DOI: 10.18195/issn.0313-122x.73.2007.303-314
Records of the Western Australian Museum Supplement No. 73: 303–314 (2007).

Contributions to the knowledge of the Leucosiidae (Crustacea: Brachyura) of the Dampier Archipelago, Western Australia

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Abstract – Leucosiids were collected from diving and dredging stations sampled during the biodiversity survey conducted between 1998 and 2002 in the Dampier Archipelago, Western Australia. The archipelago provides a complex range of habitats in its intertidal and subtidal environments, including a range of soft substrata habitats suitable to the burrowing behaviour of the Leucosiidae. The species reported herein were collected from 23 of these stations; five intertidal and 18 dredged subtidal sites. Ten leucosiid species belonging to five genera were represented in the collections; *Leucosia moresbiensis* Haswell, 1880; *L. punctata* Bell, 1855; *Myra australis* Haswell, 1880; *Myrine kesslerii* (Paulson, 1875); *Seulocia laevimana* (Miers, 1884); *Urnalana elata* (A. Milne Edwards, 1874); *U. haematosticta* (Adams and White, 1849); *U. margaritata* (A. Milne Edwards, 1874); *U. thysanotus* (George and Clark, 1976); *U. whitei* (Bell, 1855). The species are briefly described and notes on their color patterns and distributions are also provided.

INTRODUCTION

The leucosiids have been a source of systematic and nomenclatural confusion (Galil, 2001a,b; 2003a, b), and have been "... largely ignored by modern systematists" (Davie, 2002: 251), with but few works on the Australian fauna. The small pebble crabs are well-disguised – their carapacial colours expertly camouflage them when they are not buried beneath the surface of the sand. Though easily overlooked, ten leucosiid species belonging to five genera were collected in the Dampier Archipelago.

The Dampier Archipelago provides a complex range of habitats in both intertidal and subtidal environments (Wells and Walker, 2003), including a range of soft substrata habitats suitable to the burrowing behaviour of the Leucosiidae. The soft substrata of the archipelago seabed is mainly made up of mud and fine sand (Jones, 2004) but ranges from clay to gravel, with sandier conditions prominent off the seaward side of the outer islands (Hutchins *et al.*, 2004). Generally, these bottom types are relatively bare but where underlying limestone pavement emerges a diverse biota is present (Hutchins *et al.*, 2004). Silty conditions extend into the intertidal zones of the islands where sand flats have a high silt content. Regional fluvial processes, sedimentary deposit erosion and biological activity occuring throughout the archipelago have largely contributed to these diverse silty conditions (Pearce *et al.*, 2003).

MATERIALS AND METHODS

Collections of leucosiids from the Dampier Archipelago, amassed during the 1998 and 1999 Woodside Dampier Archipelago expeditions, were the result of broad-scale collecting of crustaceans from a variety of intertidal and subtidal habitats. Specimens were collected by hand at intertidal sites and subtidal sites were investigated by SCUBA (expeditions DA1/98 and DA3/99; 70 stations total). Sampling from a variety of soft substrata, subtidal habitats was conducted using a rake or scoop-lipped box dredge with a 1.0 cm mesh (expedition DA2/99; 100 stations). Dredge samples were filtered through a series of sieves to remove sediments and to recover animals. Refer to Hutchins *et al.* (2004) and Hewitt (2004) for further collection methods and site descriptions. Leucosiids were collected from 57 of the 170 stations sampled during the survey (Hewitt, 2004). The species reported herein were collected from 23 of these stations; five intertidal and 18 dredged subtidal sites.

Abbreviations used in the text are as follows: Arch. for Archipelago; C. for Cape; cl for carapace length, measured along the vertical median line of the carapace; coll. for collected by; I. for Island, Is for Islands; juv. for juvenile; ovig. for ovigerous; Pen. for Peninsula; Pt for Point; stn for station.

SYSTEMATICS

Family Leucosiidae Samouelle, 1819

Leucosia Weber, 1795

Leucosia moresbiensis Haswell, 1880

Leucosia moresbiensis Haswell, 1880: 49. — Davie, 2002: 265.

Leucosia moresbyensis. — Nobili, 1899: 251 [erroneous spelling].

Leucosia perlata. — Tyndale-Biscoe and George, 1962: 84, fig. 7. 3a, b.

Material examined

Western Australia, Dampier Archipelago. WAM C 25785 (1 male, cl 18.1 mm), stn DA1/98/02, Dolphin I. (20°28.09'S, 116°51.91'E), intertidal, coll. M. Hewitt, 17.10.1988; WAM C 25786 (1 male, cl 17.4 mm), stn DA3/99/62, East Lewis I. (20°37.50'S, 116°39.18'E), intertidal, coll. M. Hewitt, 05.09.1999.

Description

Carapace subovoid, globose; hepatic region tumescent; regions of carapace indistinct. Dorsal surface of carapace coarsely punctate. Front produced, projecting beyond epistome, tridenticulate, median denticle slightly more prominent than lateral denticles, postfrontal region laterally concave. Antennular fossa sealed by basal antennular segment. Outer orbital margin unsutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxillipeds endopod in female with setose fringe lengthwise, ischium medially carinate. Anterolateral margin of carapace carinate, sinuous, beaded. Lateral angle of carapace beaded, overhanging thoracic sinus. Thoracic sinus deep, anteriorly defined by overhanging, rounded margin of pterygostomian region, 2–3 perliform granules above cheliped basis. Posterior margin prominent, beaded. Third thoracic sternite smooth. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus trigonal, bearing perliform tubercles on anterior, posterior margins, upper surface bearing coalesced cluster of 6–8 granules proximally, followed by two diverging rows of granules, distal half of dorsal surface smooth; lower surface coarsely granulate anteriorly, pitted proximally. Carpus inflated. Palm 1.5 long as wide, its upper margin prominently carinate, its lower surface with granulate row on inner margin. Fingers 0.75 as long as propodus, gaping proximally, upper margin of dactyl carinate. Pereiopods slender, short. Pereiopodal propodi 2–4 keeled dorsally, fifth propodi keeled dorsally and ventrally; dactyli longer than propodi, laterally flattened, lanceolate. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with second segment minute; segments 3–5 fused, vertically furrowed proximally; sixth segment bearing nasutiform denticle medially; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like, telson triangular. First male pleopod elongate; shaft slightly sinuous, with 5 smooth whorls, last whorl as wide as apical muff; conical, cornute apical process hidden within swollen setose muff. Second male pleopod short, curved, apex scoop-like.

Colour

"deep brown above, lighter posteriorly" (Haswell, 1880: 49).

Distribution

New Guinea, Australia (Queensland, Western Australia).

