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Descriptions of Three New *Longidorus* Species from Alaska (Nematoda: Longidoridae)[1]

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Abstract: Three new *Longidorus* species, *L. alaskaensis* n. sp., *L. paralaskaensis* n. sp., and *L. bernardi* n. sp., are described from specimens collected near Fairbanks, Alaska. *Longidorus alaskaensis* differs from all species of *Longidorus* by the presence of a caecum-like structure situated at the reflex of the oviduct. *Longidorus paralaskaensis* most closely resembles *L. alaskaensis* n. sp., *L. crassus* Thorne, *L. picenus* Roca, Lamberti & Agostinelli, and *L. silvae* Roca, differing from the last three of these species by having a parallel vs. a tapered lip region, and from all four by having a more narrowly rounded tail tip. *Longidorus paralaskaensis* differs from *L. alaskaensis* by having a longer odontostyle (119–128 vs. 110–118 μm) and by lacking the caecum-like structure found at the reflex of the oviduct. *Longidorus bernardi* n. sp. most closely resembles *L. mirus* Khan, Chawla & Seshadri, from which it differs by having a longer tail with a more acutely rounded tip, a longer body length (3.5–4.6 vs. 3.0–3.6 μm), and a larger c′ value (1.6–1.8 vs. 1.3–1.6). *Longidorus bernardi* differs from *L. sylphus* Thorne, *L. africanus* Merny, *L. auratus* Jacobs & Heyns, and *L. conicaudatus* Khan by having a slightly expanded lip region vs. a lip region with parallel body walls and a more finely rounded tail tip.

Key words: Alaska, *Longidorus alaskaensis* n. sp., *Longidorus bernardi* n. sp., *Longidorus paralaskaensis* n. sp., morphometrics, nematode, new species, taxonomy.

During a trip to the region of Fairbanks, Alaska, in 1978 S. Van Gundy collected specimens of an undescribed species of *Longidorus* from the rhizosphere of rose (*Rosa acicularis* Lindl.) near the Chena River and from the rhizosphere of rose and alder near the Chatanika River and the Steese Highway. In 1986 E. Bernard visited this same general area and collected soil samples near Hess Creek on the Dalton Highway from the rhizosphere of willow (*Salix* sp.), rose, and aspen (*Populus tremuloides* L.), from which he extracted specimens of two additional undescribed species of *Longidorus,* which in some samples occurred together. This area is one of the coldest regions on the North American continent and is an area of permafrost with only a limited thawing of the surface soil. These three *Longidorus* species are described herein.

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Systematics

Longidorus alaskaensis n. sp. (Figs. 1 & 2)

Description

Morphometrics of holotype female, allotype male, paratype females, paratype males, and paratype juveniles given in Table 1.

Female: Body forming J- to spiral shape, about 75% of mid-body width at esophagointestinal junction, near 67% at odontophore base, tapering to about 25% at lip base. Cuticle appearing plain except for inconspicuous pores, made up of two layers approximately 4 μm thick with the outer layer 3 μm thick, becoming thicker two anal body lengths anterior to the anus to a maximum of 10 μm with the two layers of nearly equal width. Lip region almost hemispherically rounded to almost truncate. Small, obscure labial and cephalic papillae present, no lip construction or expansion. Amphid appearing bilobed in lateral view, extending posteriorly to about ⅔ of the distance to the guide ring. Nerve ring about one body width (at odontophore base) posterior to the odontophore base. Odontostyle long and slender, 2 μm-d at base, odontophore base slightly expanded. Esophageal bulb approximately

