

Records of Squat Lobsters of the Family Munidopsidae (Crustacea: Decapoda: Anomura: Galatheoidea) from the Sagami Sea and Adjacent Areas, Central Japan, with Descriptions of Two New Species

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Abstract One species of *Galacantha* A. Milne-Edwards, 1880 and six species of *Munidopsis* Whiteaves, 1874 (Crustacea: Decapoda: Munidopsidae) are reported from the Sagami Sea and Izu Islands, central Japan. Two are new to science, *Galacantha galeata* sp. nov. and *Munidopsis tuberipes* sp. nov. The former is compared with *G. bellis* Henderson, 1885 and *G. subrostrata* Macpherson, 2007, and the latter with *M. bractea* Ahyong, 2007, *M. papanui* Schnabel and Bruce, 2006, and *M. sonne* Baba, 1995. *Munidopsis dasyopus* Alcock, 1894 is recorded from Japanese waters for the first time. These new records expand the number of *Galacantha* species from four to five and *Munidopsis* species from 21 to 23. Five other species all previously known from the area and reported here are: *M. camelus* (Ortmann, 1892); *M. cylindropus* Benedict, 1902; *M. naginata* Cubelio, Tsuchida and Watanabe, 2007, and *M. taurulus* Ortmann, 1892. *Munidopsis camelus* is fully redescribed in order to show diagnostic details. Differentiating characters between *M. cylindropus* and the closely allied *M. debilis* Henderson, 1885 are discussed.

Key words: Decapoda, Anomura, Munidopsidae, *Galacantha*, *Munidopsis*, new species, new records, Japan

Squat lobsters of the genera *Galacantha* A. Milne-Edwards, 1880 and *Munidopsis* Whiteaves, 1874 (family Munidopsidae) represent important components in the deep-sea community in the world oceans, extending from continental slope to abyssal plane exceeding 5000 m depth (Baba *et al.*, 2008). *Galacantha*, which has been recently resurrected from the synonymic status of *Munidopsis* by Macpherson (2007), includes nine species; *Munidopsis* is species-rich, represented by about 225 species (De Grave *et al.*, 2009), although discovery of new species is continuous. Thanks to the recent works (e.g., Baba, 1988; 2001; 2005; Wu and Chan, 2000; Baba and Poore, 2002; Ahyong and Poore, 2004; Macpherson and Segonzac, 2005; Osawa *et al.*, 2006a, 2006b, 2007; 2008a, 2008b; Schnabel and Bruce, 2006; Ahyong, 2007; Cubelio *et al.*, 2007a, 2007b, 2007c; 2008; Jones and Macpherson, 2007; Lin *et al.*, 2007; Macpherson, 2007; Osawa and Takeda, 2007; Baba *et al.*, 2009; Taylor *et al.*, 2010), the taxonomy of species in these genera has been greatly clarified and many new species have been described. From Japanese waters, four species of *Galacantha* and 20 species of *Munidopsis* have been recorded (Table 1), but this seems to be an underestimation yet, concerning the high diversity of the marine fauna in waters around the Japanese Archipelago.

This study reports on material collected by deep-water

samplings in the Sagami Sea area and Izu Islands, central Japan, and deposited in the Natural History Museum and Institute, Chiba. It contains collections made during two major projects carried out by the National Museum and Nature and Science, “Study on Environmental Changes in the Sagami Sea and Adjacent Coastal Area with Time Serial Comparison of Fauna and Flora” (2001-2005) and “Studies on the Origin of Biodiversity in the Sagami Sea Fossa Magna Element and the Izu-Ogasawara (Bonin) Arc” (2006-2010). The following seven species, including two new to science, are identified: *Galacantha galeata* sp. nov., *Munidopsis camelus* (Ortmann, 1892), *M. cylindropus* Benedict, 1902, *M. dasyopus* Alcock, 1894, *M. naginata* Cubelio, Tsuchida and Watanabe, 2007, *M. taurulus* Ortmann, 1892, and *M. tuberipes* sp. nov. The two new species are fully described and illustrated, and compared with close relatives. *Munidopsis dasyopus* is recorded for the first time from Japanese waters. *Munidopsis camelus* is fully redescribed because detailed descriptive information is scarce for this species. An abbreviated description is given for *M. dasyopus* in order to show diagnostic details for species recognition. For the remaining species, brief taxonomic *Remarks* are provided.

The material used in this study is deposited in the following institutions: Musée Zoologique, Strasbourg

Table 1. List of species of *Galacantha* and *Munidopsis* known from Japanese waters.

Species	Occurrence	References
<i>Galacantha bellis</i> Henderson, 1885	Tosa Bay; Okinawa Trough; 1557–3278 m	Osawa and Takeda (2007)
<i>Galacantha rostrata</i> A. Milne-Edwards, 1880	Izu Islands, 1940–2800 m	Baba (1982)
<i>Galacantha subspinosa</i> Macpherson, 2007	Kyushu-Palau Ridge; 520 m.	Miyake (1982; as <i>Munidopsis rostrata</i>); Macpherson (2007)
<i>Galacantha validivae</i> Balss, 1913	Kumano Sea; Okinawa Trough; 955–1160 m	Baba (1982); Osawa and Takeda (2007)
<i>Munidopsis andamanica</i> McGilchrist, 1905	Tosa Bay; 654–786 m	Osawa and Takeda (2007)
<i>Munidopsis antonii</i> (Filhol, 1884)	Izu Islands; Tosa Bay; 2739–3960 m	Baba (1982); Osawa and Takeda (2007)
<i>Munidopsis bairdii</i> (Smith, 1884)	Okinawa Trough; 1900–2115 m	Osawa and Takeda (2007)
<i>Munidopsis hispinoculata</i> Baba, 1988	Tosa Bay; 820–840 m	Osawa and Takeda (2007)
<i>Munidopsis camelus</i> (Ortmann, 1892)	Sagami Bay; 200–500 m	Ortmann (1892); Miyake and Baba (1967)
<i>Munidopsis centrina</i> Alcock and Anderson, 1894	Tosa Bay; 2739–3278 m	Osawa and Takeda (2007)
<i>Munidopsis cylindrophthalma</i> (Alcock, 1894)	Enshu Sea; Tosa Bay; 220–815 m	Yanagita (1942; as <i>M. okadar</i> Yanagita, 1942); Baba (1986); Macpherson (2007)
<i>Munidopsis cylindropus</i> Benedict, 1902	Sagami Bay; Okinawa Trough; 220–815 m	Benedict (1902); Baba (1986; as <i>M. debilis</i> Henderson, 1885); Baba (2005)
<i>Munidopsis granulata</i> Miyake and Baba, 1967	Sagami Bay; Suruga Bay; 110–200 m	Miyake and Baba (1967); Takeda (1982)
<i>Munidopsis latimana</i> Miyake and Baba, 1966	Tosa Bay; 250–350 m	Miyake and Baba (1966); Macpherson (2007)
<i>Munidopsis longispinosa</i> Cubelio, Tsuchida and Watanabe, 2007	Okinawa Trough; 1481 m	Cubelio <i>et al.</i> (2007b)
<i>Munidopsis myojinensis</i> Cubelio, Tsuchida, Hendrickx, Kado and Watanabe, 2007	Myojin Knoll, Ogasawara Islands; 1200–1629 m	Cubelio <i>et al.</i> (2007a); Tsuchida <i>et al.</i> (2008)
<i>Munidopsis naginata</i> Cubelio, Tsuchida and Watanabe, 2007	Sagami Bay; Okinawa Trough; 1000–1500 m	Cubelio <i>et al.</i> (2007c); Tsuchida <i>et al.</i> (2008)
<i>Munidopsis nitida</i> A. Milne-Edwards, 1880	Izu Islands; 1940–1980 m	Baba (1982; as <i>M. ciliata</i> Wood-Mason, 1891)
<i>Munidopsis pilosa</i> Henderson, 1885	Tosa Bay; 820–840 m	Osawa and Takeda (2007)
<i>Munidopsis ryukyensis</i> Cubelio, Tsuchida and Watanabe, 2007	Okinawa Trough; 1480 m	Cubelio <i>et al.</i> (2007b)
<i>Munidopsis subchelata</i> Balss, 1913	Okinawa Trough; 560–991 m	Baba (1986; as <i>M. pilosa</i> Baba, 1986); Osawa and Takeda (2007)
<i>Munidopsis subquamosa</i> Henderson, 1885	off Boso Peninsula; Izu Islands; 2670–3960 m	Henderson (1885); Baba (1982)
<i>Munidopsis tauritus</i> Ortmann, 1892	Sagami Bay; 219–485 m	Baba (2001)
<i>Munidopsis trifida</i> Henderson, 1885	Tosa Bay; 526–539 m	Osawa and Takeda (2007)
<i>Munidopsis verrilli</i> Benedict, 1902	Tosa Bay; 991–995 m	Osawa and Takeda (2007)

(MZS); National Museum of Nature and Science, Tokyo (NSMT); and the Natural History Museum and Institute, Chiba (CBM-ZC). The carapace length (cl), as the indication of specimen size, was measured from the level of the base of the ocular peduncle to the posterodorsal margin in the midline. The lengths of segments of cheliped are measured along the dorsomesial margin and those of ambulatory legs are along the dorsal or extensor margin.

Taxonomic Accounts

Genus *Galacantha* A. Milne-Edwards, 1880

Galacantha galeata sp. nov.

(Figs. 1-3)

Material examined. Holotype: male (cl 14.6 mm), RV *Tansei-maru*, KT98-14 cruise, stn 15, NE of Miyake Island, Izu Islands, 34°15.61'N, 140°14.81'E, 1988-2007 m, volcanic sand, 1 September 1998, beam trawl, coll. T. Komai, CBM-ZC 6406.

Comparative material. *Galacantha bellis* Henderson, 1885. RV *Tansei-maru*, KT02-3 cruise, stn D2, Aguni Basin, Okinawa Trough, 26°30.63'N, 127°04.16'E, 1900-1920 m, 17 April 2002, beam trawl, coll. T. Komai, 1 male (cl 12.6 mm), CBM-ZC 7642.

Description. Carapace (Figs. 1A, B, 2A, B)

subquadrangular, slightly longer than wide, covered with small, low, rounded tubercles or granules, none spiniform; dorsal surface armed with 2 well-developed epigastric, one extremely strong, laterally compressed mesogastric, and one moderately large cardiac spines. Gastric and cardiac regions somewhat inflated. Lateral margins nearly parallel, with 2 prominent anterior spines and low, lobe-like process at midlength, first (anterolateral) spine smaller than second (hepatic) spine. Frontal margins oblique, without antennal spine. Posterior submarginal carina of carapace smooth. Rostrum with pair of small ventrolateral spines at anterior end of horizontal portion, these spines directed forward, visible in dorsal view; dorsal surface rounded; distal portion subequal to mesogastric spine, upturned, forming angle of about 45° with horizontal plane; width of rostrum (measured at level of distal corneal margins) greater than corneal width; horizontal portion overreaching antennal peduncle.

Thoracic sternites (Fig. 2C) smooth. Third sternite bilobate, separated by wide U-shaped notch, about 0.3 width of fourth sternite; each lobe wider than long, with anterolateral margin rounded, anterior margin minutely granulated. Fourth sternite subrectangular, narrowed anteriorly, anteromedian portion depressed below. Ridges demarcating fourth to seventh sternites minutely granulate.

Abdomen (Fig. 1B, 2B) covered with small tubercles or granules on second to fourth somites. Second to fourth

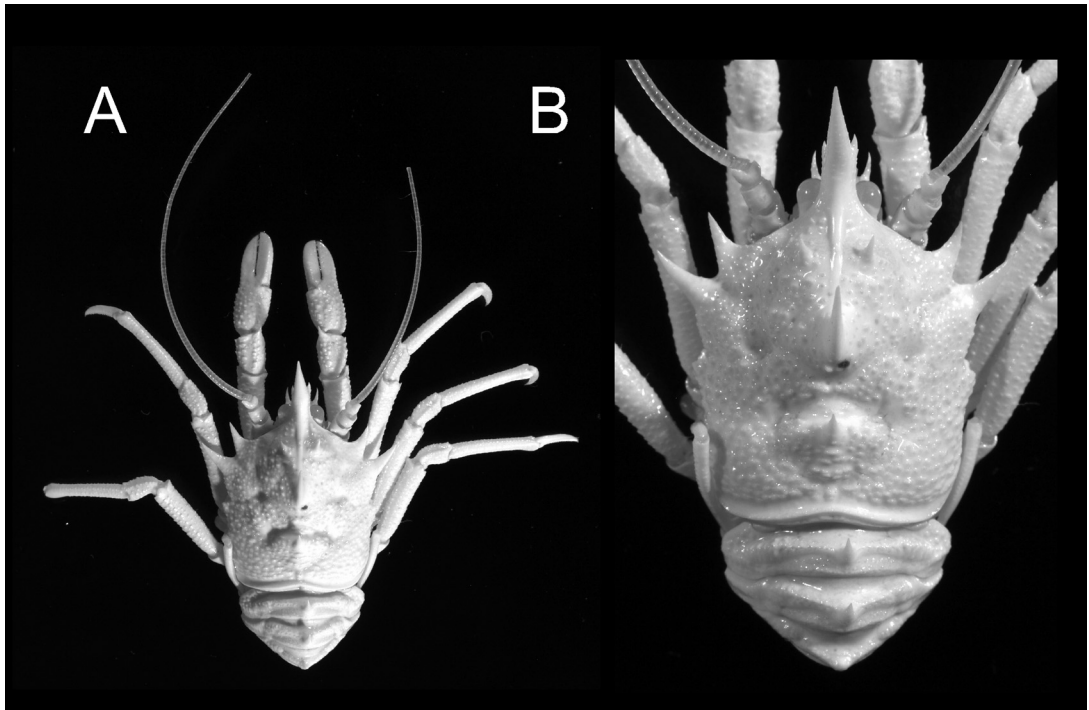


Fig. 1. *Galacantha galeata* sp. nov., holotype, male (cl 14.6 mm), CBM-ZC 6406. A, entire animal, dorsal view; B, carapace and abdomen, dorsal view.

