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Two New Species of *Prismatolaimus* de Man, 1880 (Nemata: Prismatolaimidae) in Southern Chile

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Abstract: Two new species of *Prismatolaimus* are described from Orange Bay, Hoste Island, Chile. *Prismatolaimus novoporus* sp. n. is distinguished by its females being 1.08–1.28 mm long and monovarial with a long postvulvar sac, and having a long tail (c′ = 21.5–32.2); males have 11–20 supplements confined to the posterior part of the body. *Prismatolaimus chilensis* sp. n. is distinguished by its amphidelphic reproductive system, short tail (c′ = 9.5), V = 63.4; males have 23 supplements reaching up to the neck region. A well-developed dorsal body pore behind the cardia connected with an apparently glandular organ is reported in *P. novoporus* sp. n. Function of the organ is unknown, and it is not a general feature in the genus. The generic diagnosis of *Prismatolaimus* is emended and keys to species, both females and males, are presented. The systematic position of *Prismatolaimus* is discussed, and it is judged to be the only genus of Prismatolaimidae. Also, it is concluded that Prismatolaimidae and Bastianidae represent two sister taxa in Araeolaimida or Leptolaimina.

Key words: taxonomy, morphology, new species, *Prismatolaimus*, Nemata.

A survey of nematodes at Orange Bay, Hoste Island, Chile, was carried out in 1983. Soil samples were collected in moist soil beneath deep tundra, four samples each at three different sites about 1 km apart. Full details of those samplings were reported earlier (16). The samples held a large percentage of humus content, and soil was well drained but quite moist with fresh water from frequent precipitation.

Several samples held specimens considered to be new species of *Prismatolaimus* de Man, 1880; two of the species are described here.

Materials and Methods

Processing techniques: Specimens wet sieved from soil were killed in hot water, preserved, and stored in 4% formaldehyde for varying periods of time. Later the specimens were transferred to FAA and processed to glycerin.

For SEM studies the glycerin processed specimens were first placed in a mixture of glycerin–alcohol–water, 80:6:4, then brought down in a graded series beginning with 85% glycerin in 30% ethyl alcohol (EtOH) to FAA. The specimens then were brought to absolute EtOH by vapor exchange in a 32 C oven. Specimens then were transferred to a graded series of amyl acetate in absolute EtOH from 30% to absolute amyl acetate. After a 15–60 second sonication in pure amyl acetate, they were processed through critical point drying with CO_2 then mounted on stubs and coated with 300 Å of gold layers. An ISI model 3S-130 DS scanning electron microscope was used at 10 kV.

Definitions: Some recently or less commonly used terms and abbreviations are as follows: monovarial = with one ovary, antepudendal = with genital tube anterior to vulva, postpudendal = with genital tube posterior to vulva (14), b.w. = body width, c.b.w. = corresponding body width, c′ = tail/anal body width, V′ = distance from anterior end to vulva/anterior end to anus, neck = distance from anterior end to cardia. Terms referring to body symmetries follow Coomans (7).

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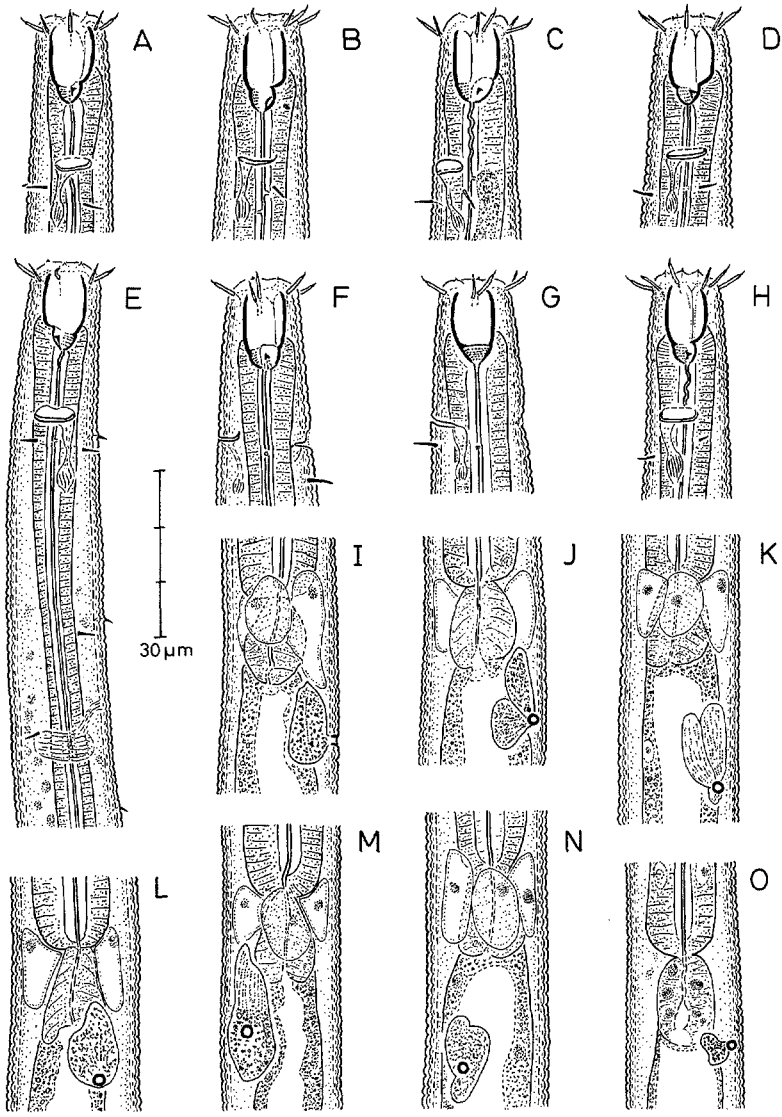


FIG. 1. *Prismatolaimus novoporus* sp. n. A–H) Anterior end in various orientations. A) Left lateral, male. B) Left sublateral, female (note blunt dorsal tooth). C) Left subdorsal, male. D) Left lateral, female. E) Right lateral, male. F) Dorsosubdorsal view, male. G) Subventral view, female. H) Left sublateral, female. I–O) Dorsal body pore and gland in various orientations and degrees of development. I) Lateral view, female. J) Right laterodorsal view, female. K) Same, male. L) Right subdorsal view, male. M) Left laterodorsal view, male. N) Same, female. O) Right dorsosublateral view, male.

DESCRIPTION OF SPECIES

Prismatolaimus novoporus sp. n. (Figs. 1–4)

Measurements

Holotype (female): L = 1.13 mm; a = 58.4; b = 5.3; c = 2.8; c′ = 26.2; V = 47.1; V′ = 73.7; neck = 214 µm; V-an = 190 µm; tail = 409 µm; postvulvar uterine sac = 57 µm; amphidial opening from anterior end = 24 µm (left), 27 µm (right); head width at level of setae = 12 µm; body width at amphid = 13 µm; body width at cardia = 19 µm; body width at vulva = 23 µm; anal body width = 16 µm.

