

A New Species of *Caprella* (Crustacea: Amphipoda: Caprellidae) from Gippsland Lakes, Australia, with a Redescription of *Caprella acanthogaster* Mayer, 1890 from Northern Japan

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ABSTRACT. *Caprella acanthogaster* Mayer, 1890 sensu lato (Crustacea: Amphipoda: Caprellidae) has previously been recorded from temperate and cold waters of Far East Asia and Australia. A detailed morphological comparison of specimens collected from Gippsland Lakes (Victoria, Australia) and Otsuchi Bay (Tohoku District, Japan) revealed that *C. acanthogaster* sensu lato from these regions comprises two separate species. *Caprella acanthogaster* Mayer, 1890 sensu stricto is confirmed to be distributed in northern Japan. *Caprella tamboensis* sp. nov. is present in Victoria and Tasmania, Australia, and most noticeably differs from *C. acanthogaster* sensu stricto in having a relatively short triangular projection on the palm of propodus of gnathopod 2 and a relatively longer peduncle article 2 of antenna 1 (being longer than article 3).

Introduction

The Amphipoda is a highly diverse order of crustaceans with approximately 10,000 species so far recorded from marine to terrestrial environments worldwide (Arfianti *et al.*, 2018). Within this order the genus *Caprella* is one of the most diverse genera containing more than 180 species with a peak in Far East Asia (Arimoto, 1976; Vassilenko, 1976; Takeuchi, 1999; Horton *et al.*, 2021). *Caprella* occupies the most apomorphic position in the *Caprogammarus-Caprella* line of the Caprellidea due to the loss of pereopods 3 and 4, and absence of a mandibular palp in the mouthparts (Takeuchi,

1993), which makes members of this genus easy to recognize. The species belonging to *Caprella* range in size from 1–3 cm in body length, and are mostly found in algal communities, or on buoys in port areas, and in aquaculture facilities with euryhaline environments (Takeuchi *et al.*, 2001, 2003).

Caprella acanthogaster Mayer, 1890, was originally recorded from the mouth of the Amur River in the Strait of Tartary (Mamiya Strait) in Far East Asia, north-western Pacific Ocean (Mayer, 1890). Subsequently, *C. acanthogaster* was reported in several taxonomic papers on the Caprellidea from the Siberian coast of the Sea of Japan (Schruin, 1937; Vassilenko, 1974), northern Japan

Keywords: Crustacea; Amphipoda; Caprellidae; *Caprella*; Far East Asia; Australia

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(Utinomi, 1943a,b; Arimoto, 1976; Hosono & Munehara, 2001), and South Korea (Lee & Lee, 1993; Lee & Hong, 2009; 2011, Heo *et al.*, 2020). *Caprella acanthogaster* was also found in the Bohai Sea and northern Yellow Sea along the coast of northern China (Wang *et al.*, 1989; Cao *et al.*, 2013; Wei *et al.*, 2016). In the early 2000s, *C. acanthogaster* was recorded from Tasmania (Guerra-García & Takeuchi, 2004). In addition, Martin (1977) described a subspecies *C. acanthogaster humboldtensis* Martin, 1977, from California. Four years later, Marelli (1981) placed *C. acanthogaster humboldtensis* as a synonym of *C. mutica* after studying the syntype of *C. acanthogaster* deposited in the Zoological Museum, Universität Hamburg, Germany.

In the present study, we conducted a detailed morphological comparison of *C. acanthogaster* sensu lato from Otsuchi Bay in Iwate Prefecture, Tohoku District of northern Japan, and from Gippsland Lakes in Victoria, Australia. The comparison revealed that these are different species. We propose and describe a new species *C. tamboensis* sp. nov. for the Victorian specimens and earlier Australian records from Tasmania, and also provide a detailed redescription of *C. acanthogaster* sensu stricto based on the material from northern Japan.

Methods

The specimen illustrations combine hand-drawn figures with digital inking methods as described by Takeuchi (2015). Mouthparts, gnathopod 1, and pereopods 5 to 7 of the described individuals were dissected and mounted on slides in polyvinyl lactophenol. The original drawings in pencil of the lateral views of body somites and antennae and the dissected appendages were made using a microscope equipped with a *camera lucida*. Hand-inked reproductions were then traced using mapping pens based on reduced copies of the original illustrations. The hand-inked sketches were converted into digital files using Adobe Photoshop CS6. The familial classification used follows that proposed by Takeuchi (1993). All material used in the present study was deposited in the Australian Museum, Sydney (AM), or Museum Victoria, Melbourne (MV).

Standard abbreviations on the plates are: *A*, antenna; *AB*, abdomen; *G*, gnathopod; *L*, left; *LL*, lower lip; *MD*, mandible; *MX*, maxilla; *MXP*, maxilliped; *P*, pereopod; *R*, right; and *UL*, upper lip.

