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## REDESCRIPTION OF *ARCTURIDES CORNUTUS* STUDER, 1882 FROM THE CROZET ISLANDS AND PRINCE EDWARD ISLAND (CRUSTACEA, ISOPODA, VALVIFERA)

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Key words: Crustacea, Valvifera, Pseudidotheinae, polymorphism.

### ABSTRACT

A redescription of the polymorphic arcturid species *Arcturides cornutus* from the Crozet Islands and Prince Edward Island is presented. The polymorphism of specimens from various regions and the systematic position of Pseudidotheinae, to which *Arcturides cornutus* belongs, are discussed.

### INTRODUCTION

The genus *Arcturides* Studer, 1882, is one of the two genera of the primitive subfamily Pseudidotheinae that has an intermediate position between the Idoteidae and the filter-feeding Arcturinae (Ohlin, 1901; Sheppard, 1957; Wägele, 1989). According to Kensley (1980), who studied new material from Kerguelen, Marion Island and Prince Edward Island and compared it with Sheppard's type material, specimens of the genus *Arcturides* show a remarkable morphological variation, which led other authors to the distinction of three independent species: *A. cornutus* Studer, 1884, *A. tribulus* Hale, 1946, *A. acuminatus* Sheppard, 1957. Until now descriptions of this phylogenetically important taxon have been rather incomplete. In this paper a redescription of specimens of *A. cornutus* from the Crozet Islands and Prince Edward Island, collected in 1976 and 1982, is presented and the polymorphism and the systematic position of Pseudidotheinae within the Valvifera, e.g. between the Idoteidae and the Arcturinae, are discussed.

### TAXONOMY

*Arcturides cornutus* Studer, 1882

Synonyms.- *Arcturides cornutus* Studer, 1882: 57; 1884: 15-17, pl. 1(fig.4); 1889: 159, pl. 25 (fig.2). Beddard, 1886: 108-109.

Ohlin, 1901: 275. Nordenstam, 1933: 113. Nierstrasz, 1941: 262. Kensley, 1980: 164-166, fig. 3. Kussakin & Vasina, 1982: 315. *Arcturides tribulus* Hale, 1946: 168, figs 3-4. Kussakin, 1967: 269. Carvacho, 1977: 178. *Arcturides acuminatus* Sheppard, 1957: 180-182, figs 17-18. Kussakin, 1967: 337. Kussakin & Vasina, 1982: 315.

Material.- 1 female: 12.4 mm, 1 male: 14.8 mm, from the Prince Edward Island, 46°40,7'S, 38°06,7'E, 315-570 m; 2 males from the various regions of the Crozet Islands, 46°22,4'S, 51°54,3'E, 150-160 m; 46°32,8'S, 50°20,0'E, 275 m; 46°26,6'S, 50°22,0'E, 125-135 m; all specimens from "Marion-Dufresne" expeditions (MD 08 1976 and MD 30 1982).

Distribution.- Indopacific subantarctic species. 47°18'5"S, 64°51'7"E, 207 m, Kerguelen, collected by S.M.S. "Gazelle" 1884-76 (Studer, 1884); 46°41'S, 38°10'E, 550 m, volcanic sand, collected by H.M.S. "Challenger" (Beddard, 1886); 49°28'S, 70°33'E, off the entrance of Royal Sound, Kerguelen, 91 m, collected by B.A.N.Z. Antarctic Research Expedition (Hale, 1946); off Prince Edward Island, 46°36,5'-46°54,8'S, 37°53,8'-38°02,3'E, 113 m, collected by the Discovery Investigation 1925-36 (Sheppard, 1957); Kerguelen Islands: 145-203 m, Crozet islands: 143-178 m, Lena Bank: 295-332 m, collected by the Soviet Antarctic Expeditions 1970-75 (Kussakin & Vasina, 1982).

