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Re-discovery of the Antarctic species of the family Neobradyidae (Copepoda, Harpacticoida) after over eighty years

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Abstract

Antarcticobradya tenuis (Brady, 1910) is re-discovered and a description is given of the female and for the first time of the male as well. Antennula and P2-P6 are sexually dimorphic. The new locality in the Weddell Sea and the *locus typicus* at Gauss-Station are almost at opposite sides of the Antarctic, yet there are only minor differences between the specimens of both localities. The male of *Antarcticobradya* differs in some important respects (P3, P5) from the one of *Neobradya*, thus supporting the establishment of the genus *Antarcticobradya* by Huys (1987). The diagnosis of the genus is amended.

Introduction

In Lang's (1948) monograph on the Harpacticoida the Neobradyidae was one of four families containing only a single species. *Neobradya pectinifera* T. Scott, 1892 had been recorded from the coasts of the British Island, of Sweden and Norway. In the same monograph Lang (1948: 592) pointed out that a species described by Brady (1910) as *Parastenhelia* (?) *tenuis* from the Antarctic resembled the Neobradyidae in many respects, yet he kept it as *species incerta sedis* in the family Parastenheliidae.

Recently, Huys (1987) redescribed the Antarctic species collected at a depth of 385 m at Gauss Station during the 'Deutsche Südpolar-Expedition 1901–1903' from Brady's original slides, confirmed that it belongs to the family Neobradyidae and erected a new genus, *Autarcticobradya* for it. Neobradyidae seem to be widespread in the Antarctic. Our samples from the Weddell Sea indicate that the family is not uncommon there and may even be rather diverse. Among our material we also discovered *Antarcticobradya tenuis* which so far is known only from a single female specimen. We can now add the description of the male and complete Huys' diagnosis of the new Antarctic genus in this respect. As both localities now known are almost at opposite sides of the Antarctic we also describe the female from the Weddell Sea location.

Material and methods

During the cruise of leg Ant V/3 of RV Polarstern, meiofauna was collected from the western Weddell Sea. The specimens described have been obtained from a dredge sample from 400–500 m depth on the 15.10.1986. An aliquot of macro-

fauna, sponge material and entrapped sediment fractions delivered from the dredge was put into a huge bucket, covered with sea water and stirred up by hand. The supernatant was decanted twice over a fine screen (100 μm) which retains meiofauna and juvenile macrofauna amongst organic debris.

The material was preserved in 5% buffered formaldehyde and later specimens were transferred into W 15 embedding medium (C. Zeiss). Drawings were made with the aid of a *camera lucida*. Body length was measured from the tip of the rostrum to the terminal margin of furcal rami; body width is given as the broadest (subterminal) part of the cephalosome.

Abbreviations used throughout the figures are: A1 = antennula, A2 = antenna, Md = mandible, Mx1 = maxillula, Mx2 = maxilla, Mxp = maxilliped, P1–P6 = swimming legs 1–6, fu-ra. = caudal ramus.

Amended generic diagnosis of Antarcticobradya

Neobradyidae. Both antennal endopod segments equal in length. Proximal endopod segment of P2-P4 squarish. Distal exopod segment of P3 male with transformed, partly hyaline plumose seta. Distal segment of endopod P4 with inner seta. Baseoendopod and exopod P5 completely confluent in the female; exopod with 4 setae, the second innermost of which is thick, stout, and bipinnate. Exopod and endopod of P5 male not fused with the basis. Female P6 a transverse plate with setae carrying outer protrusion, these setae not confluent with protrusion. Penultimate somite less than twice as long as anal somite.

Description

Antarcticobradya tenuis (Brady, 1910)

Material examined. One male and one female. Both specimens are dissected and are in the first author's collection.

Locality. Sea bottom of Weddell Sea (Antarctica) 72°43.3'S, 19°29.3'W, leg Ant V/3, 15.10.1986.

Male

Body length 0.613 mm and body width 0.116 mm.

Body (Fig. 1) slender, cylindrical, colourless and semitransparent. Body cuticle pitted. Posterior margin of all body somites provided dorsally and laterally with plain somitic hyaline frill. Anal somite shortest and deeply cleft; cuticle of inner side of cleft not as strongly chitinized as outer side. Pseudoperculum articulated with stronger cuticle (Fig. 2). Nauplius eye not observed.

Rostrum small, triangular, fused with cephalosoma, on both sides of tip with one delicate sensilla.

Caudal rami (Fig. 3) short, two fifth longer than broad; carrying in the middle of outer margin two slender bare setae of equal length; dorsal seta bare, one fourth longer than the two setae of outer margin and biarticulated at the base. Inner terminal seta and accompanying outer seta confluent at base, inner terminal seta three fifth longer than outer one. A very small inner terminal accessory seta is present.

