



A new *Philocheras* species (Decapoda, Crangonidae) from Hansa Bay, Papua New Guinea

S. De Grave

Department of Zoology and Animal Ecology, University College Cork, Lee Maltings, Prospect Row, Cork, Ireland
Fax: [+353] 21 278020; E-mail: degrave@ucc.ie

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Abstract

A new species of crangonid shrimp, *Philocheras wilkinsae* (Decapoda, Crangonidae) is described from Hansa Bay, Madang Province, Papua New Guinea. The new species belongs to the *japonicus* group, and can be distinguished from the other members of this group by carapace dentition and carination. The pleopod structure is unique in the genus.

Introduction

During the course of an investigation into the association of burrowing Gobiidae (Pisces) and Alpheidae (Caridea) in Hansa Bay, Madang Province, Papua New Guinea, samples were taken by means of a SCUBA diver-operated hydraulic suction sampler. Several samples were obtained from sediment away from the actual goby burrows, these contained shrimp species other than the actual *Alpheus* species involved in the goby-shrimp association (see De Grave & Wilkins, 1997). One of these species was a member of the genus *Philocheras* which could not be assigned to any of the described species and is here reported upon as a new species.

All specimens have been deposited in the collections of the Royal Belgian Institute for Natural Sciences, Brussels, Belgium. All post-orbital carapace lengths (pocl) are given in mm.

Systematics

Family CRANGONIDAE Haworth, 1825

Genus *PHILOCHERAS* Stebbing, 1900

Philocheras wilkinsae sp. n. (Figures 1–4)

Holotype: Ovigerous female (pocl 1.41), KBIN 27951/NAT67, from north-western side of Laing Is-

land lagoon, collected by hydraulic suction sampler, 7 m depth, coarse sand substrate, leg. H. Wilkins, 7 October 1992, field no. S92/136.

Type locality: Laing Island lagoon (4° 10'30" S, 144° 52' 47" E), Hansa Bay, Madang Province, Papua New Guinea, sand and coral rubble, 6–12 m depth.

Allotype: Male (pocl 1.00), KBIN 27951/NAT68, collection data as holotype.

Paratypes: Male (pocl 0.94), KBIN 27951/NAT69, from north-western side of Laing Island lagoon, collected by hydraulic suction sampler, 12 m depth, coarse sand-coral rubble substrate, leg. H. Wilkins & S. De Grave, 17 September 1992, field no. S92/63. 2 females (pocl 1.70, 0.90), 1 male (pocl 0.85), KBIN 27951/NAT70, from north-western side of Laing Island lagoon, collected by hydraulic suction sampler, 6 m depth, leg. H. Wilkins & S. De Grave 14 October 1992, field no. S92/159.

Derivation of name: Specific name after Dr H. K. A. Wilkins in recognition of her assistance with collecting shrimps in Papua New Guinea.

Description

Carapace (Figure 1A–D): Carapace with scattered small setae; long plumose setae along mid-dorsal carina; two long plumose setae near pterygostomial

