

ADDITIONAL RECORDS OF *CHIROSTYLUS* AND *MUNIDOPSIS* (CRUSTACEA: DECAPODA: GALATHEOIDEA) FROM TAIWAN

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ABSTRACT. – Two galatheid species, *Chirostylus rostratus* Osawa & Nishikiori, 1998, and *Munidopsis taiwanica*, new species, are reported from Taiwanese waters. The specimen of *C. rostratus* represents the first record of the genus *Chirostylus* Ortmann, 1892, from Taiwan. *Munidopsis taiwanica* appears closest to *M. solidissima* Macpherson, 2007, but differs in the shape of the thoracic sternite 4 as well as the armatures on the antennular and antennal peduncles and P1–4. The new species was collected from the deepest station so far conducted off Taiwan and at a depth of 5,011 m.

KEY WORDS. – Crustacea; Decapoda; Anomura; additional records; new species; deepest record; Taiwan.

INTRODUCTION

In the Indo-Pacific region, the galatheid family Chirostylidae currently includes about 180 species in seven genera (Baba et al. 2008). However, only seven species, *Eumunida chani* Baba & Lin, 2008, *E. funambulus* Gordon, 1930, *Uroptychus anacaeva* Baba & Lin, 2008, *U. anatonus* Baba & Lin, 2008, *U. naso* van Dam, 1933, *U. orientalis* Baba & Lin, 2008, and *U. singularis* Baba & Lin, 2008, have been reported from Taiwanese waters (Wu et al., 1998; Baba & Lin, 2008). The “Albatross” Formosa record of *E. capillata* de Saint Laurent & Macpherson, 1990 (reported as *E. smithii* Henderson, 1885 by Baba, 1988; see de Saint Laurent & Poupin, 1996), was actually from Dongsha (Pratas) in the South China Sea near Hong Kong. On the other hand, a total of 64 species in ten genera in another galatheid family Galatheidae have been reported from Taiwan (Miyake, 1953; Baba & Yu, 1987; Wu et al., 1997; Chan et al., 2000; Wu & Chan, 2000; Lin et al., 2004, 2007; Lin & Chan, 2005; Osawa et al., 2006a, b, 2008; Macpherson, 2007). The genus *Munidopsis* Whiteaves, 1874, in Taiwan is comparatively better studied on the basis

of the abundant material collected in recent deep-sea cruises and it contains 31 species (Osawa et al., 2008).

The present paper adds a chirostylid species, *Chirostylus rostratus* Osawa & Nishikiori, 1998, and a new galatheid species of the genus *Munidopsis* to the Taiwanese fauna. The genus *Chirostylus* Ortmann, 1892, is also a new record for Taiwan. The new species of *Munidopsis* was recently collected from the deepest station (5,011 m) of the TAIWAN cruises.

The specimens examined are deposited in the National Taiwan Ocean University (NTOU). The measurement given in millimeters (mm) under **Material examined** indicates postorbital carapace length (cl), the distance between the orbital margin and posterior margin of the carapace in midline. The general terminology followed is that used by Baba (2005). Abbreviations used include: stn, station; CP, 4 m French beam trawl as collection gear; Mxp3, third maxilliped; P1, first pereopod (cheliped); and P2–4, second to fourth pereopods (ambulatory legs).

TAXONOMIC ACCOUNT

Chirostylidae Ortmann, 1892

Chirostylus Ortmann, 1892

Chirostylus rostratus Osawa & Nishikiori, 1998
(Fig. 1)

Chirostylus rostratus Osawa & Nishikiori, 1998: 382, figs. 1, 2.
– Baba, 2005: 208.
– Baba et al., 2008: 14

Material examined. – Dasi fishing port, Yilan County, commercial trawler, no specific date, 1 male (cl 9.4 mm), coll. Pei Kuan Resort Crab Museum [NTOU A00893].

Diagnosis. – Rostral spine comparatively long, larger than epigastric spines, distinctly overreaching base of distal articles of ocular peduncles. Branchial region with 2 strong spines along anterolateral margin; posterior branchial region with

subacute ridge bearing blunt spines anteriorly. Thoracic sternite 3 with 4 small spines and median notch on anterior margin. Abdominal segments without posteromedian projections. Ocular peduncles with slightly dilated corneas. P1–4 covered with numerous small spines on surfaces. P2–4 dactyli each with corneous ultimate spine more slender than penultimate spine.

