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## Some new and rare species of Ameiridae (Copepoda: Harpacticoida) from the Isles of Scilly, UK

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Three new species of the harpacticoid family Ameiridae are described from clean sand at high water neap tide on St Martin's Flat, Isles of Scilly. *Ameiropsis martinis* sp. nov. appears most closely related to *A. australis* Kunz, 1975 but can be distinguished from it by the shape of the rostrum and the armature of the operculum, female genital field and the male P5 baseoendopodal lobe. *Sarsameira parexilis* sp. nov. was originally identified as *S. exilis* T. and A. Scott, 1894 but the females can be distinguished from *S. exilis* by their smaller body size and shape of the caudal ramus whilst the males can be distinguished by the 12-segmented antennule and four setae on the P5 baseoendopodal lobe. *Ameira longispina* sp. nov. is unique within the "Ameira" complex of genera and species because of the marked elongation of the inner spine on the basis of the male P1. This species is tentatively placed in *Ameira* Boeck, 1865, but has features which indicate that it probably occupies an intermediate position between this genus and *Psammameira* Noodt, 1952. The previously unknown males of *Sarsameira perezii* Bodin, 1970 and *Nitocra elegans* (T. Scott, 1905) are also described.

**Keywords:** Scilly Isles; Harpacticoida; *Ameiropsis*; *Sarsameira*; *Ameira*; *Nitocra*

### Introduction

Six months after the sampling regime described in Warwick et al. (2006) was completed at an extreme low water (LW) spring tide, uniform coarse sand site on St Martin's Flat, Isles of Scilly, the same sampling regime was employed at a similar site near the high water (HW) mark. As reported by Gee (2006), 75 species of harpacticoid were found at the LW site with the parastenheliid *Karllangia ornatissima* (Monard, 1935) and the ameirid *Sicameira leptoderma* Klie, 1950 being the dominant species. At the HW site 41 species of harpacticoid were identified and the community was dominated by the harpacticid *Harpacticus flexus* Brady and Robertson, 1873, the cletodid *Rhizothrix minuta* (T. Scott, 1903) and the laophontid *Heterolaophonte strömi* (Baird, 1834). Except for one specimen, *K. ornatissima* was absent from the HW site, but *Parastenhelia bulbosa* (Wells, 1963), which was quite rare at the LW site, occurred in every sample at the HW site. With reference to Gee (2005) it is worth noting also that the diosaccinid *Bulbamphiascus* was present in nearly every sample at the HW site and all specimens could be referred to *B. scilloniensis* Gee, 2005 and none to *B. imus* (Brady, 1872).

The Ameiridae from the HW site were noteworthy for two reasons, firstly, the complete absence of *S. leptoderma* and secondly, the six species that were present

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comprised an unusual and interesting group in that, apart from *Ameira parvula* (Claus, 1866), they were either new or very rare species. The most common species, which occurred in moderate numbers in over half the samples, was preliminarily identified as *Sarsameira exilis* (T. and A. Scott, 1894) but, on closer examination, turned out to be a new species. Two other new species were also present, one belonging to *Ameiropsis* and one provisionally assigned to *Ameira*. The other two species were the very rare *Sarsameira perezi* Bodin 1970 and *Nitocra elegans* (T. Scott, 1905), for both of which the males were unknown. In this paper, therefore, I describe the three new species and the unknown males of the other two species.

### Materials and methods

The material was obtained from cores in clean sand at high water neap tide (HWNT) on St Martin's Flat, Isles of Scilly. Sediment cores of three different sizes were sieved through 63 µm, 125 µm or 250 µm mesh sieves and retained animals were fixed in 10%, and preserved in 4%, formalin. Before dissection the habitus was drawn and body length measurements made from whole specimens temporarily mounted in lactophenol. Specimens were dissected in lactophenol, the parts individually mounted in lactophenol under coverslips subsequently sealed with clear nail varnish. All drawings were prepared using a camera lucida on a Nikon Optiphot 20 differential interference contrast microscope. The terminology of the body and appendage morphology follows that of Huys and Boxshall (1991). Abbreviations used in the text and figures are "P1–P6" for thoracopods 1–6; "exp(enp)-1(-2-3)" to denote the proximal (middle, distal) segment of a ramus; and "a" for aesthetasc. Body length was measured from the base of the rostrum to the median posterior border of the anal somite. All material has been deposited in the Natural History Museum, London.

### Taxonomy

Family **AMEIRIDAE** Boeck, 1865<sup>1</sup>  
 Sub-family **AMEIRINAE** Boeck, 1865  
 Genus *Ameiropsis* Sars, 1907  
*Ameiropsis martinis* sp. nov.  
 (Figures 1–5)

#### *Material examined*

*Holotype*. Adult ♀ dissected onto five slides, NHM Reg. No. 2009.51.

*Paratypes*. Twenty-seven adult ♀♀ (1 dissected onto 3 slides, 1 dissected onto 1 slide and 25 spirit preserved) and 15 ♂♂ (2 each dissected onto 3 slides, 1 dissected onto 1 slide and 12 spirit preserved) NHM Reg. Nos 2009.145–147; 2009.148–157; 2009.158–159.

#### *Description of female*

*Body*. See Figure 1. Length 0.593–0.870 mm (mean 0.759 mm, *n* = 10) semi-cylindrical, widest at posterior margin of cephalothorax, tapering gradually posteriorly and

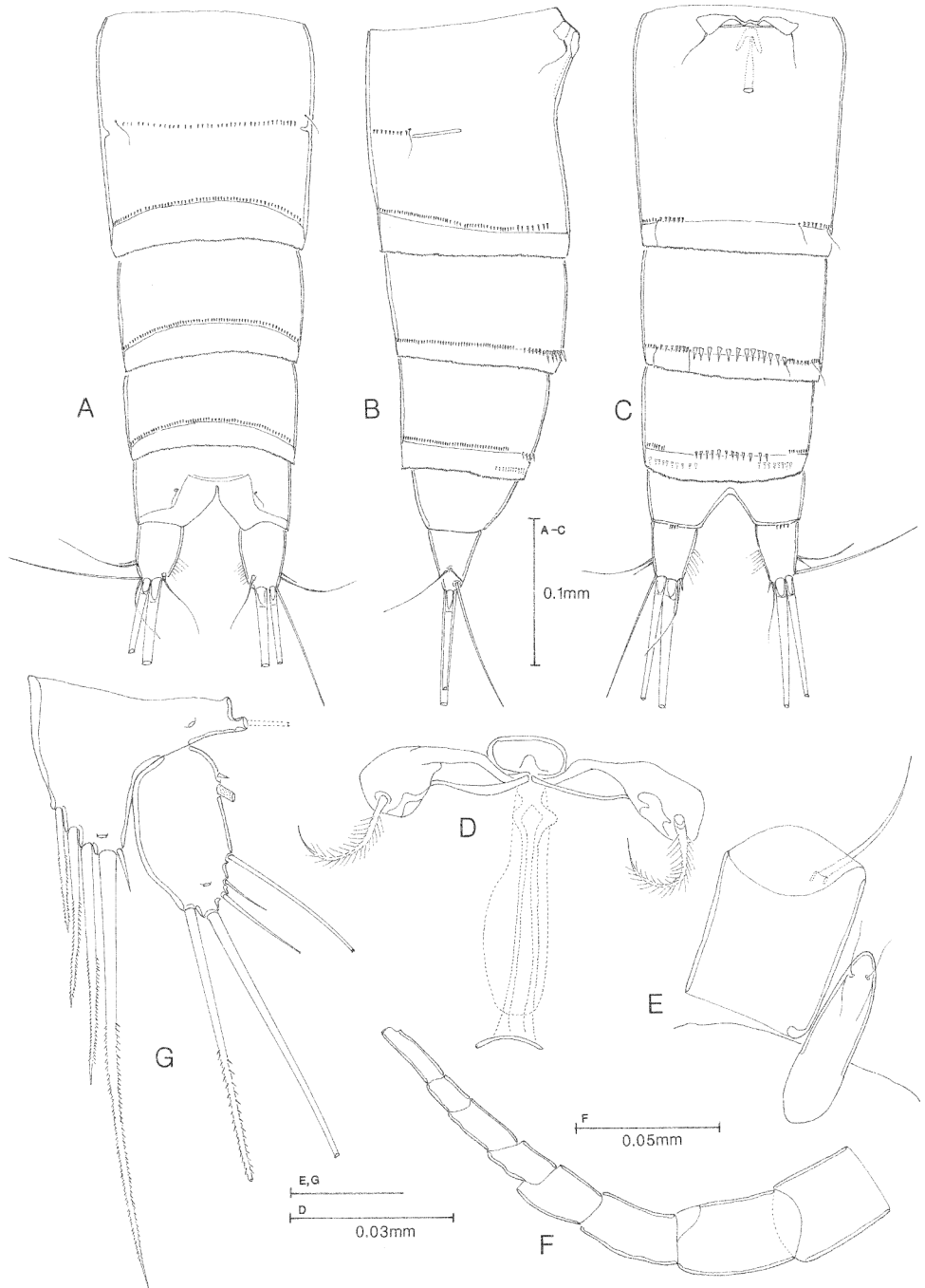


Figure 1. *Ameiropsis martinis* sp. nov., female, urosomites 2–6. (A) Dorsal; (B) lateral; (C) ventral; (D) genital field; (E) rostrum and proximal segment of antennule; (F) segmentation of antennule; (G) P5.

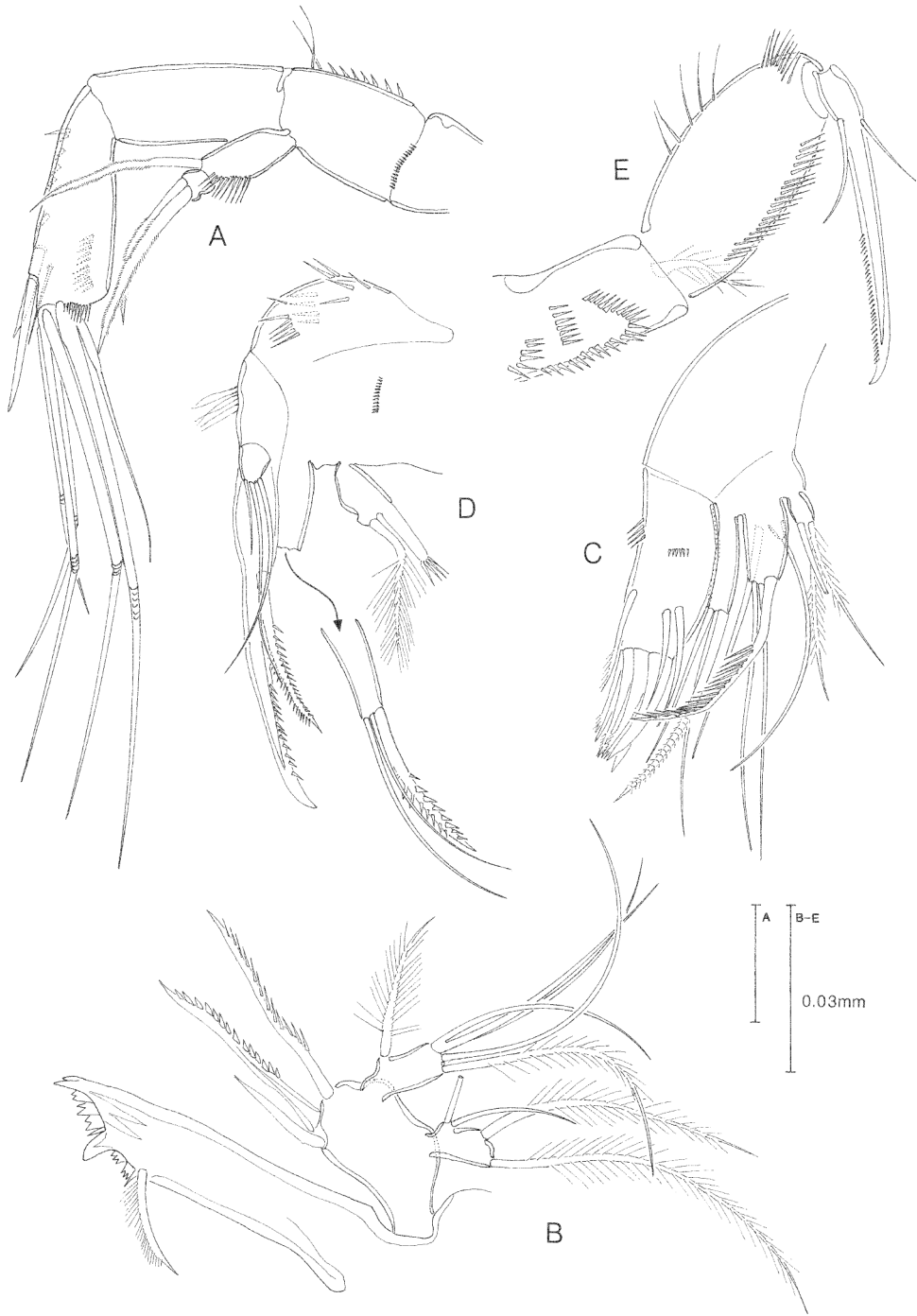


Figure 2. *Ameiropsis martinis* sp. nov., female. (A) Antenna; (B) mandible; (C) maxillule; (D) maxilla; (E) maxilliped.

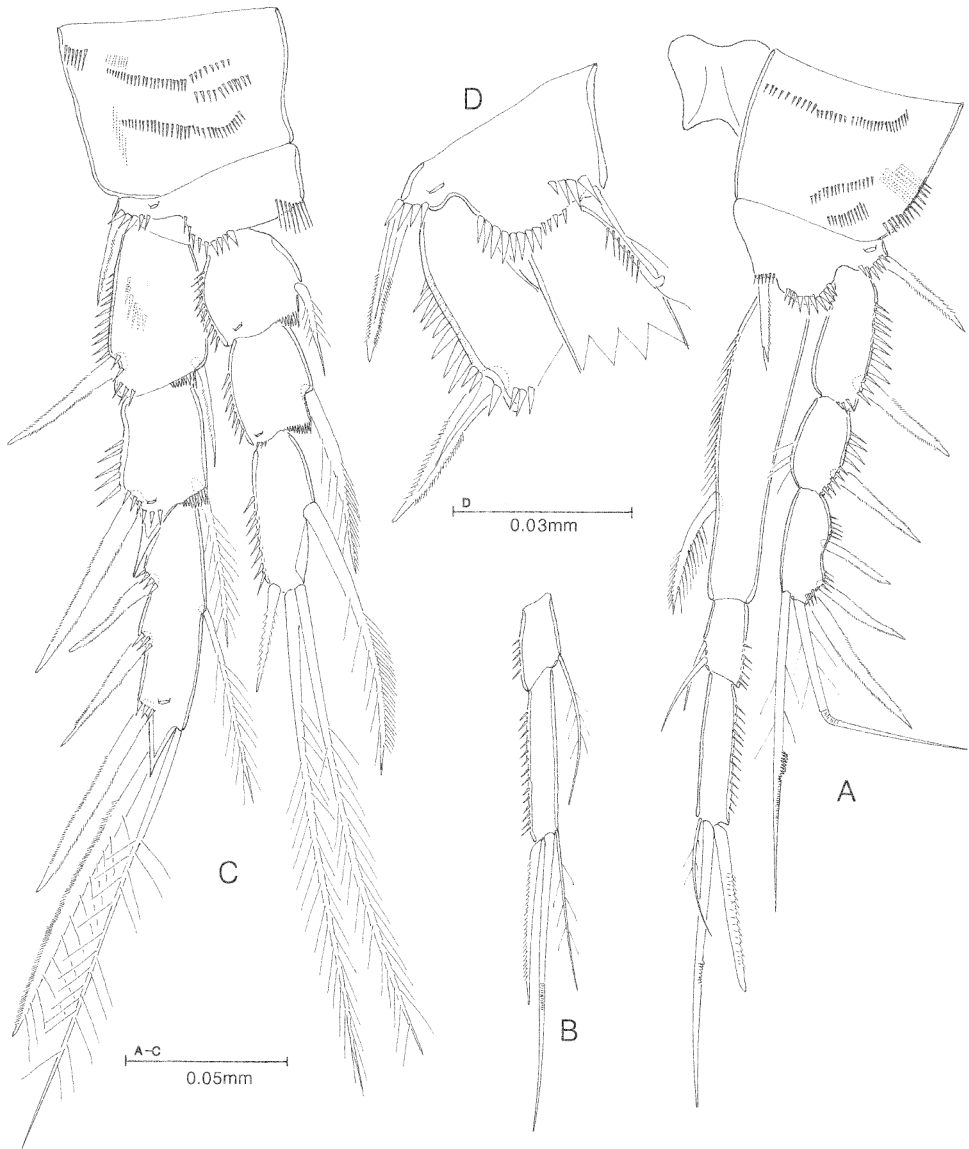


Figure 3. *Ameiropsis martinis* sp. nov. (A–C) Female: (A) P1 (abnormal enp-2); (B) P1 enp-2 and 3 of other ramus; (C) P2; (D) male: P1 basis.

without clear distinction between prosome and urosome. Cephalothorax tapering slightly anteriorly, ornamented with a few pores and sensilla. All prosomites with sensilla on posterior margin and plain hyaline frills. Urosomites -2 and -3 (genital double somite) completely fused, line of fusion marked only by a short lateral subcuticular rib (Figure 1B) and a dorsal row of very small fine spinules (Figure 1A), posterior part of double somite with a dorsal and lateral row of very small, fine spinules. Genital apparatus (Figure 1D) with median ventral copulatory pore near posterior margin of anterior part of genital double somite, a relatively long seminal



Figure 4. *Ameiropsis martinis* sp. nov., female. (A) P3; (B) P4.