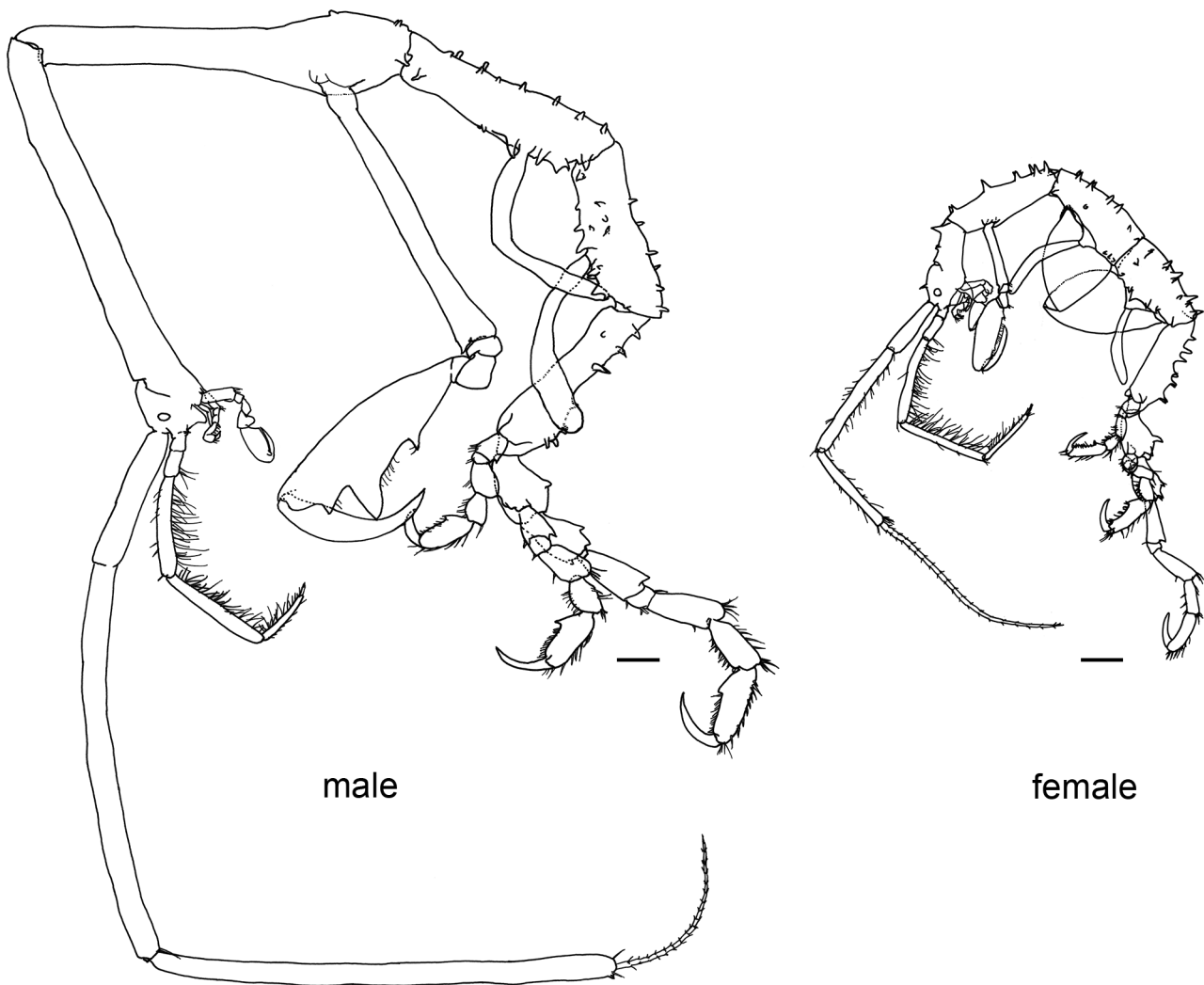


Figure 1. *Caprella acanthogaster* Mayer, 1890 from Otsuchi Bay, Iwate, Japan. Male, AM P.105618, 38.06 mm. Female, AM P.105619, 12.37 mm. Bar indicates 1.0 mm.

Taxonomy

Caprellidae Leach, 1814

Caprella Lamarck, 1801

Caprella acanthogaster Mayer, 1890

Figs 1–3

Caprella acanthogaster Mayer, 1890: 80, pl. 7 figs 52–53; 1903: 78–79, pl. 3 fig. 3.—Utinomi, 1943b: 281–282, fig. 1.—Utinomi, 1947: 71.—McCain & Steinberg, 1970: 11.—Marelli, 1981: 656, figs 1A, B.—Takeuchi, 1995: 201, figs 21–185.—Hosono & Munchara, 2001: 12–15, fig. 1.

Caprella (Spinicephala) acanthogaster.—Arimoto, 1976: 169–175, figs 91–93 (in part).

Not *Caprella acanthogaster*.—Guerra-García & Takeuchi, 2004: 996–1103, figs 22–26 (= *C. tamboensis* sp. nov.).

Material examined. Male, AM P.105618, mature female AM P.105619, 3 males and 2 mature females AM P.105620, all 30 Apr 1992, 39.3467°N 141.9334°E, Research facility for *Undaria pinnatifida* (Harvey) Suringar, 1873, off Otsuchi Marine Research Center, Ocean Research Institute (currently International Coastal Research Center, Atmosphere and Ocean Research Institute), the University of Tokyo, Otsuchi Bay, Otsuchi, Iwate Prefecture, Japan, coll. I. Takeuchi.

Description

Male, AM P.105618, body length, 38.06 mm. Head, 1.33 mm; pereonite 1, 9.27 mm; pereonite 2, 9.59 mm; pereonite 3, 5.55 mm; pereonite 4, 4.64 mm; pereonite 5, 4.80 mm; pereonite 6, 1.56 mm; Pereonite 7, 1.32 mm, respectively. Pereonite 2 longest.

Head and pereonites elongate; eye large, distinct. Pereonite 2 with small anterolateral projection, small anterodorsal projection, paired mid-dorsal projections, and paired posterodorsal projections. Pereonites 3–4 with numerous lateral and dorsal projections. Pereonite 5 with small anterolateral projection and numerous dorsal projections. Pereonites 6–7 each with paired mid-dorsal projections.

Mouthparts. Upper lip wider than deep, bilobed, setose. Lower lip, inner lobe round. Right mandible right incisor with 5 teeth, lacinia mobilis with 4 teeth followed by 2 setulate setae, molar distinct with small molar flake. Left mandible incisor with 5 teeth, lacinia mobilis with 5 teeth followed by 3 setulate setae, molar distinct. Maxilla 1 outer plate with 7 stout apical setal-teeth; palp 2-articulate; article 2 6.0 × article 1 with 10 lateral robust or slender setae and single line of apical stout setae. Maxilla 2 inner plate oval, with *ca.* 30 setae; outer plate with *ca.* 15 apical setae. Maxilliped inner plate (basal endite) distal margin with a line of setae on entire length and 2 stout setae on inner half;