Colouration. – The present preserved specimen has reddish lines on the carapace and abdomen. The colouration generally agrees with that described for the holotype of *C. rostratus* (Osawa & Nishikiori, 1998, fig. 1A). The carapace possesses oblique lines along lateral margins and lateral cardiac region, and a transverse line between epigastric spines. The abdomen has a transverse line along the dorsoposterior margin of each segment, and a longitudinal line along the midline of the second to sixth segments.

Distribution. – Previously known only from the Ogasawara Islands, south Japan, at a depth of 180 m. Now recorded from Taiwan.

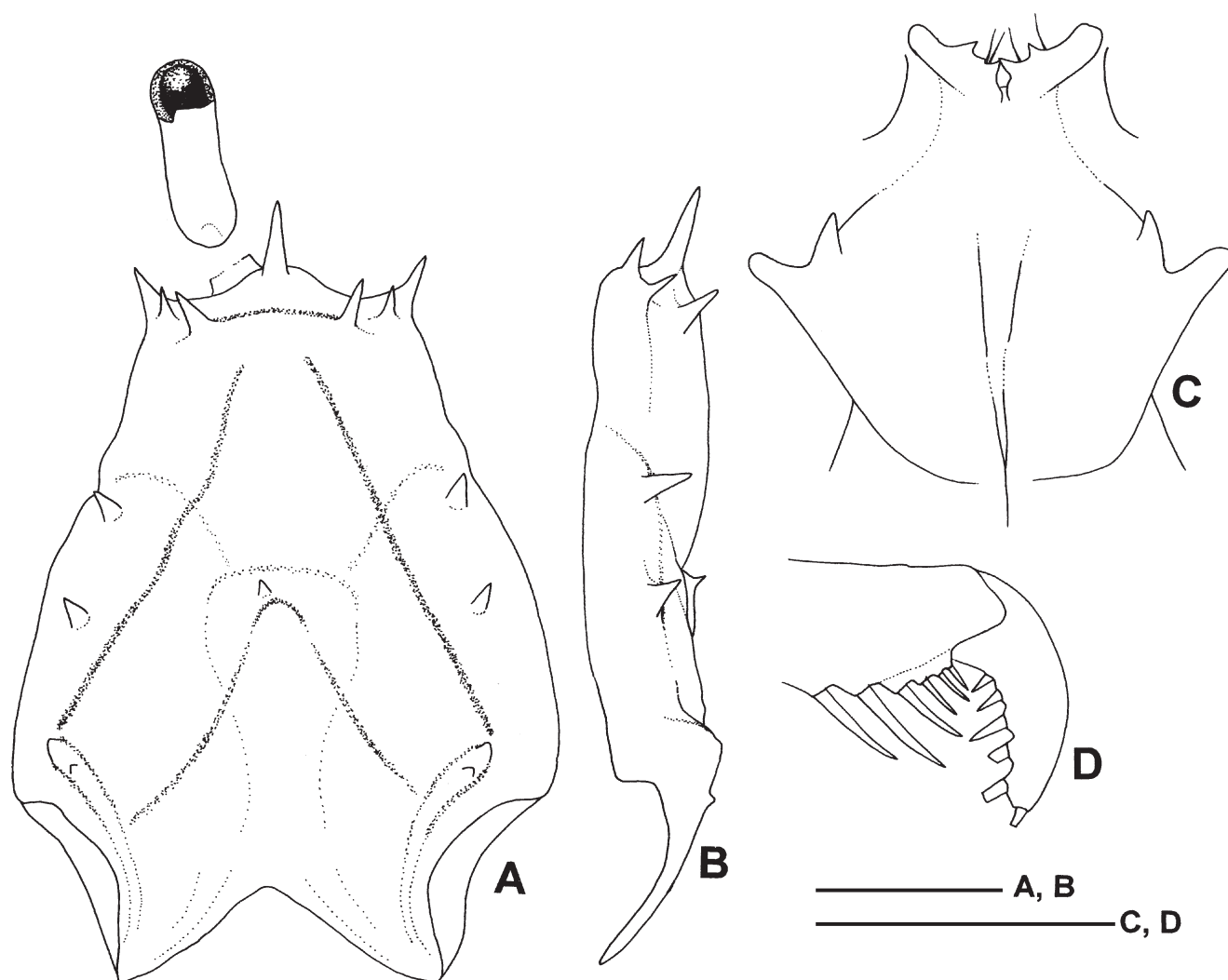


Fig. 1. *Chirostylus rostratus* Osawa & Nishikiori, 1998, male (cl 9.4 mm), Dasi, Taiwan: A, carapace and left ocular peduncle, dorsal view; B, carapace, left, lateral view; C, anterior part of sternal plastron, ventral view; D, dactylus and distal part of propodus, right detached ambulatory leg (setae omitted, spines on dactylus partly broken). Scale bars = 3.0 mm.

Remarks. – The present specimen was originally displayed in the Pei Kuan Resort Crab Museum and was said to be obtained from the catches of a commercial trawler in the Dasi fishing port nearby. The specimen is fragile and was damaged because it was in dry preservation. It undoubtedly belongs to *C. rostratus* as it has many characters diagnostic of the species. The present specimen differs from the holotype of *C. rostratus* in possessing instead of lacking a small cardiac spine on the carapace and a concave instead of nearly transverse anterior margin of the thoracic sternite 3 (Fig. 1C). The ventral margins of the P2–4 dactyli are more strongly convex on the proximal portion in the Taiwanese specimen than in the holotype (Fig. 1D). These differences are likely intraspecific variations.

The present specimen represents the first record of species of the genus *Chirostylus* from Taiwan. *Chirostylus* now includes six species, all known only from the Indo-West Pacific (Baba, 2005; Osawa, 2007). Besides *C. rostratus*, three congeners, *C. dolichopus* Ortmann, 1892, *C. ortmanni* Miyake & Baba, 1968, and *C. stellaris* Osawa, 2007, have been recorded from Japanese waters adjacent to Taiwan, and the first species is also reported from wide Indo-West Pacific area including Sulu Archipelago, Western Australia, off Tanzania, and Mauritius (Baba, 2005). Although Clark & Ng (2008) described the first stage zoea of *C. ortmanni* from Sulawesi, Indonesia, the spent