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***Smenispa irregularis* (Bleeker, 1857) (Crustacea: Isopoda: Cymothoidae), a Buccal-attaching Fish Parasite from Australia**

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ABSTRACT. *Smenispa irregularis* (Bleeker, 1857) is reported from the host *Acanthopagrus latus* (Sparidae) from Western Australia. The nomenclatural change from *Enispa* Schioedte and Meinert, 1884 to *Smenispa* Özdikem, 2009 is discussed and a full description provided for *Smenispa irregularis*. The species is identified by the strongly vaulted body shape, pereonites 1 and 2 arching anteriorly, cephalon embedded in pereonite 1, lateral margins of pereonites subparallel, and the lateral margins of pleonites subparallel and arching posteriorly.

KEYWORDS. Crustacea, Isopoda, Cymothoidae, *Smenispa irregularis*, taxonomy, Western Australia, *Acanthopagrus latus*

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The genus *Smenispa* Özdikem, 2009 (previously known as *Enispa* Schioedte & Meinert, 1884) is one of the smaller and least known of the cymothoid genera with only two species listed in *The World Register for Marine Species* (Bruce, 2013). There have been few records of *Smenispa* since its original description (as *Enispa* Schioedte & Meinert, 1884) and its host preferences and geographical distribution remain little known.

Smenispa convexa (Richardson, 1905) was first recorded from Panama from an unknown host (Richardson, 1905). Fifty years later, Menzies *et al.* (1955) thoroughly reviewed the life history and host-parasite relationship of *Smenispa convexa* (as *Livoneca convexa*). The species was reported from Pacific bumper *Chloroscombrus orqueta* Jordan & Gilbert, 1883 from the Gulf of Panama, Gulf of Guayaquil and Gulf of Fonseca (Fig. 1). Brusca (1981) designated

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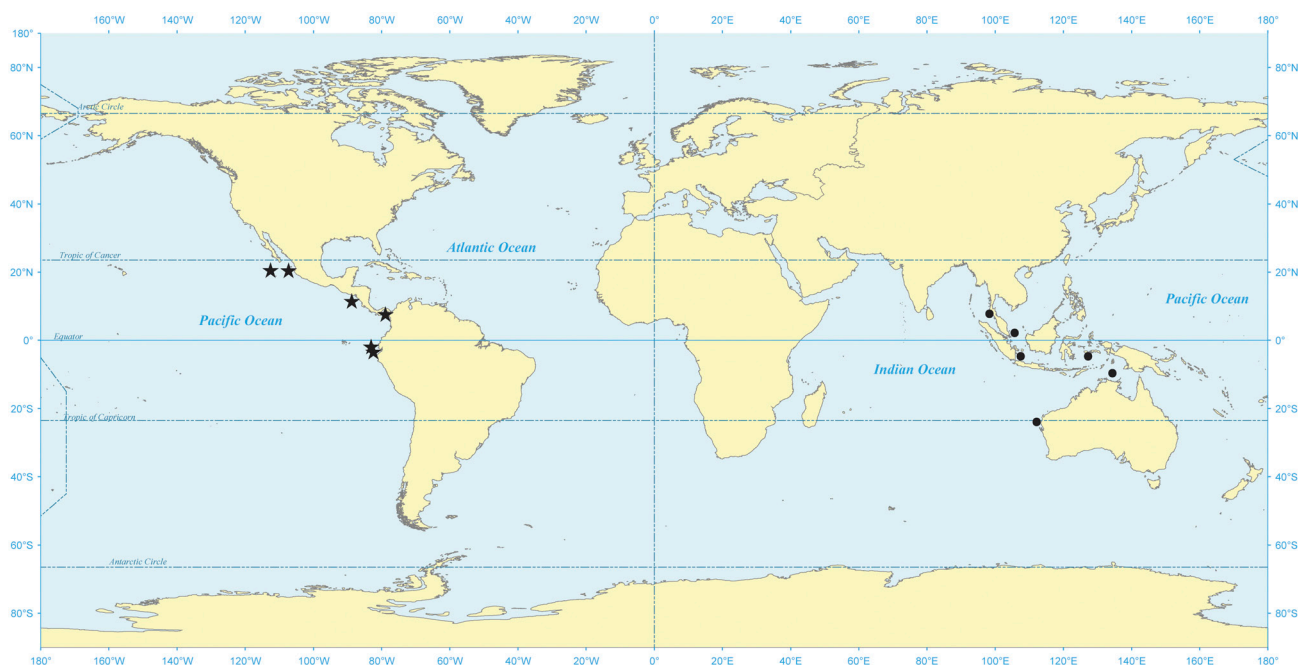


Figure 1. World map of the distribution of *Smenisa irregularis* (circles) and *Smenisa convexa* (stars).

a neotype from the host *Serranus* sp., provided detailed descriptions of both the female and male, and summarized its distribution (Fig. 1).

