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Nematodes of the Northern Great Plains Part II

Gerald Thorne

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DORYLAIMOIDEA in part [NEMATA: ADENOPHOREA]

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DORYLAIMOIDEA in part [NEMATA: ADENOPHOREA]

GERALD THORNE[1]

Introduction

This work includes 136 species of DORYLAIMIDA encountered among the nemic fauna of the Northern Great Plains and follows Part I of this series which included TYLENCHIDA from that region. A general description and history of the region was presented in Part I, "Nematodes of the Northern Great Plains, TYLENCHIDA [NEMATA: SECERNENTEA]," Technical Bulletin 31, Agricultural Experiment Station, South Dakota State University, July 1968. Reference may be made to TB 31 for discussions of ecology, surveys, bionomics and distribution.

DORYLAIMOIDEA constitutes the most numerous group of nemas found in the region, both from the standpoint of total individuals and from the number of genera and species. Unfortunately it is impractical to attempt coverage of all species in this one publication and those included probably represent not more than one-fourth of the total.

Taxonomy of the various families and genera has undergone numerous changes during the past 10 years. Some of these have improved the structure of the superfamilies while others are considered in error by the author and unacceptable. Many new genera and species have been described in small papers, often in obscure journals, and the task of keeping informed on the taxonomy has become almost impossible. Probably there are still certain papers which have not been available.

[1]Professor Emeritus, Departments of Plant Pathology and Zoology, University of Wisconsin. Formerly nematologist and professor of Plant Pathology, South Dakota State University, Brookings. The author is indebted to the Department of Plant Pathology, University of Wisconsin, for its hospitality and cooperation during the preparation of this manuscript.

James D. Smolik, research associate, Department of Plant Science, South Dakota State University, has provided substantial aid in collecting and forwarding specimens from the South Dakota collection.

Morphology

Dorylaims are so well known that additional discussion of general morphological characters is superfluous. The works of Thorne and Swanger, 1935, Thorne, 1939, Andrassy, 1959, Siddiqi, 1969 and Tjepkema, Ferris and Ferris, 1971 are replete with morphological information on this group. However it appears pertinent to again discuss and illustrate the much confused subject of the spear guiding apparatus.

Thorne and Swanger noted that there were two distinct types of spear guiding apparatus which were designated as "double" and "single." The author admits that these were not sufficiently elucidated, which was partly responsible for difficulties later encountered by various workers. The following discussion and illustrations have been prepared in an effort to solve this problem.

Double rings are typified by such genera as *Dorylaimus*, *Laimydorus*, and *Labronema*. As seen in Fig. 1 A, B, there is a sclerotized fixed ring in the pharynx forming the basal portion of the apparatus. Anterior to this is a second ring attached to the spear which, in turn, is connected with the basal ring by a membraneous sheath which insures that food passes directly through the spear into the alimentary tract. This sheath is very flexible and as the spear is thrust forward the two rings become widely separated. Then as the spear is retracted the sheath becomes shortened until frequently the two are collapsed into one massive sclerotized ring. However the anterior ring does not pass through the basal one as the spear is retracted and the spear aperture is always anterior to the guiding ring.

The so-called single rings are also joined to the spear by a sheath but the point at which it is joined to the spear passes back through the basal ring as the spear is retracted and it is practically impossible to observe when in this position. When retracted, the spear aperture is largely posterior to the fixed muscular ring and only when the spear is far extruded does the anterior junction of the spear and its sheath become visible. Fig. 1 C, D. This type of ring is typical of *Aporcelaimellus*, *Eudorylaimus*, and related genera. Frequently the basal ring is not sclerotized and refractive but appears as an extensible muscular collar as in *Aporcelaimus*.

Notes

Measurements given for the various species are from representative specimens and unless there were divergences in adult specimens of 10% or more only one value is recorded. Figure legends are kept at a minimum for no longer is it necessary to identify heads, tails and other body parts which are obvious to the reader. Only occasionally does the legend give complete details for the possible uninformed reader.

Intestinal granules of dorylaims generally are so small that it is impossible to illustrate them accurately, therefore those shown must be recognized as schematic.

Many details shown in the illustrations are not described in the narrative since they would be repetitious.

Widths of lateral fields compared to body widths are made from the region just posterior to vulva.

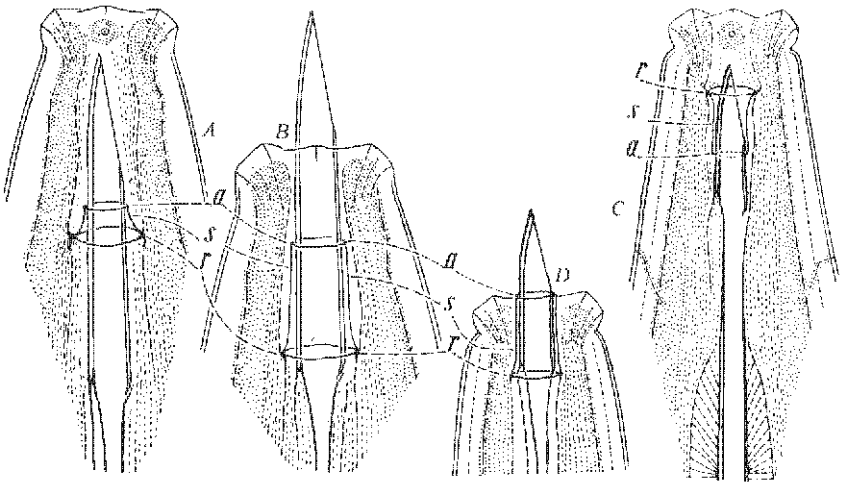


Fig. 1. A, B, *Dorylaimus stagnalis*. A, retracted spear. Note that point where connecting sheath joins the spear, it does not extend back through the basal ring. B, Extruded spear with connecting sheath well extended. C, D, *Aporcelaimellus obscurus*. C, spear retracted, dotted line about spear marks the invisible point of attachment of the connecting sheath. D, spear extruded to full extent with visible point of attachment of sheath. *a*, attachment point of sheath to spear. *s*, sheath. *r*, fixed guiding ring.

Order Dorylaimida (de Man, 1876) Pearse, 1942

Superfamily Dorylaimoidea (de Man, 1876) Thorne, 1934

Family Aporcelaimidae Heyns, 1965

Genus *Aporcelaimus* Thorne and Swanger, 1936

Diagnosis: Large nemas from 5 to 10 mm long. Cuticle marked by interwoven criss-cross lines. Lip region set off by deep constriction. Amphids with sclerotized median support. Spear aperture occupying more than ½ its length. Esophagus expanding gradually from near middle with dorsal gland nucleus far behind its orifice. Tails of both sexes conoid to bluntly rounded. Occurs only in small numbers. Predatory, especially on small oligochaete worms.

Type species: *Aporcelaimus regius* (de Man, 1876) T. & S. 1936

Key to species of *Aporcelaimus*

1. Tails almost hemispheroid, cuticle strongly thickened ..... *pachydermus*
   Tails more conoid, cuticle normal 2
2. Spicula short, massive ..... *elegans*
   Spicula elongated, angular ..... *eudorys*

Illustrations of *Aporcelaimus* heads are approximately × 800 while tails and other portions of the bodies are usually × 400.

Aporcelaimus eudorys (Ditlevsen) T. & S. 1936
Synonym *Dorylaimus eudorys* Ditlevsen, 1911
(Fig. 2, A-F)

5.4 mm; a = 64; b = 5.6; c = 100; V = Y
6.5 mm; a = 68; b = 5.8; c = 117; T = 51

Body slightly arcuate posteriorly. Lateral field about ¼ body width. Cuticle about 8μ thick near head. Lip region typical. Spear 21μ long with aperture ⅔ its length. Basal ⅓ of esophagus enlarged by gradual expansion. Prerectum of young female 3 times body width, that of male extending forward almost to end of supplement series. Supplements 12, rounded, irregularly spaced. Spicula with distinct ventral angle. Lateral guiding piece only 25μ long.

A single male and two immature females from forest nursery soil west of Brookings, South Dakota. Collected by R. B. Malek.

Tails of these specimens are slightly longer and cuticle thicker than those reported from Utah. Form of spicula, short gubernaculum and conoid tails distinguish them from other species in the area. *A. amphidysis*, Anderson, 1966 differs in thinner cuticle and form of spicula and gubernaculum. One specimen was infested by a species of *Duboscquia*, probably *D. penetrans*. Specimens indexed under *Aporcelaimus* 2.

Aporcelaimus pachydermus Thorne, 1939
(Fig. 2, G-J)

6.5 mm; a = 38; b = 5.9; c = 108; V = $^{15}48^{15}$
6.4 mm; a = 57; b = 7.0; c = 134; T = 44

Body slightly arcuate posteriorly. Cuticle about 10μ thick near head, somewhat thinner throughout the body but even thicker on tail where conspicuous radial striae are present. Lateral field ¼ body width, massively granular. About 10 dorsal, and 14 ventral pores present on neck between head and esophagus expansion. Amphids more than half head width. Spear 30μ long, its aperture occupying ⅔ the length. Spear extension twice length spear. Posterior ⅔ of esophagus enlarged by gradual expansion. Cardia disc-like, then conoid. Intestine packed with fine dark granules. Prerectum length 1-½ body width; rectum longer than anal body diameter.

Male more slender than female with 10 irregular spaced supplements. Spicula massive with lateral guiding pieces only 12μ long. Specimens indexed under *Aporcelaimus* 3.

Habitat: One female from sorghum field near Holbrook, and 1 male from corn field near Fairmont, Nebraska; also 1 female each from wheat field near Hammer and soybean field near Sisseton, South Dakota.

