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A NEW SPECIES OF THE GENUS *PARASESARMA* (CRUSTACEA: BRACHYURA: SESARMIDAE) FROM TAIWAN AND THE PHILIPPINES, AND REDESCRIPTION OF *P. JAMELENSE* (RATHBUN, 1914)

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ABSTRACT. — *Parasesarma jamelense* (Rathbun, 1914), a poorly known species, is redescribed, and a closely related and new species, *P. cognatum*, is described. *Parasesarma cognatum*, new species, can be separated from *P. jamelense* by the different shape and slightly greater number of the dactylar tubercles on the male cheliped, relatively longer walking legs and more slender male first pleopod.

KEY WORDS. — Crustacea, Decapoda, Sesarmidae, *Parasesarma*, new species, taxonomy

INTRODUCTION

The sesarmid crabs of the genus *Parasesarma* De Man, 1895, are fairly well studied. The taxonomical status of some species have been clarified (Davie, 1993; Rahayu & Ng, 2010) and several new species recently described (Rahayu & Ng, 2005, 2009; Yeo et al., 2008; Davie & Pabriks, 2010; Koller et al., 2010; Naderloo & Schubart, 2010). The genus is species-rich, having 34 known species (Ng et al, 2008; Davie & Pabriks, 2010; Koller et al., 2010; Naderloo & Schubart, 2010; Rahayu & Ng, 2009, 2010), but several of the described species are poorly known—*P. batavianum* (De Man, 1890), *P. calypso* (De Man, 1895), *P. catenatum* (Ortmann, 1897), *P. ellenae* (Pretzman, 1968), *P. jamelense* (Rathbun, 1914), *P. kuekenthali* (De Man, 1902), *P. leptosoma* (Hilgendorf, 1869), *P. mellisa* (De Man, 1887), *P. moluccense* (De Man, 1892), *P. obliquifrons* (Rathbun, 1924), *P. pangaruanense* (Rathbun, 1914)—therefore a revision is clearly necessary.

Recent collections in the Philippines and Taiwan have uncovered a new species of *Parasesarma*. The new species closely resembles *P. jamelense* (Rathbun, 1914), a species known only from the type specimens from the Philippines. In describing *P. cognatum*, new species, we also take the opportunity to redescribe *P. jamelense*.

Specimens examined are deposited in the National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C.; National Museum of Marine Biology and Aquarium (NMMBA), Pingtung, Taiwan R.O.C.; and the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research, National University of Singapore. The abbreviations P2, P3, P4 and P5 are used for first, second, third, and fourth ambulatory legs, respectively; G1 and G2 are for the first and second male pleopods, respectively. Measurements provided, in millimetres, are of the carapace breadth at the widest point followed by the carapace length.

TAXONOMY

Parasesarma jamelense (Rathbun, 1914)
(Figs. 1–3)

Sesarma (*Parasesarma*) *moluccensis jamelensis* Rathbun, 1914: 81
Sesarma (*Parasesarma*) *jamelensis* – Tesch, 1917: 178; Serène, 1968: 108 (list)
Parasesarma jamelense – Ng et al., 2008: 222 (list)

Material examined. — Holotype, male (11.5 × 10.0 mm) (USNM 45917), River station, "Point Jamelo", Batangas, Luzon, Philippines, 20 feet, seine, 13 Jul.1908. Paratypes, male (11.1 × 9.7 mm), 2 females (12.5 × 10.5 mm; 10.5 × 9.4 mm) (USNM 120524), same locality as holotype.

Diagnosis. — Carapace 1.2 times broader than long; regions well defined; postfrontal region separated into 4 lobes by

narrow, deep grooves; frontal margin bilobed from dorsal view, each lobe broadly convex; exorbital tooth directed obliquely outwards; eyes not extending beyond edge of exorbital tooth. Upper surface of cheliped palm with two transverse pectinated crests (one crest with 18 corneous teeth, the other with 11); outer surface of palm striated proximally, slightly granular distally, inner surface of palm with several tubercles; dorsal surface of dactylus with 10–11 symmetrical tubercles; first, second tubercles small, third to ninth tubercles prominent, last two tubercles indistinct; tubercles obliquely transverse. Ambulatory legs robust, flattened, broad; P4 merus approximately 2.3 times as long as broad; P4 propodus about 2.9 times as long as broad; P4 dactylus about 0.8 length of propodus, slightly recurved. Male telson semicircular, evenly rounded, slightly longer than sixth somite. G1 slender, straight; apical pectinated process long, tip truncate, bent at an angle of 45º.