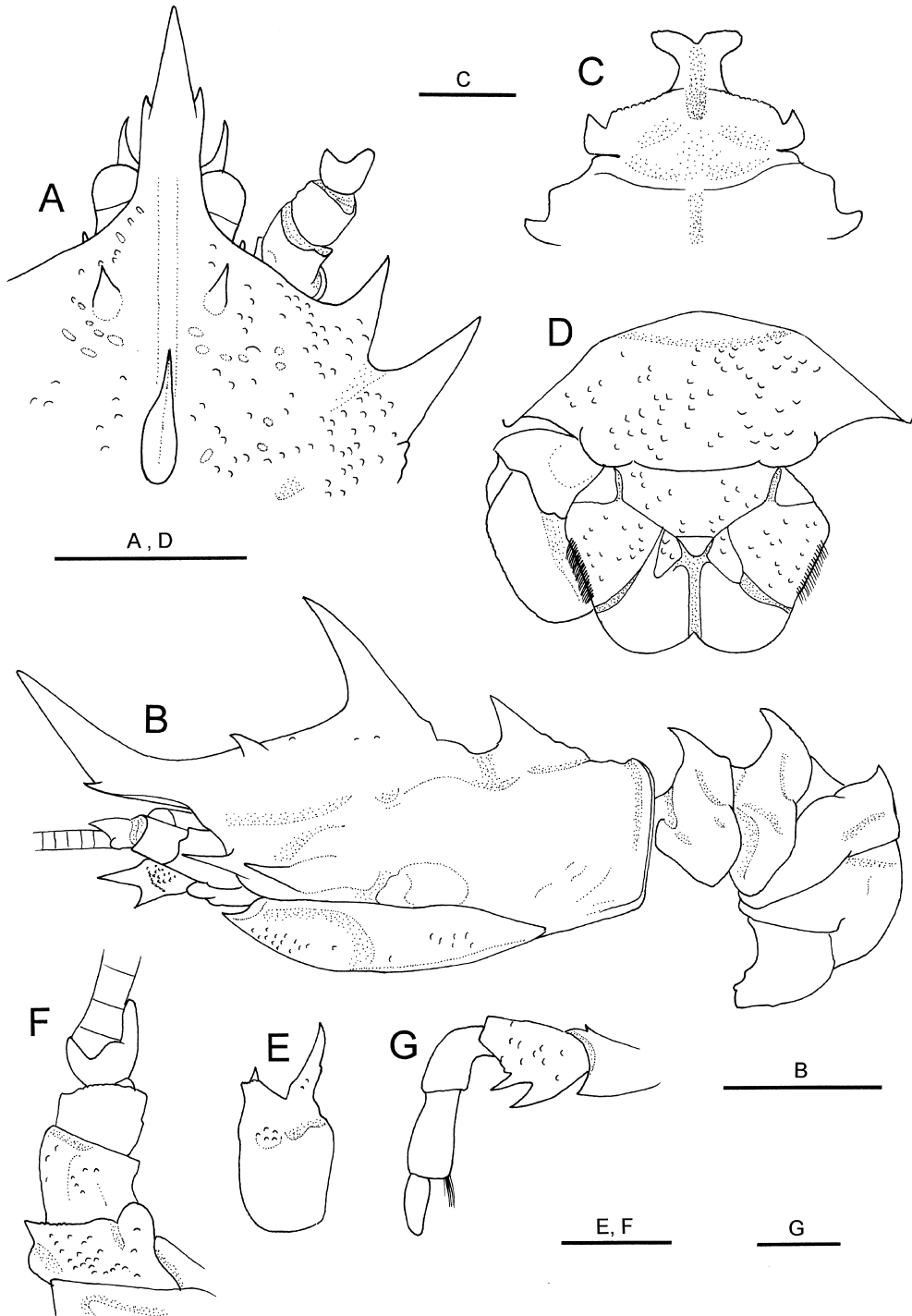


Fig. 2. *Galacantha galeata* sp. nov., holotype, male (cl 14.6 mm), CBM-ZC 6406. A, rostrum and right anterolateral part of carapace, eyes and right antennular and antennal peduncles, dorsal view; B, carapace, abdomen and cephalic appendages, lateral view (tubercles and granules on dorsal surface of carapace and abdomen omitted); C, third to fifth thoracic sternites, ventral view; D, sixth abdominal somite and telson, external view (setae partially omitted); E, basal segment of right antennular peduncle, ventral view; F, right antennal peduncle, ventral view; G, endopod of left third maxilliped, lateral view ((proximal part of ischium not shown; setae mostly omitted). Scale bars: 5 mm for A, B, D; 2 mm for C, E-G.

abdominal tergites covered with small tubercles or granules (these tubercles becoming lower and less conspicuous toward posterior) and with 2 low, blunt ridges divided by shallow transverse groove, each anterior ridge with prominent median spine, spine on fourth tergite distinctly smaller than preceding spines; fourth sternite with transverse groove between ridges interrupted medially. Fifth tergite slightly rugose. Sixth tergite (Fig. 2D) with scattered low tubercles or granules, posterolateral margin forming broadly rounded lobe, posterior margin very slightly convex. Telson (Fig. 2D) about 1.5 times as wide as long, divided into 10 plates, mid-lateral plates with stiff setae.

Eye (Fig. 2A) movable, spineless; cornea subglobular, longer than ocular peduncle.

Basal segment of antennular peduncle (Fig. 2E) with 1 very small distomesial and 1 strong distolateral spines; ventrodistal margin produced in broad, denticulate process; lateral face slightly inflated.

Antennal peduncle (Fig. 2A, F) short and stout. First segment with small, triangular ventromesial process, ventrolateral margin also slightly produced. Second and third segments unarmed. Fourth segment cup-like, with prominent distolateral process.

Third maxilliped (Fig. 2G) stout. Ischium with minute dorsodistal spine and strong ventrodistal spine; crista dentata with 18 corneous denticles. Merus almost as long

as high (including ventral teeth), with 2 strong spines on ventral margin, proximal spine arising slightly proximal to midlength, larger than distal spine; dorsodistal margin unarmed. Carpus unarmed. Propodus with slightly produced flexor distal portion.

First pereopods (chelipeds) (Fig. 1A, 3A) subequal and similar, about 1.6 times longer than carapace. Basis-ischium with 1 very small dorsodistal and 1 small ventral subterminal spines. Merus with low, scale-like tubercles on surfaces, and with very small ventrolateral distal and ventromesial distal spines. Carpus slightly shorter than palm, about 1.4 times as long as wide measured along mesial margin (except distomesial spine); surfaces with low, scale-like tubercles; ventromesial distal angle with 1 prominent spine. Chela 3.2 times longer than wide; palm 1.2 times longer than wide; surfaces with low, scale-like tubercles (edges of these tubercles often denticulate); fingers distinctly longer than carpus, subequal in length to palm, distally spooned, without gape, cutting edges crenulate.

Ambulatory legs (second to fourth pereopods) (Fig. 1A) long, slender. Second pereopod (Fig. 3B, C) overreaching cheliped by length of dactylus, about 2.0 times longer than carapace; basis-ischium with small dorsodistal tubercle; merus slightly arcuate, 5.4 times longer than wide, bearing moderately strong dorsodistal spine, surfaces with small, low, scale-like tubercles or short transverse ridges; carpus

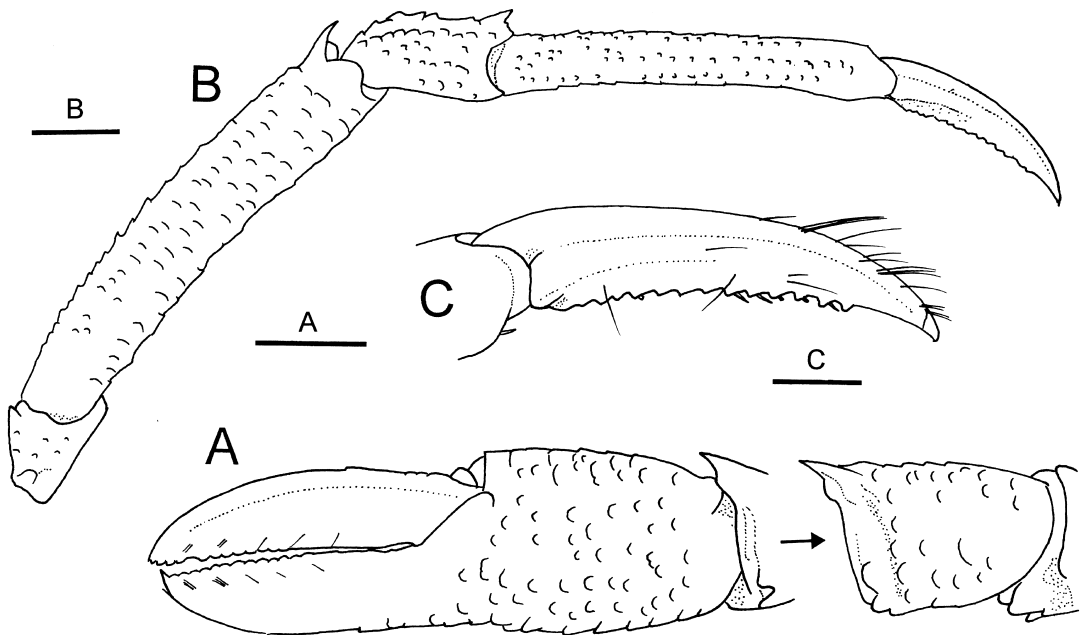


Fig. 3. *Galacantha galeata* sp. nov., holotype, male (cl 14.6 mm), CBM-ZC 6406. A, chela and carpus of left cheliped, dorsal (extensor) view; B, right second pereopod, lateral view (setae omitted); C, same, dactylus and distal part of propodus, lateral view. Scale bars: 2 mm for A, B; 1 mm for C.

short, tuberculate, with small extensor distal spine and granulated dorsolateral ridge; propodus about 7.3 times as long as high, surfaces with scattered small tubercles, flexor margin unarmed; dactylus compressed laterally, 0.6 times as long as propodus, weakly curving, flexor margin with 14 blunt teeth or tubercles diminishing in size proximally, each bearing minute, very slender corneous spinule (these corneous spinules often missing or broken), distalmost tooth located at about distal 0.2 of dactylus, distal half of extensor margin with tufts of stiff setae. Third pereopod similar to second pereopod, but dorsodistal spine of merus much smaller, extensor distal spine on carpus absent. Fourth pereopod slightly shorter than preceding pereopods; dorsodistal margins of merus and carpus unarmed.

Fifth pereopod rugose on lateral surface of merus.

Epipods present on first to third pereopods.

Uropodal protopod (Fig. 2D) unarmed. Endopod with slightly convex lateral and strongly convex mesial margins, posterior margin rounded; no conspicuous longitudinal ridge on extensor face. Exopod generally similar to endopod in shape.

Color in life. Not recorded.

Distribution. Known only from the type locality, NE of Miyake Island, Izu Islands, 1988-2007 m.

Remarks. The genus *Galacantha* had been placed in the synonymy of *Munidopsis* until Macpherson (2007) resurrected it. The genus is characterized by a unique combination of the following characters: carapace with one extremely strong laterally compressed mesogastric spine and one moderately strong cardiac spine, one or two prominent anterolateral spines, rostrum strongly upturned distally, second to fourth tergites each with prominent median spine on anterior ridges, and second pereopod overreaching tip of cheliped. The following nine species are assigned to *Galacantha*: *G. bellis* Henderson, 1885 (western Indian Ocean to eastern Pacific off Chile, 1035-3800 m); *G. diomedea* Faxon, 1893 (eastern Pacific, from south of California to off Chile, 768-3790 m); *G. quiquei* Macpherson, 2007 (southwestern Pacific, 835-1470 m); *G. rostrata* A. Milne-Edwards, 1880 (cosmopolitan, 1600-3294 m); *G. subrostrata* Macpherson, 2007 (East Atlantic, off northwest Africa to the Gulf of Guinea, 2114-3234 m); *G. subspinosa* Macpherson, 2007 (western Pacific, 660-1191 m); *G. trachynotus* Anderson, 1896 (Indo-West Pacific, 1068-2000 m); and *G. valdiviae* Balss, 1913 (Indo-West Pacific, 1000-1640 m). From Japanese waters, *G. bellis*, *G. rostrata*, *G. subspinosa* and *G. valdiviae* have been recorded (Baba, 1982; Watabe and Miyake, 2000; Macpherson, 2007; Osawa and Takeda, 2007).

