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Redescription of three species of *Haploniscus* Richardson, 1908 (Isopoda, Asellota, Haploniscidae) from the Angola Basin†

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Abstract

Three species of *Haploniscus* Richardson, 1908 from the deep sea of the Angola Basin (South Atlantic Ocean) are redescribed. Previously undescribed details of *H. bicuspis* (Sars, 1877), *H. spinifer* Hansen, 1916, and *H. nondescriptus* Menzies, 1962 are shown. A new diagnosis is given for the genus, and its phylogenetic status is discussed.

Keywords: Crustacea; Isopoda; Haploniscidae; taxonomy; deep-sea, Angola Basin

Introduction

During the Expedition M48-1/DIVA1 with RV „METEOR" (6 July – 2 August 2000), samples were taken with an epibenthic sledge from abyssal plains of the Angola Basin (South Atlantic). This material contained several species of the family Haploniscidae (Isopoda: Asellota). The family Haploniscidae was erected by Hansen (1916) for the type genus *Haploniscus* Richardson, 1908 and the new genus *Hydroniscus* Hansen, 1916. Besides these two genera it currently contains the five genera *Antennuloniscus* Menzies, 1962; *Aspidoniscus* Menzies & Schultz, 1968; *Abyssoniscus* Birstein, 1971; *Chauliodoniscus* Lincoln, 1985; and *Mastigoniscus* Lincoln, 1985. The genus *Haploniscus* was established by Richardson in 1908 for the species *H. bicuspis* (Sars, 1877) and the two new species *H. excisus* Richardson, 1908 and *H. retrospinis* Richardson, 1908.

The genus is the largest in the family (61 species), and is a heterogeneous and probably polyphyletic group. Not a single autapomorphy is known for *Haploniscus*, and the genus contains a conglomerate of species which cannot be allocated to other genera which, in turn, are well defined by distinct apomorphies. *Haploniscus* species vary considerably in body shape (oval or oblong), degree of fusion of the last pereonites with the pleotelson, the shapes of cephalothorax and pleotelson, the antennae, the shape of the endopod of pleopod 2, and the rostrum. As many of the known species were described only poorly, a redefinition of the genus requires redescriptions of numerous species.

The present paper offers detailed redescriptions of three species of *Haploniscus* found in the Angola Basin. Precise drawings are presented for comparison with specimens from other ocean basins.

Material and methods

Samples were taken at depths from 5125 to 5452 m with an epibenthic sledge combining epinet and supranet with a mesh size of 500 µm (Nils Brenke, unpublished). On board, the samples were partly sieved (mesh size 250 µm) and fixed in ethanol (70%) or buffered formalin (4%). Formalin samples were washed and preserved in ethanol later. Part of the material was sorted on board, the rest after transport to the laboratory of the Department of Animal Morphology and Systematics, Ruhr-Universität Bochum. The Haploniscid specimens

were separated for taxonomic study. Specimens were dissected under an OLYMPUS SZH10 dissecting microscope and drawn with an OLYMPUS BX40F-3 microscope using a camera lucida.

Abbreviations

A1, 2 = antenna 1, 2; l = left; Md = mandible; Mx1, 2 = maxilla 1, 2; Mxp = maxilliped; Op = operculum (pleopod 2 of female); P1-7 = pereopods 1-7; Plp1-5 = pleopods 1-5; r = right; Urp = uropod.

Taxonomy

Janiroidea Sars, 1897
Haploniscidae Hansen, 1916

Haploniscus Richardson, 1908

Type species

Haploniscus bicuspis (Sars, 1877)

Diagnosis

Haploniscidae with pereonites 5-7 at least laterally free, anterior angles of pereonites 2-4 not prolonged. Antenna 2 longer than antenna 1, third article only a little longer than wide, often with dorsal tooth. Fifth and sixth article of antenna 2 not fused, flagellum distinct. Distal carpus of pereopod 6 usually with stout spine bearing a distal sensillum. Female pleopod 2 circular. Uropods small, cylindrical, inserting near proximal end of anal valves. (Modified after Lincoln 1985a.)

Haploniscus bicuspis (Sars, 1877)

(Figs. 1-12)
Nannoniscus bicuspis Sars, 1877
Haploniscus bicuspis (Sars); Hansen (1916)

Material

Type specimens: four females, 2.2-3.2 mm, North. Pol. Exp. St. 33, 51,192, 290, Zoological Museum Oslo, F1716. New material from the DIVA1-Expedition: two subadult males, 2.00 (Figs. 1-7) and 2.20 mm; one juvenile male, 1.9 mm; three females, 2.50-2.75 mm (Figs. 8-12); one ovigerous female, 2.40 mm; two juveniles, 1.30 and 1.45 mm. All specimens from station 340-9, 18°19.4‘S 4°41.9‘E, 5395 m depth. Two ovigerous females, 2.40 and 2.45 mm, from station 344-10, 17°7.5‘S 4°42.3‘E, 5415 m depth. Deposited in the Zoological Museum Hamburg, Germany, Nos. K-40257 to K-40266.

Diagnosis

Body oval, about three times longer than wide. Cephalothorax 1.8 times wider than long, anterior margin convex, with small blunt rostral process. Pleotelson with two dorsal longitudinal keels, posterolateral processes moderately long. Antenna 1 about one quarter of body length, flagellum five-segmented in males, four-segmented in females. Antenna 2 slender, 0.66 of body length, article three with strong spinous dorsal process. Outer endite of maxilla 1 with five dentate and seven simple spines. Endopod of pleopod 2 1.3 times longer than protopod, 6.5 times longer than wide.

Description of subadult male

Body (Figs. 1, 2) about three times longer than wide, oval, pereonite 4 widest. Dorsally convex, lateral margins of pereonites flattened. Pereonites 1-5 free, pereonite 7 dorsally fused with pleotelson, suture line visible between pereonite 5 and 6. Relative lengths of pereonites: 1<2=3<4>5>6<7. Anterolateral angles of tergite of pereonite 2 slightly pointed. Posterior angles of tergites of pereonites 6-7 acute. Anterior and posterior margins of pereonites with numerous small setae, lateral margins with fewer setae. Surface covered by numerous small, wartlike tubercles, only margins of body and small parts of dorsal cuticle more or less smooth.
Cephalothorax distinctly wider than long, frontal margin convex, with small, blunt rostral process.
Pleotelson about one quarter of body length, slightly tapering posteriorly. Posterior third with two longitudinal dorsal keels near lateral margins. Posterolateral processes moderately long, projecting little beyond terminal margin.
Antenna 1 (Figs. 1-3) about one third of body length; first article of peduncle with fine cuticular furrows and a field of long setae, second article two times longer than first and three times longer than third, bearing four plumose setae and groups of small setae, third article with single seta. Flagellum five-segmented, first article short, with single plumose seta, second article more than three times longer, third article shorter, bearing a simple seta and a short aesthetasc, fourth and fifth articles longer than third, fourth with a short and a longer aesthetasc and simple seta, fifth with two apical and one subapical aesthetascs and two long apical setae.
Antenna 2 (Figs. 1-3) about two thirds of body length. Peduncle comprising six articles. Third article about 1.5 times longer than wide, with strong dorsal spinous process and single distal seta, fourth article with narrow base, distally broadened, about 0.6 length of third article, fifth article two times longer than fourth, with one plumose and two simple setae, sixth article little longer than fifth, about five times longer than wide, with three simple ventral setae, one simple dorsal, and one plumose seta. Flagellum fourteen-segmented, tapering distally, flagellar articles with up to four simple setae, distal article with five setae.

Pars incisiva of mandible (Fig. 3) with five stout blunt teeth. Left lacinia mobilis with five blunt teeth and some short spines. Right mandible with blunt spine instead of lacinia mobilis. Proximally a row of seven (left) or six (right) strong spines, the proximal three dentate, the following two setulated, the distal one or two simple. Pars molaris of right mandible with two rows of seven, respectively five, teeth on grinding surface. Proximal of the shorter row one simple and five setulated setae. Proximal of the longer row four more blunt teeth and a short row of small setae. Left pars molaris with cuticular ledge, a row of five blunt teeth, and a second row of four small teeth in between, proximal margin with five setulated setae. Mandibular palp three-articulated; first article with single distal seta, second article about two times longer than first and third, with two long rows of small setae and subapically with three setulated spines. Third article broad, with seven setulated spines, distally increasing in length, apical spine only little shorter than third palpal article. Between spines comb-like rows of small setae.

Outer endite of maxilla 1 (Fig. 4) distally with five dentate and seven simple spines, with two slender setae at distomedial margin and several rows of small setules. Inner endite shorter, apically with very small spine and seven strong setae, lateral margin with some long and thin setae.

Inner endite of maxilla 2 (Fig. 4) broader than median and outer ones, bearing two dentate spines and numerous setae. Outer endite apically with one short and two long setulated setae, a further three setae on medial margin. Median endite apically bearing one simple and two setulated setae. Especially the lateral margins of median and outer endite with numerous slender, simple setae. Sympod with six long, slender setae.

Right and left maxilliped (Figs. 1, 4) each bearing three coupling hooks. Epipodite more or less triangular, lateral angle with several tiny setae. Palp slender, less then one third of endite width, with five articles. First article short, bearing a single seta. Second article longest, about three times longer than wide, medially with four setae; three distal articles about half as long as second one, with some distal medially directed setae. Apical margin of endite serrated, bearing three small spines and several rows of short setae. Inner distal margin separated from serrated part of distal margin by deep notch, apically bearing two spines, ventrally a row of slender setae. Inner margin of endite curved dorsally, covered with numerous setae; ventrally a single seta between palp and coupling spines. Lateral margins of protopod and endite with dense fringe of diminutive setae.

All pereopods (Figs. 5-7) similar, ambulatory, increasing in length from first to seventh due to elongation of all articles, which become more slender in posterior pereopods. P1 conspicuously shorter than other pereopods, P5-7 of nearly equal length. Basis elongated, with four to six simple setae and one to three plumose setae; ischium of all pereopods elongated, with two to five setae; merus about half as long as ischium, distally wider than proximally, length increasing from P1 to P6 (width : length of P1 = 1 : 1.65, of P6 and 7 = 1 : 2.6), merus of P1 distally with three ventral and one dorsal seta, of P2-7 distally with two ventral and two dorsal setae (three are broken off in P4); carpus and propodus of all pereopods longer than wide, especially in P5-7 elongated and slender, ventrally on propodus of all pereopods and on carpus of P1-6 a fringe of setae, both with few larger, simple setae (Figs. 5-7); carpus of P2-7 distally with comb-like row of spines and opposite row of bristles, carpus of P1 distally only with row of bristles and ventrally with two sensory spines, P2 and P3 each with similar spine, P6 with stout sensory spine; propodus of all pereopods with one or two setae ventrally and dorsally, on P1-5 with apical comb-like row of small bristles; dactylus of P1 compact, of P5-7 elongated. (Width : length ratio(with unguis) of P1 = 1 : 4.3, of P7 = 1 : 10); unguis only little shorter than rest of dactylus, deeply split into two unequal parts, base with apically bifid accessory tooth.

Pleopod 1 (Fig. 7) sympod fused medially, suture distinct only ventrally, shovel-like, broadened a little distal of insertion, tapering distally, apically only half as wide as in widest part. Lateral margins in proximal third with single small seta, distal margin with several small setae. Dorsal surface on both sides with elevation covered with numerous hairlike setae, with lateral rim for reception of margin of pleopod 2. Pleopod 2 (Fig. 7) with large, oval protopod, tapering apically, apical lateral margin with six long setae, additional single seta at proximal lateral margin. Exopod small, rounded, inserted on medio-lateral margin in distal third. Endopod inserted proximally of exopod, somewhat extending over protopod, two-segmented. First article broad and curved, second article about twice as long as first, nearly straight, with several small bristles at medio-lateral margin and two simple setae at dorsal surface. Pleopods 3 and 5 (Fig. 7) distinctly smaller than pleopods 1 and 2. Pleopod 3 with large, roughly triangular endopod, bearing three stout swimming setae (one broken off in the holotype). Exopod less than half size of endopod, triangular as well, with fringe of small bristles and two larger setae. Pleopod 5 uniramous, tapering distally and slightly curved medially.

Uropod (Fig. 6) uniramous, scarcely projecting beyond terminal margin of pleotelson. Ramus bearing at least three plumose and two simple setae distally, protopod with one long and one shorter simple seta.

Description of female

The female differs from the male in the following characters:
Suture line between pereonite 7 and pleotelson visible as a thin line.
Flagellum of antenna 1 (Fig. 8) four-segmented, more slender than in male. First flagellar article short, with one plumose and one simple seta; second and third articles about four times longer than first, third distally with long aesthetasc; fourth article three times longer than first, apically bearing one long and two short aesthetascs and two setae.
Flagellum of antenna 2 (Fig. 8) fifteen-segmented.
Pars incisiva of right mandible (Fig. 8) without blunt spine distal of setal row.
Pleopod 2 (Fig. 12) subcircular, ventral surface with longitudinal rounded elevation, its caudal part flattening. Proximally at each side of elevation two short setae. Caudal margin of pleopod 2 with fifteen long setae and dorsally with numerous small fringing setae. In addition, proximal lateral margins with single seta. Pleopod 4 (Fig. 12) with large, triangular endopod, apex setulose. Exopod slender, about half as long as endopod, with long apical swimming seta projecting far beyond apex of endopod, inner margin setulose, lateral margin with numerous bristles.

Remarks

In comparisons of the new specimens with the type material, no morphological differences could be found. The species was described by Sars (1877) as *Nannoniscus bicuspis* from several stations in the North Atlantic. Richardson (1908) then designated it as the type species for the new genus *Haploniscus*. Further material was collected during the Danish Ingolf Expedition and described by Hansen (1916) and Wolff (1962).
Menzies (1962) applied the name *Haploniscus* bicuspis to material from the South Atlantic. The description differs from the original one by Sars and from the examined type specimens in the shape of the rostrum, pleotelson and first pleopod, and resembles species like *Haploniscus antarcticus* Vanhöffen, 1914. It could not be decided whether these differences are due to observation errors by Menzies or reflect different species, because the specimens were not available.
Further material was described by Lincoln (1985b) from the North Atlantic. The description also shows slight differences from the type material, such as a shorter head and different number of spines in the mandibular pars inscisiva spine row. These differences might be due to the fact that Linoln described a fully mature male specimen, or to spatial variation.

Haploniscus spinifer Hansen, 1916

(Figs. 13-25)

Material

Lectotype: female, 2.30 mm, Ingolf St. 36, 61°50‘N 56°21‘W, 2702 m depth, Zoological Museum Copenhagen, CRU-8183. Material from the DIVA1-Expedition: one subadult male, 2.05 mm (Figs. 13-19), one juvenile male, 1.85 mm, one female, 2.10 mm (Figs. 14, 20-25), from station 340-9,18°19.4‘S 4°41.9‘E, 5395 m depth; one subadult male, 2.15 mm, one female, 1.95 mm, from station 344-10, 17°7.5‘S 4°42.3‘E, 5415 m depth. Deposited in the Zoological Museum Hamburg, Germany, Nos. K-40267 to K-40271.

Diagnosis

Body about three times longer than wide, oval. Cephalothorax 2.4 times wider than long, frontal margin slightly convex, without rostrum. Dorsal surface of pleotelson with two longitudinal keels, ending near insertion of uropods, postero-lateral angles larger in males (nearly one quarter of the remaining pleotelson), projecting far beyond terminal margin, distinctly shorter in females. Antenna 1 about one fifth of body length, flagellum four-segmented in males, three-segmented in females. Antenna 2 nearly half of body length, basal flagellar articles with rim, antenna 2 distinctly more robust in males than in females. In both sexes peduncle article three with stout dorsal spinous process. Outer endite of maxilla 1 with three dentate and ten simple spines. Male Plp2 with strongly curved endopod, more than three times longer than protopod.

Description of subadult male

Body (Fig. 13) about three times longer than wide, oval, pereonites 4 and 5 widest. Dorsally convex, margins of body flattend. Relative lengths of pereonites: 1>2=3<4>5>6>7. Pereonite 7 dorsally fused with pleotelson. Caudolateral angles of pereonites 4-7 acute. Several setae on lateral margins of pereonites, numerous bristles on anterior and posterior margins.
Cephalothorax 2.4 times wider than long, trapezoidal, frontal margin slightly convex, without rostrum.
Pleotelson (Fig. 14) large, (total length : pleotelsonic length = 2.7 : 1), tapering distally, with two longitudinal keels on dorsal surface of posterior half of pleotelson, ending near insertion of uropods. Posterolateral angles large, projecting far beyond terminal margin of pleotelson. Several bristles on lateral margins.
Antenna 1 (Figs. 13, 15) about one fifth of body length, peduncle three-segmented. First article with transverse cuticular furrows, three plumose setae and row of fine bristles, second article as long as first but only half as wide, with one short and two long plumose setae and one short simple seta, length of third article one third

of first, with one simple seta. Flagellum four-segmented, first article short with one seta, second and third 1.5 times longer, both with simple seta and third article additionally with short aesthetasc, fourth article twice as long as first, apically with two long aesthetascs and one long and two shorter setae.

Antenna 2 (Figs. 13, 15) nearly half of body length, six peduncular articles, third article twice as long as wide, with stout dorsal spinous process and two bristles, fourth article half length of third, distally broadened, with two bristles, fifth and sixth articles nearly as long as third, fifth with four simple and one plumose seta, sixth with two plumose and six simple setae, apically with small spinous process, therefore with flagellum inserted slightly subapically. Flagellum eleven-segmented, proximally nearly as wide as sixth peduncular article, distally tapering, second article with two sensillae, all articles with up to four bristles, distal article with six bristles.

Pars incisiva of mandibles (Fig. 16) with five stout, blunt teeth. Left lacinia mobilis with five blunt teeth and some small setae. Right lacinia mobilis forming a huge dentated spine, beside it two bristles. Proximal spine row with three (left Md) or two (right Md) dentated spines, additionally left mandible with two, right mandible with three simple spines. Beside spines some setae present. Pars molaris of right mandible with two rows of eight, respectively five, teeth on grinding surface, two additional teeth medially. Beneath the short dental row six setulated and three simple setae, beneath long dental row eight further, flattened teeth. Left pars molaris with row of six teeth and cuticular ledge with additional tooth on each side on grinding surface. Proximally on molar suface seven setae. Palp three-segmented. First article half length of second, with distal seta, second article with row of fine bristles and three subapical setulated spines, third article as long as first, broad, with seven setulated spines, apical spine longest, the following one two thirds of its length, all other spines shorter. Between and beside spines comb-like rows of small setules.

Outer endite of maxilla 1 (Fig. 15) distally bearing three dentate and and ten simple spines. Additionally two simple setae at distomedial margin, lateral margin with several fine setules. Inner endite shorter, with six apical stout setae and some fine bristles at lateral margin.

Protopod of maxilla 2 (Fig. 15) medially with several long, hair-like setae, outer endite apically with two long spines and one shorter spine and four setae, median endite with one setulose and one simple, long spine, three further spines and some fine bristles at medial margin, inner endite about twice as wide as median and outer ones, bearing numerous stout and fine setae and distally two dentated spines.

Left and right maxilliped (Figs. 14, 16) each with three coupling hooks connecting the two. Epipodite triangular, lateral angle minutely setulose. Palp five-segmented, tapering distally. First article short, with single seta, second article three times longer, third and fourth articles two times longer than first, all with several long, medially directed setae, fifth article little longer than first, with five distal setae. Distal margin of endite serrated, with four small spines and rows of short setae. Mediodistal margin separated by deep notch, bearing small apical tooth and subapical row of fine short setae. Medial margin of endite dorsally curved, shovel-like and covered with numerous setae. Lateral margin of endite and protopod with numeous fringing setae.