Aporcelaimus elegans n. sp.
(Fig. 2, K-M, Fig. 3, A-G)

7.5-8.2 mm; a = 65-82; b = 5.7-6.2; c = 95-110; V = $^{10}52^{10}$
7.5-9.3 mm; a = 68-85; b = 5.2-7.2; c = 130-158; T = 45-60

Body cylindroid except at extremities. Cuticle marked by conspicuous

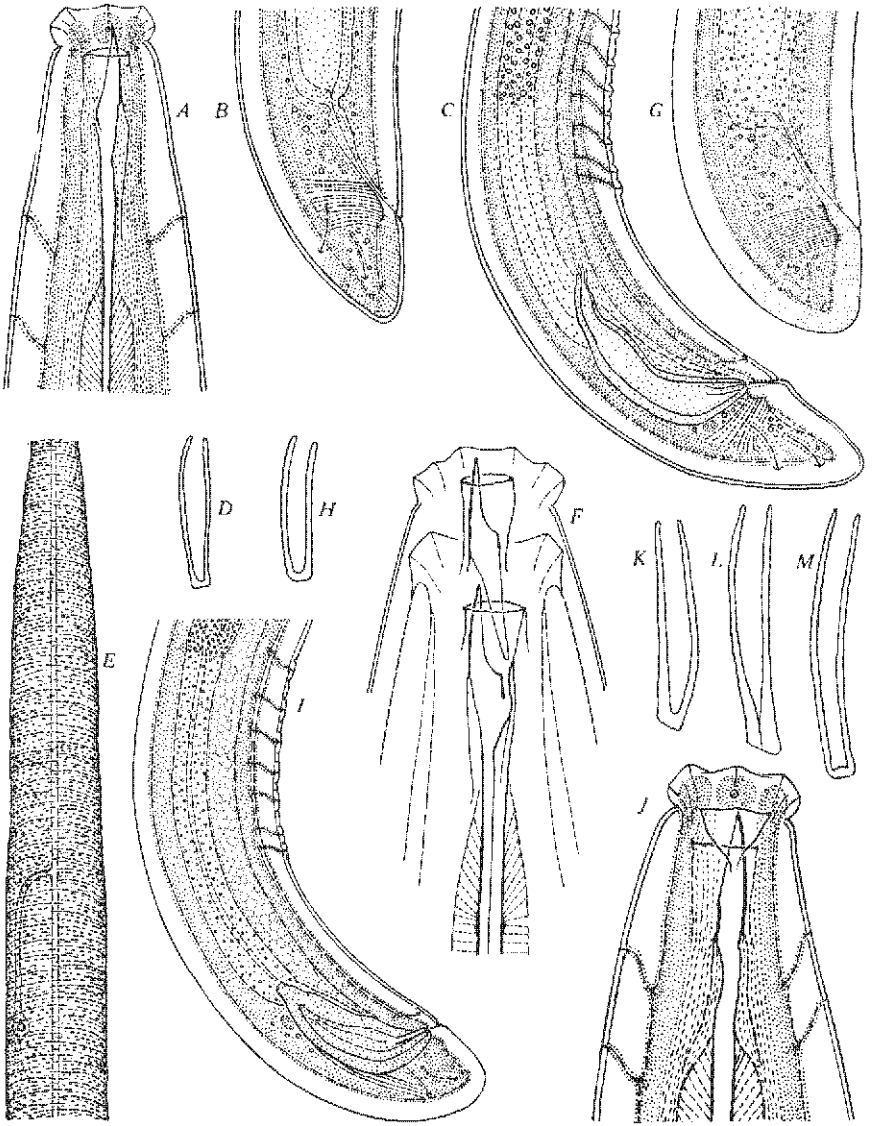


Fig. 2. A-F, *Aporcelaimus eudorys*. G-J, *A. pachydermus*. K-M, *A. elegans*, variations in lateral guiding pieces.

criss-cross fibers. Prominent lateral pores in single line except on tail. A few dorsal and ventral pores anteriorly. Lip region set off by constriction with usual 6 and 10 prominent papillae. Amphids with median reinforcing piece.

Spear 18-20μ long, with aperture occupying about ⅔ its length. Posterior 5/7 of esophagus enlarged. Prominent cardiac disc present, with bluntly conoid cardia. Intestine packed with fine bright brown granules. Vulva with refractive labia. Prerectum length 3-4 times body width.

Male similar to female in size. Supplements 9-16, low, broadly flattened. Spicula thick, blunt without ventral angle. Gubernaculum 40-45μ long with square or angled terminus. Caudal pores as illustrated.

Aporcelaimus elegans is distinctive because of its large size, thick, blunt spicula and long guiding pieces. Holotype female, allotype and other specimens as indexed under *Aporcelaimus* 1.

Distribution: Occurs in small numbers throughout North and South Dakota and western Minnesota.

Genus *Akrotonus* new genus

Aporcelaimidae: Lip region rounded, papillae not interfering with its contour. Amphid ⅔ head width, shallow, cuplike with canal about 11μ long leading back to sensillae pouch. Spear 15μ long and 5μ wide with aperture ⅔ its length. Pharynx a muscular collar half the head width similar to that of *Aporcelaimus*. Four elongate, gland-like structures extending from a point opposite middle of spear back to near nerve ring. Esophagus gradually enlarged in basal ⅓. Cardiac disc thin, attached to disc-like cardia Intestinal cells much darker on ventral side. Supplements an adanal pair and 2 ventromedian. Spicula almost straight.

Type species: *Akrotonus vigor* n. sp. A strong active species doubtless a predator.

Akrotonus vigor n. sp.
(Fig. 3. H-M)

2.0 mm; a=34; b=3.4; c=80.0; V=[illegible]56[illegible]
2.3 mm; a=38; b=3.7; c=71; T 56

Characters of the genus. Cuticle marked by fine transverse striae. Lip region ⅓ width of neck base. Basal portion of esophagus with dense, muscular tissues, completely obscuring all 4 submedian gland nuclei. Lateral field at first narrow with 6 pores to a point opposite middle of esophagus, then expanding to half body width. Row of indistinct pores along ventral side of lateral field and a few scattered ones on dorsal side. Ventromedian series of about 30 pores a prominent feature. Vulva a transverse slit with muscular labia. Vagina ⅓ body width. Ovaries reflexed almost to vulva. Sperms not observed in uteri but may have been hidden by dense body tissues. Prerectum length 4-5 times body width. Male slightly arcuate in posterior portion with well developed testes containing masses of sperms.

Akrotonus is probably most closely related to *Makatinus* Heyns, 1965 from which it differs in cuticle type, transverse vulva, almost straight spicula and few supplements. Holotype female and allotype male indexed under *Akrotonus* 1.

Habitat: Native pasture, Cottonwood Experiment Station, South Dakota.

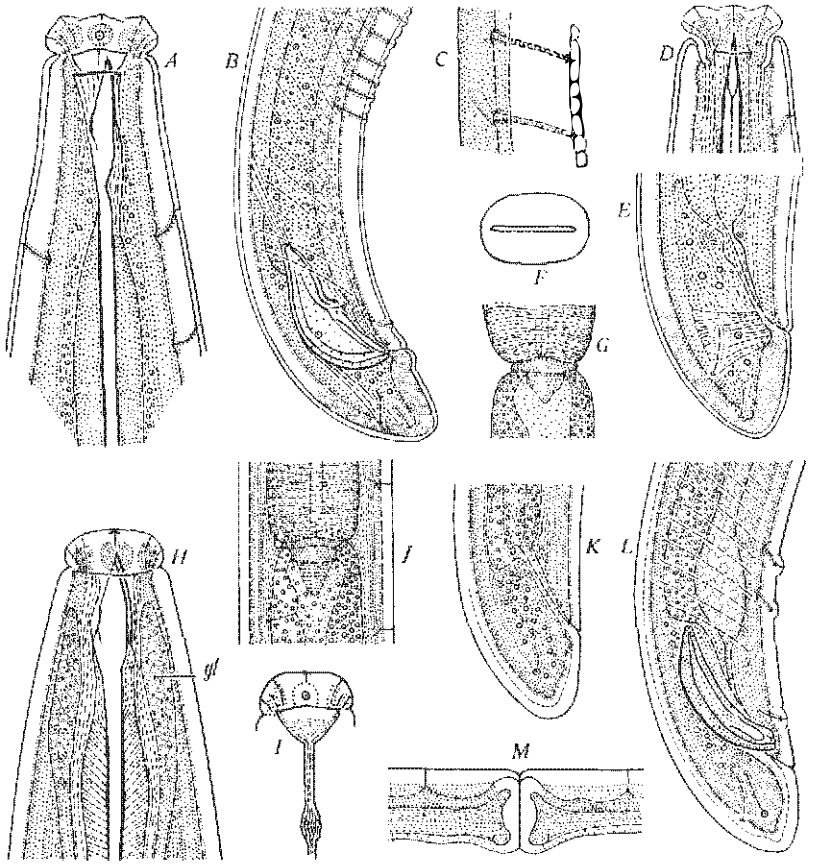


Fig. 3. A-G, *Aporcelaimus elegans*. H-M, *Akrotonus vigor*.

Genus *Aporcelaimellus* Heyns, 1965 emended

Aporcelaimidae. Generally medium sized nemas 1.5-3.0 mm long. Cuticle with thin cortical layer and frequently two thick layers which are especially prominent on the tails. Minute transverse striae usually visible. Lip region angular, set off by deep constriction. Spear aperture occupying ⅔ or more of its length. Guiding ring a muscular collar, rarely slightly sclerotized. Esophagus enlarged by long, gradual expansion. Dorsal esophageal gland nucleus well behind its orifice. A thin cardiac disc present, followed by a conoid cardia. Vulva a transverse slit usually with sclerotized labia. Tail varying from hemispheroid to elongate conoid, rarely slightly digitate. Males very rare and apparently not functional.

Type species: *Aporcelaimellus obscurus* (Thorne and Swanger, 1936) Heyns, 1965.

The above diagnosis differs from that of Heyns: Vulva a transverse slit, not pore like. Cuticle often without two thick layers on tail. Cardiac disc present, not absent.

Illustrations of heads × 800, tails × 400.

Key to species of *Aporcelaimellus*

1. Cuticle near head normal, not thickened 2
   Cuticle near head greatly thickened 5
2. Tail bluntly rounded with cuticle in two distinct layers 3
   Tail conoid to subdigitate 4
3. Tail dorsally convex conoid ..... *krygeri*
   Tail symmetrically blunt and rounded ..... *obscurus*
4. Spear aperture about ⅝ its length ..... *sublabiatus*
   Spear aperture about ½ its length ..... *capitatus*
5. Tail bluntly rounded, cuticle in 2 layers 6
   Tail elongate conoid, dorsally convex 9
6. Tail shorter than anal body diameter ..... *obscuroides*
   Tail longer than anal body diameter 7
7. Cardia surrounded by intestinal cells 8
   Cardia not surrounded by intestinal cells ..... *taylori*
8. Tail dorsally convex conoid ..... *porcus*
   Tail uniformly conoid ..... *clamus*
9. Tail with normal internal core ..... *conoidus*
   Tail with abnormal internal core 10
10. Tail core with deep dorsal notch ..... *parmus*
    Tail core ventrally hyaline ..... *placus*

Most of the new specific names are barbaric words formed by arbitrary selection of letters in the name *Aporcelaimellus*.

