NEW RECORDS OF *CRYPTOPODIA* (CRUSTACEA: DECAPODA: PARTHENOPIDAE) FROM AUSTRALIA

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Six species of *Cryptopodia* are recorded from northern Australian waters and an identification key is provided. Three, *C. angulata* H. Milne Edwards & Lucas, 1841, *C. dorsalis* White & Adams, 1847, and *C. pan* Laurie, 1906, are new to the Australian fauna and represent large range extensions. The known range of *C. queenslandi* Rathbun, 1918, is extended, and allometric growth is noted for this species. Dorsal and ventral photographs, and figures of the male first gonopods, are provided for all six species. ☐ *Crustacea, Brachyura, Parthenopidae, Cryptopodia, Indo-West Pacific, Australia.*

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Collections on which the current study is based were largely provided by two surveys undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), off North West Shelf, north-western Australia aboard the R.V. *Soela*, and in the Gulf of Carpentaria, using the R.V. *Southern Surveyor*. These have been supplemented by additional material in the Queensland and Northern Territory Museum collections. The North West Shelf was investigated using a beam trawl and epibenthic sledge, and the results of the analysis of the structure of the decapod community have been reported by Ward & Rainer (1988).

There has been relatively little work on the Indo-West Pacific Parthenopidae, with Flipse (1930) still being the single most important reference. Miers (1879), Haswell (1879), and Campbell & Stephenson (1970), have made the most significant contributions to our knowledge of the Australian fauna. Very little is known of the rich group of tropical parthenopid species.

Abbreviations used in the text are: c.b., carapace breadth; c.l., carapace length; G1, first male gonopod; NHM, The Natural History Museum, London; NTM, Northern Territory Museum, Darwin; QLD, Queensland, Australia; QM, Queensland Museum, Brisbane. Measurements given in the text are of the carapace breadth (measured at the widest point) followed by length.

SYSTEMATICS

KEY TO AUSTRALIAN SPECIES OF *CRYPTOPODIA*

1. Carapace with cardio-intestinal region relatively flat, and laterally demarcated by long, narrow, very deep grooves so as to appear lyre-shaped . . . . . *C. dorsalis* White & Adams, 1847
   Cardio-intestinal region separated by broad shallow depressions; cardiac region more-or-less elevated 2
2. Carapace with margins strongly serrated and spinous . . . . . .*C. angulata* H. Milne Edwards & Lucas, 1841
   Carapace sometimes with anterolateral margins moderately spinous, but posterior margin at most crenellated 3
3. Third maxilliped noticeably swollen, with conspicuous, broad, flattened granules on inner margin of ischium which may extend over the entire outer surface . . . . . *C. pan* Laurie, 1906
   Third maxilliped not swollen 4
4. Carapace surface relatively smooth except for slightly granular crests; shallow gastric depression centrally; presence of closed fissures radiating in from margins visible dorsally . . . . . *C. queenslandi* Rathbun, 1918
   Carapace surface more-or-less coarsely granulated and pitted; deep gastric depression centrally; marginal closed fissures not obvious dorsally 5
5. Carapace with margins of rostrum subparallel over proximal half; branchial, cardiac, and gastric regions strongly inflated . . . . . *C. fistulosa* Chiong & Ng, 1994

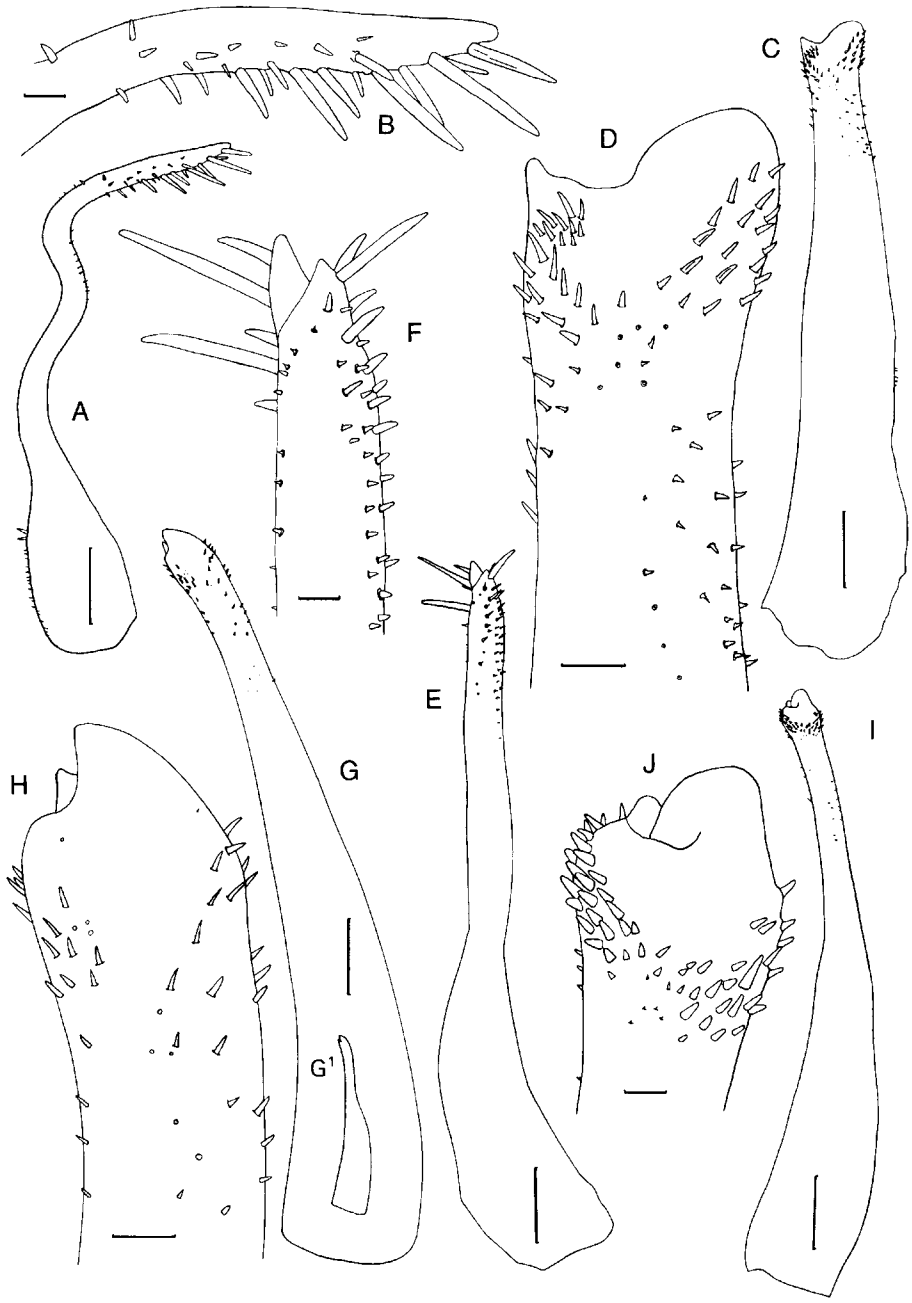

FIG. 1. Male first gonopods of *Cryptopodia* species, showing entire view and magnified view of apex. A, B, *C. pan* (QMW18473). C, D, *C. queenslandi* (QMW18981). E, F, *C. angulata* (QMW18306). G, G^1 (rotated view). H, *C. fistulosa* (QMW18980). I, J, *C. dorsalis* (QMW18291). Scale line: A, C, E, G=0.05mm. D, B, F, H, J=0.01mm; I=0.10mm.

