

PHYTOPATHOGENIC NEMATODES OF FOREST UNDERGROWTH
THE FAMILIES TYLENCHORHYNCHIDAE AND HOPLOLAIMIDAE
(NEMATODA)

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The work is devoted to a description of 8 species of ectoparasitic nematodes of the families Tylenchorhynchidae and Hoplolaimidae, collected from the rhizosphere of Picea koraiensis Nakai, Pinus koraiensis S. et Z. and Betula manchurica (Rgl) Nakai in forests of the Primorje region. The material was fixed in T. A. F., and was processed according to J. Seinhorst (1959). Preparations of the holotypes and paratypes of the new species are kept in the laboratory of general helminthology of the Institute of Biology and Soil Science, Far Eastern Scientific Center, USSR Academy of Sciences.

Trophurus ussuriensis Eroshenko sp. nov.
(Fig. 23)

Holotype ♀: L = 0.69 mm; a = 28; b = 4.7; c = 16; V = 60%; stylet 14 μ m.

Paratypes ♀♀: L = 0.69-0.75 mm; a = 26-30; b = 4.7-5.5; c = 16-19; V = 56-60%; stylet 13-14 μ m.

♂♂: L = 0.69-0.74 mm; a = 26-39; b = 4.6-5.5; c = 14-18; T = 31-40; stylet 13 μ m; spicules 18-19 μ m; gubernaculum 5-6 μ m.

Female. Body cylindrical, narrowing only in the area of the esophagus. Head end continuous with the body contour; in several individuals it is faintly separated. Cuticle finely annulated from the head end to the anus; on the tail the annulation is more noticeable. There are 4 lines in the lateral field. Stylet thin with small oval knobs. Esophagus tylenchoid. Excretory pore situated at the level of the center of the isthmus. Ovary anterior. Posterior uterus equal to one body diameter at vulva in length. Vagina strongly sclerotized. The intestine forms a small (less than the body diameter at anus) sac below the rectum. Tail 43 μ m in length, with greatly thickened cuticle on the tip. Phasmids small, situated on the lower half of the tail.

Male. Shape of body and structure of head end and esophagus similar to the females. Lateral field with 4 lines not intersected by annules of cuticle. Testis single. Spermatozooids tiny and spherical. Spicules

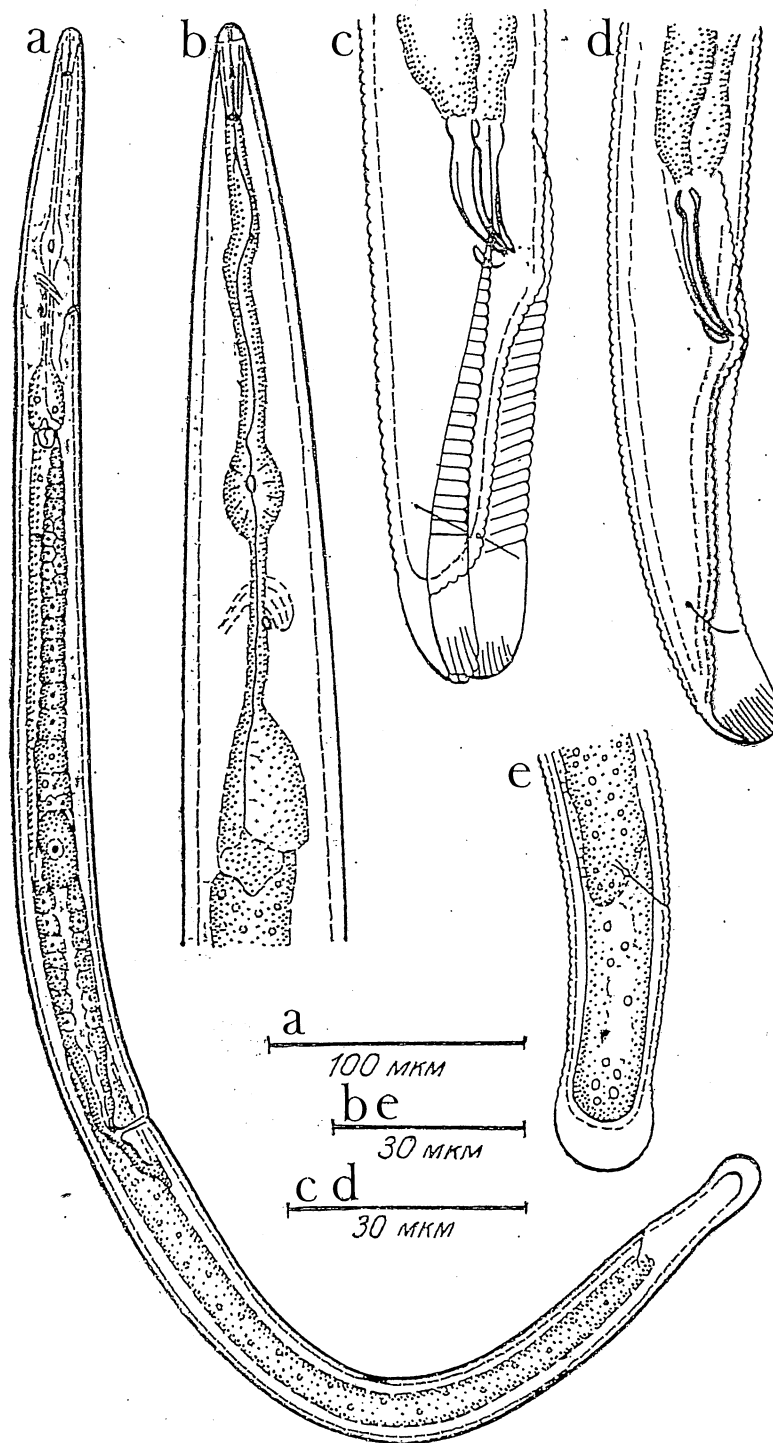


Figure 23. *Trophorus ussuriensis* sp. nov.