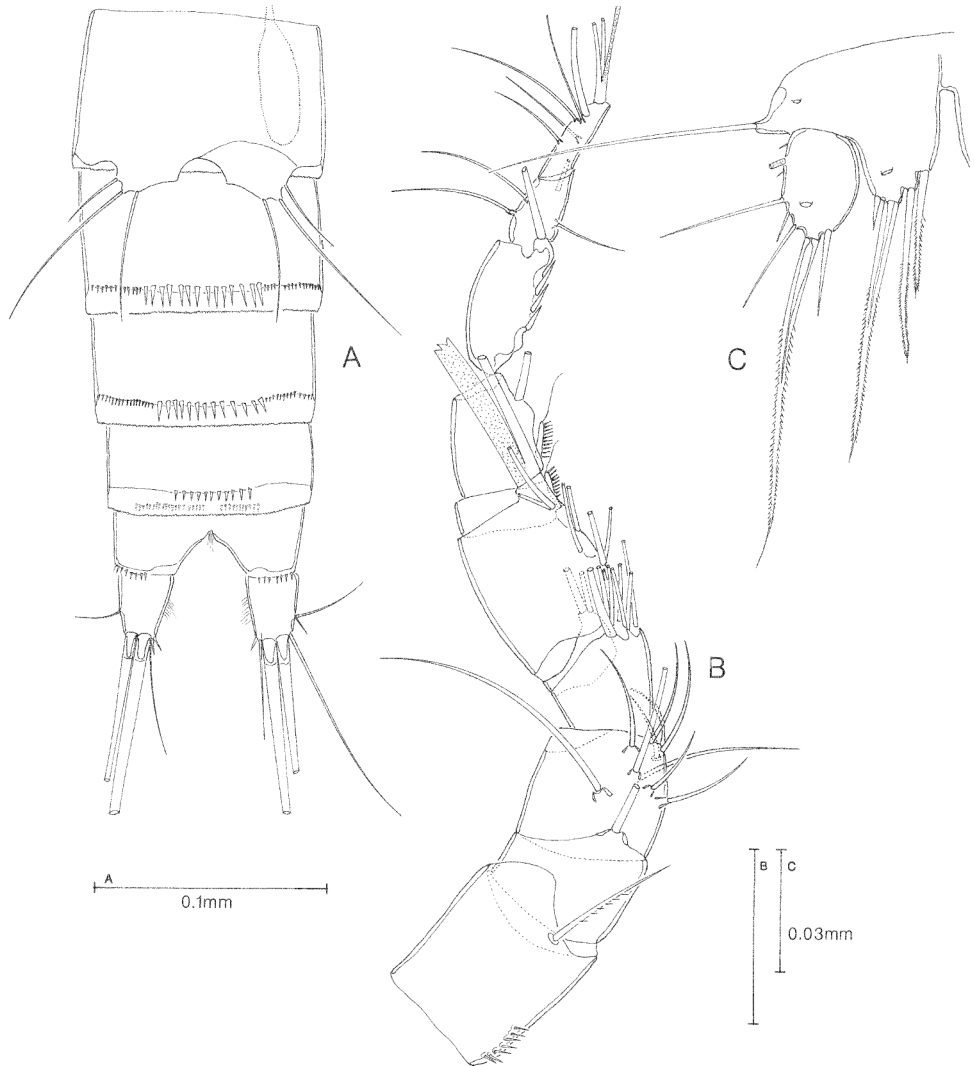


Figure 5. *Ameiropsis martinis* sp. nov., male. (A) Urosomites 2-6, ventral; (B) antennule; (C) P5.

duct leading to a long oval seminal receptacle; anterior gonopores joined by genital slit and covered by vestigial P6s each bearing one plumose seta. Hyaline frills of all urosomites minutely dentate. Urosomites -4 and -5 posterior margin with dorsal and lateral row of minute spinules and median ventral row of larger spinules. Anal somite ventrally with anterior row of spinules (Figure 1C) and a few minute spinules near base of caudal rami; dorsally bearing smooth, semi-circular, operculum. Caudal rami about as long as broad, tapering posteriorly, with a row of setules on inner margin and seven setae (lateral seta-I small, lateral seta-II and terminal setae -III and -VI slender, terminal setae -IV and -V well developed, dorsal, posterior seta-VII triarticulate).



*Rostrum.* See Figure 1E. A small elongate oval plate fused to cephalothorax, with two sensilla near anterior margin, latter only reaching to midpoint of first antennular segment.

*Antennule.* See Figure 1F. Slender, eight-segmented, segment-2 longest. All setae naked, aesthetascs on segments -4 and -8. Setal formula as follows: 1-(1), 2-(9), 3-(8), 4-(2+(1+a)), 5-(2), 6-(2), 7-(4), 8-(5+(2+a)).

*Antenna.* See Figure 2A. Well-developed coxa with row of minute spinules on anterior margin. Basis unarmed but ornamented with row of spinules and a few setules on abexopodal margin. Exopod two-segmented, proximal segment large, oval, with row of spinules on inner distal margin and a large, minutely dentate seta at outer distal corner; distal segment small with two, strong, minutely dentate, setae on distal margin. Endopod two-segmented, proximal segment unadorned and unarmed; distal segment with row of spinules, two strong spines and a seta on outer margin, a row of setules near inner margin and on distal margin, a row of setules and six setae (five geniculate setae and one plain seta fused at base to inner geniculate seta).

*Mandible.* See Figure 2B. Coxal gnathobase well developed, relatively slender, cutting edge with large bicuspid tooth at outer corner, a large unicuspid tooth medially, an array of small multicuspid teeth and a plumose seta at inner distal corner. Basis armed with three robust setae (two strongly dentate) and with well-developed rami. Exopod with two lateral and two distal plumose setae. Endopod with one lateral plumose seta and five setae distally (one plumose and four naked, three of which fused at base).

*Maxillule.* See Figure 2C. Praecoxal arthrite with a row of spinules proximally and a seta medially on inner margin; dorsal surface with row of spinules and two surface setae; distal margin with three pairs of curved spines and one(?) seta. Coxal endite with two naked and one plumose setae. Basis with one naked seta proximally and on distal margin two naked setae and one strongly spinulose seta. Endopod minute, fused to basis, with one naked seta; exopod with three plumose setae.

*Maxilla.* Figure 2D. Syncoxa with rows of spinules near proximal margin on anterior and posterior face and two endites on distal margin, inner endite broad with two pinnate setae, outer endite slender with two naked setae and a pectinate spine. Allobasal endite with group of setules basally and distally a fused pectinate claw and an articulating pectinate spine. Endopod with three naked setae.

*Maxilliped.* See Figure 2E. Syncoxa with rows of spinules proximally and one plumose seta on distal margin. Basis oval, unarmed but ornamented with row of spinules on palmar margin and medially and distally on outer margin. Endopod represented by a well-developed claw slightly longer than basis, with row of spinules on distal inner margin and two accessory setae proximally.

*Pl.* See Figure 3A–B. Intercoxal sclerite small, bilobed and unadorned. Praecoxa (not illustrated) small, triangular with row of spinules on anterior margin. Coxa almost square, with four rows of spinules on anterior face and a row of setules near outer margin on posterior face. Basis with small row of spinules on distal margin and

at base of inner and outer spine. Exopod three-segmented, proximal segment slightly the longest, all segments with row of spinules on outer margin; exp-2 without inner seta but with setules on inner margin; exp-3 with two plumose geniculate setae on distal margin and three spines on outer margin. Endopod three-segmented, enp-1 elongate, reaching distal margin of exp-3, with row of spinules on inner margin and a short stout plumose seta inserted at 65% of segment length; enp-2 only half length of enp-3, with row of setules on outer margin and, in holotype two but in other specimens one, seta on inner margin; enp-3 about half length of enp-1 with one plumose seta, a geniculate seta and a spine on distal margin.

*P2–P4.* See Figures 3C and 4. Intercoxal sclerites bilobate and unadorned. Praecoxa and coxa as in P1. Basis of P2 with row of setules on inner distal margin and spinules on distal margin and at base of outer spine; basis of P3 and P4 without inner setule row and with outer element a naked seta. All rami three-segmented and all segments with row of spinules on outer margin. P2 and P3 exp-1 with spinule row on posterior face; exp-2 with attenuated outer distal corner; enp-1 with short inner seta and enp-3 reaching to middle of exp-3. P4 exopod segments more elongate than in P2 and P3; exp-2 without attenuated distal outer corner; exp-3 with three inner setae, middle one very well developed and spinulose, distal inner seta extremely fine, articulating on posterior face of segment; enp-1 with long inner seta and enp-3 only reaching to middle of exp-2. Setal formula of swimming legs is presented in Table 1.

*P5.* See Figure 1G. Baseoendopods of each side not fused medially and exopods also separate. Baseoendopod with well-developed endopodal lobe, reaching to middle of exopod, with outer peduncle bearing a slender seta and with five setae on distal margin, four inner setae finely spinulose and outer seta very small and naked. Exopod oval, about twice as long as wide; with a spinule and a tube pore on proximal outer margin and five setae, inner seta finely spinulose, terminal setae long and naked, middle outer seta very small.

#### *Description of male*

As in female except for urosome, antennule, P1 basis, P5 and P6.

*Body.* Slightly smaller than female, length 0.534–0.646 mm (mean = 0.595 mm,  $n = 5$ ) and urosomites -2 and -3 not fused. Body ornamentation as in female except urosomite-3 with median ventral row of larger spinules (Figure 5A).

Table 1. Setal formula of swimming legs of *Ameiropsis martinis* sp. nov. female.

	Exopod	Endopod
P1	0 : 0 : 023	1 : 1 : 021
P2	1 : 1 : 123	1 : 1 : 121
P3	1 : 1 : 123	1 : 1 : 221
P4	1 : 1 : 323	1 : 1 : 221

*Antennule.* See Figure 5B. Eleven-segmented, haplocer with slightly swollen segments -6 to -8 and major articulation between segments -8 and -9. Segment-2 is a short segment bearing one seta. Aesthetacs on segments -6 and -11. Setal formula tentatively given as follows: 1-(1), 2-(1), 3-(10), 4-(8), 5-(2), 6-(6 + (1+a)), 7-(1 modified spine), 8-(1 + 1 modified spine), 9-(3 spines + 1 seta), 10-(4), 11-(5 + (2 + a)).

*P1.* See Figure 3D. As in female except that inner spine on basis bears a row of stronger spinules and distal portion recurved and hook-shaped.

*P5.* See Figure 5C. Baseoendopods of each side fused medially. Endopodal lobe shaped as in female but bearing only four setae, three inner setae finely spinulose, outer seta very small and naked. Exopod more rounded than in female, less than two times longer than wide, bearing five setae, terminal seta much stouter than others and finely spinulose, middle outer seta very small.

*P6.* See Figure 5A. Asymmetrical, with one plate fused and one plate articulating with urosomite-2, each bearing three setae.

#### *Etymology*

The specific name refers to the type locality on St Martin's flat.

#### *Variability*

The mandibular exopod in the other dissected female has only one lateral seta and one dissected male has an inner seta on P1 exp-2 on one side only.

#### *Remarks*

This animal belongs to the group of genera in the Ameirinae characterized by a clearly biramous mandibular palp, *Ameiropsis*, *Parameiropsis* Becker, 1974, *Ameiropsyllus* Bodin, 1979, *Pseudameiropsis* Pallares 1982 and *Biameiropsis* Karanovic 2006. *Parameiropsis* was established by Becker (1974) to accommodate two deep-sea forms in which the exopod of the antenna is 1-segmented bearing only two setae and the armature of enp-2 is very robust, the P1 endopod is of three equal segments and the female P5 endopodal lobe has only three setae. There is some doubt as to whether this genus should be in the Ameiridae as the short, robust antennule and the large triangular rostrum articulating with the cephalosome is very un-ameirid-like. However, the male (and the condition of the inner basal spine) is unknown for any of the three constituent species (the third species described by Itô [1983]) and until this deficiency is rectified it is to be left in this family. *Biameiropsis* was established by Karanovic (2006) to accommodate a freshwater Australian species, *B. barrowi*, in which the exopod of the antenna was also only one-segmented and was the only species in all these genera to have a seta on the abexopodal margin of the basis. On the basis of the one-segmented nature of the antenna in *Ameiropsis abbreviata* Sars, 1911 he transferred this species to *Biameiropsis*. *Pseudameiropsis* was established by Pallares (1982) for *P. argenticus* Pallares and characterized by a distinctive, very prehensile P1 endopod (in which enp-1 is much longer than the exopod and enp-2 and -3 are both very small segments) and the slight reduction in the size of enp-1 on P2–P4. Bodin (1979)

also established the genus *Ameiropsyllus* for *A. monardi* Bodin on the basis of the slightly reduced size of enp-1 on P2-P4 and the absence of an inner seta on P1 exp-2. For exhibiting these characteristics Bodin included *Ameiropsis ariana* Monard, 1928 in *Ameiropsyllus* even though this latter author stated that in this species the exopod of the mandible was represented by only a seta. Characters not mentioned by Bodin which distinguish *Ameiropsyllus* from *Ameiropsis*, as presently constituted, are: (1) the presence in the former of only three setae on the endopodal lobe of the female P5 compared with four or five setae in the latter. Three setae on the P5 endopodal lobe are also found in *Parameiropsis*; (2) the presence in the former of two setae on the syncoxa of the maxilliped. The details of the mouthparts for the original species in *Ameiropsis* are very sketchy and can only be deduced from drawings of Sars (1911, 1920) which are not reliable but it would appear that two setae on the maxilliped syncoxa had previously only been illustrated for *Ameiropsis abbreviata* (see Sars [1911, suppl. pl. 33]) and more recently reported for *Parameiropsis magnus* by Itô (1983). However, while there is only one seta on the maxilliped syncoxa in all species of *Ameiropsis*, in *Parameiropsis* the number of setae on this segment varies from 0 to 2 and in *Biameiropsis* from 1 to 2.

From the above it is clear that our specimens can only be considered as belonging to the genus *Ameiropsis*. Three species of this genus have been recorded previously from the Scilly Isles (Wells 1970), *Ameiropsis longicornis* Sars, 1907, *Ameiropsis mixta* Sars, 1907 and *Ameiropsis nobilis* Sars 1911. Whilst *A. martinis* resembles the last of these species in the baseoendopod of the female P5 (four well developed and one outer minute setae), the P5 exopod is not nearly as elongate as in the other three species and *A. martinis* also has a reduced setal formula on the swimming legs. In this and other respects *A. martinis* most resembles *Ameiropsis australis* Kunz, 1975, described by Kunz (1975) from shell gravels in intertidal pools around East London in South Africa. In both these species: (1) the endopod of the maxillule is a very small segment fused to the basis and bearing only one seta; in other species for which this mouthpart has been described or figured the endopod is well developed and bears two or three setae; (2) there is no inner seta on P1 exopod-2, a character that is shared only with *Ameiropsis robinsoni* Gurney, 1927; (3) there is only one inner seta on P2 exp-3 and enp-3 and P3 exp-3, a character shared only with *Ameiropsis reducta* Apostolov, 1973; (4) a third large inner (distal) seta on P4 exp-3 is not present, a character shared with *A. reducta* and *Ameiropsis minor* Sars, 1920. In *A. martinis* I show that distally a very small slender seta does arise from the posterior face of the segment and it is possible that this has been overlooked by Kunz (1975) for *A. australis*; (5) the female P5 exopod length/width ratio is smaller than for any other species in the genus except for *A. angulifera* Sars, 1911; (6) the male P5 baseoendopods in these two species are the only ones with more than two armature elements on the endopodal lobe; (7) the structure of the male antennule in this genus is very poorly known and has only been described in detail for the present species and figured for this species and *A. australis*. It is mentioned by Klie (1950) for *A. brevicornis* and *A. longicornis* as being eight-segmented and Bodin (1964) merely states that *A. nobilis* has no significant modifications. The antennule in *A. martinis* is 11-segmented, with the unusual feature of a separate segment-2 bearing one seta (in most harpacticoids segment-2 and segment-3 in the present species are usually fused). Kunz (1975) describes the antennule of *A. australis* as eight-segmented but illustrates at least nine segments. This should be interpreted as at least 10 segments as the small segment-5 shown in Figure 5B has

almost certainly not been recognized by Kunz (1975) and it is possible that he failed to recognize that there were two proximal segments each bearing 1 seta.

Despite these similarities between *A. martinis* and *A. australis* the two species can be easily distinguished by the following characters: (1) the rostrum is rounded anteriorly in *A. martinis* and distinctly pointed in *A. australis*; (2) in the female genital field the P6 bears one large plumose seta in *A. martinis* and two naked setae in *A. australis*; (3) the anal operculum in *A. martinis* is smooth whereas in *A. australis* it bears about seven strong spinules; (4) in *A. martinis* the P1 exp-1 is equal in length to the exopod whereas in *A. australis* it is noticeably longer than the exopod; (5) the male P5 basendopodal lobe bears four setae in *A. martinis* but only three in *A. australis*.

