

Littoral Caprellidea (Crustacea, Amphipoda) from Phuket, Thailand

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Steenstrupia



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A collection of littoral caprellids from Phuket, Thailand has been studied. The material contained five species: *Metaproto novaehollandiae* (Haswell, 1880), *Protogeton incertus* Mayer, 1903, *Aciconula* sp., *Metaprotella sandalensis* Mayer, 1898, and *Monoliropus hapipandi* new species, which is described in the present paper. *Monoliropus hapipandi* can be distinguished from the remaining species of *Monoliropus* by the abdominal appendages reduced to a seta, the mandibular palp bi-articulate instead of tri-articulate, and by the presence of a striking bi-toothed projection on the penultimate article of the maxilliped palp. *Monoliropus agilis*, the closest species to *M. hapipandi*, is illustrated in detail based on the type material, for comparison of both species. Lateral view figures for all species are given and a key to the Caprellidea from Phuket is also provided.

Keywords: Caprellidea, Phuket, Thailand, taxonomy, *Monoliropus hapipandi*, new species.

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INTRODUCTION

The caprellidean amphipods are small peracarid crustaceans distributed along the world coasts. They are very common and diverse on erect bryozoans and hydrozoans and on plant substrata such as macroalgae and seagrasses (McCain 1968). They feed on suspended materials, prey on other organisms, or graze on epibiotic fauna and flora (Caine 1974). Locally, caprellids are important prey for many coastal fish species (Caine 1989, 1991). Recently, caprellids have been found to be useful bioindicators of marine pollution and environmental stress (Guerra-García & García-Gómez 2001; Takeuchi et al. 2001; Ohji et al. 2002, 2003), adding interest to understand the taxonomy and systematics of this group of crustaceans.

Takeuchi & Guerra-García (2002) pointed out that although the tropical areas of the Indo-Pacific are well recognised as having a high species diversity of marine invertebrates, caprellids have rarely been recorded from these areas except by Mayer (1903) and Laubitz (1991). Nevertheless, there is an increasing attempt to improve the knowledge of the Indo-Pacific caprellids and sev-

eral contributions have been recently published dealing with the Caprellidea from Hong Kong (Guerra-García & Takeuchi 2003), the Philippines (Guerra-García 2002), and Papua New Guinea (Guerra-García 2003). A contribution on the caprellids of the Australian Great Barrier Reef is currently being reviewed.

In Thailand, thirteen species of caprellideans are known so far from the coast of the Gulf of Thailand (Mayer 1903, McCain & Steinberg 1970) but until now only one species, *Paraprotella saltatrix* Takeuchi & Guerra-García, had been recorded from the Andaman Sea coast. This species was described recently on the basis of female specimens collected from Phuket (Takeuchi & Guerra-García 2002).

A Thai-Danish cooperation programme integrating the Phuket Marine Biological Center (PMBC) and sponsored by the Danish International Development Agency (DANIDA) has been developed to attempt to remedy the lack of knowledge of the Andaman Sea area. This program was launched in 1966 and, in particular, the BIOSHELF surveys, which ran from 1995 to 2000, revealed that the Andaman Sea contains huge and highly diverse communities of fauna

and flora and that the Crustacea is a highly diverse group of major importance in its benthic communities. The results from the workshop "Biodiversity of Crustacea of the Andaman Sea" were published as volume 23 (2002) of the Phuket Marine Biological Center Special Publications, recording 162 species of crustaceans, including 1 new family, 2 new genera, 54 new species and 108 new records. This overview of the crustacean fauna of the Andaman Sea will undoubtedly be an important reference for future research in the region.

The Zoological Museum, University of Copenhagen, has been a strong participant in the collaboration with the Phuket Marine Biological Center over the years and many marine zoologists have had the opportunity to broaden their knowledge of the tropical marine environment, both through working at the PMBC and through supervision of Thai colleagues visiting Copenhagen. In 1982, caprellids from Phuket were sampled by Jean Just and most of the material was deposited at the Zoological Museum, University of Copenhagen. During a stay at this museum in January 2003, I studied this material. The collection contained five species in five genera, including the new species *Monoliropus hapipandi*, described herein. Therefore, six species have been reported from Phuket so far: *Paraprotella saltatrix*, described by Takeuchi & Guerra-García (2002), and five more species illustrated in the present paper.

List of stations near Phuket Marine Biological Center (PMBC), Thailand, sampled by Jean Just in 1982:

- St. 2.** 13 Feb. 1982, PMBC, outer edge of reef flat, 0.2 m, wash from dead *Acropora (cervicornis)* type) with low growth of filiform algae.
St. 3. 13 Feb. 1982, PMBC, outer edge of reef flat, 0.2 m, wash from stones.
St. 12. 19 Feb. 1982, Pa Tong Bay, outermost part of south coast, 12 m, sand on coral debris, SCUBA.
St. 14. 21 Feb. 1982, PMBC, south of the point, 5 m, coarse sand with silt.
St. 15. 22 Feb. 1982, Lon Island, southeast point, 7–8 m, outside reef, coarse sand with scattered low seagrass, SCUBA.

St. 19. 26 Feb. 1982, Kata Bay, south of Pu Island, 13 m, sand with a little coral debris, SCUBA.

St. 20. 26 Feb. 1982, Kata Bay, outside reef, 8 m, sand with coral debris, SCUBA.

St. 22. 4 Mar. 1982, PMBC, head of pier, 0–7 m, hydroids, sponges, ascidians on piles, SCUBA.

St. 27. 9 Mar. 1982, Kata Beach, inside reef, 5 m, sand with detritus, large number of young *Mactra* and mytilids.

Note that in this paper the English word "Island" is used after the name instead of the Thai word "Ko" or "Koh" before it.

TAXONOMY

Family Phtisicidae Vassilenko, 1968

Metaproto novaehollandiae (Haswell, 1880)

Fig. 1

Proto novae-hollandiae Haswell, 1880: 275–276, pl. 2, fig. 3. – Mayer 1882: 26; 1890: 14–15. – Stebbing 1888: 1230–1232.

Metaproto novaehollandiae. – Mayer 1903: 26–27, pl. 1, figs. 11–12; pl. 6, figs. 24–28; pl. 9, figs. 3, 50. – Stebbing 1910: 651–652. – McCain & Steinberg 1970: 56. – Laubitz 1991: 103–104, fig. 1. – Guerra-García 2002: 396–397, fig. 2.

Material examined:

St. 12: 2 males, 4 females (ZMUC CRU-3747); St. 14: 1 male, 2 females (PMBC 20549); St. 15: 4 males, 3 females (ZMUC CRU-3749); St. 20: 1 male (ZMUC CRU-3750).

Remarks

Metaproto can be easily distinguished from the remaining genera of the family Phtisicidae by the presence of only one pair of abdominal appendages. The genus *Metaproto* comprises, so far, only one species, *Metaproto novaehollandiae*, but Guerra-García & Takeuchi (2003) reported the presence of a different species: *Metaproto* sp., collected from Hong Kong and differing from *M. novaehollandiae* mainly on the shape of gnathopod 2 and the number of grasping spines on the propodus of pereopods 3 and 4 in males. The specimens examined in the present study are in agreement with *M. novaehollandiae* described by Haswell (1880) and with the redescrptions of Mayer (1903), based on specimens collected

