

ON NEW SPECIES OF LEUCOSIIDAE (CRUSTACEA: DECAPODA: BRACHYURA) FROM SINGAPORE AND THE SOUTH CHINA SEA

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ABSTRACT. – Four new species of Leucosiidae, *Heteronucia margaritata*, *Pseudophilyra punctulata*, *Leucosia major* and *L. singaporensis*, are described from Singapore and the South China Sea. *Heteronucia margaritata* can be separated from the allied *H. xincunensis* Chen & Türkay, 2001, by the proportions of the carapace, third maxilliped, chelipeds and legs as well as the form of the dorsal carapace surface and male first pleopod. *Pseudophilyra punctulata* can be distinguished from *P. intermedia* Ihle, 1918, by the form of the carapace, front, merus of the third maxilliped, male abdominal segments, fingers of the chela, and proportions of the exopod of the third maxilliped. *Leucosia major* and *L. singaporensis* are allied to *L. magna* Tyndale-Biscoe & George, 1962, but can be distinguished from each other by the appearance of the frontal margin, structure of the thoracic sinus, proportions of the carapace, third maxilliped and sixth male abdominal segment, and the form of the male first pleopod.

KEY WORDS. – Four new species, Leucosiidae, Singapore, South China Sea, taxonomy.

INTRODUCTION

The leucosiid fauna of Singapore, indeed of Southeast Asia in general, is not well known. While there have been a fair number of records from Singapore, only two new species have been reported in recent years, viz. *Praosia punctata* Tan & Ng, 1993, and *Alox somphos* Tan & Ng, 1996. In this paper, the authors describe another four new species from Singapore and nearby waters in the South China Sea, viz., *Heteronucia margaritata*, *Pseudophilyra punctulata*, *Leucosia major* and *Leucosia singaporensis*.

Specimens examined are deposited in the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore; and Institute of Oceanology, Chinese Academy of Sciences (IOCAS), Qingdao, China. Measurements provided (in millimeters) are reported as carapace length (tip of front to posterior margin of carapace) by width (broadest part). The abbreviations G1 and G2 are used for the male first and second pleopods respectively.

TAXONOMY

Heteronucia margaritata, new species (Figs. 1A, 2)

Material examined. – Holotype - male (3.0 by 3.5 mm) (ZRC 1993.263), Cyrene Reef, on *Pavona* coral, Singapore, coll. 15 Aug. 1986.

Diagnosis. – Carapace polygonal, regions distinct; median part with well delimited triangular area (including gastric, cardiac and intestinal regions), intestinal region relatively convex; dorsal surface of each region covered with unequally sized pearl-like granules. Hepatic region depressed, subhepatic region produced into large tubercle. Front with 2 rounded lobes, margins with small tubercles. Anterolateral margin longer than posterolateral margin, with 3 lobes, first one larger than posterior two; each lobe with tubercles of unequal sizes along edges. Posterior carapace margin straight, lined with relatively larger tubercles. Surface of third maxilliped covered with tubercles, exopod stout, distal end rounded, only reaching to base of merus; merus triangular; ischium long, twice length of merus. Chelipeds stout, short, covered with tubercles; merus stout, dilated medially, about