Smenisa irregularis (Bleeker, 1857) was recorded from Ambon Island (Bleeker, 1857), Singapore and Thailand (Schioedte & Meinert, 1884), Jakarta Bay (Trilles, 1979), Arafura Sea, Northern Territory (Bruce, 1990) and the present material is from Carnarvon, Western Australia (Fig. 1). Bruce (1990) provided the first modern redescription of *Smenisa irregularis*, albeit with limited material at hand.

This paper reports on the occurrence of *Smenisa irregularis* from Western Australia on yellowtail seabream *Acanthopagrus latus* (Houttuyn, 1782) with further description and illustration of the female and male of the species.

Materials and methods

Specimens were obtained from the Australian Museum. Pencil drawings were made using a camera lucida attached to a Leica MZ125 stereomicroscope, scanned and digitally illustrated using Adobe Illustrator and WACOM Intuos 3 drawing pad. Descriptions were prepared in DELTA (Descriptive Language for Taxonomy) (Coleman *et al.*, 2010) using a general Cymothoidae character set. Host nomenclature and distribution was obtained from *Fishbase* (Froese & Pauly, 2013).

Taxonomy

Suborder Cymothoida Wägele, 1989

Superfamily Cymothooidea Leach, 1814

Family Cymothoidae Leach, 1814

Genus *Smenisa* Özdikem, 2009

Enispa Schioedte & Meinert, 1884: 292.—Bruce, 1990: 282.

Smenisa Özdikem, 2009: 611.

Not *Enispa* Walker, 1866: 1121 (Lepidoptera, Noctuidae).

Type species. *Cymothoa irregularis* Bleeker, 1857, by monotypy.

Remarks. The key diagnostic characters of the genus are the strongly vaulted body; cephalon embedded in pereonite 1; antennula shorter than antenna, bases set wide apart; pereon and pleon are co-linear with sub-parallel lateral margins; pereopods lack carina on basis and the endopods of pleopods 3–5 have large folds. Bruce (1990) provided a detailed diagnosis for the genus.

The name *Enispa* Schioedte & Meinert, 1884 was found to be a junior homonym of the valid genus name *Enispa* Walker, 1866 (Lepidoptera) by Özdikem (2009), who proposed the new name *Smenisa* (derived by adding the first two letters of the names Schioedte and Meinert to the original name).

The overall similarity of the general somatic morphology to other buccal-attaching genera resulted in the species being placed, at times, in the genus *Cymothoa* Fabricius, 1793, and *Livoneca* Leach, 1818 especially as both genera have antennae bases set wide apart. *Cymothoa* generally have narrowly rounded uropod apices and pleonite 1 is narrower and less wide than pleonites 2–5. Early accounts (e.g., Bleeker, 1857; Haller, 1880) showed only the dorsal view of a female, and Schioedte & Meinert (1884) included dorsal and ventral views of both the female and male. The genus remained effectively ignored until Bruce (1990) redescribed the species from the type specimens and gave a revised generic description, showing that appendage and brood pouch morphology clearly aligned the genus with genera such as *Anilocra* Leach, 1818 and *Nerocila* Leach, 1818.

Bruce (1987) placed the genus within the Anilocrinae (mostly external attaching genera) on the basis of cephalon, brood pouch and pleopod morphology, Bruce (1990) later suggested avoiding the name Anilocrinae as position on the host and associated body shape was not a reliable indicator of phylogenetic relationships between genera. Ketmaier's *et al.* (2008) molecular dataset (based on a small number of species, inevitably had strange pairings) provide strong support to Bruce's (1990) warnings. In particular, we do not support the hypothesis of a "linear" evolutionary pathway that starts with externally attaching forms (Anilocrinae) and ends up with gill-mouth dwellers (Livonecinae + Cymothoinae) as previously suggested by Brusca (1981).

