beyond middle of intermediate segment; statocyst normally developed; stylocerite

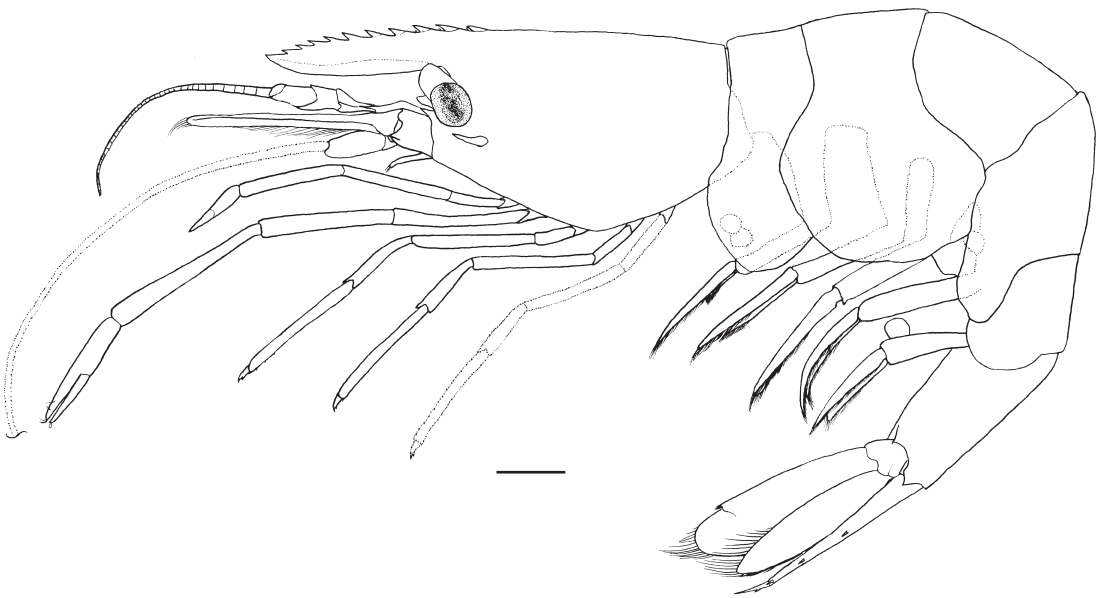

FIG. 3. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm, Taiwan (NTOUM00664), lateral view. Scale bar: 1 mm.

sharply elongate and overreaching half segment length; intermediate segment 3/4 times as long as distal segment and 0.36 times as wide as proximal segment; distal segment twice longer than broad; upper flagellum biramous, with proximal seven segments fused.

Antenna with distinct basicerite spine; carpocerite robust, 2.6 times longer than width, about 1/3 of scaphocerite length; flagellum about three times longer than carapace length; scaphocerite well developed, 3.7 times longer than broad, maximum width at proximal 1/3 of length, lateral margin straight, distolateral tooth large but falling far short of distal margin of lamella.

Eye (Fig. 4A) large, well developed; peduncle wider than long; cornea longer than wide, well pigmented.

Epistome unarmed. Thoracic sternites without projection; fifth sternite with low transverse ridge having wide median notch.

Mandible (Fig. 5A) normal, without palp; molar process distally setose and with six blunt teeth; incisor process obliquely truncate distally with three or four teeth, lateral teeth larger than medial teeth. Maxillula (Fig. 5B) with bilobed palp, lower lobe with stout hooked seta; upper lacinia with about 10 short stout spines and several setae distally, lower margin with long plumose setae; lower lacinia slender, tapering, densely packed with spiniform setae distally, lower and upper margins bearing plumose setae. Maxilla (Fig. 5C) with palp simple and bent, setose laterally; basal endite deeply bilobed, each with about 10 setae distally; coxal endite obsolete, medial margin convex; scaphognathite large, broad, 2.6 times longer than central width, anterior lobe with medial margin concave, posterior lobe broadly rounded. First maxilliped (Fig. 5D) with palp elongated and bearing one apical seta; basal endite rectangular, with distal and medial margins setose; coxal endite indistinct, medial margin sparsely setose; exopod bearing long flagellum with four long plumose setae at apex, caridean lobe large, broad; epipod large and bilobed. Second maxilliped (Fig. 5E) with normal endopod, dactylar segment narrow, with multiple rows of serrulate spines medially, propodal segment large, distomedial margin with several spinulate setae, upper margin and distomedial surface bearing some long