Leucosia punctata Bell, 1855

Leucosia punctata Bell, 1855a: 362. — 1855b: 286, pl. 30, fig. 5. — 1855c: 8. — Galil, 2003b: 187, figs 1c, 2e, f.

Material examined

Western Australia, Dampier Archipelago. WAM C 25787 (1 female, cl 16.6 mm), stn DA1/98/11, Dolphin I. (20°30.25'S, 116°49.33'E), intertidal, coll. M. Hewitt, 21.10.1988.

Description

Carapace subovoid, globose; hepatic region tumescent; regions of carapace indistinct. Dorsal surface of carapace densely punctate. Front produced, projecting beyond epistome, margin medially emarginated, postfrontal region laterally concave. Antennular fossa sealed by basal antennular segment. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxillipeds endopod in female with setose fringe lengthwise, ischium medially carinate. Anterolateral margin of carapace carinate, minutely beaded. Epibranchial angle of carapace sloping, distally granulate. Posterolateral margin beaded, terminating posteriorly in granulate cluster. Posterolateral margins of carapace rounded; Posterior margin prominent, beaded. Thoracic sinus anteriorly defined by overhanging, granulate, rounded margin of pterygostomian region, its floor minutely granulate, row of 4–5 perliform granules above cheliped basis, followed by smaller granules. Pterygostomian plate granulate along external margin. Third thoracic sternite bearing transverse granulate band. Chelipeds subequal, robust.

Cheliped merus trigonal, bearing perliform tubercles on anterior, posterior margins, upper surface granulate throughout, lower surface coarsely granulate anteriorly, pitted proximally. Carpus inflated. Propodus 1.5 long as wide, its upper margin prominently carinate; granulate lower surface of palm with granulate lines on inner and outer margins, extending to proximal part of pollex. Fingers 0.75 as long as propodus, gaping proximally, upper margin of dactyl carinate. Pereiopods slender, short. Anterior three pereiopodal meri bearing two minutely beaded lines on dorsal margin, posterior line progressively shorter in successive pereiopods; two beaded lines on ventral margin; last pereiopodal merus with single beaded line dorsally and ventrally, ventral line carinate. Pereiopodal carpi dorsally carinate. Dactyli longer than propodi, laterally flattened, lanceolate. Male abdomen with second segment minute; segments 3–5 fused, vertically furrowed proximally, bearing minute triangular denticle; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like, telson triangular. First male pleopod elongate; shaft with 9–10 thick-lipped corkscrew whorls; conical, cornute apical process hidden within swollen setose muff. Second male pleopod short, curved, apex scoop-like.

Colour

"greyish-brown, with two darker spots on the branchial regions"(Bell, 1855b: 287).

Distribution

Philippines, Indonesia, Australia (Western Australia).

Myra Leach, 1817

Myra australis Haswell, 1880

Myra australis Haswell, 1880: 50, pl. 5, fig. 3. — Haswell, 1882: 122. — Miers, 1884: 251; 1886: 315. — Calman, 1900: 27. — Tyndale-Biscoe and George, 1962: 88, fig. 7.11. — Serène, 1968: 44. — Campbell and Stephenson, 1970: 250, fig. 12. — Davie, 2002: 271.

Material examined

Western Australia, Dampier Archipelago. WAM C 7726 (1 male, cl 9.6 mm; 1 female, cl 11.2 mm), Steamboat I., 27.05.1960; WAM C 7725 (1 male, cl 14.3 mm), Eagle Hawk I., 25.6 m, coll. B. R. Wilson, 14.06.1960; WAM C 7727 (1 male, cl 17.3 mm), Dampier Arch., 02.06.1960.

Description

Carapace rounded, globose; dorsal surface of carapace closely set with flattened granules. Front narrow, slightly produced, upturned, weakly bilobed. Antennular fossa continuous with orbit, partially sealed by basal plate on antennule. Outer orbital margin trisutured, tridentate anterior margin of efferent branchial channel forms lower orbital margin. External maxillipeds with vertical row of setae on endopod in female. Protogastric region depressed, hepatic region swollen. Subhepatic margin rounded, subhepatic denticle prominent, granulate, separated from convex lateral margin by distinct notch. Lateral margins of carapace, from outer angle of efferent branchial channel to lateral posterior denticle, lined with closely-spaced granules. Lateral posterior denticles on lower plane than median posterior spine, rounded, dorsoventrally flattened, granulate. Median posterior denticle triangular, as wide as long, granulate, distally upcurved. Intestinal region slightly swollen; juvenile specimens with prominent granule medially on intestinal region. Chelipeds slender, long, subequal, longer in adult male than in female specimens; fingers curved distally, their inner margins ctenoid. Cheliped merus in male 0.7 as long as carapace, in female slightly less; granulate, granules smaller distally. Carpus, propodus minutely granulate; propodus basally swollen, upper margin ridged. Dactyl three-quarters as long as upper margin of palm, minutely granulate. Pereiopods slender, dactyls styliform, setose, longer than propodi. Lower margin of pereiopodal meri, upper margin of propodi granulate. Thoracic sternum closely set with flattened granules, granules more prominent medially on third sternite. Abdominal sulcus deep, elongate, nearly reaching buccal cavity. Male abdomen narrowly triangular; segments 3–6 fused, bearing hoof-like denticle distally; lateral margin bearing 3 indistinct ridges fitting into sutures between thoracic sternites; telson lingulate, fifth as long as fused segment. Female abdomen with segments 4–6 fused, greatly enlarged, bearing granulate band proximally, margins granulate, telson laciniate. First male pleopod elongate, shaft nearly straight, dorso-ventrally flattened, bearing ruff of setae preapically, apical process slender, ogival , cornute. Second male pleopod short, curved, apex scoop-like.

Colour

"Carapace marked with variously-disposed blotches of orange; the proximal half of the upper surface of the arm, and the articulations of the ambulatory limbs marked with the same colour, of which also two circular spots occur on the upper surface of the third joint of the ambulatory limb" (Haswell, 1880: 51).

Distribution

Australia (Queensland, Western Australia).

Myrine Galil, 2001

Myrine kesslerii (Paulson, 1875)

Callidactylus kesslerii Paulson, 1875: 85, pl. 11, fig. 1.

Myra darnleyensis Haswell, 1880: 52, pl. 5, fig. 4. — Haswell, 1882: 122. — Miers, 1886: 315.

Myra kessleri. – Tyndale-Biscoe and George, 1962: 89, fig. 7.9. — Campbell, 1971: 39. — Davie, 2002: 272.

Myrine kesslerii Galil, 2001a: 436, figs 3d, 19.

