

NATATOLANA PASTOREI (GIAMBIAGI, 1925)
(CRUSTACEA, ISOPODA, CIROLANIDAE) FROM THE
STRAITS OF MAGELLAN, SOUTH AMERICA:
REDESCRIPTION AND NOTES ON
FUNCTIONAL MORPHOLOGY

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Abstract. — Cirolanids caught with baited traps in the Straits of Magellan and identified as *Natanolana pastorei* (Giambiagi) are described. Observations on living specimens suggest that several features, such as the broadened merus of the anterior pereopods, the arrangement of spines and setae are adaptations to digging and respiration in sand.

Giambiagi (1925) described briefly from “San Sebastián, Tierra del Fuego,” south of the eastern entrance of the Straits of Magellan, a cirolanid named *Cirolana pastorei*. No other figures than those published by Giambiagi exist; they are not adequate to distinguish this species from the many similar cirolanids known today. Another cirolanid from the Straits of Magellan was mentioned by Pfeffer (1887) in a list of species collected during a German expedition to South Georgia (1882–1883). Of this *Cirolana magellanica* no illustrations or descriptions were ever published. The name was therefore listed as nomen nudum by Bruce (1986).

During an expedition to Antarctica (1985–1986) with R/V *Polarstern* a large number of cirolanids were caught in a baited trap in the Straits of Magellan. Most of these animals were kept in aquaria for bionomic studies. Later the same species was found in collections of the Zoologisches Museum Hamburg, in vials labelled “*Cirolana magellanica*, cf. types,” which possibly contain the specimens studied by Pfeffer (1887). Further material was kindly sent to the first author by Dr. Gruner from the Zoologisches Museum Berlin, also with the label “*Cirolana* cf. *magellanica*.”

The species clearly belongs to the genus

Natanolana Bruce, 1981 and is related to a group of large species, the *Natanolana valida* group, that have an exclusively southern hemisphere distribution (Bruce 1986). The species was compared to drawings of the types of *Natanolana rossi*, *N. hirtipes* and all subantarctic species and found to be distinct. The species here described is identical with the *Cirolana pastorei* of Giambiagi (1925); no differences from the original description or the type specimens could be found. The species is not identical with the *Cirolana pastorei* from South Georgia mentioned by Monod (1931).

Natanolana pastorei (Giambiagi)
Figs. 1–7

Cirolana pastorei Giambiagi, 1925:4–7, pl. 1, pl. 3, fig. 3, not *Cirolana pastorei* sensu Monod, 1931:22.

Cirolana magellanica Pfeffer, 1887:58, nomen nudum.—Bruce, 1986:218.

Material examined.—Male, length 33 mm, partly dissected, Magellan Straits, 52°17.49'S, 69°8.96'W, 35 m; 15 Nov 1984; four adult specimens, 27–36 mm, from the same locality, Zoological Museum Hamburg, K-33324. Further material: Zoological Museum Hamburg, K-19219, Magellan