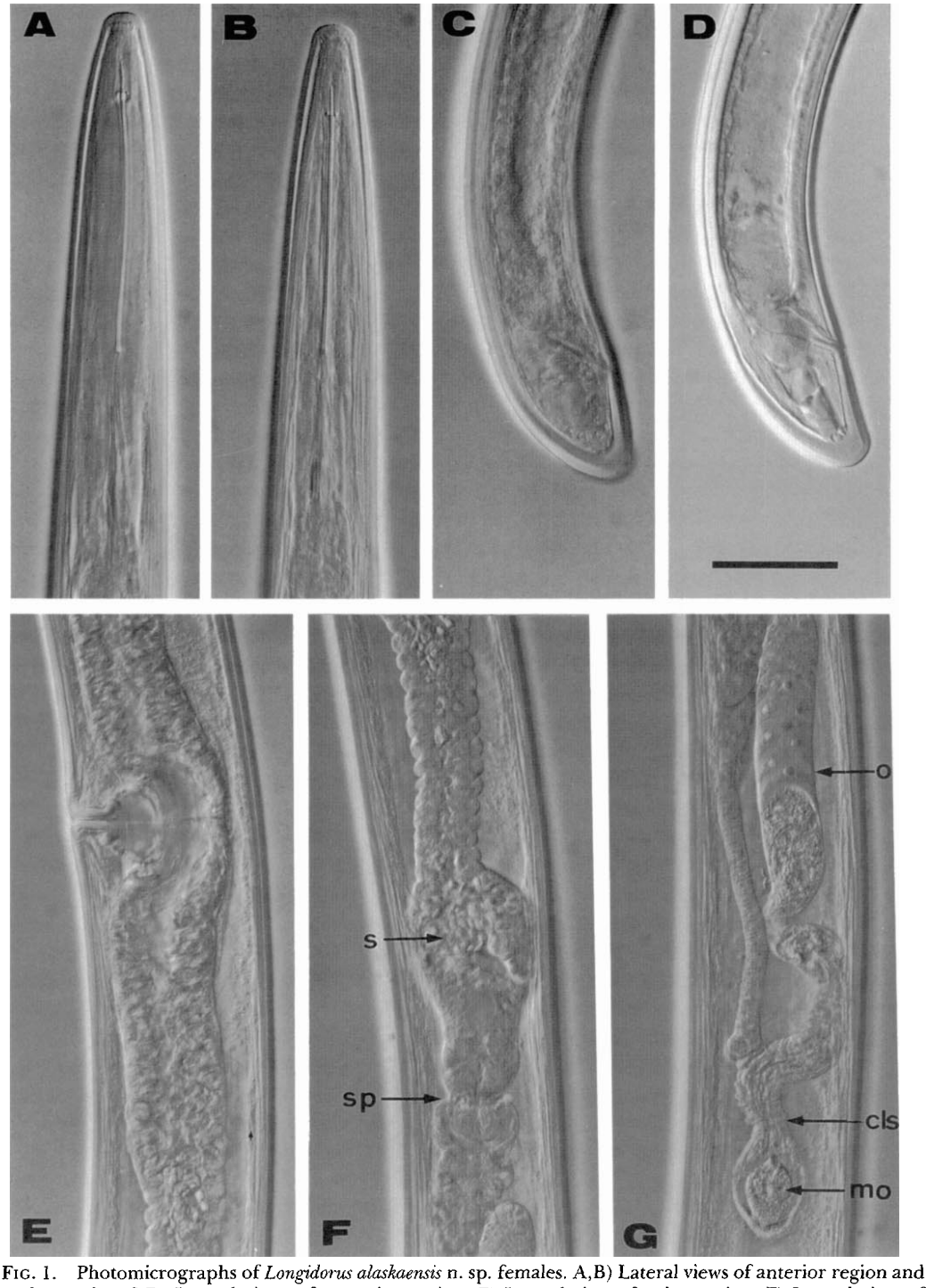

FIG. 1. Photomicrographs of *Longidorus alaskaensis* n. sp. females. A,B) Lateral views of anterior region and complete stylet. C,D) Lateral views of posterior region. E) Lateral view of vulva region. F) Lateral view of uterine region, note sperm (s) and sphincter (sp) between the uterus and oviduct. G) Lateral view of the reflex of the genital system showing oviduct, ovary (o), and caecum-like structure (cls) at the reflex (note maturing oocyte [mo]); this structure similar in all specimens although varying in length. Scale bar = 50 μm.

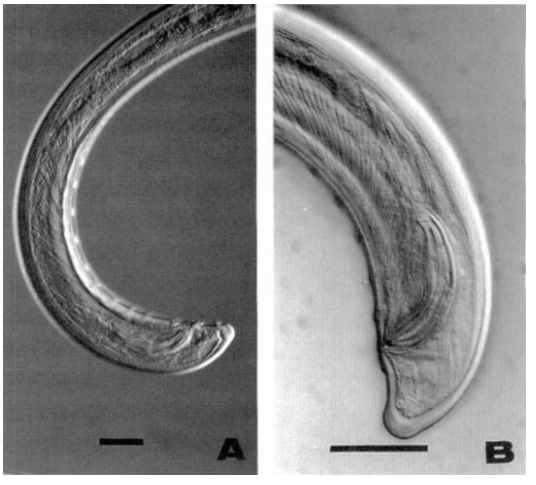

FIG. 2. Photomicrographs of *Longidorus alaskaensis* n. sp. male posterior regions in lateral view. Scale bars = 50 μm.

four times as long as wide, tapering anteriorly. Esophago-intestinal valve about 40% of width at base of the esophageal bulb, about as long as wide, almost conical posteriorly. Vulva elevated, vagina perpendicular to body axis with slightly thickened cuticular lining encircled by a muscular band at juncture with uterus, not obviously thickened exterior to the vagina. Uterus and sphincter joining uterus and oviduct prominent, sperm observed in rounded area of uterus ½ body length proximally from sphincter (Fig. 1F). Caecum-like structure extending distally from the reflex of the oviduct (Fig. 1G); structures conspicuous in five specimens, somewhat indistinct due to gut contents in four specimens; maturing oocyte (18 × 24 μm) observed 120 μm anterior to nearest oocyte in anterior structure of holotype. Ovaries paired, opposed, reflexed. Prerectum 7–9 anal body widths in length. Rectum length near 75% of anal body width. Tail with dorsal curve, tip conical to bluntly rounded (18–22 μm-d). Hyaline area of tail about twice as wide as long.