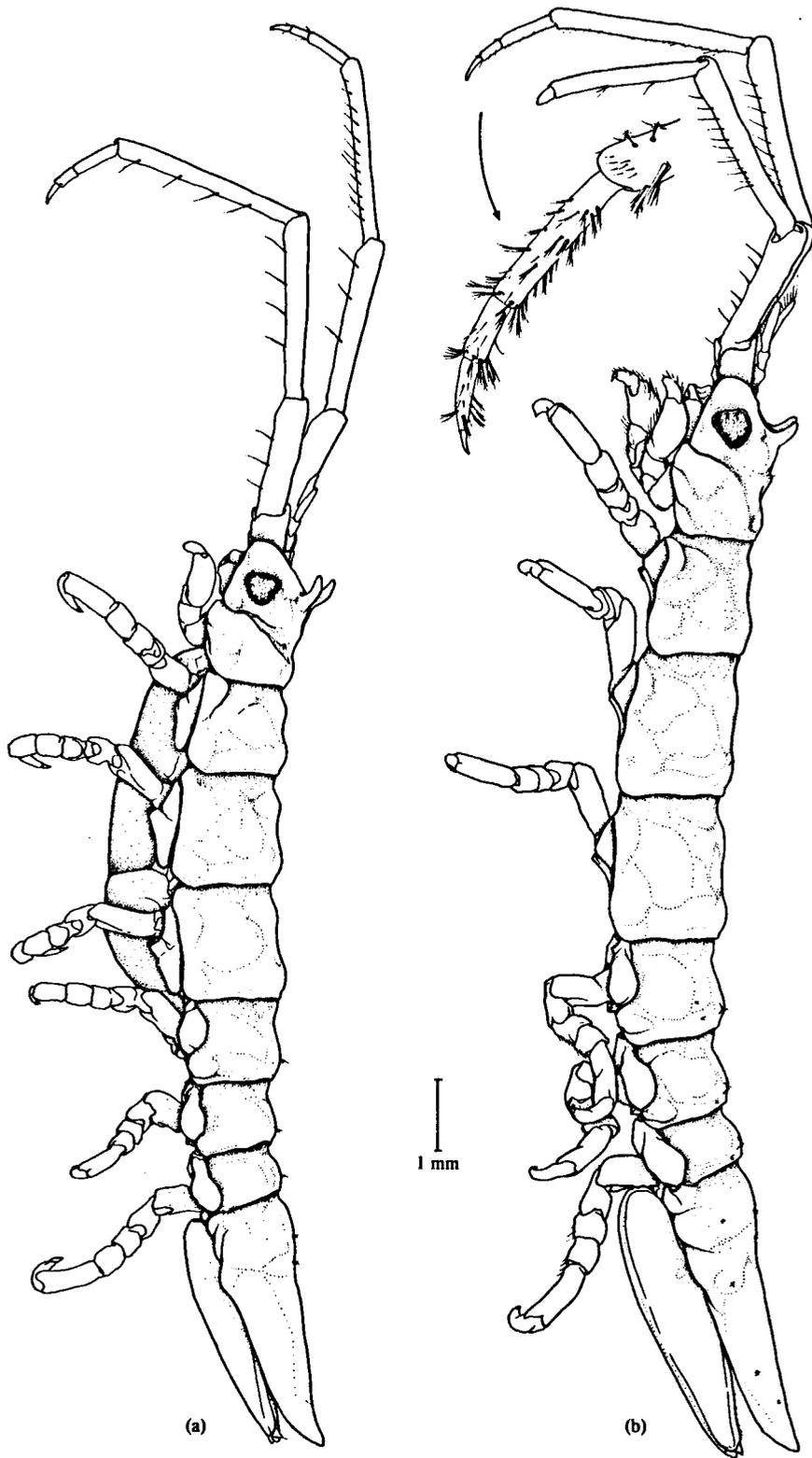


Fig. 1. *Arcturides comutus* Studer, 1882 from Prince Edward Island: lateral view, (a) female, 12.4 mm, (b) male, 14.8 mm.