Female (n = 10) (type series): L = 1.173 ±

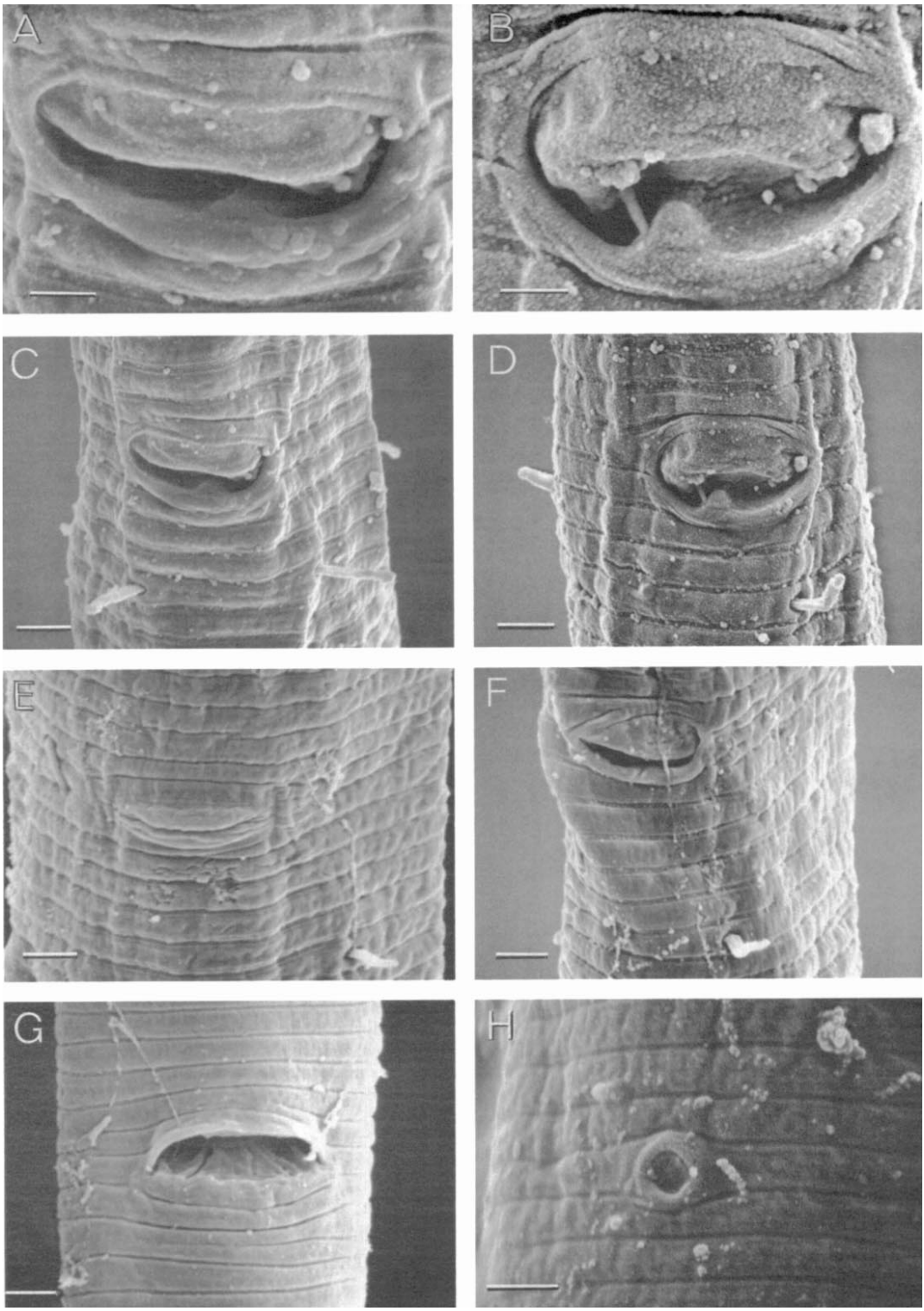


FIG. 2. *Prismatolaimus novoporus* sp. n. A) Right amphid (J4). B) Left amphid, male. C) Amphidial region (J4). D) Amphidial region, male. E) Vulva region. F) Amphidial region (right side of female.). G) Anal region, female. H) Dorsal body pore, female. Bar equals 1 μm (A, B), 2 μm (C–H).

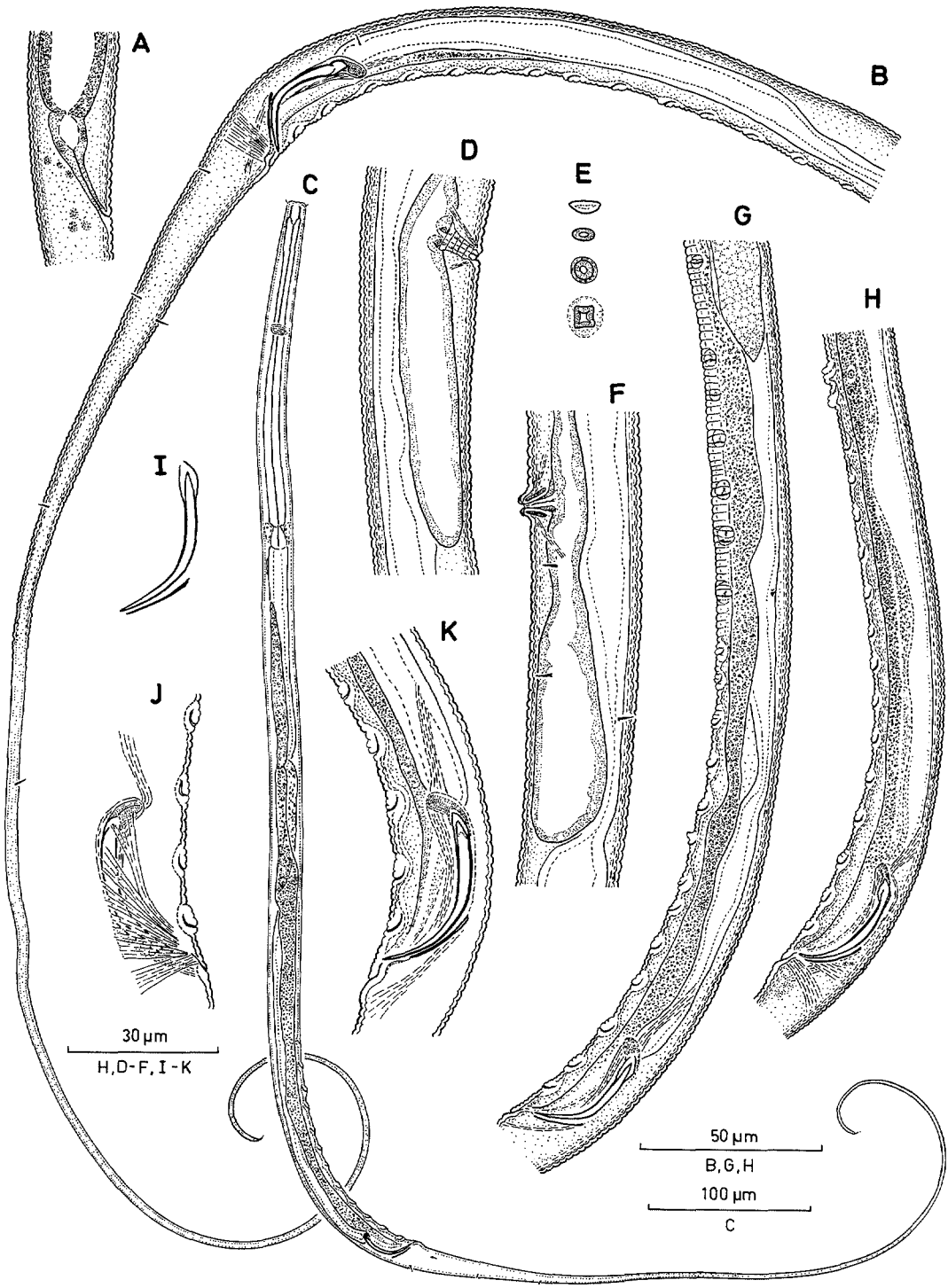


FIG. 3. *Prismatolaimus novoporus* sp. n. A) Rectum, female. B) Posterior end, male. C) Male. D) Postvulval uterine sac. E) Vulva and vagina, subsequent ventral views. F) Postvulval uterine sac. G, H) Region of supplements. I) Left spiculum and gubernaculum. J) Right spiculum and copulatory muscles. K) Left copulatory apparatus and region of posterior supplements.