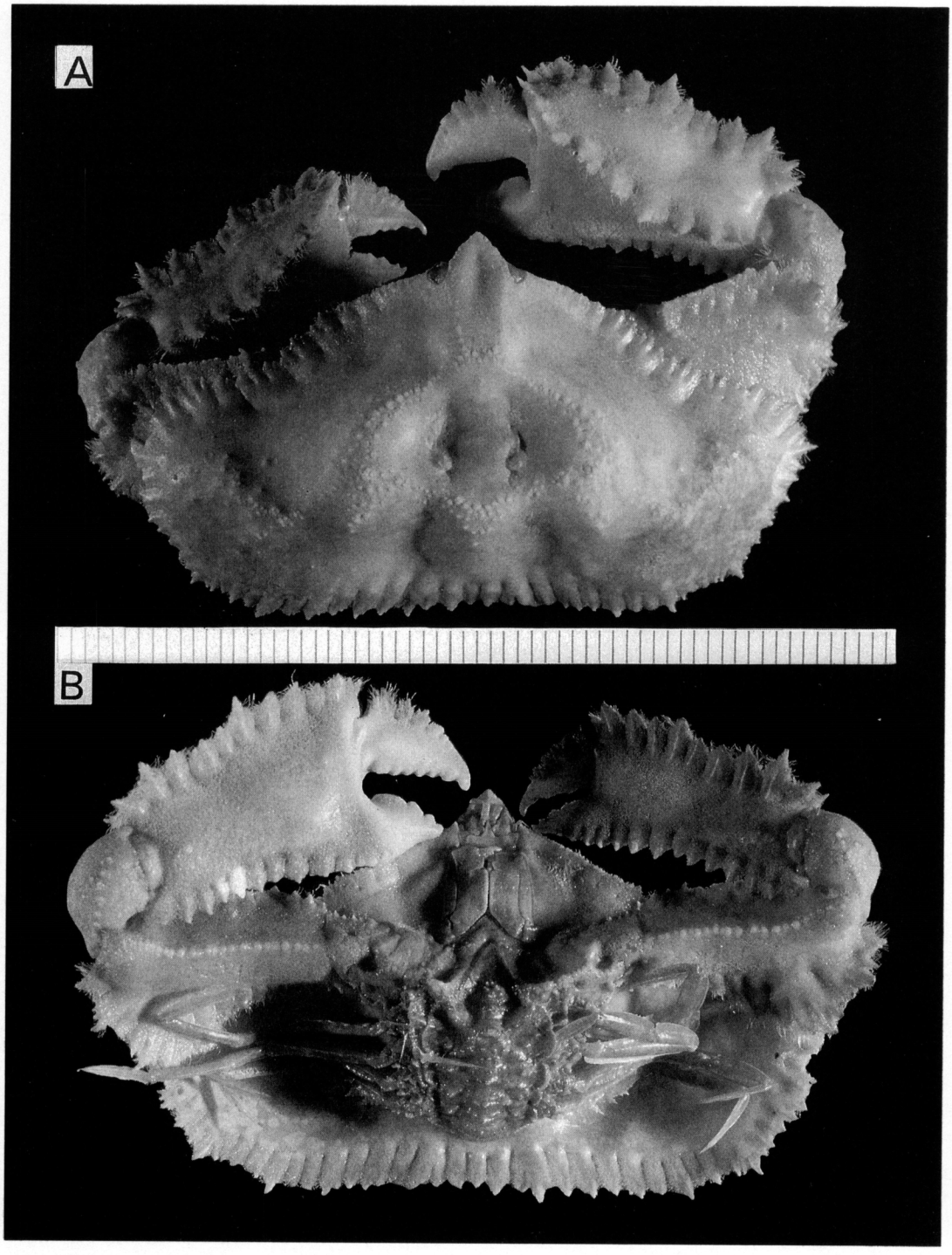

FIG. 2. *Cryptopodia angulata* H. Milne Edwards & Lucas, 1841 (QMW18299). A, dorsal view. B, ventral view. Scale line in mm.

Carapace with margins of rostrum tapering from the base; branchial, cardiac, and gastric regions not strongly inflated . . . . . *C. spatulifrons* Miers, 1879

Cryptopodia angulata
H. Milne Edwards & Lucas, 1841
(Figs 1E, F; 2A, B)

Cryptopodia angulata H. Milne Edwards & Lucas, 1841: 481, pl. 28, figs 16-19; Alcock, 1895: 282; Chopra, 1935: 473; Chhapgar, 1957: 415, pl. 4; Ahmad et al., 1973: 15 (listed); Tirmizi, 1980: 107 (listed); Tirmizi & Kazmi, 1983: 369 (listed); 1991: 211-213; Banu & Nurul Hudu, 1989: 646-647.

Cryptopodia angulata var. *cippifer* Alcock 1895: 283; Flipse, 1930: 62, 82.

MATERIAL EXAMINED

CSIRO, F.R.V. *Southern Surveyor*, Gulf of Carpentaria: QMW18305, ♂ (34.2 x 20.2mm), 13°02'S, 139°22.2'E, Stn 36, 58m, 24.11.1991. QMW18306, ♂ (21.9 x 14.1mm), 13°25.6'S, 138°36.0'E, Stn 34, 54m, 24.11.1991. QMW18298, ♀ (38.2 x 22.2mm), 14°00.7'S, 139°11.6'E, Stn 35, 59m, 28.11.1990. QMW18299, ♂ (37.1 x 22.8mm), ♀ (54.6 x 30.2mm), 13°28.9'S, 139°11.9'E, Stn 34, 57m, 28.11.1990. QMW17334, ♂ (37.8mm c.b., rostrum damaged), 14°27.4'S, 138°11.9'E, Stn 20, 52m, 25.11.1990.

OTHER MATERIAL: NTM Cr000902, 2♀ (37.3 x 22.1, 51.5 x 28.2mm), Arafura Sea, 12°58.0'S, 132°10.0E, Stn HL, 81-82, 27m, 19.10.81, R.V. *Gemini*.

REMARKS

The present study greatly extends the previously known range of *C. angulata*. Specimens collected from the Gulf of Carpentaria, apart from a few minor differences, correspond closely with the descriptions of Milne Edwards & Lucas (1841) and Alcock (1895). The triangular gastric depression, noted by Alcock (1895) as being 'very deep', appears to be variable in depth: in our specimens it is moderately deep, but Chopra (1935) found it to vary from more or less shallow to quite deep. On our specimens the border of this depression had, in most cases, a tubercle at each branchial angle and, less frequently, two small tubercles side by side on the anterior angle of the depression. No tubercles were present on the summit of the cardiac region. Chopra (1935) and Tirmizi & Kazmi (1991) found this tuberculation to be variable, with one small individual examined by Chopra bearing small spines instead of tubercles. However, none of the specimens examined by Chopra (1935), Tirmizi & Kazmi (1991), nor ourselves had 'large, erect definitely-placed spines', as described by Alcock (1895), for *C. angulata* var. *cippifer*.

Alcock described the rostrum as ending in a sharp point; the rostra of the specimens detailed herein are dome-shaped and end in a relatively blunt point. A dome-shaped rostrum was found in a male specimen by Tirmizi & Kazmi (1991).

Alcock (1895) pointed to the presence of spines on the meri of the ambulatory legs. This spination is present on our specimens but only on the first and last pair of legs. Tirmizi & Kazmi (1991) described an identical pattern of spination to that in our specimens.

Granulation on the carpus of the chelipeds was variable among the specimens examined by Chopra (1935), but showed little variation among the specimens of Tirmizi & Kazmi (1991). Most of Chopra's (1935) specimens were either smooth or slightly granular, as described for *C. angulata* var. *cippifer*, by Alcock (1895). Alcock's (1895) comparison of *C. angulata* and its variety suggests that there was no granulation on the carpi of the chelipeds of his specimens of *C. angulata*. The diagram of Tirmizi & Kazmi (1991) shows more granular carpi than those of either Chopra's (1935), or our specimens. Banu & Nurul Huda (1988) reported the presence of a granular carpus for a specimen collected off Penang Island, Malaysia, whereas a number of specimens collected by the same authors from the Chittagong Coast bordering Bangladesh possessed smooth carpi. There is only a small amount of carpal granulation among our specimens. Granulation is more evident on the ventral surface of the carpus. On two of our specimens, a male and a female, there is a small, sharp, subdistal, median spine on the upper surface of the carpus. This replaces a small tubercle in the other specimens. No mention of this character is made by other authors for *C. angulata*.

