

HYMENOSOMATID CRABS OF QUEENSLAND ESTUARIES AND TIDAL MUD
FLATS, INCLUDING DESCRIPTIONS OF FOUR NEW SPECIES OF
ELAMENOPSIS A. MILNE-EDWARDS AND A NEW SPECIES OF *AMARINUS*
LUCAS.

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ABSTRACT

Five new hymenosomatid species, *Elamenopsis thorsbornei* n.sp., *E. hirtirostris* n.sp., *E. minima* n.sp., *E. frontalis* n.sp. and *Amarinus lutarius* n.sp. are described. An ovigerous female of *E. minima* n.sp. is 1.7mm carapace width, probably the smallest mature female brachyuran ever reported. Fourteen hymenosomatid species are now known from Queensland estuaries and tidal mud flats. Of these, four are temperate - subtropical Australian species extending into southern or central Queensland, eight are essentially tropical species, and two species occur all along the Queensland coast and beyond. Five species are known only from single or adjacent localities, and the maximum number of species known from any one estuary is five. A key to the Australian species of *Amarinus* is given.

INTRODUCTION

Queensland has a large number of estuaries, allied with extensive areas of mangroves and mud flats. In common with other such areas in the Indo-west Pacific, the macroscopic crab fauna of these habitats is dominated by species of the families Ocypodidae and Grapsidae. There are however, also a number of much smaller species belonging to the family *Hymenosomatidae* Macleay. The hymenosomatids are small to very small, cryptic due to generally dull colouration and accumulation of silt on their bodies, and inactive and often buried during low tides. For these reasons they are often overlooked even though they may be very abundant. Plankton studies of one Queensland river showed the larvae of *Elamenopsis lineata* A. Milne-Edwards 1873 to be the most numerically abundant of all meroplanktonic decapod larvae over an eight month study period (Chaloupka 1978).

Lucas (1980) recorded nine species of *Hymenosomatidae* from Queensland. He acknowledged that the northern Australian coastal region

was poorly collected and expected that more new species would be found. This expectation has already been fulfilled by collections from recent biological surveys of several Queensland estuaries and the new records and new species are presented here.

The material examined is held at the Queensland Museum (QM), the museum of the School of Biological Sciences, James Cook University (JCU) and Allan Hancock Foundation, California, U.S.A. (AHF). Terminology follows the convention of Melrose (1975, fig. 1) (repeated by Lucas, 1980, fig. 1). The general measure of size is maximum carapace width (CW) in millimetres (mm) (including lateral walls), which is usually about the level of the posterior lateral angles of the carapace. Descriptions are based on mature females and large males (see Lucas 1980, p. 150) unless otherwise stated. (See Melrose (1975, p. 11) and Lucas (1980, p. 150) for comments on allometric growth in hymenosomatids.)

Family HYMENOSOMATIDAE MacLeay 1838

HYMENOSOMA Desmarest 1825

Hymenosoma hodgkini Lucas 1980

Hymenosoma hodgkini Lucas, 1980, p.169–70, figs. 2E, 6H, 7I, 10B, C.

MATERIAL EXAMINED

Burnett River, 20.x.1980, R.G. Pearson and L.K. Penridge, 2 ovigerous ♀♀ (4.3, 5.4 mm), dredge sample, (sample included *Halicarcinus bedfordi*), barrage sample (JCU); Kolan River, 21.x.1980, 6 ♂♂ (4.1 – 5.6 mm), ovigerous ♀ (4.7 mm), 4 immature ♀♀ (3.5 – 4.2 mm), dredge samples (JCU); Calliope River, Feb. 1976, P. Saenger, 2 ovigerous ♀♀ (4.3, 4.4 mm), 14 km from mouth, channel (QM W6908); Calliope River, Aug. 1976, P. Saenger, 2 ♂♂ (4.5, 5.2 mm), ovigerous ♀ (4.0 mm), immature ♀ (3.9 mm), 14 km from mouth, edge of channel (QM W6815).

DIAGNOSIS

Dorsal carapace surface with well defined grooves; rostrum much shorter than eye, not reaching cornea; without an epistome; dactyli of walking legs with a row of fine teeth; mature female abdomen projecting posteriorly in two large bulges at segment 3.

DISTRIBUTION

Coastal marine lakes, inlets and estuaries from Western Port, Victoria, to Calliope River, central Queensland.

REMARKS

The known distribution of this species is considerably extended here to include all of the temperate eastern coast of Australia. In addition to the material above, specimens have been examined from Bancroft Bay, Gippsland Lakes, and Waratah Bay, Victoria. G.C. Poore (pers. comm.) reports the species as common in Mallacoota Inlet, Lake Victoria and Lake King (Gippsland Lakes), but uncommon in Western Port and not known from Port Phillip Bay.

HALICARCINUS White 1846

Halicarcinus bedfordi Montgomery 1931

Hymenosoma sp: Montgomery, 1921, p.94–5.

Halicarcinus bedfordi Montgomery, 1931, p.425–6, pl. 27, figs. 3, 3a,b. Melrose, 1975, p.82. Lucas, 1980, p.181–2, figs. 3A, 5E, 6N, 7G, 9E, F.

MATERIAL EXAMINED

Susan River, 26.xii.1970, Australian Littoral Soc., ovigerous ♀ (2.8 mm), (QM W8949); Bogimbah Ck., Fraser Island, 22.vii.1975, R. Timmins and P. Davie, immature ♀ (2.2 mm), sieved from mud flat (QM W6424); Burnett River, 20.x.1980, R.G. Pearson and L.K. Penridge, 2 ♂♂ (4.0, 4.7 mm), ovigerous ♀ (4.2 mm), dredge sample, (sample included *Hymenosoma hodgkini*) (JCU); Calliope River, 7–9.x.1975, P. Saenger, 2 ovigerous ♀♀ (4.1, 4.8 mm), 10.5 km from mouth, edge of channel (QM W6902); Trinity Inlet, Cairns, Dec. 1974, R. Timmins, 5 ♂♂ (4.0 – 5.2 mm), ovigerous ♀ (4.0 mm) (QM W4581); Trinity Inlet, Cairns, 14.xii.1975, Aust. Litt. Soc., ♂ (2.7 mm) (QM W7430).

DIAGNOSIS

Rostrum approximately triangular, narrowing abruptly half-way or further along its length, terminating in a rounded point; eyes reaching to at least 0.4 length of rostrum; without a spine at posterior lateral angle; chelipeds massive and elongate in large males, 3 X or more carapace width; male abdomen almost equilateral triangular; male first pleopods with broad base and stout straight distal portion, terminating in a broad rounded point with tufts of long setae arising subterminally.

DISTRIBUTION

Queensland and Western Australia; specimens reported from Shark Bay and the Swan River in Western Australia, and in Queensland from Weipa, and from Cairns south to Moreton Bay. It presumably has a circum-northern distribution.

ELAMENOPSIS A. Milne-Edwards 1873

Elamenopsis lineata A. Milne-Edwards 1873

Elamenopsis lineatus A. Milne-Edwards, 1873, p. 324–5, pl. 18, fig. 4. Kemp, 1917, p. 250. Tesch, 1918, p. 26–8, pl. 1, figs. 5, 5a–c. Serene and Umali, 1970, p. 58, pl. 5, fig. 11.

Elamenopsis lineata: Lucas, 1980, p. 192–3, figs. 3J, 5J, 8E, 10J.

MATERIAL EXAMINED

Calliope River, Dec. 1975, P. Saenger, juvenile ♂ (1.8 mm), cooling water outlet at Power Station, edge of channel (QM W6909); Ross River, north Queensland, 4.x.1980, M. Kenway, ovigerous ♀ (7.2 mm), between Bundy Creek and National

Park boat ramp, in entrance of *Callianassa australiensis* burrow, approx. 80 m out from *Rhizophora* edge, sandy mud substrate (JCU); Murray River, north of Cardwell, NE Queensland, 24.v.1978, P. Davie, juvenile, ♂ (3.2 mm), immature ♀ (3.0 mm), benthic grab samples, muddy-sand and mud substrates (QM W7805, W7806); Trinity Inlet, Cairns, Dec. 1974, R. Timmins, ♂ (3.5 mm), (QM W4582).

DIAGNOSIS

Carapace wider than long, approximately hexagonal; rostrum triangular with rounded apex, strongly deflexed and nearly perpendicular; walking legs broad and laterally compressed, dactyli without teeth; fused section of male abdomen tapering, not constricted abruptly.

DISTRIBUTION

New Caledonia; eastern Australia south to Lake Macquarie; Philippines.

REMARKS

The female specimen from Ross River is unusual for its large size (about twice the carapace width of previously reported mature females) and for occupying the burrow of another decapod crustacean, the 'yabby' *Callianassa australiensis*.

Chaloupka (1978) found that the distinctive larvae of *E. lineata* were the most numerically abundant of all meroplanktonic decapod larvae in Ross River estuary over the period February to October, 1978. This abundance of larvae, despite the low fecundity of this small species, suggests that the crabs are very abundant in Ross River while remaining very inconspicuous. It is notable that the next most abundant decapod larvae in Chaloupka's samples were those of the yabby, *C. australiensis*, which reaches densities greater than 100/m² in regions of Ross River (Kenway, 1980) and has egg masses at least a magnitude larger than those of *E. lineata*.

In addition to the material above, specimens of *E. lineata* from Lake Macquarie, N.S.W., have been examined. This record extends the known distribution considerably down the eastern Australian coast.

