

Deep-water Decapod Crustacea from Eastern Australia: Lobsters of the Families Nephropidae, Palinuridae, Polychelidae and Scyllaridae

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ABSTRACT. Twenty-three species of deep-water lobsters in the families Nephropidae, Palinuridae, Polychelidae and Scyllaridae are recorded from the continental shelf and slope off eastern Australia. Ten species and two genera have not been previously recorded from Australia. These are *Acanthacaris tenuimana*, *Projasus parkeri*, *Polycheles baccatus*, *P. euthrix*, *P. granulatus*, *Stereomastis andamanensis*, *S. helleri*, *S. sculpta*, *S. suhmi* and *Willemoesia bonaspei*. The deep-water lobster fauna of eastern Australia is compared with those of other Indo-Pacific areas. A key is given to all deep-water lobster species recorded from Australian waters.

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The deep-water lobster fauna of the Australian region first became known from collections made by the British *Challenger* Expedition (Bate, 1888), the 1911–14 Australasian Antarctic Expedition (Bage, 1938), the Commonwealth of Australia fishing experiments on the *Endeavour* (1909–1914); various local trawling excursions (e.g., Grant, 1905) and serendipitous catches by professional fishermen (e.g., McNeill, 1949, 1956). Knowledge of the fauna has increased greatly since then, especially as commercial fisheries interest and abilities have extended to greater depths. Surveys by Australia's CSIRO on the North West Shelf of Australia, prompted by interest in natural gas resources and potential commercial fisheries, have added many species to the known fauna. Similar surveys in north-east Queensland and New South Wales waters have produced an extensive by-catch of deep-water crustaceans. The deep-water

fauna of southern Australia is as yet poorly known but extensive collections have been made by the Museum of Victoria on the continental shelf and slope of south-eastern Australia and Bass Strait.

This paper is the third of a series dealing with deep-water decapods taken by the New South Wales Fisheries Research Vessel *Kapala*, which has carried out trawling experiments along the coast of New South Wales since 1971. Previous papers dealt with brachyuran crabs (Griffin & Brown, 1976) and shrimps and prawns (Kensley, Tranter & Griffin, 1987). This paper also deals with material from the collections of the Queensland Museum and other Australian Museum material.

The present report gives an account of twenty-three species in four families: Nephropidae, Palinuridae, Polychelidae and Scyllaridae. Species of two other deep-water lobster families have been reported from Australia:

Neoglyphea inopinata Forest & de Saint Laurent, 1975, in the family Glypheidae, has been recorded from the Arafura Sea, off north-western Australia (Bruce, 1988b; Forest, 1989) and *Thaumastochelopsis wardi* Bruce, 1988a, in the family Thaumastochelidae, has been recorded from the Marian Plateau, Coral Sea, off north-eastern Australia (Bruce, 1988a).

Material is deposited in the Australian Museum, Sydney (AM) and the Queensland Museum, Brisbane (QM). Measurements given are carapace length (cl.) unless otherwise stated. For the Polychelidae the arrangement of spines along the lateral edge of the carapace is denoted as in this example: 5-6:3-4:7-8 meaning 5 or 6 spines in front of the anterior branch of the cervical groove, 3 or 4 between the anterior and posterior branches of the cervical groove and 7 or 8 behind the posterior branch of the cervical groove. For species of *Stereomastis* the arrangement of spines on the mid-dorsal carina of the carapace is denoted as in this example: 1,1,2,1 meaning two single, one pair, one single spine between the rostral spines and the cervical groove; and 2,2,2 meaning three sets of paired spines behind the cervical groove, including the widely spaced pair on the posterior margin. The terminology of Holthuis (1975) is used for the Nephropidae.

Family NEPHROPIDAE

Acanthacaris Bate, 1888

The genus contains two species, one of which is known from the Indo-West Pacific region. The genus has not previously been reported from Australian seas.

Acanthacaris tenuimana (Bate)

Phoberus tenuimanus Bate, 1888: 171.

Acanthacaris tenuimana.—Bate, 1888: pl. 21.—Holthuis, 1975: 752.—Hayashi & Ogawa, 1985: 220, fig. 1.—Macpherson, 1990: 293.—Holthuis, 1991: 28, figs 39b, 42.

Acanthacaris tenuimana.—Bate, 1888: pl. 22.

Acanthacaris tenuimanus.—Bruce, 1974: 303, figs 1,2.

Phoberus caecus sublevis Wood-Mason in Wood-Mason & Alcock, 1891: 197.—Alcock & Anderson, 1894: 161.—Anderson, 1896: 96.

Phoberus caecus tenuimanus.—Alcock, 1901: 156.—Alcock & McArdle, 1903: pl. 60.

Acanthacaris optipara Burukovsky & Musij, 1976: 1811, figs 1,2.

Phoberus brevirostris Tung & Wang, 1985: 379, fig. 1.

Material examined. One ovigerous female, cl. 157 mm, 1 male, cl. 119 mm, AM P38504, east of Brisbane, south-east Queensland, trawled, 700–900 m, W. Dall on MV *Valkyrie Voyager*, May 1988.

Remarks. There is only one first cheliped present, from the female specimen. The fingers are 1.7 times the length of the palm. The rostrum has one pair of small

lateral spines just before the spine-like tip and 5 small anteriorly-projecting spines on the ventral surface of the distal half.

Distribution. Indo-West Pacific Ocean: Natal, Mozambique, Madagascar, Laccadive Islands, Japan, Philippines, South China Sea, Indonesia, eastern Australia, New Caledonia; 600–2161 m.

Metanephrops Jenkins, 1972

The genus contains 17 recent species, of which 15 are known from the Indo-West Pacific region. Five species have been recorded from Australian waters: *Metanephrops australiensis* (Bruce, 1966a) from north-western Australia (Bruce, 1966a; George, 1983; Carter *et al.*, 1983; Anon., 1984; Wallner & Phillips, 1988; Wassenberg & Hill, 1989); *M. boschmai* (Holthuis, 1964) from north-western and southern Australia (Holthuis, 1964); *M. neptunus* (Bruce, 1965a) from north-western Australia (George, 1983; Holthuis, 1991; Wadley & Evans, 1991); *M. sibogae* (de Man, 1916) from north-western and north-eastern Australia (Holthuis, 1991; Wadley & Evans, 1991) and *M. velutinus* Chan & Yu, 1991 from north-western Australia (George, 1983; Anon., 1984; Davis & Ward, 1984; Bremner, 1985; Wallner & Phillips, 1988; Wassenberg & Hill, 1989; all as *M. andamanicus* [Wood-Mason, 1892]) and from southern Australia (Chan & Yu, 1991).

Metanephrops sibogae (de Man)

Nephrops Sibogae de Man, 1916: 102, pl. 4 figs 18–18d.—Bruce, 1966b: 165 (key).

Metanephrops sibogae.—Jenkins, 1972: 163,171.—Holthuis, 1991: 65, figs 113c, 127b, 154.—Wadley & Evans, 1991: 36, unnumbered figs.

Material examined. Two males, cl. 58 mm and 38+ mm (rostrum broken), QM W11219, east of Murray Isles, Coral Sea, 9°50'S 144°11'E to 9°51'S 144°09'E, 460–464 m, *Gwendoline May*, 27 May 1983; 1 female, cl. 48+ mm (tip of rostrum broken) and 1 male, cl. 40 mm, QM W11725, east of Murray Isles, Coral Sea, 480 m, *Gwendoline May*, 28 May 1983; 1 male, cl. 77 mm, AM P45097, east of Cape York, Coral Sea, 10°29.81'S 144°01.38'E, beam trawl, 596–603 m, P. Hutchings & party on RV *Franklin*, 20 August 1988, stn FR0688–2.

Remarks. *Metanephrops sibogae* has until recently been known only from the type material, nine specimens from near the Kei Islands, Indonesia. Holthuis (1991) indicated additional collections from northern Australia, but without comment or description. Wadley & Evans (1991) recorded the species from north-western Australia. The present material agrees well with de Man's (1916) description and figure of *M. sibogae* except in a few points which support the very close relationship between *M. sibogae* and *M. boschmai* (Holthuis, 1964) from the Great

Australian Bight. Type material of *M. boschmai* has been examined and compared to the present Coral Sea material and the published description and figures of *M. sibogae*. The following points of difference/correspondence were noted:

1. *Metanephrops boschmai*, *M. sibogae* and the Coral Sea material all have a set of 3 spines behind the orbit (the supraorbital, postsupraorbital and postorbital spines in the terminology of Holthuis [1975]). Above the spines, *M. boschmai* has a patch of 1–4 very small spinules. These are absent in the Coral Sea specimens, but a similar patch of very small spinules occurs more posteriorly, between the cervical spine and the median carina. Neither of these patches of spinules is described or illustrated for *M. sibogae*.