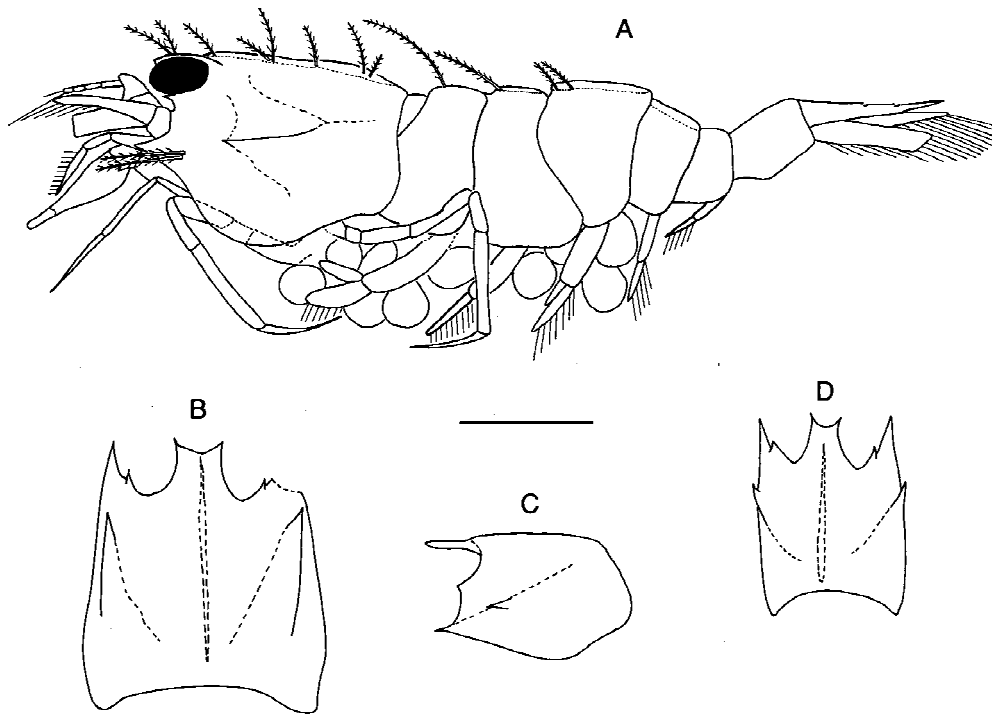


Figure 1. *Philocheirus wilkinsae* sp. n. Holotype female. (A) lateral view of entire animal; (B) carapace, dorsal view. Allotype male; (C) carapace, lateral view; (D) carapace, dorsal view. Scale bar indicates 1 mm.

angle. Defined carinae mid-dorsally and laterally, other faint lateral carinae present. Mid-dorsal carina falling short of end of carapace and extending just short of rostral apex. Carinae less developed in males. Pterygostomial angle produced into elongate spine; antennal spine small. One large tooth mid-laterally at end of lateral carina. Rostrum short, reaching end of eyes, slightly convex; anterior part bifid, not descending. No setae at distal part of rostrum.

Abdomen (Figure 1A): Furnished with scattered small setae. Abdominal pleura 1–3 rounded, pleura 4–6 quadrate. Sixth abdominal segment about $1.7 \times$ length of fifth, only $0.53 \times$ length of telson. Mid-dorsal carina strongly developed on segment 4, less developed on segments 2–3, absent on segments 5–6. Carina less developed in males.

Sternites: In males second sternite with strong, forwardly directed spine; low carina from third to fifth sternite; furnished with recurved spine on sternites 4–5. Not armed or carinated in females.

Antennule (Figure 2A): Peduncle three-segmented; stylocerite overreaching basal segment, tip bluntly rounded; basal segment longer than second and third segment together; second segment with inner distal angle produced; third segment with blunt lobe along

inner margin. Stylocerite with marginal plumose setae. Outer flagellum $3.30 \times$ length of inner flagellum and $5.5 \times$ length of peduncle.

Antenna (Figure 2B, C): Scaphocerite reaching beyond tip of antennal peduncle; medial margin rounded; lateral margin slightly concave ending in small apical tooth, which overreaches lamella, lateral margin dentate in distal half. In males (Figure 2C), lateral margin slightly more concave and dentition extending over a slightly longer distance. Flagellum about $8 \times$ length of peduncle, simple; reaching to about $1.3\text{--}1.4 \times$ total body length.

Left Mandible (Figure 2D): Elongate, consisting of molar process only. Terminating in four blunt teeth, one of which is divergent from the remainder. Right mandible not dissected.

Maxillula (Figure 2E): Lower endite bluntly rounded, anteriorly with several long, plumose setae. Upper endite not curved, quadrate; inner edge with series of stout spines; outer margin with 4 long, plumose setae; endopod simple and short, tip slightly produced inwards, single stout spine on tip.

