

Redescription and generic assignment of *Fuegiphoxus uncinatus* (Chevreux, 1912) (Crustacea, Amphipoda, Phoxocephalidae)

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ABSTRACT

The genus *Fuegiphoxus* Barnard & Barnard, 1980 comprises four species widely distributed exclusively in the Southern Ocean. *Fuegiphoxus uncinatus* (Chevreux, 1912) had been assigned provisionally to this genus. In the present paper, *Fuegiphoxus uncinatus* is redescribed on the basis of the holotype and it is confirmed as belonging in the genus *Fuegiphoxus*. The diagnosis of *Fuegiphoxus* is emended and comparisons with the most related genera are provided. Furthermore, an identification key for the four known species of the genus, *F. uncinatus*, *F. abjectus* Barnard & Barnard, 1980, *F. inutilis* Barnard & Barnard, 1980 and *F. fuegiensis* (Schellenberg, 1931), is presented.

RÉSUMÉ

Redescription et attribution générique de Fuegiphoxus uncinatus (Chevreux, 1912) (Crustacea, Amphipoda, Phoxocephalidae).

Le genre *Fuegiphoxus* Barnard & Barnard, 1980 comporte quatre espèces largement répandues dans l’Océan Austral. *Fuegiphoxus uncinatus* (Chevreux, 1912) avait été attribué provisoirement à ce genre. Dans le présent article, *Fuegiphoxus uncinatus* est redécrit à partir de l’holotype et son appartenance au genre *Fuegiphoxus* est confirmée. La diagnose de *Fuegiphoxus* est amendée et des comparaisons avec les genres apparentés sont fournies. De plus, une clé d’identification pour les quatre espèces connues du genre, *F. uncinatus*, *F. abjectus* Barnard & Barnard, 1980, *F. inutilis* Barnard & Barnard, 1980 et *F. fuegiensis* (Schellenberg, 1931), est présentée.

MOTS CLÉS

Crustacea,
Amphipoda,
Phoxocephalidae,
Fuegiphoxus,
Fuegiphoxus uncinatus,
Southern Ocean,
redescription,
key.

INTRODUCTION

The family Phoxocephalidae Sars, 1891 is a strictly marine group of abundant free-living benthic amphipods, which principally inhabit in soft substrates as burrowers. They are omnivorous, detritivores and opportunistic micropredators found in all oceans and at all depths; characterized by distinctive morphology, life style, and primitive reproductive behavior, they play an important role in marine energy cycles (Enequist 1949; Barnard & Drummond 1978; Bousfield 1978; Oliver *et al.* 1982; Oakden 1984; Slattery 1985; Conlan 1991).

Barnard & Barnard (1980) revised the material assigned to *Paraphoxus fuegiensis* (Schellenberg, 1931) from the NRS (Swedish Museum of Natural History, Stockholm) collections and noticed that the specimens were mixed with two other undescribed species. As a result, they erected the genus *Fuegiphoxus* Barnard & Barnard, 1980 (Crustacea, Amphipoda, Gammaridea) which to date includes the four species mentioned below.

The species *Fuegiphoxus fuegiensis* (Schellenberg, 1931) was originally described by Schellenberg (1931) into the genus *Parharpinia* Stebbing, 1899, but has since been placed in numerous other genera after various revisions. Barnard (1960) transferred it to *Paraphoxus* Sars, 1895, and subsequently Barnard & Drummond (1978) moved it to *Wildus* Barnard & Drummond, 1978. Finally, Barnard & Barnard (1980) redescribed and designated it as the type species of the genus *Fuegiphoxus*.

The unique specimen now identified as *Fuegiphoxus abjectus* Barnard & Barnard, 1980, was originally determined as *Parharpinia fuegiensis* by Schellenberg (1931). Later on, Barnard (1960) examined this specimen and considered it was a female of *Paraphoxus fuegiensis*. Finally, Barnard & Barnard (1980) in a careful reexamination rectified it as a male with similar characters (i.e. an unusual antenna 1) to those found in *Elpeddo kaikai* Barnard & Drummond, 1978, and described it as *Fuegiphoxus abjectus*.

Fuegiphoxus inutilis Barnard & Barnard, 1980 was also mixed in the Schellenberg's "fuegiensis" material; Barnard & Barnard (1980) described an immature male, a juvenile named "t", and an adult female on which they based the new species.

The species *Fuegiphoxus uncinatus* (Chevreux, 1912) was originally described as *Pontharpinia uncinata* by Chevreux (1912). This brief description was later improved and illustrated by Chevreux (1913). Barnard (1958a) transferred the species to *Paraphoxus* and in latter studies Barnard (1958b, 1960) considered it within the same genus. Thurston (1974) considered it in *Pontharpinia* Stebbing, 1897 and Barnard & Drummond (1978) pointed out that *Pontharpinia uncinata* had to be allocated in a new genus to be described. Finally, on the basis of the original undetailed descriptions and uncompleted illustrations of Chevreux (1912, 1913), *Pontharpinia uncinata* Chevreux, 1912 was assigned provisionally to the genus *Fuegiphoxus* by Barnard & Barnard (1980).

The genus *Fuegiphoxus* was compared with the genera *Eyakia* Barnard, 1979, *Paraphoxus* Sars, 1895, *Wildus* Barnard & Drummond, 1978, *Elpeddo* Barnard & Drummond, 1978 and *Linca* Alonso de Pina, 1993 (Barnard & Barnard 1980; Barnard & Karaman 1991; Alonso de Pina 1993). A summary of these relationships is discussed below.

In the Southern Ocean, a total of 35 species and 18 genera of Phoxocephalidae have been reported. The genus *Fuegiphoxus* is distributed in the West Antarctic, sub-Antarctic and Magellan regions, at depths from 0 to 1031 m, and it has been found in bottoms with clay, sand, small stones, shells, algae, ascidians, sponges, and associated to kelp holdfasts. *Fuegiphoxus uncinatus* has been recorded in the Magellan and West Antarctic regions, in a wide bathymetric range, from 30 to 628 m (see Alonso de Pina *et al.* 2008).

In the present contribution, the holotype of *Fuegiphoxus uncinatus* is completely redescribed and illustrated. The genus *Fuegiphoxus* is rediagnosed and compared with the most related genera. In addition, the allocation of the species *F. uncinatus* into *Fuegiphoxus* is discussed.

MATERIAL AND METHODS

Fuegiphoxus uncinatus is redescribed, based on the material deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). This material

consists of a single ovigerous female named as *Pontharpinia uncinata* by Chevreux (1912), but it was not stated as holotype or "type". The material was recently registered under MNHN-Am7551. Since the studied material is a unique specimen, as it is indicated in the publications (Chevreux 1912, 1913), we assume this specimen is the holotype of *Fuegiphoxus uncinatus* (ICZN 1999: art. 73.1.2).