Within the genus *Ameiropsis*, the species *A. minor* appears to be somewhat anomalous. It was first described by Sars (1920) as *Stenocopia minor* Sars, 1920, but moved to *Ameiropsis* by Lang (1936) on the grounds that it did not comply with Sars' (1907) definition of *Stenocopia* in the habitus, the form of the antennule (first segment much the longest) and the very slender swimming legs. He suggested that it was most like *Ameiropsis abbreviata* (which has now been moved from *Ameiropsis*, see earlier). However *A. minor* is the only species of *Ameiropsis* with the following characteristics: (1) a nine-segmented female antennule with very small segments -7 and -8, similar to the condition in *Stenocopia* and not like the condition in *A. angulifera* the other species with a nine-segmented antennules; (2) the antennal exopod is two-segmented but the distal segment is minute cylindrical with only one seta. This is unlike any other species in the "Ameiropsis" group of genera and most similar to the condition in *Stenocopia setosa* Sars 1907; (3) the basis of the mandibular palp has only one seta (according to the figure in Plate XLI of Sars [1920]), whereas all species of *Ameiropsis* for which the condition is known have two or three setae; (4) *A. minor* is the only species in this group of genera with only four elements in P1 exp-3, all other species have five elements on this segment; (5) in all species of *Ameiropsis* for which the male is known and the P5 has been figured, the outer spine of the endopodal lobe of this limb is minute, often little more than a spinule in appearance. However, Por (1964) claims that he found the male of *A. minor* and draws the ventral urosome, which indicates that the two setae on the P5 endopodal lobe are both well developed (and the setal arrangement on the P5 exopod is rather different to the female). However, the validity of Por's diagnosis of the animal he so briefly described must be in some doubt as he states that this species is unusual in exhibiting no sexual dimorphism of the inner spine on the P1 basis. Thus, I suggest that when the male of this species is properly described it may be that it should be removed from *Ameiropsis* to another genus.

Genus *Sarsameira* Wilson 1924

*Sarsameira parexilis* sp. nov.

(Figures 6–10)

*Material examined*

*Holotype*

Adult ♀ dissected onto three slides. NHM Reg. no. 2009.160.

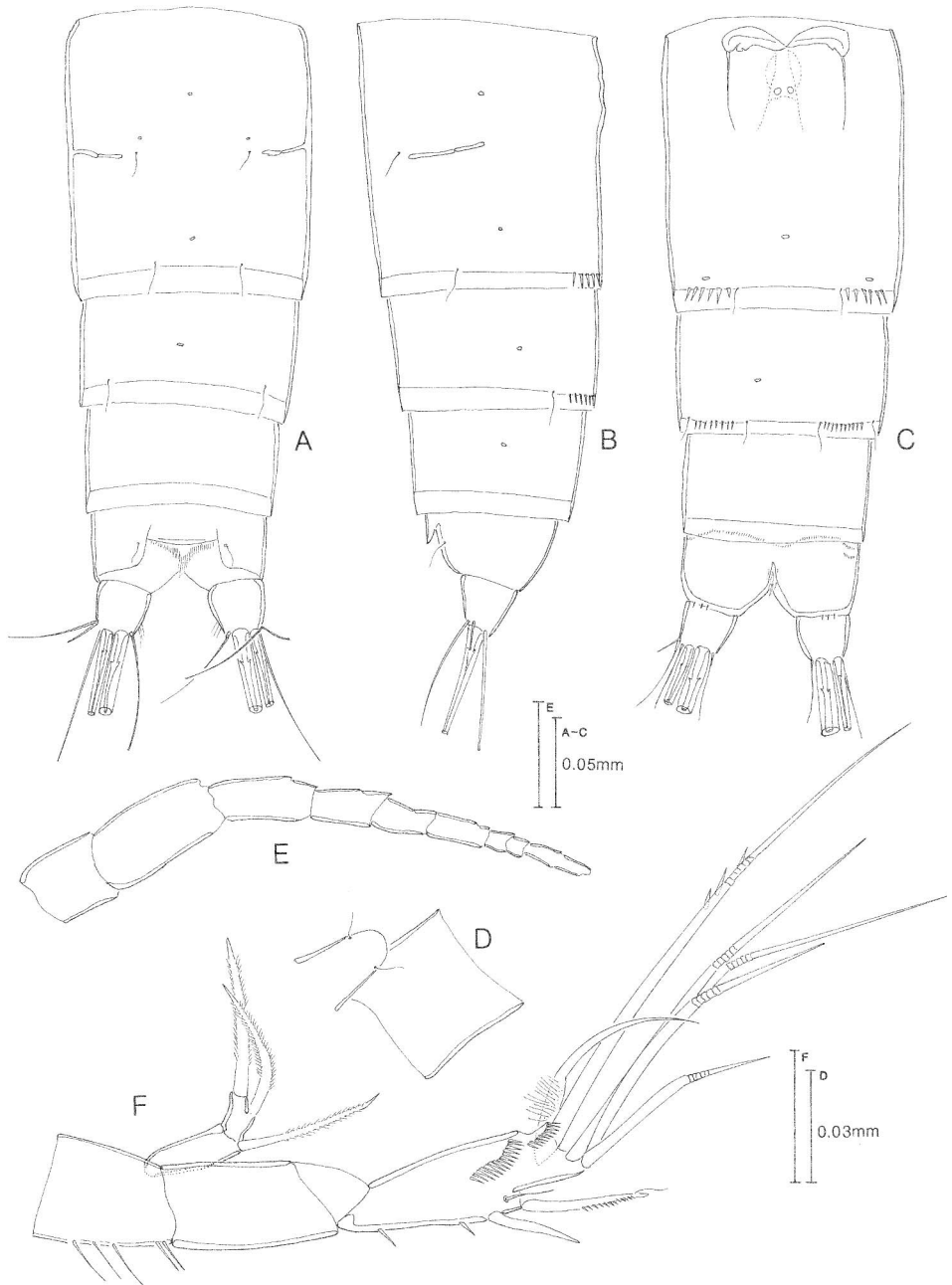


Figure 6. *Sarsameira parexilis* sp. nov., female, urosomites 2–6. (A) Dorsal; (B) lateral; (C) ventral; (D) rostrum and proximal segment of antennule; (E) antennule segmentation; (F) antenna.

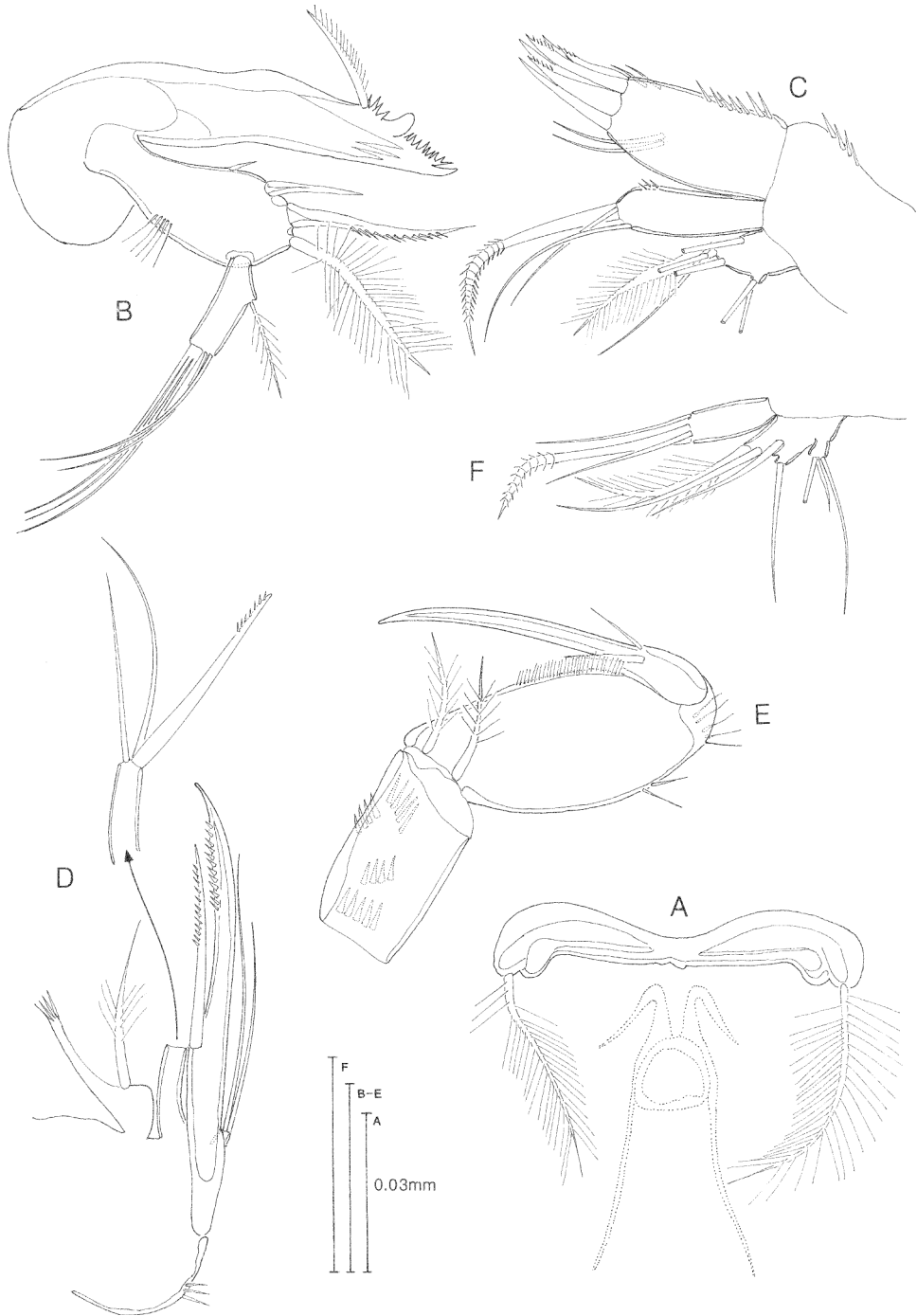


Figure 7. *Sarsameira parexilis* sp. nov. (A–E) Female: (A) genital field; (B) mandible; (C) maxillule; (D) maxilla; (E) maxilliped; (F) male: maxillule, setation of coxal endite and basis.

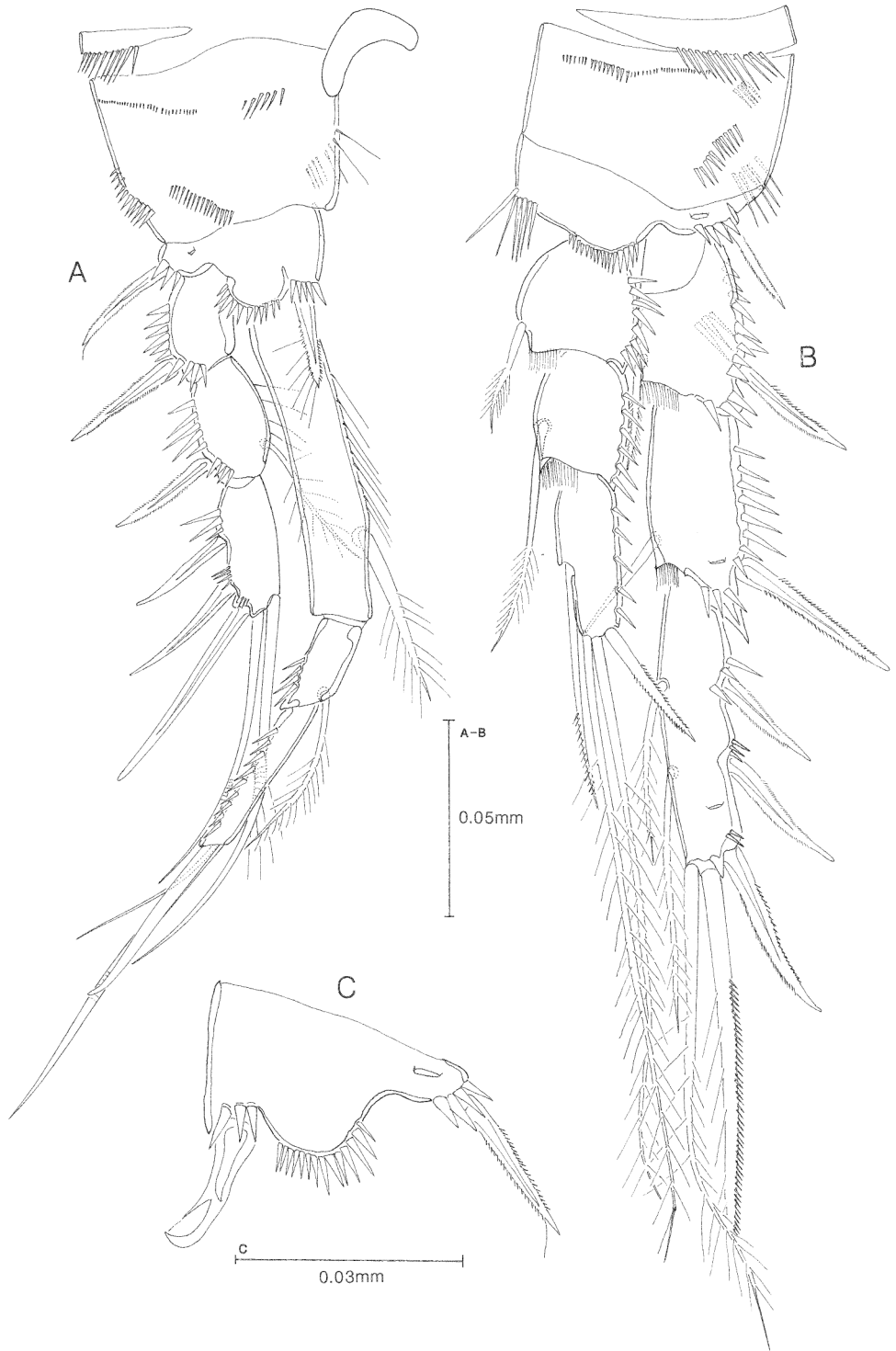


Figure 8. *Sarsameira parexilis* sp. nov. (A–B) Female: (A) P1; (B) P2; (C) male: P1 basis.



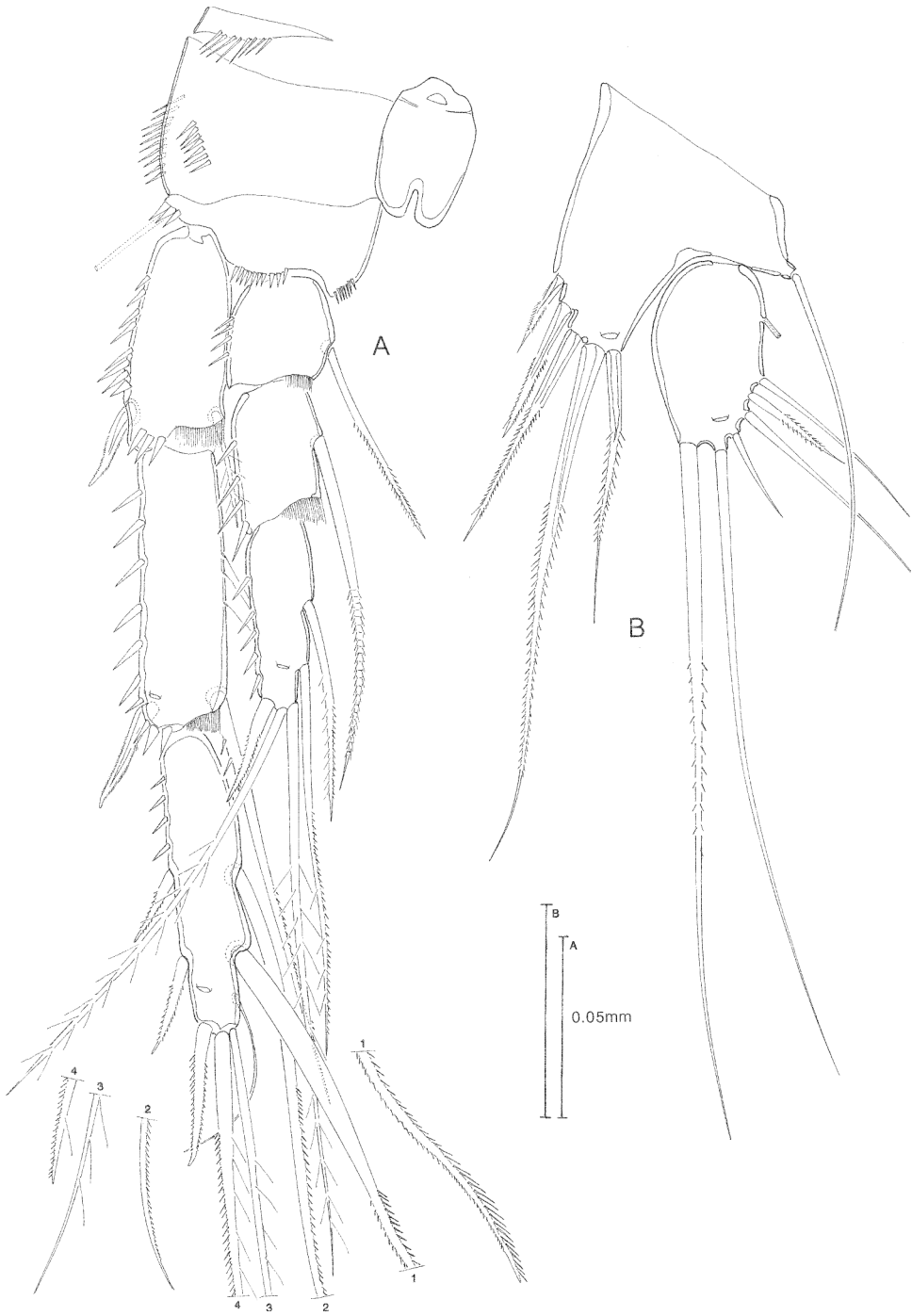


Figure 9. *Sarsameira parexilis* sp. nov., female. (A) P4 (1–4 denotes continuation of corresponding setae); (B) P5.