Maxilla (Figure 2F): Scaphognathite with regular row of plumose setae; triangular process with long

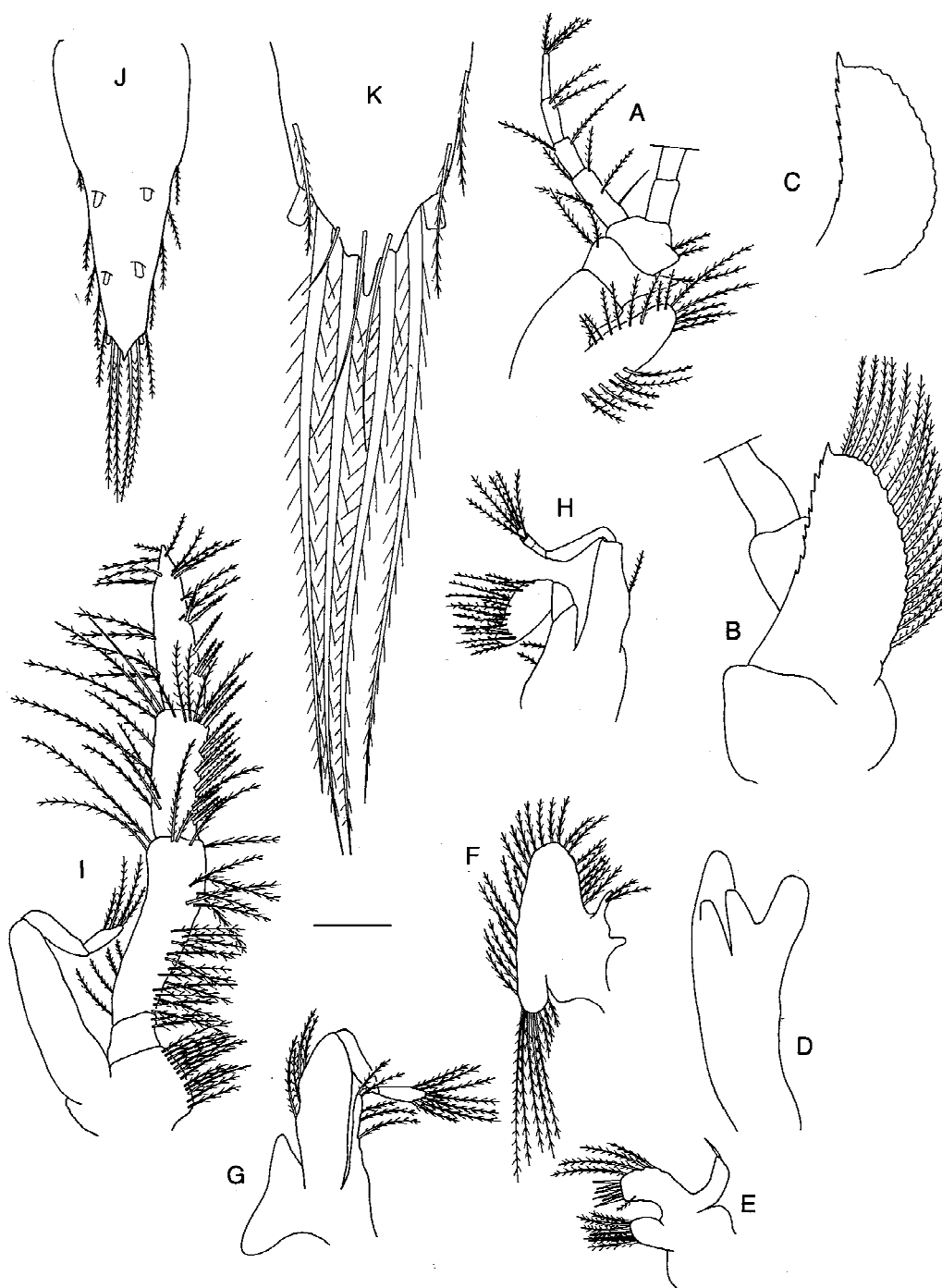


Figure 2. *Philocheras wilkinsae* sp. n. (A) Antennule; (B) antenna; (C) antennal scale (setae omitted); (D) mandible; (E) maxillula; (F) maxilla; (G) first maxilliped; (H) second maxilliped; (I) third maxilliped; (J) telson; (K) apex of telson. All from female paratype (pocl 1.70), except C from male paratype (pocl 0.85). Scale bar indicates 0.2 mm (A–C, E–J) or 0.05 mm (D, K).