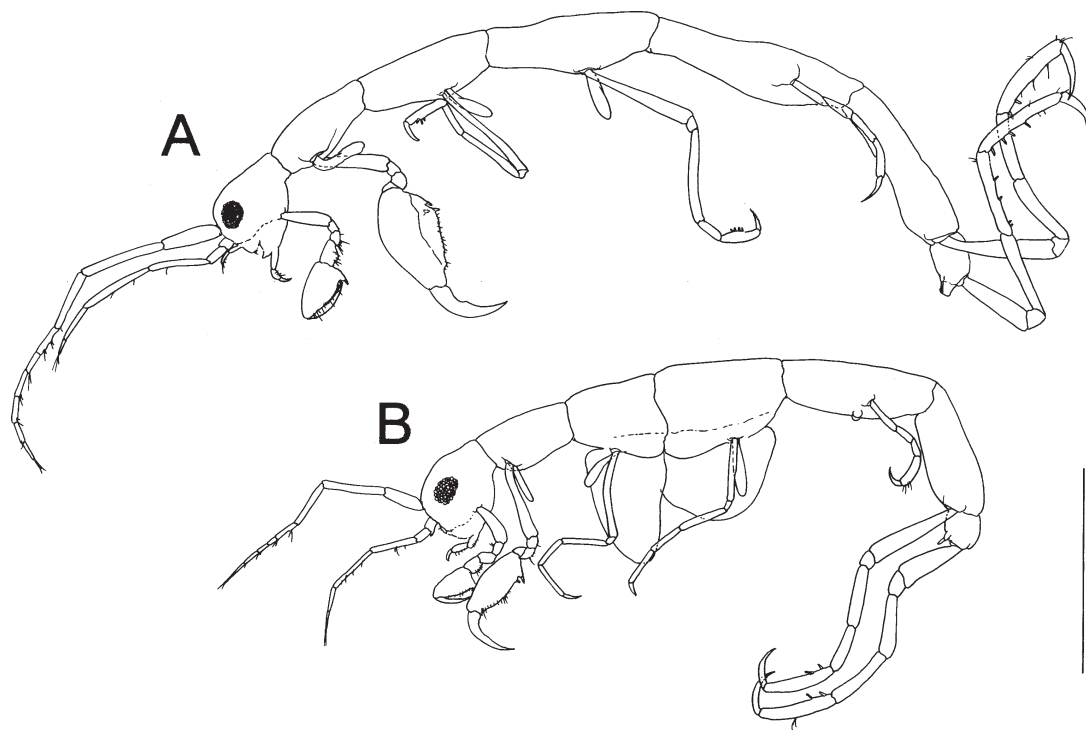


Fig. 1. *Metaproto novaehollandiae* (Haswell, 1880). Lateral view (PMBC 20549). A. Male. B. Female. – Scale bar = 1 mm.

from the Banda Sea, west of Papua-New Guinea, and Laubitz (1991), based on material from the Philippines. The ecology of *Metaproto novaehollandiae* is still poorly known; this species has been found at depths of 4–790 m, living between antipatharians, echinoderms (Laubitz 1991) and coral rubble (Guerra-García 2002). Recently, Guerra-García (personal observations) found large populations of *M. novaehollandiae* living on sandy bottoms in the Great Barrier Reef, Australia. In the present study the species has also been found in sandy bottoms with coral debris and coarse sands with silt.

Distribution

Type locality: Port Jackson, Australia (Haswell 1880). Other records: Banda Sea, Indonesia, South Africa (McCain & Steinberg 1970), New Caledonia and the Philippines (Laubitz 1991, Guerra-García 2002). New record for Thailand.

Protogeton incertus Mayer, 1903

Fig. 2.

Protogeton incertus Mayer, 1903: 29, pl. 9, fig. 12. – Arimoto 1980: 101–102, fig. 3.

Material examined:

St. 15: 3 males, 1 female (ZMUC CRU-3751).

Remarks

The genus *Protogeton* is characterised by the absence of abdominal appendages. This character is also present in the genus *Pseudoproto* Mayer, 1903 in the Phtisicidae. So far, only two species of *Protogeton* have been described, *Protogeton inflatus* Mayer, 1903, based on material from Dongala, Celebes, Indonesia, and *Protogeton incertus*, based on material from Chuen Island, Thailand. Both species can be distinguished mainly on the basis of the mandibular palp, which is mono-articulate in *P. inflatus* and bi-articulate in *P. incertus*. Furthermore, features of pereopods 3 and 4 in males are different in the

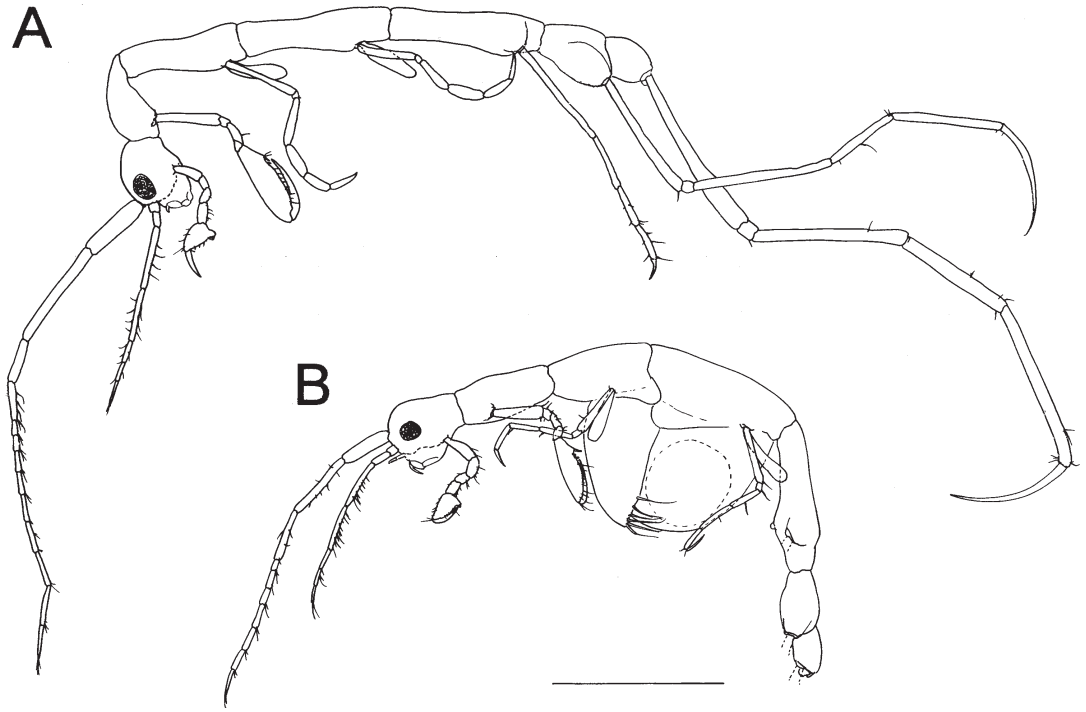


Fig. 2. *Protogeton incertus* Mayer, 1903. Lateral view (ZMUC CRU-3751). A. Male. B. Female. – Scale bar = 1 mm.

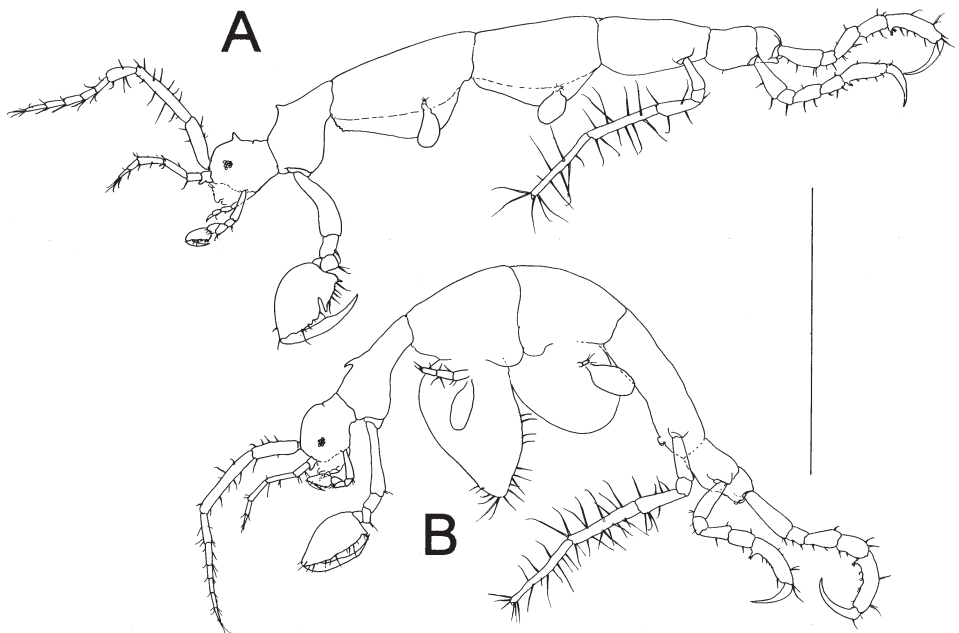


Fig. 3. *Aciconula* sp. Lateral view (ZMUC CRU-3752). A. Male. B. Female. – Scale bar = 1 mm.

