

Campbell & Stephenson, W.,

1970

14440

**THE SUBLITTORAL BRACHYURA (CRUSTACEA: DECAPODA)
OF MORETON BAY**

By

B. M. CAMPBELL and W. STEPHENSON

Reprint from Volume 15, Part 4, Memoirs of the Queensland Museum,
1st July, 1970

THE SUBLITTORAL BRACHYURA (CRUSTACEA: DECAPODA) OF MORETON BAY

B. M. CAMPBELL

Queensland Museum

and

W. STEPHENSON

Department of Zoology, University of Queensland

ABSTRACT

Eighty-four species are recorded as the result of an intensive dredging and trawling programme in Moreton Bay. New species are described in the genera *Cryptodromia* and *Hexapus* and a possibly undescribed species of *Hyastenus* is discussed. Numbers of species per family agree closely with numbers found at a similar depth in Sagami Bay. Moreton Bay sublittoral brachyuran fauna shows much greater affinity with the northern Indian Ocean than with the western Pacific Ocean.

The material reported on has been obtained from dredging and trawling operations carried out in Moreton Bay by the Zoology Department of the University of Queensland (Z.D.U.Q.) mostly by the research trawler 'Wanderer II' and mostly under the direction of one of us (W.S.). Most of this material has been deposited at the Queensland Museum (Q.M.), but some duplicate material has been sent to the Australian Museum, Sydney, (A.M.). Because of the large numbers involved many specimens of common species were not retained by the collecting party, but these were identified and recorded before being discarded.

Moreton Bay is a shallow indentation in the southern Queensland coastline some 40 miles long by 15 miles wide, bounded on the seaward side by the almost unbroken line of Moreton I., North Stradbroke I. and South Stradbroke I. While it is moderately open to the north, through a series of gutters and shallow banks, in the south it breaks up into narrow, shallow channels which are ultimately a continuation of the Nerang River mouth. The present survey extends south to Redland Bay and Macleay I. In this area the maximum depth is approximately 20 fm and the bottom is predominantly fine sand with patches of

mud, coarse sand, and grit (see pl. 22). Because of the risk to vessel and gear, collections were seldom attempted in depths of less than 2 fm.

Trawling and dredging for this survey has been carried out over a period of six years (1962–1968) and recordings were made from over 400 stations (see fig. 1). Localities are indicated with reference to the charts of Moreton Bay published by the Department of Harbours and Marine, Queensland, 1964 edition. To facilitate location of these localities Moreton Bay is here arbitrarily divided into sections based on a $0^{\circ} 5'0''$ grid (see fig. 1), and a grid reference to these localities is given in bold face with each locality listed. Localities are listed in ascending order of grid reference numbers.

Measurements of carapace width (cw.) are taken across the widest part of the carapace and length (cl.) is measured in the mid-line. Illustrations have been prepared using a camera lucida and are provided not only to facilitate future identification of material from this area but to provide a basis for future workers to criticise the present identifications. Male pleopods are drawn from the abdominal aspect, without dissection. Synonymies are restricted to significant or recent works.

LIST OF SPECIES RECORDED

The order of listing and classification follows Serene, 1965, except that *Libystes* is retained in the family Portunidae (see Stephenson and Campbell, 1960, p.84), and *Calmania* in the Xanthidae. The bracketed notation after a species refers to its known overall distribution. The key to this notation is given in the 'Discussion' (see p. 295) where distribution patterns are briefly analysed.

	PAGE
Tribe DROMIACEA	
Family DROMIIDAE	240
<i>Cryptodromia unilobata</i> sp. nov.	[5]
<i>C. hilgendorfi</i> de Man	[1]
<i>Conchoecetes artificiosus</i> (Fabricius)	[2, a. j.]
Tribe CORYSTOIDEA	
Family ATELECYCLIDAE	244
<i>Kraussia</i> sp.	
Tribe OXYSTOMATA	
Family DORIPPIDAE	244
<i>Dorippe australiensis</i> Miers	[5]

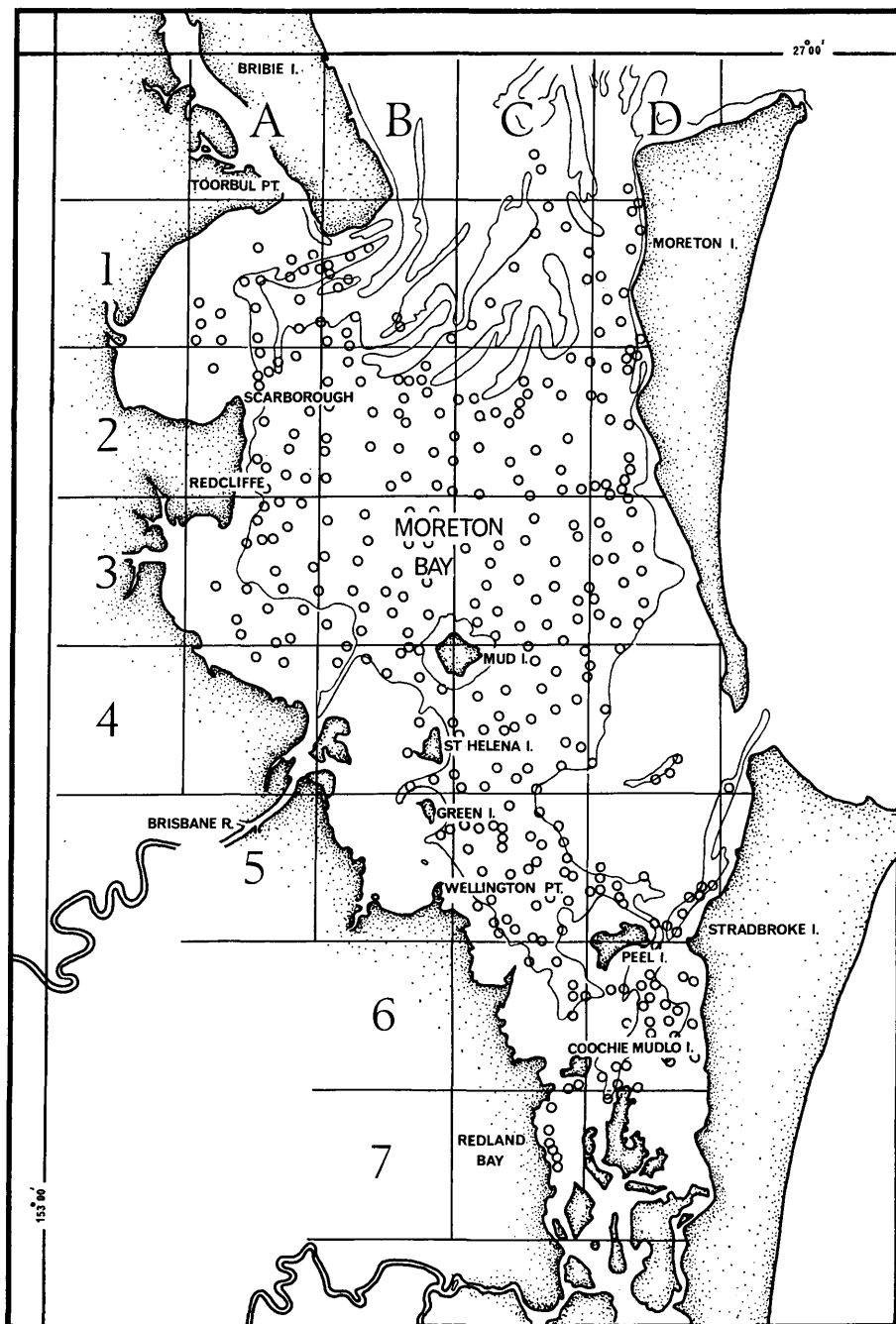


FIG. 1: Map of Moreton Bay showing collection stations, arbitrary grid reference, and 3 fm contour.

	PAGE
Family CALAPPIDAE	246
<i>Calappa philargius</i> (Linnaeus)	[1, j.]
<i>Matuta granulosa</i> Miers	[2]
<i>M. inermis</i> Miers	[5]
<i>M. planipes</i> Fabricius	[2]
Family LEUCOSIDAE	247
<i>Nursia sinuata</i> Miers	[5]
<i>N. abbreviata</i> Bell	[2]
<i>Myra affinis</i> Bell	[2]
<i>M. australis</i> Haswell	[4]
<i>Arcania novemspinosa</i> (Adams and White)	[2]
<i>Pseudophilyra tridentata</i> Miers	[2, j.]
<i>Leucosia ocellata</i> Bell	[5]
<i>L. pubescens</i> Miers	[2]
<i>L. whitei</i> Bell	[2, a.]
Tribe BRACHYGNATHA	
Family MAJIDAE	255
<i>Paratymolus latipes</i> Haswell	[5, s.]
<i>Achaeus brevirostris</i> (Haswell)	[2]
<i>A. fissifrons</i> (Haswell)	[5, s. nz.]
<i>A. lacertosus</i> Stimpson	[2, a.]
<i>Naxia deflexifrons</i> (Haswell)	[5, s.]
<i>Hyastenus brockii</i> de Man	[2]
<i>H. convexus</i> Miers	[2]
<i>H. diacanthus</i> (de Haan)	[2, j.]
<i>H. sp.</i>	
<i>H. oryx</i> A. Milne Edwards	[2, nc.]
<i>Hoplophrys ogilbyi</i> McCulloch	[2]
<i>Phalangipus australiensis</i> Rathbun	[5]
<i>P. longipes</i> (Linnaeus)	[2]
<i>Chlorinoides longispinus</i> (de Haan)	[2, a. j.]
<i>Micippa thalia</i> (Herbst)	[2, a.]
Family PARTHENOPIDAE	263
<i>Parthenope</i> (<i>Parthenope</i>) <i>longimanus</i> (Linnaeus)	[2, a.]
<i>P. (Parthenope) nodosus</i> (Jacquinot and Lucas)	[5]
<i>P. (Platylambrus) validus</i> de Haan	[3, j.]
<i>P. (Rhinolambrus) longispinus</i> (Miers)	[1, j.]
<i>P. (Pseudolambrus) harpax</i> (Adams and White)	[2]
<i>Cryptopodia queenslandi</i> Rathbun	[5]

	PAGE
Family PORTUNIDAE	270
<i>Libystes paucidentatus</i> Stephenson and Campbell	[5]
<i>Podophthalmus vigil</i> (Fabricius)	[1, h.]
<i>Portunus gracilimanus</i> (Stimpson)	[2]
<i>P. hastatoides</i> Fabricius	[2, a. j.]
<i>P. pelagicus</i> (Linnaeus)	[1, a. j.]
<i>P. rubromarginatus</i> (Lanchester)	[4]
<i>P. sanguinolentus</i> (Herbst)	[1, a. j. h.]
<i>Charybdis callianassa</i> (Herbst)	[2]
<i>C. feriatus</i> (Linnaeus)	[2, a. j.]
<i>C. helleri</i> (A. Milne Edwards)	[1, a. j.]
<i>C. incisa</i> Rathbun	[4]
<i>C. moretonensis</i> Rees and Stephenson	[5]
<i>C. natator</i> (Herbst)	[2, a. j.]
<i>C. truncata</i> (Fabricius)	[2, j.]
<i>C. yaldwyni</i> Rees and Stephenson	[5]
<i>Thalamita admete</i> (Herbst)	[1, a. j. h.]
<i>T. sima</i> H. Milne Edwards	[1, a. j. h.]
Family XANTHIDAE	276
<i>Halimede ochtodes</i> (Herbst)	[2, j.]
<i>Liagore rubromaculata</i> de Haan	[2, j.]
<i>Lophozozymus pictor</i> (Fabricius)	[3]
<i>Cycloxanthops lineatus</i> (A. Milne Edwards)	[2, j. nc.]
<i>Actaea savignii</i> (H. Milne Edwards)	[2, a. j. nc.]
<i>A. ruppellii</i> (Krauss)	[1, a. j.]
<i>Barnareia inconspicua</i> Miers	[5]
<i>Phymodius</i> sp.	
<i>Galene bispinosa</i> (Herbst)	[2, j.]
<i>Pilumnus contrarius</i> Rathbun	[5]
<i>P. semilanatus</i> Miers	[5]
<i>P. minutus</i> de Hann	[4, j.]
<i>P. spinicarpus</i> Grant and McCulloch	[5]
<i>Actumnus pugillator</i> A. Milne Edwards	[5, nc.]
<i>A. squamosus</i> (de Haan)	[2, j.]
<i>A. setifer</i> (de Haan)	[1, a. j.]
<i>Calmania prima</i> Laurie	[2, j.]
Family GONEPLACIDAE	286
<i>Eucrate sexdentata</i> Haswell	[2]
<i>E. dorsalis</i> (White)	[5]
<i>Rhizopa gracilipes</i> Stimpson	[2]
<i>Xenophthalmodes dolichophallus</i> Tesch	[4?2]

	PAGE
<i>Typhlocarcinops tonsurata</i> Griffin and Campbell	[5]
<i>Ommatocarcinus macgillivrayi</i> White	[4, j.]
<i>Hexapus granuliferus</i> sp. nov.	[5, s.]
Family PINNOTHERIDAE	292
<i>Xenophthalmus pinnotheroides</i> White	[2]
<i>Pinnotheres spinidactylus</i> Gordon	[4]
Family OCYPODIDAE	292
<i>Macrophthalmus crassipes</i> H. Milne Edwards	[2]
<i>M. punctulatus</i> Miers	[5]

Tribe DROMIACEA

Family DROMIIDAE

***Cryptodromia unilobata* sp. nov.**

(Fig. 2)

HOLOTYPE: female, 16.5 mm cw., dredged $\frac{1}{2}$ mile W. of Naval Reserve Bank beacon, 5C, 4 $\frac{1}{2}$ fm, sandy mud, 24.ix.1962, A.M., P15708.

DESCRIPTION

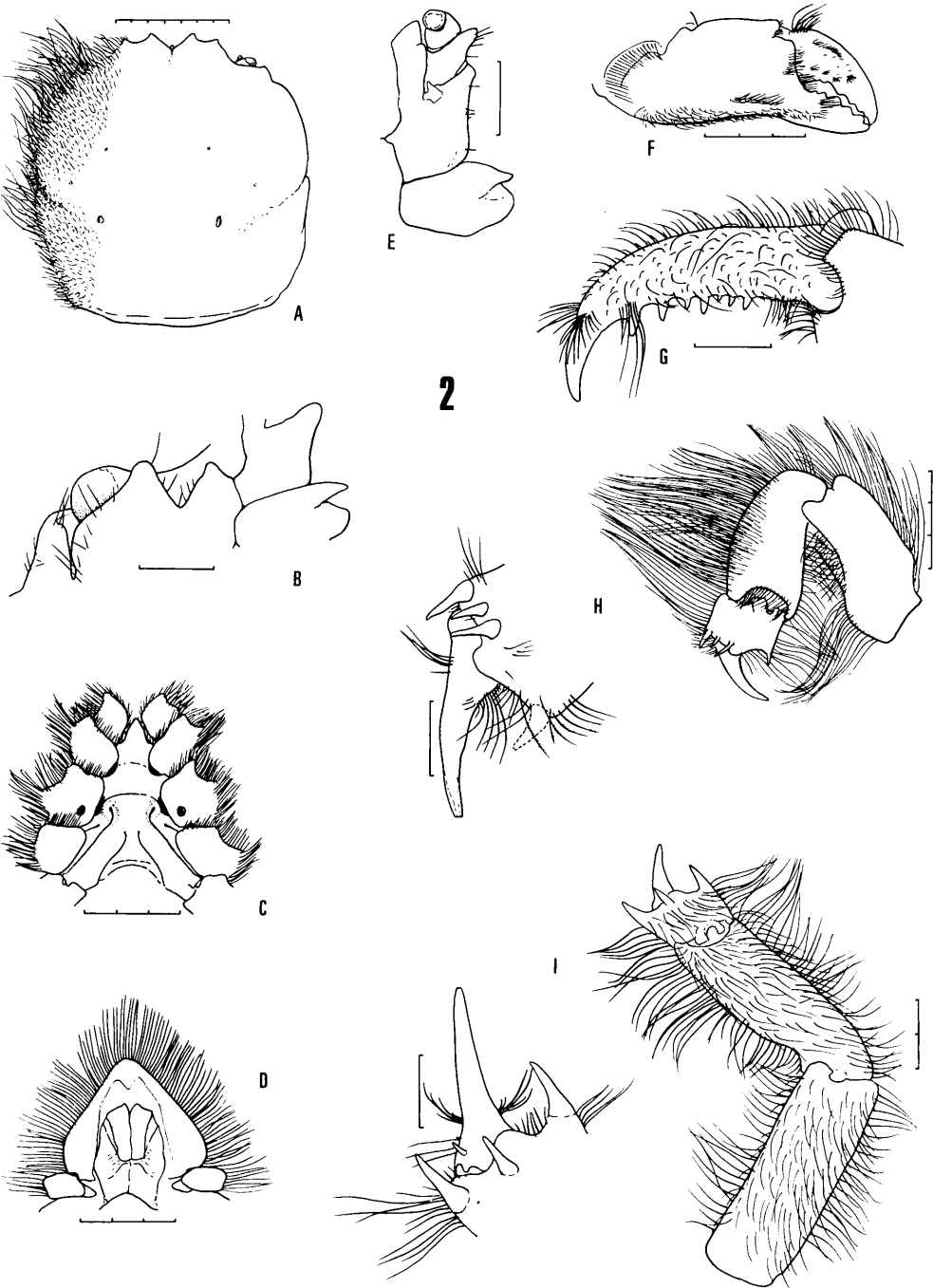
CARAPACE: little longer than broad (cw. 16.5 mm, cl. 16.7 mm in mid-line, 17.5 mm including frontal teeth), very convex, covered with long and short hairs on dorsal surface, with very serrate long hairs laterally and on legs and chelae. Regions unmarked except by median frontal groove and deep cervical grooves. Lateral margins with deep indentation at termination of cervical groove, anterior to this a single long anterolateral lobe, curving sharply in to base of outer orbital angle; outer orbital angle *c.* one fifth as long as anterolateral lobe.

Front with single median deflexed tooth, scarcely visible in dorsal view but equal in size to two lateral frontal teeth; lateral frontal teeth acute, separated by right-angled notch; inner orbital teeth prominent but smaller than frontal teeth.

Sternal grooves of female ending on low, widely separated tubercles between the coxae of the second walking legs, just anterior to the genital openings.

FIG. 2: *Cryptodromia unilobata* sp. nov.; holotype, A.M., P15708. A, carapace; B, suborbital lobes; C, sternum; D, sternal face of last segment of abdomen; E, basal antennal joint; F, cheliped; G, dactyl of first left ambulatory leg; H, left third ambulatory leg; I, last leg.

Scale divisions 1 mm, or 0.5 mm (broken line).



Basal antennal joint with outer angle markedly produced to meet front and with subsidiary lobe on inner border of this projection.

CHELIPED: without epipodite; without prominent tubercles. Merus triangular in section, with dense long serrate hairs proximally and shorter pubescence dorsally. Carpus long, with sparse pubescence. Propodus with long hairs ventrally and distally on outer face; fixed finger with 6 strong teeth. Movable finger with long curved hairs proximally on upper face shorter hairs on flattened basal half of outer face; cutting edge with two small teeth, proximally followed by series of four larger teeth decreasing in size distally.

AMBULATORY LEGS: first and second subequal, with numerous long pinnate hairs dorsally, forming a thick mat. Dactyli with series of 7–8 horny spines on inner border decreasing in size proximally. Third ambulatory leg shortest; propodus with two (right leg) or three (left leg) spines on distal margin of outer (dorsal) face behind dactylus, one on distal margin in front of opposing dactylus. Fourth ambulatory leg almost as long as first and second legs (0.9 times); propodus with two long subequal spines on distal border one at each angle, third shorter spine near base of dactylus on outer (dorsal) face; dactylus with basal spine on outer (dorsal) face.

DISCUSSION

This species bears a strong resemblance in many features to *Dromidia unidentata* (Rüppell) (see Sakai, 1936, pp. 13–15, pl. 6, fig. 2; Barnard, 1950, pp. 323–4, fig. 61h, i.) It differs most markedly from that species in the configuration of the sternal sulci which in *D. unidentata*, according to Barnard, end together between the bases of the second legs (=first walking legs). This feature appears significant at the generic level.

Although the generic situation in Dromiidae does not appear to be firmly resolved, only two genera (*Dromides* Borradaile and *Cryptodromia* Stimpson) have been described in which there is no epipod on the cheliped and in which the sternal sulci of the female end apart. Ihle (1913) has fused both under *Cryptodromia*, which is now regarded in a much broader sense than was accepted by early authors. If the present species is to be included in this genus—and the only alternative would be to erect a new monotypic genus—the generic diagnosis as given by Ihle must be altered to include not only those species in which the female sternal sulci end “mehr nach hinten oder mehr nach vorn zwischen den 2. Pereiopoden” but also those in which the sulci end between the bases of the third pereopods.

Only one other species of *Cryptodromia*, *C. incisa* Henderson, has been described as having no teeth on the anterolateral border of the carapace. The present species can be readily distinguished from *C. incisa* by the following features;

- (1) Sternal sulci terminate on low tubercles between the bases of the second walking legs instead of between the first walking legs and there is no distinct median tubercle between the endings.

- (2) The hairs on the sides of the carapace and on the legs are not clubbed, but serrate, and very long.
- (3) The anterolateral margins of the carapace are not evenly curving throughout their length but are more abruptly curved anteriorly.
- (4) The propodus of the third walking leg bears three terminal spines in addition to the one opposing the dactyl.

The specific name refers to the presence of a single anterolateral lobe between the end of the cervical groove and the outer orbital angle.

***Cryptodromia hilgendorfi* de Man**

(Fig. 3)

Cryptodromia Hilgendorfi de Man, 1887, pp. 404–6, pl. 18, fig. 3.

Cryptodromia hilgendorfi de Man: Ihle, 1913, pp. 45–6 (lit. and synon.).

DREDGED: One, Brisbane R. mouth, 4A, 1964–5, T.S. Hailstone, A.M., P15707.

This specimen keys without hesitation to this species in Ihle's (1913, pp. 33–5) key to the species of *Cryptodromia*. It agrees well with de Man's figure, but differs in that the median frontal tooth is a little larger, and the notch between the lateral frontal teeth is more acute (as in Ihle's material). The distal border of the propodus of the last leg carries spines on its inner and outer angles which were not illustrated by de Man.

DISTRIBUTION: Red Sea to Ellice Islands.

***Conchoecetes artificiosus* (Fabricius)**

Dromia artificiosa Fabricius, 1798, p. 360.

Dromia conchifera Haswell, 1882a, p. 757; 1882b, pp. 141–2, pl. 3, fig. 4.

Conchoecetes artificiosus (Fabricius): Barnard, 1950, pp. 308–9, figs. 58a, b. Sakai, 1965, pp. 11–12, pl. 5, fig. 3 (lit. and synon.).

DREDGED: One, 1 mile S. of Bribie I. beacon, 1A, 3 fm, clean fine sand, 14.viii.1967, Q.M., W2924. One, $\frac{1}{2}$ – $\frac{3}{4}$ mile W. of M3 Buoy, 2C, 10 fm, 29.x.1962. Two, $\frac{1}{2}$ mile NW. of M1 Buoy, 2C, 7 $\frac{1}{2}$ fm, sand with broken shell, 29.viii.1967. Three, $\frac{1}{4}$ mile NW. of M1 Buoy, 2C, 7 $\frac{1}{2}$ fm, hard sand with shell, 29.viii.1967. One, 2 $\frac{1}{2}$ miles E. of Scott Pt, 3A, 3 fm, culch, 6.ii.1968, Q.M., W2968. One, 3 miles E. of S. end of St Helena I., 4C, 6 fm, 13.viii.1967, Q.M., W2923. One, 1 $\frac{1}{2}$ miles SW. of Blue Hole beacon, 4D, 3 fm, 29.viii.1967. One, from Hanlon Light east, 5C, gritty sand with mud, 12.x.1961. One, 1 mile SE. of Hope Banks, 5C, 5 fm, muddy grit, 1.vi.1962. One, $\frac{1}{2}$ mile SE. of Hope Banks, 5C, 2–3 fm, 1.vi.1962. Three, 1 $\frac{1}{4}$ miles SE. of Hope Banks, 5C, 5 fm, clean sand with shell, 30.viii.1967. Two, 2 $\frac{1}{4}$ miles NW. of Hanlon Light, 5C, 4 $\frac{1}{2}$ fm, muddy sand, 30.viii.1967. One, 1 $\frac{1}{2}$ mile NNW. of Cleveland Light, 5C, 3 $\frac{1}{2}$ fm, gritty muddy sand, 6.x.1967, Q.M., W2927. One, halfway between Cleveland and Peel I. jetties, 6C, 4 $\frac{1}{2}$ fm, muddy grit, 24.ix.1962.

TRAWLED: One, Moreton B., late 1962, coll. L. Wale. One, 1 mile E. of Goat I., 6D, 4 fm, 24.ix.1962.

DISTRIBUTION: South Africa to Japan and Australia (Sakai, 1965).

Tribe CORYSTOIDEA
Family ATELECYCLIDAE

Kraussia sp.

(Fig. 4)

DREDGED: Female, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7½ fm, sand and broken shell, 29.viii.1967, Q.M., W3123.

This specimen has the carapace crushed, and the entire fronto-orbital region and epistome is missing. It is clearly referable to the genus *Kraussia* and closely resembles *K. nitida* Stimpson (see Sakai, 1965, pl. 49, fig. 2) and *K. hendersoni* Rathbun (see Rathbun, 1906, pl. 14, fig. 2) but the damage is too extensive to permit further identification.