All pereopods (Figs. 17-19) similar, ambulatory, increasing in length from P1 to P7. P1 shortest, P6 and 7 of nearly equal length; basis elongated, with two to four simple setae, P3-6 with one to three plumose setae; ischium elongated, with one to three setae; merus about half length of ischium, distally broader than basally, length increasing from P1 to P6 (width : length ratio of P1 = 1 : 1.6, of P6 = 1 : 2.), P1 and P3 with five distal setae, all others with four distal setae; carpus and propodus of all pereopods with ventral rows of fringing setae; carpus bearing subapical sensory spine on P2-6, subapical simple spine on P7, spine on P5 and 6; P6 with subapical stout sensory spine; distal margin of carpus with setal row, of P2 with additional three spines, of P3-6 with second setal row; propodus distally with one to four setae and row of small bristles, additionally simple spine on P5 and 6; dactylus of P1-4 ventrally with rows fringing setae, of P1-5 with longitudinal cuticular ledge, of P6 and 7 with dorsal scale, dorsally a group of small setae on P6. Width : length ratio(with unguis) of P1 = 1 : 4.6, of P7 = 1 : 7.7. Unguis only little shorter than dactylus, deeply split into two parts, with accessory tooth on P5-7.

Pleopod 1 (Fig. 19) sympod (right pleopod 1 of male specimen broken), shovel-like, ventral suture line visible. Greatest width in basal quarter, distally tapering. Lateral rim for reception of pleopod 2 margin, distal margin (of left pleopod 1) with four short setae. Protopod of pleopod 2 (Fig. 19) large, lateral margin with nine setae. Exopod small, about one fourth of protopod length, inserted on its medio-lateral margin in distal third. Endopod inserted proximally of exopod, two-segmented, first article curved proximally, running along lateral margin and extending beyond proximal margin of protopod; second article about twice as long as protopod, slender, curved semicircularly, distally extending beyond apex of protopod. Pleopods 3-5 (Fig. 19) distinctly smaller than pleopods 1 and 2. Pleopod

3 with large, distally rounded endopod, distally bearing three swimming setae and small rows of tiny bristles, exopod triangular, with two long setae and lateral fringe of bristles. Pleopod 4 with large, triangular endopod, exopod half width of endopod, tapering distally, with long swimming seta and lateral fringe of long and fine bristles. Pleopod 5 uniramous, triangular, with small rows of setules.
Uropod (Fig.19) uniramous, barely projecting beyond posterior margin of pleotelson, ramus with at least three distal plumose setae and one distal simple seta.

Description of female

Differs from male in the following characters:
Posterolateral angles of pleotelson small (Figs. 14, 20), scarcely projecting beyond terminal margin.
Flagellum of antenna 1 (Fig. 21) with three articles, first article short, second and third about three times longer, second article with one simple seta, third with two long aesthetascs and four simple setae.
Antenna 2 (Fig. 21) more slender than in males, flagellum with ten articles, basal articles without rim.
Pleopod 2 (Fig. 24: operculum) slightly wider than long, ventral surface with longitudinal rounded elevation, its caudal part flattening. Lateral margins bearing several fine bristles, distal margin with fourteen setae.
Ramus of uropod (Fig. 24) distally with eight plumose setae and one long, simple seta, protopod with simple seta.

Remarks

This species was found at three stations in the North-Atlantic during the Danish Ingolf Expedition (Hansen 1916).Further descriptions were prepared by Wolff (1962) based on the same material, and by Menzies (1962) based on material from the Vema expeditions. The Vema specimens were found at two stations in the South Atlantic.
In comparison with the lectotype female, the pleotelson of the new specimens from the Angola Basin is somewhat narrower, but as the width of the body may be quite variable and definitely changes between the different ontogenetic stages, the new specimens are placed within *H. spinifer* because of the correspondence of several details such as the distal process of the sixth peduncular article of antenna 2, the number of articles of the flagella of both antennae, the shape of the head, and the sexual dimorphism.

Haploniscus nondescriptus Menzies, 1962

(Figs. 26-32)

Material

Holotype male: AMNH No. 11998 Vema expedition, L.G.O Biotrawl 53, 36°34‘S 14°08‘E. New material from the DIVA-Expedition: one male, 3.2 mm (Figs. 26-32), from station 344-10, 17°7.5‘S 4°42.3‘E, 5415 m depth; one juvenile, 1.6 mm (Fig. 26), from station 320-2, 22°20.0‘S 3°17.9‘E, 5126 m depth; one juvenile, 1.4 mm, from station 348-11, 16°19.3‘S 5°27.2‘E, 5387 m depth. Deposited in the Zoological Museum Hamburg, Germany, Nos. K-40272 to K-40274.

Diagnosis

Body oval, about twice as long as wide. Cephalothorax 2.5 times wider than long, frontal margin concave, without rostral process. Pleotelson short, about one quarter of body length, dorsal surface with two longitudinal keels, ending near uropod insertion and each beginning at a small tubercle. Posterolateral angles slightly extending beyond terminal margin of pleotelson, not distinctly surpassing uropods. Antenna 1 one quarter of body length, flagellum with four articles. Third article of antenna 2 with small dorsal tooth, fourth, fifth and sixth articles with numerous triangular scales. Pars molaris of left mandible on grinding surface with row of nine teeth and additional teeth beside cuticular rim as well as nine pilose setae. Outer endite of maxilla 1 with nine simple and four setulated spines. Median endite of maxilla 2 with short serrated spine. Carpus of all pereopods with comb-like spine rows. Pleopod 2 of subadult male with short endopod, not exceeding protopod.

Description of subadult male

Body (Figs. 26, 27) about twice as long as broad, oval. Dorsally convex. Pereonites, cephalothorax and pleotelson with broad, flattened margins. Pereonites 2-6 of similar width, pereonites 1 and 7 narrower. Relative lengths of pereonites: 1=2<3<4>5>6>7. Pereonite 7 dorsally fused with pleotelson. Anterior and posterior free margins of pereonites 2-5 serrated and with numerous setae. Lateral margins of pereonites with several setae. Body surface covered by numerous small, wartlike tubercles, only small parts of dorsal cuticle and margins of body smooth.
Cephalothorax about 2.5 times wider than long, frontal margin concave, without rostral process.
Pleotelson about one quarter of body length, slightly narrowing distally. Caudal half with two dorsal longitudinal keels ending near uropods and beginning at two large, wartlike tubercles. Posterolateral angles slightly extending beyond terminal margin of pleotelson, not distinctly surpassing urupods.
Antenna 1 (Figs. 26-28) about one quarter of body length. Peduncle consisting of three articles, first article with transverse cuticular furrows and three distal plumose setae, second article 1.5 times longer and half as wide as first, with four plumose and three simple setae, third article half as long as second, bearing two simple setae; flagellum four-articulated, first article

about half as long as following articles, with one simple and probably one plumose seta (broken off in the type specimen); second article with one bristle, third with one bristle and one aesthetasc, fourth article with two aesthetascs and four simple setae.

Antenna 2 (Figs. 26-28) half of body length. Peduncle with six articles, first article with one, second with two bristles, third twice as long as first and second, bearing six setae and short dorsal tooth with two bristles, fourth article as long as third, distally broadened, with three setae and few scales, fifth and sixth articles twice as long as third, fifth and basal part of sixth covered with numerous triangular scales, fifth article with nine setae, sixth article with ten simple and two short plumose setae. Flagellum with fourteen articles bearing up to five setae.

Pars incisiva of mandibles (Fig. 28) with five stout, blunt teeth. Left mandible with lacinia mobilis, lacinia with five blunt teeth and some small bristles. Right mandible with stout, serrated spine instead of lacinia mobilis. Proximal spine row consisting of three serrated and three simple spines as well as some long setae. Pars molaris of right mandible on grinding surface with row of nine teeth and cuticular ledge. Thirteen pilose setae on proximal molar surface of tooth row, row of one large and eight smaller teeth as well as some fine bristles proximal of cuticular ledge. Left pars molaris with row of nine teeth and cuticular ledge with three, respectively four, additional teeth at each side. Nine pilose setae proximally, two simple setae on frontal surface. Palp three-segmented; first article long, slender, with distal seta, second article about 1.5 times longer than first, with fringe of short, fine bristles and three serrated spines, third article half as long as second, bearing distally one long and one shorter serrated spine, proximally a row of nine stout serrated spines and several comb-like rows of setules.

Outer endite of maxilla 1 (Fig. 29) with nine simple and and four serrated spines and row of setae, lateral margin bearing some fine bristles. Inner endite with eight stout setae and some comb-like rows of fine setules, lateral margins with several fine bristles.

Protopod of maxilla 2 (Fig. 29) with some long, fine setae. Outer endite with four long apical spines, outer margin bearing rows of fine setae, inner margin with three short subapical spines, median endite with one short serrated and two long, simple apical spines, outer margin with some fine bristles, inner margin with two spines and three setae, inner endite broad, apically with two serrated spines and some stout setae, inner margin bearing small spine and numerous setae, basal part of outer margin with some fine bristles.

Left and right maxilliped coupled by three spines on each of the maxillipeds (Figs. 27, 29). Palp five-segmented, slender; first article short with one seta, second about five times longer than first, third, fourth and fifth articles about half as long as second and of decreasing width, all with several long, medially directed setae. Distal margin of endite serrated, with three small spinules and several comb-like rows of fine bristles. Mediodistal margin separated by deep notch, bearing short spine, one stout seta and row of fine setae. Medial margin curved dorsally, bearing numerous setae. Lateral margin of protopod and endite with fringe of tiny setae. Epipodite triangular.

All pereopods (Figs. 30-32) similar, ambulatory, increasing in length from P1 to P7, P5-7 nearly equal in length. Basis elongated, with up to five long, simple setae, basis of P2 and P4-6 with two or three plumose setae; ischium elongated, bearing two to six setae; merus broadened proximally (width : length of P1 = 1.0 : 1.5, of P7 = 1.0 : 2.5); on distal merus of P1 five, of P2-4 four setae, distal merus of P5-7 with three setae and one sensory spine; carpus bearing ventrally numerous comb-like spine rows and two to five spines with distal sensillum; on P5-7 dorsally a spine with dorsal sensillum, this spine stout on P6, apical margin with two comb-like spine rows; propodus ventrally with numerous comb-like rows of bristles, on propodus of P1-4 one to three setae, of P5-7 a spine with distal sensillum subapically; dactylus of P1 compact, of P5-7 elongated (width : length (with unguis) of P1 = 1.0 : 5.4, of P7 = 1.0 : 6.6). Unguis only little shorter than dactylus, curved and deeply split into two parts, with acute accessory tooth.

Pleopod 1 (Fig. 32) sympod, shovel-like, with ventral suture, 1.6 times longer than wide, lateral margins concave, proximal quarter broadest, tapering distally, apex slightly broadened, apical margin truncated. Several long setae on apical margin, posterolateral margins each with one small seta. Dorsal surface with slight elevation, covered with fine bristles; lateral rim for reception of margin of pleopod 2. Pleopod 2 (Fig. 32) with large, nearly triangular protopod bearing several simple setae on lateral margin. Exopod small, inserted on mediolateral margin of distal third of protopod, endopod short, two-segmented, inserted proximally of exopod, not extending beyond protopod, first article short, about half as long as second, the latter slightly curved laterally, tapering distally. Pleopods 3-5 (Fig. 31) distinctly smaller than Plp1 and 2. Pleopod 3 with large, triangular endopod bearing three swimming setae on distal margin, exopod about half as long as endopod, nearly rectangular, lateral margin rounded with seven stout setae and fringe of fine bristles. Pleopod 4 with large, curved endopod and slender exopod bearing a long apical swimming seta and fringe of fine bristles on lateral margin. Pleopod 5 uniramous, roughly trian-

gular, more than two times longer than greatest width, without setae.
Uropod (Fig. 27) uniramous, scarcely projecting beyond terminal margin of pleotelson, protopod with one seta, apical ramus with at least one simple and three plumose setae.
Remarks
The species was found off the South African coast during the Expedition of RV "Vema". The original description (Menzies 1962) reports three female specimens only, and presents no more than a rough drawing of the dorsal habitus and a short text. However, the examined holotype from the AMNH collection is a subadult male specimen. The gender identity given by Menzies was obviously incorrect. The comparison with the DIVA specimens revealed no distinct differences between the type and the new material. Therefore the three new specimens are allocated to *Haploniscus nondescriptus*.

Discussion

The monophyly of the genus *Haploniscus* cannot be verified by any autapomorphy. For further phylogenetic studies of the family a redescription of numerous species is necessary.
The original publication by Richardson (1908) is problematic already because it describes the genus without a rostral process, whereas a short rostrum can be found in the type species. About 60% of the presently known species of *Haploniscus* possess a rostrum. The morphological heterogeneity of the genus is obvious, yet its revision depends on a closer phylogenetic analysis of the family Haploniscidae, which will probably result in the establishment of several new genera and the transfer of some species to other genera.

Acknowledgements

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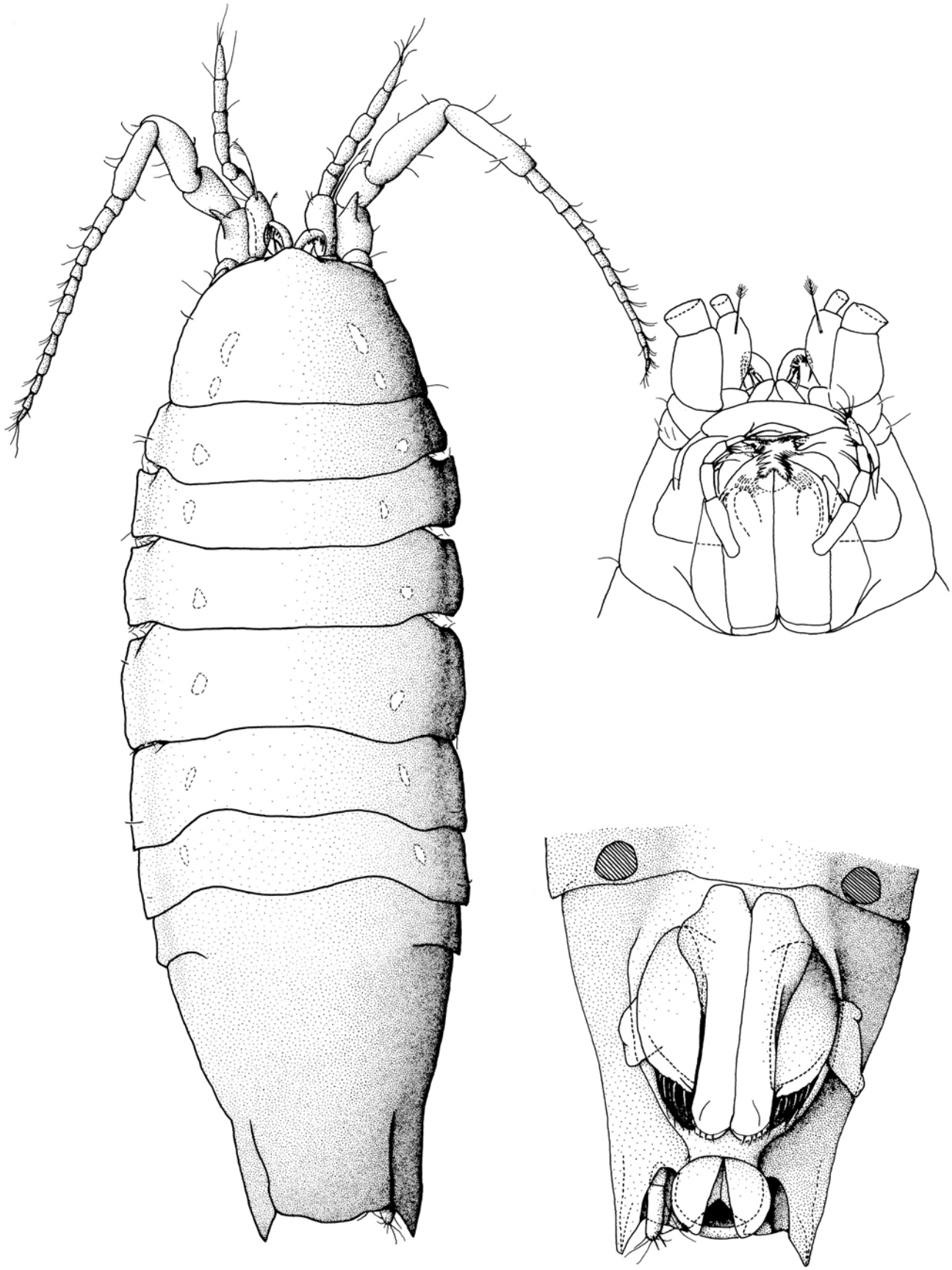

Fig. 1. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, dorsal view, ventral view of cephalon and pleotelson.

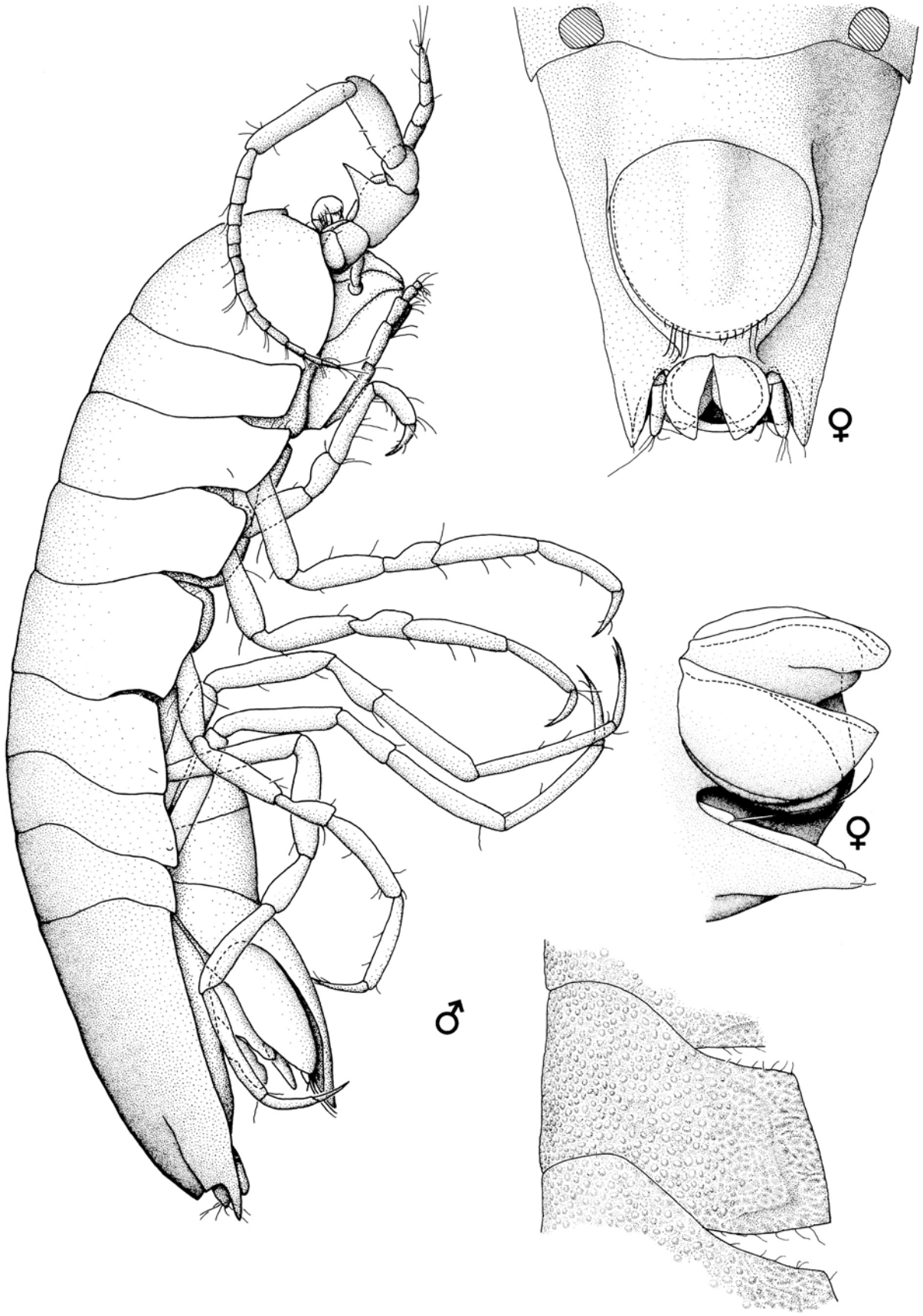

Fig. 2. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, lateral view, structure of pereonite surface; ♀, ventral view of pleotelson, anal valves.