All the dissected appendages of the holotype are mounted in 9 microscopic slides imbibed in Canada balsam. The rest of the body as head, pereon and pleon were not found on the slides or neither in a vial. In a few slides the balsam is chipped, some appendages are twisted and several setae are broken or loose in the balsam. The pereopod 6 was not found in any slide, thus it was not figured. All drawings were prepared using a Carl Zeiss (Axioskop) microscope equipped with a camera lucida. Some appendages or parts of the body not found, broken or spoiled, are described according to Chevreux (1912, 1913), using an up-to-date form. The present redescription follows partially the style standardized by Barnard & Drummond (1978) for Phoxocephalidae.

SYSTEMATICS

Order AMPHIPODA Latreille, 1816
 Suborder GAMMARIDEA Latreille, 1802
 Family PHOXOCEPHALIDAE Sars, 1891

Genus *Fuegiphoxus* Barnard & Barnard, 1980

TYPE SPECIES. — *Parharpinia fuegiensis* Schellenberg, 1931 by original designation.

DIAGNOSIS EMENDED FROM BARNARD & BARNARD (1980) AND BARNARD & KARAMAN (1991)

Rostrum unconstricted, fully developed. Eyes present. Antenna 1, peduncular article 2 short, ventral setae confined apically, moderately spread. Antenna 2, peduncular article 1 not ensiform; facial robust setae on article 4 in three or more rows, with some setae thick and some setae thin;

article 5 shorter and rather narrower than article 4. Mandibles, right incisor with three teeth; right *lacinia mobilis* bifid, flabellate, left *lacinia mobilis* with four teeth; molar not triturative, small, bearing three robust setae, one of those elongate and serrate; palpal hump small, article 1 of mandibular palp short to elongate, article 2 without outer setae, apex of article 3 oblique. Maxilla 1, inner plate with four setae, outer plate with 10 or 11 robust setae; palp biarticulate. Maxilliped, inner plate with one or two thick apical robust setae; apex of palp article 3 not strongly protuberant; dactyl elongate, apical nail distinct, medium to short length.

Gnathopods medium, dissimilar, gnathopod 2 weakly enlarged; carpus of gnathopod 1 of medium length and free, of gnathopod 2 short to elongate (only in *F. abjectus* is elongate), and subcryptic to cryptic; propodus of gnathopods 1 and 2 ovatorectangular and elongate, poorly setose anteriorly, palms oblique. Pereopods 3 and 4, carpus without posteroproximal seta; propodus with thin and thick armaments, midapical setae absent. Pereopod 5 basis of broad form, not tapering distally. Pereopods 5 and 6, merus and carpus narrow to medium, basis not setose posteriorly. Pereopod 7, basis naked ventrally, without facial setae; ischium not enlarged.

Epimera 1-2 (not described for *F. uncinatus*) without long facial brushes or posterior setae; epimeron 3 posterovenital corner rounded, subquadrate or with a hook, bearing two or more ventral setae. Urosomite 1 (not described for *F. uncinatus*) bearing or lacking lateral setae and with or without ventral setae. Urosomite 3 posterodorsally rounded. Uropod 1, peduncle elongate, without inter-ramal robust seta and major displaced robust seta; with dorsolateral setae confined apically or widely spread, medial setae widely spread. Uropod 2, peduncle strongly setose dorsally. Uropods 1 and 2, apicolateral corners of peduncles with faint comb (not described for *F. uncinatus*); rami not continuously setose to apex, without subapical nails, with immersed apical nails. Uropod 3, rami longer than peduncle, outer ramus article 2 bearing two medium to long apical setae. Telson, each lobe with two or three apical robust setae plus setule on each lobe.

REMARKS

To allocate the species *Fuegiphoxus uncinatus* properly, we have expanded the diagnosis of *Fuegiphoxus* given by Barnard & Barnard (1980) and Barnard & Karaman (1991) adding the following morphological character states: inner plate of maxilliped bearing one (original diagnosis) or two thick apical robust setae; carpus of gnathopod 2 subcryptic to cryptic (original diagnoses); epimeron 3 posteroverentral corner rounded or with hook, and telson bearing two (original diagnoses) or three apical robust setae.

COMPARISONS AMONG *FUEGIPHOXUS*
AND RELATED GENERA

Fuegiphoxus shares some morphological characters with *Eyakia*, such as enlarged robust seta of the mandibular molar, inner plate of maxilla 1 bearing four apical setae, more than two rows of facial robust setae on peduncular article 4 of antenna 2, carpus of gnathopod 2 short, and apical nails on uropods 1 and 2 immersed. On the contrary, *Eyakia* presents antenna 1 peduncular article 2 of medium length with ventral setae widely spread, propodus of pereopods 3 and 4 with only thick armaments, basis of pereopod 5 tapering distally, peduncle of uropod 2 with numerous long setae, and epimeron 3 with facial setae.

Fuegiphoxus shares with *Linca* the enlarged robust seta of the molar and the absence of midapical seta on propodus of pereopods 3 and 4, but *Linca* differs in the elongate peduncular article 2 of antenna 1 with setae placed midventrally and spread, and in the palms of gnathopods 1 and 2 subtransverse.

Fuegiphoxus shares with *Paraphoxus* the short peduncular article 2 of antenna 1, the ventral setae confined apically on this article, and the carpus of gnathopod 2 almost cryptic. Both genera can be distinguished because *Fuegiphoxus* has an enlarged robust seta on the mandibular molar, more than one strong setal facial row on article 4 of antenna 2, and four setae on the inner plate of maxilla 1, instead of two.

The genera *Wildus* and *Elpeddo* appear to be similar to *Fuegiphoxus*, but they can be separated by many differences, mainly the absence of an enlarged robust seta on the mandibular molar and the presence of the major apicomедial displaced robust

seta on the peduncle of uropod 1 (see Barnard & Barnard 1980 and Discussion).

Fuegiphoxus uncinatus (Chevreux, 1912)
(Figs 1-4)

Pontharpinia uncinata Chevreux, 1912: 211; 1913: 82, 100-104, figs 10-12. — Thurston 1974: app. C. — Barnard & Drummond 1978: 32, 146.

Paraphoxus uncinatus — Barnard 1958a: 146 (by implication); 1960: 186, 195, 283. — Lowry & Bullock 1976: 128.

Paraphoxus uncinata — Barnard 1958b: 118.

Fuegiphoxus? uncinatus — Barnard & Barnard 1980: 867. — Alonso de Pina *et al.* 2008: 2, 11, 12, 33 (considered Rauschert's unpublished records).