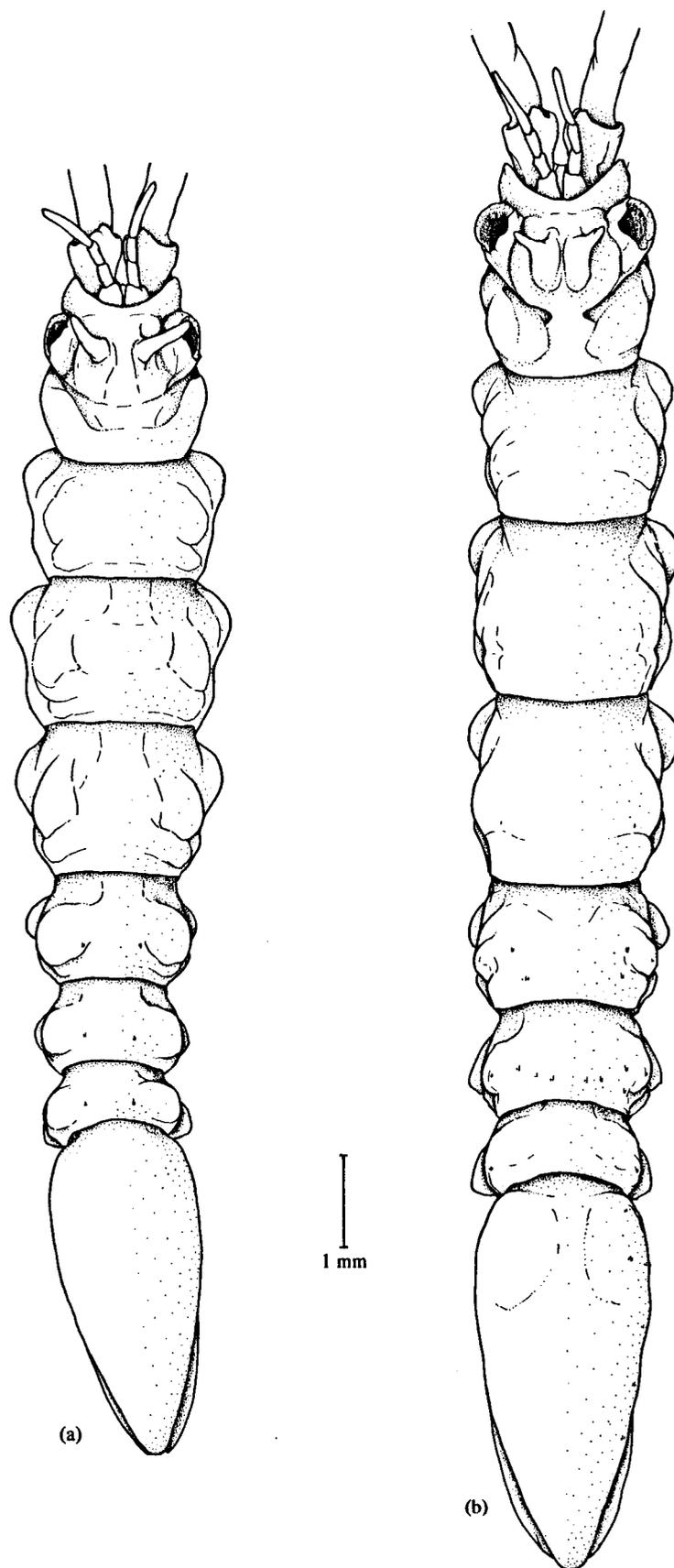


Fig. 2. *Arcturides cornutus* Studer, 1882 from Prince Edward Island: dorsal view, (a) female, 12.4 mm, (b) male, 14.8 mm.

