Memoirs of Museum Victoria 60(2): 237–242 (2003)

ISSN 1447-2546 (Print) 1447-2554 (On-line)
http://www.museum.vic.gov.au/memoirs

Gnathophyllum taylori, a new species of caridean shrimp from south-eastern Australia (Crustacea: Decapoda: Gnathophyllidae)

SHANE T. AHYONG

Department of Marine Invertebrates, Australian Museum, 6 College St, Sydney, NSW 2010, Australia (shanea@austmus.gov.au)

Abstract Ahyong, S. T. 2003. *Gnathophyllum taylori*, a new species of caridean shrimp from south-eastern Australia (Crustacea: Decapoda: Gnathophyllidae). *Memoirs of Museum Victoria* 60(2): 237–242.

A new species of caridean shrimp, *Gnathophyllum taylori* sp.nov., is described from south-eastern Australia. The new species most closely resembles two Atlantic species, *G. modestum* Hay, 1917, and *G. elegans* Risso, 1816, but is readily distinguished by its banded rather than spotted body colour pattern. *Gnathophyllum taylori* is the third Indo-West Pacific species to be recognised. It differs from *G. americanum*, with which it can be sympatric, by having fewer and narrower dark bands on the body as well as by the rostral dentition, morphology of the orbit and dactyli of the walking legs. The identity of *G. fasciolatum* Stimpson, 1860, a junior synonym of *G. americanum*, is fixed by neotype selection.

Keywords Crustacea, Decapoda, Caridea, *Gnathophyllum taylori*, new species

Introduction

The most recent treatment of the caridean genus *Gnathophyllum Latreille*, 1819, recognised eight species worldwide with two in the Indo-West Pacific – *G. americanum* Guérin-Méneville, 1855, and *G. precipuum* Titgen, 1989 (see Chace and Bruce, 1993). *Gnathophyllum precipuum* is known only from Hawai'i. *Gnathophyllum americanum* is presently recognised as having a circumtropical distribution and in the Indo-Pacific is known from the Red Sea and South Africa to Australia, Japan and French Polynesia. Off eastern Australia, *G. americanum* is known as far south as Port Jackson, Sydney, New South Wales. To date, specimens of *Gnathophyllum* from south-eastern Australia have not been studied in any detail but a popular account recognised two colour forms of *G. americanum* from eastern Australia (Healy and Yaldwyn, 1970). One form bears numerous narrow pale bands on a dark background, and the other form bears relatively few, narrow dark bands on a pale background. The first form is *G. americanum* sensu stricto, whereas the second form represents a new species, described below.

Measurements given for each specimen refer to orbital carapace length followed by total carapace length, given in millimetres (mm). Specimens are deposited in the collections of the Australian Museum, Sydney (AM).

Gnathophyllum taylori sp. nov.

Figures 1–2

Gnathophyllum americanum.—Healy and Yaldwyn, 1970: 46, fig. 21.—Debelius and Baensch, 1994: 506 [not *G. americanum* Guérin-Méneville, 1855]

Gnathophyllum sp.—Debelius, 1999: 196 [colour figure].

Material examined. Holotype: AM P64829, ovigerous female (3.9/5.6 mm), S side of Long Bay, Malabar, New South Wales, 33°58´S, 151°15´E, 4 m, under *Centrostephanus rogersi*, R. Taylor, 3 Apr 2001.

Paratypes: AM P306, 2 ovigerous females (5.0/7.0-5.7/7.7 mm), Port Jackson; AM P1420, 3 females (4.2/5.9 mm, 5.4/7.5 mm, ovigerous 6.9/9.3 mm), Port Stephens, 32º42´S, 152º06´E; AM P12423, 1 ovigerous female (4.0/5.7 mm), Long Reef, Collaroy, 33º44´S, 151º19´E, west end of reef among weeds and boulders, low tide, E. Pope, 15 Feb 1953; AM P38007, 1 ovigerous female (3.8/5.5 mm), SW Elizabeth Reef, Tasman Sea, 29º57.7´S, 159º02.8´E, outer slope, among coral heads and overhangs, A. Gill and S. Reader, 11 Dec 1987.