?*Fuegiphoxus uncinatus* — De Broyer & Jazdzewski 1993: 83.

Fuegiphoxus? uncinata — Barnard & Barnard 1990: 50. — Barnard & Karaman 1991: 610.

Fuegiphoxus uncinatus — Wakabara *et al.* 1990: 2, 5, 7. — De Broyer *et al.* 2007: 188, 189.

MATERIAL EXAMINED. — **Palmer Archipelago.** Neumayer Channel (Roosen Channel), Port Lockroy, 64°49'S, 63°30'W, 60-70 m, deuxième expédition antarctique française 1908-1910, gear dredge, 1 ovigerous ♀, holotype (MNHN-Am7551).

DISTRIBUTION

Magellan region: Straits of Magellan, Paso Ancho, 53°3.6'S, 70°32.8'W, 88 m; Straits of Magellan, Voces Bay, 53°42.6'S, 70°57.5'W, 51 m; Brecknock Channel, Sidney Island, 54°45.5'S, 71°44.4'W, 33 m; Beagle Channel, Garibaldi Sound, 54°51'S, 69°55.7'W, 30 m; Beagle Channel, Port Williams, 54°53.8'S, 67°34.5'W, 35 m; Paso Goree, 55°18.6'S, 67°08.5'W, 42 m. South Shetland Islands, 62°00.3'S, 59°14.9'W, 130 m; South Shetland Islands 62°58'07"S, 57°08'01"W, 88 m. Palmer Archipelago, Neumayer Channel (Roosen Channel), Port Lockroy, 64°49'S, 63°30'W, 60-70 m. Weddell Sea, Cape Norvegia, 71°23.10'S, 14°19.70'W, 628 m. Depth range: 30-628 m. (See Alonso de Pina *et al.* 2008 [considered Rauschert's unpublished records]).

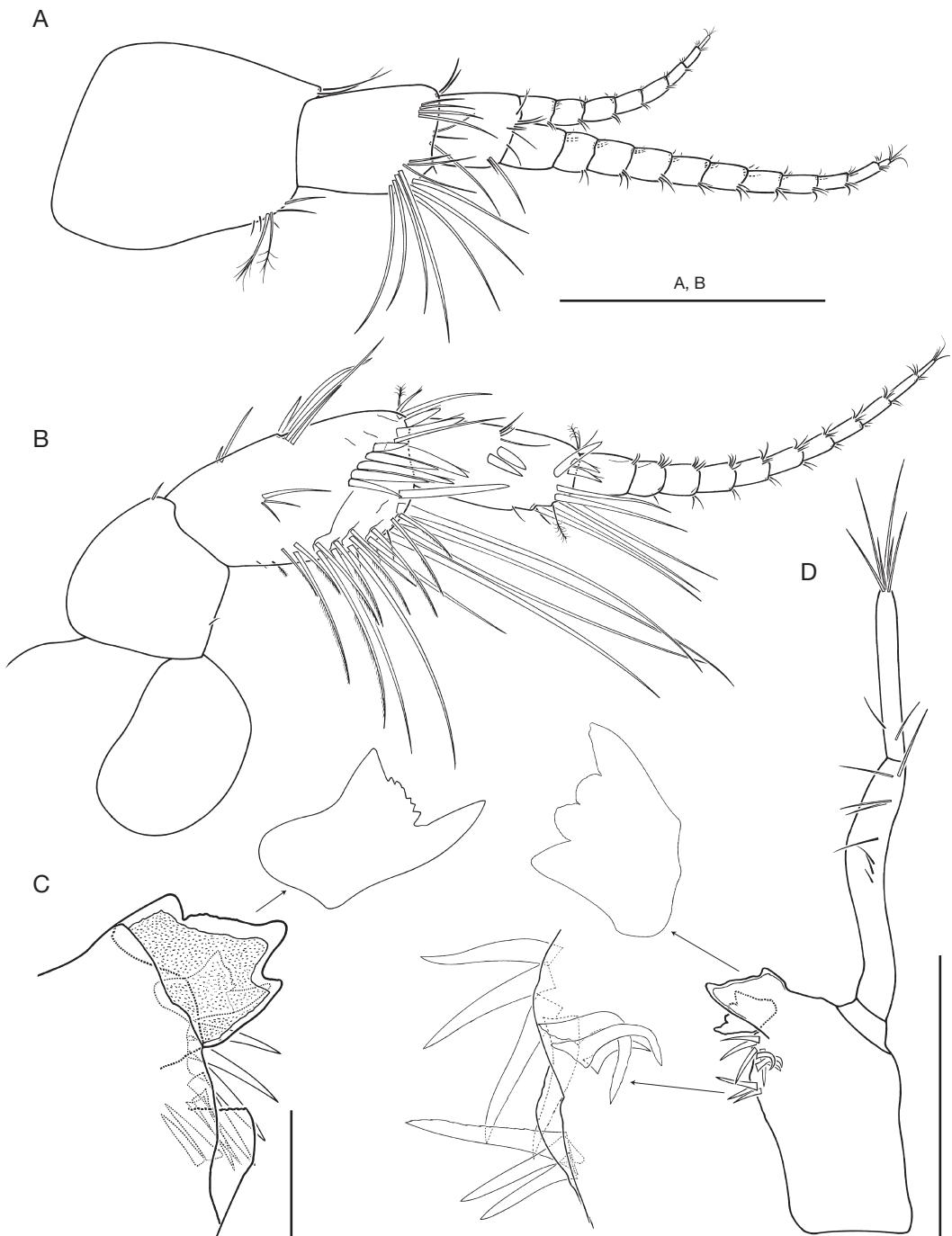


FIG. 1. — *Fuegiphoxus uncinatus* (Chevreux, 1912), holotype ovigerous ♀ (MNHN-Am7551): **A**, antenna 1; **B**, antenna 2; **C**, right mandible; **D**, left mandible. Scale bars: A-C, 0.5 mm; D, 0.1 mm.

DIAGNOSIS

Eyes large. Flagellum of antenna 1 without *aesthetascs*. Facial robust setae formula on article 4 of antenna 2 = 3-5-1. Mandible, palp article 1 short, left incisor broad with two teeth on the ends and undulations on the middle. Maxilliped, inner plate with two thick apical robust setae, palp article 4 with medium apical nail. Gnathopod 2 carpus short, subquadrate, subcryptic, posterior margin shorter. Pereopod 5, basis with posterior margin crenellate. Pereopod 7, basis strongly expanded posteroventrally, almost reaching apex of carpus, dactylus slender, 0.7 times as long as propodus. Epimeron 3, posterovenentral corner with a moderate acute hook, ventral margin with four setae. Uropod 1 with seven basofacial to ventral slender setae. Uropod 3 elongate. Telson with three apical robust setae of different length.