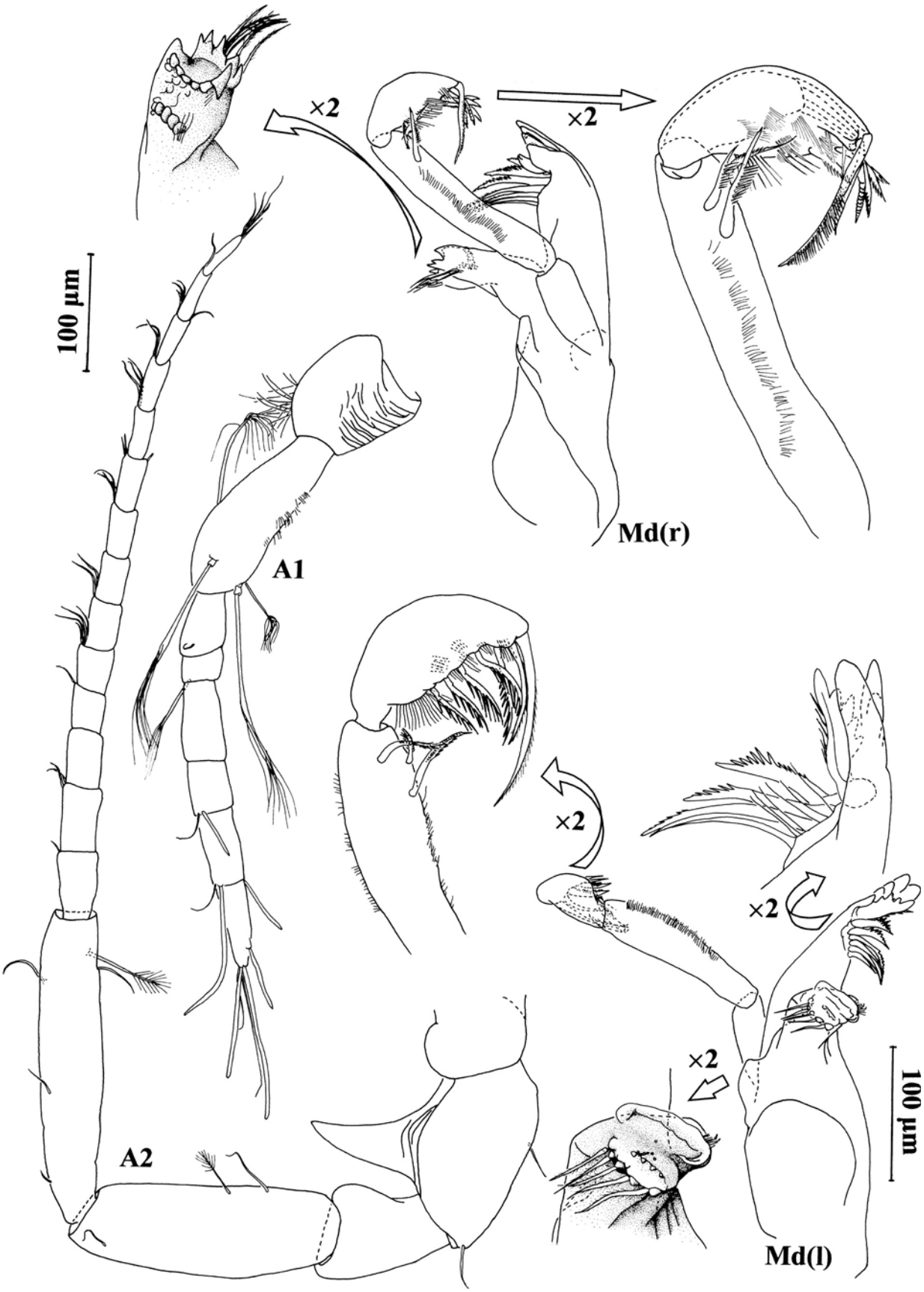

Fig. 3. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, antennae, mandibles.

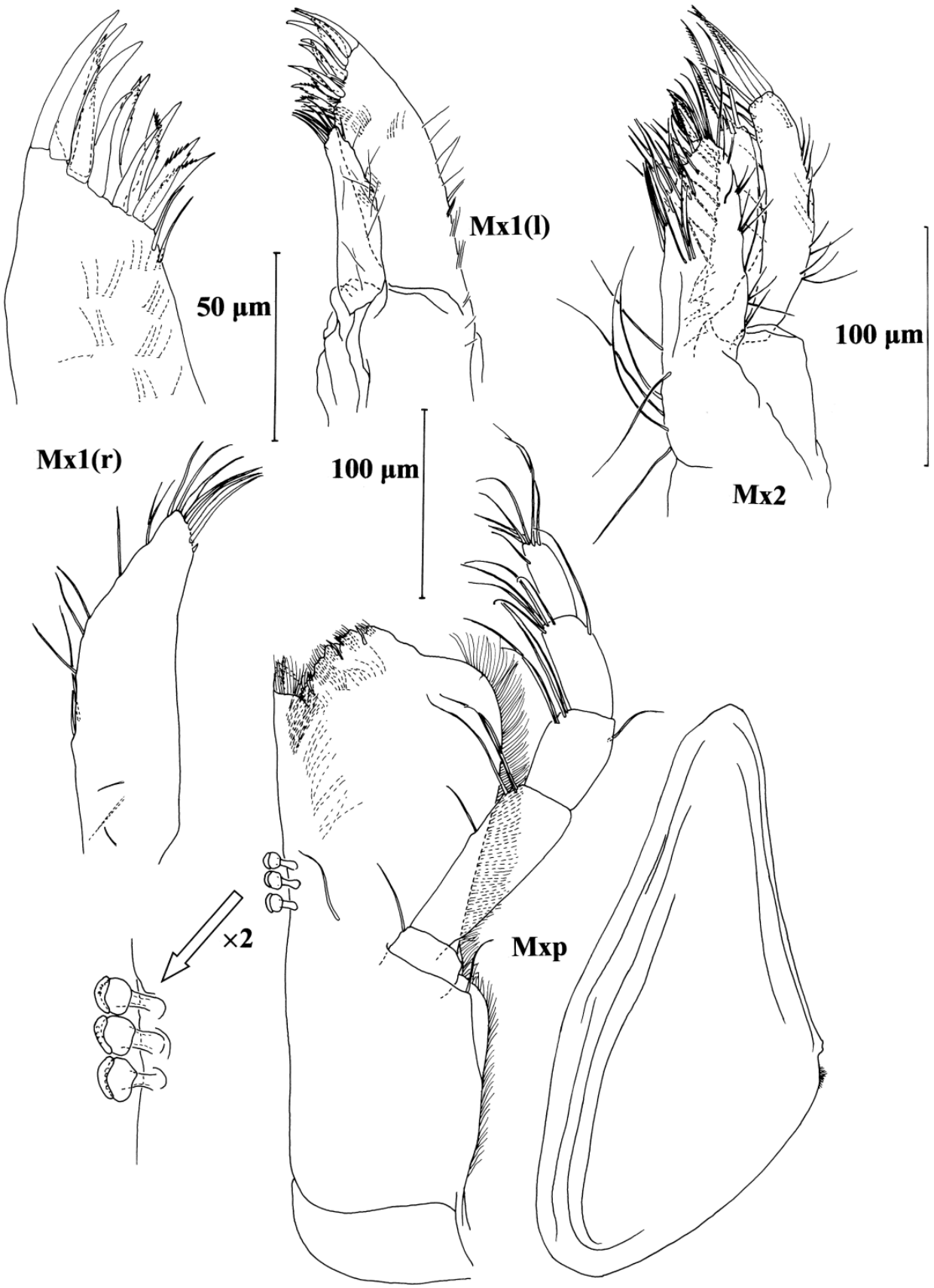

Fig. 4. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, maxillae, maxilliped.

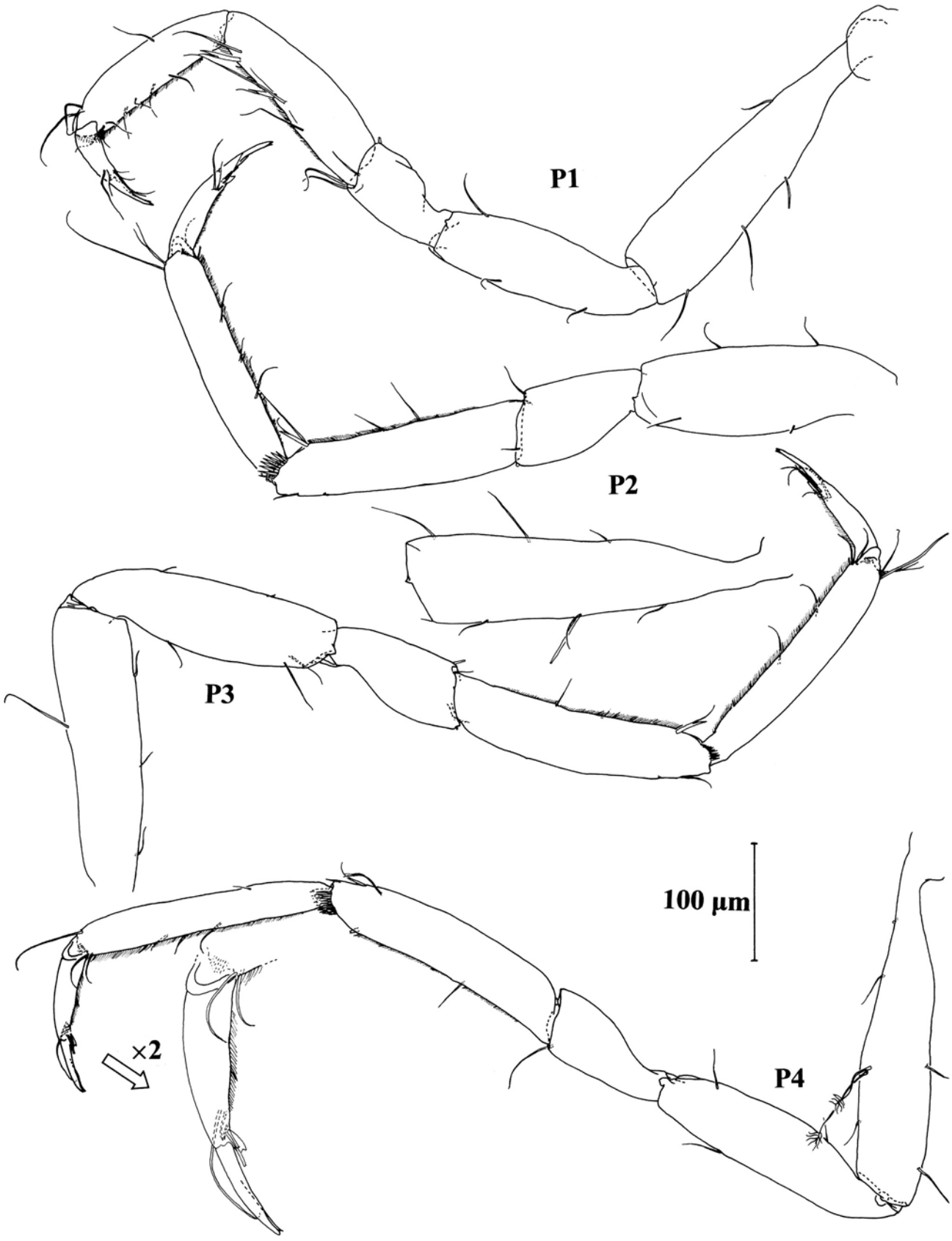

Fig. 5. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, pereopods 1-4.

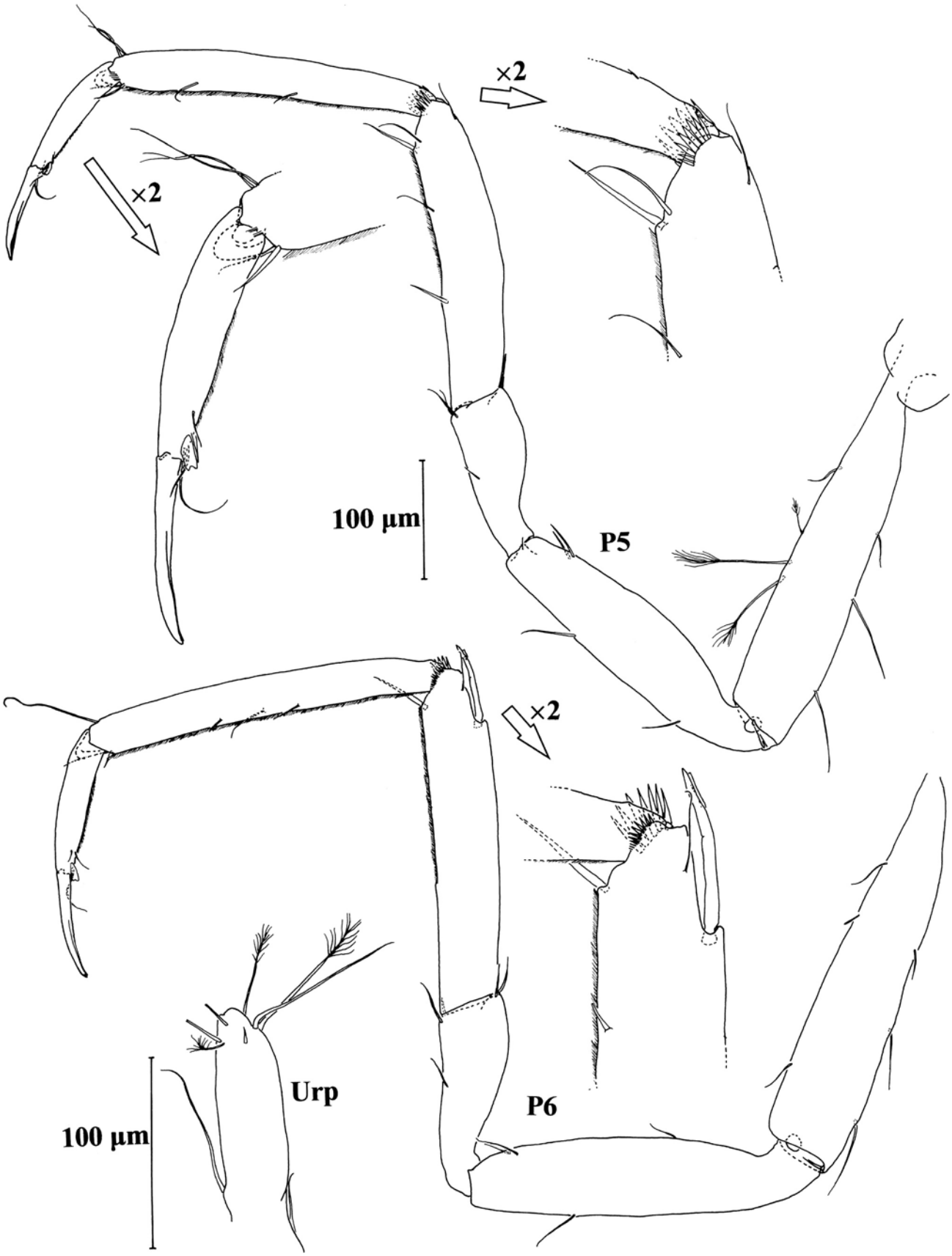

Fig. 6. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, pereopods 5-6, uropod.

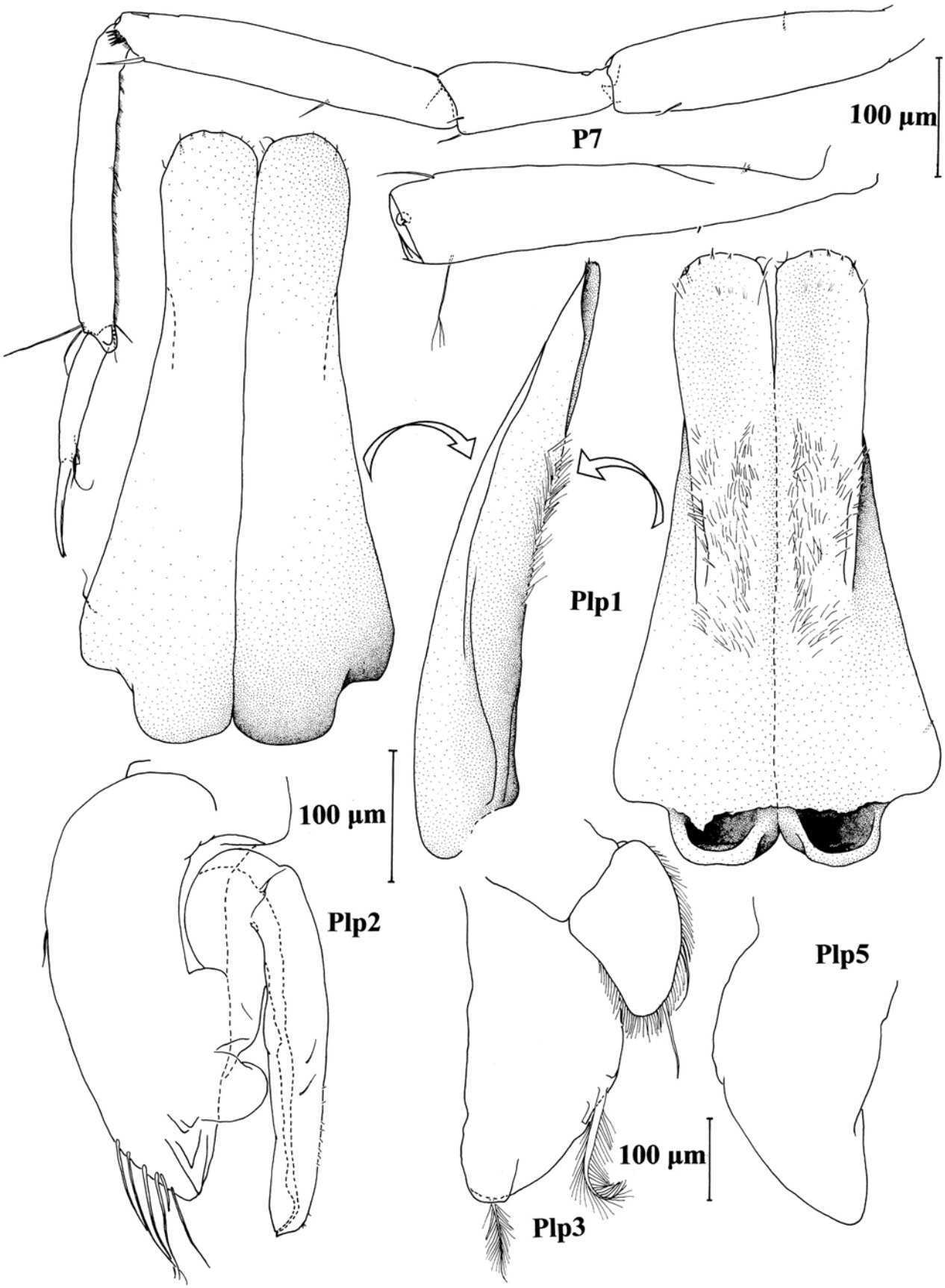

Fig. 7. *Haploniscus bicuspis* (Sars, 1877); ♂, 2.0 mm, pereopod 7, pleopods.