The following characters place the present new species close to *G. bellis* and *G. subrostrata*: carapace with two prominent anterolateral spines; and rostrum with pair

of ventrolateral spines directed forward, partly visible in dorsal view. *Galacantha galeata* differs from these two species in the weak ornamentation of the carapace. Tubercles on the carapace are more strongly raised and more clearly delimited, and often spiniform in *G. bellis* and *G. subrostrata*, but none of these tubercles are spiniform in the new species. Furthermore, *G. galeata* is distinguished from *G. bellis* by the smaller cornea and the absence of a distolateral spine on the carpus of the cheliped. The corneal width is distinctly smaller than the rostral width measured at the level of the distal corneal margin in *G. galeata*, but it is greater than the rostral width in *G. bellis*. The carpus of the cheliped bears a conspicuous distolateral spine in *G. bellis*. Macpherson (2007) considered that the complete transverse groove on the fourth abdominal tergite is diagnostic for *G. bellis*, but Osawa and Takeda (2007) noted that in their specimens referred to *G. bellis* the transverse groove is sometimes interrupted medially. Nevertheless, in the comparative specimen of *G. bellis* examined here, the transverse groove of the fourth tergite is complete, while it is interrupted medially in the holotype of *G. galeata*. Other differentiating characters between *G. galeata* and *G. subrostrata* include the position of the rostral spines, the different size of the anterolateral spines on the carapace, and the proportion of the propodus of the ambulatory legs. The rostral spines are visible in the dorsal view in *G. galeata*, rather than invisible in *G. rostrata*. In the new species, the second (hepatic) spine is larger than the anterolateral spine, but vice versa in *G. subrostrata*; the second spine is very small in *G. subrostrata*. The propodi of the second to fourth pereopods are relatively slender in *G. galeata* than in *G. subrostrata*.

Etymology. From the Latin *galeata*, meaning “armed with a helmet”, in reference to the strong armature of the carapace.

Genus *Munidopsis* Whiteaves, 1874

Munidopsis camelus (Ortmann, 1892)

(Figs. 4, 5)

Galacantha camelus Ortmann, 1892: 257, pl. 11, fig. 14, 14a, 14i [type locality: Sagami Bay, 311 m].

Munidopsis camelus: Miyake and Baba, 1967: 221, figs. 7, 8; Wu and Chan, 2000: figs. 1b, 2b; Baba, 2005: 286; Baba *et al.*, 2008: 135.

Material examined. Holotype: Sagami Bay, 311 m, 1881, coll. L. Döderlein, female (cl 10.5 mm), MZS 358 (spirit).

Non-type: FB *Chogoro-maru* No. 3, Uraga Strait, E of Kanaya, 35°10'N, 139°45'E, 180-230 m, 28 June 1995, gill net, coll. M. Miya, 1 male (cl 23.0 mm), CBM-ZC 1958;

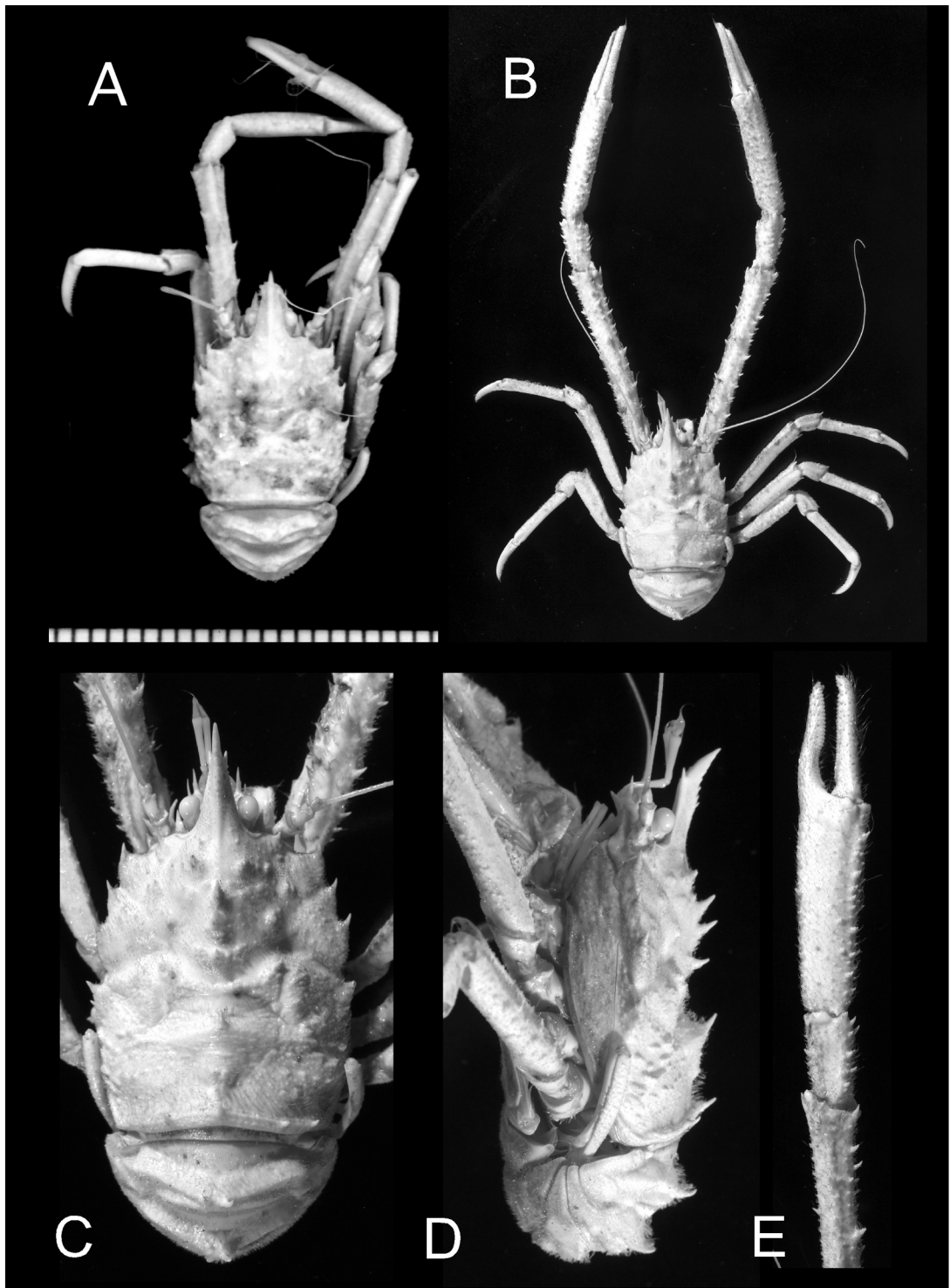


Fig. 4. *Munidopsis camelus* (Ortmann, 1892). A, holotype, female (cl 10.5 mm), MZS 354 (spirit); B-E, male (cl 26.6 mm), CBM-ZC 10133. A, entire animal, dorsal view (left third and fourth pereopods missing); B, entire animal, dorsal view (left third pereopod missing); C, carapace, abdomen and cephalic appendages, dorsal view; D, same, lateral view; E, distal part pf merus to chela of left cheliped, dorsal (extensor) view.

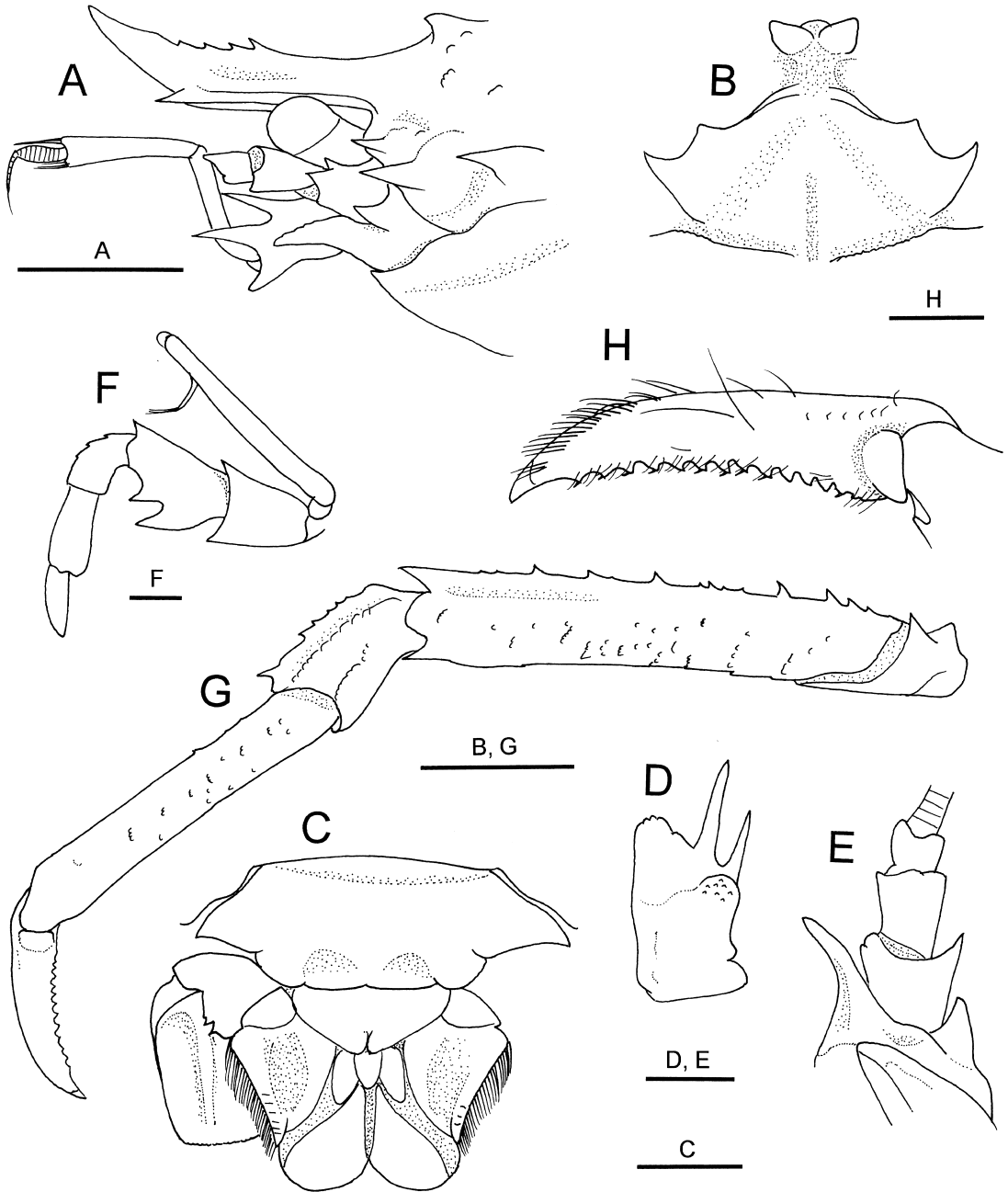


Fig. 5. *Munidopsis camelus* (Ortmann, 1892), male (cl 26.6 mm), CBM-ZC 10133. A, anterior part of carapace and cephalic appendages, lateral view (setae omitted); B, third and fourth thoracic sternite, ventral view (setae omitted); C, sixth abdominal somite, telson and left uropod, external view (setae omitted except for those on lateral margins of mid-lateral plates of telson); D, basal segment of left antennular peduncle, ventral view (setae omitted); E, left antennal peduncle, ventral view (setae omitted); F, left third maxilliped, lateral view (setae omitted); G, left second pereopod, lateral view (setae omitted); H, same, dactylus and distal part of propodus, lateral view. Scale bars: 5 mm for A-C, G; 2 mm for D-F, H.

Uraga Strait, off Katsuyama Ukishima Islet, 200-220 m, 26 January 1998, gill net, coll. T. Komai, 1 male (cl 27.6 mm), 1 female (cl 22.5 mm), CBM-ZC 4445; off Iwai, Uraga Strait, 200-250 m, 26 April 1998, gill net, coll. T. Komai, 1 female (cl 19.5 mm), CBM-ZC 4451. FB *Ido-inkyo-maru* No. 2, Uraga Strait, 300 m, 5 March 2002, scampi trap, 5 males (cl 14.6-26.6 mm), 3 ovigerous females (cl 17.6-20.5 mm), CBM-ZC 10133; same data, 7 males (cl 17.5-25.3 mm), 14 females (cl 15.5-27.8 mm), NSMT-Cr S873.

Description. Carapace (Figs. 4A-D, 5A) exclusive rostrum 1.2-1.3 times longer than broad, anterior and posterior cervical grooves distinct, deep. Dorsal surface fairly sculptured, uneven, roughened with coarse granules and short transverse ridges particularly on posterior half; covering of short, occasionally curled setae present; parahepatic spine present or absent; postcervical spine present. Gastric region elevated, moderately convex, with submedian pair of epigastric spines, median row of 3 moderately strong spines in posterior half, and some small tubercles arranged in pairs, but lacking elevated rugae. Hepatic region with small tubercles and coarse granules. Anterior part of branchial region also with coarse granules. Cardiac region elevated, bearing 1 prominent median spine anteriorly. Posterior submarginal ridge bearing 1 median and 1-3 pairs of lateral spines. Frontal margin slightly oblique in general, with shallow concavity at base of eyestalk and distinct notch somewhat mesial to anterolateral spine. Antennal spine small, directed anterolaterally. Lateral margins generally gently convex, armed with 3 moderately strong, subequal spines on anterior to notch formed by cervical groove, anteriormost one located at anterolateral angle, and following 2 spines equidistant; posterior half with 1 spine anteriorly, and occasionally with few additional spinules or spinulose tubercles. Rostrum narrowly triangular, 0.2-0.3 times as long as carapace, ascending and somewhat to strongly upturned in distal 0.3-0.4; dorsal margin bluntly carinate, with row of small tubercles or spines; ventral margins distinctly carinate, merging into frontal margin, bearing 1 pair of small lateral spines located at distal end of straight part; ventral surface proximal to lateral spines flat. Pterygostomial flap anteriorly triangular, but apex not spiniform; lateral face roughly rugose.