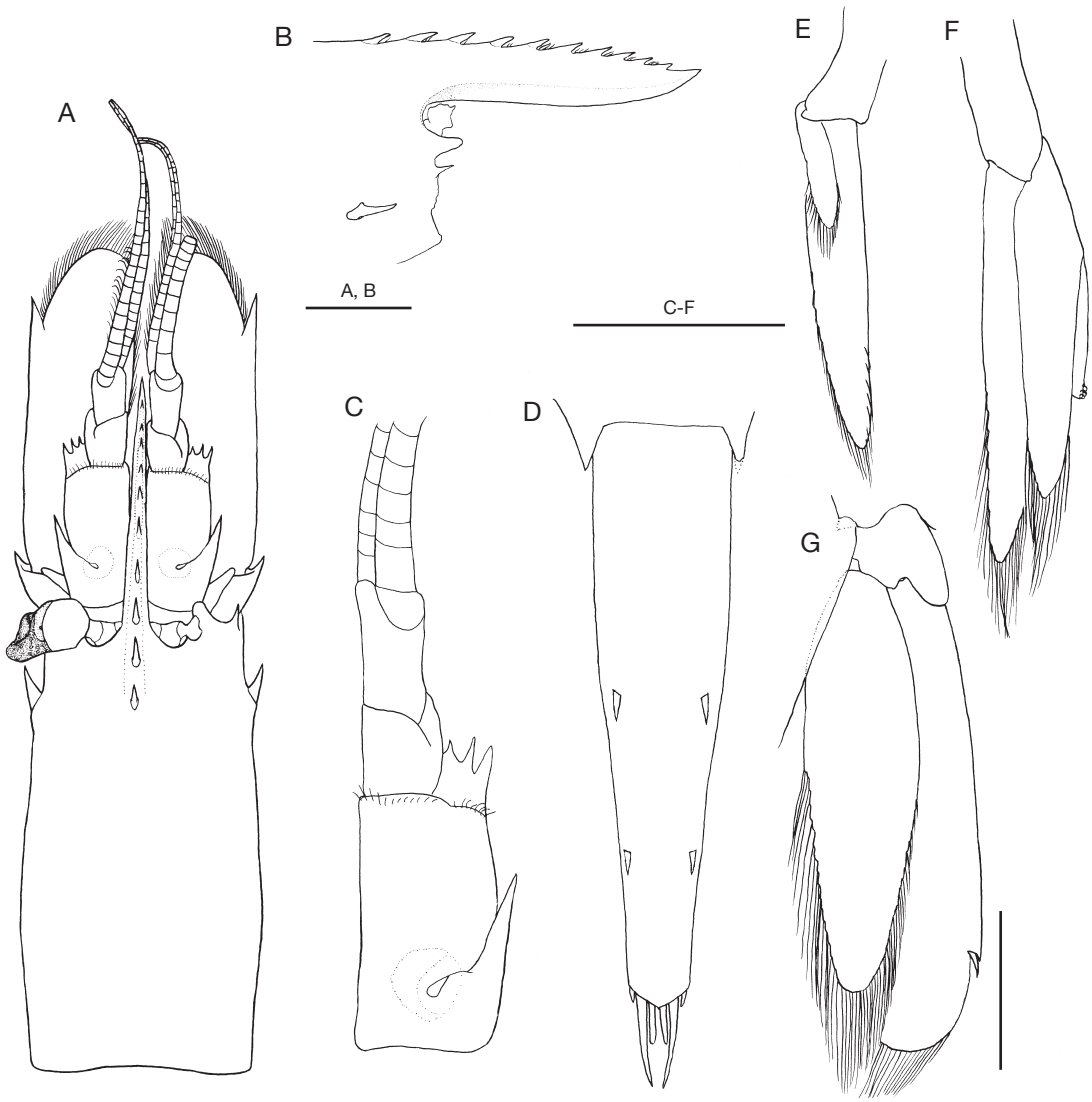

FIG. 4. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm, Taiwan (NTOUM00664): **A**, carapace, dorsal (eyes damaged or lost); **B**, anterior part of carapace, lateral; **C**, right antennular peduncle, dorsal; **D**, telson, dorsal; **E**, right first pleopod, ventral; **F**, left second pleopod, ventral; **G**, right uropod, lateral. Scale bars: 1 mm.

setae; carpus, ischiomerus and basis normal, coxa produced medially and bearing two setae; exopod well developed and bearing four long plumose setae apically; epipod large, subrectangular; podobranch absent. Third maxilliped (Fig. 5F) with moderately slender endopod; ultimate segment tapering distally and densely setose medially; penultimate segment 0.45 length of proximal segment, about four times longer than width and densely setose medially; ischiomerus 4.5 times longer than broad, with three or four distolateral spines, medial margin distributed with long setae; separation between basis and ischiomerus obscure; basis bearing some long setae along medial margin; exopod not reaching

