



On two small collections of freshwater shrimps (Decapoda: Atyidae: *Caridina*) from Papua New Guinea, with descriptions of two new species*

ANDREAS KARGE¹, KRISTINA VON RINTELEN² & WERNER KLOTZ³

¹Magdeburgerstr. 42, D-39218 Schoenebeck, Germany. E-mail: webmaster@caridea.net

²Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt-Universität zu Berlin, Invalidenstr. 43, D-10115 Berlin, Germany.

E-mail: Kristina.Rintelen@museum.hu-berlin.de

³Wiesenweg 1, A-6063 Rum, Austria. E-mail: wklotz@aon.at

* In: De Grave, S. & Fransen, C.H.J.M. (2010) Contributions to shrimp taxonomy. *Zootaxa*, 2372, 1–414.

Abstract

Several species of atyid freshwater shrimp are currently known from Papua New Guinea. Here, two new species are described: *Caridina buergersi* sp. nov. and *C. elisabethae* sp. nov. In addition, we provide new records for *C. demani* and *C. cognata*, originally described from New Guinea by J. Roux (1911) and De Man (1915).

Key words: freshwater shrimp, new species, endemism, taxonomy, *Caridina*

Introduction

The freshwater shrimp fauna (Crustacea, Decapoda, Atyidae) of Papua New Guinea is poorly known, with only a few old reports and descriptions available. The majority of these reports are from the northern, coastal region, with the mountain ranges and the southern lowlands remaining unstudied. Amongst these are several endemic species (see below). Interestingly, there is considerably more information available for the surrounding islands of Halmahera (J. Roux 1917; Cai & Ng 2001), Kai and Aru (J. Roux 1911, 1919), and New Ireland (J. Roux 1934; Holthuis 1978).

Giuseppe Nobili (1905) provided the first record of an atyid shrimp from the island of Papua. He described *C. weberi papuana* and discussed some other specimens, which he identified as *C. wyckii*, from Stephansort (20 km south of Madang). Later, J. Roux (1917) reported *Caridina weberi* var. *papuana* also from the western part of the island (River Mamapiri). J. Roux (1911) described two endemic species, *C. fecunda* from the Jamur Lake (Lac Jamour) in the western part of the island and *C. demani* from the river Tawarin.

In 1915, two more endemic species were described by De Man: *Caridina cognata* De Man, 1915, from the north-eastern region, inhabiting streams and rivers in the region around Jayapura (Hollandia) at Humboldt Bay and *C. rouxi* De Man, 1915, from a river in the Bougainville Mountains. *C. demani* was also reported from Humboldt Bay by De Man (1915).

Some widely distributed Indo-Pacific species, such as *Caridina nilotica* (P. Roux, 1833) (River Mamapiri) and *C. gracilipes* De Man, 1892 (Sentani Lake, Trambuai Lake) were also recorded by J. Roux (1917).

Edmondson (1935) reported *Caridina vitiensis* Borradaile, 1898 from Papua New Guinea, the Bismarck Archipelago and the Solomon Islands; the species having been described from Fiji (Borradaile 1898).

An examination of specimens from the northern region of the island revealed two undescribed species, which we here describe as *C. elisabethae* sp. nov. and *C. buergersi* sp. nov. We further provide new records of *C. demani* and *C. cognata*.

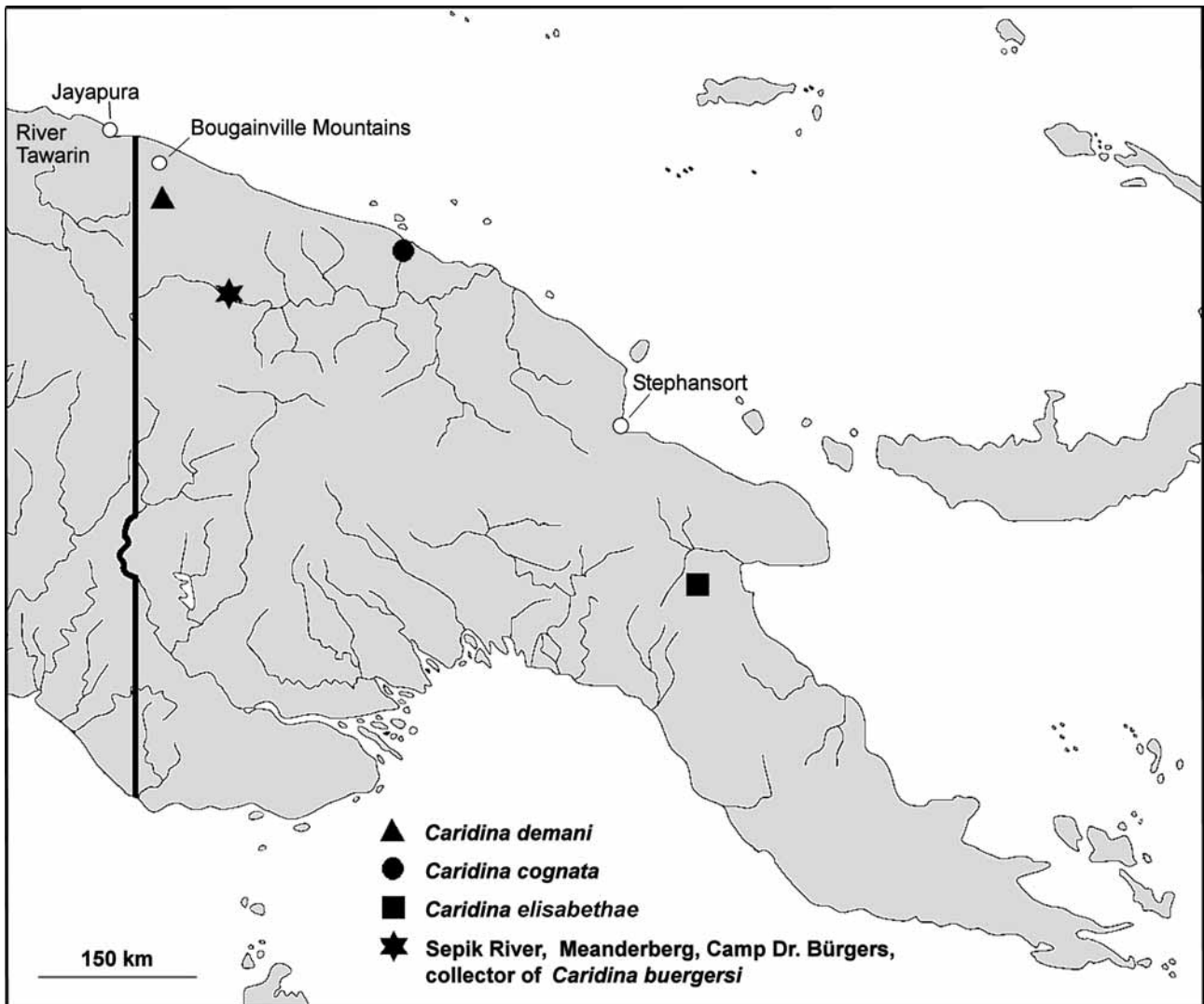


FIGURE 1. Collection sites for the four species of *Caridina* examined in Papua New Guinea.

Material and methods

One studied sample belongs to historical material deposited in the crustacean collection of the Museum für Naturkunde Berlin (ZMB). Specimens of *Caridina elisabethae*, *C. cognata* and *C. demani* were collected from Papua New Guinea by Michael Balke during a fieldtrip in 2006 (Fig. 1).

