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Pontoniinae (Crustacea: Decapoda: Palaemonidae) associated with bivalve molluscs from Hansa Bay, Papua New Guinea

by S. DE GRAVE

Abstract

Eleven species of Pontoniinae (Decapoda: Caridea) are recorded as associates from large bivalves in Hansa Bay, Madang Province, Papua New Guinea. Nine species are recorded as new to the fauna of Papua New Guinea. Morphological details, colour notes and host records of all species are provided. The taxonomic status of *Paranchistus pycnodontae* Bruce, 1978 in relation to *P. serenei* Bruce and *P. spondylis* Suzuki is discussed.
Key words: Caridea, Pontoniinae, Papua New Guinea, *Anchiopontonia*, *Anchistus*, *Paranchistus*, *Conchodytes*, Bivalve associates.

Résume

Onze espèces de Pontoniinae (Decapoda: Caridea) associées à de larges bivalves ont été rapportées de Hansa Bay, Province de Madang, Papouasie Nouvelle Guinée. Neuf espèces sont nouvelles pour la faune de Papouasie. Des détails morphologiques, la couleur ainsi que les hôtes associés sont fournis pour toutes les espèces. Le statut taxonomique de *Paranchistus pycnodontae* Bruce, 1978, en relation avec *P. serenei* Bruce et *P. spondylis* Suzuki est discuté.
Mots clés: Caridea, Pontoniinae, Papouasie Nouvelle Guinée, *Anchiopontonia*, *Anchistus*, *Paranchistus*, *Conchodytes*, Associées de bivalves.

Introduction

Commensalism is wide spread amongst tropical shrimp species of the subfamily Pontoniinae (BRUCE, 1976). Both in terms of the number of host species and the number of shrimp associates, the most important group of host organisms appears to be Scleractinia (BRUCE, 1977a). Nevertheless, bivalve molluscs are also important as hosts for shrimps. A total of 27 species of Pontoniinae, belonging to 8 genera are associated with bivalves in the Indo-West Pacific, with a further three species involved in this association in the East Pacific (FRANSEN, 1995). In spite of the wide spread occurrence of this association with bivalves and the wide geographical distribution of many of the shrimp species involved, only two nominal species have been previously recorded from Papua New Guinea: *Paranchistus armatus* (H. MILNE EDWARDS, 1837) was described as *Pontonia armata* from New Ireland, whilst *Anchistus biunguiculatus* (BORRADAILE, 1898), a junior synonym of *P. armatus* was described from Tubetube, Engineer group and *Anchistus miersi* (DE MAN, 1888) was recorded by BORRADAILE (1900) from Dobu, D'Entrecasteaux Islands. No records from the mainland of Papua New Guinea are known.

Commensalism with bivalve molluscs is not restricted to pontoniid shrimps, but also occurs in Alpheidae and Atyidae. BANNER & BANNER (1968) record *Aretopsis amabilis* DE MAN, 1910 from a bivalve host (*Pterocera* sp.) in the Marshall Islands, a species otherwise known to inhabit gastropod shells, occupied by hermit crabs. NOBILI (1907) records *Synalpheus nilandensis* COUTIÈRE, 1905 from pearl oysters in the Tuamotu archipelago. HOGARTH (1987) records *Alpheopsis aequalis* COUTIÈRE, 1896 as a commensal of *Ostrea cristagalli* (LINNAEUS) in Oman. The latter two records are most likely facultative in nature, as both species are widespread in the Indo-Pacific and frequently recorded, but with no known association with any other invertebrate, with the exception of the above records. Perhaps most interesting is the association between the fresh water species, *Limnocaridina iridinae* ROTH-WOLTERECK and the bivalve mollusc, *Iridina spekei* WOODWARD in Lake Tanganyika (ROTH-WOLTERECK, 1958), the only species of commensal atyid shrimp known to date.

Material and methods

Bivalve molluscs were collected from several locations within Hansa Bay, situated approximately 10km north of Bogia, Madang Province, Papua New Guinea. A map of all the sites sampled is given in CLAEREBOUDT *et al.* (1989). Special attention was given to World War II shipwrecks occurring within the Bay, which proved to be rich hunting grounds for large bivalves. Molluscs were placed in mesh bags and returned to the laboratory, where the valves were prised apart and the commensal shrimps extracted. It is interesting to note that all bivalves contained at least one individual of commensal shrimp. Post-orbital carapace lengths (cl) are given in mm.

Contribution no. 301 of the Leopold III Biological Station, Laing Island.

All specimens have been deposited in the collections of the 'Koninklijk Belgisch Instituut voor Natuurwetenschappen', Brussels, Belgium; registration numbers IG 27951 and IG 28056.

Systematic account

Family **Palaemonidae** RAFINESQUE, 1815
Subfamily **Pontoniinae** KINGSLEY, 1878

Anchiopontonia BRUCE, 1992

Anchiopontonia hurii (HOLTHUIS, 1981)
(Plate 1a)

Pontonia hurii HOLTHUIS, 1981: 796-800, fig. 4
Anchiopontonia hurii. — BRUCE, 1992: 1276-1282, figs. 1-4. — BRUCE, 1996: 204.

MATERIAL

1 female (cl 4.7) 1 male (cl 3.8) KBIN IG 27951/NAT15; Davit Wreck, Hansa Bay, 9m depth, from *Spondylus varius*, leg. S. DE GRAVE, 5 October 1992, field no. S92/127. 1 male (cl 3.9) KBIN IG 27951/NAT16; Sushi Maru Wreck, Hansa Bay, 19m depth, from *Spondylus varius*, leg S. DE GRAVE, 7 October 1992, field no. S92/133. 1 ov. female (cl 5.2) 1 male (cl 3.6) KBIN IG 27951/NAT17; Davit Wreck, Hansa Bay, 10m depth, from *Spondylus varius*, leg. S. DE GRAVE, 14 October 1992, field no. S92/153. 1 ov. female (cl 6.0) 1 male (cl 4.6) KBIN IG 28056/NAT18; Laing Island outer reef slope, 20m depth, from *Spondylus varius*, leg. S. DE GRAVE, 30 September 1993, field no. S93/39. 1 ov. female (cl 5.2) 1 male (cl 3.3) KBIN IG 28056/NAT19; Laing Island outer reef slope, 15m depth, from *Spondylus varius*, leg. S. DE GRAVE, 9 October 1993, field no. S93/82.

REMARKS

The present specimens agree closely with the previous descriptions of this species by HOLTHUIS (1981) and BRUCE (1992), with the laterally mobile telson spines and the shape of the dactyl being highly diagnostic. As in the specimen described by BRUCE (1992), a minute pre-terminal ventral tooth is present on the rostrum in all of the present specimens, with the exception of one female (KBIN IG 28056/NAT19). One male specimen has a regenerating tip of the rostrum with no teeth being present (KBIN IG 28056/NAT19), whilst in one male (KBIN IG 28056/NAT16) the acute tip of the rostrum is missing, creating a truncate appearance. As already noted by BRUCE (1992), the dactylar accessory spine of the ambulatory pereiopods is serrulate (Plate 1a).

COLOUR

Female largely transparent with dark yellow-orange hue, one narrow white stripe on carapace and one similar stripe on first four abdominal segments; dorsal white stripe running from eye peduncle along base of rostrum to opposite eye peduncle; egg mass dark orange. Male dark yellow-orange transparent; dorsal white stripe at base of rostrum present, other white stripes absent.

DISTRIBUTION

Arno Atoll, Marshall Islands; Raroia Atoll, Tuamotu Islands (HOLTHUIS, 1981); Okinawa, Ryukyu Islands (BRUCE, 1992); Santal Bay, Loyalty Islands (BRUCE, 1996). Not previously recorded from Papua New Guinea. Previously reported in association with *Spondylus* sp. and *Spondylus varius* SOWERBY.

Anchistus BORRADAILE, 1898

Anchistus australis BRUCE, 1977
(Fig. 1)

Anchistus australis forma *typica* BRUCE, 1977b: 56-62, figs. 7-9.
Anchistus australis forma *dendricauda* BRUCE, 1977b: 62, fig. 10.
Anchistus australis. — BRUCE, 1980a: 395-396, fig. 3A. — BRUCE, 1983a: 892, fig. 10A.

MATERIAL

1 female (cl 3.4), 1 juvenile (cl 1.5) KBIN IG 28056/NAT20; Laing Island lagoon, rubble slope, 5m depth, from *Hippopus hippopus*, leg. S. DE GRAVE, 28 September 1993, field no. S93/25. 1 ov. female (cl 6.1), 1 male (cl 4.2) KBIN IG 28056/NAT21; Laing Island reef slope, 15m depth, from *Tridacna squamosa*, leg. J.-M. TERNATE, 10 October 1993, field no. S93/85. 1 juv. (cl 1.6) KBIN IG 28056/NAT22; Laing Island reef slope, 10m depth, from *Tridacna gigas*, leg. P. VAN DE WALLE, 12 October 1993, field no. S93/100. 1 ov. female (cl 5.5), 1 male (cl 3.8) KBIN IG 28056/NAT23; Laing Island reef slope, 7m depth, from *Tridacna squamosa*, leg. H. WILKINS, 20 October 1993, field no. S93/129.