Redescription. — Carapace 1.2 times broader than long (Fig. 1); regions well defined, separated by well-marked grooves; lateral carapace surface lined with strong oblique striae; dorsal surface with sparse, scattered tufts of short setae, lateral margins with short setae. Postfrontal region distinct, separated into 4 similar lobes by narrow, deep grooves; median lobes approximately equal in width as lateral lobes. Front deflexed downwards (Fig. 2B), frontal margin bilobed from dorsal view, each lobe broadly convex, separated by broad median concavity. Supraorbital margin entire, gently convex. Exorbital tooth triangular, directed obliquely outwards, representing point of greatest width; lateral carapace margin entire; gently sinuous, subparallel along most of length before curving to join straight posterior margin; antero-, posterolateral margins not demarcated, without trace of indentation. Eyestalks not extending beyond exorbital tooth.

Basal segments of antenna, antennule adjacent, not separated by septum; basal antennular segment swollen. Antennal flagellum relatively long, entering orbit. Third maxilliped with shallow median sulcus on surface of ischium , surface of merus with distinct submedian ridge; exopod slender, tip overreaching half length of merus outer margin , flagellum long; inner margin of merus, ischium with long setae, proximal outer margin of ischium, base of exopod with long, densely packed setae.

Chelipeds subequal, large, robust (Figs. 1, 2C). Upper surface of palm with 2 transverse pectinated crests (Fig. 2D). Primary (distalmost) crest composed of 16–18 teeth; proximal crest well developed, shorter than primary, with 10–11 teeth; crests followed by row of blunt tubercles; row of small tubercles below proximal crest. Outer surface of palm striated proximally, slightly granular distally; inner surface of palm with several tubercles. Fixed finger smooth on outer, inner surfaces. Cutting edges of fixed finger, dactylus with variably sized, rounded teeth. Dorsal surface of dactylus with

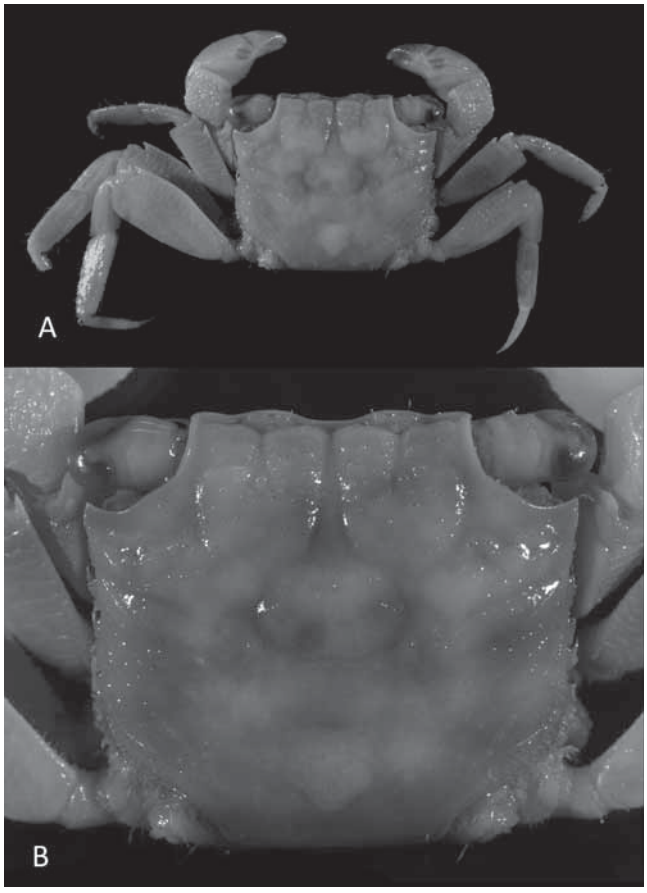

Fig. 1. *Parasesarma jamelense* (Rathbun, 1914), holotype, male (11.5 × 10.0 mm). A, whole animal, dorsal view; B, dorsal view of carapace.