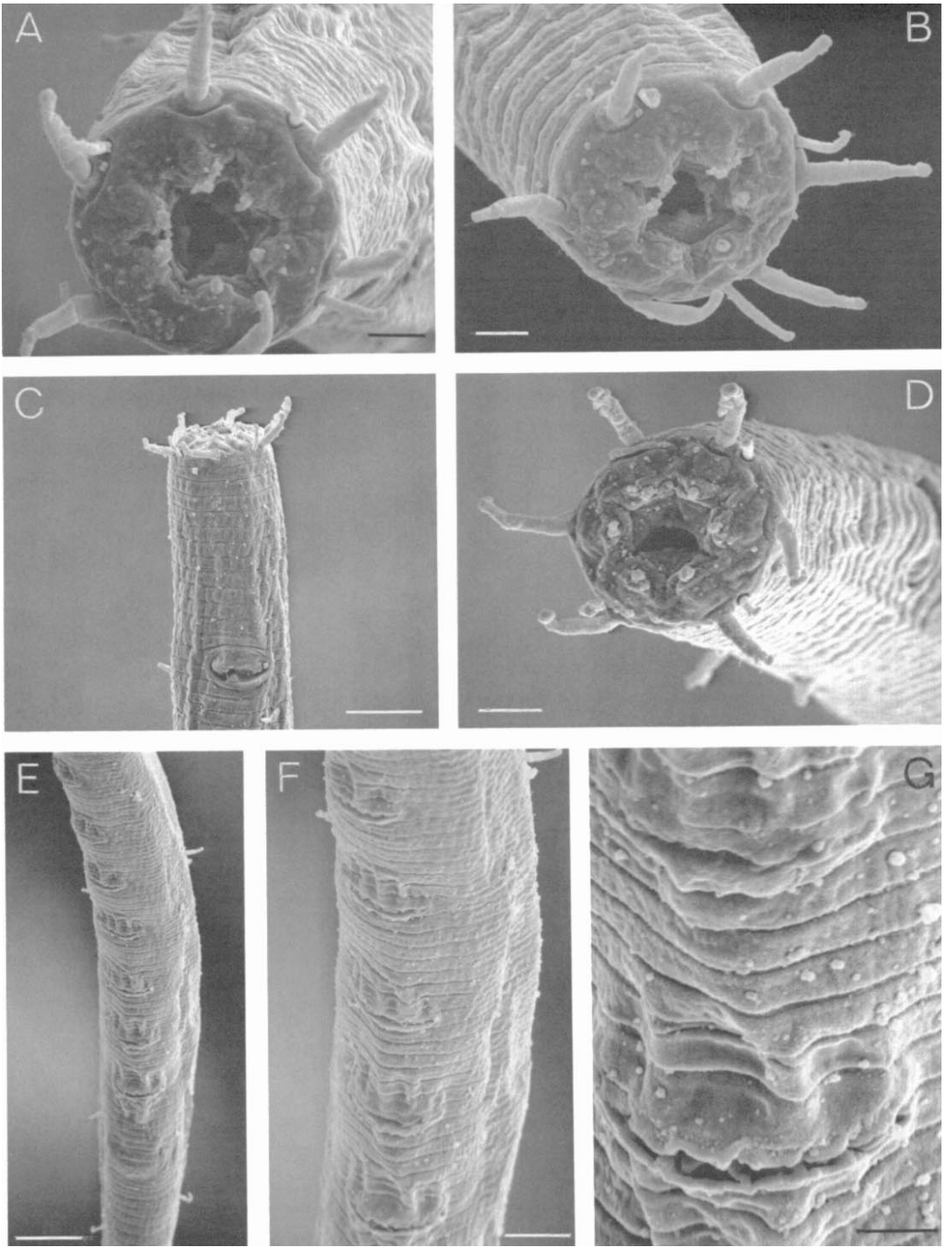


FIG. 4. *Prismatolaimus novoporus* sp. n. A–D) Anterior end. A, B) Fourth-stage juvenile. C, D) Male. E–G) Male supplements. Bar equals 2 μm (A, B, G), 3 μm (D), 5 μm (F), 10 μm (E), 15 μm (C).

0.06 (1.08–1.28) mm; a = 53.8 ± 6.69 (43.5–61.7); b = 5.4 ± 0.14 (5.2–5.7); c = 2.6 ± 0.11 (2.4–2.8); c′ = 28.2 ± 3.14 (21.5–32.2); V = 44.5 ± 2.28 (40.5–47.1); V′ = 72.0 ± 2.85 (67.2–76.8); neck = 219 ± 10.14 (199–238) μm; V-an = 202.7 ± 23.68 (169–240) μm; tail = 443 ± 34.73 (406–502) μm; postvulvar uterine sac = 63.5 ± 15.93 (36.4–98.0) μm; amphidial opening from anterior end = 25.6 ± 2.15 (22.0–29.5) μm (left) and 26.3 ± 1.82 (22.8–29.4) μm (right); head width at level of setae = 11.8 ± 0.35 (11.5–12.0) μm; body width (b.w.) at amphid = 14.3 ± 0.92 (12.0–16.0) μm; b.w. at cardia = 19.3 ± 0.85 (17.5–20.0) μm; b.w. at vulva = 22.9 ± 3.54 (19.0–29.0) μm; anal body width = 16.1 ± 1.29 (14.0–19.0) μm.

Male (n = 7) (type population): L = 1.176 ± 0.078 (1.06–1.27) mm; a = 63.8 ± 4.76 (58.8–70.4); b = 5.5 ± 0.38 (5.1–6.3); c = 2.5 ± 0.16 (2.3–2.8); c′ = 25.6 ± 3.34 (21.7–30.7); neck = 212 ± 11.19 (198–228) μm; tail = 471 ± 50.41 (404–553) μm; amphidial opening from anterior end = 27.5 ± 1.22 (26–30); μm; head width at level of setae = 11.36 ± 0.63 (10.5–12.0) μm; body width at amphid = 14.71 ± 0.64 (14.0–15.5) μm; b.w. at cardia = 18.64 ± 2.06 (15.0–21.0) μm; anal and largest body width = 18.5 ± 1.71 (16.0–20.5) μm.

Description

Female: Body slightly to markedly ventrally arcuate, tapering especially toward posterior, often coiled end. Body at cardia 1.5–1.7 times as wide as head. Cuticle marked with clear transverse striae, annuli averaging 1.7 μm (n = 100) in neck region and 2.0 μm (n = 100) at mid-body. Somatic setae usually 3.5–4.5 μm long, a few shorter or longer, in eight irregular longitudinal rows, 5–9 on neck, 3–6 on tail. Occasionally, three short ventral setae present on anterior neck.

Head anteriorly flattened, truncate, continuous with body contour (Fig. 1B, D, G, H). Inner six labial sensilla papilliform; outer six labial and four cephalic sensilla setiform. Outer labial setae stout, articulate, 5.2 μm long on average; cephalic setae not articulate, 4.2 μm long on average, located just behind outer labials. Aperture of amphidial fovea slit-like, 5–6.5 μm wide at base of a slightly depressed oval cuticular plate, often curved anteriad at dorsal and (or) ventral end (Fig. 2F), leading ventrally inward to a funnel that narrows to a canal before joining fusus. Amphid aperture 1.7 (1.6–2.1) corresponding body widths (c.b.w.) and 14 (12–17) annuli behind anterior end; fusus 8.5 (7.5–12.0) μm behind aperture (Fig. 1B, D, G, H).

Buccal cavity 13.11 ± 0.78 (12.0–14.5) μm long, consisting of a wide barrel-shaped anterior chamber and small bowl-shaped posterior part (Fig. 1B, D, G, H). Anterior part 9.61 ± 0.64 (8.5–11.0) μm long, 6.93 ± 0.26 (6.5–7.5) μm wide, wall consists of three equal, sclerotized plates. Posterior part 3.51 ± 0.43 (3.0–4.5) μm long, 4.53 ± 0.52 (4.0–5.5) μm wide; dorsal plate of wall with small sharp (rarely blunt, Fig. 1B) dorsal median tooth, subventral plates two, each bearing five transverse rows of minute denticles (Fig. 1G). Anterior part of buccal cavity surrounded by pharynx only at base. Pharynx cylindrical, slightly wider anteriorly, narrowing through nerve ring at about 40% of neck, then gradually widening toward base. Dorsal gland outlet 14.11 ± 1.54 (11.0–16.0) μm behind buccal cavity (Fig. 1B, D, G); gland nuclei and other outlets not seen with certainty. Cardia pyriform, 14.2 ± 1.39 (12.0–16.0) μm long, 10.78 ± 0.21 (10.0–12.0) μm wide, anteriorly projecting into pharynx base, posteriorly abutting on intestine, surrounded by four large coelomocytes (Fig. 1I, J, N). Rectum about 1.6 anal body widths long, proximal part wider than distal (Fig. 3A). Anus transverse, oval (Fig. 2G).

Excretory pore, ventral gland not observed. A glandular organ with a prominent, round, dorsal pore occurs 25.11 ± 5.06 (17.5–34.5) μm behind base of pharynx; organ extending completely or largely anteriad from pore, sometimes bilobed (Figs. 1I, J, N; 2H).