2. *Metanephrops boschmai* has 4–7 spinules along the posterior margin of the cervical groove, between the cervical and hepatic spines. These are not present in *M. sibogae* or the Coral Sea specimens.

3. *Metanephrops sibogae* has 6–7 pairs of denticles along the medial carina of the branchial area, posterior to the pair of post cervical spines; *M. boschmai* has 3–5 pairs of denticles and the Coral Sea specimens have three pairs.

4. The sixth abdominal somite of *M. sibogae* has four spinules arranged as in the four points of a cross, i.e. one anterior median spinule, two submedian spinules behind this and one posterior median spinule (clearly seen in de Man, 1916, plate 4, figure 18). This arrangement of spinules is also found in the Coral Sea specimens, but in *M. boschmai* the anterior spinule is absent and there are often two, sometimes three, sub median pairs.

5. Holthuis (1964) suggested that *M. boschmai* differs from *M. sibogae* in that the greatest breadth of the scaphocerite is in the proximal half in *M. boschmai* but in the distal half in *M. sibogae*. Comparison of figure 1 of Holthuis (1964), plate 4, figure 18b of de Man (1916) and available material suggests that the differences in this character are so slight as to be not of specific value.

6. The dactylus of the third maxilliped is slightly broader in *M. boschmai* than in *M. sibogae* or the Coral Sea material.

7. The merus of pereopod 1 has, in *M. boschmai*, a distinct tooth in the middle of the inner margin, sometimes followed by one or more much smaller teeth. In *M. sibogae*, de Man (1916: 106) described the merus as having “usually 2 or 3, rarely 4 or 5, granules of the inner margin ... a little larger than the rest and more or less spiniform.” The two larger males from the Coral Sea (QM W11219) have two and three (on the left and right respectively) slender spinules on the inner margin of the merus. The two smaller specimens each have only one first pereopod present, which have two similar spinules.

8. De Man (1916) recorded a sharp tooth on the inner margin of the carpus of pereopod 1 on both sides of one specimen and on the right side only of three other specimens (but not present on the specimen in figure

18 of plate 4). He referred to this spine as “an abnormality” and “the accidental spine”. This strong tooth is present on both sides of the larger Coral Sea specimens and on the two first pereopods of the smaller specimens. It is absent in *M. boschmai*.

9. The Coral Sea specimens have a distinct tooth about the middle of the inner margin of the propodus of pereopod 1. In *M. sibogae* this margin is described as granulose and in *M. boschmai* it is quite smooth.

10. The propodus of pereopod 1 is relatively broader in *M. sibogae* and the Coral Sea specimens than in *M. boschmai*; in *M. sibogae* it is broadest at the level of articulation of the dactylus whereas in *M. boschmai* the broadest point is midway between the proximal end of the propodus and the articulation of the dactylus.

Distribution. Indo-West Pacific Ocean: Indonesia, northern Australia, Coral Sea; 260–480 m. It is possible that some of the material recorded as *M. boschmai* from the North West Shelf of Australia may be *M. sibogae*.

Metanephrops velutinus Chan & Yu

Nephrops andamanicus.—Holthuis, 1964: 71.

Metanephrops andamanicus (sensu Holthuis, 1964).—Jenkins, 1972: 162, 171.—Chan & Yu, 1987: 184 (key).

Metanephrops andamanicus.—Carter *et al.*, 1983: 2, 4.—Anon., 1984: 46.—Davis & Ward, 1984: 42.—Bremner, 1985: 39, graphs 1, 2, fig. 3.—Ward & Davis, 1987: 93.—Wallner & Phillips, 1988: 36, graphs 2, 3.—Macpherson, 1990: 294, figs 2c, d, 3c, d.

[?] *Nephrops andamanicus*.—de Man, 1916: 99, pl. 3 fig. 15.

Metanephrops velutinus Chan & Yu, 1991: 22 (key), 35, pls 2b, 4b, 6c, 8a, c, d.—Holthuis, 1991: 64 (key), 82, figs 121, 160.—Wadley & Evans, 1991: 37, unnumbered figs.

Not *Nephrops andamanicus* Wood-Mason, 1892.

Material examined. One male, cl. 70+ mm (rostrum broken at mid-eye level), QM W11212, east of Murray Isles, Torres Strait, 9°51'S 144°26'E to 9°53'S 144°23'E, 480 m, trawled, RV *Gwendoline May*, 28 May 1983; 1 ovigerous female, cl. 67.5 mm, QM W14388, east of Murray Isles, Torres Strait, trawled, RV *Gwendoline May*, 28 May 1983.

Remarks. The cervical (or upper hepatic) spine is absent in both specimens; there is no branchial spine at the anterior end of the branchial carina; and the intermediate carinae are not granulose.

Distribution. Indo-West Pacific Ocean: Philippines, north-eastern and western to southern Australia (Torres Strait to Great Australian Bight); 238–702 m.

Nephropsis Wood-Mason, 1873

The genus contains 16 species, of which 10 are known from the Indo-West Pacific region. Six species have been previously recorded from Australian seas: *Nephropsis acanthura* Macpherson, 1990, from north-eastern

Australia (Macpherson, 1990) and western Australia (Macpherson, 1993); *N. holthuisi* Macpherson, 1993, from north-western Australia (Macpherson, 1993); *N. serrata* Macpherson, 1993, from north-western Australia (Wadley & Evans, 1991, as *Nephropsis* sp. 1; Macpherson, 1993); *N. stewarti* Wood-Mason, 1873, from north-western Australia (George, 1983; Wadley & Evans, 1991; Macpherson, 1993) and north-eastern Australia (Macpherson, 1993); *N. suhmi* Bate, 1888, from north-western Australia (Macpherson, 1993) and north-eastern Australia (Macpherson, 1990); and *N. sulcata* Macpherson, 1990, from north-western Australia (Macpherson, 1993) and north-eastern Australia (Macpherson, 1990; 1993).

Nephropsis acanthura Macpherson

Nephropsis acanthura Macpherson 1990: 302 (key), 311, figs 5d, 9d-f, 11a,b, 16d.—Holthuis, 1991: 32 (key), 35, fig. 61.—Macpherson, 1993: 55, 64 (key).

Material examined. One male, cl. 30 mm, AM P39685, east of Cape Hawke, 32°08'S 153°09'E to 32°04'S 153°10'E, 1033–1080 m, 15 June 1989, FRV *Kapala*, stn K89-12-04; 2 males, cl. 42 and 44 mm, AM P40378, east of Newcastle Bight, 32°50'S 152°50'E, 1090–1134 m, 11 April 1989, FRV *Kapala*, stn K89-06-04; 1 female, cl. 36 mm, AM P40379, north-east of Port Hunter, 32°05'S 152°50'E, 1079–1097 m, 8 June 1989, FRV *Kapala*, stn K89-11-01; 1 female, cl. 42.5 mm, AM P40380, east of Port Hunter, 32°55'S 152°45'E, 1043–1061 m, 11 April 1989, FRV *Kapala*, stn K89-06-02; 1 male, cl. 52 mm, AM P40381, east of Port Hunter, 33°02'S 152°38'E, 896–960 m, 16 May 1989, FRV *Kapala*, stn K89-09-01; 1 female, cl. 37 mm, AM P39233, south-east of Port Hunter, 33°05'S 152°33'E to 33°04'S 152°36'E, 896–951 m, 5 May 1988, FRV *Kapala*, stn K88-08-08; 1 male, cl. 45 mm, AM P39234, south-east of Port Hunter, 33°07'S 152°33'E to 33°06'S 152°38'E, 1006–1080 m, 3 May 1988, FRV *Kapala*, stn K88-08-02; 1 female, cl. 41 mm, 1 male, cl. 45 mm, AM P39235, east of Broken Bay, 33°33'S 152°09'E to 33°35'S 152°08'E, 1022–1051 m, 19 December 1985, FRV *Kapala*, stn K85-21-04; 1 ovigerous female, cl. 52+ mm (rostrum broken), AM P39236, east of Broken Bay, 33°36'S 152°01'E to 33°32'S 152°05'E, 722–759 m, 25 September 1984, FRV *Kapala*, stn K84-16-04; 1 ovigerous female, cl. 42 mm, AM P40382, east of Broken Bay, 33°37'S 152°06'E, 990–1020 m, 17 October 1983, FRV *Kapala*, stn K83-13-01; 1 female, cl. 46 mm, AM P40383, east of Broken Bay, 33°37'S 152°07'E, 1024–1088 m, 18 May 1989, FRV *Kapala*, stn K89-09-07; 1 female, cl. 50 mm, AM P40384, east of Broken Bay, 33°45'S 152°03'E, 1005–1015 m, 11 October 1984, FRV *Kapala*, stn K84-18-07; 1 female, cl. 46+ mm (rostrum broken), AM P40385, east of Shoalhaven Heads, 34°50'S 151°15'E, 988–1015 m, 26 October 1983, FRV *Kapala*, stn K83-14-04; 1 male, cl. 48 mm, AM P44030, east of Ulladulla, 35°27'S 150°54'E, 1050–1105 m, 14 December 1988, FRV *Kapala*, stn K88-22-01; 1 male, cl. 43 mm, AM P39237, north-east of Batemans Bay, 35°32'S 150°51'E to 35°27'S 150°55'E, 988–1024 m, 4 August 1988, FRV *Kapala*, stn K88-14-04.