and short setae; endite reduced; endopod longer than endite, with two plumose setae near tip.

First maxilliped (Figure 2G): No endites. Caridean lobe poorly developed. Exopod well developed, distally divided in two subequal parts; tip with long, plumose setae. Endopod about $0.70 \times$ length of basal segment of exopod, plumose setae along medial margin and tip. Epipod well developed, triangular.

Second maxilliped (Figure 2H): Exopod well developed, divided into peduncle and flagellum; flagellum only distinctly divided in apical portion; single plumose setae midway of medial margin of peduncle. Endopod short, penultimate segment small, ultimate segment twice as long as wide, inner margin with series of plumose setae, extending onto upper margin. No trace of epipod, maybe lost during dissection.

Third maxilliped (Figure 2I): Reaching beyond scaphocerite with about half the ultimate segment. Endopod long, narrow, four-segmented; antepenultimate segment about four times as long as wide, with plumose marginal and subterminal setae; penultimate segment $0.72 \times$ length of antepenultimate segment, with stout serrulate setae on inner margin and scattered long plumose setae along outer margin; ultimate segment $1.4 \times$ length of penultimate segment, tip narrowly pointed, with scattered plumose and stout serrulate setae along inner margin. Exopod divided into peduncle and flagellum; flagellum divided into two subequal parts; peduncle broad, non plumose; distal part of flagellum with plumose setae.

First pereopod (Figure 3A–C): Without rudimentary exopod. Stout, subchelate; reaching just past scaphocerite. Ischium and basis short. Merus $0.75 \times$ length of propodus, ventro-distal margin with three teeth and single, plumose seta. Carpus short, $0.21 \times$ length of propodus, rounded. Propodus long, distally narrowing; width $0.38 \times$ length, proximally widest; subchelar spine sub-marginal, stout, non movable; cutting edge with series of short, plumose setae. Dactylus $0.32 \times$ length propodus, falling short of subchelar spine, tip incurved.

Second pereopod (Figure 3D–E): Short, chelate; reaching to end of antennal peduncle. Basis $0.36 \times$ length of merus. Ischium $0.47 \times$ length of merus. Carpus $0.50 \times$ length of merus. Palm of propodus subequal to length of fingers, movable finger longer than fixed finger, tips of both fixed and movable finger with non-plumose setae and serrate setae, latter more numerous on fixed finger.

Third pereopod (Figure 3F–G): Slender, reaching past scaphocerite. Basis short. Ischium $1.27 \times$ length

of merus. Carpus and propodus jointly $1.07 \times$ length of merus, indistinctly divided. Propodus terminating in long filaments.

Fourth pereopod (Figure 3H): Stout, shorter than third pereopod; reaching with merus to end of antennal peduncle. Basis and ischium subequal, about $0.40 \times$ length of merus. Merus $1.68 \times$ length of carpus. Propodus slightly curved, $2.39 \times$ length of carpus. Dactylus curved, $0.82 \times$ length of propodus, tip simple.

Fifth pereopod (Figure 3I): Stout, similar to fourth pereopod; reaching with distal part of propodus past antennal peduncle. Ischium $1.64 \times$ length of basis. Merus longer than basis and ischium combined. Carpus $0.51 \times$ length of merus. Propodus straight, $2.85 \times$ length of carpus. Dactylus slightly curved, $0.80 \times$ length of propodus, tip simple.