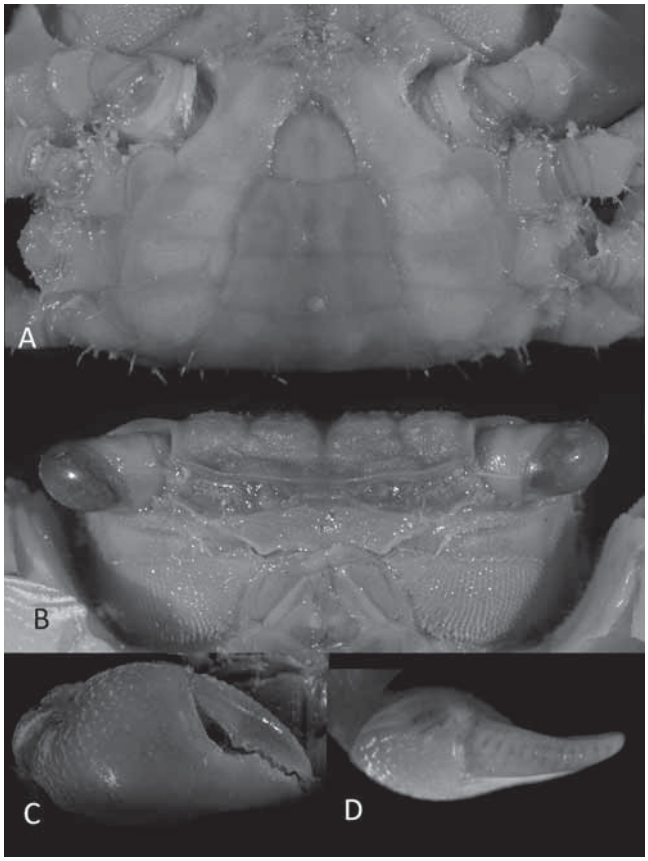

Fig. 2. *Parasesarma jamelense* (Rathbun, 1914), holotype, male (11.5 × 10.0 mm). A, ventral view showing anterior part of thoracic sternum, abdomen; B, frontal view of carapace; C, cheliped; D, dactylus of cheliped, showing dactylar tubercles.

10–11 symmetrical, obliquely transverse tubercles (Fig. 2D), first two proximal tubercles small, obscured by adjacent low tubercles, third to ninth tubercles large; distal two tubercles usually indistinct; several low tubercles on proximal third of dactylus, and scattered tubercles along proximal third of inner edge. Fingertips spoon-like, chitinous; proximal gap distinct when fingers closed. Carpus inner angle not produced, outer margin, dorsal surface striated. Merus outer margin tuberculate, with small subdistal spine; inner margin tuberculate ending in large subdistal spine; outer surface with striation, inner surface with longitudinal row of setae, scattered setae near upper margin.

Ambulatory legs robust, flattened, broad; P3, P4 longest, about 1.4 times carapace width. P4 merus approximately 2.3 times as long as broad; propodus 2.9 times as long as broad; dactylus about 0.8 length of propodus. Anterior margin of meri with acute subdistal spine, unarmed terminally; upper surface with transverse striations anteriorly; carpi with 2 longitudinal carinae on outer surface; propodi with inferior longitudinal carina along entire length, and few stiff setae; dactyli slightly recurved, terminating in acute chitinous tip. Except on meri, ambulatory legs with few stiff bristles on anterior and posterior margins.

Male abdomen relatively broad (Figs. 2B, 3E). Telson semicircular, evenly rounded, slightly longer than somite 6; somite 6 about 2.5 times as long as wide, lateral margins slightly convex. Somites 3–5 progressively more trapezoidal, lateral margins of somites 4, 5 straight, lateral margins