REMARKS

Most specimens have a rostral dentition of 5/1 or 6/1 (Fig. 1a, b), with one non-ovigerous female having 2 minute ventral teeth (KBIN IG 28056/NAT20), whilst the rostral tip appears bifid in one ov. female (KBIN IG 28056/NAT23). As in the material of FRANSEN (1995) the rostral dentition in juveniles extends over a slightly longer distance than in adults. In the present material, the accessory spine on the dactylus of the third pereiopod is reduced, and a single small spine is present along the disto-ventral margin of the propodus (Fig. 1d), as opposed to two described in the type material (BRUCE, 1977b). The submedian terminal telson spines are non-plumose, as opposed to sparsely plumose in the type material. However, significant variation exists in telson

spination in this species (see BRUCE, 1977b), both in terms of the dorsal and the terminal spines (Fig. 1f). The endopod of the male first pleopod, although similar in general appearance to the illustration and descriptions by BRUCE (1977b), harbours more plumose setae along its lateral border and more non-plumose setae along its medial border, whilst in addition a small lobe is present at the distal part of the medial border (Fig. 1g). The appendix masculina harbours more sub-terminal setae than in BRUCE (1977b).

COLOUR

Generally transparent, with scattered small blue dots all over the body and the appendages.

DISTRIBUTION

Swain's Reef, Michaelmas Reef, Heron Island and Port Essington, Australia (BRUCE & COOMBES, 1995); Ndravuni

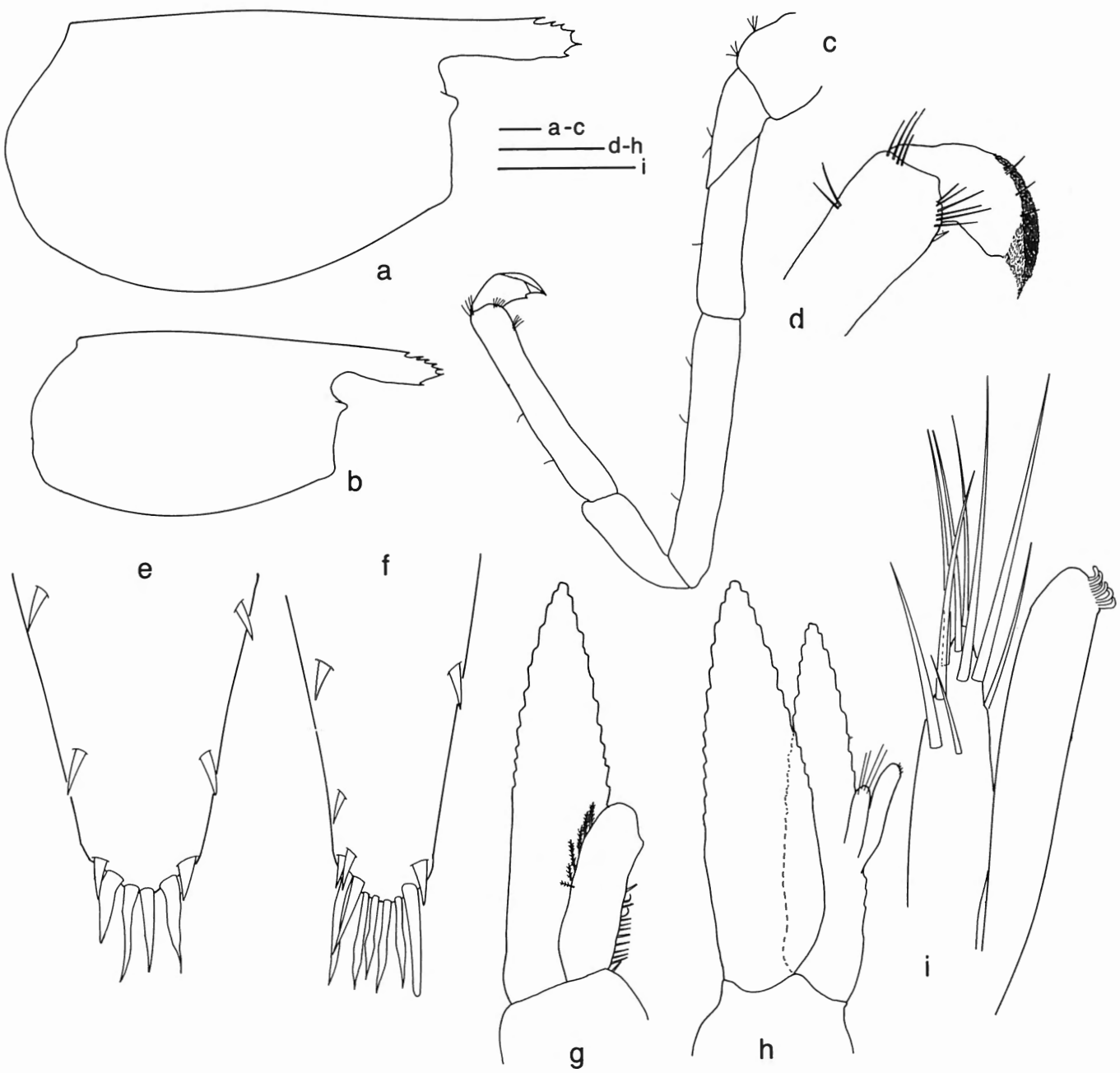

Fig. 1 - *Anchistus australis* BRUCE. KBIN IG 28056/NAT21. a: carapace of female; b: carapace of male; c: third pereiopod; d: detail of third pereiopod; e: terminal region of telson of female; f: terminal region of telson of male; g: male first pleopod; h: male second pleopod; i: appendices masculina and interna of male second pleopod. a, e female (cl 6.1), remainder from male (cl 4.2). Scale bars indicate 1 mm (a-c), 0.5 mm (d-h) or 0.1 mm (i).

Island, Fiji (BRUCE, 1980a); Seram Island, Ambon, Indonesia (BRUCE, 1983a; FRANSEN, 1995); Enewetak, Marshall Islands (DEVANEY & BRUCE, 1987); baie d'Harcourt, New Caledonia (BRUCE, 1991); Tre Island, Vietnam (BRUCE, 1993). Not previously reported from Papua New Guinea. Previously reported in association with *Tridacna* sp., *Tridacna squamosa* LAMARCK and *T. derasa* (RÖDING), the present assocations with *Hippopus hippopus* LINNAEUS and *Tridacna gigas* LINNAEUS present new host records.

Anchistus custoides BRUCE, 1977
(Fig. 2)

Anchistus custoides BRUCE, 1977b: 50-56, figs. 4-6.
Anchistus inermis. — KUBO, 1940: 48-51, figs. 15-17 (not *Harpilius inermis* MIERS).

MATERIAL

1 ov. female (cl 7.4), 1 male (cl 4.1) KBIN IG 27951/NAT24; Laing Island lagoon, 6m depth, from *Atrina vexillum*, leg. S. DE GRAVE, 2 September 1992, field no. S92/16. 2 ov. females (cl 8.2-9.0), 2 males (cl 3.1-4.6) KBIN IG 27951/NAT25; Laing Island reef slope, 15m depth, from *Pinna bicolor*, leg. S. DE GRAVE, 6 September 1992, field no. S92/31. 2 ov. females (cl 8.3-9.2), 2 males (cl 4.3-4.7) KBIN IG 27951/NAT26; Laing Island lagoon, 7m depth, from *Atrina vexillum*, leg. S. DE GRAVE, 12 October 1992, field no. S92/150. 1 ov. female (cl 8.6), 1 male (cl 4.5) KBIN IG 28056/NAT27; Laing Island lagoon, 5m depth, from *Atrina vexillum*, leg. S. DE GRAVE, 28 September 1993, field no. S93/24. 1 ov. female (cl 8.2), 1 male (cl 3.8) KBIN IG 28056/NAT28; Laing Island reef slope, from *Atrina vexillum*, leg. P. VAN DE WALLE, 30 September 1993, field no. S93/35. 1 ov. female (cl 8.0) 1 male (cl 5.1) KBIN 28056/NAT64; Laing Island lagoon, from *Atrina vexillum*, leg. J.-M. TERNATE, September 1993, field no S93/138.