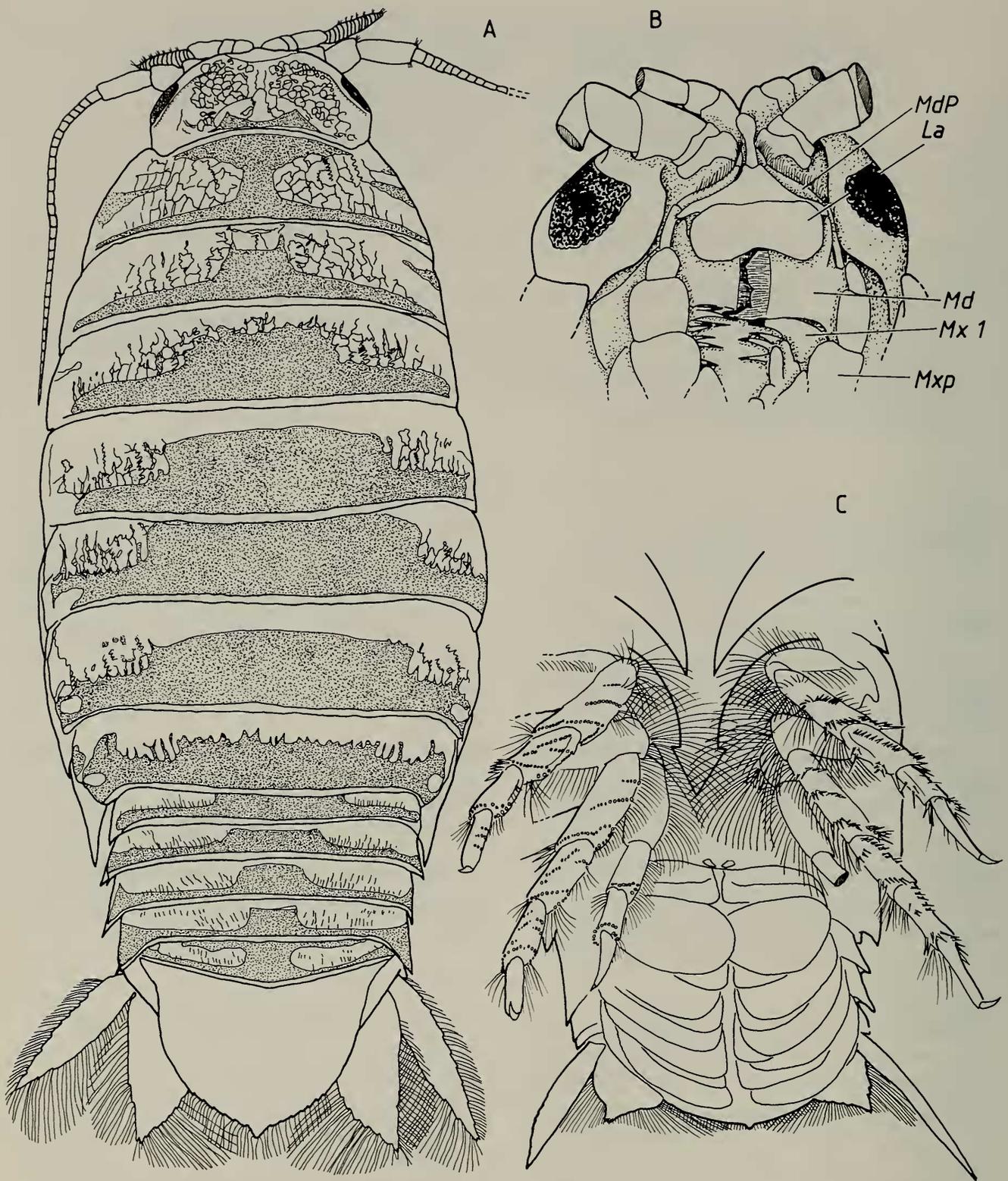


Fig. 1. *Natatolana pastorei*: A, Male in dorsal view; B, Ventral aspect of cephalothorax; C, Posterior segments, ventral. Arrow: respiratory current passing through filter of pereopods 5-7. Abbreviations.—A1, A2: antenna 1,2; La: labrum; Md: mandible; MdP: palp of Md; Mx1, Mx2: maxilla 1,2; Mxp: maxilliped; P1-7: pereopods 1-7; Plp1-5: pleopods 1-5; Tel: telson; Urp: uropod.

Straits, labelled "*Cirolana magellanica*, cf. types," leg. Kpt. R. Paessler 1886: 44 specimens, 13-29 mm, one male of 30.5 mm, no mature females; also included: 5 speci-

mens, 13-15 mm, leg. Prof. Carlos Grethe, Magellan Str., 19 Nov 1908; further material collected by Kpt. Paessler: K-23268 (about 52°20'S, 69°W), K-23287 (51°54'S,