Aporcelaimellus obscurus (T. & S. 1953) Heyns 1965

Synonyms: *Dorylaimus obscurus* Thorne & Swanger 1936
Eudorylaimus obscurus (T. & S.) Andrassy, 1959
Aporcelaimus obscurus (T. & S.), J. B. Goodey, 1961

(Fig. 4, A-N)

1.8-3.0 mm; a = 26; b = 4.0; c = 50-70; V = ^{12} 50^{14}

2.1 mm; a = 33; b = 4.0; c = 60; T = 55

Lip region angular, set off by deep constriction, its width about ⅓ that of neck base. Amphids of large specimens frequently with stiffening element. Spear about as long as lip region width, its aperture occupying about ½ its length. Esophagus enlarged by very gradual expansion near its middle, the dorsal gland well behind aperture. Cardia bluntly conoid with disc-like anterior portion, usually slightly thicker on dorsal side. Lateral field about ⅓ body width. Vulva transverse with sclerotized labia. Vagina extending ⅝ across body. Ovaries reflexed about ½ their length. Eggs varying from 1 to 3 body widths long but usually only slightly longer than body

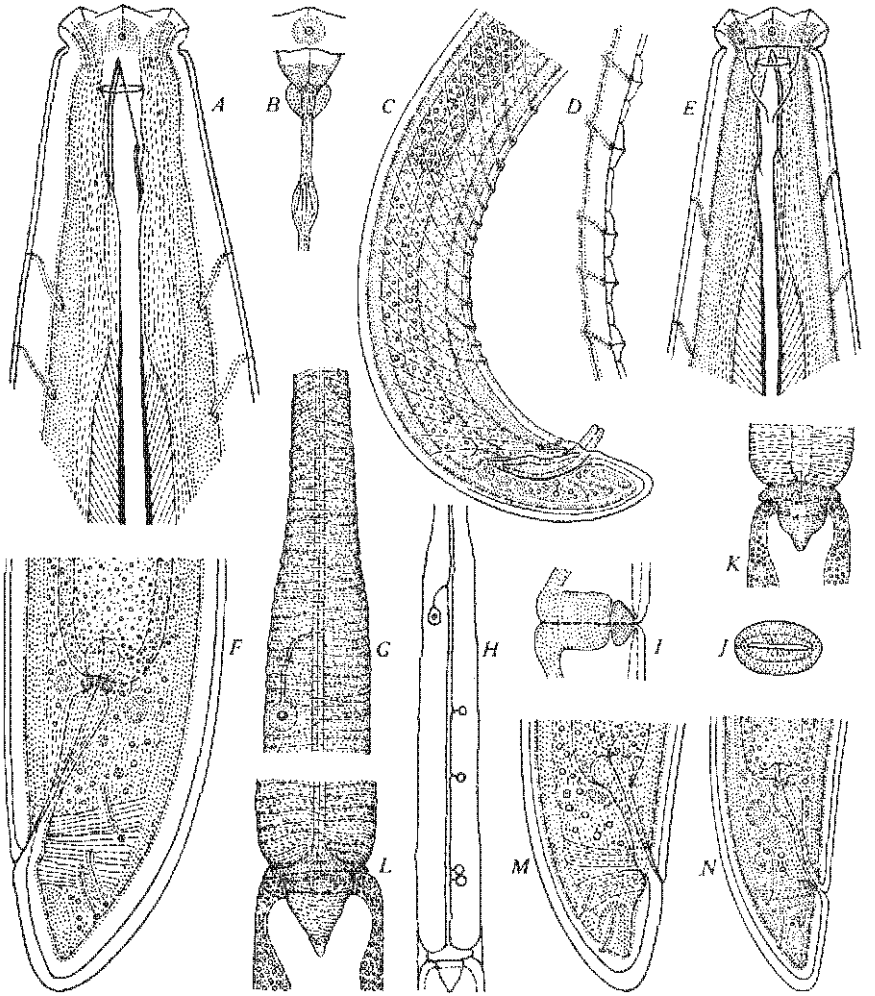


Fig. 4. *Aporcelaimellus obscurus*. A, head of 3.0 mm female. B, amphid. C, male tail. D, supplements. E, head of 2.8 mm female. F, tail of 3.0 mm female. G, expansion region of esophagus. H, arrangements of esophageal gland nuclei. I, vaginal region. J, vulva. K, cardiac region. L, variation of cardiac region. M, N, variations in smaller female tails. Heads 800 X, tails 400 X.

width. Tail dorsally arcuate to bluntly rounded terminus with conspicuous double layer of its cuticle, often with prominent radial striae. Caudal papillae 2, arranged in tandem. Males very rare and apparently not functional, although testes are filled with sperms, associated females have not been observed spermatized.

Aporcelaimellus obscurus is distinct because of its relatively large size, angular lips, symmetrically bluntly rounded tail with conspicuous double layer of tail cuticle. Specimens indexed under *Aporcelaimellus* 1.

Habitat: Probably the most common species of DORYLAIMOIDEA in the Northern Great Plains, being present in almost every soil sample collected in any locality. The variation in body length and egg size sometimes becomes confusing and may tempt the worker to establish several subspecies. However, extensive collections show that the various morphological characters overlap until it is impossible to separate them.

Aporcelaimellus krygeri (Dit., 1928) Heyns, 1965
Synonyms: *Dorylaimus krygeri*, Ditlevson, 1928
Eudorylaimus krygeri (Dit. 1928) Andrassy, 1959
Aporcelaimus krygeri (Dit. 1928) Brzeski, 1962
(Fig. 5, A, B)

2.5 mm; a = 26; b = 4.9; c = 83; $V = {}^{13}\ 48^{13}$

Body obese, cylindroid, tapering at extremities. Lateral field 1/10 body width, composed of two lines of zig-zag arranged cells. Lip region ⅓ width of neck base. Spear 25μ long, aperture ⅔ its length. Esophagus tapering very gradually at expansion. Cardiac disc thin, irregular in thickness. Cardia conoid. Ovaries reflexed ⅔ distance back to vulva. Eggs about twice as long as wide and somewhat longer than body width. Males unknown and females did not contain sperms. Prerectum 1½ to 2 times body width. Rectum as illustrated. Tail very short, dorsally convex. Caudal cuticle with very prominent radial striae.

Aporcelaimellus krygeri obviously is closely related to *A. obscurus* from which it differs in somewhat shorter neck, very short, dorsally convex tail, and more massive radial striae of tail. Specimens filed under *Aporcelaimellus* 2.

Habitat: Sorghum fields near Forestburg, South Dakota, and Holbrook, Nebraska.

Aporcelaimellus obscuroides Altheer, 1967
(Fig. 5, C, D)

3.2 mm; a = 24; b = 4.5; c = 80; $V = {}^{15}\ 47^{15}$

Body slightly arcuate, especially in posterior third. Lateral fields ⅓ body width. Cuticle strongly thickened with 2 layers near head, much thinner over remainder of body. Spear 23-25μ long, with aperture occupying ½ its length. Esophagus enlarged slightly anterior to middle by very gradual expansion. Cardia conoid. Disc thin, irregular in thickness. Anterior end of intestine frequently crowded by large dorsal gland. Prerectum length twice body width. Tail as illustrated, with coarse radial striae.

Aporcelaimellus obscuroides is immediately recognized by the massive two-layered cuticle near the head and form of tail. Specimens indexed under *Aporcelaimellus* 3.

Habitat: Soybean Field, Worthing, South Dakota and corn field, Ames, Iowa.

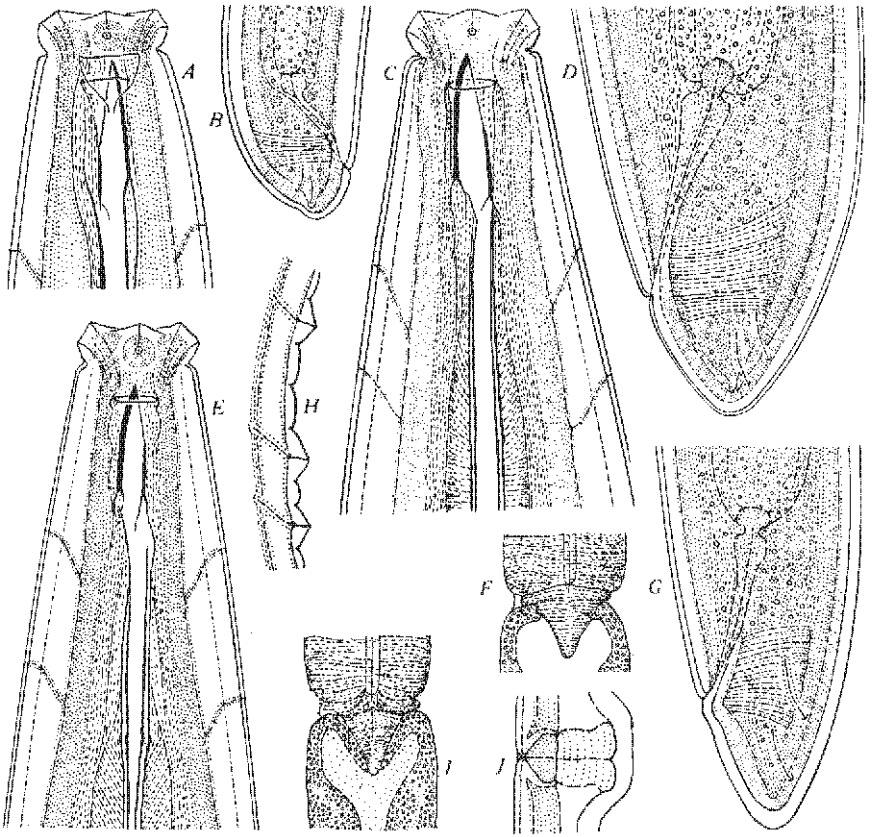


Fig. 5. A, B, *Aporcelaimellus krygeri*. B, 200 X. C, D, *A. obscuroides*. E-G, *A. taylori*. H-J, *A. porcus*.

Aporcelaimellus taylori Yeates, 1967
(Fig. 5, E-G)

1.8-2.4 mm; a=27; b=4.0; c=55; V=^{12} 50^{12}

Cuticle with two distinct layers, especially prominent about opposite base of spear extension where it occupies ¼ of the body width. Spear 18μ long, its aperture slightly more than ½ its length. Esophagus enlarged near middle by very gradual expansion. Cardia conoid with thin disc. Guiding ring about ½ head width supported by somewhat refractive pharyngeal walls. Vulva with typical well-sclerotized labia. Relatively short ovaries reflexed almost to vulva. Prerectum slightly longer than body diameter. Tail and rectum as illustrated. Males not collected although Yeates reported them as numerous in New Zealand.

