

The copepod inhabitants of sponges and algae from Hong Kong

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SYNOPSIS. Eight new siphonostome species, including two of new asterocherid genera were found in sponges and algal washings collected in Hong Kong. These are described.

INTRODUCTION

Little work has been done on the taxonomy of the benthic copepods of Hong Kong, with the exception of Boxshall (1990) who described some sponge-dwelling siphonostomes from the present collection series. It is insufficient, however, to state that an area requires study simply because it has been neglected. Hong Kong copepod fauna is compelling not only because it is poorly known, but also because it is diverse. Siphonostomes are found in all sorts of invertebrate hosts. Schirl (1973) reviewed the associates of a number of hosttypes. Huys (1990) reported over 80 copepod species in sponges alone, to these must be added Boxshall's new siphonostomes and those described here.

MATERIALS AND METHODS

The material was collected by divers in shallow waters at various stations around the coast of Hong Kong during the Second International Workshop on Marine Flora and Fauna of Hong Kong and Southern China. Station localities are given in the descriptions. The collections were made in April 1986. The sponges and algal fragments were preserved in 4% sea-water formalin. The sponge hosts have yet to be identified, samples of each are available for examination at the Natural History Museum, London.

Dissections were made with lactophenol and chlorazol black, permanent mounts were made in polyvinyl lactophenol. In the descriptions, spines are given in roman numerals and setae in arabic numerals. Body length measurements were taken from the rostral tip to the distal margin of the caudal rami; body segments were measured along the dorsal midline, and the first antenna along the non-setose inner margin.

Proportional lengths of urosome segments include the caudal rami. The material is stored at the Natural History Museum in London.

Family DINOPONTIIDAE Murnane

Stenopontius boxshalli n. sp.

Figs 1-3C

MATERIAL EXAMINED. Holotype ♀, allotype, 2 ♂♂ paratypes from the sponge *Ricinia* sp. collected at a depth of 15m at Chik Chau on 6 April 1986. BM(NH) registration numbers 1989.193 (holotype), 1989.194 (allotype), 1989.195 and 196.

ETYMOLOGY. This species is named after Dr Geoffrey Boxshall in recognition of his work on the taxonomy and anatomy of copepods.

FEMALE. Elongate, dorso-ventrally flattened, ornamented with rows of spinules, 0.52mm long. Relative lengths of urosome segments 6: 33: 14: 15: 15: 17. Genital segment 0.7 times as long as wide, apertures dorso-laterally placed at midpoint, segment widest here, but not much swollen (Fig. 1). Egg sacs paired, each sac with 2 eggs. Anal segment 0.7 times as long as wide. Genital and third urosome segment ornamented with rows of spinules on posterior margins. Caudal rami 2.5 times as long as wide, roughly cylindrical, with 4 terminal, 1 lateral and 1 dorsal setae of varying lengths.

First antenna 14-segmented (Fig. 2A); relative lengths 18: 5: 5: 3: 1: 4: 7: 16: 6: 9: 4: 6: 6: 10; armature I-0; II-0; III-2; IV-1; V-1; VI-3; VII-3; VIII-1; IX-0; X-1; XI-1; XII-1; XIII-2; XIV-4. Second antenna with terminal claw, otherwise unarmed, also lacking exopodite (Fig. 2B). Siphon very short and squat (Fig. 2C). Mandible represented by stylet. Outer lobe of first maxilla with 2 terminal setae; inner lobe larger with 3 terminal setae (Fig. 2D). Terminal segment of second maxilla produced with claw, tip with row of spinules (Fig. 2E). Maxilliped 3-segmented, robust and with terminal claw (Fig. 2F).

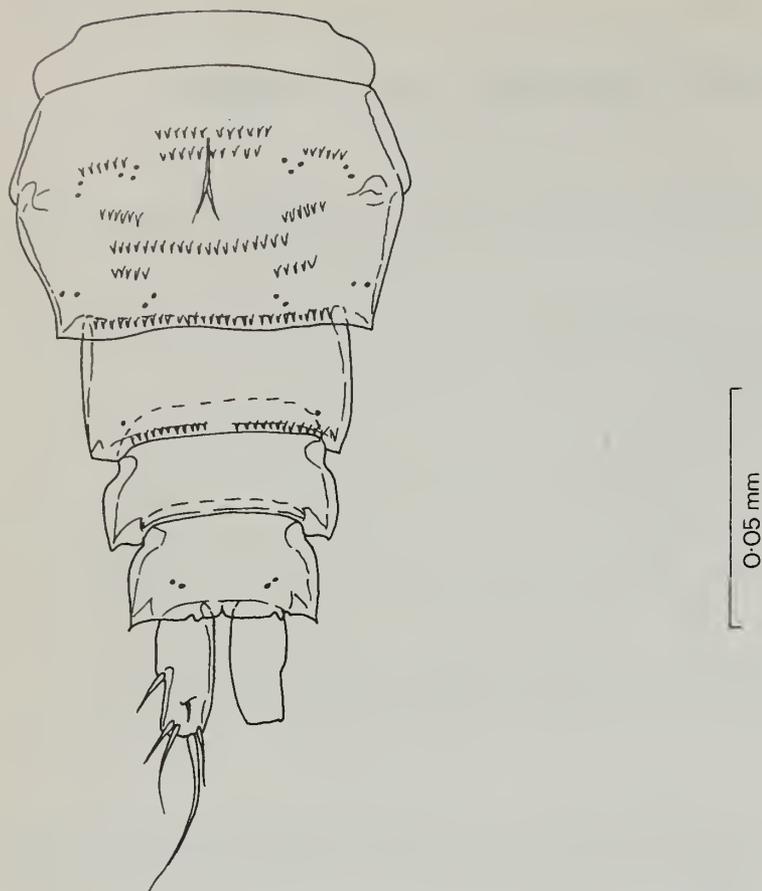


Fig. 1 *Stenopontius boxshalli* n. sp. ♀, holotype. Urosome, dorsal view.

Armature of natatory legs (Fig. 2G–J):

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0-0	0-1	0-1; 0-1; 1,1,4	I-0; I-1; II, 2,2
Leg 2	0-0	0-0	0-1; 0-2; 1,2,3	I-1; I-1; III, 1,5
Leg 3	0-0	0-0	0-1; 0-2; 1,1,3	I-1; I-1; III, 1,5
Leg 4	0-0	0-0	0-1; 0-2; 0,2,2	I-1; I-1; III, 1,5

External margins of segments spinulose. Fifth leg 2-segmented and leaf-like, terminal segment twice as long as wide with 2 terminal spines and 1 seta (Fig. 2K).

MALE. Body shape and ornamentation as for female, 0.48, 0.50 and 0.52mm long (Fig. 3A). Prosome equal in length to urosome, of uniform width in posterior half; head equal in length and width, rostrum not visible; relative lengths of prosome segments 49: 20: 17: 14; relative lengths of urosome segments 7: 32: 11: 14: 11: 11: 14. Genital segment 0.7 times as long as wide, all urosome segments with winged posterior margins and postero-ventral rows of spinules (Fig. 3B). Anal segment 0.7 times as long as wide. Dimensions and armature of caudal rami as for female.

First antenna 5-segmented by fusion of the equivalent female segments 1 to 4, 5 and 6, 7 and 8, 9 and 10, 11 to 14; relative lengths 24: 9: 24: 19: 24; armature I-2; II-2; III-6; IV-ac; V-5 (Fig. 3C). Remaining limbs similar to those of female.

REMARKS. This species is unusual insofar as the maxilliped is not sexually dimorphic. It is assigned to the genus *Stenopontius* because of the lack of an exopodite to the second antenna, the five-segmented urosome, leaf-like fifth

leg and the small exopodite of the first maxilla. It differs from both of the species hitherto described. The caudal rami are much longer than those of *S. parvus* Boxshall, 1990 and the first antenna has many more segments (8 in *S. parvus*), nor are the leg spines recessed (1990: figure 13D, E). This species shares the terminal armature of the first exopodite with *S. humesi* Murnane, 1967, II + 4, but differs again in the segmentation of the first antenna, the gross morphology of the siphon (more slender in *S. humesi*) and the armature of the fifth leg: 3 setae in *S. humesi*. The leg setae are not divided as they are in *S. humesi*.

Family ASTEROCHERIDAE Giesbrecht

Sinopontius punctatus Boxshall, 1990

Fig. 3D–F

Sinopontius punctatus Boxshall, 1990, pp. 529–533, figs 3D–F, 4, 5.

A male and a female were found in a purple-black sponge collected at a depth of 5–10m at Chek Kon Tau on 8 April 1986. They were recognised by body size (0.48 and 0.47m respectively), the rounded body shape (Fig. 3D), 19-segmented first antenna of the female, the unsegmented mandibular palp and the much reduced armature of the natatory legs. This species is distinguished from *S. aesthetascus* Boxshall, 1990, also described from Hong Kong specimens, by the armature of the second and third exopodites: the internal margins of the terminal segments are unarmed in *S. punctatus* and each has a single seta in *S. aesthetascus*. The specimens also exhibited the major details of the pore signature pattern drawn by Boxshall (Fig. 3E). The caudal rami are long, another useful diagnostic character. The exopodite of the second antenna has 2 terminal setae (Fig. 3F), but the third seta described by Boxshall may have been lost in dissection.

The BM(NH) registration numbers of these specimens are 1989.197 and 198.