A - Anterior end of body; B - Esophageal area; C, D - Male tail;
E - Female tail.

weakly bent. Gubernaculum keel-shaped and with a small distal process. Bursa well-developed and fan-shaped on the tip of the tail. Tail conical, 48 μ m in length with a finger-like tip.

Differential diagnosis. According to a series of morphological characteristics, the species being described is close to T. sculptus Loof, 1956, T. minnesotensis (Caveness, 1958) Caveness, 1959 and T. similis Khan & Nanjappa, 1971. The new species differs from T. sculptus by the presence of a small postrectal intestinal sac in females (according to Loof, 1956, sac absent in T. sculptus); and from males described from Italy (Moretti et al., 1978), by the low position of the phasmids and by the annulation of the bursa which reaches only to the level of the phasmids. It differs from T. minnesotensis by the short postrectal sac (in T. minnesotensis the intestine continues almost to the end of the tail), by the structure of the tail and by the presence of a distal process in males. In comparison with T. similis, the species being described has a thicker body, a large stylet, a postrectal intestinal sac, and a different structure of gubernaculum, bursa, and tail tip in males.

Location. Rhizosphere of the roots of Picea koraiensis Nakai in the Chuguyev district of the Primorje region, the upper reaches of the Ussuri River.

Merlinius falcatus Eroshenko sp. nov.
(Fig. 24)

Holotype ♀: L = 0.84 mm; a = 23; b = 5.8; c = 11; V = 52%; stylet 33 μ m.

Paratypes ♀♀: L = 0.90-0.96 mm; a = 22-24; b = 5.6-6.3; c = 11-13; V = 50-53%; stylet 33-35 μ m.

♂♂: L = 0.76-0.84 mm; a = 25-30; b = 4.6-5.3; c = 9-10; stylet 33-35 μ m; spicules 23-29 μ m; gubernaculum 9 μ m.

Female. Body of the nematodes crescent-shaped. Head end with 5-7 cuticular annules. Stylet powerful, with knobs drawn downward. Dorsal gland duct opening into oesophagus lumen at 2 μ m from the stylet knobs. Metacorporeal bulb oval; basal bulb cylindrical. Cardia flat. Excretory pore at level of upper edge of the esophageal glands. Gonads paired; spermatheca spherical. Epiptygmas equal. Tail conical with a hemispherical smooth tip. There are 54 fine cuticular annules on the ventral side of the tail. Phasmids located at 1/3 of the length of the tail below the anus.

Male. Spicules weakly bent. Gubernaculum bent parallel to the spicules with a distally pointed end, and thickened proximally. The bursa reaches the tip of the tail.

Differential diagnosis. M. falcatus sp. nov. is close to a group of species of American fauna described by M. Allen (Allen, 1955): M. alpinus, M. affinis, M. grandis and M. lineatus. The new species

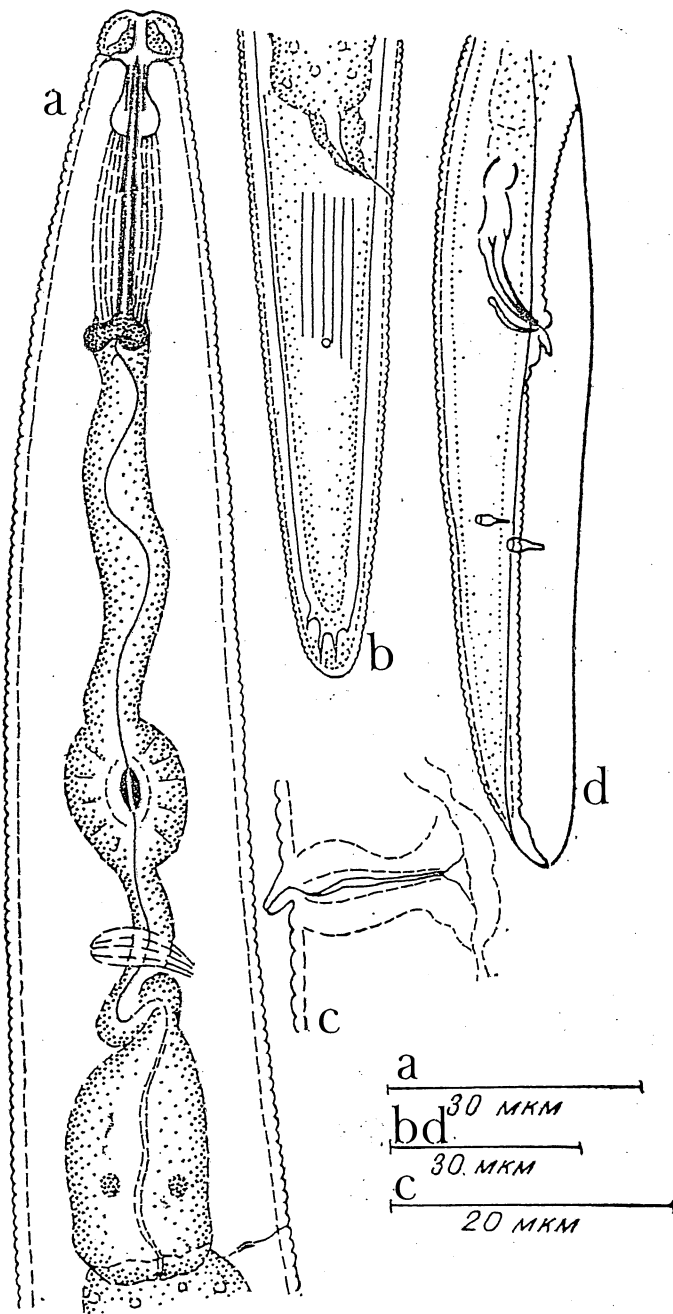


Figure 24. Merlinius falcatus sp. nov.