The status of *Cryptopodia angulata* var. *cippifer* Alcock, 1895, is still uncertain. The other character used by Alcock (1895) to separate *C. angulata* var. *cippifer* from *C. angulata*, is the presence of prominent spines surrounding the central depression. Evidence from Chopra (1935), Tirmizi & Kazmi (1991), and this study, suggests a degree of intraspecific variation that may encompass most of the characteristics described by Alcock (1895) for *C. angulata* var. *cippifer*. It is probable that *C. angulata* var. *cippifer* is a junior synonym of *C. angulata*, but examination of Alcock's type specimens along with a large series of specimens from across the range

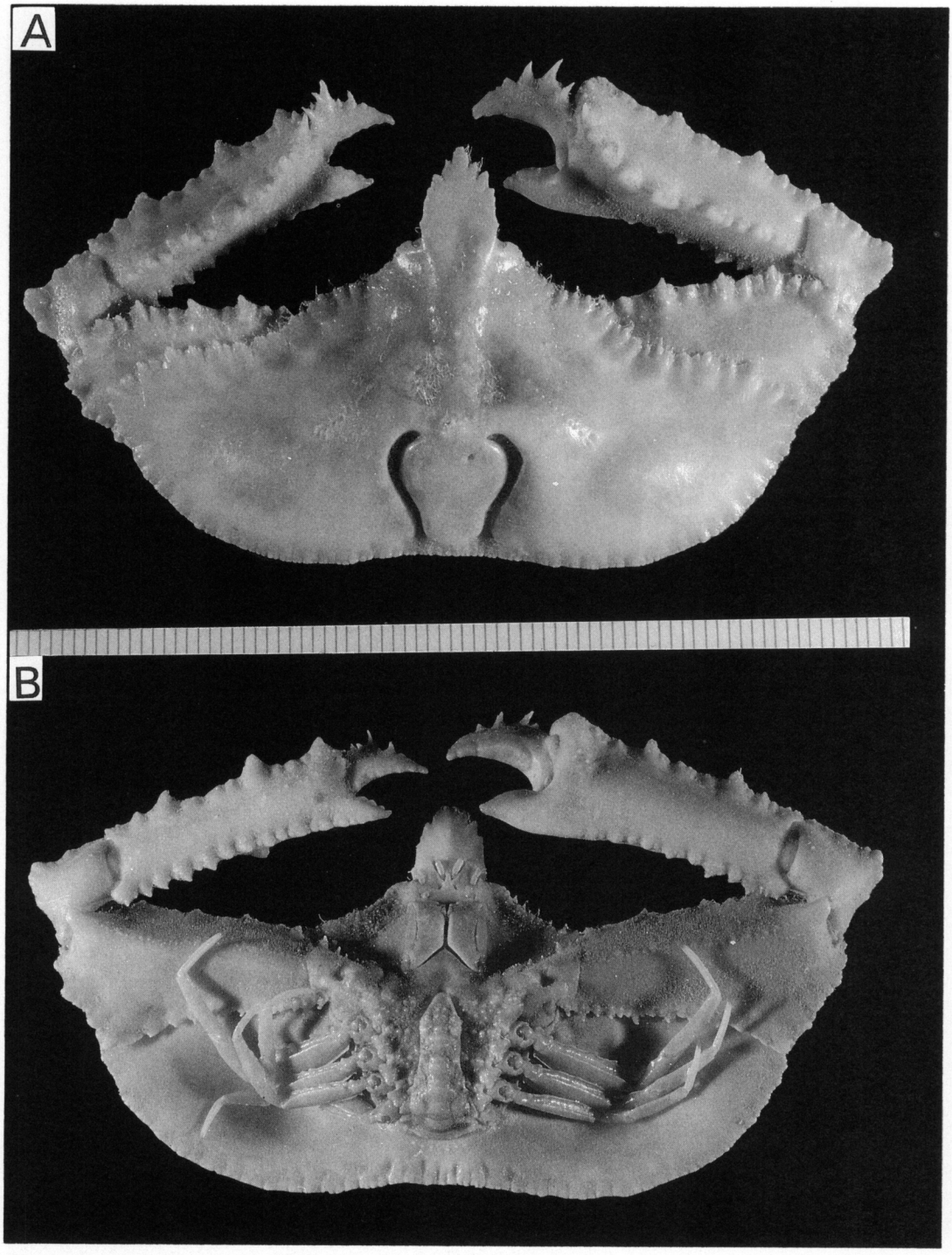

FIG. 3. *Cryptopodia dorsalis* White & Adams, 1847 (QMW18297). A, dorsal view. B, ventral view. Scale line in mm.

FIG. 4. *Cryptopodia pan* Laurie, 1906 (QMW18461). A, dorsal view. B, ventral view. Scale line in mm.

of occurrence of *C. angulata* is required for final certainty.

DISTRIBUTION

C. angulata: Type locality unknown; Karachi; west coast of India; Malabar Coast, Orissa Coast, Sandheads at mouth of Hugli River, India; Ceylon; Malaysia; and now northern Australia, from the Arafura Sea to the Gulf of Carpentaria. *C. angulata* var. *cippifer* is only known from Karachi, Pakistan (type locality). Bathymetric range: 52 to 59m.

Cryptopodia dorsalis
White & Adams, 1847 (in White, 1847)
(Figs 1 I, J; 3A, B)

Cryptopodia dorsalis White & Adams, 1847, in White, 1847a: 125 [nomen nudum]; 1847b: 84; White, 1847c: 205; Adams & White, 1848: 30, pl. 6, fig. 5; Flipse, 1930: 63, 82.

MATERIAL EXAMINED

CSIRO, R.V. *Soela*, North West Shelf: QMW18290, ♂ (62.3 x 35.3mm), 19°29.6'S, 118°52.2'E, Stn 05D03BT, 40m, 25.10.1983. QMW18291, ♂ (64.5 x 35.8mm), 19°58.6'S, 117°49.4'E, Stn 03D09BT, 43m, 26.06.1983. QMW18292, ♂ (17.1 x 11.4mm), 19°56.8'S, 117°53.5'E, Stn 03B02BT, 44m, 25.06.1983. QMW18293, ♂ (16.2 x 10.6mm), 19°45.7'S, 117°52.0'E, Stn 01B13BT, 54m, 20.02.1983. QMW18294, ♂ (20.8mm c.l., lateral margin broken), 19°03.6'S, 119°03.4'E, Stn 05B12BT, 82m, 23.10.1983. QMW18295, ♂ (25.1 x 15.5mm), 19°59.2'S, 117°03.6'E, Stn 04B18BT, 52m, 05.09.1983. QMW18296, ♂ (11.4 x 8.0mm), 19°30.8'S, 118°49.1'E, Stn 03B07S, 37-38m, 28.06.1983. QMW18478, ♂ (11.3 x 7.8mm), ♀ (16.0 x 11.6mm), 19°30.6'S, 118°49.4'E, Stn 03B07BT, 37-38m, 28.06.1983. QMW18552, ♂ (14.7mm c.l., lateral margin damaged), 19°30.8'S, 118°49.3'E, Stn 04B07BT, 38-39m, 30.08.1983. QMW18289, 2♂ (62.3 x 35.8, 22.4 x 16.4mm), 19°55.5'S, 117°55.5'E, Stn 02B03BT, 42m, 22.04.1983. QMW18288, ♂ (18.0 x 11.5mm), 19°54.6'S, 117°56'E, Stn 01B03S, 44m, 18.02.1983. QMW18287, ♀ (73.6mm c.b., rostrum broken), 19°55.9'S, 117°55.5'E, Stn 03B03BT, 42-43m, 26.06.1983.

OTHER MATERIAL: QMW18297, ♂ (61.1 x 35.3mm), Arafura Sea, 12°15.6'S, 129°15'E, Stn 508, 29m, 17.11.1989, Bureau Rural Resources. QMW12771, ♂ (76.3 x 42.4mm), N. of Cape Bowling Green, 19°08.9'S, 147°23.3'E, 09.05.1985, C. Jones, Qld. Fisheries Service.

REMARKS

The authorship of this species has been attributed to Adams & White, 1847, by Flipse (1930) in his major revision of the Parthenopidae; however the first valid citation in White (1847b) puts the authorship as White & Adams (the very first mention of the name occurred in White (1847a) but was a nomen nudum). This species was listed as new in four separate publications, and there is some difficulty in being certain which of the two descriptions that appeared in 1847 has nomenclatural priority. Apparently the first to appear was the article in the 1847 *Proceedings of the Zoological Society of London*. This volume, according to the date stamp of the British Museum Library, was not available until July, 1848, but according to Sclater (1893) the journal was published in separate sheets prior to binding, and White's article on pp. 84-86, appears with sheet cixxv which was delivered from the printers to the Zoological Society on 20 July 1847. White (1847c), as cited here, was date stamped "47.9.22.5" by the British Museum Library and therefore was available only later in September, 1847. There could be some dispute as to whether the earlier published work was distributed, and thus available, prior to the second that appeared in September, but this will probably never be known, and thus I choose to cite the publications in order of their known printing dates. *Cryptopodia dorsalis* is also described in Adams & White's 1848 report of the 'Voyage of the *Samarang*', and in this, authorship is reversed and given as Adams & White.