ASTEROCHERES Boeck, 1859

The morphology of *Asterocheres* is well-defined and as Stock (1975) has noted, it is very coherent. The genus contains 48 species including those described below. They share a distal aesthetasc on the first antenna, although the exact position varies, a second antenna with a single-segmented exopodite and an endopodite tipped with a long curved hook and 2 setae. The mandibular palp is usually 1- sometimes 2-segmented; the stylet is long and pointed. The other mouthparts are more or less uniform throughout the genus with few exceptions and the armature of the natatory legs is constant:

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0-1	1-1 or I	0-1; 0-2; 1,2,3	I-1; I-1; III, 2,2
Leg 2	0-1	1-0	0-1; 0-2; 1,2,3	I-1; I-1; III, 1,4
Leg 3	0-1	1-0	0-1; 0-2; 1,1+I,3	I-1; I-1; III, 1,4
Leg 4	0-1	1-0	0-1; 0-2; 1,1+I,2	I-1; I-1; III, 1,4

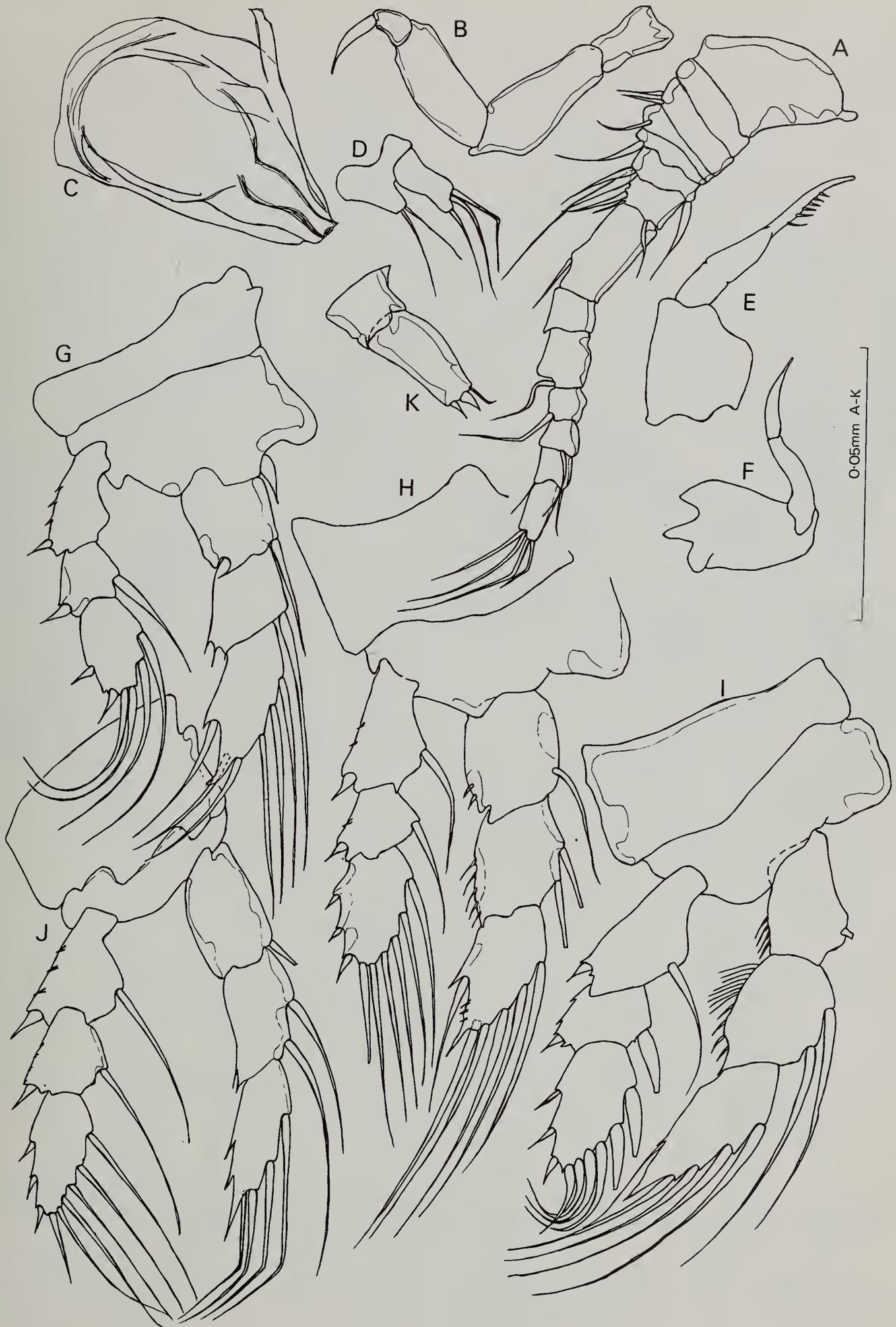


Fig. 2 *Stenopontius boxshalli* n. sp. ♀, holotype. A. First antenna; B. Second antenna; C. Siphon; D. First maxilla; E. Second maxilla; F. Maxilliped; G. First leg; H. Second leg; I. Third leg; J. Fourth leg; K. Fifth leg.

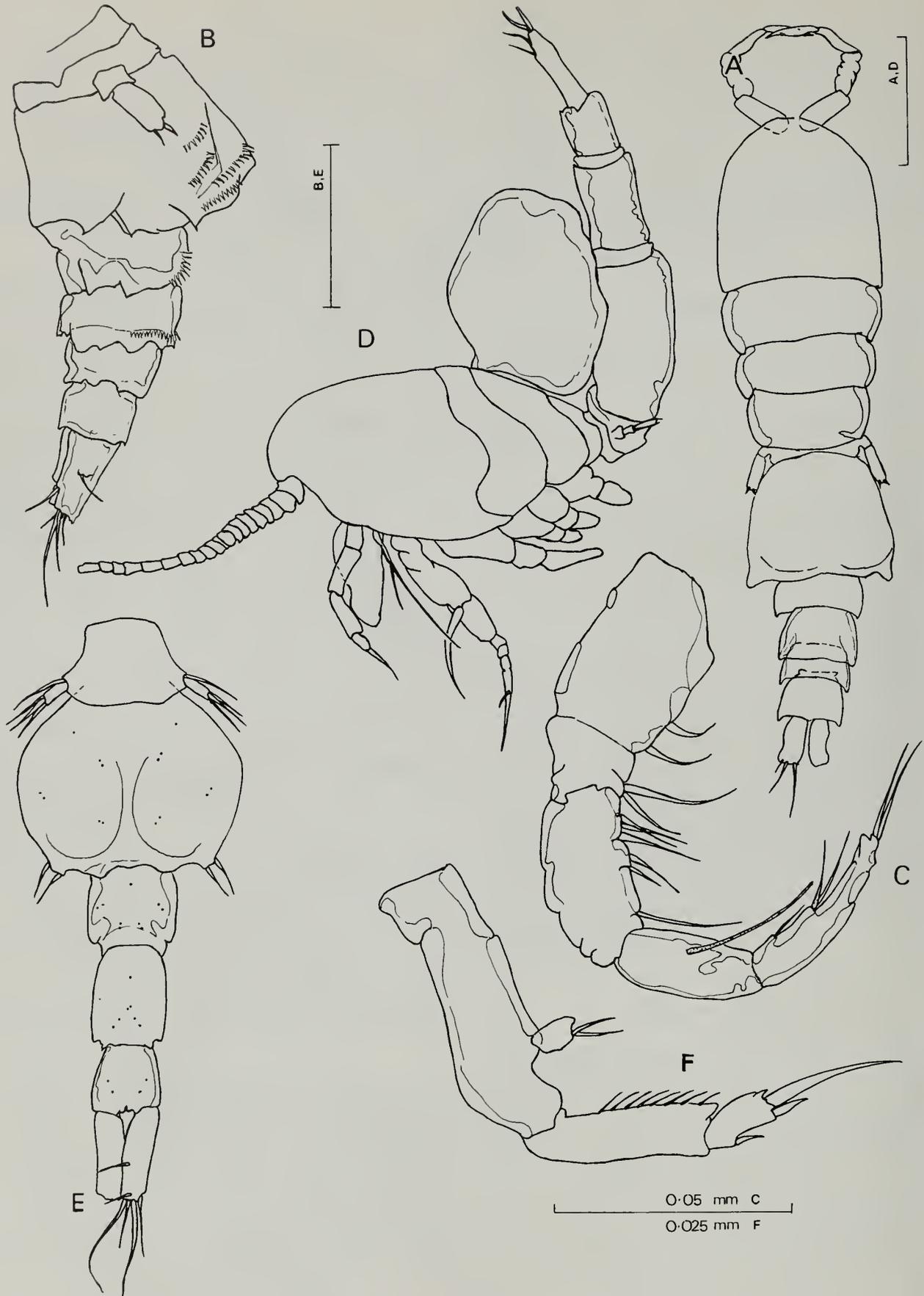


Fig. 3 *Stenopontius boxshalli* n. sp. ♂ A–C, paratype. A. Adult, dorsal view; B. Urosome, lateral view; C. First antenna; *Sinopontius punctatus* ♀. D. Adult, lateral view; ♂. E. Urosome, dorsal view; F. Second antenna. Scale bars = 0.1mm, except C, F.

There is a spine on the inner surface of the first basis, sometimes hard to pick out and not found for all species, but nevertheless it is probably universal in the genus. The fifth leg is single-segmented in both sexes and leaf-like, it has 1 sub-terminal and 2 terminal setae; there is also a seta nearby on the body segment. The prosome is 4-segmented, the first

pedigerous segment is fused with the head. The rostrum is small. The female urosome is 4-segmented and the male urosome is 5-segmented, excluding the caudal rami. The caudal rami have 4 each terminal and 2 dorsal setae.