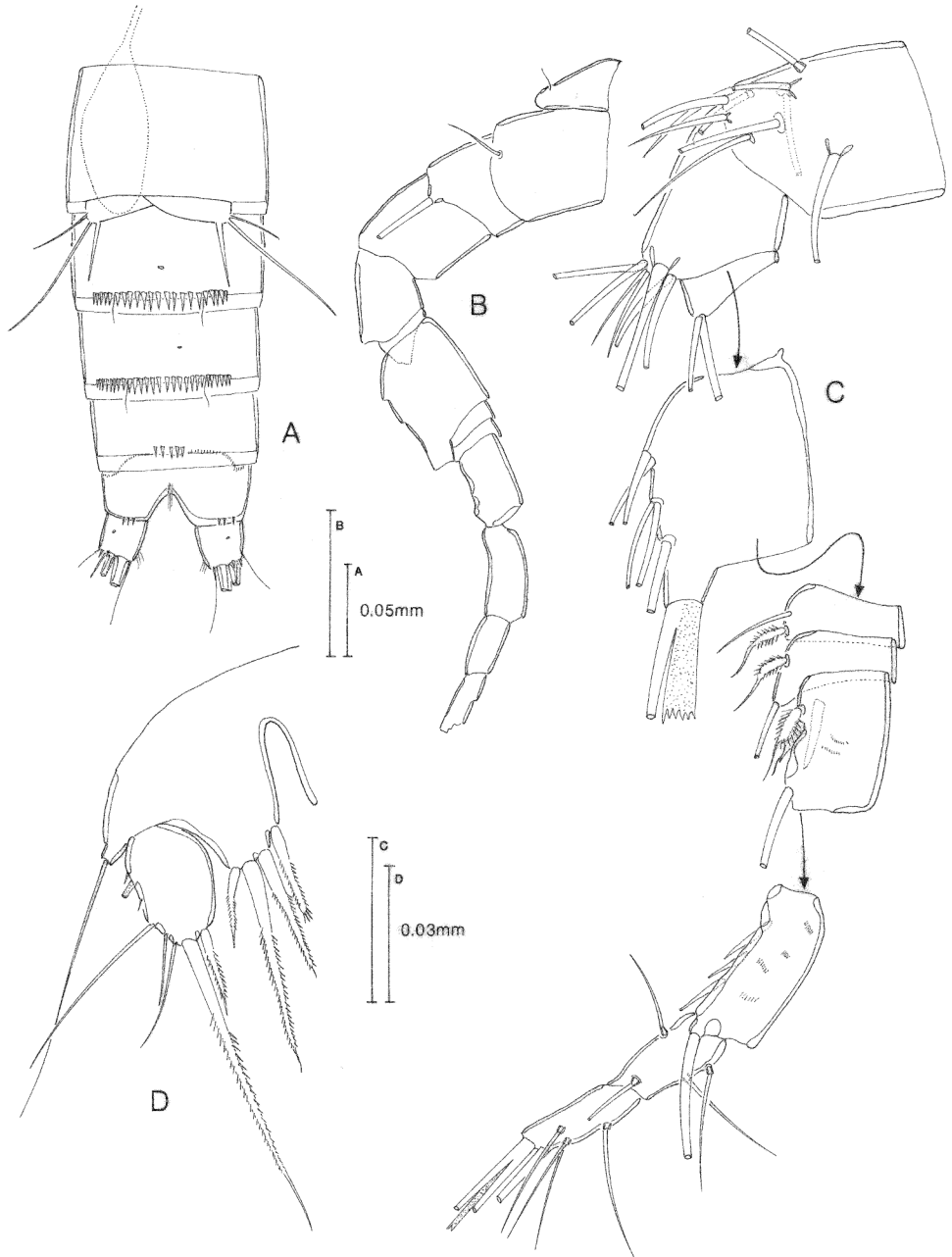


Figure 10. *Sarsameira paraxilis* sp. nov., male. (A) Urosomites 2-6, ventral; (B) segmentation of antennule; (C) setation of antennule; (D) P5.

*Paratypes.* Fifty-six ♀♀ (1 dissected onto 3 slides, 1 dissected onto 1 slide, 54 spirit preserved) and 30 ♂♂ (2 each dissected onto 3 slides, 1 dissected onto 1 slide, 27 spirit preserved), NHM Reg. nos 2009.161–165; 2009.166–175.

#### *Description of female*

*Body.* See Figure 6A–C. Length 0.582–0.81 mm (mean 0.703 mm,  $n = 10$ ), semi-cylindrical, widest at posterior margin of cephalothorax, tapering gradually posteriorly and without clear distinction between prosome and urosome. Cephalothorax tapering slightly anteriorly, ornamented with a few pores and sensilla. All prosomites with sensilla on posterior margin and plain hyaline frills. Urosomites -2 and -3 (genital double somite) completely fused, line of fusion marked only by a short dorso-lateral sub-cuticular rib (Figure 6A–B), posterior part of double somite with a short ventro-lateral row of very small spinules on each side (Figure 6C). Genital apparatus (Figure 7A) with small copulatory pore only just posterior to genital slit, with reduced P6s forming small plates covering genital apertures, each armed with one large plumose seta. Urosomite-4 with two ventro-lateral rows of fine spinules on posterior border. Anal somite with plain semi-circular operculum dorsally and ventral surface with row of minute spinules near anterior border and a few very small spinules on posterior border at base of each caudal ramus. Latter about as long as broad, tapering slightly posteriorly, bearing seven setae, lateral seta I easily discernible but smaller than plain lateral seta-II, setae -III to -VI on terminal margin, setae -III and -VI slender and setae -IV and -V robust and long, triarticulate seta-VII arising near dorsal inner margin.

*Rostrum.* See Figure 6D. Fused to cephalosome, small, not reaching middle of proximal segment of antennule, triangular with rounded anterior margin and a pair of lateral sensilla.

*Antennule.* See Figure 6E. Slender, nine-segmented, segment-1 with small row of spinules, segment-2 longest, segments -7 and -8 very small, all setae naked, aesthetascs on segments -4 and -9. Setal formula as follows: 1-(1), 2-(10), 3-(8), 4-(3+(1+a)), 5-(2), 6-(2), 7-(2), 8-(2), 9-(5+(2+a)).

*Antenna.* See Figure 6F. Basis with two-segmented exopod and endopod. Basis with a few spinules on abexopodal margin but without setae. Exopod proximal segment elongate with one minutely pinnate seta, distal segment small with one lateral and one terminal minutely pinnate seta. Proximal segment of endopod unarmed. Endopod distal segment ornamented with two rows of spinules on anterior face and a few spinules on outer margin; armature consists of two spines and one seta on outer margin and, on distal margin, five geniculate setae and one seta pinnate and swollen at base and fused to base of inner geniculate seta.

*Mandible.* See Figure 7B. Coxal gnathobase well developed, relatively slender, cutting edge with large bicuspid tooth at outer corner, a large rounded unicuspid tooth medially, an array of small multicuspid teeth and a plumose seta at inner distal corner. Basis club-shaped, with row of setules on outer margin and spinules on inner margin; distal margin armed with two spines (one strongly dentate) and a plumose

seta. Endopod well developed with one lateral plumose seta and five setae (three fused at base) on distal margin. Exopod absent.

*Maxillule.* See Figure 7C and F. Praecoxal arthrite with a row of spinules proximally and two small setae distally on inner margin; dorsal surface with two setae; distal margin with three pairs of curved spines. Coxal endite with two naked and one distally ringed and spinulose setae. Basis with one naked seta proximally and on distal margin, two or three naked setae and one weakly-developed but highly plumose seta. Endopod minute, fused to basis, with one naked seta; exopod with two or three naked(?) setae.

*Maxilla.* See Figure 7D. Syncoxa with rows of spinules near proximal margin and two endites on distal margin; inner endite broad with one weakly-chitinized, fused seta with spinulose crown and one articulating pinnate seta; outer endite slender with two naked setae and a pectinate spine. Allobasal endite with a fused pectinate claw and an articulating pectinate spine. Endopod with two naked setae.

*Maxilliped.* See Figure 7E. Syncoxa with rows of spinules proximally and two plumose setae on distal margin. Basis oval, unarmed but ornamented with row of spinules on palmar margin and medially and distally on outer margin. Endopod represented by a well-developed claw slightly longer than basis, with two accessory setae proximally.

*P1.* See Figure 8A. Intercoxal sclerite small, U-shaped and unadorned. Praecoxa small, triangular with row of spinules on anterior margin. Coxa almost square, with four rows of spinules on anterior face and a row of setules near outer margin on posterior face. Basis with small row of spinules on distal margin and at base of inner and outer spine. Exopod three-segmented, segments about equal in length with row of spinules on outer margin; exp-2 with seta and row of setules on inner margin; exp-3 with two geniculate setae on distal margin and three spines on outer margin. Endopod three-segmented, enp-1 elongate, reaching distal margin of exp-3, inner margin with row of setules and a short stout plumose seta inserted at 76% of segment length; enp-2 only half length of enp-3, with row of spinules on outer margin and one plumose seta on inner margin; enp-3 about half length of enp-1 with one naked seta, one geniculate seta and one spine on distal margin.

*P2–P4.* See Figures 8B and 9A. Intercoxal sclerites bilobate and unadorned. Praecoxa and coxa as in P1. Basis with row of long setules in P2 and short spinules in P3–P4 on inner distal margin and spinules on distal margin and at base of outer spine on P2 and outer seta on P3–P4. All rami three-segmented and all segments with row of spinules on outer margin. P2 and P3 exp-1 with spinule row on posterior face; exp-2 with attenuated outer distal corner; enp-1 with short inner seta and enp-3 reaching to proximal part of exp-3. P4 exopod segments more elongate than in P2 and P3; exp-2 without attenuated distal outer corner; exp-3 with three inner setae, middle one very well developed and spinulose, distal inner seta extremely fine, articulating on posterior face of segment; enp-1 with long inner seta and enp-3 only reaching to distal margin of exp-2. Setal formula of swimming legs is presented in Table 2.

Table 2. Setal formula of swimming legs of *Sarsameira parexilis* sp.nov. female.

	Exopod	Endopod
P1	0 : 1 : 023	1 : 1 : 021
P2	1 : 1 : 223	1 : 1 : 121
P3	1 : 1 : 223	1 : 1 : 221
P4	1 : 1 : 323	1 : 1 : 221

*P5*. See Figure 9B. Baseoendopods of each side not fused medially and exopods also separate. Baseoendopod with well-developed endopodal lobe, reaching to middle of exopod; with outer peduncle bearing a slender seta and with five finely spinulose setae on distal margin. Exopod oval, not quite twice as long as wide; with a tube pore on proximal outer margin and six well-developed setae, inner terminal seta and second outer seta finely spinulose.

#### *Description of male*

As in female except for urosome, antennule, P1 basis, P5 and P6.

*Body*. See Figure 10A. Length 0.462–0.630 mm (mean = 0.544 mm,  $n = 10$ ), urosomites -2 and -3 not fused. Urosomites -3 and -4 with long, and urosomite-5 with short, median ventral row of spinules on posterior margin, anal somite as in female.

*Antennule*. See Figure 10B–C. Twelve-segmented, haplocer with slightly swollen segments -6 to -9 and major articulation between segments -9 and -10. Segment-1 with row of spinules, segment-2 a short segment bearing one seta. All setae naked except a specialized seta on segments -7 to -9, aesthetasc on segments -6 and -12. Setal formula tentatively given as follows: 1-(1), 2-(1), 3-(10), 4-(7), 5-(2), 6-(5 + (1+a)), 7-(2), 8-(2), 9-(3+1 spine), 10-(1+3 spines), 11-(4), 12-(5 + (2 + a)).

*P1 basis*. See Figure 8C. Inner spine modified, stouter than in female and with a claw-like terminal structure with a hyaline centre.

*P5*. See Figure 10D. Baseoendopods of each side fused medially, endopodal lobe not as developed as in female, bearing a surface pore and armed with four minutely pinnate spines, shorter and more robust than in female. Exopod oval, about one-third longer than wide with a tube pore and a few spines on outer margin and bearing five setae, three on outer margin slender and naked, terminal and inner seta minutely pinnate, latter less than a quarter the length of former seta.

*P6*. See Figure 10A. Asymmetrical plates articulating with urosomite-2, each bearing three setae.

#### *Etymology*

From the Latin *par* meaning similar, so denoting the similarity of this species to *Sarsameira exilis*

*Sarsameira perezii* Bodin 1970  
(Figures 11–12)

*Material examined*

Twelve ♀♀ (1 dissected onto 3 slides, 1 dissected onto 1 slide, 10 spirit preserved). Five ♂♂ (one dissected onto three slides, one dissected onto one slide, three spirit preserved). NHM Reg nos 2009.176–179; 2009.180–189.

*Description of female*

The species was originally described by Bodin (1970) from a single female of total body length 1.02 mm, found in fine sands around La Rochelle. Here I make a few additions and alterations to that description.

*Body.* Length of females (from base of rostrum to posterior border of anal somite) 0.695–1.025 mm (mean = 0.877 mm,  $n = 8$ ). Genital double somite completely fused with only small lateral subcuticular rib marking line of fusion. Genital apparatus with small copulatory pore only just posterior to genital slit, with reduced P6s forming small plates covering genital apertures, each armed with one large plumose seta. Posterior border of genital and two succeeding somites ornamented with row of minute spinules dorsally and laterally, slightly larger spinules laterally and a well-developed spinule row ventrally on urosomites -4 and -5. Anal somite (Figure 11D–F) wider dorsally than ventrally to accommodate dorsal flange to caudal rami which extends from triangular tapering body of ramus which is displaced laterally from ventral to dorsal so that inner margin is concave and outer margin convex, very deeply triangular in lateral view.

*Antennule.* As in Bodin (1970) with the following setal formula: 1-(1), 2-(10), 3-(8), 4-(3+(1+A)), 5 -(2), 6-(2), 7-(2), 8-(2), 9-(5+(2+A)).

*Antenna.* With basis. Exopod as in Bodin (1970); basis and enp-1 without setae on abexopodal margin; enp-2 with two spines and one seta subdistally on outer margin, distal margin with five geniculate setae and one spine.

*Mouthparts.* As in Bodin (1970) except I interpret basis of the maxillule as bearing one subdistal plumose seta and one naked and two plumose setae on the distal margin, endopod fused to basis and bearing one seta, exopod also fused to basis bearing one plumose and two naked setae. The endopodal claw of the maxilliped carries two accessory setae.

*P1–P5.* As in Bodin (1970).

*Description of male*

Differs from female in urosome, caudal ramus, antennule, P1 basis, P5 and P6.

*Body.* See Figure 11A–C. Length 0.687–0.773 mm (mean = 0.723 mm,  $n = 4$ ). Urosomites -2 and -3 completely separate. P6s two unequal plates each bearing three setae. Urosomite-3 with short lateral row of fine spinules and ventral row of larger

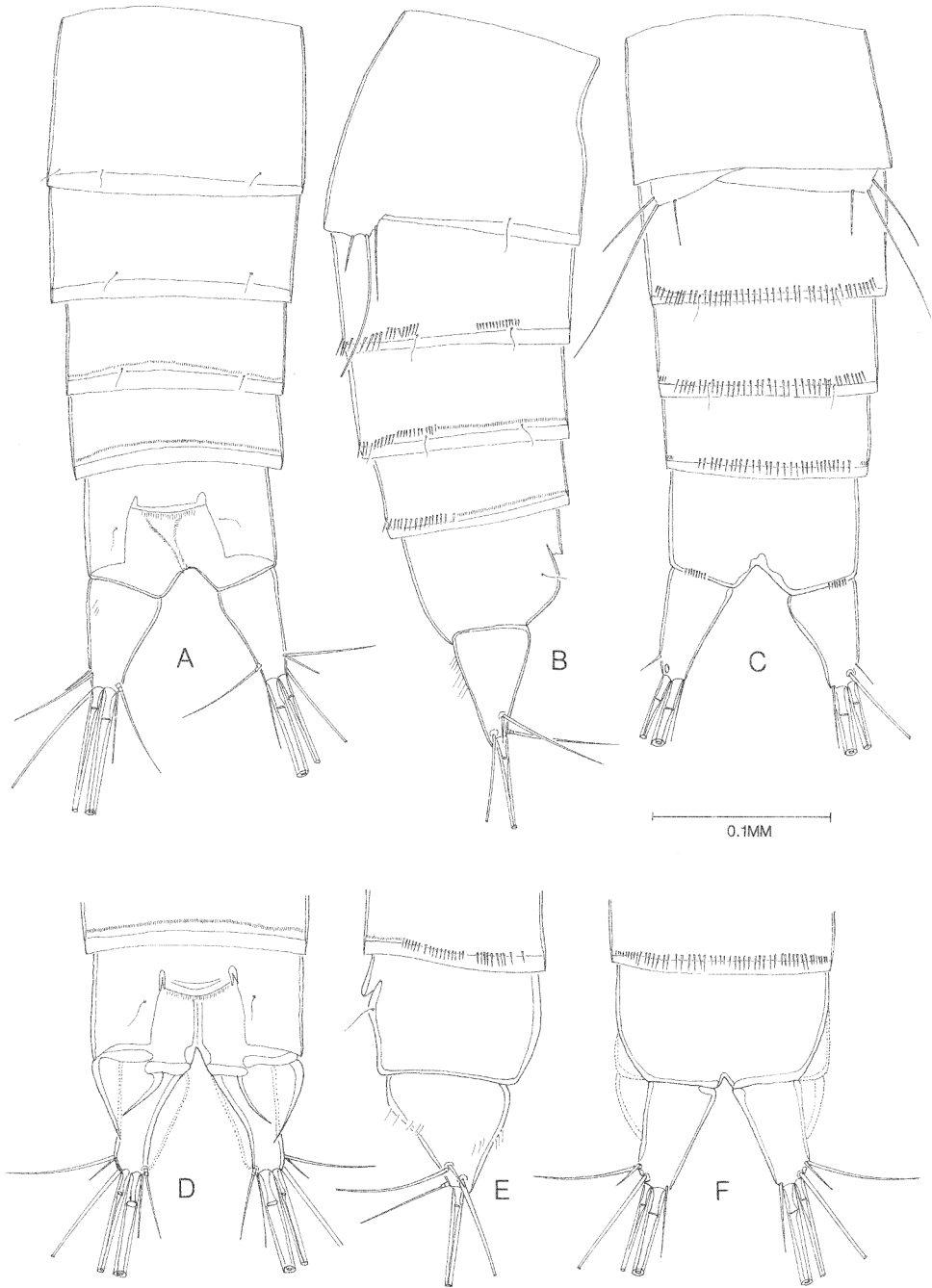


Figure 11. *Sarsameira perezii*. (A–C) Male, urosomites 2–6: (A) dorsal; (B) lateral; (C) ventral; (D–F) female, anal somite and caudal rami: (D) dorsal; (E) lateral; (F) ventral.