A - Anterior end of body; B - Female tail; C - Vulva area; D - Male tail.

differs from M. alpinus by the smaller number of cuticular annules on the head end of the body and by the shorter stylet (9 and 38-49 μ m in M. alpinus); in comparison with M. affinis the species being described has a longer stylet, fewer annules on the head end, and a tail conical in shape with a larger number of cuticular annules; the characteristics distinguishing the present species from M. grandis and M. lineatus are: the large size of the stylet, the fine cuticle, the flat form of the esophageal-intestinal valve, and in comparison with M. grandis the smaller measurements of the body.

Location. Rhizosphere of the roots of Picea koraiensis Nakai in the Chuguyev district of the Primorje region, the upper reaches of the Ussuri River.

Merlinius brevidens (Allen, 1955) Siddiqi, 1970
(Fig. 25)

♀: L = 0.56 mm; a = 24; b = 4.5; c = 13; V = 57%; stylet 17 μ m.

♂: L = 0.47 mm; a = 23; b = 5.8; c = 10; T = 54; stylet 17 μ m; spicules 21 μ m; gubernaculum 8 μ m.

Female. Lip area with 6 annules. Lateral field with 6 lines; external lines wavy. Stylet thin, with knobs posteriorly slanted. Dorsal gland duct opening into esophagus lumen at 1.4 μ m from the stylet base. Metacorporeal bulb of esophagus almost spherical. Excretory pore situated at the level of the dilatation of the basal bulb. Hemizonid two cuticular annules above excretory pore. Ovaries in two rows in the germinal zone. Spermatheca spherical. Epiptygma not noticeable. Tail conical with smooth tip. Phasmids below the anus, at 1/3 of the tail length. Tail with 48 cuticular annules.

Location. Rhizosphere of Picea koraiensis Nakai in the Dal'nerechensk district of the Primorje region, valley of the Orekhovka River.

Rotylenchus feroxcis Eroshenko sp. nov.
(Fig. 26)

Holotype ♀: L = 0.68 mm; a = 23; b = 4.7; c = 23; V = 59%; stylet 27 μ m; o = 16.

Paratypes ♀♀: L = 0.7-0.8 mm; a = 23-33; b = 4.7-5.8; c = 18-24; V = 53-60%; stylet 27-31 μ m; o = 12-19.

Males not observed.

Body bent in a crescent shape or in the form of an open spiral. Labial area anteriorly flattened, not separated from the general contours of the body, with 6-7 fine cuticle annules. The lateral field occupies a fourth of the diameter of the body, areolated only on the level of the esophagus. External lateral field lines wavy. Internal skeleton of the labial area strongly sclerotized. Transverse striation of the basal annule of the labial area not noticeable. Stylet knobs rounded or anteriorly