Individual species are separable on body shape, the number of segments in the female first antenna, the siphon

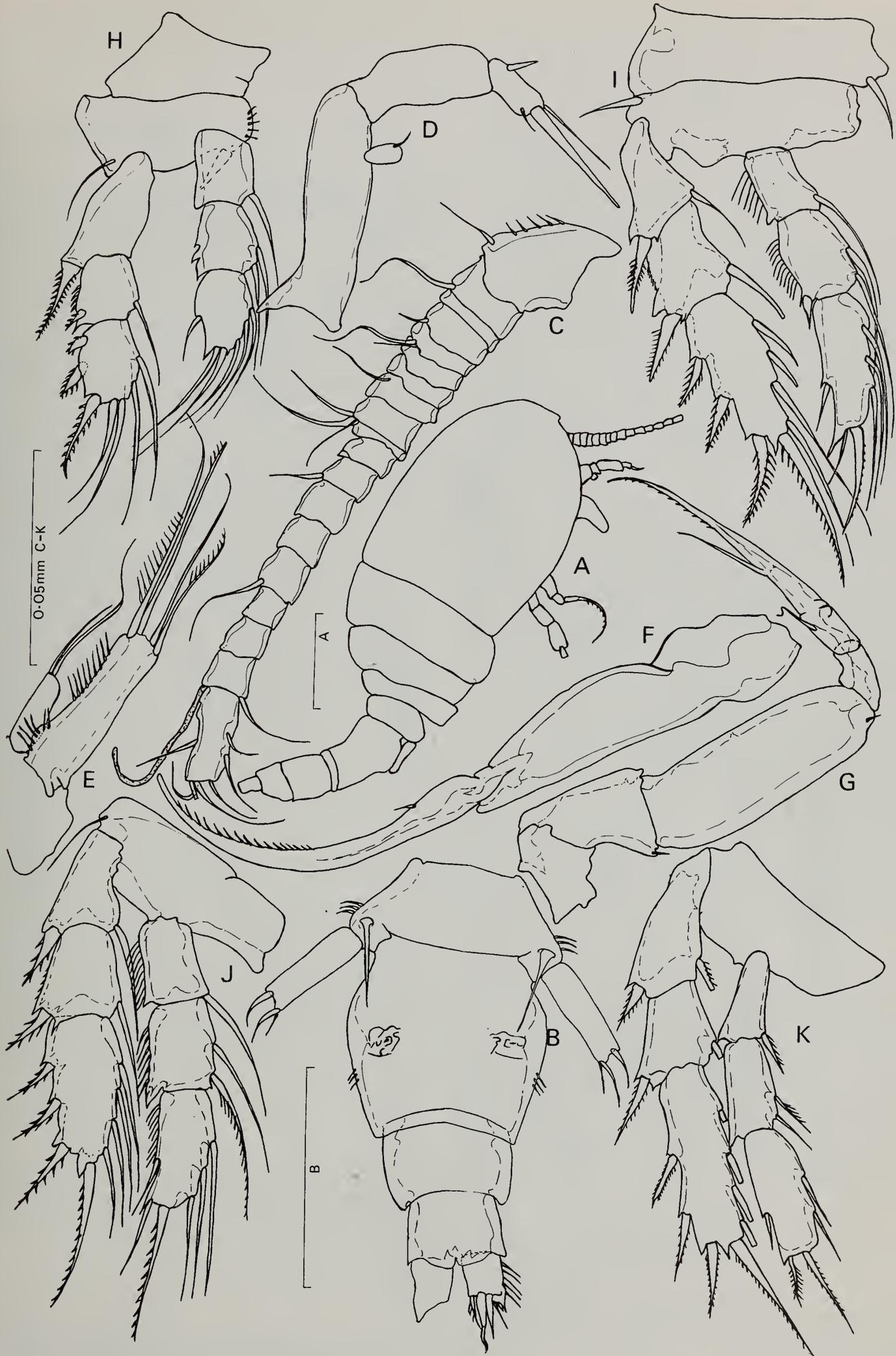


Fig. 4 *Asterocheres hongkongensis* n. sp. ♀, holotype. A. Adult, lateral view; B. Urosome, dorsal view; C. First antenna; D. Second antenna; E. Endopodite, first maxilla; F. Second maxilla; G. Maxilliped; H. First leg; I. Second leg; J. Third leg; K. Fourth leg. Scale bars = 0.1mm, except C-K.



Fig. 5 *Asterocheres bulbosus* n. sp. ♀, holotype. A. Adult, lateral view; B. Urosome, dorsal view; C. First antenna; D. Second antenna; E. Siphon; F. Mandible; G. First maxilla; H. First leg; I. Second leg; J. Third leg; K. Fourth leg. Scale bar A = 0.1mm.

length, length to width ratio of the fifth leg and caudal rami and the shape of the female genital segment. There is no comprehensive key to this genus, although one is badly needed.

Asterocheres hongkongensis n. sp.

Fig. 4A–K

MATERIAL EXAMINED. Holotype ♀ from orange sponge collected at a depth of 8m at Chek Chau on 10 April 1986 BM(NH) registration number 1989.199.

ETYMOLOGY. The specific name refers to the type locality.

FEMALE. Characteristic asterocherid shape, dorso-ventrally flattened, rounded cyclopoid, 0.50mm long (Fig. 4A). Prosome 1.8 times as long as urosome, relative lengths of prosome segments 64: 17: 12: 7; relative lengths of urosome segments 17: 40: 19: 15: 9 (Fig. 4B). Genital segment tapering only slightly towards posterior margin; widest point at level of genital apertures, genital apertures dorso-laterally placed; genital segment equal in length and width measured at widest point; lateral tuft of setules posterior to each aperture. Anal segment 0.8 times as long as wide. Caudal rami 1.1 times as long as wide, trapezoid in dorsal view with postero-lateral spinose projection.

First antenna 19-segmented (Fig. 4C); relative lengths 10: 5: 3: 3: 3: 3: 3: 4: 5: 1: 3: 6: 6: 6: 6: 7: 6: 7: 13; armature apparently I-1+setules; II-1; III-0; IV-1; V-2; VI-0; VII-0; VIII-1; IX-3; X-0; XI-0; XII-1; XIII-0; XIV-0; XV-1; XVI-0; XVII-0; XVIII-1+ae; XIX-7 (some elements may be missing). 3 terminal elements of second antennal endopodite accompanied by external spine (Fig. 4D). Siphon short, not reaching maxilliped base, pyriform. Armature of first and second maxillae, maxilliped and natatory legs illustrated (Fig. 4E–K), typical of genus. Spines on external margin of second segment of first endopodite with row of accompanying setules. Fifth leg extending beyond level of genital apertures, about 3 times as long as wide.

REMARKS. *Asterocheres hongkongensis* resembles *A. indicus* Sewell, 1949, and *A. alter* Eiselt, 1965. It differs from the former in body size, the relative lengths of the segments of the first antenna and according to Sewell's figure, the length of the fifth leg (1949: figure 10B). The female of *A. alter* is not known, however disregarding the dimorphic characters of this genus, the species differ in the robustness of the fourth endopodite; Eiselt (1965) noted that this limb is reduced in *A. alter*. *Asterocheres alter* also lacks the postero-lateral projection of the caudal rami (1965: figure 2m).

Asterocheres bulbosus n. sp.

Figs 5A–6D

MATERIAL EXAMINED. Holotype ♀, allotype, 9 ♀♀ and 8 ♂♂ paratypes from purplish sponge collected at a depth of 10m at Gau Tau on 18 April 1986. BM(NH) registration numbers 1989.200 (holotype), 1989.201 (allotype), 1989.202–218.

ETYMOLOGY. This species is so named because of the distinctively bulbous caudal setae.

FEMALE. Cyclopoid shape, dorso-ventrally flattened, 0.47mm long, range 0.42 to 0.50mm (Fig. 5A). Prosome 1.9 times as

long as urosome, relative lengths of prosome segments 66: 18: 9: 7; relative lengths of urosome segments 22: 39: 21: 11: 7 (along mid-line of caudal rami) (Fig. 5B). Genital segment tapering posteriorly; widest point anterior to genital apertures, genital apertures dorso-laterally placed; genital segment 0.8 times as long as wide. Caudal rami 0.6 times as long as wide, expanding to greater width posteriorly; caudal setae bulbous.

First antenna 21-segmented (Fig. 5C); relative lengths of segments 16: 4: 4: 4: 3: 3: 5: 5: 4: 1: 4: 5: 6: 5: 6: 6: 6: 7: 3: 2: 1; armature apparently I-1; II-1; III-1; IV-2; V-2; VI-0; VII-0; VIII-2; IX-3; X-1; XI-1; XII-1; XIII-0; XIV-1; XV-1; XVI-1; XVII-0; XVIII-0; XIX-1; XX-1+ae; XXI-6. Distal external surface of third segment of second antenna with row of setules (Fig. 5D). Siphon short, not reaching maxilliped base, pyriform (Fig. 5E). Mandibular palp 1-segmented with 2 terminal setae, 1 long and robust, 1 short and weak; stylet long, curved and unarmed (Fig. 5F). Inner lobe of first maxilla comparatively long and slender (Fig. 5G). Second maxilla and maxilliped typical of genus. Natatory legs also typical of genus (Fig. 5H–K). Fifth leg about twice as long as wide (Fig. 5B).

MALE. Cyclopoid body shape, dorso-ventrally flattened, 0.37mm long, range 0.32 to 0.40mm (Fig. 6A). Prosome 1.7 times as long as urosome, relative lengths of prosome segments 66: 13: 13: 8; relative lengths of urosome segments 14: 38: 14: 12: 12: 10 (along mid-line of caudal rami) (Fig. 6B). Genital segment rotund, widest at mid-point, 0.6 times as long as wide, genital lappets represented by postero-lateral seta on each side. Anal segment half as long as wide. Caudal rami equal in length and width, expanding to greater width posteriorly; caudal setae bulbous at bases.

First antenna 17-segmented by fusion of female segments 12 and 13, 16 and 17, 18 to 20 (Fig. 6C); penultimate segment with distal hook; relative lengths of segments 15: 3: 3: 4: 3: 3: 4: 5: 4: 1: 4: 12: 5: 6: 10: 10: 8; armature indistinct, apparently I-1; II-1; III-0; IV-2; V-2; VI-0; VII-0; VIII-2; IX-2; X-1; XI-2; XII-1; XIII-0; XIV-1; XV-2; XVI-ae; XVII-6. Remainder of mouthparts and natatory legs similar to female, except exopodite of second leg where external spines of male are bluntly spatulate (compare Figs 5I and 6D). Fifth leg reduced to short segment delimited from body segment, with 2 terminal setae.