Type specimens are deposited in Zoologische Staatssammlung München, Germany, and the Zoological Collections of the University of Papua New Guinea in Port Moresby (ZCPNG). The abbreviation *cl* is used for carapace length, measured from the postorbital margin to the posterior margin of the carapace and expressed in mm. The length of the antennular peduncle was measured from the orbital margin to the distodorsal margin of the third segment.

Taxonomy

Atyidae De Haan, 1849

Caridina H. Milne Edwards, 1837

Caridina demani J. Roux, 1911

(Figs. 2A–D)

Material examined. 1 male, cl 3.70 mm, 2 ovigerous females, cl 4.40–4.50 mm (ZMB 29467), Papua New Guinea, Sadaun, Bewani Stn., stream at base of Bewani Mountains, 200–300m, 03°05.130'S 141°10.227'E; leg. M. Balke and K. Sagata, 12.IV.2006.

Diagnosis. Rostrum (Fig. 2A) straight, reaching to end of scaphocerite, 0.78–0.90 times as long as carapace, armed dorsally with 17 to 20 teeth including 2 or 3 on carapace posterior to orbital margin, terminal one-third of rostrum unarmed, 4 or 5 small ventral teeth. Pterygostomial angle broadly rounded. Antennular peduncle 0.70–0.83 times as long as carapace. Stylocerite 0.84–0.95 times as long as the basal segment of antennular peduncle. Carpus of first pereiopod (Fig. 2B) 1.45–1.54 times as long as wide, distally excavated; chela 1.81–1.96 times as long as wide; dactylus 1.08–1.26 times as long as palm; tips of fingers rounded. Merus of first pereiopod 1.3–1.5 times as long as ischium. Carpus of second pereiopod 3.37–3.91 times as long as wide, chela 2.08–2.29 times as long as wide, 0.88–0.91 times length of carpus; dactylus 1.25–1.39 times long as palm; tips of fingers rounded. Merus of second pereiopod 1.2–1.4 times as long as ischium. Dactylus of third pereiopod 3.50–3.64 times as long as wide (terminal spine included), terminating in 1 large claw and 5 or 6 spines on flexor margin; propodus 9.75–12.36 times long as wide, 3.86–4.25 times as long as dactylus. Fifth pereiopod slender, dactylus 4.0–5.2 times as long as wide (terminal spine included), with 1 large claw and 32–38 spines on flexor margin; propodus 10.33–11.43 times as long as wide, 3.65–4.00 long as dactylus. Epipods present on first 4 pereiopods. Endopod of male first pleopod (Fig. 2C) short, triangular, 1.4 times as long as proximal width, without appendix interna. Sixth abdominal segment 0.58–0.63 times length of carapace. Telson (Fig. 2D) 3.0 times as long as proximally wide, posterior margin rounded, without median projection, with 3 pairs of dorsal and 1 pair of dorsolateral spinules; distal end with 8–10 spines, lateral pair longer and stouter than intermediate spines. Preanal carina rounded, without a tooth or spine. Uropodal diaeresis with 12–13 movable spinules. Egg size of ovigerous females 0.96–1.01 × 0.56–0.62 mm.

Distribution. *Caridina demani* is only known from some rivers in the northern part of New Guinea, especially from the rivers Tawarin (J. Roux 1911), Tami at Humboldt Bay, Tjano at Njao, Zoutbron (De Man 1915), Mamberamo (J. Roux 1927), and a stream at the base of Bewani Mt. (this study).

Remarks. *Caridina demani* is very similar to *C. cognata* De Man, 1915. It can be distinguished from *C. cognata* by the longer, distally unarmed rostrum and fewer teeth on the ventral margin (4 or 5 vs. 7–9 in *C. cognata*), by a stouter carpus and chela of the first and second pereiopods (carpus of first pereiopod 1.5, of second pereiopod 3.4–3.9 times as long as wide vs. 1.6–2.0 and 4.0–5.2 times as long in *C. cognata*). The specimens examined correspond well to the descriptions of J. Roux (1911, 1917, 1927) and De Man (1915). Only small differences were found in egg size (0.96–1.01 × 0.56–0.62 mm vs. 0.75–0.85 × 0.40–0.80 mm), which could be due to different developmental stages, different preservation state or method of measuring; and the length to width ratio of the carpus of the first (1.45–1.50 vs. 1.60–2.00) and second pereiopod (3.47–3.91 vs. 4.0–5.0).

De Man (1915) described a high intraspecific variability in his material of *C. demani*. His specimens were larger than those examined by J. Roux (1911). They further showed a length to width ratio of the carpus (1.44–1.75 on the first and 3.33–4.00 on the second pereiopods and 6–9 ventral teeth on the rostrum). The measurements obtained from the three specimen in our collection fall into the range reported by De Man (1915). The differences between the type series of J. Roux (1911), the specimen reported from three different locations by De Man and our specimen should be regarded as intraspecific variation between populations from different habitats.