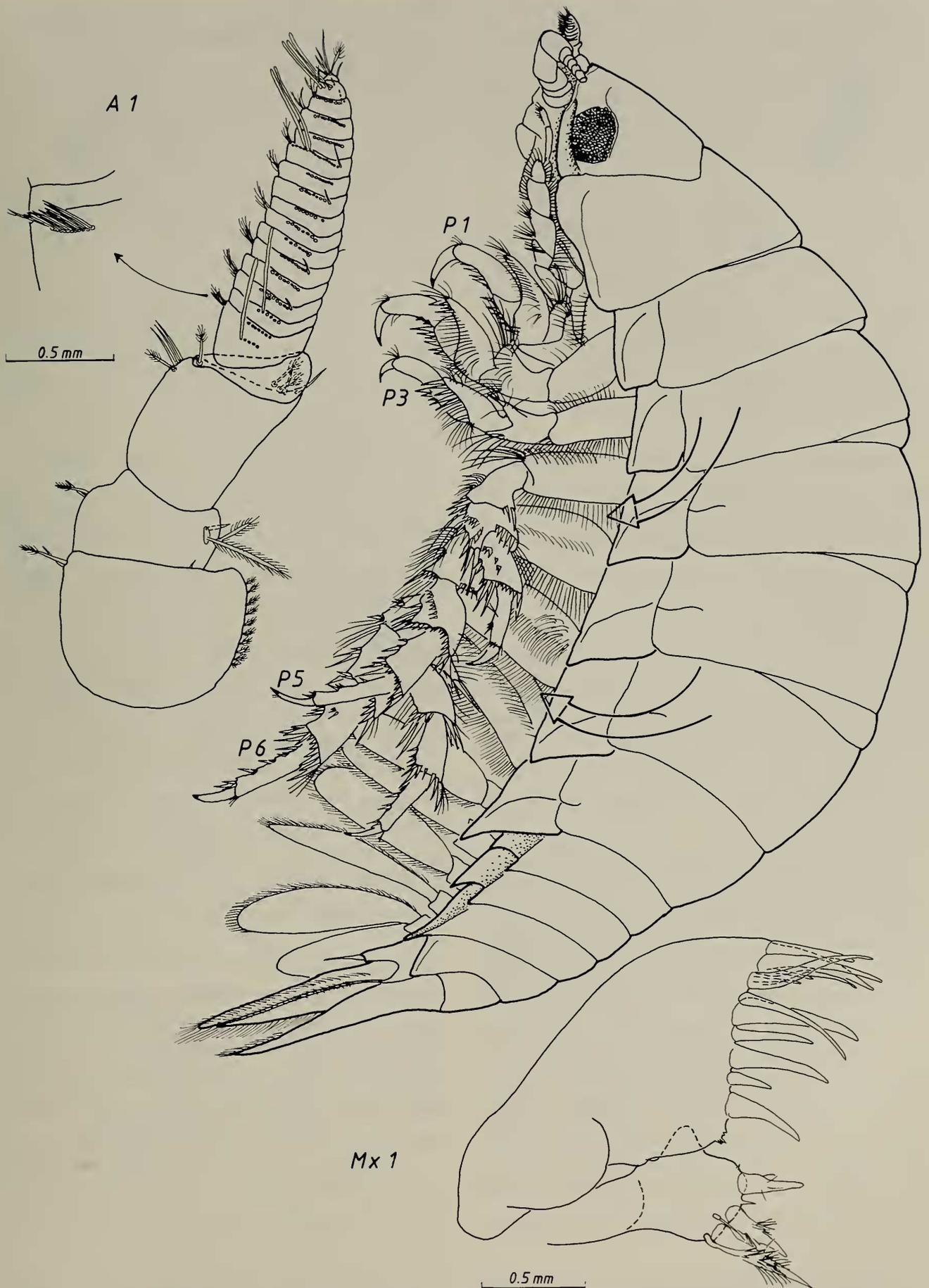


Fig. 2. *Natatolana pastorei*, male in lateral view; arrows: respiratory current passing through setal combs of basipodites, antennule with detail of flagellar setation. For abbreviations see Fig. 1.

73°42'W), K-23281 (about 47°S, Golfo de Penas), K-23278 (Hale Cove, Patagonia); with number K-23242 two samples are deposited: leg. Dr. Gassmann, Magellan Str., 1 Nov 1895, and leg. Umbach, off Punta Arenas, Chile (53°10'S, 70°54'W), 1 Jan 1903.

Zoological Museum Berlin, Nr. 8118, Magellan Str., leg. Pöhl: three small specimens (10–18 mm); one further specimen was sent to the Copenhagen Museum, probably for H. J. Hansen.

Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Nr. 12690: nine syntypes, San Sebastian, Tierra del Fuego.

Description.—Body about 2.5 times as long as broad. Cephalothorax and eyes as in Figs. 1 & 2; beneath eye a deep groove for antennae. Coxae one to three with curved carina running from frontal area of coxa to posterolateral point; coxae four to seven with more pronounced, less curved medial carina; coxa seven reaching beyond epimeral plate of pleonite 1 (Fig. 2). Epimeral plate of pleonite 3 narrower than preceding plate, posteriorly acute. Outline of telson as in Fig. 7, distal margin with six to seven sensory spines on each side and between them rows of four to five setae.

Antennule peduncle of 4 articles (3 in the sense of Wägele 1983), article 3 longest (Fig. 2); article 4 short, with three plumose setae; flagellum not much longer than peduncle, with 17 articles, articles short and broad, with rows of aesthetascs and each 2nd or 3rd article with a group of short simple setae, last article with simple setae and one plumose seta (Fig. 2). Antenna peduncle article 2 very short, article 5 longest; fourth article with lateral row of seven simple setae; flagellum long, extending to pereonite 3, of about 30 articles; last articles more slender and relatively longer than basal articles (Fig. 3).

Mandible palp setation as in Fig. 3. Lateral endite of maxillule gnathal surface with 13 stout spines, medial endite short, with

three stout apical teeth and subapically a smaller, slender trifurcate spine (Fig. 2). Maxilla of three lobes; proximal endite with two rows of setae, first row with 11, second with 17 setae; medial (second) endite with 15 long setae and a second row with 11 shorter setae; distal lobe bearing 5 setae. Maxilliped endite with two coupling hooks; all palp articles bearing large numbers of simple setae (Fig. 4).

Pereopod 1 merus posterior margin with 14 acute spines; carpus posterodistal margin with 2 long and 2 short acute spines: propodal palm with 4 large acute and 5 small acute spines and stout spine opposite base of dactylus. Pereopods 2 and 3 similar to 1 but spines of merus and carpus larger, pereopod propodal palm with 3 spines, ischium posterodistal margin with additional spines. Pereopod 3 with only 2 small spines on propodal palm. Pereopods 4–7 essentially similar but basis widening and all articles increasing in length towards posterior. Pereopod 7 basis about 1.8 times as long as greatest width, posterior margin shallowly convex, anterior margin feebly sinuate; ischium, merus and carpus with clusters of spines at distal angles and along posterior margins; propodus with three groups of 2–4 spines on posterior margin and a group of 4 spines opposite base of dactylus.