Tribe OXYSTOMATA
Family DORIPPIDAE
Dorippe australiensis Miers

(Fig. 5)

Dorippe australiensis Miers, 1884, pp. 258–9, pl. 26, fig. D. Grant and McCulloch, 1906, p. 26. Tyndale-Biscoe and George, 1962, pp. 66–7, figs. 2.2, 2.3.

Dorippe astuta Fabricius: Haswell, 1882b, pp. 136–7.

[non] *Dorippe astuta* Fabricius, 1798, p. 361.

DREDGED: Two, 1 mile NNE. of Toorbul Pt red beacon, 1A, 3 fm, sandy mud, 13.vi.1967. One, $\frac{1}{2}$ mile SE. of Toorbul Pt red beacon, 1B, sand, 29.x.1962, Q.M., W2599. One, 2 miles ESE. of Caboolture, 2A, 2 fm, mud with shell, 6.vi.1967. One, 5½–6 miles ENE. of Scarborough, 2B, 2½ fm, 6.xii.1962, Q.M., W2727. One, $\frac{1}{2}$ mile offshore N. end of Tangalooma Gutter, 2D, 1.vi.1962, Q.M., W2714. One, 1 mile E. of Otter Rock beacon, 3A, 3½ fm, mud, 17–18.v.1967, Q.M., W2799. One, $\frac{1}{2}$ mile off middle of St. Helena I., S. beacon on N. tip of Green I., 4C, 4 fm, Q.M., W2728. Three, water airport between Redland Bay and Garden I., 7C, 2–6 fm, muddy grit, 26.iv.1962, Q.M., W2711 (two spems.).

TRAWLED: One, 1 mile E. of Otter Rock beacon, 3A, 3½ fm, mud, 1.iii.1967, Q.M., W2577. Four, between Peel I. and Green I., 5C, L. Wale, 1.xi.1961, Q.M., W2597, W2719. One, 1 mile E. of Goat I., 6D, 4 fm, 24.ix.1962, Q.M., W2722. One, off Snipe I., 7C, 2½–8 fm, 30.vii.1962, Q.M., W2718.

DISTRIBUTION: Australian coast (Miers, 1884) from Port Denison, Bowen (Haswell 1882) to Moreton B.

FIG. 3: *Cryptodromia hilgendorfi* A.M., P15707. A, carapace; B, dactylus and propodus of last leg; C, male pleopods.

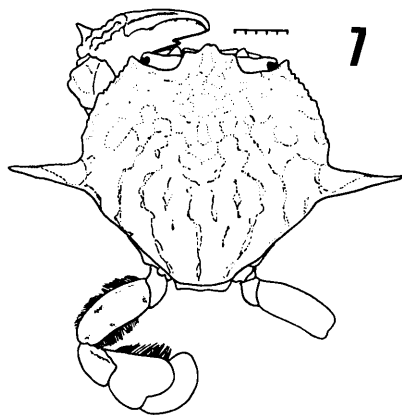
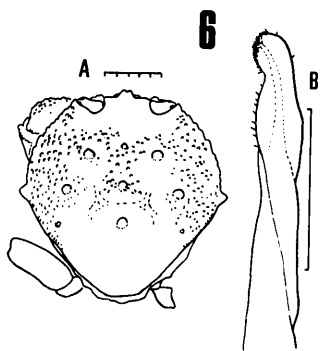
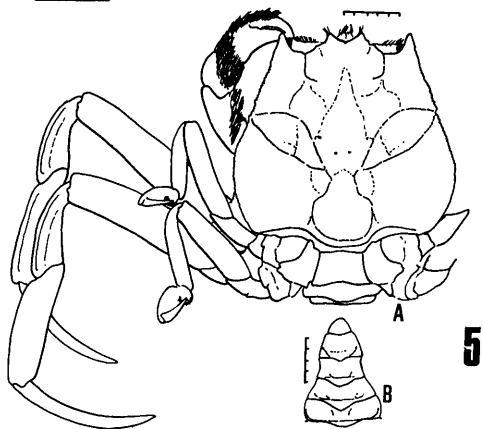
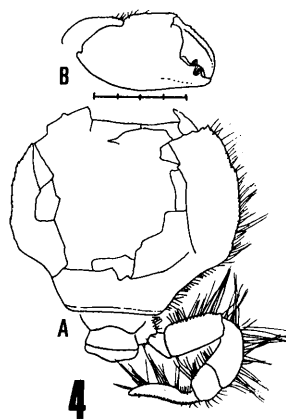
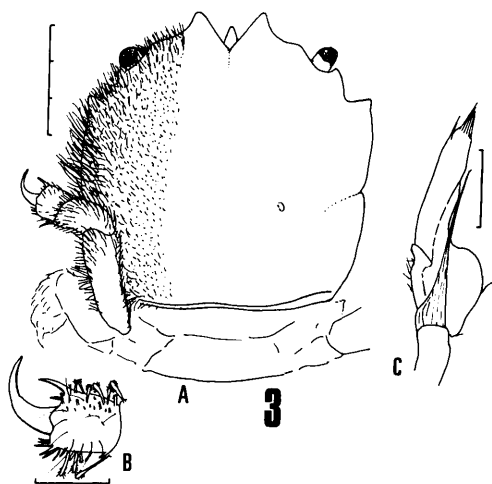
FIG. 4: *Kraussia* sp., W3123. A, carapace; B, cheliped.

FIG. 5: *Dorippe australiensis*, W2719. A, carapace; B, male abdomen; C, male pleopods.

FIG. 6: *Matuta inermis*, W2649. A, carapace; B, male pleopod.

FIG. 7: *Matuta planipes*, W2608.

Scale divisions 1 mm, or 0.5 mm (broken line).



Family CALAPPIDAE

Calappa philargius (Linnaeus)

Cancer philargius Linnaeus, 1758, p. 626.

Calappa philargius (Linnaeus): Utinomi, 1967, p. 70, pl. 35, fig. 8. Tyndale-Biscoe and George, 1962, p. 69, fig. 2.4.

TRAWLED: Two, due E. of South Passage between Moreton I. and Stradbroke I., coll. professional trawlers, Dec. 1966, Q.M., W2653. (Note: This lies outside Moreton Bay; a specimen from within the Bay has been seen by one of us (W.S.), but unfortunately no record was kept).

DISTRIBUTION: Red Sea to Japan and Samoa; Eastern and Western Australia (Tyndale-Biscoe and George, 1962).

Matuta granulosa Miers

Matuta granulosa Miers, 1877, p. 245, pl. 39, figs. 8, 9. Tyndale-Biscoe and George, 1962, pp. 71-2, fig. 4.2.

DREDGED: One, $\frac{1}{2}$ mile SE. of Toorbul Pt red beacon, 1A, 4 fm, mud, 29.x.1962. One, $5\frac{1}{2}$ miles E. of Reef Pt, Scarborough, 2B, 6 fm, grit, 15.xii.1964. Damaged juvenile, 8 miles E. of Scarborough, rising shallowing banks, 2C, 5 fm, fine sand, 10.xi.1961. One, S. edge of Dring Banks, 2D, 10 fm, 29.iv.1964, Q.M., W2651.

TRAWLED: Ovigerous female, northern Moreton B., early Nov. 1966, Q.M., W2655. One, $5\frac{1}{2}$ miles E. of Reef Pt, Scarborough, 2B, 6 fm, grit, 15.xii.1964, Q.M., W2810. Two in deep water off Tangalooma, 2D, L. Wale, Q.M., W2650. Two, $\frac{1}{2}$ mile W. of St Helena I., 4B, Nov. 1966, L. Wale, Q.M., W2652.

DISTRIBUTION: Indian Ocean; Queensland and Western Australia (Tyndale-Biscoe and George, 1962).

Matuta inermis Miers

(Fig. 6)

Matuta inermis Miers, 1884, p. 256, pl. 26, fig. C; 1886, p. 296. Tyndale-Biscoe and George, 1962, p. 72.

DREDGED: Nine, $\frac{1}{2}$ mile NW. of Cowan Cowan red light, 1D, 22 fm, dead coral and shell, 29.viii.1967, Q.M., W2843. Sixteen, $\frac{1}{2}$ mile offshore at end of Tangalooma Gutter, 2D, 8-12 fm, 1.vi.1962, Q.M., W2649 W2780 W2781.

DISTRIBUTION: Western and northern Australia to Moreton B. (Tyndale-Biscoe and George, 1962).

Matuta planipes Fabricius

(Fig. 7)

Matuta planipes Fabricius, 1798, p. 369. Sakai, 1937, p. 101, pl. 13, fig. 4. Utinomi, 1967, pp. 69-70, pl. 35, fig. 4. Tyndale-Biscoe and George, 1962, p. 71, fig. 2.11.

DREDGED: One, Pearl Channel, $\frac{1}{4}$ mile SW. of NW.7 Light, 1C, 5 fm, clean hard sand, 5.x.1967, Q.M., W2933. One, $\frac{1}{2}$ mile E. of M4 Beacon, 1D, $6\frac{1}{2}$ fm, hard sand, 29.viii.1967. Two, $1\frac{1}{2}$ miles W. of Tangalooma

white light, **2D**, 9½ fm, hard sand, 29.viii.1967. One, ½ mile offshore at end of Tangalooma Gutter, **2D**, 12 fm, 1.vi.1962. One, ½ mile outside Tangalooma Gutter, **2D**, 10 fm, 1.vi.1962. One, ½ mile offshore outside Tangalooma Gutter, **2D**, 8 fm, 1.vi.1962, Q.M., W2608. Two, Mt Cotton Reach, Rous Channel, **4D**, sand and shell grit, 2.vi.1962.

DISTRIBUTION: Indian Ocean, East India, Japan; east, north and northwest coasts of Australia. (Tyndale-Biscoe and George, 1962).

Family LEUCOSIDAE
Nursia plicata sinuata Miers

(Figs. 8, 9)

Nursia plicata (Herbst): Bell, 1855, pp. 307–8, pl. 34, fig. 4 (part only, including figured specimen; Bell's material also included specimens of *N. lar*, see below).

[non] *Cancer plicata* Herbst, 1803, pp. 2–3, pl. 59, fig. 2.

Nursia sinuata Miers, 1877, pp. 239–40. Grant and McCulloch, 1906, p. 24.

DREDGED: One, 1 mile offshore E. of Redcliffe water tower, **2A**, 3 fm, mud and shell, 15.xii.1964, Q.M., W2802. One, ½ mile NW. of M1 Red Buoy, **2C**, 7½ fm, hard sand and shell, 29.viii.1967, Q.M., W3118. One, 2½ miles E. of Scott Pt, **3A**, culch, 6.ii.1968, Q.M., W2958. Three, ¼ mile W. of N. end of St Helena I., **4B**, 2½ fm, culch, 18.vii.1967, Q.M., W3116 W3117. One, 1½ miles E. of St Helena I., **4C**, 4 fm, 13.vii.1967, Q.M., W3115. One, 1½ miles SW. of South West Rocks, **6C**, 2 fm, culch, 6.x.1967, Q.M., W3113. One, 1 mile E. of Victoria Pt, **6C**, 3 fm, culch, 13.x.1967, Q.M., W3114.

The ambiguity of Miers' (1877, p. 240) comments under '*Nursia plicata*?' has been noted by Grant and McCulloch (1906) and Tesch (1918, p. 237), but this can be resolved as follows. Bell (1855) stated that all the material known by him as *N. plicata* came from India. Miers refuted this, claiming that the '*N. plicata*' material examined by Bell at the British Museum was a heterogenous collection of Indian and Australian material. The Indian material included the type of *N. hardwickii* Leach, which was figured by Miers, 1877, pl. 38, fig. 28. (Rathbun (1910, p. 306) subsequently synonymised *N. hardwickii* with *N. lar* (Fabricius) and justification for this is provided by the fact that both are described as having totally smooth cheliped arms).

Miers recognised two species in Bell's material of '*N. plicatus* (Herbst)'. The Indian specimens with smooth cheliped arms (*N. lar*) he listed as '*Nursia plicata*?', the Australian material with granulate arms he described as a new species, *N. sinuata* Miers, 1877. He admitted not having seen Herbst's (1803, pl. 59, fig. 2) figure of *Cancer plicatus* and suggested that one of the two species he discussed should be referred to that species. Herbst's figure in fact shows distinctly granulate cheliped arms, and on that basis *N. sinuata* would have been, by Miers' criterion, the synonym of *N. plicata*.

Alcock (1896, pp. 180–1) discusses *N. plicata* and states that, in fully grown males, the chelipeds are 1.75 times the carapace length and that the maximum size of his specimens

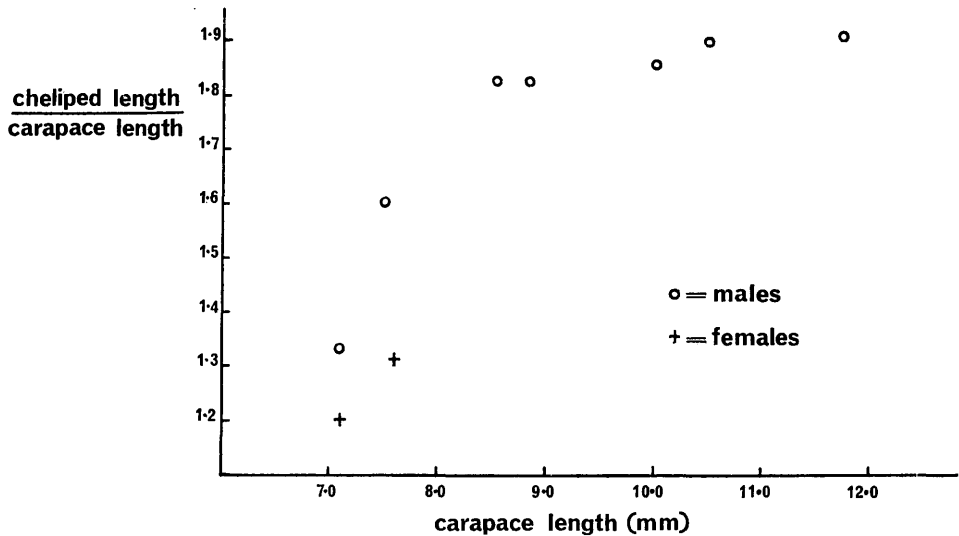


FIG. 8: Variation of length of cheliped with carapace length, *Nursia plicata sinuata*.

is 15 mm carapace length. In the present specimens the chelipeds of males range from 1.3 to 1.9 times the carapace length, but (see fig. 8) a ratio of 1.75 is passed at a carapace length of 8–9 mm. The present specimens further differ from Alcock's description and Herbst's figure in that:

- (1) The lobes on the posterior margin of the carapace are not distinctly semi-circular.
- (2) The hepatic ridges, while discernable, are not distinct.

Because of these differences Miers' name is here retained but, because the differences are slight and the extent of the variability of both groups has not been adequately assessed, full specific status is not admitted. Male pleopods of *N. plicata sinuata* agree well with Stephensen's (1945, p. 70, fig. 6c) description and figure of material from the Iranian Gulf.

Variability shown by the present specimens includes:

- (1) Front very obscurely or quite distinctly bilobed, or obscurely quadrilobate with two small median denticles.
- (2) Posterior margin with two lobes sharp or rounded, distinctly separated or united so that the posterior margin is only shallowly concave.
- (3) Length of chelipeds increases with length of carapace as in fig. 8.
- (4) Development of carapace marginal lobes.

Ihle, 1918, pp. 235–6, gives a key to the species of *Nursia* but omits to differentiate between the five species in which the hepatic and posterior transverse ridges are developed. These can be distinguished by the following key (see also Alcock, 1896, pp. 179–80).

1. Front convex, projecting well beyond eyes..... 2
Front not projecting, cut into lobes..... 3
- 2 (1). Outer face of wrist sharply cristate; snout ovate-pointed.....
..... *N. nasuta* Alcock, 1896
(See Alcock, 1896, p. 183, pl. 7, fig. 6).
Outer face of wrist bluntly and inconspicuously carinate, snout semicircularly
rounded *N. blanfordi* Alcock, 1896
(See Alcock, 1896, pp. 182-3, pl. 7, fig. 5).
- 3 (1). Cheliped arms smooth on upper face, with smooth sharp anterior margin
..... *N. lar* (Fabricius, 1798)
(= *N. hardwickii* Leach; see Miers, 1877, pl. 38, fig. 28).
Cheliped arms granulate on upper face, with granulate rounded anterior
margin 4
- 4 (3). Arms short (1.75 times cl. in large males); posterior carapace lobes semicircular
..... *N. plicata plicata* (Herbst, 1883)
(See Herbst, 1803, pp. 2-3, pl. 59, fig. 2. Alcock, 1896, 180-1).
Arms longer (c. twice cl. in large males); posterior carapace lobes often
rounded but not semicircular..... *N. plicata sinuata* Miers, 1877
(See Miers, 1877, pp. 239-40. Bell, 1855, pl. 34, fig. 4)

DISTRIBUTION: *N. plicata sinuata* is known only from Queensland; from Moreton B. (Miers, 1877, type locality) and Port Curtis (Grant and McCulloch, 1906). *N. plicata* s.s. from the Iranian Gulf, India, Hong Kong, and Japan (see Sakai, 1965).

***Nursia abbreviata* Bell**

(Fig. 10)

Nursia abbreviata Bell, 1855, p. 308, pl. 34, fig. 5. Alcock, 1896, pp. 184-5.

DREDGED: One, $\frac{3}{4}$ mile S. of Coochiemudlo I., 7C, 3 fm, culch, 13.x.1967, Q.M., W3122.

This 9 mm ovigerous female agrees well with published figures and descriptions but differs from Bell's figure in the following minor features.

- (1) Posterior margin of carapace even less distinctly bilobate.
- (2) Cardiac region with a granular elevation but this is not connected to the mid-gastric tubercle by a distinct ridge. In this, the present specimen agrees with those described by Alcock (1896, p. 184).
- (3) The inner margin of the exognath of the third maxilliped is less distinctly curved.

- (4) The carapace margins conceal more of the ambulatory meri.
- (5) The legs are not banded as shown in Bell's figure and mentioned by Alcock.

DISTRIBUTION: From the Indian Ocean (Bell, 1855, type locality) and Karachi (Alcock, 1865). Not previously from Australia.

***Myra affinis* Bell**

(Fig. 11)

Myra affinis Bell, 1855, pp. 296-7, pl. 32, fig. 2. Alcock, 1896, p. 205. Tyndale-Biscoe and George, 1962, p. 88, fig. 7.10.

DREDGED: One, 3½ miles NE. of Hope Beacon, 5C, 4½ fm, muddy sand, 30.viii.1967, Q.M., W2948.

DISTRIBUTION: Red Sea to Japan, the Philippines, and northeastern and northwestern Australia.

***Myra australis* Haswell**

(Fig. 12)

Myra australis Haswell, 1879a, pp. 50-1, pl. 5, fig. 3; 1882b, p. 122. Tyndale-Biscoe and George, 1962, pp. 88-9, figs. 7.11, 8.9b, 8.10a.

DREDGED: One, NNW. of red beacon on W. end of Green I., 4B, 4 fm, gritty sandy mud, 18.vii.1967, Q.M., W2925. One, 1 mile N. of Cleveland Light, 5C, 3 fm, gritty mud, 18.vii.1967, Q.M., W2926. One, west of Hanlon Light, 5D, gritty sand with mud, 12.x.1961, Q.M., W2606.

Tyndale-Biscoe and George (1962, pp. 88-9) have confirmed that *M. australis* is a distinct species and list points of difference between this species and *M. affinis*. The present specimens confirm these differences.

DISTRIBUTION: Malay Peninsula to northwestern and northeastern Australia.

***Arcania novemspinosa* (Adams and White)**

(Fig. 13)

Iphis novem-spinosa Adams and White, 1849, pp. 56-7, pl. 13, fig. 1.

FIG. 9: *Nursia plicata sinuata* A, carapace, W3116; B, male pleopod, W3116; C, carapace, W3117.

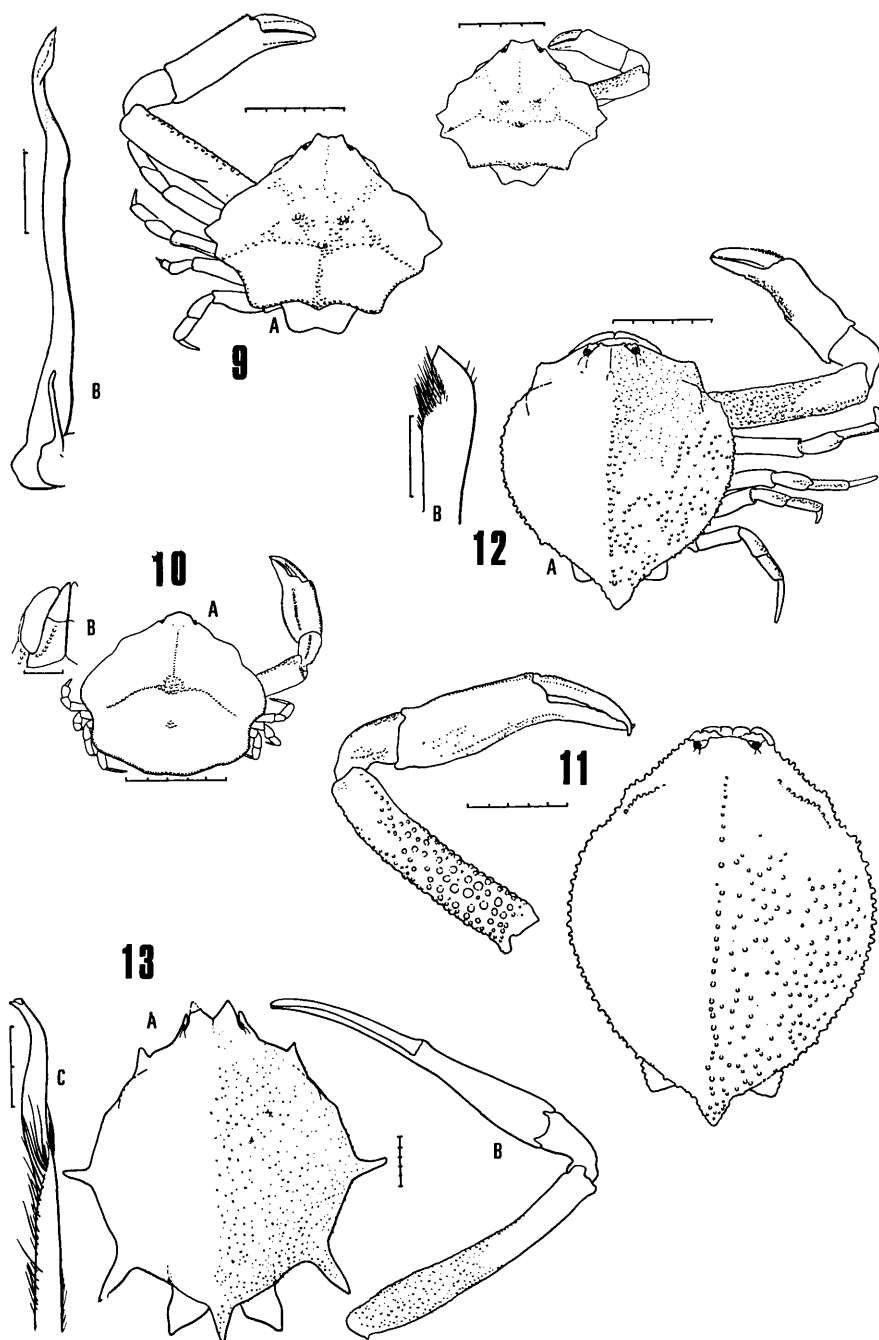
FIG. 10: *Nursia abbreviata*, W3122. A, carapace; B, third maxillipeds.

FIG. 11: *Myra affinis*, W2948.

FIG. 12: *Myra australis*, W2926. A, carapace, B, male pleopod.

FIG. 13: *Arcania novemspinosa*, W2938. A, carapace; B, cheliped; C, male pleopod.

Scale divisions 1 mm.



Arcania novem-spinosa (Adams and White): Alcock, 1896, pp. 267–8. Tyndale-Biscoe and George, 1962, p. 76.

DREDGED: One, 2 miles SE. of Sandy I., 6C, 2½ fm, shelly sand, 6.x.1967, Q.M., W2938.

This specimen agrees well with published descriptions, yet differs from Adams and White's figure in that the median posterior spine is not markedly longer than the lateral spines and the two processes on the posterior margin of the carapace are broadly flattened triangles with the base more than half the length.

DISTRIBUTION: India to the Philippines and northwestern and northeastern Australia (Tyndale-Biscoe and George, 1962).

***Pseudophilyra tridentata* Miers**

(Fig. 14)

Pseudophilyra tridentata Miers, 1879a, p. 41, pl. 2, fig. 4. Ihle, 1918, p. 268 (in key). Sakai, 1937, p. 151, pl. 14, fig. 7. Tyndale-Biscoe and George, 1962, p. 87, fig. 7.6.

DREDGED: One, 4½ miles E. of Mud I., 4D, 3 fm, gritty sand, 30.viii.1967, Q.M., W3112.

DISTRIBUTION: Persian Gulf to Japan; Western Australia, Torres Strait (Tyndale-Biscoe and George, 1962).

***Leucosia ocellata* Bell**

(Fig. 15)

Leucosia ocellata Bell, 1855, p. 289, pl. 31, fig. 1 Miers, 1886, p. 325. Tyndale-Biscoe and George, 1962, p. 86, figs. 7.4 (pleopod), 8.8a, b.