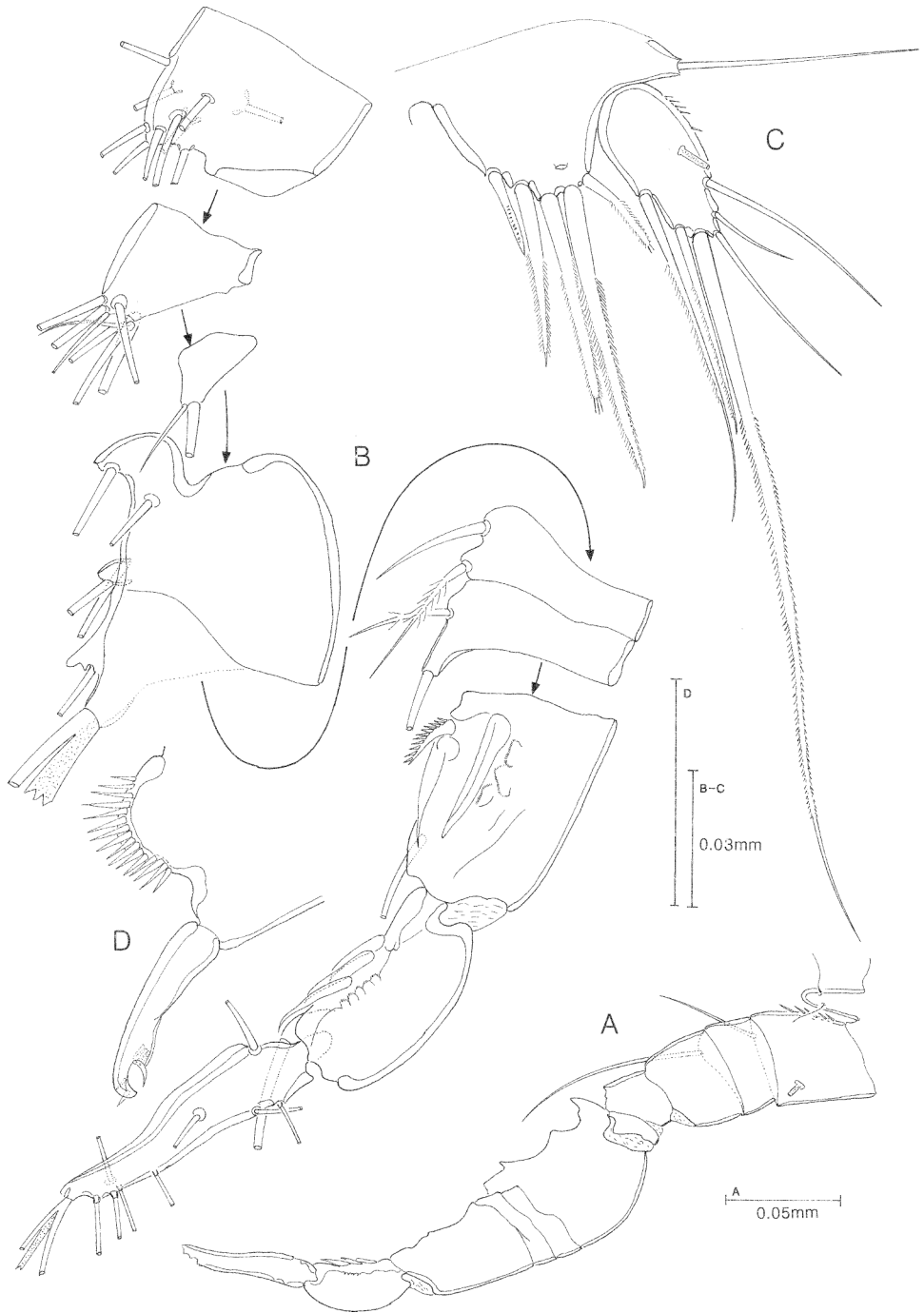


Figure 12. *Sarsameira perezii*, male. (A) Antennular segmentation (and setation of segments 1 and 2); (B) antennular setation of segments 3–11; (C) P5; (D) P1 basis.



spinules. Urosomites -4 and -5 with dorsal and lateral row of minute spinules and complete ventral row of larger spinules. Anal somite with short row of minute spinules on each side of ventral posterior margin. Caudal rami without dorsal flange, triangular, tapering posteriorly and not offset dorsal to ventral.

*Rostrum.* See Figure 12A. Small, only reaching half way up proximal segment of antennule, triangular, not defined at base, bearing two sensilla.

*Antennule.* Figure 12A–B. Subchirocer, 11-segmented, segments -6 to -9 somewhat swollen, major articulation between segments -9 and -10. Segment-1 with row of spinules on inner margin and tube pore near outer margin. Segments -9 and -10 with surface protrusions covered with minute spinules and with modified spines. Setal formula tentatively as follows: 1-(1), 2-(1), 3-(10), 4-(8), 5-(2), 6-(5 + (1+A)), 7-(2), 8-(2), 9-(3+1 spines), 10-(1+3 spines), 11-(9 + (2+A)).

*PI basis.* See Figure 12D. Inner spine modified, stouter than in female and with a claw-like terminal structure surrounded by spinules on the posterior surface.

*P5.* Figure 12C. Baseoendopods of each side fused proximally, endopodal lobe not as developed as in female, bearing a surface pore and armed with five minutely pinnate spines, shorter and more robust than in female. Exopod oval, about twice as long as wide with a tube pore and a few spines on outer margin and bearing six setae, three on outer margin slender and naked, terminal seta long and minutely pinnate, two on inner margin minutely pinnate and less than half length of terminal seta.

#### *Remarks on Sarsameira*

*Ameira exilis* was first described by Scott and Scott (1894) and in more detail later the same year by Scott (1894) based on specimens of both sexes recovered by washing black sandy mud at low-water mark at Seafield, near Leith, Firth of Forth. Later, Scott (1898) found specimens at Fairlie and Hunterstone in the Firth of Clyde, and Thompson and Scott (1899) recovered specimens from holes dug in soft mud near Piel pier in Liverpool Bay. Sars (1920) figured and gave a more complete description of a single male he found at about 20 m depth at Risør, Oslofjord, and Lang (1948) also found it in Sweden at Väderö Island and in Gullmarfjord. More recently, Wells (1963) reported it as being frequently found at a site on the west side of the lower Exe estuary in Devon, and Hockin (1982) lists the species as a faunal constituent of the Ythan Estuary, Aberdeenshire. According to Scott (1894) this species can be distinguished from all others by its large, slender body (female 1.4 mm in length, male about 1.1 mm); the pyriform shape of the female caudal rami (Scott 1894, pl. X, Fig. 12); the male however, has normal conical rami according to Sars (1920); a 9-segmented female antennule with segments -7 and -8 very small; a 10-segmented male antennule with the two long terminal segments both strongly hinged; a distinctly club-shaped mandibular palp; the segmentation and setation of the swimming legs (the same as shown for *S. parexilis*, except that Scott [1894] and Sars [1920] only found two inner setae in P4 exp-3 but both authors probably missed the minute distal seta shown here in Figure 9A); the P5 in both sexes with five and six setae on the endopodal lobe and the exopod respectively.

Primarily on the basis of the setal formula of this species Lang (1944) removed *A. exilis* from *Ameira* and placed it in a new genus *Pseudosarsameira* Lang, 1944. However, Lang (1965) felt that in *Sarsameira* (*Parameira*) *pendula* (Shen and Bai, 1956) the armature of the P2 and P4 held such an intermediate position between *Sarsameira* and *Pseudosarsameira* that the latter monotypic genus should be incorporated in the former as *Sarsameira exilis*.

The specimens from the Scilly Isles were originally tentatively identified as *S. exilis* but on closer examination of both sexes the differences were significant enough to place the Scillies material in a different species. The females of the two species can only be distinguished by two characters: (1) body size – 0.81 mm is the maximum body size found for *S. parexilis* compared with 1.4 mm as the quoted size for *S. exilis*. The slight difference in methods of measuring body length and possible differences in methods of preservation are probably not sufficient to account for this large discrepancy. However, body size alone is not sufficient grounds for distinguishing species as different body size morphs are known to occur occasionally in species of harpacticoid, e.g. in *Danielssenia typica* as discussed by Gee (1988); (2) shape of the caudal rami – for *S. exilis* these have only been described by Scott and Scott (1894) and Scott (1894) as distinctly pyriform and are figured in both papers as being very wide at the base and narrowing sharply medially to a more slender distal portion, and very reminiscent of *S. perezi* in dorsal view. In *S. parexilis* the rami are almost square and taper only slightly proximally to distally.

In the male *S. parexilis* the maximum body length of 0.77 mm is also much smaller than the 1.1 mm recorded for *S. exilis* but the caudal ramus is the same as that figured for *S. exilis* by Sars (1920). However, two features of the male *S. parexilis* are distinctly different in the two species: (1) Scott (1894) describes and figures the male antennule of *S. exilis* as 10-segmented, he clearly shows that the second segment is short and bears only 1 seta and that there are only 2 segments distal to the major articulation, the terminal segment being a long slender segment with numerous setae. In Sars' (1920) drawing (Pl XXXVII) the antennule is clearly 11-segmented, the difference being that the very small segment immediately anterior to the swollen section is clearly identified and there are still only 2 segments distal to the articulation. This antennule structure is exactly the same as that shown in Figure 12 for *S. perezi*. In *S. parexilis* the antennule is clearly 12-segmented (Figure 10) there being 3 segments distal to the articulation as a result of the division of a long terminal segment into 2 shorter segments, but with the same total setal count as for *S. perezi*; (2) all authors who have found the males of *S. exilis* agree that the setal counts on the baseoendopod/exopod of the P5 are 5/6, the same as in the female. In *S. parexilis* however there are only four setae on the baseoendopod and five on the exopod, one less than in the female, on each ramus.

Within *Sarsameira* the three species *S. exilis*, *S. parexilis* and *S. perezi* are unique in that the female antennule is nine-segmented rather than eight-segmented as in all other species. The position of the male antennule is more difficult to access because, apart from the descriptions for these three species, males are only known for six other species and in only two of these has any description or figure of the antennule been given. Reidenauer and Thistle (1983) describe the antennule of *S. knorri* Reidenauer and Thistle, as eight-segmented but they appear to figure a short segment-2 with only one seta and three short segments distal to the articulation. Kunz (1975) describes the antennule of *S. elegantula* Kunz as eight-segmented but figures it as nine-segmented

with a very long segment-2, only three segments in the swollen section and three segments distal to the articulation.

Genus *Ameira* Boeck, 1865  
*Ameira longispina* sp. nov  
 (Figures 13–18)

*Material examined*

*Holotype.* An adult ♂ dissected onto three slides NHM reg. no. 2009.190.

*Paratypes.* Eight ♀♀ (2 each dissected onto 3 slides, 2 each dissected onto 1 slide and 4 whole specimens spirit preserved); 13 long morph ♂♂ (2 each dissected onto 3 slides, 1 dissected onto 1 slide and 10 whole specimens spirit preserved) and 36 short morph ♂♂ (2 each dissected onto 3 slides, 1 dissected onto 1 slide and 33 whole specimens spirit preserved) NHM reg. nos. 2009.191–202; 2009.203–212. Unfortunately about 16 adult females were accidentally lost.

*Description of male*

*Body.* See Figure 13. Small, length 0.360–0.404 mm (mean = 0.388 mm,  $n = 23$ ), semi-cylindrical, tapering slightly posteriorly from posterior border of cephalothorax, without clear distinction between prosome and urosome. Cephalothorax rounded anteriorly bearing minute, fused rostrum also rounded anteriorly bearing a pair of sensilla. Cephalothorax and free prosomites unadorned except for sensilla, distributed as in Figure 13A, and with plain hyaline frills. Urosomites with minutely dentate hyaline frills, sensilla and pores distributed as in Figure 13A–C. Urosomite-2 with small dorso-lateral row of minute spinules, urosomites -3 and -4 with complete ventral row of spinules; preanal somite with short median-ventral row of spinules. Anal somite with dorsal semicircular operculum between a pair of sensilla (Figure 1E), ventrally with faint row of minute spinules anteriorly and small spinules at base of caudal rami. Caudal rami very slightly longer than wide, with pore on dorsal surface and a few setules on inner margin; armed with seven setae arranged as in Figure 1E.

*Antennule.* See Figure 14A–B. Nine-segmented, segment-4 minute, segments -4 to -7 forming swollen portion, major articulation between segments -7 and -8 all setae smooth except for one slightly plumose seta on segments -1, -2 and -5 and a modified “pineapple” seta with a terminal flagellum on segments -5 and -7, aesthetascs on segments -5 and -9. Setal formula as follows 1-(1), 2-(10), 3-(8), 4-(2), 5-(4+1 modified + (1+a)), 6-(1), 7-(2 + 1 modified + 1 spine), 8-(1 + 3 spines?), 9-(9 + (2+a)).

*Antenna.* See Figure 15A. Basis and enp-1 not completely separate forming indistinct allobasis, basal portion bearing a few setules on abexopodal margin and a small row of spinules near base of exopod, endopodal portion of allobasis unadorned. Distal endopod segment with widely spaced spinules on outer margin and two strong spines subdistally on same margin, with row of spinules medially on posterior face and on distal margin, latter also armed with five geniculate setae and a naked spine fused to base of inner seta. Exopod one-segmented with two or three strong spinules on inner

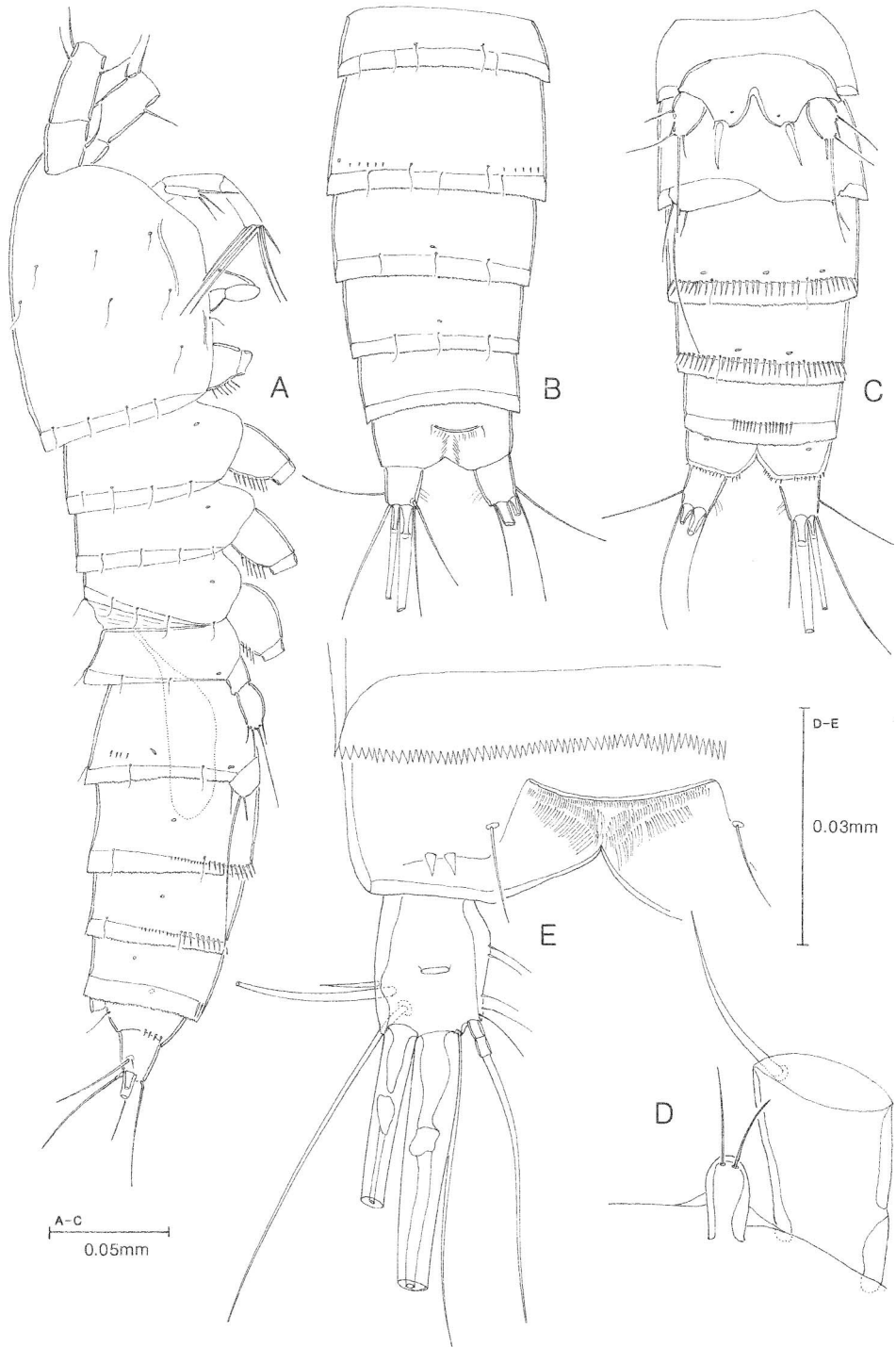


Figure 13. *Ameira longispina* sp. nov., male. (A) Habitus, lateral; (B) urosome, dorsal; (C) urosome, ventral; (D) rostrum and proximal segment of antennule; (E) anal somite and caudal ramus, dorsal.