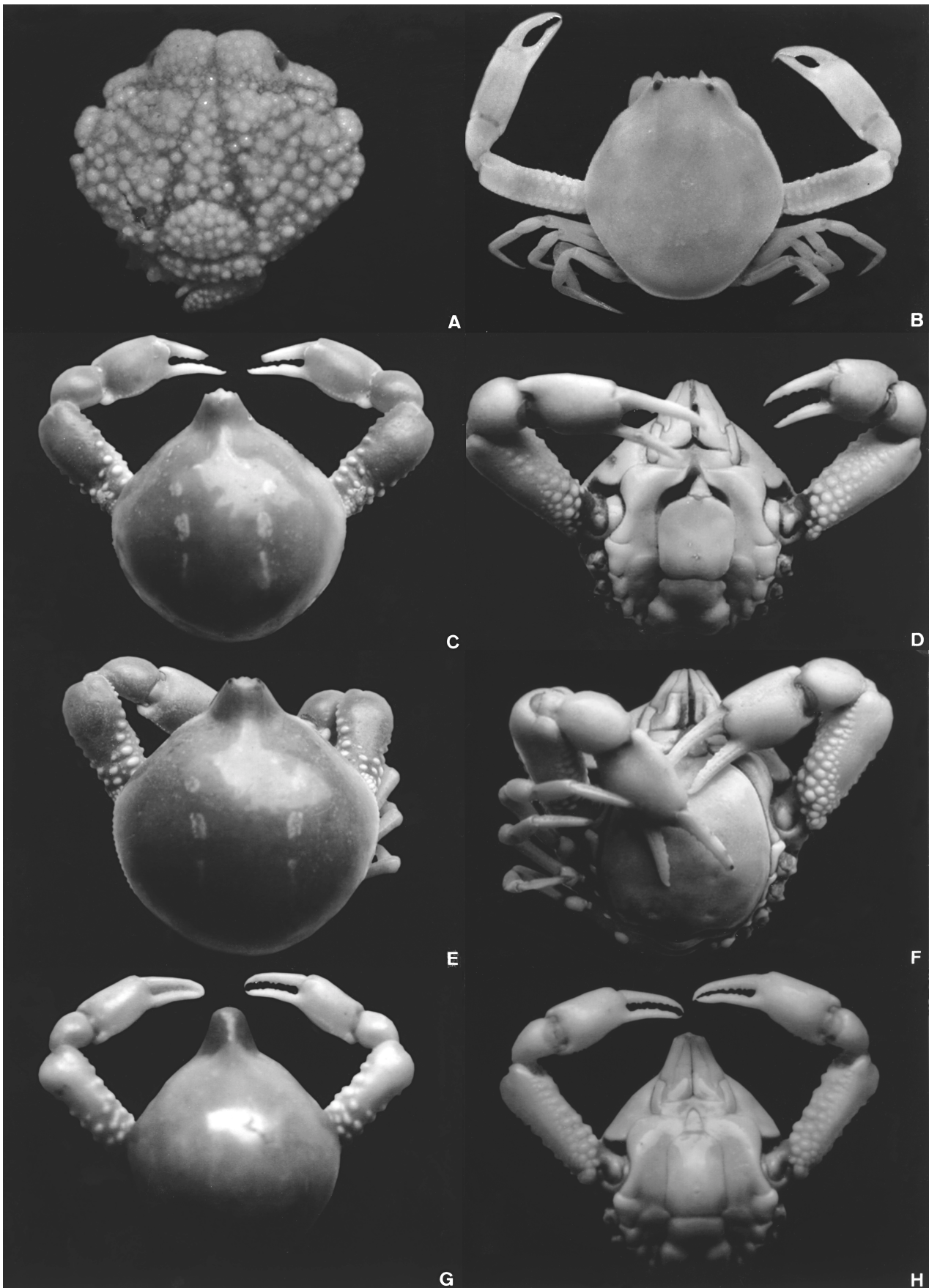


Fig. 1. A, *Heteronucia margaritata*, new species: holotype male (3.0 by 3.5mm) (ZRC 1993.263); B, *Pseudophilyra punctulata*, new species: paratype female (6.0 by 5.4 mm) (ZRC 1995.550) ; C-F, *Leucosia major*, new species, C: holotype male (38.0 by 34.0mm) (ZRC 1984.50), D, paratype male (37.1 by 32.0 mm) (ZRC 1984.6325), E, F, paratype female (36.0 by 31.9 mm) (ZRC 1984.6326); G, H, *Leucosia singaporensis*, new species: holotype male (28.0 by 24.0 mm) (ZRC 1965.10.13.49). A-C, E, G = dorsal views; D, F, H = ventral views.