female specimen actually refers to a new species being described by Baba (personal communication). The current information on *C. ortmanni* and *C. stellaris* has revealed that the two species are known only from shallow waters in Japan but do not overlap in ranges (Osawa, 2007). Some or all of these species may later be found in Taiwan by further collecting efforts particularly in shallow waters.

Galatheidae Samouelle, 1819

Munidopsis Whiteaves, 1874

Munidopsis taiwanica, new species

(Figs. 2, 3)

Material examined. – TAIWAN 2008: “Ocean Reseacher I”, stn CP414, 22°37.91'N 122°32.73'E, 5,011–4,990 m, 13 Jun.2008, holotype, ovigerous female (cl 25.9 mm) [NTOU A00894].

Diagnosis. – Carapace, exclusive of rostrum, slightly longer than broad, covered with curved short plumose setae; epigastric lobes obtuse, unarmed; anterior branchial region with small spines laterally. Lateral margins weakly convex; anterolateral spine slightly larger than antennal spine and slightly smaller than following spine; anterior branchial margin with inflated, rounded ridge, overhanging pterygostomial flap, and with 6 or 7 posteriorly diminishing spines; posterior branchial margin with 4 or 5 spines on anterior half. Front margin oblique, with small antennal spine. Rostrum broadly triangular, carinate on dorsal surface, weakly curving dorsally in lateral view. Thoracic sternite 4

narrowly elongate anteriorly. Abdominal segments unarmed; segment 6 with posteromedian margin flattish, not exceeding lateral lobes. Telson divided into 8 plates. Ocular peduncle hardly movable, with 2 eye-spines; mesial spine strong, lateral spine small. Basal article of antennular peduncle with dorsolateral and ventrolateral spines approximately equal in length. Antennal peduncle nearly reaching to tip of mesial eye-spine; article 2 with small spine on mesial margin; article 3 with small spine each at distolateral and distomesial angles. Mxp3 merus with small spine on extensor distal margin; flexor margin with 3 distinct spines on proximal half. P1 stout, setose; chela without distinct spines on lateral and mesial margins; carpus with some spines on dorsomesial and dorsolateral margins; fixed finger with denticulate carina on distolateral margin. P2–4 also setose; P2 overreaching tip of P1; meri, excluding distal spines and projections, 3.4–4.1 times longer than distal maximum height, dorsal and ventral margins each with row of small spines; carpi with some small spines along dorsal margin. Epipods present on P1, absent from P2–4.