The distribution of *C. dorsalis* suggests that it is common throughout the waters of northern Australia and the Indonesian Archipelago. There is little doubt as to the correct identification of this species, given the presence of two deep, lyre-shaped grooves which border the lateral edges of the cardiac region, a character unique to *C. dorsalis*.

DISTRIBUTION

Sulu Sea (type locality); northern Australia, from the North West Shelf, Arafura Sea, and north of Cape Bowling Green (Townsville). Bathymetric range: 29 to 82m.

Cryptopodia pan Laurie, 1906
(Figs 1A, B; 4A, B)

Cryptopodia pan Laurie, 1906: 392, fig. 4, pl. 1, fig. 6; Rathbun, 1911: 259; Flipse, 1930: 63, 78, 82; Tan & Richer de Forges, 1993: 131, figs 6E, F.

MATERIAL EXAMINED

CSIRO, R.V. *Soela*, North West Shelf: QMW18474, 2♀ (10.1 x 7.9; 10.6 x 8.0mm), 20°00.2'S, 117°00.5'E, Stn 01B17BT, 53m, 22.02.1983. QMW18476, ♂

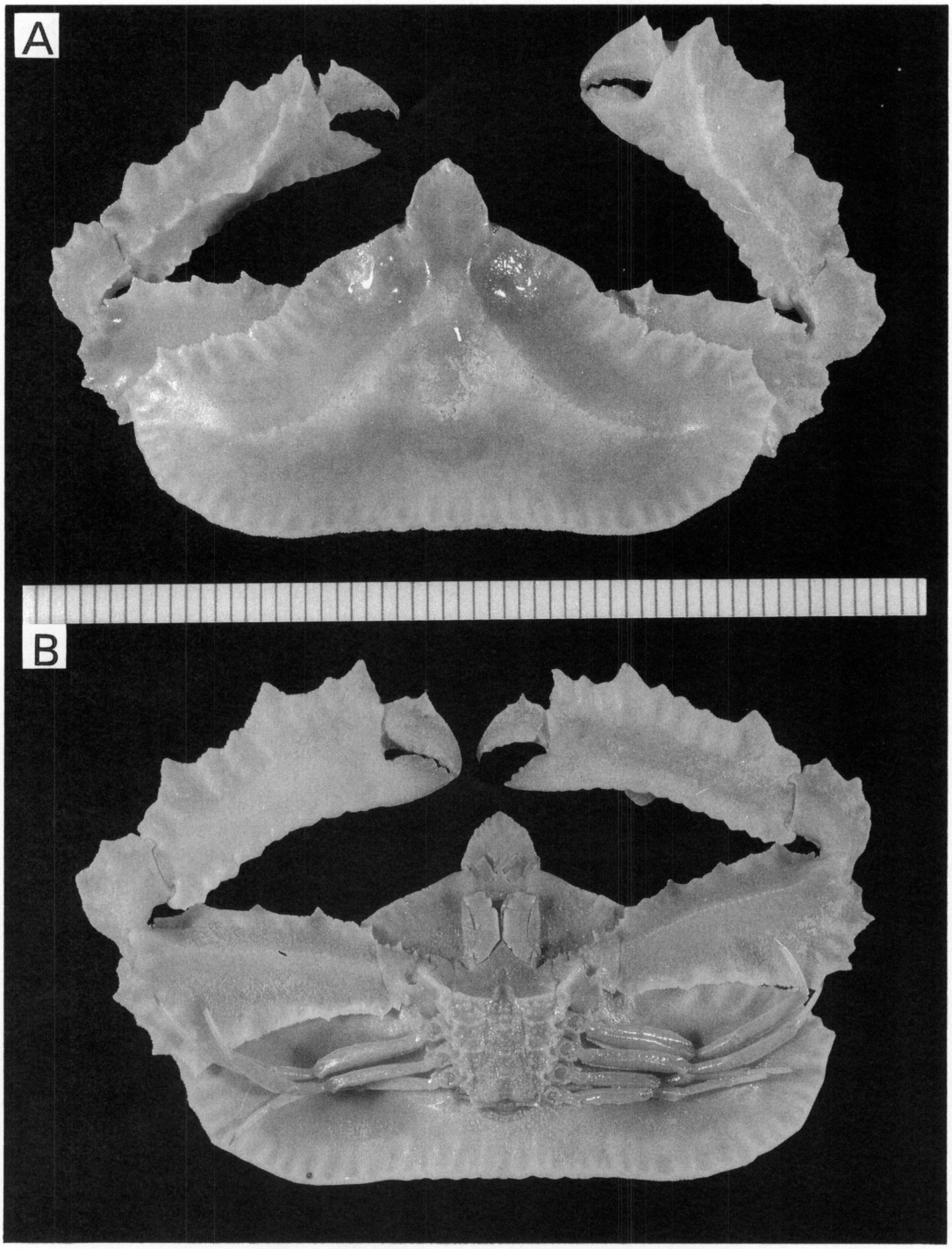

FIG. 5. *Cryptopodia queenslandi* Rathbun, 1918 (QMW18309). A, dorsal view. B, ventral view. Scale line in mm.

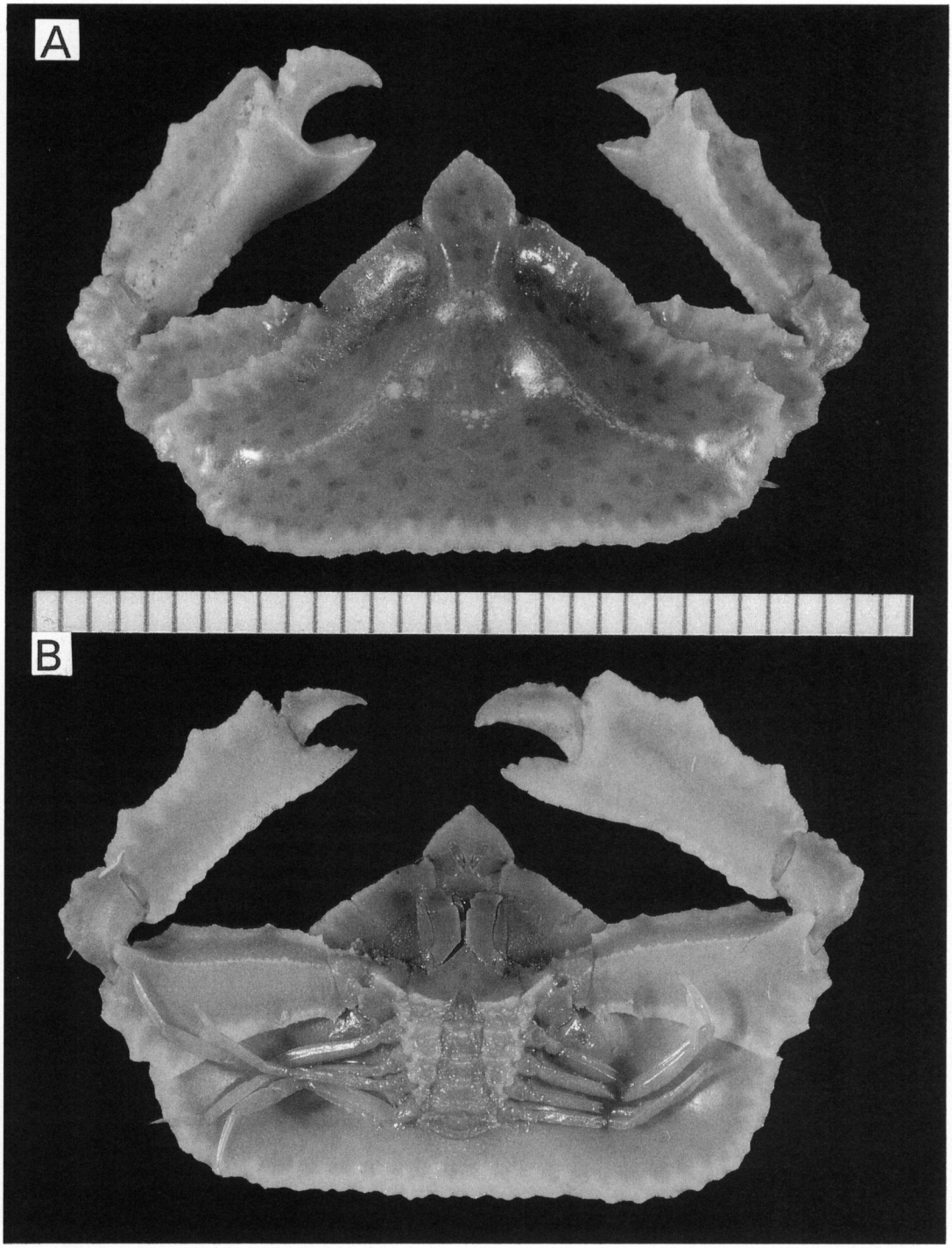

FIG. 6. *Cryptopodia queenslandi* Rathbun, 1918, spotted variant (QMW18981): A, dorsal view. B, ventral view. Scale line in mm.