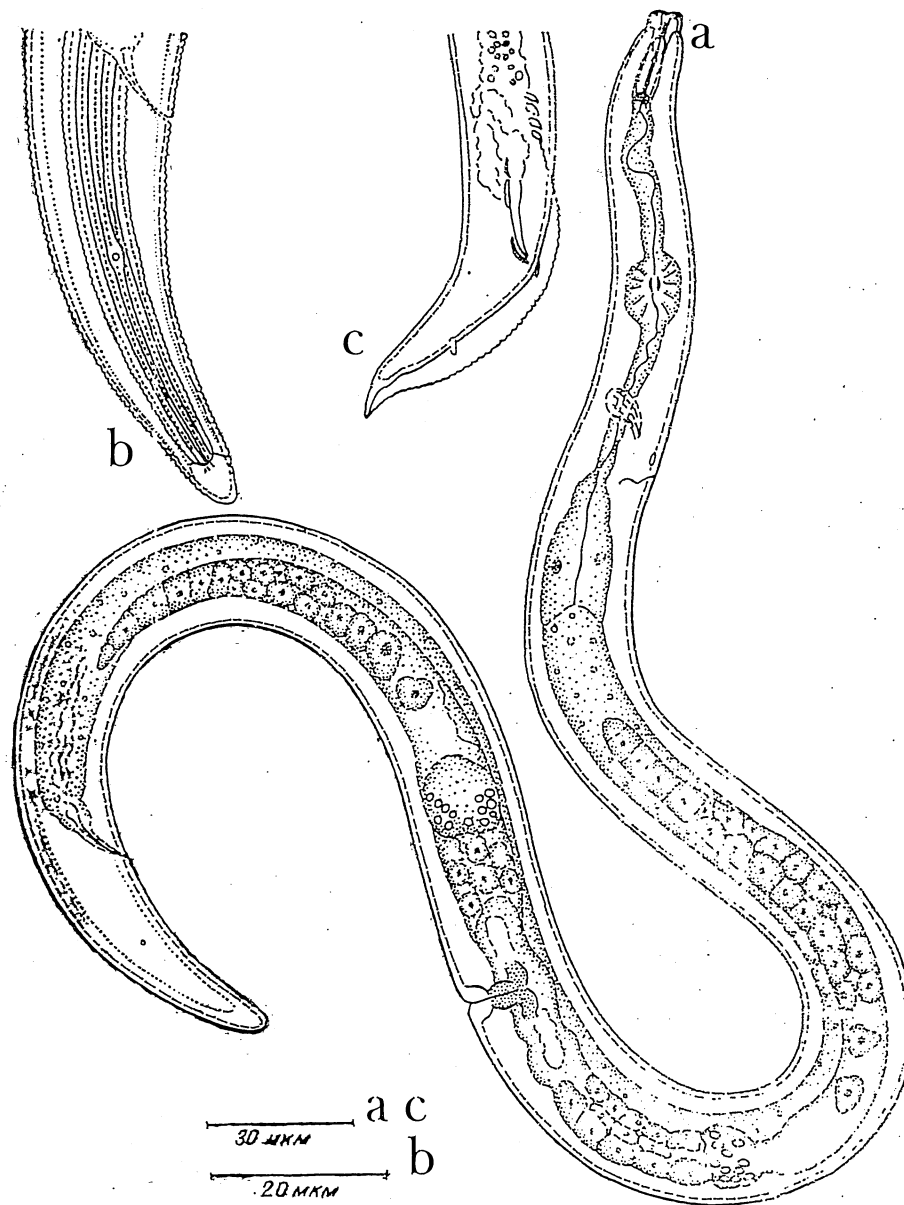


Figure 25. *Merlinius brevidens* (Allen, 1955) Siddiqi, 1970.

A - General view of the female; B - Female tail; C - Male tail.

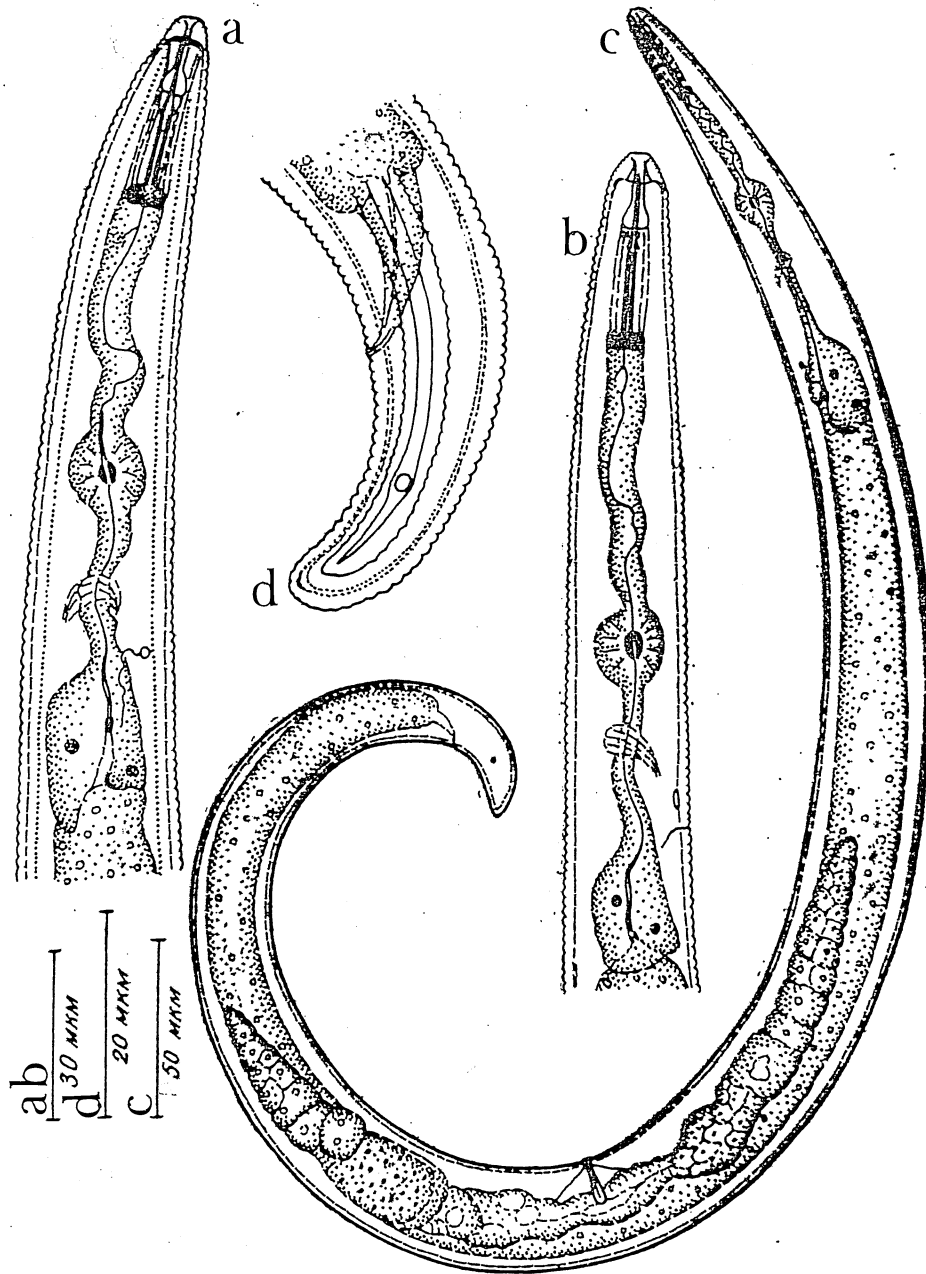


Figure 26. *Rotylenchus feroxcis* sp. nov.