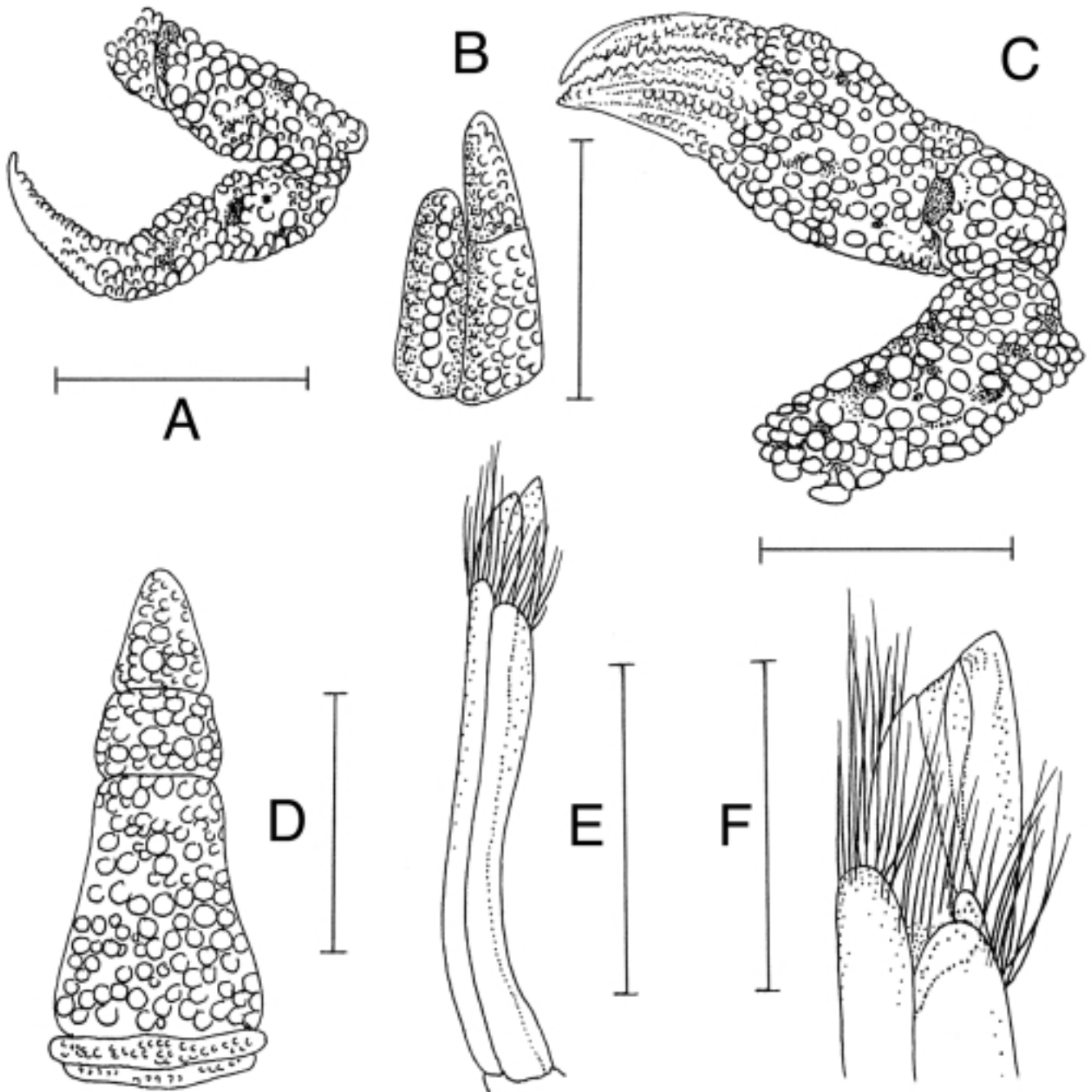


Fig. 2. *Heteronucia margaritata*, new species. Holotype male (3.0 by 3.5mm) (ZRC 1993.263). 1, carapace; 2, cheliped; 3, fourth ambulatory leg; 4, abdomen; 5, third maxilliped; 6, G1 and enlarged distal part. Scales: A-D = 1.0 mm, E = 0.5 mm, F = 0.25 mm.

twice as long as broad; carpus small; palm ca. 1.50 times as long as broad; movable finger shorter than palm, opening vertically, cutting edges of fingers with small blunt teeth. Dorsal and ventral surfaces of last ambulatory leg with small tubercles; dactylus lanceolate. Surface of abdomen with flattened rounded tubercles of different sizes; first 2 segments small, transversely narrow; segments 3-5 fused; segment 6 broader than long; telson triangular, slightly longer than broad. G1 slender, long, slightly curved basally, distal part with 2 thin blade-like processes, basally surrounded by long setae of unequal lengths.

Etymology. – The name is derived from the Latin “margaritatus” for adorned with pearls, alluding to the pattern of granules on the carapace.

Remarks. – *Heteronucia margaritata*, new species, most closely resembles *H. xincunensis* Chen & Türkay, 2001, from Hainan Island. We have compared the type specimens of both species, and *H. margaritata* can be separated from *H. xincunensis* in having a slightly broader carapace (ca. 1.17 times as broad as long) (vs. ca. 1.14 times as broad as long), the dorsal surface of the carapace has numerous unequally sized pearl-like granules (vs. with numerous fine vesicular granules), the ischium, merus and exopod of the third maxilliped are proportionately longer (length to width ratio of merus ca. 2.0 vs. 1.60), the surface of the merus of the third maxilliped has coarse granules (vs. with smooth granules), the merus of the cheliped is relatively more slender (length to width ratio ca. 2.0 vs. 1.50), the palm of the cheliped is proportionately longer (length to width ratio ca. 1.50 vs. 1.0), the merus of the last ambulatory leg is ca. 2.50 times as long as broad (vs. 2.0 times as long as broad), and the blade-like distal part of the G1 is relatively stouter (vs. relatively more slender). (see also Chen & Türkay, 2001: 245, Fig. 4).