REDESCRIPTION

Antenna 1 (Fig. 1A), peduncular article 1 almost 1.1 times as long as wide, about 2 times as wide as peduncular article 2, ventral margin with three setules, two medium simple, and two somewhat longer penicillate setae (Chevreux 1913 described four ciliate [*sic*] setae), produced dorsal apex bearing two medium setae; peduncular article 2 short, about 0.6 times as long as peduncular article 1, ventrally with distal cycle of 10 setae: four long and three medium subfacial setae, and three long marginal setae, dorsally with two apical and four subapical setae, and medially with three apical setae. Primary flagellum with 11 articles, about 0.85 times as long as peduncle, without *aesthetascs*; accessory flagellum with eight articles; both flagella bearing dorsal and ventral short setae in all articles.

Antenna 2 (Fig. 1B) not ensiform. Peduncular article 3 with two setules; peduncular article 4 much wider than peduncle article 5, dorsal margin with two proximal setae, three distal setae: two simple and one penicillate, and medial notch bearing four setae, ventral margin with about six groups of two to three medium to long setae (some penicillate), four very long ventrodistal setae, and one ventrodistal long robust seta placed subfacially; facial robust setae formula = 3-5-1; peduncular article 5, 0.72 times as long as peduncular article 4, facial robust setae formula = 3-2, dorsal margin

bearing four thin and short setae medially, and three short setae (one penicillate) distally, ventral margin with three notches, each with a short seta (one penicillate), ventrodistal corner bearing three long setae and two somewhat shorter subfacial setae. Flagellum about 0.95 times as long as articles 4 and 5 combined, with 11 articles bearing dorsal and ventral short setae.

Mandibles (Fig. 1C, D), right incisor broad, with three teeth, middle tooth largest; left incisor broad with two teeth on the ends and undulations on the middle; right *lacinia mobilis* bifid, flabellate, proximal branch simple, much longer than the distal, middle part minutely denticulate; left *lacinia mobilis* with four teeth, middle teeth rounded; right rakers six (Chevreux 1913 described them as five spines), left rakers seven; molars composed of bulbous protrusions, not triturative, bearing three robust setae, one of them larger and weakly serrate; palp opposite to molar with weak palpar hump, article 1 short, naked, article 2 elongate, about 7 times as long as wide, bearing eight short to medium facial setae (these setae appear as inner in Chevreux 1913 drawing), article 3 about 0.7 times as long as article 2, with two basofacial setae, apex feebly oblique (better observed and drawn by Chevreux 1913) with six medium to long slender setae.

Maxilla 1 (Fig. 2A), inner plate large, broad, bearing two medium apicolateral plumose setae, two apical simple setae (one short and one medium), and one short facial simple seta (Chevreux 1913 described four ciliate [*sic*] setae); outer plate with 11 robust setae, the three distal most ones specially thick and large, four long and thinner, and four medium, thinner and bidentate; palp biarticulate (not drawn in Chevreux 1913, see Discussion), longer than outer plate, article 2 with three apical setae, five medial setae and five submarginal setae.

Maxilla 2 (Fig. 2B), inner plate shorter than outer plate, both subequally broad and setose; outer plate with five apicolateral medium simple setae; inner plate medial margin with a row of three long plumose setae and four medium plumose setae.

Maxilliped (Fig. 2C), inner plate short, rectangular, with two thick apical robust setae, five medium to long apicofacial plumose setae and nine medium setae: six plumose and three simple; outer plate