A, B - Trophic-sensory section; C - General view of the female; D - Tail.

flattened. Dorsal gland duct opening into esophagus lumen at 4.2-5.6 μ m from the stylet base. Metacorp'al bulb oval. Esophageal glands short. Esophageal-intestinal valve large. Excretory pore located at level of lower end of the isthmus. Hemizonid located 2 cuticular annules above the excretory pore. Ovaries short. Spermatheca round and without spermatozooids. Epiptygma unpaired. Tail almost cylindrical, with rounded tip. Cuticle smooth on the ventral side of the tip. Phasmids large, 1.5-2 μ m in diameter, pore-like, situated 6-10 cuticular annules below the anus. Ventral side of the tail with 17-21 cuticular annules.

Differential diagnosis. The species is close to R. breviglans Sher, 1965 and R. pini Mamiya, 1968 by virtue of the short and compact esophageal glands. In comparison with R. breviglans, the species being described has a smaller body length and longer tail (according to E. Krall' [1978] in R. breviglans L = 0.85-1.5 mm, c = 29-54), and a low position of the phasmids; a ventral process is lacking on the tail tip. It differs from the Japanese species R. pini by the truncated head end, by the smaller dimensions of the body and by the long tail, by the structure of the tail tip, by the location of the phasmids and by the absence of males.

Rotylenchus capitatus Eroshenko sp. nov.
(Figure 27)

Holotype ♀: L = 0.65 mm; a = 19; b = 5.1; c = 31; V = 55%; o = 28; stylet 27 μ m.

Paratypes ♀♀: L = 0.68-0.85 mm; a = 20-25; b = 5.4-5.7; c = 32-40; V = 55-58%; o = 18-21; stylet 26-29 μ m.

oo: L = 0.67-0.84 mm; a = 25-29; b = 4.7-5.1; c = 24-27; T = 40; o = 23-38; stylet 25-29 μ m; spicules 25-29 μ m; gubernaculum 10.5 μ m.

Female. Labial area wide and truncated, with 7-8 fine cuticular annules. Longitudinal striation of the basal annule not noticeable. Lateral field lines straight. Areolation of the lateral field only in the anterior part of the body, up to level of excretory pore. Stylet knobs anteriorly flattened or weakly concave. Dorsal gland duct opening into esophagus lumen at 5-7.7 μ m from the stylet knobs. Metacorp'al bulb almost spherical. Excretory pore located at level of the middle of the isthmus, or at the beginning of the dilatation of the esophageal glands. Hemizonid not noticeable. Esophageal glands short; esophageal-intestinal valve located at the base of the glands. Ovaries straight and with oocytes arranged in a single row. Epiptygma anterior, unpaired. Spermatheca irregularly spherical in shape, and filled with spermatozooids.

Male. Similar to the female in general structure of the body. Bursa annulated and reaching to the end of the tail. Spicules tylenchoid and weakly bent. Gubernaculum rod-shaped. Tail conical with a smooth tip. Phasmids located at level of middle of tail.

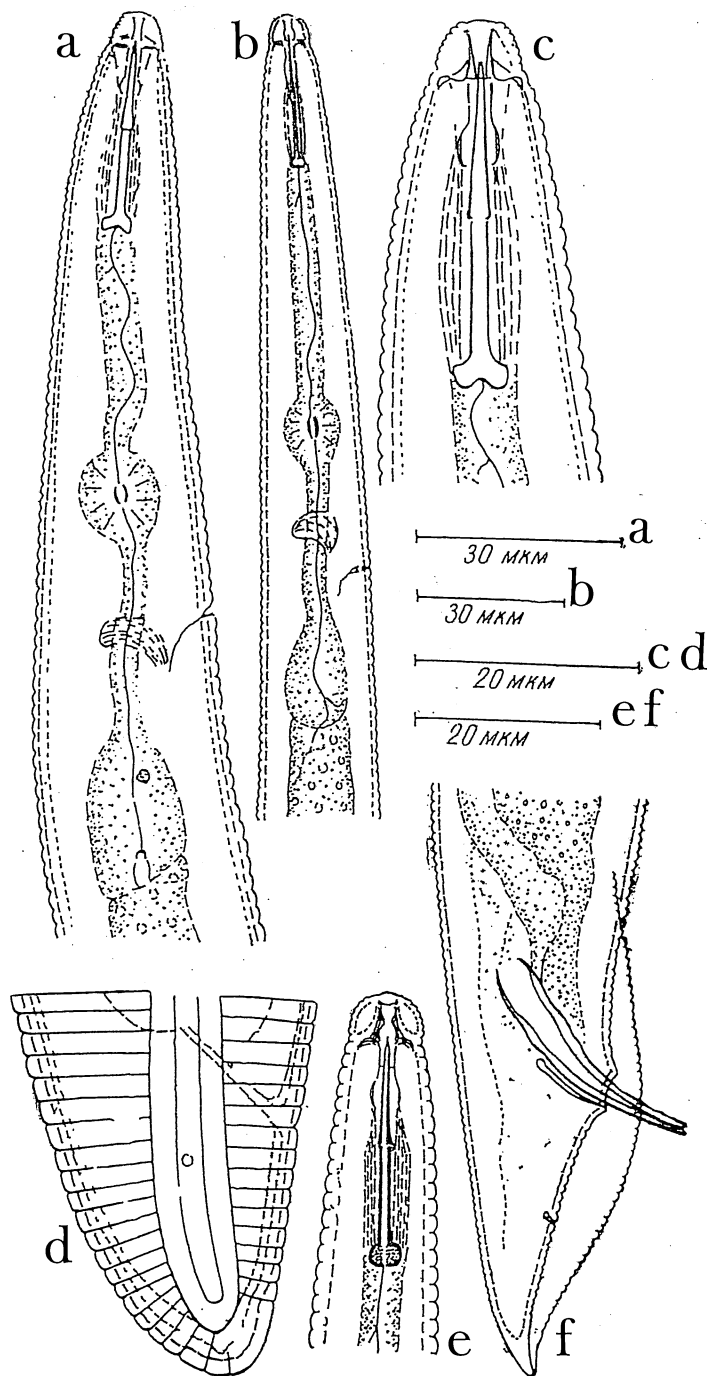


Figure 27. Rotylenchus capitatus sp. nov.

