

Meloidogyne aquatilis n. sp (Nematoda:Meloidogynidae) from *Spartina pectinata* with a Key to the Canadian Species of *Meloidogyne*

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Abstract: A new root-knot nematode, *Meloidogyne aquatilis* n. sp., attacking the roots of *Spartina pectinata* Link growing in the Ottawa River is described and illustrated. *Meloidogyne aquatilis* is distinguished from *M. graminis* by the light brown body color and by the absence of perineal lateral fields in the female. The male differs by the shorter stylet and by the hemizonid being separated by 7–9 annules from the excretory pore. The second-stage juveniles are also recognized by the 7–9-annule gap between the hemizonid and excretory pore and by the shorter tail with a disc-like subterminal tail structure, lower b ratio value, and inflated rectum. A key to the root-knot nematode species of Canada based on females, males, and juveniles is provided. The type host of *Dolichodera fluviatilis* Mulvey and Ebsary, 1980, *Spartina pectinata* Link, is reported for the first time. **Key words:** taxonomy, new species, morphology.

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Mulvey and Ebsary (2) described the new cyst nematode, *Dolichodera fluviatilis*, from Ottawa River bottom samples collected at Deschenes, Quebec; however, the host plant was unknown. Subsequent collections in 1981 of root and soil samples revealed that *Spartina pectinata* was the host plant. Further examination of the roots of *S. pectinata* revealed a new root-knot nematode species which is described and illustrated herein. The new species is the second root-knot nematode to be described from this locality, the first having been *Meloidogyne sewelli* Mulvey and Anderson (1). A key to facilitate the identification of the females, males, and second-stage juveniles of known Canadian root-knot nematode species is also provided. Procedures for fixing, preserving, and mounting specimens were previously described by Mulvey (3).

Meloidogyne aquatilis n. sp.

Figs 1, 2, 3

Holotype (female): Length (excluding neck) 623 μm ; width 289 μm ; L/W ratio 2.2; neck 114 μm ; stylet length 11 μm ; dorsal esophageal gland orifice (DGO) 6 μm posterior to base of stylet knobs.

Paratypes (20 females): Length (excluding neck) 670 μm (540–767); width 295 μm

(247–334); L/W 2.3 (2.1–2.4); neck 110 μm (99–129); stylet length 11.5 μm (10.5–12.5); width of stylet knobs 2.5–3.0 μm ; DGO 4–6.6 μm posterior to base of stylet knobs; vulva slit length 23 μm (21–25); vulva-anus distance 14 μm (12–16); distance between phasmids 14 μm (12.5–17); distance midway between phasmids to anus 6.5 μm (6–7.5).

Young and mature females light brown in color, elongate ovoid to pear shaped, with a slight posterior protuberance (Fig. 1A, B). Cuticle at midbody about 20 μm thick, annules prominent, 4–5 μm wide. Annules particularly conspicuous on esophageal and caudal regions, less conspicuous over remainder of body. Head slightly set off with two annules and a prominent head cap (Fig. 2A). Cephalic framework weak. Stylet slender; knobs small, rounded. Excretory pore distinct near base of stylet knobs or slightly posterior. Vulva area recessed into posterior protuberance (Fig. 2B). Anus covered by a fold of cuticle in vulval depression (Fig. 1C, D, F). Perineal pattern coarse, strongly etched with a high truncate dorsal arch and discontinuous striae. Striae in the anal region perpendicular to the vulva. Phasmids small, indistinct. Female embedded completely in the root without gall formation (Fig. 1E). Egg sac external to root, three to four times larger than female, containing several hundred smooth, thin-shelled eggs measuring 90 μm (80–106) \times 43 μm (42–44).

Allotype (male): Length 975 μm ; a = 42; b = 7; c = 78; stylet length 16 μm ; spicules 24 μm .

Paratypes (three males): Length 820 μm

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Fig. 1. *Meloidogyne aquatilis* n. sp. A, B) Mature females showing the slight posterior protuberance and elongate ovoid (A) and pear shapes (B). C-F) Perineal patterns. Note the truncate dorsal arch and fold of cuticle above anus (arrows). D) Perineal pattern at a lower plane of focus than C and F showing the truncate dorsal arch and anus (arrow) below the anal fold. E) Two females completely embedded in the root of *Spartina pectinata*. Note the absence of gall formation and size of egg mass in relation to the embedded female at right.