***Pseudophilyra punctulata*, new species**
(Figs. 1B, 3)

Material examined. – Holotype - male (5.8 by 5.0 mm) (ZRC 1993.92), Siloso Beach, Sentosa, Singapore, coll. P. K. L. Ng & S. L. Tay, 21 Dec.1987.

Paratype – 1 immature female (6.0 by 5.4 mm) (ZRC 1995.550), Changi Point, Singapore, coll. E. Low, 1 Aug.1992.

Diagnosis. – Dorsal surface of carapace pitted, ca. 1.11-1.16 times as long as broad, behind strongly convex front. Front divided into 3 teeth: median one prominently larger than lateral ones, tip bluntly rounded; lateral teeth low, subtriangular. Hepatic region protruding, with fine granules. Lateral margins of carapace with bead-like granules. Posterior carapace margin slightly convex, with minute bead-like granules. Surface of third maxilliped pitted, margins convex, serrulate; exopod 3 times as long as broad (measured along inner border); merus sharply triangular, twice as long as broad, inner distal margin granulated; ischium relatively short. Chelipeds symmetrical; merus cylindrical, 3 times as long as broad, dorsal surface of basal half with 2 longitudinal

rows of pearl-like granules, borders with granules, granules of basal two-thirds coarser than those of distal one-third; dorsal surface of carpus with fine granules; palm slender, twice as long as broad, covered with fine granules; movable finger shorter than palm, cutting edges of both fingers with indistinct teeth, basal half unarmed, forming relatively large gape when closed. Ambulatory legs slender, smooth; first pair longest, last pair shortest. Surface of male abdomen pitted, with 5 free segments; segments 3-5 fused, base of both sides bluntly rounded, gradually convergent to distal part, median surface unarmed; segment 1 transversely narrow; segment 2 3 times as long as first segment; segment 6 longer than broad; telson triangular.

Etymology. – The name is derived from the Latin “punctum” for small hole, alluding to the numerous small pits on the carapace.

Remarks. – *Pseudophilyra punctulata*, new species, closely resembles *P. intermedia* Ihle, 1918, but differs in that the anterior surface of the carapace does not have a discernible median beaded ridge (vs. present), the median frontal tooth is relatively more acute, the lateral and posterior margins of the carapace have coarser granules, the exopod of the third maxilliped is proportionately broader with the outer border serrated and the inner distal margin of the merus is granulated (vs. inner distal margin of the merus unarmed), the surface of fused male abdominal segments 3-5 does not have a median tooth (vs. distinctly present), and the distal half of the cutting edges of both fingers have only weakly developed teeth, with the basal half leaving a larger gape when the fingers are closed (vs. more developed teeth with only weak gape) (fide Ihle, 1918: 269, Fig. 140; Komatsu & Takeda, 2000: 275, Figs. 4f-l, 5A).

Pseudophilyra intermedia was described the Banda Sea (Indonesia) (Ihle, 1918) and has also been reported from Japan (Komatsu & Takeda, 2000). Komatsu & Takeda (2000: 278) also discussed the close affinities of *P. intermedia* with the allied *P. tridentata* Miers, 1879. The differences noted here between *P. punctulata* and *P. intermedia* are also applicable for *P. tridentata*, except that the frontal median tooth of the latter species is even more pronounced.

***Leucosia major*, new species**
(Figs. 1C-F, 4)

Material examined. – Holotype - male (38.0 by 34.0mm) (ZRC 1984.50), South China Sea, off Singapore, coll. H. Huat, 26 Nov.1982.

Paratypes – 1 male (37.1 by 32.0 mm) (ZRC 1984.6325), 1 ovigerous female (38.5 by 39.0 mm) (ZRC 1984.6326), South China Sea, off Singapore, about 30 miles from Horsburgh Lighthouse, coll. H. Huat, 1980s; 1 female (36.0 by 31.9 mm) (ZRC 1985.79), South China Sea, station B77, 6-7 fathoms, mud, coll. Singapore Fisheries Research Center, 1955-1956.