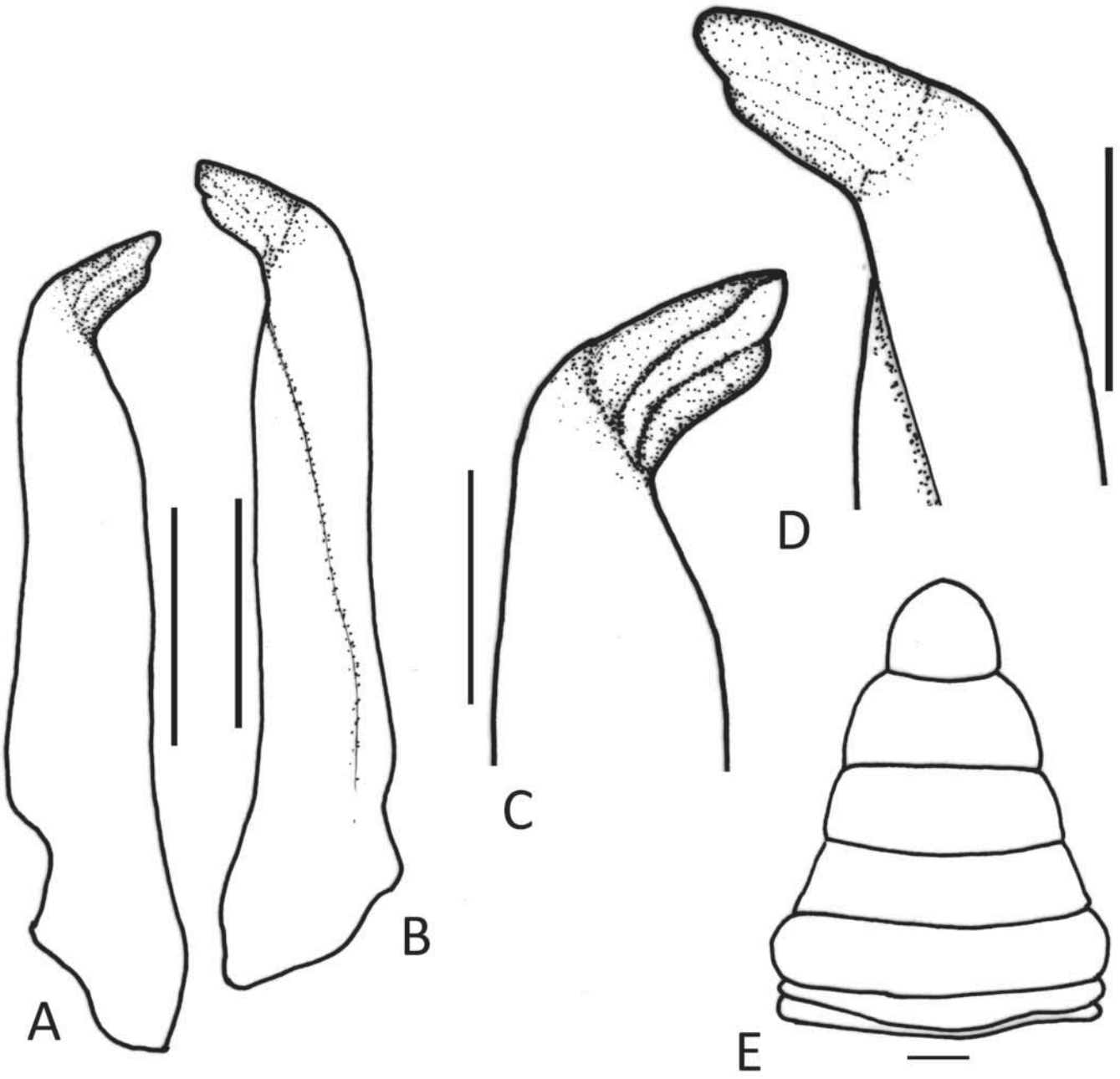

Fig. 3. *Parasesarma jamelense* (Rathbun, 1914), holotype, male (11.5 × 10.0 mm). A–D, left G1; E, abdomen. Scale bars =1 mm (A, B, E), 0.5 mm (C, D). Setae omitted.

of somite 3 slightly convex, somites 1, 2 very narrow longitudinally.

G1 slender (Figs. 3A–D), apical process corneous, long, bent at angle of 45º, tip truncate; long simple setae at base of apical process. G2 very short.

Female chelipeds smaller, pectinated crests on palm replaced by 2 transverse rows of tubercles, dactylar tubercles indistinct. Vulva on anterior edge of sternite 5.

Remarks. — *Parasesarma jamelense* was described from Luzon, Philippines, as *Sesarma* (*Parasesarma) moluccensis jamelensis*, by Rathbun (1914) without any figures provided. Tesch (1917), Serène (1968) and Ng et al. (2008) listed this species, but no new specimens have been reported, and its taxonomy was not discussed. Rathbun (1914) considered this species to be allied to *P. moluccensis* (De Man, 1896) and noted the differences in the narrower carapace, and the presence of 9 or 10 obliquely transverse dactylar tubercles instead of 8 or 9 longitudinally positioned tubercles. Examination of the holotype of *P. jamelense* showed that the number of dactylar tubercles is actually 10 or 11, not 9 or 10 as described by Rathbun (1914: 81). Rathbun probably missed the distalmost tubercles which are low and indistinct.