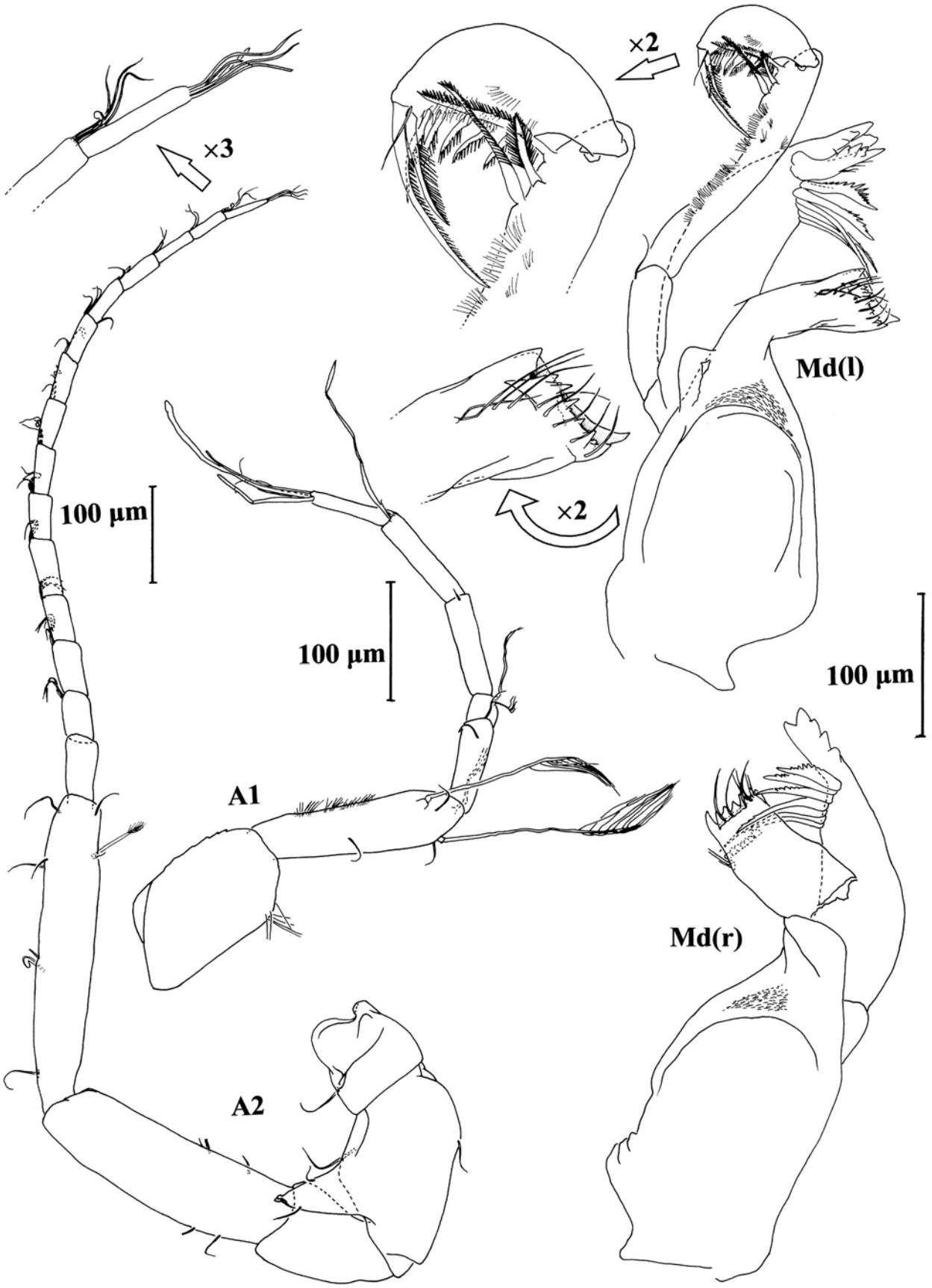

Fig. 8. *Haploniscus bicuspis* (Sars, 1877); ♀, 2.75 mm, antennae, mandibles.

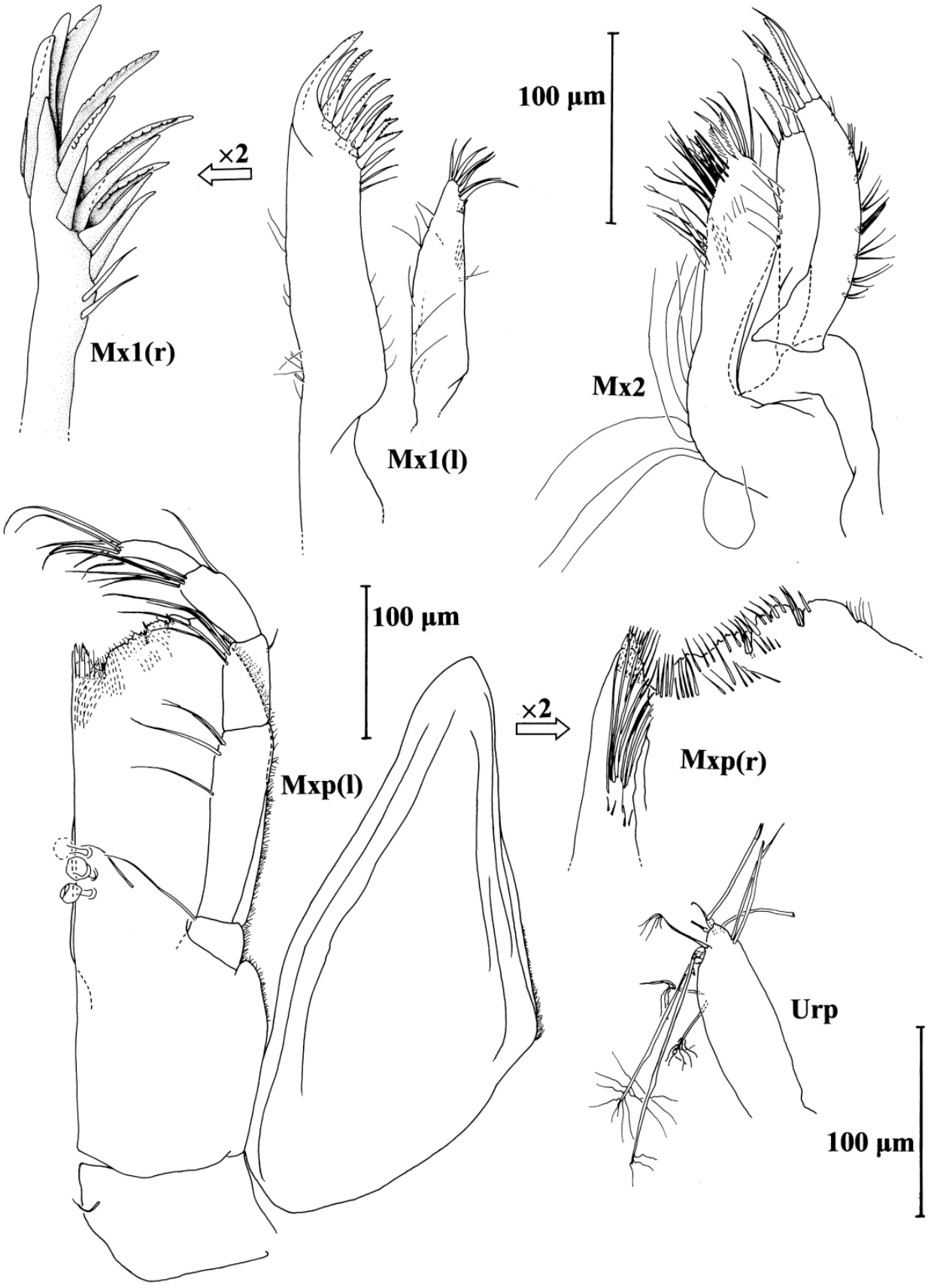

Fig. 9. *Haploniscus bicuspis* (Sars, 1877); ♀, 2.75 mm, maxillae, maxilliped, uropod.

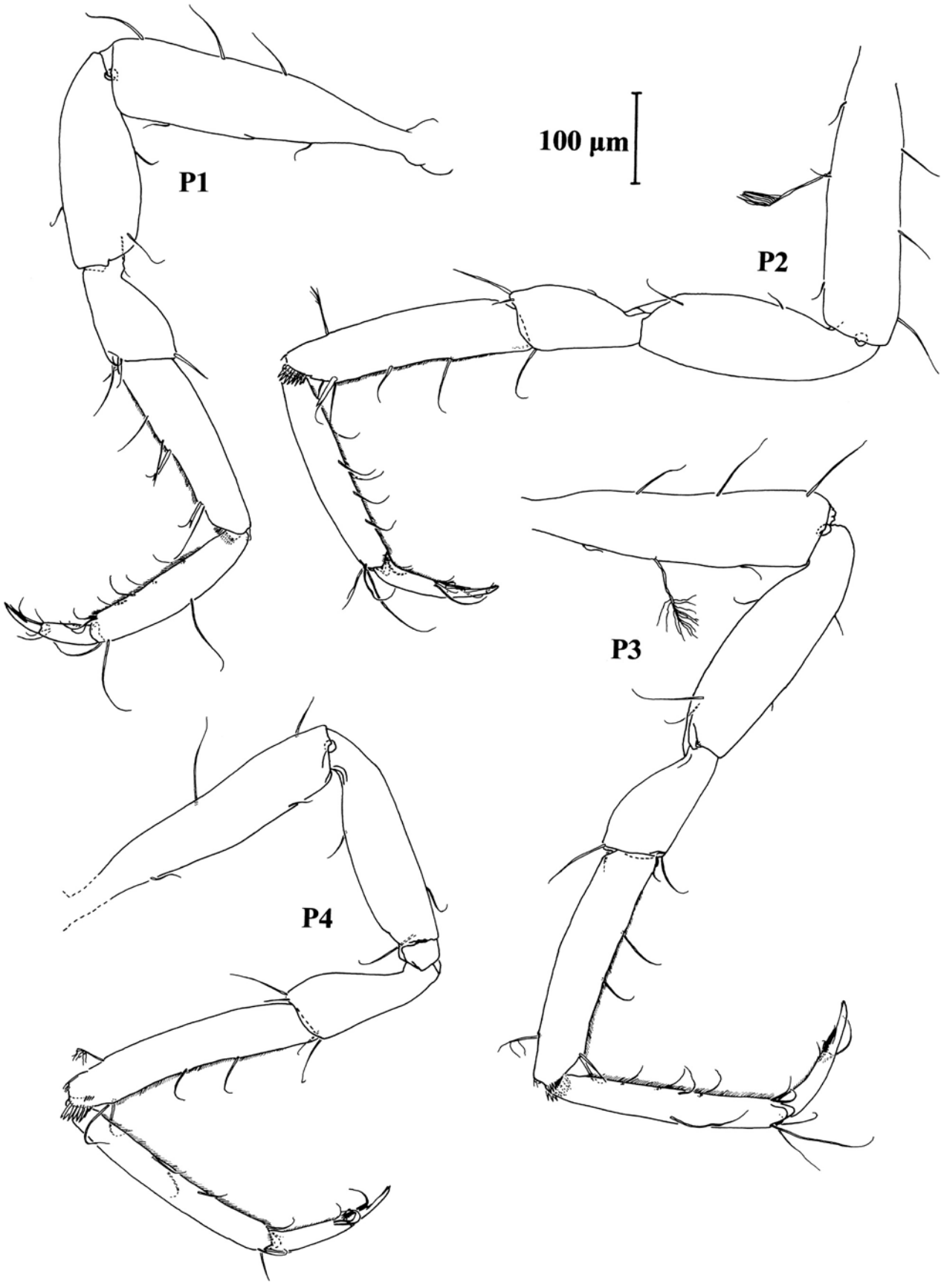

Fig. 10. *Haploniscus bicuspis* (Sars, 1877); ♀, 2.75 mm, pereopods 1-4.

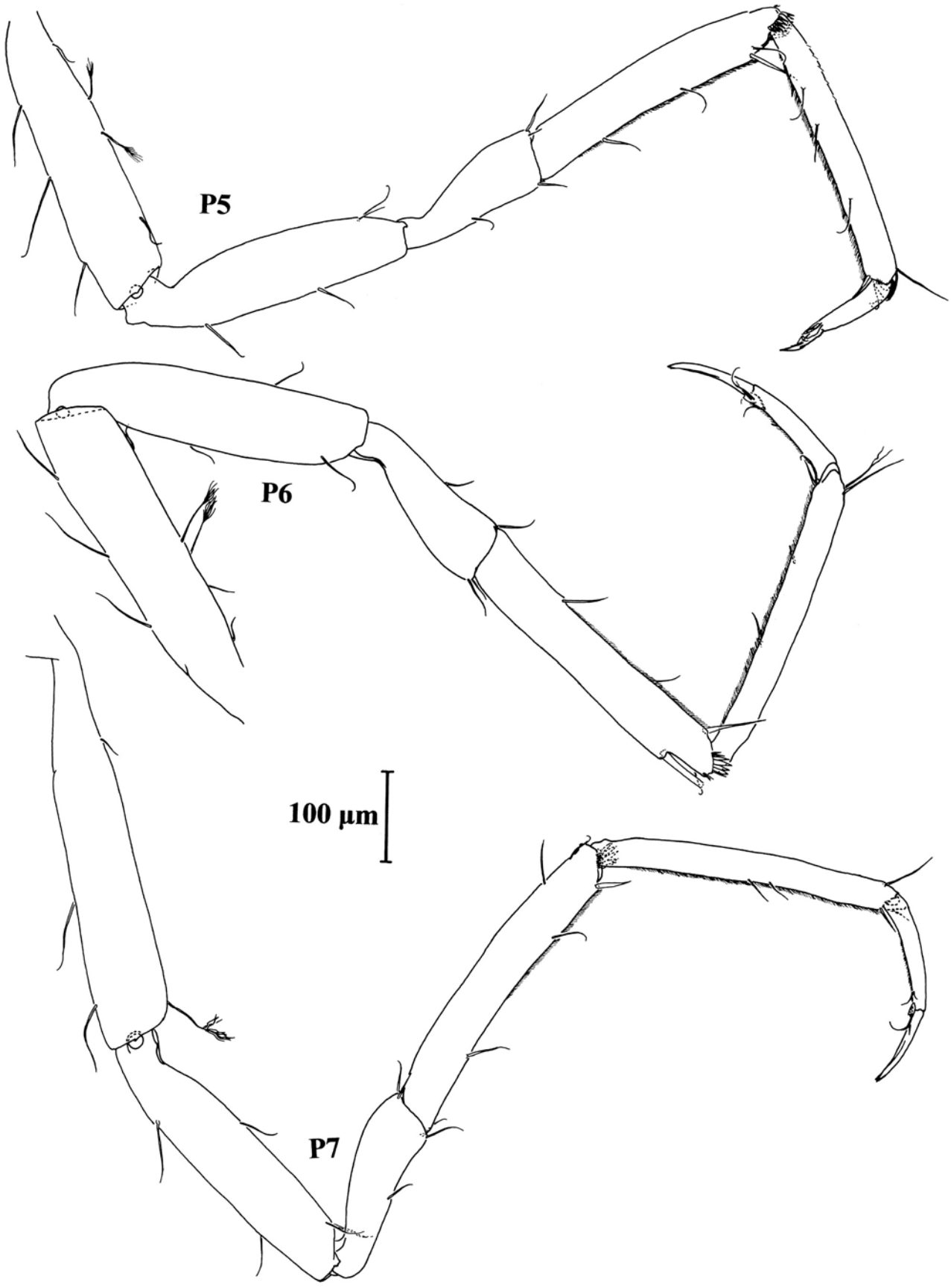

Fig. 11. *Haploniscus bicuspis* (Sars, 1877); ♀, 2.75 mm, pereopods 5-7.

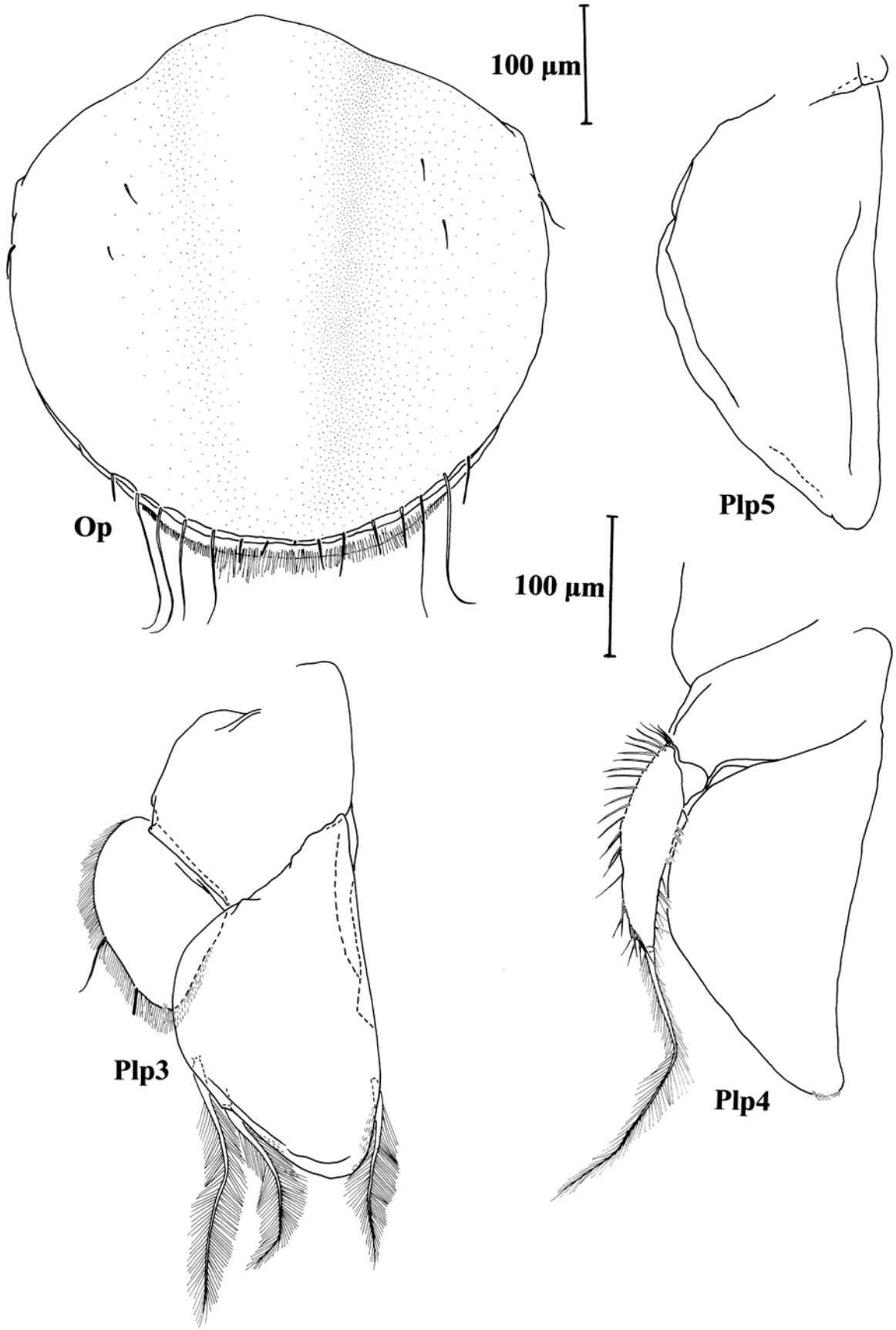

Fig. 12. *Haploniscus bicuspis* (Sars, 1877); ♀, 2.75 mm, pleopods.