Reproductive system with fully developed anterior branch, posterior branch re-

duced to a uterine sac (Fig. 3D, F) occupying 2.5–3.5 c.b.w., but occasionally shorter (1.3 c.b.w.) or longer (5.6 c.b.w.). Vagina 7.6 ± 0.86 (6.5–8.0) μm long, about one-third of c.b.w. Vulva transverse, 5 μm wide, anteriorly flattened, oval (Fig. 3E) or slit-like (Fig. 2E).

Tail very long, tapering regularly, annulation obscured and irregular toward tip. Tip ending in a dorsal, sharply pointed hook, ventrally curved.

Male (n = 12): Body shape similar to female, posteriorly more curved to L-shaped (Fig. 3C). Somatic setae as in female, but three short ventral setae in anterior neck more often present (Fig. 1E). Anterior sensilla as in female (Fig. 4D). Amphid aperture 1.89 (1.78–2.07) c.b.w., 14–16 annuli behind anterior end; fusus 8.0 (7.0–9.5) μm behind aperture (Figs. 1A, C, E, F; 2B, D; 4C). Buccal cavity 13.2 ± 0.64 (12.5–14.0) μm long; anterior part 9.57 ± 0.73 (9.0–10.5) μm × 6.93 ± 0.49 (6.0–7.0) μm, posterior part 3.64 ± 0.24 (3.5–4.0) μm × 4.63 ± 0.79 (3.5–5.0) μm. Dorsal gland outlet 13.9 ± 1.02 (13.0–15.5) μm behind buccal cavity (Fig. 1C, E, F). Dorsal gland nucleus 30–33 μm from base of pharynx. Cardia 14.43 ± 1.27 (11.0–16.0) μm long, 9.29 ± 1.29 (7.0–10.5) μm wide. Nerve ring surrounding pharynx at 38.5–40% of neck. Dorsal body pore 26.14 ± 11.07 (15.5–46.5) μm behind base of pharynx (Fig. 1K–M, O).

Reproductive system with anterior testis at right side of intestine, posterior testis and vas deferens at left side of or ventral from intestine, or entire system to right side of intestine (Fig. 3C). Posterior part of vas deferens flanked by weakly developed ejaculatory glands. Spicules curved, distally finely pointed, capitulum with a muscular extension 4.0–6.0 μm long (Fig. 3I–K). Left and right spicules of about same size, 35.2 ± 1.06 (33.5–37.0) μm along arc, in two males one of the spicules degenerate. Gubernaculum composed of two sclerotized pieces running along posterior distal part of spicules (Fig. 3I, K), 13.4 ± 1.61 (10.5–16.0) μm long; pieces connected by a nonsclerotized median part. When a spiculum is degenerate, the accompanying gubernacular piece is likewise degenerate. Spicular sheath connected to capitulum through the muscular extension (intracapsular retractor?); from proximal end of sheath a retractor muscle extending anteriad to dorsolateral body wall, protractor muscles extending posteriad to gubernaculum and anterior cloacal lip. A gubernacular protractor connecting proximal part of gubernaculum with subventral body wall of posterior cloacal lip (Fig. 3K). In region of spicules, five bands of copulatory muscles run obliquely posteriad from dorsolateral body wall to subventral body wall and cloaca (Fig. 3J), and a depressor muscle connects the posterior cloacal lip with the laterodorsal sides of tail (Fig. 3H). Supplements ranging from 11 to 20, in two males the anteriormost supplement very small, confined to posterior body region (Fig. 3C), most anterior supplement 525.6 ± 43.44 (n = 5; 483–564) μm from anterior end and 186.2 ± 38.6 (n = 5; 154–253) μm from cloacal opening; posteriormost two or three supplements within spicula region (Fig. 3G, H). Shape of supplements variable depending on development and protrusion (Fig. 3H). The anteriorly directed canal seen in profile inside each supplement not a pore canal, but rather the inwardly directed cuticular fold; 5–13 annuli between adjacent canals (Fig. 4E–G).

Juveniles (Figs. 2A, C; 4A, B): Similar to adults except for sexual characters.

The specific name refers to the dorsal body pore, a feature hitherto unreported in the genus.

Type habitat and locality: Moist soil under deep tundra at Orange Bay, Hoste Island, Chile.

Type specimens: Holotype (female)—collected by D. J. Raski, 19 January 1983; deposited on slide number 2267, University of California Davis Nematode Collection (UCDNC), Davis, California. Paratypes (8 males, 61 females, and 18 juveniles)—deposited as follows: 3 males, 27 females, 9 juveniles, UCDNC; 2 males, 16 females, 4 juveniles, Nematode Collection, Instituut voor Dierkunde, Rijks-

universiteit Gent, Belgium; 1 male, 5 females, 2 juveniles, the Nematode Collection of the Rothamsted Experimental Station, Harpenden, England; 1 male, 6 females, 2 juveniles, Nematode Collection of the Landbouwhogeschool Wageningen, The Netherlands.

Differential diagnosis: P. novoporus sp. n. resembles *P. intermedius* (Bütschli, 1873) de Man, 1880 in having a long filiform tail, in being monovarial and in having males, but it differs mainly in having fewer supplements (35–41 in *P. intermedius*), which are confined to posterior part of body (reaching until neck region in *P. intermedius*), in having in the female a long postvulvar sac (lacking or maximally one body width long in *P. intermedius*), in being longer (L = 0.50–0.75 mm in *P. intermedius*), and in having a longer tail (less than 250 μm in *P. intermedius*).

P. novoporus sp. n. also resembles *P. dolichurus* de Man, 1880 in having a long filiform tail, similar body size, and clearly denticulated plates at the base of the buccal cavity, but it differs mainly in having fewer supplements (22–27 in *P. dolichurus*), which are confined to posterior part of body (reaching neck region in *P. dolichurus*), and in females having only the anterior ovary developed (ovaries paired in *P. dolichurus*).

P. novoporus sp. n. resembles *P. tareya* Gagarin and Kuz'min, 1972 in having males with supplements confined to posterior body region, but differing mainly in being longer (L = 0.65–0.88 mm in *P. tareya*), having a longer tail (c' = 11–15 in *P. tareya*) and being monovarial (ovaries paired in *P. tareya*).

P. novoporus sp. n. resembles *P. waipukea* (Yeates, 1967) Andrássy, 1969 in having females with a long postvulval uterine sac and in having males, but it differs mainly in having fewer supplements (30–46 in *P. waipukea*), and all these supplements are confined to posterior body region (reaching to halfway in neck region in *P. waipukea*), having a longer tail (c' = 9.5–15.5 in *P. waipukea*), a more anterior vulva (V = 53.8–58.9 in *P. waipukea*), and shorter and fewer somatic setae.

Remarks: 1) One female with abnormally short (249 μm) tail with a pointed but not hooked tip had aberrant measurements (L = 0.97 mm; a = 33.7; b = 4.4; c = 3.9; V = 53.3; c' = 14.5) except V' (71.8). 2) Most of the specimens used for this study came from a soil sample that was stored for 3 weeks in a fairly constant cool ambiance in a plastic bag before it was extracted. Hence specimens were starved and very transparent, and their reproductive systems were almost depleted of germ cells and obscure in detail.