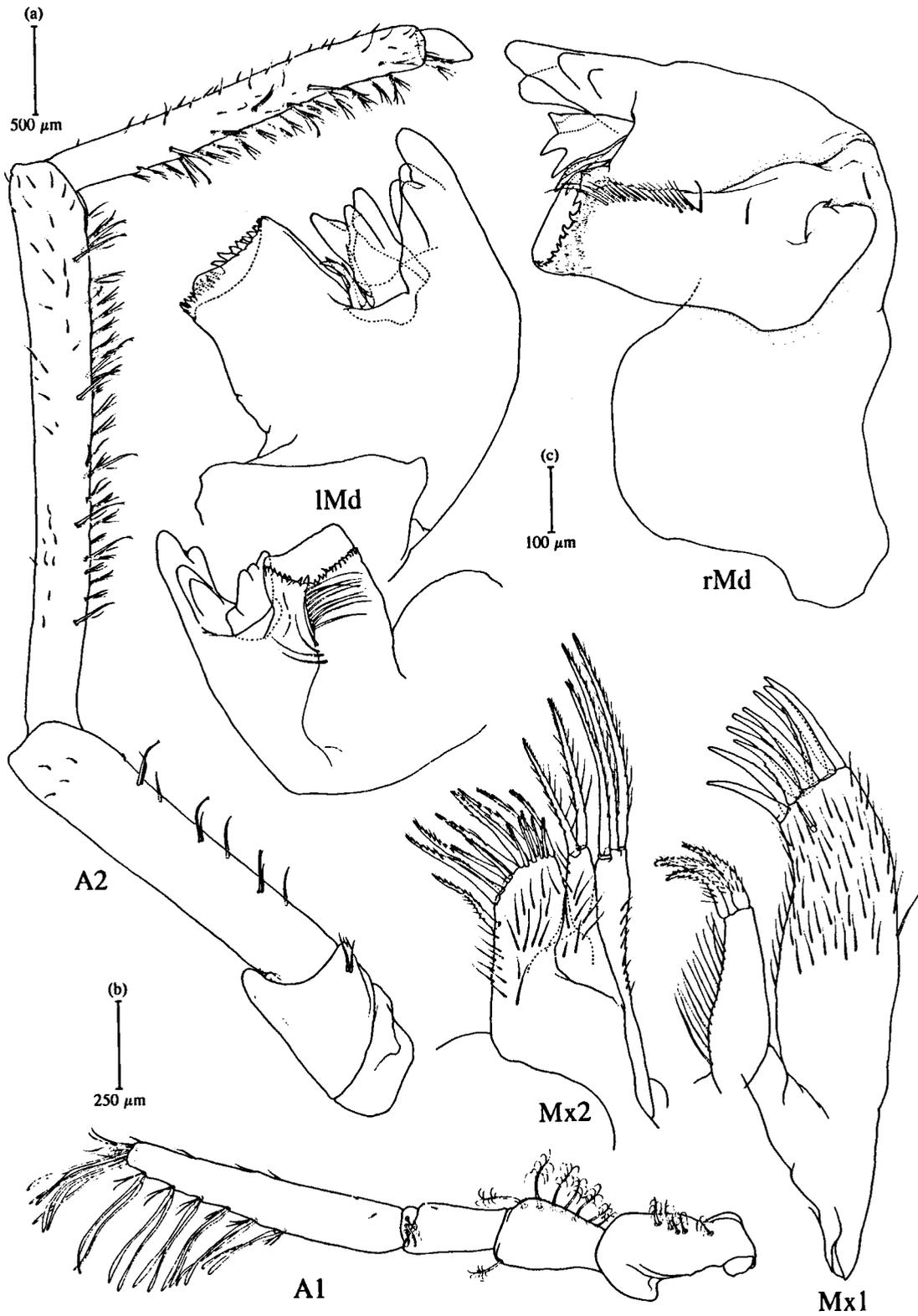


Fig. 3. *Arcturides comutus* Studer, 1882 from Prince Edward Island, male, 14.8 mm: (a) for A2; (b) for A1; (c) for IMd, rMd, Mx1 and Mx2.

## REDESCRIPTION

Body subcylindrical (Figs. 1, 2), anterolateral lobe of cephalothorax in lateral view rounded, in dorsal view anterolaterally pointed. Cephalothorax dorsally with a pair of bluntly pointed, large supraocular spines, directed frontolaterally. Eyes prominent, large, lateral. First pereonite fused with cephalothorax, but separated from it by a well-marked lateral groove. Pereonites increase in length and width slightly from the second to the fourth, fifth to seventh decreasing. Tergites with little serrated small tubercles on the dorsal surface of posterior pereonites and the pleotelson; tergites of the specimen from the Crozet Islands somewhat rougher than in Prince Edward specimens. Coxal plates distinctly separated on the second to seventh pereonites, on the fifth to seventh subconical in shape. Pleotelson more or less acute spindle-like, caudal tip rounded; pleotelson of the specimen from Crozet Islands acuter. No sutures of fused pleonites visible, but first to third pleonites discernible by lateral shallow grooves (Fig. 1).