(775-874); a = 40 (36-45); b = 4.5 (4-5); c = 103 (96-108); stylet length 14 μm (13-16); spicules 26 μm (24-26).

Body slender, vermiform, tapering anteriorly and posteriorly. Head set off by constriction from body, head cap prominent with one or two smooth post-labial annules (Fig. 2C, 3A.) Annulation prominent, annules at midbody about 4 μm wide. Stylet slender; knobs rounded, 3 μm wide, sloping posteriorly. Dorsal esophageal gland orifice 3-4 μm posterior to base of stylet knobs. Vesicles present posterior to metacarpal valve. Excretory pore 96 μm (78-111) from head. Hemizonid 7-9 annules anterior to excretory pore, occupying about two annules. Lateral incisures four; outer incisures crenate. Outer sectors of lateral field areolated completely; inner sector with infrequent transverse striae. Testis one. Spicules arcuate; head cephalated (Fig. 2D, E).

Gubernaculum 6 μm long, spindle-shaped. Tail rounded, clavate in ventral view.

Second-stage juveniles (27): Length 459 μm (418-490); a = 33 (30-36); b = 2.0 (1.9-2.1); c = 7.5 (7-10); stylet length 11 μm (10-12); tail length 61 μm (48-68); hyaline portion 12 μm (10-12).

Head with two or three fine annules; oral disc small, low (Fig. 3B). Head slightly set off from body. Cephalic framework weak. Stylet fine, slender; knobs about 2 μm wide, rounded, posteriorly sloping. Dorsal esophageal gland orifice 3 μm (2-4) posterior to base of stylet knobs. Excretory pore 70 μm (62-76) from head. Hemizonid 7-9 annules posterior to excretory pore and occupying about two annules. Lateral incisures incompletely areolated. Rectum inflated (Fig. 3C, D). Phasmids minute, off set to ventral margin of lateral field, 11 μm (9-17) posterior to anus. Seventy percent of sample