Aporcelaimellus taylori is immediately recognized by the very thick

cuticle near the head and uniformly conoid tail. Specimens indexed under *Aporcelaimellus* 4.

Habitat: A rather infrequent species from cultivated fields near Presho, Forestburg and Estelline, South Dakota; Stanley and Minot, North Dakota; Glendive, Montana; and Wauneta and Minden, Nebraska.

Aporcelaimellus porcus n. sp.
(Fig. 5, H-J. Fig. 6, A, B.)

2.5 mm; a=32; b=4.2; c=51; V=^{14}46^{16}
2.5 mm; a=31; b=4.3; c=50; T=50

Body robust, slightly arcuate. Lip region ¼ width of neck base. Cuticle near head greatly thickened. Spear 22μ long, with aperture occupying slightly more than half its length. Esophagus enlarged very gradually from near middle. Cardiac disc prominent, cardia slightly concave conoid, completely surrounded by intestinal cells. Vulva with massive sclerotized labia. Ovaries reflexed about halfway to vulva. Prerectum length about twice body width. Tail dorsally convex conoid to blunt rounded terminus. Cuticle in 2 thick layers with exceedingly coarse radial striae. Only 1 male collected, similar to those of other species of the genus. Supplements 8, mammiform, irregularly spaced. Holotype female, allotype male and other specimens as indexed under *Aporcelaimellus* 5.

Aporcelaimellus porcus is distinctive because of the intestinal cells surrounding the cardia, and strong radial striae of the dorsally arcuate rounded tails.

Habitat: Cultivated field, Highmore Experiment Station, South Dakota.

Aporcelaimellus clamus n. sp.
(Fig. 6, C-E)

2.3 mm; a=28; b=4.2; c=58; V=^{14}50^{14}
2.3 mm; a=26; b=4.3; c=60; T=66

Body slightly arcuate. Anterior end set off by slight narrowing of neck. Cuticle of anterior end very thick, in two distinct layers. Spear 18μ long, the aperture occupying slightly more than ⅓ its length. Esophagus enlarged by very gradual expansion. Cardiac disc irregular in thickness. Cardia elongate conoid, enveloped by cells of anterior intestine. Vulva with massive, sclerotized labia. Ovaries reflexed ⅔ distance back to vulva. Eggs 1½ times as long as body width and half as wide as long. Tail uniformly conoid to blunt rounded terminus with cuticle in two distinct layers, the inner one with strong radial striae. A single male bore 10 flat, elongated supplements.

Aporcelaimellus clamus is immediately distinguished from *A. porcus* by its uniformly conoid tail. Both species have the cardia surrounded by intestinal cells. Holotype female and other specimens as indexed under *Aporcelaimellus* 6.

Habitat: Cultivated fields near Presho and Chamberlain, South Dakota.

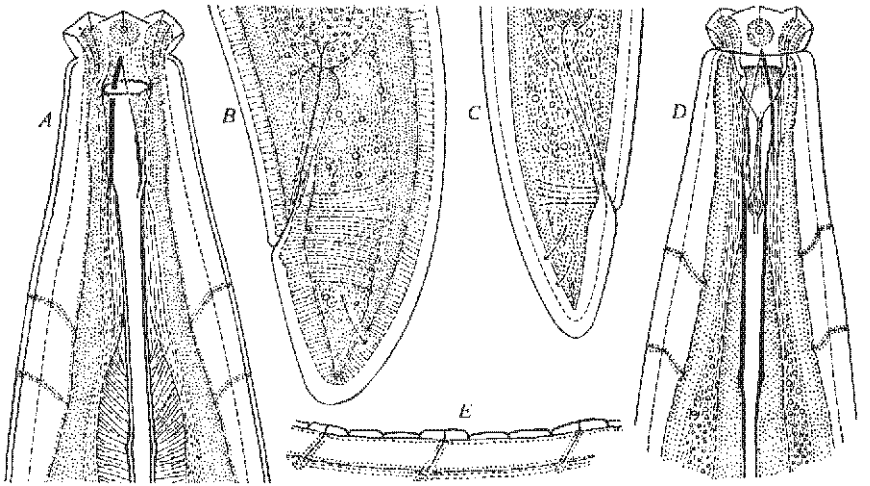


Fig. 6. A, B, *Aporcelaimellus porcus*. C-E, *A. clamus*.

Aporcelaimellus conoidus n. sp
(Fig. 7 A-E)

1.5–2.0 mm; a=28; b=3.8; v=50; V=$^{12}52^{12}$

Body slightly arcuate with lip region ½ width of neck base. Lateral field a single line of cells ⅓ body width. Numerous ventral pores present. Cuticle near head very thick as far back as opposite spear base. Lip region set off by constriction. The lips angular with conspicuous papillae. Spear about 24μ long with aperture occupying half its length. Guiding ring a muscular collar about ⅓ head width. Esophagus enlarged near middle by gradual expansion. Dorsal esophageal gland nucleus about two body widths posterior to expansion, the remaining nuclei not visible in the massive musculature. Cardia discoid, then conoid, frequently a small gland associated with it. A hyaline glandular body often crowding anterior end of intestine. Intestinal cells packed with fine, dark brown granules. Prerectum length two to three times body width. Rectum slightly longer than tail. In some specimens prerectum appears to extend into tail cavity. Vulva transverse with sclerotized labia of typical form. Ovaries reflexed ⅔ distance back to vulva. Eggs 3 times as long as body width. Tail bluntly conoid to rounded terminus.

Aporcelaimellus conoidus is immediately distinguished by its size, relatively short portion of cuticle thickened near head, length of spear aperture and regular form of tail cone. Holotype female and other specimens as indexed under *Aporcelaimellus* 7. Males unknown.

Habitat: Generally distributed throughout the Northern Great Plains in both cultivated and virgin soils.

Aporcelaimellus parmus n. sp

(Fig. 7, F-J)

2.9 mm; a = 58; b = 5.8; c = 74; V = ^{18} 52^{18}

2.3 mm; a = 41; b = 4.3; c = 45; T = 54

Body cylindroid, slightly arcuate posteriorly. Lateral field 1/5-1/7 body width, coarsely granular with conspicuous cells, each with a prominent pore. Cuticle strongly thickened near head. Lip region set off by deep constriction, angular. Spear 23-25μ long with guiding ring about ¼ head width. Esophagus enlarged in posterior ⅓ by gradual expansion. Cardia discoid, then conoid. Prerectum length about 3 times body width. Rectum about as long as tail. Vulva transverse with lightly sclerotized labia. Ovaries reflexed about halfway to vulva. Eggs about 40× 100μ.

Male similar to female with 6 low, rounded supplements. Spicula about 50μ long with slender guiding pieces 20μ long. Both sexes with dorsally convex conoid tails with the core deeply notched on dorsal side, the terminal pore rising from this deep notch. The single male had well developed testes but associated females had not been spermatized.

Aporcelaimellus parmus is distinctive among those with thickened cuticle near head, by the deeply notched core of the tail. Holotype female, allotype male and other specimens indexed under *Aporcelaimellus* 8.

Habitat: Soil about roots of young apple trees, Yankton, South Dakota and about roots of white oak, near Ames, Iowa.

Aporcelaimellus placus n. sp.

(Fig. 7, K-O)

2.5 mm; a = 39; b = 4.2; c = 52; V = ^{16}45^{15}

Body slightly arcuate, slender cylindroid. Cuticle greatly thickened near anterior end. Lips set off by deep constriction, angular. Spear 22μ long, its aperture about 3/7 of length. Lateral fields ⅓ body width, with prominent cells in tandem, each with a distinct pore. Esophagus enlarged in posterior ⅓ by a very gradual expansion. Cardia discoid, then conoid. Intestinal cells with scattered, dark refractive granules. Vulva transverse, the labia appearing more muscular than refractive. Ovaries reflexed about halfway to vulva. Egg length about twice body diameter. Prerectum length about 3 times body width. Rectum slightly longer than anal body diameter. Tail as illustrated with hyaline area occupying about ½ width of its core.

Aporcelaimellus placus is immediately distinguished by the thick cuticle near the head, narrow lateral field and hyaline area occupying ventral portion of tail. Holotype female and other specimens indexed under *Aporcelaimellus* 9.

Habitat: About roots of American elm in windbreak 2 miles east of White, South Dakota, collected by R. B. Malek.

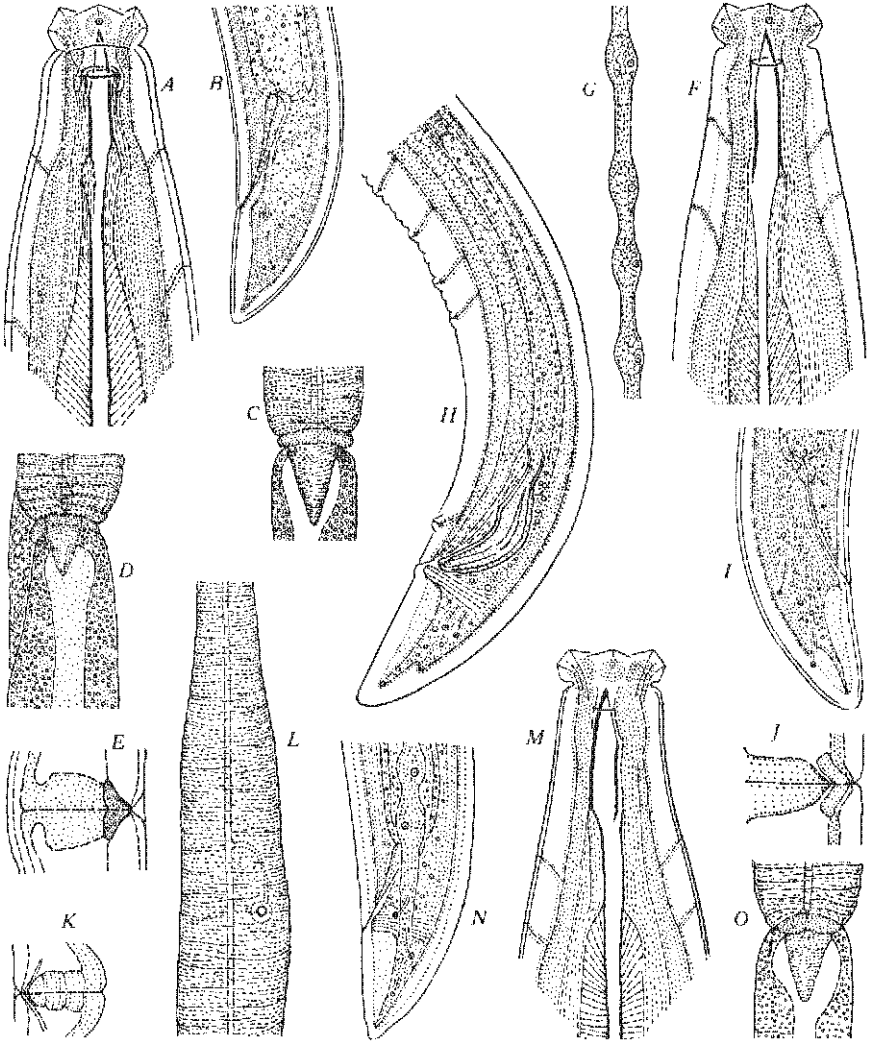


Fig. 7. A-E, *Aporcelaimellus conoidus*. F-J, *A. parmus*. K-O, *A. placus*.