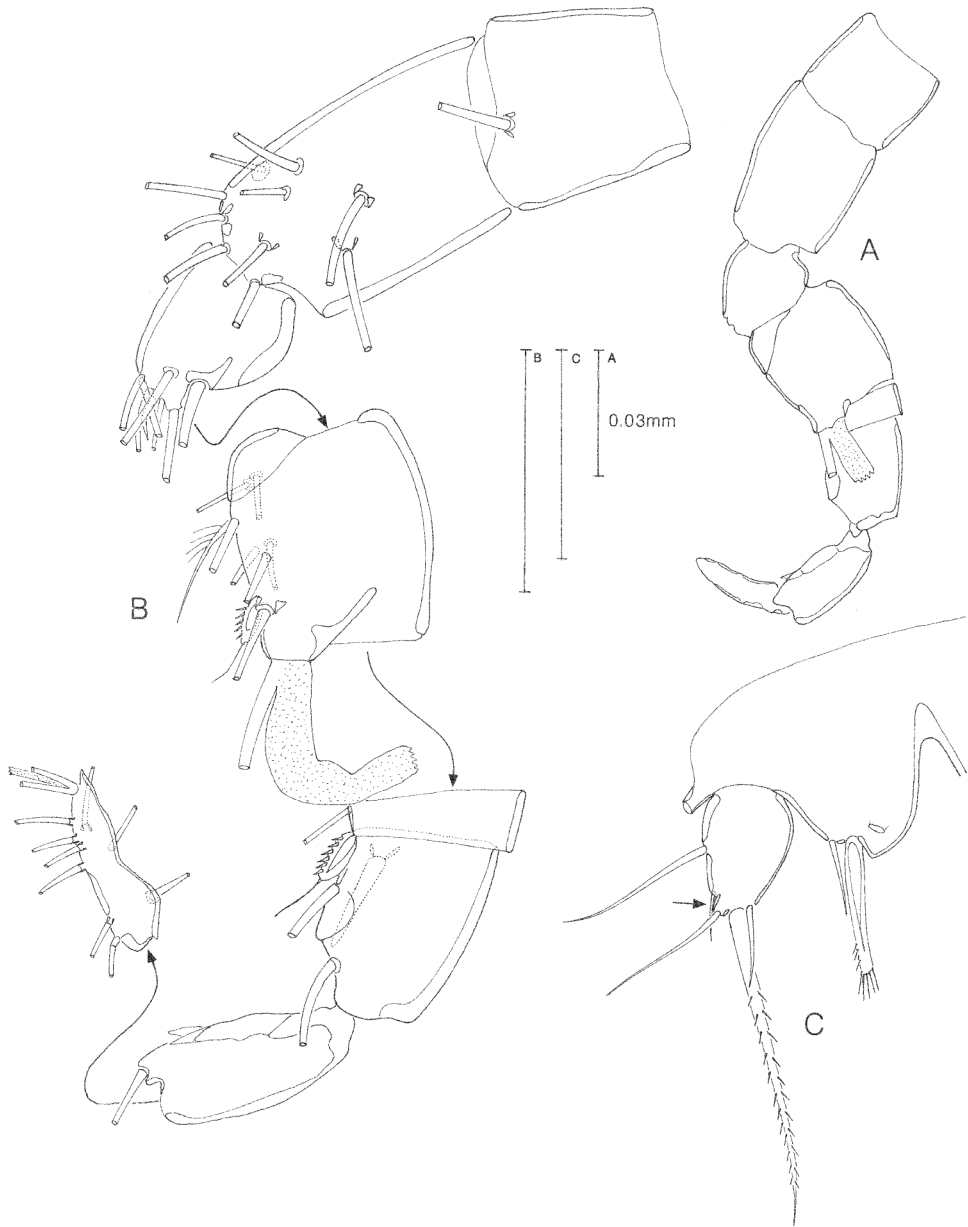


Figure 14. *Ameira longispina* sp. nov., male. (A) Antennular segmentation; (B) antennular setation; (C) P5.

margin, a row of minute spinules around inner distal corner and distal margin armed with three setae.

**Mandible.** See Figure 15B. Coxal gnathobase well developed, cutting edge with large bicuspid tooth at outer corner, a large triangular unicuspid tooth medially, an array of small multicuspid teeth and a plumose seta at inner distal corner. Basis wider

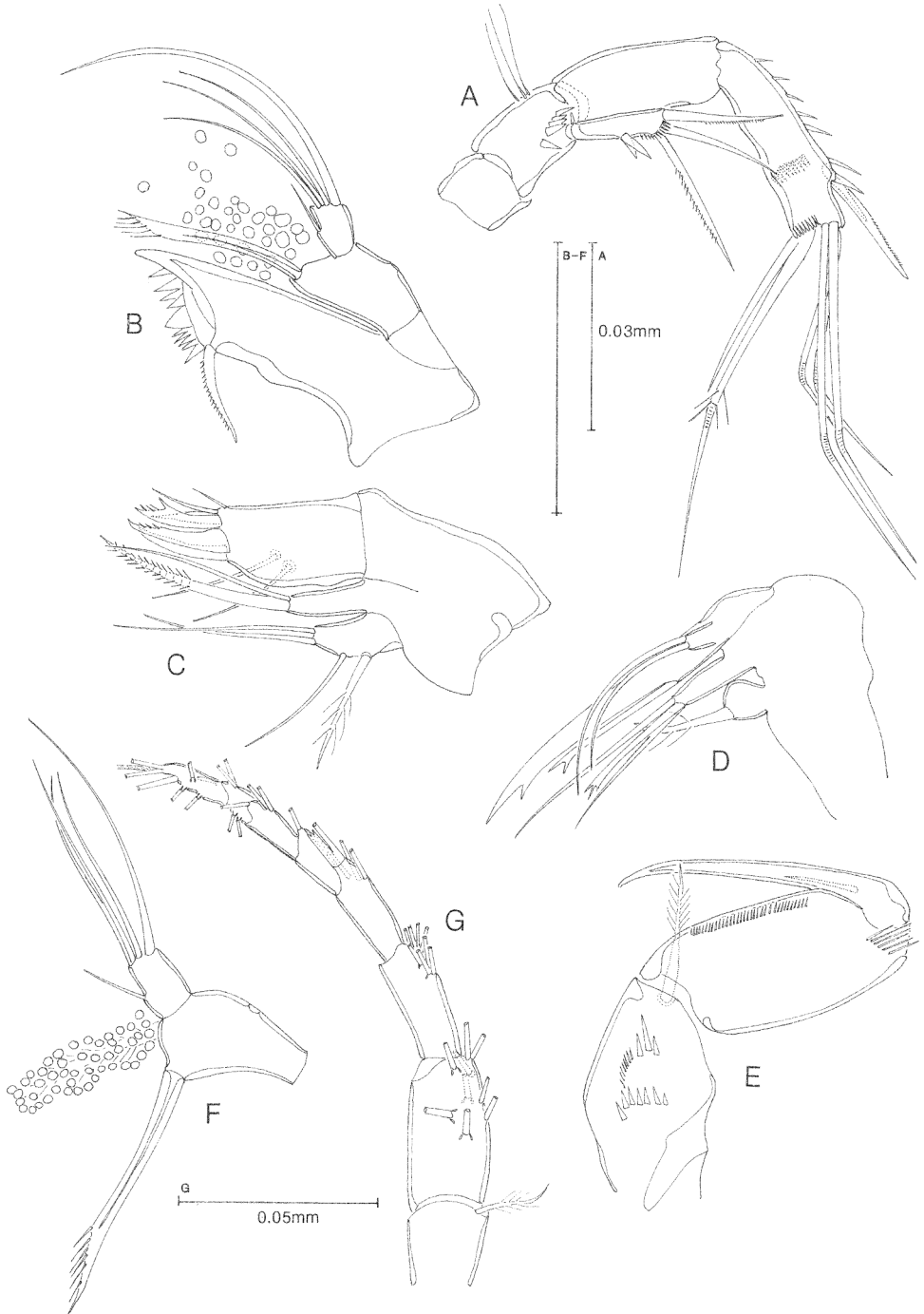


Figure 15. *Ameira longispina* sp. nov. (A–E) Male: (A) antenna; (B) mandible; (C) maxillule; (D) maxilla; (E) maxilliped; (F–G) female: (F) mandibular palp; (G) antennule.

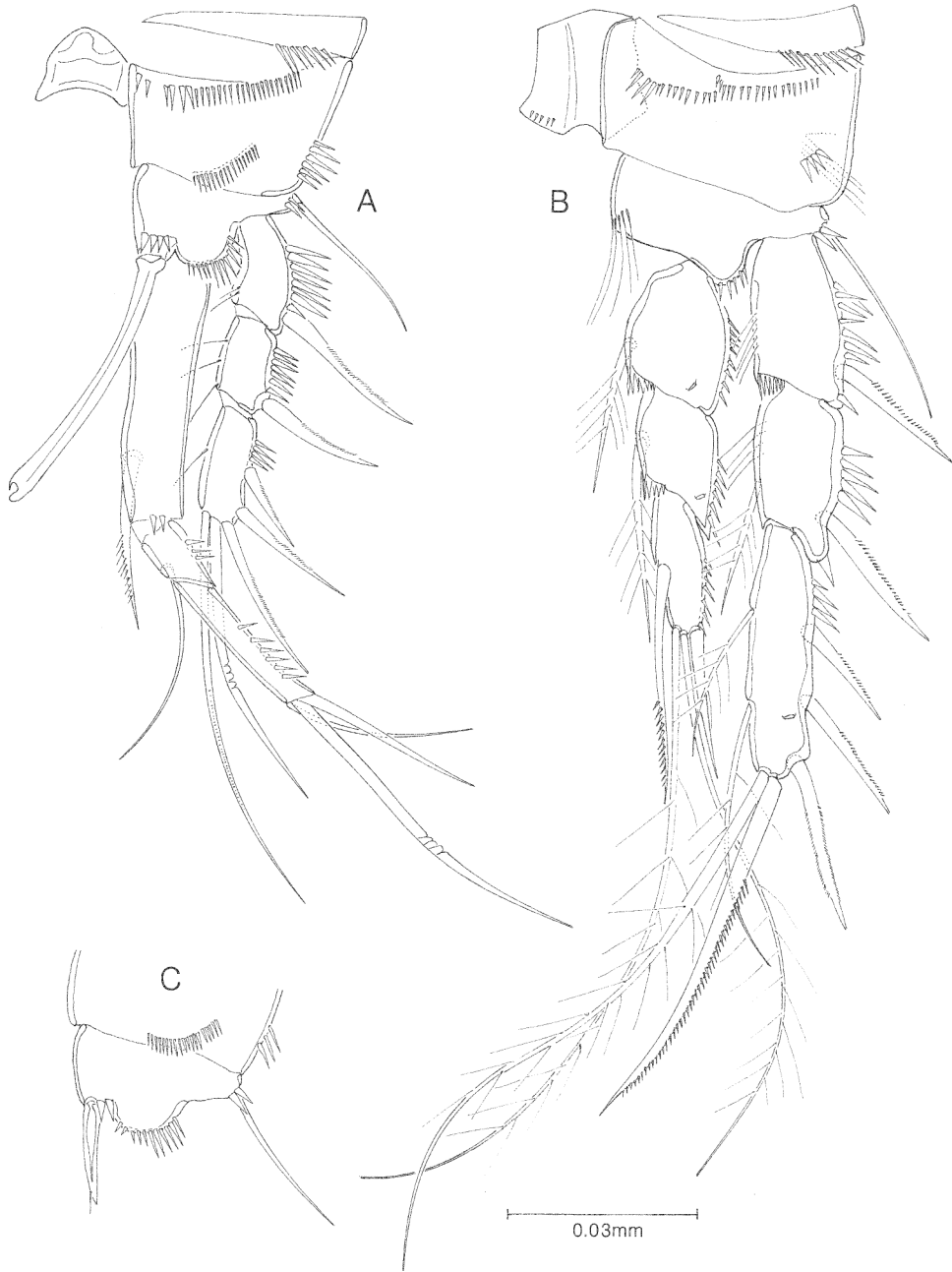


Figure 16. *Ameira longispina* sp. nov. (A–B) Male: (A) P1; (B) P2; (C) female: P1 basis.

distally than proximally bearing one large pectinate spine on distal margin and possibly a very delicate plumose element covered in small spherical particles. These are present in the position shown in Figure 15B in all the dissected specimens of both sexes but are often diffuse as in Figure 15B but occasionally seen as in Figure 15F for

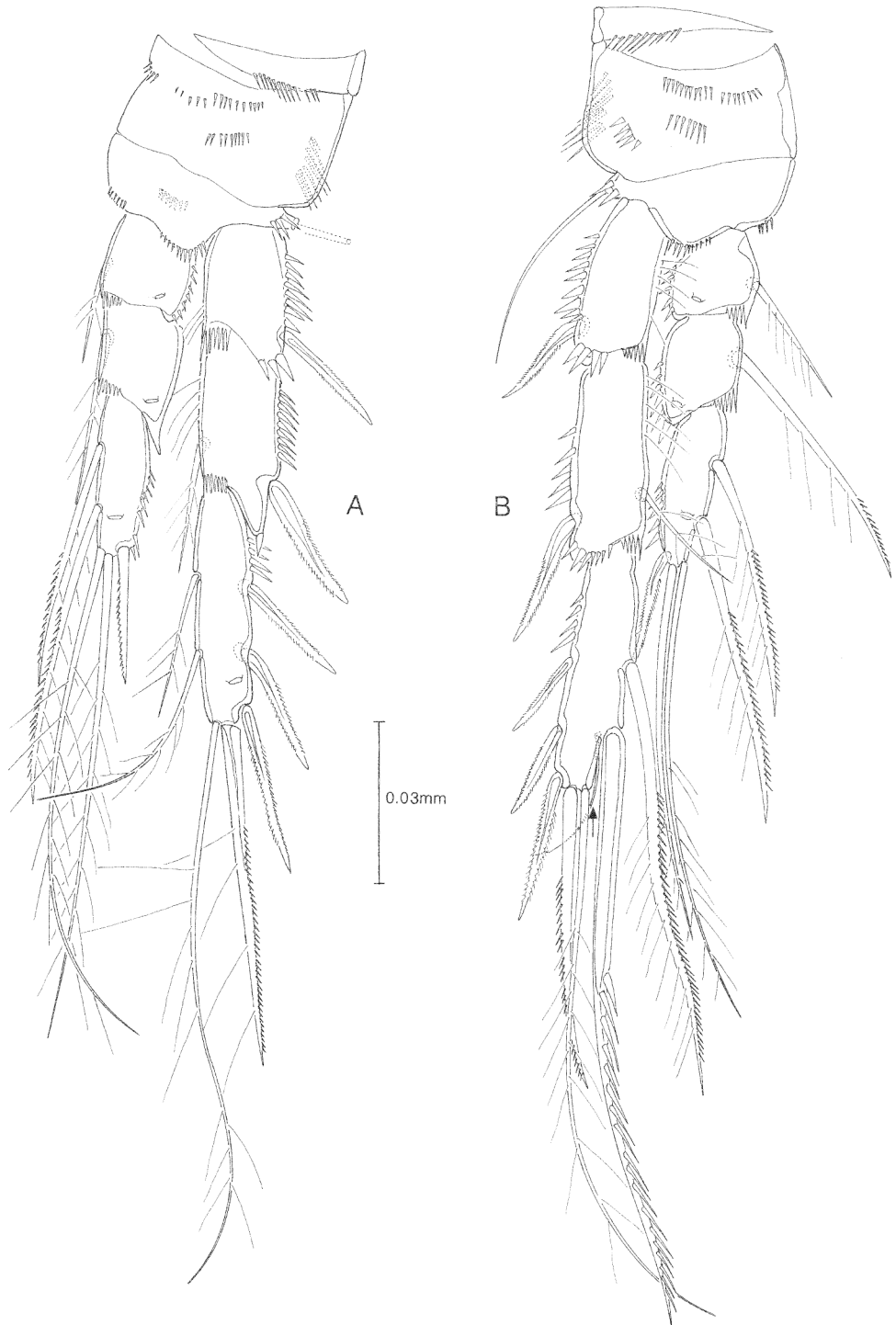


Figure 17. *Ameira longispina* sp. nov., male. (A) P3; (B) P4.