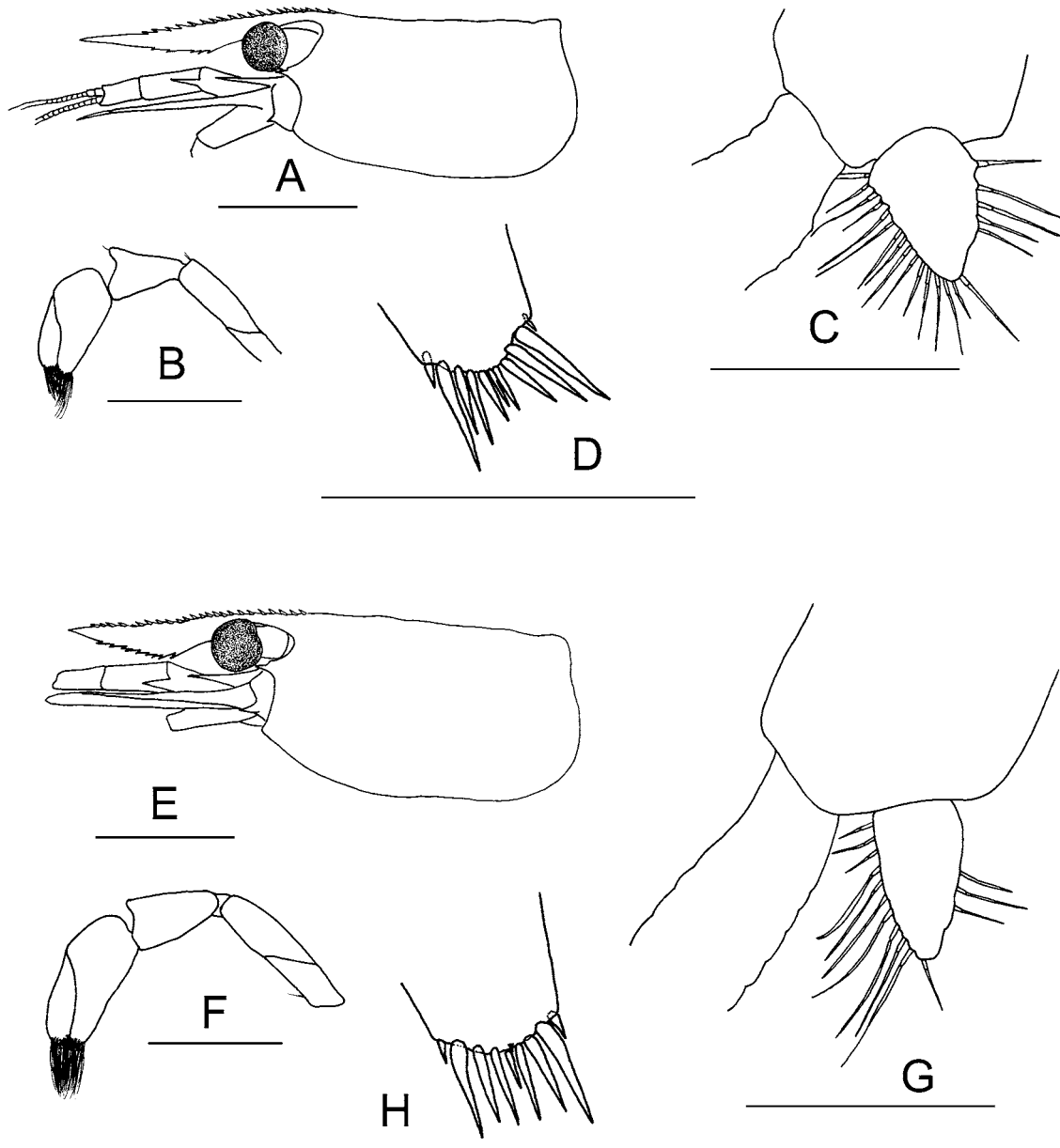


FIGURE 2. *Caridina demani*, male (cl 3.7 mm) (ZMB 29467): A, cephalothorax; B, first pereiopod; C, endopod of male first pleopod; D, distal end of telson. *Caridina cognata* male (cl 4.0 mm) (ZMB 29468): E, cephalothorax; F, first pereiopod; G, endopod of male first pleopod; H, distal end of telson. Scale bars = 2.0 mm (A, E), 1 mm (B, D, F, H) or 0.5 mm (C, G).

***Caridina cognata* De Man, 1915**

(Figs. 2E–H)

Material examined. 1 male, cl 4.0 mm, 4 ovigerous females (eggs without eyes), cl 4.80–5.00 mm (ZMB 29468), Papua New Guinea, East Sepik, Prince Alexander Mountains, Wewak, 400m, 03°37.319'S, 143°36.764'E; leg. M. Balke, 21.IV.2006.

Diagnosis. Rostrum (Fig. 2E) straight, triangular in lateral view, reaching near to or slightly beyond end of antennular peduncle, 0.65–0.81 times as long as carapace, armed dorsally with 21–27 teeth, including 2 or 3 on carapace posterior to orbital margin, 7–9 ventral teeth. Armature of rostrum reaching to tip of rostrum on dorsal margin, ventral margin toothless near the tip. Pterygostomial angle subrectangular. Antennular

peduncle 0.60–0.83 times as long as carapace. Stylocerite 0.83–0.95 times as long as basal segment of antennular peduncle. Carpus of first pereopod (Fig. 2F) 1.61–1.95 times long as wide; chela 1.82–2.05 times as long as wide; dactylus 0.93–1.30 times as long as palm; tips of fingers rounded. Carpus of second pereopod 4.00–5.18 times as long as wide, chela 2.27–2.61 times as long as wide, 0.79–0.84 times length of carpus; dactylus 1.21–1.50 times long as palm; tips of fingers rounded. Dactylus of third pereopod 3.08–4.20 times as long as wide (terminal spine included), terminating in one large claw, with 5 spines on flexor margin; propodus 9.18–11.69 times long as wide, 3.71–4.16 times as long as dactylus. Fifth pereopod slender, dactylus 4.0–5.4 times as long as wide (terminal spine included), with one large claw and 44 or 45 spines on flexor margin; propodus 10.63–13.57 times as long as wide, 3.37–3.52 long as dactylus. Epipods present on first 4 pereopods. Endopod of male first pleopod (Fig. 2G) short and triangular, without appendix interna. Sixth abdominal segment 0.54–0.59 times length of carapace. Telson (Fig. 2H) 3.2–3.5 times as long as proximally wide, with very small or without median projection, with 3–5 pairs of dorsal and one pair of dorsolateral spinules; distal margin convex with 7 or 8 spines, lateral pair longer than intermediate spines. Preanal carina rounded, without a tooth or spine. Uropodal diaeresis with 9–13 movable spinules. Egg size of ovigerous females (eggs without eyes) 0.96–1.03 × 0.58–0.65 mm.

Distribution. *Caridina cognata* is only known from some rivers in the northern part of New Guinea.

Remarks. According to De Man (1915), *C. cognata* is very similar to *C. fecunda* J. Roux, 1911 from Western New Guinea and *C. aruensis* J. Roux, 1911 from Aru Island. *Caridina cognata* can be distinguished from *C. fecunda* by the well developed epipods (mastigobranchs) on the first four pereopods (vs. epipods only on pereopods 1–3 in *C. fecunda*). *Caridina aruensis* is a species belonging to the *C. nilotica* species group, its taxonomic status having been previously discussed (Johnson 1963 as *C. simoni aruensis*; Chace 1997 as *C. nilotica typica*). According to the original description of *C. simoni* Bouvier, 1904 and the discussion in Cai & Wowor (2007) on *C. sarasinorum* Schenkel, 1902, the distal portion of the dorsal margin of the rostrum is unarmed in this species and is thus not a member of the *C. nilotica* species group. Regardless of the systematic status of *C. aruensis*, the rostrum of *C. cognata* is armed throughout its dorsal margin, and lacks a separate subapical tooth; and thus can be easily distinguished from *C. aruensis* or species of the *C. nilotica* group. *Caridina cognata* is also morphologically similar to *C. novaecaledoniae* J. Roux, 1926 from New Caledonia, but differs from this species by its relatively longer rostrum (reaching to or beyond distal end of the antennular peduncle vs. never reaching to in *C. novaecaledoniae*) and a higher number of teeth on the dorsal margin (21–27 vs. 12–22 in *C. novaecaledoniae*). Furthermore, the fingers of the first chelipeds seem to be proportionately longer in relation to the palm in *C. cognata* (dactylus 0.93–1.30 times as long as palm vs. slightly shorter or as long as palm in *C. novaecaledoniae*), according to the original description (J. Roux 1926, p. 215, fig. 53).

De Man (1915) reported *C. cognata* and *C. demani* from the same locality. In his descriptions he did not compare both species, although they share some characters. They differ only in the length, shape and armature of the rostrum as well as in the proportions of the first two pereopods. However, De Man indicated a high intraspecific variability in both species also depending on the age of the specimens. In the present material, we only found minor differences with De Man's original description of *C. cognata*, i.e. slightly stouter carpi of the first pereopods (1.61–1.95 times as long as wide vs. 1.8–2.5 times) which we regard as intraspecific variation.

***Caridina elisabethae* sp. nov.**

(Figs. 3–4)

Material examined. Holotype male, cl 4.00 mm (ZMB 29469), Papua New Guinea, Morobe, Herzog Mts., Bundun, 700–800 m, 06°51.598'S, 146°37.07'E, leg. M. Balke & K. Sagata, 2.IV.2006. Paratypes: 1 female, cl 4.70 mm (ZMB 29470), same data as holotype; 1 male, cl 3.50 mm (ZCPNG), same data as holotype.

Diagnosis: Rostrum (Fig. 3A) slightly sigmoid, reaching near to or slightly beyond end of antennular peduncle, with 1 small movable tooth near tip, 5 or 6 ventral teeth; rostral formula: 2-3 + 13–17 + 1 / 5–6.

Preanal carina (Fig. 4I) rounded, without a tooth or spine. Chela of first pereiopod 2.05–2.27 as long as wide, dactylus 0.96–1.28 times as long as palm; carpus 1.80–2.34 times as long as wide. Chela of second pereiopod 2.36–2.82 times as long as wide, dactylus 1.35–1.82 times as long as palm; carpus 3.75–5.00 times as long as wide. Endopod of male first pleopod (Fig. 4K) elongated triangular, 2 times as long as proximal width, with a vestige or without appendix interna.