Elamenopsis octagonalis (Kemp 1917)

(Fig. 4)

Rhynchoplax octagonalis Kemp, 1917, p. 256-8, fig. 5.

Neorhynchoplax octagonalis: Sakai, 1938, p. 2.

Elamenopsis octagonalis: Lucas, 1980, p. 193-4, figs. 4A, 6P.

MATERIAL EXAMINED

Dunwich, Stradbroke Island, Moreton Bay, 17.iv.1973 and 4.v.1973, J.S. Garth, 4 ♂♂ (2.3-3.7 mm, right 1st pleopod of largest male detached and mounted on slide), 3 ♀♀ (3.1-3.4 mm), immature ♀ (2.4 mm), (AHF 1530-04, 1534-04); Moreton Bay, Goat and Bird Islands, 1.v.1973, J.G. Garth, immature ♀ (2.9 mm), (AHF 1531-03); Jacksons Ck., Cribb Is., Moreton Bay, 19.vii.1973, B. Campbell, ♂ (2.6 mm), mouth, north bank (QM W4519).

DIAGNOSIS

Carapace approximately octagonal; lateral carapace walls with a forward directed spine above base of 1st walking leg; rostrum consisting of three separate spine-like lobes, fringed with short setae, lateral lobes well spaced from medial lobe, pointing slightly upward and outward, medial lobe longest, pointing forward; walking legs not laterally compressed, dactyli with one subterminal tooth; distal portion of male 1st pleopod tapering to point, with row of setae on sternal side.

DISTRIBUTION

Goa, India; Moreton Bay, Queensland.

Elamenopsis aspinifera Lucas 1980

Elamenopsis aspinifera Lucas, 1980, p. 195-6, figs. 3I, 5G, 6R, 8D, 10G.

MATERIAL EXAMINED

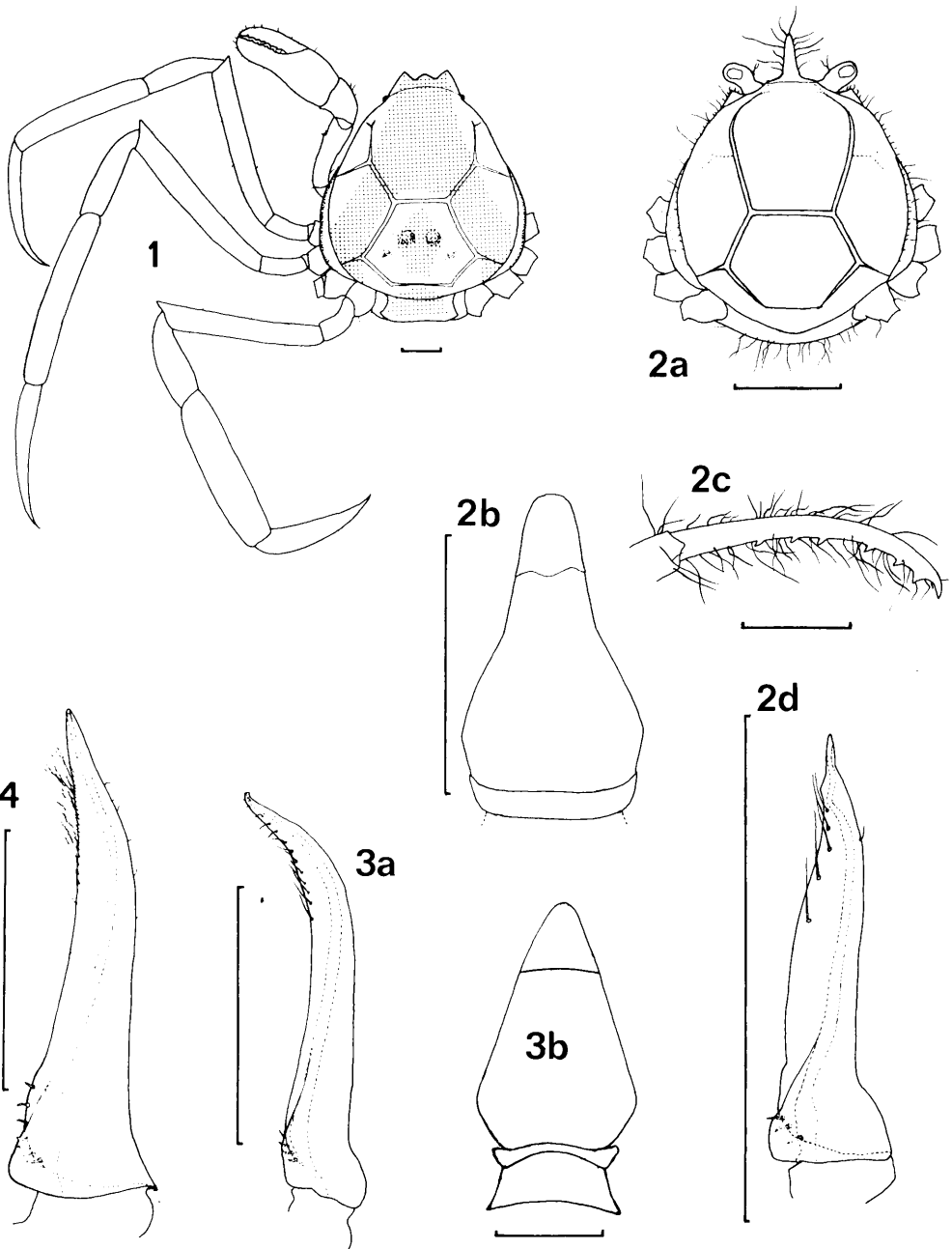
Murray River, north of Cardwell, NE Queensland, 17.v.1978, P. Davie, 2 immature ♀♀ (2.3, 2.5 mm), south bank, downstream from Tomahawk Bend, thick mud (QM W7803).

DIAGNOSIS

Carapace subcircular, lateral carapace walls without spines; rostrum consisting of three separate spinelike lobes, fringed with short setae, lateral lobes well spaced from medial lobe, pointing slightly upward, medial lobe longest, pointing forward; walking legs not laterally compressed, dactyli without subterminal teeth; male 1st pleopod with thin terminal portion short and terminating bluntly.

DISTRIBUTION

Northern Queensland, from Ross River to Weipa.



FIGS. 1-4: 1. *Elamenopsis thorsbornei* n. sp., dorsal view, Holotype; 2. *E. minima* n. sp., (a) dorsal view, Holotype (b) male abdomen (not including first segment), Paratype (c) dactyl of third walking leg, Paratype (d) first male pleopod (lateral view of right side of right pleopod), Paratype; 3. *E. torrensica*, (a) first male pleopod (b) male abdomen; 4. *E. octagonalis*, first male pleopod. Scales: 1, 2a, 3b = 1 mm; 2b, c, d, 3a, 4 = 0.5 mm.

Elamenopsis torrensica Lucas 1980

(Fig. 3a, b)

Elamenopsis torrensica Lucas, 1980, p. 194-5, figs. 4B, 6Q.

MATERIAL EXAMINED

Field Island, mouth of South Alligator River, Northern Territory, 3.iii.1979, P. Davie, ♂ (c. 2.2 mm), ♀♀ (2.8, 2.8 mm), in coral rubble on sandy mud flat in front of mangroves (QM W8965).

DIAGNOSIS

Carapace approximately octagonal; lateral carapace walls without spines or crests; rostrum consisting of three rounded lobes which are narrow and separate, without fringing setae, lateral lobes well spaced from medial lobe, pointing slightly upward, curving slightly inward, medial lobe longest, pointing forward; walking legs not laterally compressed, dactyli with one subterminal tooth.

DISTRIBUTION

Northern Australia (known only from Torres Strait, and Field Is., N.T.).

REMARKS

This species was previously known only from the female type specimen. Thus these specimens provide details of male morphology and further details of female morphology for specimens which are somewhat smaller than the holotype, although they are also apparently mature individuals.

Male chelipeds c. 1.25 X carapace width, slightly longer and slightly more inflated than chelipeds of ♀♀ in this sample, fingers with three low teeth on each cutting edge; walking legs slender and elongate, length of walking leg 2 c. 3 X carapace width in ♂ and c. 2.5 X carapace width in ♀♀; ♀ abdomen with tuft of long setae at abdominosternal junction, suture between segments 4 and 5 visible; ♂ abdomen typical of genus, segment 2 short, fused article of segments 3-5 expanding proximally to widest point of abdomen and then tapering to telson, telson approximately equilateral triangular with rounded apex and tuft of setae (abdomen somewhat distorted in this specimen); ♂ 1st pleopod moderately slender, distally curved towards sternum, with narrow upturned apex, with row of short setae on sternal side distally.

Elamenopsis thorsbornei n. sp.

(Fig. 1)

MATERIAL EXAMINED

HOLOTYPE: Murray River, north of Cardwell, North Queensland; 19.v.1978, P. Davie and P. Shanco, ovigerous ♀ (4.8 mm, three walking legs detached), sieved from sloppy mud at edge of mangroves, north bank near mouth. (QM W7804).

DIAGNOSIS

Carapace approximately ovate, dorsal surface with four tubercles in cardiac region, no tubercles in gastric region; lateral carapace walls without spines; rostral lobes fused except for tridentate terminal portion of three obtuse angles, medial lobe projecting forward, lateral lobes longer and broader than medial lobe, upturned distally; carpus and propodus of 3rd and 4th walking legs flattened and broad, propodus of 4th walking leg about one quarter as broad as long.