Antennule (Fig. 3) with 3 subequal peduncular articles, surpassing the midst of third peduncular article of antenna; first article somewhat broader and longer than second, dorsally with 5 feather-like bristles; second somewhat broader than third, ventrally with 1 and dorsally with 7 feather-like bristles; first flagellar article very short, ring-shaped, medially with 3 feather-like bristles; second somewhat shorter than 3 peduncular articles together, with 18 aesthetascs in 6 groups on ventral side and distally in 3 groups, dorsodistally with 4 simple short setae and a feather-like bristle, on ventral side 2 simple short setae in each group of aesthetascs.

Antenna (Fig. 3) with 5 peduncular and 3 flagellar articles; first article very short, but of similar breadth as second; second twice as long as first; third shorter than fourth and fifth, ventrally with some pairs of groups of short setae (only one group of each pair shown in Fig. 3); fourth and fifth of similar size, dorsally with many fine setae, ventrally with 2 longitudinal rows of groups of apically bifid setae, between them a row of groups of simple setae. Flagellum shorter than third peduncular article; first flagellar article longer than second and third together, third shortest.

Mandibles (Fig. 3) asymmetrical, without palp. Pars incisiva of right mandible somewhat longer and narrower than left, with 4 blunt teeth; right lacinia mobilis smaller than pars incisiva, with 4 teeth, proximally 3 slender indented spines; pars molaris stout, broad and slightly concave grinding surface with dorsally indented margin; a row of long setae on proximal side, directed caudally. Pars incisiva of left mandible also with 4 teeth; left lacinia mobilis larger than right one, with 3 teeth, proximally 4 slender indented spines; pars molaris as right one.

Medial endite of maxillula (Fig. 3) bearing 3 strong setulated and medially directed bristles, the medial one somewhat smaller; lateral endite larger, with 10 strong, sparsely indented and medially curved spines.

Maxilla of 3 endites (Fig. 3); medial endite broader,

mediodistally with two rows of setae, dorsally 8 spine-like large setulated setae and ventrally 8 thin and sparsely setulated; middle endite apically with 2 and lateral endite with 3 setulated long setae, which usually are finely serrated on distal third, lateral setae longer than medial ones, all setae curved medially.

On mediiodorsal and apical margin of endite of maxillipede (Fig. 4) 7 short, spine-like and densely setulated setae, mediiodorsal ones longer than distal ones; no coupling hook. Epipodite oval, surpassing first palpal article; distolateral margin with some short setae, medial margin with fine hair-like setae (omitted in fig. 4) as on whole surface of epipodite. Palp of 5 articles, with dense brushes of setae bearing fine setules; third article largest, last smallest.

Pereiopod 1 (Fig. 4) somewhat shorter than the other pereiopods, with long basis, ischium half as long as basis, merus outer distal angle produced forwards to level of anterior margin of carpus; carpus short and small trapezoidal, broad-oval subchelate propodus; dactylus somewhat shorter than propodus, with a large strong apical and a short subapical claw, between them two short setae; dactylus and propodus densely setose on medial surface (Fig. 4), medial setae on propodus arranged in comb-like rows; all articles sparsely setose on medioventral margin.

Pereiopods 2-7 (Fig. 4) rather similar in structure. Length of basis showing minute length-differences, P4 longest; pereiopod 4 longest of the anterior pereiopods (2-4), pereiopod 7 of the posterior ones (5-7); except basis homologous articles on all pereiopods of similar size; dactylus with a large apical and a short spine-like subapical claw, between them two simple setae; propodus of pereiopod 2 and 3 with relatively short simple setae in two rows, in the middle of them a row of serrated short setae, while that of the other pereiopods (4-7) medially only with a row of serrated short setae, and dorsodistally with a feather-like bristle; carpus of all pereiopods dorsodistally on medial side with a feather-like bristle, medially with a tuft of short serrated setae, on pereiopod 2-3 on both sides a row of short simple setae as on propodus of pereiopod 2-3; merus medially with a tuft of short serrated setae along the distal margin in semicircle, carpus and merus of similar size; ischium somewhat longer and narrower than carpus and merus; basis dorsally with some feather-like bristles.