Description. Rostrum (Fig. 3A) slightly sigmoid, reaching near to or slightly beyond end of antennular peduncle, 0.75–0.87 times as long as carapace, armed dorsally with 15–19 teeth including 2 or 3 on carapace posterior to orbital margin, terminal 40–50% of dorsal margin unarmed, with 1 small movable tooth near tip, 5 or 6 ventral teeth; rostral formula: 2–3 + 13–17 + 1 / 5–6.

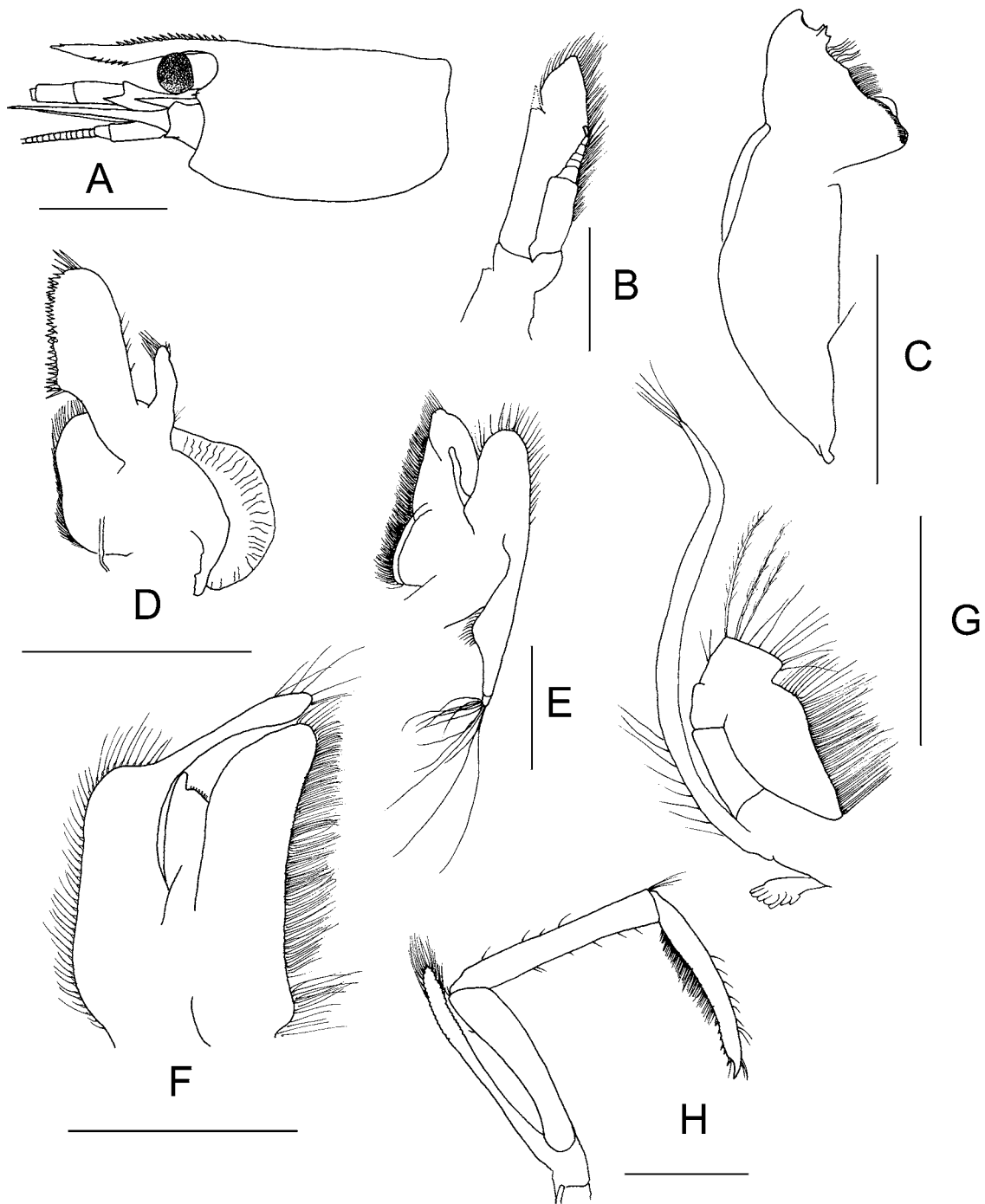


FIGURE 3. *Caridina elisabethae* sp. nov.: A, cephalothorax and cephalic appendages; B, scaphocerite; C, mandible; D, maxillula; E, maxilla; F, first maxilliped; G, second maxilliped; H, third maxilliped. A, paratype male (cl 3.5 mm) (ZCPNG); B–H, paratype female (cl 4.7 mm) (ZMB 29470). Scale bars = 2 mm (A) or 1 mm (B–H).