(14.2mm c.b., rostrum damaged), 19°03.6'S, 119°00.6'E, Stn 01B11BT, 81m, 13.02.1983. QMW18464, ♂ (23.8mm c.b., rostrum damaged), 19°57.9'S, 117°49.3'E, Stn 03D07BT, 40m, 26.06.1983. QMW18465, ♂ (15.5 x 11.7mm), 19°03.2'S, 119°02'E, Stn 06B12TN, 78-80m, 11.12.1982. QMW18466, ♀ (14.6 x 11.1mm), 19°29.4'S, 118°51.5'E, Stn 05D07BT, 40m, 25.10.1983. QMW18467, ♂ (22.1 x 15.1mm), 19°04.6'S, 118°57.9'E, Stn 03B10BT, 81-82m, 30.06.1983. QMW18468, ♂ (15.1 x 11.0mm), 19°30'S, 118°52'E, Stn 05D05S, 36-37m, 25.10.1983. QMW18469, 2♂ (22.3 x 15.3; 10.2 x 8.1mm), 20°00.4'S, 117°00.4'E, Stn 04B17BT, 52m, 04.09.1983. QMW18470, ♀ (14.8 x 10.8mm), 19°05.3'S, 118°54.0'E, Stn 03B04BT, 82m, 29.06.1983. QMW18471, ♀ (12.7 x 10.7mm), 18°59.1'S, 118°45.9'E, Stn 06B05TN, 84m, 07.12.1982. QMW18472, 1 juv. (7.1 x 6.6mm), 19°42.0'S, 117°57'E, Stn 01B15S, 56m, 20.02.1983. QMW18473, ♂ (23.4 x 16.6mm), 19°24.8'S, 118°57.6'E, Stn 06B08TN, 47-48m, 08.12.1982. QMW18475, ♀ (13.1mm c.l., lateral margin damaged), 19°59.1'S, 117°51.6'E, Stn 04B01BT, 42m, 27.08.1983. QMW18463, ♀ (carapace damaged), 19°56.7'S, 117°53.6'E, Stn 05B02BT, 40m, 26.10.1983. QMW18462, ♂ (21.0 x 14.2mm), 19°04.9'S, 118°50.6'E, Stn 05B05BT, 81m, 30.10.1983. QMW18461, ♂ (13.8 x 10.2mm), ♀ (17.1 x 12.7mm), 19°05'S, 118°50.5'E, Stn 03B05BT, 83-84m, 29.06.1983.

Remarks

This study, and that of Tan & Richer de Forges (1993), greatly extends the known distribution of this species. Our specimens agree closely with the description of Laurie (1906). In many specimens, the exposed surface of the ischium of the third maxilliped is completely covered in large, squamous granules, and in a few specimens, the granules are more or less coalesed over the outer two-thirds. This differs from Laurie's (1906) type description, where he said that only the inner third of the ischium is covered in such granules.

Distribution

Sri Lanka (type locality); northern Australia, from the North West Shelf; New Caledonia. Bathymetric range: 28 to 84m.

Cryptopodia queenslandi Rathbun, 1918
(Figs 1C, D; 5A, B; 6A, B, 7A, B)

Cryptopodia fornicata: Haswell, 1879: 454, 1882: 37 [not *C. fornicata* (Fabricius, 1781)].
Cryptopodia Queenslandi Rathbun 1918: 26, pl. 12.
Cryptopodia fornicata var. *Queenslandi*: Flipse, 1930: 65-66, 78, 82.

Material Examined

CSIRO, R.V. *Soela*, North West Shelf: QMW18322, ♀ (22.8 x 15.7mm), 19°29.8'S, 118°52.3'E, Stn 05D08BT, 37-38m, 25.10.1983. QMW18323, ♂ (17.1 x 11.2mm), 19°29.4'S, 118°52.1'E, Stn 02B08BT, 38-39m, 26.04.1983. QMW18324, 3♂ (16.0 x 10.9 - 24.3 x 15.7mm), 3♀ (16.8 x 11.0 - 30.6 x 20.1mm), 19°30.8'S, 118°49.3'E, Stn 04B07BT, 38-39m, 30.08.1983. QMW18325, ♂ (24.5 x 15.5mm), 19°28.4'S, 118°55.2'E, Stn 04B09BT, 39m, 31.08.1983. QMW18326, ♂ (17.4 x 11.4mm), 2♀ (18.1 x 11.7; 13.0 x 8.7mm), 19°30.6'S, 118°49.4'E, Stn 03B07BT, 37-38m, 28.06.1983. QMW18327, 4♂ (22.5 x 14.7 - 37.6 x 22.7mm), 2♀ (37.3 x 23.6; 40.8 x 24.6mm), 19°29.4'S, 118°52.4'E, Stn 05D02BT, 37-38m, 24.10.1983. QMW18328, 2♂ (33.5 x 20.6; 33.5 x 20.3mm), 2♀ (22.5 x 14.7; 20.7 x 13.7mm), 19°29.5'S, 118°52.2'E, Stn 05D01BT, 37m, 24.10.1983. QMW18329, 2♂ (16.4 x 11.3; 13.3 x 12.4mm), 2♀ (16.8 x 11.1; 20.2 x 12.5mm), 19°28.1'S, 118°55.2'E, Stn 03B09BT, 38-40m, 28.06.1983. QMW18330, ♀ (11.7 x 8.1mm), 19°30.9'S, 118°48.7'E, Stn 02B07BT, 39-40m, 26.04.1983. QMW18331, 4♀ (8.4mm c.l., lateral margin damaged ; 10.2 x 7.2mm ; 8.1mm c.l., lateral margin damaged; 10.8 x 7.6mm), 19°28.6'S, 118°55'E, Stn 02B09S, 38-40m, 26.04.1983. QMW18332, ♂ (7.5mm c.l., lateral margin damaged), 19°55.5'S, 117°55.5'E, Stn 02B03BT, 42m, 22.04.1983. QMW18333, 2♀ (11.4 x 7.9mm ; 11.2 x 7.9mm), 19°29.9'S, 118°52'E, Stn 02B08S, 38-39m, 26.04.1983. QMW18334, ♀ (carapace damaged), 19°58.3'S, 117°49.4'E, Stn 03D01S, 43m, 25.06.1983. QMW18335, 3 juveniles (3.1 x 2.6 - 5.1 x 4.9mm), 19°29.3'S, 118°52.6'E, Stn 01B08RevS, 36m, 15.02.1983. QMW18336, 1 juvenile (5.1 x 4.5mm), 19°58.9'S, 117°51.7'E, Stn 04B01S, 42m, 27.08.1983. QMW18337, ♀ (8.2 x 6.0mm), 19°58.1'S, 117°49.2'E, Stn 03D07S, 40m, 26.06.1983. QMW18338, 2 juveniles (4.9 x 4.0; 3.3 x 3.0mm), 19°29'S, 118°53.5'E, Stn 01B08S, 40m, 12.02.1983. QMW18312, 3♂ (7.8 x 6.0 - 26.4 x 16.7mm), 5♀ (10.0 x 7.1 - 24.3 x 15.1mm), 19°30.9'S, 118°48.7'E, Stn 02B07BT, 39-40m, 26.04.1983. QMW18313, ♀ (32.0 x 20.6mm), 19°53.1'S, 118°03.9'E, Stn 06B01S, 36-38m, 05.12.1982. QMW18314, 2♂ (20.2mm c.l., lateral margin damaged; carapace damaged), 19°29.9'S, 118°52.0'E, Stn 05D01S, 37m, 24.10.1983. QMW18315, ♂ (23.1 x 15.1mm), 2♀ (26.9 x 17.4; 20.7 x 13.4mm), 19°30.9'S, 118°49.2'E, Stn 05B07BT, 38-39m, 25.10.1983. QMW18316, ♀ (16.5 x 11.9mm), 19°56.7'S, 117°53.6'E, Stn 05B02BT, 40m, 26.10.1983. QMW18317, ♂ (37.2 x 22.9mm), 2♀ (21.2 x 15.0; 22.4 x 14.4mm), 19°29.4'S, 118°52.4'E, Stn 05D09BT, 38m, 25.10.1983. QMW18318, ♂ (25.5 x 16.7mm), 19°29.6'S, 118°52.2'E, Stn 04B08BT, 38-39m, 30.08.1983. QMW18319, ♀ (16.1 x 10.9mm), 19°56.8'S, 117°53.5'E, Stn 03B02BT, 44m, 25.06.1983. QMW18320, ♀ (14.0mm c.l., lateral margin damaged), 19°55.6'S, 117°56.0'E, Stn 04B03BT, 43-44m, 26.08.1983. QMW18321, ♂ (17.5 x