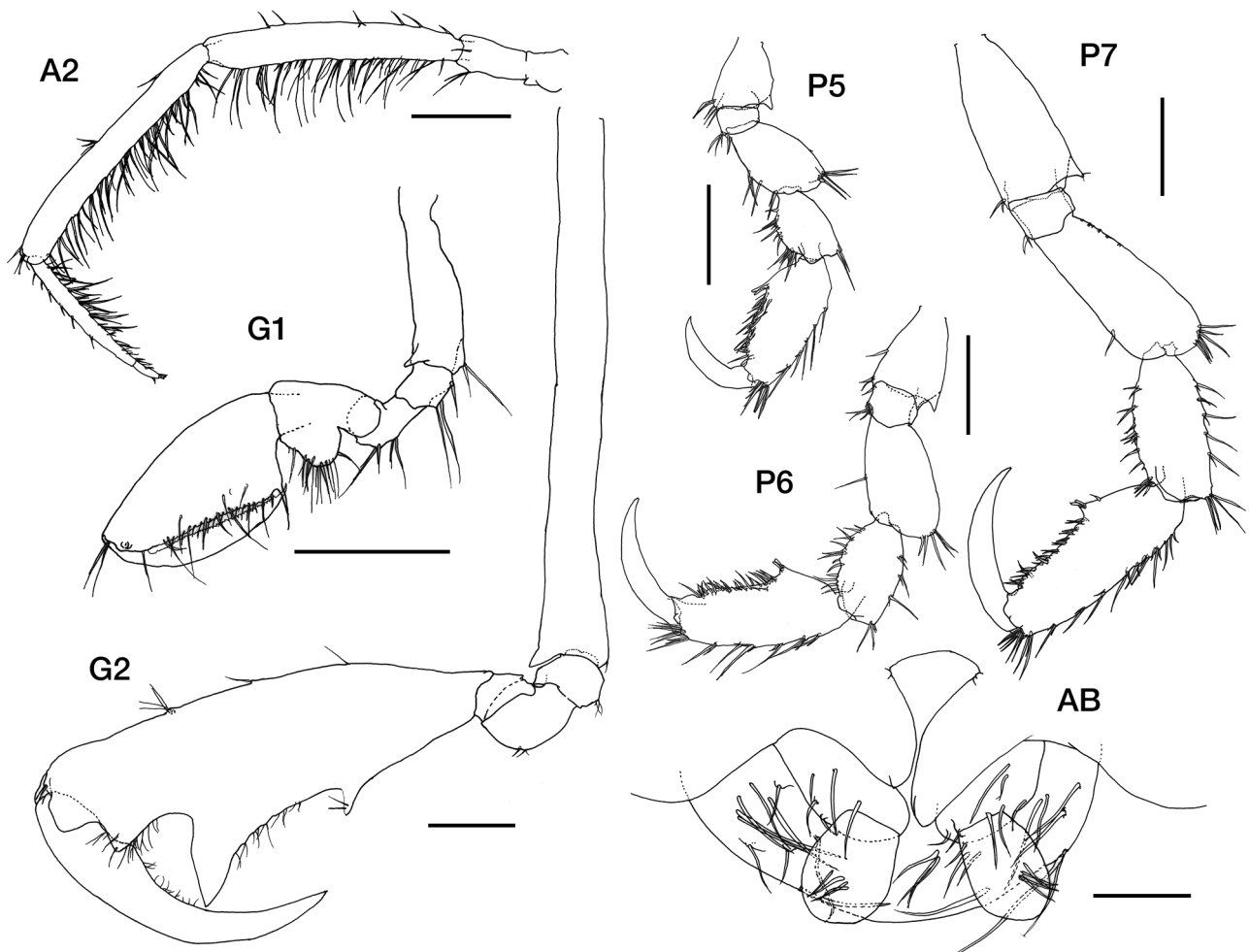


Figure 2. *Caprella acanthogaster* Mayer, 1890 from Otsuchi Bay, Iwate, Japan. Male, AM P.105618, 38.06 mm. Bar indicates 1.0 mm, except for 0.1 mm to AB.

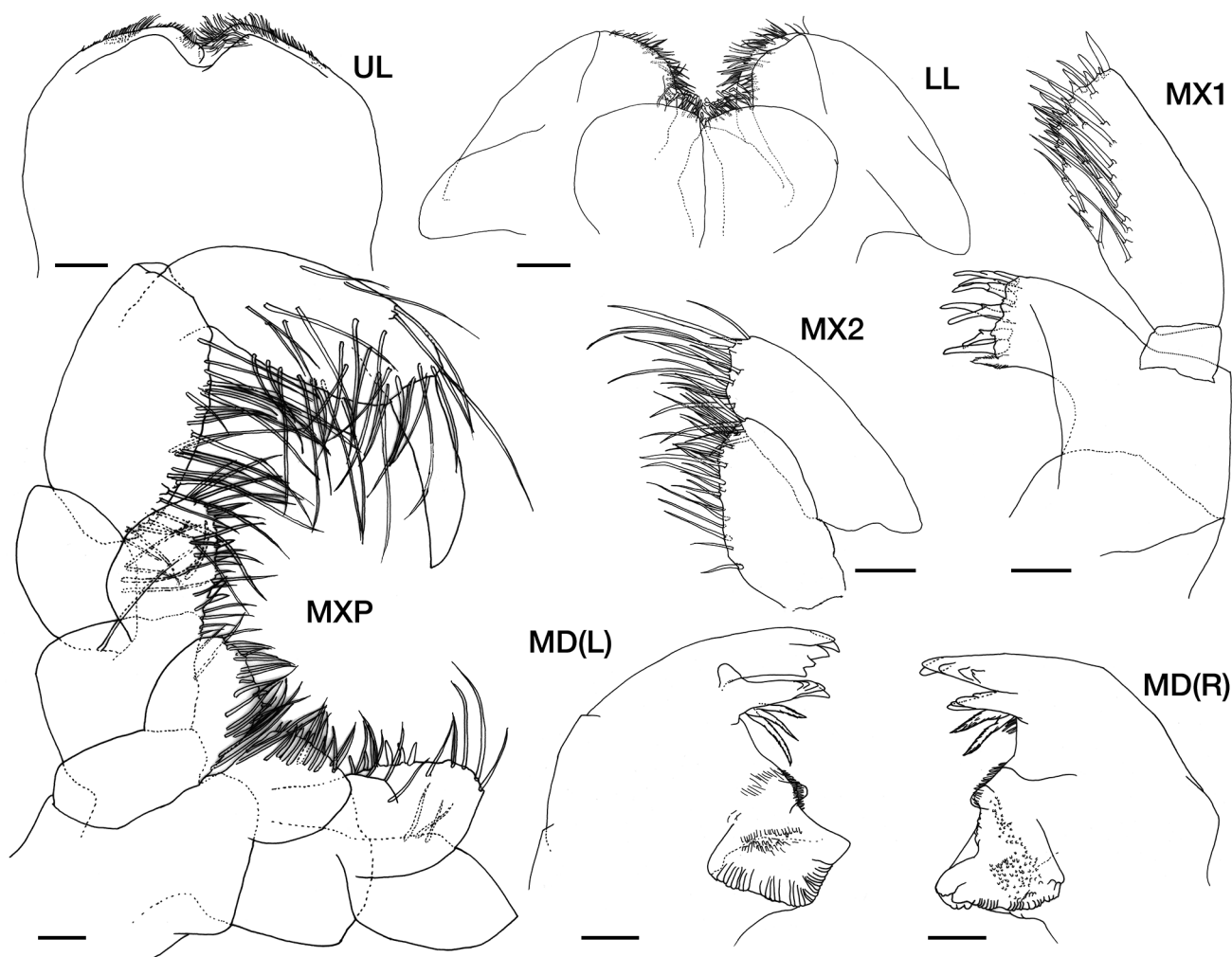


Figure 3. *Caprella acanthogaster* Mayer, 1890 from Otsuchi Bay, Iwate, Japan. Male, AM P.105618, 38.06 mm. Bar indicates 0.1 mm.

outer plate (ischial endite) $1.5 \times$ inner plate (basal endite) with *ca.* 20 setae on inner margin; palp 4-articulate, article 2 longest, setose along entire inner margin; article 3 $2.0 \times$ article 1, setose on lateral to distal part; dactylus falcate.

Antenna 1 elongate, $0.8 \times$ body length; peduncle article 3 longest, $1.10 \times$ peduncle article 2 length; flagellum short $0.25 \times$ peduncular length, with 17 articles, proximal article composed of 3 partially fused articles. *Antenna 2* slender, $0.30 \times$ antenna 1 length; peduncle article 2 to flagellum article 1 with dense plumose setae (swimming setae).

