琉球大学学術リポジトリ

ミツトゲヤワスナモグリ (新称) Lepidophthalmus tridentatus (von Martens, 1868) (甲殻亜門: 十脚目: アナエビ下目: スナモグリ科) の琉球諸島からの記録

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Records of the callianassid ghost shrimp *Lepidophthalmus tridentatus* (von Martens, 1868) (Crustacea: Decapoda: Axiidea: Callianassidae) from the Ryukyu Islands, Japan

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Abstract. Examination of samples collected from the Ryukyu Islands, Japan, has revealed the common occurrence of the callianassid ghost shrimp *Lepidophthalmus tridentatus* (von Martens, 1868), although literature records of the species are rather scarce. The specimens examined in this study were collected from Amami-ohshima Island, the Okinawa Islands and the Yaeyama Islands. The species was found to burrow in soft sediments in intertidal to shallow subtidal zones, particularly in estuaries and mangrove areas. A detailed description of the species is provided to show evidence of the identification, as well as diagnostic details not mentioned in previous literature. Some comments on the taxonomy of the genus *Lepidophthalmus* are also given.

Introduction

Since 2006, the authors have carried out investigations on shallow water infauna of decapods from Amami-ohshima Island to the Yaeyema Islands of the Ryukyu Islands in order to document cryptic biodiversity, using a commercial suction pump (yabby pump) for extraction of specimens from sediments. Continuing studies of the accumulated samples have revealed a wealth of fauna, including species new to science or new to the local fauna (Komai 2009; Komai & Fujita 2014; Komai et al. 2014a, b, 2015; Anker et al. 2015; Komai & Anker 2015; Naruse 2015; Osawa & Fujita 2016). In this article, we report on a callianassid ghost shrimp, *Lepidophthalmus tridentatus* (von Martens, 1868). Although literature records are scarce (cf. Dworschak 2007), our collection has revealed that *L. tridentatus* is quite common in estuaries and mangroves in the study area. Although the occurrence of the species in Japanese waters has been previously mentioned (Itani 2007; Komai 2009; Osawa 2012), these references did not provide voucher specimens or evidence for the identification. Robles & Felder (2015) included one specimen of the species from Nagura-Anparu, Ishigaki Island, in their molecular phylogenetic analysis of *Lepidophthalmus*, but no morphological information on the specimen was given. In this study, we provide a detailed description based on our specimens in order to show evidence of identification and for a better understanding of the diagnostic characters of the species. Comments on the taxonomy of the genus *Lepidophthalmus* are also given.

Materials and methods

Most specimens used in this study were extracted from soft sediments in intertidal or shallow subtidal zones with a stainless steel yabby pump (Alvey Co. Ltd). Specimens were chilled on iced seawater or kept in a freezer before they were preserved in 75% ethanol. Material used in this study is deposited in the Natural History Museum and Institute, Chiba (CBM), Japan, and the Ryukyu University Museum, Fujukan (RUMF), University of the Ryukyus, Okinawa, Japan. Sizes of the specimens are expressed as carapace length (cl), measured from the tip of the rostrum to the midpoint of the posterodorsal margin of the carapace.

In this study, the structure of the pereopod 4 is referred to as “semichelate”, instead of as “subchelate”, in reference to McLaughlin (1997: 435). Generally in callianassids, the development

and/or structure of pleopods 1 and 2 are different between the sexes (e.g. Sakai 1999, 2011; Dworschak et al. 2012), whereas pleopods 3–5 are generally similar.

Taxonomic account
Family Callianassidae Dana, 1852
Genus *Lepidophthalmus* Holmes, 1904
[New Japanese name: Yawa-sunamoguri-zoku]
***Lepidophthalmus tridentatus* (von Martens, 1868)**
[New Japanese name: Mitsutoge-yawa-sunamoguri]
(Figs 1–7)

Callianassa tridentata von Martens, 1868: 614 (type locality: Java, Indonesia). — A. Milne-Edwards 1870: 101 (no new locality). — Miers 1884: 13 (Sri Lanka).

Callianassa (*Callichirus*) *tridentata*. — Borradaile 1903: 547 (list; no new locality). —De Man 1928a: 27, pl. 7, fig. 13–13h (type material); 1928b: 110 (key). — Sakai 1970: 393, figs 1–3 (Sri Lanka; New Britain).

Lepidophthalmus tridentatus. — Sakai 1999: 71, fig. 14e–f (Sri Lanka); 2005: 156. — Dworschak 2007: 122, figs 2–39 (Philippines). — Komai 2009: 870 (Iriomote Island, Ryukyu Islands). — Robles et al. 2009: 317 (no new locality). — Osawa 2012: 182 (Okinawa Island, Ryukyu Islands). — Dworschak et al. 2012: 192 (list; no new locality), figs 69.6J, 69.21L. — Robles & Felder 2015: 461 (Bali, Indonesia; Bohol, Philippines; Ishigaki Island, Ryukyu Islands), 468.

Lepidophthalmus tridentata — Sakai 2015: 433 (no new locality). — Robles & Felder 2015: 455 (list).

Corallichirus tridentatus. — Tudge et al. 2000: 144 (list). — Itani 2007: 203 (Okinawa and Ishigaki islands).

Corallichirus tridentata. — Kensley 2001: 332 (no new locality).

Lepidophthalmoides tridentata. — Sakai 2011: 445 (no new locality).

Material examined. Amami-ohshima Island: Akagina, Kasari, 28°27.20'N, 129°40.13'E, muddy sand flat, 27 April 2006, coll. T. Komai, 2 males (cl 8.1, 9.3 mm), 4 females (cl 12.2–13.6 mm), CBM-ZC 11637; Ohse Beach, Kasari, 28°27.58'N, 129°43.02'E, intertidal, muddy sand flat, 27 April 2006, coll. T. Komai, 3 females (cl 8.0–12.6 mm), CBM-ZC 11638; Yanma, Sumiyo Village, 28°14.41'N, 129°24.50'E, mud flat near mangroves, 28 April 2006, coll. T. Komai, 1 male (cl 9.0 mm), 4 females (cl 7.0–10.0 mm), CBM-ZC 11642; Yadorihama, Setouchi, 28°07.31'N, 129°21.50'E, sand flat, 30 April 2006, coll. T. Komai, 1 male (cl 12.6 mm), CBM-ZC 11646. **Okinawa Islands**: Shioya, Ohgimi Village, 26°40.18'N, 128°06.28'E, tidal flat, 8 February 2008, coll. T. Komai, 2 males (cl 12.7, 14.7 mm), 4 females (cl 13.7–13.9 mm), CBM-ZC 9802; near entrance of Yagaji Island, 26°38.32'N, 129°01.57'E, intertidal, sand flat, 5 February 2005, coll. T. Komai, 1 female (cl 13.7 mm), CBM-ZC 9796; Kyoda, Nago, 26°32.28'N, 127°57.58'E, estuary, intertidal, coarse sand, 6 February 2008, coll. T. Komai, 3 males (cl 10.2–12.2 mm), 3 females (cl 11.0–12.5 mm), CBM-ZC 9800; Yabu River estuary, Nago, 26°35.52'N, 127°57.09'E, mud, intertidal, 6 February 2008, coll. T. Komai, 6 males (cl 6.8–14.2 mm), 7 females (cl 6.5–11.8 mm), 1 juvenile (cl 4.9 mm), CBM-ZC 9801; Teima River estuary, Nago, 26°33.07'N, 128°03.51'E, intertidal, 20 June 2009, coll. T. Komai, 1 male (cl 11.4 mm), 1 ovigerous female (cl 10.5 mm), CBM-ZC 12716; same data, 2 males (cl 11.9, 12.4 mm), RUMF-ZC-4742; Oura River estuary, 26°33.15'N, 128°02.29'E, intertidal, sand, 18 June 2009, coll. T. Komai & M. Osawa, 1 male (cl 12.8 mm; photo), RUMF-ZC-4743; same data, 2 males (cl 10.8, 11.8 mm), 3 females (cl 9.9–11.6 mm), RUMF-ZC-4744; Henoko, Nago, 26°31.08'N, 128°02'E, intertidal, sand, 18 June 2009, coll. T. Komai & M. Osawa, 7 males (cl 6.8–12.0 mm), 2 females (cl 8.0, 8.6 mm), CBM-ZC 12266; same data, 1 male (cl 12.9 mm), CBM-ZC 12717; Okukubi River estuary, Kin, intertidal, 3 June 2003, 1 ovigerous female (cl 12.2 mm), CBM-ZC 8670; Okukubi River, Kin, 26°27.30'N, 127°56.62'E, muddy sand flat, 16 November 2012, coll. T. Maenosono, 1 male (cl 6.8 mm), 1 female (cl 7.8 mm), RUMF-ZC-3871; Misaki, Kitanakagusuku, tidal flat, near river mouth, sand mud, 5 March 2010, coll. M. Osawa, 1 male (cl 14.7 mm), CBM-ZC 14188; similar locality, tidal flat, near river mouth, sand mud, 2 April 2010, coll. M. Osawa, 1 male (cl 13.8 mm), CBM-ZC 14189; near Hama Fishing Port, Nakagusuku, 26°15.18'N, 127°47.37'E, sand flat, 9 February 2009, coll. T. Komai, 1 male (cl 12.8 mm), CBM-ZC 9806; Senaga Islet, Tomigusuku, 26°17.33'N, 127°39.05'E, sand flat, 4 February 2008, coll. T. Komai, 1 male (cl 13.5 mm), 4 females (cl 11.2–14.8 mm), CBM-ZC 9792; Ohdo Beach, Itoman, 26°05.25'N, 127°42.31'E, intertidal sand flat, 30 June 2006, coll. T. Komai, 1 male (cl 14.0 mm), CBM-ZC 8799; Sashiki-Shinkai, Nanjo,