First pleopod (Figure 4A, F–G): Well developed endopod in female, $0.62 \times$ length of exopod; peduncle lateral margin with series of submarginal to marginal plumose setae; few setae on apical part of endopod; appendix interna absent. Reduced, oval endopod in male; $0.27 \times$ length of exopod; appendix interna reduced to small lobe; two plumose setae at mid-level, single apical plumose seta.

Second pleopod (Figure 4B, H–I): Well developed endopod in female, $0.55 \times$ length of exopod; peduncle medial and lateral margin with series of marginal plumose setae; distal half of endopod with plumose setae, both medially and laterally; appendix interna absent. Reduced endopod in male, $0.52 \times$ length of exopod; small lobe with single seta on medial margin of endopod; appendix interna basally reduced to rounded lobe, with single plumose seta; ten serrate subapical and apical setae; no appendix masculina.

Third pleopod (Figure 4C, J–K): Well developed endopod in female, $0.46 \times$ length of exopod; peduncle medial and lateral margin with series of plumose setae; medial and apical margin of endopod with plumose setae; appendix interna absent. Reduced quadrate endopod in male, $0.25 \times$ length of exopod; endopod with single apical plumose setae each at medio-distal and medio-lateral angle.

Fourth pleopod (Figure 4D, L–M): Well developed endopod in female, $0.37 \times$ length of exopod; peduncle medial and lateral margin with few, plumose setae; medial and apical margin of endopod with few plumose setae; appendix interna absent. Similar to third pleopod in male; endopod short, quadrate, $0.20 \times$ length of exopod; endopod with single apical