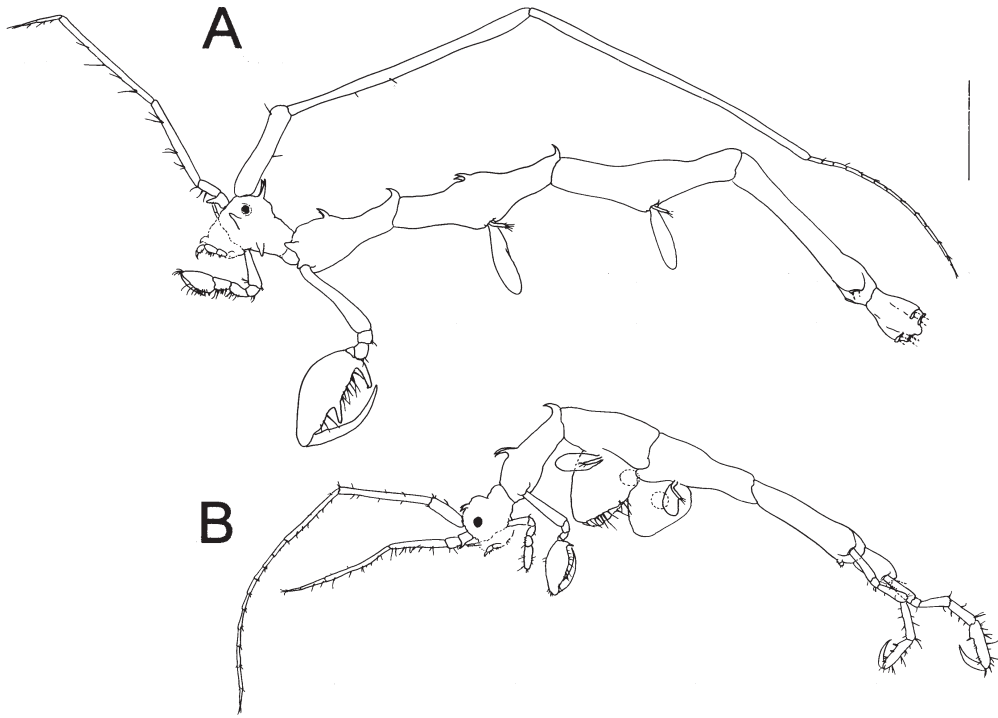


Fig. 4. *Metaprotella sandalensis* Mayer, 1898. Lateral view (ZMUC CRU-3742). A. Male. B. Female. – Scale bar = 1 mm.

two species: the carpus, propodus and dactylus are curved and have lateral expansions in *P. inflatus* whereas they lack expansions in *P. incertus*. *Protogeton incertus* has been found at depths between 0 and 50 meters; the specimens studied here were collected from 7–8 m coarse sand with scattered low seagrass.

Distribution

Type locality: Chuen Island, Thailand (Mayer 1903, McCain & Steinberg 1970). Other records: East China Sea, Korean Straits, East Chechu Island, Western Goto Islands (Arimoto 1980). New record for Phuket.

Family Caprellidae Leach, 1814

Aciconula sp.

Fig. 3

Material examined:

St. 22: 1 male, 2 females (ZMUC CRU-3752).

Remarks

The genus *Aciconula* was erected by Mayer (1903) on the basis of two female specimens of *Aciconula miranda* Mayer, 1903 collected from Singapore and Koh Krau, Thailand. After this, Mayer (1912) described the male of *A. miranda* based on material collected from Shark Bay, Australia. Chess (1989) described *Aciconula acanthosoma* Chess, 1989, which differs from *A. miranda* mainly by the presence of abundant acute projections dorsally on the head and body. These are the only two species of *Aciconula* that have been described so far. The present specimens are closer to *A. miranda*; the type material of *A. miranda* has been consulted for comparison. Of the two female types reported by Mayer, only one female (in poor condition) has been located in the Zoological Museum, University of Copenhagen (ZMUC CRU-7341). The two females of *Aciconula* sp. are very similar to the female type of *A. miranda* but in the specimens from Phuket the distal (fourth) article of pereopod 3 is well-

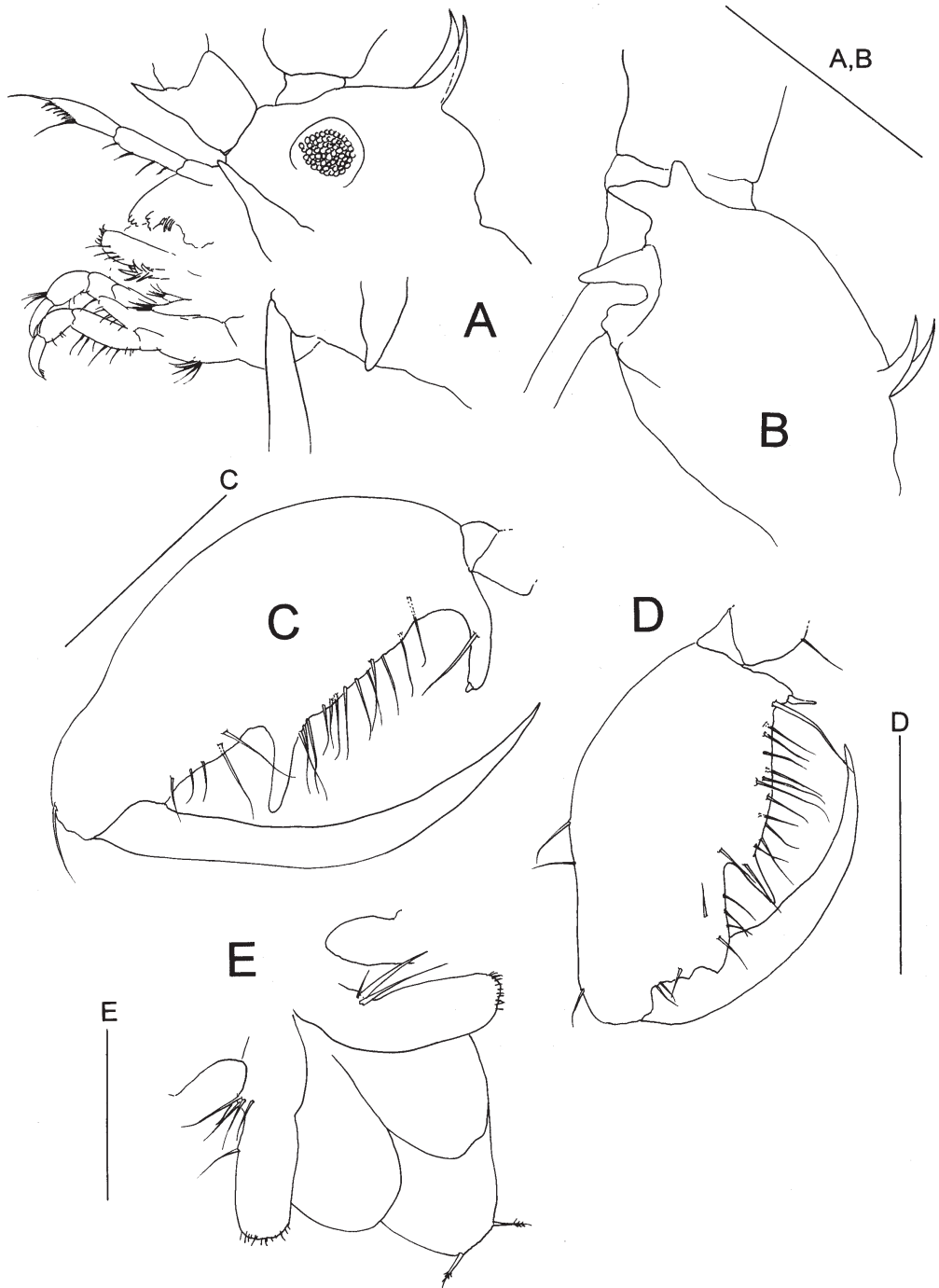


Fig. 5. *Metaprotella sandalensis* Mayer, 1898. A–C. Large (superadult) male (ZMUC CRU-3742). A. Detail of head. B. Detail of pereonite 2. C. Gnathopod 2. D–E. Adult male (ZMUC CRU-3743). D. Gnathopod 2. E. Abdomen. – Scale bars: A–D = 0.5 mm; E = 0.1 mm.

developed and the separation between this article (fourth) and the third article is clear under the microscope.