Antennula (Fig. 2) ten-segmented, haplocer; second segment longest. Distal inner corner of first segment with slender bare seta. Second segment with distinct tube pore and eight setae, of which three are slender and spinulose, one at inner distal corner short and spinulose distally, the others slender and bare. Third segment with seven setae, of which one is slender and partly spinulose, one at inner distal corner rod-like, not tapering at the end, and spinulose unilaterally and apically, the others are slender and bare. Inner distal corner of fourth segment drawn out into a sub-cylindrical process carrying a long, thick aesthetasc with two constrictions and a long slender seta which are confluent at base; two short thick and spinulose setae at base of process together with three rod-like setae with a few spinules apically, and with three slender and bare setae. Fifth segment with one slender, long, bare seta and one short, thick and spinulose one. Sixth segment with one long, slender, spinulose seta

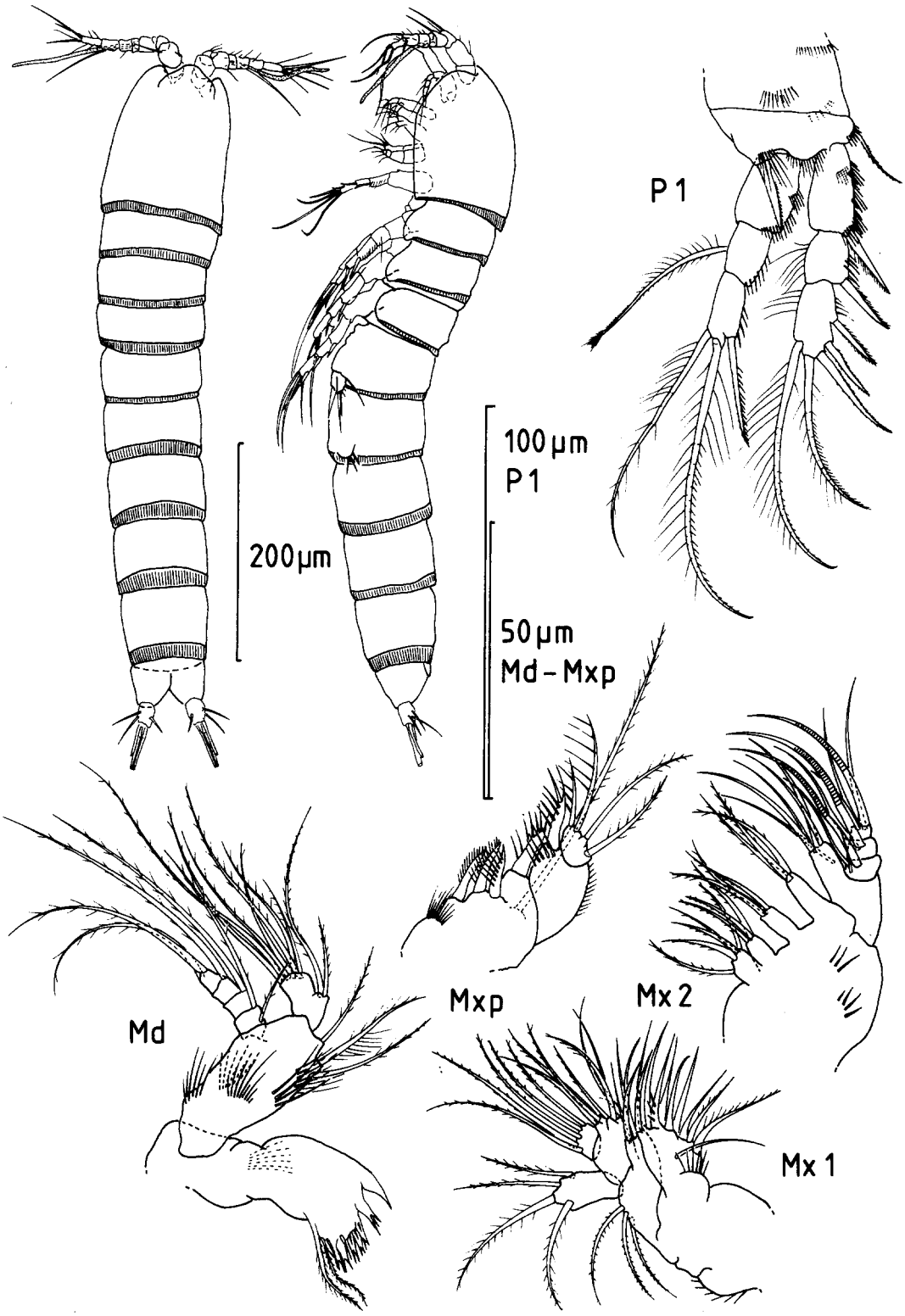

Fig. 1. Antarcticobradya tenuis. Adult male in dorsal and lateral view. Oral appendages (Md-Mxp) and first swimming leg (P1). Scales as indicated.