Third thoracic sternite (Fig. 5B) bilobed, separated by distinct median notch, about 0.3 width of fourth sternite; each lobe subtriangular with anterolateral margin slightly produced. Fourth sternite (Fig. 5B) relatively broad. Remaining sternites smooth, unarmed; ridges demarcating fourth to seventh sternites minutely granulate.

Abdomen (Fig. 4C, D) covered with short stiff setae. Second and third tergites each with moderately strong, paired submedian spines and with 2 elevated ridges divided by transverse groove. Fourth tergite unarmed, with distinct

transverse ridge anteriorly. Fifth tergites also unarmed, without conspicuous ridges. Sixth tergite (Fig. 5C) with clearly delimited posterolateral lobes; posteromedian margin nearly straight or slightly convex. Telson (Fig. 5C) about 1.4 times wider than long, divided into 10 plates; mid-lateral plate bearing stiff setae on concave lateral margin in both males and females, posterolateral part elevated, somewhat produced posteriorly.

Eye (Fig. 5A) movable. Ocular peduncle shorter than cornea, unarmed, slightly widened basally. Cornea terminal, globular, slightly wider than ocular peduncle. Relatively strong spine between eye and antennal peduncle.

Antennular peduncle with basal segment (Fig. 5A, D) bearing somewhat ascending, moderately strong distolateral spine, ventrodistal margin produced, minutely denticulate; lateral face slightly inflated, bearing 1 slender spine dorsolaterally, being subequal or slightly shorter than distolateral spine. Distal two segments relatively long and slender.

Antennal peduncle (Fig. 5A, E) moderately short and stout. Basal segment with incurved ventromesial spine slightly overreaching distal margin of second segment and with small ventrolateral spine not reaching midlength of second segment. Second segment with raised distal margin, bearing small distolateral spine. Third segment unarmed, narrower than second segment. Fourth segment with small distolateral lobe.

Third maxilliped (Fig. 5F) stout. Ischium more than half as long as merus, bearing small spine on dorsodistal margin and strong spine on ventrodistal margin; crista dentata with more than 20 small corneous denticles. Merus high, bearing 2 sharp ventral spines (proximal spine much stronger than distal spine) and 1 small dorsodistal spine. Carpus with minute denticles on extensor margin. Propodus with slightly produced flexor distal margin. Dactylus distinctly shorter than propodus.

First pereopods (chelipeds) (Fig. 4B, E) subequal, elongate, at most 4.2 times longer than carapace in males or 3.0 times in females, surfaces covered with short stiff setae, but devoid of rugae or striae. Basis-ischium with small spine or tubercle on mesial margin subterminally, dorsodistal angle with distinct spine. Merus with 3 major rows of small to moderately large spines (dorsolateral, dorsomesial and ventromesial rows), surfaces also with scattered small spines, ventral surface with scattered, tiny, multidenticate tubercles. Carpus 1.5-2.0 times longer than wide, with dorsolateral and dorsomesial rows of small spines; lateral and mesial faces spinose; ventral surface with scattered minute tubercles. Palm elongated, more than twice length of carpus, with sparse minute to small spines on dorsal surface; lateral and mesial faces spinose (spines on mesial face occasionally bifid); ventral face granulate.

Fingers unarmed, gaping proximally only in males, distally spooned; cutting edges crenulate; tips simple (females) or divided in 2 or 3 teeth (males). Dactylus 0.6-0.8 times as long as palm.

Ambulatory legs (second to fourth pereopods) (Fig. 4B) moderately long, slender, subcylindrical. Second pereopod (Fig. 5G, H) overreaching tip of rostrum by length of distal three segments, not exceeding chelipeds, about 2.0 times longer than carapace; merus 5.0-5.5 times as long as high, with dorsal row of small spines (distalmost spine much stronger), ventral margin with distal spine, lateral faces coarsely granulate or tuberculate; carpus with dorsodistal spine and 1-3 additional small spines on dorsal surface, lateral face with blunt longitudinal ridge on midline; propodus exclusive rounded distolateral projection 5.5-6.0 times longer than high, coarsely granular on surfaces; dactylus 0.6-0.7 times as long as propodus, 4.0-5.0 times longer than high, somewhat curving, flexor margin with 14-16 triangular teeth, each tooth with minute, slender corneous spinule, terminal claw corneous. Third pereopod similar to second. Fourth pereopod slightly shorter than preceding pereopods, merus with small spines and bifid or multifid spinose tubercles on lateral face.

Epipod present on first to third pereopods, absent on fourth pereopod.

Merus of fifth pereopod coarsely granular on lateral face.

Uropodal protopod (Fig. 5C) with row of minute spines or denticles on distomesial margin. Endopod with straight lateral margin, truncate distal margin, and strongly convex mesial margin; extensor surface with median ridge, lateral half coarsely granular and setose, mesial half smooth. Exopod similar to endopod in shape, extensor face with longitudinal ridge lateral to midline.

Color in life. Body generally orange on dorsal side, whitish on ventral side. Cornea opaque.

Distribution. Known only from Sagami Sea area, central Japan, 200-500 m.

Remarks. Although *Munidopsis camelus* was described more than 110 years ago, detailed descriptions on the morphology are scarce. The present description provides diagnostic details not mentioned before. This species is easily recognized by the following characters: carapace with median row of three to four moderately large spines on gastric region and one median spine on posterior submarginal ridge; frontal margin with one small spine at base of antennal peduncle; lateral margin of carapace with four spines; narrow rostrum with pair of ventrolateral spines; second and third abdominal somites each with prominent paired median spines; and epipods present on first to third pereopods.



Fig. 6. *Munidopsis cylindropus* Benedict, 1902, male (cl 6.1 mm), CBM-ZC 10134, entire animal in dorsal view.

Munidopsis cylindropus Benedict, 1902
(Figs. 6, 7)

Munidopsis cylindropus Benedict, 1902: 281, fig. 24 [type locality: Manazuru-zaki, Sagami Bay, 220-285 m]; Baba, 2005: 146, 287, figs. 63, 64; Baba *et al.*, 2008: 139. Not *Munidopsis debilis*: Baba, 1986: 177 (in Japanese), 293 (in English), fig. 128.

Material examined. RV *Tansei-maru*, KT07-31, stn L2'-500, S of Jogashima, Sagami Sea, 35°03.84'N, 139°35.49'E, 438-516 m, 28 November 2007, dredge, coll. T. Komai, 1 male (cl 6.1 mm), CBM-ZC 10134.

Distribution. Japan (Sagami Bay and Okinawa Trough) and the Philippines (Mindanao Sea), 220-1510 m (Baba, 2005).

Remarks. The present specimen agrees well with the holotype of *Munidopsis cylindropus* from off Manazuru, Sagami Bay, redescribed and illustrated by Baba (2005). As discussed by previous authors (Baba, 2005; Macpherson, 2007), *Munidopsis cylindropus* is very similar to *M. debilis* (Henderson, 1885). Baba (2005) and Macpherson (2007) noted that these two species were separated by the presence of a distinct mesial spine proximal to the midlength of the merus of the cheliped in *M. cylindropus*, whereas this spine is absent in *M. debilis*, and by the cornea being longer than the ocular peduncle in *M. cylindropus*, rather than subequal in the length in *M. debilis*. The present specimen well supports the validity of these characters. In addition, there are some other characters of possible

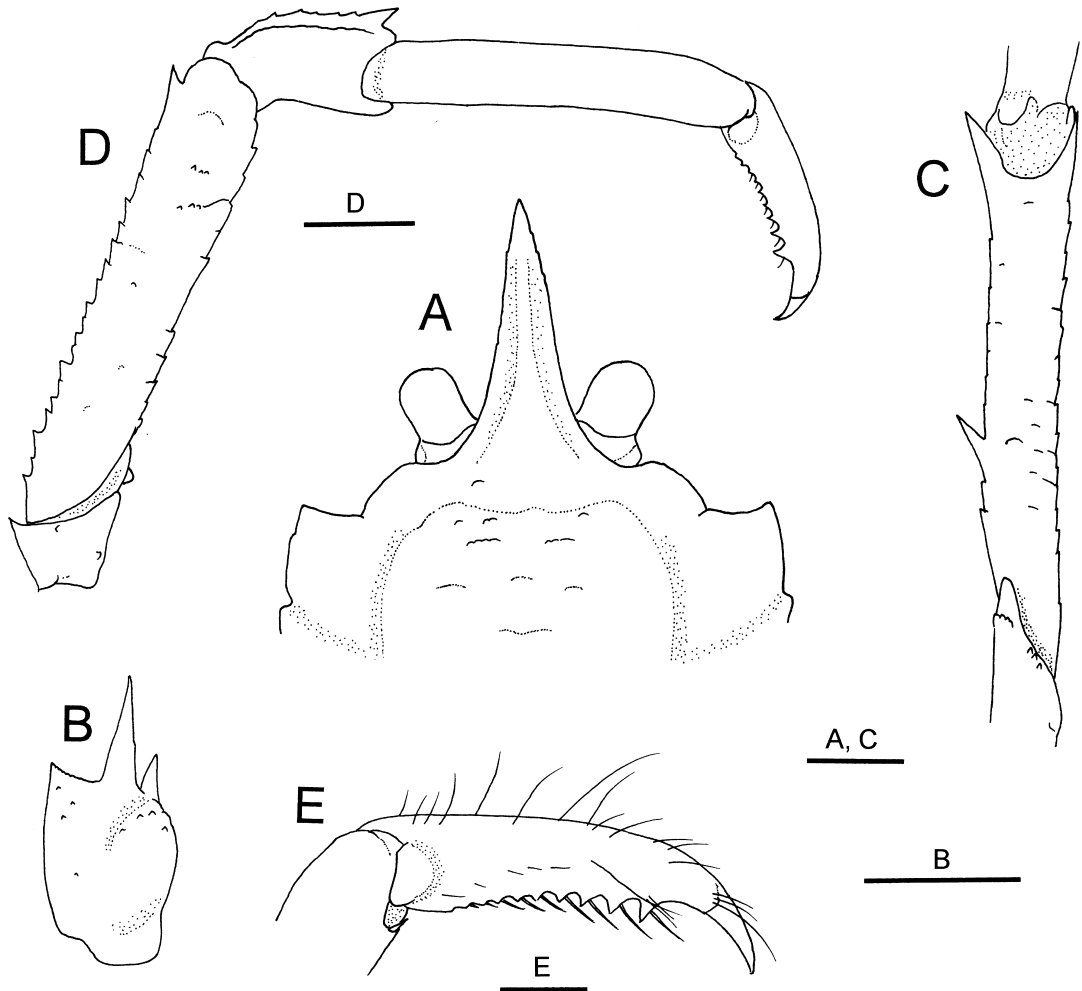


Fig. 7. *Munidopsis cylindropus* Benedict, 1902, male (cl 6.1 mm), CBM-ZC 10134. A, anterior part of carapace and eyes, dorsal view (setae omitted); B, basal segment of left antennular peduncle, ventral view; C, merus of left cheliped, ventral view; D, right second pereopod, lateral view (setae omitted); E, same, dactylus and distal part of propodus, lateral view. Scale bars: 1 mm for A-D; 0.5 mm for E.

significance as follows. The rostrum is relatively narrower in *M. cylindropus* than in *M. debilis* [cf. Fig. 7A and Figs. 28A, 29A of Macpherson (2007)]. The basal segment of the antennular peduncle bears greatly unequal lateral spines in *M. cylindropus* (the dorsal spine is much shorter than the ventral spine; Fig. 7B), rather than subequal in *M. debilis*. The ambulatory legs are much more slender in *M. cylindropus* than in *M. debilis* (see Macpherson, 2007: figs. 28G, F, 29I). For example, the merus of the second pereopod is about 5.3 times as long as high with a straight ventral margin in *M. cylindropus*, whereas it is about 2.8 times as long with a convex ventral margin in *M. debilis*; the propodus is 6.5 times as long as high in *M. cylindropus*, 3.3 times in *M. debilis*; the dactylus is 4.7 times as long as high in *M. cylindropus*, about 3.0 times in *M. debilis*.

***Munidopsis dasypus* Alcock, 1894**

(Figs. 8-10)

Munidopsis dasypus Alcock, 1894: 329 [type locality: Andaman Sea, 1027 m]; Alcock, 1901: 252; Alcock and Anderson, 1895: pl. 13, fig. 9; Baba, 1988: 154, fig. 60; Baba, 2005: 148, 287; Macpherson, 2007: 59; Baba *et al.*, 2008: 139; Osawa *et al.*, 2008: 42, fig. 2A; Taylor *et al.*, 2010: 10, figs. 3, 5F.

Not *Munidopsis dasypus*: Kensley, 1977: 176, fig. 10; Baba and Poore, 2002: 233, fig. 2. = *Munidopsis kensleyi* Ahlyong and Poore, 2004.