Metaprotella sandalensis Mayer, 1898

Figs. 4–5.

Metaprotella sandalensis Mayer, 1898: 53–56, figs. 1–6; 1903 (including f. *ralumiana*, *singaporensis*, *dolichocephala*, *gisserana*, *amboinensis*, *typica*): 40–42, pl. 1, figs. 30–31, 34–36; pl. 6, figs. 56–63; pl. 9, figs. 16–17, 44, 60. – Müller 1990: 836–842, figs. 41–64. – Laubitz 1991: 113, fig. 10.

Material examined:

St. 2: 1 male, 2 females, 3 juveniles (ZMUC CRU-3742); St. 3: 1 male (ZMUC CRU-3743); St. 12: 1 male, 1 juvenile (PMBC 20550); St. 14: 1 juvenile (ZMUC CRU-3745); St. 19: 1 female (PMBC 20729).

Remarks

This species is very common in shallow waters of the tropical Indo-Pacific Ocean and was recently redescribed by Müller (1990). The present specimens are assigned to *Metaprotella sandalensis* on the basis of the arrangement of the dorsal projections and the absence of a marked suture between head and pereonite 1 (Müller 1990, Larsen 1997), and are in agreement with the redescrptions of Müller (1990) and Laubitz (1991). The largest males have a couple of projections laterally on the head (Fig. 5A) and pereonite 2 also has a divided projection anteriorly (Fig. 5B). Gnathopod 2 in males, as Müller (1990) has already shown, varies in the course of development. Although Müller (1990) pointed out the existence of a great deal of intraspecific variation, we can not deny the possibility of the existence of a complex of different species under *M. sandalensis*. Further genetic studies are necessary to investigate if the variation among specimens is intra- or interspecific.

Distribution

Type locality: Sandal Bay, Lifu, Loyalty Islands (McCain & Steinberg 1970). Other records: Labuan Badjo, Borneo; Dongala, Celebes; Pulu Tongkil and 6°07.5'N, 120°26'E, Sulu Sea; Amboina; between Gisser and Ceram-Laut, Ceram Sea; Singapore; Chang Island and Kahdal Island, Thailand; Dutch Bay, Ceylon; Sharks Bay and Cockburn Sound, Australia; Viti Levu, Fiji Is-

lands; Aranuka and Tapeteucea, Gilbert Islands; Ralum, 4°20'S, 152°10'W; Oahu and Lisiansky Islands, Hawaiian Islands (McCain & Steinberg 1970); Bora Bora and Moorea, Society Islands (Müller 1990); Papua New Guinea (Guerra-García 2003). New record for Phuket.

Monoliropus hapipandi new species

Figs. 6–9.

Material examined:

Type material. St. 15: **Holotype** male (PMBC 20547). **Paratypes:** St. 15: 1 female (PMBC 20730), 2 males, 1 female (ZMUC CRU-3755); St. 27: 1 male, 1 female (ZMUC CRU-3756).

Description

Holotype male. – Body length 3.6 mm.

Lateral view (Fig. 6A). Body dorsally smooth. Head rounded. Pereonite 1 fused with head, suture present; pereonites 2–4 subequal in length; pereonites 5–7 decreasing in length, pereonite 7 the shortest.

Gills (Fig. 6A). Present on pereonites 3–4, oval, length about 1.5 times width.

Mouthparts. Upper lip (Fig. 7A) symmetrically bilobed, slightly pubescent apically. Mandibles (Fig. 7E, F) with bi-articulate palp and molar well-developed; proximal and distal articles of palp each with an apical seta; left mandible (Fig. 7E) with incisor five-toothed, lacinia mobilis five-toothed followed by a row of three plates; incisor of right mandible (Fig. 7F) five-toothed, lacinia mobilis deeply serrate, followed by three plates and molar flake present, minutely serrate distally. Lower lip (Fig. 7B) with inner lobes well demarcated; inner and outer lobes with setulae. Maxilla 1 (Fig. 7G) outer lobe carrying seven robust setae; distal article of the palp with four apical setae and a setae medially. Maxilla 2 (Fig. 7D) inner lobe oval carrying five setae distally; outer lobe rectangular, 1.3 times as long as inner lobe, with six apical setae. Maxilliped (Fig. 7C) inner plate rectangular carrying three setae; outer plate 1.8 times as long as inner plate; penultimate article of palp with a striking, two-toothed projection, dactylus with minute setulae on the distal end.

Antennae. Antenna 1 (Fig. 8A) almost half of body length; flagellum penta-articulate. Antenna

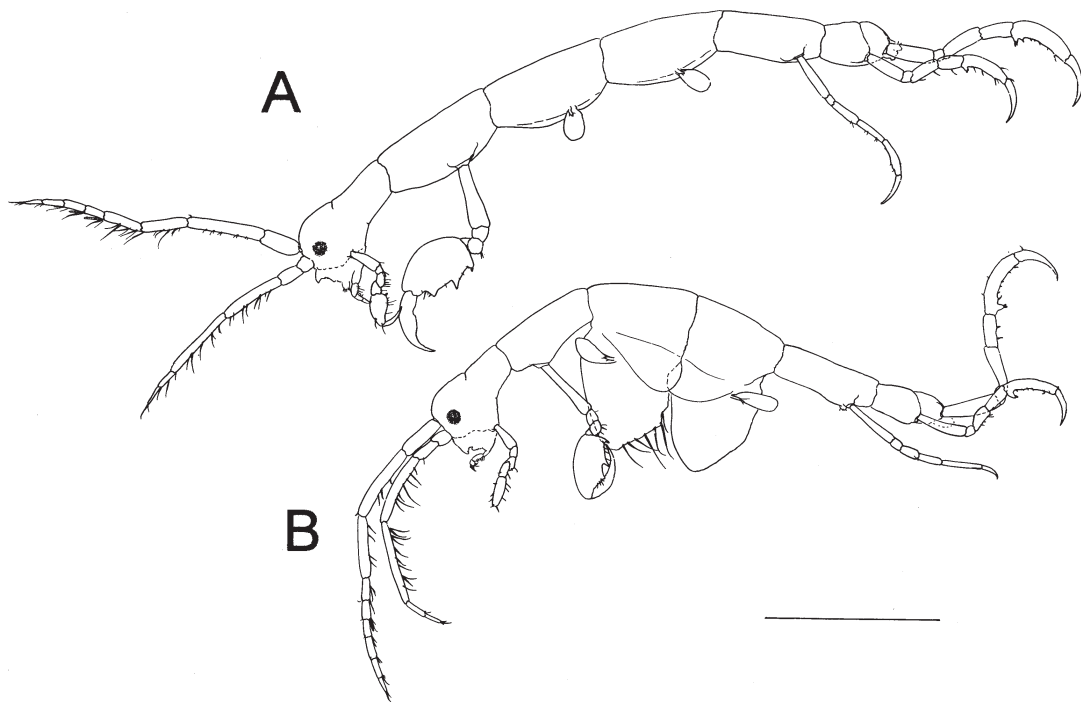


Fig. 6. *Monoliropus hapipandi* new species. Lateral view. A. Holotype male (PMBC 20547). B. Paratype female (PMBC 20730). Scale bar = 1 mm.

2 (Fig. 8B) about two-thirds of antenna 1; peduncle provided with setae but swimming setae absent; flagellum bi-articulate.