Remarks. Most of these specimens are considerably larger than the type specimens (16–36 mm) but agree well with Macpherson's description. The post supraorbital

spines vary in number and position from none at all, to only one on either the right or left side, to two on each side.

Distribution. Indo-West Pacific Ocean: Madagascar, Philippines, north-western and eastern Australia, Tasman Sea, Coral Sea, Chesterfield Islands, New Caledonia; 720–1305 m.

Nephropsis holthuisi Macpherson

Nephropsis holthuisi Macpherson, 1993: 55, figs 1–3 (but not fig 3B), fig. 6B (erroneously as *N. serrata*).

Material examined. One male, cl. 40 mm, AM P44029, east of Terrigal, 33°33'S 152°10'E, 1080–1135 m, trawled, 31 August 1988, FV *Kapala*, stn K88-17-04.

Remarks. This specimen differs in some small ways from the type material, but is sufficiently similar to be included in the species. The rostrum is not horizontal but has a slight sinusoidal curvature. There are four (left) and three (right) small spines at the proximal end of the subdorsal carinae and the same number of small postsupraorbital spines. The antennal spines are about the same size as the supraorbital spines. Except for the lateral carina the carinae on the posterior carapace are not well developed. The pleuron of the second abdominal segment ends in a longer and sharper point than that of the holotype. The pleuron of the sixth abdominal segment ends in a short sharp double point. The coxal process on the second pereopod is bluntly pointed rather than rounded.

Distribution. Indo-West Pacific Ocean: north-western Australia (Ashmore Reef), eastern Australia; 900–1105 m.

Nephropsis suhmi Bate

Nephropsis suhmi Bate, 1888: 181, pl. 23 fig. 3, pl. 24 fig. 2.—Anderson, 1896: 96.—Ramadan, 1938: 125 (in part).—Macpherson, 1990: 302 (key), 306, figs 5b, 7d–f, 8c,d, 16b.—Holthuis, 1991: 35 (key), figs 60, 82.—Macpherson, 1993: 64 (key).

Nephropsis Suhmi.—Alcock, 1901: 158 (key), 163.—de Man, 1916: 97, 112 (key), 114.—Bouvier, 1917: 21 (key).—Balss, 1925: 208.

Material examined. One male, cl. 42.5 mm, AM P39699, Lord Howe Rise, western Tasman Sea, 27°39.8'S 161°46.3'E, beam trawl, 1423 m, J.K. Lowry *et al.* on RV *Franklin*, 6 May 1989, stn FR 0589-31.

Remarks. There are two postsupraorbital spines present on each side of the carapace. There is a well-developed spine on the anterior margin of pleura of abdominal segments 2 to 4 (as in the holotype), but not on segment 5 (as in Macpherson's material).

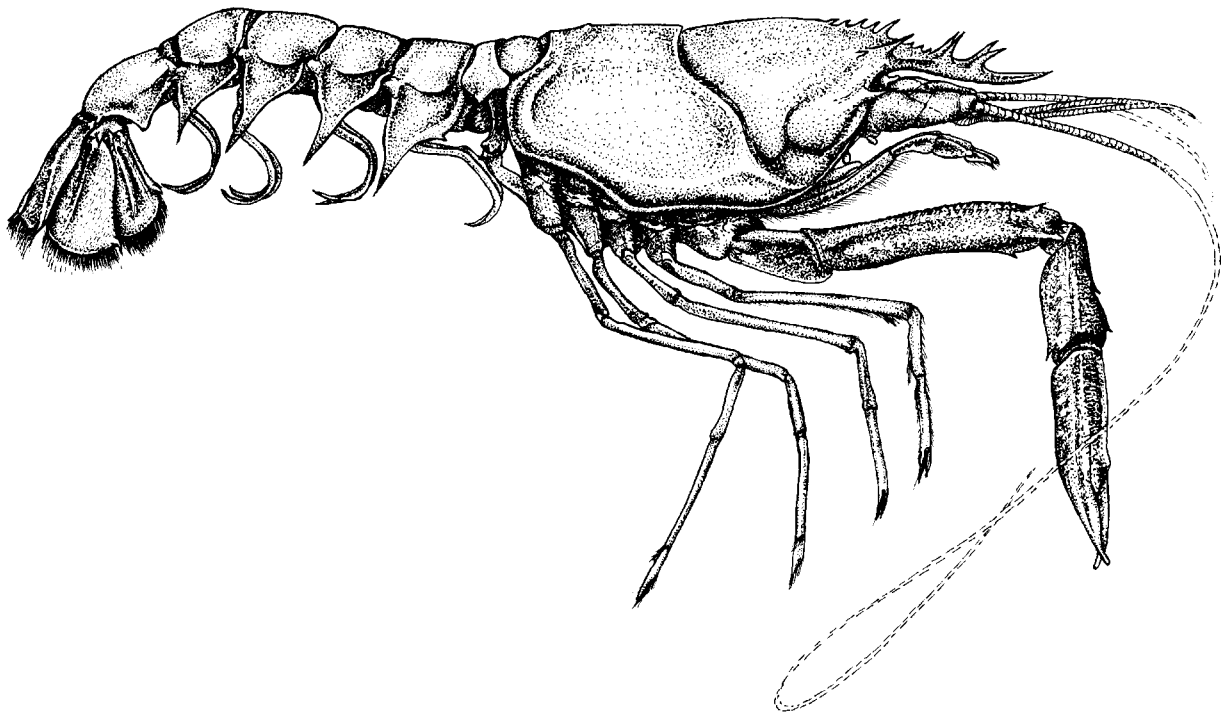


Fig. 1. *Nephropsis sulcata* Macpherson, male, cl. 38 mm, AM P20990, lateral view.

Distribution. Indo-West Pacific Ocean: Madagascar, Arabian Sea, Maldive Islands, Indonesia, north-western and north-eastern Australia, western Tasman Sea, New Caledonia; 786-2029 m.

Nephropsis sulcata Macpherson

Fig. 1

Nephropsis atlantica.—Wood-Mason & Alcock, 1891: 197, fig. 4.—Alcock, 1894a: 230.—Alcock & Anderson, 1894: 162.—Anderson, 1896: 96.—Alcock, 1901: 158 (key), 161.—Stebbing, 1902: 34.—Stebbing, 1910: 379.—Barnard in Gilchrist, 1918: 48.—von Bonde, 1932: 59.—von Bonde & Marchand, 1935: 6.—Barnard, 1950: 530, fig. 99b-e.—Barnard, 1964: 12.—Bruce, 1966c: 223.—Kensley, 1981: 29. (Not *Nephropsis atlantica* Norman, 1882).

Nephropsis sulcata Macpherson, 1990: 303 (key), 319, figs 13e-g, 14a,b, 15a,b, 16g.—Holthuis, 1991: 34 (key), 47, figs 58,84.—Macpherson, 1993: 64,65 (key).