Pleopods (Fig. 5) hidden in respiratory chamber formed by pleotelson and uropods; pleopods 1 and 2 sexually dimorphic. Protopod of pleopod 1 in both sexes three times as long as of pleopod 2, medially 9 coupling setae with hooked tips in male and 6 in female, laterally with a row of small spine-like scales; exopod in male voluminous and with a longitudinal groove (probably for sperm), which terminates on a narrow but prominent projection of distolateral edge, covered dorsally by a row of very short sparse setae, distally with a tuft of rather short plumose setae; endopod in male marginally with many long swimming-setae; exo- and endopod in female of the same size,

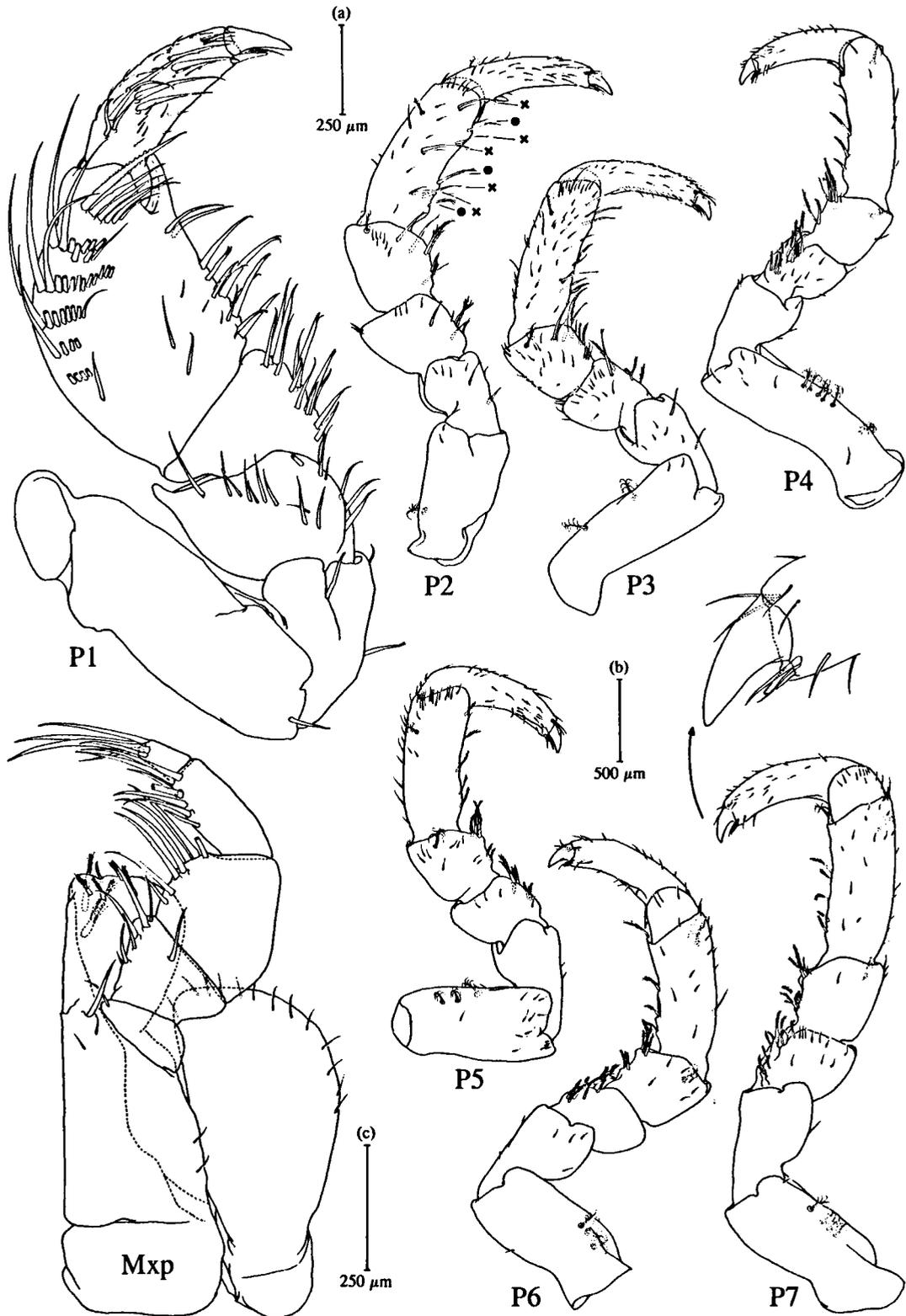


Fig. 4. *Arcturides cornutus* Studer, 1882 from Prince Edward Island, male, 14.8 mm: (a) for P1; (b) for P2-7; (c) for Mxp; P2: different symbols characterize the propodal setal rows with lateral setae (crosses) and the medial row of setae (filled circles).