Material examined

Western Australia, Dampier Archipelago. WAM C 7730 (1 male, cl 17.6 mm), N Dampier Arch., 57.0 m, 02.06.1960; WAM C 7729 (1 female, cl 15.0 mm; 1 female ovig., cl 17.0 mm), N Dampier Arch., 57.0 m, 02.06.1960.

Description

Carapace pyriform, globose; regions of carapace indistinct. Dorsal surface of carapace minutely granulate. Front narrow, produced, upcurved, closely granulate, anterior margin ogive. Antennular fossa continuous with orbit, partially sealed by basal plate. Outer orbital margin trisutured; lower orbital margin separated from anterior margin of efferent branchial channel by groove. Anterior margin of efferent branchial channel tridentate, median denticle narrower than lateral denticles, visible in dorsal view. External maxilliped endopod lacking vertical row of setae in adult female specimens. Lateral margins of carapace lacking line of closely-spaced granules. Rounded subhepatic margin separated from convex lateral margin by well defined notch. Posterior margin trilobate; lateral lobes on slightly lower plane than median lobe. Young specimens bear 3 prominent granules on branchial margin, granulate tubercle on posterolateral margin, five granulate tubercles medially on carapace, one granulate tubercle medially on intestinal region. Chelipeds slender, long, subequal, longer in adult male than in female specimens; fingers long, distally incurved, their inner margins ctenoid. Cheliped merus in male nearly as long as carapace, granulate; granules larger proximally. Carpus, propodus minutely granulate. Dactyl nearly 1.5 as long as upper margin of palm, minutely granulate. Pereiopods slender, dactyls styliform, longer than propodi, setose along upper margins. Thoracic sternum in male minutely granulate. Abdominal sulcus deep, elongate, nearly reaching buccal cavity; distal margins minutely beaded. Male abdomen narrowly triangular, segments 3–6 fused, bearing preapical crochet, lateral margin bearing 3 indistinct ridges fitting into sutures between thoracic sternites; telson slender, 1/3 as long as fused segments. Female abdomen with segments 4–6 fused, greatly enlarged, shield-like, telson laciniate. First male pleopod with straight, stocky shaft, dorsoventrally flattened, bearing ruff of setae preapically; apical process squat, bearing horizontal tendril distally. Second male pleopod short, apex shaped as dunce's cap.

Colour

Carapace white, with two horizontal purplish undulating bands; frontal region bright orange; mesogastric region purple; purple band diagonally across hepatic region. Chelipeds with two reddish bands on merus, another band distally on palm. Pereiopodal meri with purple band distally. Young specimens bear similar markings in subdued colours.

Distribution

Indo-Pacific, Red Sea to Fiji, Australia (Queensland, Western Australia).

Seulocia Galil, 2005

Seulocia laevimana (Miers, 1884)

Leucosia craniolaris var. *laevimana* Miers, 1884: 250, pl. 26, fig. A.

? *Leucosia pubescens*. — Campbell and Stephenson, 1970: 254, fig. 16.

Seulocia laevimana. — Galil, 2005b: 47, fig. 1d.

Material examined

Western Australia, Dampier Archipelago. WAM C 26105 (1 male, cl 17.2 mm), stn DA2/99/20, S of Sloping Pt, Burrup Pen. (20°34.30'S, 116°52.20'E), 11.0 m, coll. S. Slack-Smith and M. Hewitt, 16.07.1999; WAM C 26104 (1 male, cl 17.4 mm; 1 female cl 17.2 mm), stn DA2/99/17, ESE of Sloping Pt, Burrup Pen. (20°32.99'S, 116°54.71'E), 16.0–17.0 m, coll. S. Slack-Smith and M. Hewitt, 16.07.1999; WAM C 26121 (1 female, cl 17.2 mm), stn DA2/99/34, NE of Courtney Head Light, Malus I. (20°32.65'S, 116°39.14'E), 9.0–13.0 m, coll. S. Slack-Smith and M. Hewitt, 19.07.1999; WAM C 26124 (1 female, cl 16.9 mm), stn DA2/99/36, WSW of High Pt, on island NE of West Lewis I. (20°33.58'S, 116°36.87'E), 13.0 m, coll. S. Slack-Smith and M. Hewitt, 19.07.1999; WAM C 26134 (1 male, cl 18.1 mm), stn DA2/99/44, W of SW point of Goodwyn I. (20°32.71'S, 116°27.57'E), 22.0–23.0 m, coll. S. Slack-Smith and M. Hewitt, 20.07.1999; WAM C 26141 (1 male, cl 19.1 mm), stn DA2/99/53, WNW point of Goodwyn I. (20°30.90'S, 116°26.05'E), 32.0–34.0 m, coll. S. Slack-Smith and M. Hewitt, 21.07.1999; WAM C 26158 (1 male, cl 18.1 mm), stn DA2/99/61, NW of Phillip Pt, Burrup Pen. (20°35.33'S, 116°42.78'E), 11.0 m, coll. S. Slack-Smith and M. Hewitt, 22.07.1999; WAM C 26152 (1 male, cl 17.9 mm; 1 female, cl 17.9 mm), stn DA2/99/59, S of

Courtenay Head Light, Malus I. (20°32.23'S, 116°41.63'E), 17.0–19.0 m, coll. S. Slack-Smith and M. Hewitt, 22.07.1999; WAM C 26155 (1 male, cl 17.1 mm; 1 female, cl 17.3 mm), stn DA2/99/60, ESE of Courtenay Head Light, Malus I. (20°31.38'S, 116°44.24'E), 16.0–17.0 m, coll. S. Slack-Smith and M. Hewitt, 22.07.1999; WAM C 26160 (1 juvenile, cl 12.4 mm), stn DA2/99/65, NW of light on East Intercourse I. (20°38.31'S, 116°38.46'E), 10.0–15.0 m, colls S. Slack-Smith and M. Hewitt, 23.07.1999; WAM C 26165 (1 male, cl 16.7 mm), stn DA2/99/69, SE of SE point of Goodwyn I. (20°34.34'S, 116°34.67'E), 11.5–14.0 m, coll. S. Slack-Smith and M. Hewitt, 24.07.1999.