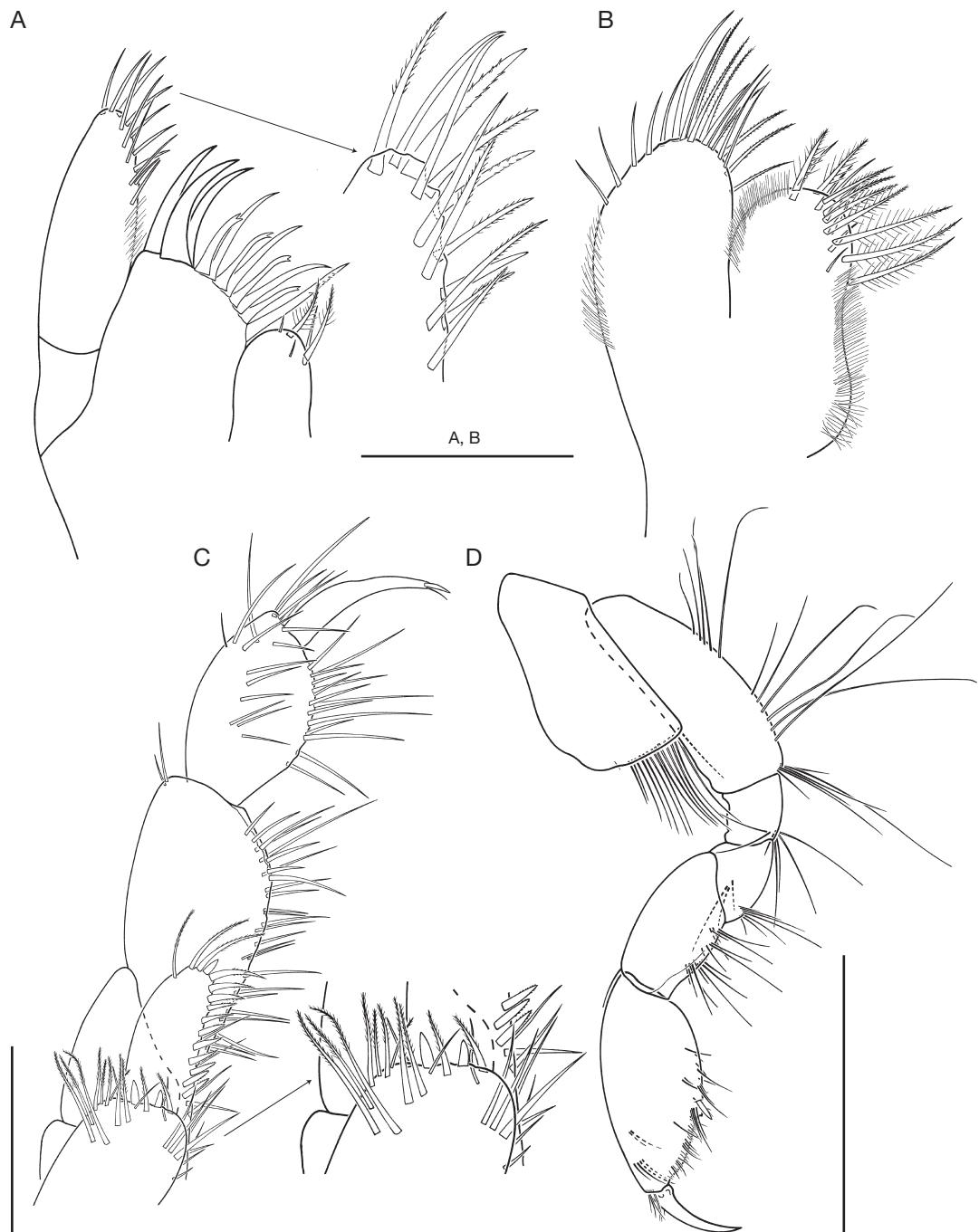


FIG. 2. — *Fuegiphoxus uncinatus* (Chevreux, 1912), holotype ovigerous female (MNHN-Am7551): **A**, maxilla 1; **B**, maxilla 2; **C**, maxilliped; **D**, gnathopod 1. Scale bars: A, B, 0.2 mm; C, 0.3 mm; D, 1 mm.

small, subtriangular, scarcely overlapping article 1, with 11 medial robust setae slightly serrate, and four apical setae: three long and serrate, and one thick and short; palp 4-articulate, stout, article 1 naked; article 2 strong, 1.6 times longer than article 3, with two apicolateral medium setae and medial margin strongly setose; article 3 suboval, 1.45 times longer than broad, with two subapicolateral setae, four medium to long apical setae, nine medium facial setae, and medial margin very setose; article 4 thin, slightly longer than article 3, with medium apical nail bearing one inner setule.

Coxae 1-3 (Figs 2D; 3A, B) subrectangular, moderately expanded distally, anterior margin slightly convex, posterior straight. Main ventral setae of coxae 1-4 = 14-13-11-14; ventral margin almost straight, anteroventral margin with weak notch bearing one very short setule. Coxa 4 (Fig. 3C) large, subquadrate, anterior and posterior margins almost parallel, anterior margin slightly convex, posterior margin almost straight, posterodorsal corner very rounded, posterodorsal margin short, excavate; width/length ratio 100:115.

Gnathopods 1 and 2 (Figs 2D; 3A) of moderate size, dissimilar; gnathopod 2 slightly larger than 1. Coxa 1, 1.8 times longer than wide; coxa 2 twice longer than wide. Gnathopods 1 and 2, basis elongate, longer than broad, with 11 long posterior setae each, zero-three short posterior setae, and with a tuft of medium to long simple setae on posterodistal angles; merus subtriangular with posterodistal setae; width ratios of merus-carpus-propodus = 21:25:32 and 23:25:39, length ratios = 22:42:65 and 23:29:68. Gnathopod 1 (Fig. 2D) carpus free, elongate, subrectangular, posterior margin slightly convex. Gnathopod 2 (Fig. 3A) carpus short, subquadrate, subcryptic, posterior margin shorter than anterior margin, almost straight. Gnathopods 1 and 2, propodus ovatorectangular, naked anteriorly, and with small setae posteriorly; palms strongly oblique, palmar humps large (principally in gnathopod 2), with one robust seta each.

Pereopods 3 and 4 (Fig. 3B, C) similar in shape, except by coxae, pereopod 4 slightly stouter than 3; basis with 14 and 11 long posterior setae respectively and a tuft of medium to long simple setae on posterodistal angles; merus very stout with an-

terodistal lobe somewhat produced over following article; propodus thinner than carpus; facial seta on merus five and five, on carpus five and two; main spine of carpus extending along 55% and 56% of propodus; carpus without proximoposterior robust seta; propodus robust setal formula = 4+5 and 4+5, some setae especially long; length ratios of merus, carpus and propodus 58:30:44 and 65:30:46; dactylus 0.5 times longer than propodus, acclivities on inner margin not observed, anterior margins with midfacial small plumose setule.

Pereopod 6 not seen (it was described by Chevreux 1913, see below).

Coxae 5 and 7, posteroventral margins naked. Pereopods 5 and 7 (Fig. 3D; 4A) width ratios of basis, merus, carpus and propodus of pereopod 5 = 63:34:30:14, of pereopod 7 = 125:22:20:11; length ratios of pereopod 5 = 95:35:41:45, of pereopod 7 = 145:22:32:42. Pereopod 5 (Fig. 3D), basis subrectangular, facially naked, with long ridge, anterior margin expanded, strongly convex, posterior margin slightly concave, crenellate; merus almost facially naked; carpus bearing very sparse facial robust setae rows; dactylus without acclivity. Pereopod 7 (Fig. 4A), basis strongly expanded posteroventrally, almost reaching apex of carpus, facially naked, with long ridge, posterior margin with about nine serrations; comb and digital processes of medial apex of propodus could not be observed. Pereopods 5 and 7, dactylus slender, 0.6 times and 0.7 times as long as propodus respectively, without acclivities, facial plumose setule (not observed in pereopod 5) placed proximally.

Gills, oostegites, pleopods and epimera were not found mounted on the slides.

Uropods 1 and 2 (Fig. 4B, C), rami with fused immersed apical nail, inner ramus shorter than outer. Comb on apicolateral corners of peduncles not observed.

Uropod 1 (Fig. 4B), peduncle elongate, about 2.8 times longer than broad, bearing seven dorsolateral slender to wider robust setae, three apicolateral shorter robust setae, and seven basofacial to ventral slender setae; rami shorter than peduncle, inner ramus bearing one dorsomedial robust seta, outer ramus with three dorsomedial robust setae.

Uropod 2 (Fig. 4C), peduncle stout, 2.4 times longer than broad, with 11 dorsolateral robust setae