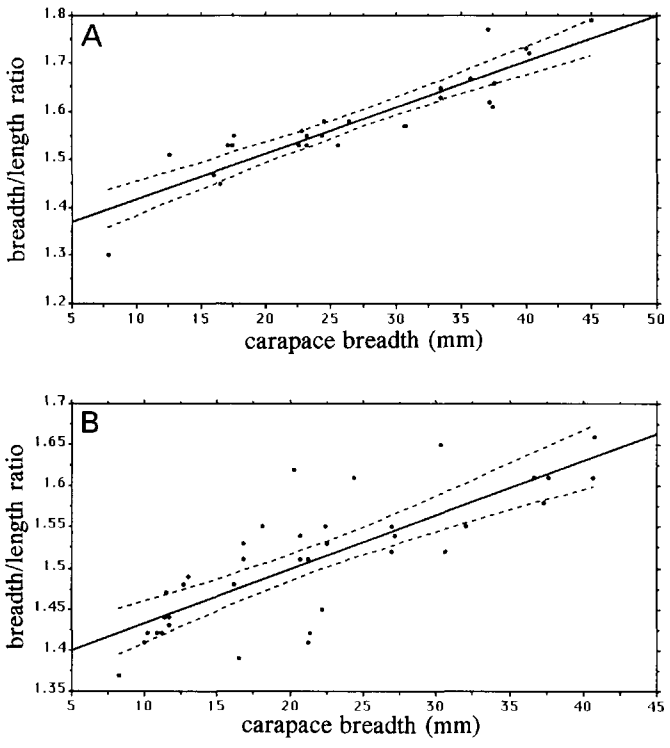

FIG. 7. Allometric growth equations for *C. queenslandi*. A, males: y=0.1x+1.32, r^2=0.82, n=27. B, females: y=0.007x+1.37, r^2=0.63, n=37. Dashed lines represent the 95% confidence interval for the true mean of y.

11.3mm), 19°30.8'S, 118°49.1'E, Stn 03B07S, 37-38m, 28.06.1983.

CSIRO, R.V. *Southern Surveyor*, Gulf of Carpentaria: QMW18307, ♂ (35.8 x 21.5mm), 13°40.1'S, 136°45.6'E, Stn 30, 22m, 23.11.1991. QMW18309, 2♂ (45.0 x 25.1; 40.3 x 23.4mm), 10°52.6'S, 136.12.1'E, Stn 12, 42m, 21.11.1991. QMW18308, ♀ (21.3 x 15.0mm), 10°57.6'S, 140°23'E, Stn 58, 54m, 29.11.1991. QMW18310, ♀ (36.7 x 22.8mm), 11°50.8'S, 136°33.9'E, Stn 4, 33m, 18.11.1991. QMW18311, 2♀ (40.7 x 25.2; 26.9 x 17.7mm), 13°02.8'S, 141°27.7'E, Stn 45, 21m, 26.11.1991. QMW18300, ♂ (26.2mm c.l., lateral margin damaged), 11°58.5'S, 140°41.4'E, Stn 63, 53m, 04.12.1991. QMW18301, ♂ (21.9mm c.l., lateral margin damaged), 10°33.4'S, 138°42.6'E, Stn 83, 53m, 09.12.1991. QMW18302, ♂ (40.0 x 23.1mm), 11°09.2'S, 139°41.8'E, Stn 82, 55m, 08.12.1991. QMW18303, ♀ (37.6 x 23.4mm), 15°00.9'S, 140°12'E, Stn 43, 48m, 30.11.1990. QMW18304, 2♂ (30.8 x 19.6mm; 21.4mm c.l., lateral margin damaged), 2♀ (30.3 x 18.4; 27.2 x 17.7mm), 16°01.8'S, 140°11.9'E, Stn 41, 31m, 29.11.1990. QMW17316, ♂ (37.1 x 21.0mm), 14°27.5'S, 138°42'E, Stn 97, 52m, 12.12.1991. QM unreg., ♂ (22.8 x 14.7mm), 143°08.6'S, 11°49.9'E, Stn 007, 22m, 13.1.93.

OTHER MATERIAL: QMW1495, ♂ (48.8 x 28.5mm), Green Island, Moreton Bay, 27°26'S, 153°14'E. QMW18981, ♂ (22.8 x 14.6mm), Shelburne Bay, 11°51.9'S, 143°08.9'E, Stn 7, 22m, 13.01.1993, CSIRO, F.R.V. *Southern Surveyor*.

REMARKS

Flipse (1930) suggested that *C. queenslandi* is a variety of *C. fornicata*. However, there are differences between these two species which warrant *C. queenslandi* being recognised as a separate species from *C. fornicata*. There are significant differences in the male G1. In *C. fornicata*, the apex of the G1 is produced into two nearly symmetrical lobes (Dai & Yang, 1991: fig. 90), whereas in *C. queenslandi*, these lobes are highly asymmetrical, with one being much smaller (Fig. 1C, D). Also, in *C. fornicata*, the G1 tapers more rapidly than in *C. queenslandi*. In these respects, the G1 of our specimens are like those of Campbell & Stephenson (1970), collected from Moreton Bay, Queensland. The chelipeds of *C. fornicata* are considerably less than twice the length of the carapace (Alcock, 1895), whereas in *C. queenslandi* they are twice the length (Rathbun, 1918). On average, *C. fornicata* appears to be a larger species, with the specimens examined by Dai & Yang (1991) being 34% larger than the largest crabs (females and males) examined in this paper. Considering the large amount of material available for our study this seems significant. Rathbun's (1918) adult male holotype of *C. queenslandi* was 28% smaller than that of Dai & Yang's (1991) specimen. The only specimens of *C. queenslandi* that approach the size of Dai & Yang's (1991) specimen are those described by Flipse (1930) from Indonesia (89% for males and 95% for females); and it would be desirable in a generic revision to check the identity of his specimens.

The degree of concavity of the posterior margin seems unreliable for separating the two species. Rathbun (1918) described the posterior rim of *C. queenslandi* as concave in its middle two-fifths;

FIG. 8. *Cryptopodia fistulosa* Chiong & Ng, 1994 (paratype, QMW18980): A, dorsal view. B, ventral view. Scale line in mm.