Description

Carapace subpentagonal, globose; regions of carapace indistinct. Dorsal surface of carapace sparsely, finely punctate anteriorly. Frontal region distinctly constricted, produced, upcurved, laterally concave; front with anterior margin tridenticulate, median denticle largest. Antennular fossa sealed by basal antennular segment. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxilliped endopod in female bearing setose fringe lengthwise, ischium medially keeled, ram-shaped. Anterolateral margin granulate, granules smaller, closer together anteriorly. Margin of epibranchial angle of carapace milled, overhanging tumentose thoracic sinus. Thoracic sinus deep; anteriorly defined by slightly rounded, smooth margin of pterygostomian region; ventral margin of sinus, above base of cheliped, bearing row of granules continuous with epimeral ridge. Posterolateral margins of carapace devoid of granulation. Epimeral margin wide, gutter-like anteriorly, narrowing posteriorly, marginal granules smaller posteriorly, meeting posterior margin at an angle. Posterior margin straight, deflexed surface of posterior margin smooth. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus trigonal, bearing perliform, bulbous tubercles on anterior, posterior margins; patch of spongy pubescence proximally on dorsal surface, bordered basally by coalesced cluster of granules and pair of perliform granules anteriorly; ventral surface pitted proximally, nearly smooth. Carpus, propodus inflated, upper surface of propodus rounded, smooth, lower surface granulate; upper and lower margins of palm constricted proximally; interior lower surface of palm proximally granulate in smaller individuals, smooth in full grown specimens. Fingers as long as upper margin of palm. Three anterior pereiopodal meri bearing two minutely beaded lines on dorsal margin, posterior line shorter in successive legs, two beaded lines on ventral margin, anterior line shorter in successive legs; last pereiopodal merus with single beaded line dorsally and ventrally, ventral margin sinuous, bearing crest of 4–6 large tubercles, followed by several smaller ones. Last pereiopodal merus in female constricted proximally. Pereiopodal carpi bearing dorsal carinae.

Male abdominal sulcus deep, elongate, nearly reaching buccal cavity. Male abdomen with 2nd segment minute; segments 3–6 fused, lacking median denticle, with a nonarticulating suture and a constriction at the commissure of the fifth and sixth segments, opposite ridge on lateral wall of abdominal sulcus; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like, telson triangular. First male pleopod elongate, shaft straight, twisted once on its axis, distally club-like, bilobed. Second male pleopod short, curved, apex scoop-like.

Colour

The carapace bears "two white spots on either side of the gastric region" (Miers, 1884: 250). The carapace (in alcohol) is sandy-grey, paler posteriorly, with the four pale spots mentioned above; the granules on the greyish cheliped merus are white, as are the tips of the fingers; the pale pereiopodal segments are distally annulated with orange.

Distribution

Australia (Western Australia).

Urnalana Galil, 2005

Urnalana elata (A. Milne Edwards, 1874)

Leucosia elata A. Milne Edwards, 1874: 41, pl. 2, fig. 2.

Urnalana elata. — Galil, 2005a: 16, figs 1d, 5a.

Material examined

Western Australia, Dampier Archipelago. WAM C 25789 (1 female, cl 12.2 mm), stn DA3/99/48, Goodwyn I. (20°32.00'S, 116°32.42'E), intertidal, coll. M. Hewitt, 31.08.1999; WAM C 25790 (1 female, cl 9.3 mm), DA3/99/59, West Lewis I. (20°33.95'S, 116°38.33'E), intertidal, coll. M. Hewitt, 04.09.1999.

Description

Carapace subpentagonal, globose; regions of carapace indistinct. Dorsal surface of carapace sparsely setose, punctate. Front squat, medially concave, frontal margin notched medially. Antennular fossa sealed by basal antennular segment. Orbits small, rounded, outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxilliped endopod lacking

setose fringe lengthwise in female. Hepatic region bearing low lozenge-shaped carina parallel with margin. Anterolateral margin of carapace overhanging thoracic sinus. Epibranchial lobe prominent, margin smooth, fringed with setae. Thoracic sinus anteriorly defined by overhanging margin of pterygostomian region; sinus with longitudinal strip of minute granules overgrown by club-like setae anteriorly; row of small perliform granules on ventral surface of epibranchial angle; another row above base of first pereiopod. Epimeral margin minutely granulate. Intestinal region somewhat inflated, more prominent in younger specimens. Posterior margin prominent, beaded. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus trigonal; bearing single row of granules, median granules large, perliform; granules on posterior margin progressively smaller distally, splitting into two divergent rows; upper surface proximally with cluster of granules partly obscured by pubescent patch, two large granules anteriorly; lower margin smooth, anteriorly with cluster of perliform granules partly obscured by pubescent patch, fusing distally into single row of large perliform granules. Anterior margin Carpus with obsolescent granules proximally on inner margin, obscure carina distally on outer margin. Upper margin of palm carinate, smooth; inner, outer basal lobe granulate, lower margin with milled carina distally, continuing into pollex. Pereiopodal meri 1–3 bearing two granulate rows on ventral and dorsal surface fourth pereiopodal merus with single row dorsally, two rows ventrally. Pereiopodal carpi dorsally carinate, propodi dorsally and ventrally carinate. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with second segment minute; segments 3–5 fused; sixth segment large, trapezoid, with modest median denticle; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like; telson laciniate. Shaft of male first pleopod short, sinuous, distally club-like, setose; apical process cornute. Second male pleopod short, curved, apex scoop-like.

Colour

"...gris verdâtre brillant, avec de nombreuses taches d'un rouge orangé" (A. Milne Edwards, 1874: 42).

Distribution

Comoro Is, Papua-New Guinea, New Caledonia, Samoa, Marshall Is, Japan, Australia (Western Australia).

***Urnalana haematosticta* (Adams and White, 1849)**

Leucosia haematosticta Adams and White, 1849: pl. 12, fig. 2. — Tyndale-Biscoe and George, 1962: 80, pl. 1.7, 2.7. – Davie, 2002: 264.

Leucosides haematosticta. — McNeill and Ward, 1930: 367, pl. 40, figs. 7, 8.

Urnalana haematosticta. — Galil, 2005a: 21, figs 2b, 6a.

Material examined

Western Australia, Dampier Archipelago. WAM C 7679 (1 female, cl 14.7 mm), NE Malus I., 18.0 m, 31.05.1960.

Description

Carapace subpentagonal, globose; regions of carapace indistinct. Front not much produced, frontal margin obtuse, deflexed, postfrontal region laterally concave. Antennular fossa sealed by basal antennular segment. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxillipeds lacking setose fringe lengthwise on endopod of female. Anterolateral margin of carapace beaded. Lateral angle of carapace prominent, overhanging thoracic sinus, margin obscurely milled. Thoracic sinus deep, densely setose, anteriorly defined by overhanging margin of pterygostomian region; row of granules ventrally. Epimeral ledge visible in dorsal view, continuous with posterior margin, margin beaded. Posterior margin prominent, beaded. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus half as long as carapace; anterior, posterior margins bearing 7–9 perliform granules, larger medially, splitting distally; upper margin with V-shaped cluster of granules, partly obscured by setose patch; 3 rows of perliform granules, proximally obscured by densely setose patch, fusing distally on lower margin. Carpus with 3 granules on inner margin. Upper margin of palm obscurely carinate; lower inner margin with row of granules extending to proximal part of pollex, granules most prominent proximally. Pereiopodal meri with two granulate rows on lower surface, single granulate row on upper surface, save for first pereiopod bearing two rows, posterior row distally obsolete. Pereiopodal carpi dorsally carinate; propodi keeled dorsally, ventrally. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with second segment minute; segments 3–5 fused, lacking median furrow, lateral margins constricted subdistally;sixth segment large, trapezoid, bearing prominent median denticle; telson triangular. Female abdomen with segments 3–6 fused, greatly

enlarged, shield-like; telson laciniate. Shaft of male first pleopod short, stout, sinuous; digitate, cornuted apical process partly concealed by subdistal setae. Second male pleopod short, curved, apex scoop-like.