Aporcelaimellus sublabiatus (T. & S., 1935) Heyns, 1965
Synonyms: *Dorylaimus sublabiatus* Thorne & Swanger, 1935
Eudorylaimus sublabiatus (T. & S., 1935) Andrassy, 1959
Aporcelaimus sublabiatus (T. & S., 1935) Brzeski, 1962

(Fig. 8, A-E)

4.0 mm; a = 46; b = 4.2; c = 58; V = $^{16}56^{16}$
4.0 mm; a = 45; b = 4.5; c = 56; T = 47

Body slightly arcuate. Lateral field about ⅓ as wide as body. Lip region about ¼ width of neck base. Lips rounded, set off by slight constriction. Spear 20μ long with aperture occupying ¾ its length. Posterior ⅜ of esophagus enlarged by gradual expansion. Cardia as illustrated. Intestinal cells massive; lumen sinuous in anterior portion. Vulva region as illustrated. Uterus generally packed with sperms. Ovaries reflexed about halfway back to vulva. Prerectum length about twice body diameter. Terminus tapering or slightly digitate. Male cylindroid, tail usually arcuate, with eight or nine supplements arranged as illustrated. Spicula arcuate with strong ventral angle and simple lateral guiding pieces.

Habitat: A rare species from brush and trees near river, Brookings; Dry farm fields, Highmore, South Dakota, and windbreak near Stromberg, Nebraska.

The position of this species is problematical, probably it belongs in a new genus but such action is suspended until additional data are available. Specimens indexed under *Aporcelaimellus* 10.

Aporcelaimellus capitatus (T. & S., 1936) Heyns, 1965
Synonyms: *Dorylaimus capitatus* Thorne and Swanger, 1936
Eudorylaimus capitatus (T. & S., 1936) And. 1959
(Fig. 8, F-I)

2.8 mm; a=44; b=4.6; c=55; V=$^{11}56^{11}$

Body almost straight when relaxed, slightly arcuate posteriorly. Lip region discoid about ⅓ width of neck base, angular with prominent papillae. Lateral field about ⅛ body width. Spear 14μ long, with aperture occupying about ½ of its length. Esophagus enlarged by gradual expansion in posterior ⅜. Dorsal esophageal gland nucleus very prominent. Cardia a very thin disc, then elongate hemispheroid. Intestine with thin walls, the cells packed with very fine granules. Vulva transverse, vagina of unusual form as illustrated. Ovaries reflexed two thirds back to vulva. An egg was 45 x 105μ. Prerectum length 3 times body width. Rectum and tail as illustrated. Males not found and gravid females contained no sperms.

Habitat: From cultivated and virgin soil throughout the Northern Great Plains from Colorado to Montana.

The taxonomic position of this species is problematical. Form of the lip region, rapid tapering of neck, enlargement of esophagus, form of the vulva and general appearance make its inclusion in *Aporcelaimellus* questionable. Lordello, 1968 described *Metaporcelaimus mombucae* which in many respects resembles *A. capitatus* but a detailed study of Lordello's specimens must be made before final decision.

Genus *Thonus* n. g.

Diagnosis: Dorylaiminae. Small nemas rarely over 2.0 mm long. Lip region rounded to angular. Tails hemispheroid to rounded convex conoid, Cuticle not in thick layers. Aperture occupying one-half or less of spear length. Esophagus expansion gradual to abrupt, the slender anterior por-

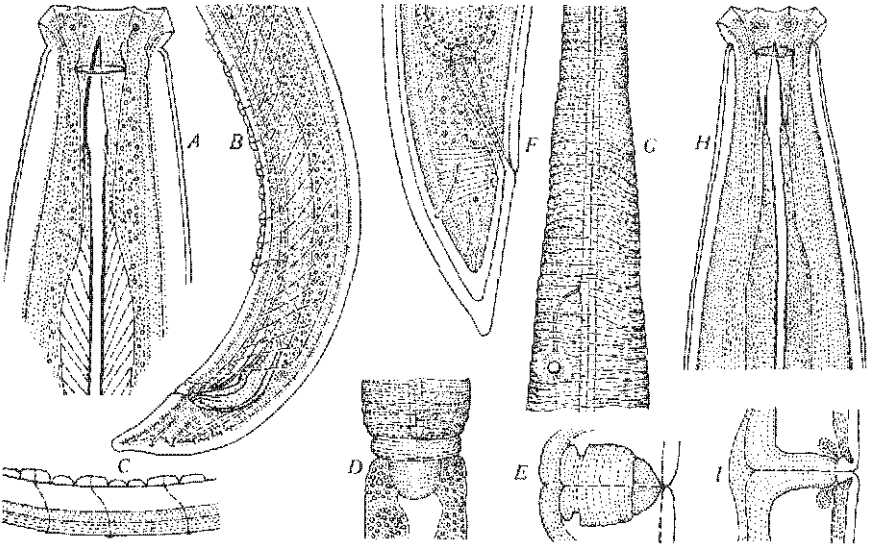


Fig. 8. A-E, *Aporcelaimellus sublabiatus*. F-I, *A. capitatus*.

tion without strong musculature. Cardia with well developed disc and short blunt portion extending into intestine. Vulva transverse with small anterior and posterior glands. Ovaries two, reflexed. Males known for only two species. Supplements 5-10. Spicula arcuate with strong ventral angle and slender lateral guiding pieces.

Type species: *Thonus nothus* (T. & S., 1936) new comb.

Thonus is distinguished from *Aporcelaimellus* by generally smaller size, less muscular esophagus, shorter spear aperture, and thick, disc-like portion of cardia. The generic name is an anagram of *nothus* the type species.

Key to species of *Thonus*

1. Tail without numerous saccate bodies 2
   Tail containing numerous saccate bodies 6
2. Head rounded, lips obscure ..... *baldus*
   Head not rounded, lips angular 3
3. Lips set off by deep constriction 4
   Lips set off by depression only 5
4. Female tail hemispheroid ..... *major*
   Female tail rounded, dorsally convex conoid ..... *nothus*
5. Prerectum length over 3 times body width ..... *elegans*
   Prerectum length about 1 body width ..... *cylindricus*
6. Tail hemispheroid ..... *circulifer*
   Tail rounded, dorsally convex conoid ..... *saccatus*

Thonus nothus (T. & S., 1936) n. comb.

Synonyms: *Dorylaimus nothus* T. & S. 1936

Eudorylaimus nothus (T. & S)., Heyns & Lagerway, 1965

Aporcelaimellus nothus (T. & S.) Heyns, 1971

(Fig. 9, A-E)

1.0 mm; a = 28; b = 3.3; c = 56; V = $^{20}60^{20}$

1.0 mm; a = 27; b = 3.3; c = 52; T = 52

Body cylindroid, slightly arcuate. Lateral field ¼ body width. Lips angular, set off by constriction, about ½ width of neck base. Spear 13μ long with aperture occupying ⅔ its length. Esophagus enlarged near middle by rather abrupt expansion. Cardia elongate conoid with prominent disc between esophagus and intestine. Intestine granules very fine and refractive. Rectum about as long as body diameter, prerectum about twice length of rectum. Vulva transverse with refractive labia. Vagina extending slightly more than halfway across body. Ovaries reflexed ½ to ¾ distance back to vulva. Tail dorsally convex to rounded terminus with two pairs of pores. Obscure traces of saccate glands sometimes present. Supplements 5 or 6, rather variably spaced, the first being slightly anterior to spicula.

Thonus nothus is distinctive because of its small size, length of spear, elongate conoid cardia and number and arrangement of supplements. Specimens indexed under *Thonus* 1.

Habitat: Blue grass field near Long Lake and mountain meadow in Black Hills, South Dakota.

Thonus major n. sp.

(Fig. 9, F-H)

1.5 mm; a = 30; b = 4.2; c = 56; V = $^{18}53^{18}$

1.6 mm; a = 28; b = 3.9; c = 62; T = 52

Female body slightly arcuate, male straighter but arcuate in region of supplements. Lateral field ¼-⅓ body width without visible cellular structure. Lip region angular, set off by deep constriction, ½ width of neck base. Spear about 13μ long with aperture ½ its length. Cephalic papillae prominent. Esophagus enlarged by rather abrupt expansion near middle. Intestinal cells with scattered, rather coarse brown granules. Prerectum length about twice body width. Rectum longer than anal body diameter. Vulva transverse with sclerotized labia. Ovaries reflexed halfway to vulva. Eggs 45 x 80μ. Sperms present in uterine tracts, indicating that males are functional. Tail elongate hemispheroid with thick cuticle and two pairs of pores. Male similar to female with slightly arcuate tail bearing 9 supplements arranged as illustrated. Spicula about 50μ long with simple lateral guiding pieces.

Holotype female and allotype male indexed under *Thonus* 5.

Thonus major is immediately distinguished by its length, set off lip region and 9 supplements.

Habitat: Alfalfa field near Bear Butte, South Dakota.