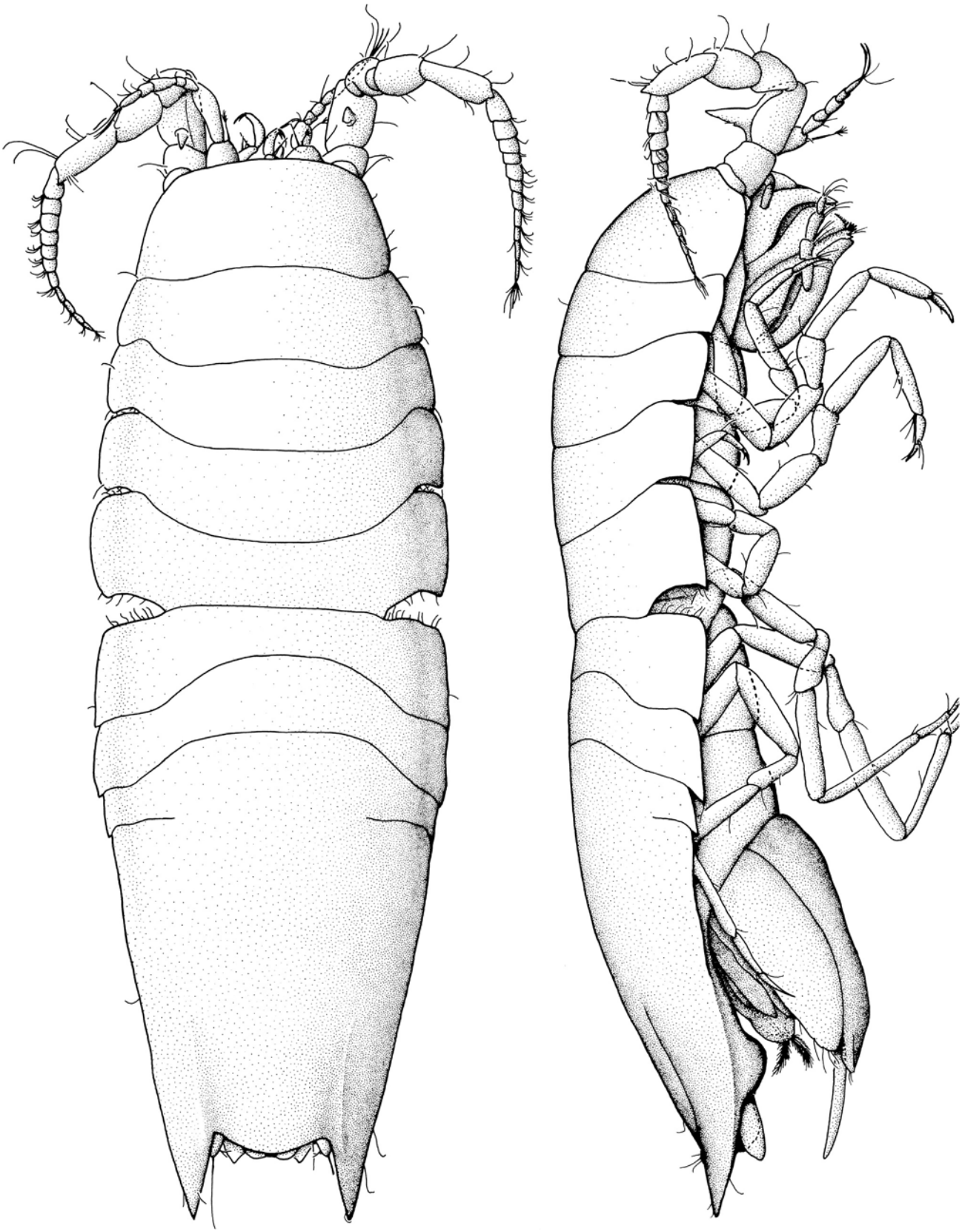

Fig. 13. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, dorsal and lateral views.

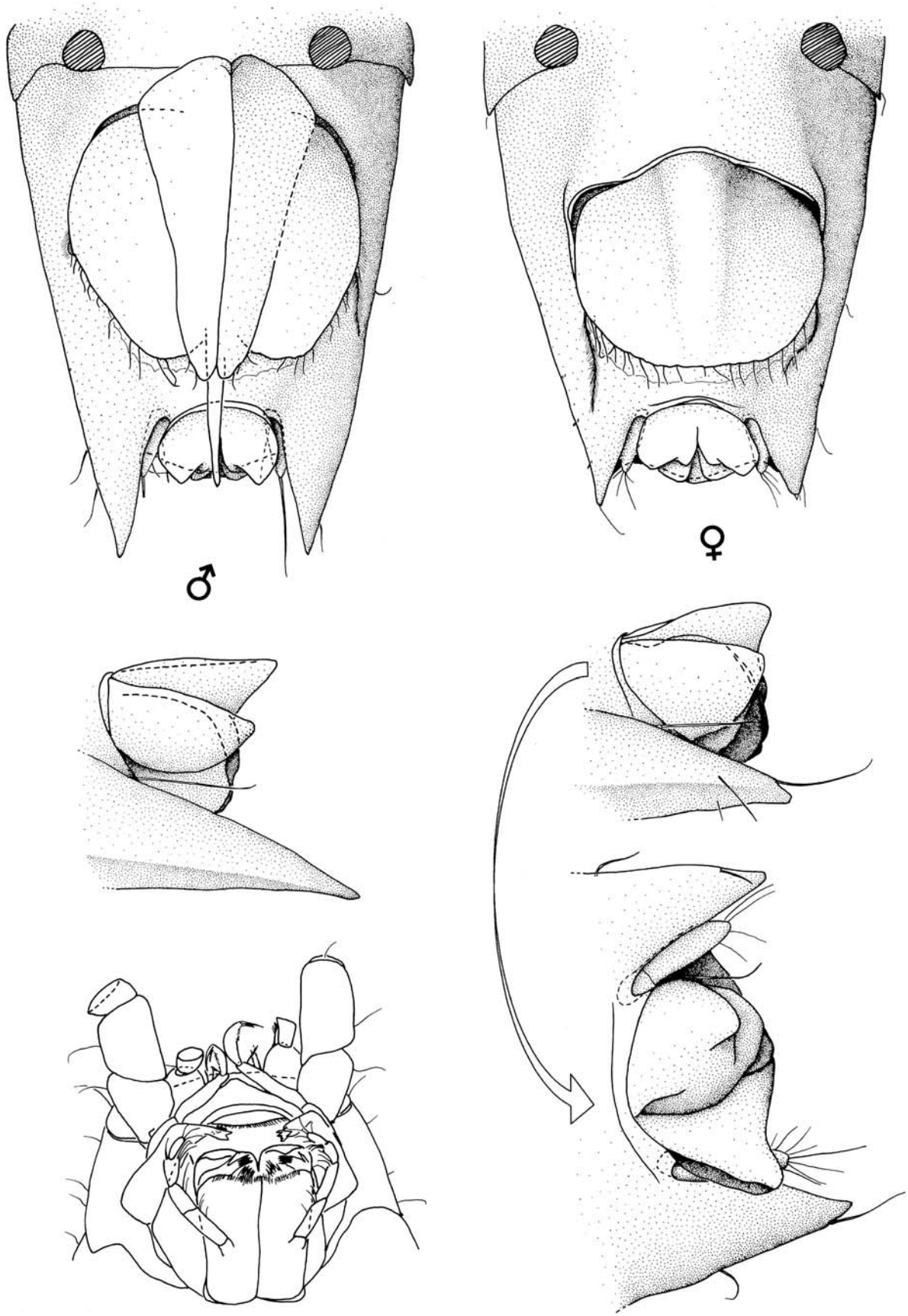

Fig. 14. *Haploniscus spinifer* Hansen, 1916; left: ♂, 2.05 mm, ventral view of pleotelson, anal valves and ventral view of cephalon; right: ♀, 2.1 mm, ventral view of pleotelson, anal valves.

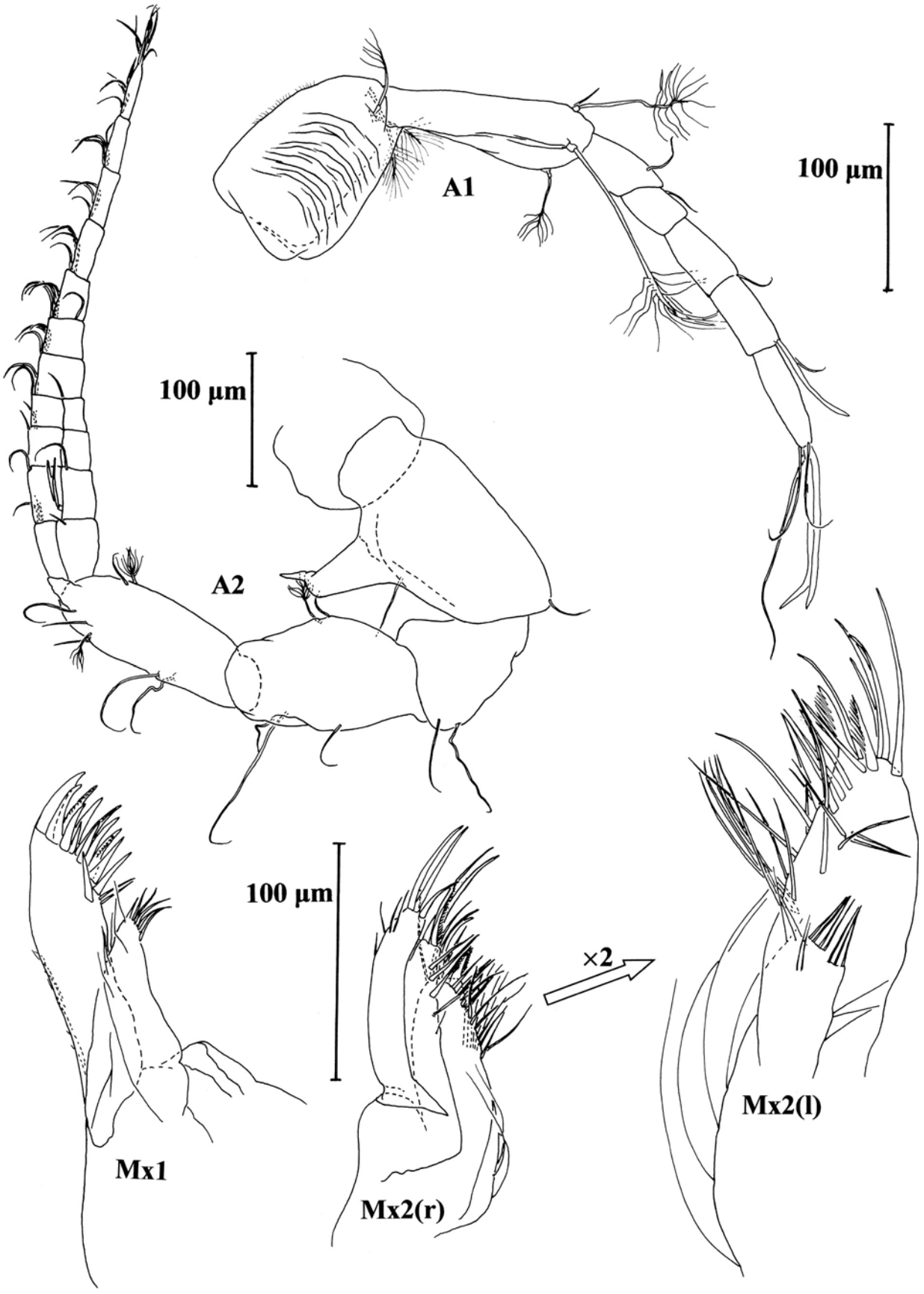

Fig. 15. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, antennae, maxillae.

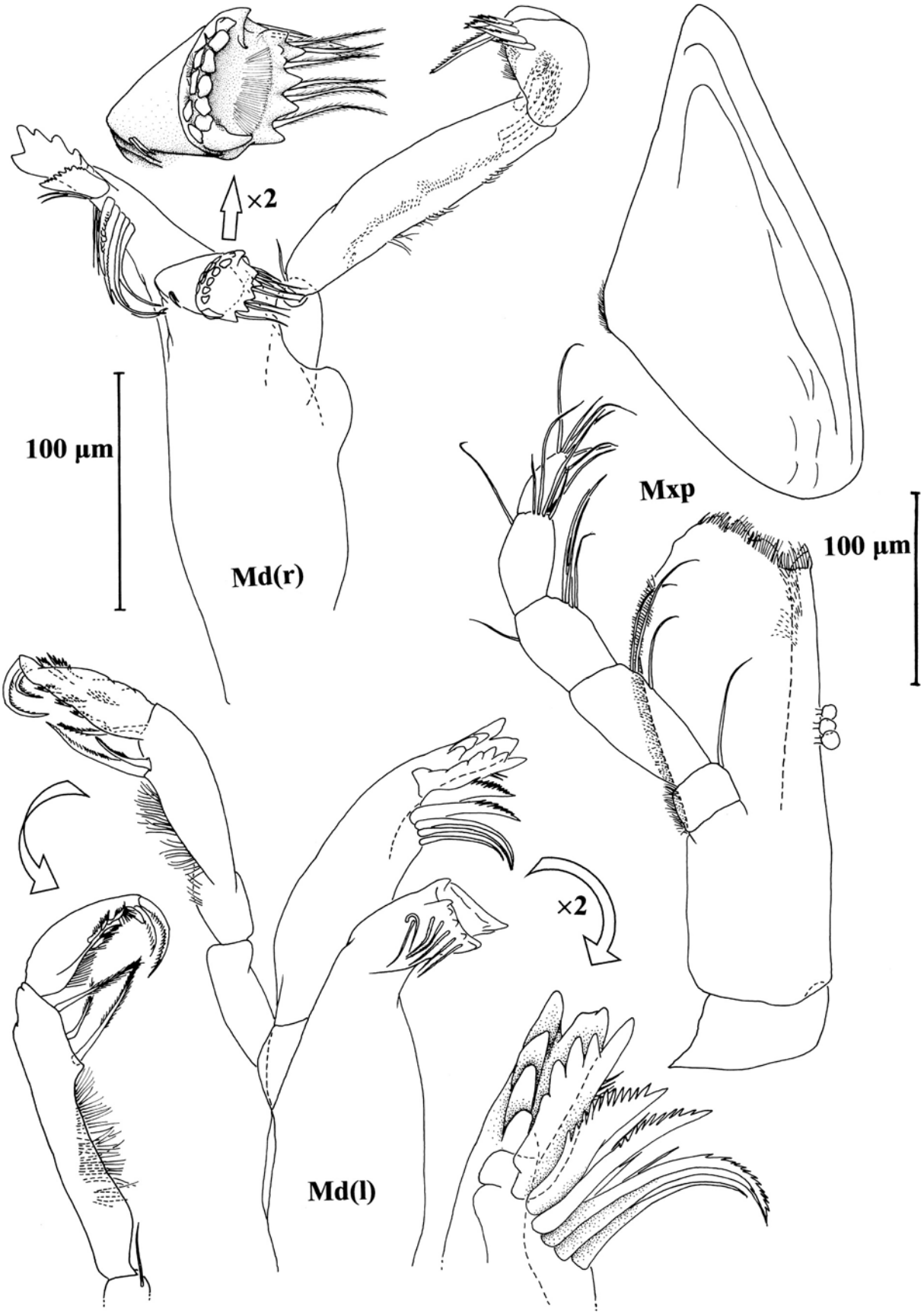

Fig. 16. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, mandibles, maxilliped.

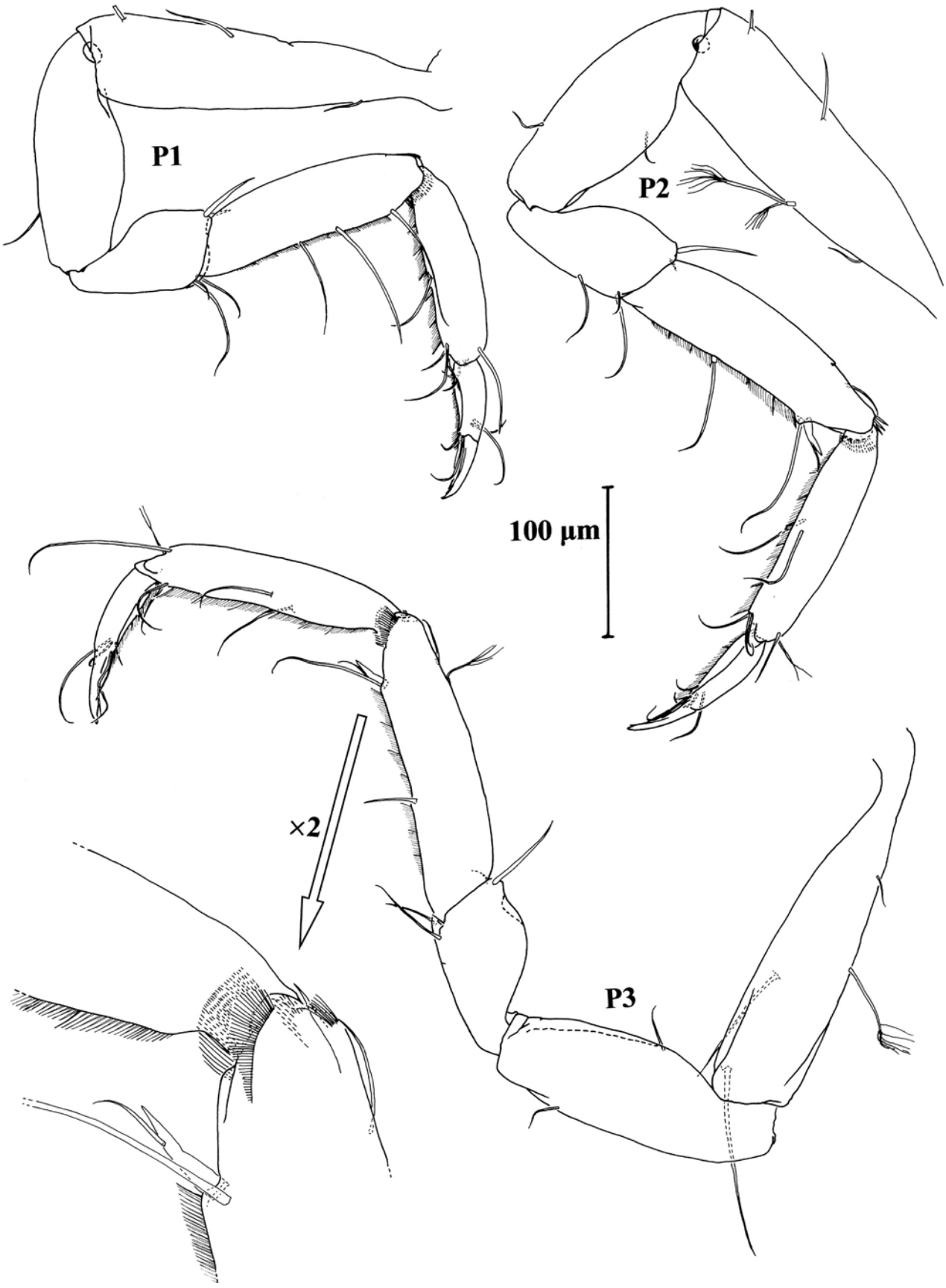

Fig. 17. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, pereopods 1-3.