Gnathopod 1 slender, setose on carpus to propodus. *Gnathopod 2* inserted 0.20 along posterior margin of corresponding pereonite; coxa vestigial; basis $1.0 \times$ length of pereonite 2, with projection near distal margin; propodus ovate, large, length $2.5 \times$ width with several setae on dorsal margin, palm proximal projection with 1 robust (grasping) seta, palm margin convex, with large triangular mid-palmar projection and shallow distal shelf, sinus present. *Gills 3–4* slender, length *ca.* $1.1 \times$ corresponding pereonite length.

Pereopod 5 slender; basis shorter than propodus; carpus anterior margin setose; propodus palm with 1 pair of robust setae (grasping setae) *ca.* 0.4 palm length from articulation with carpus and *ca.* 20 setae along palm; dactylus curved. *Pereopods 6–7* progressively longer than pereopod 5.

Penis elongated. Uropod 1 peduncle short; ramus round (length $1.6 \times$ width) with 3 lateral setae. Uropod 2 vestigial with 7 setae.

Mature female, AM P.105619, body length, 12.37 mm. Head, 0.80 mm; pereonite 1, 0.98 mm; pereonite 2, 2.41 mm; pereonite 3, 2.24 mm; pereonite 4, 2.01 mm; pereonite 5, 2.07 mm; pereonite 6, 1.01 mm; pereonite 7, 0.85 mm, respectively. Pereonite 2 longest.

Head with paired dorsal projections. Pereonite 1 with 2 paired dorsal projections. Pereonite 2 with 3 paired dorsal projections. Pereonite 3 with numerous lateral and dorsal projections. Pereonites 4–5 with numerous lateral and dorsal projections. Pereonites 6–7 each with 2 paired dorsal projections.

Antenna 1 elongate, $0.85 \times$ body length; peduncle article 2 longest; flagellum $0.80 \times$ peduncular length, with 20 articles, proximal article composed of 2 articles. *Antenna 2* slender, $0.55 \times$ antenna 1 length. *Gnathopod 2* inserted 0.30 along anterior margin of corresponding pereonite; basis $0.55 \times$ length of pereonite 2; propodus oval. *Gill 3* slender, length $0.70 \times$ corresponding pereonite length. *Gill 4* slender, length $0.85 \times$ corresponding pereonite length.

Distribution (Fig. 4).

Type locality. Mouth of Amur River, at Strait of Tartary (Mamiya Strait) between the Sea of Okhotsk and the Sea of Japan.

Other localities. Hokkaido to Miyagi Prefecture, Japan (Mayer, 1890; Utinomi, 1943b; Takeuchi, 1995; Hosono & Munchara, 2001; and the present study).

Remarks

Taxonomy, previous records. *Caprella acanthogaster* was first reported by Mayer (1890) from the mouth of the Amur River, at the Strait of Tartary (Mamiya Strait) between Sakhalin Island and the Eurasian Continent, based on 4 males (25 mm maximum body length) and 1 female. Mayer (1890) provided a brief description of the species, with figures of gnathopod 2 and pereonite 3, but was mainly focused on its differences from *C. eximia* Mayer, 1890. The type specimens were deposited at the Hamburg Museum, Germany, according to McCain and Steinberg (1960) and Marelli (1981). Mayer (1890) also reported a male specimen of *C. acanthogaster* at the Museum Godeffroy, Hamburg, Germany. The sampling location of this specimen is unknown, and Mayer (1890) concluded that it most likely originated from Australia after consultations with G. Pfeffer, although Mayer (1890) also speculated that the specimen was collected from De Castries Bay, Sakhalin Island in Far East Asia or from the Le Maire Strait at the southern tip of South America before contacting G. Pfeffer (see remarks under *C. tamboensis* sp. nov. for further discussion of this specimen). Mayer (1903) also reported this species from the Sea of Japan near Vladivostok, Russian Far East, from a collection deposited in the Moscow Museum without a specified sampling location, and from Nakabuta, Hokkaido, Japan deposited at the Hamburg Museum. In the same report, Mayer (1903) provided a brief description and the lateral view of entire *C. acanthogaster* based on the male specimen, 42 mm in body length, deposited in the Moscow Museum.

Schurin (1937) reported and briefly described a specimen of *C. acanthogaster* from Peter the Great Bay, and cited the differences between *C. acanthogaster* and *C. eximia* following the notes in Mayer (1890, 1903). However, in the lateral view Schurin (1937) provided for *C. acanthogaster* minute setae are present on pereonite 2 and gnathopod 2, a character typical for *C. mutica*. Therefore, Vassilenko (1974) concluded that *C. acanthogaster* reported in Schurin (1937) was a misidentified sample of *C. mutica*. *Caprella acanthogaster* s.l. recorded from Onagawa Bay, Miyagi Prefecture, northern Japan (Utinomi, 1943a) is similar to the above *C. acanthogaster* s.l. from Peter the Great Bay.

Vassilenko (1974) also described and provided figures of *C. acanthogaster* s.l. that was collected from Peter the Great Bay. The male specimen in Vassilenko (1974) possesses paired posterodorsal projections on pereonite 1 and paired mid-lateral and posterodorsal projections on pereonite 2. These features make the *C. acanthogaster* s.str. determination questionable. Therefore, further detailed study on these *C. acanthogaster* s.l. specimens from Peter the Great Bay and Onagawa Bay is needed. Vassilenko (1974) noted that *C. acanthogaster* differs from *C. eximia* by the smaller body size and presence of two to four projections around the base of gills on pereonites 3 and 4.

Regarding *C. acanthogaster* s.l. from Japan, Arimoto (1976) described *C. acanthogaster* collected from Kesennuma Bay, Miyagi Prefecture, northern Japan, and illustrated specimens that possessed intermediate features or a mixture of traits between *C. acanthogaster* and *C. mutica*, as pointed out by Marelli (1981) and Vassilenko (2006), and it is considered that there were both of these species among his material.

Marelli (1981) studied a syntype of *C. acanthogaster* deposited at the Hamburg Museum, Germany, and presented

its description and a lateral view of the specimen. Mayer (1890) noted the presence of paired projections on the head, but the corresponding projections are absent in the description and figure provided by Marelli (1981).

Material examined from Japan in the present study matches the description and figure of *C. acanthogaster* in Marelli (1981) in the following characteristics: smooth head, elongate pereonite 1, elongate pereonite 2 with several dorsal spines, setae on pereonite 2 absent, large triangular projection present on the middle of propodus of gnathopod 2, and elongated gills on pereonite 4.

In addition to the Siberian coast of the Sea of Japan and northern Japan, *C. acanthogaster* s.l. has been widely reported from South Korea (Hong, 1988; Lee & Lee, 1993; Lee & Hong, 2011; Heo *et al.*, 2020) to China (Wang *et al.*, 1989; Cao *et al.*, 2012; Wei *et al.*, 2016; Chen *et al.*, 2018) in East Asia.