Description. – Carapace (Fig. 2A), exclusive of rostrum, slightly longer than broad, covered with curved short plumose setae (Fig. 2B); dorsal surface convex from side to side, strongly inflated on gastric and cardiac regions; cervical grooves moderately distinct; gastric region with interrupted short, minutely tuberculate ridges; epigastric lobes obtuse, unarmed; anterior branchial region with small tubercles and lateral spines; posterior branchial and cardiac region with numerous, somewhat elevated interrupted ridges; cardiac region weakly delineated in roundly triangular shape, with moderately marked transverse ridge. Posterior margin preceded by elevated ridge. Lateral margins weakly convex; anterolateral spine slightly larger than antennal spine, directed forward, and slightly smaller than following spine; anterior branchial margin with slightly inflated, rounded ridge, overhanging pterygostomial flap, armed with 6 or 7 posteriorly diminishing spines; shallow but distinct excavation between anterior and posterior branchial regions present; posterior branchial margin with 4 or 5 spines on anterior half. Front margin oblique, with small antennal spine. Rostrum (Fig. 2A) broadly triangular, approximately half breadth between anterolateral spines of carapace when measured between lateral bases of ocular peduncles in dorsal view, more than 0.35 length of remaining carapace (distal part broken, excluded), weakly curving dorsally in lateral view; dorsal surface slightly convex from side to side, with distinct median carina extending onto epigastric lobes and some small tubercles; ventral surface flattish, with median carina; lateral margin slightly serrated distally.

Pterygostomial flap with numerous interrupted ridges; anteriorly ending in small spine.

Sternal plastron approximately as long as wide when measured in midline; lateral extremities gradually divergent posteriorly; maximum width at sternite 7. Sternite 3 (Fig. 2E) approximately 1.7 times as broad as long; anterior margin divided into 2 lobes by V-shaped median notch; each lobe dentate, lateral margin convex. Sternite 4 (Fig.