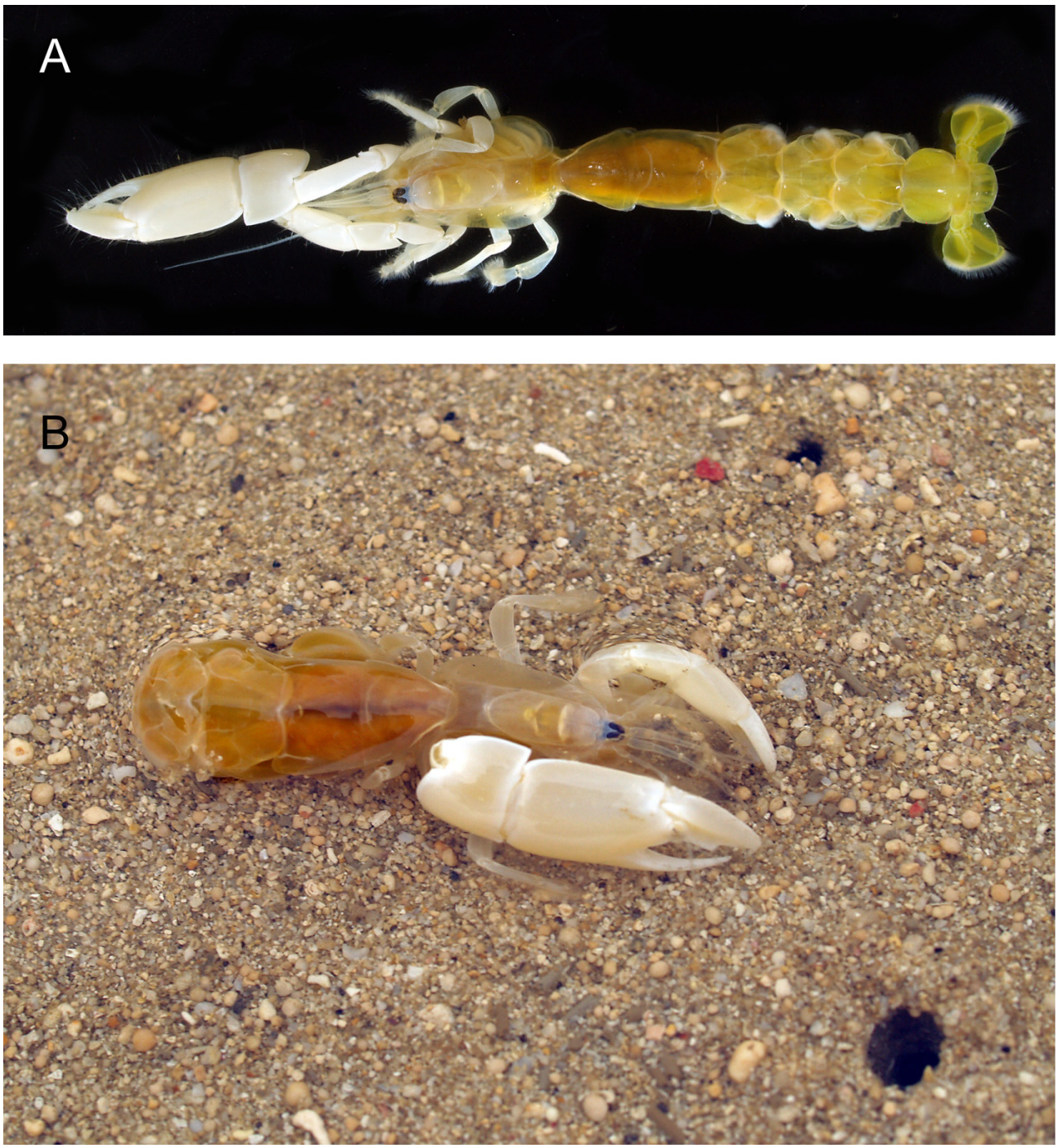


Fig. 1. *Lepidophthalmus tridentatus* (von Martens, 1868). A, male (cl 13.6 mm), CBM-ZC 14150, showing coloration in life; B, living individual in situ, male, not collected, just after extraction from burrow, photograph taken at sand flat in Uehara Port, Iriomote Island, 13 March 2017.
図 1. ミツトゲヤワスナモグリ (新称). A, 雄 (頭胸甲長 13.6 mm), CBM-ZC 14150, 生時の色彩を示す ; B, 吸引された直後の雄個体 (採集はされていない), 西表島上原港内の砂干潟 , 2017 年 3 月 13 日撮影 .

26°10.37’N, 127°46.70’E, intertidal, mud flat, 28 December 2010, coll. T. Maenosono, 1 female (cl 11.7 mm), RUMF-ZC-3870; Hamahiga Island, sand beach, intertidal, 9 February 2008, coll. T. Komai, 2 males (cl 8.0, 16.3 mm), 2 females (cl 9.9, 16.6 mm), CBM-ZC 9809. **Kume Island**: Tomari, intertidal mud flat, 12 June 1995, digging, coll. T. Komai, 1 male (cl 14.0 mm), 3 ovigerous females (cl 13.5–14.0 mm), CBM-ZC 3120; KUMEJIMA 2009, Ohara, intertidal, sand flat, 18 November 2009, coll. T. Komai, 1 male (cl 13.6 mm), RUMF-ZC-4379; KUMEJIMA 2009, Ihfu, tidal flat, 16 November 2009, coll. T. Komai, 1 male (cl 14.3 mm), 1 female (cl 13.3 mm), CBM-ZC 12718; KUMEJIMA 2009, Maja River estuary, intertidal, sand, 17 November 2009, coll. T. Komai, 3 females (cl 14.5–14.5

mm), CBM-ZC 12719. **Ishigaki Island**: Miyara River estuary, mud flat, 14 September 2004, coll. T. Suzuki, 1 male (cl 10.5 mm), CBM-ZC 8672; same locality, mangrove swamps, 14 September 2004, coll. T. Suzuki, 1 male (cl 10.1 mm), CBM-ZC 9253; Nagura-Anparu, estuary, sandy mud flat, 17 December 2008, coll. T. Komai, 1 male (cl 14.7 mm), 3 females (cl 13.6–14.7 mm), CBM-ZC 9813; interior of Kabira Bay, sandy mud flat, 14 December 2008, coll. T. Komai, 1 male (cl 13.7 mm), 1 female (cl 13.7 mm), CBM-ZC 9814; Sukuji, mangrove swamps, sand, 11 December 2008, coll. T. Komai, 3 males (cl 6.1–7.5 mm), 1 female (cl 12.3 mm), 1 juvenile (cl 5.1 mm), CBM-ZC 12263; Arakawa, intertidal, sand flat, coll. T. Komai, 1 female (cl 14.4 mm), CBM-ZC 12264. **Iriomote Island**: Haemida Beach, intertidal, sand, 4 July 2007, coll. T. Komai, 2 males (cl 10.4, 11.5 mm), 2 females (cl 9.7, 10.9 mm), CBM-ZC 9784; Ohmijya River estuary, sand, 29 June 2007, coll. T. Komai, 1 female (cl 11.7 mm), CBM-ZC 9774; near Midara Bridge, sand, 2 July 2007, coll. T. Komai, 1 male (cl 8.2 mm), 1 female (cl 10.3 mm), CBM-ZC 9789; Uehara Port, 24°24.09'N, 123°47.59'E, intertidal sand flat, 20 June 2005, coll. T. Komai, 1 male (cl 12.8 mm), CBM-ZC 9758; same locality, 13 March 2017, coll. T. Komai, 1 male (cl 13.6 mm), RUMF-ZC-4740; Shirahama, muddy sand flat, 20 June 2006, coll. T. Komai, 1 male (cl 13.0 mm), CBM-ZC 8798.

Diagnosis. Rostrum acute, spiniform, flanked by smaller spines located lateral to eyestalks. Eyestalks contiguous, anterolateral margins slightly sinuous, tapering to laterally compressed, obliquely truncate distomesial lobe; distinct, pigmented cornea located at anterolateral or median part of eyestalk, dark pigmentation often extending into inside eyestalk. Antennule with dorsal flagellum longer than article 3 of peduncle. Lower margin of major cheliped merus with hook-like proximal spine in both male and female (spine usually stronger in female than in male). Upper margin of merus lacking proximal notch. Palm of male major chela with prominent concavity at base of dactylus. Dactylus of male major chela occlusal margin with 2 widely separated teeth, tip strongly hooked. Merus of minor cheliped unarmed on lower margin; fixed finger of chela proximally with cluster of setae filling hiatus between fingers. Pereopod 3 propodus distinctly bilobate on lower distal margin. No armor of small scattered sclerites or plates on sternites of pleomeres 1 and 2. Telson wider than long, posterior margin gently convex. Male pleopod 1 terminal article slightly compressed, terminating in simple, acute tip. Uropodal endopod narrow, elongate sub-rhomboidal, length more than twice width.

Description. Body (Fig. 1A) elongate in general form.

Carapace (Figs 2A, 3A) with frontal margin (Fig. 7A, B) having acute, narrow rostral spine flanked by smaller spines located just lateral to eyestalks; rostral spine straight, usually directed forward, reaching to midlength or near distal ends of eyestalks. Surface anterior to dorsal oval (just proximal to rostral base) with at least 1 pair of short setae; dorsal oval well defined, smooth, length of oval about 0.6 carapace length; marginal suture of oval diminished at anterior midline, stronger and with sclerotized articulation to bulbous cardiac region at posterior midline; branchiostegite with low, sclerotized area on hepatic region, without armature, otherwise soft, membranous; linea thalassinica extending over entire length of carapace.