Male: Body shape same as female, except posterior region strongly curved ventrally (Fig. 2A). Morphometrics and anatomy similar to female except for structural differences in genital apparatus. Spicules thick, massive, 70–80 μm long, 14–18 μm wide, swollen from near mid-shaft ½ distance to distal end (Fig. 2A,B). Lateral accessory pieces inconspicuous. Paired adanal supplements 13–18 μm anterior to cloacal opening; 8–12 medioventral supplements anterior to cloaca. Tail conical, ventrally curved with semi-hemispherical to conical tip. Hyaline area about twice as wide (20–26 μm) as long.

Juveniles: Body shape arcuate to J-shaped, smaller than adult females. Replacement odontostyle present; in non-moulting specimens, anterior end in area of nerve ring. Juvenile stages differentiated by comparison of odontostyle and replacement odontostyle lengths. Tails of all stages more conical than tail of female.

Diagnosis

Longidorus alaskaensis n. sp. differs from all other *Longidorus* species by the presence of a caecum-like structure situated at the reflex of the oviduct (Fig. 1G). The structure is similar to that depicted for a young female of *L. orientalis* Loof (8).

Relationships

Longidorus alaskaensis n. sp. most closely resembles species belonging to the *L. elongatus* group. These nematodes lack any lip constriction or expansion and have inconspicious swellings of the odontophore bases and conical tails with broadly rounded to hemispherical tips. In addition to the diagnostic characters given, *L. alaskaensis* differs from *L. goodeyi* Hooper (4) by having a longer odontostyle (110–118 vs. 98–109 μm) and a parallel vs. tapered lip region; from *L. crassus* Thorne (13) by having a longer tail (41–64 vs. 30–42 μm), a parallel vs. tapered lip region, and a more narrowly rounded tail tip; from *L. arthensis* Brown, Grunder, Hooper, Klinger & Kunz (3) by having a larger lip width (17–19 vs. 14–17 μm) and longer odontostyle (110–118 vs. 102–111 μm); from *L. caespiticola* Hooper (4) by having a larger c′ value (0.8–1.3 vs. 0.7–0.8), a parallel vs. tapered lip region, and a more narrowly rounded tail tip; from *L. silvae* Roca (11) by having a larger lip width (17–19 vs.

TABLE 1. Morphometrics of all identified stages of *Longidorus alaskaensis* n. sp.[a]

	Holotype ♀	Paratype ♀	Allotype ♂	Paratype ♂	J2	J3	J4
n	1	8	1	6	3	7	9
Body length	5,386	5,451 ± 564 (4,898–6,213)	4,943	5,702 ± 365 (5,023–6,034)	1,925 ± 249 (1,637–2,081)	2,637 ± 182 (2,331–2,903)	3,814 ± 352 (3,024–4,105)
a	73	74 ± 5.8 (66–82)	80	82 ± 3.7 (78–88)	57 ± 5.0 (51–62)	62 ± 5.2 (58–70)	68 ± 6.4 (58–76)
b	11.5	11.5 ± 2.6 (9.6–17.4)	10.2	11.8 ± 0.9 (10.2–12.6)	5.6 ± 1.3 (4.7–6.5)	7.8 ± 1.1 (7.1–10.2)	9 ± 0.8 (7.8–10.1)
c	128	117 ± 18.2 (97–147)	95	123 ± 19.1 (97–148)	37.4 ± 2.0 (36–40)	49.3 ± 4.9 (45–58)	84.9 ± 11.9 (61–99)
c′	0.91	0.97 ± 0.15 (0.82–1.28)	1.0	0.9 ± 0.08 (0.8–1.0)	2.0 ± 0.19 (1.8–2.2)	1.6 ± 0.18 (1.3–1.8)	1.0 ± 0.12 (0.9–1.3)
V% (T%)	49.2	48.6 ± 2.4 (43.5–51.5)	62.5	52.5 ± 11.1 (37–63)	—	—	—
Lengths:							
Odontostyle	114	113.6 ± 2.9 (110–118)	118	114 ± 8.9 (102–128)	71.7 ± 1.5 (70–73)	85.5 ± 5.3 (80–94)	97.3 ± 5.5 (88–104)
Odontophore	74	77 ± 2.6 (72–80)	78	76.3 ± 4.3 (70–80)	43.5 ± 5.0 (40–47)	59.2 ± 7.7 (50–69.5)	64.2 ± 4.4 (57–72)
Replacement Odontostyle	—	—	—	—	83 ± 8.2 (74–90)	92 ± 9.0 (80–103)	112 ± 4.9 (105–120)
Tail	42	47 ± 7.3 (41–643)	52	47 ± 4.8 (40–52)	51 ± 5.0 (46–56)	54 ± 4.5 (50–60)	45 ± 4.3 (40–52)
Anterior ovary (Spicules)	750	745 ± 144 (610–1070)	76	76 ± 3.9 (70–80)	—	—	—
Posterior ovary (Number Supplements)	672	675 ± 104 (536–854)	13	10 ± 1.2 (8–11)	—	—	—
Hyaline area tail	14	14 ± 2.8 (11–20)	14.5	12 ± 3.1 (8–16)	9 ± 3.0 (6–12)	9 ± 1.7 (7–11)	10 ± 1.1 (8–12)
Esophagus base	95	102 ± 6.9 (94–115)	94	98 ± 6.3 (90–106)	74 ± 2.8 (72–76)	75 ± 6.1 (68–86)	82 ± 6.1 (74–92)
Widths:							
Lips	18	18 ± 0.6 (17–19)	17.5	17.7 ± 0.5 (17–18)	11 ± 1.0 (10–12)	13.4 ± 0.7 (12–14)	15.2 ± 0.8 (14–16)
Esophagus base	26.5	27 ± 1.6 (25–30)	25	25.5 ± 1.6 (23–28)	17.0 ± 1.4 (16–18)	21.9 ± 1.1 (20–23)	24.7 ± 1.2 (23–26)
Mid-body	74	74 ± 2.9 (70–78)	62	69.5 ± 3.8 (64–74)	34 ± 6.0 (28–40)	43 ± 4.6 (28–40)	56 ± 6.0 (50–70)
Anus	46	48.5 ± 3.0 (44–53)	52	52.3 ± 2.7 (48–56)	25.7 ± 3.5 (22–29)	33.6 ± 3.0 (30–39)	43.8 ± 4.1 (38–50)
Distance to:							
Guide ring	36	34.8 ± 2.1 (32–38)	39	37.7 ± 2.7 (34–42)	24.3 ± 2.1 (22–26)	26.3 ± 1.9 (24–28)	28.3 ± 1.8 (25–30)