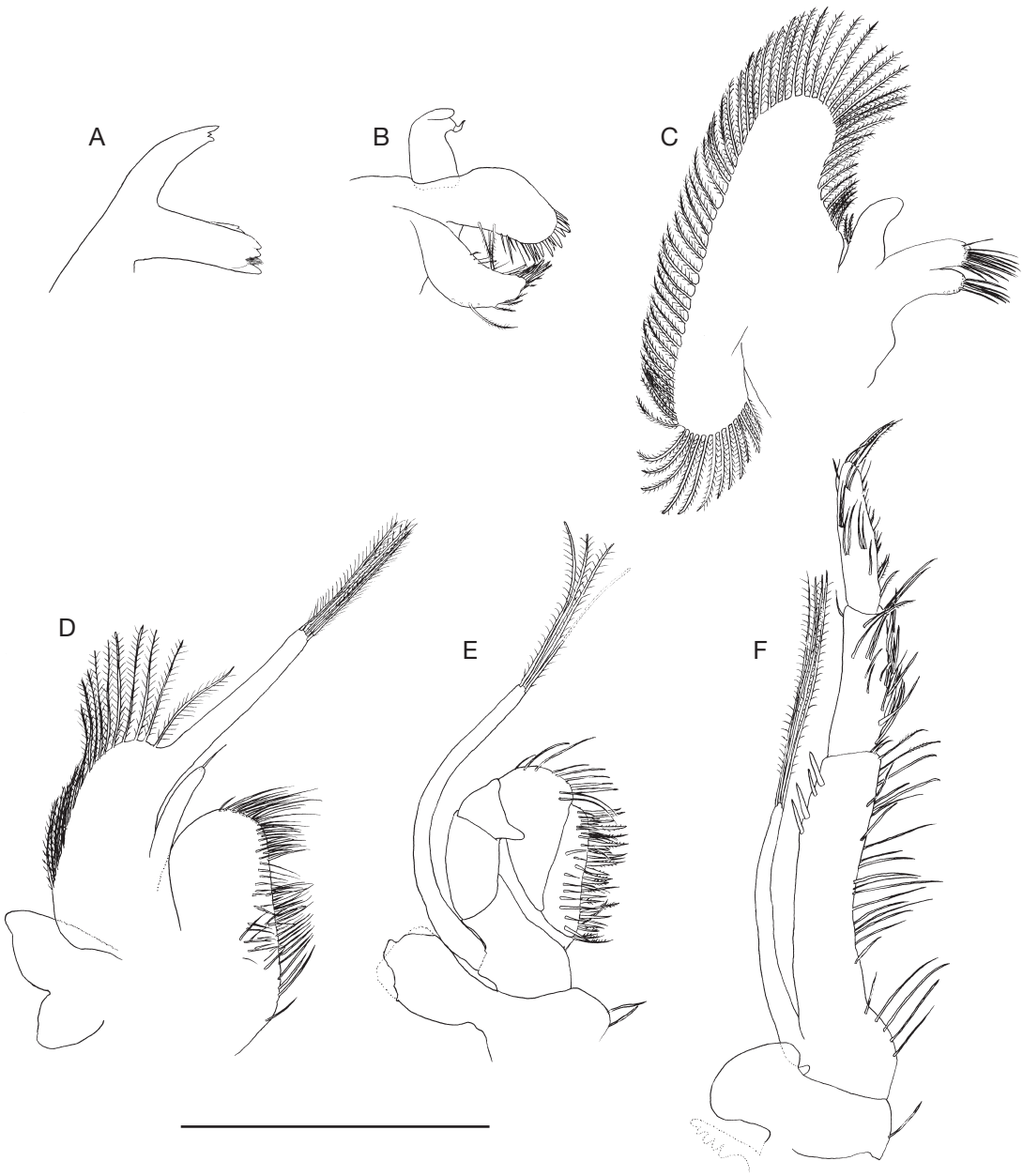

FIG. 5. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm, Taiwan (NTOUM00664), mouthparts, right side, external view: **A**, mandible; **B**, maxillula; **C**, maxilla; **D**, first maxilliped; **E**, second maxilliped; **F**, third maxilliped. Scale bar: 1 mm.

penultimate segment, with four apical setae; coxa slightly produced medially and bearing one seta; arthrobranch reduced and with four lamellae.