Thoracic sternite 7 (sternite of pereopods 4) (Fig. 2B) medially forming sub-rhomboidal, sclerotized shield having interrupted Y-shaped groove; narrow anterior part extending to sternite 6 between enlarged coxae of pereopods 4; areas lateral to median shield membranous.

Eyestalks (Figs 2A, 7A, B) contiguous, reaching distal margin of article 1 of antennular peduncle; anterolateral margins slightly sinuous, tapering to laterally compressed, obliquely truncate distomesial lobe; distinct, pigmented cornea located at anterolateral or median part of eyestalk, dark pigmentation often extending into inside eyestalk.

Antennular peduncle (Figs 2A, 3A) longer and heavier than antennal peduncle. Article 1 dorsally invaginated to form statocyst occluded by setae, overlaid by eyestalk. Article 2 longer than article 1, article 3 about 2.0 times length of article 2; articles 2 and 3 with dense, ventromesial and ventrolateral rows of long, anteroventrally directed setae. Rami of flagellum subequal in length to entire peduncle, longer than article 3 of peduncle; lower ramus slightly longer, with much denser and longer setation than upper ramus, and slightly heavier than upper ramus except in distal one-third where subterminal articles of upper ramus slightly wider than those of lower ramus and fringed with short aesthetascs.

Antennal peduncle (Figs 2A, 3A, 7C) reaching to distal 0.2 of article 3 of antennular peduncle. Article 1 with dorsolateral carina arched to form lip above excretory pore, ventrally with setose distomesial projection directed anteroventrally. Article 2

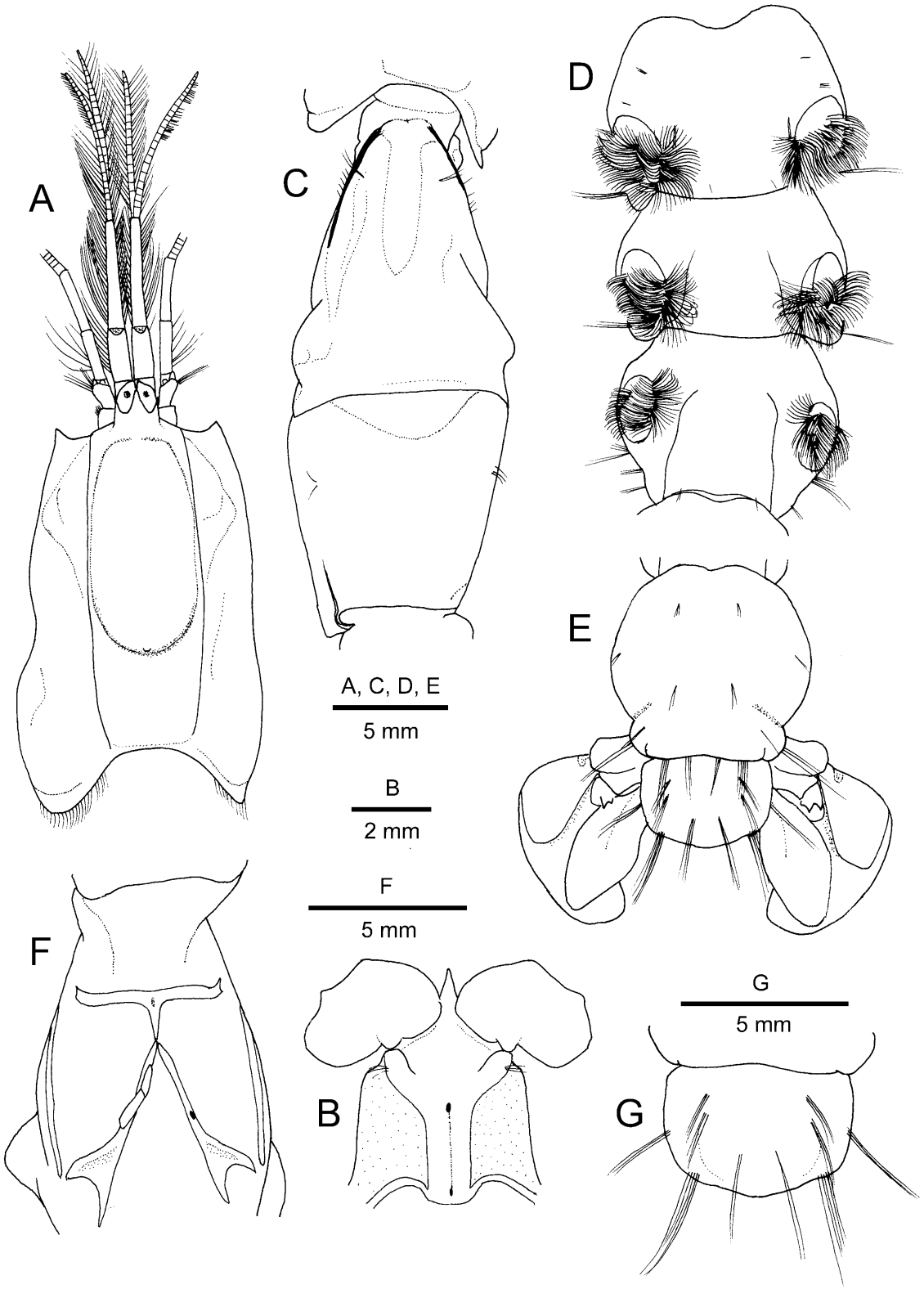


Fig. 2. *Lepidophthalmus tridentatus* (von Martens, 1868), male (cl 14.7 mm), CBM-ZC 9813. A, carapace and cephalic appendages, dorsal view; B, shield on thoracomere 7 and coxae of pereopods 4, ventral view; C, pleomeres 1 and 2, dorsal view; D, pleomeres 3–5, dorsal view; E, pleomere 6, telson and uropods, dorsal view (setae on uropods omitted); F, pleomere 1, ventral view (left pleopod 1 removed); G, telson, dorsal view.
図 2. ミツトゲヤワスナモグリ (新称), 雄 (頭胸甲長 14.7 mm), CBM-ZC 9813. A, 頭胸甲および頭部付属肢 , 背面観 ; B, 第 7 胸節上の楯板と第 4 胸脚の底節 , 腹面観 ; C, 第 1, 2 腹節 , 背面観 ; D, 第 3 ～ 5 腹節 , 背面観 ; E, 第 6 腹節 , 尾節および尾肢 , 背面観 (尾肢の剛毛を省略); F, 第 1 腹節 , 腹面観 (左第 1 腹肢を外した); G, 尾節 , 背面観 .