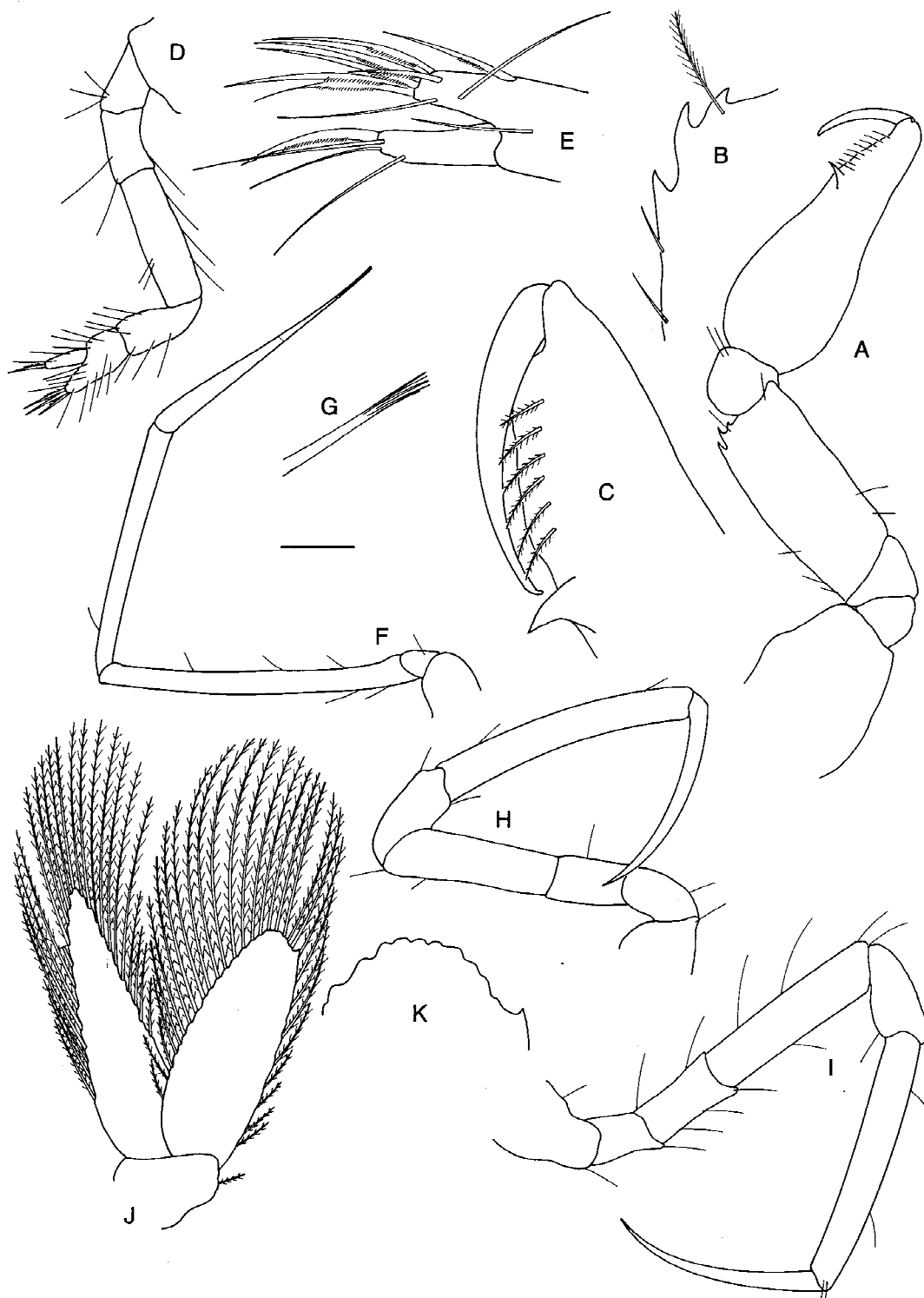


Figure 3. *Philocheras wilkinsae* sp. n. Female paratype (pocl 1.70). (A) First pereiopod; (B) ventro-distal angle of merus of first pereiopod; (C) distal part of propodus of first pereiopod; (D) second pereiopod; (E) distal part of second pereiopod; (F) third pereiopod; (G) distal part of third pereiopod; (H) fourth pereiopod; (I) fifth pereiopod; (J) uropod; (K) apex of exopod. Scale bar indicates 0.2 mm (A, D, F, H, I, J) or 0.05 mm (B, B, E, g, K).