Smenispa irregularis (Bleeker, 1857)

Figs 1–5

Cymothoa irregularis Bleeker, 1857: 34, pl. 2, figs. II.—Miers, 1880: 462.—Gerstaecker, 1882: 261.

Cymothoa paradoxa Haller, 1880: 378, pl. 18, figs. 5–7.—Gerstaecker, 1882: 261.

Enispa irregularis.—Schioedte & Meinert, 1884: 293, pl. 11, figs. 1–4.—Nierstrasz, 1915: 95.—Nierstrasz, 1931: 137.—Trilles, 1979: 259, pl. 1, figs. 6; 1994: 152.—Bruce, 1990: 282, figs. 24–25.

Type material. SYNTYPES 2 ♀ (ovigerous 19 mm, 23 mm), Rijksmuseum van Natuurlijke Historie (RMNH 62), "Oost Indie", coll. P. Bleeker (not examined).

Material examined. Western Australia: 1 ♀ (24 mm, ovig., damaged pleonite, mouthpart and pereopods), 1 ♂ (9 mm), AM P89833, from Carnarvon, 24°53'S 113°40'E, 1982, from buccal cavity of yellowfin seabream *Acanthopagrus latus* (Houttuyn, 1782).

Diagnosis. *Female.* Cephalon embedded in pereonite 1. Pereonite 1 anterior margin trilobed; lateral margins of pereonites subparallel, pereonites 1 and 2 arching anteriorly, pereonite 2 posterolateral margins produced, lateral margins of pleonites subparallel and arching posteriorly, pleotelson subtruncate and endopod larger than exopod. *Male.* Body similar to female; cephalon dorsally visible; pleon width 0.6 pereonite greatest width; pleopod 2 appendix masculina slender, apex distally acute, length 0.8 endopod length, not reaching beyond exopod; pleopod 2 endopod length 1.9 width, medial margin produced, slightly extending exopod; exopod length 1.5 width, proximal lateral margin strongly produced.

Description. Female. Body length 2.0 greatest width, dorsal surface smooth appearance, widest at pereonite 5, most narrow at pereonite 1. Cephalon length 1.0 width, visible from dorsal view, embedded in pereonite 1; frontal margin ventrally folded. Eyes indistinct, eye width 0.1 width of cephalon. Antennula shorter than antenna, comprised of 8 articles; article 2 length 2.0 article 1 length; not extending to posterior margin of eye. Antenna comprised of 12 articles, last article terminating without setae.

Pereonite margins smooth, increasing in width from pereonites 1–5, pereonite 1 length 0.3 width, anterolateral margin produced, extending past cephalon; pereonite 5 widest, length 0.2 width; pereonite 6 and 7 lateral parts

with posteriorly produced lobes. Coxae 2–3 posteroventral angles produced; 4–7 not acute posteriorly, with oblique carina. Pleonites visible in dorsal view; lateral margins arching posteriorly. Pleonite 1 posterolateral angles not hidden behind pleonite 2; pleonites 1–5 subparallel. Pleotelson length 0.5 anterior width, dorsal surface smooth, anterolateral margins weakly convex, posterior margin straight, without median point.

Pereopods 1–7 dactylus narrowly curved, merus and carpus of similar length, not produced. Pereopod 1 basis length 1.8 greatest width; ischium length 0.6 basis length; merus proximal margin without bulbous protrusion; carpus with straight proximal margin; propodus length 1.3 width. Pereopods 2 and 3 similar to pereopod 1, gradually increasing in size. Pereopod 6 basis length 2.0 greatest width, ischium length 0.4 basis length. Pereopod 7 basis length 1.6 greatest width; ischium length 0.6 basis length, merus length 0.4 ischium length, merus length 0.7 width; carpus length 0.1 ischium length, carpus length 0.3 width.

Pleopods (damaged), without setae. Uropod half the length of pleotelson, protopod length 0.8 endopod, protopod lateral margin without setae; rami not extending beyond pleotelson, apices bluntly rounded. Endopod apically not bifid, length 3.0 greatest width, lateral margin proximally convex, distally concave. Exopod shorter than endopod, length 2.8 greatest width, apically not bifid, terminates without setae.