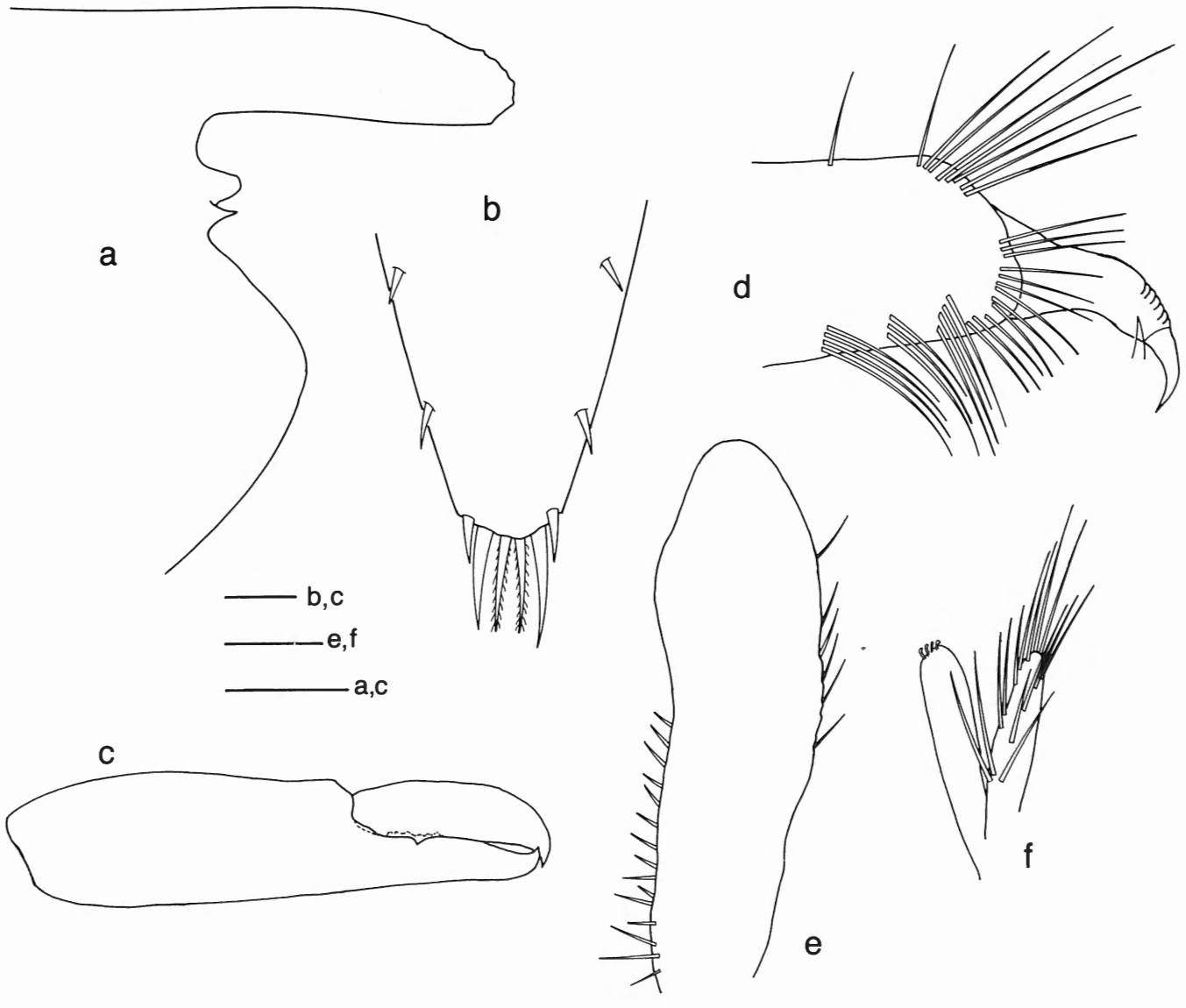

Fig. 2 - *Anchistus custoides* BRUCE. KBIN 28056/NAT28. a: frontal region of carapace; b: terminal region of telson; c: carpus of second pereiopod; d: distal region of third pereiopod; e: endopod of second pleopod; f: appendices masculina and interna of second pleopod. a, c from female (cl 8.2), remainder from male (cl 3.8). Scale bars indicate 1 mm (a, c), 0.25 mm (b), or 0.1 mm (d, e, f).

REMARKS

The present specimens agree closely with the previous descriptions of BRUCE (1977b) and KUBO (1940). Minor differences were noted in the position of the antennal spine in relation to the inferior orbital angle (Fig. 2a), the intermediate terminal telson spines being less swollen than indicated by BRUCE (1977b), whilst the cutting edges of the chelae of the second pereiopod resemble the illustration by KUBO (1940) more than the illustration by BRUCE (1977b). Both the endopod of the first male pleopod and the appendix masculina closely resemble those in BRUCE (1977b), although the setae along the lateral margin of the endopod of the first pleopod are non plumose.

COLOUR

Generally transparent, with scattered orange dots all over body and appendages.

DISTRIBUTION

Palau (KUBO, 1940); Swain Reefs, Heron Island, One Tree Island, Australia (BRUCE, 1981); Ryukyu Islands (MIYAKE, 1982); Seram Island, Indonesia (BRUCE, 1983a); Tre Island, Vietnam (BRUCE, 1993). Not previously reported from Papua New Guinea. Previously reported in association with *Magnavicula* sp., *Pinna* sp. and *Atrina vexillum* (BORN), the present association with *Pinna bicolor* GMELIN is a new host record.

Anchistus custos (FORSSKÅL, 1775)
(Fig. 3, Plate 1b-c)

Cancer custos FORSSKÅL, 1775: 94.
Anchistus custos. — HOLTHUIS, 1952: 105-109, figs.43-44. — BRUCE, 1982: 264-265, fig. 19.

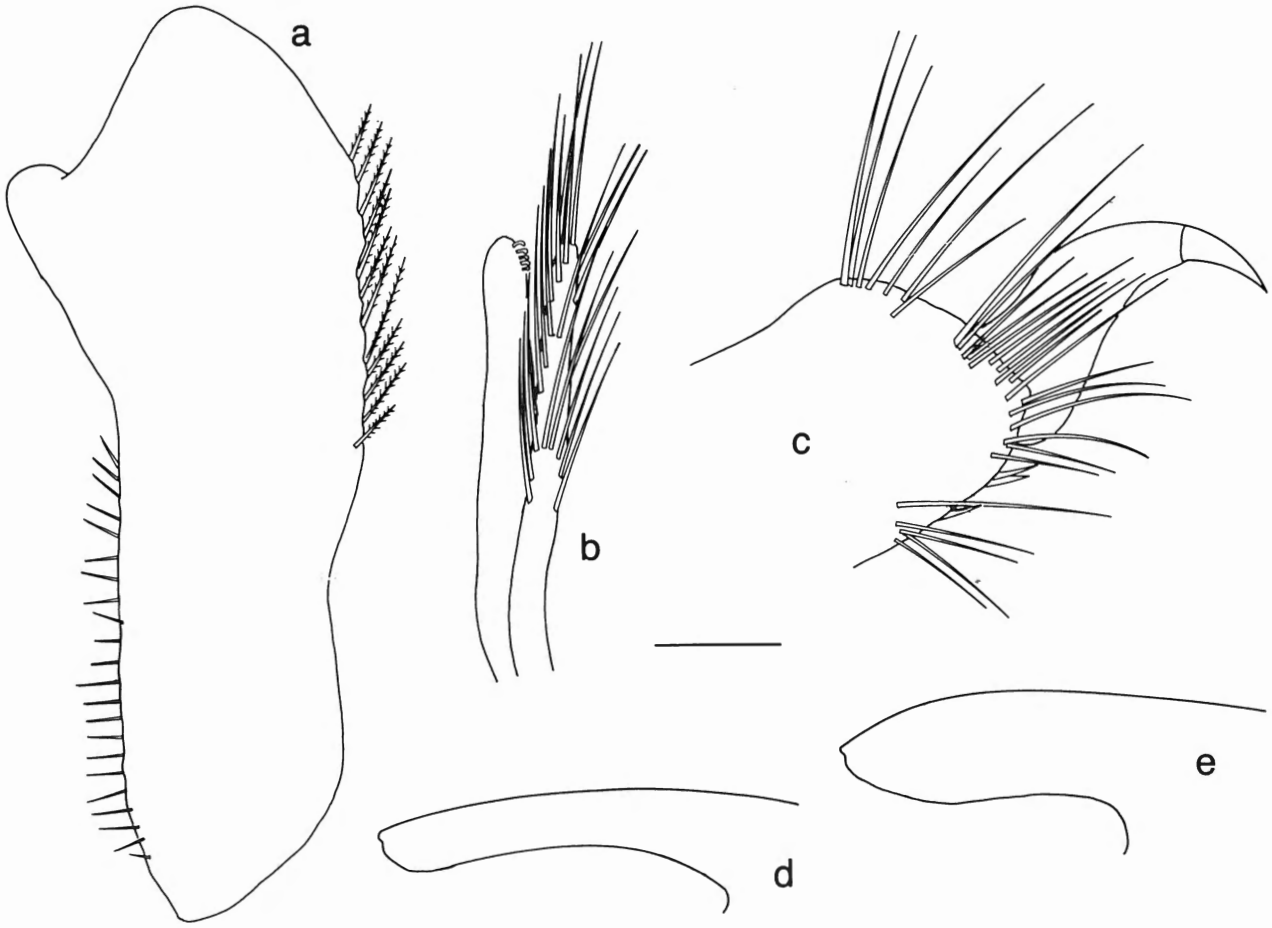

Fig. 3 - *Anchistus custos* (FORSSKÅL). KBIN IG 27951/NAT29. a: endopod of male first pleopod; b: appendices masculina and interna of male second pleopod; c: detail of third pereiopod (male); d: rostrum of male; e: rostrum of female. Scale bar indicates 1 mm (d-e) or 0.2 mm (a-c).