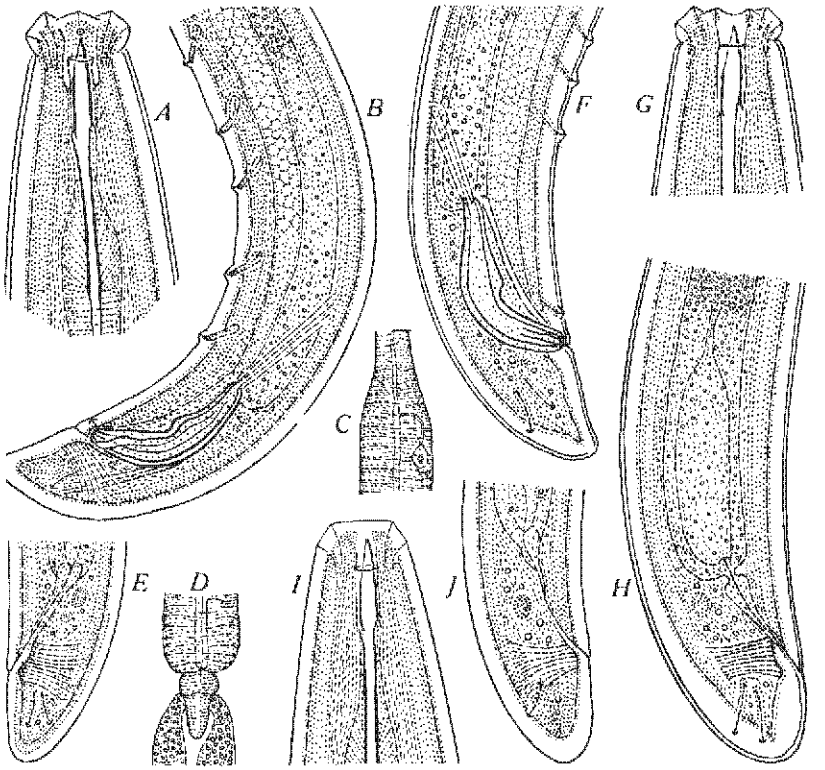


Fig. 9. A-E, *Thonus nothus*. F-H, *T. major*. I-J, *T. baldus*.

Thonus baldus n. sp.
(Fig. 9, I-J)

1.5 mm; a = 35; b = 4.3; c = 60; V = $^{10}47^{10}$

Body cylindroid, arcuate. Lateral field ⅛ body width with 2 lines of cells in zig-zag arrangement. Lip region rounded but papillae easily seen. Guiding ring a muscular collar. Spear 12μ long with aperture ½ its length. Esophagus rather abruptly enlarged near middle, until ¼ body width. Cardia discoid, then conoid. Gland-like body often crowding anterior end of intestine. Intestinal cells with prominent nuclei surrounded by fine, pale brown granules. Prerectum length 2-3 times body width. Rectum as long as tail. Ovaries reflexed halfway to vulva. Eggs two body widths long. Males unknown and gravid females contained no sperms.

Thonus baldus is distinctive because of the rounded lip region, nuclei of intestinal cells, and tail shape with a single pair of lateral pores.

Holotype female and 9 other specimens indexed under *Thonus* 4.

Habitat: Native prairie sod, South Dakota Experiment Station, Cottonwood.

Thonus elegans n. sp.

(Fig. 10 A-E)

1.7 mm; a = 40; b = 4.6; c = 60; V = $^{10}47^{10}$

Body arcuate, especially in posterior third. Lateral field ¼ body width. Lip region slightly set off with low but distinct papillae, similar to that of *T. baldus*. Spear 12μ long with aperture occupying ⅓ its length. Basal portion of esophagus enlarged in posterior 3/7 by gradual expansion. Cardia with prominent disc, then conoid. Granules of intestine exceedingly fine, distinctly forming a tesellation of the cells. Prerectum length 4 to 6 times body diameter. Rectum slightly longer than tail. Vulva transverse with lightly sclerotized labia. Ovaries reflexed about ½ their length. Vagina as illustrated. Two pairs of pores well back on tail.

Thonus elegans is distinctive because of the long prerectum and low papillae which are scarcely elevated above the head contour.

Holotype female and other specimens indexed under *Thonus* 3.

Habitat: Dry farm grain field near Huron, South Dakota.

Thonus cylindricus n. sp.

(Fig. 10 F-J)

1.6-1.9 mm; a = 38; b = 4.8; c = 66; V = $^{16}48^{10}$

Body cylindroid arcuate to open C when relaxed. Lip region ¾ width of neck base. Lateral fields ¾-¼ body width. Labial papillae low, rounded. Spear 11μ long with aperture occupying half its length. Esophagus enlarged in posterior ⅔ by gradual expansion. Cardia a thick disc, then conoid. Intestinal granules excessively fine, colorless. Prerectum length 2-2½ times body diameter. Rectum about as long as tail. Tail convex conoid to bluntly rounded terminus. Two pairs caudal pores present. Vulva a transverse slit with broad, escutcheon-shaped vagina. Vulvar glands prominent.

Thonus cylindricus is closely related to *T. elegans* from which it differs in the short prerectum, form of vagina, and longer spear aperture. Holotype female and other specimens indexed under *Thonus* 6.

Habitat: Dying lawn grass, Aberdeen, South Dakota, and prairie sod near Irvine, North Dakota.

Thonus circulifer n. comb.

Synonyms: *Dorylaimus intermedius* T. & S. 1936

Not *D. intermedius* de Man, 1880

Eudorylaimus intermedius (T. & S. 1936) And. 1959

Eudorylaimus circulifer (T. & S., 1936) Loof 1961

(Fig. 11 A-C)

1.5 mm; a = 33; b = 4.2; c = 58; V = $^{15}49^{15}$

Body cylindroid, slightly arcuate. Lateral fields ⅛ body width. Lip region set off by slight expansion with easily visible papillae. Spear 14μ long with aperture occupying ⅔ its length. Guiding ring a muscular collar. Esophagus enlarged in posterior ⅔ by very gradual expansion until ½ body width. Cardia a narrow disc with conoid posterior portion extending into intestine. Intestinal cells filled with bright brown granules. Prerectum

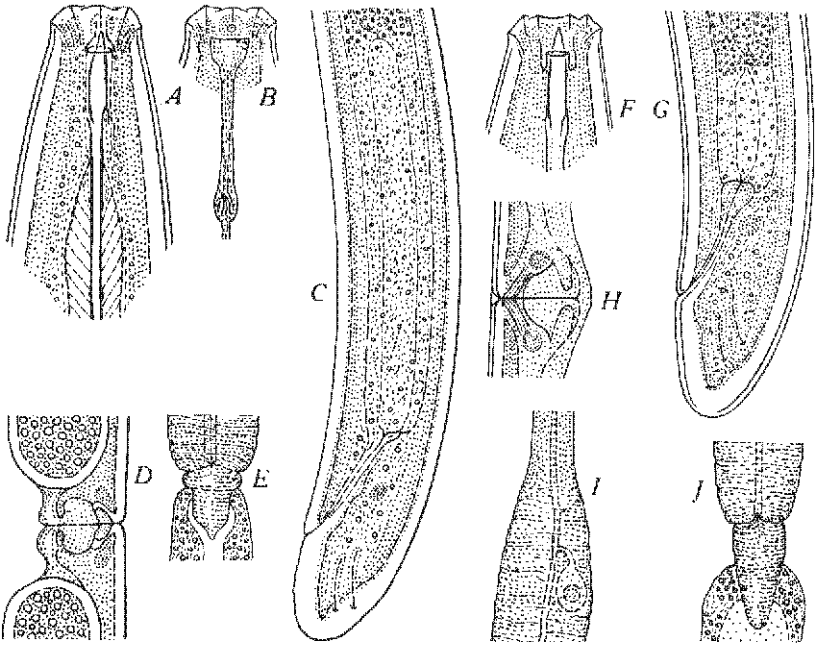


Fig. 10. A-E, *Thonus elegans*. F-J, *T. cylindricus*.

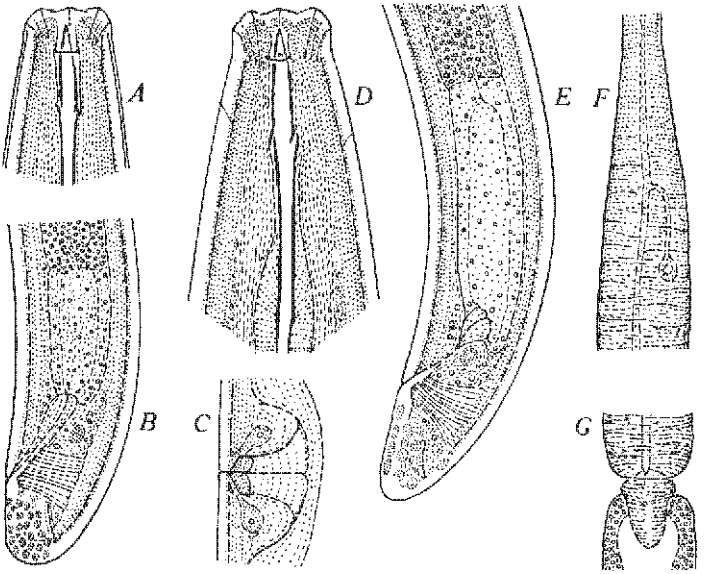


Fig. 11. A-C, *Thonus circulifer*. D-G, *T. saccatus*.

length equal to body width, rectum about same length. Vulva transverse with large sclerotized labia. Ovaries reflexed ½ distance back to vulva. Tail bluntly rounded with numerous saccate bodies in cuticle, variable in numbers and arrangement. Males not found and gravid females contained no sperms.

Thonus circulifer is distinctive because of ⅝ expanded esophagus, form of vulva and saccate glands in blunt rounded tail.

Numerous specimens indexed under *Thonus* 7.

Habitat: A rather common inhabitant of both cultivated and virgin soil throughout the Northern Great Plains.

Thonus saccatus n. sp.
(Fig. 11, D-G)

1.6-2.1 mm; a=37; b=4.3; c=55; V=$^{8}51^{10}$

Body cylindroid, arcuate, especially posteriorly. Lip region ⅓ neck base. Lateral field ⅓ body width, granular without visible cellular structure. Lip region slightly set off with low, rounded, but distinct papillae. Spear 15μ long with aperture occupying about ⅝ its length. Guiding ring a closely fitted muscular collar. Esophagus enlarged slightly anterior to middle by very gradual expansion. Cardia discoid, then elongate conoid. Intestinal cells somewhat tesellated with fine dark brown granules. Prerectum 2-3 times as long as body width. Rectum about equal to tail length. Vulva transverse with labia forming a cephalated vagina with prominent cells. Tail dorsally convex conoid to blunt rounded terminus. One pair of caudal pores and numerous saccate glands. Males unknown and females did not contain sperms.

Holotype female and other specimens indexed under *Thonus* 8.

Thonus saccatus is distinguished by the slightly elevated labial papillae, posteriorly arcuate body, form of vulva-vagina, and dorsally convex conoid tail with numerous saccate bodies.

Habitat: Hillside thicket 6 miles west of Wilmot, South Dakota.