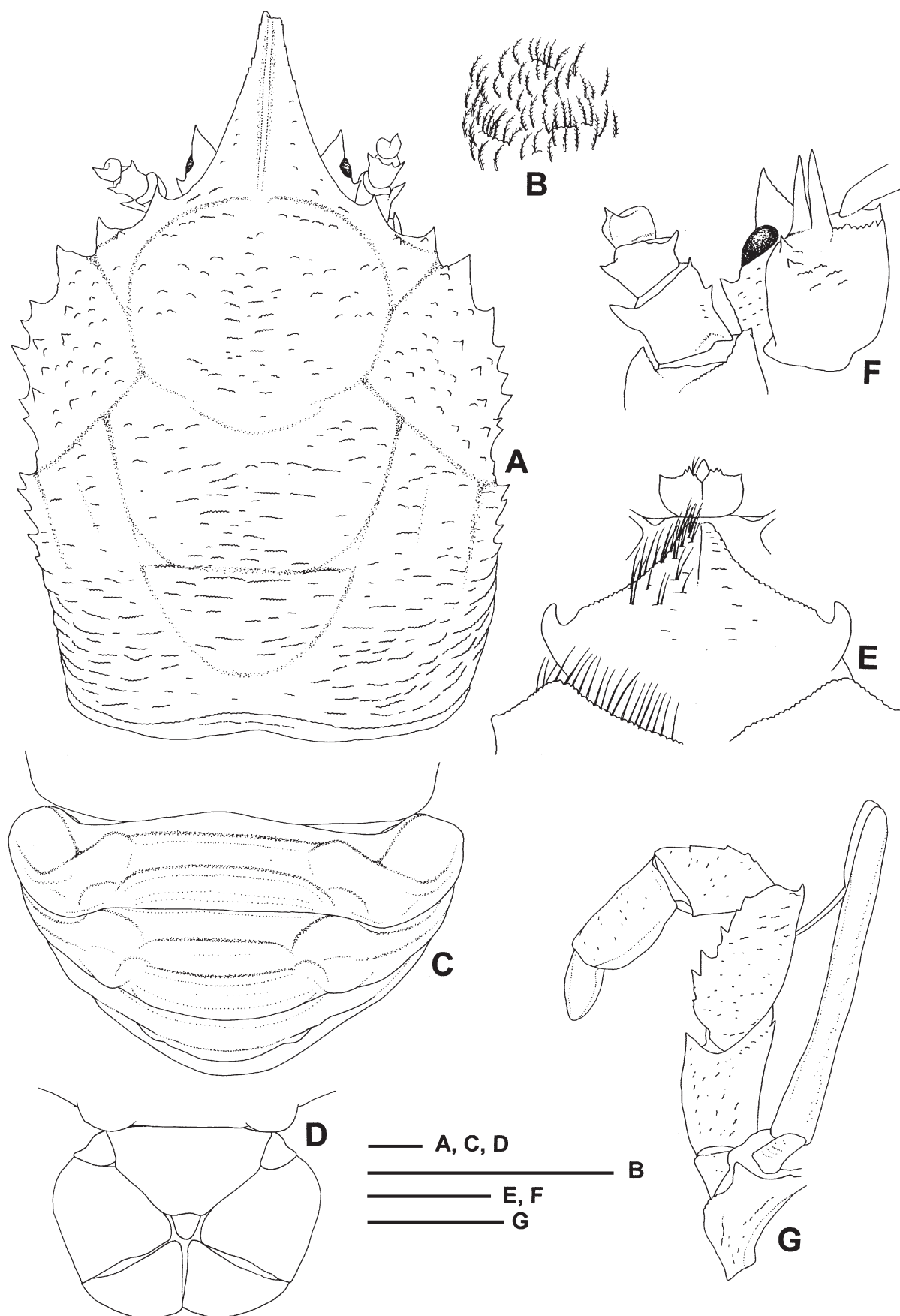


Fig. 2. *Munidopsis taiwanica*, new species, holotype, ovigerous female (cl 25.9 mm), stn CP414, Taiwan: A, carapace, dorsal view (setae omitted); B, short plumose setae on protogastric region, dorsal view; C, segments 2–4 of abdomen, dorsal view (setae omitted); D, posterior part of segment 6 of abdomen and telson, extensor view; E, anterior part of sternal plastron, ventral view (setae omitted from left side); F, right ocular and antennal peduncles and basal segment of antennular peduncle, ventral view; G, left Mxp3, lateral view (setae omitted). Scales bars = 3.0 mm.