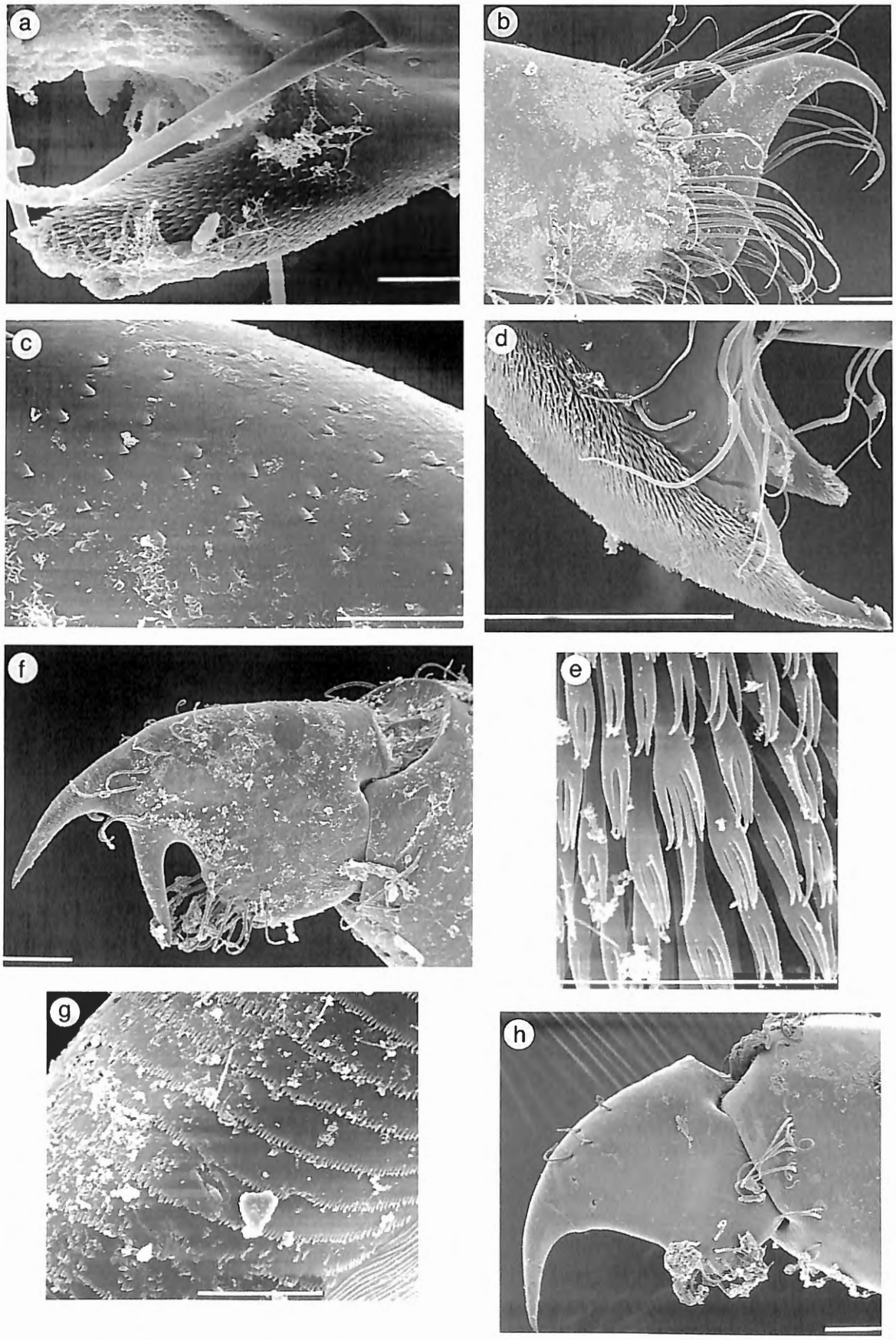

Plate 1 – *Anchiopontonia hurii* KBIN IG 27951/NAT17, male (cl 3.6); a: accessory spine on dactylus of third pereiopod (2020x). *Anchistus custos* KBIN IG 27951/NAT29, male (cl 6.5); b: dactylus of third pereiopod (137x); c: detail of dorsal surface (3100x). *Anchistus miersi* KBIN IG 28056/NAT38, male (cl 5.2); d: dactylus of third pereiopod (600x); e: detail of multidenticulate setules (6750x). *Conchodytes melaegrinea* KBIN IG 27951/NAT41, male (cl 6.1); f: dactylus of third pereiopod (186x); g: detail of dorsal surface (2980x). *Conchodytes monodactylus* KBIN IG 27951/NAT55, male (cl 6.7); h: dactylus of third pereopod (137x).

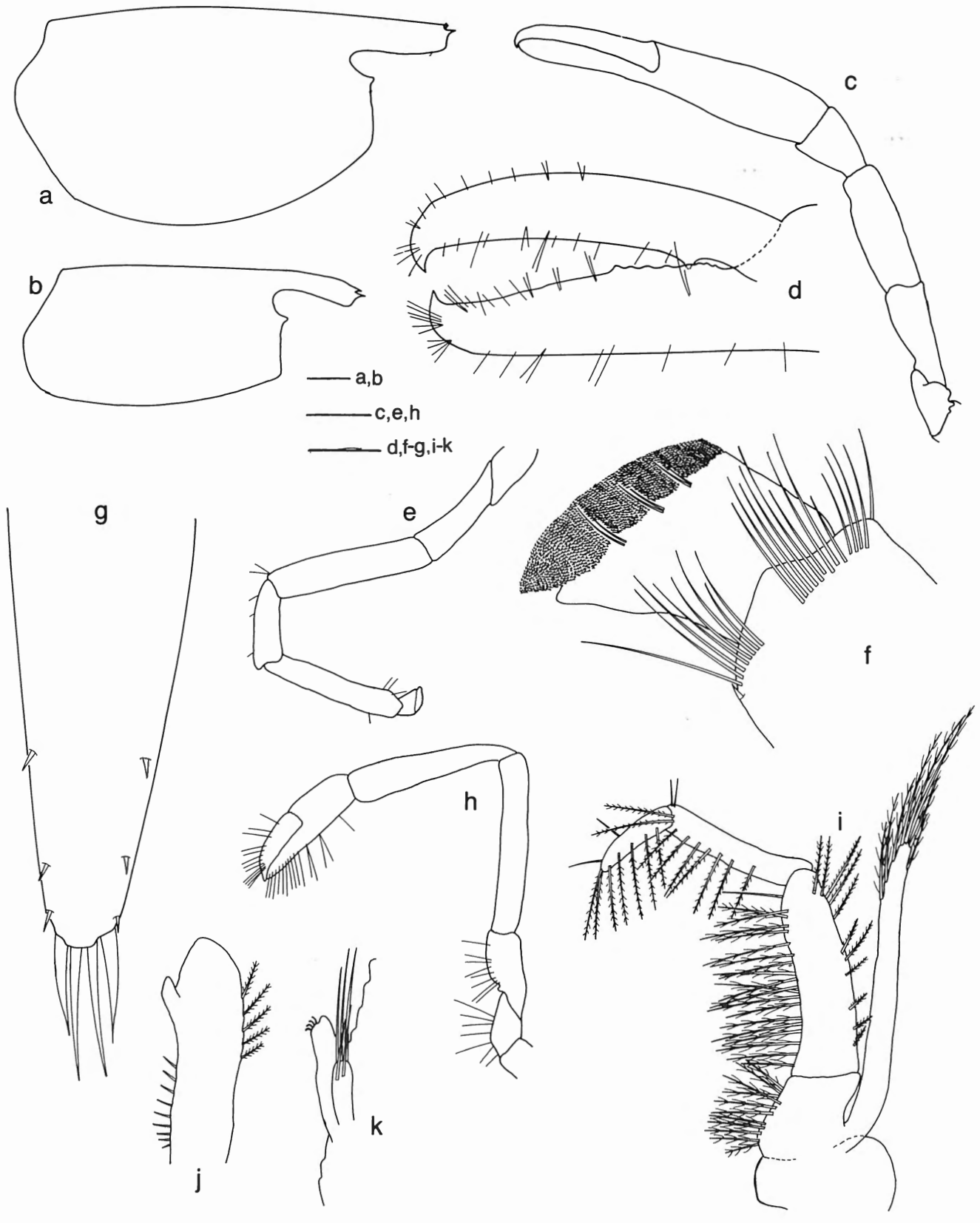

Fig. 4 - *Anchistus demani* KEMP. KBIN IG 27951/NAT31. a: carapace of female; b: carapace of male; c: second pereiopod; d: detail of second pereiopod; e: third pereiopod; f: detail of third pereiopod; g: telson; h: first pereiopod; i: third maxilliped; j: endopod of male first pleopod; k: appendices masculina and interna of male endopod of second pleopod. a, c-i from female (cl 4.1), remainder from male (cl 2.2). Scale bars indicate 1 mm (a, b), 0.5 mm (c, e, h), 0.2 mm (d, i, g), 0.1 mm (j, k) or 0.05 mm (f).

MATERIAL

1 ov. female (cl 9.1), 1 male (cl 6.5) KBIN IG 27951/NAT29; Sushi Maru Wreck, Hansa Bay, 19m depth, from *Pinna bicolor*, leg. D. VANDERSPIEGEL, 2 September 1992, field no. S92/17.

REMARKS

The present specimens agree with previous descriptions (HOLTHUIS, 1952; BRUCE, 1982), with the cannulate palm of the chelae of the first pereiopods being highly characteristic. Both specimens have a minute tubercle at the fronto-dorsal margin of the rostrum (Fig. 3d, e). The general appearance of the endopod of the male first pleopod appears to be subject to some variation, with in the present material a distal, prominent protruberance being present along the medial margin (Fig.3a) (see HOLTHUIS, 1952; BRUCE, 1982). In the male, the appendix masculina reaches to the end of the appendix interna and is furnished with numerous setae along its medial and lateral margins (Fig. 3b). SEM observations revealed that the dorsal surface of the dactylar corpus of the ambulatory pereiopods is furnished with minute, scattered scales (Plate 1b-c).

COLOUR

Generally transparent, with scattered yellow-orange dots all over body and appendages.

DISTRIBUTION

Wide spread in the Indo-Pacific, ranging from the Red Sea and East Africa to Australia and Fiji (HOLTHUIS, 1952; CHACE & BRUCE, 1993). Not previously reported from Papua New Guinea. Mainly associated with species of *Pinna* (Mollusca: Pinnidae).