Lordellonema parvum n. sp.
(Fig. 12, A-H)

1.3 mm; a=27; b=3.9; c=52; V=$^{16}59^{16}$

1.3 mm; a=26; b=4.3; c=52; T=?

Body practically straight when relaxed. Lateral field ¼ body width with about 30 glandular bodies from which minute pores arise. A comparable number occur ventrally. Lip region angular, set off by constriction and expansion. Spear 15μ long, its aperture occupying ⅓-½ the length. Esophagus enlarged near middle by gradual expansion. Cardia elongate conoid, about ½ as long as body width. Intestinal cells packed with fine, light brown granules. Lumen broad and frequently contains green, chlorophyll-like, or dark brown to black material apparently ingested as food. Vulva a tiny open pit or with 4 lip-like, unsymmetrical lahia surrounded by many radial muscles. Cross section of vagina a transverse slit. Ventral pores usually located near the vulva. Ovaries variable in length especially when

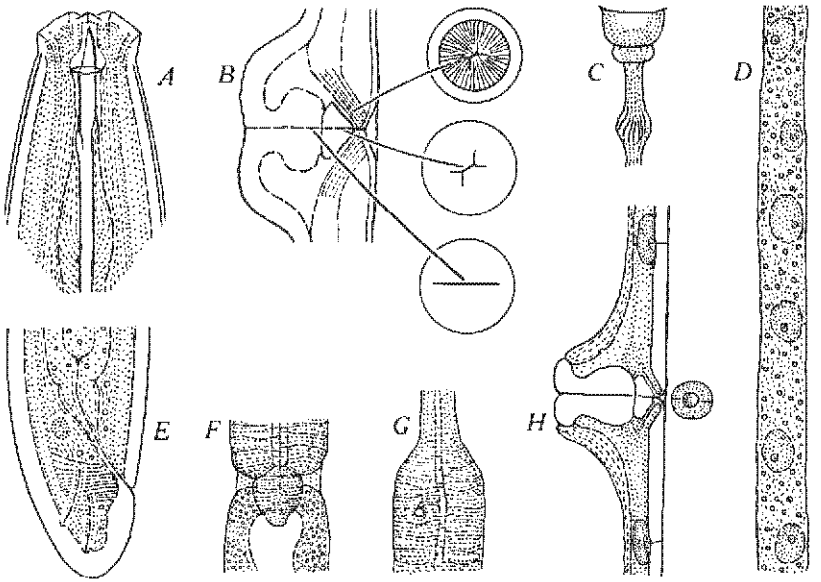


Fig. 12. *Lordellonema parvum*. A, head; B, vulvar region; C, amphid; all x 1,000; D, lateral field; E, tail; F, G, esophagus parts; H, vulvar region; all x 500.

eggs are present, reflexed about ⅓ their length. Eggs average about 35x85μ. Prerectum about 3 times body width. Tail elongate hemispheroid with two pairs of conspicuous papillae. A single male found but gravid females contained no sperms. This male bore 14 low, inconspicuous supplements beginning half a body width anterior to spicula and occupying a space of about 2 body widths. Spicula arcuate with strong ventral angle. Testes could not be seen.

Holotype female and numerous other specimens indexed under *Lordellonema* 1.

Habitat: Frequently collected from native grass sod and cultivated fields near Trinidad, Colorado; Brookings, Emmig, and Herrick, South Dakota; Fargo, North Dakota; Elizabeth, Minnesota; and Glendive, Montana.

Subfamily Dorylaiminae (de Man, 1876) Filipjev 1918

Genus *Eudorylaimus* Andrassy, 1959

Relatively small nemas 0.5-2.0 mm long. Bodies usually curved with arcuate tails, rarely straight or subdigitate. Lip region angular, set off by depression or constriction. Spear aperture occupying ⅔ or less of its length; guiding ring sclerotized. Esophagus usually enlarged near middle by rather abrupt expansion. Dorsal esophageal gland nucleus close to its orifice. Cardiac disc variable, present or obscure. Vulva transverse with sclerotized

labia or longitudinal. Males present for many species, absent in others. Junction of intestine and prerectum within range of supplements.

Type species: *Eudorylaimus carteri* (Bastian, 1865) Andrassy, 1959.

Recent work by Tjepkema, Ferris and Ferris proved that at least some species of *Eudorylaimus* are predators and subsisted on colonies of *Panagrellus redivius*.

Illustrations of *Eudorylaimus* are uniformly, heads × 800, tails × 400, unless stated otherwise.

Key to species of *Eudorylaimus*

1. Length 1.0 mm or more 2
   Length less than 1.0 mm 13
2. Cardia surrounded by intestinal cells 3
   Cardia not surrounded by intestinal cells 4
3. Vulva longitudinal ..... *confusus*
   Vulva transverse ..... *longicardius*
4. Tail slightly subdigitate or uniformly conoid 5
   Tail ventrally arcuate 6
5. Terminus slightly subdigitate ..... *sodalus*
   Terminus uniformly conoid ..... *conicaudatus*
6. Guiding ring columnar, not attached to pharynx walls ..... *varians*
   Guiding ring attached to pharynx walls 7
7. Lips set off by slight depression ..... *subdigitalis*
   Lips well set off, angular 8
8. Supplements in range of spicula ..... *robustus*
   Supplements well anterior to spicula 9
9. Tail length about equal to anal body diameter ..... *arcus*
   Tail length distinctly longer than anal body diameter 10
10. Aperture about half length of spear ..... *acuticauda*
    Aperture about ⅓ length of spear 11
11. Tail elongate, slender, c=10 ..... *angulosus*
    Tail relatively short, c=24 12
12. Vulva transverse ..... *carteri*
    Vulva longitudinal ..... *andrassyi*
13. Tail long, hooked, c=8 ..... *leptus*
    Tail conoid or slightly arcuate 14
14. Tail conoid, body practically straight ..... *miser*
    Tail slightly arcuate 15
15. Spear aperture over ⅔ its length ..... *dubius*
    Spear aperture ⅓ its length or less 16
16. Lip region set off by expansion ..... *modestus*
    Lip region set off by deep constriction 17
17. Junction of spear extension and esophageal lumen surrounded by muscular bulb ..... *angleus*
    Junction without muscular bulb 18
18. Vulva transverse ..... *aquilonarius*
    Vulva longitudinal ..... *sabulophilus*

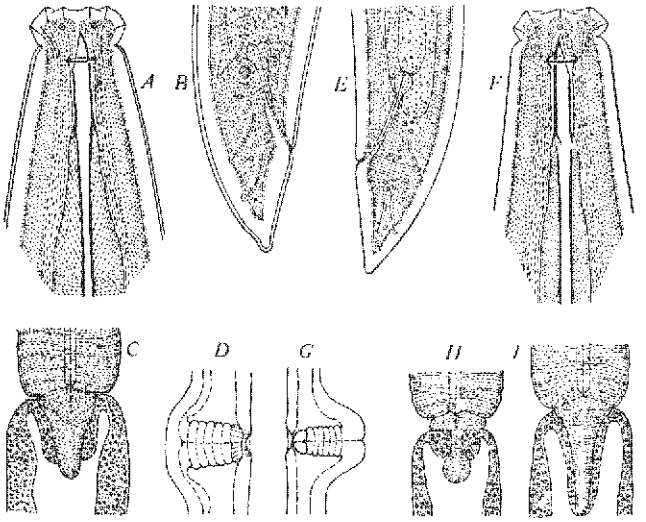


Fig. 13. A-D, *Eudorylaimus confusus*. E-I, *E. longicardius*. H, fixation artifact of cardia.

Eudorylaimus confusus n. sp.

(Fig. 13, A-D)

1.2 mm; a = 26; b = 3.4; c = 31; V = $^{13}63^{13}$

Body practically straight. Lip region angular, set off by constriction. Lateral field ¼ body width. Spear 17μ long with aperture occupying ⅓ its length. Esophagus enlarged near middle by rather abrupt expansion. Esophageal glands arranged similar to those of *Aporcelaimellus*, the anterior pair being separated by a distance about equal to width of esophagus. Very little evidence of a cardiac disc, the cardia elongate-conoid with intestinal cells almost completely surrounding it. Vulva longitudinal with moderately sclerotized labia. Vagina cylindroid, extending half way across body. Ovaries reflexed half way to vulva. Eggs 1¾ times as long as body width. Prerectum slightly longer than body width, sometimes with a slight posterior extension. Tail with a very slightly digitate bluntly rounded terminus. Cuticle of tail with easily seen radial striae. Males not collected.

Eurorylaimus confusus is distinguished by *Eudorylaimus*-like spear and rather abruptly expanded esophagus and by the *Aporcelaimellus*-like arrangement of the anterior pair of esophageal gland nuclei. Also the bluntly rounded, subdigitate terminus.

Holotype female and other specimens indexed under *Eudorylaimus* 1.

Habitat: A widely distributed species from cultivated, prairie and windbreak soils from Boulder, Colorado to Hadashville, Manitoba, Canada.

Eudorylaimus longicardius n. sp.

(Fig. 13, E-I)

1.4 mm; a = 29; b = 3.6; c = 37; V = $^{18}60^{18}$

Body slightly arcuate in posterior third. Lip region angular, set off by constriction. Guiding ring sclerotized, refractive. Spear 15μ long with aperture ⅓ its length. Esophagus enlarged by rather abrupt expansion near middle until ½ body width, gland nuclei arranged as in *Eudorylaimus*. Cardia discoid, then elongate conoid with intestinal cells surrounding it almost to apex. Intestinal lumen frequently with green or red colored contents. Prerectum length about equal to body diameter, a pouch-like dorsal extension usually extending back over rectum. Tail dorsally convex-conoid to rounded terminus, bearing two pairs of lateral pores. ♀varies reflexed about ½ their length. Vulva transverse, at bottom of a small round depression. Eggs about 40 to 75μ, as many as 4 being observed at one time. Male not collected and gravid females contained no sperms.

Eudorylaimus longicardius is immediately distinguished by the posterior location of the vulva, intestinal cells surrounding the cardia and tail form. Holotype female and other specimens as indexed under *Eudorylaimus* 2.

Habitat: Collected from soil about buffalo grass roots near Farmingdale, South Dakota by James Smolik.

Eudorylaimus sodakus n. sp.
(Fig. 14, A-D)

1.3 mm; a = 26; b = 3.6; c = 36; V = $^{14,55^{16}}$

Body slightly arcuate in posterior fourth. Lip region angular, set off by deep constriction. Guiding ring refractive, sclerotized. Spear 15μ long with aperture 3/7 of length. Esophagus enlarged near middle with rather abrupt expansion. Esophageal glands typical of the genus. Cardia a disc, then cylindroid. Vulva transverse with sclerotized labia. Prerectum length 1½ times body width, rectum slightly longer than anal body diameter. Tail dorsally convex conoid to slightly digitate terminus.