[a] Mean ± standard deviation, range in parentheses; all measurements expressed in µm.

14–17 μm), a shorter distance to the guide ring (32–38 vs. 37–44 μm), a larger c′ value (0.8–1.3 vs. 0.7–0.8), parallel vs. tapered lip region, and more narrowly rounded tail tip; from *L. paralaskaensis* n. sp. by having a shorter odontostyle (110–118 vs. 119–128 μm) and a more broadly rounded tail tip.

Type host and locality

All type specimens collected by E. Bernard 11 August 1986, north of Fairbanks, Alaska, at Hess Creek on the Dalton Highway 38 km north of its intersection with Alaska Highway 2, from the rhizospheres of willow, rose, and aspen.

Type designations

Holotype female, allotype male, seven paratype females, five paratype males, 19 juvenile paratypes (three J2, seven J3, nine J4) deposited in the USDA Nematode Collection, Beltsville, Maryland; one paratype male and one paratype female deposited in the Tennessee Nematode Collection, University of Tennessee, Knoxville, Tennessee.

Longidorus paralaskaensis n. sp.
(Fig. 3)

Description

Morphometrics of holotype female, paratype females, and paratype juveniles given in Table 2.

Female: Body forming J-shape, tapering gradually anteriorly, near 25% of mid-body width at lip base. Cuticle appearing plain except for inconspicuous pores, with two layers about 5 μm thick with the outer layer nearly 3 μm thick, becoming thicker about two anal body lengths anterior to the anus to a maximum of nearly 10 μm with the two layers of nearly equal width. Lip region arcuate anteriorly with small, obscure labial and cephalic papillae present, no lip constriction or expansion. Amphid appearing bilobed, not seen in true lateral view, extending posteriorly to about half of the distance to guide ring. Nerve ring about one body width (at odontophore base) posterior to the odontophore base. Odontostyle long and very slender, approximately 1.5 μm-d at base, odontophore base slightly swollen and muscular. Esophageal bulb about 4.5 times as long as wide, tapering anteriorly. Esophagointestinal valve about 60% of width at base of esophageal bulb, almost conical posteriorly. Vulva not elevated. Vagina perpendicular to body axis with slightly thickened cuticular lining, encircled by a muscular band at juncture with uterus, not obviously thickened exterior to the vagina. Sphincter joining uterus and oviduct, and uterus prominent, sperm not observed in uterus. Ovaries paired, opposed, reflexed. Prerectum 8–10 anal body widths in length. Rectum about 85% of anal body width long. Tail dorsally curved with a conical to bluntly rounded tip (10–15 μm-d). Hyaline area of tail approximately 2.5 times as wide as long.

Male: Not found.

Juveniles: Body shape arcuate to J-shaped, smaller than adult females. Replacement odontostyle present; in non-moulting specimens anterior end in area of nerve ring. Tail more conical than in female.

Diagnosis

Longidorus paralaskaensis n. sp. differs from other species in the genus by the following combination of characters: female lip area body walls parallel in the area of the amphids and 18–19 μm wide, tail conical with a narrowly rounded tip and nearly equal to the anal body width, odontostyle 119 to 128 μm long, odontophore base slightly expanded, and body length between 5.5 and 6.5 mm.