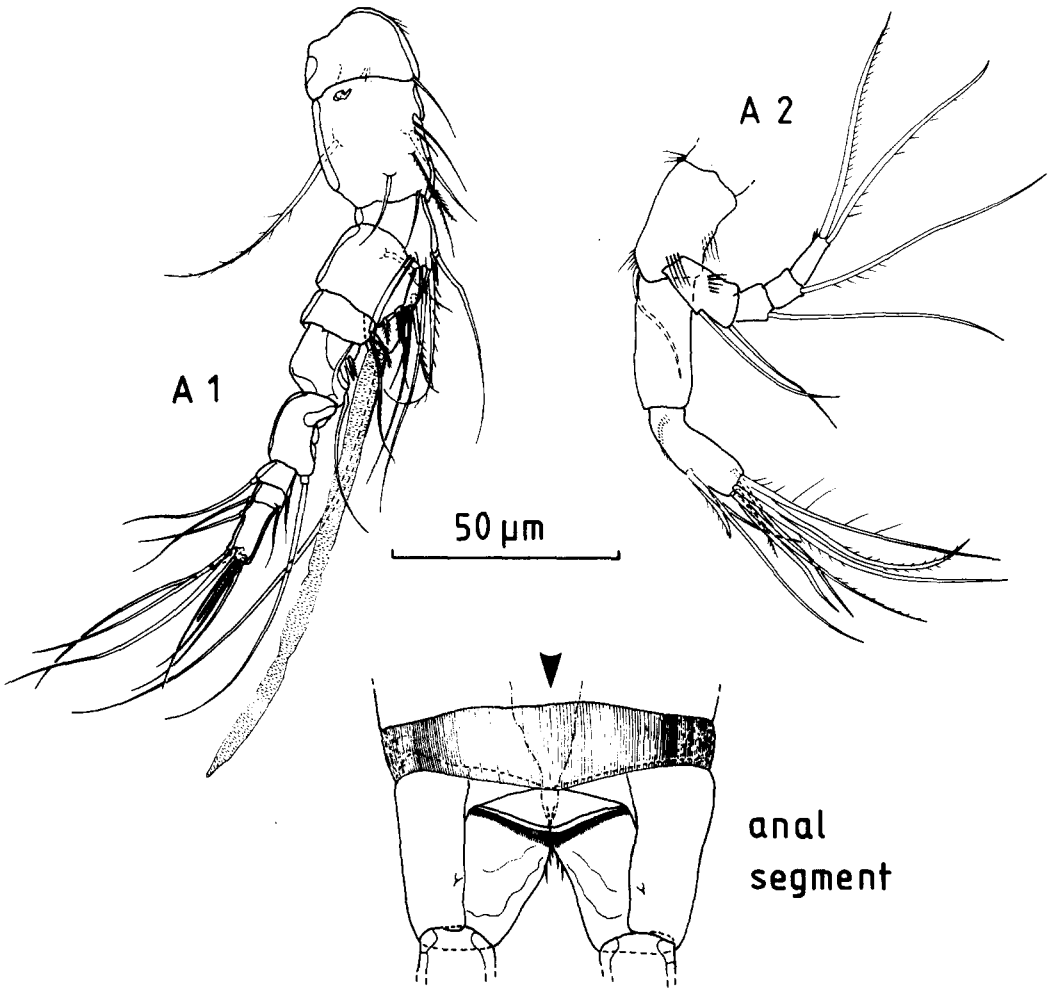

Fig. 2. Antarcticobradya tenuis male. Antennula and antenna (A1, A2) and anal segment in dorsal view (the arrow indicating the position of the hindgut).

and one short thick, spinulose one. Seventh segment with one slender, bare seta articulated at base. Eighth and ninth segments with one bare, slender inner seta and one slender outer seta which is articulated at base. Terminal segment furnished with seven slender bare setae, of which four are articulated at base. One of the terminal setae of the right first antenna transformed into an aesthetasc.

Antenna (Fig. 2). Coxa small, with three spinules. Basis with three rows of spinules and one slender seta at inner distal corner. Exopod four-segmented, first segment with two setae, second and third segments with one seta, fourth segment with two apical setae. First endopod-segment as long as second segment, unornamented; second segment with row of spinules proximally and ten setae of which three insert in a notch of the distal third. The two outer of the seven terminal setae are confluent at their bases.

Mandible (Fig. 1). *Corpus mandibulae* with a tuft of long spinules. Cutting edge with seven non-articulating teeth, the distalmost unidentate, the next tridentate and the proximal five bidentate, proximal edge carrying two slender spinulose setae. Palp well developed. Basis long and widening distally, carrying six short rows of long spinules and three slender spinulose setae, the middle