Material examined. One female, cl. 39.5 mm, QM W14382, mid-eastern Queensland, 23°17'S 153°56'E, 732 m, trawled, M.V. *Southern Intruder*, 29 November 1983; 1 male, cl. 37.5 mm, QM W11394, mid-eastern Queensland, 24°30'S 153°30'E, 658 m, trawled, M.V. *Southern Intruder*, 2 October 1983; 1 ovigerous female, cl. 39 mm, AM P38495, east of Brisbane, south-eastern Queensland, 700-900 m, trawled, M.V. *Valkyrie Voyager*, May 1988; 1 male, cl. 38 mm, AM P20990, 1 male, cl. 26+ mm (rostrum broken), AM P20997, east of Broken Bay, 33°32'S 152°00'E to 33°38'S 152°04'E, 810 m, 19 August 1975, FRV *Kapala*, stn K75-05-05; 1 ovigerous female, cl.

45 mm, AM P19098, north-east of Port Jackson, 33°43'S 151°57'E to 33°40'S 151°59'E, 765 m, 6 December 1972.

Remarks. One specimen (39 mm female, AM P38495) has a third lateral spine on the right side of the rostrum, close to the base and about halfway between the second rostral spine and the supraorbital spine. This is also the only specimen in which the median rostral groove overreaches the anterior pair of rostral spines. In the other specimens the groove extends only to the base of the anterior pair of spines. There are 4 or 5 small spines at the proximal end of each subdorsal carina, between the supraorbital spine and the gastric tubercle. One specimen (45 mm female, AM P19098) has 2 additional small spines anterior to the largest spine which is level with the supraorbital spine. In all specimens the median and intermediate carinae are absent or very poorly defined; the lateral carina is strong. There is only one small spine on the anterior margin of the pleura of abdominal segment 2.

Colour. (Based on AM P20990) Posteromedian part of carapace and abdominal terga (pubescence) grey-green; rostrum, rostral and other spines, entire edge of carapace and abdominal pleura pale red, tips of all spines and tips of pleurae white; antennular and antennal flagella, maxillipeds, pereopods 2 to 5, all pleopods, uropods and distal portion of telson brilliant red; peduncles of antennae white; eye peduncles bright red with cornea white; chelipeds (pubescence) greenish-yellow with fingers of propodus reddish with white tips.

Distribution. Indo-West Pacific Ocean: southern Africa (Natal), south-western Indian Ocean (Madagascar), Laccadive Sea, South China Sea, Philippines, north-western and eastern Australia, Coral Sea, Chesterfield Islands, New Caledonia; 415–1115 m.

Family PALINURIDAE

Linuparus White, 1847

The genus contains three recent species, all of which occur in the Indo-West Pacific region. Two species have been previously recorded from Australian waters: *Linuparus sordidus* Bruce, 1965b, from north-western Australia (George, 1983; Wadley & Evans, 1991) and *L. trigonus* (von Siebold, 1924) from north-western Australia (George, 1983; Wadley & Evans, 1991), north-eastern Australia (Wassenberg & Hill, 1989) and south-eastern Australia (McNeill, 1949, 1953, 1956; Berry & George, 1972).

Linuparus sordidus Bruce

Linuparus sordidus Bruce, 1965b: 1, fig. 1A, pls 1, 2A, C.–Berry & George, 1972: 18 (key), 22.–George, 1983: 16, 19 (key), 20.–Williams, 1986: 15, fig. 32.–Williams, 1988a: 64, unnumbered fig.–Chan & Yu, 1989c: 290, pl. 1A.–Holthuis, 1991: 111 (key), 113, figs 209a, 210a, 213.–Wadley & Evans, 1991: 29, unnumbered figs.

Material examined. Three females, cl. 71–87 mm, AM P44028, north-east of Danger Point, 28°02'S 153°57'E, 410 m, 1 June 1978, FRV *Kapala*, stn K78-09-02; 5 females, cl. 73–85 mm, AM P21667 to P21671, 1 male, cl. 62 mm, AM P21672, south-east of Clarence River, 29°41'S 153°45'E to 29°32'S 153°47'E, 399–406 m, 10 October 1975, FRV *Kapala*, stn K75-09-04.

Remarks. These specimens have all the features characteristic of *L. sordidus*, including colour: dirty-yellow brown except for the bright orange-red distal two thirds of the antennal flagella. Three specimens have a small secondary spinule on the medial slope of either the left or right supraorbital horn.

Berry & George (1972) used the presence of vestigial pleopods on the first abdominal segment to differentiate *L. somniosus* from *L. trigonus* and *L. sordidus*. In the present material one female (AM P21667) has on the right side a single reduced pleopod of a form different from that figured by Berry & George. In this specimen the antennular peduncle reaches barely as far forward as the tip of the antennal peduncle rather than extending well beyond.

There are no distinct dorsal spines on abdominal segments 2 or 3 and, except in the single male, no submedial spines on the sterna of abdominal segments 2 to 5. Ornamentation of the abdominal segments and sternum may vary with size of the animal.

Distribution. South China Sea, Taiwan, north-western and eastern Australia; 200–414 m.

Linuparus trigonus (von Siebold)

Palinurus Trigonus von Siebold, 1824: 15.

Palinurus trigonus.–De Haan, 1841: 157, pls 39,40.–Yamaguchi, 1993: 588.

Linuparus trigonus.–Holthuis, 1946: 121, pl. 11 figs i,j.–McNeill, 1953: 89.–McNeill, 1956: 53, unnumbered fig.–Bruce, 1965b: 13, fig. 1B, pl. 2B, D.–Holthuis, 1966: 264.–Prasad & Tampi, 1969: 79.–Holthuis & Sakai, 1970: 92, 114, pl. 6.–Berry & George, 1972: 18 (key), 21.–George, 1983: 17, 18 (unnumbered fig.), 19 (key), 20.–Williams, 1986: 15, figs 7a, 31.–Williams, 1988a: 63, unnumbered fig. & photo.–Wassenberg & Hill, 1989: 161.–Holthuis, 1991: 111 (key), 114, figs 210b, 215.–Wadley & Evans, 1991: 30, unnumbered figs.–Ng, 1992: 184.–Yamaguchi & Baba, 1993: 238, figs 54A–C, pl. 5b,c.

Not *Linuparus trigonus*.–Barnard, 1950: 820 (= *L. somniosus* Berry & George, 1972).

Puerulus carinatus.–McNeill, 1949: 337, unnumbered fig. (Not *Puerulus carinatus* Borradaile, 1910).

Material examined. One female, cl. 64.5 mm, AM P17914, north-east of Wooli, 29°51'S 153°40'E to 29°58'S 153°38'E, 315 m, prawn trawl on sandy mud, 11 May 1971, FRV *Kapala*, stn K71-09-03; 1 female, cl. 99 mm, AM P44026, east of Newcastle, 32°53'S 151°59'E to 32°53'S 152°00'E, 71–73 m, 10 April 1990, FRV *Kapala*, stn K90-07-07; 1 female, cl. 47 mm, AM P44027, east of Long Reef, 33°45'S 151°30'E, 121–122 m, 19 March 1986, FRV *Kapala*, stn K86-06-07.

Colour. Bright red with yellow-brown patches.

Distribution. Western Pacific Ocean: Japan, Korea, China, Taiwan, Vietnam, Philippines, north-western and eastern Australia; 30–414 m.

Projasus George & Grindley, 1964

The genus contains two species, one of which is known from the Indo-West Pacific region. Adults of the genus have not previously been reported from Australian waters, though Webber & Booth (1988) reported a puerulus stage of *Projasus* sp. from east of Greenwell Point, New South Wales.

Projasus parkeri (Stebbing)

Jasus parkeri Stebbing, 1902: 39, pl. 7.–Stebbing, 1910: 375.–K.H. Barnard, 1950: 540.

Puerulus parkeri.–Holthuis, 1946: 110, 148.

Projasus parkeri.–George & Grindley, 1964: 89, fig. 2.–George, 1976: 31.–Webber & Booth, 1988: 82, figs 1–3.–Melville-Smith, 1990: 314.–Holthuis, 1991: 158 (key), 159, figs 295b, 298.

Material examined. One female, cl. 53.5 mm, AM P45094, east of Newcastle, 33°30'S 152°10'E, 880 m, G. Harmer, 1992;

1 female, cl. 69.8 mm, 1 male, cl. 64.2 mm, AM P45096, east of Bermagui, 36°23'S 150°22'E, 820 m, J. Jarvis on FV *Josephine Jeen*, 3 December 1993; 1 male, cl. 63.2 mm, AM P41898, east of Eden, 37°35'S 150°21'E, 810 m, D. Bradbury on MV *Pacific Dynasty*, 25 May 1993; 1 male, cl. 64.4 mm, AM P45095, south-east of Gabo Island, 37°40'S 150°19'E, 730 m, M. Kelly on FV *Terrance Star*, 1 December 1993.