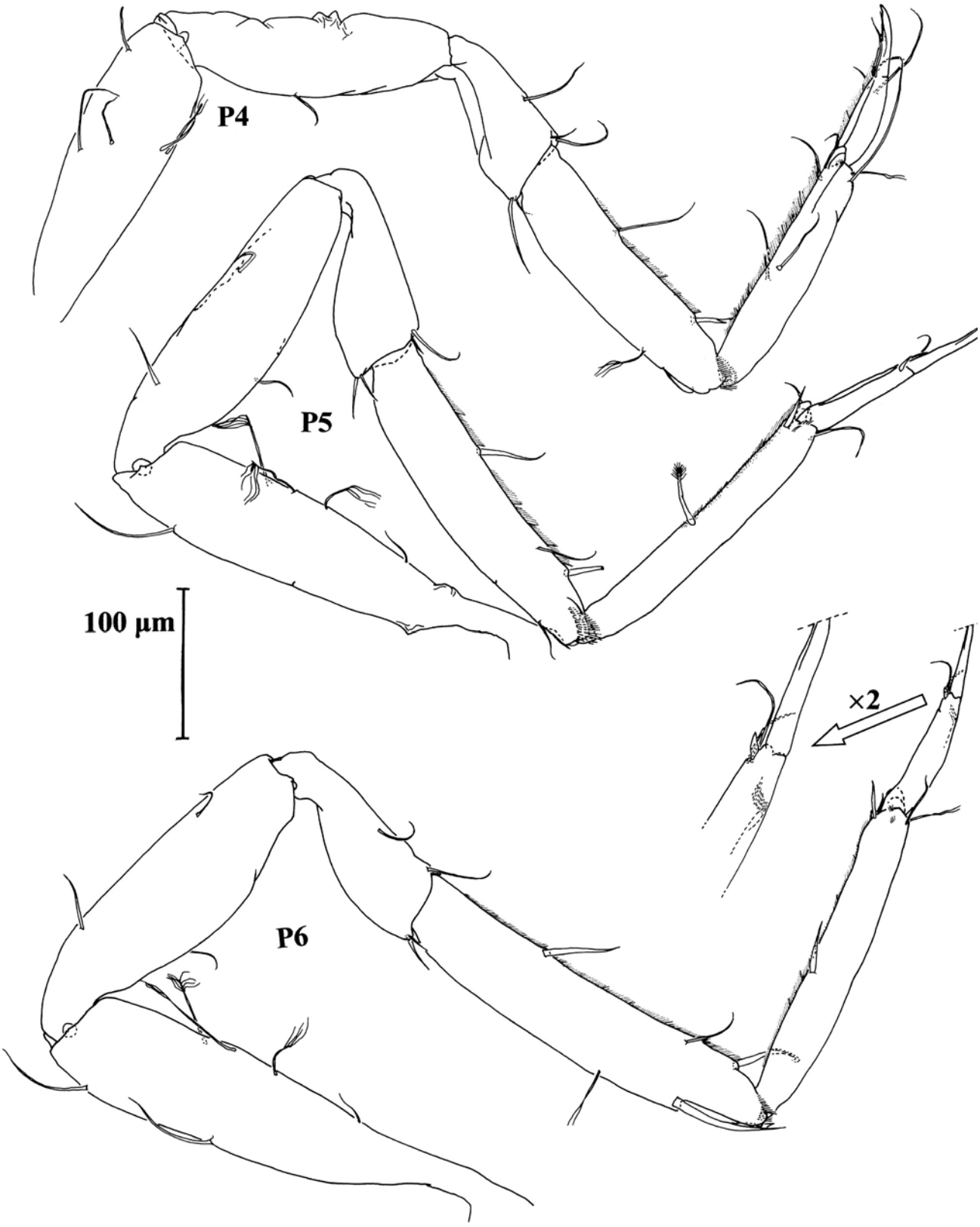

Fig. 18. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, pereopods 4-6.

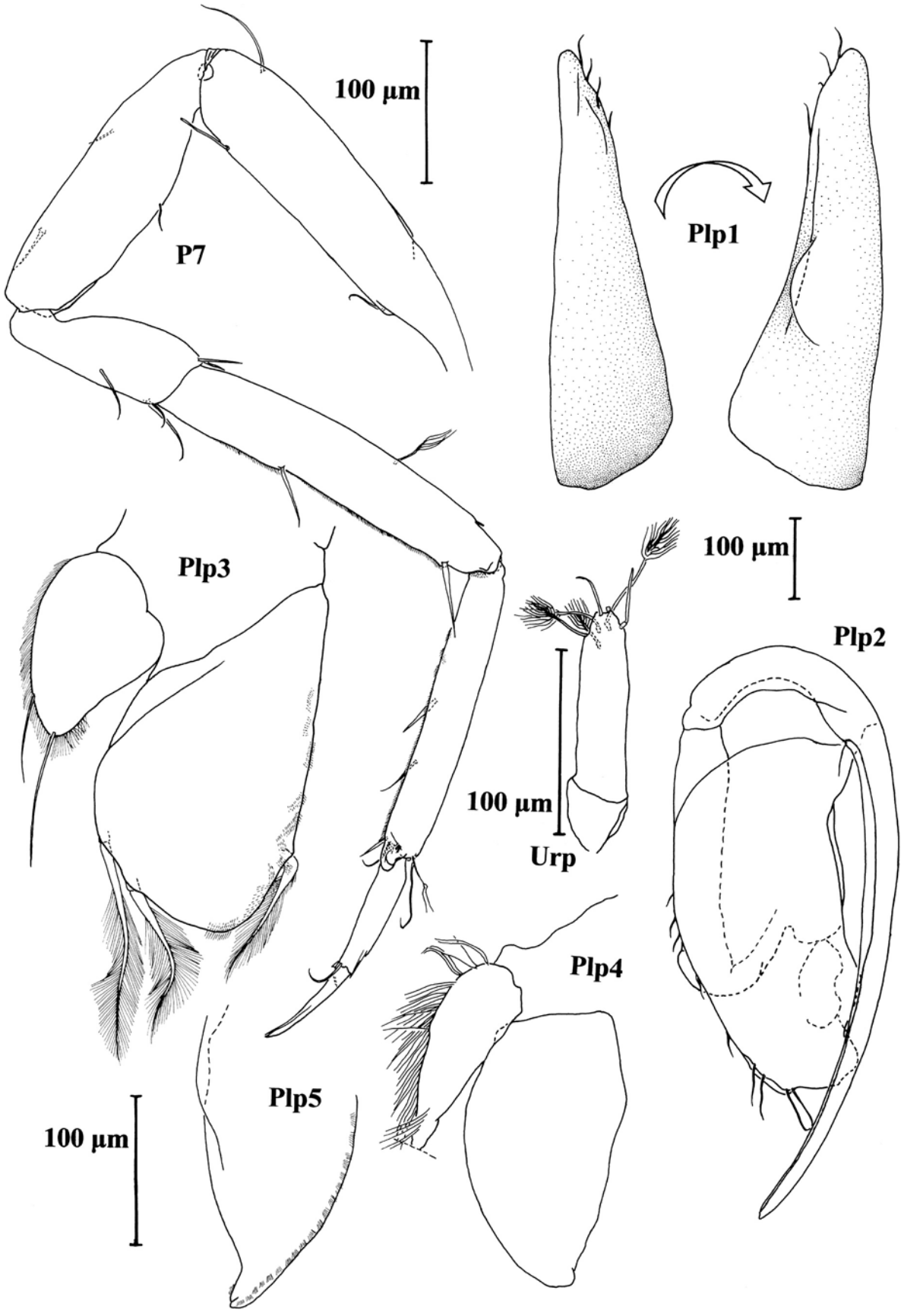

Fig. 19. *Haploniscus spinifer* Hansen, 1916; ♂, 2.05 mm, pereopod 7, pleopods, uropod.

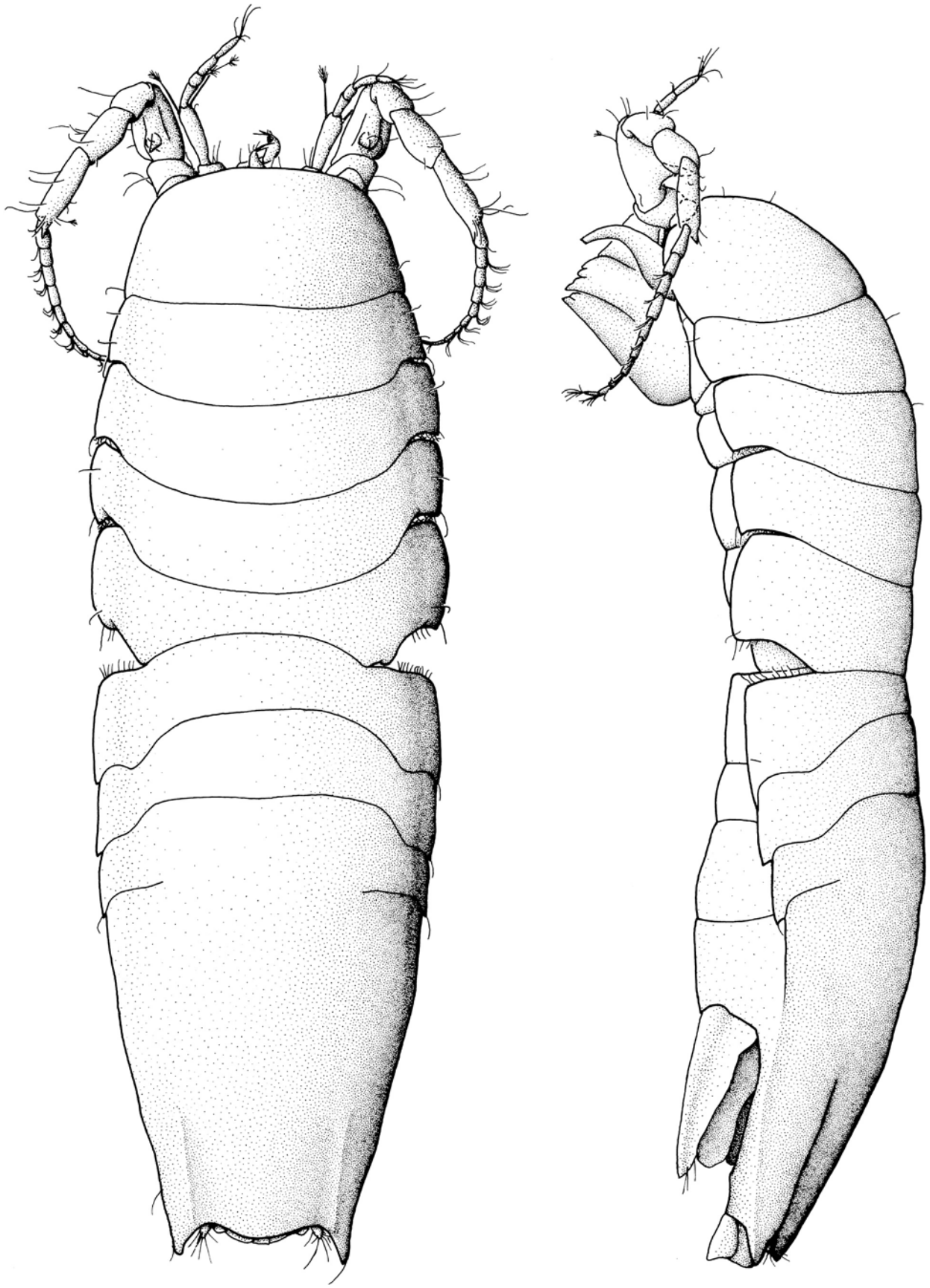

Fig. 20. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, dorsal and lateral views.

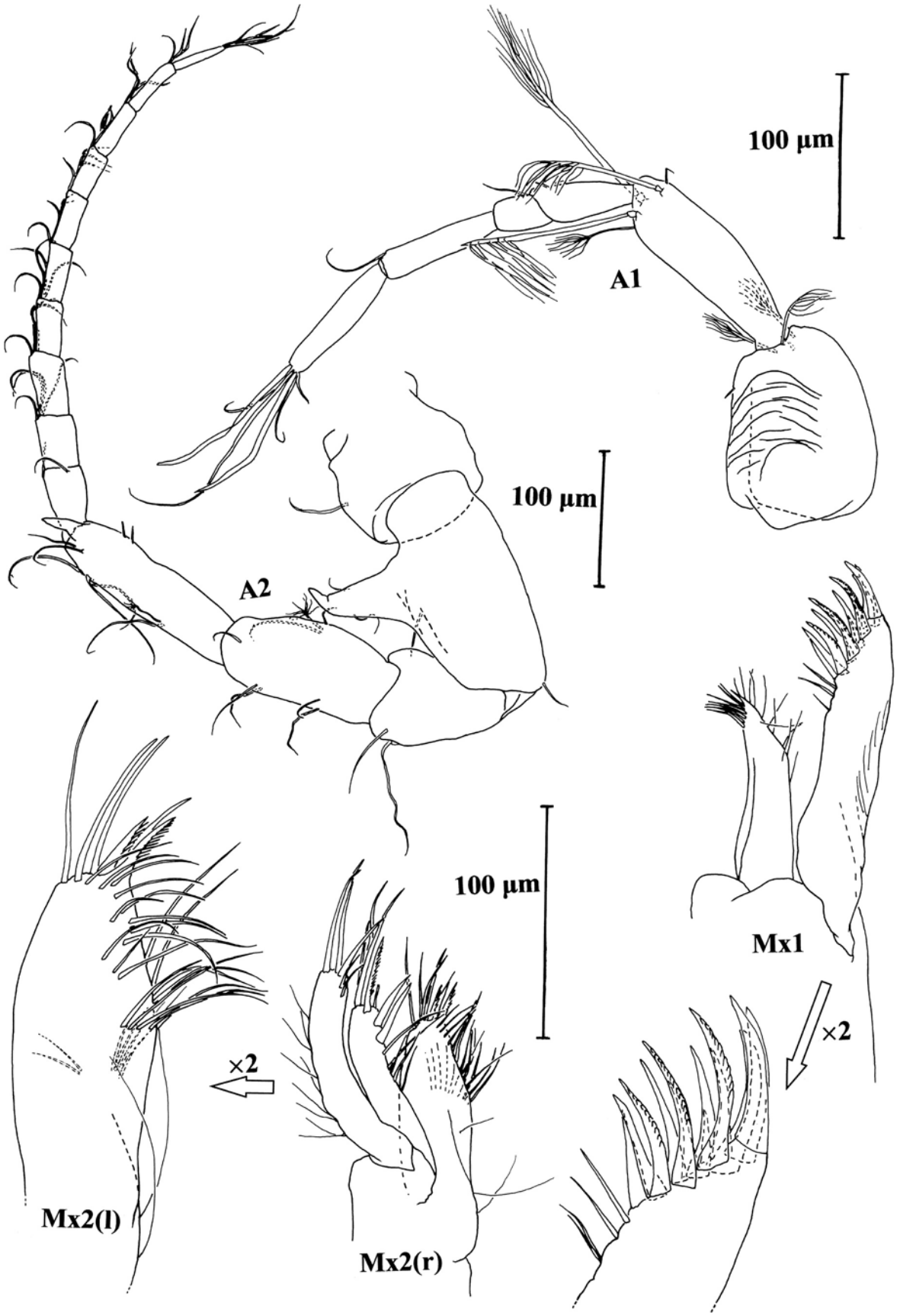

Fig. 21. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, antennae, maxillae.

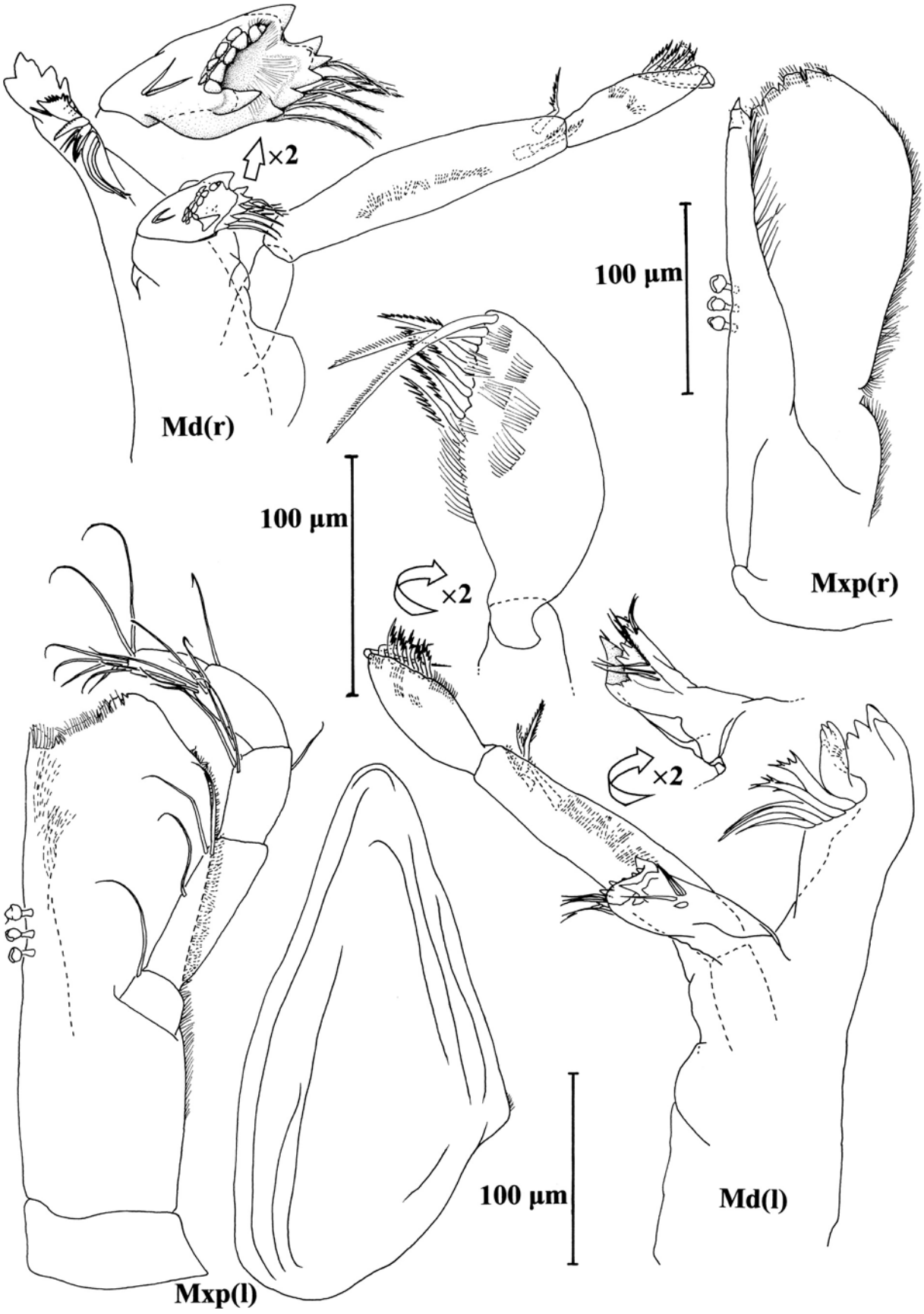

Fig. 22. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, mandibles, maxilliped.