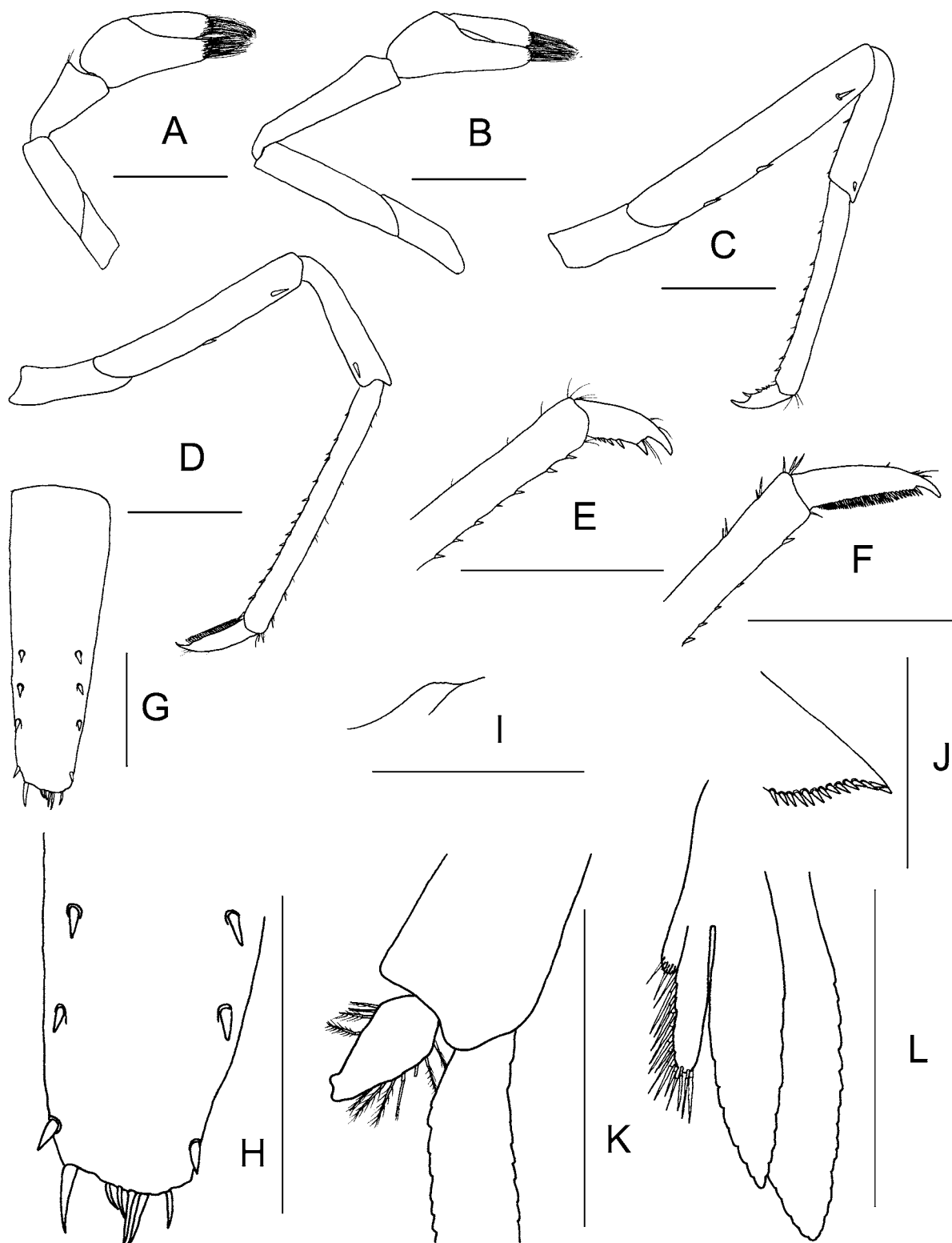


FIGURE 4. *Caridina elisabethae* sp. nov.: A, first pereiopod; B, second pereiopod; C, third pereiopod; D, fifth pereiopod; E, dactylus of third pereiopod; F, dactylus of fifth pereiopod; G, telson; H, distal end of telson; I, preanal carina; J, uropodal diaeresis; K, endopod of male first pleopod; L, appendix masculina of male second pleopod. A–J, paratype female (cl 4.7 mm; ZMB 29470); K–L paratype male (cl 3.5 mm) (ZCPNG). Scale bars = 1.0 mm.

Inferior orbital angle fused with antennal spine. Pterygostomial angle subrectangular. Antennular peduncle 0.62–0.82 times as long as carapace, second segment 1.31–1.55 times length of third segment, third segment 0.38–0.41 times as length of basal segment. Stylocerite 0.77–0.94 times as long as basal segment of antennular peduncle. Scaphocerite (Fig. 3B) 3.13–3.51 times as long as wide.

Sixth abdominal somite 0.53–0.60 times length of carapace, 2 times as long as fifth somite, slightly shorter than telson. Telson (Figs. 4G–H) 2.84 times as long as proximally wide, distal margin broadly rounded, with indistinct or without median projection, with 3 or 4 pairs of dorsal and 1 pair of dorsolateral spinules, distal end with 8 or 9 spines, lateral pair longer than intermediate spines. Preanal carina (Fig. 3I) rounded, without a tooth or spine. Uropodal diaeresis (Fig. 4J) with 11–13 movable spinules.

Incisor process of mandible (Fig. 3C) ending in irregular teeth, molar process truncated. Lower lacinia of maxillula (Fig. 3D) broadly rounded, upper lacinia elongate, with numerous distinct teeth on inner margin, palp slender with few simple setae at tip. Upper endites of maxilla (Fig. 3E) subdivided, palp short, scaphognathite tapering posteriorly, fringed with long, curved setae at posterior margin. Palp of first maxilliped (Fig. 3F) ending in a distinct finger-like projection. Podobranch on second maxilliped (Fig. 3G) well developed. Third maxilliped (Fig. 3H) with 2 arthrobranches, ultimate segment slightly shorter than penultimate segment. Pleurobranches present on all pereopods. First pereopod with 1 arthrobranch. Well developed epipods present on third maxilliped and first 4 pereopods.

Chela and carpus of first pereopod distinctly stouter and broader than chela and carpus of second pereopod (Figs. 3A–B); chela of first pereopod 2.05–2.27 as long as wide, 1.26–1.50 times length of carpus; tips of fingers rounded, without hooks; dactylus 0.96–1.28 times as long as palm; carpus 1.80–2.34 times as long as wide, 0.92–1.00 times length of merus. Chela of second pereopod 2.36–2.82 times as long as wide, 0.82–1.00 times length of carpus; tips of fingers rounded, without hooks, dactylus 1.35–1.82 times as long as palm; carpus 3.75–5.0 times as long as wide, as long as or slightly longer than merus. Third pereopod (Figs. 4C, E) slender, dactylus 3.0–3.5 times as long as wide (terminal spine included, without spines on flexor margin), terminating in one large claw with 5 or 6 accessory spines on flexor margin; propodus 9.57–10.29 times as long as wide, 3.53–4.28 times as long as dactylus; carpus 4.60–4.95 times as long as wide, 0.65–0.69 times as long as propodus, 0.52–0.59 times as long as merus; merus 6.26–6.32 times as long as wide, 1.68–1.91 times as long as carpus, bearing 1–2 movable spines on posterior margin of outer surface. Fifth pereopod slender (Figs. 4D, F), dactylus 4.55–4.67 times as long as wide (terminal spine included, without spines on flexor margin), terminating in 1 large claw with 37–42 spinules on flexor margin; propodus 10.56–12.57 times as long as wide, 3.39–3.52 times length of dactylus, carpus 5.22 times as long as wide, 0.53–0.54 times as long as propodus, 0.64 times as long as merus; merus 6.15–7.30 times as long as wide, 1.55–1.57 times length of carpus, bearing 1 or 2 strong, movable spines on posterior margin of outer surface.

Endopod of male first pleopod (Fig. 4K) elongated triangular, 2 times as long as proximal width, 0.3 times as long as exopod, with a vestige or without appendix interna. Appendix masculina on male second pleopod (Fig. 4L) slender, rod-like, with long spines on inner and distal margin, appendix interna reaching to about two-thirds of appendix masculina.

Reproductive biology unknown, no ovigerous females were present in the material examined.

Etymology. *Caridina elisabethae* is dedicated to Elisabeth Hintelmann from Munich for her great support of systematic research.

Remarks. *Caridina elisabethae* shares some characters with *C. demani*, but can be distinguished from this species by the presence of a small tooth near the distal end of the rostrum and more slender first and second chelipeds (chela 2.05–2.27 and 2.36–2.82 times as long as wide vs. 1.81–1.96 and 2.08–2.29 times in *C. demani*, carpus 1.80–2.34 and 3.75–5.0 times as long as wide vs. 1.45–1.54 and 3.37–3.91 times in *C. demani*). The endopod of the male first pleopod is also relatively more slender in *C. elisabethae* (two times as long as proximal width vs. 1.4 times in *C. demani*). From *C. cognata*, *C. elisabethae* differs by the shape and armature of the rostrum and the slightly stouter carpus on second pereopod (3.75–5.0 times as long as wide vs. 4.00–5.18 times in *C. cognata*).

In possessing a small tooth near the tip of the rostrum, *C. elisabethae* also resembles *C. nilotica*. The shape of this tooth, however, is somewhat different from the “true” subapical tooth found in *C. nilotica* and members of the *C. nilotica* species group (De Man, 1908).

From the single specimen of *C. nilotica* “forma typica” reported from Papua New Guinea by J. Roux (1917), *C. elisabethae* can easily be differentiated by a shorter rostrum with few ventral teeth (5 or 6 vs. 19 in *C. nilotica* “forma typica”), shorter dactyli on the first pair of chelipeds (0.96–1.28 times as long as palm vs.