Remarks. These five specimens differ slightly from the South African material described by George (1976) and show much of the variation noted by Webber & Booth (1988) in their New Zealand material. In particular, the rostrum curves upward or is straight; the anterior margins of the supraorbital horns are almost straight in some specimens but slightly convex in others; the branchial spine row is curved in lateral view; the median carina of abdominal segment 1 varies from a distinct carina with a small sharp anterodorsally-directed tooth to almost absent with a very small blunt tooth; the median carina of abdominal segments 2 to 5 is low, blunt and anteriorly obtuse. There are two median spines on the posterior margin of the fifth sternal plate and no median posterior spine on the fourth abdominal segment. The 53.5 mm female (AM P45094) has two distinct teeth on the anterior margin of the first abdominal pleurite; the other specimens have 3–5 blunt granules.

The discovery of adult *Projasus parkeri* on the east coast of Australia makes it highly likely that the puerulus stage described by Webber & Booth (1988), as *Projasus* sp., is really that of *P. parkeri* as they suggested.

Distribution. Atlantic Ocean: south-west Africa; Indian Ocean: south-east Africa, St Paul Island; Pacific Ocean: south-eastern Australia, New Zealand; 370–880 m.

Puerulus Ortmann, 1897

The genus contains four species, all of which occur in the Indo-West Pacific region. Two species have been previously recorded from Australian waters: *Puerulus angulatus* (Bate, 1888), from north-western Australia (George, 1983; Wadley & Evans, 1991) and *P. velutinus* Holthuis, 1963, also from north-western Australia (Wadley & Evans, 1991).

Puerulus angulatus (Bate)

Panulirus angulatus Bate, 1888: 81, pl. 11 figs 2–4.

Puer angulatus.—Ortmann, 1891: 37.

Puerulus angulatus.—Calman, 1909: 442.—Balss, 1925: 203.—Holthuis, 1946: 110.—Holthuis, 1966: 267 (in part, part = *P. carinatus* Borradaile, 1910).—Berry, 1969: 247, pl. 1 fig. 2, pl. 2 fig. 2, pl. 3 fig. 2.—Harada, 1980: 244, figs 1,2.—Kensley, 1981: 30.—George, 1983: 16, 19 (key), 20.—Baba *et al.*, 1986: 155, 282, fig. 106.—Williams, 1986: 25 (key), fig. 59A.—King, 1988: 109.—Williams, 1988a: 111 (key), unnumbered figs.—Williams, 1988b: 315.—Chan & Yu, 1989a: 2, pl. 1.—Holthuis, 1991: 162, figs 300b, 301.—Wadley & Evans, 1991: 31, unnumbered figs.

Puerulus carinatus.—Ramadan, 1938: 133, figs 6,7. (Not *Puerulus carinatus* Borradaile, 1910).

Puerulus gracilis Kubo, 1939: 316, figs. 1,2.

Not *Panulirus angulatus*.—Alcock & Anderson, 1894: 166.—Alcock, 1901: 185. (= *Puerulus sewelli* Ramadan, 1938). Not *Puerulus angulatus*.—de Man, 1916: 36, pl. 2 fig. 5. (= *P. velutinus* Holthuis, 1963).

Material examined. One male, cl. 35.8 mm, AM P34714, 2–3 km north-north-east of Raine Island, Queensland, 11°35'S 114°02'E, 275m, prawn trawl over sand, 12 February 1979, FNQ 79-31; 1 ovigerous female, cl. 43.4 mm, 1 male, cl. 43.2 mm, QM W14299, 17°33'S 149°52'E to 17°35'S 149°56'E, 302 m, P. Davie on RV *Soela*, 3 December 1985; 1 ovigerous female, cl. 48.9 mm, 1 male, cl. 40 mm, QM W14270, 17°39'S 150°10'E to 17°36'S 150°10'E, 225 m, P. Davie on RV *Soela*, 4 December 1985; 3 females, cl. 33.5, 37, 38 mm, QM W14383, 22°00'S 153°31'E, 270 m, MV *Southern Intruder*, 1 November 1983; 1 male, cl. 34.8 mm, QM W10163, 22°54.5'S 152°12.5'E, 351 m, CRAIGMIN Survey, 3 December 1980; 1 male, cl. 45.8 mm, QM W14384, 28°05'S 153°54'E, 270 m, P. Dutton on MV *Iron Summer*, 27 July 1982; 1 male, cl. 44.7 mm, QM W14374, 28°05'S, 275m, P. Dutton on MV *Iron Summer*, 27 September 1982; 1 female, cl. 47 mm, 2 males, cl. 24.5 and 38.5 mm, AM P39488, Britannia Sea Mount, western Tasman Sea, 28°18.48'S 155°38.62'E, 415 m, limestone and coarse coral sand bottom, J.K. Lowry & party on RV *Franklin*, 10 May 1989, stn FR0589-48; 1 female, cl. 21.7 mm, AM P26841, east of Wollongong, NSW, 192 m; 1 immature, cl. 13 mm, AM P30647 and 1 female, cl. 30.5 mm, AM P30754, 32 km east of Greenwell Point, NSW, 34°55'S 151°08'E, 373 m and 408 m, A. Bell, 16 July 1980.

Remarks. These specimens are generally in good agreement with the description of Holthuis (1966). They differ slightly in the following features: The supraorbital horns are only very slightly crenulate in most specimens and quite smooth in the 47 mm female (AM P39488). The tooth on either side of the anterior margin of the carapace, at the inner base of the supraorbital horn, is single, rather than bifurcate, in all specimens except the 47 mm female. The third tooth of the row between the supraorbital horns and the cervical groove is very small and in some specimens is present on one side only; it is slightly lateral to, and closely pressed against, the base of the second tooth; in a few specimens it is bifurcate or a second tiny tooth is also present. As reported by Berry (1969) for South African material, there is only one row of 4–5 teeth on the ventral surface of antennal segment 3.

Holthuis (1966: 270) mentions that in a 12 mm juvenile from the Philippines, the “epistome, instead of having a single median tooth which is directed forward, has two strong submedian spine-like teeth which are directed ventrally”. In the present material the 13 mm juvenile (AM P30647) and the 21.7 mm female (AM P26841) have both the single median tooth and a blunt submedian tooth on either side of it. These two small specimens also have well-developed median spines on the thoracic sternum, and 1, 1, 2 and 3 spines at the base of pereopods 2, 3, 4 and 5 respectively, as in adults.

This series of specimens shows clearly that the size and sharpness of the spines on the abdominal median

keel decreases with increase in size of the animal. The abdominal profile of the 13 mm juvenile is almost identical to that of Bate's juvenile holotype, but in large adults the spines are reduced to a blunt ridge. The spines at the base of pereopods 2 to 5 are also much less sharp in larger specimens.

Colour. (of specimens AM P39488): overall appearance light orange; antennae uniformly light orange, not banded; anterior carapace mottled orange to translucent white, dark orange to red around bases of spines, tips of spines white; pereopods white; dark orange transverse bands on posterior of abdominal somites 1 to 6 and on abdominal carinae.

These colour notes were made from frozen material and colour photographs of that material. Of particular note is that the antennae are not banded. Berry (1969), Holthuis (1991) and Wadley & Evans (1991) have drawn attention to the banded red and white antennae of *P. angulatus*. It is possible that the banding was lost as a result of freezing but this seems unlikely since the remainder of the animal retained good colour. Morphologically, the specimens are unquestionably *P. angulatus*.

Distribution. Western Indian Ocean: Natal, Mozambique, Zanzibar, Somalia; Northern Indian Ocean: Nicobar Islands; Western Pacific Ocean: Japan, Philippines, Taiwan, New Guinea, north-western and eastern Australia, western Tasman Sea; 192–536 m.

Family POLYCHELIDAE

Polycheles Heller, 1862

The genus contains about sixteen species, of which nine are known from the Indo-West Pacific region and a further two from the north central Pacific Ocean. One species has been previously recorded from Australian waters: *Polycheles typhlops* Heller, 1862, from north-western Australia (George, 1983; Wadley & Evans, 1991).

Polycheles baccatus Bate

Polycheles baccatus Bate, 1878: 278.–de Man, 1916: 5 (list), 23 (key), 26, pl. 1 figs 4, 4a.–Bernard, 1953: 86.–Firth & Pequegnat, 1971: 39 (key), 41.–Chan & Yu, 1989b: 168, pl. 1C,D.

Polycheles baccata–Bate, 1888: 131, fig. 32, pl. 14 fig. 1.–Sund, 1920: 226.

