

A Redescription of *Periclimenes yaldwyni* Holthuis (*Brachycarpus audouini* Bate, 1888, Crustacea, Decapoda, Palaemonidae) and Its Occurrence in Australian Waters¹

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ABSTRACT: The pontonine shrimp *Periclimenes yaldwyni* Holthuis is recorded for the first time from Australian waters and is redescribed and figured in detail to augment the original description and illustration provided by Bate (1888) as *Brachycarpus audouini*. The presently available data on carideans (eight spp.) occurring in both Australian and New Zealand waters are summarized.

IN HIS 1888 REPORT ON the caridean shrimps collected by the *Challenger* Expedition, Bate provided a description of a single specimen of a shrimp under the name of *Brachycarpus audouini*. This ovigerous female was collected from 10 fms (18.3 m) at 41°4' S, 174°19' E, in Cook Strait, New Zealand, and the species has since been found to be moderately abundant in New Zealand waters. The holotype specimen, lacking many appendages (Kemp 1925), is now preserved in the collections of the British Museum (Natural History), registration number 1960.1.30:2. The species was subsequently transferred to the pontonine genus *Periclimenes* by Kemp (1925) and later renamed *P. batei* by Holthuis (1950). This name was later found to be invalid and a new name, *P. yaldwyni*, was provided by Holthuis (1959). The species proved to be common in New Zealand's shallow coastal waters and was considered to be endemic to New Zealand (Richardson and Yaldwyn 1958; Yaldwyn 1974). Its discovery in Tasmanian waters is therefore of interest and increases slightly the small number of carideans found in both southern Australian and New Zealand waters.

Periclimenes yaldwyni Holthuis
Figures 1–6

RESTRICTED SYNONYMY: *Brachycarpus audouini* Bate, 1888: 798–800, pl. 129, figs. 5, 5k.; *Periclimenes (Ancylocaris) audouini* Kemp, 1925: 326; *Periclimenes batei* Holthuis, 1950: 22; *Periclimenes (Harpilius) yaldwyni* Holthuis, 1959: 197–199 (full synonymy).

MATERIAL EXAMINED: (i) 1♂, 3 ovig. ♀, Mercury Passage, Maria Island, Tasmania, ca. 42°40' S, 148°00' E, 16–28 m, 15 April 1983, coll. D. A. Cropp, Northern Territory Museum (NTM) Cr.000434; (ii) 1♂, 2♀, *idem*, no date, NTM Cr.000386; (iii) 1♂, 4♀ (3 ovig.), Shelly Bay, Wellington, New Zealand, 28 June 1953, coll. J. Moreland.

DESCRIPTION: Medium-sized, robustly built pontonine shrimp of generally smooth, sub-cylindrical body form. All specimens with many pereopods detached.

Carapace smooth with rostrum well developed, acute, deep, extending well beyond antennal peduncle; lateral carinae feebly developed; dorsal and ventral laminae well developed, with 8–9 dorsal, 4–5 ventral teeth, generally 9/5; distal dorsal and ventral teeth sometimes minute; first two dorsal teeth situated on carapace: interstices between rostral teeth setose. Orbit feebly developed. Supraorbital spines absent. Superior orbital angle acute, produced. Antennal spine slender, submarginal, below inferior orbital angle. Hepatic spine slender, below and posterior to antennal spine. Anterolateral and posterolateral angles of branchiostegite rounded.

Abdomen of normal proportions, smooth, with third segment not posterodorsally pro-

¹ Manuscript accepted 17 April 1984.

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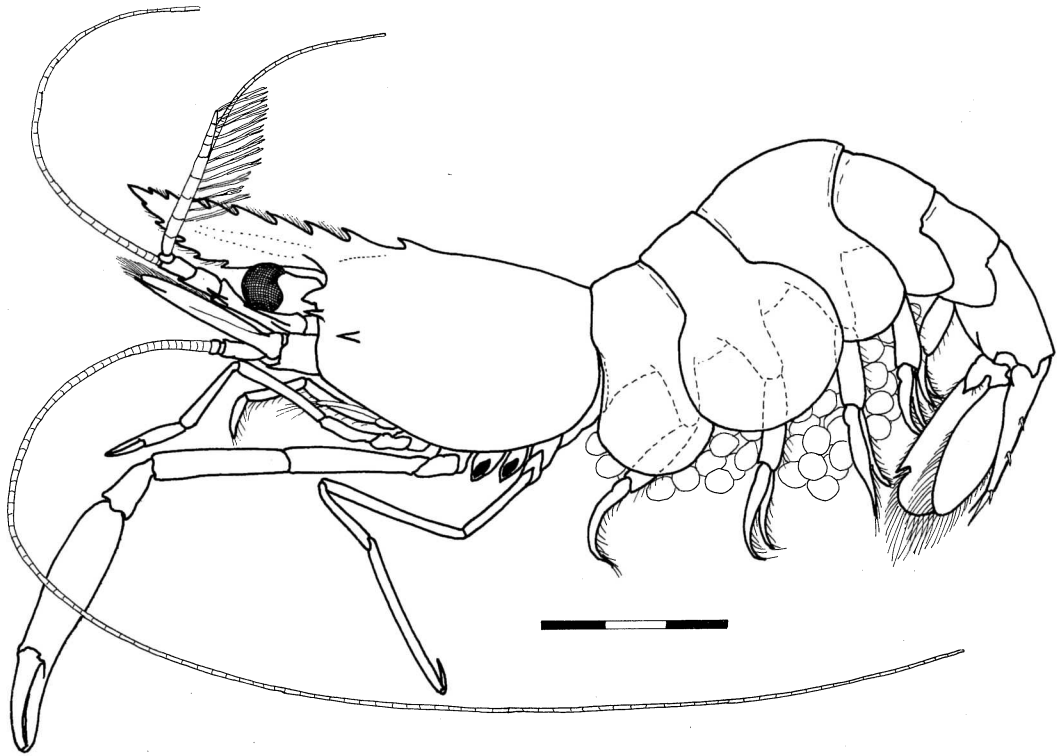