Anchistus demani KEMP, 1922
(Fig. 4)

Anchistus demani KEMP, 1922: 256-259, figs. 86-88.
Anchistus demani. — BRUCE, 1974: 200-201. — BRUCE, 1977b: 50. — BRUCE, 1991: 259-260, fig. 22.

MATERIAL

1 ov. female (cl 3.2), 1 male (cl 2.1) KBIN IG 28056/NAT30; Laing Island reef slope, 5m depth, from *Tridacna* sp., leg. S. DE GRAVE, 7 October 1993, field no. S93/72. 1 ov. female (cl 4.1), 1 male (cl 2.2) KBIN IG 27951/NAT31; Laing Island lagoon, 6m depth, from *Tridacna maxima*, leg. J-M. OUIN, 2 September 1992, field no. S92/18. 1 non-ov. female (cl 2.5) KBIN IG 27951/NAT32; Laing Island lagoon, 5m depth, from *Tridacna squamosa*, leg. S. DE GRAVE, 17 September 1992, field no. S92/67. 1 ov. female (cl 3.0), 1 male (cl 2.0) KBIN IG 27951/NAT33; Davit Wreck, Hansa Bay, 3m depth, from *Tridacna squamosa*, leg. S. DE GRAVE, 5 October 1992, field no. S92/128. 1 ov. female (cl 2.0) KBIN IG 27951/NAT34; Davit Wreck, Hansa Bay, 3m depth, from *Tridacna maxima*, leg. H. WILKINS, 5 October 1992, field no. S92/129.

REMARKS

Rostrum truncate with two dorsal teeth (Fig. 4a, b), except one ovigerous female (KBIN IG 27951/NAT34) which harbours a single tooth; rostrum in males ascending in distal half (Fig. 4b), in females nearly straight (Fig 4a). Dentition of fixed finger and dactylus of second pereiopod less pronounced (Fig. 4d) than described in the type material (KEMP, 1922). Accessory tooth on dactylus of third pereiopod blunt and inconspicuous (Fig. 4f). Distoventral angle of propodus with pair of small spines (Fig. 4f), these being noted as absent by KEMP (1922) in the type material, but probably overlooked (see BRUCE, 1991). Dorsal surface of dactylus covered with microscales, with three pairs of short setae below this area (Fig. 4f). Distance between dorsal pairs of telson spines approximately twice as long as distance between posterior pair and apex (Fig. 4g). Endopod of male first pleopod (Fig. 4j) with prominent lobe along medial margin and a series of plumose setae along lateral margin. Appendix masculina only half the length of the appendix interna and sparsely furnished with long setae in distal part (Fig. 4k).

COLOUR

Generally transparent with scattered blue dots all over body, less numerous on legs. Ova green.

DISTRIBUTION

Wide spread in the Indo-Pacific, ranging from East Africa to Australia and the Marshall Islands (CHACE & BRUCE, 1993). Not previously reported from Papua New Guinea. Previously reported in association with *Tridacna* sp., *Tridacna crocea* LAMARCK, *T. maxima* (RÖDING) and *T. gigas* L., the present association with *T. squamosa* is a new host record.

Anchistus miersi (DE MAN, 1888)
(Plate 1d-e)

Harpilius miersi DE MAN, 1888: 274-277, Plate 17: figs. 6-10.
Anchistus miersi. — HOLTHUIS, 1952: 110-111, fig. 45. — BRUCE, 1973: 136, fig. 1c-e.— MONOD, 1976: 24-26; figs. 29-36.

MATERIAL

1 ov. female (cl 3.6) KBIN IG 27951/NAT35; Sushi Maru Wreck, Hansa Bay, 19m depth, from *Magnavicula penguin*, leg. S. DE GRAVE, 29 September 1992, field no. S92/7. 1 ov. female (cl 3.5), 1 male (cl 2.1) KBIN IG 27951/NAT36; Laing Isl reef

flat, intertidal, from *T. maxima*, leg. S. De Grave, 6 October 1992, field no. S92/32. 1 male (cl 3.1) KBIN IG 27951/NAT37; Davit Wreck, Hansa Bay, 10m depth, from *Magnavicula penguin*, leg. S. De Grave, 14 October 1992, field no. S92/156. 1 ov. female (cl 6.6), 1 male (cl 5.2) KBIN IG 28056/NAT38; Duangit reef, Hansa Bay, 3m depth, from *Tridacna* sp., leg. S. De Grave, 12 October 1993, field no. S93/101. 1 ov. female (cl 4.0), 1 male (cl 3.1) KBIN IG 28056/NAT39; Laing Island reef slope, 5m depth, from *Tridacna* sp., leg. H. Wilkins, 20 October 1993, field no. S93/130. 1 juvenile (cl 2.2) KBIN IG 28056/NAT64, free in Laing Island aquarium, leg. S. De Grave, 30 September 1993, field no. S93/42.

REMARKS

The specimens agree closely with previous descriptions. Rostral dentition is 4-5/0-1, with the ventral tooth reduced to a tubercle in some specimens. In juveniles, the rostral dentition extends over a slightly longer distance. SEM observations revealed that the dactylar accessory tooth is serrated (Plate 1d), whilst the dorsal surface of the dactylus is covered with multidenticulate setules (Plate 1e).

COLOUR

Generally transparent, with scattered red dots all over body and appendages.

DISTRIBUTION

Wide spread in the Indo-Pacific, ranging from the Red Sea to French Polynesia (Chace & Bruce, 1993). Previously found in Papua New Guinea: Dobu, D'Entrecasteaux group (Borradaile, 1900). Mainly in association with the genera *Hippopus* and *Tridacna*. Although the association with the genus *Magnavicula* is considered doubtful by Chace & Bruce (1993) and Fransen (1995), the present records substantiate this association.

Conchodytes Peters, 1852

Conchodytes biunguiculatus (Paul'son, 1875)

Pontonia biunguiculatus Paul'son, 1875: 111, Plate 15, fig. 1.
Conchodytes biunguiculatus. — Holthuis, 1952: 199-200. — Fransen, 1994: 89-96, figs. 3-7, 12-15, 23, 27, 30-31, 35.
Conchodytes kempi Bruce, 1989: 183-184, fig. 3b-e.
Conchodytes kempi. — Bruce, 1993: 60-61, fig. 4.

MATERIAL

1 ov. female (cl 4.6), 1 male (cl 2.9) KBIN IG 27951/NAT65; Laing Isl lagoon, rubble slope, 7m depth, from *Streptopinna saccata* (L.) partly embedded in atrial cavity of large unidentified sponge, leg. S. De Grave, 11 October 1992, field no. S92/145.

REMARKS

The present specimens agree with the description of Fransen (1994) in having a single serrate, broad tooth on the dactylus of the second pereiopod and two serrate, broad teeth on the fixed finger. In contrast, the rostrum is more broadly triangular and the basal protuberance on the dactylus of the third pereiopod is not well developed, the latter is furnished with a small tooth. The accessory tooth is small, approximately 0.3 x length of primary unguis. Unguis well demarcated from corpus, with transverse striations.

COLOUR

Not noted in live specimens.

DISTRIBUTION

Due to confusion regarding the identity of *C. biunguiculatus* versus *C. nipponensis* (De Haan, 1844), the distribution of this taxon is not clear. With certainty, the species is known from the Indian Ocean (Fransen, 1994), Indonesia, southern Taiwan (Holthuis, 1952) and Vietnam (Bruce, 1993). Not previously reported from Papua New Guinea. The association with *S. saccata* is a new host record.

Conchodytes meleagrinae Peters, 1852
(Plate 1f-g)

Conchodytes meleagrinae Peters, 1852: 289-290.
Conchodytes meleagrina.e — Borradaile, 1917: 393, Plate 57, fig. 26. — Kemp, 1922: 285. — Bruce, 1977b: 73, fig. 14c-d. — Bruce, 1991: 262, fig. a-d.

MATERIAL

1 ov. female (cl 7.1), 1 male (cl 5.7) KBIN IG 27951/NAT40; Laing Island lagoon, 15m depth, from *Pinctada margaritifera*, leg J.-M. Ouin, 3 September 1992, field no. S92/29. 3 ov. females (cl 6.7-7.3) 1 non ov. female (cl 6.4) 6 males (cl 5.0-6.1) KBIN IG 27951/NAT41; Laing Island lagoon, 10m depth, from *Pinctada margaritifera*, leg. S. De Grave, 29 September 1992, field no. S92/4. 1 non ov. female (cl 8.0), 1 male (cl 6.1) KBIN IG 27951/NAT42; Laing Island lagoon, 10m depth, from *Pinctada margaritifera*, leg. S. De Grave, 29 September 1992, field no. S92/5. 15 spec. (cl 2.0-8.2) KBIN IG 27951/NAT43; Lagoon Wreck, Laing Island, from *Pinctada margaritifera*, leg. J.-M. Ouin, 31 September 1992, field no. S92/10. 1 ov. female (cl 6.7), 1 male (cl 4.8) KBIN IG 27951/NAT44; Laing Island lagoon, from *Pinctada margaritifera*, leg. J.-M. Ouin, 6 September 1992, field no. S92/33. 2 males (cl 6.9, 7.0) KBIN IG 27951/NAT45; Lagoon Wreck, Laing Island, from *Pinctada margaritifera*, leg. D. Vanderspiegel, 7 September 1992, field no. S92/44. 1 ov. female (cl 7.9) 3 males (cl 5.0-6.1) KBIN IG 27951/NAT46; Riverwreck, Hansa