Material examined. One male, cl. 34.5 mm, QM W20794, 27°12.83'S 153°52.87'E, trawled, MV *Iron Summer*, R. Morton, 10 May 1983; 1 male (badly damaged), cl. 25 mm, AM P21766, north-east of Woolli, 29°52'S 153°43'E to

29°46'S 153°45'E, 505 m, 10 October 1975, FRV *Kapala*, stn K75-09-03; 1 female, 33.5 mm, AM P44749, south-east of Cape Byron, 28°37'S 153°50'E, 502 m, 19 August 1978, FRV *Kapala*, stn K78-17-21; 1 female, cl. 43 mm, AM P26649, east of Woolli, 29°51'S 153°43'E, 495 m, 23 August 1977, FRV *Kapala*, stn K77-13-10; 1 male, cl. 36.5 mm, AM P26549, east of Woolli, 29°52'S 153°43'E to 29°55'S 153°42'E, 495 m, 23 August 1977, FRV *Kapala*, stn K77-13-12; 1 ovigerous female, cl. 34.5 mm, AM P40372 and 3 ovigerous females, cl. 40, 40.5, 41.5 mm, AM P44748, north-east of North Solitary Island, 29°53'S 153°42'E to 29°50'S 153°43'E, 457 m, 26 April 1978, FRV *Kapala*, stn K78-06-07.

Remarks. The carapaces of these specimens are densely covered with fine and medium-sized granules. There are two rostral spines and immediately below these a conical tooth projects from the frontal wall of the carapace. The frontal border of the carapace bears spines or granules extending just beyond the internal angle of the orbit. In the smallest male (AM P21766) a strong, acute, flattened tooth forms the internal angle of the triangular orbital notch, the rounded external border of which is armed with five to seven spines.

The spine formula of the lateral edge of the carapace is 9–12:5:21–25. The spine forming the anterolateral angle of the carapace is larger than the following lateral spines and, like the others, is inwardly curved. The mid-dorsal carina (excluding rostral spines) comprises paired granules, two pairs anteriorly and several pairs posteriorly being larger than the others. The posterior edge of the carapace is armed with small spinules or raised granules. The gastro-orbital carina is composed of small spinules like those mid-dorsally and the superior branchial carina is marked by a line of raised granules. The two branches of the cervical groove are also marked by a series of raised granules.

The 25 mm male (AM P21766) corresponds more closely to de Man's (1916) description and figures of the *Siboga* material than to Bate's description and figures of the *Challenger* specimen of *P. baccatus*. De Man, however, pointed out several inaccuracies in Bate's description and figures.

Colour. (Based on AM P21766). Dorsal surface of the carapace and abdomen a rich burnt orange, area below lateral edges of carapace and lower half of the abdominal pleura white. Interspaces between abdominal segments as well as the grooves in abdominal terga also white. Second to fifth pereopods white, chelae of second and third pereopods pinkish red. Ischium of cheliped pinkish, colour continuing to proximal portion of merus; distal portion of merus, carpus and propodus burnt orange; joints between merus and carpus, carpus and propodus and tips of fingers whitish, giving a subtly banded appearance.

Distribution. Indo-West Pacific Ocean: Taiwan, Bali Sea, south-eastern Australia, Fiji; 350–916 m.

Polycheles euthrix (Bate)

Figs 2,3

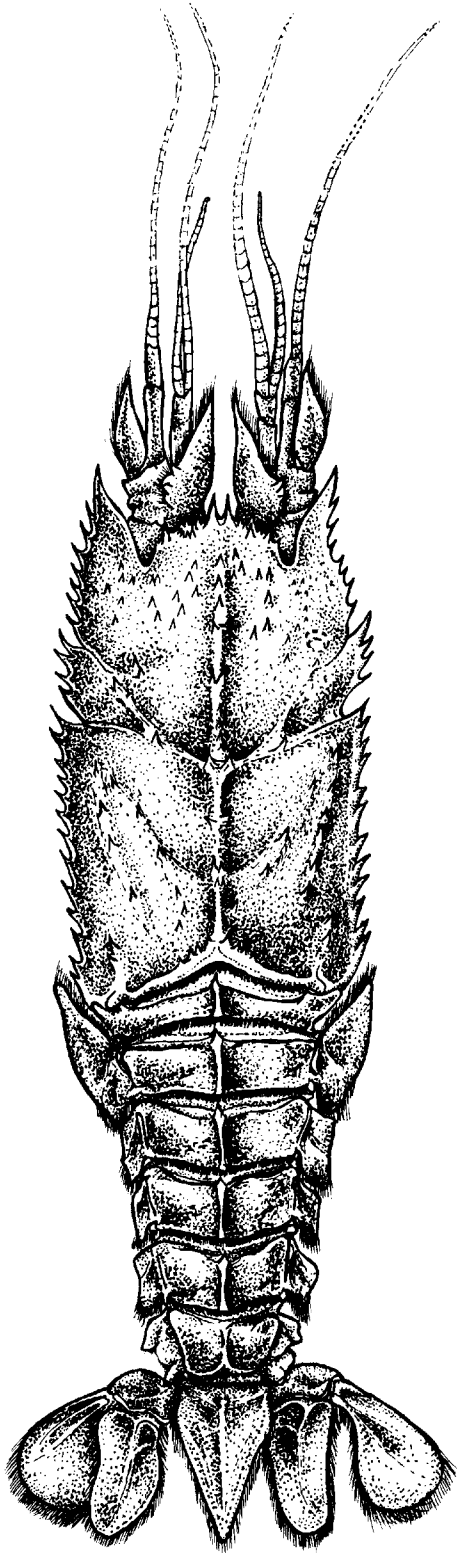


Fig. 2. *Polycheles euthrix* (Bate), male, cl. 39.7 mm, AM P17910, dorsal view.

Pentacheles euthrix Bate, 1878: 280, pl. 13 figs 1–3 (erroneous spelling for *P. euthrix*).

Pentacheles euthrix.—Bate, 1888: 149, figs 33–36, pl. 17.—Sund, 1920: 226.

Polycheles euthrix.—de Man, 1916: 5 (list).—Bernard, 1953: 86.—Firth & Pequegnat, 1971: 39 (key), 45.

Material examined. Two females, cl. 35 and 36 mm, 1 specimen, cl. approx. 22 mm (very damaged), QM W14280, Coral Sea, 16°55'S 151°34'E, 880 m, P. Davie on RV *Soela*, 6 December 1985; 1 female, cl. 67 mm, 2 males, cl. 55 and 45 mm, QM W14321, 17°01'S 151°20'E, 800 m, P. Davie on RV *Soela*, 6 December 1985; 1 female, cl. 88 mm, QM W14816, 17°02'S 151°03'E, 700 m, P. Davie on RV *Soela*, 6 December 1985; 2 females, cl. 61 and 65 mm, 1 male, cl. 49 mm, QM W14300, 17°38'S 149°23'E to 17°34'S 149°23'E, 600 m, P. Davie on RV *Soela*, 3 December 1985; 1 male, cl. 21.7 mm, QM W14293, 17°30'S 149°00'E to 17°27'S 149°01'E, 900–908 m, P. Davie on RV *Soela*, 2 December 1985; 1 male, cl. 40 mm, QM W11464, 23°37'S 153°16'E, 590 m, MV *Southern Intruder*, 9 August 1983; 1 ovigerous female, cl. 71.4 mm, QM W20795, 27°13.52'S 153°53.46'E, 620 m, R. Morton on MV *Iron Summer*, 31 March 1983; 1 female, cl. 71.3 mm, QM W14336, 27°19.91'S 153°34.47'E, 600 m, MV *Iron Summer*, 10 May 1983; 1 ovigerous female, cl. 62.5 mm, QM W14286, 27°53.90'S 153°00.33'E, 560 m, R. Morton on MV *Iron Summer*, 30 March 1983; 1 female, cl. 55.8 mm, QM W14368, 27°55'S 154°01'E, 555 m, MV *Iron Summer*, 30 November 1982; 1 female, cl. 59.5 mm, QM W14273, 27°56'S 153°54'E, 590 m, S. Hyland on MV *Iron Summer*, 30 November 1982; 2 males, cl. 44.2 and 54 mm, QM W14363, 595 m, MV *Southern Intruder*, 25 April 1984; 1 female, cl. 55.5 mm, AM P44755, north-east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, trawl, 549 m, 6 November 1978, FRV *Kapala*, stn K78-23-09; 3 females, cl. 30, 54.5 and 55 mm, and 1 ovigerous female, cl. 63 mm, AM P44752, east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, trawl, 549 m, 6 November 1978, FRV *Kapala*, stn K78-23-09; 1 female, cl. 73 mm, AM P44750, 1 female, cl. 64.5 mm and 1 ovigerous female, cl. 63.5 mm, AM P44751, north-east of Point Danger, 28°02'S 153°59'E to 27°59'S 153°59'E, trawl, 549 m, 2 June 1978, FRV *Kapala*, stn K78-09-05; 3 females, cl. 46, 51 and 69.5 mm, 1 male, cl. 61.5 mm, AM P44754, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, trawl, 732 m, 6 November 1978, FRV *Kapala*, stn K78-23-08; 1 male, cl. 41 mm, AM P44753, east of Point Danger, 28°12'S 153°53'E to 28°09'S 153°53'E, trawl, 229 m, 2 November 1978, FRV *Kapala*, stn K78-23-05; 1 female, cl. 55.5 mm, 1 male, cl. 49 mm, AM P44756, east of Crowdy Head, 31°56'S 153°08'E to 31°52'S 153°16'E, trawl, 925 m, 9 December 1987, FRV *Kapala*, stn K87-24-05; 1 ovigerous female, cl. 52 mm, AM P39742, east of Hawkes Nest, 32°41'S 152°50'E, beam trawl, 713–796 m, 14 June 1989, FRV *Kapala*, stn K89-11-03; 1 ovigerous female, cl. 51 mm, AM P26754, 4 females (3 ovigerous), cl. 44.5, 47, 48 and 48.5 mm, AM P26755, 1 male, cl. 31 mm, AM P26753, east of Newcastle, 33°11'S 152°24'E to 33°09'S 152°25'E, demersal trawl, 732 m, 7 December 1977, FRV *Kapala*, stn K77-23-10; 1 male, cl. 39.7 mm, AM P17910, south-east of Port Stephens, 32°46'S