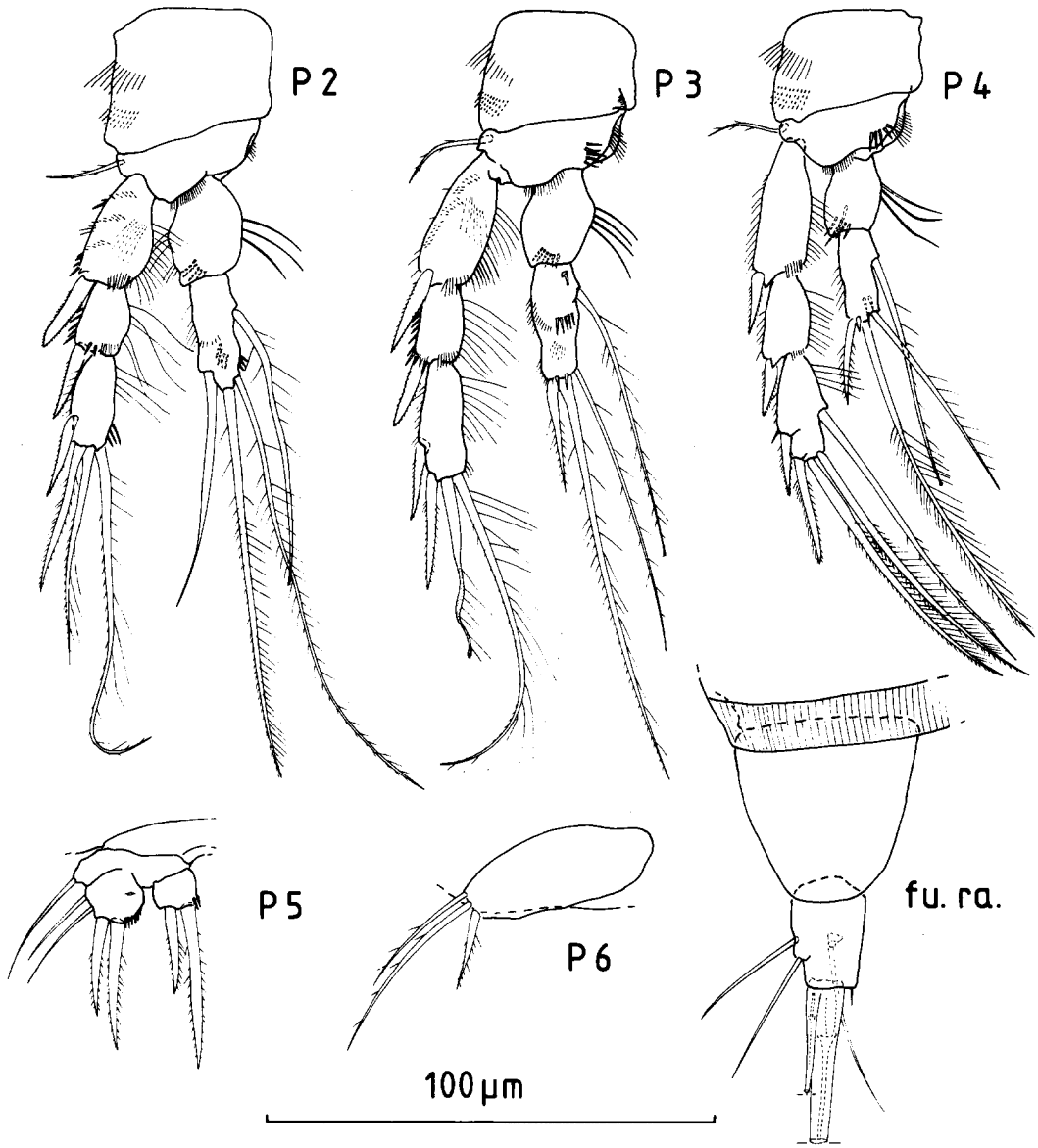

Fig. 3. Antarcticobradya tenuis male. Swimming legs 2–6 (P2–P6). Right caudal ramus (fu. ra.) in ventral view.

one plumose at inner margin. Exopod four-segmented; proximal segment with two plumose setae, second and third with one such seta, fourth segment with two plumose setae apically. Endopod unisegmented, with seven plumose setae apically and two such setae arising from a subterminal notch.

Maxillula (Fig. 1). Arthrite of praecoxa along inner margin with 9 setae forming a double row of four curved spines in the one and three in the other row and proximally in each row with one stout curved, unilaterally spinulose seta; anterior surface of arthrite with a row of five spinules and with a slender, bare seta; posterior surface with two additional setae. Endite of coxa with three curved, plumose setae representing coxoexite. Endite of basis slightly bipartite, proximal part carrying four, distal part three setae. Endopod short, unisegmented with five setae. Exopod also

unisegmented, longer, widening distally and carrying three plumose setae distally and one more proximally.

Maxilla (Fig. 1). Syncoxa with four endites. Proximal endite armed with five setae, second, third and fourth endite with three setae. Inner process of basis with three inwardly curved setae and one claw-like seta apically and one slender bare seta at its base. Endopod three-segmented; each segment with one medially geniculate claw-like seta, first segment additionally with two long slender setae, second segment with one long seta, and third segment with three long setae.

Maxilliped (Fig. 1) not prehensile. Syncoxa along inner border with four strong spines which on one side are heavily spinulose; proximally to these a row of long spinules; on posterior surface a very long seta which reaches beyond the end of the maxiliped and is one fourth longer than whole appendage. Basis with fine spinules along outer rim and a row of long spinules on inner side and furnished at distal inner corner with a strong spine heavily spinose on one side; endopod unisegmented, short, with two plumose outer and two pectinate inner setae.
Peraeopods 1–4 with three-segmented exopod and two-segmented endopod except for P1 where it is three-segmented.