Distribution. — This species is known only from the type locality, "Point Jamelo", in what is now called Hamilo Cove, near Nasugbu town, Batangas province, southwestern Luzon, 14°10'36"N, 120°35'48"E, Philippines.

Parasesarma cognatum, new species
(Figs. 4–7)

Material examined. — Holotype, male (14.3 × 13.1 mm) (NMMBCD 3975), mouth of Kankou stream, Manchow, Pintung County, south eastern Taiwan, 1 Sep.2012. Paratypes: 1 male (13.9 × 12.2 mm (ZRC 2013.722), 1 male (11.8 × 10.3 mm) (USNM), 1 ovigerous female (11.52 × 10.5 mm) (NMMBCD 3976), male (14.1 × 12.9 mm), (NMMBCD 3506), 8 Jun.2012, 2 females (11.5 × 10.3 mm; 14.4 × 12.6 mm) (NMMBCD 3505), 7 Jun.2012, 7 males (9.9 × 9.0 mm – 12.3 × 10.6 mm), 6 females (9.7 × 8.3 mm – 13.0 × 11.8 mm) (NMMBCD 3507), 1 Jun.2012; same locality as holotype.

Other material. — 1 male (10.2 × 10.1mm), 1 female (10.2 ×10.1mm) (NMMBCD3980), Houwan, Pintung County, south western Taiwan, 20 May 2013.6 males (7.2 × 6.5 mm – 11.5 × 10.4 mm) (NMMBCD3508), 27 Jun.2012, mouth of Kanzai stream, Manchow, Pintung County, south eastern Taiwan; 2 males (12.9 × 11.3 mm; 12.0 × 10.7 mm), 28 Jul.2012, mouth of Meilun stream, Hualian city, eastern Taiwan. (NMMBCD3509); 3 males (14.6 × 12.7 mm; 13.9 × 12.4 mm; 13.3 × 11.4 mm) (ZRC.2008.1017), 1 male (13.9 × 12.4 mm) (ZRC.2008.0901), Kawasan Falls, southern Cebu, Philippines, coll. P. K. L. Ng et al., 4 Dec.2001.

Diagnosis. — Carapace 1.1 times broader than long; regions well defined; postfrontal region separated into four lobes by narrow, deep grooves; frontal margin bilobed from dorsal view, each lobe broadly convex; exorbital tooth directed forward; eyes not extending beyond tip of exorbital tooth. Upper surface of cheliped palm with two transverse pectinated crests (one crest with 14 corneous teeth, the other with 10); outer surface of palm striated proximally, granular distally, inner surface with numerous tubercles; dorsal surface of dactylus with 11–12 symmetrical, obliquely elongate tubercles, first three tubercles small, fourth to tenth tubercles large but becoming smaller distally, last two tubercles indistinct. Ambulatory legs relatively stout; P4 merus 2.8 times as long as broad; P4 propodus 3.6 times as long as broad; P4 dactylus 0.8 times length of propodus. Male telson semicircular, evenly rounded, slightly shorter than somite 6; G1 straight; apical process corneous, slightly bent at angle of 60°, long, stout, ending in rounded tip.

Description. — Carapace 1.1 times broader than long (Figs. 4, 5); regions well defined, separated by well marked grooves; lateral surface lined with strong oblique striae; dorsal surface with numerous tufts of short setae, lateral margins with row of short setae. Postfrontal region distinct (Fig. 6B), separated into four lobes by narrow, deep grooves; median lobes approximately same width as lateral lobes. Front deflexed downwards, margin bilobed from dorsal view, each lobe broadly convex, separated by broad median concavity. Supraorbital margin gently convex, entire. Exorbital tooth triangular, directed obliquely forward, representing point of greatest width; contiguous with entire lateral carapace margin; antero-, posterolateral margins not demarcated, without trace of tooth or indentation, lateral margin gently sinuous, subparallel along most of length before curving to join almost straight posterior carapace margin. Eyes not extending beyond edge of exorbital tooth. Basal segments of antenna, antennule adjacent, not separated by septum; basal antennular segment swollen. Antennal flagellum relatively long, entering orbit. Third maxilliped with shallow median sulcus on surface of ischium, surface of merus with distinct

Fig. 4. *Parasesarma cognatum*, new species, live colouration. A, paratype, male (14.1 × 12.9 mm); B, male (13.9 × 12.4 mm).

submedian ridge; exopod slender, tip overreaching half length of outer margin of merus, flagellum long; inner margin of merus, ischium with long setae, proximal outer margin of ischium, base of exopod with long, densely packed setae.