Male. Body subparallel, length 2.2 width. Cephalon length 1.5 width, visible from dorsal view, not embedded in pereonite 1. Eyes distinct and well developed. Pereonites without posterior lateral lobes, similar in length. Antennula comprised of 8 articles. Antenna comprised of 10 articles, last article terminating without setae, extending to posterior of pereonite 1. Anterior margin of cephalon subtruncate, without small median point. Mandibular process present, covered in pectinate scales, article 3 with fine setae. Maxillula with 3 narrow spines. Maxilla mesial lobe with 2 recurved spines, partly fused to lateral lobe with 2 recurved spines. Maxilliped article 3 with 2 recurved robust setae. Lateral ends of pleonites less developed than in female. Pereopods 1–7 similar to female; dactylus length 0.8 basis length.

Pleopods without setae, without lobes on pleopods 1–2. Pleopod 1 exopod length 1.3 width, lateral margin weakly convex, mesial margin weakly produced; endopod length 1.7 width, lateral margin straight, mesial margin slightly convex; protopod width 4.0 length. Pleopod 2 endopod length 1.9 width, medial margin produced, slightly extending exopod; exopod length 1.5 width, proximal lateral margin strongly produced; appendix masculina slender, apex distally acute, length 0.8 endopod length, not reaching beyond exopod. Pleopods 2–5 with basal projections; exopods proximal lateral border extending beyond protopod; endopods proximal mesial boarder extending past protopod boarder, endopod dorsal with large medial fleshy folds. Uropods dorsally visible, slightly hidden by pleotelson.

Colour. Present specimens (female and male) dark orange brown. Bruce (1990) reported pale tan in the Northern Territory specimen with no chromatophores present.

Size. Non-ovigerous female 24 mm, male 9 mm. Other reports include Bleeker (1857) (female: 28 mm), Schioedte & Meinert