REMARKS. *Asterocheres bulbosus* resembles *A. aesthetes* Ho, 1984 and *A. hongkongensis*. However the females of these each have a 19-segmented first antenna and *A. aesthetes* has a highly characteristic aesthetasc on the second maxilla. The male of *A. alter* is similar to that of *A. bulbosus* but has longer caudal rami and a 2-segmented mandibular palp. The proportional lengths of the segments of the first antenna also differ. Females of this species differ from *A. hongkongensis* in several ways, notably in the slenderness of the endopodite of the first maxilla, the short fifth leg, and the bulbous caudal setae.

Asterocheres rotundus n. sp.

Figs 6E–7H

MATERIAL EXAMINED. Holotype ♀ from purplish sponge collected at a depth of 5–10m at Gau Tau on 18 April 1986. 2 ♀♀ and 2 ♂♂ paratypes from reddish-purple sponge collected at a depth of 2m at Peng Chau on 15 April 1986; 1 ♀

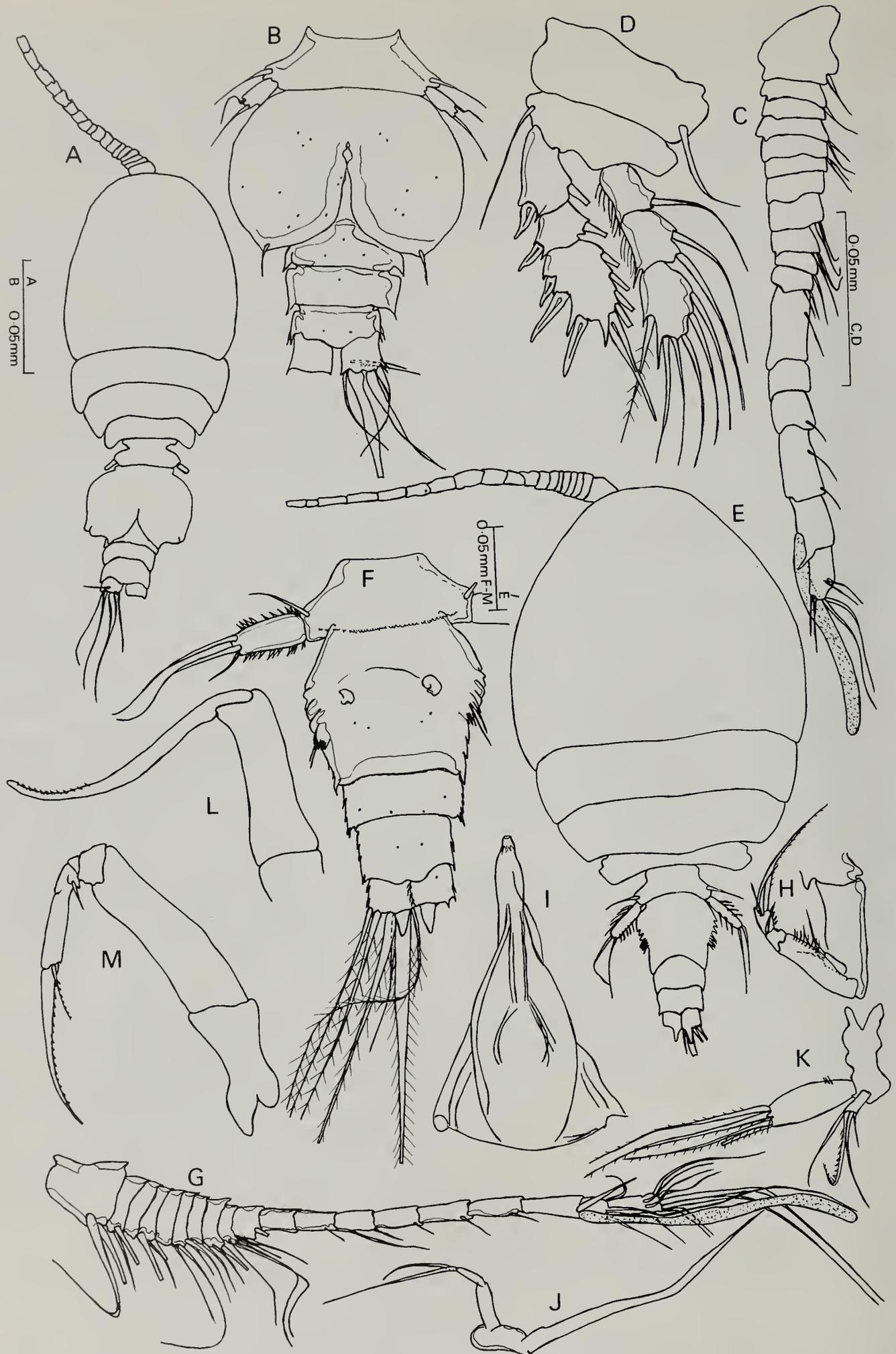


Fig. 6 *Asterocheres bulbosus* n. sp. ♂. A-D, paratype. A. Adult, dorsal view; B. Urosome, ventral view; C. First antenna; D. Second leg; *A. rotundus* n. sp. ♀. E-M, holotype. E. Adult, dorsal view; F. Urosome, dorsal view; G. First antenna; H. Second antenna; I. Siphon; J. Mandible; K. First maxilla; L. Second maxilla; M. Maxilliped. Scale bars A, E = 0.1mm.

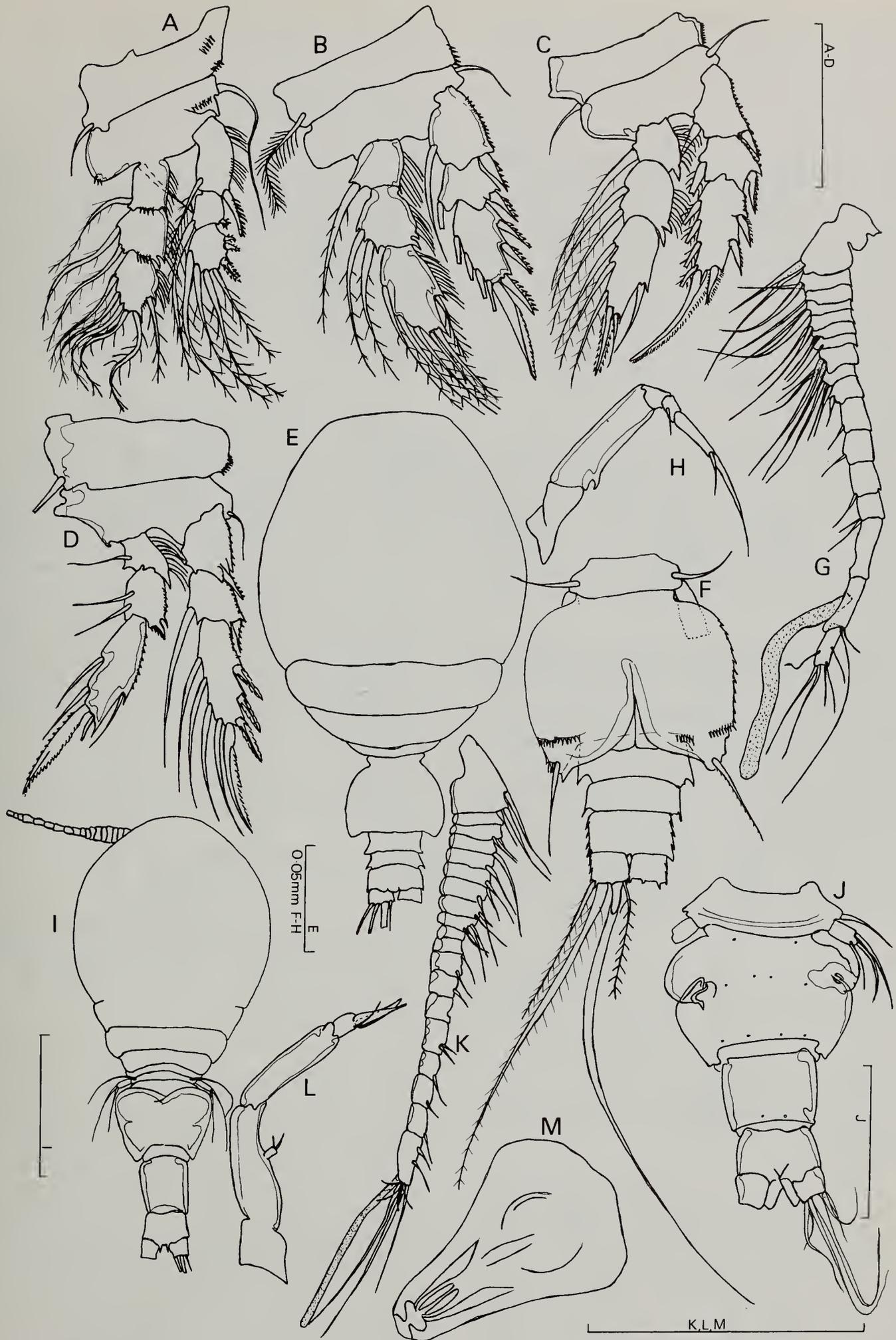


Fig. 7 *Asterocheres rotundus* n. sp. ♀. A-D, holotype. A. First leg; B. Second leg; C. Third leg; D. Fourth leg; ♂. E-H, paratype. E. Adult, dorsal view; F. Urosome, ventral view; G. First antenna; H. Maxilliped; *Asterocheroides sinensis* n. gen. n. sp. ♀. I-M, holotype. I. Adult, dorsal view; J. Urosome, dorsal view; K. First antenna; L. Second antenna; M. Siphon. Scale bars = 0.1mm, except F-H.

and 1 ♂ paratypes from the sponge *Ricinia* sp. collected at a depth of 15m at Chik Chau on 6 April 1986. BM(NH) registration numbers 1989.219 (holotype), 1989.220–225.

ETYMOLOGY. This species is named according to the rounded body shape.

FEMALE. Laterally expanded cyclopoid shape, head angular, dorso-ventrally flattened, 0.62mm long, range 0.59 to 0.66mm (Fig. 6E). Prosome 2.2 times as long as urosome, relative lengths of segments 67: 14: 15: 4; relative lengths of urosome segments 16: 43: 12: 19: 10 (along mid-line of caudal rami), posterior and lateral margins setulose. Genital segment robust and flask-shaped (Fig. 6F); widest point anterior to genital apertures, genital apertures dorso-laterally placed; genital segment 0.7 times as long as wide, segment laterally infolded and with tuft of spinules and setules posterior to infolds; anal segment 0.7 times as long as wide. Caudal rami equal in length and width, with spinules on both lateral margins.