Diagnosis. – Carapace somewhat rhomboidal, 1.12-1.16 times as long as broad. Median part, from front to intestinal

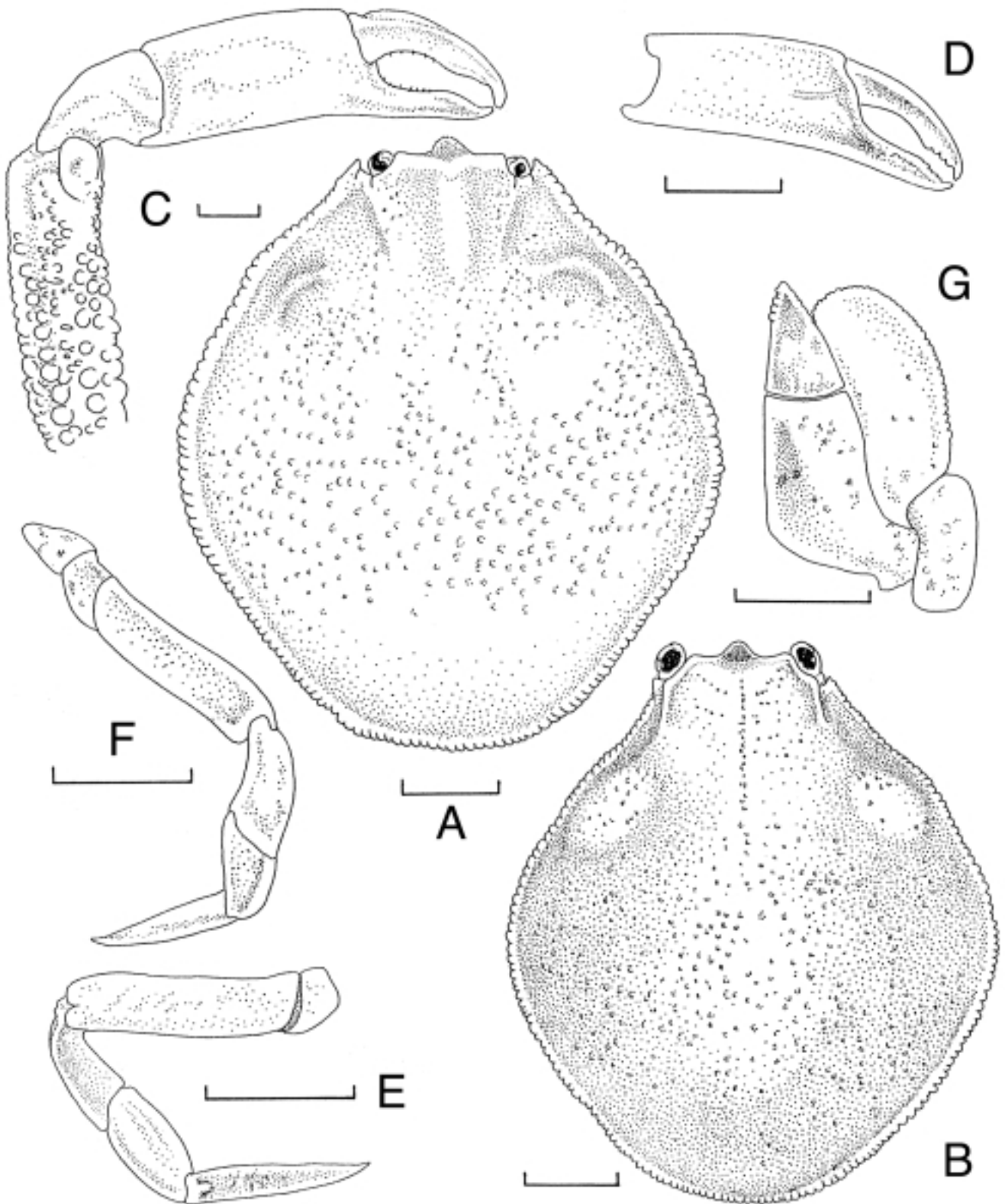


Fig. 3. *Pseudophilyra punctulata*, new species. A, C, F, G, paratype female (6.0 by 5.4 mm) (ZRC 1995.550); B, D, E, holotype male (5.8 by 5.0 mm) (ZRC 1993.92). A, B, carapaces; C, left cheliped; D, right chela; E, fourth left ambulatory leg; F, fourth right ambulatory leg; G, left third maxilliped.