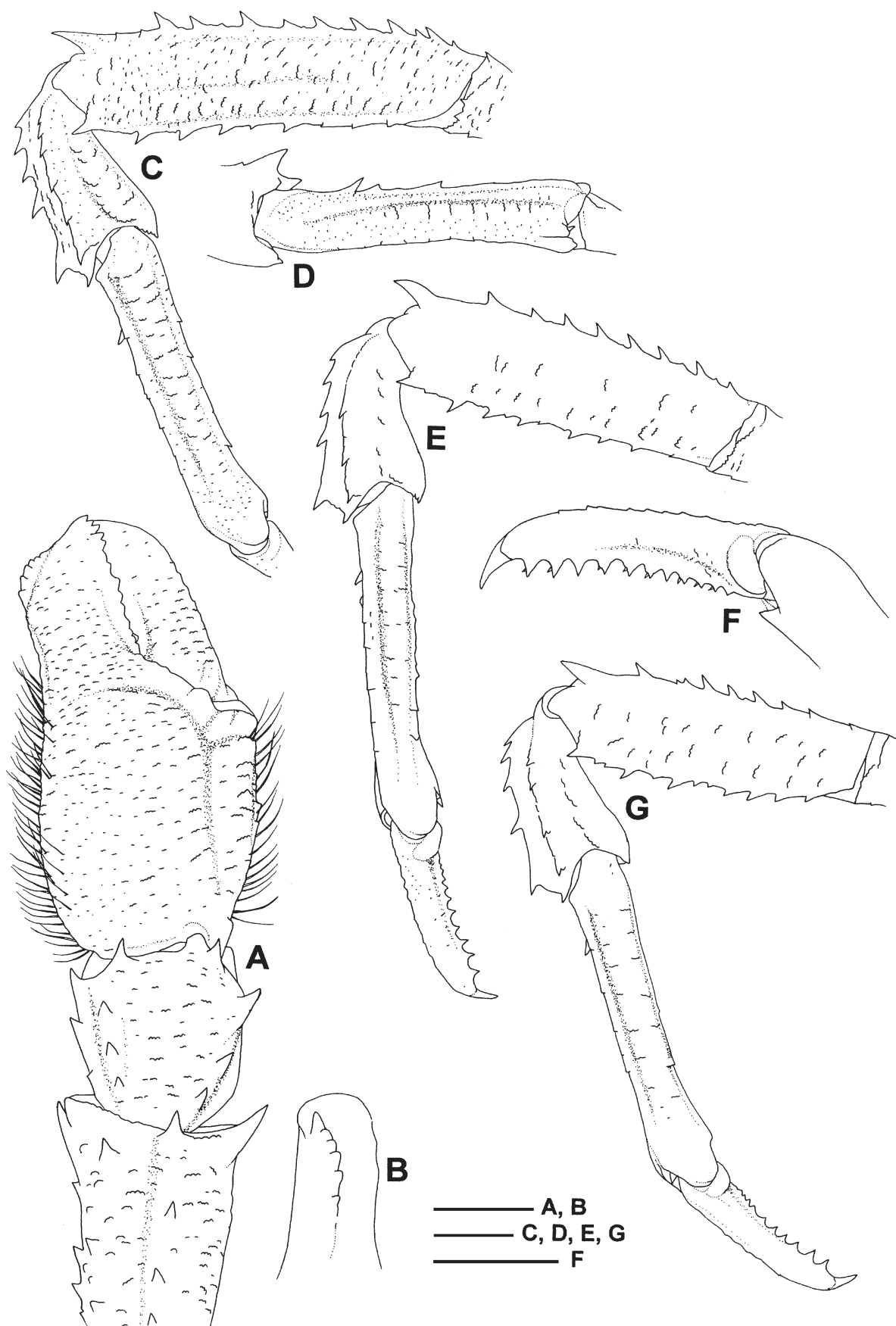


Fig. 3. *Munidopsis taiwanica*, new species, holotype, ovigerous female (cl 25.9 mm), stn CP414, Taiwan: A, left P1, dorsal view (only setae on lateral and ventral margins of palm illustrated); B, same, distal part of fixed finger, lateral view; C, left P2, lateral view (setae omitted, distal part of dactylus broken); D, same, propodus and distal part of mesial carpus view (setae omitted); E, left P3, lateral view (surface structure partly omitted and setae omitted); F, same, dactylus and distal part of propodus, ventrolateral view (setae omitted); G, left P4, lateral view (surface structure partly omitted and setae omitted). Scale bars = 3.0 mm.

2E) contiguous nearly to posterior margin of sternite 3, narrowly elongate anteriorly; greatest width 3.6 times that of sternite 3; anterolateral margins oblique, slightly concave, each with row of small tubercles and setae; surface depressed in midline, with short ridges bearing short setae. Sternites 5–7 each with row of setae on anterior tuberculate ridge and scattered short setae on surface.

Abdomen (Fig. 2C) covered with curved short plumose setae; segments 2–4 each with 2 elevated, blunt transverse ridges, posterior ridge on segment 4 obsolete; segment 5 without transverse ridges, slightly convex on median surface; segment 6 flattish, posteromedian margin nearly transverse, not exceeding posterolateral lobes. Telson (Fig. 2D) composed of 8 calcified plates; posterior plates broader than long.

Ocular peduncle (Fig. 2F) small and short, broader than antennal peduncle, hardly movable, with small lateral and large mesial eye-spines; cornea small and lateral; no spine ventral to front margin between ocular and antennal peduncles.

Basal article of antennular peduncle (Fig. 2F) with dorsolateral and ventrolateral spines approximately equal in length; lateral margin unarmed, convex; distomesial margin with row of small denticles; ventral surface with short tuberculate ridges and 1 or 2 small spines laterally; small dorsomesial distal spine present.

Antennal peduncle (Fig. 2F) nearly reaching tip of mesial eye-spine. Article 1 with blunt distomesial process slightly overreaching proximal margin of article 2; distolateral spine subequal in size to distomesial process. Article 2 with well developed distolateral spine barely reaching midlength of article 3; distomesial spine small; mesial margin also with small spine on median part. Articles 3 with distomesial and distolateral spines; dorsodistal margin with small spine or tubercle laterally. Article 4 rounded, with lateral projection bearing small distal spine.