Comparative material of *Gnathophyllum americanum* Guérin-Méneville, 1855. AM P62995, ovigerous female (4.1/5.8 mm), Rose Bay, Port Jackson, NSW, seine net, D. Hoese 19 Jan 1976 (neotype of *G. fasciolatum* Stimpson); AM P20302, 1 male (4.0/5.4 mm), 1 female (4.2/5.7 mm), Gun Island, Houtman Abrolhos Group, Western Australia, 1.8 m, under rocks near reef edge, N. Coleman, 9 May 1972; AM P18558, 1 male (4.2/5.4 mm), 1 ovigerous female (4.3/5.4 mm), Heron Island, Queensland, Aug 1960.

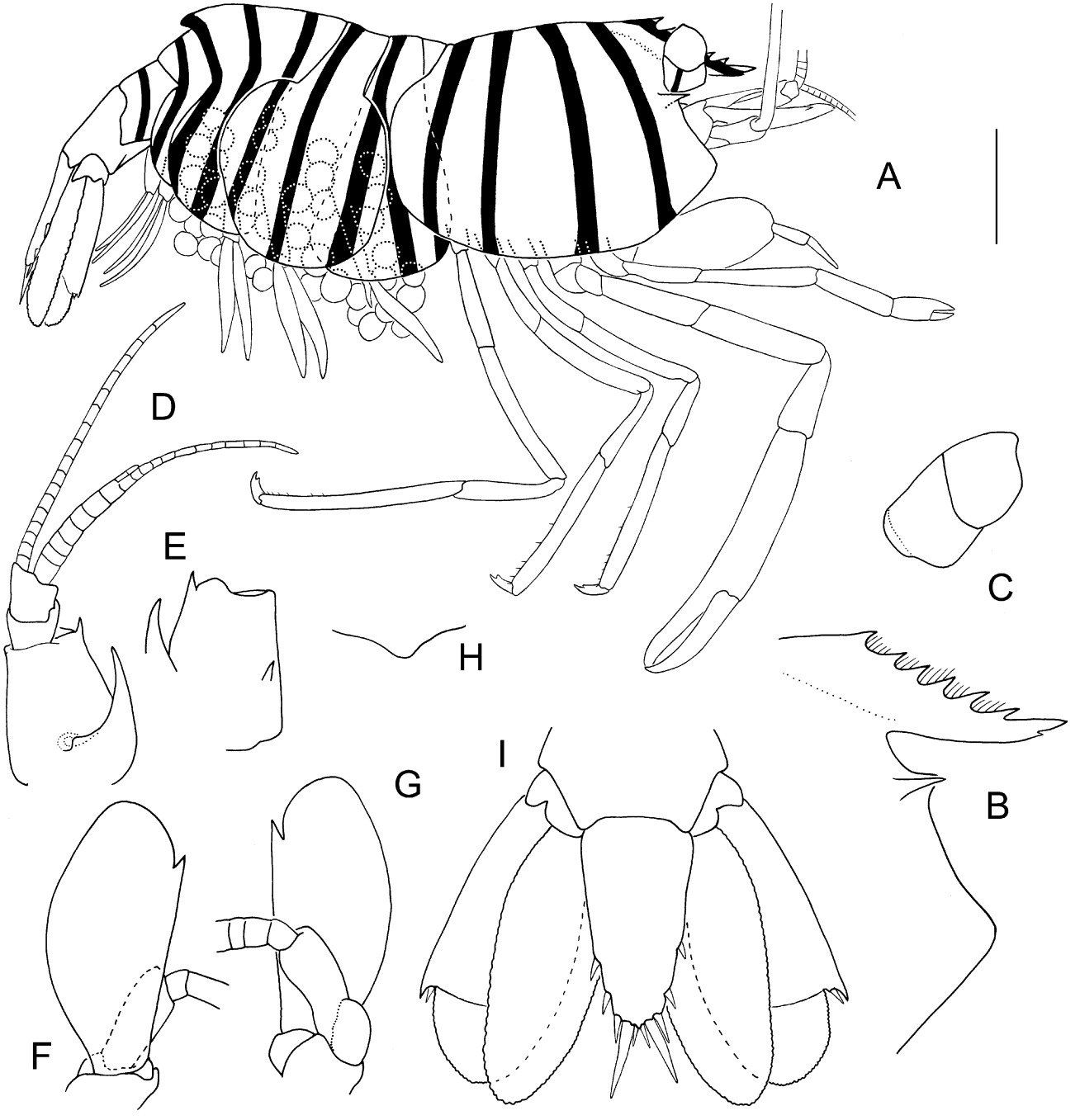

Figure 1. *Gnathophyllum taylori* sp. nov., holotype female cl. 5.6 mm. A, right lateral. B, anterior carapace, right lateral. C, eye, right lateral. D, antennule, right dorsal. E, basal segment of antennule, right ventral. F, antennal peduncle, right dorsal. G, antennal peduncle, right ventral. H, posterior margin of third abdominal somite, dorsal. I, tailfan, dorsal. Scale A = 2 mm, B–I = 1 mm.

Diagnosis. Rostrum with 5 or 6 dorsal teeth and minute subdistal ventral denticle; proximal 1 or 2 teeth behind level of posterior orbital margin. Orbit without narrow posterodorsal sinus. Telson posterior lateral spines arising well anterior to outer pair of posterior spines; telson posterior margin with blunt median tubercle. Cornea of eye with narrow, rounded point. Antennular peduncle with apex of stylocerite not reaching base of second segment. Pereopods 3–5 with dactylus biunguiculate, ventral process shorter than dorsal, broad, subtrapezoid, not evenly tapering. Body pale dull yellow with narrow, widely spaced dark bands; pereopods without banding but with white speckling; sixth abdominal tergite and tail-fan transparent.