Bay, 9m depth, from *Pinctada margaritifera*, leg. S. DE GRAVE, 8 September 1992, field no. S92/51. 1 ov. female (cl 8.6), 1 male (cl 5.5) KBIN IG 27951/NAT47; Duangit Reef, Hansa Bay, 10m depth, from *Pinctada margaritifera*, leg. J.-M. OUIN, 20 September 1992, field no. S92/86. 1 ov. female (cl 7.0), 1 male (cl 5.5) KBIN IG 27951/NAT48; Laing Island lagoon, from *Pinctada margaritifera*, leg. S. DE GRAVE, 11 October 1992, field no. S92/143. 1 ov. female (cl 8.7), 1 male (cl 6.4) KBIN IG 27951/NAT49; Laing Island lagoon, from *Pinctada margaritifera*, leg. S. DE GRAVE, 11 October 1992, field no. S92/144. 1 female (cl 7.5), 1 male (cl 5.1) KBIN IG 27951/NAT50; Laing Island reef flat, intertidal margin, 0.5m, from *Pinctada margaritifera* leg. H. WILKINS, 14 October 1992, field no. S92/155 . 1 female (cl 10.5) KBIN IG 28056/NAT51; Laing Island lagoon, from *Pinctada maxima*, leg. P. VAN DE WALLE, 23 September 1993, field no. S93/6. 1 ov. female (cl 5.5), 2 males (cl 4.6, 6.5) KBIN IG 28056/NAT52; Laing Island reef slope, from *Pinctada margaritifera*, leg. P. VAN DE WALLE, 30 September 1993, field no. S93/36. 1 ov. female (cl 8.3), 1 male (cl 5.8) KBIN IG 28056/NAT53; Laing Island reef slope, 5m depth, from *Pinctada margaritifera*, leg. S. DE GRAVE, 7 October 1993, field no. S93/70. 1 ov. female (cl 8.1), 1 male (cl 6.4) KBIN IG 28056/NAT54; Laing Island reef slope, 10m depth, from *Pinctada margaritifera*, leg. S. DE GRAVE, 7 October 1993, field no. S93/71.

REMARKS

The present specimens present no unique features. SEM observations showed that the dorsal surface of the dactylar unguis of the ambulatory pereiopods is covered with transverse rows of minute, pointed scales (Plate 1f-g).

COLOUR

Transparent with scattered orange dots.

Distribution

Wide spread in the Indo-Pacific, ranging from the Red Sea to French Polynesia (CHACE & BRUCE, 1993). Not previously reported from Papua New Guinea. Always in association with the genus *Pinctada* (FRANSEN, 1995).

Conchodytes monodactylus HOLTHUIS, 1952
(Fig. 5, Plate 1h)

Conhodytes monodactylus HOLTHUIS, 1952: 200-204, figs. 96-98.
Conchodytes monodactylus. — BRUCE, 1977c: 177-178, fig. 8.

MATERIAL

1 ov. female (cl 10.6), 1 male (cl 6.7) KBIN IG 27951/NAT55; Lagoon Wreck, Laing Island, 20m depth, from *Magnavicula penguin*, leg. J.-M. OUIN, 7 September 1993, field no. S92/43

REMARKS

Rostrum broadly triangular in dorsal view (Fig. 5a), reaching to end of third segment of antennular peduncle; apex broadly rounded in both dorsal and lateral view (Figs. 5a, b). Inferior orbital angle distinctly produced. Telson 1.8 x longer than wide, with pairs of strong spines inserted at 0.23 and 0.70 of length (Fig. 5d). Apex with pair of sub-terminal spines and two pairs of terminal spines; outer pair of terminal spines larger than thinner, curved inner pair (Fig. 5e); inner pair with scales along part of medial margin (Fig. 5f). Antennal scale (Fig. 5h) and third maxilliped (Fig. 5g) as described by HOLTHUIS (1952), although the antepenultimate segment of the latter is narrower. Second pereiopods large, reaching beyond scaphocerite; dactylar tip strongly curved, both fixed finger and dactylus with single, broad tooth (Fig. 5c). Third pereiopod stout (Fig. 5i); ischium 0.85 x length of merus; carpus 0.76 x length of propodus; dactylus with well developed basal protuberance, unguis demarcated from corpus (Fig. 5j, Plate 1h). Male first pleopod with endopod 0.4 x length of exopod; endopod furnished with plumose setae along both medial and lateral margin, extending further along medial margin (Fig. 5k). Male second pleopod with endopod 0.89 x length of exopod, appendices inserted at 0.24 of endopod. Appendix masculina 0.74 x length of appendix interna, furnished with progressively longer setae along medial margin and apex (Fig. 5l). The present specimens agree in most respects with the type description by HOLTHUIS (1952) and can be separated from all other *Conchodytes* species by the lack of an accessory tooth on the dactyl of the ambulatory pereiopods.

COLOUR

Colour not noted in living specimens.

DISTRIBUTION

Lesser Sunda Islands, Indonesia; southern Taiwan (HOLTHUIS, 1952); Singapore (JOHNSON, 1961); Magnetic Island and Cobourg Peninsula, Australia (BRUCE, 1977c; 1983b); Hong Kong (BRUCE, 1979). Not previously reported from Papua New Guinea. Previously reported in association with *Pinna* sp., *Pinna bicolor* and *Atrina* sp., the present association with *M. penguin* is a new host record.

Paranchistus HOLTHUIS, 1952

Paranchistus armatus (H. MILNE EDWARDS, 1837)
(Plate 2a)

Pontonia armata H. MILNE EDWARDS, 1837: 359.
Paranchistus armatus. — BRUCE, 1975: 49, figs. 1-3.
Anchistus biunguiculatus BORRADAILE, 1898: 387.
Paranchistus biunguiculatus. — HOLTHUIS, 1952: 93-97, figs. 36-38.

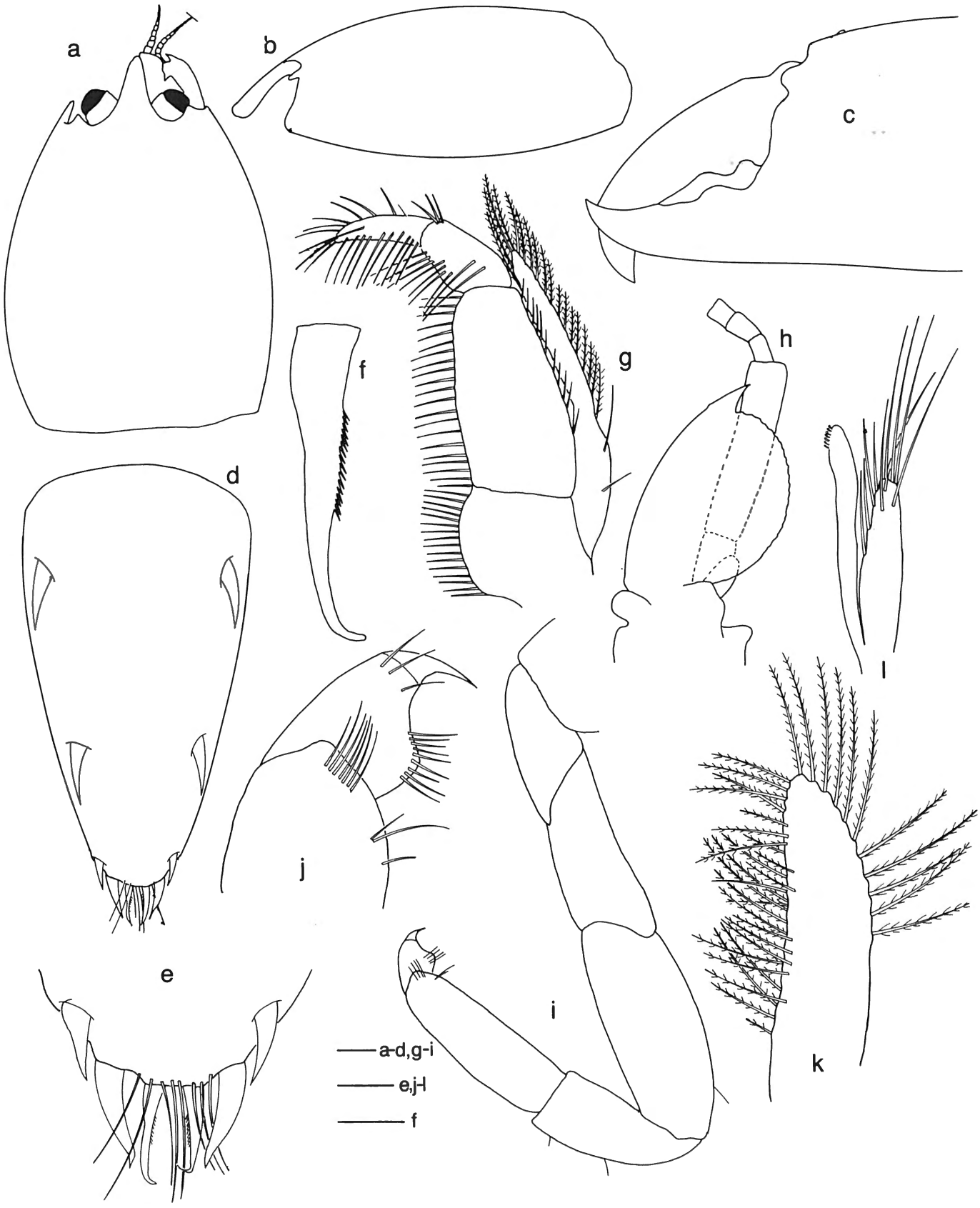

Fig. 5 - *Conchodytes monodactylus* HOLTHUIS. KBIN IG 27951/NAT55. a: carapace, dorsal view; b: carapace, lateral view; c: carpus and dactylus of second pereiopod; d: telson; e: tip of telson; f: detail of intermediate spine; g: third maxilliped; h: antennal scale (setae omitted); i: third pereiopod; j: detail of third pereiopod; k: endopod of first pleopod; l: appendices masculina and interna. All from male (cl 3.7). Scale bars indicate 1mm (a, b), 0.5 mm (c, d, g-i), 0.2 mm (e, j-l) or 0.05 mm (f).