DREDGED: One, ¼ mile NW. of M1 Red Buoy, 2C, 7½ fm, hard sand and shell, 14.viii.1967, Q.M. W2836. One, between Green I. south beacon and Huybers Beacon, 5B, 3½ fms, muddy grit, 13.xii.1962. One, ½ mile W. of Naval Reserve Bank beacon, 5C, 4½ fms, sandy mud, 24.ix.1962. One, W. of Hanlon Light, 5D, gritty sand with mud, 12.x.1961, Q.M., W2601. One, 1 mile ENE. of Cleveland Light, 6C, 6½ fm, gritty sand, 12.ii.1968, Q.M., W2959. Two, 1½ miles SW. of South West Rocks, Peel I., 6D, 6.x.1967, 2 fm, culch, Q.M., W2916. One, ½ mile NW. of Pat's Pt, 6D, 5 fm, gritty mud, 13.x.1967, Q.M., W2915. Two, 2¼ miles SW. of Goat I., 6D, 6 fm, gritty muddy sand, 12.x.1967, Q.M., W2914. One, off South West Rocks, 6D, 5–6 fms, 5.x.1961, Q.M., W2731.

TRAWLED: One, Redland B., 7C, early 1961, O. Wiseman.

Identification of specimens has been confirmed by Dr. R. George.

DISTRIBUTION: Arafura Sea; eastern and western Australia.

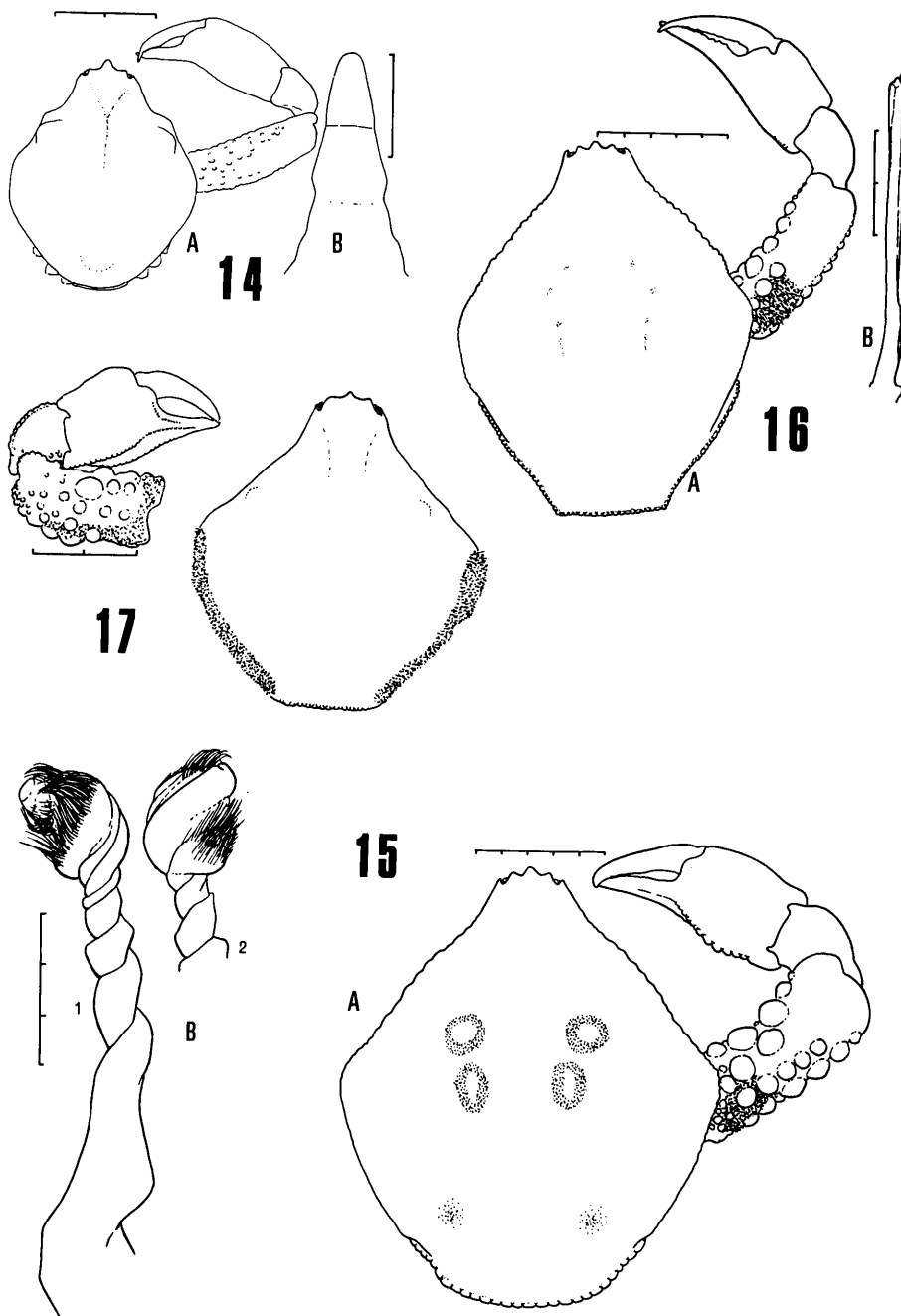
FIG. 14: *Pseudophilyra tridentata*, W3112. A, carapace; B, male abdomen.

FIG. 15: *Leucosia ocellata*, W2959. A, carapace; B, male pleopod (1, abdominal view; 2, sternal view).

FIG. 16: *Leucosia pubescens*, W2894. A, carapace; B, male pleopod.

FIG. 17: *Leucosia whitei*, W2807.

Scale divisions 1 mm.



***Leucosia pubescens* Miers**

(Fig. 16)

Leucosia pubescens Miers, 1877, pp. 238–9, pl. 38, figs. 22–4. Alcock, 1896, pp. 233–4. Ihle, 1918, pp. 282–3. Stephensen, 1945, p. 95, fig. 17 A-B (pleopod). Tyndale-Biscoe and George, 1962, p. 84, fig. 7.1 (pleopod).

Leucosides pubescens (Miers): Buitendijk, 1939, p. 230.

DREDGED: Two, $\frac{1}{2}$ mile SE. of Toorbul Pt red beacon, 1A, 29.x.1962. One, $\frac{1}{2}$ mile NE. of Old Pile Light, 3B, 2 fm, mud and culch, 15.vi.1967, Q.M., W2800. One (juv.), $\frac{1}{2}$ mile W. of Naval Reserve Bank beacon, 5C, 4 $\frac{1}{2}$ fm, sandy mud, 24.ix.1962. One, 1 mile NW. of Snipe I., 7C, 3 fm, gritty mud, 13.x.1967, Q.M., W2917. One (juv.), 1 mile off Redland B. jetty towards Snipe I., 7C, muddy grit and mud, 26.iv.1962, Q.M., W2602.

TRAWLED: One, 4 $\frac{1}{2}$ miles E. of Otter Rock beacon, 3B, 3–4 fm, sandy grit, 10.xi.1961, Q.M., W2603. One between Peel I. and Green I., 5C, 1.xi.1961, L. Wale. Four, c. $\frac{1}{2}$ mile off Redland B. jetty in water airport area, 7C, 4–6 fm, muddy grit, 26.iv.1962.

Although these specimens agree well with Miers' (1877) description, his figure (fig. 22) shows the anterolateral margins of the carapace to be more rounded. They key out without hesitation to this species in Alcock's key (1896, pp. 211–4) and male pleopods agree well with Tyndale-Biscoe and George's figure (1962, fig. 7.1).

The shape of the granulate posterior margin of the carapace varies with size. In small specimens (to c. 6.5 mm cw.) the margin is concave, the lateral angles acute. The angles are still prominent in 11.5 mm specimens but barely discernable at 14 mm. A similar variation has been reported by Alcock (1896, p. 233) for *L. vittata*.

DISTRIBUTION: Indian Ocean from Red Sea to India, East Indies and Western Australia (Tyndale-Biscoe and George, 1962). Not previously from eastern Australia.

***Leucosia whitei* Bell**

(Fig. 17)

Leucosia whitei Bell, 1855, pp. 289–90, pl. 31, fig. 2. Alcock, 1896, pp. 225–6. Barnard, 1950, p. 386, fig. 71 h. Tyndale-Biscoe and George, 1962, p. 77, pl. 1, figs. 6, 9, pl. 2, figs. 6, 9. McNeill, 1968, pp. 41–2.

Leucosia cheverti Haswell, 1879a, p. 47, pl. 5, fig. 2; 1882b, p. 120.

DREDGED: One, S. end of Pearl Channel, 1C, 4 $\frac{1}{2}$ fm, sand, 6.vii.1962, Q.M., W2807.

In spite of McNeill's (1968, p. 42) notes on the now unavailable type material of *L. chevertii* Haswell, there seems to be no justification for considering these two to be distinct species. McNeill's description of the tuberculation of the chelae of *L. chevertii* is not inconsistent with Bell's figure of *L. whitei* and there remains only the degree of development of the frontal teeth and the granulation of the hepatic region of the carapace, both of which, as Tyndale-Biscoe and George (1962, p. 77) have noted, were shown to be

very variable by Miers (1884, p. 249). The present specimen, with its very distinctly tridentate front and its single smooth hepatic elevation, bridges both 'species'.

DISTRIBUTION: Indo-Pacific from East Africa, Andamans, East Indies to northeastern and western Australia (Tyndale-Biscoe and George, 1962).

Tribe BRACHYGNATHA

Family MAJIDAE

Paratymolus latipes Haswell

Paratymolus latipes Haswell, 1880b, p. 303, pl. 16, figs. 3–5; 1882b, p. 143. Griffin, 1966, p. 276 (in key).

Paratymolus latipes Haswell var. *quadridentata* Baker, 1906, pp. 107–8, pl. 1, fig. 2.

Paratymolus latipes quadridentata Baker: Hale, 1927, p. 123, fig. 119.

DREDGED: One (juv.), 1 mile W. of Pearl Channel buoy, **2B**, 6 fm, 6.vii.1962 (ident. F. A. McNeill).

DISTRIBUTION: Southeastern, southern and southwestern Australia (Griffin, 1966).

Achaeus brevirostris (Haswell)

(Fig. 18)

Stenorhynchus brevirostris Haswell, 1879b, p. 408; 1880a, p. 432, pl. 27, fig. 5.

Achaeus affinis Miers, 1884, p. 188.

Achaeus brevirostris (Haswell): Griffin and Yaldwyn, 1965, pp. 46–8. Griffin, 1966, p. 276 (in key).

DREDGED: One, $\frac{1}{4}$ mile W. of black beacon on SW. side of St Helena I., **4B**, 2 fm, mud, 18.vii.1967, Q.M., W2851.

DISTRIBUTION: Northern and eastern Australia, Indian Ocean, Indo-Malaya, sublittoral to shallow offshore (Griffin, 1966).

Achaeus fissifrons (Haswell)

(Fig. 19)

Stenorhynchus fissifrons Haswell, 1879b, p. 409; 1882b, p. 2.

Achaeus tenuicollis Miers, 1886, p. 9, pl. 1, figs. 3a–c. Stephensen, 1945, p. 97, figs. 18A, B.

Achaeus elongatus Sakai, 1938, p. 223, fig. 13.

Achaeus fissifrons (Haswell): Griffin and Yaldwyn, 1965, pp. 38–44, figs. 1–8 (lit. and synon.).

DREDGED: Two, due E. of Jumpin Pin Bar, 47 fm, amongst fan corals, 1.vii.1961, Q.M., W2624. (Outside Moreton B.).

TRAWLED: One, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962.

DISTRIBUTION: New Zealand, southern and eastern Australia, north to Japan. Perhaps extending west to the Andaman Islands and Iranian Gulf in the Indian Ocean area (Griffin and Yaldwyn, 1965).

***Achaeus lacertosus* Stimpson**

(Fig. 20)

Achaeus lacertosus Stimpson, 1857, p. 218; 1907, p. 20, pl. 3, fig. 7. Grant and McCulloch, 1906, p. 26, pl. 3, fig. 1. Barnard, 1950, p. 19, figs. 3a, 3b. Griffin and Yaldwyn, 1965, pp. 44–6 (lit. and synon.).

Achaeus breviceps Haswell, 1880a, p. 433.

Achaeus spinifrons Sakai, 1938, p. 212, fig. 6.

DREDGED: One, 3 miles NW. of M3 beacon, **1B**, 6 fm, gritty sand, 5.x.1967, Q.M., W2918. One, $\frac{1}{4}$ mile W. of N. end of St Helena I., **4B**, $2\frac{1}{2}$ fm, culch, 18.vii.1967, Q.M., W2928.

DISTRIBUTION: Eastern, northern and western Australia, Japan, India and east coast of Africa (Griffin and Yaldwyn, 1965).

***Naxia deflexifrons* (Haswell)**

(Fig. 21)

Microhalimus deflexifrons Haswell, 1880, pp. 435–6, pl. 25, fig. 2; 1882, p. 7.

Naxia (Microhalimus) deflexifrons (Haswell): McCulloch, 1918, pp. 330–2, pl. 10, figs. 1–4.

Naxia deflexifrons (Haswell): Griffin, 1966, p. 274 (in key).

DREDGED: One, NE. up Rainbow Channel from Myora Light, **5D**, 6–8 fm, coarse sand, 12.x.1961, Q.M., W2622.

DISTRIBUTION: Australia, Port Jackson (McCulloch, 1913).

***Hyastenus brockii* de Man**

(Fig. 24)

Hyastenus Brockii de Man, 1887b, pp. 221–3, pl. 7, figs. 1, 1a, 1b.

Hyastenus brockii de Man: Griffin, 1966, p. 282 (in key).

DREDGED: One, NE. up Rainbow Channel from Myora Light, **5D**, 6–8 fm, coarse sand, 12.x.1961, Q.M., W2625. One, $\frac{1}{4}$ mile NW. of M1 Buoy, **2C**, $7\frac{1}{2}$ fm, hard sand with shell, 29.viii.1967.

FIG. 18: *Achaeus brevirostris*, W2851. A, carapace; B, lateral view of carapace; C, dactylus of last leg.

FIG. 19: *Achaeus fissifrons*, W2624. A, carapace; B, lateral view of carapace.

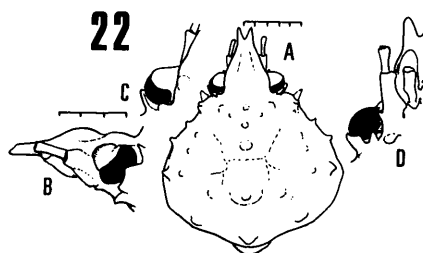
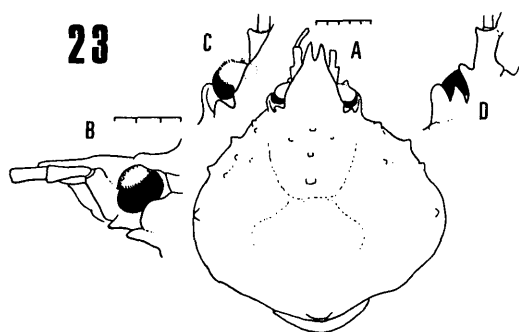
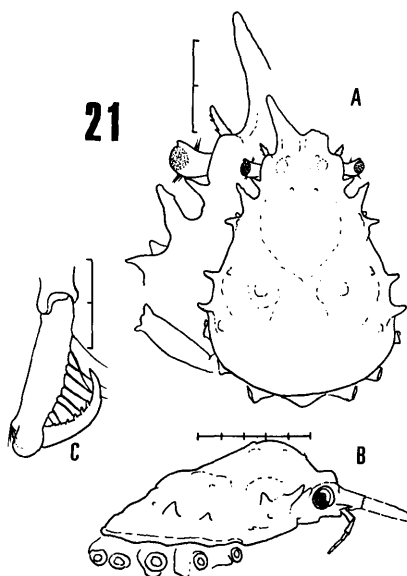
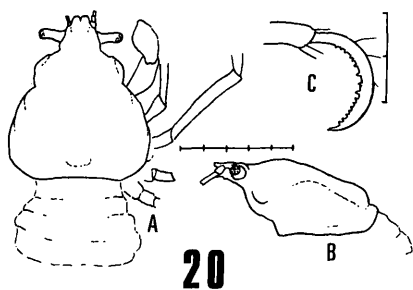
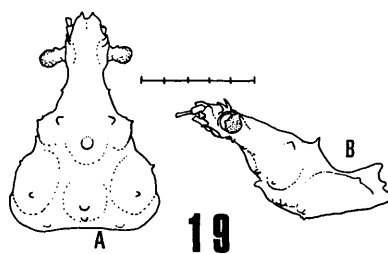
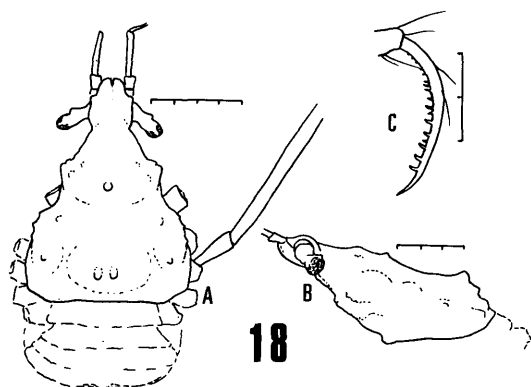
FIG. 20: *Achaeus lacertosus*, W2928. A, carapace; B, lateral view of carapace; C, dactylus of last leg.

FIG. 21: *Naxia deflexifrons*, W2622. A, carapace; B, lateral view of carapace; C, propodus and dactylus of last leg.

FIG. 22: *Phalangipus australiensis*, W2620. A, carapace; B, C, D, lateral, dorsal and ventral views of orbit.

FIG. 23: *Phalangipus longipes*, W2797. A, carapace; B, C, D, lateral, dorsal and ventral views of orbit.

Scale divisions 1 mm.



DISTRIBUTION: Indian Ocean, Indo-Malaya. In Australia previously known only from Torres Strait (Griffin, 1966).

***Hyastenus convexus* Miers**

(Fig. 25)

Hyastenus (Chorilia) convexus Miers, 1884, p. 196, pl. 18, fig. B.

Hyastenus convexus Miers: Griffin, 1966, p. 282 (in key).

DREDGED: One, $\frac{1}{4}$ mile NW. of M1 Red Buoy, 2C, $7\frac{1}{2}$ fm, hard sand and shell, 29.viii.1967, Q.M., W2950.

DISTRIBUTION: Indian Ocean, Indo-Malaya, Philippines; northwestern to north-eastern Australia (Griffin, 1966).

***Hyastenus diacanthus* (de Haan)**

(Fig. 26)

Pisa (Naxia) diacantha de Haan, 1839, p. 96, pl. 24, fig. 1.

Hyastenus diacanthus (de Haan): Alcock, 1895, p. 210. Sakai, 1938, pp. 279–80, pl. 29, fig. 2. Sakai, 1965, p. 81, pl. 36, fig. 1. Griffin, 1966, p. 281 (in key).

DREDGED: Two, $1\frac{1}{4}$ mile W. of Rous Channel Light, 4C, 8–14 fm, 13.xii.1962. Present, $\frac{1}{2}$ mile SE. of Hope Banks, 5C, 3 fm, sandy mud, 1.vi.1962. One, 1 mile SE. of Hope Banks, 5C, 5–6 fm, muddy grit, 1.vi.1962. Present, 1 mile W. of Naval Reserve Bank beacon, 5C, $4\frac{1}{2}$ fm, sandy mud, 24.ix.1962. Present, $2\frac{1}{2}$ mile NNE. of Cleveland Light, 5C, 5 fm, muddy sand, 24.ix.1962. One, between Hanlon Light and Naval Reserve Bank beacon, 5D, muddy grit, 12.x.1961. Four, from Hanlon Light east, 5D, gritty sand with mud, 12.x.1961, (2 ident. by F. A. McNeill). Eight, $1\frac{1}{4}$ miles SE. of Hope Banks, 5C, 5 fm, clean sand with shell, 30.viii.1967, Q.M., W2847. One, $2\frac{1}{4}$ miles NW. of Hanlon Light, 5C, $4\frac{1}{2}$ fm, sandy mud (mostly sand), 30.viii.1967. One, $3\frac{1}{2}$ miles NE. of Hope Beacon, 5C, $4\frac{1}{2}$ fm, muddy sand, 30.viii.1967, Q.M., W2845. Three, 1 mile SW. of South West Rocks, 6C, 4 fm, culch, 6.x.1967, Q.M., W2919 W2929. Three, $1\frac{1}{2}$ miles E. of Cleveland Light, 6C, $2\frac{1}{2}$ fm, culch, 6.ii.1968, Q.M., W2965. Two, SW. corner of Peel I., 6D, muddy sand, 24.ix.1962. Present, off SW. point of Peel I., 6D, 5–6 fm, 5.xii.1962. One, off SE. corner of Peel I., 6D, 12.x.1961. One, between two S. beacons, Peel I., 6D, 3 fm, muddy grit, 12.x.1961. One, near Pat's Pt, 6D, $6\frac{1}{2}$ fm, shell, 25.v.1962. One, S. of Dunwich in channel, 6D, $4\frac{1}{2}$ fm, shell, 25.v.1962. One, $\frac{1}{2}$ mile W. of 'House' on Macleay I., 7D, $3\frac{1}{2}$ fm, muddy sand with shell, 13.x.1967, Q.M., W2930.

TRAWLED: Twelve, between Peel I. and Green I., 1.xi.1961.

DISTRIBUTION: Widespread Indo-West Pacific. (Griffin, 1966, p. 281).

***Hyastenus* sp.**

(Fig. 27)

DREDGED: One, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, $7\frac{1}{2}$ fm, sand with broken shell, 29.viii.1967, Q.M.-W2839. One, $\frac{1}{4}$ mile NW. of M1 Red Buoy, 2C, $7\frac{1}{2}$ fm, hard sand with shell, 29.viii.1967, Q.M., W3106.

ADDITIONAL MATERIAL: Male, Arnhem B., Northern Territory, 10 fm, sand and mud, V. Wells, Q.M. W2734.

These specimens differ from those listed under *Hyastenus diacanthus* in the following particulars:

- (1) The carapace is much flatter, particularly in the gastric region, and is without dorsal tubercles.
- (2) The rostral spines are shorter, being 0.22–0.29 times postrostral carapace as against 0.33 to 0.5 times in *H. diacanthus*.
- (3) There is a wide, U shaped sinus between the basal antennal joint and the post-orbital cup.
- (4) The terminal segment of the male abdomen is distinctly longer than broad.

In these particulars the specimens approach *H. planasius* (Adams and White) but in that species the rostral spines are shorter (one-sixth carapace length) and are parallel, the basal antennal joint bears a distinct tooth visible in dorsal view, and the male pleopod has a distinct but not greatly elongate terminal process (see Buitendijk, 1939, fig. 13).

Buitendijk (1939) figures male pleopods of several species of *Hyastenus*, and shows two quite different pleopod forms for each of two cotypes of *N. diacanthus*. The 35 mm specimen has a pleopod with a long filiform terminal appendage, whereas in the 34 mm specimen this appendage is not developed. Buitendijk ascribes this difference to age, but in all of the ten males, ranging from 20 to 70 mm total carapace length, examined in the present study the pleopods are without a long filiform appendage, and larger specimens tend more towards Buitendijk's figure of *H. aries* (fig. 1). In the single 20.5 mm male here listed as *Hyastenus* sp. the pleopod has a very long filiform appendage exactly as figured by Buitendijk (figs. 5–7).

Two distinct species close to *H. diacanthus* (de Haan) are therefore represented in Moreton Bay and it would seem possible that the material which de Haan described as *H. diacanthus* also in fact consisted of specimens of these same two species. Further investigation of this problem, including an examination of de Haan's 35 mm male in relation to features 1–5 listed above, and the selection of a lectotype, would involve a more detailed study of the genus than can be attempted here.

DISTRIBUTION: Northern and northeastern Australia; Japan.

***Hyastenus oryx* A. Milne Edwards**

(Fig. 28)

Hyastenus oryx A. Milne Edwards, 1872, pp. 250–2, pl. 14, fig. 1. Haswell, 1882b, p. 20. de Man, 1887b, pp. 224–5, pl. 7, fig. 2. Buitendijk, 1939, p. 244, figs. 11, 12 (male pleopod). Griffin, 1966, p. 281 (in key). McNeill, 1968, p. 46.

DREDGED: Five, 2 miles N. of Cowan Cowan Light, 1D, 3 fm, clean sand with weed, 5.x.1967, Q.M., W3107.

DISTRIBUTION: Indian Ocean, Indo-Malaya, New Caledonia; southwestern to northern and northeastern Australia (Griffin, 1966).

Hoplophrys ogilbyi McCulloch

Hoplophrys ogilbyi McCulloch, 1908, pp. 51-3, pl. 12, figs. 2, 2a. Griffin, 1966, p. 283 (in key).

HOLOTYPE: Female 9.5 mm, Moreton B., 8 fm, on *Spongodes*, J. D. Ogilby, Q.M., W223.

Not taken in present conditions.

DISTRIBUTION: Indo-Malaya, possibly Japan; in Australia only from Moreton B. (Griffin, 1966).

Phalangipus australiensis Rathbun

(Fig. 22)

Phalangipus australiensis Rathbun, 1918, pp. 15-16, pl. 6. Griffin, 1966, p. 280.

TRAWLED: One, $\frac{1}{2}$ mile E. of Hope Beacon, 5C, $4\frac{1}{2}$ fm, gritty mud, 18.vii.1967, Q.M., W2890. Two, 1 mile N. of Cleveland Light, 5C, 3 fm, gritty sand, 18.vii.1967, Q.M., W2854. Six, midway between Goat I. and Pat's Pt, 6D, 12.x.1961, Q.M., W2620 (2 spems).

DISTRIBUTION: Previously known only from Platypus Bay, Queensland. (Griffin, 1966).

Phalangipus longipes (Linnaeus)

(Fig. 23)

Cancer longipes Linnaeus, 1758, p. 629; 1767, p. 1047.