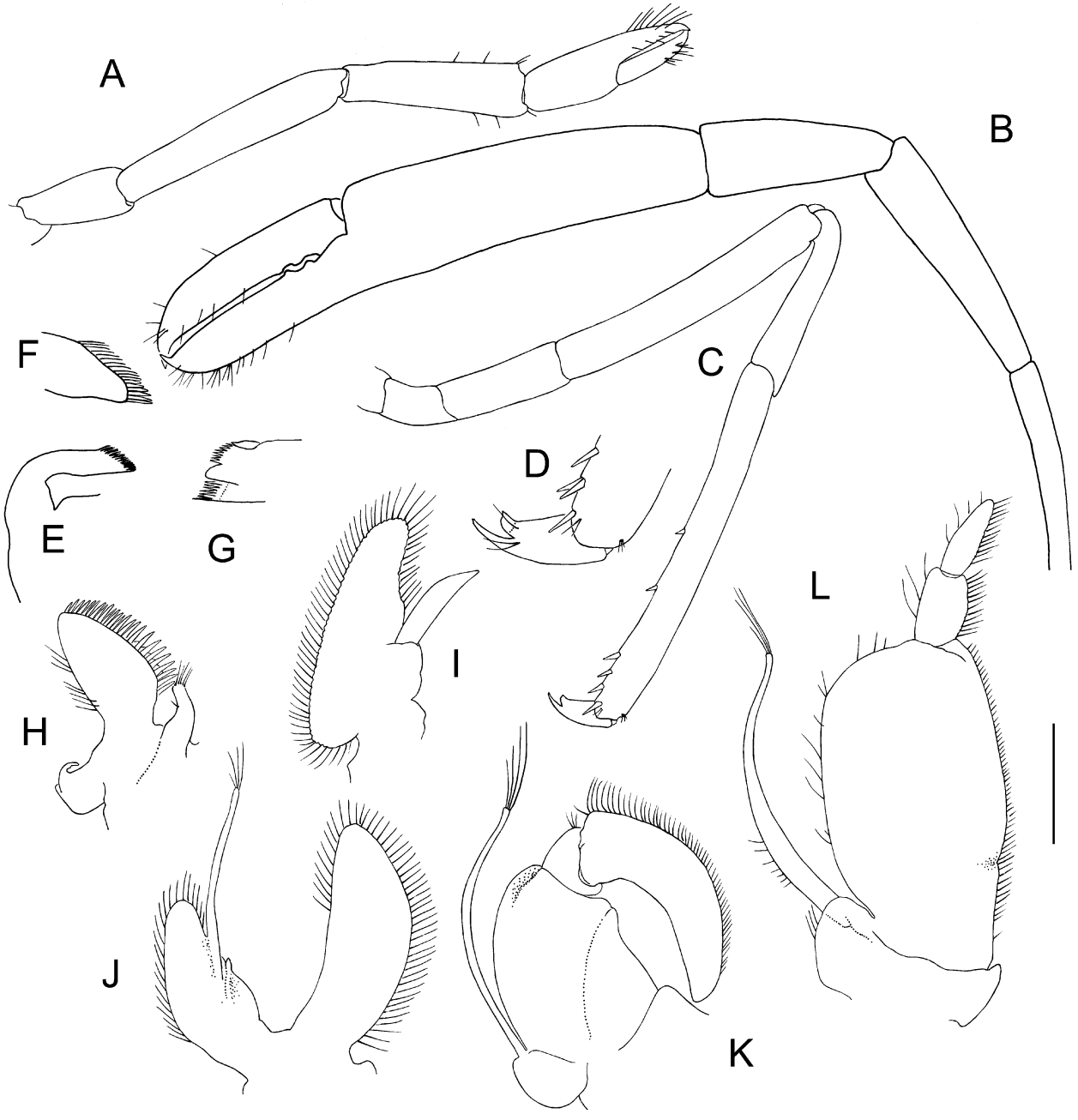

Figure 2. *Gnathophyllum taylori* sp. nov., holotype female cl. 5.6 mm. A, pereopod 1, right lateral. B, pereopod 2, left lateral. C, pereopod 3, right lateral. D, dactylus of pereopod 3, right. E, mandible, right posterior. F, mandible, distal posterior. G, mandible, distal anterior. H, maxilla 1, right posterior. I, maxilla 2, right posterior. J, maxilliped 1, left anterior. K, maxilliped 2, right posterior. L, maxilliped 3, right posterior. Scale A–C, E–L = 1 mm, D = 0.5 mm.

Description. Rostrum not overreaching basal-antennular-segment, with 5 or 6 dorsal teeth and minute subdistal ventral denticle; proximal 1 or 2 teeth behind level of posterior orbital margin. Orbit without narrow posterodorsal sinus. Antennal spine well developed, arising slightly submarginally. Inferior orbital angle with blunt anterior projection at level of antennal spine, extending anteriorly to or slightly beyond apex of antennal spine. Pterygostomian angle of carapace rounded and produced anteriorly beyond antennal spine.

Abdomen smooth, pleura 1–4 rounded; pleuron 5 posterolaterally angular; medial margin of somite 3 rounded, slightly overhanging somite 2. Sixth abdominal somite three-quarters length of telson; height about three-quarters length. Telson twice as long as wide; with 2 pairs of lateral spines and 3 pairs

of spines on posterior margin; anterior lateral spines arising well behind midlength of telson; posterior lateral spines arising well anterior to outer pair of posterior spines; intermediate posterior spines more than twice length of lateral and mesial posterior spines; mesial posterior spines somewhat soft; telson posterior margin with blunt median tubercle.