FIGURE 1. *Periclimenes yaldwyni* Holthuis. Ovigerous female, Mercury Passage, Maria Island, Tasmania (scale in mm).

duced. Sixth segment about 1.5 times length of fifth, 1.5 times longer than deep, with postero-lateral angle acutely and posteroventral angle bluntly produced. Pleura of first three segments broadly rounded, expanded in females; fourth and fifth pleura bluntly produced. Telson about 1.3 times length of sixth segment, 2.25 times longer than wide, anterior width about 3.1 times posterior width; two pairs of subequal dorsal spines present at ca. 0.43 and 0.67 of telson length; lateral posterior spines slightly smaller than dorsal, intermediate spines slender, about 4.7 times length of lateral spines, equal to ca. 0.3 of telson length and 1.8 times length of setulose submedian spines.

Eyes well developed with large globular cornea with dorsal accessory pigment spot. Stalk about as long as wide, slightly compressed, slightly narrower than corneal width.

Antennae normal. Antennule with proximal segment of peduncle about 2.2 times longer than wide; stylocerite slender, exceed-

ing half segment length, statocyst well developed, with granular statolith; anterolateral angle produced with a slender acute lateral tooth which exceeds half length of intermediate segment. Intermediate segment with lateral lobe, length equal to 0.25 of proximal segment, slightly shorter than distal segment. Upper flagellum biramous, with proximal 5-6 segments fused; shorter ramus with four segments, about 18 groups of aesthetascs; longer ramus filiform, shorter than carapace length; lower flagellum slender, longer than carapace length.

Antenna with robust basicerite, with strong distolateral tooth, ischiocerite and merocerite normal, carpocerite about twice as long as wide, not exceeding midpoint of scaphocerite, which is 3.5 times longer than wide, broadest centrally, with lateral margin straight with strong slender acute distal tooth that fails to exceed rounded anterior margin of lamella; flagellum well developed.