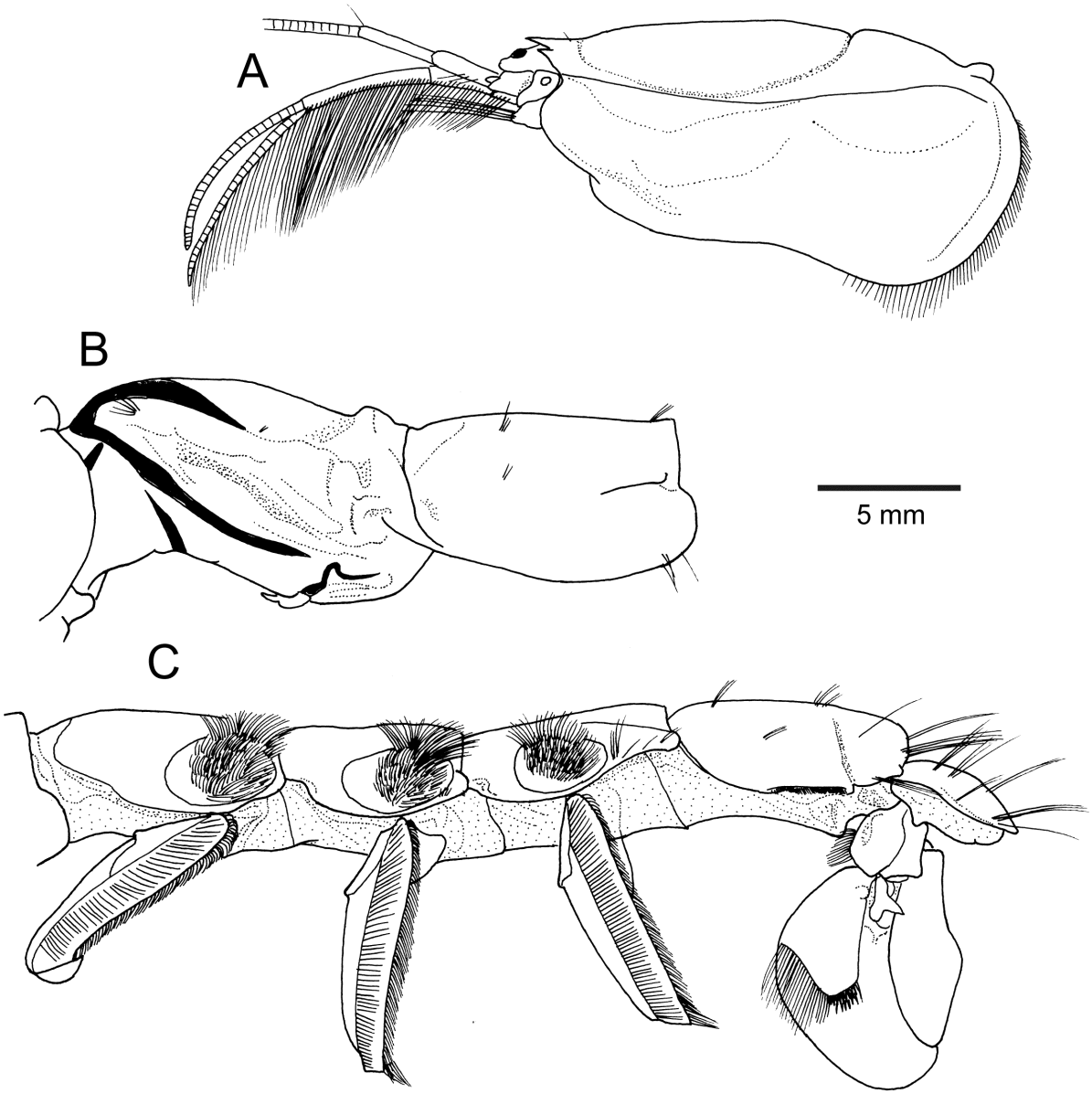


Fig. 3. *Lepidophthalmus tridentatus* (von Martens, 1868), male (cl 14.7 mm), CBM-ZC 9813. A, carapace and cephalic appendages, lateral view (the small protuberance on posterodorsal margin is due to artifact caused by slight damage); B, pleomeres 1 and 2, lateral view (sclerotized parts marked by black); C, pleomeres 3–6, telson, and pleonal appendages, lateral view.
図 3. ミツトゲヤワスナモグリ (新称), 雄 (頭胸甲長 14.7 mm), CBM-ZC 9813. A, 頭胸甲および頭部付属肢 , 側面観 (頭胸甲背後縁のこぶ状の突出部は軽微な破損によるもの); B, 第 1, 2 腹節 , 側面観 (角質化した部分を黒で表示); C, 第 3 ～ 6 腹節 , 尾節および腹部付属肢 , 側面観 .

thickened distally, with long setae on laterodistal portion. Article 3 very short. Article 4 slightly longer than combined lengths of articles 1–3, slightly shorter than article 5, laterally with few long setae. Article 5 narrower than others, setation limited to few long subterminal setae (Fig. 3A). Flagellum with sparse short setae, about 3 times length of antennular flagella.

Mouthparts (dissected from one specimen but not figured) very similar to those of congeneric species (e.g. Felder & Robles 2015). Maxilliped 3 (Fig. 6A, B) with minute, terminally acute, non-setose, rudimentary exopod and large setose endopod. Ischium subrectangular, maximum diagonal length distinctly less than 2 times width at midlength; mesial surface with rudimentary, unarmed longitudinal carina on proximal half. Merus subtriangular, slightly wider than long; distomesial margin forming distinct, subtriangular lobe. Carpus subrectangular, but abruptly narrowing proximally, slightly longer

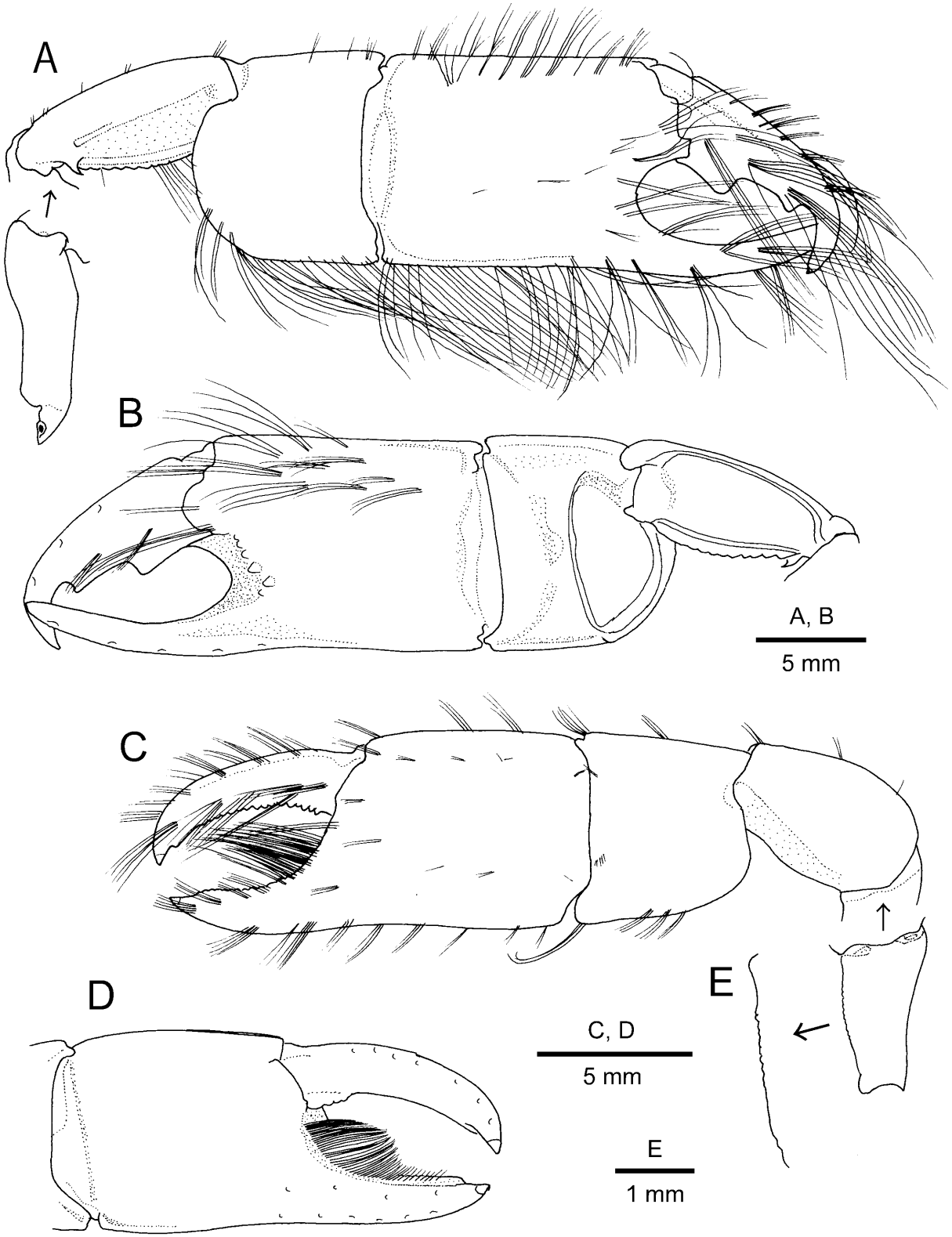


Fig. 4. *Lepidophthalmus tridentatus* (von Martens, 1868), male (cl 14.7 mm), CBM-ZC 9813. A, right major cheliped, lateral view; B, same, merus, carpus and chela, mesial view (setae partially omitted); C, left minor cheliped, lateral view; D, same, chela, mesial view; E, same, close up of lower margin of ischium, lateral view.
図 4. ミツトゲヤワスナモグリ (新称), 雄 (頭胸甲長 14.7 mm), CBM-ZC 9813. A, 右大鉗脚 , 側面観 ; B, 同 , 長節 , 腕節および鉗 , 内面観 (剛毛は部分的に省略); C, 左小鉗脚 , 側面観 ; D, 同 , 鉗 , 内面観 ; E, 同 , 坐節下縁の拡大図 , 側面観 .

than wide. Propodus large, subrectangular, distinctly wider than long; lower margin widely convex, lower proximal angle rounded. Dactylus narrow, strongly arcuate proximally; upper and distal margins with long setae, rounded terminus also bearing few long stiff bristles.

Branchial formula as reported for congeners (e.g. Lemaitre & Rodrigues 1991: 625; Felder & Rodrigues 1993: 363, 369, 370); branchiae limited to single rudimentary arthrobranch on maxilliped 2 and pair of arthrobranchs on maxilliped 3 and pereopods 1–4.

Major cheliped located on either right or left side, shape and ornamentation sexually dimorphic. Major cheliped of male (Figs 1A, B, 4A, B) massive, more strongly armed in general than that of female. Ischium slender; upper margin sinuous; lower margin nearly straight in proximal two-thirds, and sinuous, unarmed or with rudimentary tubercles in distal one-third. Merus with upper margin slightly convex, sharply carinate over entire length; outer face divided into 2 facets by longitudinal median carina, proximally bearing hook-like conspicuous spine separated from median carina by deep notch; lower margin bicarinate, outer carina weakly tuberculate, inner carina with row of more conspicuous, distally inclined tubercles, narrow space between carinae grooved; inner surface nearly flat, with deep, narrow groove along lower margin. Carpus wide (height about 1.2 times length), subquadrate, upper and lower margins sharply keeled, nearly parallel, terminating in subacute angular upper corner and truncate lower corner; proximal margin gently convex, junction between proximal and lower margin with small tubercle or obtuse shoulder on inner side; outer surface gently convex, glabrous; inner surface concave with upturned upper margin and wide concavity accommodating distal part of merus when cheliped flexed, and with deep oblique groove on lower distal part; tufts of long setae on inner surface along lower margin. Propodus wide, heavy, length of fixed finger subequal to length of palm; palm 1.2 times as long as high and distinctly longer than carpus; outer surface smooth, with scattered tufts of short to long setae on upper part and around base of fixed finger; inner surface of palm proximally smooth, several tufts of long setae on upper part, oblique low of small rounded tubercles adjacent to concavity at base of fixed finger; upper margin carinate in proximal one-third, rounded in distal two-thirds; lower margin keeled, but not extending onto fixed finger, with rows of tufts of long setae extending onto fixed finger (becoming sparse on fixed finger); distal margin inferior to base of dactylus deeply concave, with conspicuous, terminally truncate process at base of dactylus. Fingers leaving wide hiatus when closed. Fixed finger gently curving, with well-defined separation of inner and outer occlusal margins, inner margin unarmed but forming thick rounded carina extending slightly onto palm, outer margin bluntly carinate. Dactylus subequal in length to palm, terminating in hooked tip crossing outer side of fixed finger; upper margin forming short, rounded carina proximally; inner surface with shorter, rounded proximal carina; lower surface with weakly defined rounded carina forming unarmed inner occlusal margin, outer occlusal margin usually with 2 heavy, distally inclined occlusal teeth (size and shape of teeth somewhat variable); surfaces with tufts of long setae arranged in longitudinal rows.