For the Korean records Lee & Hong (2011) provide a description and figures of a male *C. acanthogaster* (20.0 mm in body length) from Yeongdeok, South Korea, and noted that the species is widely distributed along the South Korean coast. Heo *et al.* (2020) also described in detail *C. acanthogaster* from South Korea based on a 15.3 mm long male specimen. Based on Lee & Hong (2011) and Heo *et al.* (2020), *C. acanthogaster* s.l. from South Korea is distinct from the *C. acanthogaster* s.str. described in the present paper in having many tiny tubercle-like projections on pereonite 1, dorsal part of pereonite 2, and basis of gnathopod 2. These records apparently represent a different species. This may be similar to the situation Ito *et al.* (2007) reported where the geographic isolation of the East/South China Sea and the paleo-Japan Sea from the Pacific Ocean by tectonic processes promotes high species diversity of the coastal fish genus *Girella* Gray, 1835 around Japan.

To the best of our knowledge, there are no detailed descriptions and/or figures of *C. acanthogaster* from the Chinese coastline. However, the record from fouling assemblages in the sub-tropical area of Hainan Island in southern China (Chen *et al.*, 2018) is questionable because this location is currently disjunct from other records in the more temperate regions contiguous with the type locality. Furthermore, recent studies have confirmed that the huge amount of freshwater from the Yangtze River entering the East China Sea forms a barrier to several species of Mollusca and Crustacea where the duration of the pelagic larval stage is < 10 days (Ni *et al.*, 2017). Since the Amphipoda including *Caprella* spp. lack a pelagic larval stage, the outflow from the Yangtze River may act as a distinct barrier for the species distribution along the coast of China in a similar way.

We therefore conclude a detailed comparison of *C. acanthogaster* from northern China and Korea with those from other localities should be conducted. Particularly as recent detailed comparisons of common species of *Caprella* and related genera in the Caprellidae and the Phtisicidae, previously regarded as cosmopolitan examples from different geographical localities, shows that these records are separated into region-specific species (Takeuchi & Lowry, 2007, 2016, 2019; Takeuchi & Oyamada, 2013; Hughes & Takeuchi, 2016; present study). Similarly, Takeuchi & Oyamada (2013) conducted a detailed comparison of *C. californica* Stimpson, 1857 s.l. from Japan and California, and proposed *C. scauroides* Mayer, 1903 as the correct name for the Japanese specimens.

Ecology. *Caprella acanthogaster* is one of the dominant species among *Caprella* spp. inhabiting gill nets and scallop and seaweed aquaculture facilities along the coast of Iwate, Aomori, and Hokkaido, Japan (Arimoto, 1976; Hosono & Munehara, 2001; Takeuchi *et al.*, 2001, 2004; Hosono & Sakurai, 2006). Hosono & Sakurai (2006) reported on the population dynamics of *C. acanthogaster* in an aquaculture facility of Japanese kelp *Laminaria japonica* on the Pacific coast of southern Hokkaido, Japan, which showed the population of *C. acanthogaster* is influenced by immigration of large individuals to the facility in spring (April), their density increases with increasing water temperature during summer, and then rapidly decreases in September and remains low until the following spring (Hosono & Sakurai, 2006). Hosono (2014) noted that at 5°C, females of *C. acanthogaster* reach maturity after 4 months, whereas males require a longer period.

Caprella tamboensis sp. nov.

Figs 5–7

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Caprella acanthogaster.—Guerra-García & Takeuchi, 2004: 996–1103, figs 21–26.

Holotype, male, AM P.102618, 01 Dec 2018, 37.85°S 147.81°E, Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia, coll. M. Jenkins. **Paratypes** (all same collection details as holotype), 1 male, AM P.102619; mature female (described), AM P.102620; 1 male and 1 mature female, AM P.102621; 2 mature females, AM P.102622; 5 mature females, AM P.102623; *ca.* 10 individuals, AM P.102624; male, AM P.105616; male, AM P.105617.

Other material. Many, AM P.102617 (same collection details as holotype); 5 males, 5 females, MV J74951 (same collection details as holotype).

Additional comparative material, all cited by Guerra-García & Takeuchi (2004). 3 males, 1 female, P.48785, 3 Jun 1993, 42°42'S 148°E, Mercury Passage, Tasmania, Australia, Coll. G. Edgar. Series from 29 Mar 1996, 42°34'S 148°5'E, “Scallop aquaculture”, Mercury Passage, Tasmania, Australia, coll. G. Edgar and N. Barrett, substrate *Undaria pinnatifida*, 5 m depth – many specimens, P.48790; many specimens P.48791; 1 male with 2 microscope slides P.61248 (ex P.48790); 1 female P.61249 (ex P.48791).