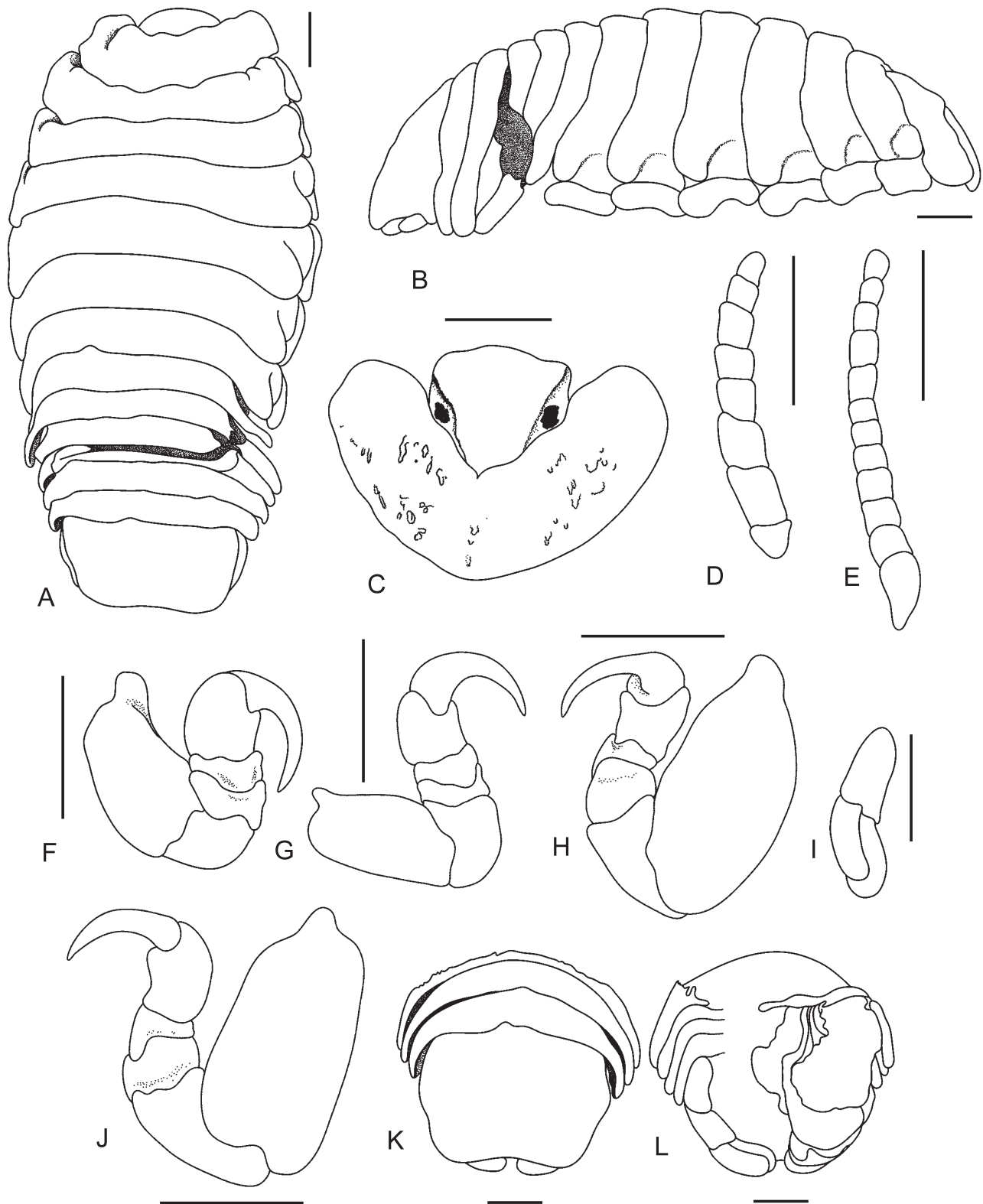


Figure 2. *Smenispa irregularis*, ovigerous female (24 mm) (AM P89833). (A) dorsal view of body; (B) lateral view of body; (C) front view of pereonite 1 and cephalon; (D) antennula; (E) antenna; (F) pereopod 1; (G) pereopod 2; (H) pereopod 6; (I) uropod; (J) pereopod 7; (K) dorsal view of pleotelson; (L) ventral view of pleotelson. Scales = 2 mm, except D, E = 0.5 mm.

(1884) (ovigerous female: 20–24 mm non ovigerous female 22 mm; male 5–8 mm), Haller (1880) (ovigerous female: 18 mm), Trilles (1979) (ovigerous female: 19 mm; males 16 mm).

Hosts. Material from yellowfin seabream *Acanthopagrus*

latus. Previous records are Indian halibut *Psettodes erumei* (Bloch & Schneider, 1801) Schioedte & Meinert (1884) and *Caranx carangus* (Bloch, 1973) Haller (1880). Miers (1880) quoted Bleeker (1857) "... is common on fishes in the sea of Amboina Island".