Relationships

Longidorus paralaskaensis n. sp. most closely resembles *L. alaskaensis* n. sp., *L. crassus* Thorne (14), *L. picenus* Roca, Lamberti & Agostinelli (12), and *L. silvae* Roca (11) but differs from the last three of these species by having a parallel vs. a tapered lip region, and from all four species by having a more narrowly rounded tail tip. *L. pa-*

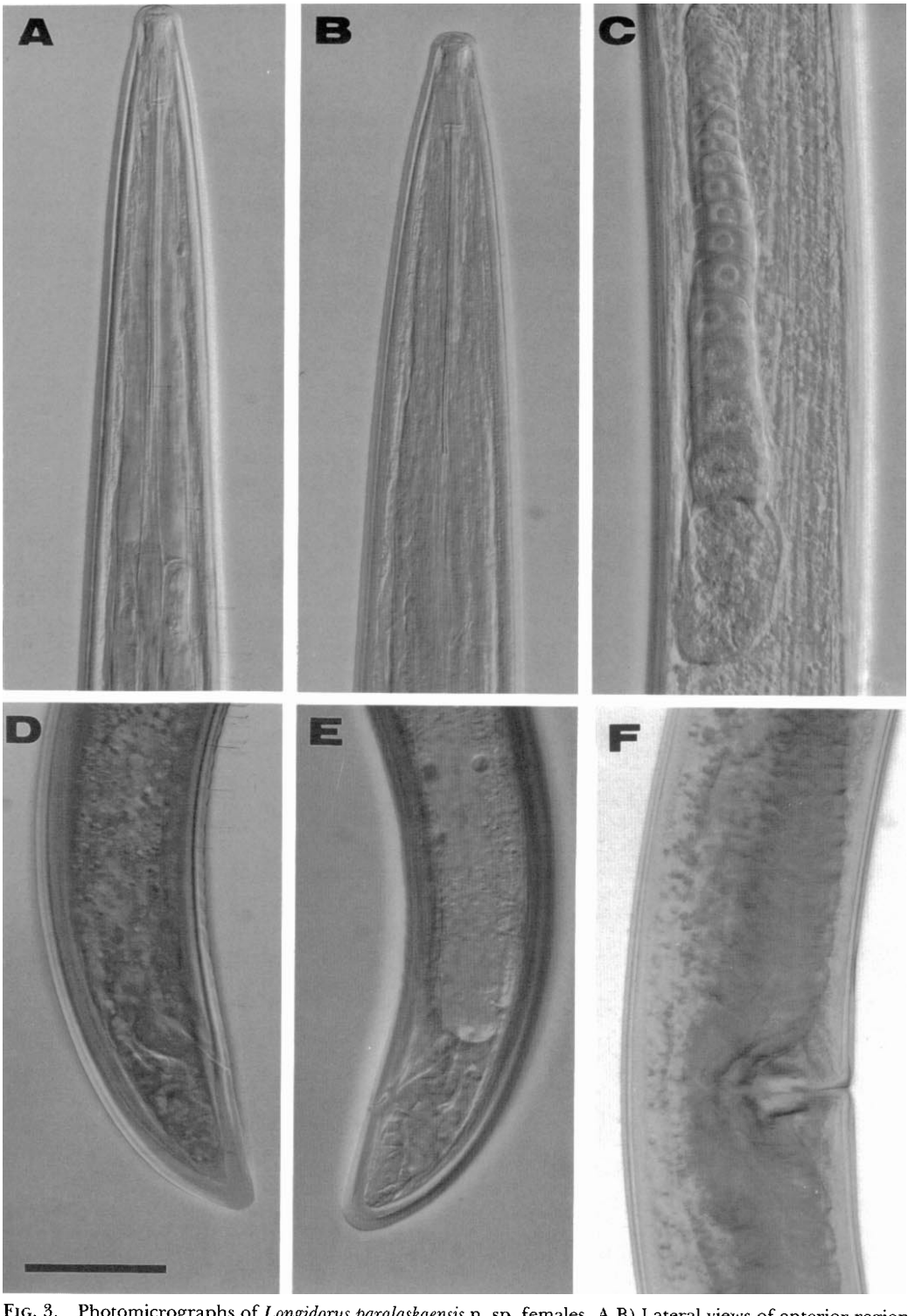

FIG. 3. Photomicrographs of *Longidorus paralaskaensis* n. sp. females. A,B) Lateral views of anterior region and complete stylet. C) Lateral view of posterior ovarial region. D,E) Lateral views of posterior region. F) Lateral view of vulva region. Scale bar = 50 μm.

TABLE 2. Morphometrics of all identified stages of *Longidorus paralaskaensis* n. sp.[a]

	Holotype ♀	Paratype ♀♀[b]	Paratype J3	Paratype J4	Chatanika River ♀
n	1	2	1	4	1
Body length	6,386	5,784–6,286	3,412	4,371 ± 339 (4,194–4,879)	6,143
a	84	77–80	74	73 ± 2.8 (70–76)	71
b	11.7	10.7–12.0	8.2	8.7 ± 0.7 (8.1–9.6)	12.2
c	152	136–121	69.6	94 ± 9.2 (81–103)	139
c′	0.95	0.98–1.13	1.4	1.1 ± 0.1 (1.0–1.2)	0.96
V	52	51.2–49.8	—	—	47.2
Lengths:					
Odontostyle	128	120–119	86	103.8 ± 4.6 (99–110)	126
Odontophore	70	70–70	66	69 ± 2.5 (66–72)	70
Replacement odontostyle	—	—	104	119.5 ± 1.7 (117–121)	—
Tail	42	43–52	49	46.8 ± 5.1 (41–52)	44
Anterior ovary	720	667–608	—	—	342
Posterior ovary	762	676–707	—	—	360
Hyaline area of tail tip	9	10–12	8	9 ± 1.2 (8–10)	19
Expanded esophagus base	127	132–130	94	112 ± 5.9 (106–120)	113
Widths:					
Lips	19	18–18	14	16 ± 0.0 (16)	18
Esop. base	34	28–30	22	24.8 ± 1.0 (24–26)	22
Mid-body	76	76–78	46	59.5 ± 3.4 (56–64)	86
Anus	44	44–46	35	42.8 ± 3.6 (40–48)	46
Distance to:					
Guide ring	37	34–37	28	32.3 ± 1.9 (31–35)	36