P1 (Fig. 1). Coxa well developed, furnished with three oblique spinular rows and one on distal margin. Basis shorter than coxa, outer edge carrying a short plumose seta, inner distal corner armed with a stout spinulose seta at the base of which there is a row of long spinules. There are rows of spinules also along the distal and outer edges. Exopod three-segmented, as long as endopod. Proximal segment longest, furnished with three oblique spinular rows along outer edge and one stout spinulose seta at outer distal corner. Second segment shortest, fringed with stout spinules along outer and with fine long spinules along inner edge, and armed with one stout spinulose seta at outer distal corner. Distal segment on outer proximal margin with an oblique spinular row and long spinules along inner margin; with three bipinnate spines along outer side and terminally with two outwardly curved setae, which are spinulose along outer and plumose along inner margin. Endopod three-segmented; proximal segment longest, with two oblique spinular rows along outer and one row along distal margin. Second segment shortest, with spinules along outer and distal margin and on inner margin with a long plumose seta with a brush-like tip (cf. Fig. 6 female P2). Distal segment with spinules on outer margin and three long setae terminally, the inner one of these plumose as the seta of the preceding segment but without brush-like tip; the middle seta spinulose along outer and plumose along inner margin; the outer 35% the length of the middle seta and bipinnate.

P2 (Fig. 3). Coxa well developed, with two oblique spinular rows. Basis much smaller, with plumose seta at outer edge and a row of tiny spinules above insertion of endopod and along inner margin, respectively. Exopod three-segmented, one fourth longer than endopod. Setation as in P1 except for the following differences: proximal segment with a row of very long spinules on posterior surface; terminal segment with only two bipinnate spines, terminal setae not outwardly curved; both spinulose along outer and plumose along inner margin. Endopod two-segmented. Proximal segment bulging on inner side, with 3 long spinules along inner and two rows of shorter spinules along outer margin, an additional row subdistally. Second segment one fourth longer than proximal one; with spinules along outer margin and on anterior surface, and with a long plumose seta with brush-like tip arising from proximal half of inner margin. Distally on inner side one long plumose seta without brush-like tip and another long seta plumose along inner and spinulose along outer margin. Subdistally on outer margin a long stout and bare seta, 60% the length of the middle seta.

P3 (Fig. 3). Coxa as in P2. Basis also as in P2, however, on inner side with additional row of spinules. Exopod three-segmented, one third lon-

ger than endopod. Setation as in P2 except for terminal setae of distal segment; inner seta plumose along inner and spinulose along outer margin; middle seta beginning as normal seta, then thinning to half the breadth, the other half as a hyaline membrane, ending in a rounded tip and being plumose on the distal half along the inner margin. The outer apical and the subapical stout seta bipinnate. Endopod two-segmented. Proximal segment bare along outer margin and with three to four very long spinules on inner margin. Distal segment with small tube pore proximally and with spinular row along inner and outer margin as well as on anterior and posterior surface; long plumose seta with brush-like tip arising from proximal half of inner margin; three terminal setae, innermost plumose without brush-like tip, middle seta longest, plumose along inner, spinulose along outer margin; outer seta bipinnate and only 25% the length of the middle seta.

P4 (Fig. 3). Coxa and basis as in P3. Exopod three-segmented, almost double the length of endopod. Setation as in P1 except for setae of terminal segment; a very long seta spinulose on its distal half arises in the middle from the inner border; three terminal setae of which the inner two are spinulose along the outer and plumose along the inner margin, both are almost the same length, the outer of these setae bipinnate like the subapical one on the outer border. Endopod two-segmented; proximal segment with three very long spinules on inner edge and one spinular row on posterior surface. Distal segment with spinules along outer margin and two spinules on posterior surface. On inner side one seta with brush-like tip spinulose only along inner margin, inner terminal seta plumose along inner margin, middle seta plumose along inner and spinulose along outer margin; outer seta bipinnate and only 20% the length of the middle seta.

P5 (Fig. 3). Basis small with slender seta on outer edge. Endo- and exopod one-segmented and not fused with basis. Exopod slightly longer and broader than endopod, both with two stout bipinnate setae of which the outer is the shorter one in both cases. Exopod with two additional slender and bare setae on outer margin and proximally with short tube pore.

P6 (Fig. 3). One ellipsoid plate, at its outer edge with one stout spinulose inner seta and two outer slender setae which are plumose along the outer margin.

Female

Body length 0.618 mm and body width 0.132 mm.

General body shape (Fig. 4) as in male. Genital double somite without any trace of subdivision. Caudal rami (Fig. 6) as in male.

Sexual dimorphism in antennula and P2–6.

Antennula (Fig. 5) nine-segmented, second segment longest. First segment armed with spinulose seta at distal inner corner and with two rows of spinules. Second segment with tube pore proximally and with eight setae, one plumose outer one, three bare setae and one spinulose seta proximal on inner side and two slender bare setae distally together with a rod-like seta with spinules along inner margin and on the tip. Third segment with proximal indentation carrying three slender setae of which the middle one is shortest and spinulose along inner margin and the other two bare; along inner edge distal of indentation three rod-like setae as in segment two and two slender bare setae. Inner distal corner of fourth segment drawn out into a sub-cylindrical process carrying a long thick aesthetasc with two constrictions and a long bare accompanying seta which are confluent at the base; at base of process a slender spinulose seta and more proximally at inner side a rod-like seta as in segment two (the holotype also has three setae on this segment, Huys, personal communication). Fifth segment with a long slender bare seta on a slight process at the distal inner corner and with a shorter spinulose seta more proximally. Sixth segment with three setae. Seventh segment with long bare seta articulated at the base arising from outer distal corner and with shorter seta arising from inner corner. Eighth segment as segment seven. Ninth segment with one slender bare seta articulated at the base proximal on outer