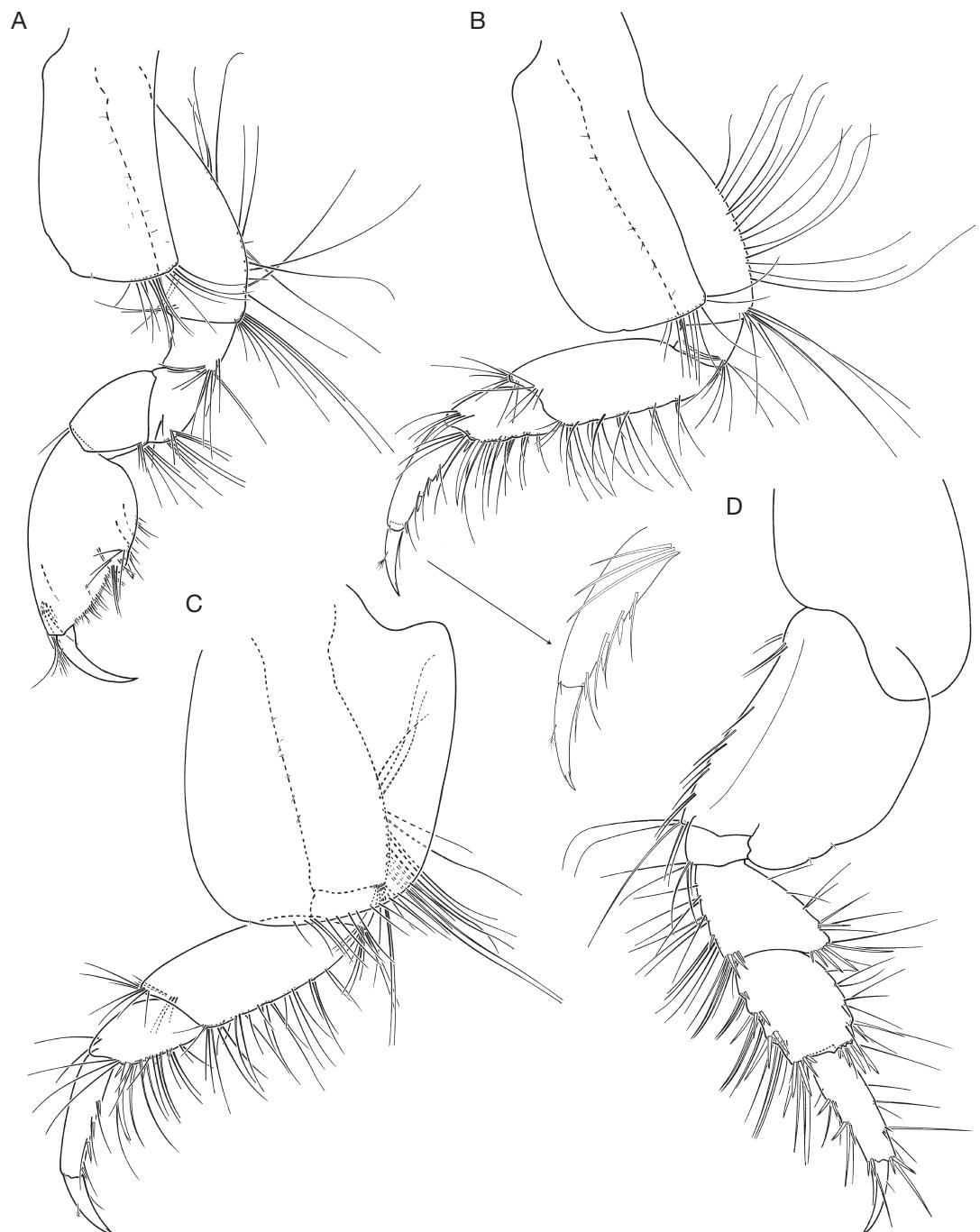


FIG. 3. — *Fuegiphoxus uncinatus* (Chevreux, 1912), holotype ovigerous female (MNHN-Am7551): **A**, gnathopod 2; **B**, pereopod 3; **C**, pereopod 4; **D**, pereopod 5. Scale bar: 1 mm.

(Chevreux 1913 described 14 setae), the three proximal ones the longest, and one subapicolateral robust seta; rami shorter than peduncle, outer ramus with two dorsomedial robust setae, inner ramus naked.

Uropod 3 (Fig. 4D), peduncle 1.2 times longer than broad, bearing seven ventral robust setae, one subapical medial robust seta, and dorsally with one shorter seta. Rami unequal in length; inner ramus extending 98% on article 1 of outer ramus, apex carrying two long plumose setae, lateral and medial margins with six (three broken) and four (one broken) plumose setae respectively; outer ramus, medial margin with seven plumose setae (some broken), lateral margin with four acclivities, setal formula = 1-1-1-2-2, article 2 of outer ramus short, 10% of article 1, bearing two apical medium plumose setae.

Telson (Fig. 4E) large, 1.2 times longer than broad, cleft 72% of total length, each apex wide, rounded, subtruncate, acclivities shallow, with three apical robust setae of different length, and one slender plumose seta (only seen on right apex); each lobe bearing two midlateral plumose setules of different length (on left side only seen one setule).

MORPHOLOGICAL CHARACTERS DESCRIBED BY CHEVREUX

The following morphological characters could not be observed on the type material deposited in the MNHN, although they were described by Chevreux (1912, 1913).

Ovigerous female, 6 mm length, body laterally strongly compressed. Head slightly longer than the three first segments of pereon. Rostrum unconstricted, extending beyond the middle of peduncular article 2 of antenna 1. Eyes large, reniform, with many ocelli. Antenna 1 somewhat longer than head. Antenna 2 a little longer than antenna 1. Mandibular palp thin and long, twice as long as mandible. Maxilla 1, palp with a strong thickening near the base, not clearly distinguished, suggests two articles (see Discussion). Maxilla 2, inner plate with a row of 10 setae in medial margin. Coxae 1-4 longer than the corresponding segments of the pereon. Pereopod 5, basis with posterior margin crenellate, posterior margin of carpus with five distal plumose setae. Pereopod 6 longer than pereopods 3-5 and 7,

basis longer than wide, posterior margin smooth, anterior margin with long setae, some of them plumose; ischium bearing plumose setae; merus and carpus less stout than those of preceding pereopods; propodus subequal in length to carpus. Epimeron 3, posteroventral corner with a moderate acute hook, ventral margin with four setae.

REMARKS

Barnard & Barnard (1980) had pointed out that some character states of *Fuegiphoxus uncinatus* needed to be confirmed. We were able to observe and describe the following morphological characters: antenna 2 peduncular article 4 facial robust setae formula = 3-5-1; right *lacinia mobilis* bifid, flabellate, left *lacinia mobilis* with four teeth; mandibular palp, article 2 elongate, bearing eight short to medium facial setae, article 3 about 0.7 times as long as article 2, with two basofacial setae, apex feebly oblique with six slender setae; maxilliped, inner plate with two thick apical robust setae, five medium to long apicofacial plumose setae and nine medial setae, outer plate with 11 medial robust setae slightly serrate, and four apical setae, article 4 of palp thin, with medium apical nail, bearing one inner setule; uropods 1 and 2, peduncles bearing three apicolateral robust setae and one subapicolateral robust seta respectively, both inner and outer rami with fused immersed apical nails.

Unfortunately, the setal formulas of epimera 1 and 2, and urosomite 1, that Barnard & Barnard (1980) also recommended checking, were not possible to observe on the dissected type material (see Discussion).