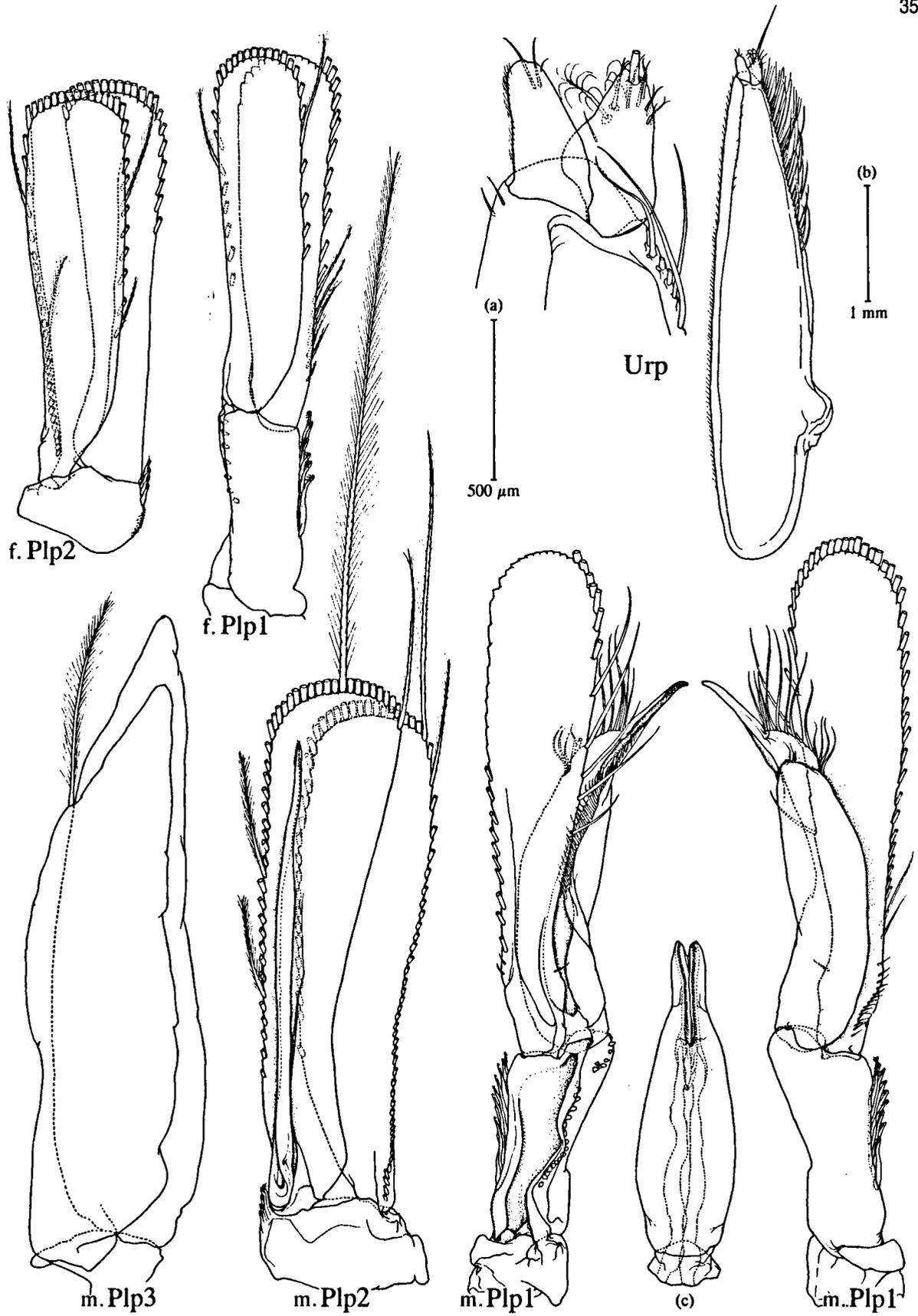


Fig. 5. *Arcturides cornutus* Studer, 1882 from Prince Edward Island, male, 14.8 mm: (a) for m.Plp1-3, f.Plp1-2 and (c) geni papillae; (b) for Urp.

marginally with many long swimming-setae. Protopod of pleopod 2 in both sexes short, medially 5 coupling setae with hooked tips in male, 4 in female; endo- and exopod in both sexes of similar size, marginally with many long swimming-setae; appendix masculina not longer than endopod in the form of a robust rod, distal end terminating in a curved pointed projection. Rami of pleopods 3-5 (Fig. 5) leaf-shaped; endopod somewhat longer than exopod; exopod of pleopod 3 apically with a single swimming-seta, endopod without setae.

Genital papillae of male (Fig. 5) forming single, elongated structure, fused basally, but cleft distally.

Uropod (Fig. 5) biramous; sympod with many long plumose setae on distolateral margin; rows of short fine setae longitudinally on medial margin; both rami of approximately similar size; the outer ventrally with two feather-like bristles and some simple short setae, apically tipped with a large long simple seta; the inner apically with some short setae, fine setae on medial margin.

#### DISCUSSION

According to Kensley (1980) specimens with the strong dorsal spination typical for *Arcturides tribulis* occur together with dorsally smooth specimens. Spination seems to be very variable and is not correlated with age, wherefore Kensley (1980) suggested the synonymy of *A. tribulis* Hale, 1946, *A. acuminatus* Sheppard, 1957 and *A. cornutus* Studer, 1882. There are no distinct phenotypical ranges of variability, furthermore the appendages and especially the first two male pleopods are very similar in all populations.