Material examined. RV *Tansei-maru*, KT07-31 cruise, stn L-8'-1000, E of Miyake Island, Izu Islands, 34°08.21'N,

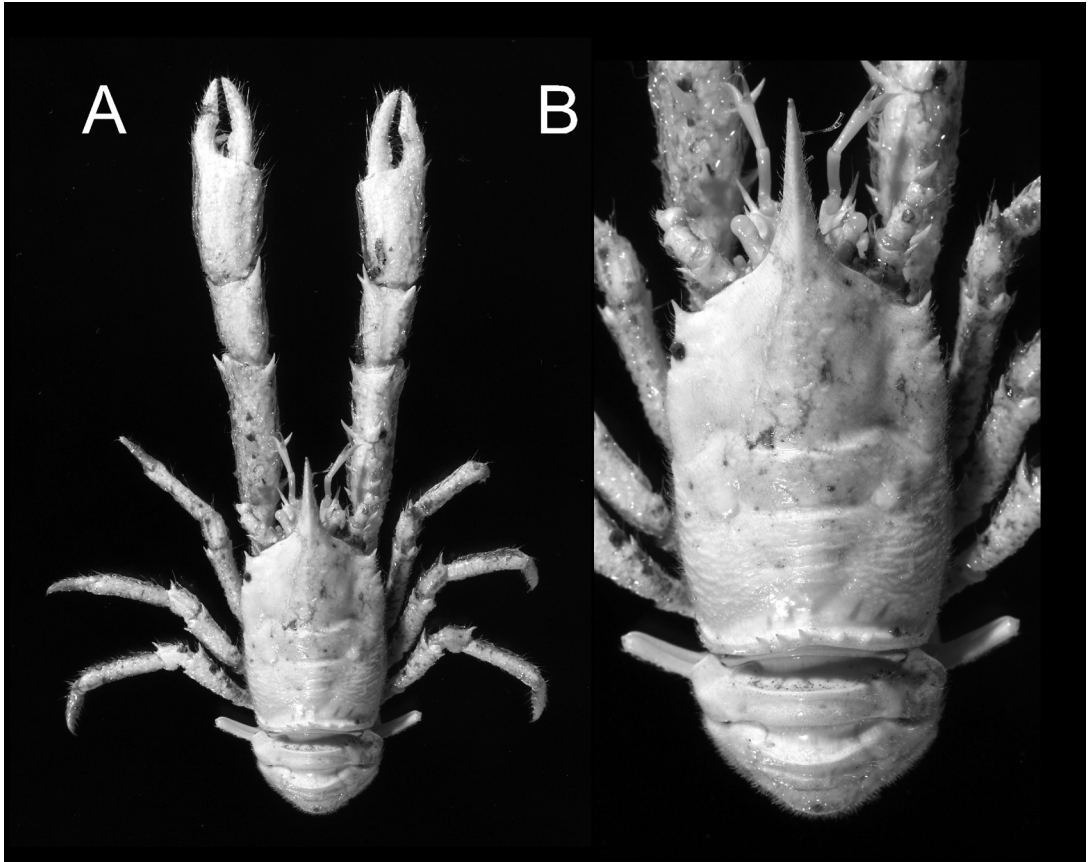


Fig. 8. *Munidopsis dasyypus* Alcock, 1894, male (cl 19.8 mm), CBM-ZC 10135. A, entire animal in dorsal view; B, carapace, abdomen and cephalic appendages, dorsal view.

139°50.97'E to 34°07.28'N, 139°49.51'E, 1009-1029 m, 26 November 2007, beam trawl 1 male (cl 19.8 mm), 1 ovigerous female (cl 19.0 mm), CBM-ZC 10135; KT04-6 cruise, stn KN-1(1), Shima Spur, 34°00.50'N, 136°54.43'E, 767-774 m, 1 May 2004, beam trawl, coll. H. Kohtsuka, 2 males (cl 13.0, 20.2 mm), CBM-ZC 9898; stn KN-1(2), Shima Spur, Kumano Sea, 34°00.86'N, 136°54.32'E, 767-771 m, 1 May 2004, beam trawl, coll. H. Kohtsuka, 1 male (cl 18.0 mm), CBM-ZC 9966; stn KN-8(1), Kumano Sea, 33°43.53'N, 136°42.32'E, 1982-2012 m, 1 May 2004, beam trawl, coll. H. Kohtsuka, 1 ovigerous female (cl 17.1 mm), CBM-ZC 9654.

Description of Japanese specimens. Carapace (Figs. 8A, B, 9A, 10A, B) exclusive rostrum about 1.3 times longer than wide, strongly convex side to side, covered with short setae; cervical groove distinct, posterior part delimited by distinct transverse ridge in middle part; dorsal surface without spines except for transverse row of 5 spines on posterior submarginal ridge. Frontal margin oblique, without antennal spine. Lateral margin subparallel, with moderately small anterolateral spine and small spine or

shallow notch slightly posterior to base of anterolateral spine, but otherwise unarmed. Rostrum narrowly triangular in dorsal view, slightly upturned, apex acute, 0.5-0.6 times as long as carapace; dorsal surface bluntly carinate; lateral margins nearly smooth, ventrolateral margin distinctly carinate, merging into frontal margin. Pterygostomial flap rounded anteriorly, lateral face rugose.

Third thoracic sternite (Fig. 9B) bilobed, separated by median notch, about 0.3 as wide as fourth sternite; each lobe subtriangular with anterolateral margin angular to spiniform. Fourth sternite with small median excavation. Remaining sternites not widened posteriorly, smooth; ridges demarcating fourth to seventh sternites distinct.

Abdominal tergites (Fig. 8A, B) covered with scattered short setae. Second to fourth tergites unarmed, each with sharply delimited anterior ridge accompanied by shallow transverse groove. Sixth tergite (Fig. 9C) with non-produced posterior margin. Telson (Fig. 9C) about as long as wide, divided into 8 plates; posteromedian notch deep; mid-lateral plates with fringe of stiff setae in males only, females with thin, shorter setae.

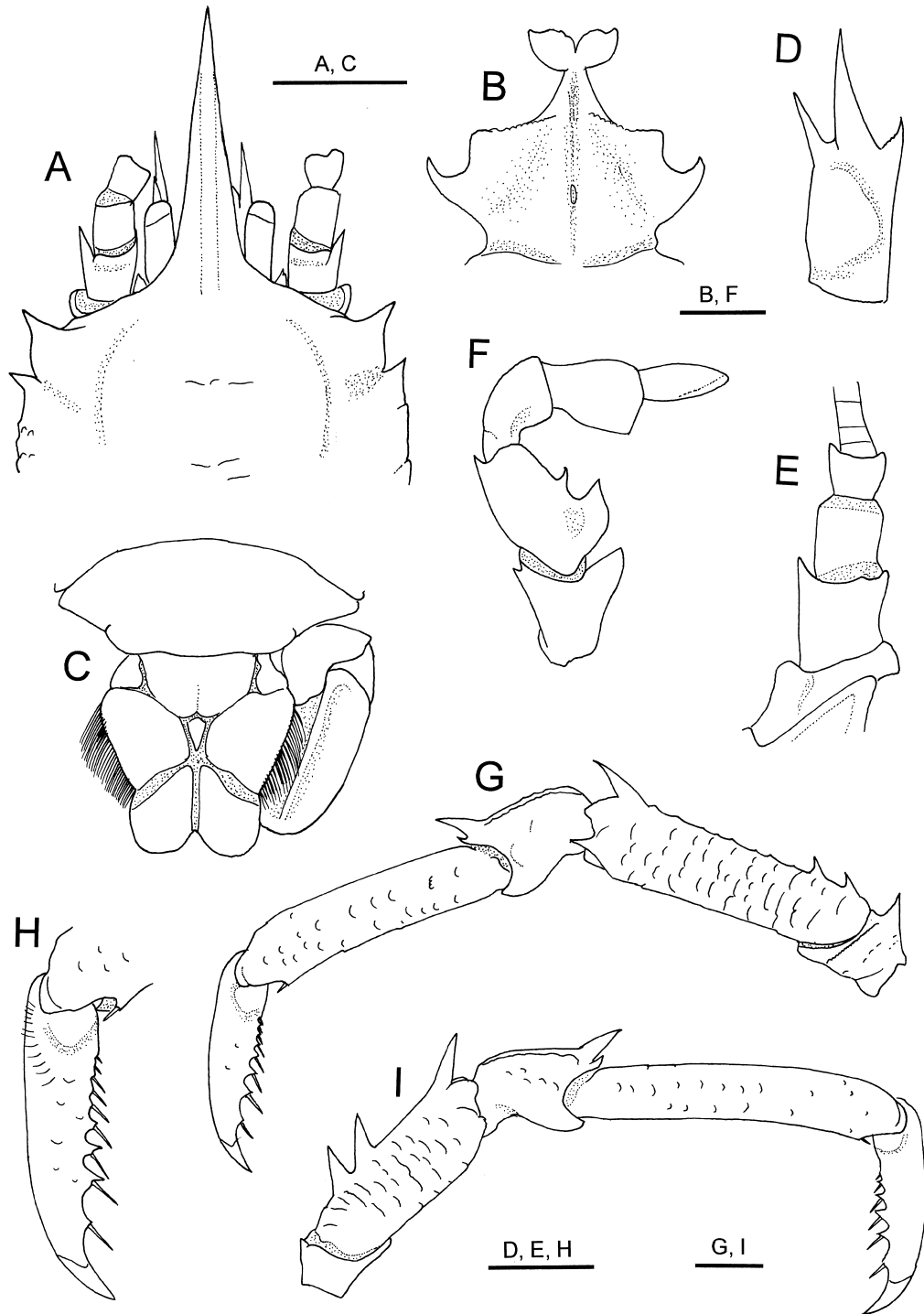


Fig. 9. *Munidopsis dasypus* Alcock, 1894, male (cl 18.0 mm), CBM-ZC 9966. A, anterior part of carapace and cephalic appendages, dorsal view (setae omitted); B, third and fourth thoracic sternite, ventral view (setae omitted); C, sixth abdominal somite, telson and right uropod, external view (setae omitted except for those on lateral margins of mid-lateral plates of telson); D, basal segment of right antennular peduncle, ventral view; E, right antennal peduncle, ventral view; F, endopod of right third maxilliped, lateral view (setae omitted); G, left second pereopod, lateral view (setae omitted); H, same, dactylus and distal part of propodus, lateral view; I, right fourth pereopod, lateral view (setae omitted). Scale bars: 5 mm for A, C; 2 mm for B, D-H.

Eye (Figs. 9A, 10A) movable. Ocular peduncle unarmed, basally widened, with longitudinal suture extending from base of cornea to base of peduncle on lateral face. Cornea small, subglobular, as wide as and distinctly shorter than ocular peduncle.

Antennular peduncle with basal segment (Fig. 9D) relatively stout, bearing long, slender distolateral spine and much shorter dorsodistal spine, ventrodistal margin only slightly produced, lateral face relatively well convex. Distal two segments relatively long, slender.

Antennal peduncle (Fig. 9A, E) moderately short and stout. First segment without spine, but distolateral margin slightly produced in triangular lobe. Second segment with short distolateral spine far falling short of distal margin of third segment. Third and fourth segment unarmed.

Third maxilliped (Fig. 9F) stout. Ischium with dorsodistal margin terminating in small spine, ventrodistal margin produced in strong triangular spine. Merus with small dorsodistal spine; ventral margin with large, broad proximal spine and small median spine. Distal three segments unarmed, carpus with slightly produced ventrodistal margin.

First pereopods (chelipeds) (Fig. 8A) subequal and similar, elongate, 2.5 times longer than carapace at most, setose. Basis-ischium with small dorsodistal and ventral subdistal spines. Merus with numerous transverse or squamiform ridges on surfaces, and with distal spines and 2 rows of 1-3 spines on dorsal and lateral surfaces. Carpus with dorsal and ventral spines distally. Chela unarmed; palm about 2.0 times longer than wide in males, 2.5-3.0 times as long in females; fingers distally hollowed, having gape proximally in adult males, without gape in young males and females; dactylus subequal in length to or slightly longer

than palm.

Ambulatory legs (second to fourth pereopods) (Fig. 8A) relatively short, moderately slender, subcylindrical, setose. Second pereopod (Fig. 9G, H) overreaching tip of rostrum by length of dactylus, not exceeding chelipeds, about 1.5 times longer than carapace; basis-ischium with distinct dorsodistal spine; merus 5.5-6.0 times longer than high, bearing numerous transverse setiferous ridges on surfaces, dorsal margin with 1-4 spines and 1 strong dorsodistal spine, ventral margin with distal spine; carpus short, with strong extensor distal spine and 1 additional small spine at base of distal spine, lateral face with distinct longitudinal ridge dorsally, ventral surface strongly convex; propodus exclusive rounded distolateral projection about 4.0-4.5 times longer than high, with short setiferous ridges; dactylus 0.7-0.8 times as long as propodus, 4.5-5.0 times longer than high, moderately slender, slightly curving, flexor margin with 5-8 triangular teeth proximally decreasing in size, each with slender corneous spinule, terminal claw corneous. Third pereopod similar to second. Fourth pereopod (Fig. 9I) unarmed on basis-ischium; merus shorter than those of preceding pereopods, bearing 1-3 prominent spines on dorsal margin; propodus longer than those of preceding pereopods.