Fuegiphoxus uncinatus is easily distinguished from the other species of the genus by the shape of epimeron 3 with a slight acute hook on the posteroventral corner (see Chevreux 1913); the facial robust setae formula on article 4 of second antenna = 3-5-1; the mandible left incisor broad with two teeth on the ends and undulations on the middle; the inner plate on maxilliped with two thick apical robust setae; the pereopod 7 with basis strongly expanded posteroventrally, almost reaching apex of carpus, and with the dactylus slender 0.7 times as long as propodus; and the telson bearing three apical robust setae of different length.

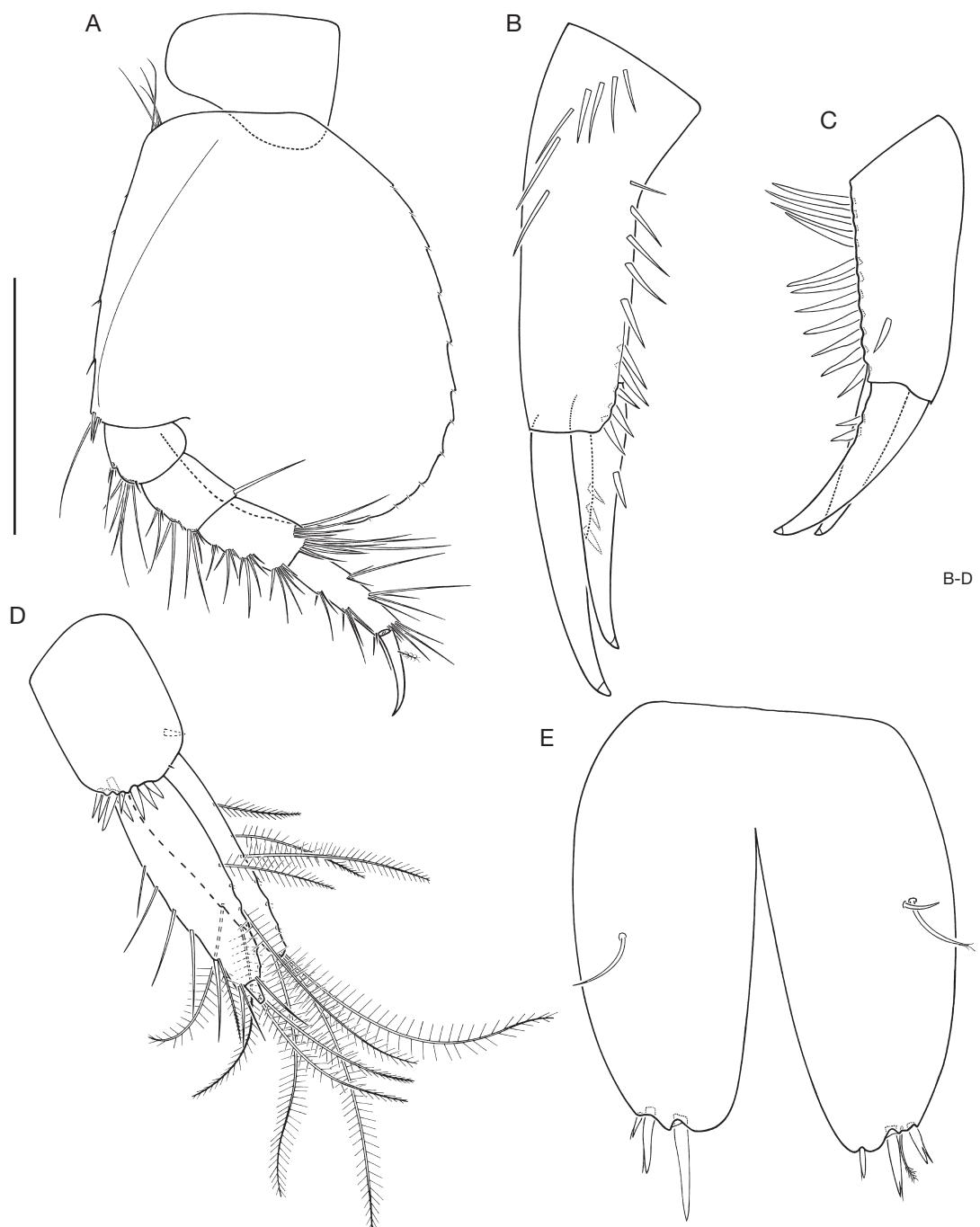


FIG. 4. — *Fuegiphoxus uncinatus* (Chevreux, 1912), holotype ovigerous female (MNHN-Am7551): **A**, pereopod 7; **B**, uropod 1; **C**, uropod 2; **D**, uropod 3; **E**, telson. Scale bars: A, 1 mm; B-D, 0.5 mm; E, 0.2 mm.

In addition, *Fuegiphoxus uncinatus* differs from both *F. fuegiensis* and *F. inutilis* in: flagellum of antenna 1 without aesthetascs, mandible palp article 1 short, and epimeron 3 ventral margin bearing four setae.

The absence of the male in the *Fuegiphoxus uncinatus* material makes difficult the comparison with *F. abjectus*, which is only known from a male;

however, some features present in *F. abjectus* are very different from those observed in *F. uncinatus*, such as the small, diffuse or absent eyes, the specially setose propodus of pereopods 3 and 4, the epimeron 3 subquadrate posteroventrally, the somewhat larger gnathopod 2, and the elongate carpus of gnathopod 2.

KEY TO THE SPECIES OF *FUEGIPHOXUS* (EMEND. AFTER BARNARD & BARNARD 1980)

1. Epimeron 3 posterolateral corner with moderate acute hook; pereopod 7, basis almost reaching apex of carpus; maxilliped, inner plate with two thick apical robust setae *F. uncinatus*
- Epimeron 3 posterolateral corner rounded or broadly quadrate; pereopod 7, basis not reaching apex of carpus; maxilliped, inner plate with one thick apical robust seta 2
2. Gnathopod 2, carpus elongate, subequal in length to propodus *F. abjectus* (only male known)
- Gnathopod 2, carpus short, less than half propodus length 3
3. Epimera 1-2 with small posterolateral tooth; facial setal formula on article 4 of antenna 2 = 4-4-1; urosome small; uropod 3 short *F. inutilis*
- Epimera 1-2 rounded posterolaterally; facial setal formula on article 4 of antenna 2 = 3-3-2; urosome large; uropod 3 elongate *F. fuegiensis*

DISCUSSION

In the present paper, *Fuegiphoxus uncinatus* (Chevreux, 1912) is redescribed based on the holotype and its belonging to *Fuegiphoxus* is confirmed.

The descriptions and illustrations of *F. uncinatus* given by Chevreux (1912, 1913) were adequate for those times. However, given the number of new species discoveries and the many taxonomic revisions published since, a redescription with more details was needed for a correct assignation to this genus within the family Phoxocephalidae.