Pleopods conform to the generic condition; pleopod 2 of male with appendix masculina, apex narrowed, slightly angled, slightly extending beyond apex of endopod. Uropod endopod medial margin convex with six spines and a further apical spine, lateral margin with two large and two small spines, apex narrow. Exopod lanceolate, lateral margin with eight spines and a further small apical spine, medial with four.

Variations of spine armature of tail fan in adult specimens (25–36 mm): Distal margin of telson with 6 to 8 spines on each side (generally 6), lateral margin of uropod exopod with 9 to 11 (usually 10, including apical spine), medial margin always with 4 (including apical spine of this side), lateral

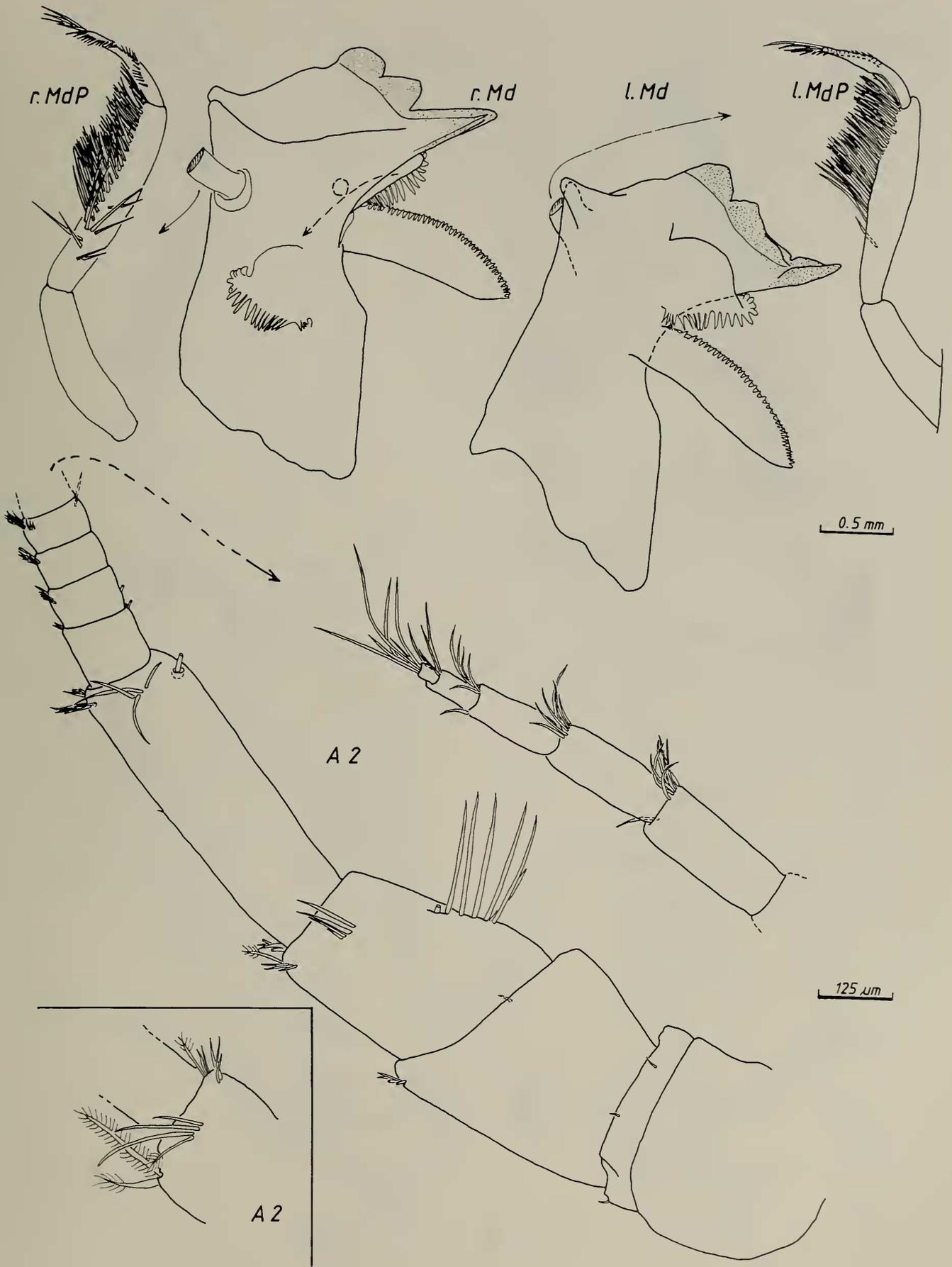


Fig. 3. *Natatolana pastorei*, male: Last articles of antenna and apical part of 5th peduncular article (inset, bottom) of immature adult; Right mandible (r. Md) with detail of setal lobe. For abbreviations see Fig. 1.