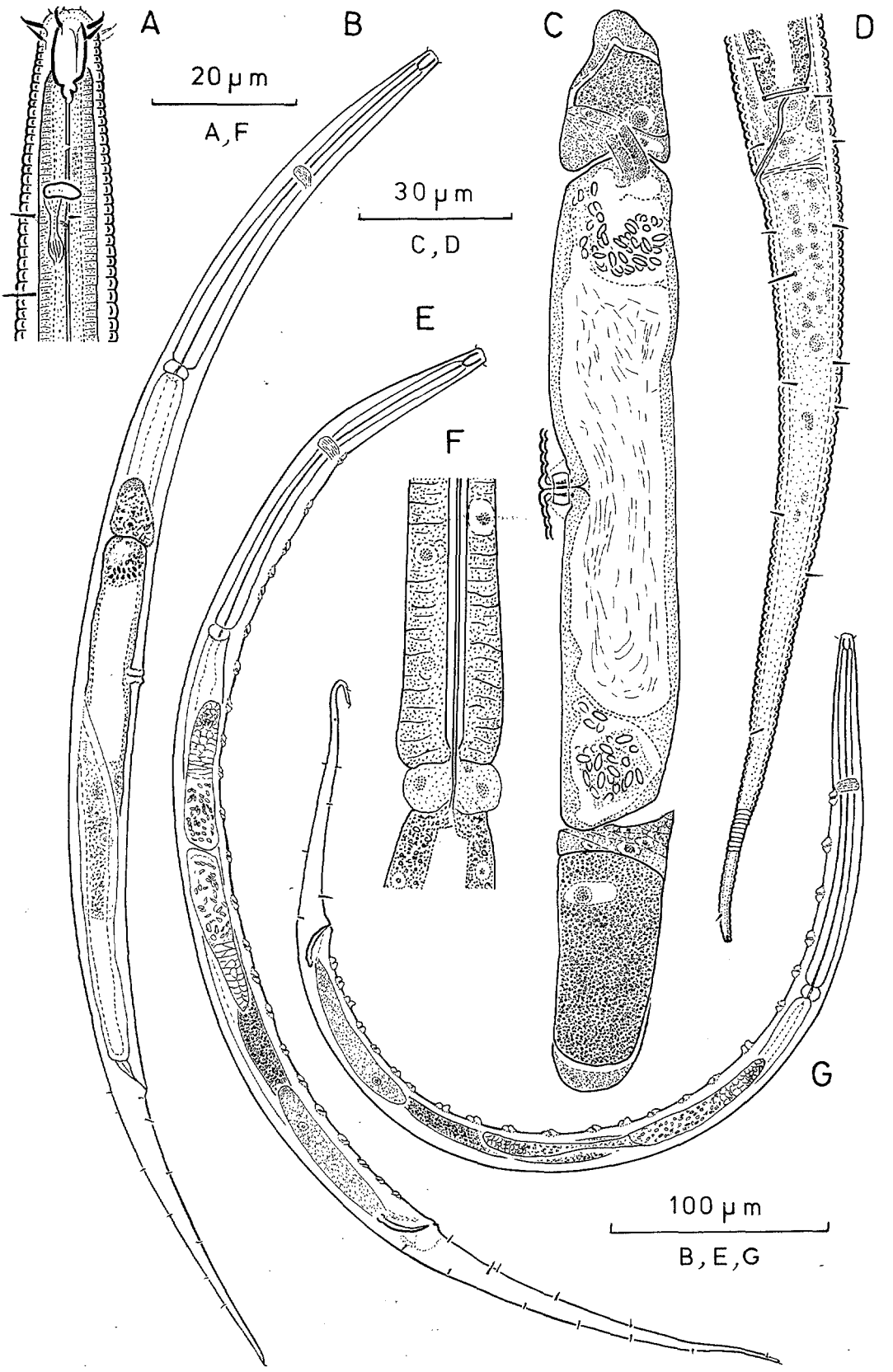
Prismatolaimus chilensis sp. n.
(Figs. 5, 6)

Measurements

Holotype (female): L = 0.69 mm; a = 23; b = 3.6; c = 4.6; c' = 9.5; V = 49.6; V' = 63.4; neck = 192 μm; V-a = 197 μm; tail = 151 μm; G1 = 13; G2 = 16; amphidial opening from anterior end = 24 μm; head width at level of setae = 7.5 μm; body width at amphid = 12 μm; b.w. at cardia = 22 μm; b.w. at vulva = 28.5 μm; anal body width = 16 μm.

Paratype (three males): L = 0.70 (0.64–0.78) mm; a = 31.0 (28.0–35.9); b = 3.77 (3.7–3.8); c = 4.07 (3.8–4.4); c' = 9.6 (9.5–9.7); neck = 186.8 (172–206) μm; tail = 173.7 (144–193) μm; T = 43.2 (42.1–44.4); amphidial opening from anterior end = 22.75 (21–25) μm; head width at level of setae = 7.8 (7.5–8.0) μm; body width at amphid = 11.0 (9.5–12.0) μm; b.w. at cardia = 20.8 (16.5–24.0) μm; b.w. at mid-body = 23.3 (18–28) μm; b.w. at cloacal opening = 18.5 (15.0–21.5) μm.

Juvenile (fourth-stage): L = 0.68 mm; a = 28.8; b = 3.9; c = 4.2; c' = 10.9; neck = 175 μm; tail = 161 μm; gonadal primordium = 122 μm long; cuticular annuli average 1.8 μm; amphidial opening from anterior end = 27.5 μm (left), 30 μm (right); head width at setae = 7.5 μm; body width at amphid = 12 μm; b.w. at cardia = 20 μm; b.w. at mid-body = 24 μm; anal b.w. = 15 μm; buccal cavity = 9.5 μm long and 4 μm wide.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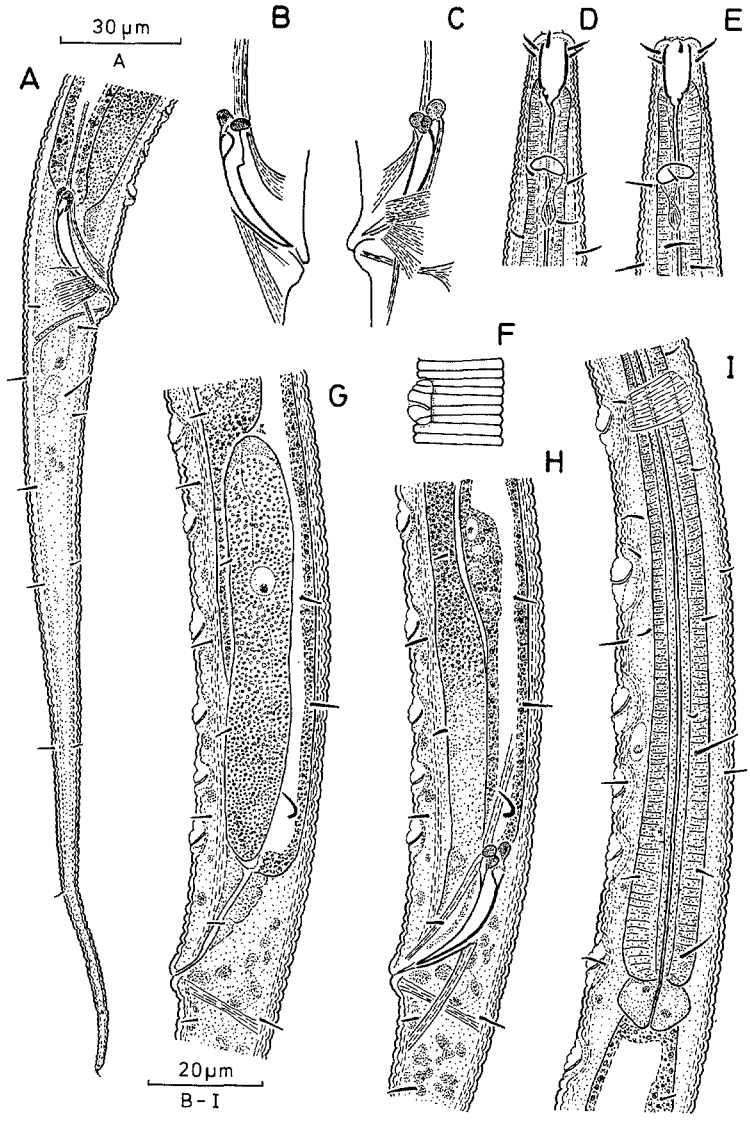

FIG. 6. *Prismatolaimus chilensis* sp. n. A) Male, tail. B, C) Copulatory apparatus. D, E) Anterior end, male. D) Right lateral. E) Left lateral. F) First supplement, surface view. G, H) Hind region of same male. G) Ejaculatory gland and cloaca. H) Vas deferens, intestine, and copulatory apparatus. I) Anterior supplements in neck region, male.

Description

Female: Body slightly ventrally arcuate, tapering toward both ends (Fig. 5B). Body at cardia almost three times as wide as at anterior end. Cuticle marked with clear transverse striae; annuli averaging 1.7 µm (n = 50) in neck region and 2.4 µm (n = 60) at mid-body. Somatic setae usually 3.5 µm long, some lateral ones 5.5 µm, 25 left and 27 right on neck, 10 left and 11 right on tail.

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FIG. 5. *Prismatolaimus chilensis* sp. n. A) Anterior end, holotype. B) Holotype. C) Reproductive system, holotype. D) Tail, holotype. E) Male. F) Basal part of pharynx and cardia, holotype. G) Male.