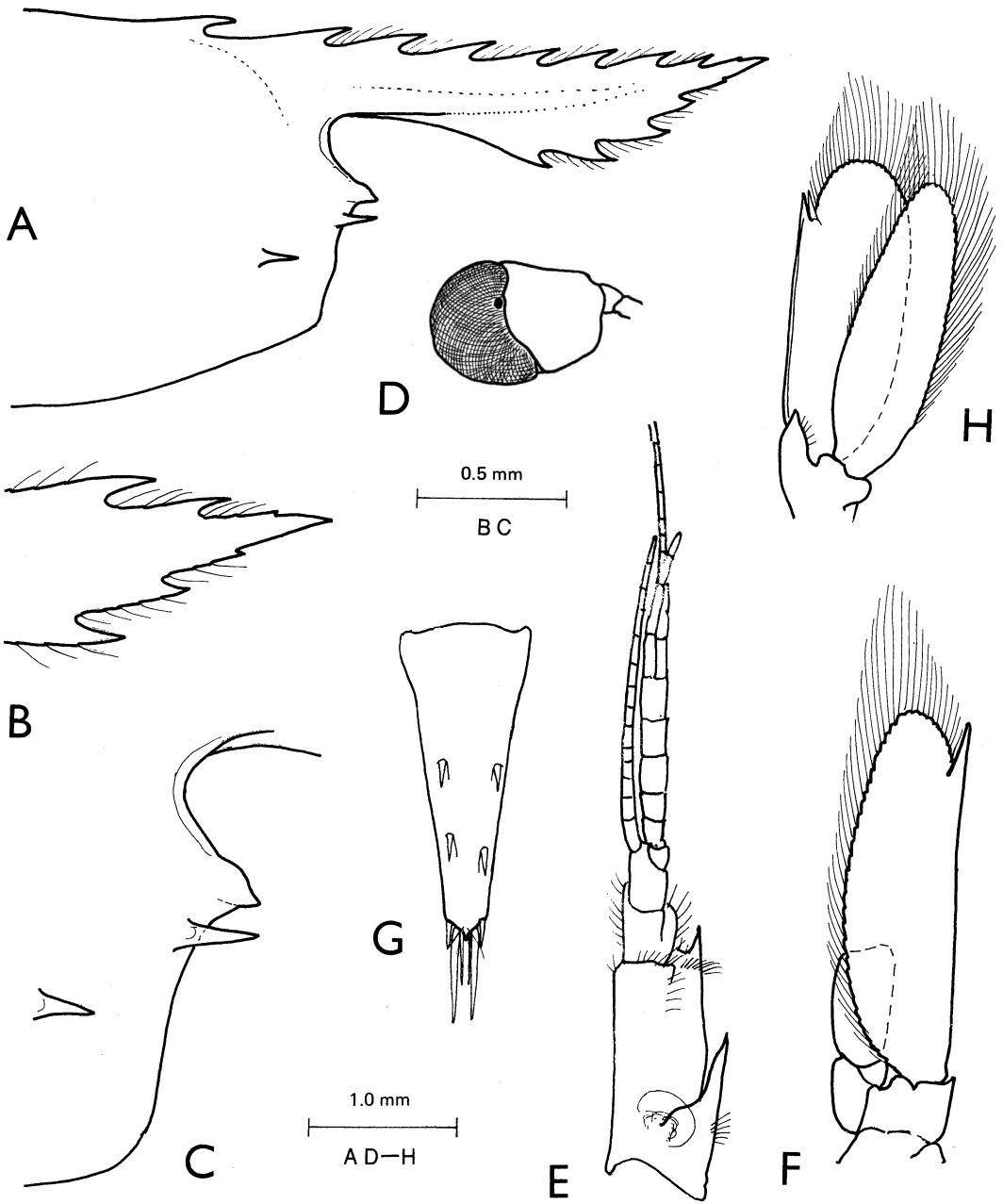


FIGURE 2. *Periclimenes yaldwyni* Holthuis, ovigerous female. A, anterior carapace and rostrum. B, tip of rostrum. C, inferior orbital angle. D, eye. E, antennule. F, antenna. G, telson. H, uropod.