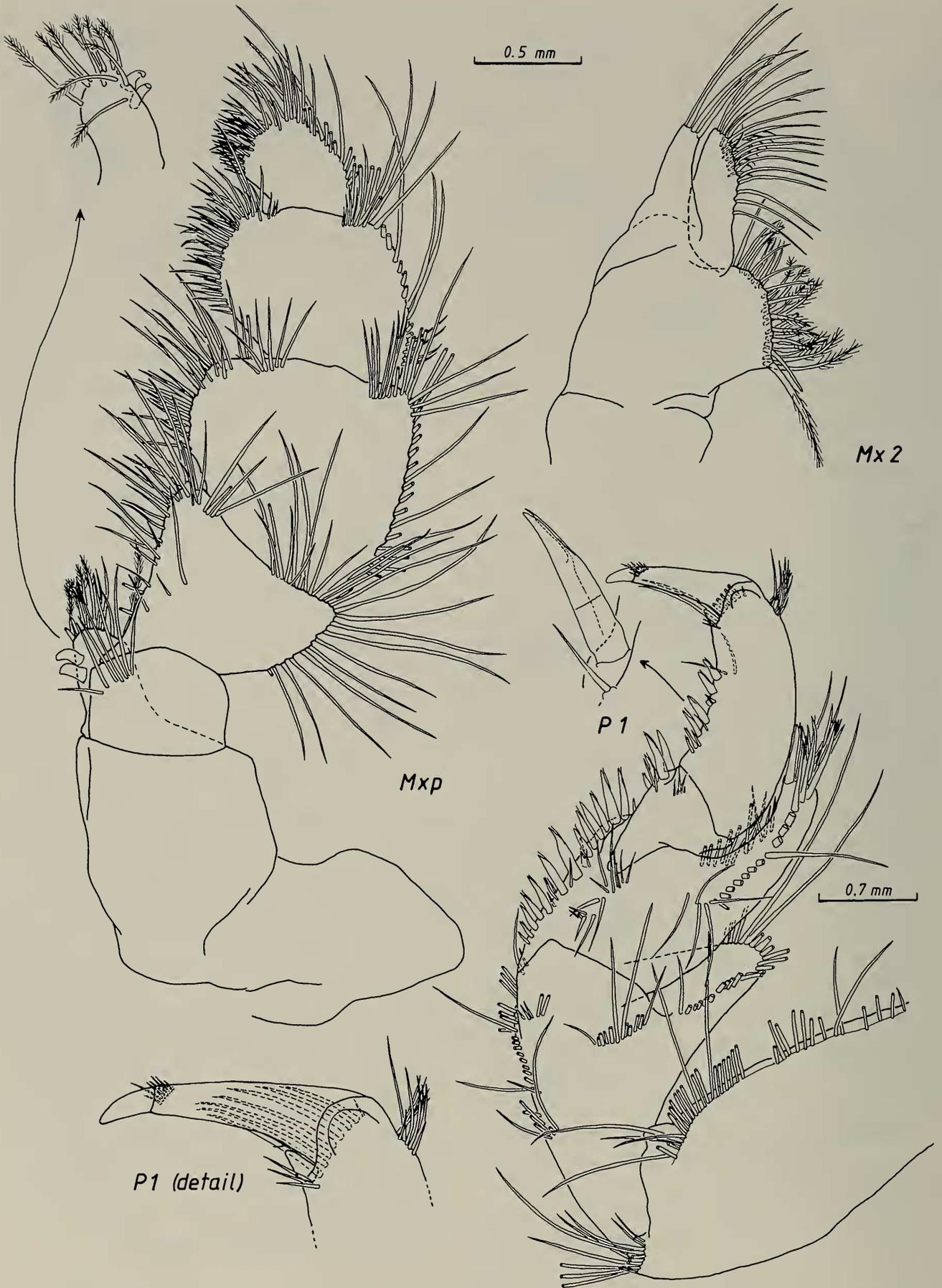


Fig. 4. *Natatolana pastorei*, male: Maxilliped with detail of endite; several setae and sensory spines cut off. For abbreviations see Fig. 1.