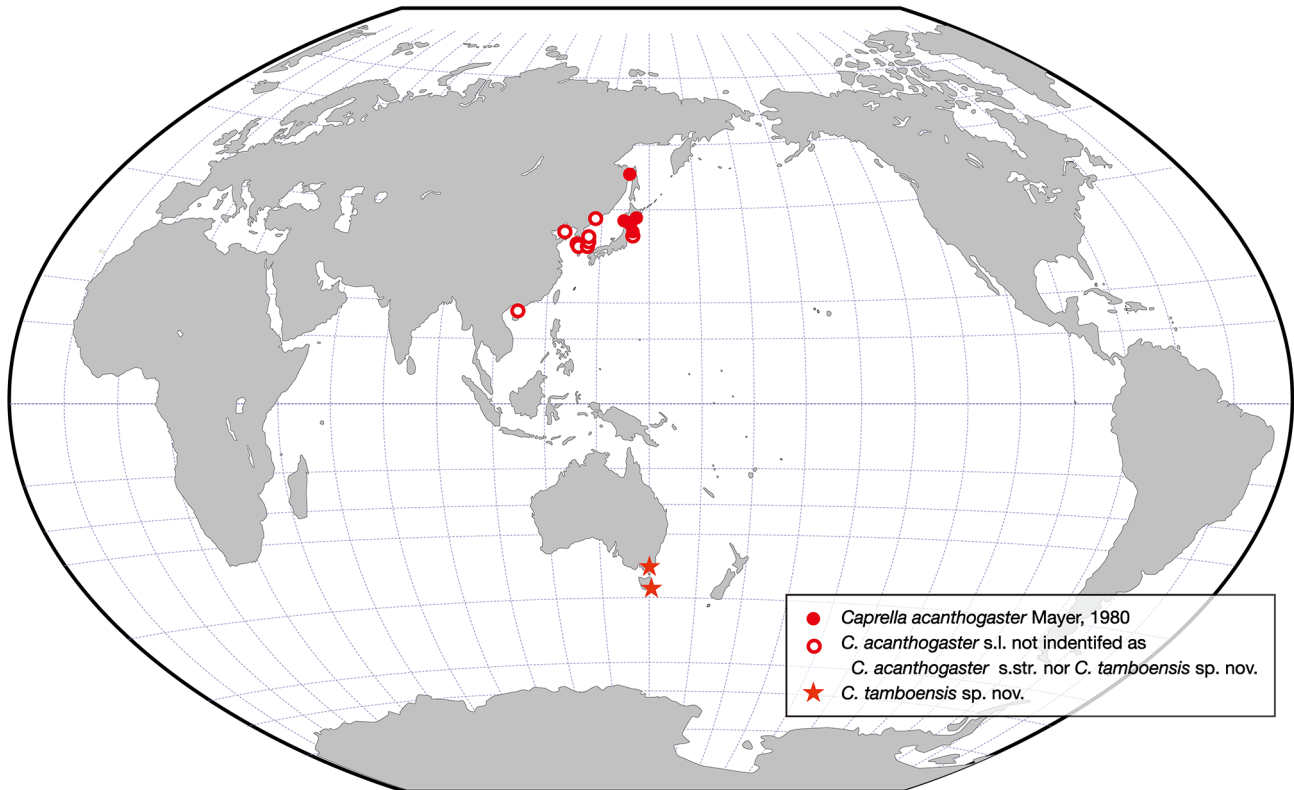


Figure 4. Distribution of *Caprella acanthogaster* Mayer, 1880 and related species. Data is based on Mayer (1880), Schruin (1937), Utinomi (1943a,b), Arimoto (1976), Vassilenko (1974), Wang *et al.* (1989), Lee & Lee (1993), Hosono & Munehara (2001), Guerra-García & Takeuchi (2004), Takeuchi (2005), Lee & Hong (2009, 2011), Cao *et al.* (2013), Wei *et al.* (2016), Heo *et al.* (2020), and the present study.

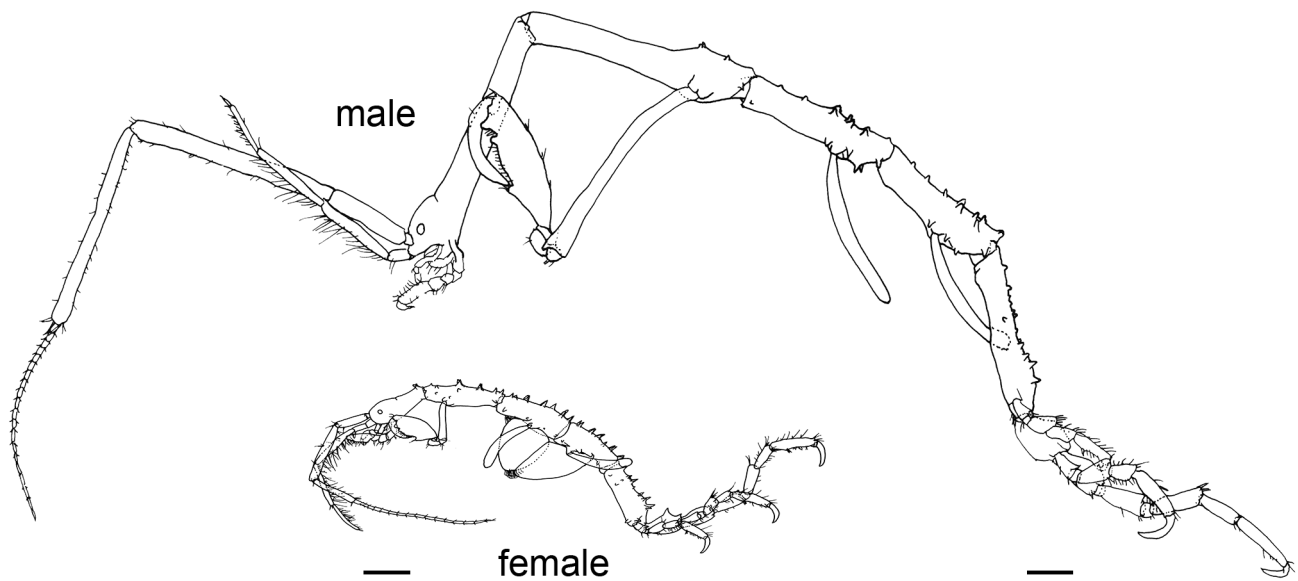


Figure 5. *Caprella tamboensis* sp. nov. from Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia. Holotype, male, AM P.102618, 21.93 mm. Paratype, female, AM P.102620, 9.40 mm. Bar indicates 1.0 mm.

Description

Male, holotype, AM P.102618, body length, 21.93 mm. Head, 1.25 mm; pereonite 1, 3.92 mm; pereonite 2, 5.14 mm; pereonite 3, 3.35 mm; pereonite 4, 3.02 mm; pereonite 5, 3.25 mm; pereonite 6, 1.01 mm; Pereonite 7, 0.98 mm, respectively. Pereonite 2 longest.

Head and pereonites elongate; eye large, distinctive. Pereonite 2 with small anterolateral projection, lateral posterior projection, and 3 paired mid-dorsal to posterodorsal projections. Pereonites 3–4 each with *ca.* 5 lateral and numerous dorsal projections. Pereonite 5 with small anterolateral projection and numerous dorsal projections. Pereonites 6–7 each with paired mid-dorsal projections.

Mouthparts, similar to those described in the current study for *Caprella acanthogaster*.

Antenna 1 elongate, $0.7 \times$ body length; peduncle article 2 longest, peduncle article 3 $0.90 \times$ peduncle article 2 length; flagellum $0.45 \times$ peduncular length, with 19 articles, proximal article composed of 3 partially fused articles. *Antenna 2* slender, $0.35 \times$ antenna 1 length; peduncle article 2 to flagellum article 1 with dense plumose setae (swimming setae).

Gnathopod 1 slender, setose on carpus to propodus. *Gnathopod 2* begins 0.20 along posterior margin of corresponding pereonite; coxa vestigial; basis $1.0 \times$ length of pereonite 2, with projection near distal margin; propodus ovate, large, length $2.5 \times$ width, with three rows of setae on dorsal margin; palm proximal projection with 1 robust (grasping) seta; palm margin wide, slightly convex, with small triangular midpalmar projection, shallow sinus, and shallow distal shelf. *Gill 3* elongated, length $1.1 \times$ corresponding pereonite. *Gill 4* elongated, length $1.0 \times$ corresponding pereonite length.

Pereopod 5 slender; basis shorter than propodus; carpus with *ca.* 10 setae on anterior margin; propodus with 1 pair of robust setae proximally 0.3 palm length from articulation with carpus and 13 setae along palm; dactylus curved. *Pereopod 6* longer than pereopod 5. *Pereopod 7* longer than pereopod 6.

Penis elongated. Uropod 1 peduncle short; ramus round (length $1.4 \times$ width) with 5 lateral setae. Uropod 2 vestigial with 7 setae at basal part.