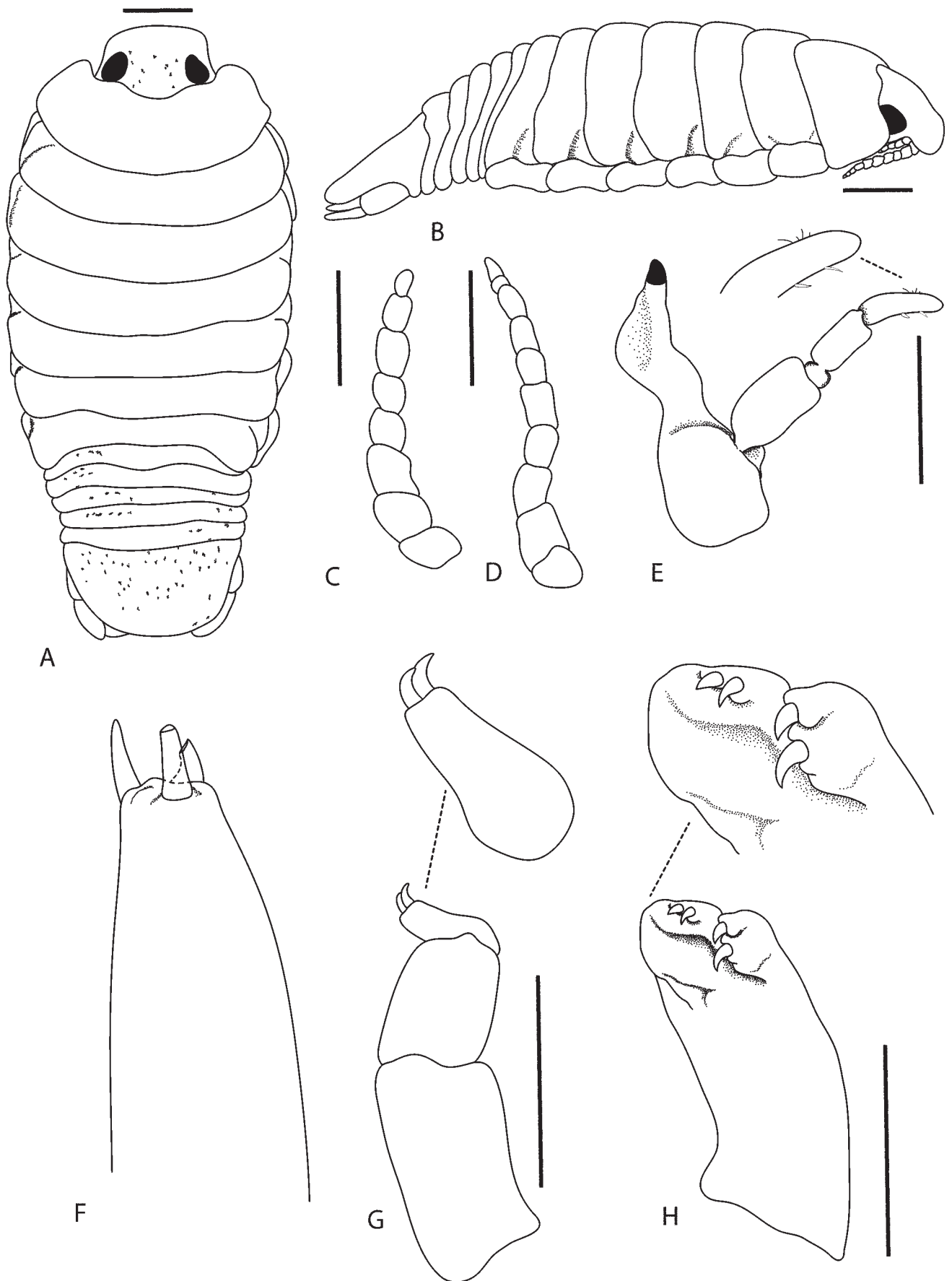


Figure 3. *Smenispa irregularis*, male (9 mm) (AM P89833). (A) dorsal view of body; (B) lateral view of body; (C) antennula; (D) antenna; (E) mandible; (F) maxillula; (G) maxilliped; (H) maxilla. Scales: A, B = 1 mm; C, D = 0.5 mm; E–H = 0.25 mm.