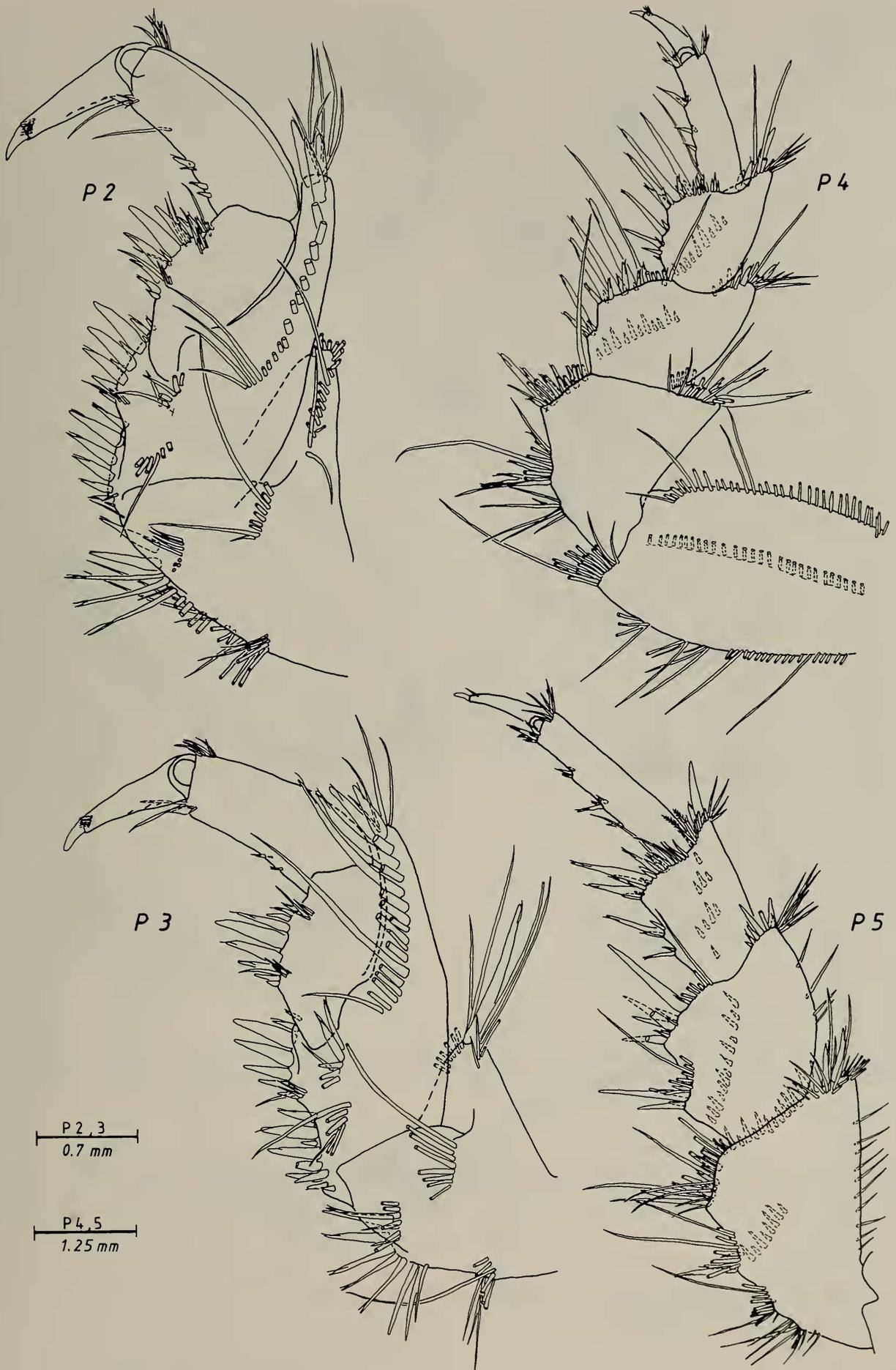


Fig. 5. *Natatolana pastorei*, male: Pereopods 2-5, several setae and sensory spines cut off. For abbreviations see Fig. 1.