Head somewhat rounded anteriorly, continuous with body contour (Fig. 5A). Inner labial sensilla papillate. Outer labial setae articulate, 3.5–4.0 μm long, cephalic setae nonarticulate, 3 μm long, located about 1 μm behind labial setae (Fig. 5A). Amphidial fovea bean-shaped (Fig. 5A), convex side directed anteriorly, 5 μm wide, 1.5–2.0 μm long, leading inward at ventral half to a funnel that soon narrows to a canal before it joins fusus. Fovea 16 annuli and 2 c.b.w. behind anterior end, fusus 7.5–8.0 μm behind middle of fovea. Buccal cavity 10.5 μm long, consisting of an 8.0-μm-long, 4.5-μm-wide barrel-shaped anterior chamber and a 2.5-μm-long, 2.0-μm-wide funnel-shaped posterior part, the latter with small tooth halfway on dorsal plate, without denticles on subventral plates (Fig. 5A). Pharynx widening gradually toward base, especially in posterior third. Dorsal gland outlet 8.5 μm behind stoma (Fig. 5A), dorsal gland nucleus 33 μm from pharynx base (Fig. 5F). Cardia (Fig. 5F) almost twice as wide (13 μm) as long (7 μm), coelomocytes obscure. Rectum 17 μm or about one anal body width long, consisting of a wide proximal and narrow distal part (Fig. 5D).

Nerve ring surrounding pharynx at 43.5% of neck length. No dorsal pore or gland observed.

Reproductive system amphidelphic, diovarial, anterior branch completely to right of intestine, posterior ovary and spermatheca to left (Fig. 5B, C). Each branch consisting of an ovary 32 μm and 55 μm long, a narrow oviduct joining ovary with spermatheca (filled with sperm), and a wide uterus. Uteri 63 μm and 64 μm long, continuous with each other, forming a large, 127-μm-long chamber that connects ventrally with 7-μm-long vagina; latter surrounded by a well-developed sphincter.

Tail moderately long, tapering regularly; annulation extending toward hooked tip, usually obscure because of sidewise bending. Second ventrally directed seta longer than other setae (Fig. 5D).

Male (n = 3): Body shape similar to female, but more ventrally curved to C-shaped (Fig. 5E, G). Somatic setae as in female, but some up to 7.5 μm long; 20–25 on neck, 10–11 on tail. Cuticular annuli 2.1–2.5 μm wide at base of neck (dorsal side); 2.4–2.5 μm at mid-body. Anterior sensilla as in female (outer labial sensilla = 3.0–3.5 μm; cephalic sensilla = 2.5–3.0 μm). Amphidial fovea 5.0–6.0 μm wide, 14–15 annuli or about two body widths behind anterior end, fusus 7.8 (n = 6; 6.0–9.5) μm behind middle of fovea (Fig. 6D, E). Buccal cavity 10.0–10.5 μm long, anterior part 8.0–8.5 × 4.0–4.5 μm, posterior part 2.0 × 2.0 μm. Dorsal gland outlet 7.8 μm behind stoma. Cardia 7.5–8.5 μm long, 12.0–13.5 μm wide. Nerve ring at 43.2 (41.7–45.7)% of neck length.

Anterior testis left (n= 2) or right (n = 1) of intestine, 73.5 (70–77) μm long posterior right (n = 3); 72.5 (67.0–77.5) μm long (Fig. 5E, G). Uninucleate ejaculatory gland at each side of posterior part of vas deferens prominent, opening into vas deferens at junction with rectum (Fig. 6G). Spicules curved, distally sharply pointed, proximally with expanded capitulum surmounted by double muscular extension on which protractor and retractor muscles insert (Fig. 6A–C, H). Spicules (n = 6) of about equal length, 22.9 (18.0–26.5) μm long. Gubernaculum (n = 3) 10.7 (9.5–13.0) μm long, double. Specialized muscles like in *P. novoporus* sp. n. Supplements well developed, 23 in three males, starting 83.0 (77.5–89.5) μm from anterior end, or 429.3 (402–471) μm anterior to cloacal opening, ending just in front of retracted spicules; 5–16 annuli between adjacent canals (Figs. 5E, G; 6F–I).

Juvenile (1): Resembles female in all aspects except sexual characters.

Type habitat and locality: Moist soil under deep tundra, Orange Bay, Hoste Island, Chile.

Type specimens: Holotype (female)—collected by D. J. Raski, 19 January 1983; deposited in UCDNC, Davis, California, slide number 2268. Paratypes (two males and one juvenile)—same data and collection as holotype.

Differential diagnosis: P. chilensis sp. n. resembles *P. dolichurus, P. intermedius,* and *P. waipukea* in having males with many supplements, which extend to the neck. It can

be differentiated from the latter two in being amphidelphic with two complete branches and from the former in having a much shorter tail (c' = 20–35 in *P. dolichurus*), more posterior vulva (up to 45% in *P. dolichurus*), and longer body (L = 0.8–1.4 mm in *P. dolichurus*). The new species resembles the monodelphic species *P. leptolaimus* Andrássy, 1969 and *P. hsuei* Wu and Hoeppli, 1929 in general body shape, but it differs in being amphidelphic; *P. leptolaimus* had also a narrower buccal cavity.

Remarks: In one of the males, the body cavity in the whole region of the intestine was filled with oval (6.0–6.5 × 2.5 μm) bodies, probably infectious organisms (one of them occurring inside a cell of the cardia). Another male had some inclusions of a different type in the body cavity around the cardia and anterior intestine. The female had a cyst-like inclusion with 16 small rounded bodies inside an intestinal cell (sporozoan?) opposite the anterior ovary; the single juvenile had the same inclusion in an intestinal cell at a comparable place.

Prismatolaimus

Diagnosis (emended): Prismatolaiminae. Cuticle annulated; with submedian setae along body. Dorsal body pore behind cardia present or absent. Head with six papilliform inner labial sensilla, six articulate, setiform outer labial sensilla (o.l.s.) and four nonarticulate setiform cephalic sensilla (c.s.); c.s. just behind o.l.s. (single whorl of setae) or clearly behind them (two whorls). Amphids with oval fovea and transverse slit-like aperture, leading to a small pocket at its ventral half which is connected through a short ductus with the fusus. Buccal cavity composed of flattened, hexaradiate cheilostome with weakly cuticularized walls and bipartite, triradiate pharyngostome; latter consisting of a wide, barrel-shaped, less sclerotized part with well sclerotized walls and a narrower, funnel-shaped or bowl-shaped, less sclerotized part. The dorsal plate of this terminal portion bearing a small tooth medially; ventrosublateral plates naked or with several rows of small denticles. Pharynx cylindrical, anteriorly surrounding buccal cavity up to base of barrel-shaped portion, slightly widening posteriorly. Gland nuclei a short distance from base, dorsal gland opening a short distance behind buccal cavity. Pharyngo-intestinal junction with well-developed valve (cardia). Female reproductive system monovarial, antepudendal or di-ovarial, with short oviduct, wide uterus and short vagina. Males diorchic; vas deferens glandular, flanked by single ejaculatory gland at each side. Spicules ventrally curved, with complex musculature; gubernaculum with two sclerotized pieces behind spicules. Supplements numerous, composed of folded, partly inflated cuticle, confined to posterior body region or extending to neck. Tail filiform, usually ending with a hook-like extension.

Type species: P. intermedius (Bütschli, 1873) de Man, 1880.