1.8 times as long in *C. nilotica* “forma typica”), and stouter carpi on the second chelipeds (3.75–5.0 times as long as wide vs. 6 times as long as wide in *C. nilotica* “forma typica”). According to Richard & Clark (2005), *C. nilotica* is restricted to the River Nile catchment area in Africa, and the presence of *C. nilotica* in the Indo-Pacific area should be re-evaluated. However, from *C. nilotica*, *C. elisabethae* differs in the same characters as from the Papuan specimen viz. a shorter rostrum (0.75–0.87 times as long as carapace vs. 1.0–1.13 times as long in *C. nilotica*) with less numerous ventral teeth (5 or 6 vs. 10–28 in *C. nilotica*), shorter dactyli on the first pair of chelipeds (0.96–1.28 times as long as palm vs. 1.2–1.9 times as long in *C. nilotica*), furthermore, in the armature of the dactyli on the third pereopod (with 5–6 spinules on flexor margin vs. 6–10 in *C. nilotica*) and a different shape and armature of the distal margin of the telson (broadly rounded with 3 or 4 pairs of distal spines vs. convex with 1–3 pairs of distal spines).

***Caridina buergersi* sp. nov.**

(Figs. 5–6)

Material examined. Holotype male, cl 3.30 (ZMB 17166), Papua New Guinea, former “Deutsch-Neuguinea”, near Määnderberg, coll. Bürgers. Paratypes: 5 females, cl 2.90–4.10 mm (ZMB 17166), same data as holotype; 1 ov. female (eggs without eyes), cl 4.00 mm (ZMB 17166), 6 males, cl 3.10–3.40 mm (ZMB 17166), same data as holotype. 4 juveniles, cl 1.70–3.00 mm (ZMB 17166), same data as holotype.

Diagnosis. Rostrum (Fig. 5A) straight or slightly sigmoid, with a basal crest, reaching to end of or beyond antennular peduncle, or to distal end of the scaphocerite, rostral formula: 2–3(3) + 17–21(19) + 0–2(0) / 5–11(7). Pterygostomial angle (Fig. 5B) obtuse, mostly with a distinct tooth. Preanal carina almost absent or flattish without a tooth or spine. Chela of first pereopod 1.94–2.71 as long as wide, dactylus 1.06–1.30 as long as palm; carpus 2.40–3.10 times as long as wide (juvenile specimen 2.18). Chela of second pereopod 2.26–2.94 times as long as wide, dactylus 1.11–1.60 times as long as palm; carpus 5.17–6.67 times as long as wide.

Description. Rostrum (Fig. 5A) straight or slightly sigmoid, with a basal crest, reaching to end of or beyond antennular peduncle, or to distal end of the scaphocerite, 0.73–0.99 times as long as carapace, armed dorsally with 21–24 teeth including 2 or 3 on the carapace posterior to orbital margin, armature reaching almost to the distal end with 0–2 supapical-like teeth, 5–11 ventral teeth; rostral formula: 2–3(3) + 17–21(19) + 0–2(0) / 5–11(7). Juvenile specimens differ in rostral length (reaching to end of second segment of antennular peduncle or end of third segment, 0.57–0.71 times carapace length) and number of teeth; rostral formula: 2–3 + 12–15 + 0 / 2–5.

Antennal spine below inferior orbital angle. Pterygostomial angle (Fig. 5B) obtuse, with a distinct tooth in 13 of 17 specimens. Antennular peduncle 0.70–0.93 times as long as carapace, second segment 2.00–2.13 times length of third segment, third segment 0.24–0.25 times as length of basal segment. Stylocerite 0.80–0.85 times as long as the basal segment of antennular peduncle. Scaphocerite (Fig. 5C) 3.7 times as long as wide.

Sixth abdominal somite 0.58–0.67 times length of carapace, 1.8–2.2 times as long as fifth somite, as long as or slightly shorter than telson. Telson (Figs. 6G–H) 3.1–3.6 times as long as proximal width, distal margin convex or rounded, without median projection, with 3 or 4 pairs dorsal and 1 pair of dorsolateral spinules, dorsal spinules located close to lateral margin of telson, distal end with 6–8 relatively short spines, lateral pair slightly longer than intermediate spines. Preanal carina almost absent or flattish without a tooth or spine. Uropodal diaeresis (Fig. 6I) with 12–15 movable spinules.

Incisor process of mandible (Fig. 5D) ending in irregular teeth, molar process truncated. Lower lacinia of maxillula (Fig. 5E) rounded, upper lacinia elongate, with numerous distinct teeth on inner margin, palp slender with few simple setae at tip. Upper endites of maxilla (Fig. 5F) subdivided, palp short, scaphognathite tapering posteriorly, fringed with long, curved setae at posterior margin. Palp of first maxilliped (Fig. 5G) ending in a distinct finger-like projection. Podobranch on second maxilliped (Fig. 5H) well developed. Third maxilliped (Fig. 5I) with 2 arthrobranchs, ultimate segment shorter than penultimate segment. Pleurobranchs present on all pereopods. First pereopod with 1 arthrobranch. Well developed epipods present on the third maxilliped and the first 4 pereopods.