DESCRIPTION

(Based only on female holotype). Carapace width 4.8 mm, carapace length 5.1 mm (without rostrum), 5.35 mm (with rostrum); dorsal carapace surface finely granular, with convex gastric, cardiac and branchial regions, cardiac region with four tubercles, one tubercle each side of midline and a smaller tubercle posterolateral to it; rim of dorsal carapace surface elevated, except across base of rostrum; anterolateral and posterolateral carapace angles rounded obtuse and little indicated; gastroducardiac, thoracic, cervical and contiguous grooves well defined; branchiostegites sloping out slightly towards leg bases; margin of rostrum with fine serrations; eyes short, almost completely obscured in dorsal view by carapace; postocular lobes small, acute; antennules, when unflexed, reach to anterior of rostrum, basal segment very stout with a strong anterolateral lobe fringed with setae; interantennular septum prominent, very broad at base, extending forward beyond basal antennular segment to meet rostral keel; rostral keel moderate, extending to base of medial rostral lobe; antennal spines small, sited posterolateral to bases of antennae; pterygostomial region with strong dorsal ridge; mouth-frame with strong anterolateral ridge.

Third maxillipeds with strong setae along inner edges of ischium and merus and arising from a medial longitudinal ridge on ischium, ischium with prominent anteromedial lobe, palp extending to ischio-merus junction, exopodite conspicuous, epipodite prominent in strongly arched Milne-Edwards aperture; female chelipeds c. 6 mm long,

little stouter than walking legs, maximum depth of propodus 1.1 mm; fingers curved, meeting distally, each with five low teeth in gape; walking legs long, 2nd walking legs longer than 3 X carapace width, ischium and merus not flattened, merus with short terminal spine, carpus and propodus flattened and broadened, especially in 3rd and 4th walking legs, dactyli tapering to simple point, without teeth, dactyli more slender and curved on 1st and 2nd walking legs.

Abdominosternal region typical of *Elamenopsis* females, pleopods absent, eggs apparently brooded within abdomen and cephalothorax cavities, segment 2 of abdomen very short, segments 3–5 fused, telson also possibly fused (not clearly indicated); eggs c. 0.32 mm diameter; genital apertures subcircular, sited on sternum between bases of 1st walking legs.

Body coloured very light brown with brown stripes (alcohol preserved specimen), brown stripes extend laterally on each side of the dorsal carapace surface, meeting in the frontal and gastrocardiac regions in a somewhat A-shaped configuration, another brown stripe in midline of cardiac region, another brown stripe on each lateral carapace wall extending from eye along and above leg bases; setation minimal, present on mouthparts and antennules, scattered on chelipeds, and fringing abdomen.

DISTRIBUTION

Murray River, NE.Q.

REMARKS

E. thorsbornei is most closely related to the other *Elamenopsis* taxa with tubercles on the dorsal carapace surface, i.e. the *E. tuberculata* complex, *E. t. tuberculata* (Chopra and Das) from southern India, *E. t. attenuipes* (Chopra and Das) from southern India and *E. t. pageti* (Pretzmann) from Sri Lanka; these may be three species rather than three subspecies (Lucas, 1980). Apart from tubercles, these taxa share other important features: (i) rounded (not angular) carapace form; (ii) dactyli of walking legs without teeth; (iii) rostrum trilobate but short and with lateral lobes broader than the medial lobe; (iv) walking legs with compressed segments.

E. thorsbornei is readily distinguished from the *E. tuberculata* taxa in having no spines on the lateral carapace walls, no tubercle in the gastric region and a different pattern of tubercles in the cardiac region of the carapace, a rostrum with greater fusion of the lobes, and very unequal compression of the segments within each leg and between legs.

We suggest that the non-tuberculate species most closely related to *E. thorsbornei* and *E. tuberculata* are: *E. demeloi* (Kemp) which has all the above features (i–iv); *E. ariakensis* (Sakai) which has all the above features except possibly the walking legs which Sakai (1969) describes as “stout,” and which may be compressed (see Sakai, 1969, text figure 2); and *E. frontalis* n. sp. which has all the above features except (ii), the absence of dentition on walking leg dactyli. This suggestion is contrary to Chopra and Das (1930) and Pretzmann (1975), who placed *E. tuberculata* with *E. woodmasoni* (Alcock), *E. alcocki* (Kemp) and *E. kempii* (Chopra and Das) on the basis of one character: presence of spines on the lateral carapace walls.

Two other species, *E. lineata* and *E. (?) palawanensis* Serene (see Lucas, 1980), have laterally compressed legs. They have quite different rostra to *E. thorsbornei* and differ from it in various other features, suggesting no close affinity.

E. thorsbornei may be unique among hymenosomatids in having a pattern of stripes on the carapace. The positioning of stripes on the holotype of *E. thorsbornei* suggests a regular pattern and it remains to be seen whether further collections confirm the stripes as characteristic of the species. Most hymenosomatids are a uniform cryptic colour and in the case of *Elamenopsis* species, which usually live on muddy substrates, the colour is usually dull brown. In one other *Elamenopsis* species, *E. introversa* (Kemp), two specimens were noted to have markings ‘somewhat like a fleur-de-lys’ (Kemp, 1917). Some *Haliscarcinus* species are multi-coloured, but these have patches of colour of variable pattern rather than clear stripes.

The holotype was collected during an Australian Littoral Society/Queensland Museum survey of Murray River and this species is named after Arthur and Margaret Thorsborne who own a property near Murray River and who greatly assisted members of the survey.

Elamenopsis hirtirostris n. sp.
(Fig. 5a—e)

MATERIAL EXAMINED

HOLOTYPE: Daintree River, North Queensland, 13.ix.1976, R.G. Pearson and L.K. Penridge, ♂ (3.0 mm, one walking leg lost), collected in artificial substrate traps (QM W9096).

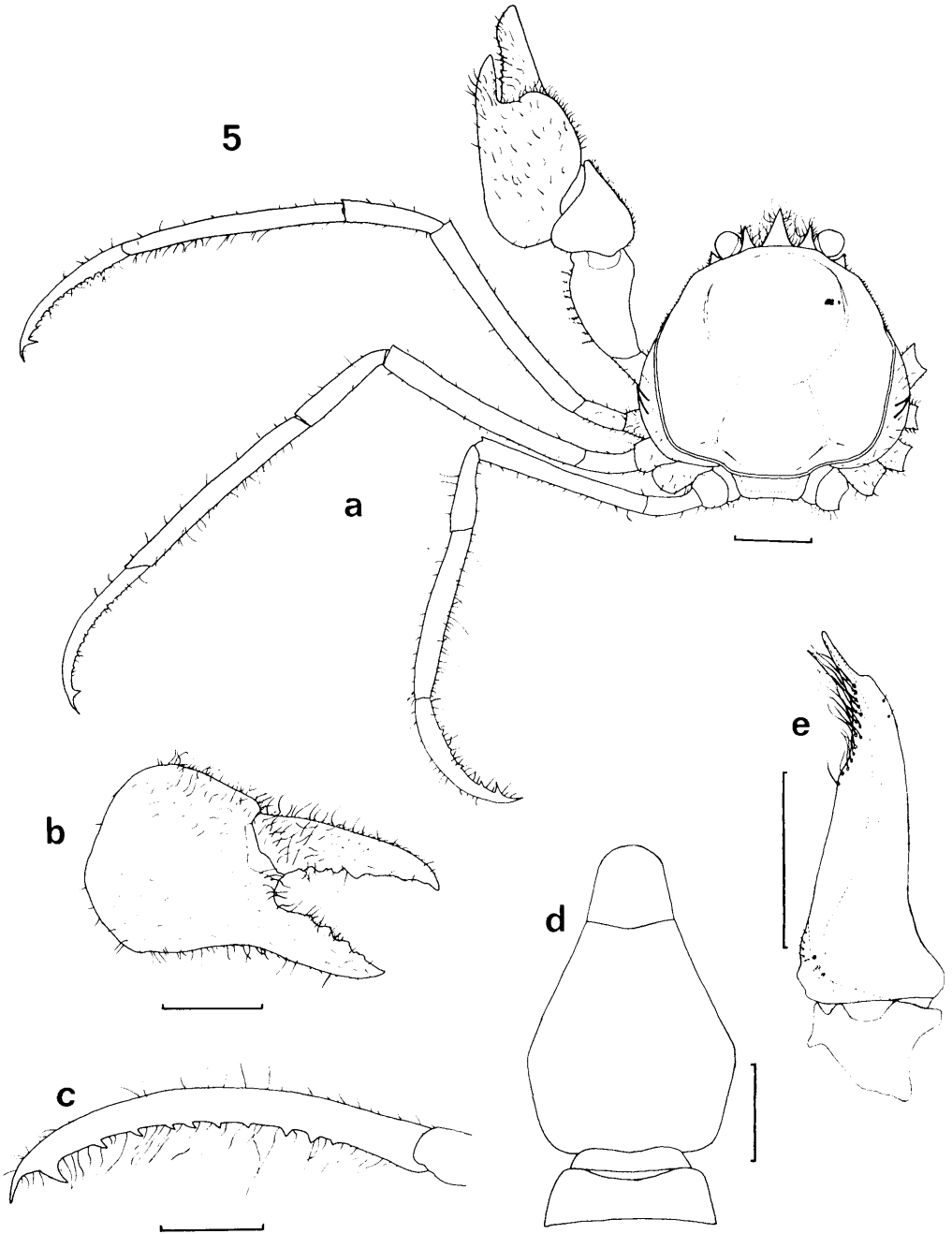


FIG. 5: *Elamenopsis hirtirostris* n. sp., Holotype, (a) dorsal view (b) left chela (c) dactylus of third walking leg (d) male abdomen (e) first male pleopod (lateral view of right side of right pleopod). Scales: a, b = 1 mm; c, d, e = 0.5 mm.