Egeria Herbstii H. Milne Edwards, 1834, p. 292.

Phalangipus herbstii (H. Milne Edwards): Rathbun, 1918, p. 16 (in table).

Phalangipus longipes (Linnaeus): Griffin, 1966, pp. 270, 280 (in key).

TRAWLED: One, 1 mile E. of Otter Rock beacon, 3A, $3\frac{1}{2}$ fm, mud, 23-4.v.1967, Q.M., W2797.

FIG. 24: *Hyastenus brockii*, W2625.

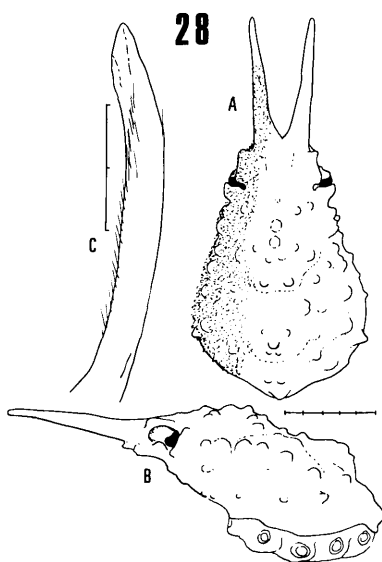
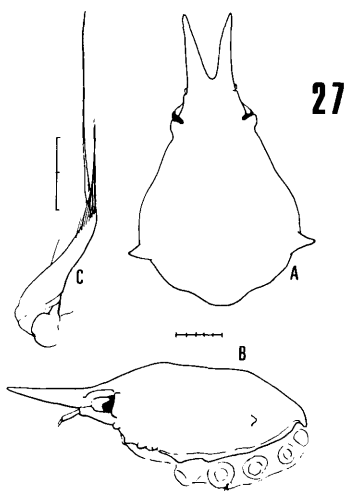
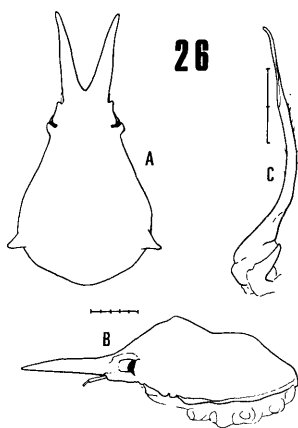
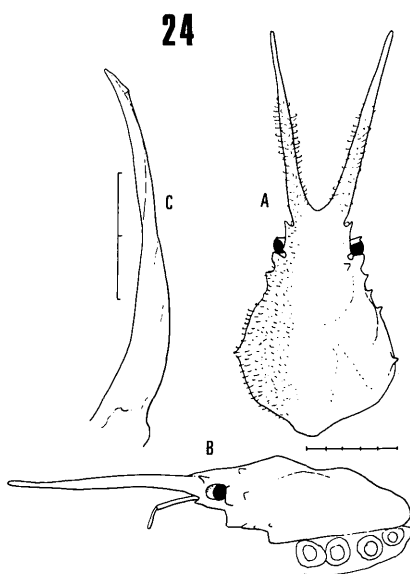
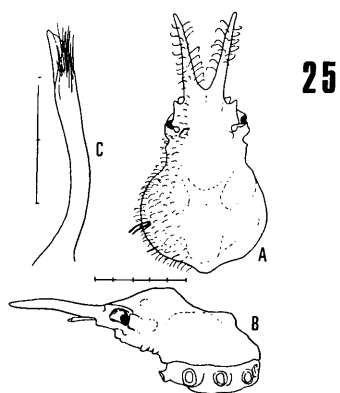
FIG. 25: *Hyastenus convexus*, W2950.

FIG. 26: *Hyastenus diacanthus*, W2847.

FIG. 27: *Hyastenus* sp., W2734.

FIG. 28: *Hyastenus oryx*, W3107.

A, carapace; B, lateral view of carapace; C, male pleopod. Scale divisions 1 mm.



Features not mentioned by Rathbun (1918) nor by Griffin (1966) but useful in discriminating between this species and *P. australiensis* are the angle which the basal antennal joint makes with the rostrum in lateral view and the relative acuteness of the lower angle of the postorbital lobe (see figs. 22B, 23B).

DISTRIBUTION: Northeastern and northern Australia, Indian Ocean (Griffin, 1966).

Phalangipus spp.

The following material was recorded but not retained, and is consequently not available for specific determination.

DREDGED: One, $\frac{1}{2}$ mile SE. of Toorbul Pt red beacon, **1B**, 4 fm, mud, 29.x.1962. One, $\frac{1}{2}$ – $\frac{3}{4}$ mile W. of M3 Buoy, **2C**, 10 fm, 29.x.1962. One, $\frac{1}{2}$ mile NW. of M1 Buoy, **2C**, $7\frac{1}{2}$ fm, sand with broken shell, 29.viii.1967. One, $1\frac{1}{2}$ mile N. of M2 Buoy, **2C**, $17\frac{1}{2}$ fm, clean hard sand, 29.viii.1967. One, black beacon on S. of St Helena I. on Nazareth House, **4C**, clay and mud, 13.xii.1962. One, N. edge of Green I. on Lytton Hill, **4C**, 10–11 fm, muddy sand, 13.xii.1962. One, $1\frac{1}{2}$ mile E. of S. end of St Helena I., **4C**, 4 fm, 18.vii.1967. One, 3 miles SW. of centre of St Helena I., **4C**, $7\frac{1}{2}$ fm, clean hard sand, 30.viii.1967. One, 3 miles N. of Cleveland Pier, **5C**, $4\frac{1}{2}$ fm, muddy sand, 24.ix.1962. Present, $\frac{1}{2}$ mile W. of Naval Reserve Bank beacon, **5C**, $4\frac{1}{2}$ fm, sandy mud, 24.ix.1962. One, $2\frac{1}{2}$ mile NW. of Hanlon Light, **5C**, $4\frac{1}{2}$ fm, sandy mud (mostly sand), 30.viii.1967. One, $1\frac{3}{4}$ mile WSW. of Hanlon Light, **5C**, $4\frac{1}{2}$ fm, sandy mud, 30.viii.1967. Four, $2\frac{3}{4}$ mile WNW. of Hanlon Light, **5C**, $5\frac{1}{2}$ fm, gritty sandy mud, 30.viii.1967. Three, 1 mile WSW. of tip of Peel I., **5C**, 4 fm, culch, 6.x.1967. One, $1\frac{1}{2}$ mile NNW. of Cleveland Light, **5C**, $3\frac{1}{2}$ fm, gritty muddy sand, 6.x.1967. One, NW. of Hanlon Light, between Hanlon Light and Naval Reserve Bank beacon, **5D**, 6 fm, muddy sand, 12.x.1961. Two, from Hanlon Light east, **5D**, gritty sand with mud, 12.x.1961. Present, $\frac{1}{2}$ way between Cleveland and Peel I. jetties, **6C**, muddy grit, 24.ix.1962. One, $1\frac{1}{2}$ mile SW. of S. tip of Peel I., **6C**, $5\frac{1}{2}$ fm, shelly sand, 6.x.1967. One, 1 mile SSW. of S. tip of Peel I., **6D**, 2 fm, culch, 6.x.1967.

TRAWLED: Forty-five, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, muddy, 1.iii.1967. Seven, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 8.iii.1967. One, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 17–18.v.1967. Fifty-three 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, 23.ii.1967. Five, between Peel I. and Green I., **5C**, 1.xi.1961. Twelve, S. of Peel I., **6D**, $2\text{--}4\frac{1}{2}$ fm, 24.ix.1962. Common, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962.

Chlorinoides longispinus (de Haan)

Maia (Chorinus) longispinus de Haan, 1839, p. 94, pl. 23, fig. 2.

Paramithrax Coppingeri Haswell, 1882a, pp. 750–1; 1882b, pp. 15–16.

Paramithrax (Chlorinoides) longispinus (de Haan): Miers, 1884, p. 522.

Chlorinoides longispinus (de Haan): Miers, 1886, p. 53. Griffin, 1966, p. 286 (in key).

Acanthophrys longispinus (de Haan): Sakai, 1938, p. 308, pl. 31, fig. 2; 1965, p. 87, pl. 40, fig. 1.

DREDGED: One, $\frac{1}{2}$ mile SE. of Toorbul Pt red beacon, **1A**, 29.x.1962. Five, $2\frac{1}{2}$ mile E. of Scott Pt, **3A**, 3 fm, culch, 6.ii.1968, Q.M., W2956. One, $\frac{1}{2}$ mile E. of Otter Rock beacon, **3A**, 3 fm, mud and shell, 31.viii.1967, Q.M., W2842. One, $\frac{1}{4}$ mile W. of black beacon, SW. side of St Helena I., **4B**, 2 fm, mud, 18.vii.1967, Q.M., W2852. Six, $1\frac{1}{2}$ mile E. of S. end of St Helena I., **4C**, 4 fm, Q.M., W2940. One, Hanlon Light east, **5D**, gritty sand with mud, 12.x.1961, Q.M., W2623. One, 1 mile SW. of South West Rocks, **6C**, 4 fm,

culch, 6.x.1967, Q.M., W2939. Five, S. of Peel I., **6D**, 3–6 fm, 17.vii.1961. One, between south beacons Peel I., **6D**, 3 fm, muddy grit, 12.x.1961. Five, 4½ mile S. of Dunwich, **6D**, 6½ fm, shelly bottom, 25.v.1962, O. Wiseman.

TRAWLED: One, 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 17–18.v.1967, Q.M., W2790. Two, between Peel I. and Green I., **5C**, 1.ix.1962, L. Wale. One, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962.

DISTRIBUTION: Indo-West Pacific Japan to Mozambique; eastern and northern Australia (Griffin, 1966).

Micippa thalia (Herbst)

Cancer thalia Herbst, 1803, p. 50, pl. 58, fig. 3.

Micippa thalia (Herbst): de Haan, 1839, p. 98, pl. 23, fig. 3. Alcock, 1895, pp. 251–2 (lit. and synon.). Sakai, 1965, p. 90, pl. 42, fig. 3. Griffin, 1966, p. 287 (in key).

DREDGED: Three, ¾ mile NW. of M1 Buoy, **2C**, 7½ fm, hard sand and broken shell, 29.viii.1967, Q.M., W2941 W2943. One, ¼ mile NW. of M1 Buoy, **2C**, 7½ fm, hard sand and shell, 29.viii.1967, Q.M., W2949.

DISTRIBUTION: East coast of Africa and the Red Sea to East Asia and Australia. (Griffin, 1966).

Family PARTHENOPIDAE

Parthenope (Parthenope) longimanus (Linnaeus)

(Fig. 31)

Cancer longimanus Linnaeus, 1758, p. 629.

Lambrus longimanus: Leach, 1815, p. 310 (name only, with reference to *Maja longimana*, Bosc.).

Lambrus longimanus: H. Milne-Edwards, 1834, p. 354.

Lambrus longimanus?: Miers, 1879b, pp. 20–1.

Lambrus longimanus?: Haswell, 1882b, p. 31.

Lambrus longimanus, H. Milne-Edwards: de Man, 1887a, p. 21.

Lambrus longimanus, Leach: Alcock, 1895, pp. 260–1.

Lambrus (Lambrus) longimanus, A. Milne-Edwards: Flipse, 1930, pp. 21–2, fig. 23 (male pleopods).

Lambrus (Lambrus) longimanus, Leach: Sakai, 1938, pp. 329–30.

Lambrus (Lambrus) longimanus (A. Milne-Edwards): Stephensen, 1945, p. 113, fig. 23A–B (male pleopods).

As is indicated by the above, very incomplete, synonymy, the authorship of this name has been the subject of considerable controversy due to many inadequate descriptions in the early literature. It has been variously attributed to Linnaeus, with and without a query; to H. Milne-Edwards, who gave probably the earliest recognisable description; to Leach, with no apparent justification whatsoever; and to A. Milne-Edwards, apparently

in error. The name became available when published with a description (admittedly inadequate) by Linnaeus, 1758, and takes authorship from that publication. Linnaeus' description although vague must surely be of a species of *Parthenope* and *Parthenope longimanus* if used with any more recent authorship (e.g. on the grounds that the present species may not be conspecific with that described by Linnaeus) would be a junior secondary homonym.

TRAWLED: One, Moreton B., presumably trawled, L. Wale, Dec. 1961, Q.M., W2613.

DISTRIBUTION: East coast of Africa to Formosa and Australia (Flipse, 1930; Sakai, 1938).

***Parthenope (Parthenope) nodosa* (Jacquinot and Lucas)**

(Fig. 29)

Lambrus nodosus Jacquinot and Lucas, 1853, p. 13, pl. 1, fig. 2. Miers, 1876, p. 12; 1884, pp. 200–1. Haswell, 1880a, p. 451; 1882b, p. 34. Filhol, 1885, p. 370, pl. 41, fig. 1–3.

Parthenope (Parthenope) nodosa (Jacquinot): Rathbun, 1924, pp. 7–8.

DREDGED: One, SW. edge of Hope Banks, 5C, 6–8 fm, sandy grit, 13.xii.1962, Q.M., W2735. One, $\frac{1}{2}$ mile W. of N. end of St Helena I., 4B, 2 $\frac{1}{2}$ fm, culch, 18.vii.1967, Q.M., W2937. Three, $\frac{1}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, hard sand and shell, 29.viii.1967, Q.M., W2838 W2841. Two, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, sand and broken shell, 29.viii.1967, Q.M., W2835 W2944. One, 4 $\frac{3}{4}$ mile E. of Mud I., 3D, 3 fm, gritty sand, 30.viii.1967, Q.M., W2844. One, SE. corner of Peel I., 6D, muddy grit, 12.x.1961, Q.M., W2610. One, Pat's Pt to Dunwich, 6D, 6 $\frac{1}{2}$ fm, shell bottom, 25.v.1962, O. Wiseman, Q.M., W2737. Two, 2 $\frac{1}{4}$ mile SW. of Goat I., 6D, 6 fm, gritty muddy sand, 12.x.1967, Q.M., W2931 W2936.

TRAWLED: Four, 1 mile E. of Goat I., 6D, 4 fm, 24.ix.1962, Q.M., W2612 W2745.

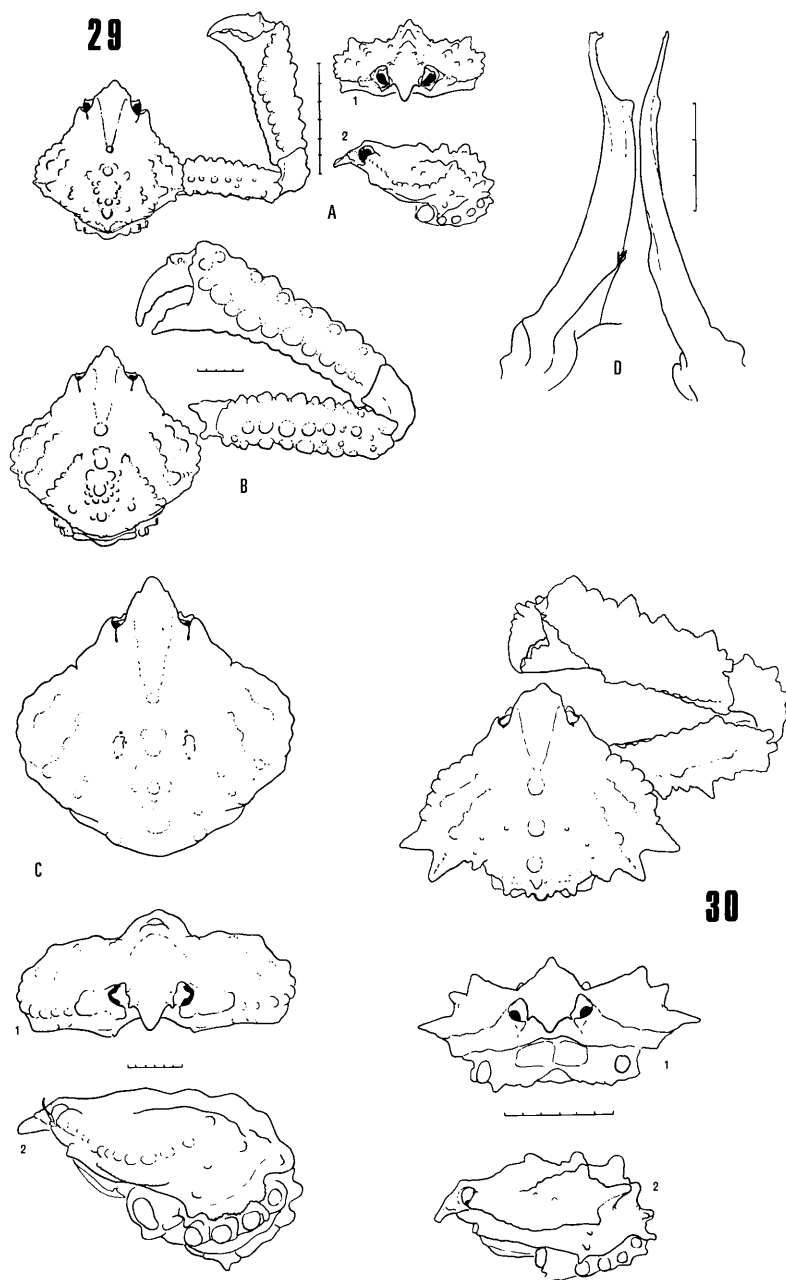
Small specimens of this species differ quite markedly from those with a carapace width exceeding c. 10 mm, and it would be difficult to recognise them as *P. nodosa* were it not for the continuous gradation within the series available. The tubercles on the chelipeds do not have the typical rounded appearance but are sharp and flattened; the meri, and more particularly the propodi, are more sharply angled, the upper surfaces of the propodi tending to be smooth and flat; the tubercles on the carapace are much more acute and more distinct, forming almost crestlike rows.

Miers (1884, p. 201) suggested that *P. intermedia* (Miers, 1879) might represent a young stage of *P. nodosa*. Balss 1922 (fide Sakai, 1938, p. 330) has shown *P. intermedia* to be in fact, a young stage of *P. valida* de Haan. The present small specimens differ from small *P. valida* in having the carapace as long as broad, three rows of tubercles on each

FIG. 29: *Parthenope nodosa*. A, carapace, W2610; B, carapace, W2745; C, carapace, W2963; D, male pleopods, W2963.

FIG. 30: *Parthenope valida*, W2712.

1 = frontal view, 2 = lateral view. Scale divisions 1 mm.



branchial region instead of a single row, and no strong backwardly directed teeth on the lateral posterior margins of the carapace.

The large circular red spot on the inner face of the hand at the base of the fingers is a convenient feature for field identification.

Miers (1877) record of this species from New Zealand was neither confirmed nor denied by Bennett (1964), but because of the inaccuracy of Miers's locality data in that publication some confirmation seems desirable before New Zealand can be included in the distribution of *P. nodosa*.

DISTRIBUTION: Northern Australia, from Cape Jaubert, W.A., to Moreton B.

Parthenope (Platylambrus) valida de Haan

(Fig. 30)

Parthenope (Lambrus) validus de Haan, 1839, p. 90, pl. 21, fig. 2, pl. 22, fig. 1.

Lambrus intermedius Miers, 1879a, pp. 29–30; 1886, p. 96, pl. 10, fig. 4.

Lambrus (Platylambrus) validus (de Haan): Sakai, 1938, pp. 330–1, pl. 33, fig. 4, pl. 39, fig. 1.

Lambrus validus (de Haan): Sakai, 1965, pp. 93–4, pl. 43, figs. 1, 2, 3 (juv.). Utinomi, 1967, p. 80, pl. 40, fig. 9.

TRAWLED: One, E. of Goat I., 6D, 24.ix.1962, Q.M., W2712.

This small (12 mm cl.) specimen is readily distinguished from small *P. nodosa* by its broad (15.5 mm) carapace and the two very strong spines on each posterolateral angle of the carapace.

DISTRIBUTION: Singapore, Japan, and NE. Australia to Samoa (Sakai, 1965)

Parthenope (Rhinolambrus) longispinus (Miers)

(Fig. 32)

Lambrus longispinus Miers, 1879b, pp. 18–19.

Lambrus spinifer Haswell, 1880a, pp. 451–2, pl. 27, fig. 1.

Lambrus (Rhinolambrus) longispinus Miers: Alcock, 1895, pp. 266–7. Flipse, 1930, p. 28.

Parthenope (Rhinolambrus) longispinis (Miers): McNeill, 1968, p. 48.

Lambrus (Rhinolambrus) longispinis Miers: Sakai, 1938, pp. 333–4, pl. 39, fig. 2 (= *P. contraria*, see Sakai, 1965, p. 96).

DREDGED: Two, $\frac{1}{2}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, hard sand and shell, 29.viii.1967, Q.M., W2978.

This species is close to *P. contraria* which also occurs in Moreton Bay (but has not appeared among present trawled or dredged material) and existing keys stress the difference in length of the chelipeds in relation to carapace length— $3 \times$ in *P. contraria*, $2.5 \times$ in *P. longispinus*. This seems to be reliable only with large males of *P. contraria* and the differences listed by Sakai, 1965, p. 96 must be used to separate these species. To these differences it might be added that the rostrum of *P. contraria* carries spinules laterally and a transverse row of four spinules at its base (see fig. 33).

DISTRIBUTION: India to Japan, Australia, and Samoa (McNeill, 1968).

Parthenope (Pseudolambrus) harpax (Adams and White)

(Fig. 34)

Lambrus harpax Adams and White, 1848, pp. 25–6, pl. 6, fig. 3. Haswell, 1880a, p. 450.

Lambrus (Parthenope) sandrockii Haswell, 1880a, pp. 452–3, pl. 27, fig. 2.

Lambrus (Parthenopoides) harpax Adams and White: Miers, 1884, pp. 202–3.

Lambrus (Parthenolambrus) harpax Adams and White: Alcock, 1895, pp. 278–9.

Parthenope (Pseudolambrus) sandrockii (Haswell): Rathbun, 1924, p. 8.

[?] *Lambrus (Pseudolambrus) harpax* Adams and White: Sakai, 1938, pp. 338–9, pl. 33, fig. 6.

DREDGED: One, 1 mile SE. of Hope Banks, 5C, 5 fm, muddy grit, 1.vi.1962. One, S. end of Rainbow Channel, 5D, 2.vi.1967. One, E. of Hope Banks, 5C, 5 fm, clean sand with shell, 30.viii.1967, Q.M., W2947. One, $3\frac{1}{2}$ mile NE. of Hope Beacon, 5C, 11 fm, sandy mud, mostly sand, 30.viii.1967, Q.M., W2891. Two, $2\frac{1}{2}$ mile SW. of South West Rocks, 6C, 4 fm, culch, 6.x.1967, Q.M., W2934 W2935. One, S. of Peel I., 6D, 3–6 fm, 17.vii.1961, Q.M., W2614. One, between two S. beacons Peel I., 6D, 3 fm, muddy grit, 12.x.1961, Q.M., W2616.

TRAWLED: Nine, 1 mile E. of Goat I., 6D, 4 fm, 24.ix.1962, Q.M., W2615 W2746.

Haswell (1880a, p. 450) described two varieties of this species, variety 'a' similar to Adams and White's illustration, variety 'b' with long post orbital gastric and cardiac spines. Miers (1884) describes a smooth and a granulate form, attributing the differences noted to age. He also synonymises *Parthenope sandrockii* (Haswell) with this species, and this was questioned by Rathbun (1924, p. 8). The present series contains specimens which agree well with Adams and White's figure and with Haswell's figure of *P. sandrockii* and shows a range of variation which includes all the features mentioned. This variation seems independent of size.

Although a great deal has been written on variability within this species (e.g. Haswell, 1880; Miers, 1884) keys have subsequently (Flipse, 1930; Sakai, 1938) been based on extremely variable features and some additional comment seems justified. Variations in "Key" features shown by this series include:—

- (1) Hepatic region: margin very convexly rounded or only very slightly convex, entire or scarcely notched or with two to six small or large, smooth or serrated teeth separated by V-shaped notches or narrow slits; not at all separated from outer orbital angle or separated by a notch which may be larger and more conspicuous than the orbit.
- (2) Carapace: 1.00 to 1.15 times as broad as long.
- (3) Carapace surface: mostly smooth, or with few or many granules which may be small or large, discrete or more or less coalesced, with or without distinct deep punctae between them.
- (4) Post frontal, cardiac, and gastric regions: bearing very long or short tubular spines or with only rounded granules.
- (5) Chelipeds: 1.5 to 2.0 times the length of the carapace with or without an enlarged tooth or winged expansion anteriorly in the proximal third of the arm.

With variability of this magnitude, Flipse's key does not function, and doubt must be shed on the validity of his *P. bicornis* and *P. lobatus*. The distinctions given by Sakai (1938, p. 338) for *P. beaumontii* and *P. harpax* are no longer adequate. The specimens identified by him as these species probably all belong to *P. beaumontii*: the front is too anteriorly projecting, and the posterolateral teeth do not have the characteristic complexity of *P. harpax*.

DISTRIBUTION: Amirante I., Andaman I., to Gulf of Thailand, and Australia.

***Cryptopodia queenslandi* Rathbun**

(Fig. 35)

Cryptopodia queenslandi Rathbun, 1918, pp. 26-7, pl. 12.