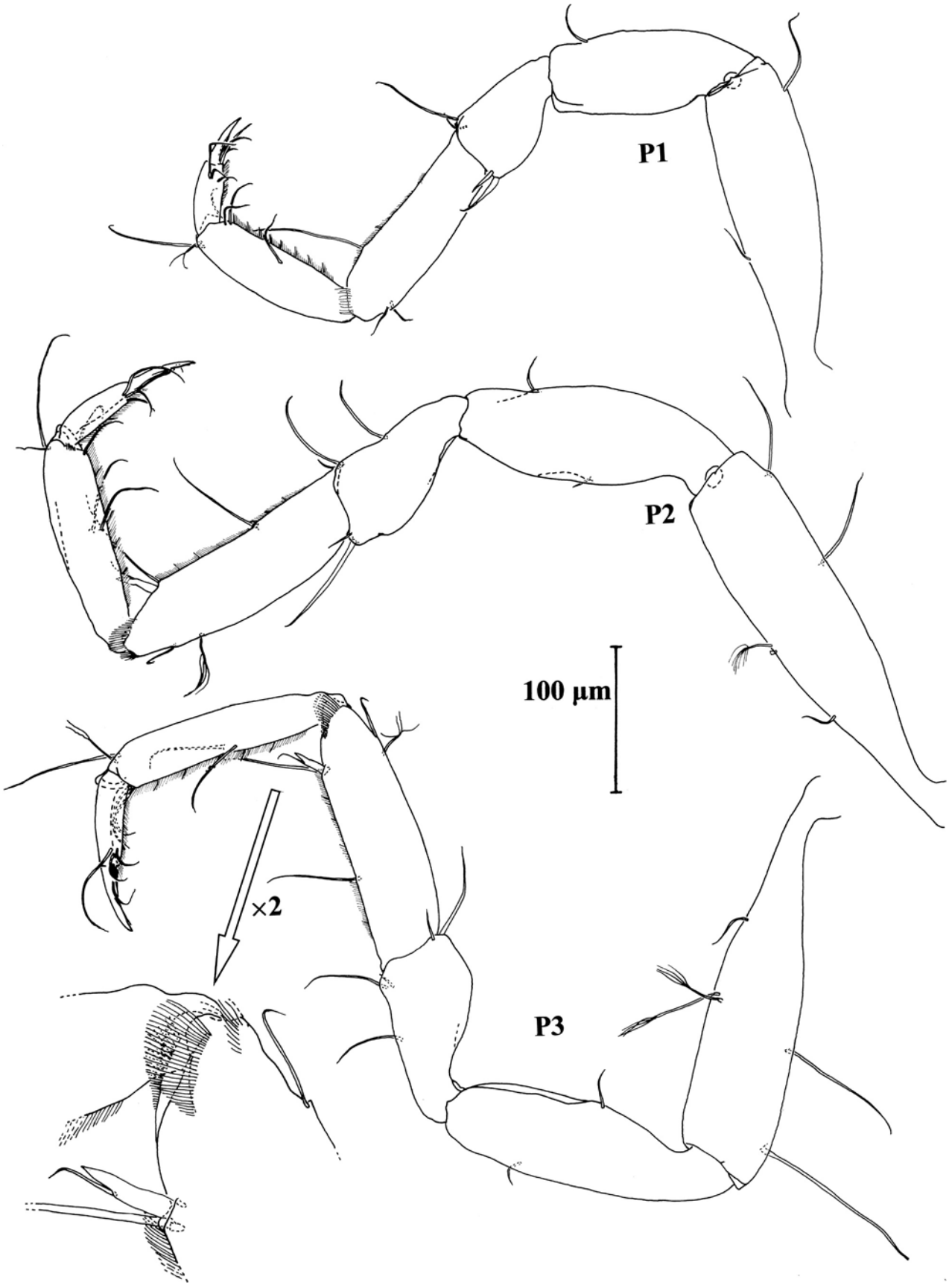

Fig. 23. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, pereopods 1-3.

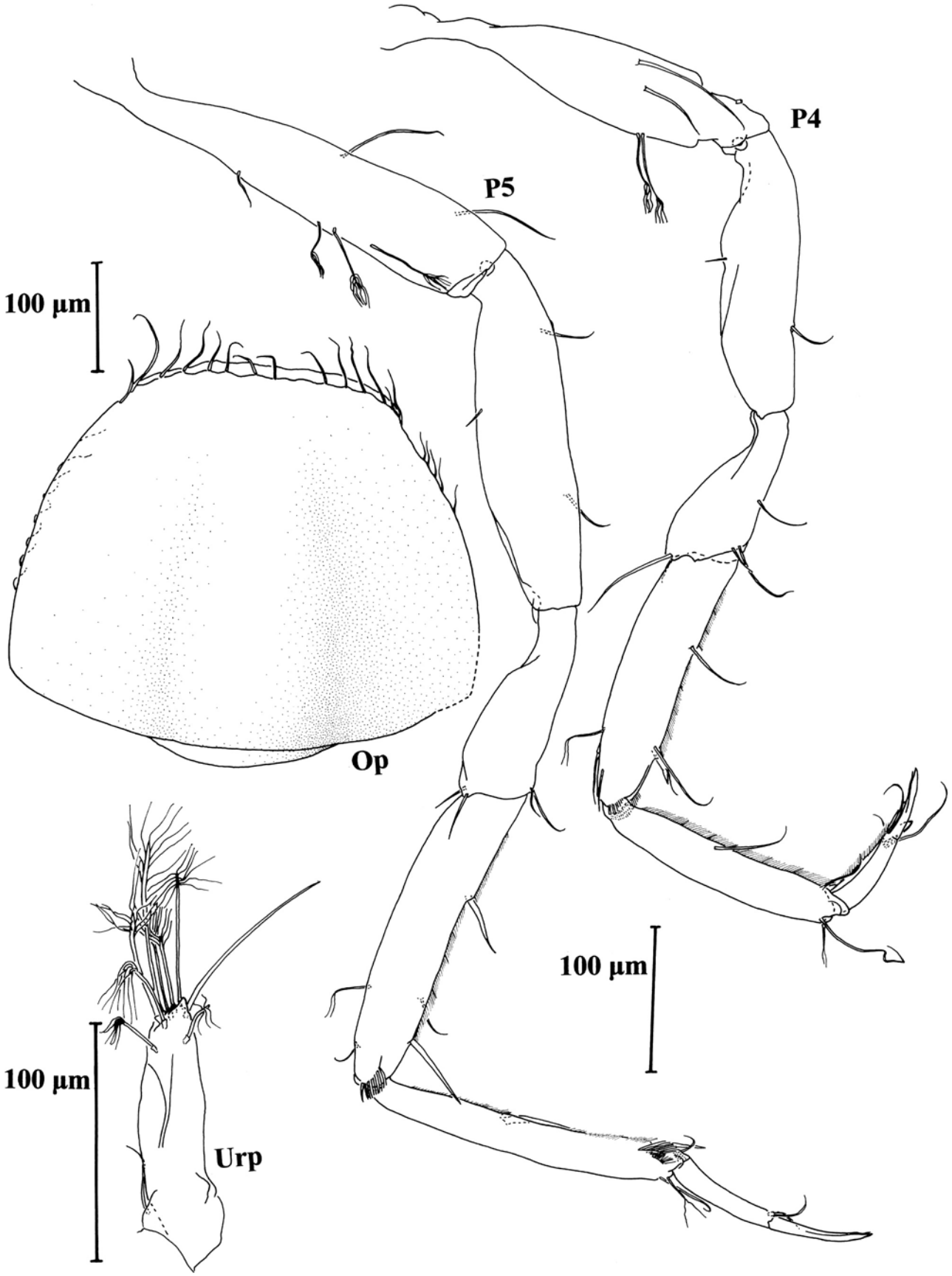

Fig. 24. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, pereopods 4-5, operculum (pleopod 2), uropod.

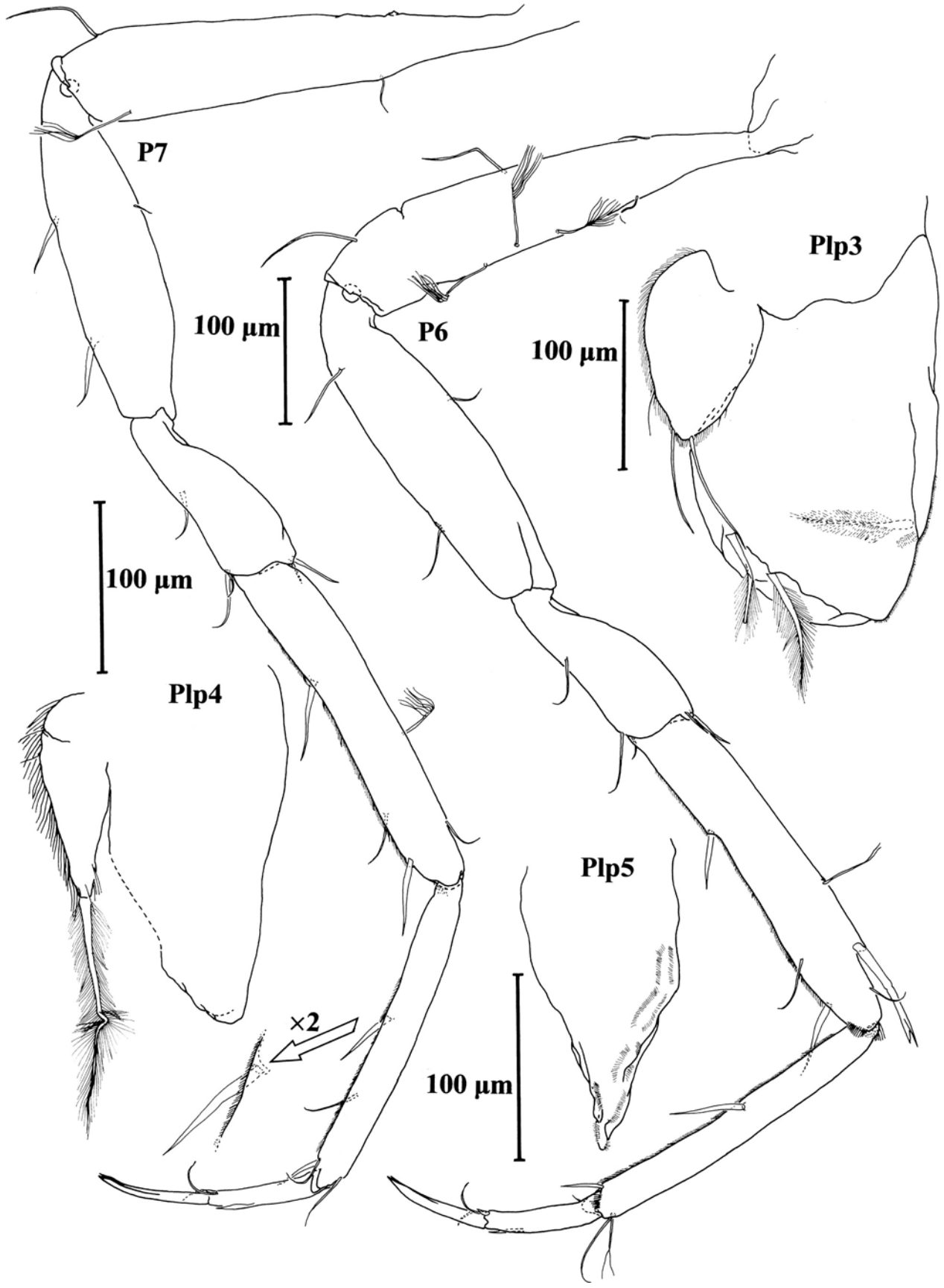

Fig. 25. *Haploniscus spinifer* Hansen, 1916; ♀, 2.1 mm, pereopods 6-7, pleopods 3-5.

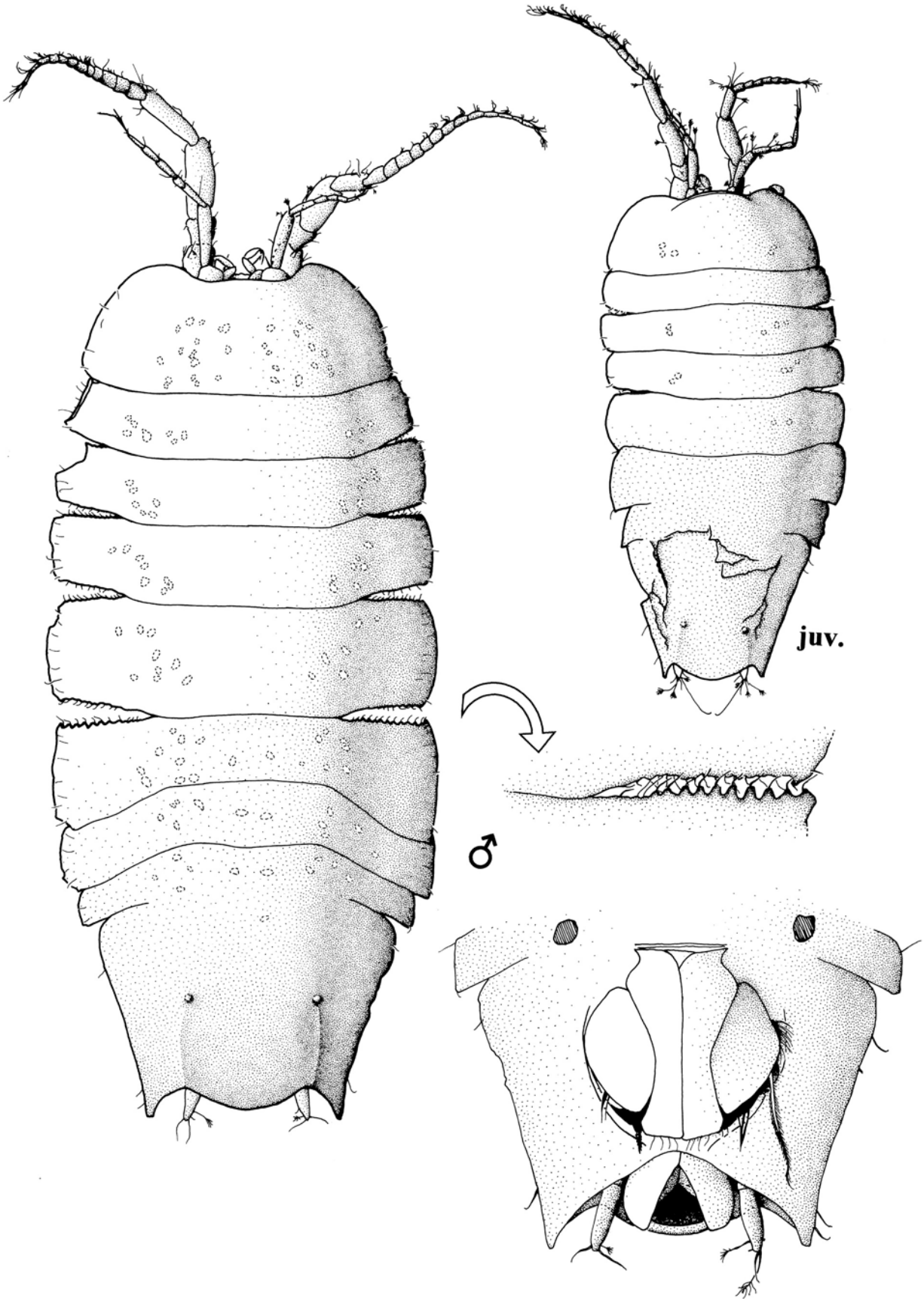

Fig. 26. *Haploniscus nondescriptus* Menzies, 1962, ♂, 3.2 mm, dorsal view, detail of pereonite margins, ventral view of pleotelson; juvenile specimen, 1.6 mm.

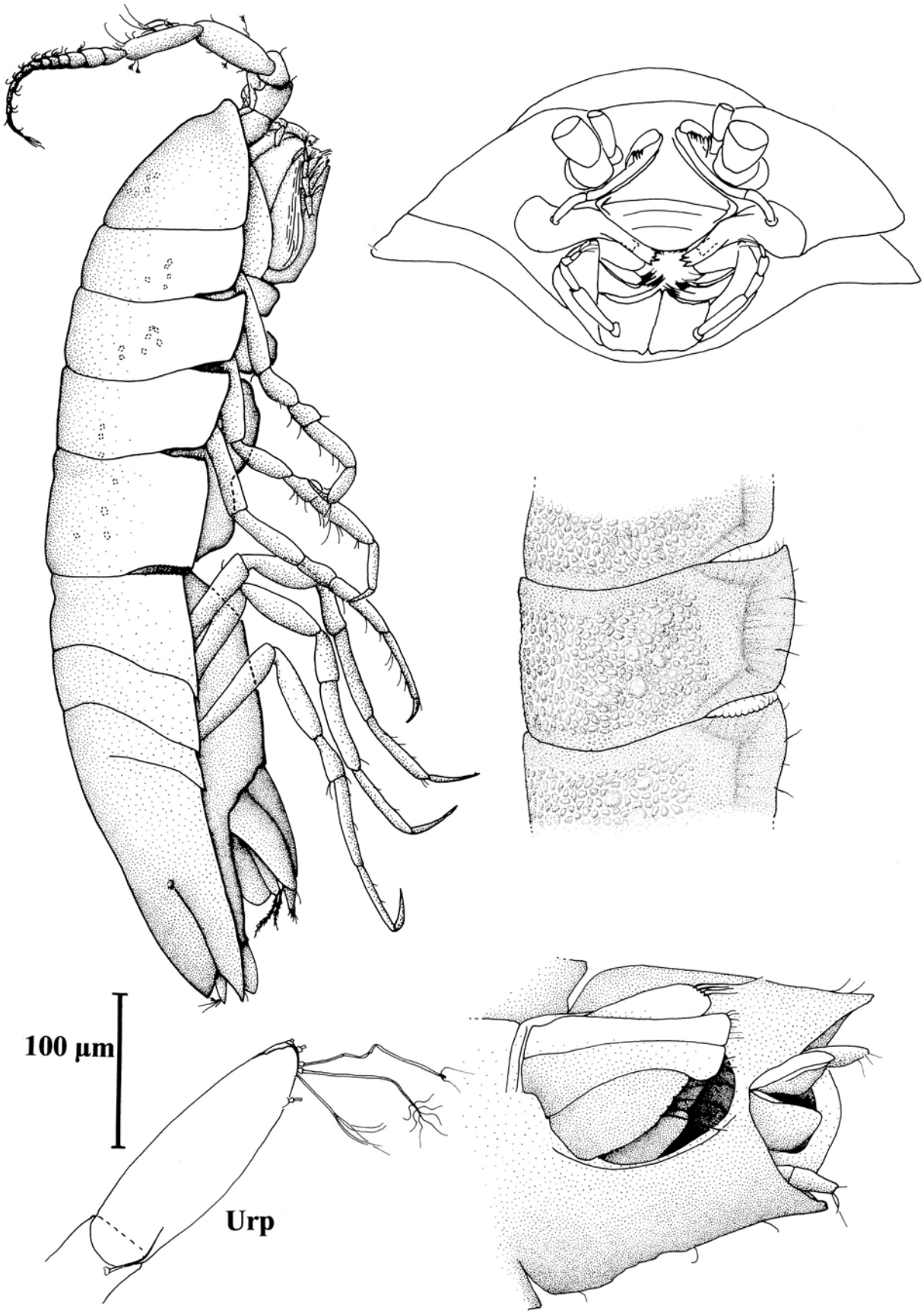

Fig. 27. *Haploniscus nondescriptus* Menzies, 1962; ♂, 3.2 mm, lateral view, anteroventral view of cephalon, structure of pereonite surface, uropod, lateral view of pleotelson.