Major cheliped of female (Fig. 5A, B, E) less massive and less strongly sculptured than that of male. Merus with proximal hook-like spine on lower margin usually more prominent than in male; palm about 1.2 times as long as high, upper margin slightly sloping distally, lower margin nearly straight. Fixed finger basally wider than in males, terminating in acute, strongly curved tip; occlusal margin generally concave, with row of very low, rounded denticles and 1 small, triangular proximal tooth, notch at base small, shallowly incised; dactylus 0.7 length of palm, strongly hooked terminally; occlusal margin sinuous, with faint denticles; no hiatus between fingers when closed.

Minor cheliped (Figs. 4C, D, 5C, D, F) reaching midlength of palm to base of fingers of major cheliped. Ischium minutely granulate on most of lower margin (Fig. 4E); upper margin slightly sinuous. Merus unarmed; upper margin slightly convex; lower margin faintly sinuous; outer surface gently convex in general, but lower distal part shallowly concave to accommodate proximal part of carpus when cheliped flexed. Carpus subtrapezoidal, slightly widened distally; upper margin carinate, terminating in angular corner; lower and proximal margins sharply carinate, with few tufts of setae; outer surface gently convex, glabrous; inner surface also generally convex, glabrous. Palm distinctly longer than carpus, about as long as high; outer and inner surfaces similarly convex, glabrous; upper margin carinate in proximal one-third, rounded in distal two-thirds; lower margin (including fixed finger) slightly sinuous. Fixed finger terminating

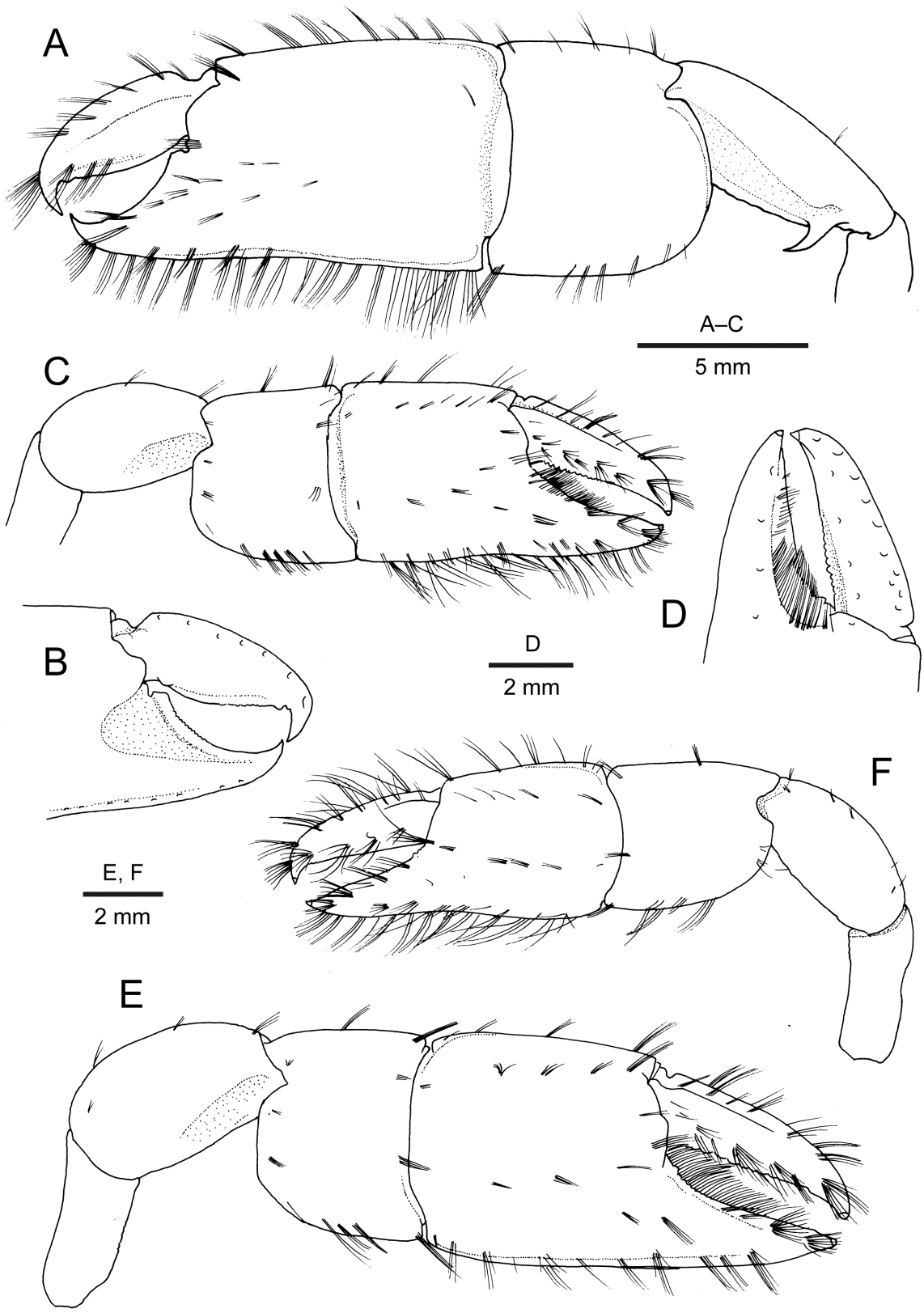


Fig. 5. *Lepidophthalmus tridentatus* (von Martens, 1868). A–D, female (cl 13.7 mm), CBM-ZC 9796; E, F, female (cl 12.3 mm), CBM-ZC 9802. A, left major cheliped, lateral view (ischium omitted); B, same, fingers, mesial view (setae omitted); C, right minor cheliped, lateral view (ischium omitted); D, same, fingers, mesial view (setal mat on fixed finger shown); E, right major cheliped, lateral view; F, left minor cheliped, lateral view.

図 5. ミツトゲヤワスナモグリ (新称), A–D, 雌 (cl 13.7 mm), CBM-ZC 9796; E, F, 雌 (cl 12.3 mm), CBM-ZC 9802. A, 左大鉗脚, 側面観 (坐節を省略); B, 同 , 指部 , 内面観 (剛毛を省略); C, 右小鉗脚, 側面観 (坐節を省略); D, 同 , 指部 , 内面観 (咬合面基部にある剛毛のマットを示す); E, 右大鉗脚 , 側面観 ; F, 左小鉗脚 , 側面観 .

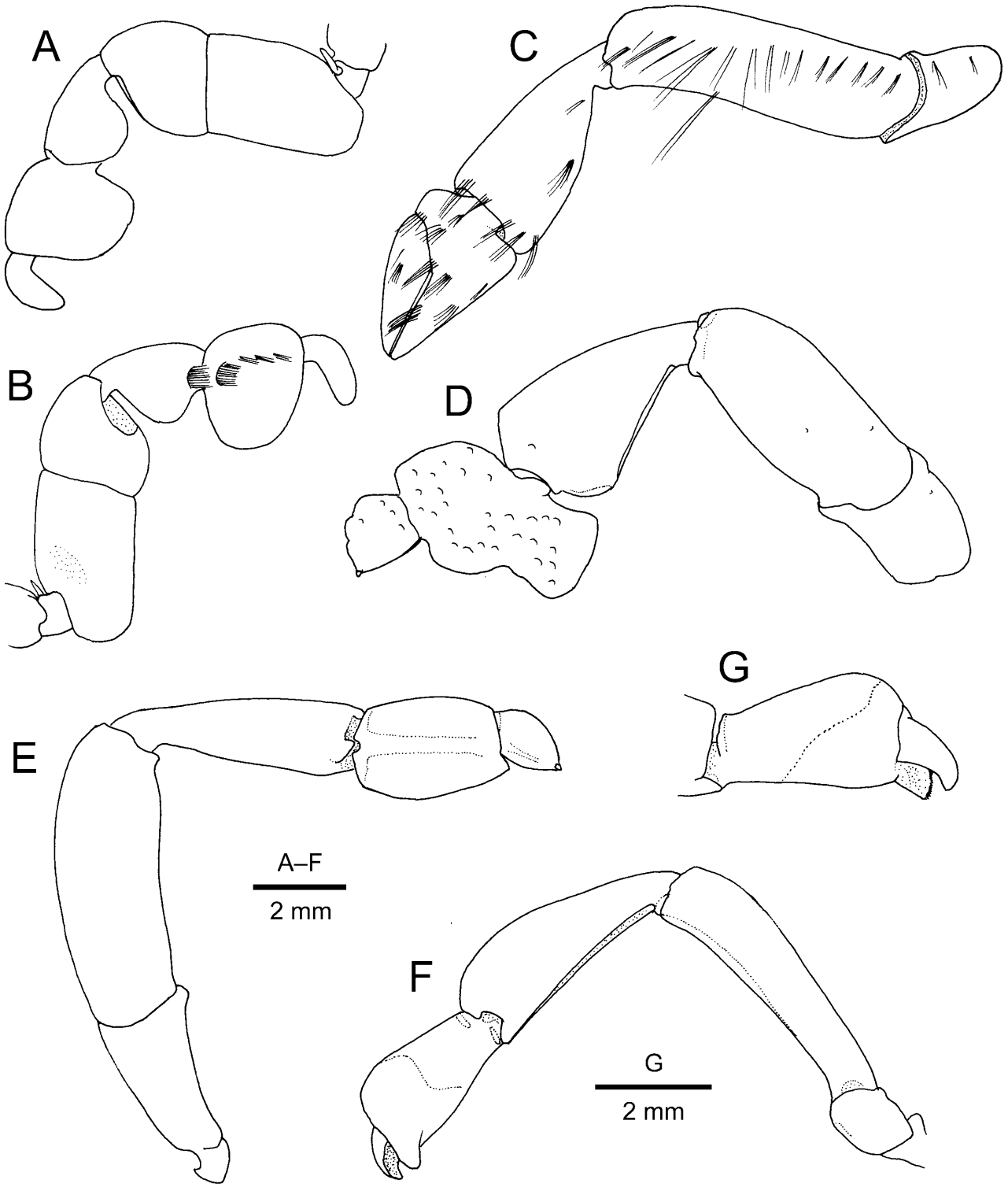


Fig. 6. *Lepidophthalmus tridentatus* (von Martens, 1868). A, B, female (cl 13.2 mm), CBM-ZC 11637; C–G, male (cl 14.7 mm), CBM-ZC 9813. A, left maxilliped 3, lateral view (setae omitted); B, same, mesial view (mesial setae on carpus and propodus are shown); C, left pereopod 2, lateral view (setae partially omitted); D, left pereopod 3, lateral view (setae omitted); E, right pereopod 4, lateral view (setae omitted); F, left pereopod 5, lateral view (setae omitted); G, same, chela, mesial view.