Mxp3 (Fig. 2G) scatteredly setose on lateral surface. Ischium distinctly shorter than merus when measured in midlateral line; extensor margin with subdistal small spine; flexor margin sharply ridged, terminating in small spine; crista dentata with row of 17 small corneous teeth; lateral surface with indistinct short ridges. Merus with short ridges on distal half of lateral surface; flexor margin with 3 distinct spines on proximal half and some smaller spines; extensor margin nearly smooth, with small distal spine. Carpus weakly protuberant on extensor surface. Propodus and dactylus nearly smooth. Exopod distinctly overreaching distal margin of merus. Epipod long, slender.

P1 (Fig. 3A, B) stout, approximately 1.1 times postorbital carapace length; surfaces covered with short or very short, dentate or minutely tuberculate ridges bearing curved short plumose setae; ridges fewer on dorsolateral surface of chela and distal half of dactylus; marginal setae longer. Ischium with dorsodistal spine; ventrodistal margin with 3 small subacute tubercles; ventromesial margin with small

subdistal spine. Merus approximately 1.9 times as long as broad (breadth measured on dorsal distal margin, exclusive of spines), with 4 strong distal spines (dorsal, dorsomesial, ventromesial, ventrolateral), dorsal spine smallest; dorsal ridge blunt, with row of spines; dorsolateral surface with subdistal spine and some elevated ridges; dorsomesial surface without spines; ventral surface slightly convex. Carpus short, approximately 1.1 times longer than broad (breadth measured on dorsodistal margin, exclusive of spines), with 4 distal spines (dorsal, dorsomesial, dorsolateral, lateral); dorsolateral and dorsomesial margins each with row of 2 or 3 spines; dorsal surface flattish; lateral surface with small submedian spine; ventral surface convex; ventrodistal margin with row of small denticles and median subtriangular projection. Palm without spines, length approximately 1.2 times breadth measured at base of fingers, 1.7 times longer than carpus; dorsal surface generally convex, with shallow depression along mesial margin; lateral margin weakly concave at base of fixed finger; mesial margin with short, slightly elevated ridges; ventral surface with shallow depression along mesial margin. Fingers about as long as palm; opposable margins nearly straight, not gaping, distally spooned; prehensile edges each with row of low teeth; distal margins each with row of small closely-set teeth; fixed finger with short denticulate carina on distolateral surface (Fig. 3B).

P2–4 (Fig. 3C–G) moderately slender, subcylindrical, somewhat compressed; P2 longest, overreaching tip of P1 by nearly entire length of dactylus; surfaces of ischium to propodus with numerous short, minutely tuberculate and slightly elevated ridges bearing short curved plumose setae. Meri elongate, subrectangular in lateral view, successively shorter posteriorly (length measured on dorsal margin, exclusive of spines; P3 merus 0.9 P2 merus, P4 merus 0.85 P3 merus), successively slightly narrower posteriorly; length-height ratio (height measured between bases of dorsodistal and ventrodistal spines), 4.1 on P2, 3.75 on P3, 3.4 on P4; merus-propodus ratio, 1.4 on P2, 1.2 on P3, 1.05 on P4; dorsal margin rounded, with row of small but distinct spines, distal spine pronounced; ventrolateral margin with row of small spines; ventromesial margin without spines but slightly elevated short ridges; ventral surface flattish. Carpi each with row of spines on dorsal crest; lateral surface with elevated crest of small spines somewhat dorsally along midline; ventrodistal margin rounded, with minute denticles. Propodi, exclusive of distal rounded projection, slightly shorter on P2 than on P3 and P4; length-height ratio (length measured on dorsal margin; height measured at base of distal projection), 4.1 on P2, 4.8 on P3 and P4; dorsal surface flattish; dorsolateral and dorsomesial margins each delimited by row of short transverse, slightly elevated ridges, dorsomesial margin with 1 small spine on proximal half of left P2–4 and right P2 but unarmed on right P3 and P4; lateral and mesial surfaces each with shallow sulcus dorsally along midline; ventral surface flattish; ventrodistal margin with pair of small corneous spines, lateral spine larger. Dactyli subequal in length to carpi, 0.7 length of propodi, slender, each terminating in long corneous claw; dorsal surface with small, low protuberances; ventral margin nearly transverse, with 9–11 subtriangular teeth decreasing

in sizes proximally, each tooth accompanying with very small corneous spine.