DREDGED: One, E. Moreton B., 2.vi.1962, T. Hailstone. One, 200 yd S. of North Reef Light, 2A, 3 fm, 29.x.1962. One, 5 miles W. of Tangalooma, 2C, 10 fm, sandy mud, 10.xi.1961, Q.M., W2617. One, $\frac{1}{2}$ mile NW. of M1 Buoy, 2C, 7 $\frac{1}{2}$ fm, sand with broken shell, 29.viii.1967. One, 2 $\frac{1}{2}$ mile E. of Scott Pt, 3A, 3 fm, culch, 6.ii.1968, Q.M., W2963. One, $\frac{1}{2}$ mile W. of Naval Reserve Bank beacon, 5C, 4 $\frac{1}{2}$ fm, sandy mud, 29.ix.1962. One, $\frac{1}{2}$ mile E. of Hope Banks beacon, 5C, 4 $\frac{1}{2}$ fm, gritty mud, 18.vii.1967, Q.M., W2859. One, $\frac{1}{2}$ mile NE. of Hope Banks beacon, 5C, 3 $\frac{1}{2}$ fm, gritty muddy sand, 6.x.1967, Q.M., W2922.

FIG. 31: *Parthenope longimanus*, W2613. A, carapace; B, lateral view of carapace; C, male pleopod.

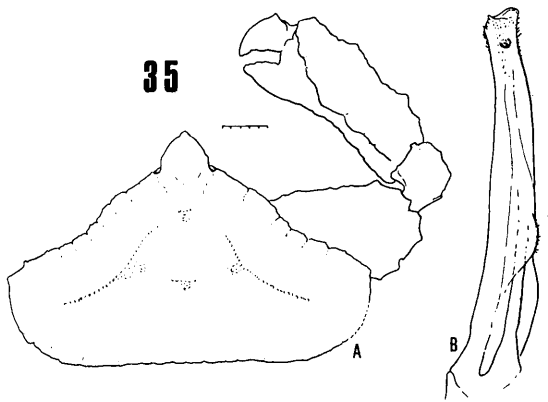
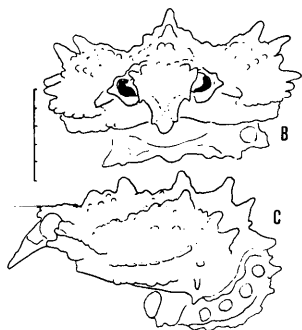
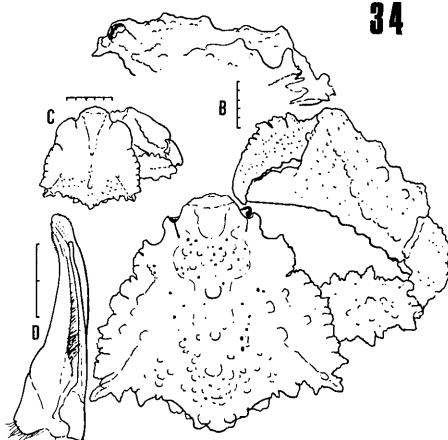
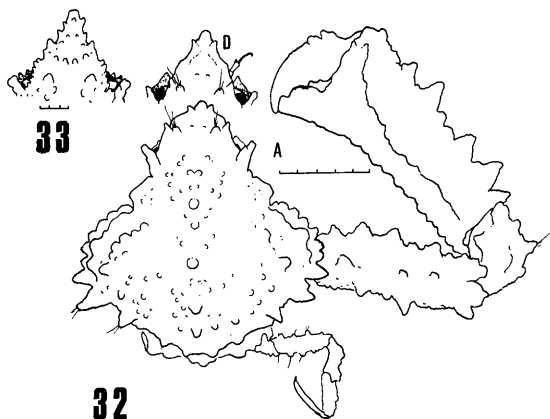
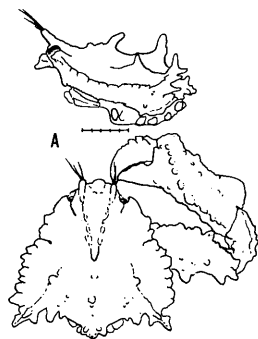
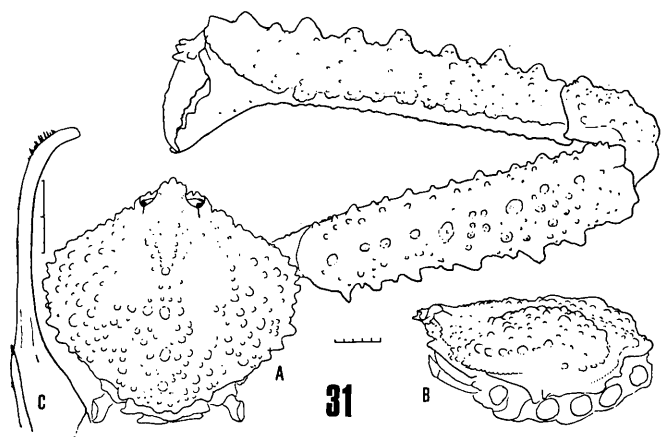
FIG. 32: *Parthenope longispinus*, W2978. A, carapace; B, frontal view; C, lateral view; D, rostrum.

FIG. 33: *Parthenope contraria*, W2611, rostrum.

FIG. 34: *Parthenope harpax*. A, W2891, dorsal and lateral views; B, W3065, dorsal and lateral views; C, W2614; D, male pleopod, W2746.

FIG. 35: *Cryptopodia queenslandi*, W2964. A, carapace; B, male pleopod.

Scale divisions 1 mm.



TRAWLED: One, northern Moreton B., late January 1962, L. Wale. One, 1 mile E. of Goat I., **6D**, 4 fm, 29.ix.1962.

DISTRIBUTION: Type locality, 20 mile NE. of C. Gloucester, Qd, 35 fm (Rathbun, 1918).

Family PORTUNIDAE

Libystes paucidentatus Stephenson and Campbell

Libystes paucidentatus Stephenson and Campbell, 1960, pp. 86–7, fig. 1B, 2D; pl. 1, fig. 4; pl. 5D.

DREDGED: One, 1 mile W. of red buoy S. of Toorbul Pt, **2B**, 3 fm, sandy mud, 6.vi.1967. One, 6 mile E. of Garnet Rock, **2B**, 6½ fm, 31.viii.1967. One, ½ mile E. of Green I., beacon S. of Green I. in line with Manly Water Tower, **5B**, 13.xii.1962.

PAST RECORDS: Male (18 mm), Redland B., **7C**, in gritty mud, MLW, 11.viii.1958. Male (14.5 mm), 2 females (15, 16 mm), Redland B., **7C**, in gritty mud, MLW, 7.i.1959. (Stephenson and Campbell, 1960, p. 86). Female (20 mm), trawled between Peel I. and Green I., **5C**, 1.ii.1961, coll. L. Wale. Female (17.5 mm), trawled Moreton B., late 1962, coll. L. Wale. (Rees and Stephenson, 1966, p. 30).

DISTRIBUTION: Moreton B.

Podophthalmus vigil (Fabricius)

Portunus vigil Fabricius, 1798, p. 368.

Podophthalmus vigil (Fabricius): Stephenson and Campbell, 1960, pp. 115–6, figs. 1(L), 2(O); pl. 5, fig. 1; pl. 5(O).

TRAWLED: One, in S. Moreton B., early, 1962, coll. O. Wiseman. Two, between Mud I. and Moreton I., **3C**, 14.xii.1962.

PAST RECORDS: Moreton B. (Bribie I., Pearl Banks, Woody Pt, Peel I., Victoria Pt, Stradbroke I.), trawled 5–10 fm, sandy mud and weed. (Stephenson and Campbell, 1960, p. 115).

DISTRIBUTION: Within Australia from Brisbane River, Southport and Western Australia. Also from Indian Ocean, Red Sea, Iranian Gulf to Formosa, Philippines and Hawaii. (Stephenson and Campbell, 1960).

Portunus gracilimanus (Stimpson)

Amphitrite gracilimanus Stimpson, 1858, p. 38; 1907, p. 77, pl. 10, fig. 3.

Portunus gracilimanus (Stimpson): Stephenson and Campbell, 1959, pp. 115–6, figs. 2M, 3M; pl. 4, fig. 1; pls. 4M, 5M. McNeill, 1968, p. 55.

TRAWLED: One, 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 1.iii.1967, Q.M., W2576. One, 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 23.ii.1967. One, 1½ mile ENE. of Mud I., **3C**, 5½ fm, mud, 3–4.viii.1967.

DISTRIBUTION: From Andamans, east coast of India, Hong Kong, Malaya to New Guinea, Australia (Northern Territory, Queensland). (Rees and Stephenson, 1966).

***Portunus hastatoides* Fabricius**

Portunus hastatoides Fabricius, 1798 p. 368. Stephenson and Campbell, 1959, pp. 101–2, figs. 2D, 3D; pl. 1, fig. 4; pls. 4D, 5D. McNeill, 1968, p. 55.

DREDGED: Five, $\frac{1}{2}$ mile ENE. of Pile Light, **3B**, 6 fm, mud, 25.v.1967. One, $1\frac{1}{2}$ mile NW. of Pile Light, **3B**, 5 fm, mud, 25.v.1967. One, $4\frac{1}{2}$ mile NW. of sand hills on Moreton I., **3D**, $11\frac{1}{2}$ –12 fm, 1.vi.1962. Two, $\frac{3}{4}$ mile SW. of south beacon off Mud I., **4B**, $4\frac{1}{2}$ fm, 25.v.1967. One, 2 mile N. of E. end of Mud I., **4C**, $6\frac{1}{2}$ fm, mud, 25.v.1967. One, 1–2 miles W. of S. end of Moreton I., **4D**, 17–18 fm, 7.iv.1961. Seven, N. end of Rous Channel, **4D**, 2.vi.1962.

TRAWLED: Seven, NE. corner of Moreton B., 7–8.iv.1961. Four, 8 mile E. of Scarborough, **2B**, $4\frac{1}{2}$ fm, sand, 10.xi.1961. Five (including 2 ovig. females) N. Moreton B., late January, 1962. One ovig. female, near Shark Spit, **2D**, 12 fm, 23.ii.1962. One hundred and twenty-eight, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 23.ii.1967, 31.iii.1967, 8.iii.1967, 19–20.iv.1967, 17–18.v.1967, 23–24.v.1967. One, 3 mile ESE. of Woody Pt, **3A**, 3 fm, mud, 9.iv.1968. Two hundred and nine, $1\frac{1}{2}$ miles ENE. of Mud I., **3C**, $5\frac{1}{2}$ fm, mud, A. Jones, 9–10.viii.1967, 7.ix.1967, 30–1.x.1967. Two, S. of Peel I., **6D**, 6 fm, 4.xii.1961.

PAST RECORDS: Moreton B. (Woody Pt, Pearl Banks). Trawled and dredged in soft mud, sandy mud, and shelly mud, 3–9 fm. (Stephenson and Campbell, 1959).

DISTRIBUTION: From the coast of Zululand to Japan and the Philippines, including the northern coasts of Australia. (Stephenson and Campbell, 1959).

***Portunus pelagicus* (Linnaeus)**

Cancer pelagicus Linnaeus, 1767, p. 1042.

Portunus pelagicus (Linnaeus): Stephenson and Campbell, 1959, pp. 96–8, figs. 2A, 3A; pl. 1, fig. 1; pls. 4A, 5A. McNeill, 1968, p. 54. Stephenson, 1968a, pp. 83–9, pl. 11; 1968b, pp. 385–99, fig. 2C, D.

DREDGED: One, $2\frac{1}{2}$ miles E. of Scott Pt, **3A**, 3 fm, culch, 6.ii.1968. Six, $1\frac{1}{2}$ miles S. of Dunwich near black beacon, **6D**, $2\frac{1}{2}$ – $3\frac{1}{2}$ fm, 11.iv.1962. One, 2 miles ESE. of Caboolture River, **1A**, 2 fm, mud with shell, 6.vi.1967.

TRAWLED: Everywhere in Moreton Bay, but never in large quantities, April to November, 1961. Two thousand, eight hundred and ninety two, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 23.ii.1967, 1.iii.1967, 8.iii.1967, 19–20.iv.1967, 23–4.v.1967. One thousand two hundred and seventeen $1\frac{1}{2}$ miles ENE. of Mud I., **3C**, $5\frac{1}{2}$ fm, mud, 3–4.viii.1967, 9–10.viii.1967, 7.ix.1967, 25–6.ix.1967, 30–1.x.1967, 22–3.i.1968. Several, S. of Peel I., **6D**, 5.xii.1962.

PAST RECORDS: Trawled commercially throughout Moreton B. Common in shallow, sandy-muddy, inshore waters, but much less common in clearer offshore waters. (Stephenson and Campbell, 1959).

DISTRIBUTION: Within Australia abundantly and widely recorded. Also from Mediterranean and East Africa to Japan, the Philippines, Tahiti and New Zealand.

Portunus rubromarginatus (Lanchester)

Achelous rubromarginatus Lanchester, 1900, pp. 746–7, pl. 46, fig. 8.

Portunus rubromarginatus (Lanchester): Stephenson and Campbell, 1959, pp. 112–3, figs. 2K, 3K; pl. 3, fig. 3; pls. 4K, 5K.

DREDGED: One, $\frac{1}{4}$ mile NW. of M1 Buoy, **2C**, $7\frac{1}{2}$ fm, hard sand with shell, 14.viii.1967. One, $1\frac{3}{4}$ mile SE. of M3 Buoy, **2C**, $4\frac{1}{2}$ fm, clean hard sand with weed, 29.viii.1967. One, $\frac{1}{2}$ mile offshore, outside Tangalooma Gutter, **2D**, 8 fm, 1 vi.1962. One, in channel between Ridge Shoal and Dring Banks, **2D**, 9 fm, fine sand, 29.iv.1964. One, $1\frac{1}{2}$ mile W. of Tangalooma White Light, **2D**, $9\frac{1}{2}$ fm, hard sand, 14.vii.1967. One, 2 mile NNW. of Shark Spit, **2D**, 10 fm, clean hard sand, 29.viii.1967. One, $1\frac{1}{2}$ mile E. of Cleveland Light, **6C**, $2\frac{1}{2}$ fm, culch, 12.ii.1968.

TRAWLED: One, S. of Peel I., **6D**, $2-4\frac{1}{2}$ fm, 24.ix.1962. One, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962. Three, between Mud I. and Moreton I., **3C**, 14.xii.1962. One, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 1.iii.1967, Q.M., W2576. Seven, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 19–20.iv.1967, 17–18.v.1967. Seven, $1\frac{1}{2}$ mile ENE. of Mud I., **3C**, $5\frac{1}{2}$ fm, mud, 3–4.viii.1967, 22–3.i.1968.

PAST RECORDS: Moreton B. (Dunwich, Woody Pt), trawled sandy mud, 3–12 fm (Stephenson and Campbell, 1959).

DISTRIBUTION: South China Sea, Hong Kong, Malay Archipelago, and Northern half of Australia. (Stephenson and Campbell, 1959).

Portunus sanguinolentus sanguinolentus (Herbst)

Cancer sanguinolentus Herbst, 1796, p. 161, pl. 8, figs. 56, 57.

Portunus sanguinolentus (Herbst): Stephenson and Campbell, 1959, pp. 98–9, figs. 2B, 3B; pl. 1, fig. 2; pls. 4B, 5B. Stephenson, 1968b, pp. 385–99, fig. 2B.

TRAWLED: Eight miles E. of Scarborough, **2C**, $4\frac{1}{2}$ fm, sand, 10.xi.1961. Five, 1 mile E. of Otter Rock beacon, **3A**, $3\frac{1}{2}$ fm, mud, 1.iii.1967, 8.iii.1967, 17–18.v.1967, 23–24.v.1967. Sixteen, $1\frac{1}{2}$ mile ENE. of Mud I., **3C**, $5\frac{1}{2}$ fm, mud, 22–3.i.1968.

PAST RECORDS: Moreton B. (Deception B., Woody Pt, Sandgate) (Stephenson and Campbell, 1959).

DISTRIBUTION: Within Australia recorded from Queensland, New South Wales, South Australia and Western Australia. Also from East Africa to Hawaii. (Stephenson and Campbell, 1959).

Charybdis callianassa (Herbst)

[?] *Cancer callianassa* Herbst, 1789, pl. 54, fig. 7 (fide Leene, 1938).

Charybdis (Charybdis) callianassa (Herbst): Leene, 1938, pp. 81–4, figs. 41–3. Stephenson, Hudson and Campbell, 1957, pp. 493–5, figs. 1B–D, **2C**, **3D**; pl. 1, fig. 2; pl. 4A.

DREDGED: One, 2 miles SW. of Toorbul Pt red beacon, **2A**, $2\frac{1}{2}$ fm, mud with shell, 6.vi.1967. Two, 8 miles E. of Scarborough, **2C**, 8–10 fm, rising shallowing banks, 10.xi.1961. One, $4\frac{1}{2}$ miles E. of Otter Rock beacon, **3B**, on sandy ground, 10.xi.1961. One, $\frac{1}{2}$ mile ENE. of Pile Light, **3B**, 6 fm, mud, 25.v.1967.

TRAWLED: Very common, NE. end of Moreton B., 7–8.iv.1961. Dominant form in trawl, 8 miles E. of Scarborough, **2C**, 4½ fm, sand, 10.xi.1961. One ovig. female, 1 mile W. of Porpoise B., Moreton I., **2D**, 12–13 fm, 22.ii.1962. Six hundred and forty nine, 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 23.ii.1967, 1.iii.1967, 8.iii.1967, 19–20.iv.1967, 17–18.v.1967, 23–4.v.1967. One, 2 miles ESE. of Woody Pt, **3A**, 3 fm, mud, 9.iv.1968. Twenty nine, 1½ miles ENE. of Mud I., **3C**, 5½ fm, mud, 9–10.viii.1967, 7.ix.1967, 30–31.x.1967, 22–3.i.1968. Very common in trawl, 3 miles NE. of Mud I., **3C**, 6 fm, mud, 10.xi.1961

PAST RECORDS: Moreton B. (Scarborough, Woody Pt, Pat's Pt), trawled in sandy mud and shells, 3–6 fm. Common amongst penaeid prawn catches in Moreton B. (Stephenson, Hudson and Campbell, 1959).

DISTRIBUTION: Karachi to both Western and Eastern Australia.

***Charybdis feriatus* (Linnaeus)**

Cancer feriatus Linnaeus, 1758, p. 627.

Charybdis (Charybdis) cruciata (Herbst): Leene, 1938, pp. 24–7, fig. 1, 2. Stephenson, Hudson and Campbell, 1957, pp. 495, 497, figs. 2E, 3F; pl. 1, fig. 3; pl. 4B.

TRAWLED: One, NE. end of Moreton B., 10–20 fm, 7–8.iv.1961. Two, 8 miles E. of Scarborough, **2C**, 4½ fm, sandy, 10.xi.1961.

PAST RECORDS: Moreton B. (Beechmere, Deception B., Scarborough, Woody Pt, Pat's Pt, Cleveland), trawled 5–10 fm, sandy mud. Common from September to February, caught with *Portunus pelagicus*. (Stephenson, Hudson and Campbell, 1957).

Holthuis, 1962, pp.23–45, discusses the need for changing the long-accepted name of this species.

DISTRIBUTION: Madagascar, South Africa, India to Japan and Australia.

***Charybdis hellerii* (A. Milne-Edwards)**

Goniosoma hellerii A. Milne-Edwards, 1867, p. 282.

Charybdis (Charybdis) hellerii (A. Milne-Edwards): Leene, 1938, pp. 44–9, figs. 15–17.

Charybdis (Charybdis) hellerii (A. Milne-Edwards): Stephenson, Hudson and Campbell, 1957, pp. 497–8, figs. 1A, 2I, 3J; pl. 1, fig. 4; pls. 4C, 5B.

TRAWLED: One, 1 mile E. Otter Rock beacon, **3A**, 3½ fm, mud, 19–20.iv.1967.

PAST RECORDS: Male, 77 mm, end of N. jetty, Wynnum, **5B**, 16.ix.1952. Also from Scott's Pt, Woody Pt, dredged 3–7 fm. (Stephenson, Hudson and Campbell, 1957).

DISTRIBUTION: Mediterranean to Hawaii, including Australia.

***Charybdis incisa* Rathbun**

Charybdis (Charybdis) incisa Rathbun, 1923, pp. 131–2, pl. 33, figs. 1–3. Rees and Stephenson, 1966, pp. 31–2, pl. 7A.

PAST RECORDS: Female (c. 18 mm), Rainbow Channel, NE. of Myora Light, Moreton B., dredged coarse sand, **5D**, 6–8 fm, 12.x.1961. (Rees and Stephenson, 1966).

DISTRIBUTION: Only from southern Queensland and the west coast of Ceram.

Charybdis moretonensis Rees and Stephenson

Charybdis (Charybdis) moretonensis Rees and Stephenson, 1966, pp. 37–9; pl. 7D.

PAST RECORDS: Female (*Sacculina* infested, damaged, c. 35 mm), trawled 3½ mile S. of Woody Pt pier, 3A, 3½ fm, 26.x.1952, E. M. Grant, A.M. P13081. (Rees and Stephenson, 1966).

DISTRIBUTION: Known only from the holotype collected in Moreton Bay.

Charybdis natator (Herbst)

Cancer natator Herbst, 1789, pl. 40, fig. 1 (fide Leene, 1938).

Charybdis (Charybdis) natator (Herbst): Leene, 1938, pp. 93–7, figs. 50, 57. Stephenson, Hudson and Campbell, 1957, pp. 501–2, figs. 2G, 3H; pl. 2, fig. 4; pl. 4J.

TRAWLED: Ten, 1 mile E. of Otter Rock beacon, 3A, 3½ fm, 23.ii.1967, 1.iii.1967, 19–20.iv.1967.

PAST RECORDS: Moreton B. (Woody Pt, Cleveland, Myora, Pearl Banks, Peel I., Cowan Cowan), at low water, in sand, mud and weeds, also live coral; trawled 4–33 fm. (Stephenson, Hudson and Campbell, 1957).

DISTRIBUTION: Southeast Africa to Japan and Australia.

Charybdis truncata (Fabricius)

Portunus truncata Fabricius, 1798, p. 365.

Charybdis (Goniohellenus) truncata (Fabricius): Leene, 1938, pp. 118–21, figs. 66, 67.

Stephenson Hudson and Campbell, 1957, pp. 503–4, figs. 2D, 3E; pl. 3, fig. 3; pl. 4I.

Charybdis truncata (Fabricius): Stephenson and Rees, 1968, p. 292.

TRAWLED: One ovig. female, trawled near Shark Spit, 2D, 12 fm, 23.ii.1962. Sixty-eight, 1½ mile ENE. of Mud I., 3C, 5½ fm, mud, A. Jones, 3–4.viii.1967, 9–10.viii.1967, 7.ix.1967, 25–6.ix.1967, 30–1.x.1967, 22–3.i.1968.

PAST RECORDS: Male (35 mm) trawled 7 miles E. of Scarborough, 2B, 7½ fm, sandy mud, 10.xi.1966. Seventy (including eighteen ovig. females) between Mud I. and sand hills on Moreton I., 5½–18 fm, 19.xii.1966. (Stephenson and Rees, 1968).

DISTRIBUTION: From India to Japan including eastern and western Australia.

Charybdis yaldwyni Rees and Stephenson

Charybdis (Charybdis) yaldwyni Rees and Stephenson, 1966, pp. 32–5; pl. 7c, fig. 1D–8. Stephenson and Rees, 1968, pp. 292–3.

DREDGED: One, between Peel I. and Green I., 5C, 1.xi.1961, coll. L. Wale.

TRAWLED: One, Moreton B., late 1962, coll. L. Wale. Male, ovig. female, 8 miles E. of Scarborough, **2C**, 4½ fm, sand, 10.xi.1961. Three, 1 mile E. of Otter Rock, **3A**, 3½ fm, mud, 17–18.v.1967, 23–4.v.1967. Forty-nine, 1½ miles ENE. of Mud I., **3C**, 5½ fm, mud, 3–4.viii.1967, 30–1.x.1967, 22–3.i.1968. Three, between Mud I., and Moreton I., **3C**, 14.xii.1962.

PAST RECORDS: Male (42 mm), female (c. 36 mm), Pat's Pt, Moreton B., trawled, 4 fm, mud, 24.x.1950, T. C. Marshall. Male (29.5 mm), trawled, 3½ miles S. of Woody Pt Pier, **3A**, 3½ fm, 2.vi.1952, E. M. Grant. Two females (36.5, 42.5 mm) data as above, 26.x.1952, E. M. Grant. Ovig. female (44 mm), off SE. edge of Pearl Channel, **1C**, 6 fm, 20.xi.1952, E. M. Grant. Three males (35–44.5 mm), trawled between Mud I. and Moreton I., **3C**, 14.xii.1962. (Rees and Stephenson, 1966). Seven males (32.5–40 mm), six ovig. females (39–43.5 mm) trawled 4 miles W. of small sand hill on Moreton I., **3D**, 10–12½ fm, sandy mud, 19.xii.1966. (Stephenson and Rees, 1968).

DISTRIBUTION: Northern Australia, from Exmouth Gulf to Moreton Bay.

***Thalamita admete* (Herbst)**

Cancer admete Herbst, 1803, pp. 40–1, pl. 57, fig. 1.

Thalamita admete (Herbst): Stephenson and Hudson, 1957, pp. 320, 324–6, figs. 2I, 3I; pl. 1, fig. 1; pls 7A, 10A. Stephenson and Rees, 1967, pp. 56–61, fig. 20. McNeill, 1968, p. 51.

DREDGED: One juv., ½ mile NE. of North Reef Light, **2A**, 4½ fm, 14.ii.1962.

PAST RECORDS: Moreton B. (Peel I., Dunwich, Bird I.), all intertidal recordings. (Stephenson and Hudson, 1957).

DISTRIBUTION: From Red Sea, Durban, Mauritius through Indian Ocean to Australia, Japan, Fiji and Hawaii.