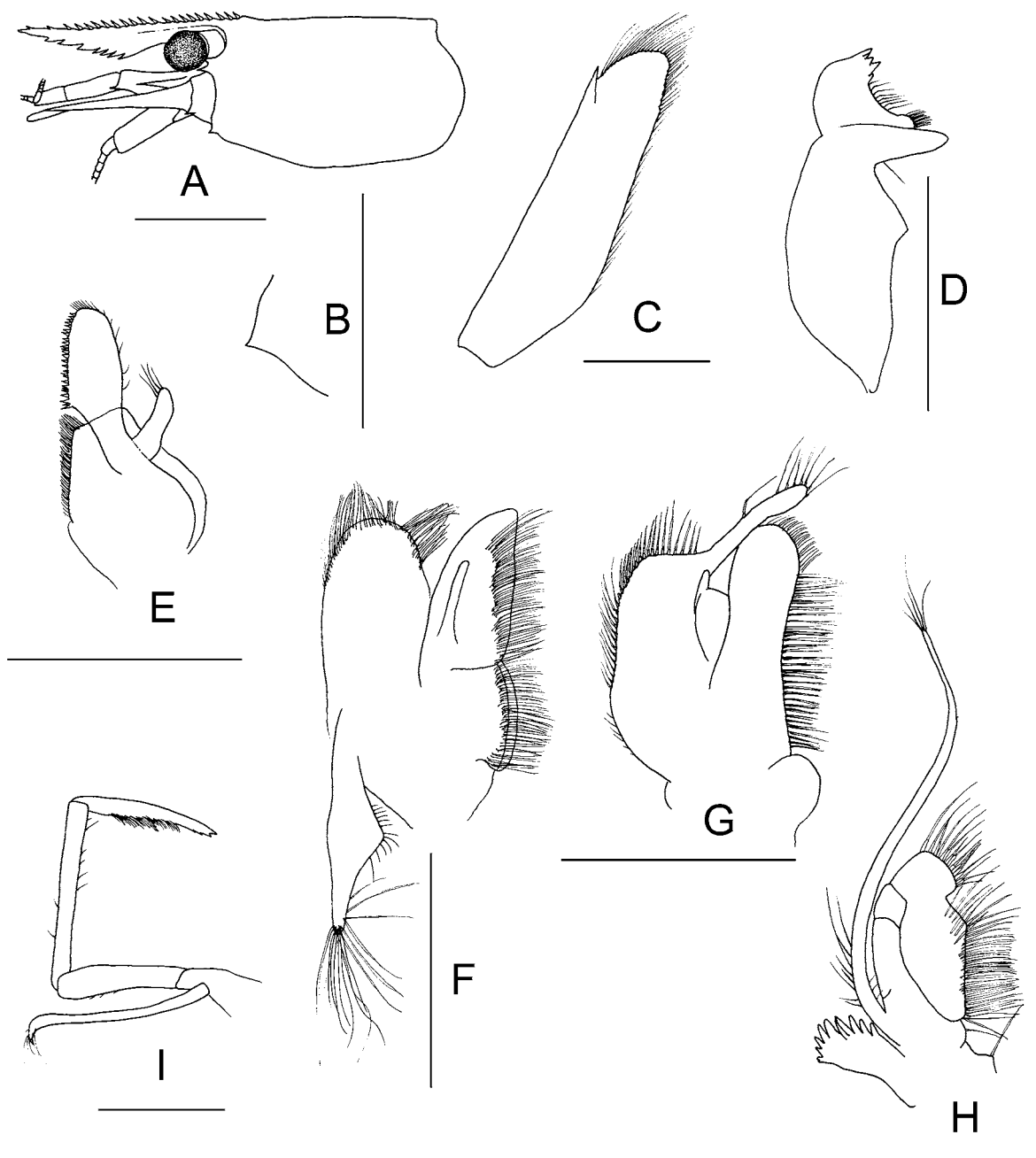


FIGURE 5. *Caridina buergersi* sp. nov., paratype male (cl 3.4 mm) (ZMB 17166): A, cephalothorax and cephalic appendages; B, pterygostomial margin; C, scaphocerite; D, mandible; E, maxillula; F, maxilla; G, first maxilliped; H, second maxilliped; I, third maxilliped. Scale bars = 2 mm (A) and 1 mm (B-I).

Chela and carpus of first pereiopod (Figs. 6A–B) distinctly stouter and broader than chela and carpus of second pereiopod; chela of first pereiopod 1.94–2.71 as long as wide, 1.07–1.28 times length of carpus; tips of fingers without hooks; dactylus 1.06–1.30 as long as palm; carpus 2.4–3.1 times as long as wide (juvenile specimen 2.18), 0.76–1.12 times length of merus. Chela of second pereiopod 2.26–2.94 times as long as wide, 0.66–0.82 times length of carpus; tips of fingers rounded, dactylus 1.11–1.60 times as long as palm; carpus 5.17–6.67 times as long as wide, 1.24–1.36 times length of merus (juvenile specimen 1.10). Third pereiopod (Figs. 6C–D) slender, dactylus 2.8–4.1 times as long as wide (terminal spine included, without spines on flexor margin), terminating in one large claw with 4–6 accessory spines on flexor margin; propodus 11.4–15.1 times as long as wide (juvenile specimen 9.8), 4.32–4.53 times as long as dactylus (juvenile specimen 3.5);

carpus 4.63–6.0 times as long as wide, 0.55–0.66 times as long as propodus, 0.46–0.54 times as long as merus; merus 7.60–9.20 times as long as wide, 1.84–2.16 times as long as carpus, bearing 2–3 movable spines on posterior margin of outer surface. Fifth pereiopod (Figs. 6E–F) slender, dactylus 5.0 times as long as wide (terminal spine included, without spines on flexor margin), terminating in one large claw with 37–45 spinules on flexor margin; propodus 12.55–13.57 times as long as wide, 3.29–3.96 times length of dactylus, carpus 4.67–5.63 times as long as wide, 0.44–0.50 times as long as propodus, 0.57 times as long as merus; merus 7.4–8.7 times as long as wide, 1.76 times length of carpus, bearing 2 or 3 strong, movable spines on posterior margin of outer surface.

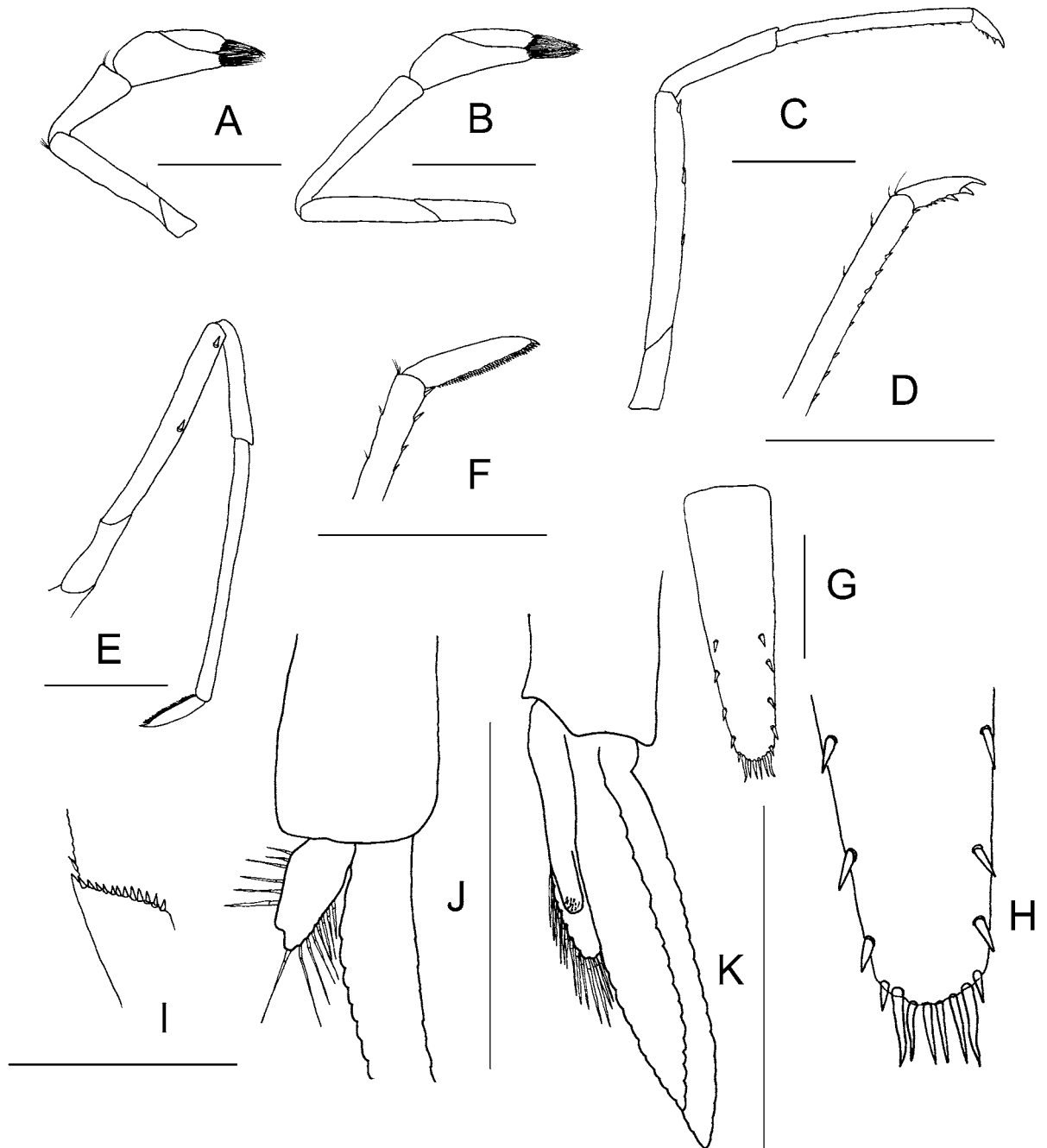


FIGURE 6. *Caridina buergersi* sp. nov., paratype male (cl 3.4 mm) (ZMB 17166): A, first pereiopod; B, second pereiopod; C, third pereiopod; D, dactylus of third pereiopod; E, fifth pereiopod; F, dactylus of fifth pereiopod; G, telson; H, distal end of telson; I, uropodal diaeresis; J, endopod of male first pleopod; K, appendix masculina of male second pleopod. Scale bars = 1.0 mm.