Cornea of eye pigmented; with blunt apical point.

Antennular peduncle with broad basal segment, apex of stylocerite not reaching base of second segment, with stout distolateral spine overreaching second segment, ventromesial margin with spine at midlength; dorsolateral flagellum totalling 19–28 articles, fused basal portion of 7–13 short articles.

Antennal scale overreaching antennular peduncle; about twice as long as wide; lateral margin straight, distal spine about as long as wide, not reaching to apex of blade.

Mandible small, unequal, without incisor process. Maxillule with upper endite expanded with double row of robust setae medially, setose laterally; lower endite small, blunt, distally setose. Maxilla without endites; scaphognathite well developed, marginally setose; palp elongate, distally tapered, non-setose.

First maxilliped with well developed caridean lobe, exopod slender, distally setose; endite large, setose. Second maxilliped exopod slender, distally setose; endopod with broad basal articles and elongate, curved distal segment, setose on outer margin. Third maxilliped well-developed; endopod with operculiform ischiomerus, about twice as long as wide, evenly setose medially, sparsely setose laterally; exopod long, slender, setose distally and proximolaterally; ischiomerus completely fused with basis.

Pereopods symmetrical left to right. Pereopod 1 distinctly overreaching antennal scale by length of chela and three-quarters length of carpus; occlusal margins of dactylus and pollex smooth; dactylus almost as long as palm. Pereopod 2 overreaching antennal scale by length of chela and carpus; occlusal margins of dactylus and pollex smooth on distal three-quarters sinuous on proximal third; dactylus more than $1^1/_2$ times palm length. Pereopods 3–5 similar, merus 6–7 times as long as wide. Distal half of propodus with 7–10 movable spines along lower margin. Dactylus biunguiculate, dorsal process slender, evenly tapering to sharp point; ventral process shorter than dorsal, broad, trianguloid to subtrapezoid, not evenly tapering.

Uropodal protopod unarmed dorsally or ventrally; exopod with stout laterodistal spine flanked by smaller movable spine mesially; endopod ovate, unarmed.

Colour in life. Body pale dull translucent yellow with narrow, widely spaced dark purplish bands; 4–5 bands on carapace, 6–8 bands on abdomen; margins of dark bands slightly brighter than base colour of body. Ground colour of cephalothorax sometimes appearing deeper yellow than that of abdomen owing to colour of viscera. Pereopods without banding but with white or yellowish speckling. Sixth abdominal somite and tail-fan transparent. Third maxilliped with dark purple "O" on ischiomerus.

Etymology. Named for Richard Taylor, Leigh Marine Laboratory, New Zealand (formerly of University of New South Wales, Australia), who collected the holotype.

Distribution. NSW, Elizabeth Reef south to Long Bay.

Remarks. Gnathophyllum taylori sp.nov. is the third species of the genus to be recognised from the Indo-West Pacific. *Gnathophyllum precipuum*, from Hawai'i is readily distinguished from *G. taylori* by having two instead of five or six dorsal rostral teeth, and by lacking the dark banding on the body. Instead, *G. precipuum* has a basic colour pattern of "irregular reddish-brown spots on light yellow background" (Titgen, 1989: 206). The only other species of *Gnathophyllum* known from the Indo-West Pacific is *G. americanum*. As in *G. taylori*, *G. americanum* bears dark banding on the body, but of a different pattern. Morphologically, however, *G. taylori* most closely approaches the Atlantic species, *G. elegans* (Risso, 1816) and *G. modestum* Hay, 1917, in having the posterior-most of the dorsal rostral spines situated behind the posterior orbital margin, in having the posterior pair of lateral telson spines distinctly anterior to the posterior pair of spines, and in having the apex of the stylocerite not reaching the base of the second antennular segment. The new species is readily distinguished from *G. modestum* and *G. elegans* by the considerably shorter laterodistal spine on the antennal scale in which it is about as long as wide instead of about twice as long as wide. *Gnathophyllum taylori* also differs from *G. modestum* and *G. elegans* by the banded rather than uniform or spotted colour pattern of the body (Manning, 1963).