PARATYPES: Daintree River, North Queensland, 13.ix.1976, R.G. Pearson and L.K. Penridge, 3 ♀♀ (3.4–3.5 mm), collected in artificial substrate traps (QM W9097); Daintree River, North Queensland, 30.v.1977, R.G. Pearson and L.K. Penridge, ♂ (2.9 mm), benthic sample using net (QM W9098); Daintree River, 22.xi.1976, R.G. Pearson and L.K. Penridge, ovigerous ♀ (3.0 mm), 2 immature ♀♀ (1.3, 1.6 mm), juvenile (0.9 mm), collected in artificial substrate traps (JCU).

DIAGNOSIS

Carapace subcircular; lateral carapace walls with a spine below carapace rim, above base of 1st walking leg; rostrum consisting of three separate spine-like lobes, lobes fringed with setae which are longest and most dense on medial lobe, rostral region densely setose, lateral rostral lobes well spaced from medial lobe, pointing distinctly upward, medial lobe longest, pointing forward, arising distinctly below carapace rim; walking legs not laterally compressed, dactyli with a subterminal tooth and c. 8 recurved teeth spaced along ventral edge; male 1st pleopod with a distinct thin terminal portion tapering to a point, distal portion with row of setae on sternal side.

DESCRIPTION

Ratio of carapace width to carapace length (including rostrum) 0.93 (♀♀) and c. 1.00 (♂♂); dorsal carapace surface approximately flat, with gastric, cardiac and postbranchial regions convex; gastroduodenal, cervical and thoracic grooves well defined, contiguous grooves weak; branchiospiracles sloping out slightly towards leg bases; anterolateral and posterolateral carapace angles rounded obtuse; rostral region densely setose with long setae arising from undersurface of medial rostral lobe and from carapace wall between rostral lobes, in addition to fringing setae on rostral lobes; eyes short, outreached anteriorly by lateral rostral lobes, cornea fully visible in dorsal view; postocular lobes small and acute; antennules longer than rostrum when unflexed, basal segment with acute lateral lobe bearing setae (adding to setation of rostral region); antenna with long flagellum; interantennular septum prominent, extending to base of medial rostral lobe; no rostral keel; no antennal spine; pterygostomial region with strong dorsal ridge.

Ischium and merus of 3rd maxilliped with strong setae along inner edges, ischium with distinct anteromedial lobe, palp stout, not reaching ischio-merus junction, exopodite and epipodite conspicuous; length of male chelipeds

greater than 1.5 X carapace width, much stouter than walking legs, propodus especially inflated and expanded ventrally, merus with small tooth on ventral surface near outer-distal edge, fingers slightly curved, meeting distally, fingers each with c. 4 irregular teeth, chelipeds of holotype male quite setose, especially on dorsal margin of carpus, outer surface of propodus and fingers; length of female chelipeds c. 1.2 X carapace width, female chelipeds stouter than walking legs but much smaller and less setose than male chelipeds, fingers meeting along most of length, each with c. 4 low teeth; walking legs long and slender, length of 2nd walking leg almost 2.5 X (♀♀) to almost 3 X (holotype ♂) carapace width, dactyli slender and curved distally, with a subterminal tooth and c. 8 recurved teeth along ventral edge, walking legs setose, especially on ventral surface of propodus and dactylus.

Female abdominosternal region without pleopods, typical of *Elamenopsis* species, segments 1 and 2 short, segments 3–5 fused, making major part of abdomen, telson short, broad and arcuate; female genital apertures oval, with raised anterior rim, sited on sternum just posterior to bases of chelipeds; male abdomen with segments 1 and 2 short, fused article of segments 3–5 expanding to maximum abdomen width then tapering uniformly to telson, telson trapezoidal with rounded distal angles; male 1st pleopods little curved, moderately stout, with a distinct thin terminal portion tapering to a point, and projecting towards sternum, with a row of setae subterminally on sternal side and several small curved setae distally on abdominal side of pleopod.

Body colour light brown to brown (alcohol preserved specimens); body setose with short setae on dorsal carapace surface and long setae on lateral carapace walls, sternum, chelipeds, walking legs and abdomen; some plumulose setae around posterior of body, proximal segments of walking legs and outer surface of chelae of large male tending to accumulate silt particles and taking on a clubbed appearance; mature females 3.4–3.5 mm carapace width; males 2.9 and 3.0 mm carapace width with inflated chelae.

DISTRIBUTION

Daintree River, NE. Queensland.

REMARKS

E. hirtirostris belongs with the large group of *Elamenopsis* species which have a subcircular carapace, short tripartite rostrum of narrow lobes and long, unflattened legs. These species are

mutually distinguished by features such as the form of the rostral lobes and their degree of fusion, development of body spines, and armature of the walking leg dactyli. *E. hirtirostris* is most similar to *E. octagonalis* (Kemp). It is most clearly distinguished from *E. octagonalis* by its series of recurved teeth spaced along the walking leg dactyli; *E. octagonalis* has only a subterminal tooth and some serrations on the ventral surface of the dactylus in some specimens. (The row of teeth on the dactylus also distinguishes *E. hirtirostris* from the other similar *Elamenopsis* species reported from Australia, *E. aspinifera* Lucas and *E. torrensica* Lucas). Other features in which *E. hirtirostris* differs from *E. octagonalis* are: less angular carapace shape; rostral region more setose, with a tangle of setae rather than the regular fringing setae of *E. octagonalis*; spines on the lateral carapace walls not as long or projecting as vertically; terminal portion of male 1st pleopod thinner, more pointed and more distinct from shaft of pleopod (cf. Fig. 5e to Fig. 4) and greater setation, including presence of 'clubbed' setae.

The name *hirtirostris* (Latin, feminine) refers to the 'hairy' rostral region.

Elamenopsis minima n. sp.
(Fig. 2a-d)

MATERIAL EXAMINED

HOLOTYPE: Calliope River, SE.Q., July 1979, P. Saenger, ♀ (2.4 mm, specimen with only left cheliped and right walking leg 2 present, one detached walking leg with specimen), (QM W8848).

PARATYPES: Same locality as holotype; Feb. 1977, P. Saenger, 3 ♂♂, ovigerous ♀, immature ♀ (1.0—1.7 mm, all specimens without limbs, some detached walking legs and chelipeds present), (QM W8847); July, 1979, P. Saenger, 2 immature ♀♀ (1.6, 1.8 mm, larger specimen with only right cheliped attached, other specimen without limbs, some detached walking legs and cheliped present), (QM W8849).

DIAGNOSIS

Carapace approximately ovate; lateral carapace walls without spines; rostrum consisting of one long thin lobe, tip of rostrum rounded, often with two long and two very long forward projecting setae; walking legs not laterally compressed, dactyli with 2-7 recurved teeth along ventral edge; females mature at c. 2.0 mm carapace width.

DESCRIPTION

Ratio of carapace width to carapace length (including rostrum) 0.77-0.79 (♂♂), 0.80-0.84 (immature ♀♀), 0.85-0.86 (mature ♀♀); carapace width to length (excluding rostrum) ratio c. 1.0; dorsal carapace surface irregular, with convex gastric and cardiac regions; gastroduodenal, cervical and thoracic grooves strong, contiguous grooves weaker; lateral carapace walls sloping out to leg bases; carapace angles not indicated or posterolateral angles slightly indicated and rounded obtuse; rostrum arising well below carapace rim, moderately upturned with a row of well spaced setae along each lateral edge and ventrolaterally; eyestalks moderately long, tending to curve laterally, completely visible in dorsal view; postocular lobes prominent; antennules completely visible in dorsal view, basal segment long and stout and reaching to about half rostral length, basal segment with setae on distolateral edge, antennules terminating in two simple rami with a tuft of stout setae arising between rami (not from rami); antennae long; interantennular septum extending to base of rostrum; rostrum consisting of one long thin lobe, tip of rostrum rounded and often with two long and two very long setae arising from it and projecting forward, no rostral keel; no antennal spines; epistome short laterally, but longer medially due to projection forward between antennules and down into mouthfield.

Third maxilliped palp reaching ischio-merus junction, exopodite prominent; female chelipeds stouter than walking legs but not much inflated, cheliped length c. 1.4 X carapace width, fingers curved distally, meeting along most of length with low serrations along cutting edges (no male specimens with chelipeds attached); legs slender, length of walking leg 2 of holotype 2.35 X carapace width, dactyli curved with longer recurved teeth distally.

Female abdominosternal region typical of *Elamenopsis* species, fused segments 3-5 constitute all of ventral portion of abdomen; telson small, rather transversely rhombic; eggs c. 0.25 mm diameter, c. 20 eggs visible in abdomen and cephalothorax of 1.7 mm ovigerous female; male abdomen with segments 1 and 2 short, article of fused segments 3-5 expanding to widest point of abdomen then tapering to telson, telson apparently fused with segments 3-5 with suture evident, telson rounded terminally; male 1st pleopods moderately stout and straight (see Remarks) distally tapering to a distinct thin terminal portion, with c. 5 setae distally along sternal edge and several short setae distally on abdominal edge.