図 6. ミツトゲヤワスナモグリ (新称). A, B, 雌 (頭胸甲長 13.2 mm), CBM-ZC 11637; C–G, 雄 (頭胸甲長 14.7 mm), CBM-ZC 9813. A, 左第 3 顎脚 , 側面観 (剛毛を省略); B, 同 , 内面観 (内面の剛毛を表示); C, 左第 2 胸脚 , 側面観 (剛毛を部分的に省略); D, 左第 3 胸脚 , 側面観 (剛毛を省略); E, 右第 4 胸脚 , 側面観 (剛毛を省略); F, 左第 5 胸脚 , 側面観 (剛毛を省略); G, 同 , 鉗 , 内面観 .

in small corneous claw; wide occlusal surface delimited by blunt carinae, proximal half forming wide concavity, filled by dense mat of setae (setae on outer side longest) in males, outer occlusal margin at least with 1 subterminal tooth, inner occlusal margin smooth, unarmed. Dactylus gently curving, terminating in small corneous claw, crossing inner side of fixed finger; upper surface with short blunt carina proximally on outer side; outer surface with row of tufts of long setae along upper and occlusal margin; outer occlusal margin with small subterminal tooth followed by row of minute to small denticles, inner occlusal margin smooth, unarmed. Setation of excavation much less developed in gape between fingers of female; excavation of fixed finger, size of gape between fingers, and relative size of propodus compared to carpus, all slightly larger in males than in females.

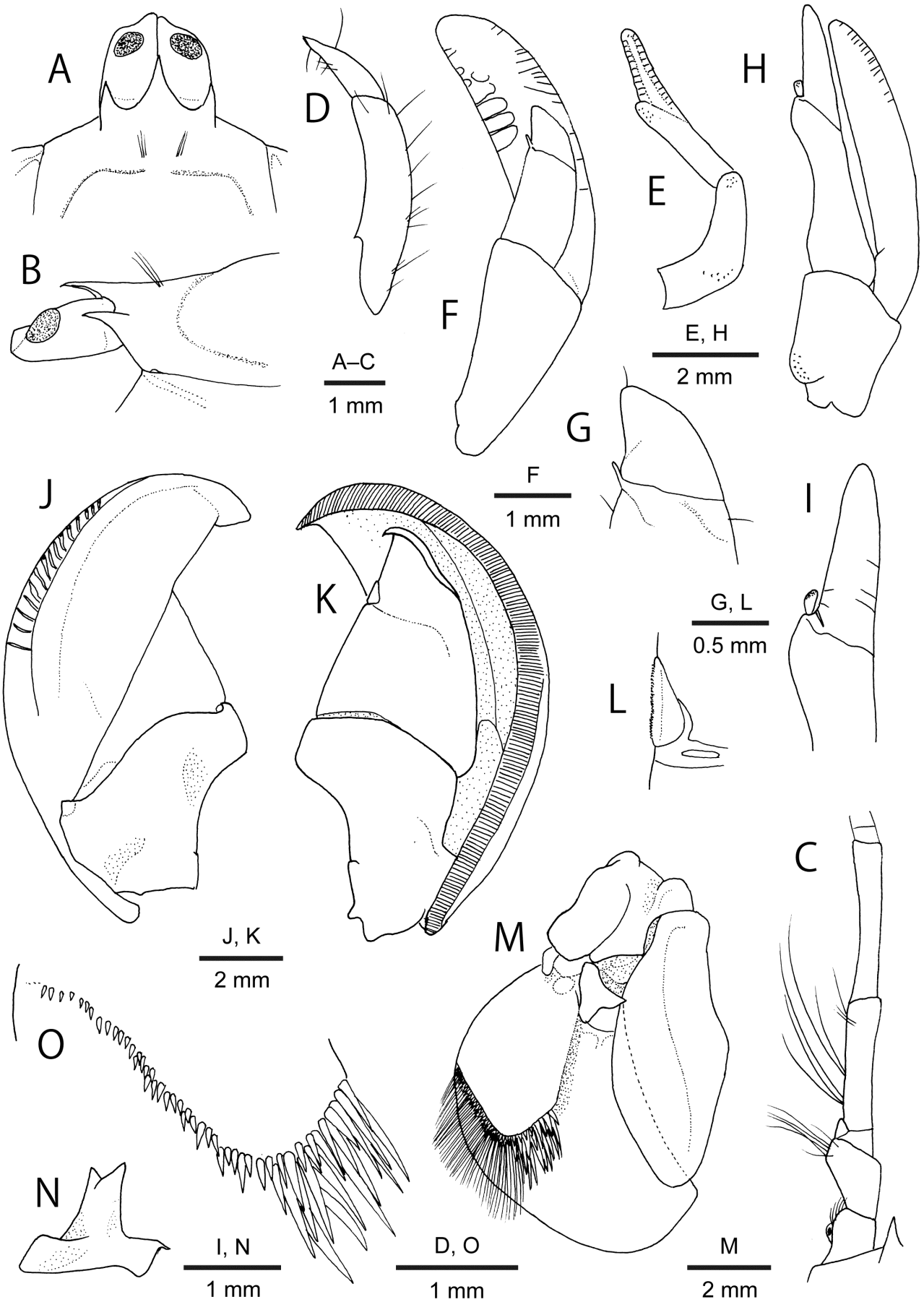
Pereopod 2 (Fig. 6C) chelate, strongly compressed laterally. Ischium short, lower distal corner slightly produced. Lower margins of merus and carpus lined with evenly spaced long setae. Merus with upper margin straight in proximal 0.7, sloping in distal 0.3; lower margin slightly sinuous. Carpus subtriangular, about twice as long as high; upper margin with sparse long setae. Chela subtriangular; lower margin of propodus nearly straight, with long setae proximally and stiffened and reduced in length to become dense field of short bristles distally, lower proximal corner rounded; fixed finger with patch of short stiff bristles just outside of occlusal margin at midlength; occlusal margins of both fingers corneous, terminating in small corneous claws; upper margin of palm very short, with tuft of long setae; upper margin of dactylus straight except for convex proximal part, with long stiff setae grading to short stiff bristles distally.

Pereopod 3 (Fig. 6D) ischium short, lower margin sinuous with produced distal corner. Merus length 2.3 times high; upper margin nearly straight in proximal 0.7, sloping in distal 0.3; lower margin slightly convex. Carpus subtriangular, distinctly widened distally; articulation to propodus located at middle of distal margin, either side of articulation obliquely truncate. Propodus with scattered tufts of short stiff setae on outer surface; upper margin gently convex; lower distal margin bilobate, lobes demarcated by furrows on inner surface; distal margins of both lobes with dense fringe of stiff setae, medially divided in 2 tufts with distinct interruption; subtruncate, lower proximal margin not exceeding beyond lower margin of carpus. Dactylus subsemicircular, terminating in minute, corneous claw; upper margin scalloped, with dense stiff setae; outer surface with few tufts of short stiff setae; lower margin nearly straight, with dense short stiff setae.

Pereopod 4 (Fig. 6E) slightly semichelate. Ischium widened distally. Merus highest at distal one-third. Carpus narrower than merus, widened distally. Propodus subrectangular, with lower distal process small, rounded; lower margin slightly convex, with dense brush of setae extending onto lower part of inner surface; outer surface with fields of setae on either side of naked, slightly elevated midline. Dactylus tear-shaped; upper margin arched, narrowed distally, terminating in short, outwardly directed corneous claw; outer surface with dense covering of setae, longest on lower side.

Pereopod 5 (Fig. 6F, G) chelate. Ischium short. Merus slightly widened distally, slightly arcuate. Carpus elongate, widened distally, with convex upper margin. Propodus stout, widened distally (about twice as long as wide), with dense field of long, close-set setae on distal two-thirds of outer, inner and lower surfaces; upper margin strongly arcuate, with few short setae; fixed finger deflected, terminally pectinate. Dactylus minutely denticulate on terminal margin, extensor surface with dense setation. Both fingers terminally rounded, occlusal surfaces spooned.