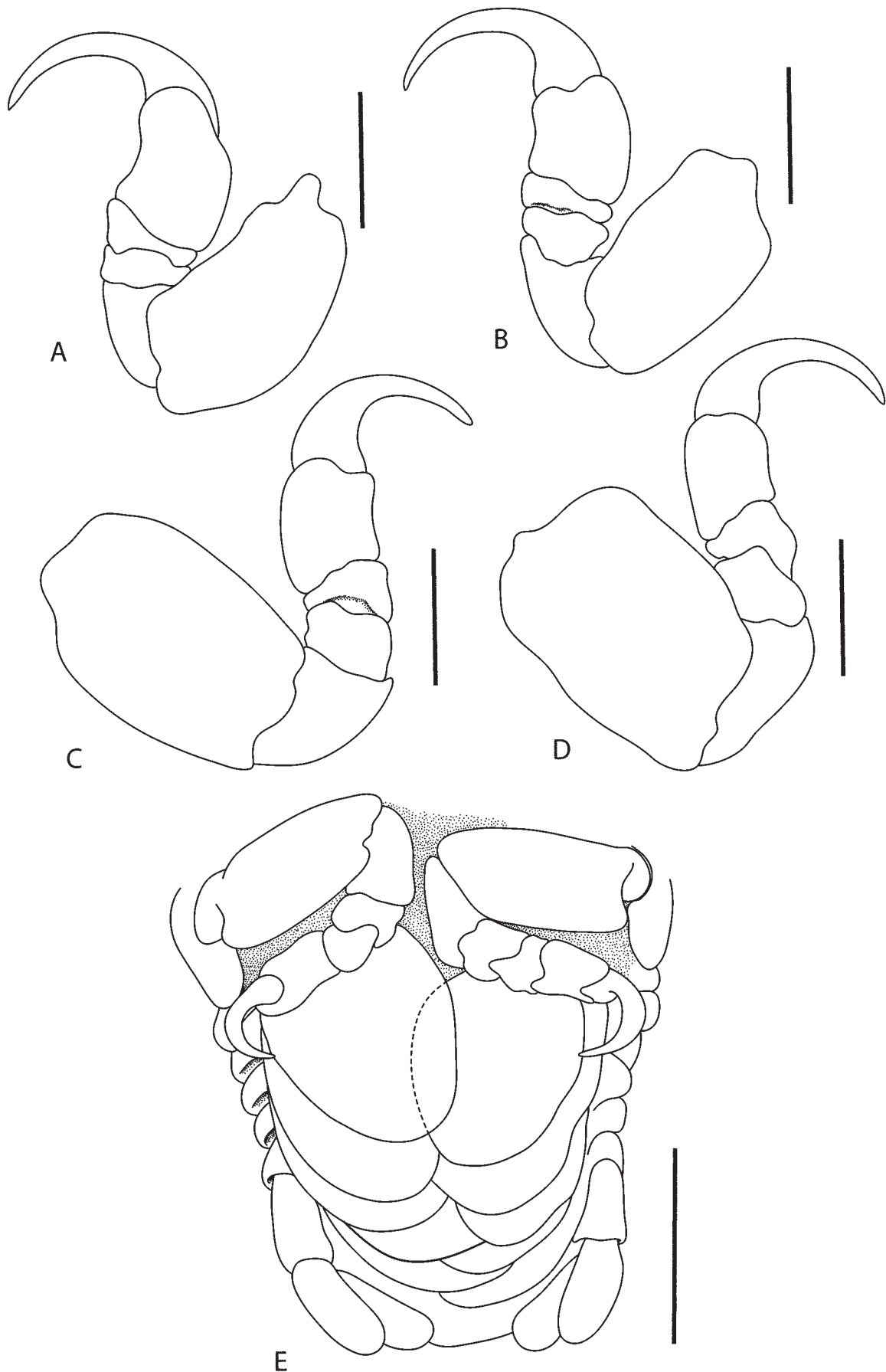


Figure 4. *Smenispia irregularis*, male (9 mm) (AM P89833). (A–D) pereopod 1, 2, 6, 7 respectively; (E) ventral view of pleotelson. Scales: A–D= 0.25 mm; E = 1 mm.



Figure 5. *Smenispa irregularis*, male (9 mm) (AM P89833). (A–E) pleopod 1–5 respectively. Scales = 0.25 mm.

Distribution. *Smenispa irregularis* (Bleeker, 1857) was recorded from Ambon Island (Bleeker, 1857), Singapore and Thailand (Schioedte & Meinert, 1884), Jakarta Bay (Trilles, 1979), Arafura Sea, Northern Territory (Bruce, 1990) and present material is from Carnarvon, Western Australia (Fig. 1).

Remarks. Our current female and male specimens differ from each other in the female having indistinct eyes, the cephalon deeply immersed in pereonite 1; pereonite 1 anterolateral margin well produced and posterior margin of pereonite 7 well developed.

The body shape of the female syntypes (Bruce, 1990, fig. 24) differ slightly from that of the Australian specimen also illustrated by Bruce (1990, fig. 25) and also from that of the present material. The syntype female cephalon has an irregular and rounded cephalon deeply embedded in pereonite 1; the posterolateral margins of pereonite 1–3 are deeply convex; the posterior margin of pereonite 7 is well developed, laterally overlapping pleonite 1; pereonite width 5 1.5 times pleon width; coxae 5–7 are short (“compact”) and do not extend to the posterior margins of their respective pereonite, moderately rounded uropod rami apices and rounded pleotelson posterior margin. The Australian specimens from Carnarvon and Bruce’s (1990) specimen differ from the syntypes in having a subquadrate cephalon (compared to the rounded cephalon), the posterior margin of pereonites 1–3 are subequal in width (compared to the progressive posterior margin width of pereonites 1–3), pereon and pleon are co-linear with sub-parallel lateral margins, both uropod rami apices rounded (compared to the rounded endopod and sub-truncate exopod) and subquadrate pleotelson posterior margin (compared to the smooth and rounded pleotelson).

Smenispa irregularis is known to occur on host species from the family Sparidae, Carangidae and Psettodidae, suggesting the species has low host specificity. The current host *Acanthopagrus latus* is a schooling species that occurs in the Indo-West Pacific (Froese & Pauly, 2013).

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