Colour

"Carapace... of a light yellow, covered with numerous small round blood-red spots, fewer posteriorly, ...Fore-legs with round, scattered, blood-red spots, and a large quadrate mark of the same colour on the outer surface of each claw. Hind-legs with a blood-red band on the upper half of each joint." (Adams and White, 1849: 54).

Distribution

Sri-Lanka, Thailand, Singapore, South China Sea, Indonesia, Coral Sea, New Guinea, Australia (NSW, QLD, WA).

Urnalana margaritata (A. Milne Edwards, 1874)

Leucosia margaritata A. Milne Edwards, 1874: 42: pl. 2, fig. 3. — McNeill, 1968: 41. — Davie, 2002: 265.

Urnalana margaritata. — Galil, 2005a: 25, figs 2e, 7b.

Material examined

Western Australia, Dampier Archipelago. WAM C 26130 (1 female ovig., cl 6.7 mm), stn DA2/99/39, ENE of Bluff Pt, Enderby I. (20°37.05'S, 116°33.86'E), 13.0–14.0 m, coll. S. Slack-Smith and M. Hewitt; 19.07.1999.

Description

Carapace subpentagonal, globose; regions of carapace indistinct, intestinal region prominent. Front produced, frontal margin slightly sinuous, medially depressed, nondeflexed. Antennular fossa sealed by basal antennular segment. Antenna short, inserted between antennular fossa and orbit. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. Outer maxillipeds lacking setose fringe lengthwise on endopod of female. Anterolateral margin of carapace beaded; lateral angle of carapace prominent, overhanging thoracic sinus, margin indistinctly granulate. Thoracic sinus shallow, undefined, filled with plumate setae; row of small granules on ventral surface of epibranchial angle, another row above base of first pereiopod. Epimeral ledge visible in dorsal view, continuous with posterior margin, margin beaded. Posterolateral margins of carapace anteriorly edged with wedge of pubescence. Posterior margin prominent, beaded. Cheliped merus with anterior margin bearing row of perliform granules, posterior margin bearing two rows splitting distally, upper surface proximally with oblique row of granules partly obscured by pubescent patch, distally smooth; lower margin proximally pitted, anteriorly with cluster of perliform granules partly obscured by pubescent patch, narrowing distally. Carpus bearing granules proximally on inner margin, distally on outer margin. Upper margin of palm carinate, closely granulate; lower inner margin with row of granules extending to proximal part of pollex, granules most prominent proximally. Pollex with parallel rows of small granules on inner and lower margins. Pereiopods slender, short, with two granulate rows on lower surface, single granulate row on upper surface, save for first pereiopod bearing two rows, posterior row distally obsolete. Pereiopodal carpi dorsally carinate; propodi carinate dorsally and ventrally. Anterolateral angle of third sternal segment denticulate. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with 2nd segment minute; segments 3–5 fused; sixth segment large, trapezoid, with minute median denticle, reniform dimple; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like; telson laciniate. Shaft of male first pleopod short, straight, flattened; apical process cornuted, curved ventrally. Second male pleopod short, curved, apex scoop-like.

Colour

Carapace "...brun verdâtre clair, tacheté de rouge" (A. Milne Edwards, 1874: 42).

Distribution

Indonesia, Palau Is., Chesterfield Is., New Caledonia, Australia (Queensland, Western Australia).

Urnalana thysanotus (George and Clark, 1976)

Leucosia thysanotus George and Clark, 1976: 304, figs. 1–4. — Davie, 2002: 265.

Urnalana thysanotus. — Galil, 2005a: 31, figs 3c, 9a.

Material examined

Western Australia, Dampier Archipelago. WAM C 26115 (1 male, cl 12.9 mm; 1 female, cl 14.1 mm), stn DA2/99/29, W of C. Bruguieres (20°24.64'S, 116°44.05'E), 28.0–27.0 m, coll. S. Slack-Smith and M. Hewitt, 17.07.1999; WAM C 26138 (1 female, cl 13.8 mm), stn DA2/99/46, WNW of Rocky Head, Enderby I. (20°35.90'S, 116°25.60'E), 17.0–18.0 m, coll. S. Slack-Smith and M. Hewitt, 20.07.1999; WAM C 26151 (1 female, cl 10.1 mm), stn DA2/99/58, NNE of Roly Rock (20°29.11'S, 116°30.78'E),

25.0–25.5 m depth, coll. S. Slack-Smith and M. Hewitt, 21.07.1999; WAM C 26173 (1 female, cl 14.8 mm), stn DA2/99/78, NE of NW point of Goodwyn I. (20°31.09'S, 116°33.04'E), 14.0–15.0 m, coll. S. Slack-Smith and M. Hewitt, 25.07.1999.

Description

Carapace subpentagonal, globose; regions of carapace indistinct. Dorsal surface of carapace minutely, densely punctate anteriorly. Front prominent, frontal margin obsoletely bilobate. Postfrontal region deeply concave laterally. Antennular fossa sealed by basal antennular segment. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxillipeds lacking setose fringe lengthwise on endopod of female. Hepatic region obliquely tumescent, with band of minute granules continuing into epibranchial region. Lateral angle of carapace overhanging thoracic sinus, margin smooth, fringed with stiff setae. Anterior half of posterolateral margin granulate. Thoracic sinus deep, anteriorly defined by thin overhanging margin of pterygostomian region; sinus with L-shaped band of closely packed nail-shaped setae anteriorly. Posterolateral margins of carapace granulate, anteriorly edged with posteriorly narrowing strip of short fur. Epimeral ledge visible in dorsal view, continuous with posterior margin, margin beaded. Posterior margin prominent, beaded. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus entirely granulate but for smooth patch medially on lower surface; anterior, posterior margins bearing prominent perliform granules, larger medially. Carpus unevenly granulate. Upper margin of palm with row of obsolescent granules; lower margin crenulate, granulate, carina extending to proximal part of pollex, granules most prominent proximally; inner surface of palm proximally with row of granules, parallel with lower margin; inner surface of palm bearing patch of granules proximally. Pereiopods slender, short. Pereiopodal meri with two granulate rows on lower surface, with two granulate rows on upper surface on first three pereiopods, posterior dorsal row on third pereiopod distally obsolete, single dorsal row on fourth pereiopod. Pereiopodal carpi 1–3 prominently bi-keeled dorsally, fourth carpus with single keel; propodi keeled dorsally and ventrally, leaf-like. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with 2nd segment minute; segments 3–5 fused, proximally with broad median furrow; 6th segment large, trapezoid; telson triangular. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like; telson laciniate. Shaft of male first pleopod short, stout, curved; cornute apical process hidden by swollen setose muff. Second male pleopod short, curved, apex scoop-like.