Other species

P. andrassyanus Coomans and Mulk, 1980 (syn. *P. andrassyi* apud Mulk and Coomans, 1979)
P. brevicaudatus Wu and Hoeppli, 1929
P. chilensis sp. n.
P. dolichurus de Man, 1880
P. hsuei Wu and Hoeppli, 1929
P. kenyensis Mulk and Coomans, 1979
P. leptolaimus Andrássy, 1969
P. matoni Mulk and Coomans, 1979
P. novoporus sp. n.
P. parvus Milne, 1963
P. primitivus Loof, 1971
P. stenolaimoides Loof, 1971
P. stenolaimus de Man, 1921
P. tareya Gagarin and Kuz'min, 1972
P. tenuicaudatus Sch. Stekhoven, 1951
P. verrucosus Hirschmann, 1952
P. waipukea (Yeates, 1967) Andrássy, 1969

Species inquirendae

P. indicus Ali, Suryawanshi and Chisty, 1973
P. andrassyi Khera and Chaturvedi, 1977

Key to Females

1. Buccal cavity narrow, 3× or more longer than wide 2
1. Buccal cavity wider, 2.0–2.5× longer than wide 5
2. Buccal cavity 4–5 μm long 3

2. Buccal cavity 8–9 μm long; monovarial 4
3. L = 0.67 mm; a = 70; c = 2.5–2.8; anterior setae in two whorls (6 + 4) ..... *P. stenolaimus*
3. L = 0.37–0.39 mm; a = 32–41; c = 3.3–3.5; anterior setae in one whorl (10); di-ovarial ..... *P. stenolaimoides*
4. Anterior setae in two whorls; a = 33; c′ = 14; terminal hook of tail ventral, dorsally bent ..... *P. leptolaimus*
4. Anterior setae in one whorl; a = 37.0–48.5; c′ = 22–25; terminal hook of tail dorsal, ventrally bent ..... *P. andrassyanus*
5. Monovarial 6
5. Di-ovarial 12
6. Small, stout species with relatively short tail; a = 17–23; c′ = 7.5 ..... *P. hsuei*
6. More slender species with relatively longer tail; a > 25; c′ > 9.5 7
7. Anterior setae in two whorls (L = 0.46–0.73 mm; a = 41–55; c = 2.7–3.7; V = 56–60; c′ = 16 ..... *P. parvus*
7. Anterior setae in one whorl 8
8. Tail tip rounded, tail rather short (L = 0.96 mm; a = 30; c = 3.9; V = 58; c′ = 10) ..... *P. tenuicaudatus*
8. Tail tip sharp, normally provided with a hook-like extension 9
9. Larger species (L = 0.70–1.28 mm) with long postvulval sac (usually > two body widths) 10
9. Smaller species (L = 0.50–0.84 mm) with no or short postvulval sac (< one body width) 11
10. L = 0.78–0.97 mm; b = 4.3–5.2; c = 3.6–4.8; V = 54–59; c′ = 9.5–15.5; buccal cavity 9–10 μm long; (see also males) ..... *P. waipukea*
10. L = 1.08–1.28 mm; b = 5.2–5.7; c = 2.4–2.8; V = 40.5–47.0; c′ = 21.5–32.2; buccal cavity 12.0–14.5 μm long; prominent dorsal body pore a short distance behind cardia; (see also males) ..... *P. novoporus* sp. n.
11. Tail = 162–233 μm; c′ = 15–28; seven pairs of setae on tail; postvulval uterine sac lacking or up to one body width; dorsal body pore present ..... *P. intermedius*
11. Tail = 149–163 μm; c′ = 13–14; five pairs of setae on tail; postvulval uterine sac absent; dorsal body pore lacking ..... *P. matoni*
12. Body length more than 1.7 mm; tail more than 600 μm long; outer labial setae 14 μm long ..... *P. verrucosus*
12. Body length less than 1.7 mm; tail less than 600 μm; outer labial setae less than 10 μm long 13
13. Tail proportionally shorter, c = 6.2 (L = 1.0 mm, c′ = 10.5) ..... *P. brevicaudatus*
13. Tail proportionally longer, c less than 5 14
14. Anterior setae in two whorls 15
14. Anterior setae in one whorl 17
15. Body rather plump (a = 23); c′ = 9.5–9.7; V = 49.6; cephalic sensilla 1 μm behind outer labial sensilla ..... *P. chilensis* sp. n.
15. Body more slender (a = 35–51); c′ = 11–25; V = 43–47; cephalic sensilla 2.0–2.5 μm behind outer labial sensilla 16
16. V = 43–44; c′ = 15–25 ..... *P. primitivus*
16. V = 45.5–47.0; c′ = 11–15 ..... *P. tareya*
17. L = 0.80–1.69 mm; V = 33.5–44.0; c′ = 20–34; outer labial sensilla = 8–14 μm ..... *P. dolichurus*
17. L = 0.39–0.47 mm; V = 40–48; c′ = 15–18; outer labial sensilla = 3.5–4.0 μm ..... *P. kenyensis*

Key to Males

1. Male with supplements confined to posterior region of body 2
1. Male with supplements to neck 3
2. L = 0.63–0.68 mm; a = 35–43; b = 3.1–4.4; c = 4.3–4.7; c′ = 11–15; spicules = 19–21 μm; gubernaculum = 6.5 μm; tail = 140–150 μm; anterior setae in two whorls; 11–12 supplements ..... *P. tareya*
2. L = 1.08–1.28 mm; a = 43.5–62.0; b = 5.2–5.7; c = 2.4–2.8; c′ = 21.5–32.2; spicules = 33–37 μm; gubernaculum = 10–16 μm; tail = 406–

502 μm; anterior setae in one whorl; 11–20 supplements ..... *P. novoporus* sp. n.

3. Supplements < 30 4
3. Supplements > 30 5
4. L = 0.64–0.78 mm; c′ = 9.5–9.7; supplements = 23, extending to mid-neck ..... *P. chilensis* sp. n.
4. L > 0.9 mm; c′ > 20; supplements = 22–27, extending to posterior third of neck ..... *P. dolichurus*
5. Spicules = 20 μm; L = 0.66–0.70 mm; supplements = 35–41; c′ = 15 or more ..... *P. intermedius*
5. Spicules = 24–31 μm; L = 0.78–0.97 mm; supplements = 30–46; c′ = 9.5–14.2 ..... *P. waipukea*

Remarks: 1) *P. intermedius* appears to be a very variable species as described in the literature but probably represents a mixture of species. This would explain the extreme range of its measurements: L = 0.48–0.84 mm; a = 25–54; b = 3.1–5.8; c = 2.5–4.8; V = 45–71; c′ = 15–28.

2) *P. indicus* is not included in the key because its description and differential diagnosis (2) apparently contains several mistakes: (a) six anterior setae were described instead of ten; (b) the authors misinterpreted the structure of the buccal cavity and considered the borderline of the two parts as an additional dorsal tooth and a pair of subventral teeth. They differentiated *P. indicus* from *P. hsuei, P. intermedius,* and *P. parvus* on the basis of this erroneous interpretation. The measurements (L = 0.61–0.66 mm; a = 37–42; b = 4.4–4.8; c = 3.5–3.6; V = 55–57) agree with those of most described collections of *P. intermedius.*

3) As reported in the literature, *P. dolichurus* is highly variable (L = 0.80–1.69 mm; a = 36–78; b = 3.5–5.3; c = 2.0–3.7; V = 33.5–44.0; c′ = 20–34) and possibly also is a mixture of species. Larger specimens may be *P. verrucosus.*

4) *P. primitivus* and *P. tereya* are very similar, but for the former, the male is unknown.

5) *P. andrassyi* cannot be separated from *P. intermedius* and *P. matoni.*

Discussion

The discovery of a well-developed dorsal body pore behind the cardia in *P. novoporus* sp. n. is interesting, although its function is unknown, apart from the fact that it is connected with an apparently glandular organ. Similar pores have been observed by the authors in several other *Prismatolaimus* species and found to show various degrees of development: the sclerotized ring may be weak or lacking; the pore itself may be minute; and the gland may be poorly developed. In his description of *P. stenurus* (= *P. dolichurus*), Cobb (6) mentioned the presence of a "body" that probably refers to the same organ as described here. He supposed the structure might represent the renette cell but did not report an outlet. The absence of the pore in species such as *P. chilensis* sp. n. and *P. matoni* shows that it is not a general feature of the genus.

According to Chitwood and Chitwood (5), *Prismatolaimus* belongs to Tripylidae, and this family was characterized by the presence of five pharyngeal glands, of which the dorsal and first pair of subventral glands extend to the base of the stoma, where they open. Although Chitwood and Chitwood (5) nowhere specifically referred to *Prismatolaimus* and provided details and illustrations only for *Tripyla,* this statement was accepted as also applying to *Prismatolaimus* (13,15). We found the outlet of the dorsal gland to be at about two buccal cavity lengths behind the anterior end. A short distance behind the dorsal gland outlet there are indications of two other outlets that possibly represent the outlets of ventrosublateral glands. With the available evidence, however, we cannot exclude that these breaks in the cuticular lining represent nerve endings instead of outlets.