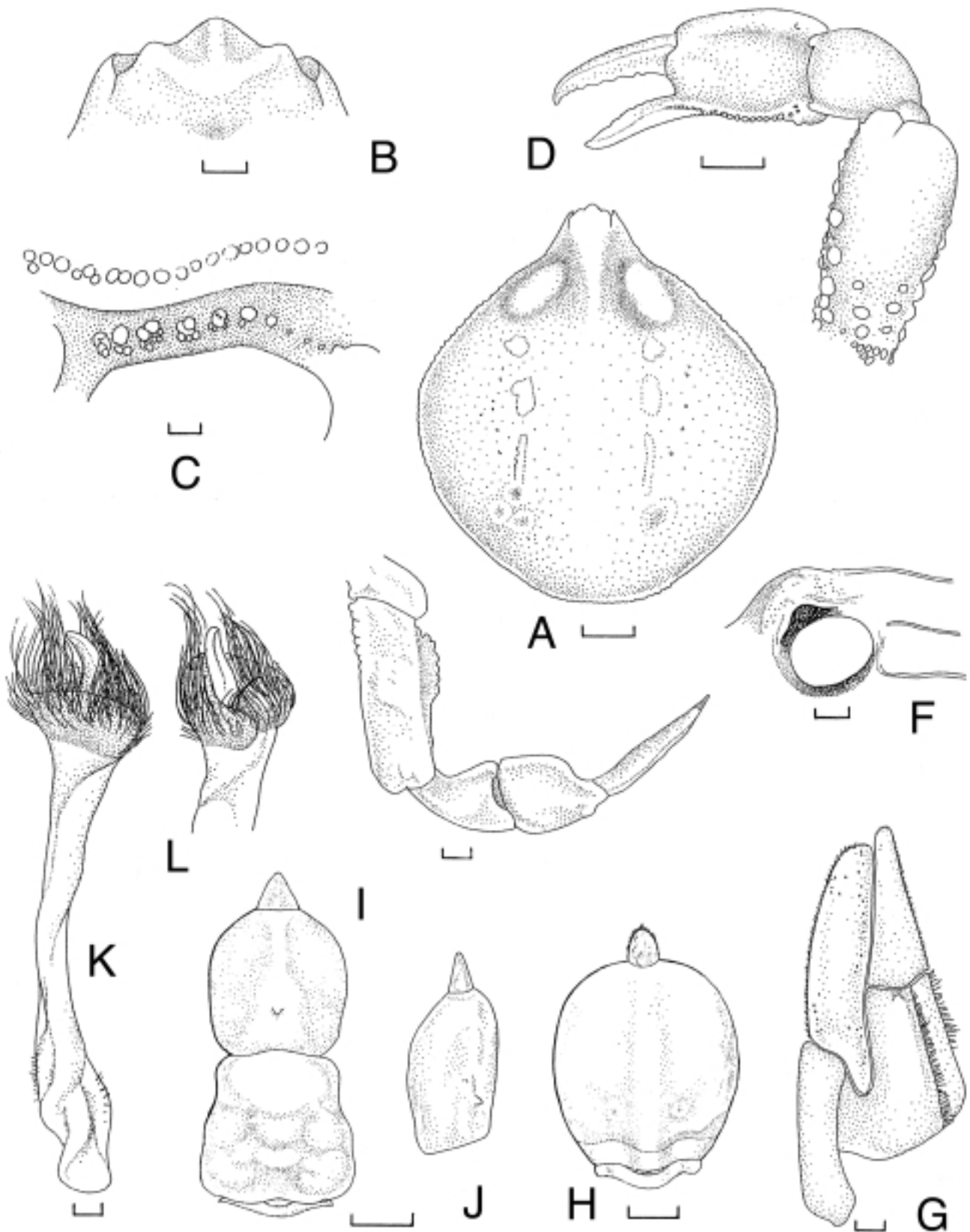


Fig. 4. *Leucosia major*, new species. A-C, E-H, paratype female (36.0 by 31.9 mm) (ZRC 1985.79); D, I-L, holotype male (38.0 by 34.0 mm) (ZRC 19984.50). A, carapace; B, front; C, thoracic sinus; D, right cheliped; E, fourth left ambulatory leg; F, female genital opening; G, right third maxilliped; H, female abdomen; I, male abdomen; J, lateral view of male abdominal segment 6 and telson; K, G1; L, distal part of G1. Scales = 5.0 mm.

Table 1. Differences between *L. magna* Tyndale-Biscoe & George, 1961, *L. major*, new species, and *L. singaporensis*, new species.

	<i>L. magna</i>	<i>L. major</i>	<i>L. singaporensis</i>
Carapace	ca.1.20 times as long as broad	1.12-1.16 times as long as broad	1.25 times as long as broad
Three frontal teeth	distinct: median tooth long	distinct: median tooth long	indistinct: median tooth very short
Thoracic sinus	with 7 or 8 prominent granules	about 10 granules, with first and last 3 smaller	with 6 granules
Ischium of female third maxilliped	not known	with longitudinal elevation, unarmed	elevated, with tooth
Sixth male abdominal segment	ca. 1.11 times as long as broad	ca.1.37 times as long as broad	As long as broad
G1	thick, slightly bent, shaft coiled 3 times; terminal coil with curved, distally expanded, flattened tooth; setose extension of penultimate coil projecting as far as tip of tooth	stout, long, sinuous, distal part corneous, surrounded by long setae, with finger-like process slightly curving inwards	stout, long, distal part broadly membranous, surrounded by long setae, with hook-like process distinctly curving inwards