***Thalamita sima* H. Milne-Edwards**

Thalamita sima H. Milne-Edwards, 1834, p. 460. Stephenson and Hudson, 1957, pp. 352–4, figs. 2C, 3C; pl. 5, fig. 2; pls. 8(O), 9(G). McNeill, 1968, p. 53.

DREDGED: Eleven, ½ mile SE. of Toorbul Pt red beacon, **1A**, sand, 29.x.1962. One, ½ mile SE. of Toorbul Pt red beacon, **1A**, mud, 29.x.1962. One, 1 mile NNE. of Toorbul Pt red buoy, **1A**, 3 fm, sandy mud, 13.vi.1967. One, ½ mile ENE. of Toorbul Pt red buoy, **1A**, 3½ fm, muddy sand, 13.vi.1967. Two, 1¾ miles S. of Bulwer Wrecks, **1D**, 3 fm, clean sand with weed, 5.x.1967. Six, 2½ miles E. of Scott Pt, **3A**, 3 fm, culch, 6.ii.1968. One, 1½ miles E. of St Helena I., **4C**, 4 fm, 13.vii.1967. One, 3 miles SW. of centre of St Helena I., **4C**, 7½ fm, clean hard sand, 30.vii.1967. Two, 1½ miles SW. of Blue Hole beacon, **4D**, 3 fm, gritty sand, 30.viii.1967. Several, ½ mile W. of Naval Reserve Bank beacon, **5C**, 4½ fm, sandy mud, 24.ix.1962. One, 2½ miles NNW. of Cleveland Light, **5C**, 2½ fm, gritty sand with coral, 6.x.1967. Adults and juvs., from Hanlon Light east, **5D**, gritty sand, with mud, 12.x.1961. Several, NW. of Hanlon Light, between Hanlon Light and Naval Reserve Bank beacon, **5D**, muddy sand, 12.x.1961. Two, ½ mile E. of E. edge of Victoria Pt, **6C**, 3½ fm, culch, 12.x.1976. One, 1½ miles E. of Cleveland Light, **6C**, 2½ fm, culch, 12.ii.1968. One, 1 mile WSW. of Goat I., **6D**, 6 fm, gritty muddy sand, 12.x.1967. Two, ¼ mile NW. of Pat's Pt, **6D**, 5 fm, gritty mud, 13.x.1967. Juvs., S. of Peel I., **6D**, 8.iv.1961. Several, S. of Peel I., **6D**, 3–6 fm, 17.vii.1961. Several, sand banks off Dunwich pier, **6D**, 2.vi.1962. One juv., Pat's Pt, W. to Stradbroke I., **6D**, 6½ fm, shell bottom, 23.v.1962. One juv., 4½ miles S. of Dunwich in channel, **7D**, 4½ fm, culch bottom, 25.v.1962.

TRAWLED: One ovig. female, near Shark Spit, **2D**, 12 fm, 23.ii.1962. Six hundred and seventy-four, 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 23.ii.1967, 1.iii.1967, 19–20.iv.1967, 17–18.v.1967, 23–24.v.1967. One hundred and twelve, 1½ miles ENE. of Mud I., **3C**, 5½ fm, mud, 9–10.viii.1967, 7.ix.1967, 25–6.ix.1967, 30–1.x.1967, 22–3.i.1968. Common, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962.

PAST RECORDS: Moreton B. (Redcliffe, Woody Pt pier, Myora Banks, Mud I., Pat's Pt, Rainbow Channel, Cowan Cowan), trawled and dredged, 2½–19 fm. Also intertidal. (Stephenson and Hudson, 1957).

DISTRIBUTION: Within Australia, from Queensland, New South Wales, South Australia, Western Australia, Northern Territory. Also from Mozambique to Red Sea and from Japan and Hawaii to New Zealand.

Family XANTHIDAE

Halimede ochtodes (Herbst)

(Fig. 36)

Cancer ochtodes Herbst, 1783, p. 158, pl. 8, fig. 54.

Galene ochtodes (Herbst): Adams and White, 1849, p. 43, pl. 10, fig. 2.

Polycrémnus ochtodes (Herbst): Alcock, 1898, p. 135.

Halimede ochtodes (Herbst): Sakai, 1965, p. 128, pl. 66, fig. 1.

[?] *Medaeus nodosus* A. Milne-Edwards, 1867, p. 271; 1873, p. 212, pl. 8, fig. 2.

Medaeus nodosus A. Milne-Edwards: Haswell, 1882b, pp. 52–3.

DREDGED: One, 5½ miles E. of Reef Pt, Scarborough, **2B**, 6 fm, grit, 15.xii.1964, Q.M., W2803. Two, ¼ mile NW. of M1 Red Buoy, **2C**, 7½ fm, hard sand and shell, 28.viii.1967, Q.M., W2886. Two, ½ mile NW. of M1 Red Buoy, **2C**, 7½ fm, sand and broken shell, 29.viii.1967, Q.M., W2885 W2945. One 1 mile E. of Otter Rock beacon, **3A**, 3½ fm, mud, 17–18.v.1967, Q.M., W2798. One, 4 miles W. of Sand Hills, Moreton I., **3C**, 10–18 fm, sandy mud, 19.xii.1966.

The present collection contains a series of specimens ranging from 10 mm to 40 mm and the species shows considerable, but apparently continuous, variation over this range. In the 10 mm specimen the front is much broader (nearly one third carapace width), the anterolateral margins of the carapace are more strongly and irregularly toothed, and the carapace regions are more distinctly marked. The seven abdominal segments are distinct, but the terminal one is only 1.5 times as long as the penultimate as against more than twice as long in adult *Halimede*.

In almost all respects this small specimen agrees well with Milne Edwards's (1873) figures and description of *Medaeus nodosus*, but differs in having the anterior border of the buccal cavity not distinctly granular. Haswell (1882, p. 52) referred a specimen from Port Denison with a non-granulate buccal cavity margin to *M. nodosus*. Odhner (1925, p. 82) considered this specimen to be *Halimede ochtodes*.

Medaeus nodosus has long been the subject of controversy. Henderson (1893, p. 360) suggested that it should be transferred to *Halimede*. Alcock (1898, p. 124) disagreed

with this because of the differences in the male abdomen—his specimen was small and may not have developed the characteristic elongation of the terminal segment. Odhner (1925, p. 81) states that this species undoubtedly belongs in the genus *Halimede*. The holotype of *M. nodosus* was only 12 mm in carapace width and, except for the granulation of the buccal cavity margin, appears to fall within the range of variability shown by *H. ochtodes*.

DISTRIBUTION: From the Red Sea and Japan (Sakai, 1965) to Australia, and possibly New Caledonia (A. Milne-Edwards, 1873).

***Liagore rubromaculata* de Haan**

Cancer (Liagore) rubromaculata de Haan, 1835, p. 49, pl. 5, fig. 1.

Liagore rubromaculata de Haan: Kemp, 1923, pp. 408–9, pl. 10, fig. 2. Sakai, 1939, p. 446, pl. 55, fig. 3; 1965, p. 128, pl. 66, fig. 2. Buitendijk, 1960, pp. 265–7, fig. 5a (male pleopod).

DREDGED: One, 6 miles E. of Garnet Rock, **2B**, 6½ fm, 31.viii.1967. One, 2–3 miles W. of Sand Hills, Moreton I., **3D**, 10 fm, 14.xii.1962, Q.M., W2642. One, 4 miles E. of Mud I., **4C**, 8–10 fm, muddy grit, 13.vii.1967.

TRAWLED: One, 4½–5 miles off Queen's Beach, Redcliffe, **2B**, 5–6 fm, 29.iii.1966, L. Wale, Q.M., W2720. Two, between Mud I. and Moreton I., **3C**, 14.xii.1962, Q.M., W2723. One, 2 miles NNE. of Pile Light, **3B**, 6 fm, mud, 11.iv.1968.

DISTRIBUTION: From the Persian Gulf to Japan and Australia.

***Lophozozymus pictor* (Fabricius)**

Cancer pictor Fabricius, 1798, p. 335.

Lophozozymus octodentatus (H. Milne Edwards): Alcock, 1898, pp. 106–7 (lit. and synon.). Ward, 1928, pl. 29.

Lophozozymus pictor (Fabricius): Rathbun, 1924, pp. 15–16. Ward, 1932, p. 243. Buitendijk, 1960, pp. 297–8, fig. 7C (male pleopod). Forest and Guinot, 1961, p. 56, fig. 40 (male pleopod). McNeill, 1968, pp. 68–9.

DREDGED: One, W. of Tangalooma, L. Wale.

TRAWLED: One, Moreton B., November 1966, L. Wale, Q.M., W2646.

This species is also common intertidally among rocks and reefs in Moreton Bay.

DISTRIBUTION: Singapore and Malay Archipelago to NW. and NE. Australia, Fiji, Samoa, and Tahiti. (McNeill, 1968).

Cycloxanthops lineatus (A. Milne-Edwards)

Cycloxanthus lineatus A. Milne-Edwards, 1867, p. 269; 1873, p. 209, pl. 6, fig. 5. Alcock, 1898, pp. 124–5.

Cycloxanthops lineatus (A. Milne-Edwards): Sakai, 1965, p. 133, pl. 68, fig. 2 (synon). McNeill, 1968, p. 60.

DREDGED: One, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7 fm, sand with broken shell, 30.viii.1967, Q.M., W2888.

The characteristic oblique purplish linear markings are not present in this 8.5 mm specimen, nor were they present in McNeill's 10.5 mm specimen from Low Isles. Sakai (1965) notes that this is typical of younger specimens.

DISTRIBUTION: From the Red Sea to Japan, Australia and New Caledonia (Sakai, 1965).

Actaea savignii (H. Milne-Edwards)

(Fig. 37)

Cancer granulatus Audouin, 1826, pl. 6, fig. 2 (preoccupied by *Cancer granulatus* Linnaeus, 1758, p. 627).

Cancer Savignii H. Milne-Edwards, 1834, p. 378.

Actaea savignyi (H. Milne-Edwards): Sakai, 1939, pp. 485–6, fig. 37, pl. 91, fig. 1; 1965, p. 145, pl. 72, fig. 2 (lit. and synon.). Serène, 1961, p. 204 (in key).

DREDGED: One, W. of Tangalooma, L. Wale. One, $2\frac{1}{2}$ miles E. of Scott Pt, 3A, 3 fm, culch, 6.ii.1968, Q.M., W2966. One, $\frac{3}{4}$ mile WSW. of Old Pile Light, 3A, 2 fm, mud and culch, 15.v.1967, Q.M., W2816. One, $\frac{1}{4}$ mile W. of N. end of St Helena I., 4B, $2\frac{1}{2}$ fm, culch, 18.vii.1967, Q.M., W2855. One, 1 mile SE. of Hope Banks, 5C, 5 fm, muddy grit, 1.vi.1962. Two, E. of Hanlon Light, 5D, gritty sand with mud, 12.x.1961, Q.M., W2643 W2644. One, $1\frac{1}{2}$ miles E. of Cleveland Light, 6C, $2\frac{1}{2}$ fm, culch, 12.ii.1968, Q.M., W2967. Three, between two beacons S. of Peel I., 6D, 3 fm, muddy grit, 12.x.1961. One, $4\frac{1}{2}$ miles S. of Dunwich, 6D, $4\frac{1}{2}$ fm, shelly bottom, 25.v.1962. One, off S.W. point of Peel I., 6D, 5–6 fm, 5.xii.1962. One, $\frac{1}{2}$ mile N. of 'House' on Macleay I., 6D, $3\frac{1}{2}$ fm, muddy sand with shell, 3.x.1967, Q.M., W2920.

TRAWLED: One, NE. end of Moreton B., 7–8.iv.1961. Two, 1 mile E. of Otter Rock beacon, 3A, $3\frac{1}{2}$ fm, mud, 19–20.iv.1967. Two, E. of Pat's Pt, 6D, $6\frac{1}{2}$ fm, shelly bottom, 25.v.1962.

In small specimens (6 mm) the compound tubercles illustrated by Barnard (1950, fig. 43b) are not well developed. Instead, each tubercle is borne on a flattened plate, separated from other such plates by distinct but fine grooves. With increasing size these

FIG. 36: *Halimede ochtodes*. A, W2885; B, W2945; C, W2803.

(1 — male abdomen, 2 — chela, 3 — male pleopod).

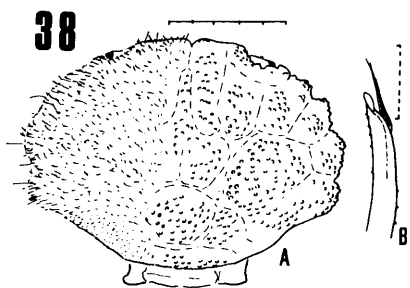
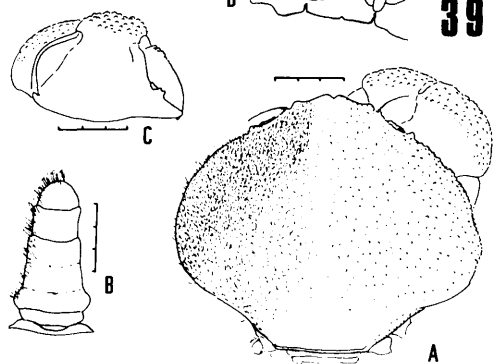
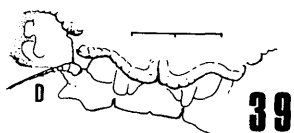
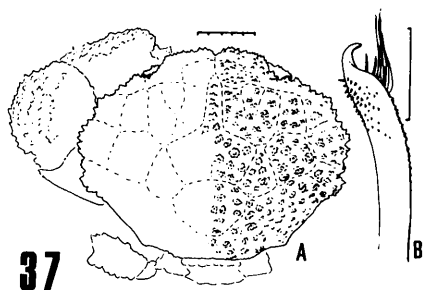
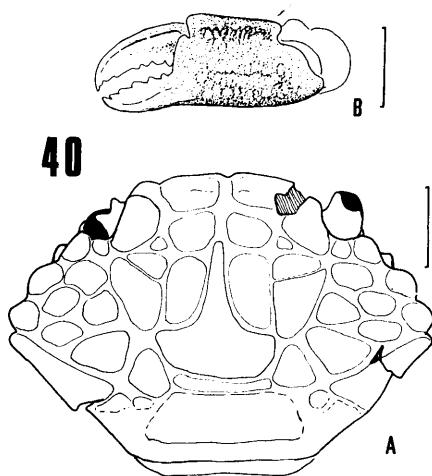
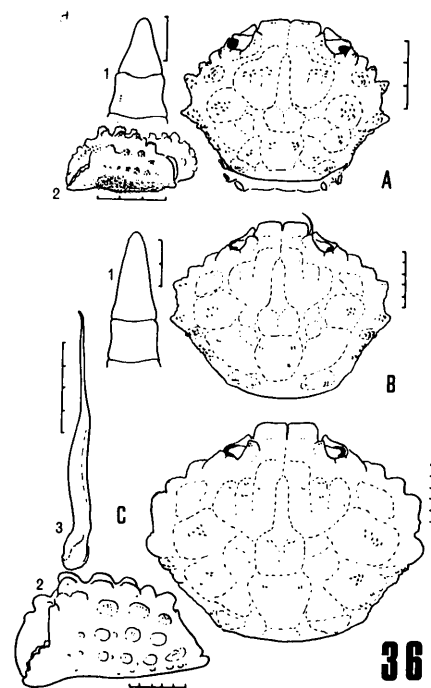
FIG. 37: *Actaea savignii*, W2644. A, carapace; B, male pleopod.

FIG. 38: *Actaea rueppellii*, W2889. A, carapace; B, male pleopod.

FIG. 39: *Banareia inconspicua*, W3111. A, carapace; B, male abdomen; C, chela; D, front.

FIG. 40: *Phymodius* sp., W2887. A, carapace; B, chela.

Scale divisions 1 mm or 0.5 mm (broken line).



plates fuse together, the lines of fusion become less distinct, and the originally separate tubercles come together around the base of a central enlarged tubercle to form the characteristic compound tubercles with, in fully grown specimens, no trace of the separate flattened plates that were present in the small specimens.

DISTRIBUTION: From South Africa and the Red Sea to East Asia, Australia and New Caledonia (Sakai, 1965).

***Actaea rueppellii* (Krauss)**

(Fig. 38)

Aegle rueppellii Krauss, 1843, p. 28, pl. 1, fig. 1.

Actaea rueppellii (Krauss): Alcock, 1898, p. 144, (lit. and synon.). Odhner, 1925, pp. 45-6, pl. 3, fig. 6.
Barnard, 1950, p. 235, fig. 37d, 43i, j. Sakai, 1965, p. 146, pl. 72, fig. 6.

Actaea ruppelli (Krauss): Serène, 1961, p. 210 (in key).

Actaea rueppellii (Krauss): McNeill, 1968, p. 71.

DREDGED: One, east of Hope Banks, 5C, 5 fm, clean sand with shell, 30.viii.1967, Q.M., W2889.

This specimen agrees well with Alcock's description, and more closely resembles Odhner's figure than it does Sakai's, in which 3M is shown to be very large and situated more posteriorly than is usual in this genus. The male pleopods resemble Barnard's figure although the terminal hairs are much longer and the tip is not as strongly produced.

DISTRIBUTION: Widely ranging in the Indo-West Pacific from South Africa to Japan, NW. and NE. Australia, Samoa, and Fiji. (McNeill, 1968).

***Banareia inconspicua* Miers**

(Fig. 39)

Banareia inconspicua Miers, 1884, pp. 210-1, pl. 19, fig. C.

DREDGED: One (13 mm male), 2 miles W. of Tangalooma white lights, 2D, 7 fm, sand and shell, 26.vi. 1968, Q.M., W3111.

This specimen agrees well with Miers's description in the characteristic very indistinct marking of the carapace regions and in all other particulars except that:

- (1) The front in frontal view is not as deeply cut into four lobules as is shown in Miers's fig. C.
- (2) Chelae, while smooth in the ventral two thirds of the outer face are coarsely granulate in the hirsute upper third. Outer face of carpus is similarly granulate among the pubescence.

These differences could be due to exaggeration by the artist, and to failure to remove pubescence respectively.

DISTRIBUTION: Previously from Darwin and Port Denison (Miers, 1884).

Phymodius sp.

(Fig. 40)

DREDGED: One, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7 fm, sand and broken shell, 29.viii.1967, Q.M., W2887.

This small (5.5 mm) and very damaged female, while close to *Phymodius monticulosus* Dana (see Barnard 1950, p. 217, fig. 40a-h. Forest and Guinot, 1961, pp. 106-9, pl. 10, figs. 1-6) in many respects, differs from that species in that:

- (1) 3M is not divided and is more distinctly L-shaped.
- (2) Areoles are more rugosely punctate.
- (3) Anterolateral teeth are less acute than seems usual in juvenile *P. monticulosus* (see Forest and Guinot, 1961, pl. 10, figs. 1-3).

DISTRIBUTION: *P. monticulosus* occurs throughout the Indo-West Pacific from South Africa and the Red Sea to Tahiti (see Forest and Guinot, 1961).

Galene bispinosa (Herbst)

Cancer bispinosus Herbst, 1783, p. 144, pl. 6, fig. 45.

Cancer (Galene) bispinosus (Herbst): de Haan, 1835, p. 49, pl. 5, fig. 2.

Galene bispinosa (Herbst): Alcock, 1898, pp. 136-7. Etheridge and McCulloch, 1916, pp. 10-11, pl. 3, figs. 3, 4 (sub fossil).

DREDGED: One, $4\frac{1}{2}$ miles E. of Pine R. entrance, 3A, $4\frac{1}{2}$ fm, mud, 14.viii.1967, Q.M., W2860. One, $2\frac{1}{2}$ miles NE. of Pat's Pt, 6D, 2 fm, sandy mud, 13.x.1967.

TRAWLED: Three, between Mud I. and Moreton I., L. Wale, late 1962. Four, 8 miles E. of Scarborough, 2C, $4\frac{1}{2}$ fm, sand, 10.ix.1961, Q.M., W3105 (one spec.). Six, 1 mile E. of Otter Rock beacon, 3A, $3\frac{1}{2}$ fm, mud, 23.ii.1967, 19-20.iv.1967, 17-18.v.1967, 23-4.v.1967. One, $1\frac{1}{2}$ miles ENE of Mud I., 3C, $5\frac{1}{2}$ fm, mud, 3-4.viii.1967. One, 2 miles SSE. of 'Coffee Pots', 4B, $3\frac{1}{2}$ fm, mud and shell, 25.v.1967, Q.M., W2819. One, $1-1\frac{1}{2}$ miles E. of St Helena I., 4C, $4\frac{1}{2}$ fm, 15.ii.1966, Q.M., W2687.

DISTRIBUTION: India to Japan and Australia. Previously in Australia from Bowen and Moreton B. (subfossil). (Etheridge and McCulloch, 1916).

***Pilumnus contrarius* Rathbun**

(Fig. 42)

Pilumnus contrarius Rathbun, 1923, pp. 113–4, pl. 23.[non] *Pilumnus contrarius* Rathbun: Montgomery, 1931, p. 444 (= *Heteropanope serratifrons* Kinahan, see Bennett, 1964, p. 69).DREDGED: One, from Hanlon Light east, **5D**, gritty sand with mud, 12.x.1961, Q.M., W2751. One, 1½ miles E. of Cleveland Light, **6C**, 2½ fm, culch, 12.ii.1968, Q.M., W2957.TRAWLED: One, 1 mile E. of Goat I., **6D**, 4 fm, 24.ix.1962, Q.M., W2752.

DISTRIBUTION: Previously from Bowen, northern Queensland (Rathbun, 1923).

***Pilumnus semilanatus* Miers**

(Fig. 41)

Pilumnus semilanatus Miers, 1884, p. 222, pl. 22, figs. B, b. McCulloch, 1913, p. 325, fig. 43. Rathbun, 1923, pp. 114–5, pl. 24, figs. 1, 2. Hale, 1927, pp. 164–5, fig. 165. McNeill, 1968, p. 64. Takeda and Miyake, 1968, pp. 7–9, fig. 1a–c, pl. 1B.DREDGED: One, NE. up Rainbow Channel from Myora Light, **5D**, 7 fm, coarse sand, 12.x.1961, Q.M., W2695.

DISTRIBUTION: Port Hedland, Western Australia, and Low Isles to Moreton B., Queensland.

***Pilumnus minutus* de Haan**

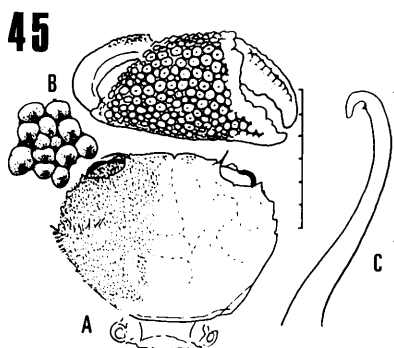
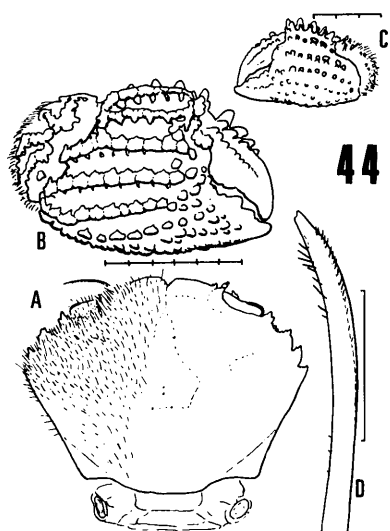
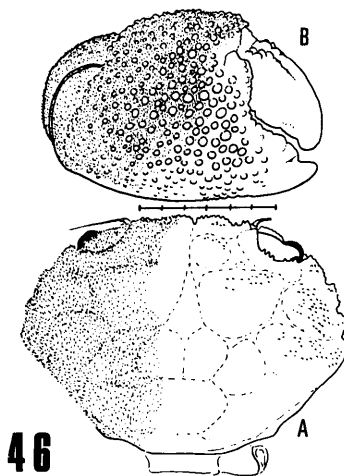
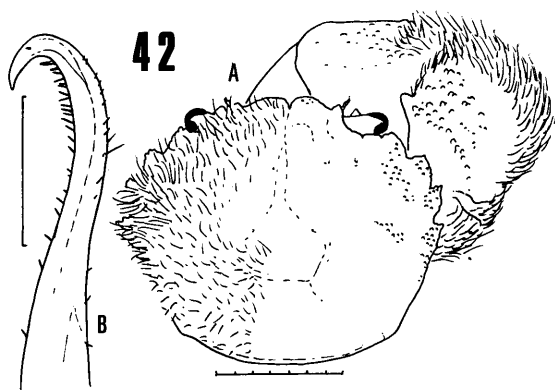
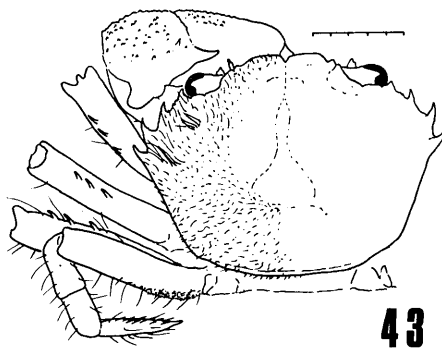
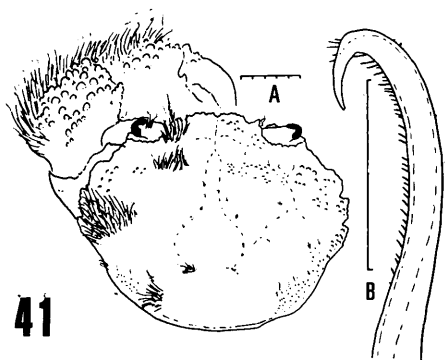
(Fig. 47)

Pilumnus minutus de Haan, 1835, p. 50, pl. 3, fig. 2. Sakai, 1939, p. 535, fig. 53a, b, pl. 64, fig. 2, pl. 100, fig. 9; 1965, pp. 158–9. McNeill, 1968, p. 63. Takeda and Miyake, 1968, pp. 40–2, fig. 9d–e.*Pilumnus hirsutus* Stimpson, 1858, p. 37; 1907, p. 69, pl. 9, fig. 1. Rathbun, 1923, pp. 110, 122, pl. 28.BY GRAB: One, South West Rocks, Peel I., **6D**, sandy mud and grit, 10.ix.1969, Q.M., W3134.