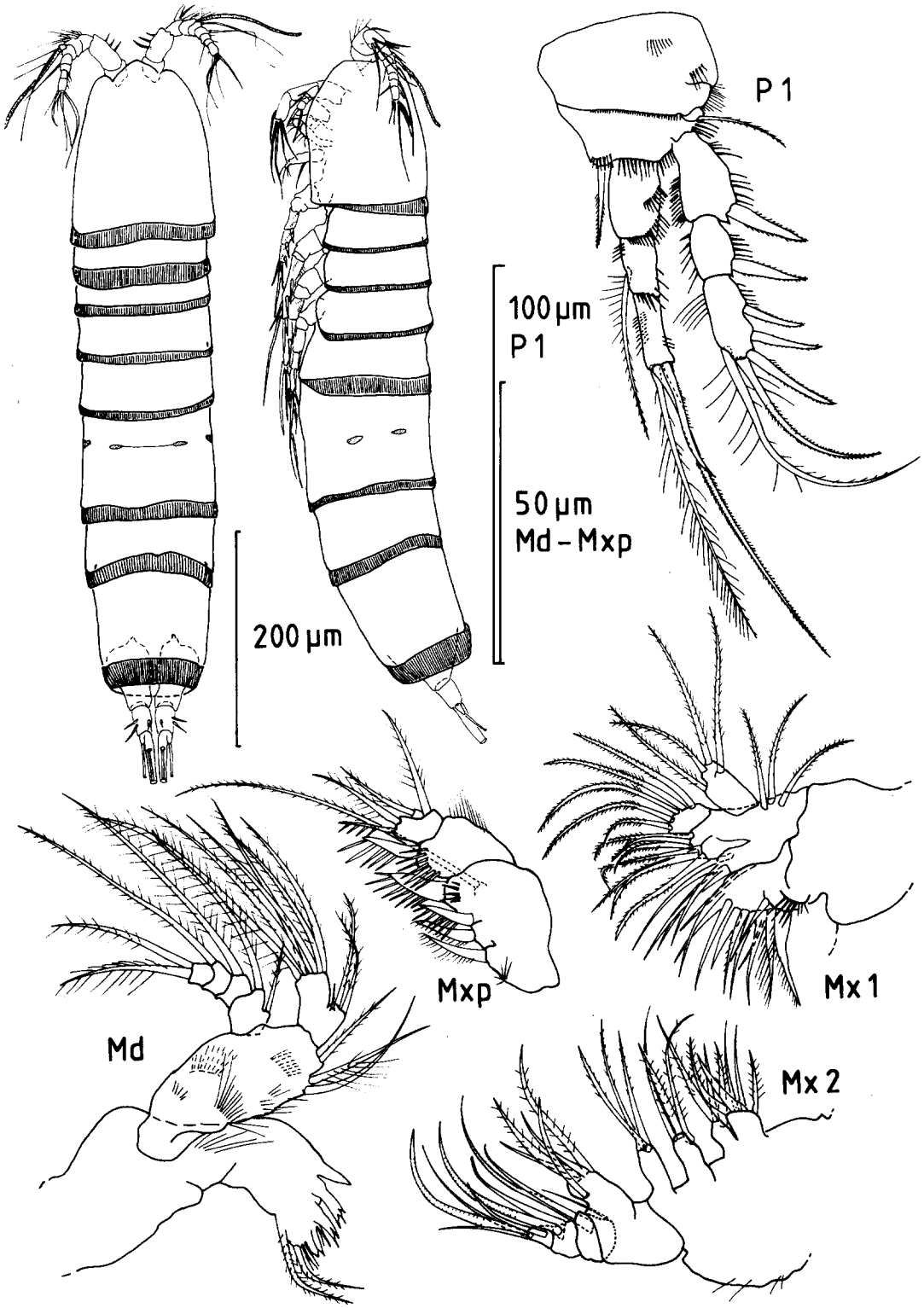

Fig. 4. Antarcticobradya tenuis. Adult female in dorsal and lateral view. Oral appendages (Md-Mxp) and first swimming leg (P1). Scales as indicated.