Colour

"Carapace marbled with brown, white and orange; paler posteriorly. Front dark brown. Hepatic granules red. Arm of cheliped brown with white granules; hand pale with orange-brown spot on palm, base of fingers orange. Legs white with orange blotches" (George and Clark, 1976: 304).

Remarks

George and Clark (1976: 306) distinguished *Leucosia thysanotus* from *L. whitei* "by the nature of the front, the hairiness of the epibranchial angle, the hepatic granules, the dorsal margin of the hand and the carpus of the walking legs". To these characters we add the form of male 1st pleopod and the different colour pattern.

Distribution

Australia (Western Australia).

Urnalana whitei (Bell, 1855)

Leucosia whitei Bell, 1855a: 362. — 1855b: 289, pl. 31, fig. 2. — 1855c: 9. — Hess, 1865: 155. — Haswell, 1880: 45. — 1882: 118. — Miers, 1884: 249 (part). — Tyndale-Biscoe and George, 1962: 77, fig. 4.10a, b, pl. 1, figs. 6, 9, pl. 2, figs. 6, 9 (part). — McNeill, 1968: 41. — Arnold and George, 1987: 212, fig. 2, fig. 3a–c. — Davie, 2002: 266.

Urnalana whitei. — Galil, 2005a: 32, figs 3d, 9b.

Not *Leucosia whitei*. — Miers, 1886: 325 (part). — Tyndale-Biscoe and George, 1962: 77, fig. 4.10a, b, pl. 1, figs. 6, 9, pl. 2, figs. 6, 9 (part). — Campbell and Stephenson, 1970: 254, fig. 17 [=*U. chevreti* (Haswell, 1880)].

Material examined

Western Australia, Dampier Archipelago. WAM C 26171 (1 female, cl 14.8 mm), DA2/99/75, E of NE point of Goodwyn I. (20°32.16'S, 116°33.70'E), 14.0–19.0 m, coll. S. Slack-Smith and M. Hewitt, 25.07.1999; WAM C 26102 (1 female, cl 14.9 mm), DA2/99/04, NNW of Cohen I. (20°19.64'S, 116°45.75'E), 42.0–43.0 m, coll. S. Slack-Smith and M. Hewitt, 14.07.1999; WAM C 26178 (1 juv., cl 7.8 mm), stn DA2/99/88, NW of Brigadier I. (20°26.04'S, 116°36.77'E), 33.0–38.0 m, coll. S. Slack-Smith and M. Hewitt, 26.07.1999; WAM C 26148 (1 female, cl 13.9 mm), stn DA2/99/55, NW of Roly Rock (20°28.45'S, 116°27.43'E), 37.0–38.0 m, coll. S. Slack-Smith and M. Hewitt, 21.07.1999.

Description

Carapace subpentagonal, globose; regions of carapace indistinct. Front prominent, frontal margin tridentate, deflexed. Antennular fossa sealed by basal antennular segment. Outer orbital margin unisutured, anterior margin of efferent branchial channel forms part of lower orbital margin. External maxillipeds lacking setose fringe lengthwise on endopod of female. Hepatic region tumescent, bearing cluster of perliform granules. Lateral angle of carapace overhanging thoracic sinus, bearing cluster of perliform granules, margin milled, obsolescent in larger specimens. Thoracic sinus shallow, densely setose, with median stripe of closely packed paxilliform setae; anteriorly defined by thickly granulate margin of pterygostomian region; sinus with median row of granules. Posterolateral margins of carapace granulate, anteriorly edged with posteriorly narrowing strip of dense pubescence. Epimeral edge visible in dorsal view, continuous with posterior margin, margin beaded. Posterior margin prominent, beaded. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus more than half as long as carapace; entirely granular but for smooth patch medially on lower surface; anterior, posterior margins bearing prominent perliform granules, larger medially. Carpus unevenly granulate. Upper margin of palm with row of granules, progressively smaller distally; lower margin with row of granules extending to proximal part of pollex, granules most prominent medially; inner surface of palm with row of granules, proximally parallel with lower margin; inner surface of palm unevenly granulate proximally. Pereiopods slender, short, pereiopodal meri with two granulate rows on lower surface, with two granulate rows on upper surface on first three pereiopods, posterior dorsal row on third pereiopod distally obsolete, single dorsal row on fourth pereiopod. Pereiopodal carpi prominently keeled dorsally, propodi keeled dorsally and ventrally. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity; its lateral margin bearing distinct ridge fitting into suture between abdominal segments. Male abdomen with second segment minute; segments 3–5 proximally with broad median furrow; sixth abdominal segment wider than long, bearing minute denticle medially. Female abdomen with segments 3–6 fused, greatly enlarged, shield-like; telson laciniate. Shaft of male first pleopod short, stout, sinuous; cornuted, claw-like apical process hidden within swollen setose muff. Second male pleopod short, curved, apex scoop-like.

Colour

"light brown; the spots on the carapace small, of an angular form, and red colour; a large red spot on the upper surface of the hand" (Bell, 1855b: 290); "Carapace...grey-yellow anteriorly, with elongate triangular reddish patch in each metabranchial region; palm grey-yellow, with a large red spot at base; fingers ...base orange or red " (Arnold and George, 1987: 211, table I).

Remarks

Urnalana whitei differs from *U. chevreti* (Haswell, 1880) in having a cluster of granules anteriorly on the epibranchial region; the upper margin of the cheliped palm granulate; the apical process of 1st male pleopod hidden by a swollen, setose muff; and a conspicuous red spot on the inner surface of the palm.

Distribution

Indonesia, Australia (Northern Territory, Queensland, Western Australia).