First pereiopods (Fig. 6A, B) slender, reaching tip of scaphocerite; chela slender, 4.8 times longer than width, fingers slightly longer than palm; movable

finger six times longer than proximal width, cutting edge entire, unarmed; fixed finger similar, 5.4 times longer than proximal width; both fingers provided with tufts of setae; palm scattered with setae, particularly with group of short setae proximomedially; carpus 1.5 times as long as chela and seven times longer than distal width, distally with tufts of plumose setae; merus as long as carpus, naked and smooth, 8.4 times longer than width; ischium 2.5 times as long as merus, three times longer than maximum width; basis short, 0.7 times as long as ischium; coxa with row of ventromedial setae.

Second pereiopods (Fig. 6C, D) similar, slender, overreaching scaphocerite by length of chela and distal 1/4 length of carpus; chela slender, shorter than half length of carapace, 5.7 times longer than width, ventral margin slightly concave; fingers slightly longer than palm, movable and fixed fingers similar, 6.3 times longer than proximal width, cutting edge entire, unarmed, with tufts of setae distally; carpus slightly broaden distally, unarmed, 1.2 times longer than chela and 8.7 times as long as distal width; merus naked and smooth, 0.8 times as long as carpus, same length as ischium, eight times as long as wide; ischium slender, unarmed, 9.3 times as long as distal width.

Third pereiopod (Fig. 6E, F) slender, not exceeding scaphocerite; dactylus short, 2.6 times as long as proximal width, biunguiculate, accessory tooth half length of demarcated unguis; propodus 7.6 times as long as dactylus, with four or five ventral spinules, distal margin bearing tufts of setae; carpus 0.56 times as long as propodus, five times as long as width, unarmed; merus 1.7 times longer than carpus, eight times as long as width; ischium 0.48 times as long as ischium, 3.7 times longer than width. Fourth and fifth pereiopods similar to third pereiopod.

Pleopods (Fig. 4E, F) slender; endopod of first pleopod 1/3 as long as exopod and about three times longer than wide, without appendix interna; exopod of second pleopod 1.2 times longer than endopod, appendix interna reaching distal 1/3 of endopod.

Uropods (Fig. 4G) with posterolateral lobe of protopodite blunt, unarmed; exopod well exceeding telson, broad, 3.3 times longer than maximum width, lateral border feebly convex and bearing minute distal spinule with larger movable spine medially; endopod shorter than exopod, 0.9 times as long as exopod, 3.7 times longer than wide.

Eggs about 0.46 mm in maximum length (few remaining in holotype).

Coloration (Fig. 1)

Body generally translucent and somewhat pinkish, lateral surface bearing three pairs of faint but broad pale red longitudinal stripes extending from carapace to fifth abdominal somite. Rostrum mottled with white dots. Eyes dark brown. Pereiopods generally translucent except for slightly pinkish chela of second pereiopod. Pleopods pale red. Distal part of uropods mottled with some white dots. Eggs greenish brown.

REMARKS

Patonia mclaughlinae n. gen., n. sp. can be distinguished from other known Pontoniinae in having the following combination of characters: body moderately compressed laterally; hepatic spine large, with a complete basal suture and possibly mobile; rostrum armed with distinct teeth along entire dorsal border; pereiopods slender, second pereiopod feebly developed with carpus distinctly longer than chela.

The general appearance of this new species shows some resemblance to *Periclimenes perturbans* Bruce, 1978 from Madagascar and Hong Kong (Bruce 1990), and *P. priodactylus* Bruce, 1992 from Australia. However, these two species are found in shallow waters (3.5-40 m), and morphologically differ from *P. mclaughlinae* n. gen., n. sp. in having the hepatic spine much smaller, the rostral teeth fixed, and the basal segment of the antennular peduncle bearing only a simple distolateral tooth. Moreover, in *P. mclaughlinae* n. gen., n. sp., the carpi of the second pereiopods are shorter than the chelae, and the shape of the dactyli of the posterior pereiopods are different (simple in *P. perturbans* and densely serrated with ventral spinules in *P. priodactylus*).

The present new species was collected from a station rich in crinoids, chirostylids, galatheids, hermit crabs and pylochelids. However, there was no direct evidence of the host of this shrimp.