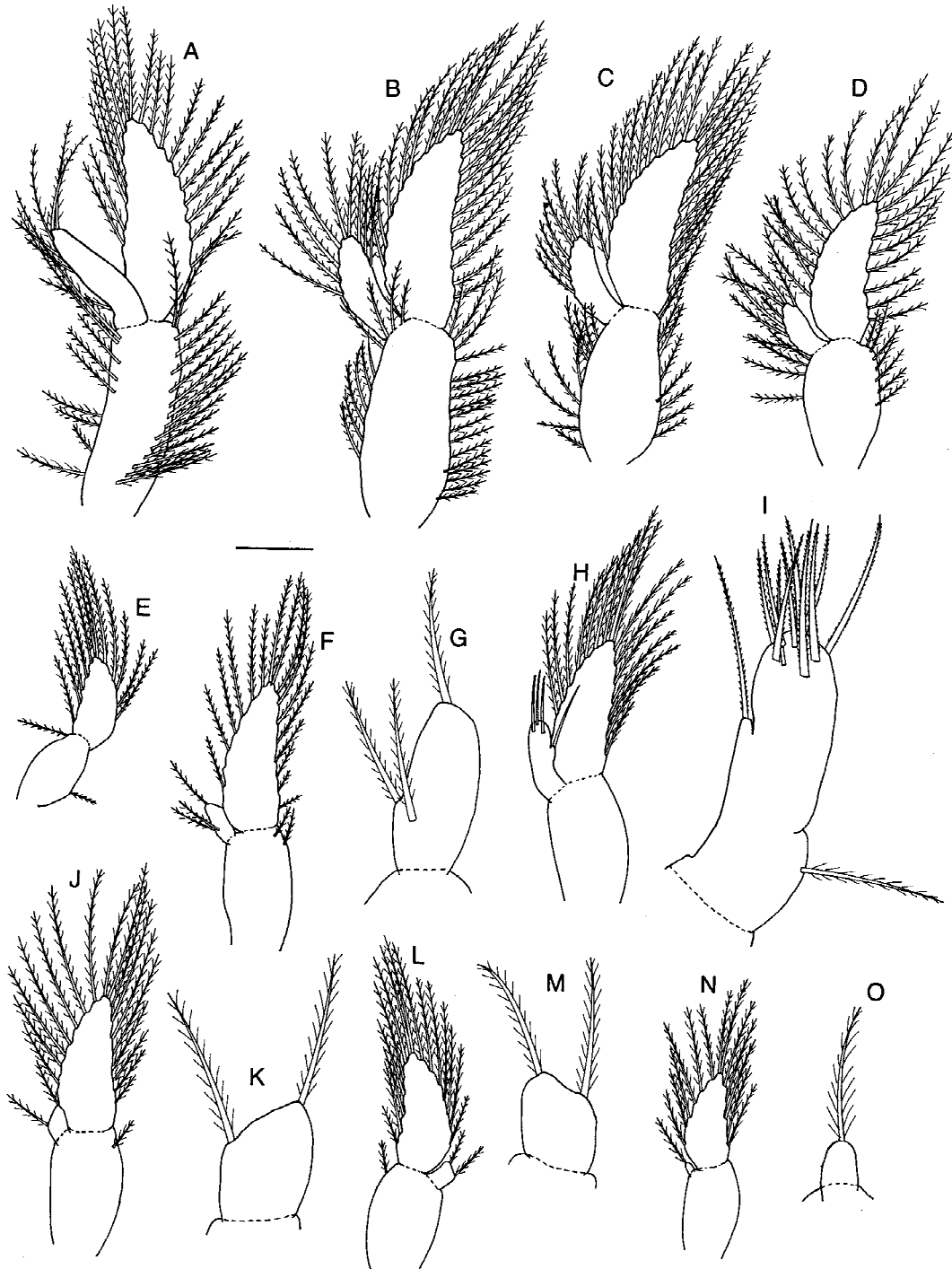


Figure 4. *Philocheras wilkinsae* sp. n. Female paratype (pocl 1.70). (A) First pleopod; (B) second pleopod; (C) third pleopod; (D) fourth pleopod; (E) fifth pleopod. Male paratype (pocl 0.85 mm). (F) First pleopod; (G) endopod of first pleopod; (H) second pleopod; (I) endopod of second pleopod; (J) third pleopod; (K) endopod of third pleopod; (L) fourth pleopod; (M) endopod of fourth pleopod; (N) fifth pleopod; (O) endopod of fifth pleopod. Top scale bar indicates 0.1 mm (G, I, K, M, O), lower scale bar indicates 0.05 mm (A–E, F, H, J, L, N).

plumose setae each at medio-distal and medio-lateral angle.

Fifth pleopod (Figure 4E, N–O): No endopod in female; peduncle lateral margin and disto-medial angle with single plumose seta; appendix interna absent. Short, oval endopod in male; $0.15 \times$ length of exopod; single plumose setae on tip of endopod.

Uropods (Figure 3J–K): Endopod just reaching past tip of telson. Exopod $0.85 \times$ length of endopod. Endopod lanceolate, medial and lateral margins with long plumose setae. Exopod broader than endopod; medial and lateral margins with long plumose setae; disto-lateral angle with small subapical tooth, not reaching past lamella.

Telson (Figure 2J–K): About $2.41 \times$ as long as wide; wider proximally, gently narrowing from level of proximal dorsal spines; distal margin narrowing to a narrow, rounded tip. Lateral margins with few, submarginal, short plumose setae. Two pairs of blunt, dorsal spines, inserted at 0.46 and 0.65 of telson length. Apex with pair of dorso-marginal blunt spines, two pairs of terminal long plumose setae, inner most pair longer and smaller non-plumose setae, inserted dorsally. Terminal setae $0.46 \times$ length of telson.