[a] Mean ± standard deviation, range in parentheses; all measurements expressed in μm.
[b] Left, measurements of specimen 1: right, measurements of specimen 2.

ralaskaensis differs from *L. alaskaensis* by having a longer odontostyle (119–128 vs. 110–118 μm) and lacking the caecum-like structure found at the reflex of the oviduct; from *L. crassus* by having a longer odontostyle (119–128 vs. 100–118 μm) and longer tail (42–52 vs. 30–42 μm); from *L. picenus* by having a shorter odontostyle (119–128 vs. 131–146 μm), longer tail (42–52 vs. 35–42 μm), shorter body length (5.9–6.4 vs. 6.4–7.8 mm), and shorter distance to the guide ring (34–37 vs. 37–42 μm); from *L. silvae* by a larger c′ value (0.9–1.1 vs. 0.5–0.7) and shorter distance to the guide ring (34–37 vs. 37–44 μm).

Type host and locality

All type specimens were collected by S. Van Gundy 13 September 1978 from the rhizosphere of rose near the Chena River, Fairbanks, Alaska. A single female was collected from the rhizosphere of rose and alder near the Chatanika River on the Steese Highway near Fairbanks, Alaska.

Type designations

Holotype female, two paratype females, five paratype juveniles (one J3, four J4) deposited in the University of California-Riverside Nematode Collection. The single female from the Chatanika River site also was deposited in the Riverside collection.

Longidorus bernardi n. sp.
(Fig. 4)

Description

Morphometrics of holotype female, paratype females, and paratype juveniles given in Table 3.

Female: Body forming open spiral to J-shape, tapering gradually anteriorly, about 90% of mid-body width at esophagus base, 75% at odontophore base, 30% at