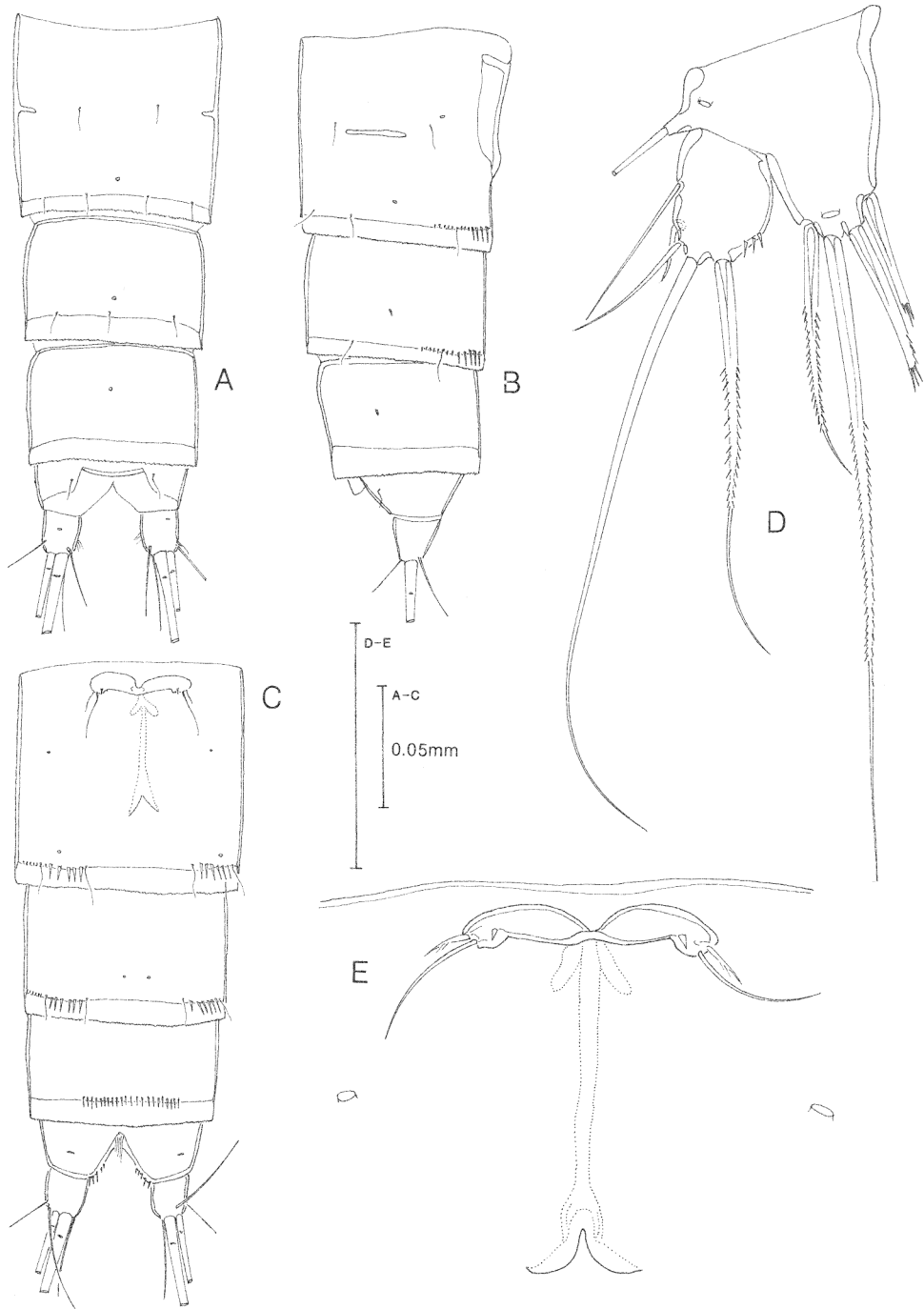


Figure 18. *Ameira longispina* sp. nov., female, urosomites 2–6. (A) Dorsal; (B) lateral; (C) ventral; (D) P5; (E) genital field.

one dissected female. Endopod well developed bearing one lateral and four terminal setae. Exopod absent.

*Maxillule.* See Figure 15C. Praecoxal arthrite with two setae distally on inner margin; dorsal surface with two setae; distal margin with two pairs of pectinate curved spines. Coxal endite with one naked and one distally ringed and spinulose seta. Armature of basis uncertain but probably with two or three setae on distal margin, possibly with a delicate structure (as described for mandibular basis) subdistally, endopod and exopod absorbed into basis represented by one seta each.

*Maxilla.* See Figure 15D. Syncoxa with two endites on distal margin; inner endite broad with one weakly-chitinized, fused seta with spinulose crown and possibly one delicate plumose seta similar to that described for mandibular basis; outer endite slender with two naked setae and a spine with a trifid tip. Allobasal endite with a fused claw and an articulating spine both bifid at tip. Endopod with two naked setae.

*Maxilliped.* See Figure 15E. Syncoxa with rows of spinules proximally and one plumose setae on distal margin. Basis oval, unarmed but ornamented with row of spinules on palmar margin and distally on outer margin. Endopod represented by a well-developed claw slightly longer than basis, with one accessory seta proximally.

*P1.* See Figures 16A and 19A. Intercoxal sclerite small, u-shaped and unadorned. Praecoxa small, triangular with row of spinules on distal margin. Coxa broader than long, with row of spinules proximally and distally on anterior face and a row of longer spinules near outer margin. Basis with small row of spinules on distal margin and at base of inner spine and outer seta. Inner spine sexually dimorphic, extremely enlarged, reaching to distal margin of enp-1 in the long morph specimens (Figure 16A) or at least half length of enp-1 in the short morph specimens (Figure 19A), slightly curved with a small cusp-like hook distally. Exopod three-segmented, segments about equal in length with row of spinules on outer margin and setules on inner margin; exp-2 without inner seta; exp-3 with two geniculate setae on distal margin and three spines on outer margin. Endopod three-segmented, enp-1 elongate, about equal in length to enp-2 and enp-3 combined and reaching distal margin of exp-3, inner margin with short stout plumose seta inserted at 75% of segment length; enp-2 only half length of enp-3, with row of spinules on outer margin and one seta on inner margin; enp-3 with one naked seta, one geniculate seta and one spine on distal margin.

*P2–P4.* See Figures 16B and 17A–B. Intercoxal sclerites bilobate. Praecoxa and coxa as in P1. Basis with row of long setules in P2 and short spinules in P3–P4 on inner distal margin and spinules on distal margin and at base of outer seta. All rami three-segmented and all segments with row of spinules on outer margin. P2 and P3 exp-2 and enp-2 with attenuated outer distal corner; enp-3 reaching to proximal part of exp-3. P4 exopod segments slightly more elongate than in P2 and P3; exp-2 without attenuated distal outer corner; exp-3 with three inner setae, middle one very well developed and spinulose, distal inner seta extremely fine, articulating on posterior face of segment; enp-2 without attenuated inner distal corner and enp-3 only reaching to distal margin of exp-2. Setal formula of swimming legs is presented in Table 3.

Table 3. Setal formula of swimming legs of *Ameira longispina* sp. nov. male.

	Exopod	Endopod
P1	0 : 0 : 023	1 : 1 : 021
P2	0 : 1 : 223	1 : 1 : 121
P3	0 : 1 : 223	1 : 1 : 221
P4	0 : 1 : 323	1 : 1 : 221

*P5.* See Figure 14C. Baseoendopod of each side fused medially, endopodal lobe well developed with pore on anterior face and distal inner margin projecting slightly, outer portion bearing two armature elements, an inner stout spine with pectinate tip and an outer close set small naked spine. Exopod oval with five armature elements, an inner small naked seta, a distal large minutely pinnate seta and three naked setae on outer margin, middle one (arrowed in Figure 14C) extremely small and often only visible under  $\times 100$  oil immersion objective.

*P6.* See Figure 13C. One fixed and one articulating plate on posterior border of urosomite-2 each bearing three setae, inner and outer short, median seta long, reaching to posterior border of urosomite-4.

#### *Description of female*

As in male except for urosome, genital field, antennule P1 basis and P5.

*Body.* See Figure 18A–C. Slightly larger than in male, length 0.45–0.56 mm (mean = 0.512 mm,  $n = 5$ ). Prosome as in male, urosome with segments -2 and -3 completely fused, line of separation marked only by very short lateral sub-cuticular rib (Figure 18B). Urosomites unadorned dorsally, posterior margin of genital double somite and following somite with short ventro-lateral row of spinules, pre-anal and anal somites as in male. Genital field (Figure 18E) with copulatory pore unusually far posterior, situated medially in posterior part of double somite, long copulatory duct leads to small paired seminal receptacles, genital slit connects paired genital pores, each covered by vestigial P6 bearing one short plumose seta, one long naked seta and a minute spinous process.

*Antennule.* See Figure 15G. Eight-segmented, segments -2 and -3 longest, aesthetascs on segments -4 and -8, all setae naked except for a plumose seta on segments -1 and -2. Setal formula as follows: 1-(1), 2-(9), 3-(8), 4-(3 + (1 + a)), 5-(1), 6-(3), 7-(4), 8-(5 + (2 + a)).

*P1 basis.* See Figure 16C. Ornamented as in male but inner spine short, pointed, with a small setule near tip.

*P5.* See Figure 18D. Baseoendopod of each side separate with pore at base of peduncle bearing outer seta and near apex of endopodal lobe. Latter well developed bearing four armature elements, two inner spines with pinnate crowns and two pinnate setae,

inner over twice as long as outer. Exopod semi-oval with a few spinules on inner margin and bearing five setae, inner seta pinnate, distal seta longest and middle outer seta very small (but more obvious than in male).

### Etymology

The name refers to the long inner basal spine on the male P1.

### Remarks

In their partial revision of the genus *Ameira*, Conroy-Dalton and Huys (1996, 1998) erected two new genera *Filexilia* Conroy-Dalton and Huys, 1996 and *Glabrimeira* Conroy-Dalton and Huys, 1996 and reinstated the genus *Psammameira* Noodt, 1952. *Filexilia* contains the following species previously allocated to *Ameira* in Lang (1948) and Bodin (1997): *A. longicaudata* Nicholls, 1939, *A. attenuata* Thompson, 1893, *A. brevipes* Kunz, 1954, *A. pestae* Petkovski, 1955, *A. longifurca* Bodin, 1964, *A. gravellicola* Guille and Soyer, 1966, *A. intermedia* Galhano, 1970, *A. brevipes pestae* Marinov, 1971, *A. tenella* Sars *sensu* Kunz (1983). *Filexilia* is characterized by: (1) a slender elongate body and elongate caudal rami; (2) anal operculum bearing fine spinules; (3) female genital somite completely fused without internal rib; (4) female copulatory duct strongly chitinized and P6 with one pinnate seta and two spinous processes; (5) antennule elongate with very long setae on distal segments; (6) antennary exopod two-segmented, distal minute, proximal tapering towards base, convex outer margin with fine spinule rows and a distinctly recurved lateral seta; (7) male P1 inner basal spine recurved and unipinnate; (8) P2–P3 exp-2 and P2–P4 enp-1 without inner seta; (9) male P6 with three setae, middle one longest; (10) female P5 exopod elongate. According to Conroy-Dalton and Huys (1996) *Filexilia* is most closely related to *Sicameira* Klie, 1950 as they are the only two genera of Ameiridae to share the same elongate setae on the antennule and detailed structure of the antennary exopod.

The same authors erected the genus *Glabrimeira* to accommodate *Ameira bengalensis* Rao and Ganapati, 1969 as it was intermediate between *Filexilia* and *Sicameira* because it had lost the inner seta on P2–P4 exp-2 (as in *Filexilia*), had an elongate caudal ramus (as in both genera) and had only two spines on the female P5 benp (as in *Sicameira*).

Conroy-Dalton and Huys (1998) reinstated the genus *Psammameira* to accommodate *A. hyalina* (Noodt, 1952) and *A. parasimulans* Lang, 1965. *A. simulans* Scott, 1894 is maintained as *incertae sedis* in this genus. This genus belongs to a lineage of small interstitial ameirids which also includes *A. listensis* Mielke, 1973, *A. atlantica* Noodt, 1958, *A. atlantica mediterranea* Kunz, 1974 and *A. reducta* Petkovski, 1954. This lineage is characterized by: (1) a two-segmented antennary exopod bearing groups of spinules and a minute surface frill on exp-1; (2) maxillary coxal endite with only one well-developed element; (3) a short P1 endopod with the proximal segment at most as long as the exopod; (4) a typical shape to the endopodal lobe of the male P5 in which the inner distal margin is extended; (5) a 1:1:121 P4 endopodal setal formula; (6) denticulate or incized hyaline frills on the urosomites. According to these authors a unique apomorphy for *Psammameira* is the posteriorly-displaced copulatory pore and the long copulatory duct. This is found in a genital somite, which is almost completely fused only showing a short lateral subcuticular ridge and a P6 bearing a short plumose outer seta and an inner short spine.

The other species group within *Ameira* with which Conroy-Dalton and Huys (1996, 1998) compare their new genera is that of the type species *A. longipes* Boeck 1865 and includes *A. minuta* Boeck, 1865, *A. parvula* (Claus, 1866), *A. Scotti* Sars, 1911, *A. parvuloides* Lang, 1965 (and possibly *A. tenuicornis* Scott, 1902, *A. parascotti* Chislenko, 1977, *A. usitata* Klie, 1950, *A. bathyalis* Becker, 1979 and *A. faroensis* Schriever, 1982). This group is characterized by: (1) a more robust body with some dorsal ornamentation, a naked operculum and short caudal rami; (2) a female antennule with the proximal segments short and stout; (3) an antennal exopod which is either one-segmented (e.g. Sars [1911] for *A. longipes*) or two-segmented (e.g. Mielke [1974] for *A. longipes* and Moore [1976] for *A. parvula*) with straight sides tapering only slightly posteriorly, the outer margin bearing one or two stout spinules (as in Figure 19C) and possibly a row of minute spinules on the anterior face; (4) mandibular basis with a pectinate spine, a normal spine and a flexible pinnate seta; (5) a maxillulary coxal endite with two elements and a basis with a minute, discrete, endopodal segment (Figure 19D); (6) a maxilla with only one syncoxal endite(?); (7) a P1 endopod with enp-1 at least as long as exopod; inner basal spine in male without spinules; (8) P2–P4 exp-2 with inner seta; enp-1 and enp-2 with inner seta and enp-3 with 1, 2, 2 inner setae on P2–P4 respectively; (9) P5 female with 4:5 and male with 2:5 setae on baseoendopod and exopod respectively, exopod not elongate and male endopod without extended endopodal lobe; (10) female genital double somite with complete or almost complete subcuticular rib; (11) copulatory pore in anterior half of anterior portion of double segment and short copulatory duct weakly chitinized (Figure 19B); (12) female P6 with minute outer seta recurved anteriorly and two inner chitinous projections (see figure 189d in Lang [1965] and Figure 19B); male P6 symmetrical with three elements, inner element spinous.

The present species always keys out to *Ameira* in any of the modern keys but from the foregoing it is difficult to place it in any of the groups outlined in the revisions of Conroy-Dalton and Huys (1996, 1998). These authors place great emphasis on the detailed morphology of the antennary exopod in defining their lineages and in this respect my species certainly agrees with the *A. longipes* lineage in that the proximal segment is adorned with two strong spinules on the outer margin and a row of fine spinules round the distal margin. Similarly, because there is no sexual dimorphism in the swimming legs, the setal arrangement on these limbs has also been used to define lineages and genera and my species again possesses the characteristics of the *A. longipes* group in this respect, which is the plesiomorphic condition for the whole complex. While my specimens also possess the general body shape, female P5, operculum, caudal rami, and maxillulary coxal endite of the *A. longipes* group, there are a number of significant differences: (1) there is no dorsal ornamentation on the body and the segments of the female antennule are more slender; (2) the mandibular basis has only one strong pectinate spine (and possibly a very flimsy, pinnate seta); (3) in the maxillule the endopod is completely absorbed into the basis and appears to be represented by one seta; (4) the maxilla has two syncoxal endites, the inner being globose and with two? elements; (5) the female genital double somite is almost completely fused with only a very short lateral subcuticular rib; (6) the copulatory pore in the female is situated in the posterior part of the double somite and connects to the seminal vesicles by a long copulatory duct; (7) the female P6 has two setal elements the inner of which is long and naked; (8) the male P5 endopodal lobe has a small inner extension and the male P6 is asymmetrical with three setae.