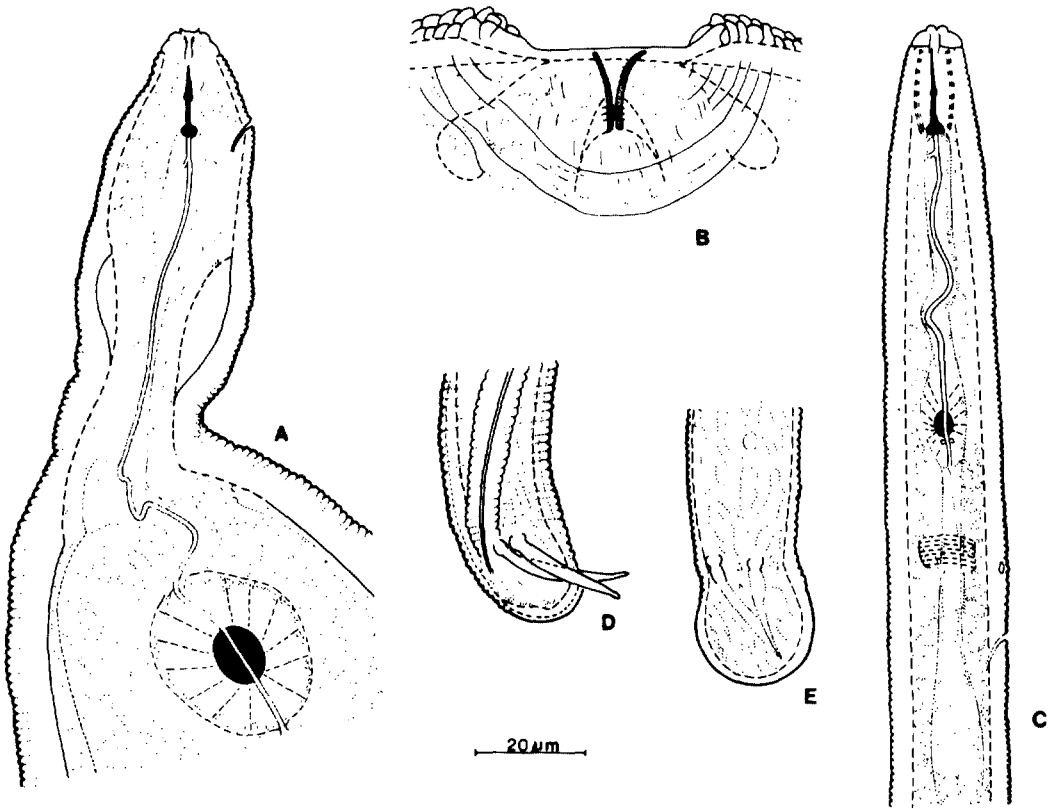


Fig. 2. *Meloidogyne aquatilis* n. sp. A) Head and esophageal region of female. B) Perineal region in lateral view showing the recessed vulva. C) Head and esophageal region of male in dorso-ventral view. D) Tail of male in lateral view. E) Tail of male in ventral view. Note the clavate appearance.

with a disc-like structure near the slightly clavate terminus.

Type host and locality: Collected December 1981 from *Spartina pectinata* Link growing in 15–20 cm of running water in the Ottawa River at Deschenes, Quebec.

Type deposition: Holotype female and allotype male mounted on slides 273 and 273a and deposited in the Canadian National Collection of Nematodes type collection, Ottawa. Paratype females, perineal patterns, males, and second-stage juveniles mounted on slides 273 and 273b-m and deposited as above. One male, four juveniles, and three female paratypes also deposited with the United States Department of Agriculture Nematode Collection at Beltsville, Maryland.

Differential diagnosis: *Meloidogyne aquatilis* n. sp. is most similar to *M. graminis* Sledge and Golden, 1964 but differs by the female being light brown in color without a perineal lateral field (*M. graminis*

females are white and have a deeply incised lateral field). The second-stage juveniles are readily distinguished by having the hemizonid 7–9 annules posterior to the excretory pore (4 annules posterior in *M. graminis*), a shorter tail (48–68 μm) with a refractive disc-like structure near the tail terminus versus a longer tail (68–88 μm) without the disc-like structure in *M. graminis*. *M. aquatilis* also has a smaller b ratio than *M. graminis* (2 [1.9–2.1] versus 2.3 [2.1–2.9]) and an inflated rectum (noninflated in *M. graminis*). The male of *M. aquatilis* differs from *M. graminis* by its shorter length (886 μm [775–975] versus 1,500 μm [1,200–1,700]), smaller b ratio (4–5 versus 6–8), shorter stylet (13–16 μm versus 17–19 μm), and by the hemizonid being 7–9 annules anterior to the excretory pore (anterior hemizonid separated from excretory pore by 1–2 annules in *M. graminis*).