Both *G. taylori* and *G. americanum* bear transverse banding on the body, but the nature of the banding is the most obvious distinguishing feature. In *G. americanum* the dark bands are broader and about twice as numerous as in *G. taylori*. The broader and more numerous dark bands in *G. americanum* give the body a dark overall appearance whereas in *G. taylori*, the background colour is dull pale yellow with narrow, widely spaced dark purplish bands giving the body a light overall appearance. In addition, the pereopods are banded in *G. americanum*, but not banded in *G. taylori*. The ground colour of the body of *G. taylori* may vary somewhat in the density of pale yellow pigmentation. Where the base pigmentation is less dense, the colour of the internal organs is visible through the carapace giving the appearance of a deeper yellow cast to the cephalothorax as figured by Debelius and Baensch (1994) and Debelius (1999). Conversely, the base yellow pigmentation in the holotype was denser, giving a more uniformly yellow cast to the whole body.

Aside from differences in colour pattern, *G. taylori* differs morphologically from *G. americanum* in having the proximal tooth of the dorsal rostral series on the carapace arising behind instead of anterior to the posterior orbital margin, in having a higher range of dorsal rostral teeth (5 or 6 instead of 3–6), in lacking a short narrow sinus in the posterodorsal margin of the orbit, and in having a broad rather than slender ventral tooth on the dactyli of pereopods 3–5.

A character that might prove useful in distinguishing species of *Gnathophyllum* is the fusion of the ischiomerus with the basis of the third maxilliped. In *G. taylori* and apparently in *G. ascensione* Manning and Chace, 1991 (see their fig. 5P), the ischiomerus and basis of the third maxilliped are fused. Conversely, the ischiomerus and basis appear to be clearly demarcated in *G. americanum* from the Canary Islands and

Micronesia, and *G. precipuum* as figured by Kubo (1940: fig. 8F), Holthuis (1949b: fig. 6H) and Titgen (1989: fig. 2I) respectively. The accuracy of these figures requires verification, but if accurate, indicate that the degree of fusion of the ischiomerus and basis of the third maxilliped has diagnostic value for species of *Gnathophyllum*. It is noteworthy then, that all Australian specimens of *G. americanum* examined resemble *G. taylori* in the fusion of the ischiomerus and basis of the third maxilliped, unlike those figured by Holthuis (1949b) and Kubo (1940). The possible heterogeneity in *G. americanum* also indicates the potential validity of one of its synonyms, *Gnathophyllum fasciolatum* Stimpson, 1860.

Gnathophyllum fasciolatum Stimpson, 1860, was described from Port Jackson, Sydney, which is well within the range of *G. taylori*. Stimpson's (1860) species has long been established as a junior synonym of *G. americanum* (e.g. Rathbun, 1901; Armstrong, 1940; Manning, 1963; Chace and Bruce, 1993). *Gnathophyllum americanum*, first described from Cuba, is presently regarded as a near-cosmopolitan species but could prove to be a species complex (this study, Davie, 2002). The holotype of *G. fasciolatum*, however, is lost and Stimpson's (1860) brief account could apply to either species of *Gnathophyllum* from the Sydney region (let alone almost any other species of the genus were colour pattern not considered). *Gnathophyllum fasciolatum*, an older name, threatens the nomenclatural stability of *G. taylori*. Therefore, a neotype designation for *G. fasciolatum* is justified. A specimen of *G. americanum* from Rose Bay, Port Jackson, is herein designated as the neotype of *G. fasciolatum* to fix the identity of the species (Fig. 3). The neotype is an ovigerous female, cl. 5.8 mm, registered as AM P62995. Revision of *G. americanum* is beyond the scope of this study but should *G. fasciolatum* be removed from synonymy, its identity is now stabilised through the present neotype selection. Other synonyms of *G. americanum* are not identifiable with *G. taylori*. In both *G. zebra* Richters, 1880 (described from Mauritius) and *G. miniscularium* Armstrong, 1940 (described from Bermuda), the posterior-most dorsal rostral tooth is placed anterior to the orbit instead of behind as in *G. taylori*. *Gnathophyllum tridens* (type locality Rikitea, French Polynesia; redescribed by Holthuis, 1949a) bears three dorsal rostral teeth and is within the range of *G. americanum* (3–6) but not of *G. taylori* (5–6). *Gnathophyllum pallidum* Ortmann, 1890, also described from French Polynesia, was neither illustrated nor described in detail, but is well within the known range of *G. americanum*, and well outside that of *G. taylori*.