Gnathopods. Gnathopod 1 (Fig. 8C) basis as long as the lengths of ischium, merus and carpus combined; propodus oval, length about 1.5 times width, palm with a grasping spine proximally; grasping margin of propodus palm and dactylus smooth. Gnathopod 2 (Fig. 8D) inserted on the posterior half of pereonite 2 (Fig. 6A); basis about half of pereonite 2 in length; ischium rectangular; merus rounded; carpus short and triangular; propodus oval, as long as the basis; palm provided with two grasping spines proximally, a projection medially and another projection distally; dactylus robust and curved, thickened medially.

Pereopods. Pereopod 3 (Fig. 9A) and pereopod 4 (Fig. 9B) reduced to one article, with two setae distally. Pereopod 5 (Fig. 9C) hexa-articulate, less robust than pereopods 6 and 7; merus and carpus with two fine setae and propodus with

two robust setae distally. Pereopods 6 (Fig. 9D) and 7 (Fig. 9E) similar in shape but pereopod 7 larger than pereopod 6; propodus with a pair of proximal grasping spines located on a small projection and a row of setae

Penes (Fig. 9F) robust, situated medially, as long as wide.

Abdomen (Fig. 9F) with a pair of tiny appendages, each with a seta distally (appendages degenerated into a seta), a pair of lateral lobes and a single dorsal lobe.

Paratype female (PMBC 20730). – Body length 3.1 mm.

Habitus similar to the male. Gnathopod 2 inserted on anterior half of pereonite 2 (Fig. 6B). Oosteguites of pereonite 3 setose (Fig. 6B). Abdomen (Fig. 9G) without setae.

Remarks

The genus *Monoliropus* was erected by Mayer (1903) based on the species *M. agilis* Mayer,

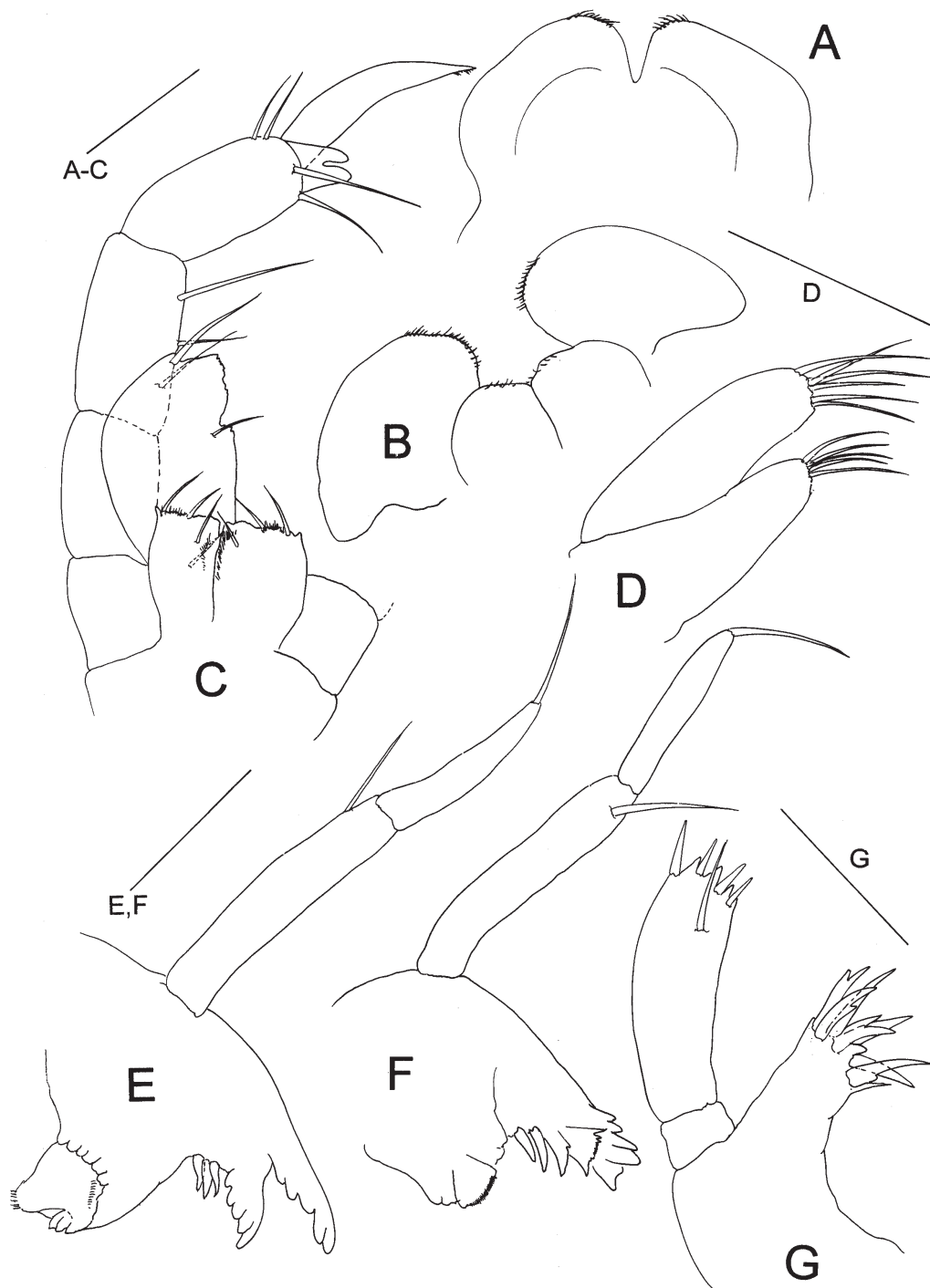


Fig. 7. *Monoliropus hapipandi* new species. Holotype male (PMBC 20547). A. Upper lip. B. Lower lip. C. Maxilliped. D. Maxilla 2. E. Left mandible. F. Right mandible. G. Maxilla 1. – Scale bars = 0.05 mm.