Chelipeds subequal, large, robust (Figs. 4, 5A, 6C). Merus outer margin tuberculate, with large subdistal spine; inner margin tuberculate ending in large subdistal spine; outer surface striated, inner surface with longitudinal row of setae, scattered setae near upper margin. Carpus inner angle not produced, outer margin, across dorsal surface tuberculate. Upper surface of palm with two transverse pectinated crests (Fig. 6D). Primary (distalmost) crest composed of 14 high corneous teeth; proximal crest well developed, shorter than primary crest, with 8–10 lower, more widely spaced corneous teeth; crests not followed by row of tubercles. Outer surface of palm striated proximally, granular distally, glabrous; inner surface of palm with numerous tubercles. Fixed finger smooth on outer, inner surfaces. Cutting edge of fixed finger, dactylus with small, large rounded teeth. Dorsal surface of dactylus with 11–12 obliquely elongate tubercles (Fig. 6D), first three proximal tubercles small, fourth to sixth tubercles larger, seventh to tenth tubercles rounded, smaller, last two tubercles indistinct. Several low tubercles on proximal third of upper surface of dactylus; scattered low tubercles also on proximal third of inner edge of dorsal surface of dactylus. Fingers with chitinous tips, proximal gap distinct when fingers closed.

Ambulatory legs long, robust, laterally flattened (Figs. 4A, 5A); P3, P4 subequal, longer than others, about 1.9 times carapace width. P4 merus 2.8 times as long as broad; propodus 3.6 times as long as broad; dactylus 0.8 times length of propodus. In P2 to P5 upper margin of meri with an acute subdistal spine, carpi with two accessory carinae on outer surface, propodi with accessory carina on inferior proximal portion of outer surface, dorsal, ventral margins with short stiff setae; tip of dactyli slightly recurved, terminating in acute, corneous tip; dorsal, ventral margins with short stiff setae.

Male abdomen relatively broad (Figs. 6A, 7E). Telson semicircular, evenly rounded, about same length as somite 6; somite 6 about 2 times as long as wide, lateral margins slightly convex. Somites 3–5 progressively more trapezoidal, lateral margins of somites 4, 5 straight, lateral margins of somite 3 slightly convex, somites 1, 2 very narrow longitudinally.

G1 slender (Figs. 7A–D), apical process corneous long, bent at an angle of 60°, tip rounded. Setae long, simple, originating at base of apical process. G2 very short.

Female with smaller chelipeds, pectinated crests on palm replaced by two transverse rows of tubercles, dactylar tubercles indistinct. Vulvae on anterior edge of sternite 5.

Ecological note. — *Parasesarma cognatum* was usually found under rocks or stones in river/stream bank, about 50–200 m upstream from mouth.

Colour. — Specimen from Taiwan: carapace light brown with black and dark brown blotches, chelipeds yellow to brownish

Fig. 5. *Parasesarma cognatum*, new species, holotype, male (14.3 × 13.1 mm), A, whole animal, dorsal view; B, dorsal view of carapace.