Female: A, C, D. Male: B, E, F. A, B - Anterior end of body;
 C, E - Head end; D, F - Tail.

Differential diagnosis. The species being described is closest in general structure and measurements of the body to R. quartus (Andrassy, 1958) Sher, 1961, but differs from it by the smaller measurement of the stylet (in R. quartus 29-33 μ m), by the straight lines of the lateral field, by the presence of an epiptygma, by the number of cuticular annules on the tail (in R. quartus 12-16) and by the presence of a section of smooth cuticle on the ventral side of the tail tip. The new species is similar to R. agnetis Szczygiel, 1968, R. buxophilus Golden, 1956, R. breviglans Sher, 1965 and R. pini Mamiya, 1968 in the structure of the esophageal glands. It differs from R. agnetis by the smaller measurement of the stylet and the larger number of cuticular annules in the labial area, by the presence of males, and by the lower position of the phasmids (0-6 cuticular annules above the anus in R. agnetis). In comparison with R. buxophilus the new species has a higher labial area with a larger number of cuticular annules, much smaller dimensions of the body and stylet, a different location of the excretory pore and the phasmids, and a broadly rounded tail end (pointed in the case of R. buxophilus). R. capitatus sp. n., differs from R. breviglans by the much smaller measurements of the body and stylet, by the equatorial location of the vulva and presence of an epiptygma, by the structure of the stylet knobs, by the structure of the tail tip, and by the presence of males. It differs from R. pini by the smaller measurement of the body, by the lower position of the phasmids (11-30 annules above the anus in R. pini) and by the presence of a section of smooth cuticle on the tail tip.

Location. Rhizosphere of Picea koraiensis Nakai in the Chuguyev district of the Primorje region, upper reaches of the Ussuri River.

Helicotylenchus ussuriensis Eroshenko sp. nov.
(Fig. 28)

Holotype ♀: L = 0.76 mm; a = 30; b = 5.6; c = 30; V = 63%; o = 37; stylet 28 μ m.

Paratypes ♀♀: L = 0.75-0.89 mm; a = 22-30; b = 5.3-6; c = 30-39; V = 57-63%; o = 34-37; stylet 28-31 μ m.

Males not observed.

Nematode body coiled into a spiral. Head end conical with 6-7 weakly expressed cuticular annules. Stylet knobs rounded. Dorsal gland opening into esophagus lumen at 10.5-11 μ m from the stylet knobs. Dorsal and subventral glands enveloping the intestine for a significant distance after the esophageal-intestinal valve. Excretory pore located 130-140 μ m from the anterior end of the body. Hemizonid oval, 2-3 annules above the excretory pore. Gonads usual for the genus. Spermatheca spherical, and without spermatozooids. Tail 21-29 μ m in length, with a conical, bluntly rounded tip. Tip of the tail annulated, with 13-18 cuticular annules on the ventral side of the tail. Phasmids located from 3 cuticular annules above the anus to 4 below it.

Differential diagnosis. By the measurements of the body and the structure of the head end and the tail, the species is closest to H. caroliniensis