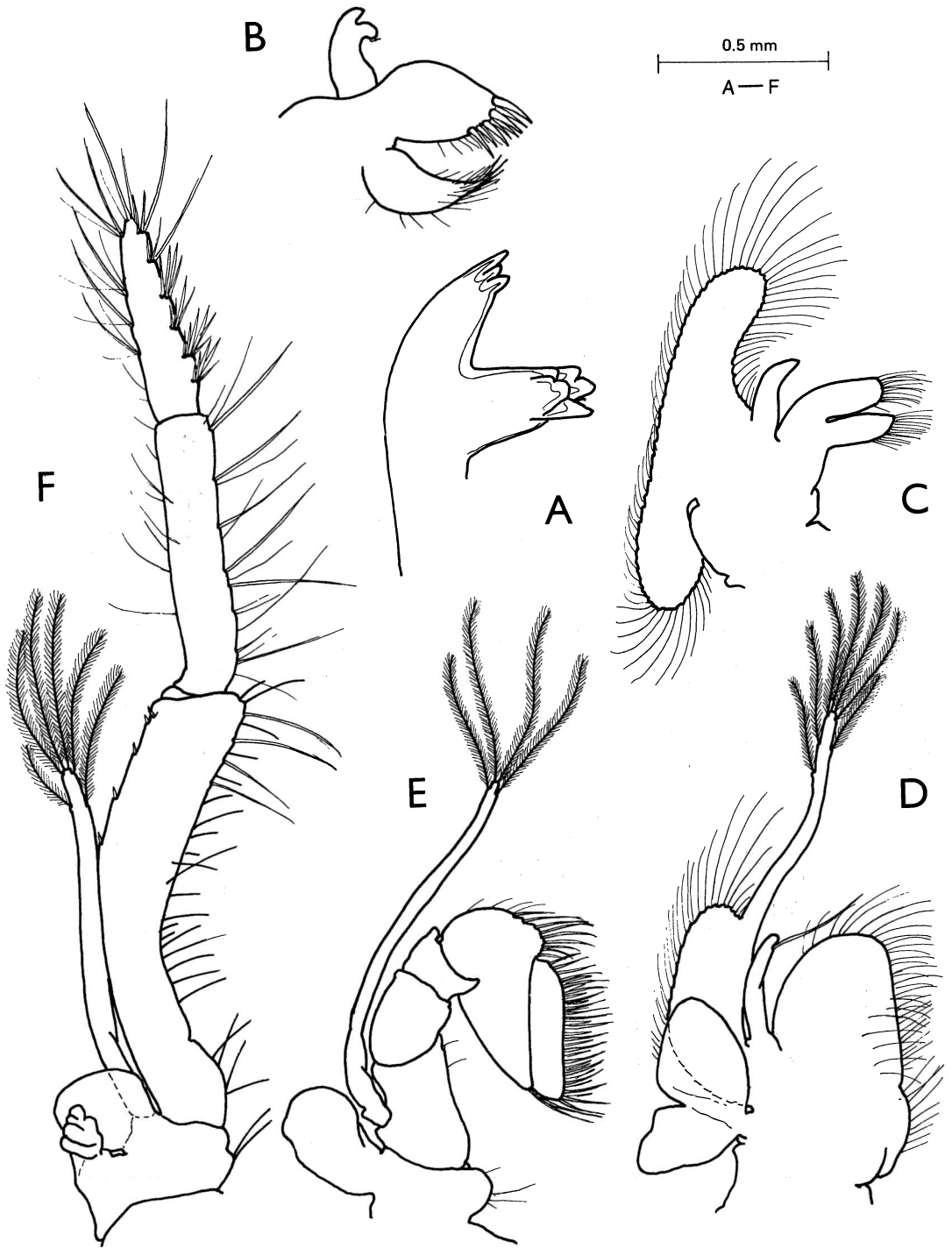


FIGURE 3. *Periclimenes yaldwyni* Holthuis, ovigerous female. A, mandible. B, maxillula. C, maxilla. D, first maxilliped. E, second maxilliped. F, third maxilliped.

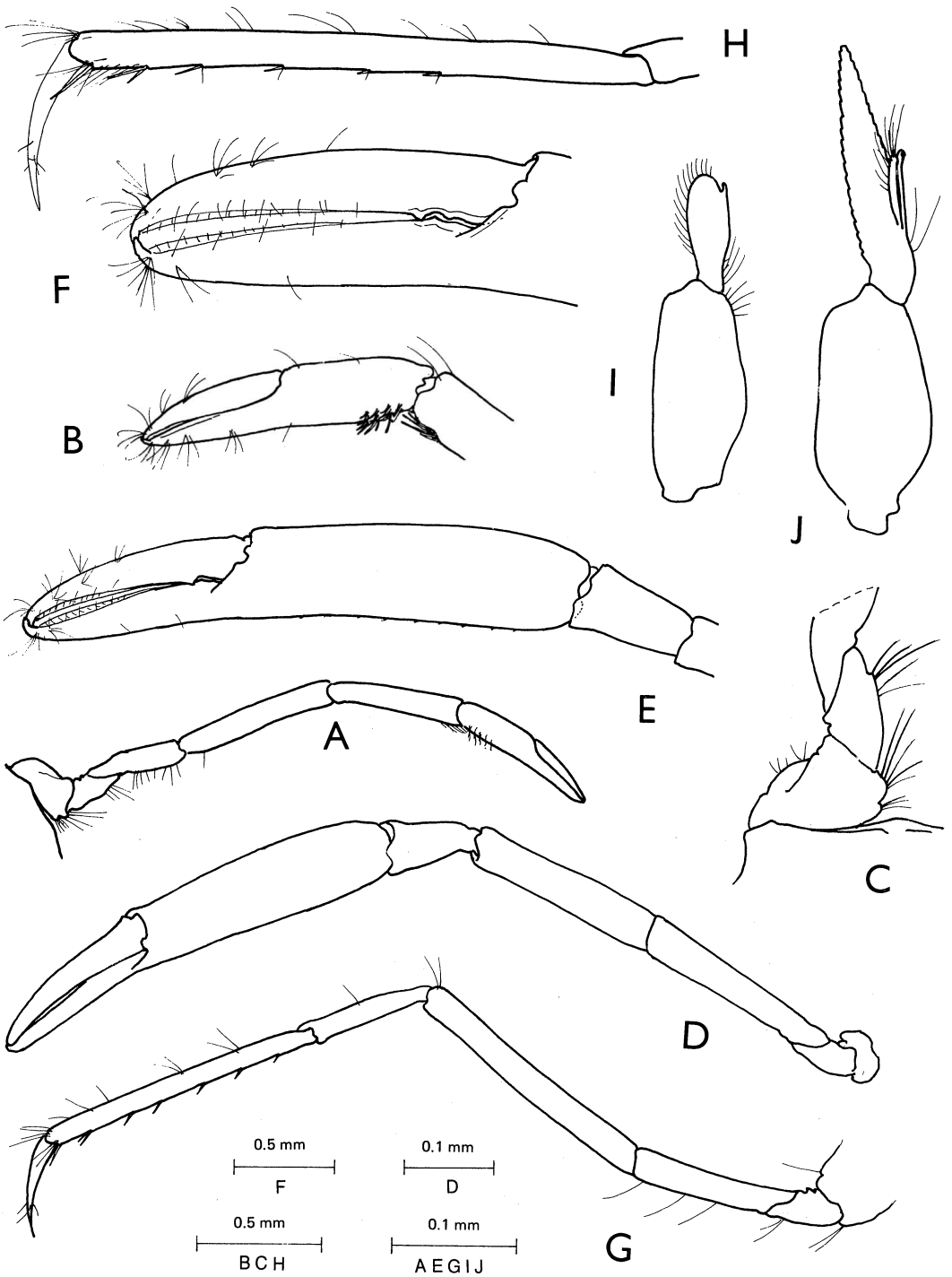


FIGURE 4. *Periclimenes yaldwyni* Holthuis, ovigerous female. A, first pereiopod. B, same, chela. C, same, basis, coxa, and fourth thoracic sternite. D, major second pereiopod. E, same, chela and carpus. F, same, fingers. G, third pereiopod. H, fifth pereiopod, propod and dactyl. Male. I, first pleopod, exopod removed. J, second pleopod, exopod removed.