First antenna 19-segmented (Fig. 6G); relative lengths 4: 3: 3: 2: 2: 2: 2: 4: 2: 6: 7: 8: 8: 8: 9: 10: 10: 3: 7; armature I–2; II–2; III–1; IV–2; V–2; VI–2; VII–1; VIII–2; IX–5; X–1; XI–0; XII–2; XIII–1; XIV–1; XV–1; XVI–1; XVII–1+ae; XVIII–3; XIX–8. Third and terminal segments of second antenna setulose, terminal seta also setulose (Fig. 6H). Siphon reaching beyond maxilliped basis, but not to basis of first leg, tubiform (Fig. 6I). Other mouthparts typical of genus (Fig. 6J–M).

External spine on first segment of first leg enlarged and robust; internal exopodite margins fringed with long setules (Fig. 7A–D). Fifth leg about twice as long as wide (Fig. 6F).

MALE. Laterally expanded cyclopoid shape, head angular, dorso-ventrally flattened, 0.49mm long, range 0.48 to 0.50mm (Fig. 7E). Prosome 1.9 times as long as urosome (figured specimen slightly telescoped), relative lengths of prosome segments 59: 23: 11: 7; relative lengths of urosome segments 16: 41: 12: 9: 14: 8 (along mid-line of caudal rami). Genital segment with relatively large genital lappets, bearing long robust spine and row of marginal spinules, segment with pronounced anterior shoulders, 0.8 times as long as wide (Fig. 7F). Anal segment and caudal rami 0.7 times as long as wide.

First antenna 17-segmented, by fusion of female segments 16 and 17, 18 and 19 (Fig. 7G); penultimate segment with distal hook; antenna geniculate, articulated between segments 15 and 16; relative lengths of segments 5: 3: 2: 2: 2: 2: 2: 4: 2: 7: 8: 7: 9: 6: 15: 13: 11, armature similar to that of female but with aesthetasc on penultimate segment. Mandible, first and second maxilla similar to those of female. Second segment of maxilliped with proximal hooked process (Fig. 7H). Natatory legs similar to those of female. Fifth leg typical of genus.

REMARKS. This species is easily distinguished from the previous two by the angular head, and the longer, thinner siphon. In most species of *Asterocheres* the siphon is pyriform, in some species it is tubiform and in a few species the tube reaches beyond the level of the basis of leg 2. *Asterocheres rotundus* is one of the intermediate group in which the tubiform siphon is shorter than this. This species is similar to the following on the base of the siphon, the 19-segmented female first antenna and body size (*A. ovalis* Sewell, 1949 is included although the siphon length is not known); *Asterocheres aesthetes* is distinguished by the aesthetasc on

the basis of the second maxilla; *A. canui* Giesbrecht, 1897 is not well-known and the type description is poor, it is known only from the male which has a distinctive swollen seta on the outer ramus of the first maxilla, not found on *A. rotundus*; *A. halichondriae* Stock, 1966 has external spines on the fourth exopodite which are reduced in size and are smaller than those found here; *A. indicus* differs in having caudal rami which are longer than they are broad; *A. mucronipes* Stock, 1960 and *A. scutatus* Stock, 1966 are both more bulky-looking species, *A. mucronipes* has a longer exopodite on the second antenna; finally *A. ovalis*, known only from the male, has a genital segment which is about twice as wide as it is long, also the anal segment is longer in proportion to the preceding segment than in *A. robustus*. Of all the foregoing, *A. halichondriae* is the most similar in general appearance to *A. robustus*.

ASTEROCHEROIDES n. gen

DIAGNOSIS. Asterocheridae; body cyclopoid, prosome 4-segmented, urosome 4-segmented in female, excluding caudal rami, 5-segmented in male. First antenna 19-segmented in female with aesthetasc on distal segment; 17-segmented in male, aesthetascs on segments 16 and 17. Second antenna with single-segmented exopodite, bearing 2 setae; endopodite with seta and robust claw. Siphon short and conical. Mandibular palp single-segmented with 2 terminal setae. Second maxilla 3-segmented with thick terminal hook. Maxilliped 5-segmented with terminal claw. Natatory legs all biramous and 3-segmented, each exopodite bearing 3 external spines on terminal segment; internal spine on first basis; terminal segment on fourth endopodite with setal formula 0, 1, 2.

ETYMOLOGY. Superficially at least, this genus resembles *Asterocheres* and the root of the name is used accordingly.

Asterocheroides sinensis n. gen. n. sp.

Figs 7I–8J

MATERIAL EXAMINED. Holotype ♀, allotype, 6 ♀♀ and 5 ♂♂ paratypes from the sponge *Ricinia* sp. collected at a depth of 15m at Chik Chau on 6 April 1986. BM(NH) registration numbers 1989.226 (holotype), 1989.227 (allotype), 1989.228–238.

ETYMOLOGY. The specific name comes from the type locality.

FEMALE. Characteristic asterocherid, rounded cyclopoid shape; burgundy red in colour; 0.32mm long, range 0.27 to 0.34mm (Fig. 7I). Prosome 1.4 times as long as urosome; head laterally expanded with point of maximum width half way between rostrum and posterior margin; head incompletely fused to following segment; rostrum inconspicuous; relative lengths of prosome segments 79: 8: 8: 5; relative lengths of urosome segments 13: 38: 24: 16: 9 (along mid-line of caudal rami). Genital segment very broad with distinct antero-lateral shoulders, 0.6 times as long as wide; genital apertures in lateral infoldings of segment well just anterior to mid-point, paired cuticular pores clearly visible (Fig. 7J). Anal segment 0.6 times as long as wide, excluding ventral flap. Caudal rami about equal in length and width measured along outer edge, shorter along inner edge; 6 terminal and sub-terminal setae; 2 shield-like process posteriorly projecting between rami.

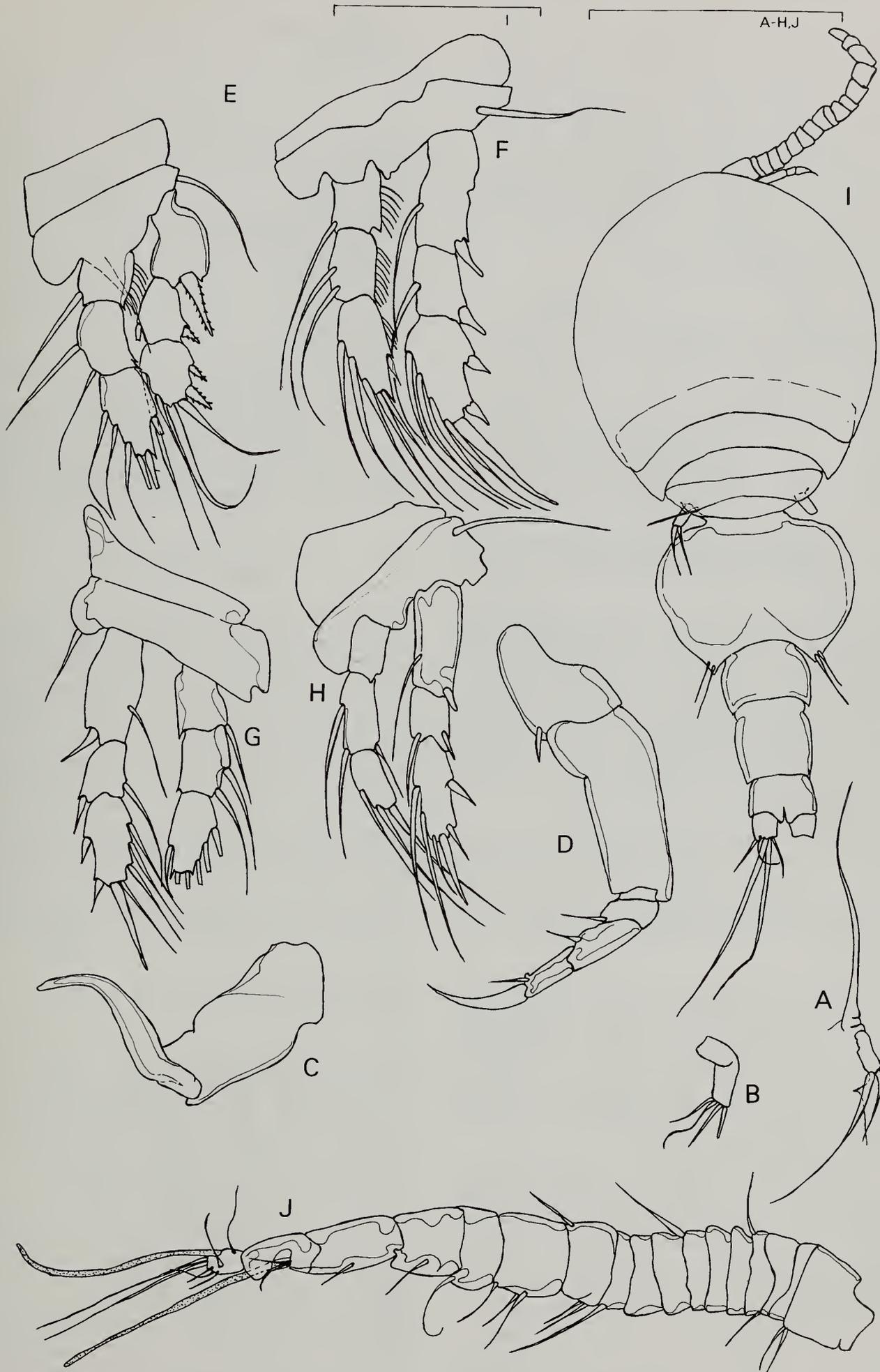


Fig. 8 *Asterocheres sinensis* n. gen. n. sp. ♀. A-H, holotype. A. Mandible; B. Outer lobe, first maxilla; C. Second maxilla; D. Maxilliped; E. First leg; F. Second leg; G. Third leg; H. Fourth leg; ♂. I, J, paratype. I. Adult, dorsal view; J. First antenna. Scale bars = 0.1mm.