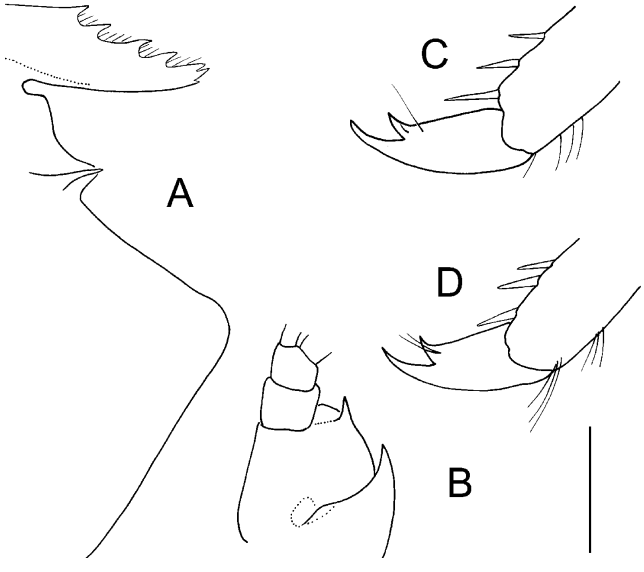

Figure 3. *Gnathophyllum americanum*, (neotype of *G. fasciolatum*), female cl. 5.8 mm. A, anterior carapace, right lateral. B, antennule, right dorsal. C, dactylus of pereopod 3, right. D, dactylus of pereopod 5, right. Scale A, B = 1 mm, C, D = 0.5 mm.

The holotype of *G. taylori* was collected from beneath the echinoid, *Centrostephanus rogersi*, but other specimens were collected from under boulders or amongst marine algae. *Gnathophyllum taylori* is temperate water species, in contrast to the primarily tropical *G. americanum*. All known specimens of *G. taylori* are from New South Wales, Australia. *Gnathophyllum americanum* is known as far south as Port Jackson on the east coast and as far south as the Abrolhos Islands on the west coast. The distribution of *G. taylori* thus overlaps that of *G. americanum* in south-eastern Australia. *Gnathophyllum americanum* was figured in colour from near Grafton and Lord Howe Island, New South Wales by Healy and Yaldwyn (1970: pl. 20), and Coleman (2002: 50) respectively. Debelius and Baensch (1994) and Debelius (1999: 196) figured *G. taylori* in colour, photographed by R. Kuiter, at Seal Rocks, New South Wales at 2 m depth.

Acknowledgements

Thanks to Richard Taylor and Peter Schüpp, both formerly University of New South Wales, for collecting and photographing the holotype respectively, and thanks to Rudie Kuiter for information regarding his photograph of *G. taylori* from Seal Rocks. Comments from two anonymous reviewers are gratefully acknowledged. This study was supported by an Australian Postdoctoral Fellowship from the Australian Research Council to STA.

References

Armstrong, J.C. 1940. New species of Caridea from the Bermudas. *American Museum Novitates* 1906: 1–10.

Chace, F.A., and Bruce, A.J. 1993. The caridean shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition 1907–1910, part 6: Superfamily Palaemonoidea. *Smithsonian Contributions to Zoology* 543: 1–152.