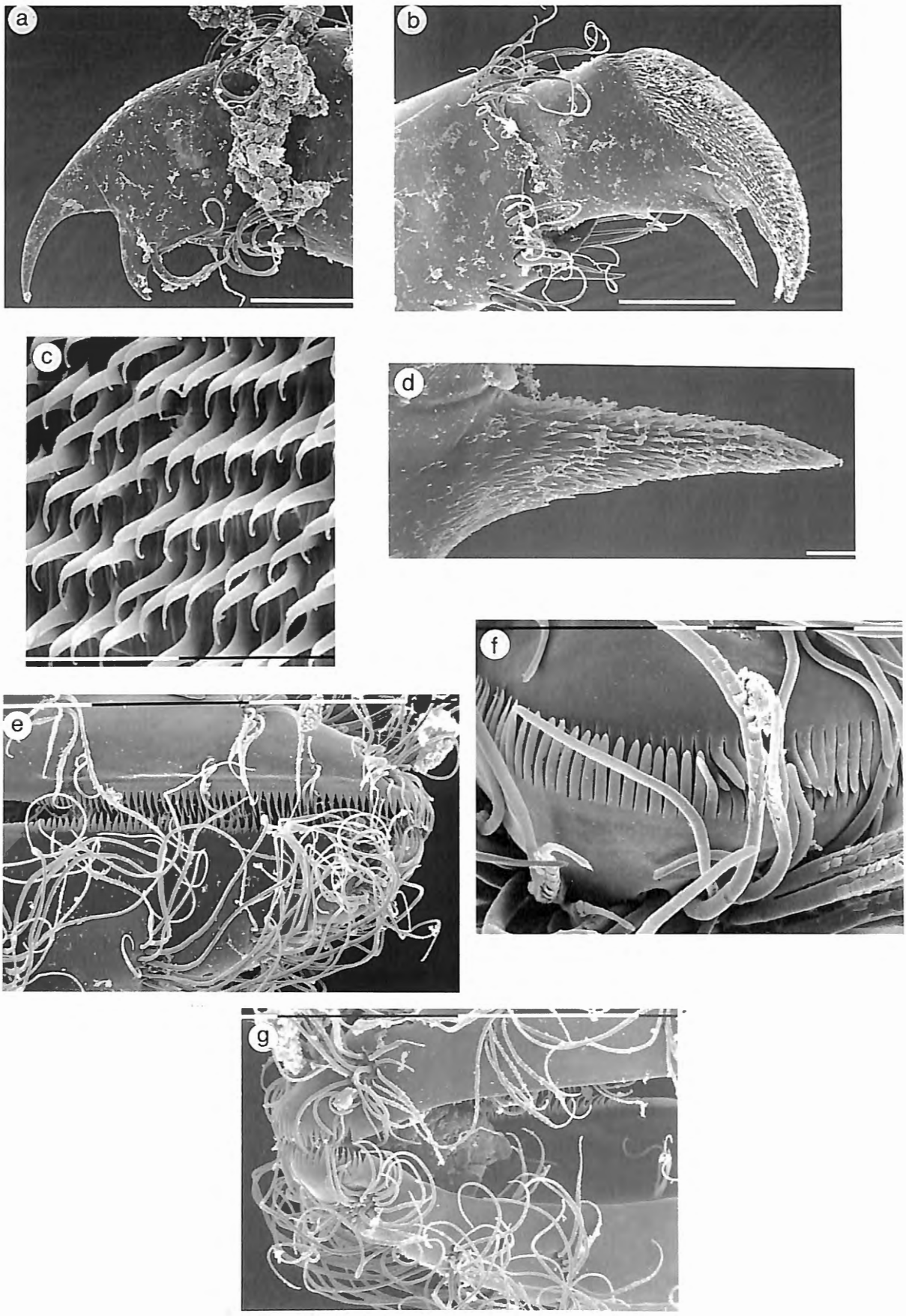

Plate 2 – *Paranchistus armatus* KBIN IG 28056/NAT56, male (cl 3.9); a: dactylus of third pereiopod (259x). *Paranchistus pycnodontae* KBIN IG 28056/NAT62, male (cl 3.3); b: dactylus of third pereiopod (287x); c: detail of micro-scales on dorsal surface (3860x); d: detail of accessory spine (1200x); e: chela of first pereiopod, lateral side (388x); f: detail of cutting edge (1250x); g: mesial side (442x).

MATERIAL

1 male (cl 3.9) KBIN IG 28056/NAT56; Laing Island reef slope, from *Tridacna gigas*, leg. J.-M. TERNATE, 17 October 1993, field no. S93/119. 1 female (cl 9.5) 1 male (cl 3.2) KBIN IG 28056/NAT57; Laing Island reef slope, from *Tridacna gigas*, leg. J.-M. TERNATE, 20 October 1993, field no. S93/128.

REMARKS

The present specimens agree with the descriptions of HOLTHUIS (1952) and BRUCE (1975). Both males have 8 minute dorsal serrations on the rostrum, whilst in the female the dorsal rostral margin is smooth. A distinct pair of setae below the accessory tooth on the dactylus of ambulatory pereiopods is present (Plate 2a), as already noted by BRUCE (1975).

COLOUR

Generally transparent with tiny blue dots all over body, flagellum of antennae deep blue, eyes red. Specimen KBIN IG 28056/NAT56 was transparent with red eyes.

DISTRIBUTION

Moluccas, Irian Jaya, Papua New Guinea, Palau Islands, Queensland, Gilbert and Marshall Islands (BRUCE, 1975). The type locality for *P. armata* is New Ireland (H. MILNE

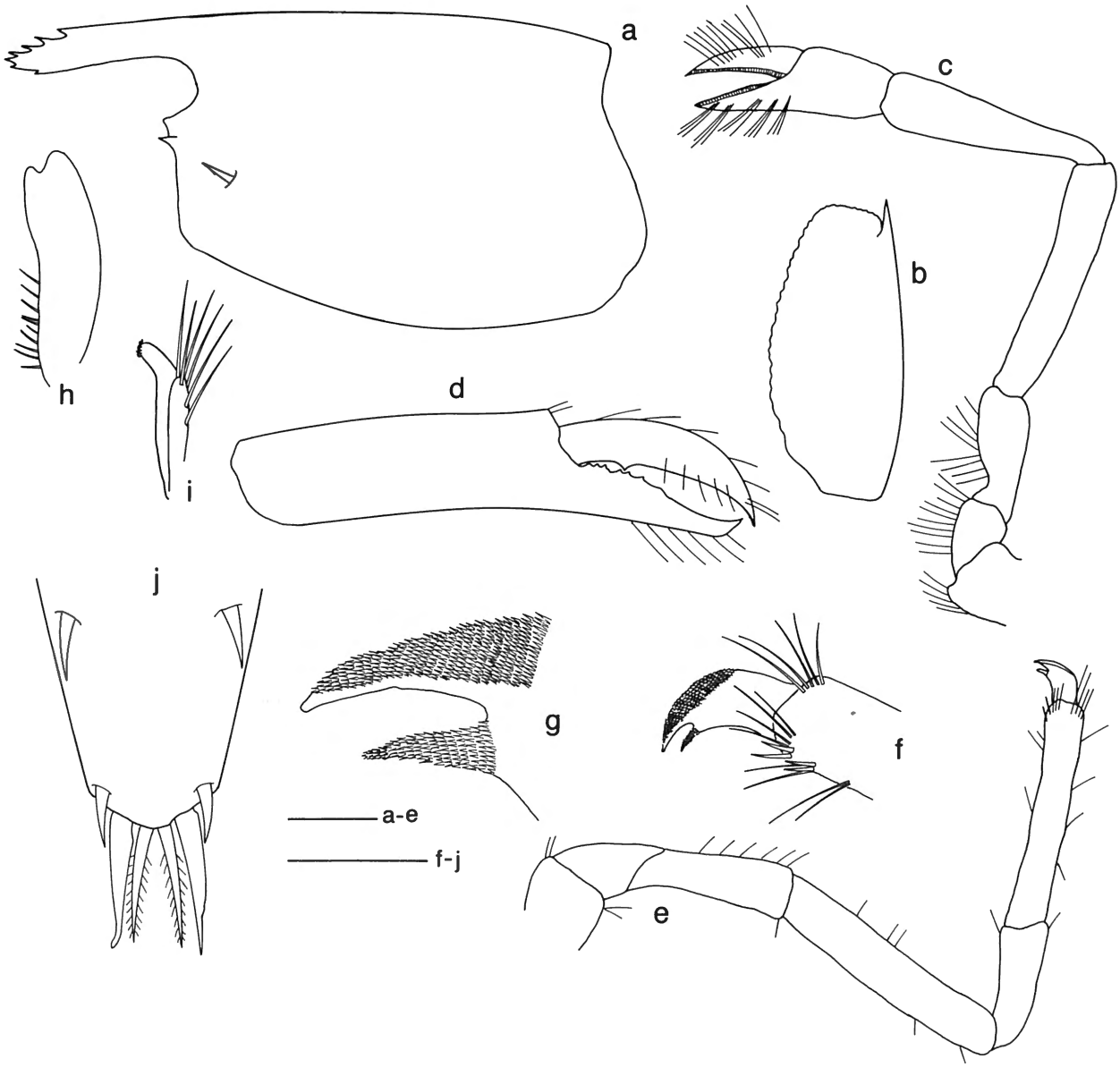

Fig. 6 - *Paranchistus pycnodontae* BRUCE. KBIN IG 28056/NAT62. a: carapace; b: antennal scale; c: first pereiopod; d: chela of second pereiopod, e: third pereiopod, f: carpus of third pereiopod; g: detail; h: first pleopod; i: appendices masculina and interna of second pleopod; j: telson. All from male (cl 3.3). Scale bars indicate 1 mm (a, d), 0.5 mm (b, c, e), 0.2 mm (f, h-j) or 0.05 mm (g).