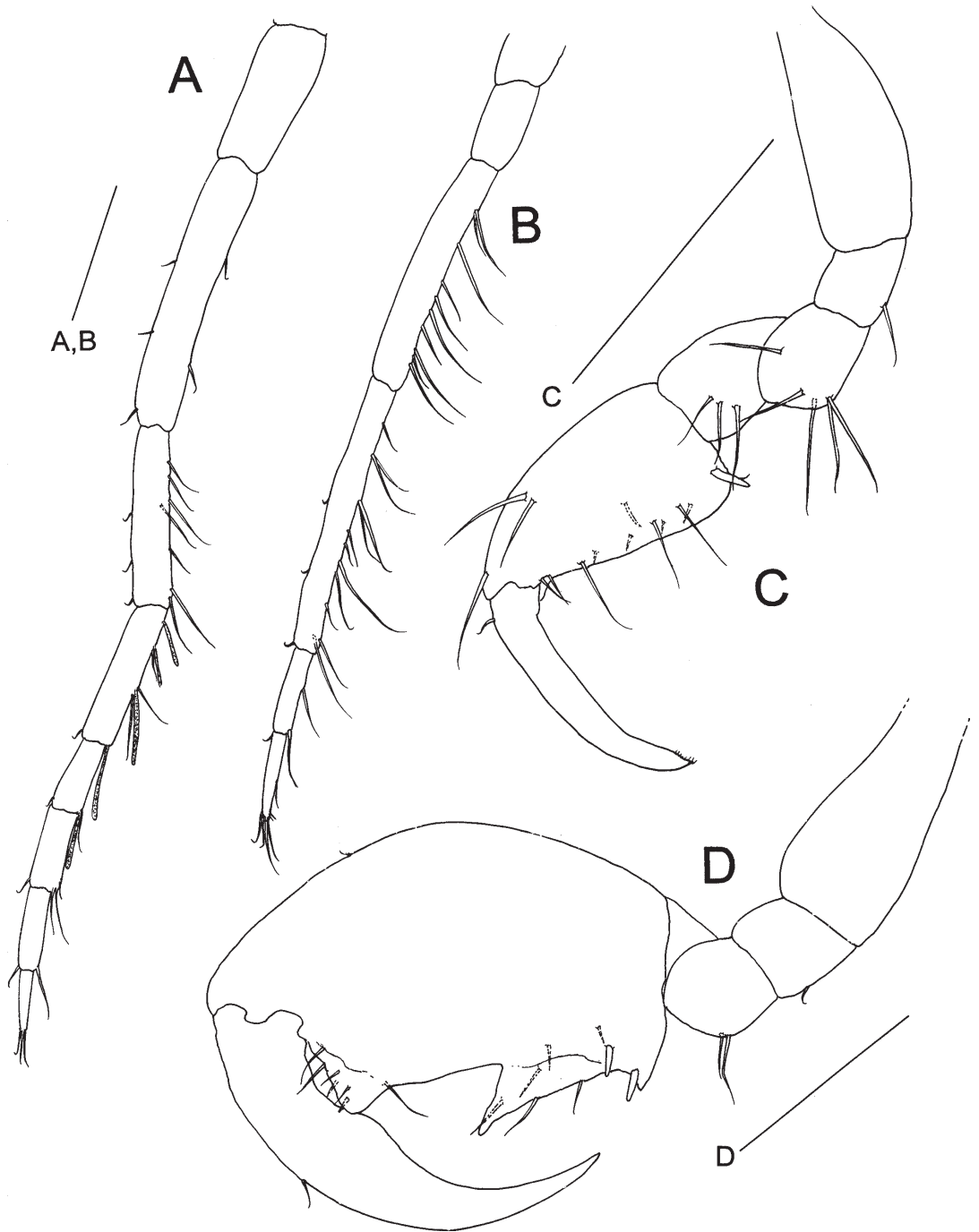


Fig. 8. *Monoliropus hapipandi* new species. Holotype male (PMBC 20547). A. Antenna 1. B. Antenna 2. C. Gnathopod 1. D. Gnathopod 2. – Scale bars: A, B = 0.5 mm; C, D = 0.2 mm.

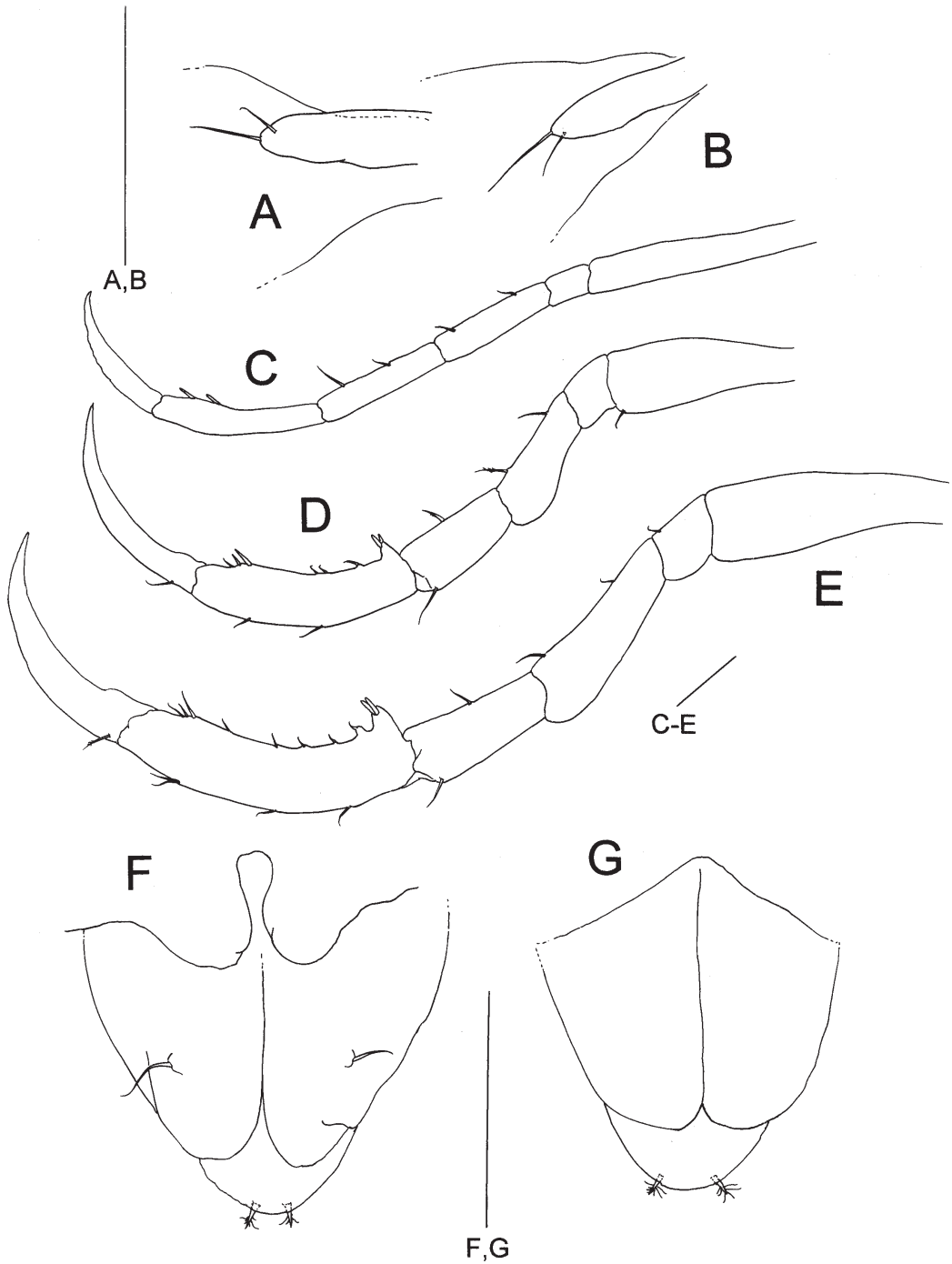


Fig. 9. *Monoliropus hapipandi* new species. A–F. Holotype male (PMBC 20547). A. Pereopod 3. B. Pereopod 4. C. Pereopod 5. D. Pereopod 6. E. Pereopod 7. F. Abdomen (ventral view). G. Paratype female (PMBC 20730), abdomen (ventral view). – Scale bars = 0.1 mm.

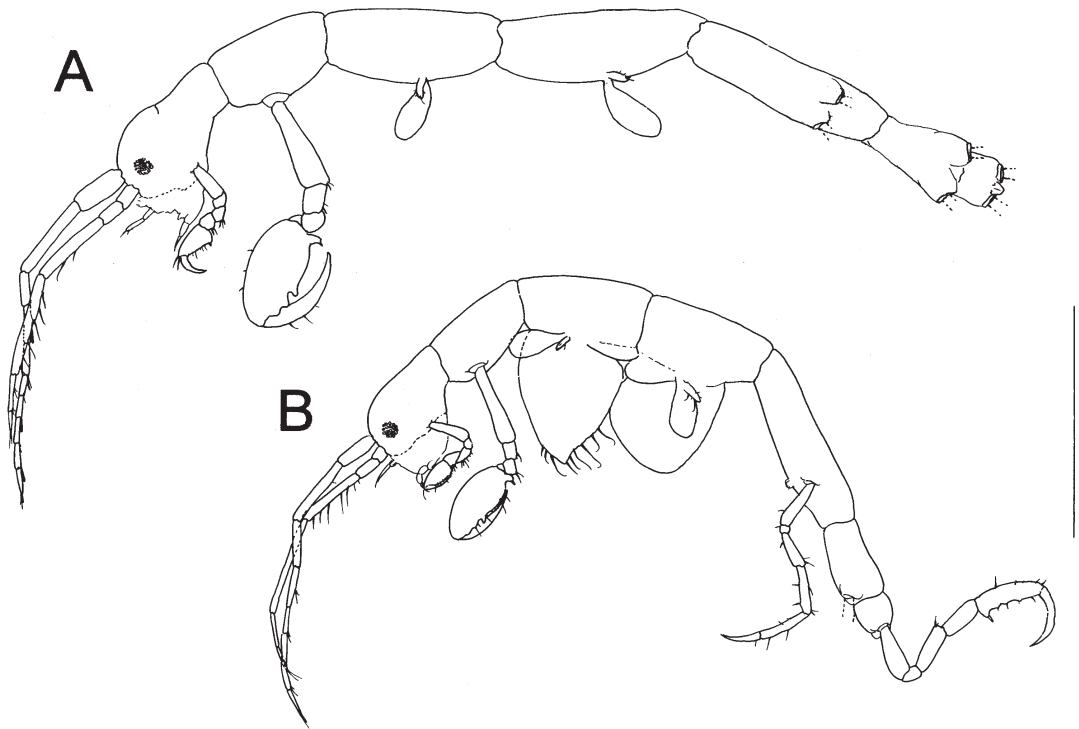


Fig. 10. *Monoliropus agilis* Mayer, 1903. A. Male (ZMUC CRU-3757). B. Female (ZMUC CRU-3758). – Scale bar = 0.1 mm.