Pleonal somites (Figs 2C–E, 3B, C) mostly smooth dorsally. Pleomere 1 wider posteriorly, subtriangular in dorsal view; tergite with translucent, longitudinally elongate, subrectangular middorsal sclerite, not reaching to posterior margin; membranous area of either side without sclerite, enclosed laterally by arms of anterolateral sclerite diverging toward posterior of somite; narrow surface of each arm of anterolateral sclerite with deep groove; sternite (Fig. 2F) with narrow, transverse sclerite bearing posteromedian projection connected with posteriorly diverging, narrow sclerites forming bases of pleopods 1; membranous parts without pattern of small sclerites. Pleomere 2 tergite dorsally membranous, laterally weakly sclerotized; posterolateral lobe below longitudinal sclerotized line demarcated anteriorly by short transverse (vertical) row of short setae, with tuft of longer setae posteriorly on surface. Pleomeres 3–5 tergites each with pair of finely setose, membranous, subcircular or suboval areas laterally, that of tergite 3 more posterolaterally positioned than in tergites 4 and 5, that of tergite 5 smallest; each ventrolateral margin forming weak shoulder (shoulder on pleomere 3


A
B
D
A–C
1 mm
F
F
1 mm
E
E, H
2 mm
H
G
G, L
0.5 mm
I
L
J
K
J, K
2 mm
M
C
O
N
I, N
1 mm
D, O
1 mm
M
2 mm

more posteriorly located than in pleomeres 4 and 5, those on pleomeres 4 and 5 obsolete); lateral outlines of pleomeres 3–5 strongly convex, and thus notches between those pleomeres deeply incised. Pleomere 6 subcircular in general outline in dorsal view; tergite convex, without lines of short setae anterior to posterolateral groove; posterolateral groove obliquely transverse, forming distinct notch on lateral margin of pleomere 6; posterior sutures short, not reaching to posterolateral groove; posterolateral lobes each with marginal tuft of long setae; posterodorsal margin nearly straight, with 2 pairs of tufts of long setae.

Pleopod 1 of male and female both uniramous, composed of 2 articles. In male, pleopod 1 (Fig. 7D) very small, less than 0.2 length of pleopod 2, entirely arcuate; terminal article less than half-length of proximal article, flattened, tapering to acute point, with few short setae. In female (Fig. 7E), total extended length subequal to that of pleopod 2; proximal article fairly arcuate, bearing low convexity slightly proximal to midlength; terminal article slightly longer than proximal article, with very low shoulder on inner margin slightly distal to midlength, distal half flexible; both articles bearing long setae.

Pleopod 2 of male and female biramous, with appendix interna on endopod. In male (Fig. 7F, G), protopod slightly elongate subtriangular with obliquely truncate distal margin, strongly flattened; endopod almost naked, about half-length of exopod, tapering to inwardly directed, rounded apex; subtriangular part distal to base of appendix interna demarcated by obliquely transverse suture; appendix interna very small, distinctly offset from endopod, far exceeded by terminal part, tapering, directed distomesially, bearing few cincinnuli terminally; exopod not tapering distally, terminal margin widely rounded, with pattern of short transverse sutures along margins. In female (Fig. 7H, I), protopod subtrapezoidal; rami subequal in length; endopod generally tapering distally to rounded terminus, mesial margin proximal to base of appendix interna sinuous; appendix interna clearly separated from endopod, stouter than that of male, with field of cincinnuli distomesially; narrow terminal part of endopod demarcated by obliquely transverse suture at base of appendix interna; exopod slightly arcuate.

Pleopods 3–5 pairs forming large, posteriorly cupped fans when cross linked by hooked setae of appendices internae on opposed (mesial) margins of endopods. Protopods (Fig. 7J, K) flattened, distinctly wider than long; distomesial margin roundly truncate; proximomesial margin strongly concave; anterior (upper) surfaces each with small tubercle at condylar articulation with exopod. Endopods each subtriangular; stubby appendix interna (Fig. 7L) demarcated by sutures where embedded in endopod, offset slightly from mesial margin of endopod, with covering of hooked setae on subovate mesial face. Exopods each with pattern of simple or branched transverse sutures on anterior (upper) lateral surface; anterior (upper) surface bluntly ridged lateral to midline; marginal area of posterior (lower) side with fine transverse sutures.

Telson (Figs 2E, G, 3C) roundly subrectangular, width 1.3 times length, widest at anterolateral angles; posterior margin slightly convex, unarmed; dorsal surface slightly convex, usually with 3 pairs of tufts of erect long setae; lateral margins with pair of setal tufts at about midlength, posterolateral angle also with distinct setal tuft.

Uropod (Figs 2E, 3C, 7M) with triangular, posteriorly directed tooth on protopod and terminally bifid or trifid spine (Fig. 7N) on proximal article of exopod, both positioned to abut or overreach anterior margin of extended endopod. Endopod sinuous,

Fig. 7. *Lepidophthalmus tridentatus* (von Martens, 1868). A–D, F, G, J–O, male (cl 14.7 mm), CBM-ZC 9813; E, H, I, female (cl 13.7 mm), CBM-ZC 9796. A, front and eyestalks, dorsal view; B, same, lateral view; C, left antennal peduncle, dorsal view; D, male left pleopod 1, ventral view; E, female left pleopod 1, ventral view (setae omitted); F, male left pleopod 2, ventral (posterior) view; G, same, distal part of endopod, including appendix interna; H, female left pleopod 2, ventral (posterior) view (setae omitted); I, same, distal part of endopod, including appendix interna; J, left pleopod 3, dorsal (anterior) view; K, same, ventral (posterior) view; L, same, appendix interna, ventral (posterior) view; M, left uropod, dorsal view (marginal setae on rami omitted); N, spinose proximal article of exopod of left uropod; O, distal margin of dorsal plate of exopod of left uropod, showing armature composed of spiniform setae.
図 7. ミツトゲヤワスナモグリ (新称). A–D, F, G, J–O, 雄 (頭胸甲長 14.7 mm), CBM-ZC 9813; E, H, I, 雌 (頭胸甲長 13.7 mm), CBM-ZC 9796. A, 額と眼柄 , 背面観 ; B, 同 , 側面観 ; C, 左第 2 触角柄部 , 背面観 ; D, 雄の左第 1 腹肢 , 腹面観 ; E, 雌の左第 1 腹肢 , 腹面観 (剛毛を省略); F, 雄の左第 2 腹肢 , 腹面 (後面) 観 ; G, 同 , 内肢の先端部 (内肢突起を含む); H, 雌の左第 2 腹肢 , 腹面 (後面) 観 (剛毛を省略); I, 同 , 内肢の先端部 (内肢突起を含む); J, 左第 3 腹肢 , 背面 (前面) 観 ; K, 同 , 腹面 (後面) 観 ; L, 同 , 内肢突起の拡大 , 腹面 (後面) 観 ; M, 左尾肢 , 背面観 (内外肢の縁の剛毛を省略); N, 同 , 外肢基部付属節上の棘状突起 ; O, 左尾肢の外肢背板の先端縁にある棘状剛毛の形状と配置の詳細 .

sub-rhomboidal, about 2.3 times as long as wide, slightly overreaching distal end of anterodorsal plate on flexed exopod, tapering to rounded terminus; posteromesial margin with fringe of setae extending to terminus. Exopod subsemicircular, length about 1.7 times of greatest width, with thick anterodorsal plate falling well short of distal margin; posterodistal edge of plate bearing spiniform setae (Fig. 7O) increasing in length toward mesial angle and grading to thinner, dense, elongate setae of exopod margin; distal margin of exopod with dense fringe of setation, longest posteriorly, and with 1 minute spiniform seta at postero-inner angle.

Color in life. Carapace and pleon (Fig. 1A, B) yellowish or light brownish translucent, pleomere 6 and uropods more yellowish. Eyestalks with black pigments often filling inside. Antennular and antennal peduncles generally whitish semi-translucent. Major cheliped whitish or occasionally pinkish. Minor chelipeds and pereopods 2–5 whitish.

Size. Largest male cl 16.3 mm; largest female cl 16.6 mm; ovigerous females cl 12.2–14.0 mm.

Variation. Female chelipeds exhibit curious variation that might be related to loss and regeneration of the major side. Four of the 29 female specimens with major cheliped preserved have an abnormal major cheliped (CBM-ZC 9800, two individuals, cl 11.0, 11.6 mm; CBM-ZC 9801, one individual, cl 10.9 mm; CBM-ZC 9802, one individual, cl 12.3 mm; Fig. 5E), which is very similar to the minor cheliped of the other female specimens. In those four specimens, the minor cheliped (Fig. 5F) is generally similar to the major cheliped, except for the smaller size and more slenderness, and the lack of an excavation on the occlusal surface of the fixed finger filled with a mat of dense setae.

Distribution and habitat. Previously known from Sri Lanka, Indonesia, Philippines, New Britain and Ryukyu Islands, Japan; intertidal to shallow subtidal.

Burrowing in soft sediments of estuarine areas, channels in mangroves to outer flats along mangrove margins, and sand beaches influenced by freshwater spring. Komai (2009) reported on the possible association of an alpheid shrimp *Salmoneus brucei* Komai, 2009 with burrows constructed by *L. tridentatus*.

Remark. As stated by Dworschak (2007), *L. tridentatus* agrees well with the generic diagnosis of *Lepidophthalmus* presented by Manning & Felder (1991) particularly in the elongate antennular peduncle, the possession of a rudimentary exopod on the maxilliped 3, the presence of a hook-like spine on the lower proximal margin of the major cheliped merus, and the bilobed propodus of the pereopod 3. In addition, it shares with the vast majority of species assigned to *Lepidophthalmus* the absence of a crista dentata on the mesial face of the maxilliped 3 ischium. The molecular phylogenetic analysis by Robles & Felder (2015) also strongly supports the generic assignment.