Body coloured yellow to pale brown (alcohol preserved specimens); long setae scattered over body, most abundant on lateral and posterior carapace regions and on legs; mature females 1.7 and 2.4 mm, largest immature female 1.8 mm; largest male 1.3 mm.

DISTRIBUTION

Calliope River, Central Queensland.

REMARKS

Three other species of *Elamenopsis* have single lobed rostra. Two of these, *E. lineata* and *E. inermis* (Takeda and Miyake), have a short deflexed rostrum and in this and other morphological features they do not appear to be closely related to *E. minima*. The other species, *E. nasalis* (Kemp), has a similar rostrum to *E. minima* though shorter, and its atypical frontal region, with very exposed eyestalks and antennules, is also in common with *E. minima*. Other features which these species share are general carapace shape, slender uncompressed legs, absence of spines on lateral carapace walls and general setation. *E. minima* differs from *E. nasalis* in having a longer rostrum, long terminal setae on the rostrum, prominent postocular lobes, an interantennal septum, at least two teeth and often a row of teeth on the dactyli of walking legs, and a typical male abdomen. The male abdomen in *E. nasalis* is unusually broad, the fused article of segments 3–5 being broader than long, and there is a large tubercle distally. Since shape of the male abdomen reflects the form of the 1st pleopods it is quite possible that *E. nasalis* has atypical male 1st pleopods. Those of *E. minima* are quite typical of *Elamenopsis* males. The 1st pleopod illustrated in Fig. 2d is from a male which is considerably smaller than the largest female and may represent a fairly immature condition.

The ovigerous female paratype of *E. minima*, 1.7 mm carapace width, is the smallest mature female reported for any hymenosomatid species and also probably the smallest mature female crab, free living or commensal, that has been reported. R.G. Hartnoll (pers. comm.) comments 'The only cases I can think of which might dispute the claim [that *E. minima* is the smallest crab species] are some of the very sexually dimorphic hapalocarcinids. The females are not as small, but the mature males are of the order of 1 mm.' Hymenosomatids in general are amongst the smallest brachyurans and there are species of *Elamena*, *Elamenopsis* and *Halicarcinus* which mature at less than 3 mm carapace width;

however, *Halicarcinus keijibabai* (Takeda and Miyake) is the only other species for which a mature female less than 2 mm carapace width has been found.

The name *minima* (Latin, feminine) refers to the very small size of this species.

Elamenopsis frontalis n. sp.
(Fig. 6)

MATERIAL EXAMINED

HOLOTYPE: North Mossman River, North Queensland; 25.v.1977, R.G. Pearson and L.K. Penridge, ♀ (3.4 mm, right cheliped and a walking leg lost), collected in an artificial substrate sampler (QM W9095).

DIAGNOSIS

Carapace oval, broader than long, ratio of carapace width to length (without rostrum) less than 1.2; frontal region distinguished by being somewhat extended forward; rostral lobes unfused, medial lobe small, triangular and not deflexed, lateral lobes very short and extending around curved edge of frontal region; merus of walking legs laterally compressed, dactylus with a strong subterminal tooth, walking legs with numerous long setae along ventral edges of segments from merus to dactylus.

DESCRIPTION

(Based only on female holotype). Ratio of carapace width to length 1.19 (with rostrum) and 1.14 (without rostrum), dorsal carapace surface with convex gastric, cardiac and branchial regions; carapace rim elevated; gastrocervical, thoracic and cervical grooves deep, contiguous grooves extending to carapace rim, cardiac region strongly indicated by grooves; branchiostegites nearly vertical, bulging slightly; anterolateral angles rounded obtuse, well forward, posterolateral angles not indicated; rostral lobes fringed with setae; eyestalks short, somewhat bent laterally; postocular lobes with small points; antennules of moderate length, visible in dorsal view, basal segment with setose lateral lobe, peduncle of two segments; antenna with long flagellum; interantennular septum broad and strong, reaching rostrum; no rostral keel or antennal spines; pterygostomial region plain.

Third maxillipeds well separated medially, palp stout, barely reaching ischio-merus junction, exopodite largely concealed; length of chelipeds c. 1.2 X carapace width, merus stouter than largest walking leg merus, propodus slightly inflated,

fingers meeting along length, with interlocking teeth, c.4 teeth per finger, fingers curved slightly distally; length of walking legs c. 1.8 X carapace width, legs moderately stout, laterally compressed, but not strongly so, lateral compression most evident in merus segment, dactylus tapering and curved distally without teeth other than subterminal tooth.

Female reproductive morphology typical of genus, abdominal segments 1 and 2 visible dorsally, fused article consisting of segments 3-5 and also telson which is not differentiated from abdomen, fused article approximately oval, broader than long with rounded point at telson; female genital apertures round, c. 0.15 mm diameter.

Body coloured very light brown (alcohol preserved specimen); quite setose, normal setation on mouth parts and Milne-Edwards apertures, rather plumulose setae in rostral region, at posterior and lateral edges of body and around leg bases, scattered setae on chelipeds, walking legs and abdomen, 2 approximate rows of setae on ventral edges of leg segments; mature female 3.4 mm carapace width.

DISTRIBUTION

North Mossman River, NE.Q.

REMARKS

The female holotype of *E. frontalis* is quite distinct from other Australian species of *Elamenopsis* and most like *E. ariakensis* Sakai, a Japanese species which is commensal with a species of holothurian. The rostra of *E. frontalis* and *E. ariakensis* are similar, although the lobes are not separated in the latter species. In *E. ariakensis* the carapace is broader (carapace width to length ratio c. 1.4) and the frontal region is not produced. The merus segments of walking legs are apparently more compressed in *E. ariakensis* than in *E. frontalis* and in the former the walking leg dactyli do not have any teeth. *E. frontalis* is distinguished from the other *Elamenopsis* species with compressed leg segments i.e. *E. lineata*, *E. demeloi*, *E. tuberculata*, *E. ariakensis* and *E. thorsbornei* by having subterminal teeth on its curved walking leg dactyli. *E. (?) palawanensis* Serene (see Lucas 1980) also has compressed leg segments however Serene's diagnosis and figure are inadequate for showing the presence or absence of subterminal teeth on the walking leg dactylus. It can be separated from *E. frontalis* by its much wider compressed walking legs and the unusually elongate lateral rostral lobes.

The name *frontalis* (Latin, feminine) refers to the prominent frontal region of the holotype.

Amarinus Lucas 1980

Amarinus paralacustris (Lucas 1970)

(Fig. 7)

Halimacarcinus paralacustris Lucas 1970, p. 275-7, figs. 3c, e; 1971, p. 475-82, figs. 3JK, 5EFGH (larval morphology).

Amarinus paralacustris: Lucas 1980, p. 204-5, (part) figs. 4E, 7C, 10A (see Remarks).

MATERIAL EXAMINED

Calliope R., Central Queensland, 9-13. vii. 1976, P. Saenger, ♂ (4.0 mm), 2 immature ♀ ♀ (2.9, 4.2 mm), 14 km from mouth, edge of channel (QM W6812); Burnett R., SE.Q., 20.x.1980, R.G. Pearson and L.K. Penridge, 2 ovigerous ♀ ♀ (5.4, 6.4 mm) from hard substrate (JCU).

DIAGNOSIS

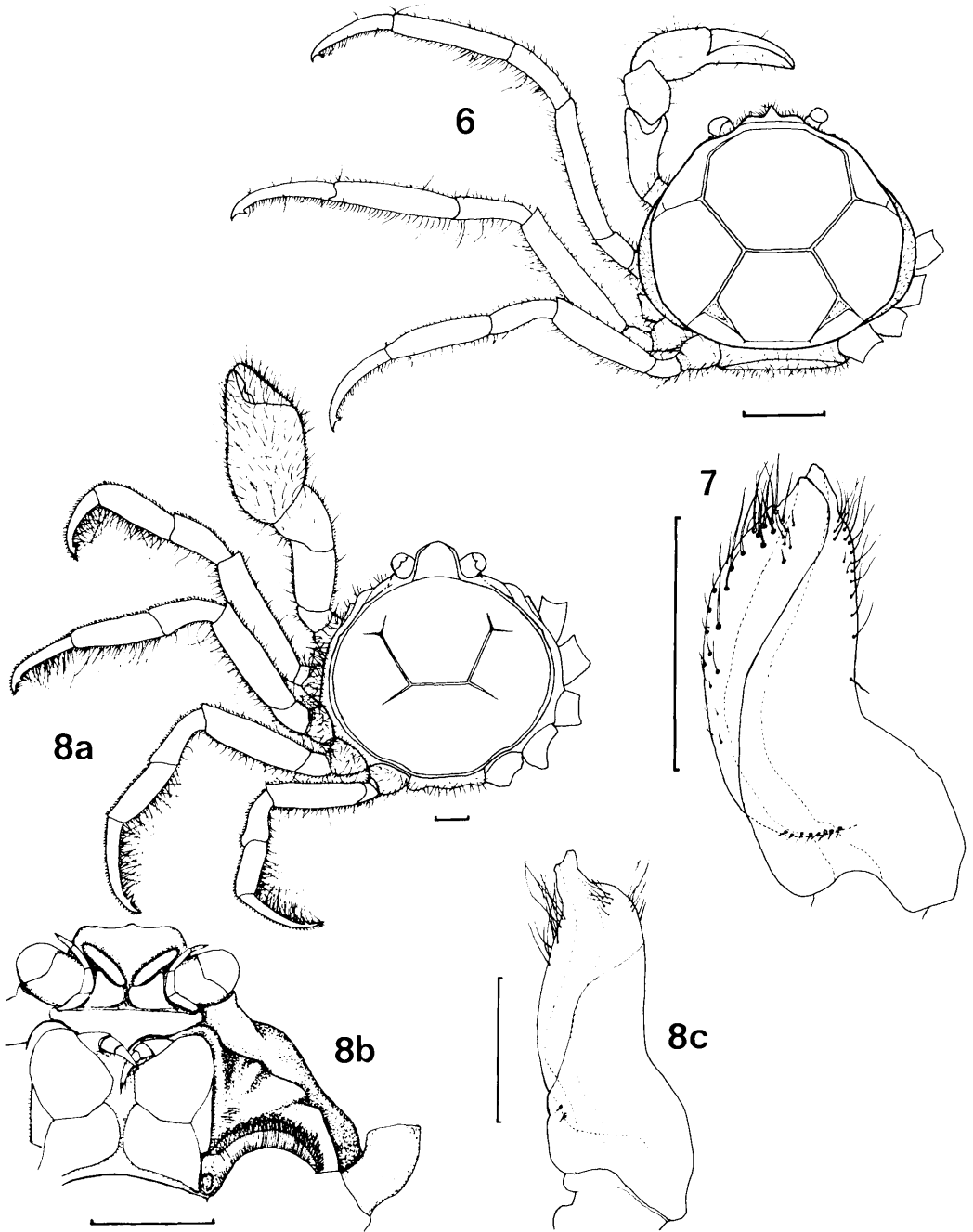
Rarely exceeding 10 mm carapace width; anterolateral carapace margins plain; rostrum meeting but not fused with postocular lobes; antennal spines obtuse and inconspicuous; female genital apertures 0.4-0.5 mm wide with a curved medial prominence; eggs c. 0.35 mm diameter; mean value of breadth/length ratios of inner rami of pleopods c. 0.4; telson length/total abdomen length c. 0.35 in mature females; male first pleopod very stout, tapering to a simple tip.