1903. To date the genus comprises five species: *M. agilis*, distributed in the Gulf of Thailand, Seram Sea, Banda Sea, the Philippines and Western Australia (McCain & Steinberg 1970, Laubitz 1991, Rayol & Serejo 2003); *M. enodis* Rayol & Serejo, 2003, from Guanabara Bay, Brazil; *M. falcimanus* Mayer, 1904, from Sri Lanka and India (Sivaprakasam 1977); *M. tener* Arimoto, 1968, from Tateyama Bay, Japan (Arimoto 1976); and *M. hapipandi* n. sp., so far only known from Phuket, Thailand (present study). A comparison of the species of *Monoliropus* and a key for identification are given by Rayol & Serejo (2003).

The new species can be distinguished from all other species of *Monoliropus* by the following characteristics: (1) the abdominal appendages are reduced to a seta in *M. hapipandi* (Fig. 9F) whereas in the remaining species they are well-developed; (2) the mandibular palp is bi-articulate in *M. hapipandi* (Fig. 7E, F) and tri-articulate in the rest of the species; (3) the penultimate

article of the maxillipedal palp has a unique projection in *M. hapipandi* (Fig. 7C). The closest species to *M. hapipandi* is *M. agilis*, also described from Thai waters. The habitus of these two species is very similar, and the species could be confused in future studies. For this reason, the type material of *M. agilis* has been consulted and illustrated in detail (Figs. 10–13). The following syntypes of *M. agilis* have been checked (see Mayer 1903): 1 female (ZMUC CRU-3759) collected from Krau Island, Thailand; 2 males, 2 females (ZMUC CRU-3760) collected from Kam Island, Thailand; 1 male, 1 female (ZMUC CRU-3761) collected from Kauv Island, Thailand; 9 males, 12 females, 1 juvenile (ZMUC CRU-5212) collected between Mesan Island and Cap Liant, Thailand; 1 male (specimen “a” selected for drawings, ZMUC CRU-3757) and 1 female (specimen “b” selected for drawings, ZMUC CRU-3758) also collected between Mesan Island and Cap Liant, Thailand.

Besides the general differences in the abdomi-

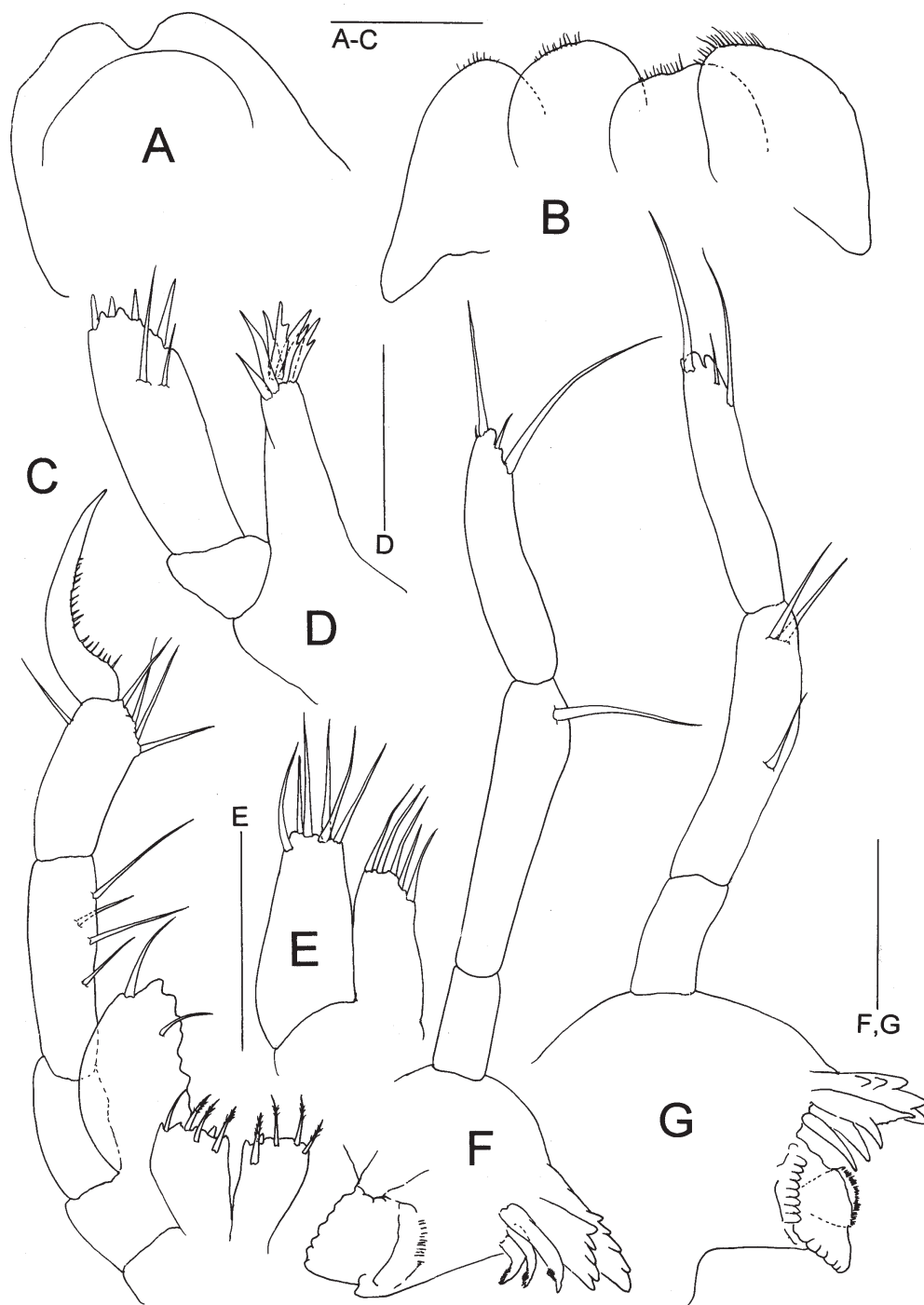


Fig. 11. *Monoliropus agilis* Mayer, 1903. Male (ZMUC CRU-3757). A. Upper lip. B. Lower lip. C. Maxilliped. D. Maxilla 1. E. Maxilla 2. F. Left mandible. G. Right mandible. – Scale bars = 0.05 mm.