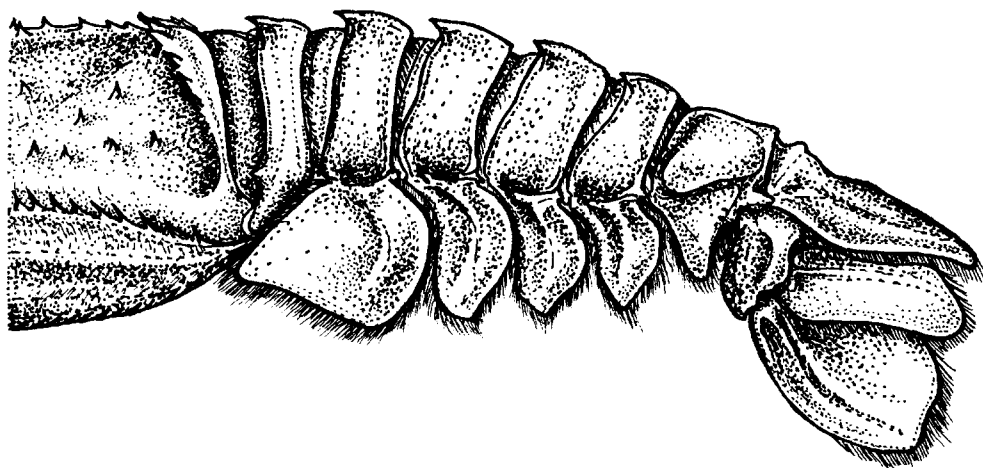


Fig. 3. *Polycheles euthrix* (Bate), male, cl. 39.7 mm, AM P17910, lateral view of abdomen.

152°46'E to 32°51'S 152°42'E, prawn trawl, sandy mud, 585–594 m, 7 May 1971, FRV *Kapala*, stn K71-09-01; 1 female, cl. 46.5 mm, AM P44757, east of Budgewoi, 33°11'S 152°25'E, beam trawl, 722–768 m, 12 April 1989, FRV *Kapala*, stn K89-06-05; 1 male, cl. 36.5 mm, AM P39743, east of Broken Bay, 33°34'S 152°05'E to 33°38'S 152°01'E, beam trawl, 814–832 m, 25 September 1984, FRV *Kapala*, stn K84-16-05.

Remarks. There are two rostral spines and, immediately below, a single small conical tooth projecting from the frontal wall of the carapace. The frontal border of the carapace is convex with 3 or 4 spines and several spinules on either side of the rostral spines. The 39.7 mm male (AM P17910) has 6 or 7 irregularly spaced spines on the frontal border. The orbital notch is subtriangular, the inner and outer borders confluent with the frontal margin, and a small sharp spine overhangs the inner border anteriorly.

The spinal formula of the lateral edges of the carapace is 7–9:3–5:13–16. In nearly all specimens there is some variation between the left and right margins. The spines of the mid-dorsal carina of the carapace (excluding rostral spines) vary from three single followed by two paired spines (1,1,1,2,2) to 1,1,1,2,1 to 1,1,2,2 to 1,1,2,1 before the cervical groove and two paired spines behind it. The posterior border of the carapace has several antorse spines (one large and several smaller) on each side of the mid-dorsal carina.

The mid-gastric and branchial regions of the carapace bear scattered spines, spinules and granules which are not evident in Bate's figure. Sund (1920) remarked that in the *Challenger* material there was only one spine on the gastric region and none on the branchial regions. Whereas the *Challenger* specimens had only a single spine on the antero-external angle of the basal segment of the antennular peduncle, the present specimens have a small spinule as well as a spine. In one specimen (40 mm male, QM W11464) the spinule is bifid.

Distribution. Western Pacific Ocean: eastern Australia, Kermadec Islands, Fiji; 229–1152 m.

Polycheles granulatus Faxon

Figs 4,5

Polycheles granulatus Faxon, 1893: 197.–Faxon, 1895: 123, pl. 32 fig. 1, pl. 33 figs 2,2a.–Rathbun, 1906: 899, fig. 54.–Selbie, 1914: 23, pl. 3.–de Man, 1916: 5 (list).–Bouvier, 1917: 45, pl. 2 figs 7–14.–Barnard, 1950: 569.–Bernard, 1953: 86.–Zariquiey, 1968: 210.–Firth & Pequegnat, 1971: 40 (key), 47.–Wenner, 1979: 443.–Kensley, 1981: 29.
Pentacheles Beaumontii Alcock, 1894a: 236.–Alcock, 1901: 175.

Pentacheles beaumontii.–Alcock, 1894b: pl. 8 fig. 3.
? *Polycheles granulatus*.–Balss, 1925: 200.

Material examined. Two females, cl. 24.5 and 32.5 mm, AM P44910, Lord Howe Rise, western Tasman Sea, 28°05.76'S 163°06.04'E, beam trawl, coarse ooze and pumice, 1051 m, J.K. Lowry & party on RV *Franklin*, 5 May 1989, stn FR0589-25; 2 males, cl. 17.5 and 19 mm, AM P44909, Lord Howe Rise, western Tasman Sea, 28°44.08'S 161°54.59'E, beam trawl, pale grey ooze, 1325 m, J.K. Lowry & party on RV *Franklin*, 4 May 1989, stn FR0589-22; 4 females, cl. 23.5, 25.5, 30 and 39 mm, 2 ovigerous females, cl. 53 and 59.5 mm, 3 males, cl. 30, 32.5 and 39 mm, AM P44910, east of Diamond Head, 31°46'S 153°18'E to 31°46'S 153°19'E, 1005–1240 m, 21 June 1988, FRV *Kapala*, stn K88-12-03; 1 ovigerous female, cl. 50.5 mm, AM P44904, east of Crowdy Head, 31°56'S 153°08'E to 31°52'S 153°16'E, 485–925 m, 9 December 1987, FRV *Kapala*, stn K87-24-05; 2 ovigerous females, cl. 46.5 and 45.5 mm, 2 males, cl. 31.5 and 42 mm, AM P39721, east of Black Head, 32°01'S 153°10'E, 915–997 m, 15 June 1989, FRV *Kapala*, stn K89-12-05; 5 males, cl. 25, 36.5, 37.5, 45.5 and 46.5 mm, AM P39726, east of Black Head, 32°04'S 153°10'E, 1034–1079 m, 15 June 1989, FRV *Kapala*, stn K89-12-04; 1 ovigerous female, cl. 55.5 mm, AM P44907, east of Crowdy Head, 32°05'S 153°08'E to 32°02'S