Ova: Ova with developed embryos $0.50 \times$ 0.41 mm. Approximately 20 eggs in holotype.

Colouration: Live specimens mottled dark and light brown all over carapace and abdomen. Male preserved (fixed in formalin and preserved in ethanol) specimen (KBIN 27951/NAT70) with scattered dark and light brown stellate chromatophores on carapace, dark brown spot dorsally on fourth abdominal segment.

Discussion

Philocheras wilkinsae sp. n. belongs to the *japonicus* group, which is distinguished from all other members of the genus by having the lateral margin of the scaphocerite dentate, in all other species this margin is edentate or furnished with only one or two teeth. Besides the dentition on the antennal scale, the species of this group also share other characters: small body size, squat appearance, broadly bifurcate rostrum, similar first and second pereopod and telson spination. Previously the *japonicus* group contained three species: *Philocheras japonicus* (Doflein, 1902 as *Pontophilus japonicus*) known from Sagami Bay, Japan (Doflein, 1902), East China Sea (Fujino & Miyake, 1970) and the Sulu Sea (De Man, 1918); *Philocheras lowisi*

(Kemp, 1916 as *Pontophilus lowisi*) known from the Andaman Islands (Kemp, 1916), Hong Kong (Bruce, 1986) and the Timor Sea (Bruce, 1994); *Philocheras prionolepis* (Holthuis, 1952 as *Pontophilus prionolepis*) from Cape Verde south to Zaire, south west Africa (Holthuis, 1952; Burukovsky, 1988).

Within the *japonicus* group, *P. wilkinsae* sp. n. is most closely related to *P. lowisi*, from which it may be separated by the presence of a lateral carina on the carapace terminating in a spine, with both carina and spine being absent in *P. lowisi*. Both species can also be distinguished by the development of the pleopods, with the endopod of pleopods 2–5 well developed and furnished with an appendix interna in the male of *P. lowisi* (Kemp, 1916), but reduced and not harbouring an appendix interna in male *P. wilkinsae* sp. n., in females of *P. lowisi* the endopods are greatly reduced (Kemp, 1916), but are well developed on pleopods 1–4 in *P. wilkinsae*.

The four species in the *japonicus* group can be separated by the carapace spination and carination, with only a median carina being present and no spines in *P. lowisi*; median, lateral carinae and a lateral spine in *P. wilkinsae* sp. n., a median and pair of submedian and lateral carinae in both *P. japonicus* and *P. prionolepis*, but with three spines (median, lateral) in *P. prionolepis* and five spines in *P. japonicus* (median, submedian, lateral).

After Kemp (1911) had synonymised the genus *Philocheras* with *Pontophilus* Leach, Kemp (1916) divided the genus into five groups on the basis of endopod and appendix interna development. One of these groups (Group I) corresponds to the true *Pontophilus* (see Chace, 1984), leaving four types of pleopod development in *Philocheras*. The pleopodal development of *P. wilkinsae* sp. n. with well developed endopods on pleopod 1–4 in the female, but no appendix interna present and in males a progressively reduced endopod with no appendix interna, presents a further type of pleopodal development. In all likelihood, pleopodal development is quite varied within the genus and can not be used to indicate intrageneric relationships, as species which are similar in carapace morphology, general body form and the structure of many appendages, may exhibit quite different types of pleopodal development. This is clearly the case in the *japonicus* group, which exhibits different types of pleopodal development. Both *P. lowisi* and *P. prionolepis* fall within Kemp's group III, in contrast *P. japonicus* belongs to Kemp's group II (see Fujino & Miyake, 1970). The pleopodal development of *P.*

wilkinsae sp. n. has been described above and can not be placed in any of Kemp's groups. A similar case has been discussed by Lebour (1954) for the northern Atlantic species *P. sculptus* (Bell), *P. echinulatus* (M. Sars) and *P. trispinosus* (Hailstone), which can be placed in Kemp's groups II, III and V, respectively.

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