Epipod present only on first pereopod, absent on second to fourth pereopods.

Merus of fifth pereopod setose on lateral face.

Uropodal protopod (Fig. 9C) with distolateral margin minutely tuberculate. Endopod with straight lateral margin, distal to mesial margin rounded; dorsal surface with median ridge, lateral half setose, mesial half smooth. Exopod similar to endopod in shape, extensor face with longitudinal

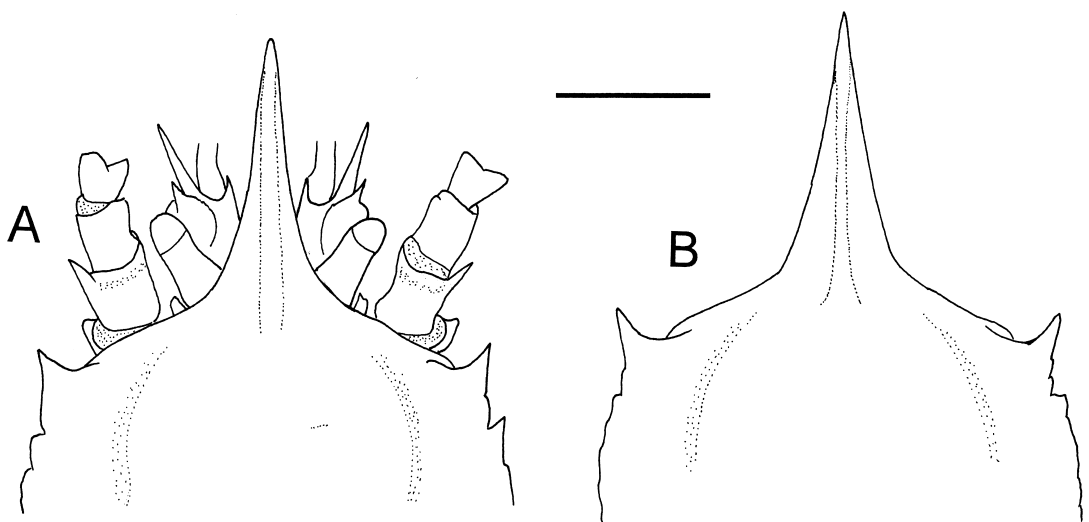


Fig. 10. *Munidopsis dasypus* Alcock, 1894. A, male (cl 19.8 mm), CBM-ZC 10135; B, female (cl 19.0 mm), same lot. Anterior part of carapace, cephalic appendages omitted in B. Scale bar: 5 mm.

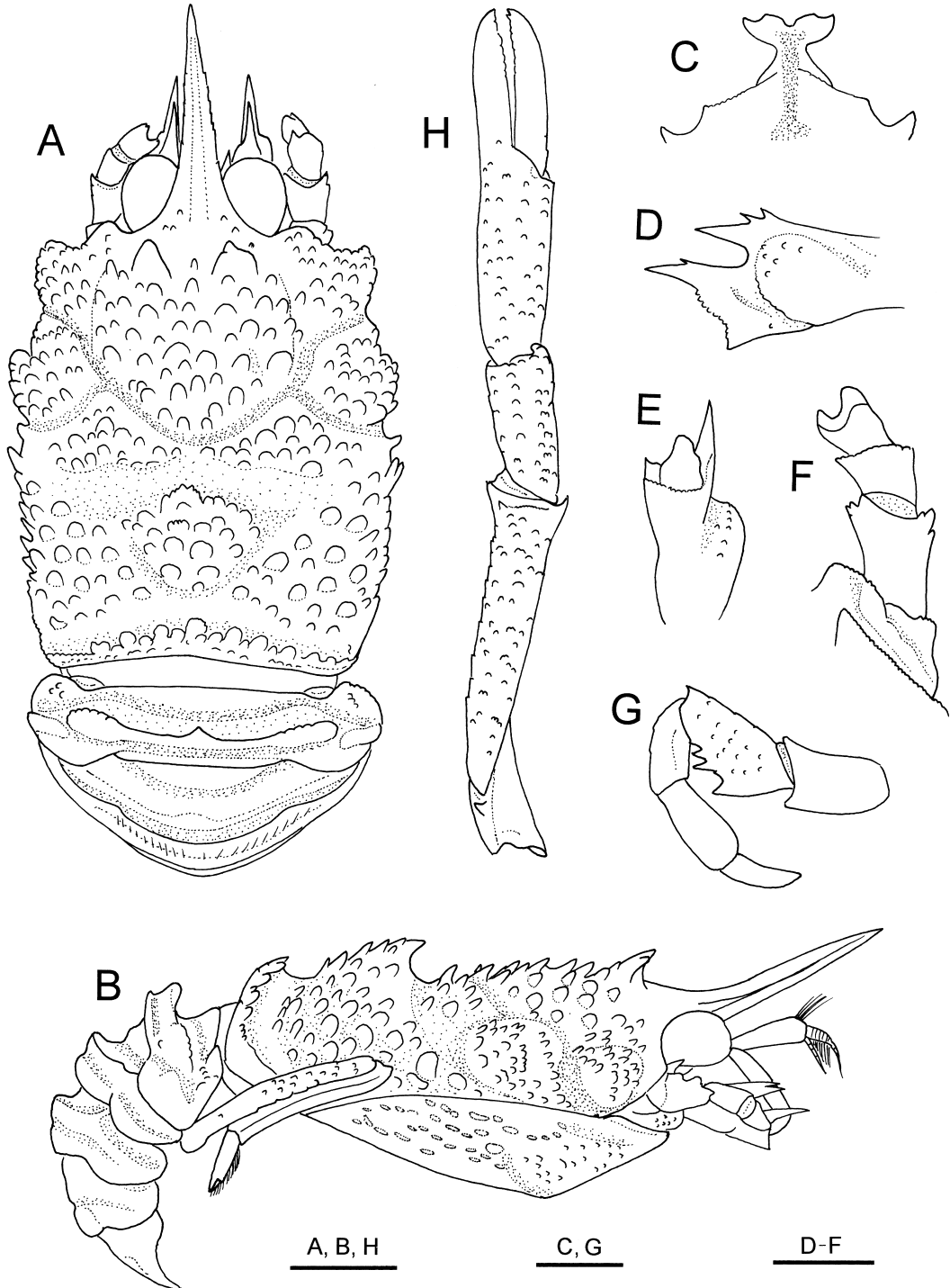


Fig. 11. *Munidopsis naginata* Cubelio, Tsuchida and Watanabe, 2007, male (cl 7.8 mm), CBM-ZC 5350. A, carapace, abdomen and cephalic appendages, dorsal view (setae mostly omitted); B, same, lateral view (setae mostly omitted; fifth pereopod shown); C, third and anterior part of fourth thoracic sternites, ventral view; D, basal segment of left antennular peduncle, lateral view; E, same, ventral view; F, left antennal peduncle, ventral view; G, endopod of left third maxilliped, lateral view (setae omitted); H, left cheliped, dorsal view. Scale bars: 2 mm for A, B, H; 1 mm for C, G; 0.5 mm for D-F.

ridge lateral to midline.

Color in life. Generally orange.

Distribution. Previously known from Madagascar, Gulf of Aden, Arabian Sea, Bay of Bengal, Laccadive Sea, Andaman Sea, Western Australia, Indonesia, South China Sea, Philippines, and Taiwan, 214-1480 m. The present material extends the geographic range of this species to Japanese waters and bathymetric range to 1982-2012 m.

Remarks. Ah Yong and Poore (2004) described a new species, *Munidopsis kensleyi*, based on material from southeastern Australia. The authors believed that the materials referred to *M. dasypus* by Kensley (1977) from South Africa and by Baba and Poore (2002) from southeastern Australia belong to *M. kensleyi*. The major difference between the two taxa is that *M. kensleyi* has no spine posterior to the anterolateral spine of the carapace, instead of possessing one spine in *M. dasypus*. However, Baba (2005) discussed the variation in the development of the spination in his material from the Andaman Sea and the Philippines. The present Japanese specimens also support Baba (2005)'s observation. In particular, in the male specimen from the Izu Islands (CBM-ZC 10135), the left anterolateral margin of the carapace only has a shallow notch posterior to the base of the anterolateral spine, while the right margin does have a small but distinct spine posterior to the base of the anterolateral spine. In the ovigerous female specimen from the same lot, each

anterolateral margin of the carapace has only a small tubercle posterior to the base of the anterolateral spine. It seems difficult to separate *M. dasypus* and *M. kensleyi* by this spination alone. Nevertheless, comparison with the original description of *M. kensleyi* suggests that spines on the chelipeds and ambulatory legs seem to be stronger in *M. dasypus* than in *M. kensleyi*, as Ah Yong and Poore (2004) noted. For example, the merus of the fourth pereopod bears one to three prominent spines on the present Japanese specimens, but there is only a smaller dorsodistal spine in the Australian specimens (Ah Yong and Poore, 2004: Fig. 10H). However, critical examination of more specimens will be advisable to finally conclude if these two taxa are distinct.

Concerning the variation in the spination of the anterolateral margin of the carapace, the specific identity of the previously reported material from the Philippines (Baba, 1988; 2005) and Taiwan (Osawa *et al.*, 2008; Baba *et al.*, 2009), referred to *M. dasypus* and *M. kensleyi*, should be reassessed.

Munidopsis naginata Cubelio, Tsuchida and Watanabe, 2007
(Figs. 11, 12)

Munidopsis naginata Cubelio *et al.*, 2007c: 7, figs. 3c, 6
[type locality: Hatoma Knoll, Okinawa Trough, 1469 m];
Baba *et al.*, 2008: 151; Tsuchida *et al.*, 2008: 196, fig.

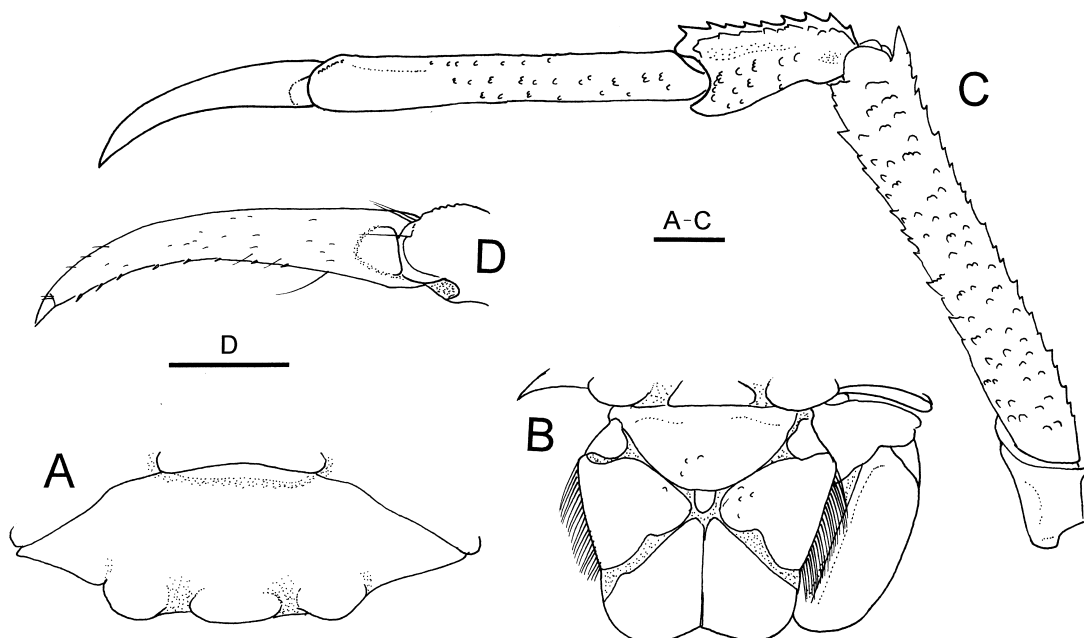


Fig. 12. *Munidopsis naginata* Cubelio, Tsuchida and Watanabe, 2007, male (cl 7.8 mm), CBM-ZC 5350. A, sixth abdominal somite, external view (setae omitted); B, telson and right uropod, external view (setae omitted except for setae on lateral margins of mid-lateral plates of telson). Scale bars: 2 mm for A-C; 1 mm for D.

11.28.

Material examined. TRV *Shin'yo-maru*, 1996 cruise, stn 21, W of Sunosaki, Tateyama, Sagami Sea, 34°56.46'N, 139°33.12'E, 1039-1300 m, 24 October 1996, dredge, coll. T. Komai, 2 males (cl 7.8, 7.8 mm), 3 females (cl 8.8 mm, other smaller 2 specimens badly damaged), CBM-ZC 5350.

Distribution. Sagami Sea area and Hatoma Knoll, Okinawa Trough, 1026-1469 m (Cubelio *et al.*, 2007; this study).

Remarks. Although the original description by Cubelio *et al.* (2007) is enough detailed for species recognition, the given illustrations (Cubelio *et al.*, 2007: Fig. 6) are rather diagrammatic and are not very accurate. Therefore, illustrations of some important parts providing diagnostic features are given here to supplement the original account.