Epipods present on P1, absent from P2–4.

Colouration. – Body and pereopods was entirely whitish when the specimen was fresh.

Distribution. – At present, only known from Taiwan, at a depth of 4,990–5,011 m.

Etymology. – The new species is named after the type locality.

Remarks. – Thirty-one species of the genus *Munidopsis* have been recorded from Taiwanese waters (Osawa et al., 2008). In Taiwan, *M. taiwanica* new species represents the 32nd species of the genus and the tenth species from abyssal depths below 3,000 m. The other abyssal species include *M. centrina* Alcock & Anderson, 1894, *M. echinata* Osawa, Lin & Chan, 2008, *M. edwardsii* (Wood-Mason, 1891), *M. granosa* Alcock, 1901, *M. pallida* Alcock, 1894, *M. panamae* Baba, 2005, *M. profunda* Baba, 2005, *M. tafrii* Osawa, Lin & Chan, 2006, and *M. teretis* Baba, 2005. The occurrence of these species indicates that the sea around Taiwan probably has an abyssal fauna richer than those of other Indo-West Pacific areas, although most regions of the areas are still not well investigated. *Munidopsis taiwanica* was collected from the deepest station at 4,990–5,011 m conducted in the TAIWAN cruises. Previous deepest marine organism reported from Taiwan was also a species of *Munidopsis*, *M. profunda*, from a depth of 4,455 m (Osawa et al., 2006b).

Munidopsis taiwanica appears closest to *M. solidissima* Macpherson, 2007, known from Madagascar in general appearance and armature of the carapace and having, a well-developed eye-spine on the mesial end of the ocular peduncle, P1 fixed finger with a denticulate carina on the distolateral surface, P2 overreaching P1, epipods present only on P1, and P2–4 meri armed with small spines on the dorsal margin. However, the two species differ in some characters. The anterior part of the thoracic sternite 4 is narrower in *M. taiwanica* than in *M. solidissima*. The dorsolateral spine of the basal article of the antennular peduncle is approximately equal in length to the ventrolateral spine in *M. taiwanica*, whereas it is much shorter than the ventrolateral spine in *M. solidissima*. The antennal peduncle of the Taiwanese species is armed with a small spine on the mesial margin of the article 2 and a distinct spine at each of the distomesial and distolateral angles of the article 3, but all these spines are absent in the Madagascar species. The P1 carpus is armed with two or three spines on the dorsomesial and dorsolateral margins in *M. taiwanica*, but it does not have such an arrangement of spines in *M. solidissima*. The two species has small spines on the dorsal margin of each the P2–4 meri and carpi, but the spines of *M. taiwanica* are stronger and more numerous than those of *M. solidissima*. The P2–4 meri have a row of small but distinct spines on each of the ventral margins in *M. taiwanica*, but these margins are unarmed except for the distal spines in *M. solidissima*. The rostrum also appears to

be shorter in *M. taiwanica* than *M. solidissima*, though the rostrum of the Taiwanese species is broken distally.

The sole holotype of *M. taiwanica* was collected together with seven specimens (cl 14.4–27.1 mm) of *M. profunda*. *Munidopsis taiwanica* and *M. profunda* are quite similar to each other in both the morphology and colouration. The present specimen was mistaken as *M. profunda* when caught, and thus no photograph was taken before preservation. *Munidopsis taiwanica* is distinguished from *M. profunda* chiefly by the distinctly broader carapace, the antennal peduncle not reaching to instead of clearly overreaching the tip of the mesial eye-spine, and the P2–P4 meri with much smaller spines on the dorsal and ventral margins. *Munidopsis hirsuta* Jones & Macpherson, 2007, known from off California is also allied to *M. taiwanica*, but is different in the antennal spine being distinctly smaller than instead of subequal in length to the anterolateral spine of the carapace, the antennal peduncle falling far short of instead of nearly reaching to the tip of the mesial eye-spine, and the much stronger armature on the P2–P4 meri.

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