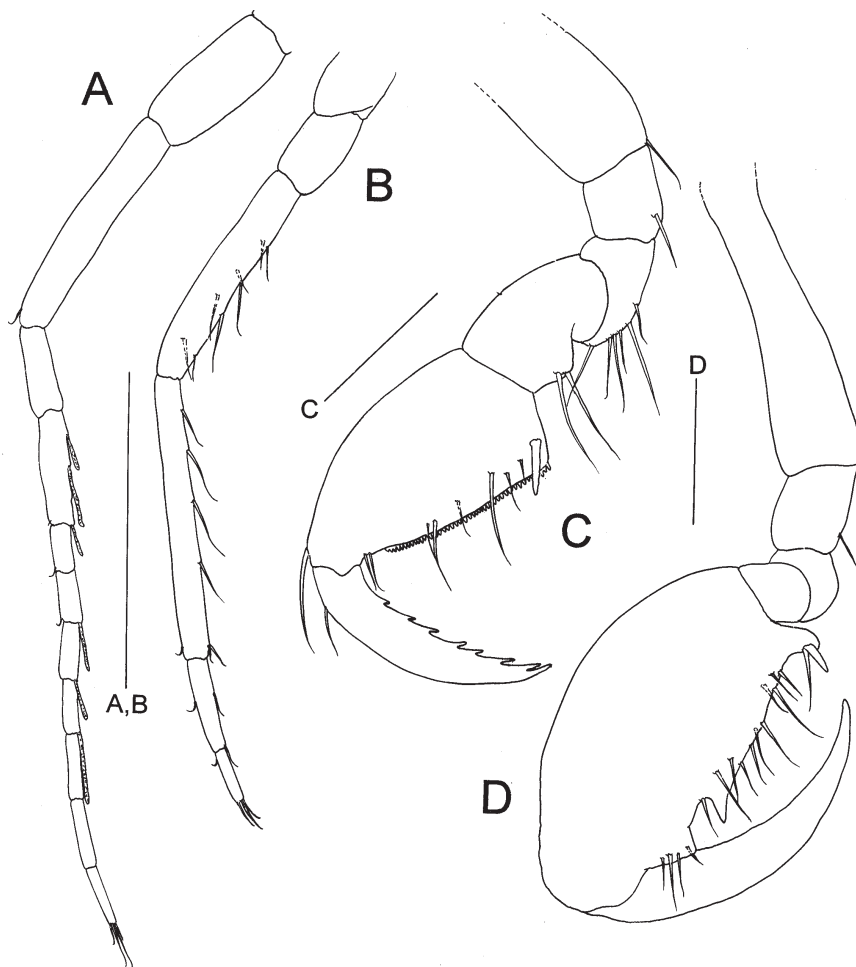


Fig. 12. *Monoliropus agilis* Mayer, 1903. Male (ZMUC CRU-3757). A. Antenna 1. B. Antenna 2. C. Gnathopod 1. D. Gnathopod 2. – Scale bars: A, B = 0.5 mm; C = 0.1 mm; D = 0.3 mm.

nal appendages, the maxilliped and the mandibular palp already reported between *M. hapipandi* and all the remaining species of *Monoliropus* (including *M. agilis*), some more differences can be used to distinguish *M. hapipandi* and *M. agilis* (see Figs. 6–9 and Figs. 10–13): (1) The male gnathopod 2 is inserted on the posterior half of pereonite 2 in *M. hapipandi* (Fig. 6A) and on the anterior half in *M. agilis* (Fig. 10A); (2) the grasping margin of the propodus and dactylus of gnathopod 1 is smooth in *M. hapipandi* (Fig. 8C) and serrate in *M. agilis* (Fig. 12C); (3) the propodus of pereopods 6 and 7 has a pair of grasping

spines in *M. hapipandi* (Fig. 9D, E) and a single grasping spine (Fig. 13D, E) in *M. agilis*.

Etymology

The species is dedicated to all my colleagues at the Marine Biology Laboratory, University of Sevilla (“hapipandi” group), for their support, encouragement and friendship during my caprellid studies.

Distribution

So far only known from the type locality, Lon Island, and Kata Beach, Phuket, Thailand.

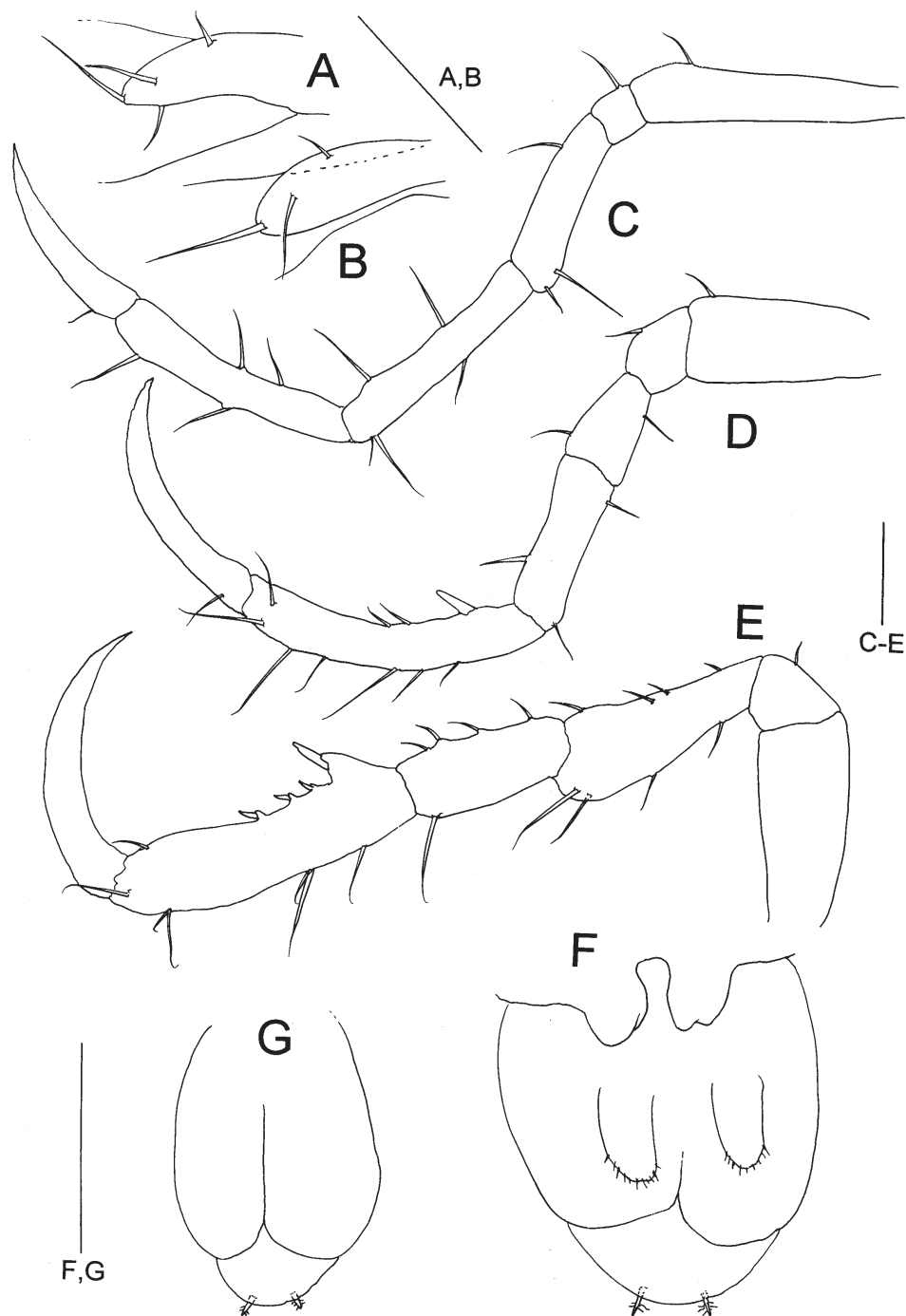


Fig. 13. *Monoliropus agilis* Mayer, 1903. A-F. Male (ZMUC CRU-3757). A. Pereopod 3. B. Pereopod 4. C. Pereopod 5. D. Pereopod 6. E. Pereopod 7. F. Abdomen (ventral view). G. Female (ZMUC CRU-3758), abdomen (ventral view). - Scale bars = 0.1 mm.

Key to the Caprellidea from Phuket

The key includes the six species which have been reported so far from Phuket. McCain (1968) includes a lateral view of a generalised caprellid showing the names of the different body parts. Consultation of this figure could be helpful in using the following key.

1. Gills on pereonites 2, 3 and 4
..... *Metaproteo novaehollandiae* (Fig. 1)
– Gills on pereonites 3 and 4 2
2. Pereopods 3 and 4 each with six articles
..... *Protogeton incertus* (Fig. 2)
– Pereopods 3 and 4 reduced, with less than five articles 3
3. Body dorsally smooth
..... *Monoliropus hapipandi* (Figs. 6–9)
– Body with dorsal projections, at least on pereonite 2 4

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4. Pereonites 6 and 7 fused
..... *Metaprotella sandalensis* (Figs. 4–5)
– Pereonites 6 and 7 not fused 5
5. Pereopod 4 bi-articulate. Antenna 1 shorter than half the body *Aciconula* sp. (Fig. 3)
– Pereopod 4 tri-articulate. Antenna 1 longer than half the body *Paraprotella saltatrix* (see Takeuchi & Guerra-García 2002)

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