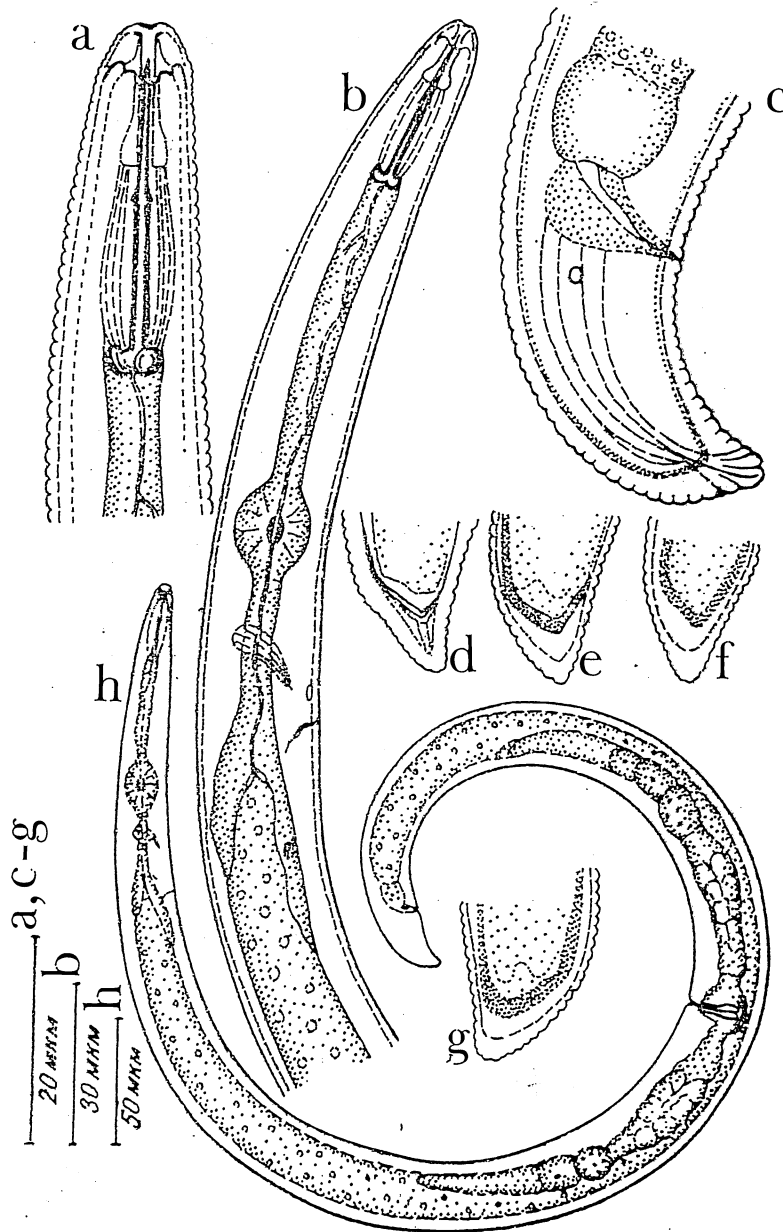


Figure 28. *Helicotylenchus ussuriensis* sp. nov.

A - Head end; B - Esophagus area; C - Tail; D-G - Variations in the structure of the tail tip; H - General view of the female.

Sher, 1966. It differs from it by the oval form of the metacorporeal bulb and by the much larger stylet (28-31 μ m as against 25-28 μ m in H. caroliniensis). It differs from the other close species, H. cavenessi Sher, 1966 and H. rotundicauda Sher, 1966, by the following characteristics: from H. cavenessi, by the much larger measurements of the body and stylet, by the large phasmids and by their location (3-7 annules above the anus in H. cavenessi), by the non-merging lines of the lateral field in the area of the tail and by the large number of annules on the tail (13-18 as against 9-14 in H. cavenessi); and from H. rotundicauda, by the much longer stylet, by the large number of cuticular annules on the tail, by the absence of a smooth section of cuticle on the tip of the tail, by the low position of the phasmids (3-8 annules above the anus in H. rotundicauda) and by the non-merging lines of the lateral field in the area of the tail.

Location. Rhizosphere of Picea koraiensis Nakai in the Chuguyev district of the Primorje region, the upper reaches of the Ussuri River.

Helicotylenchus interrogativus Eroshenko sp. nov.
(Fig. 29)

Holotype ♀: L = 0.62 mm; a = 28; b = 5.3; c = 29; V = 62%; o = 37; stylet 27 μ m.

Paratypes ♀♀: L = 0.62-0.7 mm; a = 25-30; b = 5.4-5.6; c = 21-30; V = 60-68%; o = 37-40; stylet 27-28 μ m.

Males not known.

After fixation, the nematodes often take the shape of a question mark. Labial area hemispherical with 4-5 well-marked cuticular annules. Stylet powerful, with knobs anteriorly concave. Dorsal gland duct opening into esophagus lumen at 10-11 μ m from the basal part of the stylet. Excretory pore always above the esophageal-intestinal valve. Ovaries symmetrical. Spermatheca round and empty. Tail conical, 21-28 μ m in length. Tail tip of diverse shape, more often bluntly pointed. 12-18 annules on ventral side of tail. Phasmids located at anus level or 2-3 cuticular annules below. Internal lines of lateral field merging at an insignificant distance from its end.

Differential diagnosis. The species is close to H. mangiferensis Elmilgy, 1970, from which it differs by the concave knobs and the large dimensions of the stylet, by the value of the index "o" (in H. mangiferensis o = 21-25), by the large number of cuticular annules on the ventral side of the tail and the low position of the phasmids. The species being described is similar to H. exallus Sher, 1966 in general structure but differs from it by the lack of males and by the low position of the phasmids.

Location. Rhizosphere of Betula manshurica (Rgl) Nakai (holotype) and Picea koraiensis Nakai (paratypes) in the Da'nerechensk (valley of the Orekhovka River) and in the Chuguyev (upper reaches of the Ussuri River) districts.