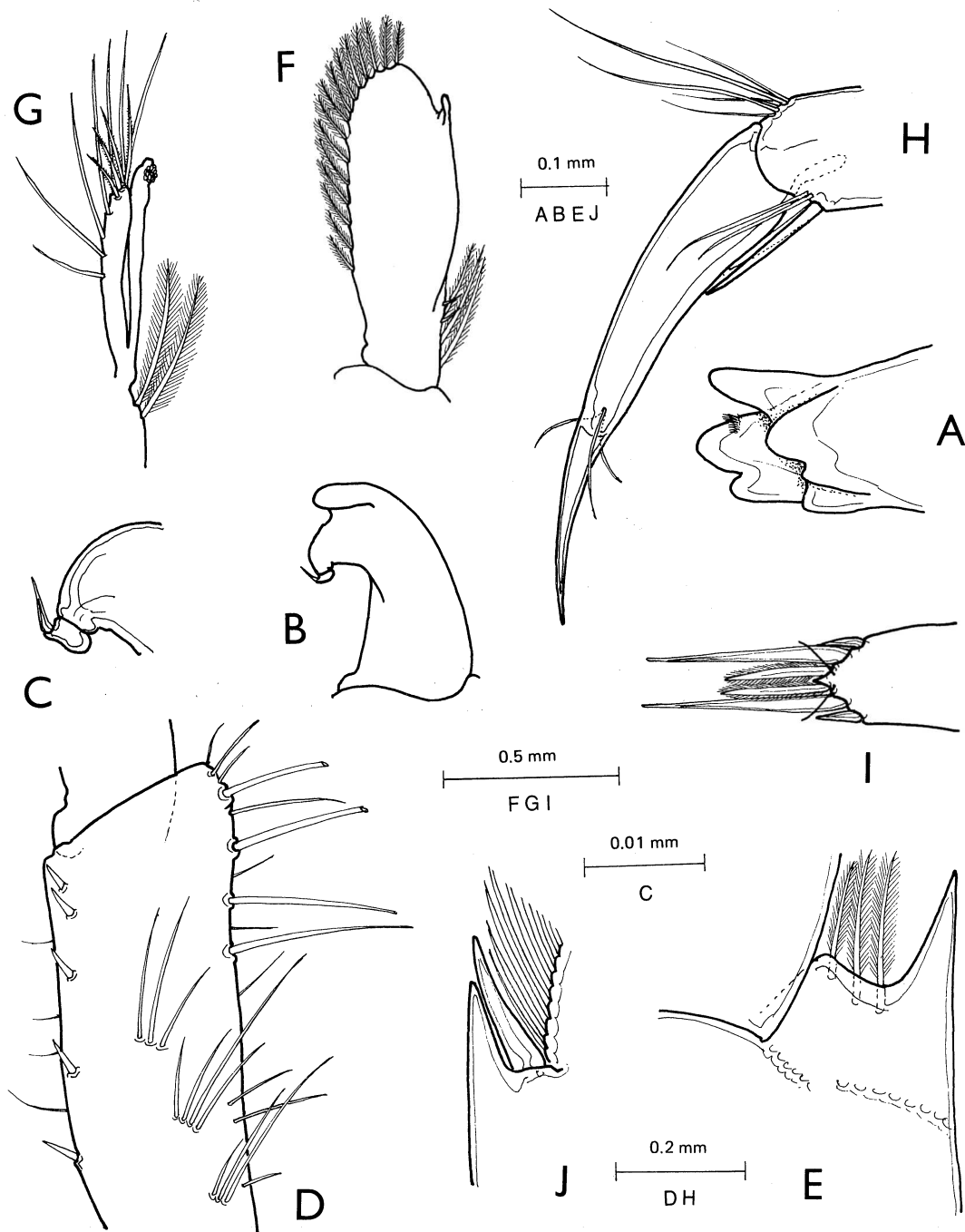


FIGURE 5. *Periclimenes yaldwyni* Holthuis. A, molar process of mandible. B, palp of maxillula. C, same, lower lobe. D, third maxilliped, distal merus. E, antennule, distolateral angle of proximal segment. F, first pleopod, endopod. G, second pleopod, appendices interna and masculina. H, third pereiopod, dactyl. I, posterior telson spines. J, distolateral angle of exopod of uropod. A-E, I-J, ovigerous female. G-H, male.