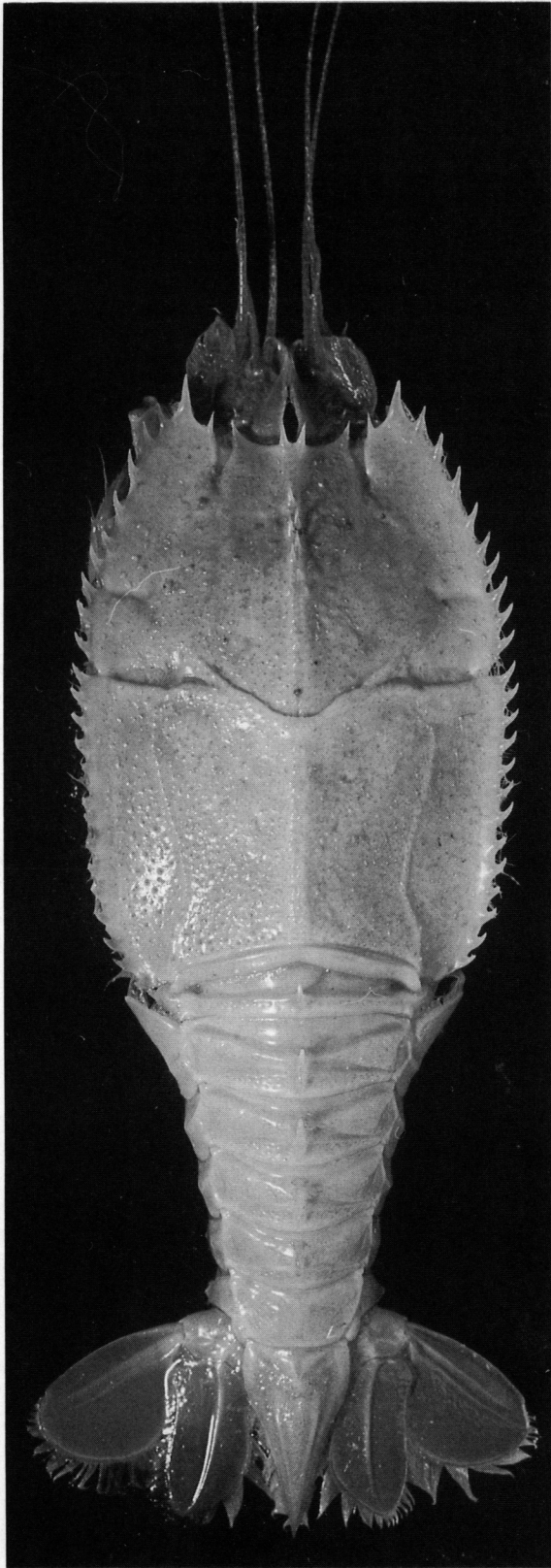


Fig. 4. *Polychelès granulatus* Faxon, male, cl. 32 mm, AM P25047, dorsal view.

153°10'E, 1025 m, 21 June 1988, FRV *Kapala*, stn K88-12-02; 2 females, cl. 52.5 and 62.5 mm, 1 male, cl. 49.5 mm, AM P44905, east of Cape Hawke, 32°06'S 153°08'E to 32°02'S 153°09'E, 1025–1080 m, 4 May 1988, FRV *Kapala*, stn K88-08-04; 3 females, cl. 41.5, 42.5 and 49.5 mm, AM P39724, east of Cape Hawke, 32°06'S 153°08'E to 32°02'S 153°09'E, 942–978 m, 2 November 1983, FRV *Kapala*, stn K83-15-02; 1 female, cl. 51.2 mm, 1 male, cl. 44.5 mm, AM P39719, east of Cape Hawke, 32°08'S 153°09'E to 32°04'S 153°10'E, 1066–1052 m, 18 July 1984, FRV *Kapala*, stn K84-10-04; 1 female, cl. 50.5 mm, 1 male, cl. 41.5 mm, AM P44906, south-east of Crowdy Head, 32°09'S 153°09'E to 32°05'S 153°09'E, 1066–1100 m, 21 June 1988, FRV *Kapala*, stn K88-12-01; 1 male, cl. 41.5 mm, AM P44901, east of Port Stephens, 32°43'S 152°51'E to 32°35'S 152°51'E, 914 m, 18 October 1983, FRV *Kapala*, stn K83-13-03; 1 female, cl. 49 mm, 1 male, cl. 39 mm, AM P39723, north-east of Newcastle, 32°50'S 152°48'E to 32°48'S 152°48'E, 945–990 m, 16 August 1988, FRV *Kapala*, stn K88-16-03; 3 males, cl. 31.5, 37 and 45 mm, AM P39720, north-east of Newcastle, 32°50'S 152°50'E, 1066–1052 m, 8 June 1989, FRV *Kapala*, stn K89-11-02; 1 female, cl. 40 mm, 3 males, cl. 24, 31.5 and 40.5 mm, AM P39722, north-east of Newcastle, 32°50'S 152°50'E, 1079–1097 m, 8 June 1989, FRV *Kapala*, stn K89-11-01; 1 ovigerous female, cl. 44.5 mm, AM P44902, east of Newcastle, 32°57'S 152°44'E to 32°54'S 152°46'E, 540–565 m, 19 October 1983, FRV *Kapala*, stn K83-13-04; 2 females, cl. 46 and 48 mm, 1 ovigerous female, cl. 51.5 mm, AM P39731, east of Newcastle, 32°59'S 152°42'E to 32°54'S 152°44'E, 988–960 m, 18 October 1983, FRV *Kapala*, stn K83-13-02; 1 ovigerous female, cl. 50.5 mm, 4 males, cl. 28, 38.5, 41.5 and 45.5 mm, AM P39725, east of Newcastle, 33°02'S 152°38'E, 896–960 m, 16 May 1989, FRV *Kapala*, stn K89-09-01; 4 females, cl. 23.5, 30, 46.5 and 47 mm, 1 ovigerous female, cl. 49 mm, 2 males, cl. 22 and 32.5 mm, 2 juveniles, cl. 17.5 and 18.5 mm, AM P44896, north-east of Broken Bay, 33°27'S 152°09'E to 33°25'S 152°11'E, 882–914 m, 8 December 1977, FRV *Kapala*, stn K77-23-13; 1 female, cl. 31 mm, AM P39729, north-east of Broken Bay, 33°28'S 152°12'E to 33°33'S 152°10'E, 1080–1135 m, 31 August 1988, FRV *Kapala*, stn K88-17-04; 1 female, cl. 52 mm, 1 male, cl. 43.5 mm, AM P44908, north-east of Broken Bay, 33°30'S 152°10'E, November 1992; 1 female, cl. 22 mm, 1 male, cl. 19 mm, AM P21062, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 822 m, 19 August 1975, FRV *Kapala*, stn K75-05-05; 1 male, cl. 24.5 mm, AM P39730, east of Broken Bay, 33°32'S 152°07'E, 732–795 m, 17 May 1989, FRV *Kapala*, stn K89-09-06; 2 females, cl. 30.5 and 32 mm, 1 ovigerous female, cl. 43.5 mm, 1 male, 41 mm, 1 juvenile, 23 mm, AM P26787, east of Broken Bay, 33°33'S 152°03'E, 905–914 m, 12 December 1977, FRV *Kapala*, no station number; 2 males, cl. 18.5 and 26 mm, 2 damaged specimens, cl. 18 and 19 mm, AM P38724, east of Broken Bay, 33°33'S 152°09'E, 1022–1051 m, 19 December 1985, FRV *Kapala*, stn K85-21-04; 1 ovigerous female, cl. 47 mm, AM P26811, east of Broken Bay, 33°35'S 152°00'E to 33°33'S 152°02'E, 823 m, 8 December 1977, FRV *Kapala*, stn K77-23-12; 1 male, cl. 32 mm, AM P25047, 1 female, cl. 19 mm, AM P25048, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 825 m, 20 December 1976, FRV *Kapala*, stn K76-24-03; 1 female, cl. 52.5 mm, AM P44898, east of Broken Bay, 33°36'S 152°06'E to 33°34'S 152°08'E, 914 m, 4 December 1979, FRV *Kapala*, stn K79-20-06; 1 female, cl. 24 mm, 1 juvenile, cl. 18 mm, AM P44899, south-east of Broken Bay, 33°39'S 152°06'E to 33°37'S 152°07'E, 990 m, 6 December 1979, FRV *Kapala*, stn K79-20-15; 1 male, cl. 18.5 mm, AM P26778,