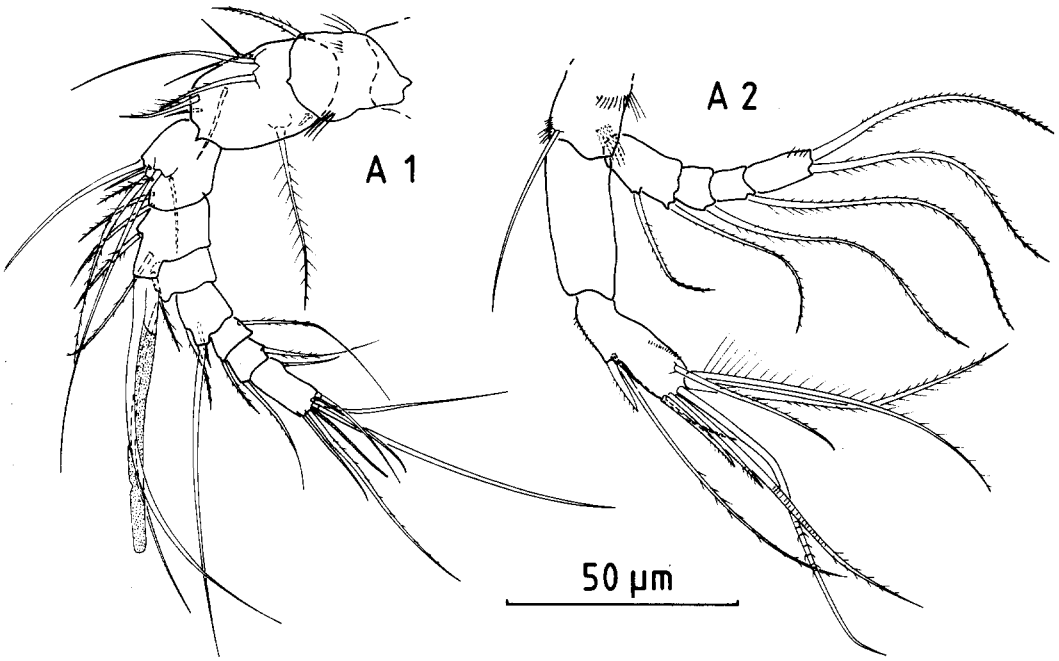

Fig. 5. Antarcticobradya tenuis female. Antennula and antenna (A1, A2).

margin, and terminally with six slender setae, three of which are articulated at the base and one small aesthetasc.

Antenna, mandible, maxillula, maxilla, maxilliped, and P1 as in male (Fig. 4).

P2 (Fig. 6) as in male except for the following differences: inner distal corner of basis with distinct cuticular spike; the inner of the terminal setae of distal endopod segment only 35% the length of middle seta and spinulose.

P3 (Fig. 6) as in male except for the following differences: inner distal corner of basis with distinct cuticular spike; middle seta of terminal ones on distal segment of exopod not transformed and spinulose along outer and plumose along inner margin.

P4 (Fig. 6) as in male except for distinct cuticular spike at inner distal corner of basis.

P5 (Fig. 6) located at the posterior margin of the somite. Basis fused with exo- and endopod and with long, partly plumose seta at outer edge. Exopod broader than endopod, both armed with two very stout bipinnate setae of which the outer is shorter than the inner one; exopod in addition with two outer slender bare setae.

P6 (Fig. 6) covered by P5, a narrow transverse plate with outer protrusion carrying two short setae.

Genital field as in Fig. 6.

Discussion

A detailed comparison of the only specimen redescribed by Huys (1987), a female from Gauss Station, with the female from the Weddell Sea reveals only minor differences.

The pseudoperculum is clearly defined in the Weddell Sea specimens. There are also slight differences in the number of setae. Segment 2 of the antennula of the Weddell Sea female has 8 instead of 10 setae as in the specimen from Gauss Station, segment 3 has 8 instead of 7, and segment 9 has 7 instead of 8 setae the small terminal aesthetasc not being counted. The terminal segment of the endopod of the antenna has one seta less (3 instead of 4) arising from the subterminal notch in the Weddell Sea specimen.

The mouthparts of the specimen from Gauss Station are said by Huys (1987) to be exactly the