Lepidophthalmus tridentatus was originally described (but not figured) by von Martens (1868; as a species of *Callianassa*) on the basis of type material from Java, Indonesia. Miers (1884) mentioned an additional specimen from Ceylon (Sri Lanka) in the collections of the British Museum and compared it with his new species *Callianassa martensi* (presently assigned to *Corallianassa*). Later, De Man (1928a) re-examined the four type specimens (syntypes) deposited in the collections of the Zoological Museum of the Humboldt University, Berlin, and provided figures for the first time. He noted that all the syntypes were damaged, of which only one specimen had a major cheliped attached to the body. Sakai (1970) studied specimens from Sri Lanka and New Britain, as well as the specimen reported by Miers (1884), presenting a rather detailed description and figures. Sakai (1999), who examined two male specimens from Sri Lanka, confirmed the presence of a rudimentary exopod on the maxilliped 3 in the species and thereby transferred it to *Lepidophthalmus* Holmes, 1904. The occurrence of this species in the Ryukyu Islands, Japan, has been already suggested by some workers (Itani 2007; Komai 2009; Osawa 2012; Robles & Felder 2015), but no descriptive information has been presented. Dworschak (2007) reported the species from the Philippines with a detailed description and figures.

The present material from the Ryukyu Islands agrees well with the previous taxonomic accounts of *Lepidophthalmus tridentatus* (cf. De Man 1928a; Sakai 1970, 1999; Dworschak 2007), and is identified with the species with little hesitation.

The phylogenetic tree by Robles & Felder (2015) clusters the three Indo-West Pacific species of the genus, *L. tridentatus*, *L. grandidieri* (Coutière, 1899) and *L. rosae* (Nobili, 1904) in a clade; *L. tridentatus* and *L. rosae* are sister species. All those Indo-West Pacific species lack sternal armor of small sclerites on the pleomeres 1 and 2, which is seen in several American species (e.g. Felder & Staton 2000). *Lepidophthalmus tridentatus* is distinguished from *L.*

rosae by having paired acute frontal spines flanking the rostral spine, the broadly convex posterior margin of the telson and the sub-rhomboidal endopod of the uropod. In *L. rosae*, there are only low convexities, flanking the rostral spine, on the frontal margin; the posterior margin of the telson is bilobed with a very shallow median notch; and the uropodal endopod is lanceolate with a sharply pointed tip (cf. Nobili 1906).

Lepidophthalmus grandidieri, presently known only from Madagascar, also has a pair of frontal spines lateral to the rostral spine (cf. Coutière 1899), as in *L. tridentatus*. Nevertheless, the armature of the chelipeds is distinctive in *L. grandidieri*: the upper distal and lower distal angles of the carpi of both chelipeds are spinose; the palm of the major cheliped is armed with a row of five spines on the upper margin and some spines along the margin near the base of the fixed finger; and the dactylus of the major cheliped is armed with a row of five spines on the upper margin.

Lepidophthalmus tridentatus is quite common in easily accessible estuarine or mangrove areas of the Ryukyu Islands, ranging from Amami-ohshima Island to the Yaeyema Islands. The scarce records of the species in Japanese literature seem to reflect poor sampling efforts in the past.

Notes on the taxonomy of *Lepidophthalmus*

In the latest treatment of *Lepidophthalmus*, Robles & Felder (2015) recognized the following 18 extant species in the genus: *L. bocourti* (A. Milne-Edwards, 1870) (eastern Pacific: Mexico to Nicaragua); *L. eiseni* Holmes, 1904 (type species; eastern Pacific: Mexico to Costa Rica); *L. grandidieri* (western Indian Ocean: Madagascar); *L. jamaicense* (Schmitt, 1935) (western Atlantic: Caribbean Sea); *L. louisianensis* (Schmitt, 1935) (western Atlantic: Florida to Louisiana); *L. manningi* Felder & Staton, 2000 (western Atlantic: southwestern Gulf of Mexico); *L. natesi* Felder & Robles, 2015 (eastern Pacific: Colombia to Nicaragua); *L. panamensis* Felder & Robles, 2015 (eastern Pacific: Panama to Colombia); *L. rafai* Felder & Manning, 1998 (Eastern Pacific: Colombia); *L. ranongensis* (Sakai, 1983) (Indo-West Pacific: Ranong, Thailand; Halmahera, Indonesia); *L. richardi* Felder & Manning, 1997 (western Atlantic: Gulf of Honduras and Belize); *L. rosae* (Indo-West Pacific: Red Sea and Madagascar to the Philippines); *L. sinuensis* Lemaitre & Rodrigues, 1991 (eastern Pacific: Colombia); *L. siriboia* Felder & Rodrigues, 1993 (western Atlantic: Brazil); *L. socotrensis* Sakai & Apel, 2002 (western Indian Ocean: Yemen), *L. statoni* Felder, 2015 (western Atlantic: southwestern Gulf of Mexico), *L. tridentatus* (Indo-West Pacific: Sri Lanka to Indonesia and Japan), and *L. turneranus* (White, 1861) (eastern Atlantic: Togo to Congo). Some comments are given below.

Sakai (2011) established a new genus, *Lepidophthalmoides*, to accommodate eight species theretofore assigned to *Lepidophthalmus*, with its type species *Lepidophthalmus eiseni*. The differentiation between the two genera was based solely on the shape of the distal article of the male pleopod 1. *Lepidophthalmoides* was characterized by a simple distal article of the male pleopod 1, while *Lepidophthlamus* was characterized by a "chelate" or "subchelate" distal article of the appendage. However, Dworschak (2013) pointed out that *Lepidophthalmus eiseni* was the type species of the genus *Lepidophthalmus*, and that thus *Lepidophthalmoides* must be a junior objective synonym of *Lepidophthalmus*. In response to Dworschak (2013), Sakai (2015) again established a new genus *Lepidophthalminus* with the type species *Lepidophthalmus bocourti*, but this genus name is a nomen nudum as pointed by the WoRMS Editorial Board (2018). A molecular phylogenetic analysis of *Lepidophthalmus* species based upon sequence analyses of the 16S and 12S mitochondrial genes by Robles & Felder (2015) does not support Sakai's (2011, 2015) divisions. Robles & Felder (2015) noted that Sakai's (2011) division was apparently based on some misunderstanding of previous descriptions, illustrations, and maturational variation in the male gonopods (pleopods 1 and 2). There is no doubt that Sakai's (2011, 2015) action does not have any merit.

The generic assignment of *Callianassa ranongensis* has been subject of disagreement. Sakai (1999) referred the species to *Neocallichirus* Sakai, 1988. Tudge et al. (2000) referred it to *Lepidophthalmus*, and this was followed by Robles & Felder (2015), as mentioned above. Sakai (2011) subsequently established a new monotypic genus *Thailandcallichirus* to accommodate it but the WoRMS Editorial Board (2018) places the genus in the synonymy of *Lepidophthalmus* without much justification. Indeed, *Callianassa ranongensis* does not fit the generic diagnosis of *Lepidophthalmus* in having the antennular peduncle shorter than the antennal peduncle and the absence of an exopod

on the maxilliped 3 (cf. Sakai 1983). At present, it seems reasonable to recognize *Thailandcallichirus* as a good genus with the type species *Callianassa ranongensis*.

Lepidophthalmus socotrensis was originally described from Yemen, western Indian Ocean (Sakai & Apel 2002). However, Sakai et al. (2014) came to a conclusion that the species was conspecific with *Podocallichirus madagassus* (Lenz & Richters, 1881) originally described from Madagascar, the latter name having a priority over *L. socotrensis*. The concept of the genus *Podocallichirus* Sakai, 1999 was greatly changed from the original by Sakai (2011) in which the genus is restricted only to its type species, *P. madagassus*. The differentiation between *Podocallichirus* and *Lepidophthalmus* on the basis of characters offered by Sakai (2011) is not clear. *Podocallichirus madagassus* has a rudimentary exopod on the maxilliped 3 (Sakai et al. 2014) as in species of *Lepidophthalmus*, but the marginally spinose minor chela (Lenz & Richters 1881; Sakai 1999, 2011; Sakai et al. 2014) is characteristic to *P. madagassus* (in species of *Lepidophthalmus*, the minor chela is unarmed marginally). More extensive character analyses, as well as genetic analyses with additional samples, are necessary to clarify the relationship between species of *Lepidophthalmus* and *Podocallichirus madagassus*.

Among the 16 species assigned to *Lepidophthalmus* with certainty, only three species, *L. grandidieri*, *L. rosae* and *L. tridentatus* show Indo-West Pacific distributions (Sakai 1999, 2005; Dworschak 2007), although *L. grandidieri* is known at present only from Madagascar, western Indian Ocean.

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ミツトゲヤワスナモグリ（新称）*Lepidophthalmus tridentatus* (von Martens, 1868)（甲殻亜門：十脚目：アナエビ下目：スナモグリ科）の琉球諸島からの記録

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要旨 . 琉球諸島から採集された標本に基づき , スナモグリ科の一種 *Lepidophthalmus tridentatus* (von Martens, 1868) (新称 : ミツトゲヤワスナモグリ) を報告する . 本種はスリランカ～フィリピン・インドネシア・ビスマルク諸島におよぶ範囲から記録されていたが , 文献での報告は少ない . 本種の日本における出現は，これまでいくつかの文献で示唆されていたが，標本に基づいた記録と形態の記載はなされていなかった . 本研究により検討された標本は奄美大島を北限に , 沖縄諸島 , 久米島 , 八重山諸島 (石垣島 , 西表島) から採集され , これらの島嶼の河口域やマングローブ林内あるいは周辺の砂泥干潟に普通に生息することが明らかとなった . 産地によっては , かなりの高密度で巣穴が認められた . 同定の根拠を明らかにすることと種の認識にあたり有用な形態形質を明示することを目的として詳細な記載を与えた . さらに , *Lepidophthalmus* (新称 : ヤワスナモグリ属) の分類の現状と種構成についていくつかコメントを与えた .