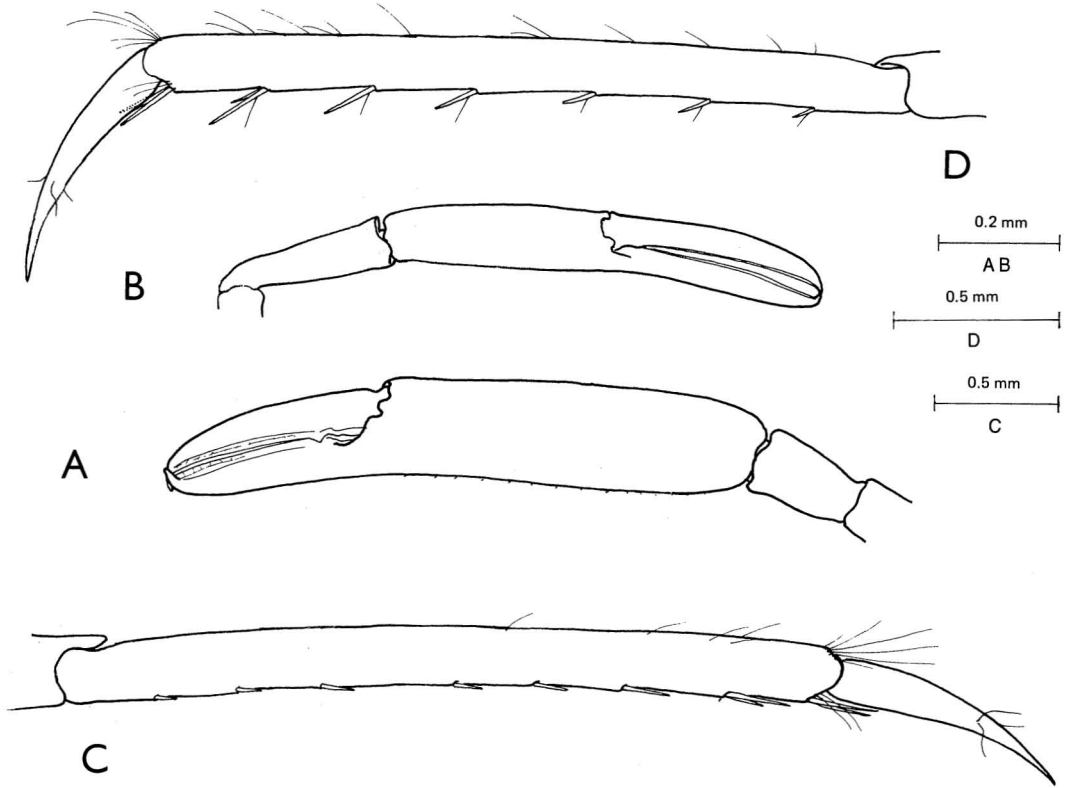


FIGURE 6. *Periclimenes yaldwyni* Holthuis. A, chela and carpus of major chela. B, same, minor chela. C, D, dactyl and propod of third pereiopods. A–C, New Zealand specimen. D, Tasmanian specimen.

Fourth thoracic sternite broad, without median spine, slightly produced medially. Subsequent sternites narrow but of increasing width posteriorly.

Mandible robust, without palp; molar process stout with five blunt distal teeth; incisor process robust, with three blunt teeth distally. Maxillula with palp bilobed, lower lobe with small hooked setae distally; upper lacinia broad, with about seven strong distal spines; lower lacinia narrow with numerous distal setae. Maxilla without a medial seta; distal endite deeply bilobed, upper lobe with 15 finely serrulate setae distally, lower lobe with 17 similar setae; proximal endite obsolete, border slightly produced medially; scaphognathite narrow, about 3.8 times longer than wide; anterior lobe narrow with medial border concave. First maxilliped with longer slender palp, with single medial plumose seta; basal endite large, broadly rounded, strongly setose

distally and medially; coxal endite distinct, rounded, feebly setose medially; exopod well developed, flagellum slender with seven plumose setae distally and well developed, narrow caridean lobe proximally; epipod large, triangular, feebly bilobed. Second maxilliped of normal form; exopod slender with four plumose setae distally; epipod simple, rounded, without podobranch. Third maxilliped reaching anterior of first segment of antennular peduncle; ischio-merus and basis almost fully fused, small notch present medially, combined segment ca. 5.5 times longer than average width, bowed, with numerous small spines along distolateral border, sparsely setose medially; penultimate segment 5.0 times longer than wide, ca. 0.6 of antepenultimate segment, uniform, sparsely setose medially; terminal segment tapering, 4.0 times longer than wide, ca. 0.5 of antepenultimate segment length, with numerous groups of

short spines medially, longer spines distally; exopod with slender flagellum with six plumose setae distally; epipod well developed, rounded; rudimentary arthrobranch present; medial margin of coxa slightly produced, with few setae.