Mature female, AM P.102620, body length, 9.40 mm. Head, 0.67 mm; pereonite 1, 0.46 mm; pereonite 2, 1.80 mm; pereonite 3, 1.66 mm; pereonite 4, 1.58 mm; pereonite 5, 1.80 mm; pereonite 6, 0.77 mm; Pereonite 7, 0.66 mm, respectively. Pereonites 2 and 5 longest.

Head round. Pereonite 1 with paired posterodorsal projections. Pereonites 2–5 each with numerous lateral and dorsal projections. Pereonites 6–7 each with 2 paired dorsal projections.

Antenna 1 elongate, $0.70 \times$ body length; peduncle article 2 longest; flagellum subequal to peduncular length, with 17 articles, proximal article composed of 2 partially fused articles. *Antenna 2* slender; $0.60 \times$ antenna 1 length. *Gnathopod 2* inserted 0.25 along posterior margin of corresponding pereonite; basis $0.60 \times$ length of pereonite 2, propodus oval. *Gills 3–4* slender, length *ca.* $0.9 \times$ corresponding pereonite length.

Distribution (Fig. 4).

Type locality. Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia.

Other locality. Mercury Passage, Tasmania, Australia (Guerra-Garcia & Takeuchi, 2004).

Etymology. The species name refers to the type locality of the species Tambo Bay, Gippsland Lakes, Victoria.

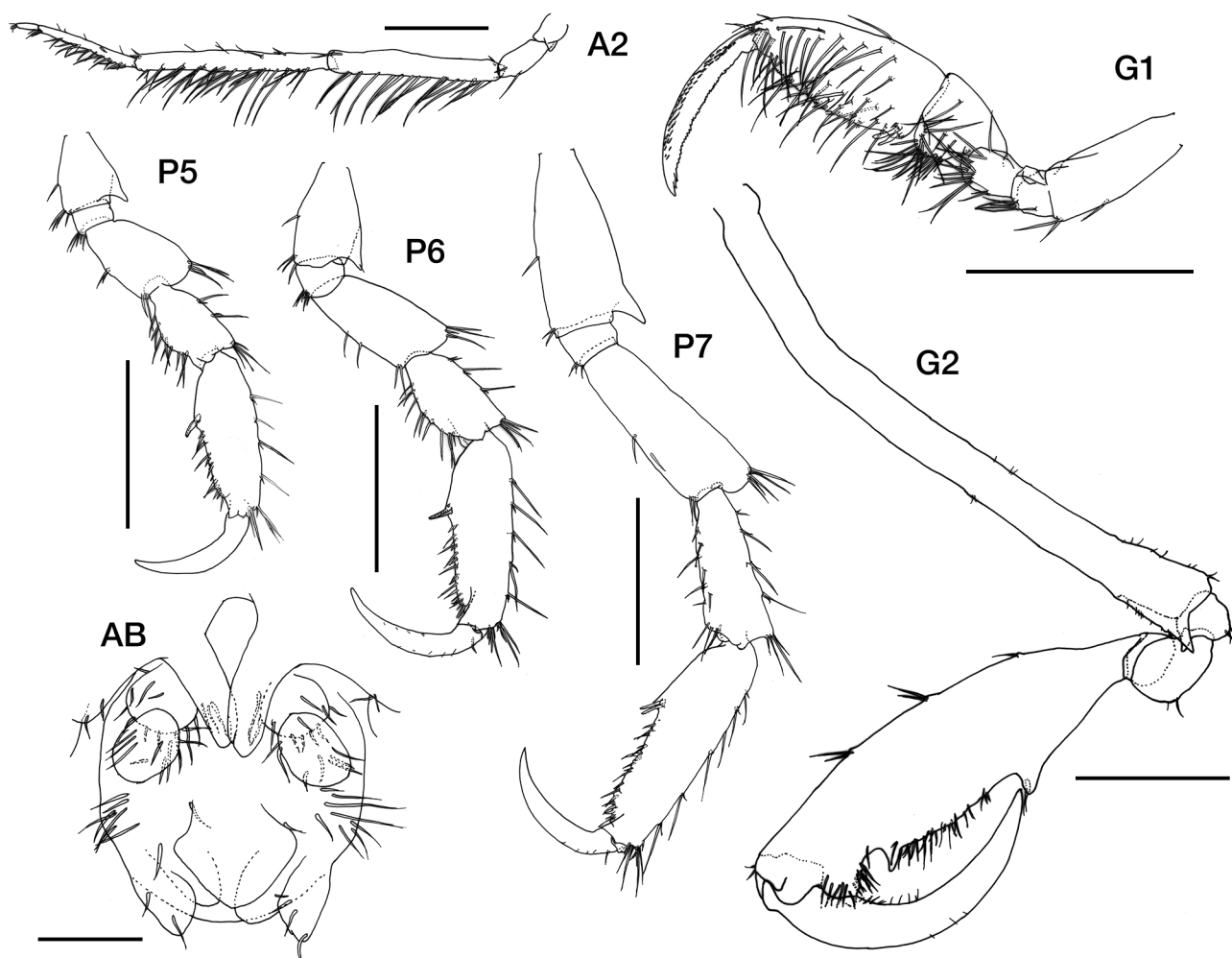


Figure 6. *Caprella tamboensis* sp. nov. from Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia. Holotype, male, AM P.102618, 21.93 mm. Bar indicates 1.0 mm, except for 0.1 mm to AB.

Remarks

The highly dense aggregations of *Caprella* attached to fisheries nets at Tambo Bay, Gippsland Lakes, Victoria, were first discovered by M. Jenkins, a local fisherman (Fig. 8), and the specimens were sent to the Australian Museum for identification.

While the body length of the male specimen of the *C. acanthogaster* redescribed here from Japan is double that of the *Caprella* from Gippsland Lakes the former has less articles in the flagellum of the antenna 1. The number of antenna 1 flagellar articles has been reported to increase in *Caprella danilevskii* Czerniavski, 1868 by one or two in every moult as individuals mature (Takeuchi & Hirano, 1991). Taking this into account it appears both male specimens described here from Japan and Gippsland Lakes are at approximately the same stage of development. Therefore, comparison of *Caprella* from Gippsland Lakes and *C. acanthogaster* s.str. from Far East Asia (Marelli, 1981; present study) based on large mature males has revealed that they are similar but the former differs in: i) the small mid-projection on the palm of propodus of gnathopod 2; ii) the relatively longer antenna 1 peduncle article 2, being longer than article 3; and iii) the relatively higher number of articles in the antenna 1 flagellum. To accommodate these specimens,

we establish a new species, *Caprella tamboensis* sp. nov. The specimens of *C. acanthogaster* reported from Mercury Passage, Tasmania, Australia, by Guerra-García & Takeuchi (2004) are also identified as belonging to this new species.