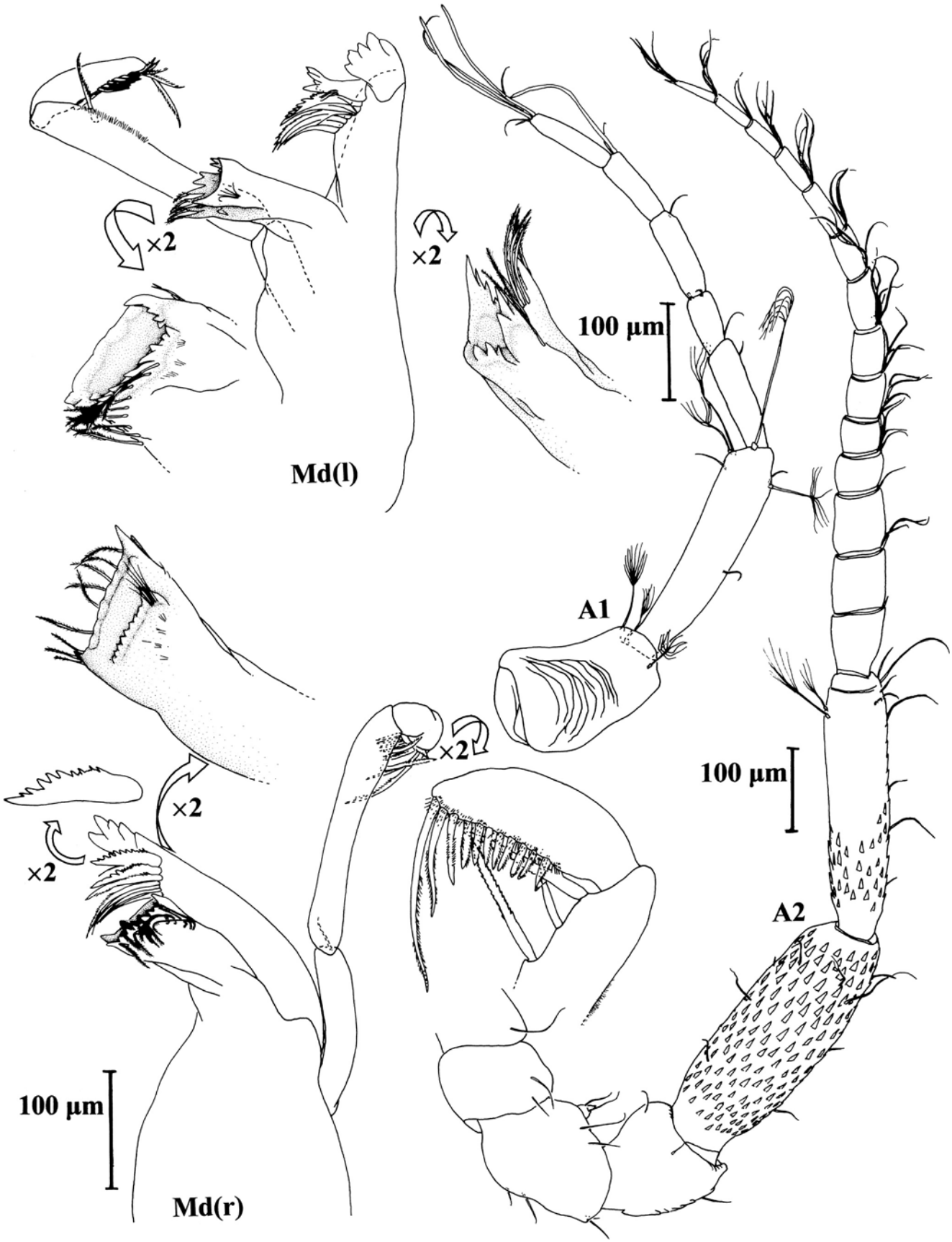

Fig. 28. *Haploniscus nondescriptus* Menzies, 1962; ♂, 3.2 mm, antennae, mandibles.

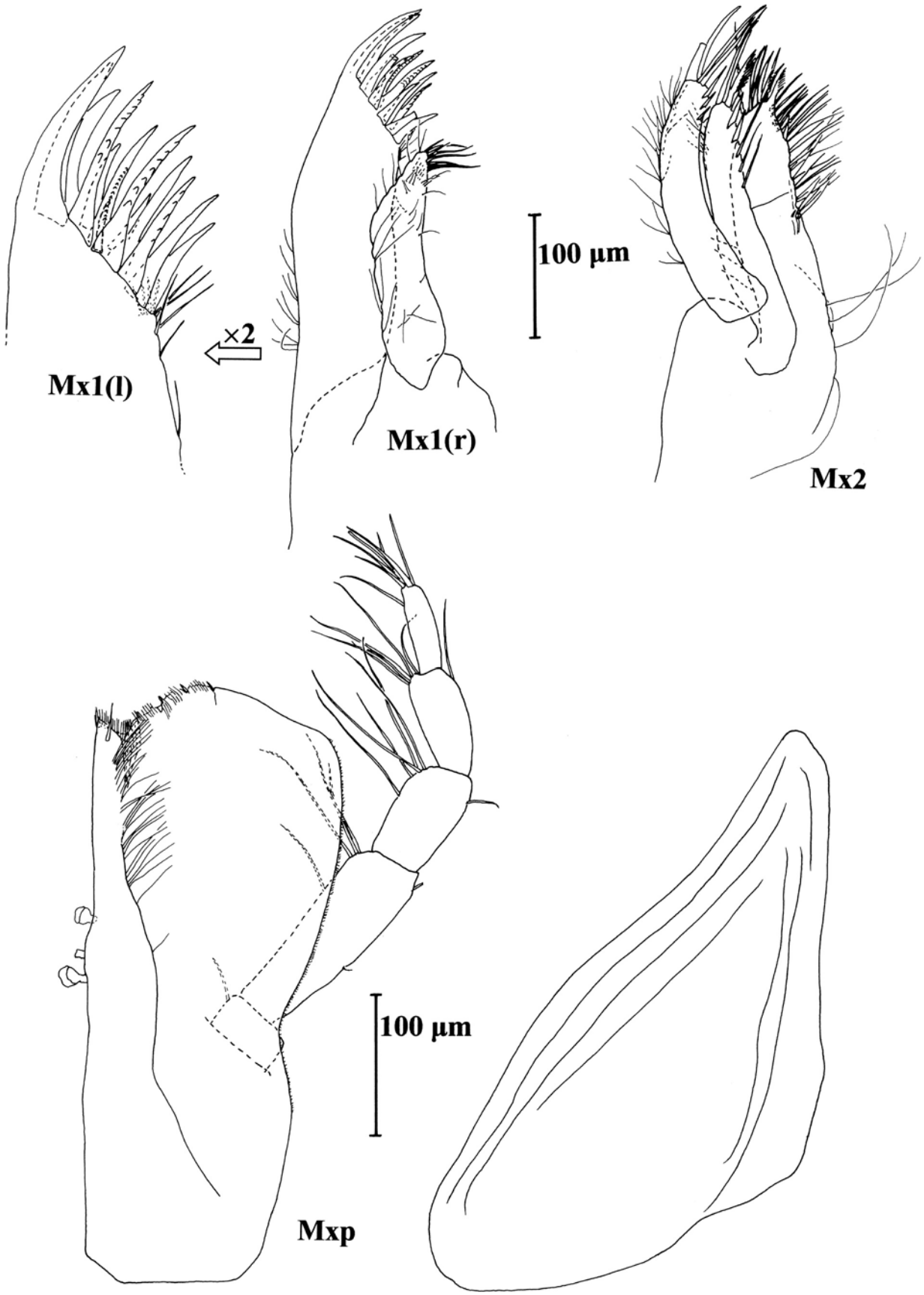

Fig. 29. *Haploniscus nondescriptus* Menzies, 1962; ♂, 3.2 mm, maxillae, maxilliped.

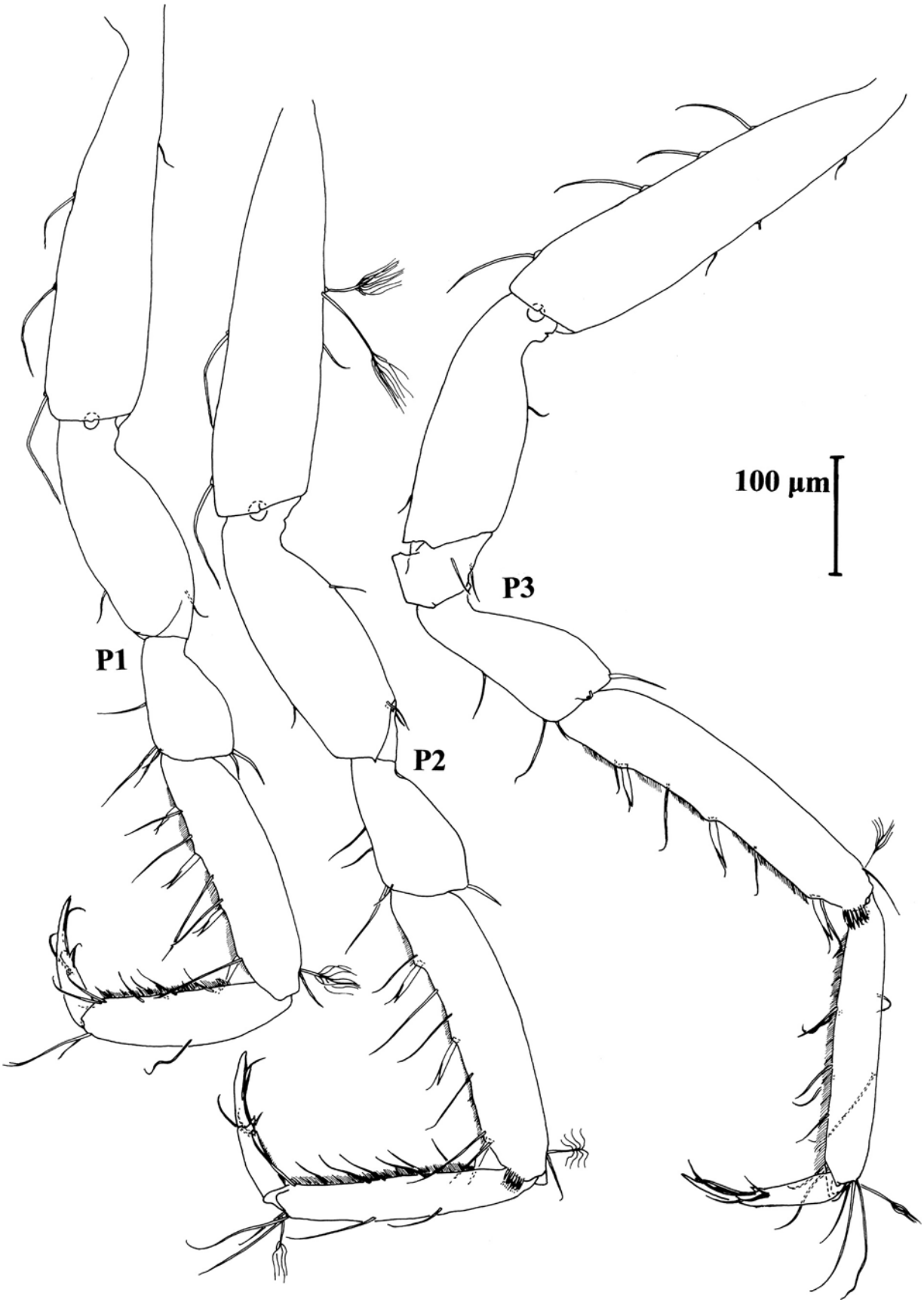

Fig. 30. *Haploniscus nondescriptus* Menzies, 1962; ♂, 3.2 mm, pereopods 1-3.

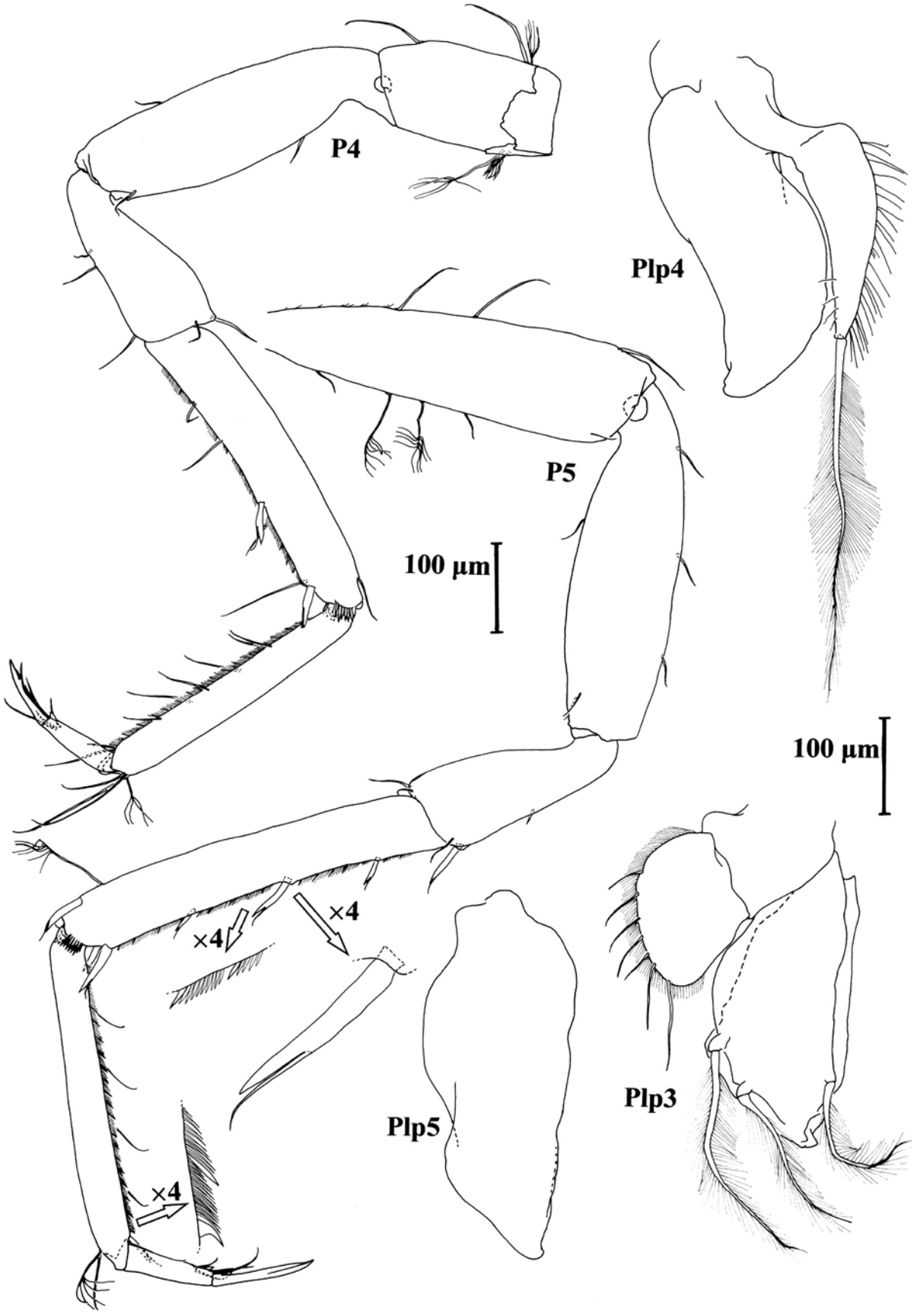

Fig. 31. *Haploniscus nondescriptus* Menzies, 1962, ♂; 3.2 mm, pereopods 4-5, pleopods 3-5.

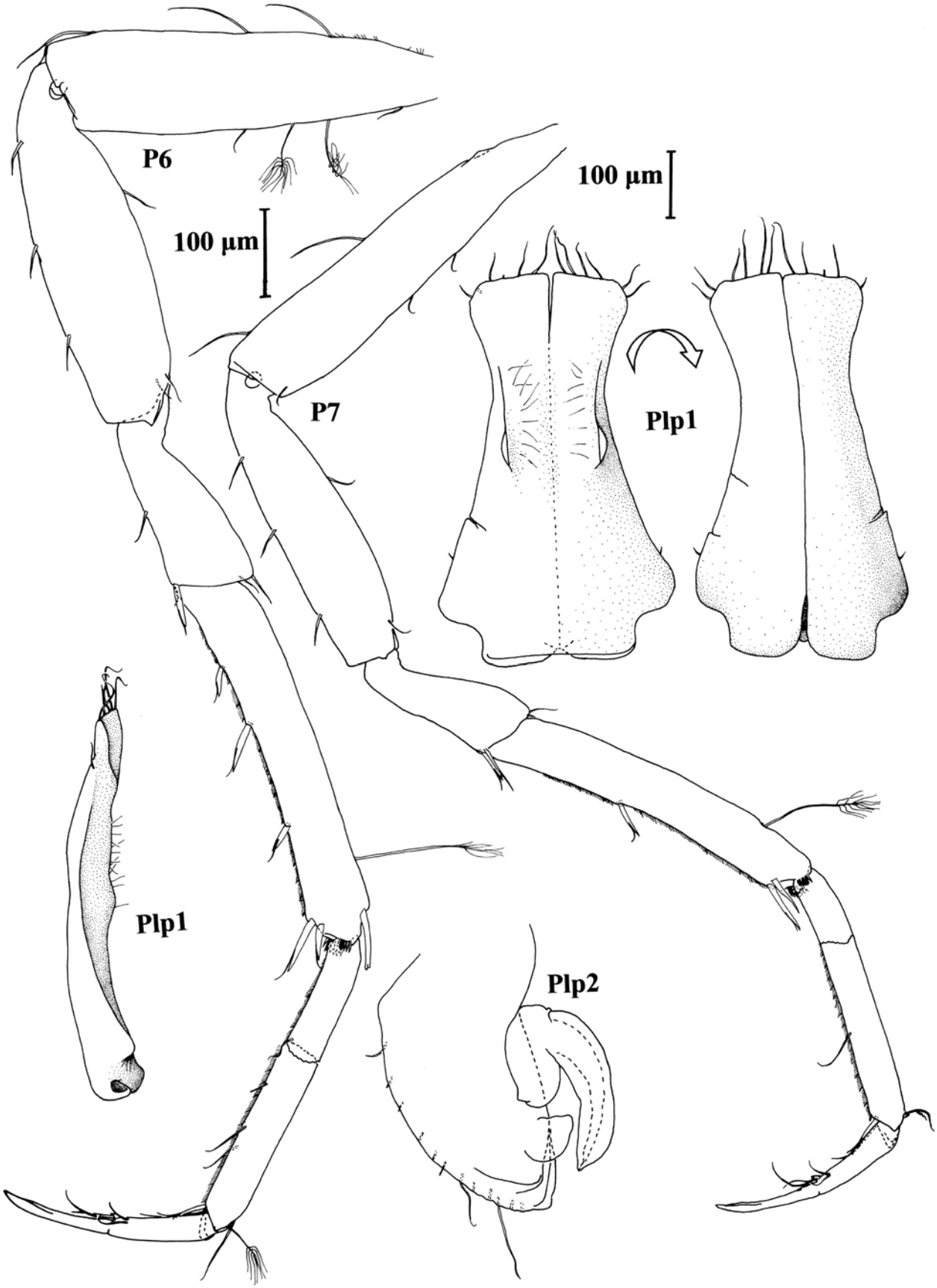

Fig. 32. *Haploniscus nondescriptus* Menzies, 1962, ♂; 3.2 mm, pereopods 6-7, pleopods 1-2.