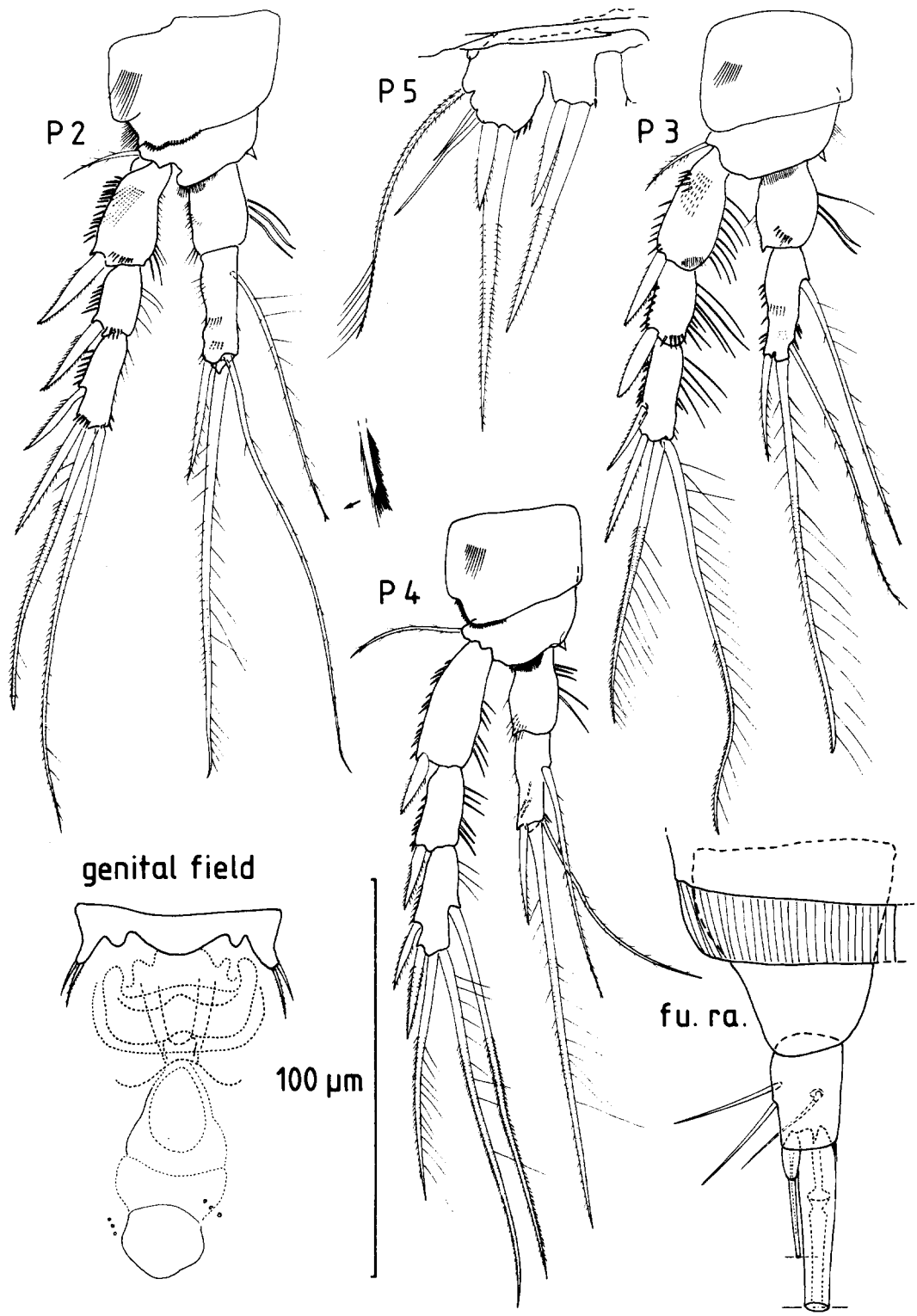

Fig. 6. Antarcticobradya tenuis female. Swimming legs 2–5 (P2–P5). Genital field and right caudal ramus (fu. ra.) in ventral view.

same as in *Neobradya pectinifera*. The Weddell Sea specimens differ slightly from it in this respect. The endopod of its mandible has 7 instead of 6 apical setae. The distal basal endite of the maxillula has 3 instead of 2 setae. The endopod of its maxilla carries 3 instead of 2 setae on its first segment. All these differences are not of a magnitude to warrant a separate specific status of the Weddell Sea specimens. They belong to the same species as the specimen from Gauss Station.

This single specimen is a female and on it the generic diagnosis is based which Huys (1987) gave for his new genus *Antarcticobradya*. It is interesting to see whether the erection of the new genus is borne out by a comparison between the males of *Neobradya* from the northern hemisphere (described by T. Scott (1892), Sars (1911) and in great detail by Huys (1987) and *Antarcticobradya* from the Antarctic. The endopod of the maxilliped (also in the female, although not mentioned by Huys) of *Antarcticobradya* differs from that of *Neobradya* in having two inner setae instead of 2 stout pinnate spines. The plumose seta with the characteristic brush-like tip arising from the proximal half of the inner margin of the endopod P2 is conspicuously shorter and weaker in *Neobradya* than in *Antarcticobradya*. The P3 of the male of the latter genus carries on the terminal segment of its exopod a very characteristic transformed seta which is lacking in *Neobradya*. The male P5 differs from *Neobradya* in that both, exopod and endopod are not fused with the basis and that the exopod has only 2 instead of 3 stout bipinnate setae. Of the three setae of the male P6 the middle one is longest in *Antarcticobradya* and not the outer one as in *Neobradya*. The female P6 of *Antarcticobradya* has a distinct knob which is less clearly defined in *Neobradya*, and the two short setae are articulating and not confluent with the plate. Also the copulatory pore of the female of *Antarcticobradya* seems to be wider than that of the female of *Neobradya*.

These differences add to those already revealed by Huys (1987) and support his decision to establish a new genus for the Antarctic specimen. The generic diagnosis has therefore been amended accordingly further above.

There is one remarkable detail that is shared by both the males of *Neobradya* and *Antarcticobradya*, the tube pore on the anterior surface of the distal segment of the endopod P3. This feature may be even diagnostic for the family.

Acknowledgements

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References

Brady, G. S., 1910. Die marinen Copepoden der Deutschen Südpolar-Expedition. In: Drygalski, E. von (ed.). Deutsche Südpolar-Expedition 1901–1903, 11, Zoologie 3: 499–593.

Huys, R., 1987. Some morphological observations on the Neobradyidae Olofsson, 1917 (Copepoda, Harpacticoida) including the redescription of *Antarcticobradya tenuis* (Brady, 1910) comb. nov. Bull. Inst. r. Sci. nat. Belg., Biologie 57: 133–148.

Lang, K., 1948. Monographie der Harpacticiden. Reprint Otto Koeltz Science Publishers, Königstein 1975, 2 vol., 1682 pp.

Sars, G. O., 1911. An account of the Crustacea of Norway. V. Copepoda Harpacticoida. Bergen Museum: 369–449.

Scott, T., 1892. Additions to the fauna of the Firth of Forth. Part IV. Tenth Annual Report of the Fishery Board for Scotland for the year 1891, Part III. Scientific Investigation: 244–272.