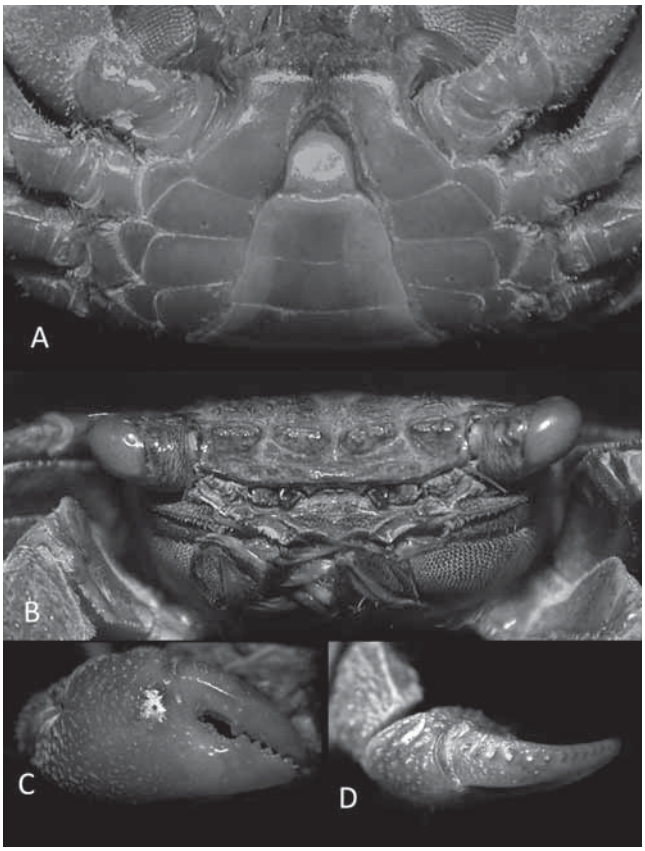

Fig. 6. *Parasesarma cognatum*, new species, holotype, male (14.3 × 13.1 mm). A, ventral view showing anterior part of thoracic sternum, abdomen; B, frontal view of carapace; C, cheliped; D, dactylus of cheliped, showing dactylar tubercles.

yellow (Fig. 4). Specimen from Philippines (preserved in alcohol for 12 years): carapace light brown mottled with dark brown, chelipeds cream or whitish.

***Distribution*.** — Southern and Eastern Taiwan and Cebu, Philippines.

***Etymology*.** — From the Latin *cognatus*, related to, for the close resemblance to *P. jamelense*.

***Remarks*.** — Rahayu & Ng (2009) recognised two major groups of species in *Parasesarma*: one group with relatively short and broad walking legs in which the meri and propodi of the second and third legs are less than three times as long as broad, and a second group which has relatively long and slender walking legs, with the meri and propodi of the second and third legs more than three times as long as wide. *Parasesarma cognatum*, new species, belongs to the first species-group. It most resembles *P. jamelense* in having the carapace almost as long as broad, and having the same number of dactylar tubercles on the chelipeds (11 to 12 tubercles vs 10 to11 tubercles in *P. jamelense*), and with the distal corneous part of G1 long and stout. In *P. jamelense*, however, the ambulatory legs are relatively shorter and stouter, with the length of the P4 1.4 times the carapace width, and the merus 2.3 times longer than broad (Fig.1A). In *P. cognatum*, the length of the P4 is 1.9 times the carapace width, with the merus slightly less than three times as long as broad (Fig. 4A, 5A). The shape of each male dactylar tubercle is also quite different. *Parasesarma jamelense* has oblique, narrow, closely-spaced tubercles (Fig. 2D), while in *P. cognatum* only the first three tubercles are narrow and oblique, with the following three wide, oblique, and the seventh to twelfth tubercles are rounded and widely spaced (Fig. 5D).

Among the species of *Parasesarma* with broad and short ambulatory legs, *P. cognatum* is also closely related to *P. dumacense* (Rathbun, 1914) in having the first three tubercles small, obliquely elongate (Rahayu & Ng, 2010: fig. 13D), and the stout, broad-tipped of G1 (Rahayu & Ng, 2010: fig. 14A–D). However, the number of dactylar tubercles in *P. dumacense* is eight, each with fine transverse lines, while in *P. cognatum* it is 11 or 12 tubercles, without transverse lines