Key to Dampier Archipelago leucosiids

1. Carapace bearing 3 spines or denticles posteriorly; chelipeds slender, long 2

   Posterior margin of carapace lacking spines or denticles; chelipeds short, massive 3

2. Subhepatic denticle present; outer maxilliped endopod in female bearing vertical row of setae; anterior margin of efferent branchial channel forming lower orbital margin ..... *Myra australis*

   Subhepatic denticle lacking; outer maxilliped endopod in female lacking vertical row of setae; anterior margin of efferent branchial channel distinct, separated from lower orbital margin by groove ..... *Myrine kesslerii*

3. Carapace urn-shaped, laterally pubescent, male abdomen with segments 3-5 fused; shaft of the first male pleopod uncoiled ... *Urnalana* 4

   Carapace subovoid, glabrous; male abdomen with segments 3–6 fused, first male pleopod with straight shaft, twisted once on its axis .. *Seulocia laevimana*

   Carapace subovoid, glabrous; male abdomen with segments 3–5 fused, first male pleopod with screw-like tightly coiled shaft, terminating in a setose muff. ..... *Leucosia* 8

4. Dorsal surface of cheliped merus entirely granulate; male fused abdominal segments proximally with broad median furrow, apical process of first male pleopod hidden by swollen, setose muff 5

   Dorsal surface of cheliped merus distally smooth or obscurely granulate; male fused abdominal segments lacking furrow, apical process of first male pleopod otherwise 6

5. Frontal margin bilobate; posterior margin of pterygostomian region overhanging thoracic sinus; epibranchial angle with fringe of horizontal setae; pereiopodal carpi 1–3 bi-keeled dorsally ..... *U. thysanotus*

   Frontal margin tridentate; posterior margin of pterygostomian region not overhanging thoracic sinus; epibranchial angle lacking setose fringe; pereiopodal carpi 1–3 with single keel dorsally ..... *U. whitei*

6. Pubescence restricted to epibranchial angle, apical process of first male pleopod distally club-shaped ..... *U. elata*

   Lateral margin with dense pubescence extending along postero-lateral margin 7

7. Posterior margin of cheliped merus with two parallel rows of granules, minute median denticle on penultimate male abdominal segment, apical process of first male pleopod curved ventally, mottled colour pattern .... *U. margaritata*

   Posterior margin of cheliped merus with single granulate row, splitting into 2 distally, male sixth abdominal segment setose, median denticle prominent, apical process of male first pleopod partly concealed by subdistal setae; carapace covered with blood-red spots ..... *U. haematosticta*

8. Frontal margin medially emarginate; epibranchial region laterally granulate; posterolateral margin beaded throughout, terminating in granulate cluster; pterygostomian region laterally granulate; third thoracic sternite bearing granulate band ..... *L. punctata*

   Frontal margin tridenticulate; epibranchial region punctate; posterolateral margin beaded anteriorly, lacking granulate cluster; pterygostomian region, third thoracic sternite smooth ..... *L. moresbiensis*

ACKNOWLEDGEMENTS

Bella Galil thanks A. Crosnier, Muséum national d'Histoire naturelle, Paris, for his kind hospitality. Visits to the Muséum national d'Histoire naturelle and to the Zoologisk Museum, Kopenhagen, for comparative material, were supported by the European Commission's PARSYST and COBICE programmes, respectively.

Melissa Titelius is grateful to all her fellow expedition members, Sue Morrison, Clay Bryce, Shirley Slack-Smith, Jane Fromont and Barry Hutchins, for their constant companionship and help during the long field expeditions. Special thanks go to Mark Salotti, Angela Anderson and Dick Anderson for their help in the laboratory and data basing of the material reported here. Many thanks go to J. Ralston and the crew of the Kimberley Quest (Expedition 1), Theo Berden and the crew of the reseach vessel Flinders (Expedition 2) and B. Kirkwood and the crew on Top Gun (Expedition 3), for their assistance and service during the respective expeditions.

The authors thank Diana Jones for providing the opportunity to work on this collection. Woodside Energy Ltd. provided the funding for the field component of this project and this publication.

REFERENCES

Adams, A. and White, A. (1849). Crustacea. *In* Adams, A. (ed.), *The Zoology of the Voyage of H.M.S. Samarang; under the command of Captain Sir Edward Belcher, C.B., F.R.A.S., F.G.S., during the years 1843–1846.* Reeve, Benham and Reeve, London. Part II. i–viii, 33–66, pls. 7–13.

Arnold, P. W. and George, R.W. (1987). Recognition of *Leucosia whitei* Bell and *Leucosia cheverti* Haswell (Decapoda, Brachyura, Leucosiidae). *Crustaceana* **53**: 209–214.

Bell, Th. (1855a). Horae carcinologicae, or notices of Crustacea. I. A monograph of the Leucosiadae, with observations on the relations, structure, habits and distribution of the family; a revision of the generic characters; and descriptions of new genera and species. *Annals and Magazine of Natural History* **16**: 361–367.

Bell, Th. (1855b). Horae carcinologicae, or notices of Crustacea. I. A monograph of the Leucosiadae, with observations on the relations, structure, habits and distribution of the family; a revision of the generic characters; and descriptions of new genera and species. *Transactions of the Linnean Society, London* **21**: 277–314, pls. 30–34.

Bell, Th. (1855c). *Catalogue of Crustacea in the collections of the British Museum.* Part I. Leucosiadae: 1–24. London.

Calman, W.T. (1900). On a collection of Brachyura from Torres Strait. *Transactions of the Linnean Society* **8**: 1–50.

Campbell, B.M. (1971). New records and new species of crabs (Crustacea: Brachyura) trawled off southern Queensland: Dromiacea, Homolidea, Gymnopleura, Corystoidea, and Oxystomata. *Memoirs of the Queensland Museum* **16**: 27–48.

Campbell, B.M. and Stephenson, W. (1970). The sublittoral Brachyura (Crustacea: Decapoda) of Moreton Bay. *Memoirs of the Queensland Museum* **15**: 235–301.

Davie, P.J.F. (2002). Crustacea: Malacostraca Eucarida (Part 2). Decapoda – Anomura, Brachyura. *In* Wells. A. and Houston, W.W.K. (eds.) *Zoological Catalogue of Australia* vol. **19.3B**. CSIRO Publishing, Melbourne, Australia. xiv + 641 pp.

Haswell, W.A. (1880). Contribution to a monograph of Australian Leucosiidae. *Proceedings of the Linnean Society of New South Wales* **4**: 44–60.

Haswell, W.A. (1882). *Catalogue of the Australian Stalk- and Sessile-eyed Crustacea*. Sydney: Australian Museum XXIV. 326 pp. 4 pls.

Hess, W. (1865). Beiträge zur Kenntniss der Decapoden-Krebse Ost-Australiens. *Archiv für Naturgeshichte, Berlin* **31**: 127–173.

Galil, B.S. (2001a). A revision of *Myra* Leach, 1817 (Crustacea: Decapoda: Leucosioidea). *Zoologische Mededelingen Leiden* **75**: 409–446.