First antenna 19-segmented (Fig. 7K); relative lengths 7: 2: 2: 3: 4: 4: 5: 4: 3: 4: 3: 5: 6: 7: 7: 7: 7: 7: 13; armature I-3; II-0; III-2; IV-1; V-1; VI-2; VII-1; VIII-2; IX-3; X-0; XI-1; XII-1; XIII-1; XIV-0; XV-2; XVI-1; XVII-1; XVIII-1; XIX-7+ae. Endopodite of second antenna with short robust spine, thinner spine and seta distally; short, single-segmented exopodite with 2 terminal setae (Fig. 7L). Siphon conical (Fig. 7M). Mandibular palp short, single-segmented with 1 long and 1 short terminal seta; stylet pointed, jointed at base (Fig. 8A). First maxilla damaged in dissection, outer lobe with 4 terminal setae (Fig. 8B). Second maxilla robust with short thick terminal claw (Fig. 8C). Maxilliped 5-segmented with terminal heavy claw (Fig. 8D).

Armature of natatory legs (Fig. 8E-H):

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0-0	1-I internal	0-1; 0-2; 1,1,4	I-0; I-1; II,2,2
Leg 2	0-0	1-0	0-1; 0-2; 1,1,4	I-1; I-1; II,1,4
Leg 3	0-0	1-0	0-1; 0-2; 1,1,4	I-1; I-1; II,1,4
Leg 4	0-0	1-0	0-0; 0-2; 0,1,2	I-1; I-1; II,1,4

Fifth leg single, cylindrical segment with 3 long terminal and sub-terminal setae reaching beyond level of genital apertures; seta on body nearby.

MALE. Similar in body shape to female, 0.33mm long, range 0.30 to 0.35mm (Fig. 8I). Prosome 1.1 times as long as urosome (figured specimen telescoped); relative lengths of prosome segments 67: 20: 8: 5; relative lengths of urosome segments 13: 34: 16: 20: 10: 7 (along mid-line of caudal rami). Genital segment rotund, 0.6 times as long as wide, cuticular pores as for female; genital lappets small and rounded, 2 spines on each. Anal segment 0.7 times as long as wide. Caudal rami as for female.

First antenna 17-segmented (Fig. 8J), by fusion of female segments 15 and 16, and 17 with 18; relative lengths of segments 9: 2: 4: 3: 3: 4: 3: 4: 4: 3: 7: 10: 6: 9: 12: 10: 7; armature similar to that of female except segment 16 with invagination bearing aesthetasc. Remainder of limbs similar to those of female.

REMARKS. This species is typically asterocheroid in possessing the single-segmented exopodite of the second antenna, together with the terminal claw and accompanying single seta of the endopodite. This species also has the characteristic mandibular palp, 3-segmented biramous natatory legs (not universal in the family) and 4-segmented female urosome. The Asterocheridae share a many-segmented first antenna, here there are 19 segments in the female.

In Table 1 *Asterocheroides* is compared to some morphologically similar genera. Like *Asteropontopsis* Stock, 1987 it lacks an inner seta on the first segment of the first exopodite, the endopodite of the second antenna resembles *Asteropontius* Thompson & Scott, 1903 and *Asteropontopsis* but the reduced armature distinguishes *Asterocheroides*. It is most morphologically akin to *Asteropontopsis* but the latter has a distinctive pair of hyaline lobes on the distal part of the siphon, and also the first antenna has a sub-terminal aesthetasc (terminal in *Asterocheroides*). Stock (1987) states that the differences between *Asteropontius* and *Asteropontopsis* are slight but sufficient to warrant separation of their respective

species into separate genera. *Asterocheroides* is erected on a similar basis.

Table 1 A comparison of some morphologically similar genera of asterocherids.

	A1	A2	Man	ex 1	ex 2	ex 4	en 4	P5
<i>Asterocheres</i> Boech, 1859	19-20	2+I	1/2(2)	I-1	t	III, I, 4	1+I, 2	v
<i>Asterocheroides</i> n. gen.	19	1+c	1 (?)	I-0	t	II, I, 4	2, 1	s
<i>Asteropontius</i> Thompson and Scott, 1903	19-20	1+c	1 (1)	I-1	t	III, I, 4	1+I, 2	s
<i>Asteropontoides</i> Stock, 1975	18	2+I	? (?)	I-1	L	III, I, 3	I, 2	e
<i>Asteropontopsis</i> Stock, 1987	19	1+c	1 (1)	I-0	t	II, I, 4	1+I, 2	1

A1, number of segments female first antenna. A2, armature endopodite second antenna: c = claw. Man, segmentation mandibular palp (armature). ex 1, armature first segment first exopodite. ex 2, shape second segment first exopodite: t = trapezoid, L = l-shaped. ex 3, armature third segment fourth exopodite. en 4, armature third segment fourth endopodite. P5, size basal segment fifth leg: v = variable, s = small, e = elongate, l = large and robust.

SIPHONOPONTIUS n. gen.

DIAGNOSIS. Asterocheridae; body cyclopoid, prosome 5-segmented, urosome 4-segmented in female, excluding caudal rami. First antenna 20-segmented with terminal aesthetasc. Second antenna with single-segmented exopodite, bearing 2 setae; endopodite with robust terminal spine and thick claw. Siphon pyriform with bulbous tip. Mandibular palp single-segmented with terminal seta. First maxilla: outer lobe with 4 terminal elements, inner lobe with 2. Second maxilla tipped with robust, recurved claw. Maxilliped 5-segmented with terminal claw. Natatory legs biramous, each 3-segmented except fourth endopodite 2-segmented; terminal armature fourth endopodite 2+I. Male not known.

ETYMOLOGY. This genus is so named because of the distinctive shape of the siphon of the type-species.

Siphonopontius robustus n. gen. n. sp.

Fig. 9A-L

MATERIAL EXAMINED. Holotype ♀, 2 ♀♀ paratypes from an orange sponge collected at a depth of 8m at Chek Chau on 10 April 1986. BM(NH) registration numbers 1989.239 (holotype), 1989.240-241. 8 ♀♀ from reddish-purple sponge collected at a depth of 2m at Peng Chau on 15 April 1986. BM(NH) registration numbers 1989.242-249.

FEMALE. Cyclopoid shape, 0.36 mm long, range 0.33 to 0.42mm (Fig. 9A). Prosome twice as long as urosome; head 1.2 times as long as wide; head not fused to following segment, therefore prosome 5-segmented, but segmentation indistinct, relative lengths 52: 16: 19: 9: 4; rostrum small and rounded; relative lengths of urosome segments 19: 47: 12: 17: 5 (along mid-line of caudal rami). Genital segment short and robust, not greatly expanded, 0.7 times as long as wide, genital apertures dorso-laterally placed at position of maximum width (Fig. 9B); paired egg sacs with single eggs.

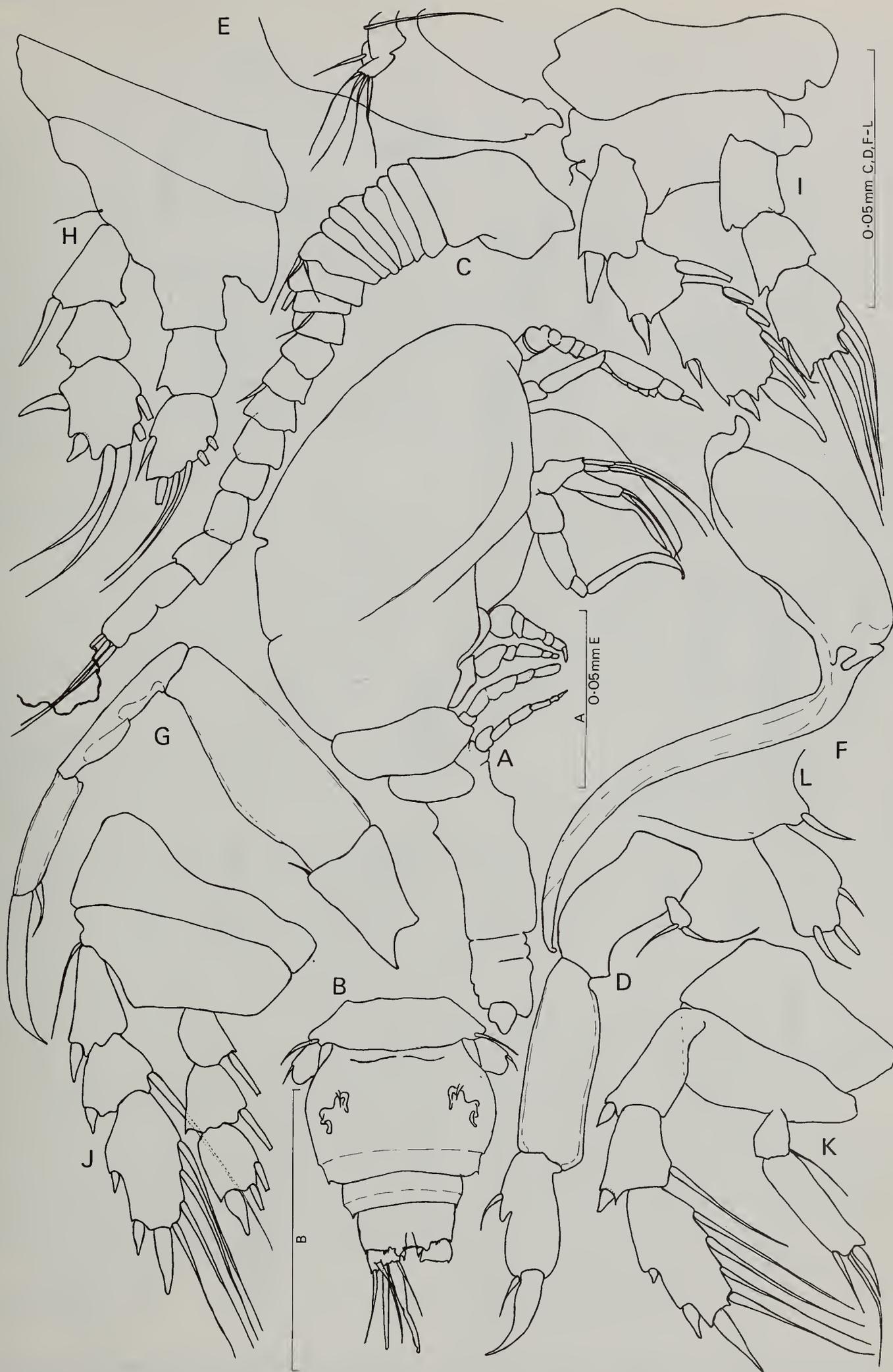


Fig. 9 *Siphonopontius robustus* n. gen. n. sp. ♀, holotype A. Adult, lateral view; B. Urosome, dorsal view; C. First antenna; D. Second antenna; E. Siphon, mandibular stylet and first maxilla; F. Second maxilla; G. Maxilliped; H. First leg; I. Second leg; J. Third leg; K. Fourth leg; L. Fifth leg. Scale bars A, B = 0.1mm.