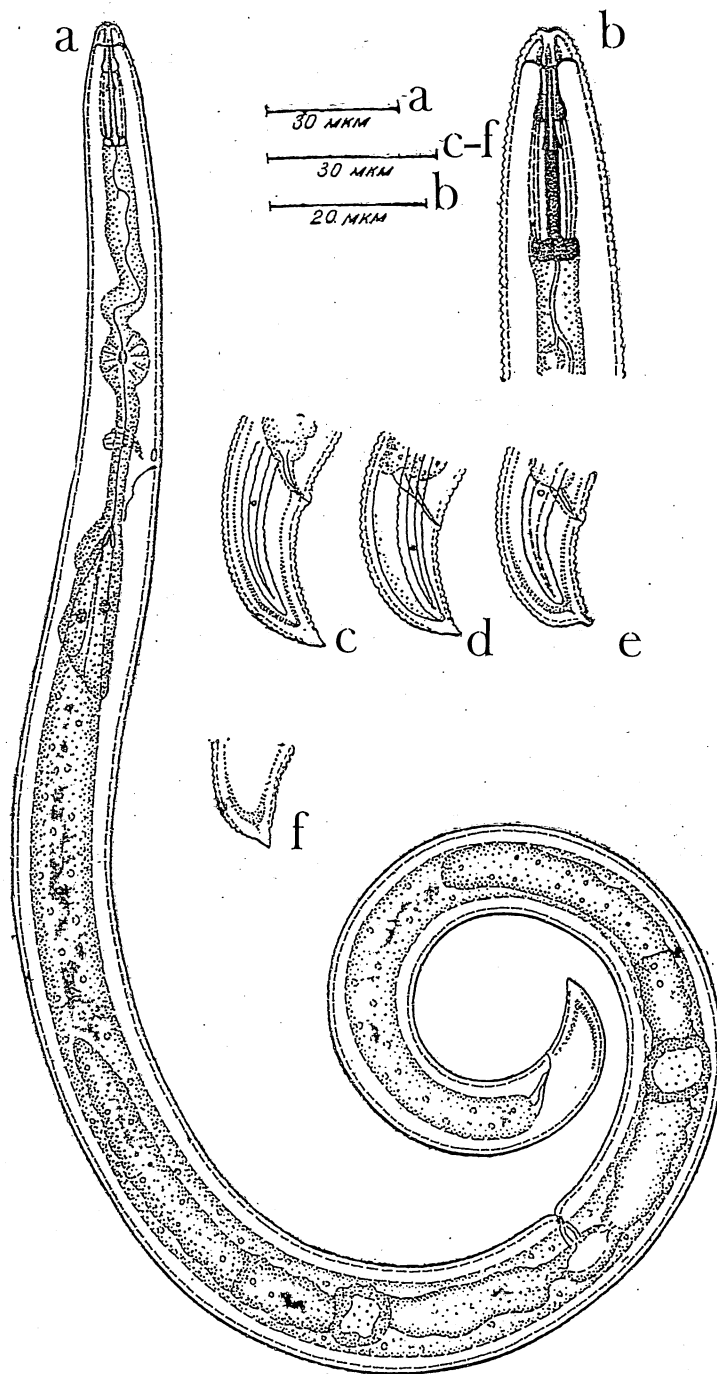


Figure 29. *Helicotylenchus interrogativus* sp. nov.

A - General view of the female body; B - Head end; C-F - Variations in tail shape.

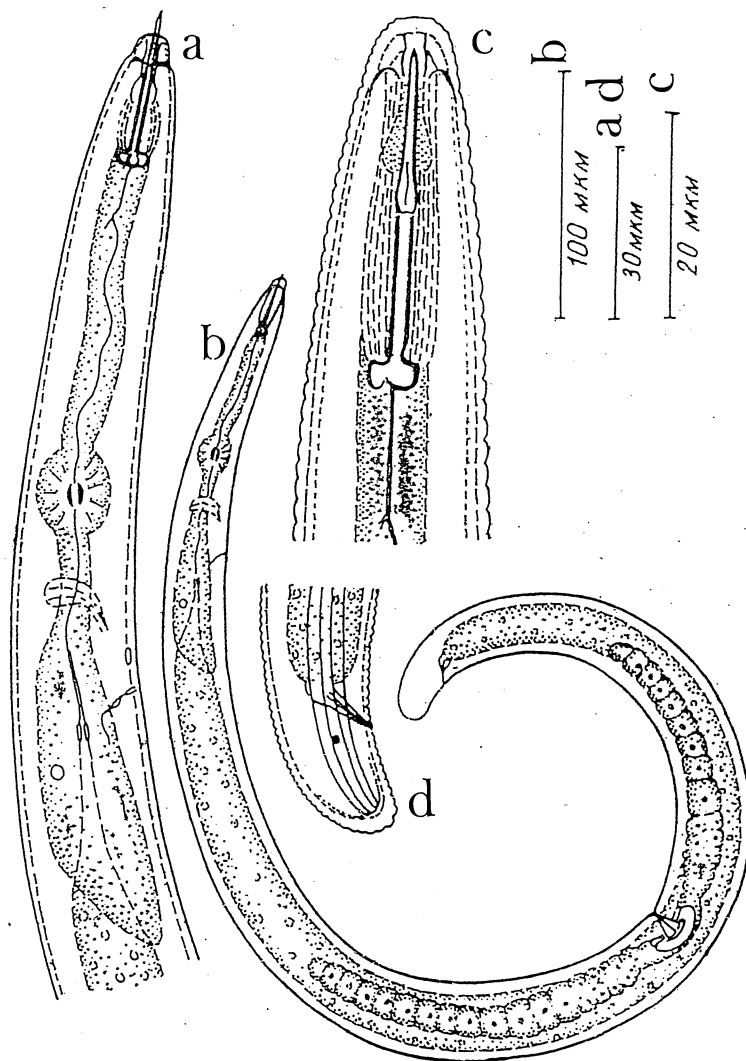


Figure 30. Helicotylenchus digonicus Perry, 1959

A - Trophic-sensory section of the body; B - General view of the female;
 C - Head end; D - Tail.

Helicotylenchus digonicus Perry, 1959
(Fig. 30)

L = 0.63-0.71 mm; a = 24-25; b = 4.3-6.5; c = 36-42; V = 62-64%;
o = 36-38; stylet 28 μ m.

When relaxed, the body of the nematodes takes the shape of an open spiral. Head end hemispherical with 4-5 distinct cuticular annules. Stylet knobs anteriorly concave. Dorsal gland duct opening into esophagus lumen at 10 μ m from the basal part of the stylet. Metacorporeal bulb almost spherical in shape. Excretory pore situated above the level of the esophageal-intestinal valve. Ovaries symmetrical; in different specimens their length varies, in some it approaches the esophageal glands and the anus, in others they are twice as short. Spermatheca spherical. Tail bent dorsally with an annulated tip. The ventral side of the tail tip has an angular shape, sometimes with a small outgrowth beginning to show. Phasmids located usually at anus level or 1-3 cuticular annules below. 10-12 cuticular annules on the ventral side of the tail.

Location. Rhizosphere of Picea koraiensis Nakai in the Dal'nerechensk district of the Primorje region.

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