Galil, B.S. (2001b). A revision of the genus *Praebebalia* Rathbun, 1911 (Brachyura, Leucosioidea). *Journal of Crustacean Biology* **21**: 266–274.

Galil, B.S. (2003a). Four new genera of Leucosiid crabs (Crustacea: Brachyura: Leucosiidae) for three new species and nine species previously in the genus *Randallia* Stimpson, 1857, with a redescription of the type species, *R. ornata* (Randall, 1939). *Proceedings of the Zoological Society of Washington* **116**: 395–422.

Galil, B. S. (2003b). Contributions to the knowledge of Leucosiidae I. The identity of *Leucosia craniolaris* (Linnaeus, 1758), and redefinition of the genus *Leucosia* Weber, 1795 (Crustacea: Brachyura). *Zoologische Mededelingen Leiden* **77**: 181–191.

Galil, B.S. (2005a). Contribution to the knowledge of Leucosiidae III. *Urnalana* gen. nov. (Crustacea: Brachyura). *Zoologische Mededelingen Leiden* **79**: 9–40.

Galil, B.S. (2005b). Contributions to the knowledge of Leucosiidae IV. *Seulocia* gen. nov. (Crustacea: Brachyura). *Zoologische Mededelingen Leiden* **79**: 41–59.

George, R.W. and Clark, M. (1976). Two new species of pebble crab (Oxystomata: Leucosiidae) from Western Australia. *Records of the Western Australian Museum* **4**: 303–309.

Haswell, W.A. (1880). Contributions towards a monograph of Australian Leucosiidae. *Proceedings of the Linnean Society of New South Wales* **4**: 44–66.

Haswell, W.A. (1882). *Catalogue of the Australian stalk- and sessile-eyed Crustacea: iii–xxiv*, 1–324, pls. 1–4. The Australian Museum, Sydney.

Hewitt, M.A. (2004). Crustacea (excluding Cirripedia) of the Dampier Archipelago, Western Australia. *In* Jones, D.S. (ed), *Report on the Results of the Western Australian Museum/Woodside Energy Ltd. Partnership to explore the Marine Biodiversity of the Dampier Archipelago Western Australia 1998–2002. Records of the Western Australian Museum,* Supplement **66**: 169–219.

Hutchins, J.B., Slack-Smith, S.M., Berry, P.R. and Jones, D.S. (2004). Methodology. *In* Jones, D.S. (ed), *Report on the Results of the Western Australian Museum/ Woodside Energy Ltd. Partnership to explore the Marine Biodiversity of the Dampier Archipelago Western Australia 1998–2002. Records of the Western Australian Museum,* Supplement **66**: 3–5.

Jones, D.S. (2004). The Burrup Peninsula and Dampier Archipelago, Western Australia: an introduction to the history of its discovery and study, marine habitats and their flora and fauna. *In* Jones, D.S. (ed), *Report on the Results of the Western Australian Museum/ Woodside Energy Ltd. Partnership to explore the Marine Biodiversity of the Dampier Archipelago Western Australia 1998–2002. Records of the Western Australian Museum,* Supplement **66**: 27–49.

Leach, W.E. (1815). *The Zoological Miscellany; being descriptions of new or interesting animals ... illustrated with coloured figures drawn from nature by R.P. Nodder &c.* E. Nodder and Son, London. Volume **2.** pp. 145–154, pls 116–120.

McNeill, F.A. (1968). Crustacea, Decapoda and Stomatopoda. In, *Scientific Reports Great Barrier Reef Expedition 1928–29* **7**:1–98, 2 pls. Trustees of the British Museum (Natural History).

McNeill, F.A. and Ward, M. (1930). Carcinological Notes. No. I. *Records of the Australian Museum* **17**: 357–383.

Miers, E.J. (1884). *Crustacea. Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. 'Alert' 1881–2. Part I. The collections from Melanesia.* 178–322, pls. 18–32. British Museum, Natural History, London.

Miers, E.J. (1886). Report on the Brachyura collected by H.M.S. Challenger during the years 1873–1876. *Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873–76, (Zool)* **17**: 1–362.

Milne Edwards, A. (1874). Recherches sur la faune carcinologique de la Nouvelle Calédonie. *Nouvelles Archives du Museum d'Histoire naturelle, Paris* **10**: 39–58, pls. 2–3.

Nobili, G. (1889). Contribuzioni alla conoscenza della fauna carcinologica della Papuasia, delle Molucche e dell'Australia. *Annali del Museo civico di Storia Naturali di Genova* **20** (40): 230–282.

Paulson, O.M. (1875). *Studies on Crustacea of the Red Sea with notes regarding other seas. Part I. Podophthalmata and Edriophthalmata (Cumacea).* 143 pp. 21 pls. English translation, Jerusalem, the Israel Program for Scientific Translations.

Pearce, A.F., Buchan, S., Chiffings, T., D'Adamo, N., Randry, C., Fearns, P., Mills, D., Phillips, R. and Simpson, C. (2003). A review of the oceanography of the Dampier Archipelago. *In* Wells, F.E., Walker, D.I. and Jones, D.S. (eds), *The Marine Flora and Fauna of Dampier, Western Australia* **1**: 13–50. Western Australian Museum, Perth.

Samouelle, G. (1819). *The Entomologist's Useful Compendium*; or an introduction to the knowledge of British Insects, comprising the best means of obtaining and preserving them, and a description of the apparatus generally used; together with the genera of Linné, and modern methods of arranging the Classes Crustacea, Myriapoda, spiders, mites and insects, from the affinities and structure, according to the views of Dr. Leach. Also an explanation of the terms used in entomology; a calendar of the times of appearance and usual situations of near 3,000 species of British Insects; with instructions for collecting and fitting up objects for the microscope. Thomas Boys, London. 496 pp, 12 pls

Serène, R. (1968). Prodromus for a check list of the non-planctonic marine fauna of South East Asia. *Singapore National Academy of Science,* Special Publication **1**: 1–122.

Tyndale-Biscoe, M. and George, R.W. (1962).The Oxystomata and Gymnopleura (Crustacea,

Brachyura) of Western Australia with descriptions of two new species from Western Australia and one from India. *Journal of the Royal Society of Western Australia* **45**: 65–96.

Weber, F. (1795). *Nomenclator entomologicus secundum entomologian systematicam ill. Fabricii, adjectis speciebus recens detectis et varietatibus.* C.E. Bohn, Chiloni et Hamburgi. viii 171 pp.

Wells, F.E. and Walker, D.I. (2003). Introduction to the marine environment of Dampier, Western Australia. *In* Wells, F.E., Walker, D.I. and Jones, D.S. (eds), *The Marine Flora and Fauna of Dampier, Western Australia* **1**: 1–12. Western Australian Museum, Perth.