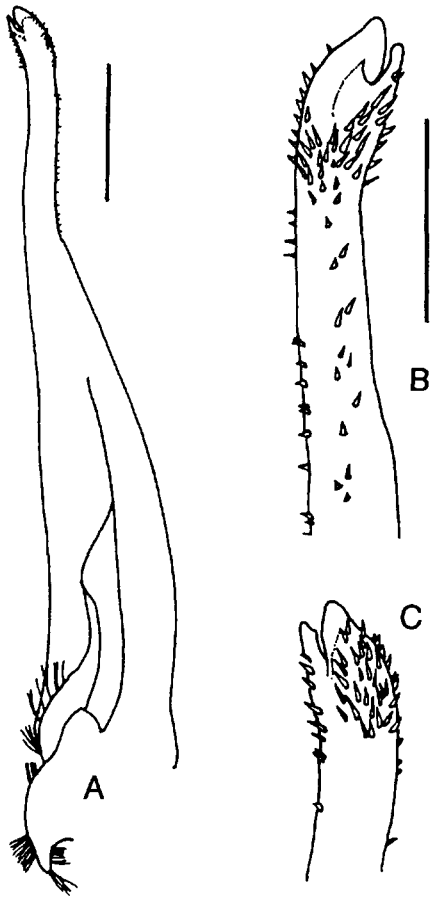

FIG. 9. *Cryptopodia spatulifrons* Miers, 1879, holotype (NHM 1858.172), male first gonopod (left), showing entire view, and magnified ventral and dorsal views.(Taken from Chiong & Ng (1994)).

whereas Flipse (1930) said it was straight or very weakly concave. However, some records have also described or figured specimens of *C. fornicata* as having a convex posterior rim that forms a continouus smooth edge with the antero-lateral margin (eg. Sakai, 1976: 292, text-fig 163, Dai & Yang, 1991).

Flipse (1930) described *C. fornicata* as being 1.5 times as wide as long, and *C. queenslandi* as being twice as wide as long. Dai & Yang (1991) described *C. fornicata* as being 1.6-1.8 times as wide as long, while the specimen examined by Rathbun (1918), a male, had a ratio of 1.8. We have plotted length against breadth for the specimens in this study (Fig. 7A, B); and there is distinct allometric growth with the length/breadth ratio ranging from 1.35 in the smallest specimens, to c. 1.8 in the largest. This is discussed further later. Therefore we disagree with Flipse (1930) that the simple breadth/length ratio is useful in separating the two species.

C. queenslandi normally has no obvious dorsal patterning, but an unusual specimen from the Gulf of Carpentaria (♂, 22.8 mm c.b., QMW18981), bears numerous spots over the entire dorsal surface (Fig. 6). Morphologically it cannot be separated. Dr P.K.L. Ng has informed us that juvenile *C. fornicata* have a striking colour pattern that is absent in adults, however while there were many smaller specimens in the present series, only the individual above showed the distinctive pattern described.

C. queenslandi appears to be restricted to waters around northern Australia and possibly Indonesia, whereas *C. fornicata*, as reported by Sakai (1976), is found in Sagami Bay, Japan; China Sea; the Phillippines; the Gulf of Thailand; Singapore; and westward to the Gulf of Mattaban; Andaman Sea; Sri Lanka; Palk Straits; and the Persian Gulf. We believe Haswell (1880) incorrectly identified *C. fornicata* from Port Denison, north Queensland, and that his specimens were most likely *C. queenslandi*.

Allometric growth: Allometric growth has been reported in the Parthenopidae previously by Gore & Scotto (1983). As we had an abundance of specimens of *C. queenslandi* we did a simple plot of length/breadth ratios. Fig. 7A, B shows the linear relationship between carapace length and breadth for male and female *C. queenslandi*, respectively. Both diagrams display statistically significant allometric growth for both sexes (r^2=0.821 (males) and r^2=0.63 (females), $p<0.05$). The correlation coefficients for both sexes are not significantly different ($p>0.05$). However, males broaden to a significantly greater extent than females with increasing size ($p<0.05$).

DISTRIBUTION

Cape Gloucester, Bowen, Queensland (type locality); Java Sea; North West Shelf; Arnhem Bay (Northern Territory); Torres Strait, Shelburne Bay and Palm Island (north Queensland); Moreton Bay (southeast Queensland); Woody Head (northern New South Wales). Bathymetric range: 21-55m.

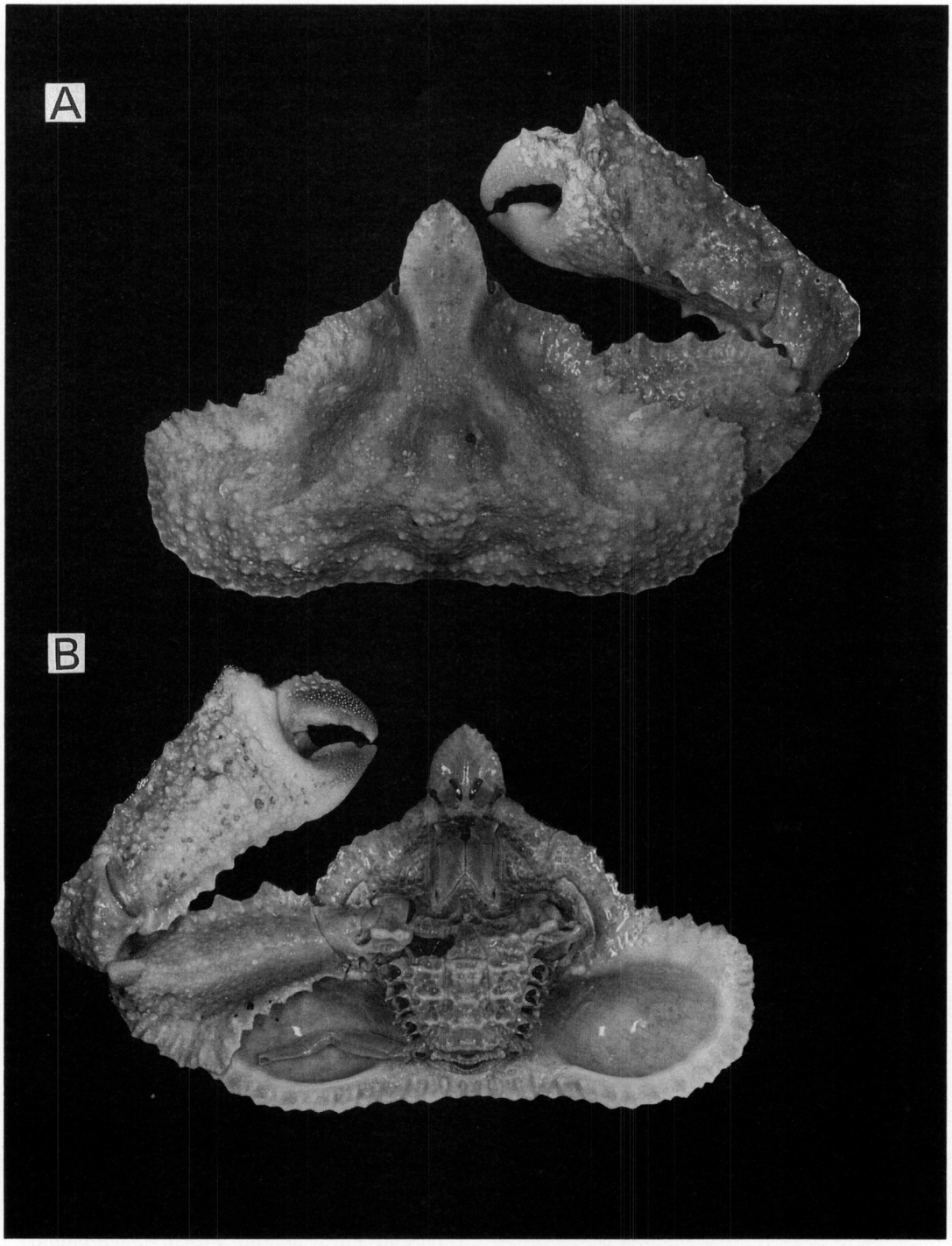

FIG. 10. *Cryptopodia spatulifrons* Miers, 1879 (Holotype ♂, NHM1858.172, 48.8 mm c.b.): A, dorsal view. B, ventral view.

Cryptopodia fistulosa Chiong & Ng, 1994 (Figs 1G, H; 8A, B)

Cryptopodia spatulifrons: Miers, 1884: 203-204 (specimen from Thursday Island) [not *C. spatulifrons* Miers, 1879].

Cryptopodia fistulosa Chiong & Ng, 1994: 952-957, figs 1A, 2A, 3A, 4A, 5A, C, D, G, H.