DISTRIBUTION: Malay Archipelago and Japan to northeast Australia.

FIG. 41: *Pilumnus semilanatus*, W2695. A, carapace; B, male pleopod.FIG. 42: *Pilumnus contrarius*, W2751. A, carapace; B, male pleopod.FIG. 43: *Pilumnus spinicarpus*, W2694.FIG. 44: *Actumnus pugilator*. A, carapace, W2883; B, chela, W2883; C, chela, W2884; D, male pleopod, W2883.FIG. 45: *Actumnus squamosus*, W2813. A, carapace; B, chela with detail of tubercles; C, male pleopod.FIG. 46: *Actumnus setifer*, W2645. A, carapace; B, chela.

Scale divisions 1 mm and 0.5 mm (broken line).



***Pilumnus spinicarpus* Grant and McCulloch**

(Fig. 43)

Pilumnus cursor: Haswell, 1882b, p. 67.[non] *Pilumnus cursor* A. Milne Edwards, 1873, p. 244, pl. 9, fig. 4.*Pilumnus spinicarpus* Grant and McCulloch, 1906, pp. 15-17, pl. 1, figs. 2, 2a. Rathbun, 1923, p. 123. McNeill, 1968, p. 63.

TRAWLED: One, between Peel I. and Green I., 5C, 1.xi.1961, Q.M., W2694.

DISTRIBUTION: Queensland coast, from Low Isles to Moreton B.

***Actumnus pugilator* A. Milne Edwards**

(Fig. 44)

Actumnus pugilator A. Milne Edwards, 1873, p. 195, pl. 7, fig. 1. Rathbun, 1923, p. 126, pl. 27, figs. 3, 4. McNeill, 1968, p. 64.DREDGED: One, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, sand and broken shell, 29.viii.1967, Q.M., W2884. One, $\frac{1}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, hard sand and shell, 29.viii.1967, Q.M., W2883. One, 2 miles W. of Tangalooma white lights, 2C, 7 fm, sand and shell, 26.vi.1968, Q.M., W3110.

In the smaller (7.2 mm) male and on the smaller chela of the 8.2 mm male the ornamentation of the chela consists of rows of tall tubercles, the tops of which are flattened and expanded in the dorsal rows, much as in Rathbun's figure (female 18.6 mm). In the larger male (12 mm) and in the large chela of the 8.2 mm male the flattened tops of these tubercles have become much more expanded and have coalesced in all but the more ventral rows to form crests, as shown in Milne-Edwards's figure.

DISTRIBUTION: New Caledonia (Milne-Edwards, 1873) and Queensland. (McNeill, 1968).

***Actumnus squamosus* (de Haan)**

(Fig. 45)

Pilumnus squamosus de Haan, 1835, p. 50.*Actumnus squamosus* (de Haan): A. Milne-Edwards, 1865, pp. 286-7, pl. 18, figs. 6, 6a-c. Sakai, 1965, p. 155, pl. 76, fig. 3 (lit. and synonym.).DREDGED: Two, $\frac{3}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, sand and broken shell, 29.viii.1967, Q.M., W2878 W2881. Two, $\frac{1}{4}$ mile NW. of M1 Red Buoy, 2C, 7 $\frac{1}{2}$ fm, hard sand and shell, 29.viii.1967, Q.M., W2879 W2880. One, 3 miles W. of Shark Spit, Moreton I., 2C, 12 $\frac{1}{2}$ fm, sand with little mud, 5.x.1967, Q.M., W2932. One, 1 mile W. of Shark Spit, 2D, 10-14 fm, muddy sand, 4.iv.1968, Q.M., W3109. One,

S. edge of Dring Banks, **2D**, 10 fm, 29.iv.1964, Q.M., W2811. One, $\frac{1}{4}$ mile S. of Dring Banks, **2D**, 10 fm, 29.iv.1964, Q.M., W2813. One, $4\frac{3}{4}$ miles E. of Mud I., **3D**, 3 fm, gritty sand, 30.viii.1967, Q.M., W2882.

DISTRIBUTION: From India to Japan and the Philippines (Sakai, 1965) and Australia.

***Actumnus setifer* (de Haan)**

(Fig. 46)

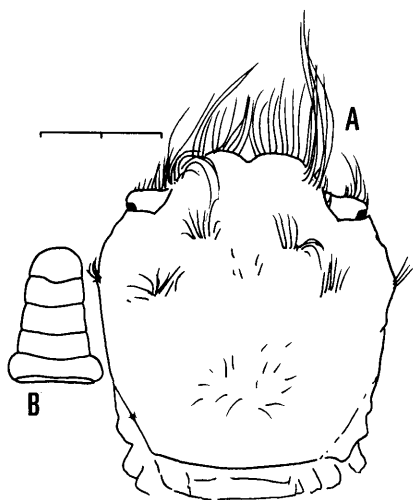
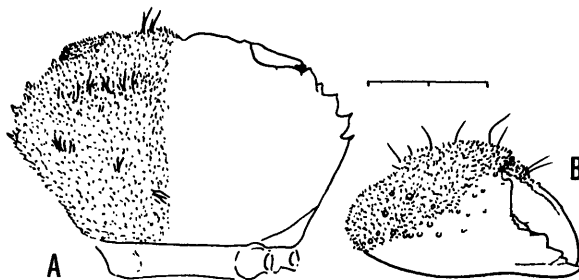
Pilumnus setifer de Haan, 1835, p. 50, pl. 3, fig. 3.

Actumnus setifer (de Haan): Hale, 1927, p. 167, fig. 168. Sakai, 1939, pp. 526, 528, pl. 65, fig. 1. Barnard, 1950, p. 271, fig. 50. McNeill, 1968, p. 64.

DREDGED: One, S. of Peel I, **6D**, 3–6 fm, 17.vii.1961, Q.M., W2645.

DISTRIBUTION: East Africa and the Red Sea to Japan, NW., NE. and S. Australia, Samoa, Fiji and Tahiti (McNeill, 1968).

47



48

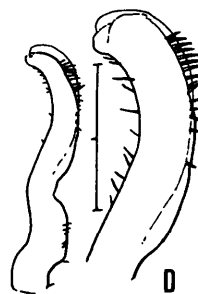


FIG. 47: *Pilumnus minutus*, W3134. A, carapace; B, large chela.

FIG. 48: *Calmania prima*, W3135. A, carapace; B, male abdomen; C, chela; D, male pleopod.

Scale divisions 1 mm.

***Calmania prima* Laurie**

(Fig. 48)

Calmania prima Laurie 1906, p. 407, pl. 1, fig. 10. Sakai, 1939, p. 548, pl. 65, fig. 3; 1965, p. 162, pl. 80, fig. 3.

BY GRAB: One, South West Rocks, Peel I., 6D, sandy mud and grit, 10.ix.1969, Q.M., W3135.

DISTRIBUTION: Ceylon, Japan, and now Australia.

Family GONEPLACIDAE

The sublittoral Goneplacidae of Moreton Bay have been reported on by Griffin and Campbell, 1969. The species recorded from the present survey were:

Rhizopa gracilipes Stimpson

Xenophthalmodes dolichophallus Tesch

Typhlocarcinops tonsurata Griffin and Campbell

Eucrate sexdentata Haswell

Eucrate dorsalis (White)

A further species, *Ommatocarcinus macgillivrayi* White was recorded from sublittoral Moreton Bay but was not taken during the present survey.

More recent collections included a single small female, belonging to the subfamily Hexapodinae, which has not previously been described.

***Hexapus granuliferus* sp. nov.**

(Fig. 49)

Hexapus sexpes (Fabricius): Haswell, 1882b, pp. 71-2.

[non] *Cancer sexpes* Fabricius, 1798, p. 344.

HOLOTYPE: Female, 6.5 mm, $\frac{3}{4}$ mile SW. of M1 Red Buoy, 2C, 6 $\frac{1}{2}$ fm, sandy mud, 24.iv.1968, Q.M., W3108.

PARATYPES: Male, 15.5 mm, Port Jackson, N.S.W., A.M., P714 (dry specimen, identified by Haswell as *H. sexpes*).

Female, 10 mm, Port Jackson, N.S.W., November 1908, A.M., P1410.

DESCRIPTION

CARAPACE: much wider than long (1.7 times), widest posteriorly; dorsal surface vaulted longitudinally, almost flat from side to side; surface entirely covered with close

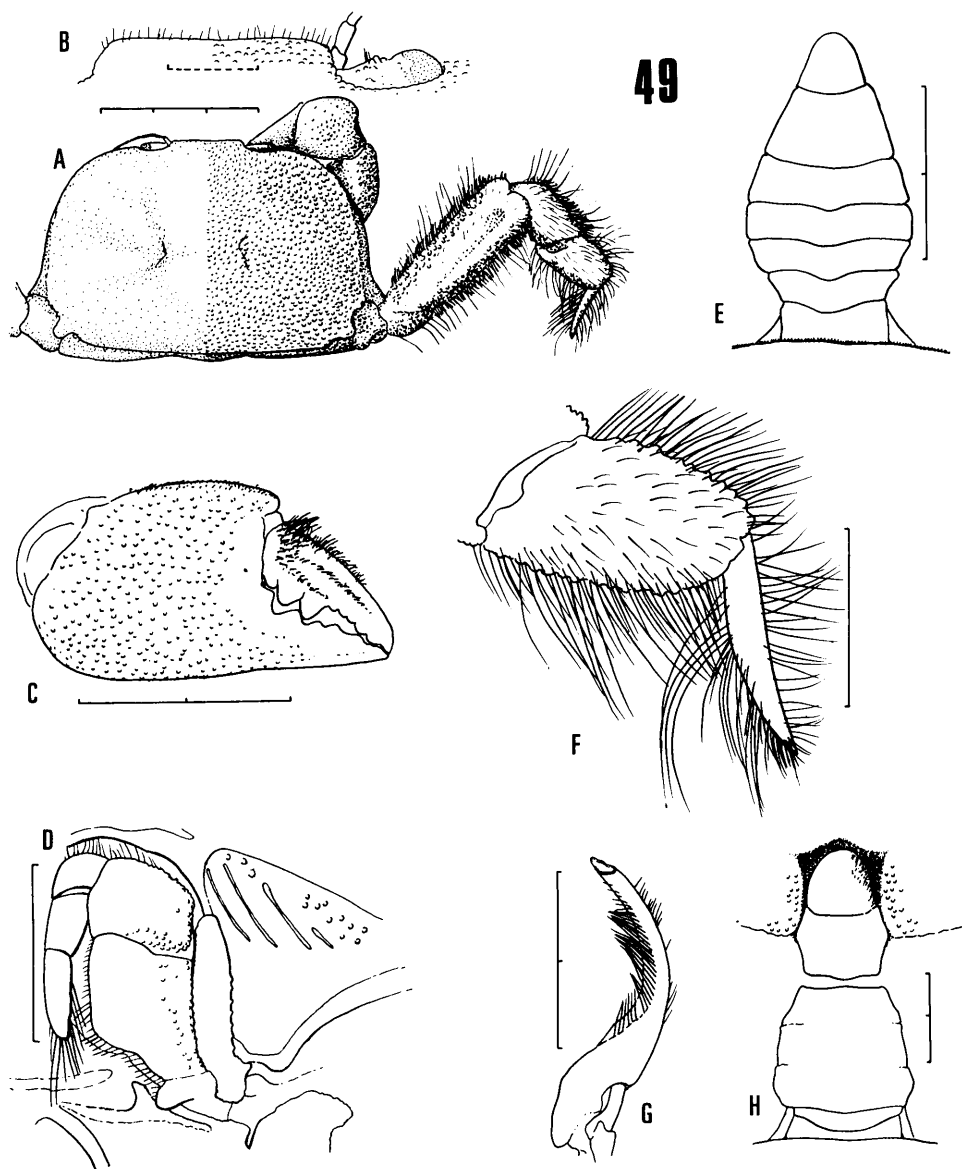


FIG. 49: *Hexapus granuliferus* sp. nov. A-F, holotype, Q.M., W3108. G, H, paratype, A.M., P714. A, carapace; B, front; C, chela; D, third maxilliped and pterygostome; E, female abdomen; F, propodus and dactylus of last leg; G, male pleopod; H, male abdomen. To eliminate parallax due to excessive surface curvature, D, E and H are composites of several drawings.

Scale divisions 1 mm or 0.5 mm (broken lines).

packed granules which are largest anterolaterally, forming distinct row laterally to mark junction of dorsal surface and side walls; side wall visible in dorsal view and strongly produced to meet base of last leg. Carapace regions vaguely indicated by moderately distinct gastro-cardiac grooves which end laterally in deep indentations from which shallow indentations run anteriorly towards the outer orbital angles, anterolaterally, posterolaterally, and posteromedially. Front narrow (5–6 times in carapace width, 2 times in fronto-orbital width), very obscurely divided into two straight-edged lobes by a shallow median impression; anterolateral margins rounded, convex, entire; lateral margins of dorsal surface weakly divergent posteriorly, lateral margins of carapace walls more strongly divergent, with prominent angles at bases of last legs; posterolateral angles with strong flattened lobe over bases of last legs. Orbits well formed, filled by moveable, granulate eyestalks with large, spherical, pale-pigmented cornea.

THIRD MAXILLIPEDS: with ischium longer than merus, parallel sided for most of its length; merus broader than long (1.4 times), well rounded anterolaterally; palp articulated at anterointernal angle of merus, with all segments sub-cylindrical, dactylus > propodus > carpus; dactylus reaching to, or almost to posteromedial angle of ischium. Pterygostome with three to seven long or short, broken or entire, oblique ridges, and some scattered granules.

CHELIPEDS: short, robust, outer faces of chela, carpus, and merus granulate. Palm of larger (right) chela longer than high (1.2 times), granules on outer face continued over dorsal face onto projecting granulate rim on inner face parallel to and just below dorsal margin; ventral to this, inner face smooth except for some 5–6 centrally placed granules. Fingers stout, dactyl with two large teeth proximally.

AMBULATORY LEGS: compressed, tomentose, three in number. Second legs longest, third (last) legs stoutest, with merus granulate and longitudinally furrowed, carpus and propodus granulate near anterior and posterior margins; merus 3 times as long as broad; propodus 1.7 times as long as broad; dactyl shorter than propodus (0.8 times), smooth, backwardly curved throughout entire length.

ABDOMEN: of male with third, fourth, and fifth segments fused but distinguishable; third broadest, with markedly convex lateral margins; fifth with lateral margins strongly tapered distally; sixth segment broader than long (1.5 times), broadest in middle of length; seventh segment as long as broad, well rounded distally. Anterior border of abdominal fossa with distinct emarginations laterally in 15.5 mm male. Abdomen of female seven segmented.

Sternum, abdomen and ventral faces of ambulatory meri closely granulate. First sternite with T-shaped groove running from tip of abdominal sulcus to base of maxillipeds distinct in smaller female, shallower in larger female and larger male.

MALE PLEOPOD: short, curving to obliquely truncate (possibly fractured) tip. Shaft with long hairs along outer edge of abdominal face and fewer, shorter hairs along inner edge of sternal face.

DISTRIBUTION

Previously recorded from Port Jackson and Port Stephens, dredged in a few fathoms (Haswell, 1882b).

DISCUSSION

STERNAL GROOVES AND THE GENERA *Lambdophallus* AND *Hexapus*: Alcock (1900, pp. 329–40) erected the genus *Lambdophallus* for his new species, *L. sexpes*, in which the male pleopods are bent at right angles, the terminal portion lying in deep grooves which extend laterally across the first sternite just anterior to its posterior margin. Rathbun (1909, p. 113; 1910, pp. 348–9) described *L. anfractus*, placing it in the genus *Lambdophallus* because of the presence of deep grooves in the first sternite extending anterolaterally towards the bases of the maxillipeds. She noted that her species had “a suspicious resemblance to *Hexapus sexpes* de Man (Arch. f. Naturg., LIII, 1, p. 322, pl. XIII, fig. 3, 1887), but the author does not mention a sternal trench.” She further doubted that “the species represented by him is the same as *H. sexpes* de Haan or *H. sexpes* A. Milne Edwards which appear also to be distinct from each other.”

Tesch (1918, pp. 239, 241) noted that in specimens which he identified as *H. sexpes*, and in de Haan's specimens which he examined at the Leiden Museum, grooves similar to those of *L. anfractus* are present but partly concealed by hairs. He suggested that the apparent absence of these grooves in de Man's specimens could have been due to the larger size of those specimens. This suggestion is supported by the present material as the 6.5 mm female has distinct grooves, the 10 mm female has very shallow but still discernible grooves and in the 15.5 mm male the grooves are almost completely absent, but anterolateral emargination of the abdominal fossa on each side indicates that they may once have been present.

Although sternal grooves have thus been demonstrated in both *Lambdophallus* and *Hexapus*, the continued existence of *Lambdophallus* as a separate genus is justified because in *Lambdophallus* the eyestalks are fixed and the sternal grooves extend laterally from below the junction of the sixth and seventh abdominal segments, running parallel and close to the posterior margin of the first sternite (see Alcock and McArdle, 1902, pl. 62, fig. 1); in *Hexapus* they run anterolaterally towards the bases of the maxillipeds. Because of this, Rathbun's *L. anfractus* must, as Tesch suggested, be transferred to the genus *Hexapus*.

THE SPECIES OF *Hexapus*: Tesch recognised only one species of *Hexapus*, *H. sexpes*, stating that specimens described by Stebbing (1910, p. 315, pl. 15; S. Africa), Milne Edwards

(1873, pp. 253–4, pl. 12, fig. 1; New Caledonia), de Haan (1835, pp. 63–4, pl. 11, fig. 6, Tab. D; Japan), de Man (1887b, p. 322–5, pl. 13, fig. 3; Amboina) and Rathbun (1909, p. 113; 1910, pp. 348–9; Siam, as *Lambdophallus anfractus*) were conspecific with his own specimens from the central tropic Indo-Pacific. Stebbing's '*H. sexpes*' has since been described as a new species, *H. stebbingi*, by Barnard (1946, p. 366; 1950, pp. 299–300, fig. 56d–f) and considerable differences in published figures and descriptions of '*H. sexpes*' suggest that this name embraces at least two further species.

Milne Edwards's specimen from New Caledonia would appear to differ specifically from others in this genus in the following particulars:

- (1) Carapace very broad (cw. twice cl.).
- (2) Lateral margins of carapace very strongly divergent posteriorly.
- (3) Carapace covered with thick tomentum which conceals the surface.
- (4) Front relatively broad (4.5 times in cw.).
- (5) Median frontal groove distinct.
- (6) Last ambulatory dactyl sinuous, recurved in distal half.
- (7) Flagellum of antennae short, with only two swollen basal segments (? error in illustration)

Descriptions and figures of *H. sexpus* from Japan and Amboina given respectively by Sakai (1939, pp. 577–8, pl. 102, fig. 4) and de Man (1887b, pp. 322–5, pl. 13, fig. 3) agree with each other in the following features which also serve to distinguish them from others in the genus:

- (1) Lateral margins of carapace sinuous, with distinct lobule in posterior third.
- (2) Anterolateral margins of carapace abruptly curved, almost angular.
- (3) Front very narrow (6 times in cw.).
- (4) Last ambulatory dactyli straight.
- (5) Ambulatory meri very broad (last leg $l/b=c. 2.5$), widest distally.

The brief description and small figure given by de Haan (1835, pp. 63–4, pl. 11, fig. 6, Tab. D) do not appear significantly different from those of de Man and Sakai, and de Man has already said (1887b, p. 323) that his specimens seem closer to those of de Haan than to those of Milne Edwards. Tesch examined specimens from the central Indo-Pacific and compared these with de Haan's type, pronouncing them identical. While Tesch's concept of the continuity of variability within *Hexapus* does not agree with that expressed

here it is reasonable to assume that his comparison was valid, particularly so as he refers to the broad ambulatory meri (twice as long as broad) and the straight dactyli. Tesch's figure of the third maxilliped would suggest that this species also differs in having the ischium parallel sided in only the distal half, the merus pointed anteromedially and the exognath tapering distally. Rathbun's *Lambdophallus anfractus* from Siam could also belong to this species as both she and Tesch have suggested, but her figure (1910, fig. 36) does not agree well with those of Tesch (1918, pl. 17, fig. 1) as regards third maxilliped and male abdomen (particularly the penultimate segment).

The South African *H. stebbingi* Barnard is readily distinguished by the lack of a lobe on the posterolateral corners of the carapace above the base of the last legs (a feature apparently shared with '*H. sexpes*: Milne Edwards', from which it differs in carapace shape) and the longitudinal division of the sixth abdominal segment in the males.

This then would suggest the existence of four species of *Hexapus*; *H. stebbingi* (South Africa), *H. granuliferus* (Australia), '*H. sexpes*: Milne Edwards' (New Caledonia), and '*H. sexpes*: de Haan, Tesch, Sakai'=*L. anfractus* Rathbun (central Indo-West Pacific to Japan). The type specimen of *H. sexpes* Fabricius (now no longer extant, see Rathbun, 1910, p. 349) came from India, and Fabricius' brief description is inadequate to assign it to any of these four species. It could in fact equally possibly be conspecific with the Indian *Lambdophallus sexpes* Alcock.

The present species is distinguished from the abovementioned possible species by the following features.

- (1) Carapace conspicuously granulate over whole surface, not punctate with granules laterally (hence the specific name).
- (2) Dactylus of last leg evenly recurved throughout its entire length.
- (3) Merus of last leg c. 3 times as long as broad.
- (4) Ischium of third maxillipeds parallel sided for distal three quarters of length.
- (5) Eystalks mobile, cornea spherical.
- (6) Chelae with patch of granules on inner face, dactyl with two large teeth proximally.
- (7) Male pleopods with long hairs along both sides of shaft.
- (8) Posterolateral angles of carapace with flattened lobe over last legs.

The four species could be separated by the following tentative key.

1. Carapace very broad posteriorly (cw.=2 × cl.) with broad front (cl.=2 × fw.); dactyls of last legs sinuous, recurved in distal half. 'H. sexpes: A. Milne Edwards' (New Caledonia).
Carapace less broad (cw.=1.8 × cl.) with narrower front (cl.=3 × fw.); dactyls of last legs straight or evenly recurved throughout length. 2
- 2 (1). Posterolateral angles of carapace without flattened lobe over bases of last legs; penultimate segment of male abdomen longitudinally divided.
. H. *stebbingi* Barnard (South Africa).
Posterolateral angles of carapace with flattened lobe over bases of last legs; penultimate segment of male abdomen entire. 3
- 3 (2). Carapace punctate, lateral margins sinuous; merus of last leg broad (l.=2.5 × w.), dactylus of last leg straight.
'H. sexpes: de Haan, de Man, Tesch, Sakai' (Central Indo-Pacific to Japan).
Carapace granulate, lateral margins divergent posteriorly; merus of last leg narrower (l.=3 × w.), dactylus of last leg evenly recurved.
. H. *granuliferus* sp. nov.

Family PINNOTHERIDAE

The following species taken during this survey were reported by Griffin and Campbell, 1969, pp. 153–62.

Xenophthalmus pinnotheroides White

Pinnotheres spinidactylus Gordon

Family OCYPODIDAE

Macrophthalmus crassipes H. Milne Edwards

Macrophthalmus crassipes H. Milne Edwards, 1852, p. 157.

Macrophthalmus (*Macrophthalmus*) *crassipes* H. Milne Edwards: Barnes, 1967, pp. 208–11, fig. 2, pl. 1b (synon.).

DREDGED: Three, just N. of Polka Pt, Dunwich, 5D, 3 fm, F.C. Vohra.

No other sublittoral specimens have been obtained in extensive collecting since Vohra although this species is common intertidally.

DISTRIBUTION: Gulf of Siam, Malaya, China, Caroline Is. and Australia (Barnes, 1967).

Macrophthalmus punctulatus Miers

Macrophthalmus punctulatus Miers, 1884, p. 237, pl. 25, fig. A.

Macrophthalmus (Mopsocarcinus) punctulatus Miers: Barnes, 1967, pp. 229–31, fig. 10, pl. 3b.

DREDGED: Two, just N. of Polka Pt, Dunwich, 5D, 3 fm, F.C. Vohra.

No other sublittoral specimens have been obtained in extensive collecting since Vohra although this species is common intertidally. It seems possible that Vohra's collecting data for this and the preceding species was incorrect.

DISTRIBUTION: Eastern Australia (Barnes, 1967).