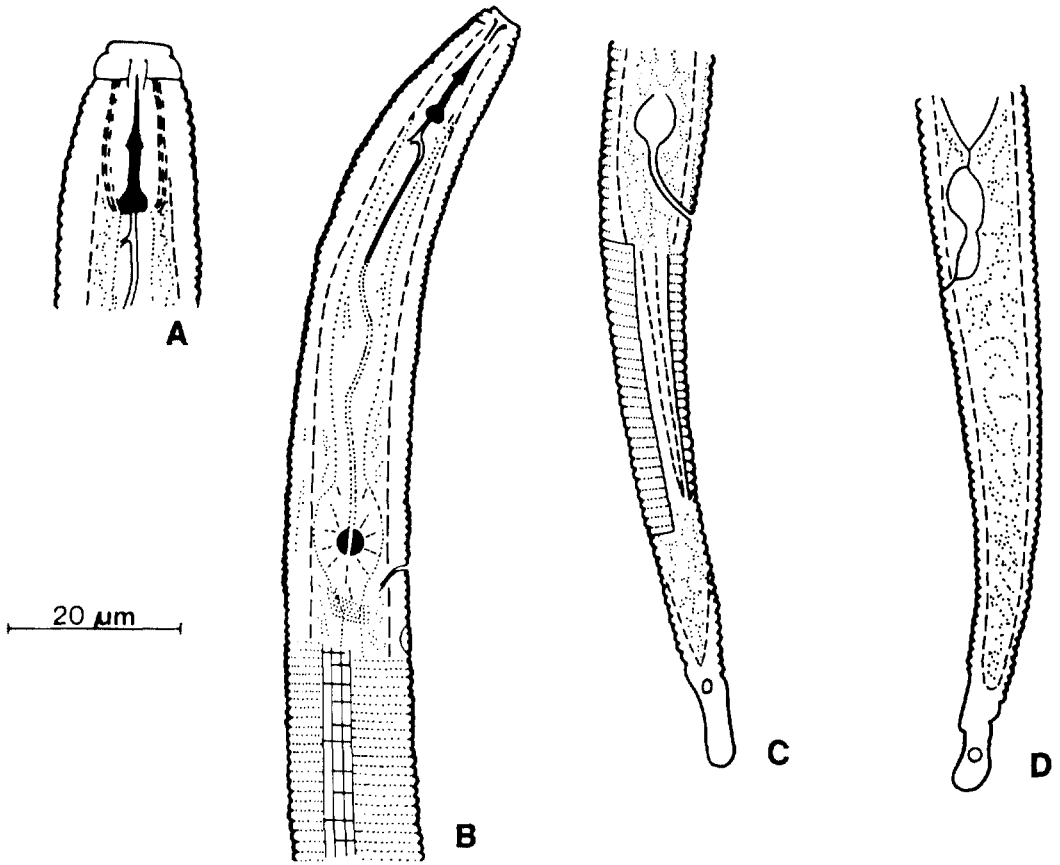


Fig. 3. *Meloidogyne aquatilis* n. sp. A) Head of male in lateral view. B) Head and esophageal region of second-stage juvenile. C, D) Tails of juveniles in lateral view. Note the inflated rectum and disc-like structure near the tail terminus.

Key to Canadian *Meloidogyne* species

- 1. Females 2
- Males 6
- Second-stage juveniles 10
- 2. Perineal pattern with stippling concentrated in anal area or diffused over inner part of pattern *hapla*
- Perineal pattern without stippling 3
- 3. Vulva recessed in a slight posterior protuberance; perineal pattern very strong; anus covered by a fold of cuticle *aquatilis* n. sp.
- Vulva not recessed; protuberance lacking; perineal pattern weakly to moderately developed; anus not covered by fold of cuticle 4
- 4. Perineal pattern very weak, inconspicuous *sewelli*
- Perineal pattern well delineated 5
- 5. Perineal pattern with striae interrupted above anus appearing as a

- ridge; striae widely spaced; dorsal arch high, squared off; dorsal esophageal gland orifice 5–6 μm behind stylet *microtyla*
- Perineal pattern continuous above anus without a ridge; striae closely spaced; dorsal arch high, rounded; dorsal esophageal gland orifice 3–4 μm behind stylet *incognita*¹
- 6. Stylet 23–33 μm ; spicules 29–40 μm *incognita*
- Stylet 13–20 μm ; spicules 24–31 μm 7
- 7. Lateral incisures areolated 8
- Lateral incisures incompletely areolated 9
- 8. Tail subdigitate *sewelli*
- Tail rounded *microtyla*
- 9. Stylet 13–16 μm ; spicules 24–28 μm *aquatilis* n. sp.

¹This species is a greenhouse pest and does not overwinter in the field in Canada.

- Stylet 17–20 μm ; spicules 28–31 μm
..... *hapla*
10. Rectum not inflated *hapla*
Rectum inflated 11
11. Tail 68–78 μm ; terminus subacute
..... *sewelli*
Tail 38–68 μm ; terminus rounded 12
12. Hemizonid posterior to excretory pore
..... *aquatilis* n. sp.
Hemizonid anterior to excretory pore
..... 13
13. Outer lateral incisures transversely
striate *incognita*
Outer lateral incisures not transversely
striate *microtyla*

LITERATURE CITED

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