region more convex than lateral sides. Hepatic region slightly elevated, other regions indistinct. Front divided into 3 teeth: median tooth produced anteriorly downwards, broad, long, lateral teeth bluntly narrow, short, distal ends of all 3 teeth bluntly rounded. Anterolateral margin and distal half of posterolateral margin with fine granules. Posterior carapace margin with distinct granules. Thoracic sinus shallow, with setae, base of sinus with 7 granular tubercles, of which first and seventh tubercles smaller than others, with 2-3 fine granules behind seventh tubercle. Exopod of third maxilliped slender, long, 4.5 times as long as broad, distal end reaching distal part of merus of endopod; merus narrowly triangular, 2.5 times as long as broad, longer than ischium; distal part of female ischium elevated, inner side and base of merus with longitudinal row of setae; male ischium not elevated, glabrous. Chelipeds stout, merus twice as long as broad, distal end broader than basal half, median part of distal one-third elevated, dorsum of distal two-thirds smooth, without granules, dorsal surface of basal half near outer border with patch of 10 fine granules, anterior part with 2 longitudinal rows of 2 or 3 similarly shaped granules; carpus subglobose; palm flattened, 1.5 times as long as broad, borders thin, inner border with coarse granules; movable finger shorter than palm, cutting edges of both fingers with indistinct teeth. First pair of ambulatory legs longest, other legs gradually shorter, last pair shortest. Male abdomen with 5 free segments; segments 3-5 fused, stout, short, borders sinuous; segment 1 short, broad; segment 2 very small; segment 6 broad, flattened, distal part of borders narrowed; telson equilaterally triangular. Female abdomen longitudinally ovate, segments 3-6 fused, stout, large, suture between fused third and fourth segments visible; segment 1 very short, visible only laterally; median part of segment 2 protruding posteriorly; telson triangular, 1.18 times as long as broad, borders with short setae. G1 stout, sinuous, distal part corneous, hard, yellow (in preservative), surrounded by long setae, finger-like process slightly curving inwards.

Color (in alcohol). – Anterior two-thirds of carapace grayish brown, posterior one-third pale brown, each side of meso-

gastric region with 4 white spots in 2 oblique rows followed by longitudinal rows of white stripes. Each side of cardiac region with indistinct black blotch.

Etymology. – The name is derived from the Latin for large, alluding to the relatively large size of the species.

Remarks. – This new species closely resembles *Leucosia magna* Tyndale-Biscoe & George, 1962, and *L. singaporensis*, new species, in the carapace shape and structure of the thoracic sinus. The differences between these species are summarised in Table 1.

Leucosia singaporensis, new species

(Figs. 1G, H, 5)

Material examined. – Holotype - male (28.0 by 24.0 mm) (ZRC 1965.10.13.49), Singapore, coll. 13 Oct. 1965.

Paratype – 1 female (32.0 by 26.3 mm) (ZRC 1965.10.13.50), same data as holotype.

Diagnosis. – Carapace rhomboidal, smooth (except dorsum which may be pitted); regions indistinct. Hepatic region weakly elevated, median portion very convex. Front slightly projected, with 3 teeth: median tooth longer than weak lateral teeth. Behind front, median line with longitudinal smooth ridge, lateral areas depressed. Anterolateral margin shorter than posterolateral margin, without granules, latter with fine granules. Posterior carapace margin convex medially, both sides slightly convex. Exopod of third maxilliped narrow, 3 times as long as broad; merus narrowly triangular, longer than ischium, female ischium with tooth subdistally, inner side with longitudinal row of setae which extends to base of merus, male ischium without tooth, glabrous. Male abdomen with 5 free segments; segments 3-5 fused, basal half with shallow median groove, both sides strongly convex, median part of distal half convex, sides depressed; segment 1 very narrow transversely; segment 2 very narrow transversely, segment 6 1.4 times as long as broad, median part of basal