DISTRIBUTION

Temperate and subtropical eastern Australian mainland, in estuaries along the coast from Anglesea, Victoria, to Calliope R., Central Queensland.

REMARKS

The specimens of *Amarinus* from northern Queensland which Lucas (1980, p.205) provisionally identified as *A. paralacustris* while recognising that these specimens differed in some important respects from the southern specimens, are now recognised as being conspecific with the *A. latinasus* holotype. The most northern locality now known for *A. paralacustris* is Calliope River (24° 00' S) in Central Queensland i.e. *A. paralacustris* has a temperate-subtropical distribution in eastern Australia. *A. latinasus* is a tropical species, known from Herbert River (17° 30' S) and further north. The two species are distinguished by a number of features (Table 1) but most obviously by the female genital aperture and male 1st pleopod.



FIGS. 6-8: 6. *Elamenopsis frontalis* n. sp., dorsal view, Holotype; 7. *Amarinus paralacustris*, first male pleopod (lateral view of right side of right pleopod); 8. *A. latinasus* (a) dorsal view of female (b) pterygostomial region of female (c) first male pleopod. Scales: 6, 8a, b = 1 mm; 7, 8c = 0.5 mm.

The male specimen from Calliope River appears to be at its final instar, although quite small. Its 1st pleopod is figured (Fig. 7) to show the conformity with southern specimens (c.f. Lucas 1980, fig. 10A) and for comparison with the pleopod of *A. latinasus* and *A. lutarius* n. sp.

Amarinus latinasus Lucas 1980

(Fig. 8a-c)

Amarinus latinasus Lucas, 1980 (in part), p. 205-6. Figs. 7D, 9F (see Remarks).

MATERIAL EXAMINED

HOLOTYPE: Johnstone River, NE. Queensland, 30.xi.1972, M. Draper, ♂ (2.0 mm, with abdomen and 1st pleopod detached and mounted on a slide), among *Elodea* at low salinity (QM W4066).

PARATYPES: collection details as for holotype, 3 ♂♂ (1.5, 1.7, 1.9 mm) (QM W9101).

OTHER MATERIAL: Herbert R., NE.Q., 1.vii.1975 — 10.xi.1976, R.G. Pearson, and L.K. Penridge, 4 ♂♂ (1.8-7.3 mm), 6 ovigerous ♀♀ (6.2-7.8 mm), 2 immature ♀♀ (2.4, 6.1 mm), juvenile (1.8 mm), from artificial substrate collectors and drift net (JCU, 7 lots); Herbert R., NE.Q., 3.iv.1976, R.G. Pearson and L.K. Penridge, ♂ (6.1 mm), ovigerous ♀ (6.5 mm), from artificial substrate collector (QM W9100); Murray R., NE.Q., 16.v.1978, R. Timmins, ♂ (4.1 mm), south bank opposite terrestrial patch, Tomahawk Bend, mid-estuary (QM W7802); Murray R., NE.Q., 24.v.1978, P. Davie, 2 immature ♀♀ (4.4, 5.5 mm), muddy-sand substrate, benthic grab sample (QM W7801); South Johnstone R., NE.Q., 28.ix.1976, 26.x.1977, R.G. Pearson and L.K. Penridge, ♂ (2.3 mm), 2 immature ♀♀ (2.2, 5.2 mm), dredge and benthic samples (JCU, 2 lots); North Johnstone R., NE.Q., 11.xi.1975, R.G. Pearson 4 ♂♂ (2.8-5.3 mm), 2 immature ♀♀ (2.2-4.8 mm), found in weedy backwater, near-fresh water, dredge sample, about 5 km from mouth (JCU); North Johnstone R., NE.Q., 26.ix.1976, R.G. Pearson and L.K. Penridge, ♂ (4.5 mm), collected by hand net (JCU); Russell R., NE.Q., 24.ix.1976-20.vi.1978, 16 ♂♂ (1.8-5.4 mm), ovigerous ♀ (4.9 mm), 6 immature ♀♀ (2.2-5.2 mm), dredge and benthic samples (JCU, 4 lots); North Mossman R., NE.Q., 19.xi.1976, R.G. Pearson and L.K. Penridge, ♂ (2.2 mm), benthic sample (JCU); Daintree R., NE.Q., 21.v.1976-30.v.1977, R.G. Pearson and L.K. Penridge, 3 ♂♂ (4.0-5.5 mm), juvenile (2.1 mm), benthic sample (JCU, 3 lots).

DIAGNOSIS

Lateral extensions of rostrum substantially fused with postocular lobes above eyestalks; postocular lobes prominent, developed into acute lobes below carapace rim, not extending back along anterolateral carapace borders; upper ridge of pterygostomial region with lobe near mouth frame in large specimens; male 1st pleopod stout, not tapering, with broad apical region projecting towards sternum; genital apertures of mature females oval without medial prominences; large mature females less than 10 mm carapace width. (Modified from Lucas 1980.)

DESCRIPTION

The following is a redescription of this species necessitated by the removal of the female paratype from the type-series (see Remarks), and from examination of mature male and female specimens.

Carapace subcircular, ratio of carapace width to length (including rostrum) 0.88-1.00, greatest in large specimens; dorsal carapace surface flat to slightly convex, with gastro-cardiac, cervical and thoracic grooves, thoracic grooves short and angled quite laterally; anterolateral angles obtuse, situated well forward, posterolateral angles not indicated; carapace rim often with a series of low vertical prominences, first prominence on anterolateral angle, second and largest prominence on mid-lateral border and up to six small prominences along lateral border; branchiostegites nearly vertical in small specimens, sloping out ventrally near last walking legs in large specimens; rostrum spade-shaped, with rounded obtuse apex; eyes short; antennules largely concealed in dorsal view when flexed; interantennular septum narrow; rostral keel indistinct; antennal spines very small; epistome very short; upper ridge of pterygostomial region prominent with distinct lobe near anterolateral edge of mouth frame in large specimens and prominences on either side of pterygostomial and branchiostegite junction anterior to cheliped bases; Milne-Edwards apertures normal.

Mouth field wider than long, almost completely filled by 3rd maxillipeds; ischium of 3rd maxillipeds shorter than merus along lateral edge, palp not reaching ischio-merus junction, exopodite largely concealed; length of male chelipeds c. 1.33 X carapace width, propodus inflated, without a ventral keel, propodus with dense hairs on outer surface, fingers curved and gaping widely proximally, dactylus with basal tooth in gape, fingers meeting distally with small teeth on

cutting edges, fixed finger slightly angled downward compared to lower edge of palm; length of female chelipeds less than carapace width, propodus only slightly stouter than merus of largest walking leg; length of walking legs c. 1.5 X carapace width ($\sigma\sigma$), slightly greater than carapace width (mature ♀), legs moderately thick, dactyli distinctly more slender than propodi, dactyli little curved, with prominent subterminal tooth and two rows of ventral setae.

Female abdomen oval and convex with two prominent submedial grooves diverging proximally to give a prominent medial portion on segments 1 and 2 in dorsal view, segments 1–5 progressively longer and broader, telson arcuate, c. 0.4 total abdomen length; eggs c. 0.38 mm diameter; segments 1 and 2 of male abdomen shorter and broader than segments 3–5, segments 3–5 of similar length, tapering to telson, telson spade-shaped with broadly rounded apex; male 1st pleopods with small tuft of setae terminally on abdominal side and short setae near apex.

Body coloured light brown (alcohol preserved specimens); setae on mouth parts, Milne-Edwards aperture, walking legs, around edge of female abdomen and on outer side of male propodus; mature females 4.9–7.8 mm, males with inflated chelae 5.1–7.3 mm.