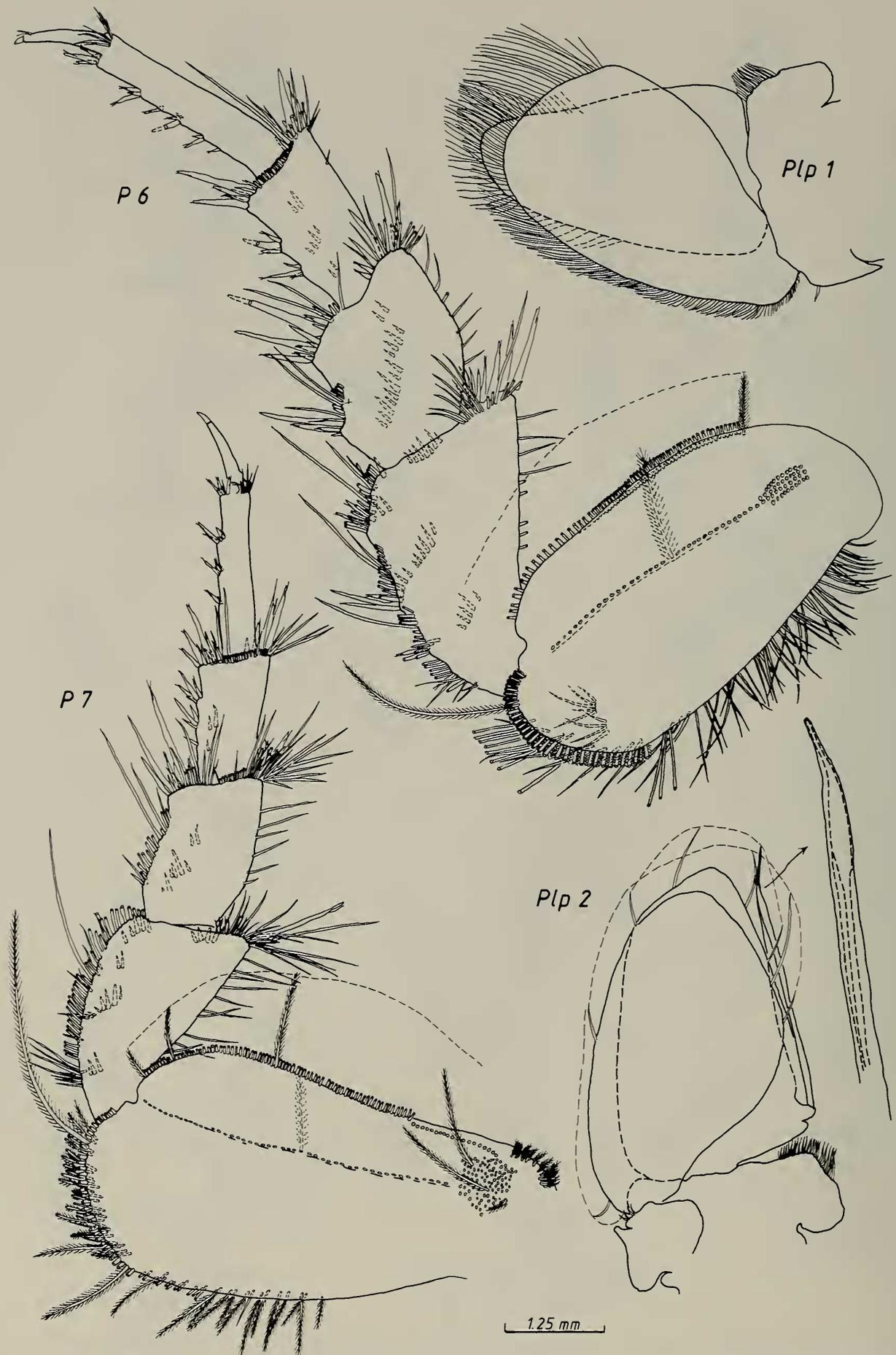


Fig. 6. *Natatolana pastorei*, male: Several setae and sensory spines cut off; setae of pleopods shown as simple setae; dashed line (Plp 2): range of setae. For abbreviations see Fig. 1.