First pereopods slender, extending to about end of antennular peduncle, exceeding carapocerite by palm length; chela with palm ca. 2.4 times longer than deep, slightly compressed, with four rows of cleaning setae proximally; fingers slender, tapering, small acute hooked tips, entire cutting edges, about 5.0 times longer than deep, subequal to palm length; carpus slightly shorter than chela, 5.0 times longer than distal width, slightly tapered proximally, with few long cleaning setae distally; merus about 1.2 times carpal length, ca. 6.4 times longer than wide, uniform; ischium, basis, and coxa normal, coxa with small medial setose process.

Second pereopods well developed, slender, similar, slightly unequal. Chela of major pereopod with palm subcylindrical, ca. 3.6 times longer than deep, slightly compressed, with sparse minute acute tubercles; fingers slender, equal to 0.7 of palm length, with small acute hooked tips, cutting edges mainly entire, with single small subacute tooth proximally on dactylus; carpus short and stout, twice as long as wide, expanded distally, unarmed, equal to ca. 0.3 of palm length; merus 2.5 times carpus length, 5.0 times longer than wide, uniform, unarmed; ischium slightly longer than merus, tapering proximally, unarmed, ca. 5.7 times longer than distal width; basis and coxa normal, short and robust. Chela of minor second pereopod with palm ca. 3.2 times longer than deep, minutely tuberculate; fingers subequal to palm length, slender, unarmed; carpus 0.75 of palm length, ca. 3.8 times longer than distal width, feebly expanded distally, unarmed.

Ambulatory pereopods slender, third exceeding carapocerite by about half carpus length. Dactylus slender, simple, about 5.5 times longer than broad, corpus ca. 1.7 times length of feebly demarcated unguis, with single medial and pair of short sensory setae distally; propod ca. 2.8 times length of dactyl, uniform, ca. 14.5 times longer than wide, with

two pairs of spines distoventrally and five single spines along rest of ventral border: carpus about 0.45 of propod length, unarmed, ca. 6.0 times longer than wide; merus without distoventral tooth, slightly shorter than propod, uniform, ca. 8.8 times longer than width; ischium ca. 0.8 of merus length, 5.0 times longer than distal width, tapering slightly proximally, unarmed; basis short, about 0.3 of ischium length; coxa robust. Fourth and fifth pereopod similar; fifth with rows of serrated cleaning setae distolaterally and fewer ventral spines.

Endopod of male first pleopod about 3.0 times longer than wide, distal three fourths slightly expanded with small distomedial lobule; proximal fourth of medial margin with three plumose setae and two short simple spines; distal two thirds of lateral margin with 15 short plumose setae. Endopod of male second pleopod with appendix interna exceeding appendix masculina, slender, about 11.5 times longer than distal width with small group of concinni distally: appendix masculina ca. 6.0 times longer than wide, seven long simple setae along distolateral margin, four short, finely serrulate setae along distoventral aspect.

Protopodite of uropod with posterolateral angle acute; exopod slightly exceeding telson, ca. 2.5 times longer than wide, lateral border straight, strong acute tooth distally with robust mobile spine medially; endopod narrower, ca. 3.3 times longer than wide, subequal to exopod length.

The ova are numerous and small, about 0.5 mm in length.

MEASUREMENTS: Postorbital carapace lengths (mm); Tasmanian specimens, (i) ♂4.7; ovig. ♀ 3.0, 4.2, 4.7 (ii) ♂4.6, ♀(nonovig.) 5.1, 5.3. (iii) New Zealand specimens, ♂4.2, ♀(ovig.) 5.3, 5.6, 5.6, (nonovig.) 4.4.

COLORATION: Mainly transparent in life with red pigmentation. Carapace with scattered red chromatophores, most concentrated on the mid-dorsal region, with a transverse bar across base of antennal peduncles, on first, second, and third maxillipeds; first, third, and fourth pereopods. Second pereopod with prominent spot on margin of

fixed finger, and series of spots along inner borders of other segments. Abdomen speckled with red, with irregular red bars extending across ventral aspect and extending down peduncles of pleopods, more diffuse distally. Uropods and telson lightly speckled with red.

HABITAT: Specimens have been collected from 1 to 30 m, but specimens from shallow water are mainly juveniles. Found mainly over muddy sand substrates, generally with abundant *Polysiphonia* and *Giffordia* and lesser amounts of *Ceramium*. Often found in company with *Nauticaris marionis* (Bate).

PARASITES: The single male Tasmanian specimen studied has a large, clearly visible parasitic worm (Nematomorpha?) filling most of the anterodorsal gastric region of the cephalothorax. In some samples up to about 30 percent of shrimps may be similarly infected. A few shrimps have also been found infected by an unidentified bopyrid parasite.