Munidopsis naginata is morphologically most similar to *M. keijii* Macpherson, 2007, described from the Solomon Islands (Macpherson, 2007). It is worth to compare the two species because no comparison has been made. *Munidopsis naginata* differs from *M. keijii* by the structure of the basal segment of the antennular peduncle. In *M. naginata*, this segment does not have spines on the lateral face, but there is a cluster of spines on the lateral face on the segment distally in *M. keijii*. Furthermore, the rostrum seems to be narrower in *M. naginata* than in *M. keijii*; the anterolateral lobe of the carapace is generally rounded in *M. naginata*, rather than having one small spine distally in *M. keijii*; the ocular peduncle is not visible in *M. naginata*, but it is still visible in the dorsal and lateral views in *M. keijii*; and the propodi and dactyli of the second to fourth pereopods are more elongate in *M. naginata* in *M. keijii*.

The type series of this species contains specimens collected from hydrothermal vents (Hatoma Knoll) and cold seeps (Sagami Bay). The present specimens, however, were collected from rocky bottom where no evidence indicating the presence of chemosynthetic community was available.

***Munidopsis taurulus* Ortmann, 1892**

(Fig. 13)

Munidopsis taurulus Ortmann, 1892: 256, pl. 11, fig. 13, 13a, 13i [type locality: Sagami Bay, 366 m]; Baba, 2001: 150, figs. 2, 3; Baba, 2005: 190, 297; Baba *et al.*, 2008: 165.

Munidopsis hastifer Benedict, 1902: 248, fig. 28 [type locality: Manazuru-zaki, Sagami Bay, 219-485 m].

Material examined. Holotype: Sagami Bay, 366 m, coll. L. Döderlein, ovigerous female (cl 5.3 mm), MZS 354 (spirit).

Other material: FB *Ido-inkyo-maru* No. 2, Uruga Strait,

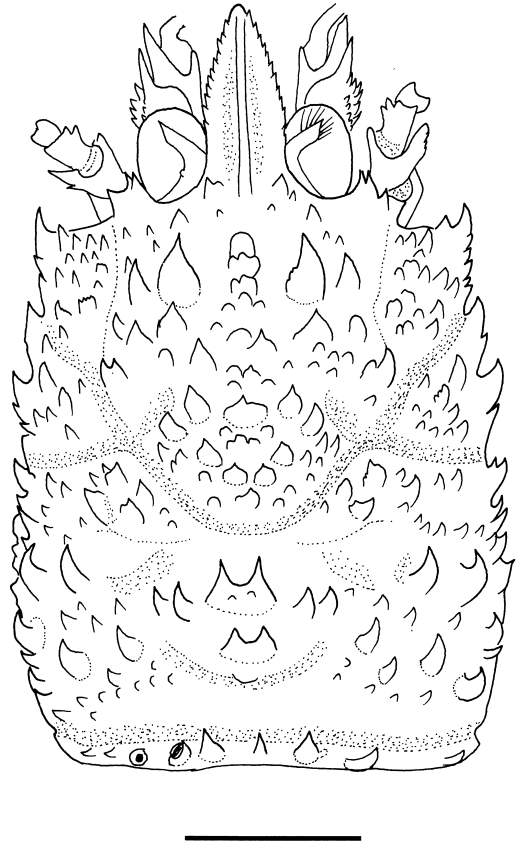


Fig. 13. *Munidopsis taurulus* Ortmann, 1892, male (cl 6.6 mm), CBM-ZC 10136, carapace in dorsal view (setae omitted). Scale bar: 2 mm.

250-300 m, 8 March 2002, 1 male (cl 6.4 mm), CBM-ZC 10136. RV *Shin'yo-maru*, 2002 cruise, stn 6, SW of Jogashima, Sagami Sea, 35°05.62'N, 139°32.29'E, 448-968 m, gray mud mixed with small rocks, 22 October 2002, dredge, coll. T. Komai, 3 specimens (all badly damaged), CBM-ZC 7418.

Distribution. Known only from Sagami Bay and Uruga Strait, 250-942 m (Baba, 2005; this study).

Remarks. Baba (2001) redescribed this species on the basis of the female holotype. He synonymized *M. hastifer* Benedict, 1902 with *M. taurulus* after comparison between the three male syntypes of the former taxon and the holotype of the latter. The present male specimen generally agrees with the male syntypes of *M. hastifer*. It differs from Baba's (2001, 2005) accounts in the more pronounced armature on the carapace and the bifid cardiac spine (Fig. 13). These differences are considered to be intraspecific variation.

Munidopsis tuberipes sp. nov.

(Figs. 14-16)

Material examined. Holotype: TRV *Shin'yo-maru*, 1996 cruise, stn 6, Hyotan-se Bank, Izu Islands, 34°20.75'N, 139°20.00'E, 275-350 m, rock, 22 October 1996, dredge, coll. T. Komai, male (cl 5.0 mm), CBM-ZC 4619.

Paratypes: same data as holotype, 1 male (cl 4.7 mm), 2 females (cl 4.5, 5.1 mm), 1 ovigerous female (cl 5.3 mm), 1 juvenile (cl 2.4 mm), CBM-ZC 10137; TRV *Shin'yo-maru*, 1996 cruise, stn 20, Okinoyama Bank, Sagami Sea, 34°57.18'N, 139°40.30'E, 190-450 m, rock, 24 October 1996, dredge, coll. T. Komai, 1 male (cl 4.3 mm), 3 females (c; 2.7-3.9 mm), CBM-ZC 5299; TRV *Shin'yo-maru*,



Fig. 14. *Munidopsis tuberipes* sp. nov., holotype, male (cl 5.0 mm), entire animal in dorsal view, CBM-ZC 4619.

2002 cruise, stn 37, W of Izu-oshima Island, 34°43.90'N, 139°18.67'E, 284-304 m, 24 October 2002, dredge, coll. T. Komai, 1 ovigerous female (cl 4.2 mm), NSMT-Cr S874.

Description. Carapace (Figs. 14, 15A, B) exclusive of rostrum 1.1-1.2 times longer than wide; dorsal surface convex side to side, covered with numerous, small protuberances or tubercles bearing short setae distally (distal margins of these protuberances usually multidenticulate); regions well delineated by furrows including distinct anterior and posterior cervical grooves. Gastric region elevated, bearing pair of prominent, bluntly pointed, epigastric process. Cardiac region well delineated by surrounding furrow, elevated; anterior margin sharply delimited and slightly overhanging deep transverse furrow. Posterior submarginal ridge distinct; anterior margin irregularly tuberculate and slightly produced medially. Lateral margins slightly convex, subparallel, not crested; anterolateral angle produced in blunt process, but without conspicuous spine; anterior end of anterior cervical groove and lateral end of posterior cervical groove each forming shallow notch, and these grooves delineating hepatic and anterior branchial lobes. Frontal margin generally oblique, bearing prominent, rounded external ocular process, lateral portion between external ocular process and anterolateral angle deeply concave. Rostrum subtriangular with rounded apex in dorsal view, directed downward, about 0.3 times as long as carapace and approximately as long as wide measured at level of posterior end of ocular peduncle; lateral margins nearly straight, tuberculate; middorsal ridge low, bearing small tubercles, extending to epigastric region; ventral surface medially carinate.

Pterygostomial flap (Fig. 15B, F) covered with numerous small protuberances and tubercles, tapering anteriorly to subacute apex.

Thoracic sternum (Fig. 15C) not widened posteriorly, maximum width at fifth sternite. Third sternite about 2.8 times longer than wide, contiguous with fourth sternite, faintly divided into 2 rounded lobes with very shallow anteromedian notch. Fourth sternite about 2.4 times as wide as third sternite at widest portion; anterolateral margins oblique, tuberculate; ventral surface depressed medially, covered with low, marginally multidenticulate tubercles. Fifth and sixth sternites with sparse small tubercles; ridges demarcating fourth to seventh sternites minutely tuberculate.

Abdomen (Fig. 15A, B) unarmed; second to sixth somites covered with small tubercles on transverse ridges and pleura (tubercles becoming lower toward posterior). Second to fourth somites each with two elevated transverse ridges separated by uninterrupted transverse groove (transverse ridges on second somite blunt, those on third and fourth somites with sharply defined edges; anterior

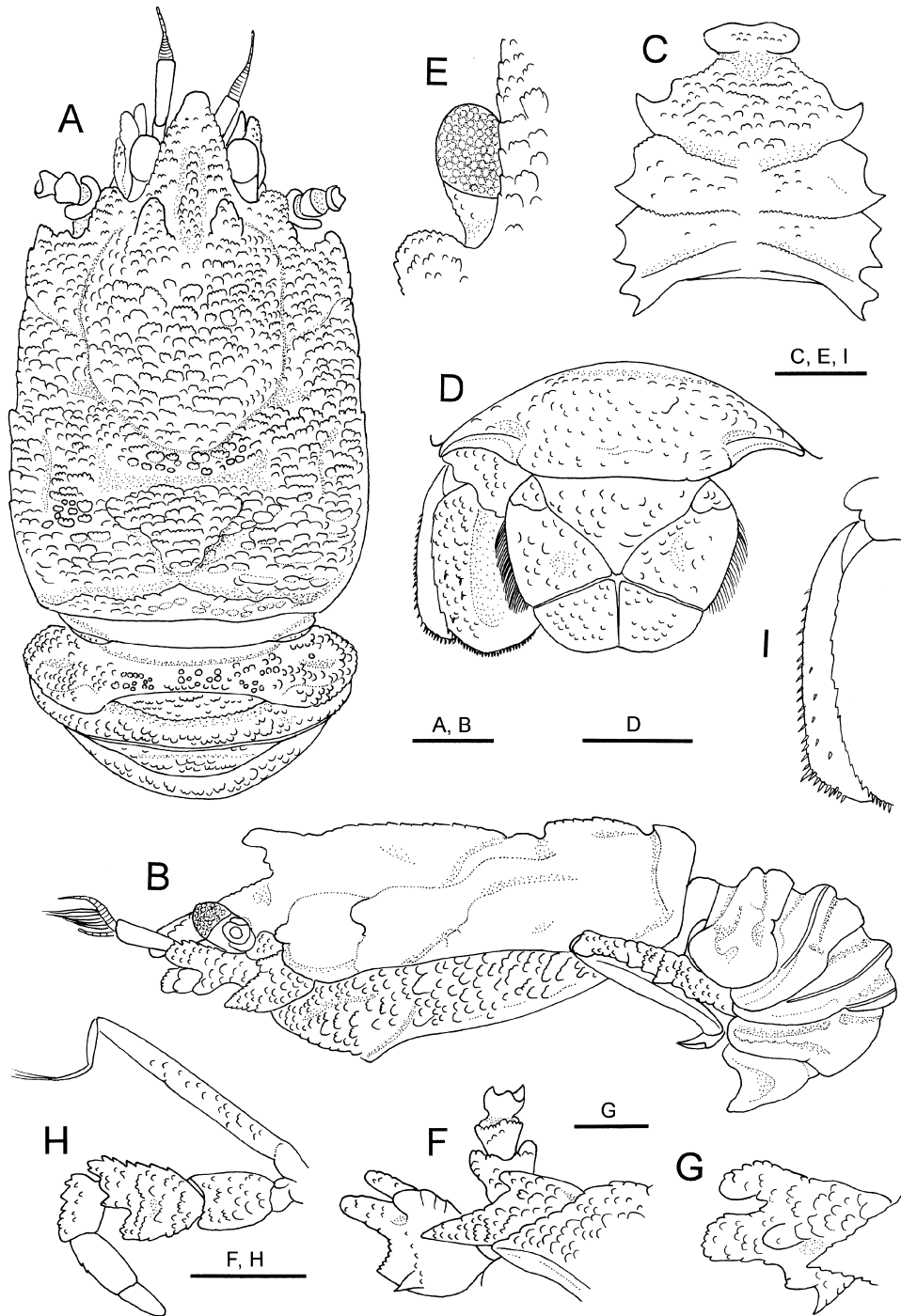


Fig. 15. *Munidopsis tuberipes* sp. nov., holotype, male (cl 5.0 mm), CBM-ZC 4619. A, carapace, abdomen and cephalic appendages, dorsal view (setae omitted); B, same, lateral view (tubercles on dorsal surface of carapace and abdomen omitted); C, third to seventh thoracic sternites, ventral view; D, sixth abdominal somite, telson and left uropod, external view (setae omitted except for setae on lateral margins of mid-lateral plate of telson); E, left eye, dorsal view; F, anterior part of pterygostomial flap, basal segment of antennular peduncle and antennal peduncle, ventral view; G, basal segment of antennular peduncle, lateral view; H, left third maxilliped, lateral view (setae omitted); I, close up of lateral margin of uropodal exopod, dorsal view. Scale bars: 1 mm for A-D, H, F; 0.5 mm for E, G, I.

transverse ridges on third and fourth somites extending to pleura). Fifth somite with weakly sculptured tergum, pleuron with distinct transverse ridge. Sixth somite (Fig. 15D) flattish, with weakly produced, rounded posterolateral lobes, posterior margin nearly straight or very slightly concave. Telson 1.3-1.4 times wider than long, divided into 78 plates, all plates well calcified, anterolateral plate small; mid-lateral plate bearing dense stiff setae on lateral margin in males, only with sparse setae in females; posteromedian notch very shallow.

Ocular peduncle (Fig. 15A, E) movable, spineless; surfaces irregularly granulate; cornea terminal, subglobose, rounded facets clearly delimited.

Antennular peduncle with basal segment (Fig. 15F, G) stout, rugose and tuberculate, bearing 3 bluntly pointed processes laterally and 1 small acute spine on ventral surface; distolateral and dorsolateral process subequal in size, lateral process much smaller than distal two processes, ventrodistal margin not particularly produced, minutely denticulate. Distal two segments relatively short, stout (Fig. 15A).