EDWARDS, 1837) and for *A. biunguiculatus* is Tubetube, Engineer Group (BORRADAILE, 1898), both offshore islands being part of the state of Papua New Guinea. The present record is the first mainland record. Previously reported in association with *Tridacna* sp. and *T. gigas*.

Paranchistus pycnodontae BRUCE, 1978
(Fig. 6, Plate 2b-g)

Paranchistus pycnodontae BRUCE, 1978: 233-239, figs. 1-5.
Paranchistus pycnodontae. — BRUCE, 1980: 180; BRUCE, 1981: 9.
Paranchistus serenei BRUCE, 1983a: 890-891, figs. 7h-i, 9.
Paranchistus serenei. — CHACE & BRUCE, 1993: 91. — FRANSEN, 1995: fig. 2e, Table 1.

MATERIAL

2 ov. females (cl 4.0, 4.2) 1 non-ov. female (cl 3.2) 4 males (cl 2.1-3.2) KBIN IG 27951/NAT58; Davit Wreck, Hansa Bay, 10m depth, from several *Hyotissa hyotis*, leg S. DE GRAVE & H. WILKINS, 31 September 1992, field no. S92/8. 1 male (cl 3.9) KBIN IG 27951/NAT59, Davit Wreck, Hansa Bay, 10m, from *Magnavicula penguin*, leg. S. DE GRAVE, 31 September 1992, field no. S92/9. 1 ov. female (cl 4.9) 2 males (cl 2.8, 3.2) KBIN IG 27951/NAT60, River Wreck, Hansa Bay, 9m depth, from *Magnavicula penguin*, leg S. DE GRAVE, 8 September 1992, field no. S92/52. 1 ov. female (cl 3.1) 1 male (cl 3.1) 2 juv. (cl 1.2, 1.6) KBIN IG 28056/NAT61, Davit Wreck, Hansa Bay, from *Magnavicula penguin*, leg. S.DE GRAVE, field no. S93/7. 1 female (cl 4.1), 1 male (cl 3.3) KBIN IG 28056/NAT62, Davit Wreck, Hansa Bay, 10m depth, from *Hyotissa hyotis*, leg S. DE GRAVE, 29 September 1993, field no. S93/30. 1 ov. female (cl 3.7), 1 male (cl 2.6) KBIN IG 28056/NAT63, Davit Wreck, Hansa Bay, 10m depth, from *Hyotissa hyotis*, leg H. WILKINS, 29 September 1993, field no. S93/31.

DIAGNOSIS

The rostral dentition of the present specimens is 4-5/1-3, with 5/1 being the most frequent combination. In juveniles, the dorsal teeth extend over a larger distance than they do in adults. Antennal spine small and slender, hepatic spine larger and mobile (Fig. 6a). Apex of telson with three pairs of spines (Fig. 6j). Lateral pair smallest, situated on dorsal surface of telson, in advance of posterior margin; intermediate pair longest and stout with tips attenuated; median pair plumose, nearly as long as intermediate pair, uniformly tapering. First pereiopod with subspatulate chelae (Fig. 6c); lateral side with fine denticulations along distal third of cutting edge (Plate 2e-f), gaping proximally on mesial side (Plate 2g). Second pereiopods slender; dactylus of chelae not strongly curved, overreaching fixed finger, cutting edge entire except for single, small tooth proximally; proximal half of fixed finger with series of small teeth (Fig. 6d). Third pereiopod slender (Fig. 6e); ischium 0.61 x length of merus; carpus 0.50 x length of propodus; disto-ventral margin of propodus with two pairs of small to medium sized spines. Dactylus elongate (Fig. 6f), dorsoventrally compressed, dorsal surface covered with dense field of micro-scales (Fig. 6g, Plate 2c); accessory spine well developed, spinulate (Plate 2b, d). In some specimens a small additional denticle was present on the posterior margin of the accessory spine. Male first pleopod with endopod 0.50 x length of exopod; endopod elongate, disto-medial margin with lobe creating a bifurcate appearance to the apex (Fig. 6h), medial margin with series of non-plumose setae proximally. Male second pleopod with appendices inserted at 0.4 of endopod, appendix interna reaching to 0.86 of endopod. Appendix masculina shorter than appendix interna (Fig. 6i); furnished with progressively longer setae along the lateral margin and apex.

REMARKS

The present specimens are attributed to *Paranchistus pycnodontae* due to several characteristics, most notably the denticulate and subspatulate chelae of the first pereiopod and rostral orientation (BRUCE, 1978; CHACE & BRUCE, 1993). Furthermore, in all other characteristics the specimens correspond closely to the type description (BRUCE, 1978). However, the holotype of *P. pycnodontae* did not harbour any spinulation on the accessory tooth on the dactyli of the ambulatory pereiopods, which is present in all the specimens studied. SEM observations (BRUCE, 1980b) on the holotype revealed that the tooth is feebly serrated, which may represent a reduced or aberrant condition. Certainly, in the present material the spinulation is not always easily observed by conventional light microscopy, but was always very evident when observed with SEM. The type description of *P. pycnodontae* is based on a single ovigerous female from Heron Island, Queensland, Australia collected from *Hyotissa hyotis* L. (as *Pycnodonta hyotis*; BRUCE, 1978), with no other specimens or localities being reported upon since, until now. The host species was corrected to *Hyotissa* sp. by BRUCE (1981, 1983c).
This presence of this spinulation was considered to be the sole characteristic distinguishing *Paranchistus serenei* BRUCE from *P. pycnodontae*, a species only known from the type material (one ov. female, two males), obtained from *Ostrea cristagalli* L. from Seram Isl., Indonesia (BRUCE, 1983). CHACE & BRUCE (1993) distinguish both species by the denticulate and subspatulate chelae of the first pereiopod in *P. pycnodontae* versus non-denticulate and non-subspatulate in *P. serenei*. However, examination of the type specimens of *P. serenei* (Museum national d'Histoire naturelle, Paris; catalogue numbers Na 5280-5282), clearly shows the presence of a denticulate, subspatulate and partially gaping chelae in the male holotype, as well as in the female allotype and the male paratype. No other significant differences could be detected between the type specimens of *P. serenei* and either the type description of *P. pycnodontae* or the present specimens. Therefore *P. serenei* BRUCE, 1983 is considered to be a synonym of *P. pycnodontae* BRUCE, 1978.

This species is very closely related to *P. spondylis* SUZUKI, a species only known from the male holotype from Sagami Bay, Japan, collected from *Spondylus barbatus* Reeve (SUZUKI, 1971) and two juvenile specimens from the northern South China Sea (X. LI & R. B. MANNING, pers. comm.). Ultimately, *P. pycnodontae* may fall into the synonymy of *P. spondylis*, as only questionable differences appear to separate both species. The drawing by SUZUKI (1971) indicates some minor spinulation on the accessory tooth on the dactyli of the ambulatory pereiopods, although this is not alluded to in the text. The only difference between the type description of SUZUKI (1971) and the present specimens, appears to be the non-denticulate chelae of the first pereiopod and the movable finger on the chelae of the second pereiopod not over-reaching the fixed finger (*P. spondylis*) versus denticulate and over-reaching in *P. pycnodontae*. The constancy of these characters in *P. spondylis* should be re-assessed in new material of this species, before this question can be resolved.

COLOUR

Generally transparent with scattered orange-red dots all over body and appendages, except antennal flagellum which is transparent.

DISTRIBUTION

Heron Isl. Australia (BRUCE, 1978); Seram Island (BRUCE, 1983a) and Ambon, Indonesia (FRANSEN, 1995). Not previously reported from Papua New Guinea. Previously reported in association with *Hyotissa* sp. (BRUCE, 1978), *Ostrea cristagalli* L. (BRUCE, 1983a) and one species each in the families Pteriidae, Malleidae and Gryphaeidae (FRANSEN, 1995).

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Note added in proof

Paranchistus pycnodontae has recently been recorded from Tuamotu (Fangataufa), French Polynesia (as *Paranchstus serenei)* by POUPIN (1998), from pearl oysters (*Pinctada margaritifera).*

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