DISCUSSION**COMPARISON WITH SAGAMI BAY FAUNA**

Eighty-four species are here recorded from the sublittoral of Moreton Bay. Sakai (1965) has listed 340 crabs from eastern Sagami Bay of which no less than 276 are from the sublittoral. The area of Sagami Bay forming the basis of Sakai's study is roughly half that of the present survey area and the apparent richness of the Japanese fauna could be the result of:

- (1) Length of survey. While the present survey was carried out intensively for some six years, previous collecting having been very sporadic, Sakai's material was accumulated over some forty years. The present survey did not, for example, collect specimens of *Calappa philargius*, *Hoplophrys ogilbyi* or *Ommatocarcinus macgillivrayi* although these have been noticed in earlier collecting. It is doubtful that this time factor could account for a great number of species.
- (2) Substrate diversity. Although Sakai gives little information on bottom type, reefs and rock seem common, with some coral. Moreton Bay is predominantly mud and sand, with small rocky outcrops and coral only around some of the smaller islands. These have not been sampled by dredge or by trawl because gear would have been extensively damaged, but recent collecting by grab in one such area produced two Xanthids not previously collected in Moreton Bay.
- (3) Depth. Sagami Bay material was taken from depths of up to 270 m, whereas the depth of Moreton Bay barely exceeds 30 m, and that in only a very small area off Moreton I. Of Sakai's material, 93 species were recorded from a depth of 30 m or less and, except for the Xanthids, there is a remarkable agreement between the number of species taken in each family from the two areas (see Table I). The greater representation of Xanthids in the Sagami Bay shallow water could be due to the greater abundance of rocky substrate in that area.

TABLE 1
COMPARISON OF SAGAMI BAY AND MORETON BAY CRAB FAUNAS IN MAJOR
TAXONOMIC GROUPINGS

Taxonomic Group	Number of species		
	Sagami Bay	Moreton Bay	Sagami Bay 30 m or less
Dromiacea	17	3	7
Dorippidae	11	1	4
Leucosidae	36	9	6
Calappidae	15	5	5
Hymenosomidae	2	0	1
Majidae	47	15	15
Parthenopidae	12	6	5
Corystoidea	10	1	0
Portunidae	30	17	18
Xanthidae	51	17	27
Goneplacidae	15	6	2
Pinnotheridae	9	2	3
Ocypodidae	0	2	0
Grapsidae	1	0	0
Total	256	84	94

While the agreement between the last two columns of table I is very close, two factors prohibit exact comparisons.

- (1) The area of Sagami Bay of 30 m depth or less is about one fifth that of Moreton Bay, and the effect that this decrease in sampling area would have on the number of species collected is not known.
- (2) Moreton Bay is almost completely ringed by islands and shallow banks whereas Sagami Bay is open to the south. Consequently it could be expected that some of the crabs in the 30 m zone of Sagami Bay would be deep water crabs at the shallow end of their range, and these would have no counterpart in Moreton Bay.

Depth would appear to be the major factor contributing to the greater apparent diversity of the Sagami Bay fauna as compared with that of Moreton Bay. Collections on hand from deeper water outside Moreton Bay do contain many species not represented in the present survey and if the data from the Sagami Bay collections can be applied to southern Queensland it would seem possible that some 200 additional species might be expected from the deeper water at present being trawled commercially off Cape Moreton.

DISTRIBUTION OF SPECIES WITHIN THE INDO-WEST PACIFIC

In the list of species presented in the introduction the distribution is given in brackets after each species, according to the following notation (modified after Stephenson, 1961, p. 321).

- (1) Widespread Indo-West Pacific species ranging from the Indian Ocean to the Islands of the Central Pacific.
- (2) Indian Ocean species which occur in the Indian Ocean, extending to the shores of the western Pacific but not to the islands of the central Pacific.
- (3) Pacific Ocean species which are centred on the western Pacific Ocean and extend to the eastern shores of the Indian Ocean but not to India itself.
- (4) Central Indo Pacific species which do not extend to India in the west nor beyond New Caledonia in the east.
- (5) Australian species, not recorded outside Australia (except for extensions to New Caledonia or New Zealand).
 - a extending to eastern coast of Africa in the west.
 - j extending to Japan in the north.
 - h extending to Hawaii in the east.
 - nc extending to New Caledonia.
 - nz extending to New Zealand.
 - s predominantly southern Australian distribution.

Although distribution data is incomplete for some species and some areas, at the present state of our knowledge it would appear that of the 81 species firmly identified 11 are widespread Indo-West Pacific species, 38 occur widely in the Indian Ocean, 2 in the Pacific Ocean, 7 are Central Indo-Pacific species, and 23 are found only in Australia. Of these 23, 4 have been recorded only from Moreton Bay, 15 are essentially northern species and 4 are essentially southern species.

The number of species taken in Moreton Bay which are shared with other areas of major carcinological activity are; Africa (east coast), 16; India, 48; Japan, 26; New Caledonia, 13; New Zealand, 2; Hawaii, 4.

The strong affinity of the Moreton Bay brachyuran fauna with that of the Indian Ocean is at variance with the analysis presented by Griffin and Yaldwyn (1968, p. 178) in regard to the Portunidae, Majidae, and Oxystomata. Their analysis shows that of the tropical Australian species, 43–52% are widespread throughout the Indo-West Pacific, 10–24% are found in the Indian Ocean, 8–15% in the West Pacific, and 4–15% in the central Indo Pacific whereas the corresponding figures for the present report would be 13%, 45%, 2%, 8%.

This apparent anomaly is only partly resolved by a different partitioning of areas. Area 2 of the present analysis includes 15 species distributed from India to Japan, the Philippines, or New Caledonia which Griffin and Yaldwyn could well have listed in their category "widespread" rather than "Indian Ocean". Allowing for this, the figures for the present report would become 31 %, 27 %, 2 %, 8 %. The still very noticable excess of Indian Ocean over Pacific Ocean species cannot wholly be explained by assuming a more comprehensive knowledge of the Indian Ocean shallow water fauna and is not inconsistent with the smaller available areas of shallow water in the Western Pacific and the relative discontinuity of these with the Australian continent.

ACKNOWLEDGEMENTS

We are grateful to the late Mr. F. A. McNeill, to Drs. J. C. Yaldwyn and D. J. G. Griffin of the Australian Museum and to Dr. R. W. George of the Western Australian Museum for their valued opinions on the identity of certain material from the early collections. Several of the collections were made primarily by Mr. A. Jones.

We are especially grateful to Prof. W. G. H. Maxwell for permission to use unpublished data on the bottom sediments of Moreton Bay in preparing the model shown in plate 1.

LITERATURE CITED

- ADAMS, A. and WHITE, A., 1848-9. Crustacea *In* A. Adams (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", pp. i-viii, 1-66, pls. 1-13. (Reeve, Benham, and Reeve: London).
- ALCOCK, A., 1895. Materials for a carinological fauna of India. No. 1. The Brachyura Oxyrhyncha. *J. Asiat. Soc. Bengal* **64**: 157-291, 3 pls
1896. Materials for a carinological fauna of India. No. 2. The Brachyura Oxystomata. *J. Asiat. Soc. Bengal*. **65**: 134-296, 3 pls.
1898. Materials for a carinological fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The family Xanthidae. *J. Asiat. Soc. Bengal*. **67**: 67-233.
1900. Materials for a carinological fauna of India. No. 6. The Brachyura Catometopa, or Grapsoidea. *J. Asiat. Soc. Bengal*. **69**: 279-456.
- ALCOCK, A. and MCARDLE, A. F., 1902. "Illustrations of the Zoology of the R.I.M.S.S. 'Investigator'." Crustacea. Part 10, pls. 56-67 (Calcutta).
- AUDOUIN, V., 1826. Explication des planches, Crustacea. Vol. I, pt. 2, pp. 77-98 *In* SAVIGNY, J. C. and AUDOUIN, V., 1809-29. "Description de l'Egypte". (Commission de l'Egypte: Paris).
- BAKER, H. W., 1905. Notes on South Australian decapod Crustacea. Part 2. *Trans. Roy. Soc. S. Aust.* **29**: 116-31, pls. 21-4.
1906. Notes on South Australian decapod Crustacea. Part 4. *Trans. Roy. Soc. S. Aust.* **30**: 104-17, pls. 1-3.
- BALSS, H., 1922. Ostasiatische Decapoden. III. Die Dromiaceen, Oxystomen und Parthenopiden. *Arch. Naturgesch.* **88** (A3): 104-40.

- BARNARD, K. H., 1946. Description of new species of South African decapod Crustacea, with notes on synonymy and new records. *Ann. Mag. Nat. Hist.* (11) **13**: 361-92.
1950. Descriptive catalogue of South African decapod Crustacea (crabs and shrimps). *Ann. S. Afr. Mus.* **38**: 1-837.
- BARNES, R. S. K., 1967. The Macrophthalminae of Australia; with a review of the evolution and morphological diversity of the type genus *Macrophthalmus* (Crustacea: Brachyura). *Trans. Zool. Soc. Lond.* **31** (2): 195-262.
- BELL, T., 1855. 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. *Trans. Linn. Soc. Lond.* **21** (4): 277-314, pls. 30-4.
- BENNETT, E. W., 1964. The marine fauna of New Zealand: Crustacea Brachyura. *Bull. N.Z. Dep. sci. industr. Res.* **153** (N.Z. Oceanogr. Inst. Mem. 22), 120 pp.
- BUITENDIJK, ALIDA M., 1939. Biological results of the Snellius Expedition. V. The Dromiacea, Oxystomata, and Oxyrhyncha of the Snellius Expedition. *Temminckia* **4**: 223-76, pls. 7-11.
1960. Biological results of the Snellius Expedition. XXI. Brachyura of the families Atelecyclidae and Xanthidae. *Temminckia* **10**: 252-338.
- DANA, J. D., 1852. Crustacea. In 'United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N. Vol. 13, pp. 1-685. (Philadelphia).
- ETHERIDGE, R. and McCULLOCH, A. R., 1916. Sub-fossil crustaceans from the coasts of Australia. *Rec. Aust. Mus.* **11**: 1-14, pls. 1-7.
- FABRICIUS, J. C., 1798. Supplementum Entomologiae Systematicae. pp. 1-572 (Hafniae).
- FILHOL, H., 1885. "Recherches zoologiques, botaniques et géologiques faites à l'île Campbell et en Nouvelle-Zélande. Zoologie, In Recueil de mémoires, rapports et documents relatifs à l'observation du passage de Vénus sur la Soleil." Vol. 3, part 2, no. 1, pp. 19-576; atlas, pls. 1-55.
- FLIPSE, H. J., 1930. Die Decapoda Brachyura der Siboga-Expedition. VI. Oxyrhyncha: Parthenopidae. *Siboga Exped. Monogr* 39C², Livr. 112, pp. 1-96.
- FOREST, J. and GUINOT, D., 1961, "Crustacés Décapodes Brachyours de Tahiti et des Tuamotu". (Expédition Française sur les Recifs Coralliens de la Nouvelle-Calédonie, Volume Préliminaire.) pp. 1-195, pls. 1-18. (Éditions de la Fondation Singer-Polignac: Paris).
- GRANT, F. E. and McCULLOCH, A. R., 1906. On a collection of Crustacea from the Port Curtis district, Queensland. *Proc. Linn. Soc. N.S.W.* **31** (1): 1-53, pls. 1-4.
- GRIFFIN, D. J. G., 1966. A review of the Australian majid spider crabs (Crustacea, Brachyura). *Aust. Zool.* **13** (3): 259-98, pls. 15-17.
- GRIFFIN, D. J. G. and YALDWYN, J. C., 1965. A record of the majid brachyuran genus *Achaeus* from New Zealand, with notes on the Australian species. *Trans. roy. Soc. N.Z. Zool.* **6** (4): 33-51.
1968. The constitution, distribution and relationships of the Australian decapod Crustacea. *Proc. Linn. Soc. N.S.W.* **93** (1): 164-83.
- HAAN, W. DE, 1833-50. Crustacea In P. F. VON SIEBOLD, "Fauna Japonica". (J. Müller and Sons: Amsterdam).
- HALE, H. M., 1927. "The Crustaceans of South Australia. Part I". pp. 1-201. (Govt. Printer: Adelaide).
- HASWELL, W. A., 1879a. Contributions to a monograph of Australian Leucosiidae. *Proc. Linn. Soc. N.S.W.* **4** (1): 44-60, pls. 5, 6.

- 1879b. On two new species of the genus *Stenorhynchus*. *Proc. Linn. Soc. N.S.W.* **4** (3): 408–9.
- 1880a. On the Australian Brachyura Oxyrhyncha. *Proc. Linn. Soc. N.S.W.* **4** (4): 431–58, pls. 25–7.
- 1880b. On two new species of the genus *Paratymolus* Miers from Australia. *Ann. Mag. Nat. Hist.* (5) **5**: 302–4, pl. 16.
- 1882a. Description of some new species of Australian Decapoda. *Proc. Linn. Soc. N.S.W.* **6** (4): 750–63.
- 1882b. "Catalogue of the Australian Stalk- and Sessile-Eyed Crustacea". 327 pp. 4 pls. (Australian Museum: Sydney).
- HENDERSON, J. R., 1893. A contribution to Indian Carcinology. *Trans. Linn. Soc. Lond. (Zool.)*. (2) **5**: 325–458, pls. 36–40.
- HERBST, J. F. W., 1782–1804. "Versuch einer Naturgeschichte der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschieden Arten". 3 vols, 72 pls. (Berlin und Stralsund).
- HESS, W., 1865. Beiträge zur Kenntniss der Decapoden-Krebse Ost-Australiens. *Arch. Naturgesch.* **31**: 127–63, pls. 6, 7.
- HOLTHUIS, L. B., 1962. Forty-seven genera of Decapoda (Crustacea); proposed addition to the official list. *Bull. Zool. Nom.* **19** (4): 232–53.
- IHLE, J. E. W., 1913. Die Decapoda Brachyura der Siboga-Expedition. I. Dromiacea. *Siboga Exped. Monogr.* 39b, Livr. 71, pp. 1–96, pls. 1–4.
1918. Die Decapoda Brachyura der Siboga-Expedition. III. Oxystomata: Calappidae, Leucosiidae, Raninidae. *Siboga Exped. Monogr.* 39b², Livr. 85, pp. 159–322.
- JACQUINOT, H., and LUCAS, H., 1853. Crustacés In "Voyage au Pôle Sud et dans l'Océanie sur les corvettes l'Astrolabe et la Zélée exécuté pendant 1837–40, sous le commandement de M. J. Dunmo. d'Urville". Zoologie, vol. 3, pp. 1–107; atlas, Crustacea, pls. 1–9 (1852) (Gide et Baudry: Paris).
- KEMP, S., 1923. Notes on Crustacea Decapoda in the Indian Museum. XVI. On two interesting crabs from the mouth of the river Hughli. *Rec. Indian Mus.* **25**: 405–9, pl. 10.
- KRAUSS, C. F. F., 1843. "Die Südafrikanischen Crustaceen eine Zusammenstellung aller bekannten Malacostraca, Bemerkungen über deren Lebensweise und geographische Verbreitung, nebst Beschreibung und Abbildung mehrerer neuen Arten". (Stuttgart).
- LANCHESTER, W. F., 1900. On a collection of crustaceans made at Singapore and Malacca.—Part 1. Crustacea Brachyura. *Proc. Zool. Soc. Lond.* **1900**: 719–70, pls. 14–17.
- LAURIE, R. D., 1906. Report on the Brachyura collected by Professor Herdman, at Ceylon, in 1902. In HERDMAN, W. A., "Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar" Part V, Supplementary Report No. XL, pp. 349–431, pls. 1, 2 (Royal Society: London).
- LEACH, W. E., 1815. A tabular view of the external characters of four classes of animals, which Linné arranged under Insecta; with the distribution of the genera composing three of these classes into orders etc., and descriptions of several new genera and species. *Trans. Linn. Soc. Lond.* (1) **11**: 306–400.
- LEENE, JENTINA E., 1938. The Decapoda Brachyura of the Siboga Expedition. VII. Brachygnatha: Portunidae. *Siboga Exped. Monogr.* 39c³, Livr. 131, pp. 1–156.
- LINNAEUS, C., 1758. "Systema Naturae". Ed. 10, vol. 1, pp. 1–824. (Holmiae).
1767. "Systema Naturae". Ed. 12, vol. 1, pp. 1–1327.
- MCCULLOCH, A. R., 1908. Studies in Australian Crustacea. No. 1. *Rec. Aust. Mus.* **7**: 51–9, pl. 12.
- MCNEILL, F. A., 1968. Crustacea, Decapoda and Stomatopoda. *Sci. Rep. Gr. Barrier Reef Exped.* **7** (1): 1–98, pls. 1, 2.

- MAN, J. G. DE, 1887a. Report on the podophthalmous Crustacea of the Mergui Archipelago, collected for the trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. *J. Linn. Soc. London (Zool.)* **22** (1): 1-64, pls. 1-53.
- 1887b. Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Arch. Naturgesch.* **53** (1): 215-600, pls. 7-22a.
- MIERS, E. J., 1876. "Catalogue of the Stalk- and Sessile-eyed Crustacea of New Zealand". pp. 1-136, pls. 1-3. (Colonial Museum and Geological Survey Department: London).
1877. Notes upon the oxystomatous Crustacea. *Trans. Linn. Soc. Lond. (Zool.)*. (2) **1** (5): 235-49, pls. 38-40.
- 1879a. On a collection of Crustacea made by Capt. H. C. St. John, R.N. in the Korean and Japanese Seas. I. Podophthalmia. *Proc. Zool. Soc. Lond.* **1879**: 18-61, pls. 1-3.
- 1879b. Descriptions of new or little-known species of maioid Crustacea (Oxyrhyncha) in the collection of the British Museum. *Ann. Mag. Nat. Hist.* (5) **4** (19): 1-28, pls. 4, 5.
1884. Crustacea. In "Report of the Zoological Collections made in the Indo Pacific Ocean during the Voyage of H.M.S. Alert, 1881-1882." pp. 178-322, 513-75, pls. 18-32, 46-52. (British Museum: London).
1886. Report on the Brachyura collected by H.M.S. "Challenger" during the years 1873-1876. In "Report on the Scientific Results of the Voyage of H.M.S. "Challenger" during the years 1873-76 under the command of Captain George S. Nares, R.N., F.R.S. and the Late Captain Frank Tourle Thomson, R.N." Zoology, vol. 17, part 2, pp. i-l, 1-362, pls. 1-29.
- MILNE-EDWARDS, A., 1865. Études zoologiques sur les Crustacés récents de la famille des Cancériens. *Nouv. Arch. Mus. Hist. nat. Paris.* **1**: 177-308, pls. 11-19.
1867. Description de quelques espèces nouvelles de Crustacés Brachyures. *Ann. Soc. entomol. France.* (4) **7**: 263-88.
1872. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. *Nouv. Arch. Mus. Hist. nat. Paris.* **8**: 229-67, pls. 10-14.
1873. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. *Nouv. Arch. Mus. Hist. nat. Paris.* **9**: 155-332, pls. 4-18.
- MILNE-EDWARDS, H. 1834. "Histoire Naturelle des Crustacés, Comprenant l'Anatomie, la Physiologie et la Classification de ces Animaux." Vol. 1, pp. i-xxv, 1-468. Atlas, 42 plates. (Lib. Roret: Paris).
1852. Observations sur les affinités zoologiques et la classification naturelle des crustacés. *Ann. Sci. nat.* (3) **18**: 109-66.
- MONTGOMERY, S. K., 1931. Report on the Crustacea Brachyura of the Percy Sladen Trust Expedition to the Abrolhos Islands under the leadership of Professor W. J. Dakin, D.Sc., F.L.S., in 1913; along with other crabs from Western Australia. *J. Linn. Soc. London (Zool.)* **37** (253): 415-65, 7 pls.
- ODHNER, T., 1925. Monographierte Gattungen der Krabben-familie Xanthidae. 1. *Göteborgs k. Vetensk.-o. Vitterh-Samh. Handl.* **29** (1): 1-92, pls. 1-5.
- RATHBUN, MARY J., 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U.S. Fish. Comm.* **23** (3): 827-930, pls. 1-24.
1910. The Danish Expedition to Siam, 1890-1907. 5. The Brachyura. *K. danske Vidensk. Selsk. Skr.* (7) **4**: 303-67.
1918. Report on the spider crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *Biol. Res. "Endeavour"* **5** (1): 1-29, pls. 1-15.
1923. Report on the crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *Biol. Res. "Endeavour"* **5** (3): 95-156, pls. 16-42.

1924. Results of Dr. E. Mjöberg's Swedish Scientific Expeditions to Australia 1910-1913. 37. Brachyura, Albuneidae and Porcellanidae. *Ark. Zool.* **16** (23): 1-33, pls. 1, 2.
- REES, MAY and STEPHENSON, W., 1966. Some portunids (Crustacea: Portunidae) mostly from Queensland. *Proc. Roy. Soc. Qd* **78** (3): 29-42, pl. 7.
- SAKAI, T., 1936. Studies on the crabs of Japan. I. Dromiacea. *Sci. Rep. Tokyo Bunrika Daigaku* (B) **3** (suppl. 1): 1-66, pls. 1-9.
1937. Studies on the crabs of Japan. II. Oxystomata. *Sci. Rep. Tokyo Bunrika Daigaku* (B) **3** (suppl. 2): 67-192, pls. 10-19.
1938. "Studies on the Crabs of Japan. III. Brachygnatha, Oxyrhyncha." pp. 193-364, pls. 20-41 (Yokendo Ltd.: Tokyo).
1939. "Studies on the Crabs of Japan. IV. Brachygnatha, Brachyrhyncha". pp. 365-741, pls. 42-111 (Yokendo Ltd.: Tokyo).
1965. "The Crabs of Sagami Bay collected by His Majesty the Emperor of Japan". pp. i-xvi, 1-206, 1-26 (English), 1-92, 27-32 (Japanese) pls. 1-100. (Maruzen: Tokyo).
- SERÈNE, R., 1961. Les espèces Indo-Pacifique d'*Actea* et celles des genres *Pseudactea* et *Banareia*. *Bull. Soc. Zool. France* **86**: 195-212, 673-93, pl. 1.
1965. "Guide for Curators of Brachyuran Collections in Southeast Asia". pp. 1-65. (Applied Scientific Research Corporation of Thailand: Bangkok).
- STEPHENSON, K., 1945. The Brachyura of the Iranian Gulf. *Dan. Sci. Invest. Iran*, Pt. 4: 57-237.
- STEPHENSON, W., 1961. Evolution and ecology of portunid crabs, with especial reference to Australian species, pp. 311-27. In LEEPER, G. W. ed., "The Evolution of Living Organisms", 459pp. (Melbourne University Press: Melbourne).
- 1968a. Variability in the sand crab *Portunus pelagicus* (Linnaeus) (Crustacea: Portunidae). *Mem. Qd Mus.* **15** (2): 83-90, pl. 11.
- 1968b. Studies on *Portunus pelagicus* (Linnaeus) and *P. sanguinolentus* (Herbst). *Occ. Pap. Bishop Mus.* **23** (15): 385-99.
- STEPHENSON, W. and CAMPBELL, B., 1959. The Australian portunids (Crustacea: Portunidae). III. The genus *Portunus*. *Aust. J. Mar. Freshw. Res.* **10** (1): 84-124, 5 pls.
1960. The Australian portunids (Crustacea: Portunidae). IV. Remaining genera. *Aust. J. Mar. Freshw. Res.* **11** (1): 73-122, 6 pls.
- STEPHENSON, W. and HUDSON, JOY J., 1957. The Australian portunids (Crustacea: Portunidae). I. The genus *Thalamita*. *Aust. J. Mar. Freshw. Res.* **8** (3): 312-68, 10 pls.
- STEPHENSON, W., HUDSON, JOY J. and CAMPBELL, B., 1957. The Australian portunids (Crustacea: Portunidae). II. The genus *Charybdis*. *Aust. J. Mar. Freshw. Res.* **8** (4): 491-507, 5 pls.
- STEPHENSON, W. and REES, MAY, 1967. Some portunid crabs from the Pacific and Indian Oceans in the collections of the Smithsonian Institution. *Proc. U.S. Nat. Mus.* **120** (3556): 1-114, 9 pls.
1968. The *Endeavour* and other Australian Museum collections of portunid crabs (Crustacea, Decapoda, Portunidae). *Rec. Aust. Mus.* **27** (13): 285-98, pl. 43.
- STEBBING, T. R. R., 1910. General catalogue of South African Crustacea. *Ann. S. Afr. Mus.* **6** (4): 281-593, pls. 15-22.
- STIMPSON, W., 1857. Prodomus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Pars III. Crustacea Maiorida. *Proc. Acad. Nat. Sci. Philad.* **1857**: 216-21.

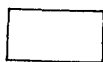
1858. Prodromus descriptions animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Pars IV. Crustacea Cancroidea et Crystoidea, Cancridae. *Proc. Acad. Nat. Sci. Philad.* **1858**: 31–40.
1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853–1856. *Smithson. Misc. Coll.* **49** (1717): 1–240, 26 pls.
- TAKEDA, M. and MIYAKE, S., 1968. Pilumnid crabs of the family Xanthidae from the West Pacific. I. Twenty-three species of the genus *Pilumnus*, with description of four new species. *Ohmu* **1**: 1–60, pls. 1–4.
- TESCH, J. J., 1918. The Decapoda Brachyura of the Siboga-Expedition. II. Goneplacidae and Pinnotheridae. *Siboga Exped. Monogr* 39c, Livr. 84, pp. 149–295, pls. 7–18.
- TYNDALE-BISCOE, MARINA 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. *J. Proc. R. Soc. West. Aust.* **45** (3): 65–96, pls. 1–3.
- UTINOMI, H., 1967. "Coloured Illustrations of Seashore Animals of Japan". pp. 1–168, pls. 1–64, 1–12. (Hoikusha: Osaka).
- WARD, M. 1928. The Crustacea of the Capricorn and Bunker Groups, Queensland. *Aust. Zool.* **5** (3): 241–6, pls. 27–9.
1932. The true crabs of the Capricorn Group, Queensland. (Class Crustacea, order Decapoda Brachyura). *Aust. Zool.* **7** (3): 237–55.

PLATE 22

Stereopair of Moreton Bay showing bottom topography and sediments. The vertical scale has been greatly exaggerated. Bottom sediments have been incorporated from unpublished data provided by Professor W. G. H. Maxwell, University of Sydney.



grit



sand



fine sand



mud