MATERIAL EXAMINED

CSIRO, R.V. *SOELA*, NORTH WEST SHELF: QMW18995, ♀ (23.8 x 16.1mm), 19°55.2'S, 117°56.0'E, Stn 05B03BT, 40m, 26.10.1983. QMW18980, ♂ (33.3 x 21.3mm), 19°28.4'S, 118°55.2'E, Stn 04B09BT, 39m, 31.08.1983. QMW18994, ♂ (16.1 x 11.3mm), 20°00.2'S, 117°00.5'E, Stn 04B17S, 52m, 04.09.1983.

REMARKS

This recently described species is very similar in general appearance to *C. spatulifrons* Miers, 1879. The two species can be separated using the key provided in the present paper, but Chiong & Ng (1994) should be consulted for a full list of characters by which they differ.

DISTRIBUTION

Northern Australia, from Shark Bay, W.A. to Torres Straight, northern Queensland. Bathymetric range: 5-52m.

Cryptopodia spatulifrons Miers, 1879 (Figs 9A-C, 10A, B)

Cryptopodia spatulifrons Miers, 1879: 26, pl.5, fig. 10; Haswell, 1879: 454; 1882: 37; Ortmann 1894: 48; Flipse, 1930: 63, 78, 82; Chiong & Ng, 1994: 950-952, figs 1B, 2B, 3B, 4B, 5B, E, F, I, J.

REMARKS

This endemic Australian species is only known with certainty from two specimens, and no new material has been examined as part of this study. The species was redescribed by Chiong & Ng (1994).

DISTRIBUTION

Shark's Bay, Western Australia (type locality); North West Shelf; Prince of Wales Channel, Torres Strait (Miers, 1884); Questionably from Port Jackson (Haswell, 1880). Bathymetric range: 13m (Miers, 1884).

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LITERATURE CITED

ADAMS, A. & WHITE, A. 1848. Crustacea. In Adams, A. (Ed.) 'The zoology of the voyage of *H.M.S Samarang*; under the command of Captain Sir Edward Belcher, C.B., F.R.A.S., F.G.S., during the years 1843-1846'. Part 1, pp. 1-32, pls 1-6 (Reeve, Benham, and Reeve: London).

AHMAD, M.F., S.M. SAYED, KARIM, M.S., NIAZI, T.JAWAID & M. MASIHUZ ZAMAN. 1973. Marine fauna supplement. Records of the Zoological Survey (Pakistan): IV (1 & 2): i-iv, 1-46.

ALCOCK, A. 1895. Materials for a Carcinological Fauna of India. No. 1. The Brachyura Oxyrhyncha. Journal of the Asiatic Society of Bengal 64 (Pt.2, No.2): 157-291.

BANU, Q. & NURUL HUDA, K.M. 1989. New record of *Cryptopodia angulata* Milne Edwards & Lucas (Parthenopidae: Decapoda: Crustacea) from Malaysian waters. Journal of the Bombay Natural History Society 85: 646-647.

CAMPBELL, B.M. & STEPHENSON, W. 1970. The sublittoral Brachyura (Crustacea: Decapoda) of Moreton Bay. Memoirs of the Queensland Museum 15(4): 235-301.

CHIONG, W.L. & NG, P.K.L. 1994. The identity of *Cryptopodia spatulifrons* Miers, 1879, and description of a new species, *Cryptopodia fistulosa* (Crustacea: Decapoda: Brachyura: Parthenopidae) from Australia. Raffles Bulletin of Zoology 42(4): 949-959.

CHHAPGAR, B.F. 1957. On the marine crabs (Decapoda: Brachyura) of Bombay State. Part I. Journal of the Bombay Natural History Society 54(2): 399-439.

CHOPRA, B. 1935. Further Notes on Crustacea Decapoda in the Indian Museum. VIII. On the Decapod Crustacea collected by the Bengal Pilot Service off the Mouth of the River Hughli; Brachygnatha (Oxyrhyncha and Brachyrhyncha). Records of the Indian Museum 37(4): 463-514.

DAI, A. & YANG, S. 1991. 'Crabs of the China Seas' (China Ocean Press: Beijing).

FABRICIUS, J.C. 1781. Species Insectorum exhibentes corum Differentias, specificas, Synonyma auctorum, Loca natalia, Metamorphosis adiectis Observationibus, Descriptionibus. i-viii, 1-552 pp.

FLIPSE, H.J. 1930. Die Decapoda Brachyura der Siboga-Expedition. VI. Oxyrhyncha:

Parthenopidae. Siboga-Expeditie. Leiden Livr. 112, Monogr. 39c: 1-96.

GORE, R.H. & SCOTTO, L.E. 1983. Studies on decapod Crustacea from the Indian River region of Florida. xxv. Carapacial and abdominal allometry in five species of subtropical parthenopid crabs (Brachyura, Parthenopidae). Crustaceana 44: 1-22.

HASWELL, W.A. 1879. On the Australian *Brachyura - Oxyrhyncha*. Proceedings of the Linnean Society of New South Wales 4: 431-58.

1882. Catalogue of the Australian Stalk and Sessile-Eyed Crustacea (Sydney): 1-323.

LAURIE, R.D. 1906. Report on the Brachyura collected by Professor Herdman, at Ceylon, in 1902. In W.A. Herdman, Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. Part V. Supplementary Report. 40: 349-432.

MIERS, E.J. 1879. Descriptions of new or little known species of Maioid Crustacea (Oxyrhyncha) in the collection of the British Museum. Annals and Magazine of Natural History (5), 4: 1-28.

1884. Crustacea. In 'Report on the Zoological collections made in the Indo-west Pacific Ocean during the Voyage of the H.M.S. "Alert", 1881'. London.

MILNE EDWARDS, H. & LUCAS, H. 1841. Description des Crustacés nouveau ou peu connus conservés dans la collection du Museum d'Histoire Naturelle. Archives du Muséum d'Histoire Naturelle. Paris II: 461-73.

ORTMANN, A. 1894. Crustaceen. In R. Semon, Zoologische Forshungreisen in Australien und dem Malayischen Archipel. Denkschriften der Medizinisch-Naturwissenschaftlichen Gesellschaft zu Jena 8(1): 1-80.

RATHBUN, M.J. 1911. Reports of the Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the Leadership of Mr. J. Stanley Gardiner. Vol. III. No. XI. Marine Brachyura. Transactions of the Linnaean Society. London Ser. 2, Zool., 14(2): 191-261.

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. Chapter 1. In 'Biological Results of the Fishing Experiments carried out by the F.I.S. *Endeavour*, 1909-14', (Commonwealth of Australia, Department of Trade and Customs).

SAKAI, T. 1976. Crabs of Japan and the Adjacent Seas (3 vols.) (Kodansha: Tokyo).

SCLATER, P.L. 1893. List of the dates of receipt from the printers of the sheets of Society's 'Proceedings' from 1831 to 1859 inclusive. Proceedings of the Zoological Society of London. 1893: 435-440.

TAN, C.G.S. & RICHER DE FORGES, B. 1993. On the systematics and ecology of two species of mimetic crabs belonging to the family Leucosiidae (Crustacea: Decapoda: Brachyura). Raffles Bulletin of Zoology 41: 119-132.

TIRMIZI, N.M. 1980. Marine Crustacea (Decapoda and Stomatopoda) of Pakistan. Proceedings 1st Pakistan Congress of Zoology: 97-114.

TIRMIZI, N.M. & KAZMI, Q.B. 1983. Carcinological studies in Pakistan, with remarks on species in common to the Red Sea and the Meditteranean. Bulletin of the Institute of Oceanography and Fisheries (9) Marine Science in the Red Sea: 347-380.

TIRMIZI, N.M. & KAZMI, Q.B. 1991. Marine fauna of Pakistan: 4. Crustacea: Brachyura (Dromiacea, Archaeobrachyura, Oxystomata, Oxyrhyncha). Publication I, BCCI Foundation Chair, Institute of Marine Sciences, University of Karachi. 245 pp.

WARD, T.J. & RAINER, S.F. 1988. Decapod crustaceans of the North West Shelf of north-western Australia. Australian Journal of Marine and Freshwater Research 39: 751-765.

WHITE, A. 1847a [April]. List of species in the collections of the British Museum. (Edward Newman: London).

1847b [July]. Short descriptions of some new species of Crustacea in the collection of the British Museum. Proceedings of the Zoological Society of London 15: 84-86.

1847c [September]. Short descriptions of some new species of Crustacea in the collection of the British Museum. In, Proceedings of Learned Societies. Zoological Society. Annals and Magazine of Natural History 20(132): 205-207.