SYSTEMATIC POSITION: Kemp (1925), after examining the holotype specimen, concluded, with reservation, that this species was to be placed in the genus *Periclimenes* and was most closely related to a well-known anemone-associate, *P. brevicarpalis* (Schenkel). Although apparently a free-living species, *P. yaldwyni* is without a well-developed median process on the fourth thoracic sternite and is not therefore closely related to the major group of free-living species, the *P. grandis* group. The form of dactyl of the ambulatory pereiopods closely resembles those of other probably free-living species and contrasts with those of many commensal species, most of which have a biunguiculate dactyl, although in *P. brevicarpalis* this is generally obsolete and only infrequently present (Bruce 1979). Of the presently known Indo-West Pacific species of *Periclimenes*, *P. yaldwyni* appears most closely related to the Japanese species *P. akiensis* Kubo, so far known only by the type material, from shallow weedy water at Simokamogari, Aki Province, Shikoku (Kubo 1936). *Periclimenes yaldwyni* differs from *P. akiensis* in having a deeper rostral lamina, hepatic spine closer to anten-

nal spine, less posterodorsally produced third abdominal tergite, better developed distolateral spine on scaphocerite, carpus of first pereiopod subequal to chela length, more robust carpi on second pereiopods, more strongly armed propods on ambulatory pereiopods, and better developed dorsal telson spines. The scaphognathite also appears to be of significantly different shape in the two species, with the anterior lobe broadly rounded in *P. yaldwyni* and narrowly pointed in *P. akiensis*. The eye in *P. yaldwyni* is also comparatively short and stout, in comparison with *P. akiensis*, in which the stalk is much longer and more slender.

DISCUSSION

Few shallow water marine caridean shrimps have been found to occur in both New Zealand and Australian waters, but the discovery of *P. yaldwyni* in Tasmania cannot be considered as really surprising in view of the similarity of the ecological situations. Only two other palaemonid shrimps have so far been reported as occurring in both regions. One is *Palaemon affinis*, a common species on New Zealand shores, also reported from Queensland, New South Wales, Victoria, South Australian, and Tasmanian waters, as well as the Chatham Islands and Campbell Island (Holthuis 1950). However, a detailed description has only recently become available and Yaldwyn (1954) considered that all Australian records are unsubstantiated. The second is the cosmopolitan *Leander tenuirostris*.

The shallow water marine carideans so far identified as occurring in both Australian and New Zealand waters are summarized below.

Palaemonidae

1. *Leander tenuicornis* (Say)
2. *Palaemon affinis* (H. Milne-Edwards)
3. *Periclimenes yaldwyni* Holthuis

Alpheidae

4. *Alpheus euphrosyne* De Man
5. *Alpheus novaezealandiae* Miers.
6. *Alpheus socialis* Heller

Ogyrididae

7. *Ogyrides delli* Yaldwyn

Hippolytidae

8. *Nauticaris marionis* Bate

With one exception, all of these shrimps have a restricted Australia–New Zealand distribution. The exception, *Leander tenuicornis*, is of widespread distribution throughout temperate and tropical zones of the Atlantic, Indian, and western Pacific Oceans, but there have been no records from eastern Pacific waters or the American west coast. In contrast to the other shrimps, which are probably of strictly benthic habits, *L. tenuicornis* is commonly found in free floating *Sargassum*.

ACKNOWLEDGMENT

We are most grateful to J. C. Yaldwyn for the loan of comparative material from New Zealand.

LITERATURE CITED

- BRUCE, A. J. 1979. A report on a small collection of pontoniine shrimps from Eniwetok Atoll. *Crustaceana*, suppl. 5: 209–230, figs. 1–7, pl. 1.
- BATE, C. S. 1888. Report on the Crustacea Macrura collected by H. M. S. Challenger during the years 1873–76. Rep. Voy. Challenger, Zool, 24:i–xc, 1–942, figs. 1–76, pls. 1–150.
- HOLTHUIS, L. B. 1950. Subfamily Palaemoninae. The Palaemonidae collected by the Siboga and Snellius expeditions, with remarks on other species. I. The Decapoda of the Siboga Expedition, X. Siboga Exped. Mon. 39a⁹: 1–268, figs. 1–52.
- 1959. Results of the examination of the type specimens of some species belonging to the subfamilies Pontoniinae and Palaemoninae (Crustacea Decapoda Macrura). Zool. Meded., Leiden 36(ii): 193–200, fig. 1.
- KEMP, S. 1925. On various Caridea. Notes on Crustacea Decapoda in the Indian Museum. XVII. Rec. Indian Mus. 27: 249–343, figs. 1–24.
- KUBO, I. 1936. Two new littoral macrurous crustaceans from Japan. J. Imp. Fish. Inst. 31(2): 47–54, pls. 14–15, tab. 1.
- RICHARDSON, L. R. and J. C. YALDWYN. 1958. A guide to the natant decapod crustacea (*Shrimps and Prawns*) of New Zealand. Tuatera 7(1): 17–41, figs. 1–50.
- YALDWYN, J. C. 1954. Studies on *Palaemon affinis* M.-Edw. 1837 (Crustacea, Decapoda, Natantia). Pt. 1. Synonymy and external morphology. Trans. Roy. Soc. N.Z. 82(1): 169–187, figs. 1–2.
- 1974. Shrimps and prawns. N.Z. Nat. Herit. 3(38): 1041–1046.