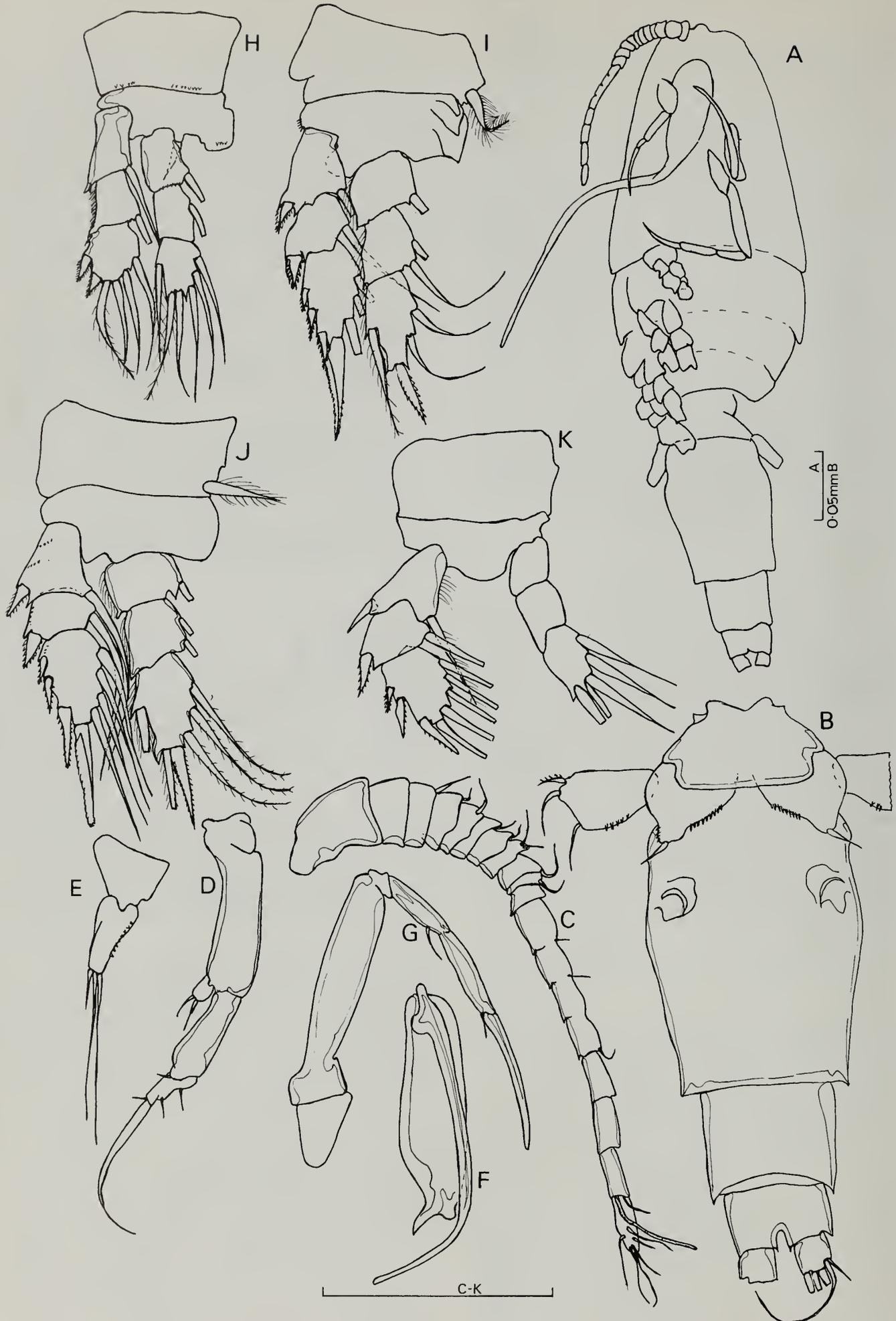


Fig. 10 *Scottocheres stocki* n. sp. ♀, holotype. A. Adult, ventral view; B. Urosome, dorsal view; C. First antenna; D. Second antenna; E. Inner lobe, first maxilla; F. Second maxilla; G. Maxilliped; H. First leg; I. Second leg; J. Third leg; K. Fourth leg. Scale bars = 0.1mm, except B.

Anal segment half as long as wide measured along mid-line, 0.4 times as long as wide measured along lateral margin, medial posterior processes accounting for difference. Caudal rami also irregular in shape. 0.3 times as long as wide along inner margin and 0.7 times along outer margin; armature 4 terminal setae of varying lengths, largest seta jointed, and 1 dorsal seta.

First antenna 20-segmented, segmentation indistinct (Fig. 9C); relative lengths 15: 3: 2: 2: 2: 3: 2: 4: 5: 3: 3: 4: 5: 6: 6: 6: 6: 7: 6: 10; armature uncertain, indistinct but bearing terminal aesthetasc. Exopodite of second antenna single-segmented with 2 terminal setae; endopodite with short thick terminal spine and thick claw, external margin of third segment dentate (Fig. 9D). Siphon short, pyriform with bulbous tip. Mandible with single-segmented palp bearing 1 terminal seta; stylet unarmed and pointed (Fig. 9E). Outer lobe of first maxilla with 4 terminal setae (Fig. 9E); inner lobe with 2 terminal setae. Second maxilla with long recurved claw (Fig. 9F). Maxilliped indistinctly 5-segmented with short terminal claw and seta (Fig. 9G).

Armature of natatory legs (Fig. 9H-K):

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0-0	1-0	0-0; 0-0; 1,1,4	I-0; I*-0; II,2,2
Leg 2	0-0	1-0	0-1; 0-1; 1,2,2	I-0, I-1; II,I,4
Leg 3	0-0	1-0	0-1; 0-1; 0,I,2	I-0; I-1; II,I,4
Leg 4	0-0	0-0	0-1; 2+I	I-0; I-1; II,I,4

* missing from figured specimen

Spines on exopodites indistinctly flanged, those of first exopodite rounded. Fifth leg single-segmented, leaf-like; armature comprising 2 terminal and 1 sub-terminal setae (Fig. 9L).

REMARKS. This genus can be grouped with *Discopontius* Nicholls, 1944 and *Peltomyzon* Stock, 1975 as they share many similarities in morphology. *Siphonopontius* can be assigned to the Asterocheridae on the same bases as *Asterocheroides* (cf), namely the many-segmented first antenna and the second antennal claw, the presence of the mandibular palp and the 4-segmented female urosome. However *Siphonopontius* shares a 2-segmented fourth endopodite with *Discopontius* and *Peltomyzon*, in *Asterocheroides* this limb is 3-segmented. In common with *Asterocheroides*, *Siphonopontius* has a terminal aesthetasc on the first antenna. This new genus differs from *Peltomyzon* in possessing a 3-segmented third endopodite, in *Peltomyzon* it is 2-segmented. It differs from *Discopontius* in having a single medial seta on the second segment of the second endopodite and no seta at all at the corresponding position on the first leg. *Discopontius* has 2 setae at each position. *Discopontius* is known only from the type species, *D. discoides*; in many ways it is very similar to *S. robustus*, but besides the above, it may be distinguished by the lateral expansions of the genital segment.

Scottocheres stocki n. sp.

Fig. 10 A-K

MATERIAL EXAMINED. Holotype ♀ from the sponge *Ricinia* sp. collected at a depth of 15m at Chik Chau on 6 April 1986. BM(NH) registration number 1989.250.

ETYMOLOGY. This species is named after Professor Jan Stock in recognition of his extensive work on the Asterocheridae.

FEMALE. Elongated and slender cyclopoid shape, 0.92mm long (Fig. 10A). Prosome 1.3 times as long as urosome; head equal in length and width, maximum width at posterior margin; rostrum small; relative lengths of prosome segments 58: 19: 12: 11; relative lengths of urosome segments 12: 54: 17: 11: 6. Genital segment almost uniform in width, tapering only slightly posteriorly, widest at position of dorso-laterally placed genital apertures; 1.8 times as long as wide (Fig. 10B). Anal segment 0.6 times as long as wide. Caudal rami equal in length and width, with 5 terminal and sub-terminal setae of varying lengths.

First antenna 19-segmented, segments 12 to 15 partially fused; relative lengths 6: 4: 5: 3: 2: 2: 3: 2: 2: 1: 5: 8: 6: 6: 8: 8: 8: 9: 12; armature I-0; II-0; III-1; IV-1; V-1; VI-1; VII-1; VIII-2; IX-1; X-1; XI-0; XII-1; XIII-1; XIV-0; XV-1; XVI-0; XVII-0; XVIII-1+ae; XIX-6 (Fig. 10C). Second antenna typically asterocherid: terminal endopodite segment with long hooked claw and 2 terminal spinules; exopodite single-segmented with 2 terminal setae (Fig. 10D). Siphon elongate, distally slim and tubiform, reaching genital segment (Fig. 10A). Mandibular stylet smooth, thin and equal in length to siphon. Inner lobe of first maxilla single-segmented with 3 terminal setae, row of denticles on outer margin (Fig. 10E). Second maxilla 2-segmented, unarmed (Fig. 10F). Maxilliped 5-segmented, third and fourth segments with distal spinules on inner angles, fifth segment produced as unarmed claw (Fig. 10G).