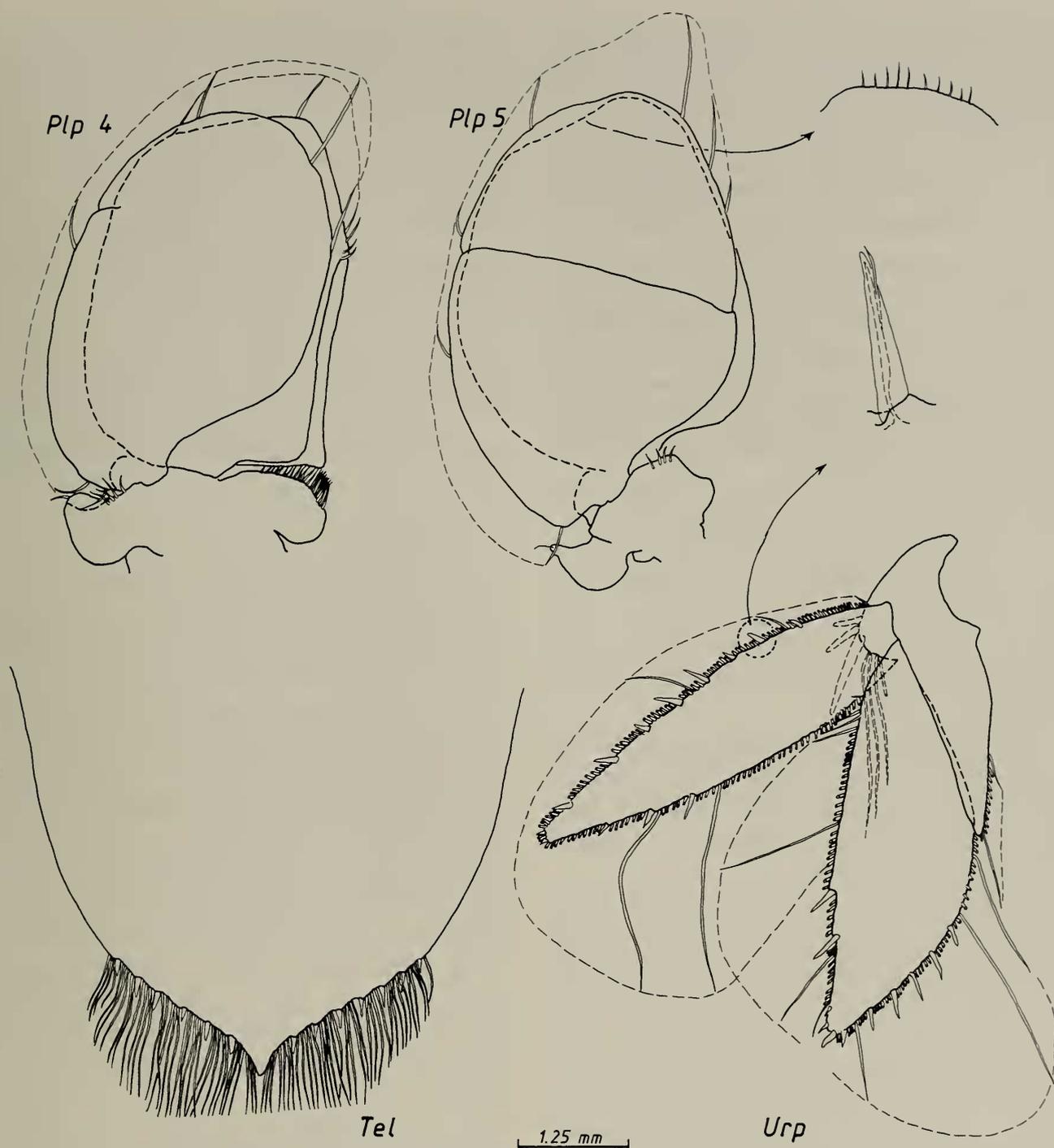


Fig. 7. *Natatolana pastorei*, male: Setae of pleopods shown as simple setae, dashed line indicating length of setae; detail of Plp 5 showing apex of endopod; detail of uropod showing a sensory spine. For abbreviations see Fig. 1.

margin of endopod always with 4, medial with 4 to 7 spines (including apical spine).

Color.—Purple brown, chromatophore pattern shown in Fig. 1.

Size.—Immature adults 27–34 mm, males 30.5–33 mm.

Remarks.—*Natatolana pastorei* belongs to the *N. valida* group of species characterized by Bruce (1986). It can be distinguished

from all of those species listed by having a slightly wider basis to pereopod 7, narrow apices on the uropod rami, and also differences in the spination of the uropod rami. Other large *Natatolana* species include those found in the subantarctic region such as *N. meridionalis* Hodgson, *N. nitida* Hale or *N. obtusata* Vanhöffen (these species were listed by Bruce, 1986). All of these species are

characterized by large penial processes, broad or elongate appendix masculina and acute upturned posterolateral margins on pleonite 4.

The present material differs from the material discovered in South Georgia and mentioned by Monod (1931) as "*Cirolana pastorei*." An examination of Monod's material (collection of the Senckenberg Institute, Frankfurt) revealed the following differences: Lateral margin of uropod endopod with six spines (instead of four in *N. pastorei*); telson narrower; antennule shorter with only 12 flagellar articles; groove beneath the eyes not present; eyes longer and less wide (number of ommatidia in *N. pastorei* (17.5 mm): longitudinal line with 11–12, vertical line with 12; in the specimen from South Georgia: longitudinal line with 14–15, vertical line with 8–9). So the population from South Georgia must belong to a different species.

Distribution. — Known from Straits of Magellan and between Hale Cove, Argentina to Punta Arenas, Chile, and from San Sebastián, Argentina. Occurs in shallow sublittoral sediments.

Observations on biology and functional morphology. — About 20 specimens were observed in aquaria kept at 1–2°C together with other Antarctic isopods. At this low temperature the animals were inactive for many weeks, only sporadically feeding on pieces of krill and fish. All specimens burrowed in sand; when resting only the tips of the antennae and sometimes the eyes could be seen. In coarse sand burrowing is difficult, as the grains keep rolling back into the groove, but in fine sand the specimens disappear within 1–2 min. The sand is pushed with the first pereopods laterally and caudally, the broad merus with its setae being a very effective broom; the posterior pereopods push the sand caudally, their effectiveness is increased due to the lateral spines (Fig. 1, bottom). The pleopods help when the animals dig fast; with their beat a strong current sweeps away the grains loosened by

the pereopods. In a depth of 2–5 cm the animals stop digging. After feeding the animals can obviously remain inactive for about two months; in aquaria the animals were fed only once a week and mostly the food was not consumed. Though the low temperature affects the metabolism, in nature this species is probably also able to survive several weeks without food, living as an opportunistic carrion feeder.

Some isopods living in sand possess a protective operculum to cover the respiratory pleopods (Chaetiliidae, Bathynataliidae, Serolidae, Anthuridae). The cirolanid genera *Conilera* and *Oncilorpheus* also have such structures, but operculate pleopods are absent from other cirolanid genera. In *Natatolana* the setae of the pereopods are arranged in such a way, that sand grains are kept away from the thin pleopods. While on the ventral side gravity will keep many grains in their place, the sides of the animal are protected against sand; the marginal setae of the pereopods cover the slits between the basipodites, where the respiratory current passes (Fig. 2). Directly in front of the pleopods, the setae of the frontal margins of the basis and ischium of P5–7 form a fan-like filter, to intercept grains and detritus.

The pereopods are not used for swimming, animals swim with their dorsum downwards, propelled only by the beating pleopods. The broadened merus of P1–3, flattened basis with the marginal setae of P5–7, the arrangement of the sensory spines are adaptations to digging in fine sand.

Acknowledgments

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