The male specimen reported by Mayer (1890) as *C. acanthogaster* found in the collection from the Museum Godeffroy, Hamburg, Germany, possibly originated from Australia (see remarks under *C. acanthogaster* above). The Museum Godeffroy was founded by Mr Cesar Godeffroy, one of the merchant magnates of Hamburg, Germany, whose ships had sailed around every ocean for over half a century (Ward, 1876). Included in these travels were expeditions concentrated around the South Sea Islands to collect crustaceans, molluscs, starfish, sea urchins, holothurians, corals, sponges, sea fans, and other organisms (Ward, 1876). Ward (1876) noted that Mr Darnel (probably staff of Mr Cesar Godeffroy), while working in Eastern Australia, passed through Queensland and penetrated three hundred miles into the interior, obtaining strange forms of molluscs and fishes. Therefore, there is a possibility that the specimen of *Caprella* in the Museum Godeffroy collection cited by Mayer (1890) was obtained in Australia and may be *C. tamboensis* or another species related to *C. acanthogaster* or *C. tamboensis*. However, with the closure of the Museum Godeffroy in

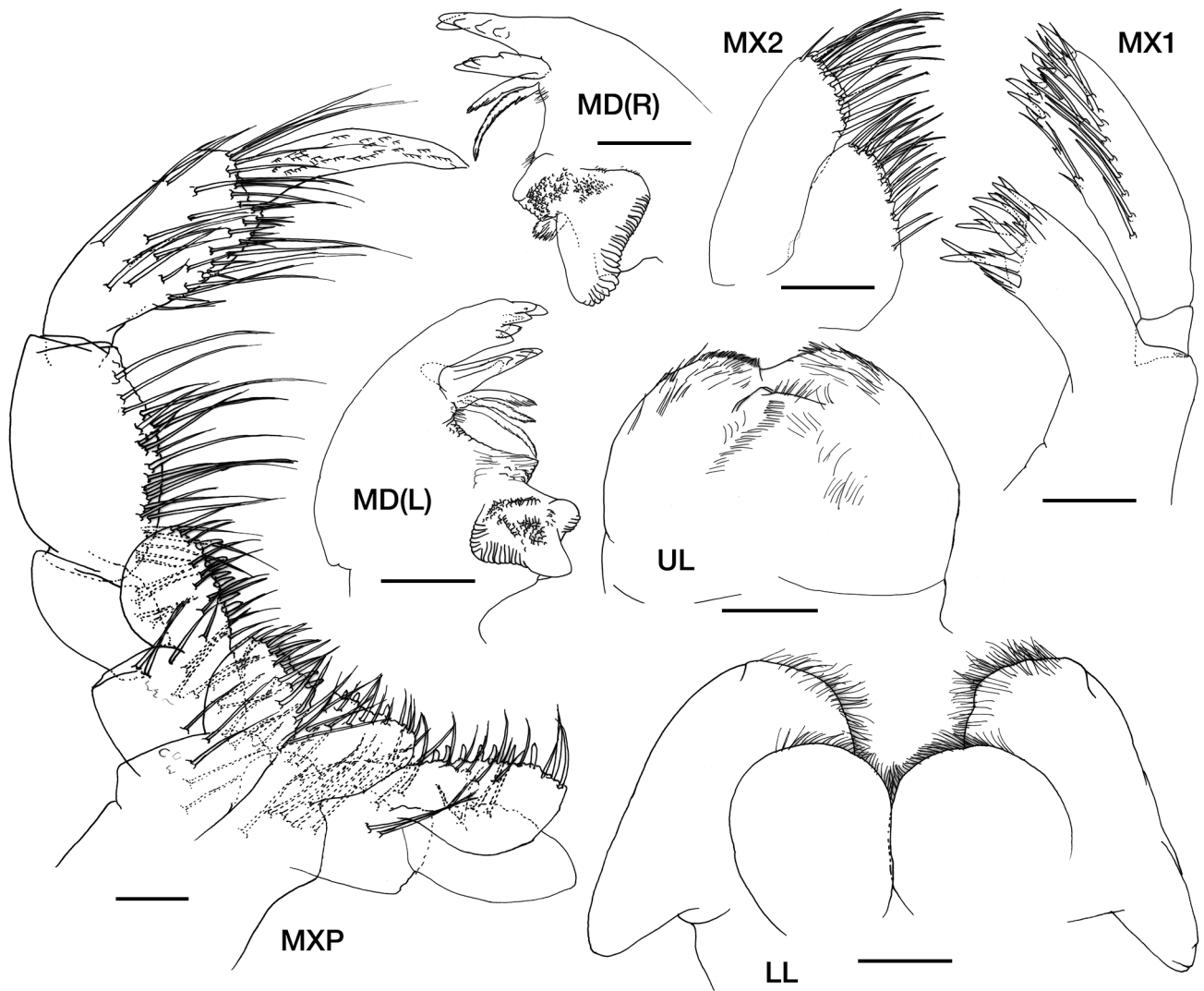


Figure 7. *Caprella tamboensis* sp. nov. from Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia. Holotype, male, AM P.102618, 21.93 mm. Bar indicates 0.1 mm.

1885 the collection was scattered among various institutions (Wikipedia, 2021) and we have been unable to locate the specimen to resolve this.

Evidence provided here suggests a different conclusion to that of Guerra-García & Takeuchi (2004) who reasoned that *Caprella acanthogaster* s.l. (= *C. tamboensis* sp. nov.) from Tasmania was possibly introduced from Far East Asia as the specimens were found among a scallop aquaculture facility, including on the invasive alien macro-alga *Undaria pinnatifida* (Harvey) Suringar, 1873, and suggested the likely transport vector as associated with spat of scallop from the north-eastern Pacific (Edgar, 2000; Guerra-García & Takeuchi, 2004). While we do not discount the possibility that the caprellid recognized here from Gippsland Lakes and Tasmania as *C. tamboensis* may have been introduced to those areas we do not find it to be the same species as *C. acanthogaster* and it is equally likely it may be a native

species, widely distributed but as yet largely unrecorded in southern Australia. For example, Guerra-García *et al.* (2020) have noted examination of the Caprellidae from South Australia and Victoria would also assist in filling gaps in understanding the biodiversity and biogeographical patterns of the Australian fauna.

Our observations also highlight that further detailed morphological study, possibly combined with genetic analysis, may be necessary for reconstructing the phylogeny and to better understand the distribution pattern for species reported as *C. acanthogaster* and other similar related species from the temperate to cold waters of the northeast Asia. These include *C. mutica* and *C. eximia*, both of which were reported to be closely related to *C. acanthogaster* (Vassilenko, 1993), as well as *C. centroda* Vassilenko, 1993 from the Chishima Islands (Kurile Islands) located between Hokkaido and the Kamchatka Peninsula.



Figure 8. Aggregation of *Caprella tamboensis* sp. nov. on a fishing net in Tambo Bay, Lake King, Gippsland Lakes, Victoria, Australia. The image was taken from a screen shot of the video recorded by Mr M. Jenkins when the specimens reported here were collected.

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