DISTRIBUTION

Northern Queensland, known from Herbert River to Daintree River.

REMARKS

The type-series of *A. latinasus* nominated by Lucas (1980) consisted of the holotype juvenile male and 3 other juvenile males from Johnstone River and an ovigerous female from Weipa. Re-examination of these types and of further specimens of *Amarinus* from northern Queensland has revealed that two species are present. The female specimen has been designated as one of the paratypes of *A. lutarius* n. sp. which is described later in this paper. The original description of *A. latinasus* included features of this female specimen and therefore it was necessary to redescribe the species, as above.

A mature male pleopod (Fig. 8c) has been figured for comparison with the immature holotype, previously figured (Lucas, 1980, fig. 10F).

Amarinus lutarius n. sp.

(Fig. 9a–e)

Amarinus latinasus Lucas, 1980 (in part), figs.

4F, 6G (see Remarks under *A. latinasus*, this paper).

MATERIAL EXAMINED

HOLOTYPE: Murray River, NE. Queensland. 22.v.1978, P. Davie and P. Shanco, ♂ (3.8 mm, right 1st pleopod detached and mounted on slide), seiving at mouth, in front of mangrove island, mud substrate (QM W7800).

PARATYPES: Collection details as for holotype, ovigerous ♀ (3.9 mm) (QM W9631); Murray River, NE.Q., 24.v.1978, P. Davie, 9 ♂ ♂ (1.0–2.6 mm), 4 immature ♀ ♀ (1.7–3.3 mm), 17 juveniles (c. 0.9 mm X), benthic samples (QM W7793–W7799); Herbert River, NE.Q., 2.ix.1976, R.G. Pearson and L.K. Penridge, ♂ (3.9 mm), sand wash (QM W9099); Russell River, NE.Q., 10.xi.1977, R.G. Pearson and L.K. Penridge, 4 ♂ ♂ (1.5–2.6 mm), 2 immature ♀ ♀ (2.8, 3.4 mm), benthic sample (JCU); Weipa, NW.Q., July 1972, W. McCormick, ovigerous ♀ (4.1 mm, all limbs detached), benthic zone in front of mangroves (QM W4065).

DIAGNOSIS

Lateral extensions of rostrum substantially fused with postocular lobes above eyestalks; postocular lobes prominent, level and continuous with carapace rim, extending back along anterolateral carapace borders, so forming a horizontal shield across front of carapace with weakly deflexed rostrum; lateral edges of Milne-Edwards apertures and pterygostomian-branchiostegite junctions far forward of cheliped bases; male 1st pleopod moderately stout, not tapering, with apical region projecting medially, crest-like lobe projecting laterally; genital apertures of mature females oval without medial prominences; mature females less than 5 mm carapace width.

DESCRIPTION

Carapace subcircular, ratio of carapace width to length (including rostrum) 0.90–0.96, greatest in immature female; dorsal carapace surface flat to slightly concave or slightly convex, with gastrocardiac, cervical and thoracic grooves, thoracic grooves short and angled quite laterally; anterolateral angles rounded obtuse, situated well forward, posterolateral angles not indicated; mid-lateral carapace borders slightly indented behind anterolateral angles; branchiostegites vertical; rostrum with obtuse apex in females and small males, apex more elongate and acute in largest male; eyes short; antennules concealed when flexed; interantennular septum thin; no rostral keel; antennal spines very small and obtuse; epistome very short; pterygostomial region

reduced, due to anterior extension of branchiostegite and anterior position of Milne-Edwards aperture, pterygostomian-branchiostegite junction prominent, sited medially between cheliped base and anterolateral edge of mouth frame; anterolateral edges of mouth frame developed into prominences.

Mouth field wider than long, almost completely filled by 3rd maxillipeds; ischium of 3rd maxillipeds shorter than merus along lateral edge, palp short, exopodite largely concealed; length of male cheliped c. 1.25 X carapace width, propodus not strongly inflated, long setae on outer surface, fingers with narrow gape proximally, cutting edges slightly curved without teeth except for elongate low tooth on dactylus in gape; length of female chelipeds subequal with carapace width, propodus little stouter than walking legs, fingers

slightly less than half total propodus length, cutting edges plain; length of walking legs c. 1.75 X carapace width (largest ♂) and c. 1.5 X carapace width (♀ ♀), moderately slender, dactyli slender and tapering, curved distally with subterminal recurved tooth, two rows of long hairs ventrally.

Female abdomen oval and convex, similar to *A. latinasus*; eggs c. 0.35 mm diameter; male abdomen similar to *A. latinasus* but broader distally, telson distinctly wider than long; male 1st pleopod with small tuft of setae subterminally on abdominal side, row of setae on sternal side.

Body coloured light brown (alcohol preserved specimens); setae on mouth parts, Milne-Edwards apertures, walking legs, chelipeds and around edge of female abdomen; mature females 3.9, 4.1 mm, largest male 3.9 mm.

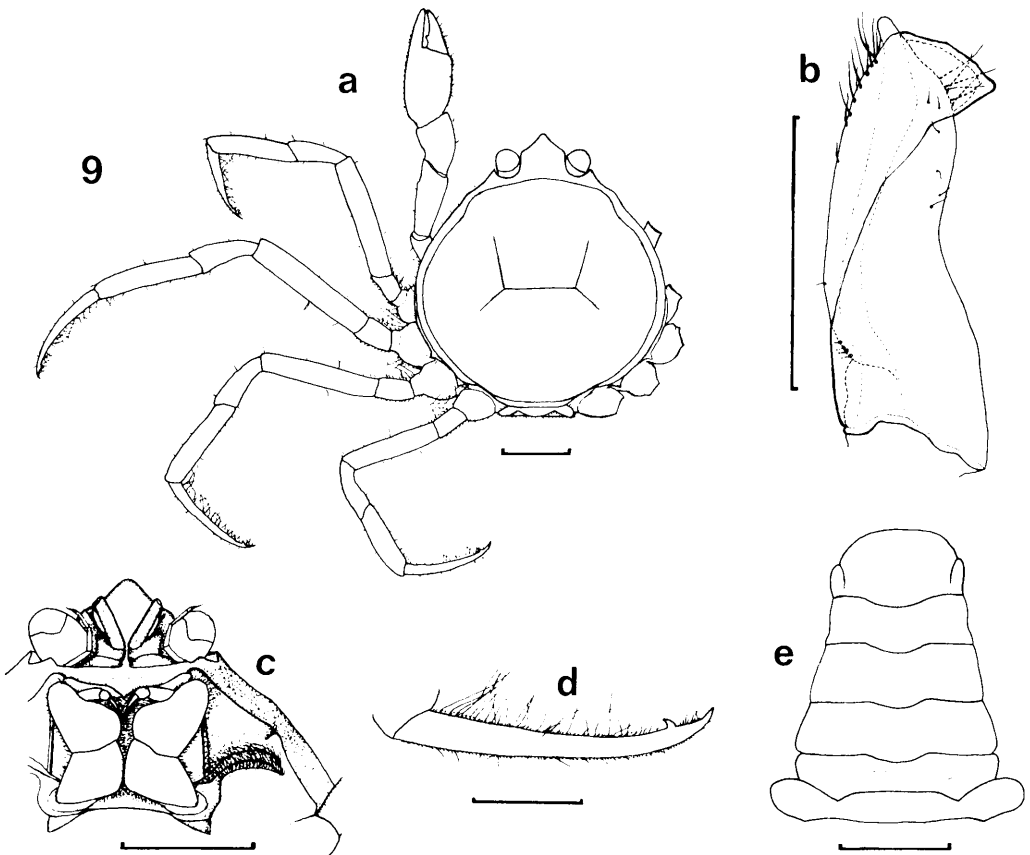


FIG. 9: *Amarinus lutarius* n. sp., Holotype (a) dorsal view (b) first male pleopod (lateral view of right side of right pleopod) (c) pterygostomial region (d) dactylus of third walking leg (e) male abdomen. Scales: a, c, d = 1 mm; b, e = 0.5 mm.

DISTRIBUTION

Northern Queensland, from Herbert River north.

REMARKS

A. lutarius has some unusual features which distinguish it from other *Amarinus* species: broad postocular lobes, reduced pterygostomial region and crested male 1st pleopod. It is most similar to *A. paracacustris* and *A. latinasus* and differences between these three species are summarised in Table 1. It is the smallest of the *Amarinus* species judging from the sizes of mature specimens so far collected.

A. lutarius and *A. latinasus* are both northern Queensland species and they are known to co-occur in three estuaries, the Herbert, Murray and Russell Rivers.

The name *lutarius* (mud dwelling; Latin, masculine) refers to the habitat of the type specimens.

Amarinus laevis (Targioni Tozzetti 1877)

Hymenosoma laeve Targioni Tozzetti, 1877, p.179–82, pl. 11 figs. 3a–e. (fig. 3d is incorrectly labelled 5d).

Amarinus laevis: Lucas, 1980, p.199–201, figs. 4C, 7A, 10D.

For full synonymy see Lucas, 1980.

MATERIAL EXAMINED

Corio Bay, north of Yeppoon, ME.Q., July 1974, R. Timmins, ♂ (12.8 mm), ovigerous ♀ (11.2 mm), (QM W4767). Mary River, S.E.Q., 17.x.81, N.L. Bruce and J. Fields, mud/gravel, c. 5–10 m depth, immature ♀ (6.4 mm) (QM W9745). Mary River, mouth of Tinana Ck., SE.Q., 15.x.81, N.L. Bruce, 2 ♂♂ (5.9, 6.9 mm) (QM W9746).