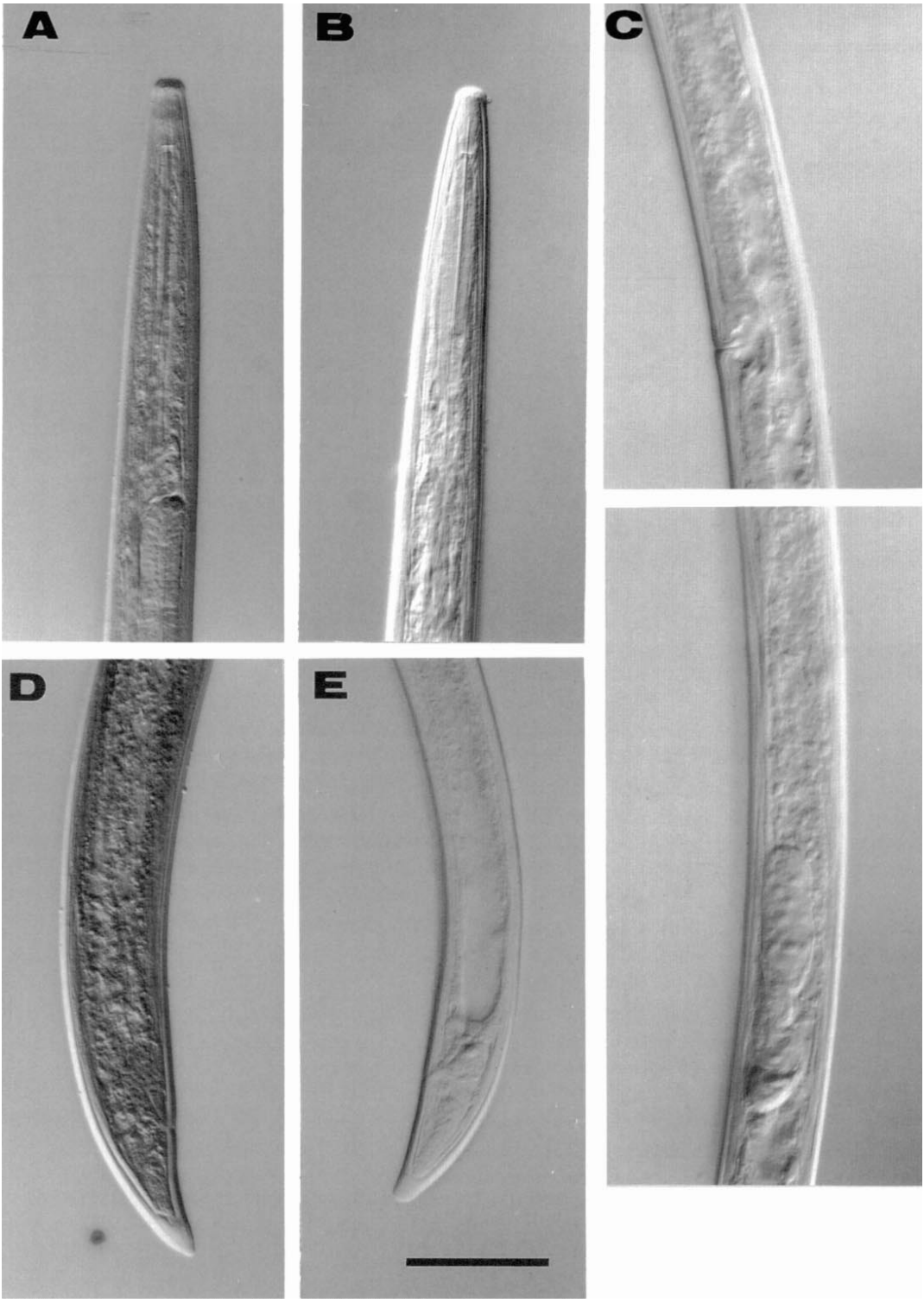

FIG. 4. Photomicrographs of *Longidorus bernardi* n. sp. females. A,B) Lateral views of anterior region and complete stylet. C) Lateral view of vulva region and posterior reproductive tract. D,E) Lateral views of posterior region. Scale bar = 50 μm.

TABLE 3. Morphometrics of all identified stages of *Longidorus bernardi* n. sp.[a]

		Paratypes		
	Holotype ♀	♀♀	J3	J4
n	1	10	3	6
Body length	3505	4,071 ± 258 (3,744–4,597)	2,024 ± 87 (1,952–2,121)	2,968 ± 209 (2,661–3,218)
a	103	104 ± 7.1 (94–118)	79 ± 5.2 (75–85)	98 ± 11.9 (88–121)
b	12.3	13.6 ± 3.3 (10.9–20.8)	8.0 ± 0.3 (7.8–8.3)	9.6 ± 0.8 (8.5–10.6)
c	76	90 ± 6.8 (81–104)	41 ± 2.3 (39–44)	59 ± 6.3 (49–66)
c′	1.77	1.68 ± 0.08 (1.56–1.84)	2.6 ± 0.1 (2.5–2.7)	2.2 ± 0.2 (1.9–2.3)
V	48.2	47.8 ± 1.9 (44.8–51.7)	—	—
Lengths:				
Odontostyle	74	74.8 ± 2.3 (72–80)	56.3 ± 3.2 (54–60)	67.2 ± 2.3 (64–70)
Odontophore	46	48 ± 3.8 (42–54)	39.7 ± 3.5 (36–43)	46.8 ± 3.3 (42–50)
Replacement Odontostyle	—	—	63.7 ± 2.5 (61–66)	74.2 ± 1.2 (73–76)
Tail	46	45.4 ± 1.7 (42–48)	49.7 ± 4.0 (46–54)	50.7 ± 4.3 (46–56)
Anterior ovary	300	323 ± 28 (282–368)	—	—
Posterior ovary	264	307 ± 48 (228–374)	—	—
Hayaline area of tail	10	10.6 ± 1.3 (8–12)	4.7 ± 1.2 8.9 ± 1.3	(4–6) (8–11)
Esophagus base	86	78 ± 6.2 (70–86)	58 ± 2.8 (56–60)	66.4 ± 6.5 (58–74)
Widths:				
Lips	11	10.9 ± 0.2 (10.5–11.0)	9.3 ± 0.3 (9.0–9.5)	10.5 ± 0.5 (10–11)
Esophagus base	16	18 ± 1.7 (14–20)	15 ± 1.4 (14–16)	17.2 ± 1.1 (16–18)
Mid-body	34	39.4 ± 2.1 (37–42)	25.7 ± 0.6 (25–26)	30.7 ± 4.5 (22–34)
Anus	26	27.1 ± 1.2 (25–29)	19.3 ± 1.2 (18–20)	23.3 ± 0.8 (22–24)
Distance to:				
Guide ring	24	24.9 ± 1.3 (23–27)	20.7 ± 1.2 (20–22)	22.3 ± 1.0 (21–24)

[a] Mean ± standard deviation, range in parentheses; all measurements expressed in μm.

lip base. Cuticle appearing plain except for inconspicuous pores, with two layers nearly 4 μm thick with the layers of almost equal thickness, very little thickening at vulva or either extremity. Lip region arcuate to almost truncate anteriorly. Small, obscure labial and cephalic papillae, slight lip constriction and expansion. Amphid appearing simple, not conspicious, extending nearly ⅔ of the distance to guide ring. Nerve ring about one body width (at odontophore base) posterior to the odontophore base. Odontostyle long and very slender, nearly 0.8 μm-d at base, odontophore base obscure, not swollen or muscular. Esophageal bulb nearly 4.5 times as long as wide, tapering anteriorly. Esophago-intestinal valve about half of width at base of esophageal bulb, slightly longer than wide, almost hemispherical posteri-

orly. Vulva slightly elevated. Vagina perpendicular to body axis, with slightly thickened cuticular lining, encircled by a muscular band at juncture with uterus, not obviously thickened exterior to the vagina. Sphincter joining uterus and oviduct, and uterus inconspicious, sperm not observed in uterus. Ovaries paired, opposed, reflexed. Prerectum 2–4 anal body widths in length. Rectum length about 60% of anal body width. Tail curved ventrally, with conical to bluntly rounded tip (5–7 μm-d). Hyaline area of tail about as wide as long.