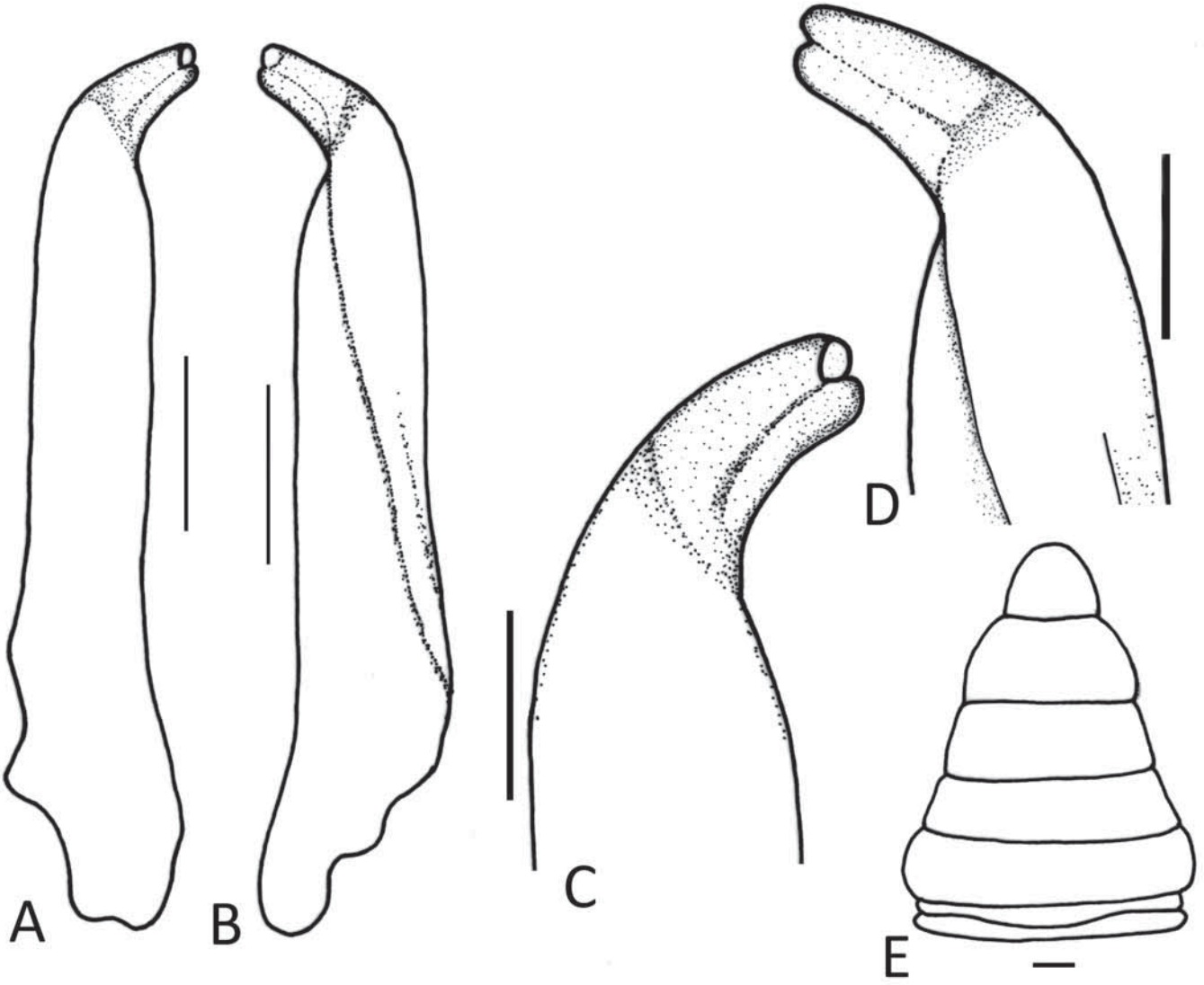

Fig. 7. *Parasesarma cognatum*, new species, holotype, male (14.3 × 13.1 mm). A–D, left G1; E, abdomen. Scale bars = 1 mm (A, B, E), 0.5 mm (C, D). Setae omitted.

(Fig. 5D). Their G1 structures are very different. The apical process of the G1 of *P. dumacense* is wide distally (Rahayu & Ng, 2010, fig. 14A–D), but in *P. cognatum*, it is slightly narrowed at the tip (Figs. 6A–D).

Parasesarma liho Koller et al., 2010, a recently described species from eastern Taiwan, shares some characters with *P. cognatum*, such as relatively slender G1 and long ambulatory legs. In *P. cognatum*, however, the ambulatory propodi are longer (3.6 as long as broad vs 2.8 as long as broad in *P. liho*), the apical process of the G1 is relatively broader and longer (Fig. 6A–D) (vs slightly tapered tip in *P. liho*; cf. Koller et al., 2010: fig. 2d, e). The two species can also be easily separated by the number and shape of the dactylar tubercles of the male chela (10–13 dactylar tubercles which are oblique and perpendicular to the orientation of dactylus in *P. liho* vs 11–12 obliquely elongate and rounded dactylar tubercles in *P. cognatum*). Moreover their coloration is very different, *P. liho* has a grey-beige carapace with violet blotches and light grey-violet chelae with fingers fading into cream or yellow ventrally (Koller et al., 2010: fig. 3) while *P. cognatum* has a light brown carapace with black and dark brown blotches, and yellow to brownish yellow chelipeds (Fig. 4).

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