Prismatolaimus is at present assigned either to a separate family or subfamily. It mainly has been classified close to either *Bastiania* de Man, 1876 or *Onchulus* Cobb,

1920, but Goodey (11) listed *Prismatolaimus* under Monhysteridae.

De Coninck (8) considered *Prismatolaimus* as closely related to *Tripyla* Bastian, 1865, *Tobrilus* Andrássy, 1959, and *Bastiania.* Chitwood and Chitwood (5) agreed with a close relationship of the former three genera in the Tripylidae, but placed *Bastiania* close to Plectoidea.

Andrássy (3) classified *Prismatolaimus* together with *Onchulus* and related genera in a separate family under Tripyloidea. Independently, De Coninck (9) classified *Prismatolaimus* with *Onchulus* and related genera and with *Tobrilus* under Tobrilinae De Coninck, 1965 but at the same time pointed out the similarities in amphid and cardia structure with *Bastiania,* grouped as a separate family under Leptolaimoidea.

Andrássy (4) brought Bastianidae De Coninck, 1935 down to subfamily level under Oxystominidae Filipjev, 1918 (superfam. Oxystominoidea Filipjev, 1918) belonging to Tripylina. This author considered *Prismatolaimus* as the sole representative of a subfamily Prismatolaiminae Micoletzky, 1922 constituting, together with Onchulinae Andrássy, 1964, the family Prismatolaimidae Micoletzky, 1922.

In 1981, Lorenzen (13) transferred Prismatolaimidae and Bastianiidae to his new suborder Leptolaimina under Chromadorida mainly on the basis of the dorsally curved amphid with amphidial duct and fusus ventral from the mediolateral line, a unique feature within Chromadoria and supposedly derived from ventrally curved amphids with dorsal shifted duct (as occasionally occurs in *Bastiania*) (13) instead of from pocket-like symmetrical amphids. Prismatolaimidae sensu Lorenzen contains only the genus *Prismatolaimus,* and Onchulidae Andrássy, 1964 is assigned to a new order Trefusiida (13).

Alekseev (1), apparently unaware of Lorenzen's proposition (13), transferred Prismatolaimidae from Enoplida to Araeolaimida because of the spiral type amphids with slit-like or sometimes oval openings.

In the present study, it was found that the amphidial fovea of *Prismatolaimus* consists of an oval, slightly depressed cuticular plate with a curved, slit-like aperture along its posterior, dorsal, and ventral margins. The aperture therefore is concave towards the anterior side with development of the dorsal extensions varying with specimen and even body side. The anterior lip of the fovea has a posteriorly and ventrally inwardly directed slope, so that the deepest part of the opening is at the ventral side of the amphid corresponding with the internal pocket. The posterior lip of the fovea is thickened. The amphid of some species of *Bastiania* is more curved and more or less unispiral.

Apart from the similar amphid structure and position, the following characters point to a close relationship of these genera: similar anterior and somatic setae, similar type of body annulation, similar position of nerve ring, similar cardia, same type and position of supplements, same structure and shape of spicules and gubernaculum, including the muscular extension described above for *Prismatolaimus,* same number (two) of ejaculatory glands, and similar tail with hook-like extension. The difference in buccal cavity is related to different feeding habits and can best be explained as a reduction in *Bastiania.*

With regard to Onchulidae and Tripyloidea, the relationships are less clear. Similarities seem to exist in the spicular pouch, which may act as a hydrostatic system causing protraction of the spicules (18), but shape and structure of spicules and gubernaculum are different. Males of *Kinonchulus* Riemann, 1972 possess papilliform supplements extending to the neck region (17), and this situation also exists in *Tripyla* (6). The copulatory muscles of *Tobrilus* and *Tripyla* have arrangements similar to those in *Prismatolaimus,* and some species of *Tobrilus* and *Tripyla* show clearly the presence of four coelomocytes near the base of the pharynx, comparable again to *Prismatolaimus.* Both characters, however, have been little studied and could have a far more general occurrence than presently known. Differences exist in amphid shape, position of cephalic setae, position of dorsal pha-

ryngeal gland outlet (DO) in Onchulidae, and position and shape of amphids, position of DO, presence of metanemes, and presence of caudal glands in Tripyloidea. Although caudal glands have been reported for *Prismatolaimus* (10), they have not been confirmed by other authors or by the present study.

On the basis of the available evidence, inclusion of Bastianidae and Prismatolaimidae as two sister taxa in the Araeolaimida or Leptolaimina seems more justified at present, but the affinities there are far from clear and a more detailed study (TEM) is needed to determine the exact position of the ventrosublateral gland outlets in both genera.

Literature Cited

1. Alekseev, V. M. 1983. [Analysis of the systematic position of the family Prismatolaimidae (Nematoda: Araeolaimida) and description of *Prismatolaimus verrucosa* from the south of the Far-East, found for the first time in the USSR.] Nauchnye Doklady Vysshei Shkoly Biologicheskie Nauki 5:37–40.

2. Ali, S. M., M. V. Suryawanshi, and K. Z. Chisty. 1973. *Prismatolaimus indicus* sp. n. and *Onchulus longicauda* (Daday, 1899) Andrássy, 1964 (Nematoda: Onchulidae) from Marathwada, India. Indian Journal of Nematology (1972) 2:7–10.

3. Andrássy, I. 1964. Onchulidae n. fam., eine neue Familie der Ordnung Enoplida (Nematoda). Opuscula Zoologica Budapest 5:25–41.

4. Andrássy, I. 1976. Evolution as a basis for the systematization of nematodes. London: Pitman Publishing.

5. Chitwood, B. G., and M. B. Chitwood. 1974. Introduction to nematology. Baltimore: University Park Press.

6. Cobb, N. A. 1914. North American free-living freshwater nematodes. Transactions American Microscopical Society 33:69–134.

7. Coomans, A. 1979. A proposal for a more precise terminology of the body regions in the nematode. Annales de la Société Royale Zoologique Belgique 108:115–117.

8. De Coninck, L. 1935. Contribution à la connaissance des nématodes libres du Congo belge. I. Les nématodes libres des marais de la Nyamuamba (Ruwenzori) et des sources chaudes du Mont Banze (Lac Kivu). Revue de Zoologie et Botanique Africaine 26: 249–326.

9. De Coninck, L. 1965. Classe des nématodes. Pp. 3–217 *in* P. P. Grassé, ed. Traité de zoologie—anatomie, systématique, biologie. Paris: Masson et Cie.

10. Gagarin, V. G., and L. L. Kuz'min. 1972. [New data on taxonomy of the genus *Prismatolaimus* (Nematoda, Onchulidae).] Zoologischeskii Zhurnal 51: 1879–1881.

11. Goodey, T. 1963. Soil and freshwater nematodes. 2nd edition by J. B. Goodey. London: Methuen and Co.

12. Khera, S., and Y. Chaturvedi. 1977. Nematodes from tea plantations of Dehra Dun, India. Records Zoological Survey India 72:125–152.

13. Lorenzen, S. 1981. Entwurf eines phylogenetischen Systems der freilebenden Nematoden. Veröffentlichungen des Instituts für Meeresforschung, Bremerhaven, Supplement 7:1–472.

14. Maggenti, A. R. 1981. General nematology. New York: Springer Verlag.

15. Maggenti, A. R. 1982. Nemata. Pp. 879–929 *in* S. B. Parker, ed. Synopsis and classification of living organisms 1. New York: McGraw-Hill.

16. Raski, D. J., M. Luc, and A. Valenzuela-A. 1985. Redescription of *Criconema giardi* (Certes, 1889) Micoletzky, 1925, type species of the genus *Criconema* Hofmänner and Menzel, 1925 (Criconematidae: Nematoda). Revue de Nématologie 7:301–334.

17. Riemann, F. 1972. *Kinonchulus sattleri* n. g. n. sp. (Enoplida, Tripyloidea) an aberrant free-living nematode from the lower Amazonas. Veröffentlichungen des Instituts für Meeresforschung Bremerhaven 13:317–326.

18. Riemann, F. 1977. Causal aspects of nematode evolution: Relationships between structure, function, habitat and evolution. Mikrofauna Meeresbodens 61: 217–230.