With the present redescription all appendages of specimens from the Prince Edward Island area are described (mouthparts illustrated also in Kensley 1980, appendages of material from Kerguelen in Hale 1946). Of phylogenetic interest is the intermediate morphology of *Arcturides cornutus* between the more archaic arcturids (Holidoteinae) and the filter-feeding Arcturinae (sensu Wägele 1989). The Holidoteinae still have an oval, dorsoventrally flattened body, but they already show important apomorphies of the Arcturidae (e.g. male pleopod 1 modified, pereopod 1 with medial combs of setae on propodus, enlarged sympod of pleopod 1, elongated and fused male genital papillae). These characters are also seen in *A. cornutus*, in addition to an elongated peduncle of antenna 2, an apomorphy absent in Holidoteinae and present in Arcturinae. The dense rows of filter-setae on pereopods 2 to 4, which are

a characteristic apomorphy for the Arcturinae, are absent in Holidoteinae and in *Arcturides* and *Pseudidothea* (only genera of the Pseudidotheinae Ohlin, 1901). It is interesting that the arrangement of the filter-setae of Arcturinae is already visible on pereopods of the Pseudidotheinae (e.g. Fig. 4: P2), but the setae are still short and do not form combs. Other primitive features in comparison with the Arcturinae are the similarity of the shapes of P2 to P7 and the relatively large size of pereopod 1. Furthermore it is remarkable that anterior coxal plates (pereonites 2 to 4) are still well separated from corresponding tergites in *Arcturides*. The circumpolar distribution of the more archaic Arcturidae indicates a southern origin of this taxon. The Xenarcturinae, Pseudidotheinae and Holidoteinae are probably relicts of a Gondwanian fauna, with a history similar to that of the Serolidae (see Wägele 1994).

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