Coleman, N. 2002. *Lord Howe Island Marine Park: Sea Shore to Sea Floor.* Neville Coleman's Underwater Geographic: Springwood. 96 pp.

Davie, P.J.F. 2002. Crustacea: Malacostraca: Phyllocarida, Hoplocarida, Eucarida (Part 1). In: Wells, A. and Houston, W. W. K. (eds) Zoological Catalogue of Australia. Vol. 19.3A. CSIRO Publishing: Melbourne. xii + 551 pp.

Debelius, H. 1999. *Crustacea Guide of the World.* IKAN – Unterwasserarchiv, Frankfurt. 321 pp.

Debelius, H., and Baensch, H.A. 1994. *Marine Atlas*.Mergus: Melle. 1215 pp.

Guérin-Méneville, F.E. 1855–1856. Crustaceos. In: Ramon de la Sagra, *Historia fisica politica y natural de la isla de Cuba, Historia Natural* 7: v–xxxii, 8, pls 1–3.

Hay, W.P. 1917. Preliminary descriptions of five new species of crustaceans from the coast of North Carolina. *Proceedings of the Biological Society of Washington* 30: 71–73.

Healy, A., and Yaldwyn, J. 1970. *Australian crustaceans in colour.* Reed: Sydney. 112 pp.

Holthuis, L.B. 1949a. Note sur le type du *Gnathophyllum tridens* Nobili, 1906 (Crustacés, Décapodes). *Bulletin du Muséum d'Histoire Naturelle, Paris* (2) 21(2): 210–214.

Holthuis, L.B. 1949b. The Caridean Crustacea of the Canary Islands. *Zoologische Mededelingen, Leiden* 30: 227–255.

Kubo, T. 1940. On some littoral shrimps collected from Micronesia. *Journal of the Imperial Fisheries Institute, Tokyo* 34(1): 77–99.

Latreille, P.A. 1819. Salicoques, Carides, Latr. *Nouveau Dictionnaire d'Histoire Naturelle* 30: 68–73.

Manning, R.B. 1963. The east American species of *Gnathophyllum* (Decapoda, Caridea), with the description of a new species. *Crustaceana* 5(1): 47–63.

Nobili, G. 1906. Diagnoses préliminaires de Crustacés, Décapodes et Isopodes nouveaux recueillis par M. le Dr. G. Seurat aux îles Touamotou. *Bulletin du Muséum d'Histoire Naturelle, Paris* 12(5): 256–270.

Ortmann, A. 1890. Die Unterordnung Natantia Boas: Die Decapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und z. Z. im Strassburger Museum aufbewahrten Formen, I. *Zoologische Jahrbücher. Abtheilung für Systematik, Geographie und Biologie der Tiere* 5: 693–750

Rathbun, M.J. 1901. The Brachyura and Macrura of Porto Rico. *Bulletin of the United States Fish Commission* 20(2): 3–126.

Richters, F. 1880. Decapoda. Pp. 139–178 in: Möbius, X. *Beiträge zur Meersfauna der Insel Mauritius und der Seychellen.* Berlin.

Risso, A. 1816. *Histoire naturelle des Crustacés des environs de Nice.* Librairie Grecque-Latine-Allemande: Paris 175 pp, 173 pls.

Stimpson, W. 1860. Prodromus Descriptionis Animalium Evertabratorum, quae in expeditione ad Oceanum Pacificum septentrionalem a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rogers ducibus, observavit descripsit. Pars VIII. Crustacea Macrura. *Proceedings of the Academy of Natural Sciences of Philadelphia* 1860: 22–47.

Titgen, R.H. 1989. Gnathophyllid shrimp of the Hawaiian Islands, with the description of a new species of *Gnathophyllum* (Decapoda. Gnathophyllidae) *Crustaceana* 56(2): 200–210.