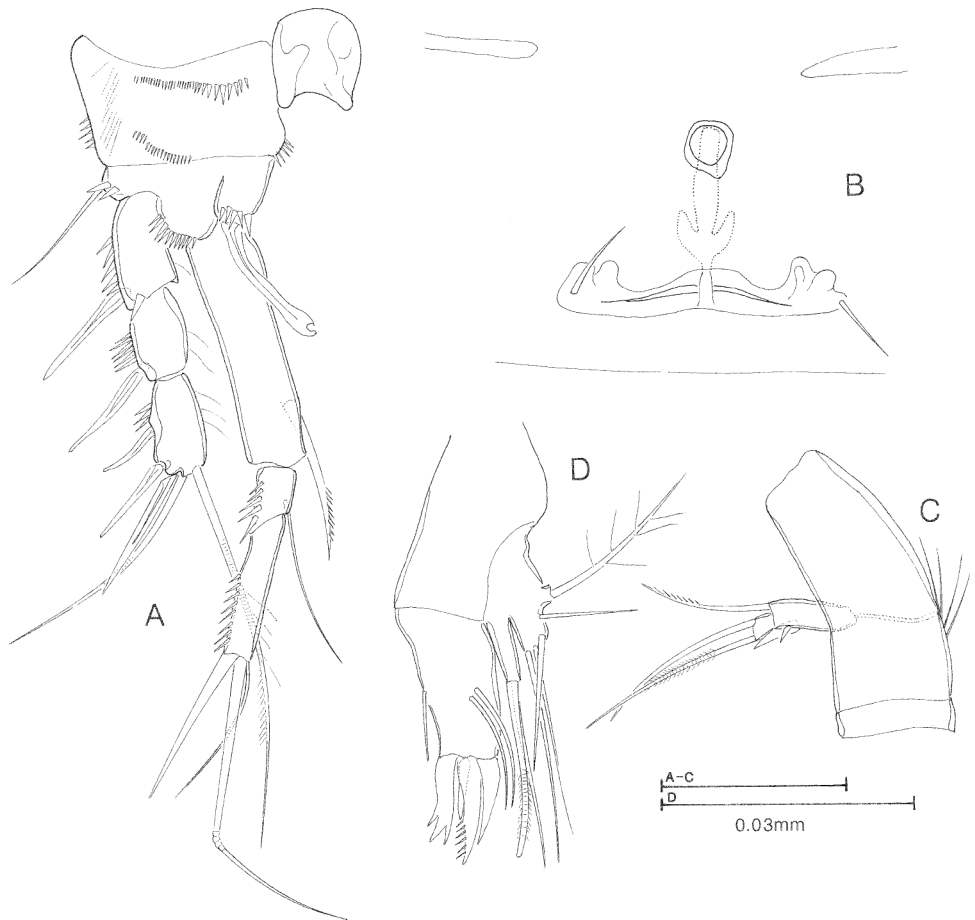


Figure 19. (A) *Ameira longispina* sp. nov., male P1 of “short morph”; (B–D) *Ameira parvula*: (B) female genital field; (C) antennal coxa, allobasis and exopod; (D) maxillule.

In features 1, 3, 4, 5, 6 and 8 our species is very similar to *Psammameira* and character 6 was given as an autapomorphy for that genus by Conroy-Dalton and Huys (1998). However, my specimens do not possess important features of that genus, namely the vermiform body, a rostrum defined at the base, the structure of the antennal exopod, the setal formula of the swimming legs and female P5 and the armature of the female P6 (in which the inner element is a short spine). This species should probably be placed in a separate genus but, because the revision of Conroy-Dalton and Huys is incomplete, I have decided to maintain it provisionally in the genus *Ameira* on the basis of the structure of the antenna and the setal formula of the swimming legs and P5.

This species can be distinguished from all others in the *Ameira* complex by the marked elongation of the inner basal spine of the male P1. In the holotype and 13 other males the spine extends to the distal margin of the elongate proximal segment of the endopod (as in Figure 16A) whereas in the other 36 males the inner spine is

two-thirds the length of the former type and reaches just past the middle of the proximal segment of the endopod (as in Figure 19). As there were no specimens with a spine length intermediate between these two conditions it is possible that there are two closely related species represented in this material. However, because I could find no other differences in the fine structure of the males or any character on which to separate the 24 females, I have not created two species but denoted them as a “long” and “short” morph. This course may be supported by the fact that out of 20 samples taken over a 64-m<sup>2</sup> patch of sand (see layout in Warwick et al. [2006]), 68 of a total of 74 specimens recovered were found in one 0.00156-m<sup>2</sup> sample.

Genus *Nitocra* Boeck, 1865<sup>2</sup>  
*Nitocra elegans* (T. Scott, 1905)  
 (Figures 20–21)

*Material examined*

Ten ♀♀ (one dissected onto one slide, nine spirit preserved). Nine ♂♂ (one dissected onto one slide, one onto three slides, seven spirit preserved). NHM reg. nos 2009.213–214; 2009.215–224.

*Description of female*

The female of this species has been described by Scott (1905) as *Ameira elegans* from the east coast of Scotland and by Monard (1935) from Roscoff. It has been recorded from intertidal rock pools on the Norfolk coast (Hamond pers. comm.) and in the Scilly Isles by Wells (1970) from gravel and filamentous algae in low water rock pools at Porth Hellick on St. Mary's. The male was unknown to these authors.

*Description of male*

As in female except for urosome, antennule, P1 basis, P4 exp-3, P5, P6.

*Body.* See Figure 20A–C. Length 0.482–0.688 mm (mean = 0.577 mm,  $n = 8$ ). Genital somites completely separate. P6s forming two equal plates on posterior margin of urosomite-2, each bearing three setae. All urosomites with prominent, dentate hyaline frills. Ornamentation moderately complex, as figured. Operculum semi-circular, ornamented with 10–12 strong spines. Caudal rami about as broad as long in ventral view, with lateral and ventral row of spinules near distal margin and seven setae normally placed

*Antennule.* See Figure 21B–C. Ten-segmented, haplocer, segments -5 to -8 slightly swollen, major articulation between segments -7 and -8. Segment-1 with row of spinules, segment-5 with a closely set group of small setae and a large aesthetasc, segments -6 and -7 with a modified pinnate spine, segment-10 with terminal trithec of two setae and a slender aesthetasc. Setal formula as follows: 1-(1), 2-(11), 3-(8), 4-(2), 5-(14? + 2 spines + (1+a)), 6-(1+1 modified spine), 7-(1+1 modified spine), 8-(1+3 spines), 9-(4), 10-(5+(2+a)).

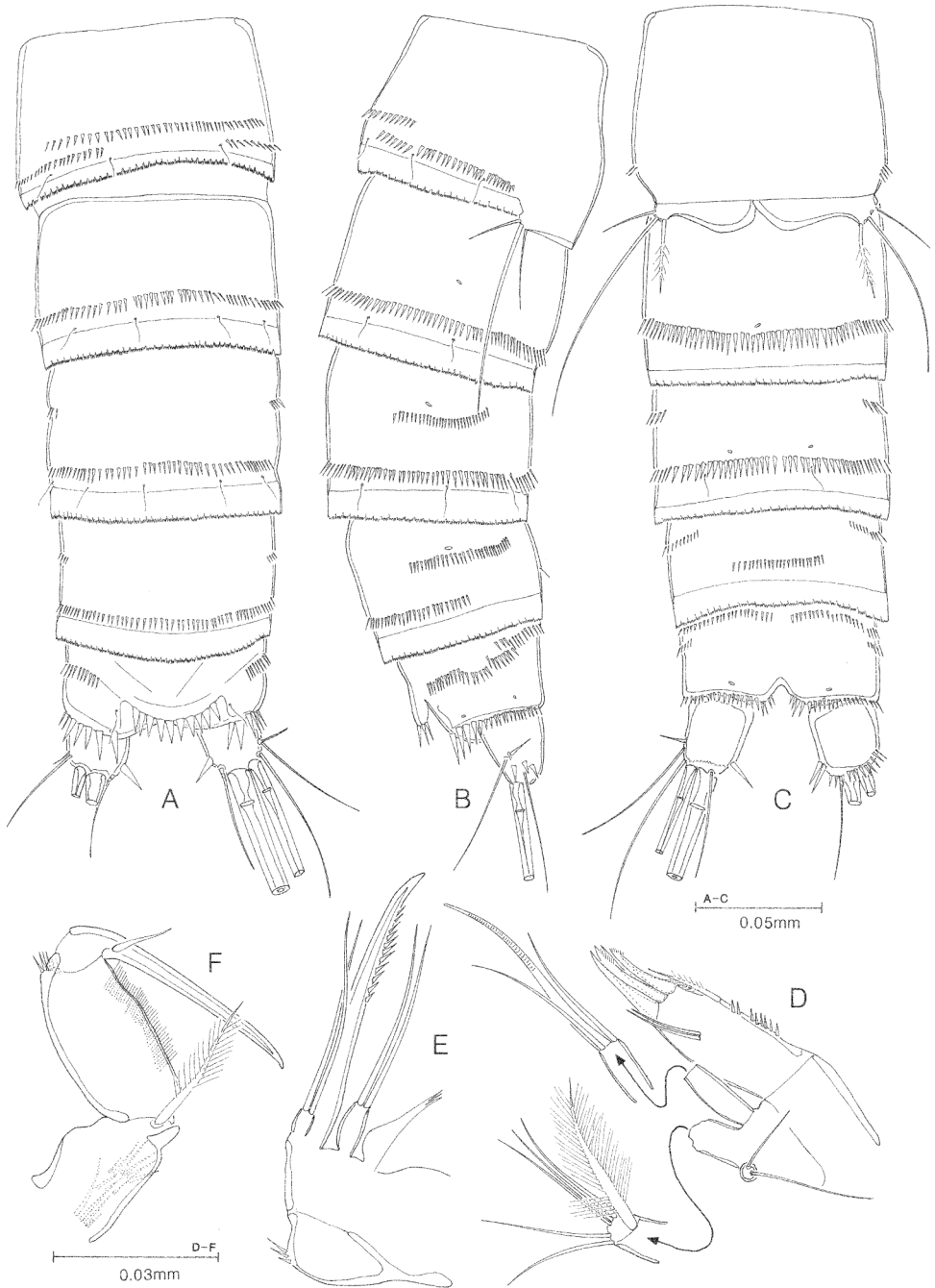


Figure 20. *Nitocra elegans*, male urosome. (A) Dorsal; (B) lateral; (C) ventral; (D) maxillule; (E) maxilla; (F) maxilliped.



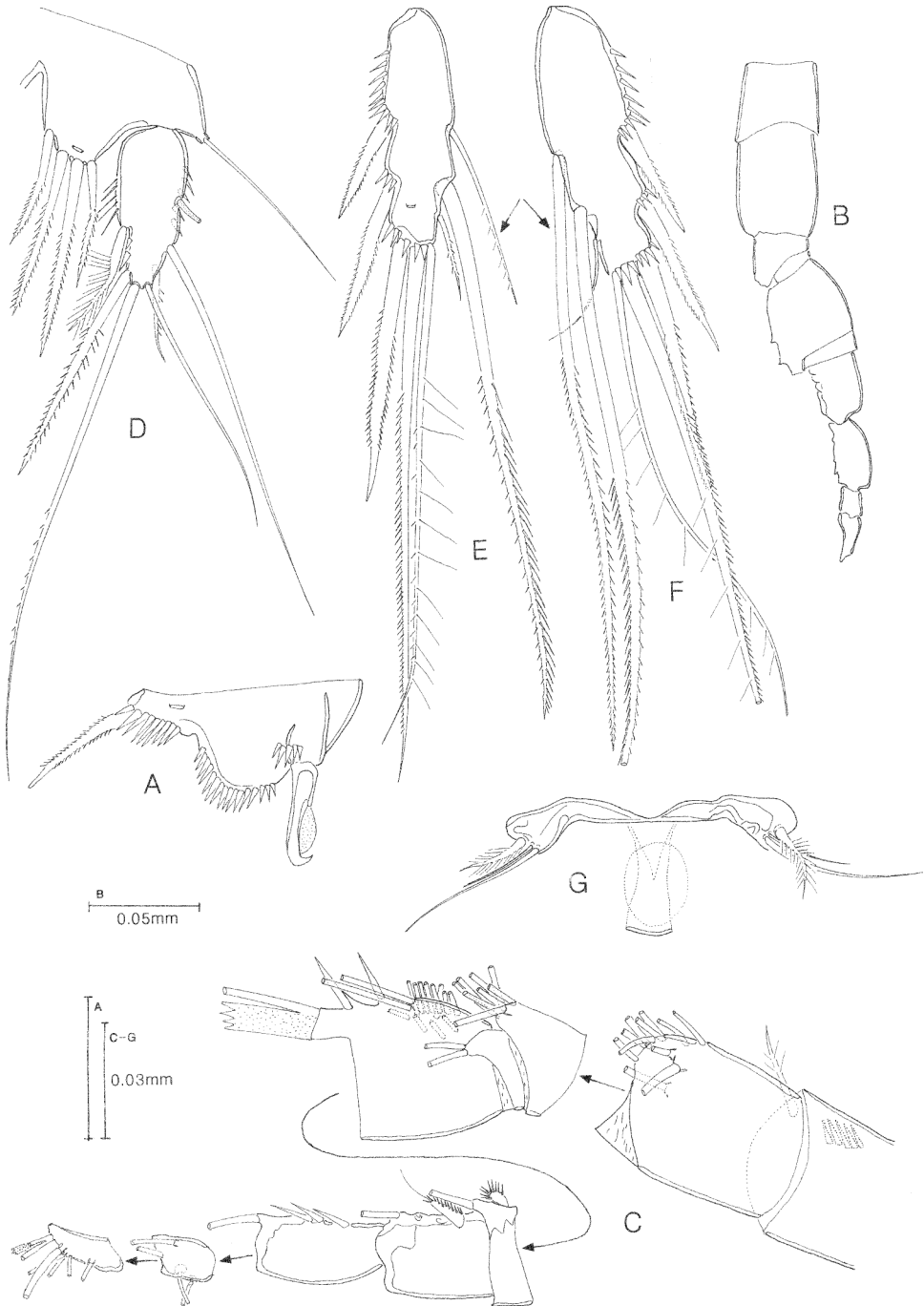


Figure 21. *Nitocra elegans*. (A-E) Male: (A) P1 basis; (B) antennular segmentation; (C) antennular setation; (D) P5; (E) P4 exp-3; (F-G) female: (F) P4 exp-3; (G) genital field.

*Antenna.* Partial basis with no abexopodal setae on basis or enp-1; enp-2 with two spines and two setae subdistally on outer margin, distal margin with five geniculate and one normal setae. Exopod one-segmented with three setae, not four as shown in Scott (1905).

*Mandible.* As shown in Scott (1905) except that large plumose basal seta very flimsy and poorly chitinized and endopod bears one plumose seta on lateral margin and five naked setae, three fused at base, on distal margin.

*Maxillule.* See Figure 20D. Praecoxal arthrite with two surface setae, two plumose setae on inner margin and six recurved spines on distal margin. Coxal endite with one pectinate spine and two setae. Basis with five naked setae on distal margin and two sub-distal, poorly chitinized, highly plumose setae (one missing in Figure 20D). Endopod with two naked setae.

*Maxilla.* See Figure 20E. Syncoxa with small row of spinules and two endites. inner endite poorly chitinized, with bulbous base extending into a tridentate projection. Outer endite cylindrical with two naked setae. Allobasal endite bearing only a large, fused, pectinate spine. Endopod with two naked setae.

*Maxilliped.* See Figure 20F. Syncoxa with three rows of spinules and, at outer corner, a chitinous knob and one pinnate seta. Basis with row of spinules on palmar margin and small row of spinules on outer margin. Endopodal claw with one accessory seta.

*P1–P4.* See Figure 21A and E. P1 basis inner spine modified into a stout terminally hooked structure with a hyaline swelling just below hook. Otherwise as for female with enp-1 equal in length to exopod. P2 and P3 as in female. P4 exp-3 proximal inner seta (arrowed in Figure 21E) much weaker than in female (arrowed in Figure 21F) and only minutely pinnate; distal inner seta somewhat stronger than in female.

*P5.* Figure 21D. Baseoendopod of each side fused medially, exopods separate. Endopodal lobe of baseoendopod only reaching one-third way up exopod and bearing four minutely pinnate spines. Exopod more elongate than in female with row of spinules and a tube pore on outer margin and spinules on inner margin; bearing six setae, three outer setae similar to female, fourth (distal) seta longest, fifth situated on distal inner margin, spine-like and spinulose, sixth, one-third way down inner margin, swollen at base and pinnate distally.

*Additional observation on female*

*Body.* Length 0.541–0.815 mm, (mean = 0.705 mm,  $n = 9$ ). Genital double somite completely fused with no indication of line of fusion. Genital field as in Figure 21G with copulatory pore a small slit posterior to genital slit which joins the paired gonopores covered by vestigial P6s bearing one pinnate and two naked setae. Ornamentation of urosome as in male.

*Antennule.* Eight-segmented, segments as shown by Scott (1905). Setal formula as follows: 1-(1), 2-(8), 3-(9), 4-(3+(1+a)), 5-(2), 6-(3), 7-(4), 8-(5+(2+a)).

*Mouthparts.* As described for male.

*P1–P5.* As described by Scott (1905) except that P4 exp-3 has three inner setae, the proximal two setae are very robust but the distal seta is very slender and relatively short as shown in Figure 21F.

### Acknowledgements

My thanks to the members of the Biodiversity Programme in Plymouth Marine Laboratory for providing the specimens described in this paper. This work was carried out whilst the author held an Honorary Fellowship at Plymouth Marine Laboratory.

### Notes

1. See note 143, page 88 in Wells (2007).
2. See note 148, page 88 in Wells (2007).

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