Male: Not found.

Juveniles: Body shape arcuate to J-shaped. Replacement odontostyle present; in non-moulting specimens, anterior end in area of nerve ring. Tail more conical and acutely rounded than female.

Diagnosis

Longidorus bernardi n. sp. differs from other species in the genus by the following combination of characters: female lips slightly expanded, 10–11 μm wide, conical tail 1.5–2.0 times the anal body width with a finely rounded tip, odontostyle 72 to 80 μm long, odontophore base obscure, without swelling, and body length 3.5–4.8 mm.

Relationships

Longidorus bernardi n. sp. most closely resembles *L. mirus* Khan, Chawla & Seshadri (7), from which it differs by having a longer tail with a more finely rounded tip, longer body length (3.5–4.6 vs. 3.0–3.6 μm), and larger c′ value (1.6–1.8 vs. 1.3–1.6). *Longidorus bernardi* n. sp. differs from *L. sylphus* Thorne (13), *L. africanus* Merny (9), *L. auratus* Jacobs & Heyns (5), and *L. conicaudatus* Khan (6) by having a slightly expanded lip region vs. a lip region with parallel body walls, and a more finely rounded tail tip. *Longidorus bernardi* differs from *L. sylphus* in lacking a swollen odontophore base and by having a larger c′ value (1.6–1.8 vs. 1.4–1.6); from *L. africanus* by having a shorter odontostyle (72–80 vs. 82–93 μm) and longer tail (42–48 vs. 30–44 μm); from *L. auratus* by having a longer tail (42–48 vs. 33–41 μm) and shorter distance from the anterior end to guide ring (23–27 vs. 27–33 μm); from *L. conicaudatus* by having a longer tail (42–48 vs. 30–47 μm), shorter odontostyle (72–80 vs. 82–93 μm), and shorter distance from anterior end to guide ring (23–27 vs. 27–33 μm).

Type host and locality

All type specimens were collected by E. Bernard 11 August 1986 in the rhizosphere of willow, rose, and aspen north of Fairbanks, Alaska, at Hess Creek on the Dalton Highway 38 km north of its intersection with Alaska Highway 2.

Type designations

Holotype female, nine paratype females, 12 juvenile paratypes (three J3, nine J4) deposited in the USDA Nematode Collection, Beltsville, Maryland; one paratype female deposited in the Tennessee Nematode Collection, University of Tennessee, Knoxville.

Biological Notes: The structure of the caecum-like structure of *Longidorus alaskaensis* was similar in all specimens. Overall length of the structure varied among specimens.

The terminology for juvenile development stages is as defined by Robbins et al. (10). In *Longidorus* species unequivocally shown to have only three juvenile stages, the stages are designated as JI, JII, and JIII, whereas in all other species the designation is J1, J2, J3, and J4.

Plant-parasitic nematodes belonging to the virus-vector genera *Longidorus* and *Trichodorus* are distributed from the tropics to within the Arctic Circle. Bernard (2) reported the occurrence of four *Trichodorus* species from Alaska, two being new to science. In Europe, *T. primitivus* (de Man) Micoletzky and *P. pachydermus* (Seinhorst) Siddiqi have been reported from within the Arctic Circle in northern Norway (1). Also, *L. elongatus* (de Man) Thorne & Swanger has been collected from soil samples from within the Arctic Circle in northern Norway, including the southern part of Senja Island (1). However, the climate along the coastal area of Norway is mod-

erated by the Gulf Stream, which provides the nematodes with a more moderate biotope for survival. *Longidorus elongatus* is also present in southwestern and central Finland but in the central region has been only collected from sites in proximity to the Baltic Sea, which also provides a moderated coastal climate.

In common with the earlier records of the occurrence of *Trichodorus* species in Alaska, the three *Longidorus* species described here were extracted from soil samples collected in the Fairbanks region, Alaska, an area of discontinuous permafrost with upper soil layers sometimes thawing only for a few weeks during the summer each year. The *Longidorus* spp. described herein were recovered from soil samples collected in the proximity of rivers; thus, they were present in biotopes with moderated, localized, riverbank micro-climates. These three species are almost certainly indigenous to this area, as they were collected from ecologically undisturbed biotopes. The natural occurrence of *L. alaskaensis, L. paralaskaensis, L. bernardi,* and the four *Trichodorus* species, in the Fairbanks area of Alaska provides evidence of the ecological flexibility and adaptability of nematodes in these two genera.

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