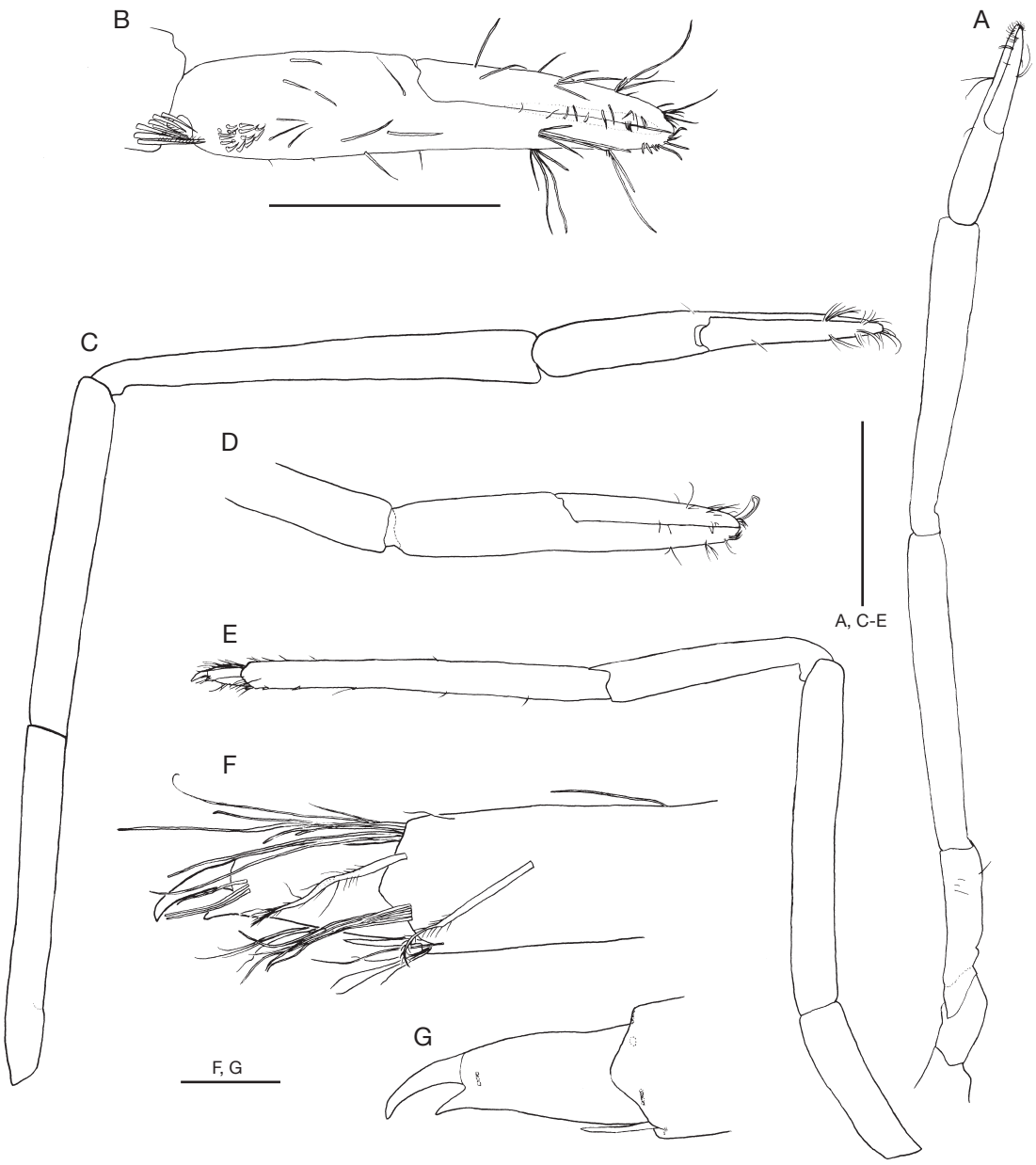

FIG. 6. — *Patonia mclaughlinae* n. gen., n. sp., holotype, ovigerous ♀ cl 4.0 mm (NTOUM00664), Taiwan: **A**, right first pereiopod, ventral; **B**, same, chela, medial; **C**, right second pereiopod, ventral; **D**, same, chela, medial; **E**, right third pereiopod, medial; **F**, same, dactylus and distal part of propodus, medial; **G**, same, seta omitted. Scale bars: A, C-E, 1 mm; B, 0.5 mm; F, G, 0.1 mm.

Shrimps of the family Palaemonidae have greatest diversity in shallow tropical waters. Deep-water palaemonids (i.e. from more than 200 m deep) are much fewer in numbers and at present only 33 species of eight genera have been recognized (Bruce 1991, 1996). The discovery of this new

genus and species in Taiwan waters demonstrates again the high diversity of the marine environments of this island.

NOTE ADDED TO PROOF

Another specimen, damaged, was found just before the publication of this work: TAIWAN 2000, R/V *Fisheries Researcher 1*, stn CP 58, 24°35.1'N, 122°05.8'E, beam trawl, 221-254 m, 4.VIII.2000, 1 ♂ cl 3.9 mm, bl 17.8 mm, paratype (NTOUM00697).

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