Armature of natatory legs (Fig. 10 H-K):

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0-0	I internal-0	0-1; 0-1; 1,2,3	0-1; 0-1; II,2,2
Leg 2	0-I	0-0	0-1; 0-2; 1,I,2	I-1; I-1; III,I,3
Leg 3	0-I	0-0	0-1; 0-2; 1,1+I,3	I-1; I-1; III,I,4
Leg 4	0-0	0-0	0-0; 0-0; 0,2,3	I-1; I-1; III,I,4

Exopodite spines flanged except for spatulate terminal spine of third leg. Fifth leg single-segmented and leaf-like; 3 distal spinules (Fig. 10B). Body segment bearing fifth leg also bearing posteriorly pointing ventral flanges, each with terminal spine flanked by rows of denticles.

REMARKS. Stock produced a comprehensive key to the genera of the Asterocheridae (1987). This species is readily assigned to *Scottocheres* Giesbrecht, 1892. It is superficially similar to *S. elongatus* (Thompson & Scott, 1894) which has also been found in sponges (see Schirl, 1973 for review). Detailed examination of the natatory legs, however, reveals several differences in the armatures, notably on the first terminal exopodite segment where *S. elongatus* is II, I + 2, 2 (Sars, 1915: Plate LXVI) and *S. stocki* is II, 2, 2; correspondingly the second exopodites are respectively II, I, 4 and III, I, 3. *Scottocheres elongatus* has a 17-segmented first antenna (19 here). *Scottocheres lauberi* Stock, 1967, another sponge dweller is distinguished by the armature of the second, third and fourth exopodites.

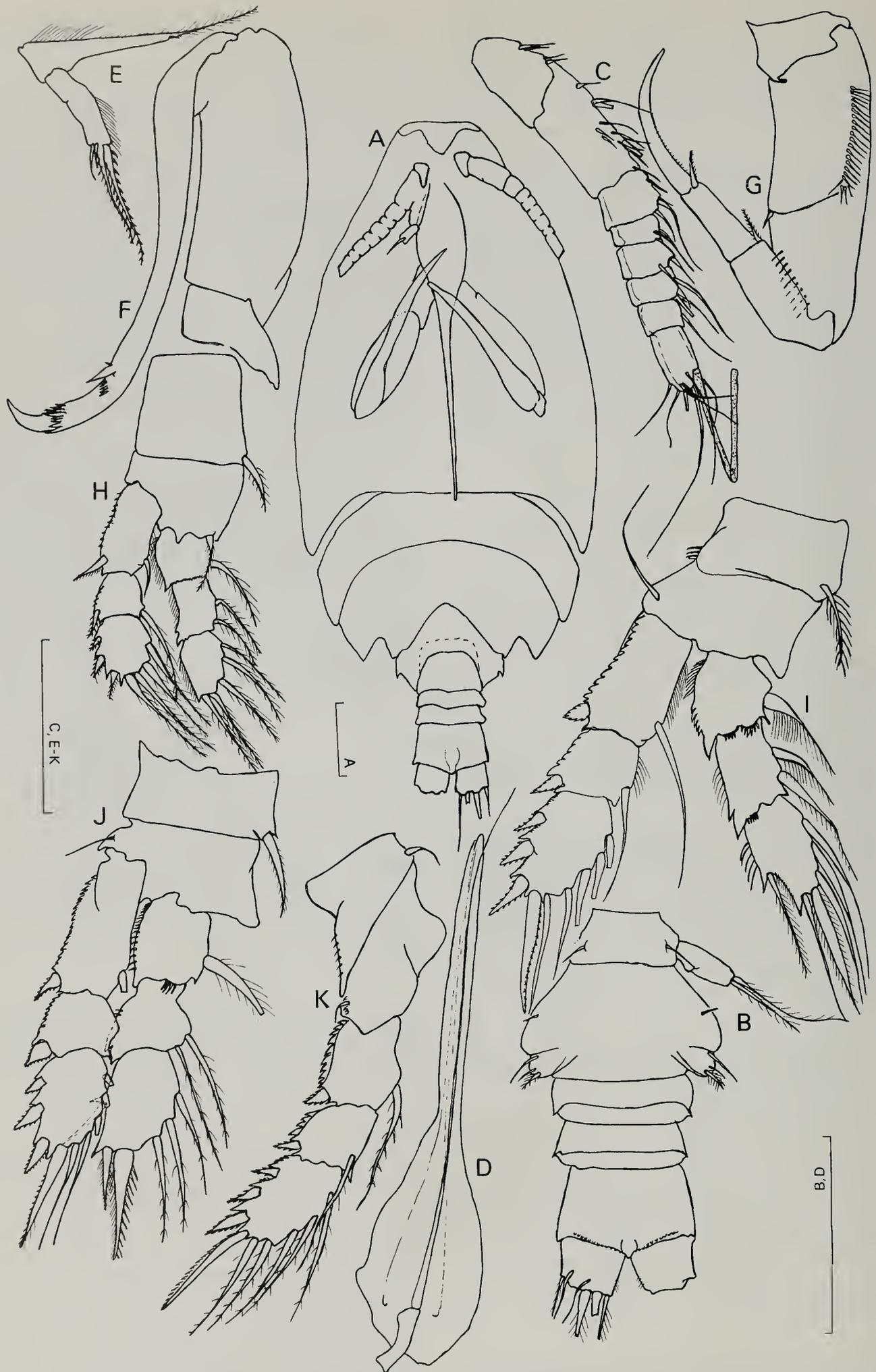


Fig. 11 *Cryptopontius ricinus* n. sp. ♀, holotype. A. Adult, ventral view; B. Urosome, dorsal view; C. First antenna; D. Siphon; E. First maxilla; F. Second maxilla; G. Maxilliped; H. First leg; I. Second leg; J. Third leg; K. Fourth leg. Scale bars = 0.1mm.

Family **DYSPONTIIDAE** Thorell*Cryptopontius ricinius* n. sp.

Fig. 11 A–K

MATERIAL EXAMINED. Holotype ♀ from the sponge *Ricinia* sp. collected at a depth of 15m at Chik Chau on 6 April 1986. BM(NH) registration number 1989.251.

ETYMOLOGY. This species is named after the sponge in which it was discovered.

FEMALE. Slender, prosome elongate oval, laterally extended into epimeral plates, these being postero–laterally pointed, 0.94mm long (Fig. 11A). Prosome 3.7 times as long as urosome, measuring urosome from posterior border of prosome (genital segment much recessed under posterior border); head 1.3 times as long as wide; rostrum small, produced postero-ventrally; relative lengths of prosome segments 69: 9: 12: 10, head fused to following segment; relative lengths of urosome segments ? : 34: 13: 13: 25: 15 (first segment damaged in dissection). Genital segment expanded posteriorly into 2 pairs of small lobes, outer with long spinule, inner with shorter spinules; 0.7 times as long as wide (Fig. 11B). Caudal rami 0.8 times as long as wide, roughly rectangular; armature 4 terminal elements of varying length, 2 dorsal setules.

First antenna 8-segmented (Fig. 11C); relative lengths 17: 24: 9: 5: 9: 7: 9: 20; armature I–4; II–12; III–4; IV–1+I; V–2; VI–3; VII–1; VIII–8+ae, spine on fourth segment robust. Second antenna lost in dissection. Siphon tubiform, elongate and slender, extending to level of second natatory leg (Fig. 11D). Mandibular stylet 2-segmented, distal segment elongate (Fig. 11D); palp absent. Outer lobe of first maxilla 2-segmented, distal segment with 4 terminal spines, 2 large and spinose, 2 small and unarmed (Fig. 11E); inner lobe single-segmented, longer than outer lobe and tapering distally, with terminal pinnate seta and spinule, segment with internal row of setules, long proximally, shorter distally. Second maxilla 3-segmented, proximal 2 unarmed; distal segment produced into long, curved claw with sub-terminal clusters of spinules (Fig. 11F). Maxilliped 5-segmented (Fig. 11G); segment 2 with lateral rows of setules and internal spine, segments 3 and 4 with internal pinnate spines; terminal segment produced as curved claw, inner concave surface spinulose.

Fourth natatory leg lacking endopodite. Outer surfaces of second, third and fourth legs dentate. Fifth leg cylindrical, single-segmented, about twice as long as wide, with 2 small terminal setae (Fig. 11B).

Armature of natatory legs (Fig. 11 H–K):

	Coxa	Basis	Endopodite	Exopodite
Leg 1	0–I	0–I	0–1; 0–2; 0,2,3	I–1; I–1; III,2,2
Leg 2	0–1	1–0	0–1; 0–2; 1,I+1,3	I–1; I–1; III,I,5
Leg 3	0–1	1–0	0–1; 0–2; 1,II,3	I–1; I–1; III,I,5
Leg 4	0–1	1–0		I–1; I–1; III,I,5

REMARKS. This species was assigned to the genus *Cryptopontius* Giesbrecht, 1899 on the basis of the siphon length, the reduction of the mandible and fourth natatory leg. Leg armature and size separate this from the otherwise similar *C. minor* Stock, 1965. The fifth leg is comparatively long, as found in *C. longipes* Nicholls, 1944, however *C. longipes* has a 9-segmented first antenna in the female and the genital segment is more laterally dilated.

ACKNOWLEDGEMENTS. I am grateful to Dr Geoffrey Boxshall for his help and advice on the preparation of the text and to the Trustees of the Natural History Museum in London for the use of Museum facilities for this piece of research.

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Manuscript accepted for publication 22 April 1991.