Endopod of male first pleopod (Fig. 6J) elongated triangular, two times as long as proximal width, less than 0.3 times as long as exopod, without an appendix interna but with shoulder-like interruption near distal end. Appendix masculina on male second pleopod (Fig. 6K) slender, rod-like, with long spines on inner and distal margin, appendix interna reaching to about three-quarters of appendix masculina.

Egg size 0.84×0.41 mm

Etymology. *Caridina buergersi* is dedicated to Dr. J. Bürgers, a member of the Sepik expedition 1912/1913 to New Guinea. The name is used as a noun in apposition.

Remarks. The studied sample belongs to historical material deposited in the crustacean collection of the Museum für Naturkunde Berlin (ZMB). It was labelled as “*Caridina sarasinorum*, Deutsch-Neuguinea” and collected on the German Sepik-Expedition in 1912–13 by Dr. J. Bürgers. In *C. sarasinorum*, a species regarded as endemic to the Lake Poso in central Sulawesi, Indonesia, the distal part of the rostrum is unarmed on dorsal margin and epipods are present on the first pair of pereopods only (Cai & Wowor, 2007). The rostrum of the present material is armed almost to the distal end with 0–2 supapical-like teeth on dorsal margin and epipods are well developed on first to fourth pereopods. Due to this differences the present specimen could not assigned to this species and is proposed as new to science. In the shape and armature of the rostrum (armed up to tip on dorsal margin, unarmed near tip on ventral margin) *Caridina buergersi* resembles *C. cognata*, but differs by having a distinct tooth on the pterygostomial margin of the carapace in 13 out of 17 specimens examined (vs. pterygostomial margin without a tooth in *C. cognata*). Furthermore, *C. buergersi* differs by its more slender carpi of the first (2.4–3.1 times as long as wide vs. 1.61–1.95 times in *C. cognata*) and second pereopod (5.17–5.67 times as long as wide vs. 4.00–5.18 times in *C. cognata*). The tooth present on the pterygostomial margin in most specimens distinguishes *C. buergersi* also from all other *Caridina* species known from Papua New Guinea and the surrounding islands.

Acknowledgements

We thank Michael Balke (Zoologische Staatssammlung München) for collecting some of the specimens studied here and Sammy De Grave (Oxford University Museum of Natural History), Yixiong Cai (National University of Singapore), and 2 anonymous reviewers for their useful comments on an earlier version of the manuscript. Further, we thank Oliver Coleman (Museum für Naturkunde Berlin) for the loan of the previously undescribed specimens of *Caridina buergersi* sp. nov.

Literature Cited

- Cai, Y. & Ng, P.K.L. (2001) The Freshwater Decapod Crustaceans of Halmahera, Indonesia. *Journal of Crustacean Biology*, 21(3), 665–695.
- Cai, Y. & Wowor, D. (2007) Atyid shrimps from Lake Poso, Central Sulawesi, Indonesia, with description of one new species (Crustacea: Decapoda: Caridea). *Raffles Bulletin of Zoology*, 55(2), 311–320.
- Borradaile, L.A. (1898) On some crustaceans from the South Pacific. Part 3. *Proceedings of the Zoological Society of London*, 1898, 1000–1015, pls. 63–65.
- Bouvier, E.-L. (1904) Crevettes de la famille des Atyidés: espèces qui font partie des collections du Muséum d'Histoire Naturelle. *Bulletin du Muséum D'Histoire Naturelle, Paris*, 10, 129–138.
- Chace, F.A., Jr (1997) The Caridean Shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907–1910, Part 7: Families Atyidae, Eugonatonotidae, Rhynchocinetidae, Bathypalaemonellidae, Processidae, and Hippolytidae. *Smithsonian Contributions to Zoology*, 587, 1–106.
- Edmondson, C.H. (1935) Atyidae of Southern Polynesia *Occasional Papers of Bernice P. Bishop Museum, Honolulu, Hawaii*, 11(3), 1–19.
- Haan, W. de (1833–1850) Crustacea. In: von Siebold, P. F. *Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suspecto, Annis 1823–1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit*, Lugduni-Batavorum, pp. i–xxxii, ix–xvi, 1–243, pls. A–J, L–Q, 1–55.
- Holthuis, L.B. (1978) Zoological results of the British speleological expedition to Papua New Guinea 1975. 7.

- (Cavernivorous shrimps (Crustacea, Decapoda, Natantia) from New Ireland and the Philippines. *Zoologische Mededelingen*, 53(19), 209–224.
- Johnson, D. (1963) Distributional and other notes on some freshwater prawns (Atyidae and Palaemonidae) mainly from the Indo-West Pacific region. *Bulletin of the National Museum of Singapore*, 32, 5–30.
- Man, J.G. de (1908) On *Caridina nilotica* (Roux) and its varieties. *Records of the Indian Museum*, (2), 255–283.
- Man, J.G. de (1915) Zur Fauna von Nord-Neuguinea. Nach den Sammlungen von Dr. P. N. van Kampen u. K. Gjellerup aus den Jahren 1910 und 1911. Macrura. *Zoologisches Jahrbuch Abtheilung für Systematik* 37, 385–458.
- Milne Edwards, H. (1837) *Histoire naturelle des Crustacés, Comprenant l'Anatomie, la Physiologie et la Classification de ces Animaux*. Volume 2. Libraire Encyclopedique de Roret, Paris, 532 pp.
- Nobili, G. (1905) Decapodi e Isopodi della Nova Guinea tedesca. *Annales Historico-Naturales Musei Nationalis Hungarici*, 3, 480–507.
- Richard, J. & Clark, P.F. (2005) *Caridina nilotica* (P. Roux, 1833) (Crustacea: Decapoda: Caridea: Atyidae) from East Africa, with descriptions of four new species. *Proceedings of the Biological Society of Washington*, 118(4), 706–730.
- Roux, J. (1911) Nouvelles Especies de Decapodes d'eau douce provenant de Papouasie. *Notes from the Leyden Museum*, 38, 81–106.
- Roux, J. (1917) Crustacés (Expedition de 1903). *Nova Guinea. Résultats de l'Expédition scientifique Néerlandaise à la Nouvelle-Guinée en 1903 sous les auspices de Arthur Wichmann*, V (Zoologie), 589–621.
- Roux, J. (1919) Süßwasserdekapoden von den Aru- und Kei Inseln. *Abhandlungen (Senckenbergische Naturforschende Gesellschaft)*, 35, 315–351.
- Roux, J. (1926) Crustacés décapodes d'eau douce de la Nouvelle-Caledonie. *Nova Caledonia. Forschungen in Neu-Caledonien und auf der Loyalty-Inseln. A. (Zoologie)*, 4, 179–240.
- Roux, J. (1927) Contribution a la Faune Carcinologique d'eau douce de la Nouvelle-Guinee. *Nova Guinea, Resultats de l'Expédition Scientifique Neerlandaise a la Nouvelle-Guinee, Zoologique*, 15, 319–350.
- Roux, J. (1934) Notes de Carcinologie mélanésienne. *Revue suisse de Zoologie*, 41, 11, 217–234.
- Roux, P. (1833) Lettre relative à divers Coquilles, Crustacés, Insectes, reptiles et Oiseaux, observés en Égypte. *Annales des Sciences Naturelles*, 28, 72–78.
- Schenkel, E. (1902) Beitrag zur Kenntnis der Dekapodenfauna von Celebes. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, 13, 485–585, pls. 7–13.