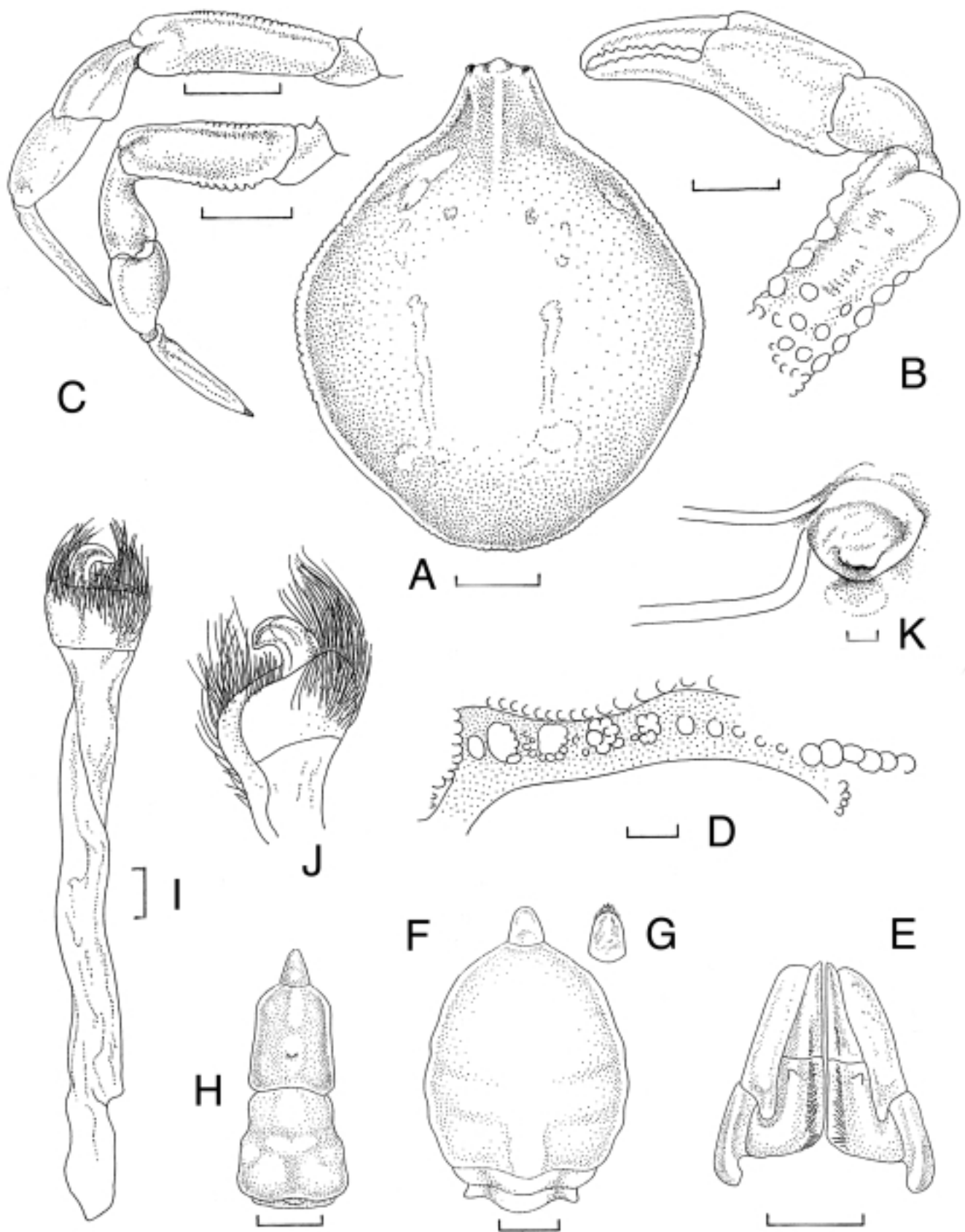


Fig. 5. *Leucosia singaporensis*, new species. A, B, D, H-J, holotype male (28.0 by 24.0 mm) (ZRC); C, E-G, K, paratype female (32.0 by 26.3 mm) (ZRC). A, carapace; B, right cheliped; C, third and fourth ambulatory legs (top to bottom); D, thoracic sinus; E, third maxillipeds; F, female abdomen; G, female telson; H, male abdomen; I, G1; J, distal part of G1; K, female genital opening. Scales = 0.5 mm.

one-third with small dent; telson triangular. Female abdomen longitudinally ovate, elevated medially, with 4 free segments (segments 3-6 fused), median portion of segments 1 and 2 convex posteriorly; telson slightly longer than broad, distal end bluntly rounded. G1 stout, long, distal part broadly membranous, surrounded by long setae, with hook-like process curving inwards.

Etymology. – The species is named after its type locality, Singapore.

Remarks. – This new species closely resembles *Leucosia magna* Tyndale-Biscoe & George, 1962, and *Leucosia major*, new species, in the shape of the carapace and form of the thoracic sinus. The differences between these three species are summarised in Table 1.

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