Some morphological characters are redescribed in a different manner herein compared with the descriptions carried out by Chevreux (1912, 1913), i.e. the two plumose setae on maxilla 1 inner plate, instead of the four "ciliate" setae described originally. These differences could be a consequence of the bad condition of part of the material. However, none of these character states is crucial to allocate the species in *Fuegiphoxus*.

In his description of *F. uncinatus*, Chevreux (1913) mentioned that the palp of maxilla 1 has a strong

thickening near the base which suggested the presence of two articles, although finally he described the palp as not biarticulate. The revision of the type material allowed the observation of a clear division of the palp into two articles.

The pereopod 6 was not figured because it was not found on the slides. Chevreux (1913) described it, but it was not illustrated. The original description does not mention notorious features different from the other co-generic species.

The four species of *Fuegiphoxus* can be easily separated by the shape of epimera and the setal formula of antenna 2 peduncular article 4. However, many of the morphological features that distinguish each of the four species of *Fuegiphoxus* are a combination of characters, therefore it is not clearly evident which species is more related to the other. Additionally, in almost all the species the male and female together are not known. Only in *F. fuegiensis*, where both sexes were found, some dimorphic characters have been described such as male with eyes large, antenna 2 longer and uropod 3 with both rami very setose (Barnard & Barnard 1980). As a con-

sequence, there is not much knowledge about the sexual dimorphism in *Fuegiphoxus* to allow a better comparison among the species.

Barnard & Barnard (1980) assigned provisionally the species *Paraphoxus uncinata* to the genus *Fuegiphoxus* and proposed the examination of some features to be verified. We could confirm the states of the most part of these characters, although the absence of the entire holotype did not allow a detailed observation of the general aspect of the body, the shape and setal formula of epimera 1-2, and the setation of urosomite 1 (Chevreux 1913 illustrated the general aspect of the specimen omitting the details of the last two characters). However, the lack of description of these features does not preclude the assignment of *F. uncinatus* to the genus *Fuegiphoxus*.

The genera *Wildus* and *Elpeddo* were compared with *Fuegiphoxus* by Barnard & Barnard (1980). Previously to its designation as the type species of *Fuegiphoxus*, *Paraphoxus fuegiensis* was considered provisionally into the genus *Wildus* by Barnard & Drummond (1978). However, the strong differences between *Fuegiphoxus* and *Wildus* (see Barnard & Barnard 1980) make this comparison inadequate.

The genus *Elpeddo* is actually monotypic and it was erected by Barnard & Drummond (1978). Barnard & Barnard (1980) pointed out that *Fuegiphoxus abjectus*, with a unique male specimen described, was similar to *Elpeddo kaikai* in the atypical antenna 1 with articles 2 and 3 wide. Barnard & Drummond (1978) considered the male of *E. kaikai* as a specimen possibly aberrant. Moreover, while the antenna of both males are similar and atypical, the flagellum article 1 of antenna 1 in *E. kaikai* has rows of long *aesthetascs*, a feature absent in *F. abjectus* and in the other species of *Fuegiphoxus*. Therefore, we consider the comparison between both genera inadequate.

Fuegiphoxus was compared with *Eyakia* and *Linca* by Barnard & Barnard (1980) and Alonso de Pina (1993), respectively. According to the diagnosis given by Barnard & Barnard (1980) and Barnard & Karaman (1991), *Fuegiphoxus* differs clearly in its combination of characters from its more related genera. However, one of the characters redescribed in *F. uncinatus*, and added to the diagnosis of *Fue-*

giphoxus, the inner plate of maxilliped with two thick apical robust setae, is also present in *Eyakia* and *Linca*. Nevertheless, *Eyakia* and *Linca* have an elongate article 2 of antenna 1, while *F. uncinatus* has this article short; this morphological character is distinct enough in Phoxocephalidae genera, to transfer *F. uncinatus* to *Eyakia* or *Linca*.

Although in the Barnard & Karaman (1991) Phoxocephalidae key the species *Fuegiphoxus uncinatus* fits very well into the genus *Fuegiphoxus*, some features herein redescribed disagree from the diagnoses of *Fuegiphoxus* given by Barnard & Barnard (1980) and Barnard & Karaman (1991); thus the inner plate of maxilliped bears two thick apical robust setae (instead of one), the carpus of gnathopod 2 is subcryptic (instead of cryptic) and the telson has three apical robust setae (instead of two). We consider that these morphological characters are not strong enough to move *F. uncinatus* to another phoxocephalid genus or to erect a new one.

Fuegiphoxus uncinatus is an example of an increasing number of new species of Phoxocephalidae that do not comply totally with the original diagnoses of the genera (Alonso de Pina 2001; Taylor 2006). Approximately, half of all phoxocephalid genera are monotypic, and a preliminary cladistic analysis did not support the monophyly and highlights the incongruity between the phylogenetic results and the current generic level classification (Taylor & Poore 2001; Taylor 2006). Therefore, in order to prevent further taxonomic inconsistency, we consider proper to confirm the allocation of *F. uncinatus* into *Fuegiphoxus*, and expand its generic diagnosis.

The genus *Fuegiphoxus* is widely distributed in the Southern Ocean. *Fuegiphoxus abjectus* is known exclusively from Inútil Bay (southern Magellan region). *Fuegiphoxus inutilis* is present in South Georgia Island. *Fuegiphoxus fuegiensis* is known from Tristan da Cunha, many localities of the Magellan region (Argentine and Chilean sectors), Drake Passage, South Georgia Island and South Shetland Island. *Fuegiphoxus uncinatus*, collected originally from Palmer Archipelago, was then recorded from South Shetland Island, the Magellan region (Chilean sector), and the West Antarctic province (Weddell Sea) (Alonso de Pina *et al.* 2008). Moreover, the four species of *Fuegiphoxus* were cited from an

important diversity of substrates and have a wide bathymetric distribution. *Fuegiphoxus fuegiensis* is the phoxocephalid with the most bathymetric amplitude in the Southern Ocean (0 to 1031 m), and *F. uncinatus* is distributed between 30 and 628 m deep. In addition, although the endemicity of Phoxocephalidae at generic level is low, *Fuegiphoxus* is one of the four genera from this family endemic to the Southern Ocean (Alonso de Pina et al. 2008).

Linca is recorded from the Magellan region, while the other genera compared with *Fuegiphoxus* are distributed far away from the Southern Ocean; thus *Paraphoxus* is known from north Atlantic and north Pacific, while *Eyakia* is known from the cold north Pacific (Barnard & Karaman 1991). At present, there is no support to relate these genera neither cladistically, nor by their geographic distributions.

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