DIAGNOSIS

Mature specimens rarely less than 10 mm; males and females up to 22 mm and 18 mm respectively;

TABLE 1. MORPHOLOGICAL DIFFERENCES BETWEEN *AMARINUS PARACACUSTRIS*, *A. LATINASUS* AND *A. LUTARIUS* N. SP.

	<i>A. paracacustris</i>	<i>A. latinasus</i>	<i>A. lutarius</i> n. sp.
Thoracic grooves	typical	short, angled laterally	short, angled laterally
Lateral extensions of rostrum	meeting post-ocular lobes	fused with postocular lobes	fused with postocular lobes
Rostrum of large males	obtuse apex	obtuse apex	acute or near acute apex
Postocular lobes	acute lobe below carapace rim, not extended	acute lobe below carapace rim, not extended	level and continuous with carapace rim, extended along antlat. carapace borders
Mid-lateral carapace border	not indented	not indented, prominence	slightly indented behind antlat. angle
Pterygostomial region	plain	lobe near mouth frame	reduced
Milne-Edwards apertures	typical	typical	very anterior
Walking legs	moderately stout	moderately stout	more slender and slightly longer
Female genital apertures	with medial prominence	without medial prominence	without medial prominence
Male telson	length and width subequal	length and width subequal	length distinctly shorter than width
Male 1st pleopods	very stout, with terminal point	stout, with apex projecting towards sternum	moderately stout, with apex projecting medially and terminal crest
Carpus of male cheliped, ventral edge	with one or more large crenulations	without crenulations	without crenulations
Fixed finger of male cheliped, compared to ventral edge of propodus	angled distinctly downward	angled slightly downward	approximately parallel

anterolateral carapace margins without a row of teeth or thin spines; antennal spines acute and prominent; male 1st pleopod not tapering at apex, apex complex, with several lobes and tufts of setae; propodus of chela very deep in large males, with knife-edge ventrally and large pulvinus (a sac arising between the bases of the fingers).

DISTRIBUTION

Essentially a temperate species, stretching from Moore River in Western Australia around the southern coast, although penetrating subtropical Queensland waters to Corio Bay near Yeppoon, ME.Q.

REMARKS

Previously only known as far north as the Brisbane River, these records extend the known distribution considerably.

DISCUSSION

The known distributions of hymenosomatids in Queensland estuaries and tidal mud flats are summarised in Table 2. However, because the nineteen localities listed have not been sampled with equal intensity and because they represent

only a small percentage of the suitable localities, the distributions indicated are only approximate. Species are listed in Table 2 according to latitudinal distribution and three patterns are evident:

1. temperate to subtropical species;
2. temperate to tropical species;
3. tropical species.

In the first category are four species, *Elamenopsis octagonalis*, *Amarinus laevis*, *Hymenosoma hodgkini* and *A. paralacustris*. The last three occur in estuaries and embayments all along the temperate eastern coast of mainland Australia, extending north into southern Queensland. *E. octagonalis* appears to be localised in distribution as it is only known in Queensland from Moreton Bay. This being the case, it is improbable that the Moreton Bay specimens are conspecific with the holotype from Mormugao Bay, India, the only other specimen reported. Lucas (1980) found only small differences between the Moreton Bay specimens and the holotype description of Kemp (1917) but was not prepared to give them separate taxonomic status on the basis of available morphological data.

TABLE 2: RECORDS OF HYMENOSOMATIDS FROM QUEENSLAND ESTUARIES AND TIDAL MUD FLATS. a — from Lucas (1980).

Species	COASTAL REGIONS AND LOCALITIES																		
	Southern		Central						Northern					Gulf					
	Moreton Bay	Brisbane R.	Mary R.	Susan R.	Bogimbah Ck.	Burnett R.	Kolan R.	Calliope R.	Corio Bay	Ross R.	Herbert R.	Murray R.	Johnstone Rs.	Russell R.	Trinity Inlet	N. Mossman R.	Daintree R.	Thursday I.	Weipa
<i>Elamenopsis octagonalis</i>	X ^a																		
<i>Amarinus laevis</i>	X ^a	X ^a	X					X											
<i>Hymenosoma hodgkini</i>	X ^a				X	X	X												
<i>Amarinus paralacustris</i>		X ^a			X	X	X												
<i>Halicarcinus bedfordi</i>	X ^a		X	X	X		X		X ^a						X				X ^a
<i>Elamenopsis lineata</i>	X ^a						X		X		X			X					X ^a
<i>Elamenopsis minima</i>								X											
<i>Elamenopsis aspinifera</i>									X ^a	X									X ^a
<i>Amarinus latinasus</i>										X	X	X	X		X	X			
<i>Amarinus lutarius</i>										X	X		X						X
<i>Elamenopsis thorsbornei</i>											X								
<i>Elamenopsis frontalis</i>															X				
<i>Elamenopsis hirtirostris</i>																X			
<i>Elamenopsis torrensica</i>																	X ^a		
Species Totals	5	2	1	1	1	3	1	5	1	3	2	5	1	2	2	2	2	1	4

In the second category, species occurring at all Queensland latitudes, are *Halicarcinus bedfordi* and *Elamenopsis lineata*. Their distributions extend beyond Queensland waters into Western Australia for the former species, and into northern New South Wales, New Caledonia and the Philippines for the latter species.

The remaining eight species make up the category of tropical species, with *Elamenopsis minima* being marginal. On present knowledge all are endemic to Queensland except for *E. torrensica*, the most northern species, which is known both from Torres Strait and Arnhem Land. Four species, *Amarinus latinus*, *A. lutarius*, *E. torrensica* and *E. aspinifera*, have more or less extensive distributions while the other four *Elamenopsis* species are known only from single localities.

Although fourteen hymenosomatid species have now been reported from Queensland estuaries and adjacent localities, no more than five species have been collected from any one locality (Table 2). While recognising the geographical separation of temperate-subtropical and tropical species, this is only part of the explanation. The question arises as to whether the low numbers of species per locality reflect inadequate collecting or real differences in species complements at different localities? Inter-locality differences in species complements may result from:

1. different environmental conditions prevailing at those localities;
2. competition between species with broadly overlapping niche requirements;
3. limited capacities of some species to locate all suitable localities, which are discontinuous along the coast, or to recolonise localities where populations have been lost due to unfavourable conditions such as persistent low salinity — this limited capacity resulting from the low fecundity and limited larval dispersal characteristic of these species.

Unfortunately we know nothing about the habitat requirements of most of these hymenosomatid species, whether they have broad requirements or occupy quite specific niches, so it is not possible to assess the features of various localities in terms of their suitability for each hymenosomatid species.

In revising the family *Hymenosomatidae* Lucas (1980) recognised 64 species and this number is now raised to 69 with the descriptions of 5 new species in this paper. *Elamenopsis*, the largest of the ten hymenosomatid genera, is further enlarged and now contains 21 species. The genus *Amarinus* now contains eight species, five of them occurring

in Australia. Because the Australian species of *Amarinus* are alike in general appearance, causing confusion in the past, and because of changes to the description of *A. latinus*, a revised key for identification of the Australian species of *Amarinus* is provided here:

KEY TO AUSTRALIAN SPECIES OF *AMARINUS*

1. — Antennal spines acute and prominent; male 1st pleopod with complex apex of lobes, without a point; chela of large males with pulvinus (a sac arising between bases of fingers); mature females usually greater than 10 mm carapace width *A. laevis*
- Antennal spines obtuse and inconspicuous; male 1st pleopod with simple pointed apex; chela of large males without pulvinus; mature females usually less than 10 mm carapace width 2
- 2(1). — Rostrum little deflexed, apex acute or near acute in large males; postocular lobes level and continuous with carapace rim, extending back along anterolateral carapace border, not developed into a tooth; pterygostomial region reduced by anterior position of Milne-Edwards apertures; pterygostomial-branchiostegite junction approximately medial to cheliped base and anterolateral edge of mouth-frame; male 1st pleopod with apical crest *A. lutarius*
- Rostrum moderately deflexed, apex obtuse in large males; postocular lobe developed into a tooth below carapace rim, not extending back along anterolateral carapace border; pterygostomial region not reduced; pterygostomial-branchiostegite junction near cheliped base or nearer to cheliped base than edge of mouth-frame; male 1st pleopod without crest 3
- 3(2) — Pterygostomial ridge with small lobe near anterolateral edge of mouth-frame in large specimens; thoracic grooves on dorsal carapace angled strongly laterally, each forming a right angle or slightly obtuse angle with adjacent cervical groove; male 1st pleopod with apex on sternal side and pointing towards sternum; female genital apertures without a curved medial prominence *A. latinus*
- Pterygostomial ridge without lobe near mouth-frame; thoracic grooves on dorsal carapace angled moderately laterally, each forming a distinctly obtuse angle with adjacent cervical groove; male 1st pleopod with terminal apex; female genital apertures

- with or without a curved medial prominence4
- 4(3) — Female genital apertures 0.4–0.5 mm wide, with a curved medial prominence; eggs c. 0.35 mm diameter; telson c. 0.35 of total abdomen length in mature females *A. paralacustris*
- Female genital apertures 0.65 – 0.8 mm wide, without a curved medial prominence; eggs c. 0.7 mm diameter; telson c. 0.25 of total abdomen length in mature females *A. lacustris*

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