Antennal peduncle (Fig. 15A, F) very short, stout, reaching distal corneal margin. First segment with prominent distomesial process terminating acutely, and overreaching distal margin of second segment; surfaces strongly tuberculate; distolateral margin with small blunt process. Second segment tuberculate, with distinct distolateral process and weakly produced distomesial margin. Third segment also tuberculate, wider than long, cup-like. Fourth segment small, also cup-like with 3 short blunt terminal processes.

Third maxilliped (Fig. 15H) stout. Ischium shorter than merus, unarmed on dorsodistal margin; ventrodistal angle slightly produced in rounded lobe; lateral face granulate; crista dentata with 16 corneous spines. Merus roughly granulate on lateral surface; dorsodistal margin produced in granulate process; ventral margin with 2 distinct in distal half, distal spine subacute, proximal spine much larger and broader than distal spine, subacutely pointed. Carpus also tuberculate on extensor margin and lateral face. Propodus and dactylus nearly smooth.

First pereopods (chelipeds) (Figs. 14, 16A, C, G) subequal, similar, stouter in males than in females. 2.8 times longer than carapace at most in males, 2.3 times in females; dorsal and ventral surfaces covered with numerous small protuberances or tubercles, almost naked except for fingers. Basis-ischium with small tubercle subdistally on dorsal surface. Merus about 2.5 times longer than wide measured along mesial margin; dorsal surface convex, without crest or ridge; some protuberances or short ridges on mesial face strongly raised; ventromesial distal angle produced in large blunt process. Carpus about 1.4 times longer than

wide, bearing 23 prominent, strongly raised protuberances on mesial face. Chela about 2.5 times longer than wide in males, 3.1 times in females, without conspicuous spines; palm distally widened, about 1.4 times longer than wide in males, 1.7 times in females; fingers curving with gape in males, straight without gape in females, 0.8-0.9 times as long as palm, distally spooned; cutting edges crenulate, that of dactylus having prominent tooth proximal to midlength in males but devoid of such tooth in females, edges obscured by numerous setae in males, nearly naked in females; fixed finger without distinct carinae.

Ambulatory legs (second to fourth pereopods) (Fig. 14) moderately stout, somewhat compressed laterally, covered with small protuberances or tubercles. Second pereopod (Fig. 16D, E) overreaching distal margin of merus of cheliped by length of dactylus. Basis-ischium with small dorsodistal spine or tubercle. Merus with blunt distal projection and 4 prominent protuberances on dorsal margin; some protuberances on ventral surface enlarged, strongly raised, ventrodistal lateral angle without spine. Carpus with prominent, blunt extensor process and 1 or 2 smaller protuberances on extensor margin; lateral face without distinct ridge or crest; flexor surface strongly convex. Propodus exclusive of distal rounded projection about 4.2 times longer than high, without spines; flexor distal margin without corneous spines or spinules. Dactylus 0.7-0.8 times as long as propodus, terminating in relatively short corneous claw; lateral surface with scattered granules; flexor margin nearly straight or slightly curving, without prominent teeth but with row of 8-10 corneous spinules almost over entire length. Third pereopod similar to second pereopod. Fourth pereopod (Fig. 16F) also similar to preceding pereopods except for: basis-ischium without dorsodistal tubercle; merus shorter than those of preceding pereopods, dorsal margin with only prominent median protuberance; propodus slightly longer than those of preceding pereopods.

Merus of fifth pereopod strongly tuberculate (Fig. 15B).

Epipods absent on pereopods.

Uropodal protopod (Fig. 15D) without marginal spine, external surface granulate. Endopod with slightly convex lateral and strongly convex mesial margins, lateral margin faintly denticulate, posterior margin with numerous minute movable spinules; extensor surface granulate and spinulose in lateral half, smooth in mesial half. Exopod with row of minute movable spinules on lateral to posterior margins (Fig. 15I)

Eggs about 1.3 × 1.2 mm, counting 4 (ovigeous female, cl 4.2 mm; NSMT-Cr).

Color in life. Body entirely orange; cornea opaque.

Distribution. Known only from Sagami Sea and Izu Islands, central Japan, 190-450 m.

Remarks. As is apparent from the above description,

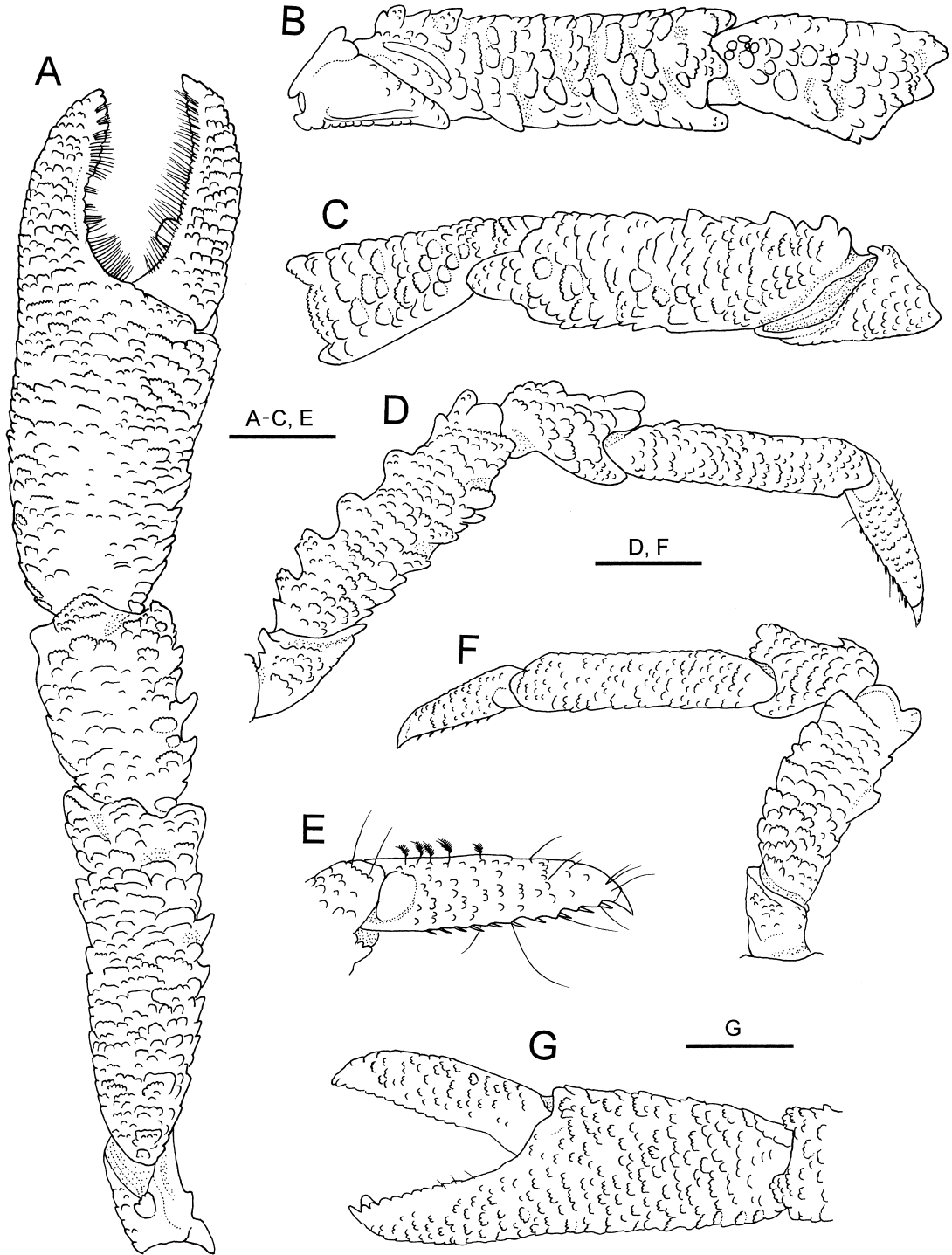


Fig. 16. *Muidopsis tuberipes* sp. nov. A-E, holotype, male (cl 5.0 mm), CBM-ZC 4619; paratype, ovigerous female (cl 4.2 mm), NSMT-Cr S874. A, left cheliped, dorsal view (setae partially omitted); B, same, basis-ischium, merus and carpus, mesial view; C, same, lateral view; D, right second pereopod, lateral view; E, same, dactylus, lateral view; F, left fourth pereopod, lateral view; G, chela of left cheliped, dorsal view. Scale bars: 1 mm for A-F, H, I; 0.5 mm for E.

males differs from females in the more elongate and more stout cheliped, setose fingers of the chela, and the presence of a dense fringe of stiff setae on the mid-lateral plate of the telson.

This new species is morphologically most similar to *Munidopsis sonne* Baba, 1995, known from active hydrothermal vents on the North Fiji Basin, 1992 m. Shared key characters include: carapace lateral margin without well-defined spines; carapace with pair of epigastric processes, these processes not spiniform or tubercle-like; frontal margin of carapace with process lateral to base of ocular peduncle; rostrum without pair of lateral spines; eye spineless; second to fourth abdominal somites unarmed; second pereopod not overreaching tip of cheliped; second to fourth pereopods not subchelate; and dactyli of second to fourth pereopods bearing row of corneous spinules on flexor margins. *Munidopsis tuberipes* is readily distinguished from *M. sonne* by the prominent, bluntly pointed, horn-like epigastric processes and the presence of one to four prominent protuberances on the dorsal margin of the meri of the ambulatory legs. In *M. sonne*, the epigastric processes are truncate and antero-posteriorly compressed; and the meri of the ambulatory legs bear rows of numerous small spiniform tubercles on the dorsal margins (Baba, 1995). Other differentiating characters are: protuberances and tubercles on the body and pereopods are larger and much denser in *M. tuberipes* than in *M. sonne*; the external ocular process on the frontal margin of the carapace is much more developed in *M. tuberipes* than in *M. sonne*; the basal segment of the antennular peduncle bears three prominent, blunt lateral processes and one sharp ventral spine in *M. tuberipes*, but it is armed with a row of several small spines on the dorsolateral carina and one slender distolateral spine in *M. sonne*; the first segment of the antennal peduncle bears a prominent, acutely pointed process on the ventromesial angle in the new species, rather than only slightly produced on that angle in *M. sonne*; the second segment of the antennal peduncle is strongly tuberculate in *M. tuberipes*, rather than smooth and armed with distolateral spine in *M. sonne*; the cheliped does not have spines on the distomesial margins of the merus and carpus in *M. tuberipes*, but in contrast, there are prominent spines on those margins in *M. sonne*; and the epipod on the cheliped is present in *M. sonne*, but it is absent in *M. tuberipes*.

In the general pattern of the armature and ornamentation of the dorsal surface of the carapace and the presence of a conspicuous external ocular process on the frontal margin, *M. tuberipes* is also similar to *M. bractea* Ah Yong, 2007 from the Norfolk Ridge, and *M. papanui* Schnabel and Bruce, 2006 from off New Zealand. Nevertheless, the new species is readily distinguished from these two species by

the absence of a distal prolongation on the ocular peduncle and the absence of epipods on the first to third pereopods. Furthermore, *M. bractea* and *M. papanui* differ from the new species in having strong median processes on the second and third abdominal tergites, which are absent in *M. tuberipes*; there are prominent protuberances on the dorsal margins of the meri of the ambulatory legs in *M. bractea* and *M. tuberipes*, although those margins have smaller blunt spines in *M. papanui*.

Etymology. From the Latin *tuberosus* (= protuberous) and *pes* (leg), alluding to the prominent protuberances on the ambulatory meri. Used as a noun in apposition.

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相模灘とその周辺海域から採集されたシン
カイコシオリエビ科 (甲殻亜門：十脚目：
異尾下目：コシオリエビ上科)

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国立科学博物館によって実施されたプロジェクト研究「相模灘およびその沿岸地域における動植物相の経時的比較に基づく環境変遷の解明」(2001～2005年)および「相模灘における生物多様性の起源探求に関する研究 フォッサマグナ要素および伊豆-小笠原弧」(2006～2010年)により、南房総沖を含む相模灘および周辺海域から採集された材料を中心にシンカイコシオリエビ科について分類学的な研究を行った。さらに、千葉県立中央博物館に所蔵されている標本もあわせて検討した。結果として、2新種を含む以下の2属7種が記録された：*Galacantha galeata* sp. nov. (新称：カプトシンカイコシオリエビ)；*Munidopsis camelus* (Ortmann, 1892) (ツノナガシンカイコシオリエビ)；*M. cylindropus* Benedict, 1902 (トゲナシシンカイコシオリエビ)；*M. dasyopus* Alcock, 1894 (新称：ヒイロシンカイコシオリエビ)；*M. naginata* Cubelio, Tsuchida and Watanabe, 2007 (ナギナタシンカイコシオリエビ)；*M. taurulus* Ortmann, 1892 (コウシシンカイコシオリエビ)；*M. tuberipes* sp. nov. (新称：コブアシシンカイコシオリエビ)。2新種については詳細な記載を与え、近縁種との比較を行った。ヒイロシンカイコシオリエビはインド太平洋の各地から記録されていたが、本研究により本邦海域にも分布することが明らかとなった。既知種4種はいずれも相模灘海域から記録されていたが、形態情報が乏しいツノナガシンカイコシオリエビについて詳細な再記載を与えた。