Eudorylaimus sodakus is distinctive because of its small size, rather long spear aperture, sclerotized vulva labia and tail form.

Holotype female and other specimens indexed under *Eudorylaimus* 3.

Habitat: Soil about roots of Ponderosa pine, Custer State Park and native sod from roadside park near Hammer, South Dakota.

The specific name is composed of the first letters of South Dakota.

Eudorylaimus conicaudatus n. sp.
(Fig. 14, E-I)

1.5 mm; a = 25; b = 4.5; c = 30; V = $^{1750^{20}}$

Body slightly arcuate. Lateral field ½ body width. Lip region slightly set off with low but distinct papillae. Spear 15μ long with aperture ⅔ its length. Guiding ring refractive, ⅓ head width. Posterior 3/7 of esophagus enlarged by gradual expansion. Cardia discoid, then bluntly conoid, ½ body width long. Intestine with dense, dark granules and lumen packed with dark food. Prerectum length equal to body width, rectum as long as anal body diameter. Vulva transverse with highly sclerotized labia. Ovaries

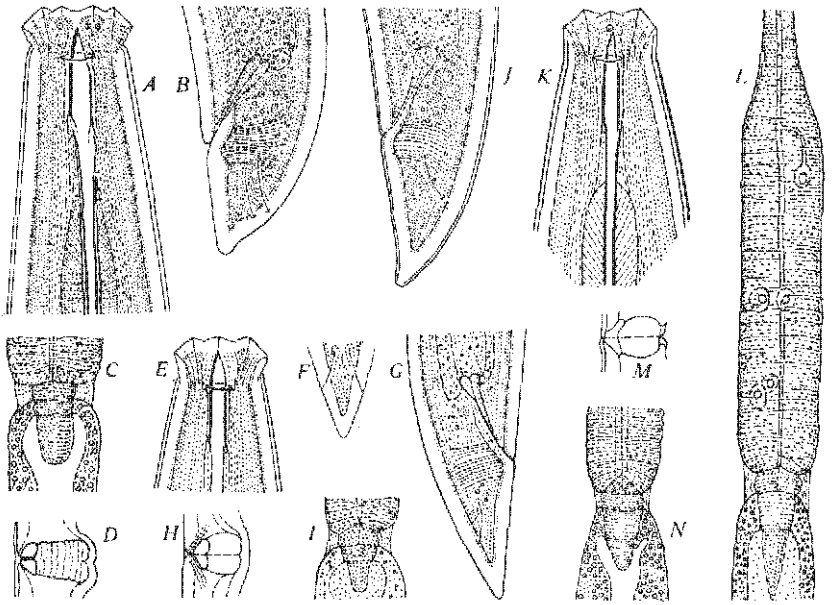


Fig. 14. A-D, *Eudorylaimus sodakus*. E-I, *E. conicaudatus*. J-N, *E. subdigitalis*.

reflexed about half the distance back to vulva. Egg length about 1½ body width, four being observed in one specimen. Tail conoid to blunt, rounded terminus. A single pair of caudal pores seen.

Eudorylaimus conicaudatus is distinctive because of its obscure lips, conoid, bluntly rounded terminus, transverse vulva with highly sclerotized labia and short prerectum. Holotype female and other specimens indexed under *Eudorylaimus* 4.

Habitat: A single collection from prairie sod near Emmig, South Dakota.

Eudorylaimus subdigitalis Tjepkema, Ferris & Ferris, 1971
(Fig. 14, J-N)

1.3 mm; a = 23; b = 3.6; c = 24; V = $^{14}54^{14}$

Body usually slightly arcuate. Lateral field ⅓ body width, with two lines of cells, each with a distinct nucleus. Lip region somewhat angular, set off by low depression. Spear 15μ long with aperture occupying ⅔ its length. Esophagus enlarged near middle by gradual expansion. Cardia elongated, varying considerably in length. Intestinal cells packed with minute, brown, refractive granules. Vulva transverse with sclerotized labia. Ovaries reflexed about halfway to vulva. Egg length 1½ times body width. Prerectum about 1½ times body width, often with slight dorsad extension.

Tail slightly arcuate ventrally with small rounded terminus. Males not collected and gravid females contained no sperms.

Eudorylaimus subdigitalis is distinctive because of slightly set off lip region, rather long spear aperture, transverse vulva with sclerotized labia and slightly arcuate tail with rounded terminus. Specimens indexed under *Eudorylaimus* 5.

Habitat: Cultivated field near Meckling and native sod, Emmig and Rapid City, South Dakota.

Eudorylaimus varians n. sp.
(Fig. 15, A-C)

1.8 mm; a=34; b=4.2; c=28; $V=^{11}51^{11}$

Body almost straight back to vulva, then ventrally curved to the arcuate tail. Head usually seen in submedian view. Lateral field ¼ body width, without visible cellular structure. Lips angular with prominent papillae. Pharynx an open chamber with spear guiding sheath a prominent feature, different in structure from those of other species. Spear 22μ long with aperture occupying about ¼ its length. Esophagus enlarged near middle by gradual expansion. Cardia a pyramidal disc then conoid, about ½ as long as body width, conoid portion a flaccid nonmuscular valvular apparatus. Intestine with excessively fine, pale granules. Prerectum length twice body width, rectum half as long as prerectum. Vulva transverse, slightly elevated with sclerotized labia. Vagina extending halfway across body. Ovaries reflexed ¾ their length. Neither spermatheca or sperms observed, males probably nonexistent.

Eudorylaimus varians is distinctive because of its spear guide.

Holotype female and other specimens indexed under *Eudorylaimus* 6.

Habitat: Underbrush by Sioux River west of Brookings, South Dakota.

Eudorylaimus robustus n. sp.
(Fig. 15, D-H)

1.8 mm; a=30; b=4.3; c=36; $V=^{10}56^{10}$

1.6 mm; a=28; b=3.9; c=28; T=52

Body arcuate especially in posterior third, ending in a somewhat hooked tail region. Lateral field about ⅛ body width. Lip region angular, set off by constriction, papillae prominent. Spear 15μ long with aperture ⅓ its length. Extension twice spear length. Esophagus enlarged in posterior half by gradual expansion. Cardia with narrow disc, then conoid. Intestinal cells with bright brown, scattered granules. Prerectum 1½ times as long as body width. Vulva transverse with pointed, sclerotized labia. Eggs slightly longer than body width. Uteri packed with sperms. Males with 11 uniformly well spaced supplements, the posterior one being within range of spicula. Prerectum reaching to a point opposite midway of the 5th and 6th supplements. *Eudorylaimus robustus* is distinctive because of supplement arrangement and sclerotized labia of the transverse vulva. Usually the vulva

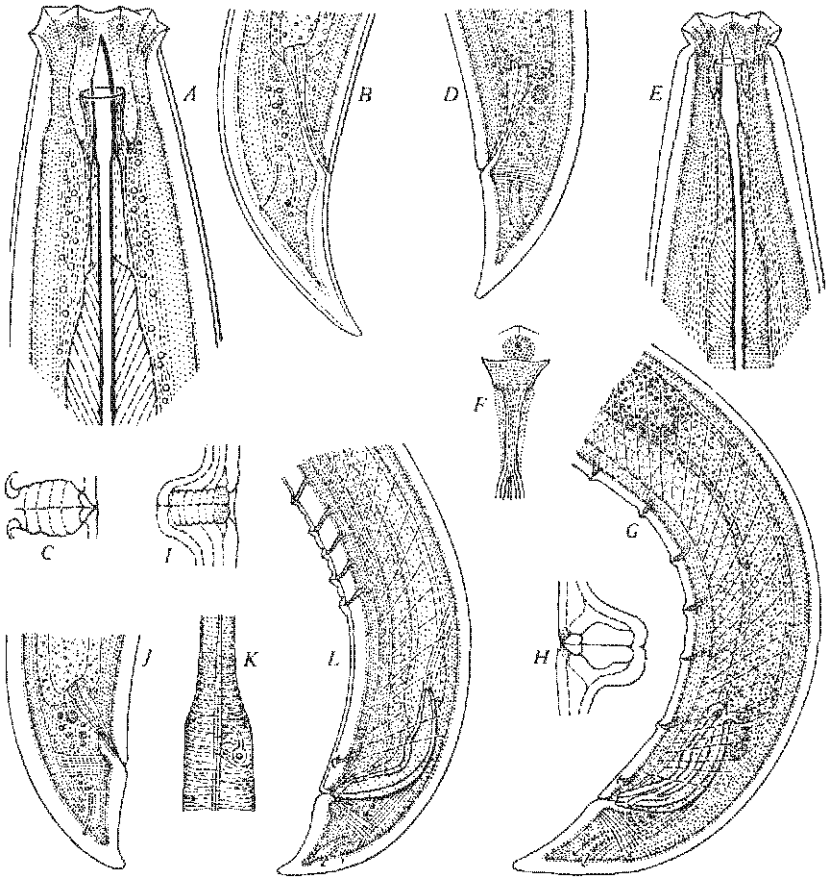


Fig. 15. A-C, *Eudorylaimus varians*. D-H, *E. robustus*. I-L, *E. arcus*.

of bisexual *Eudorylaimus* is longitudinal. Holotype female, allotype male and other specimens indexed under *Eudorylaimus* 7.

Habitat: A single collection from native sod near Murdo, South Dakota.

Eudorylaimus arcus (T. & S., 1936) Andrassy, 1959

Synonym: *Dorylaimus arcus* Thorne and Swanger 1936

(Fig. 15, I-L)

1.3 mm; a = 24; b = 3.6; c = 36; V = $^{24}58^{22}$

1.3 mm; a = 29; b = 4.0; c = 37; T = 62

Body moderately arcuate. Lateral field about ⅓ body width. Lips angular with prominent papillae. Spear about 16μ long with aperture ⅝ its

length. Guiding ring refractive. Esophagus enlarged near middle by rather abrupt expansion. Cardia cylindroid, then conoid, 1½ body widths long. Ovaries reflexed ¾ their length. Vagina extending halfway across body Vulva longitudinal. Uterus forming a massive spermatheca packed with sperms. Female prerectum length about equal to body diameter, often extending back forming a short pouch. Rectum about equal in length to anal body diameter. Two pairs of closely approximated pores present.

Males with 11 or 12 pairs of mammiform supplements as illustrated, the series beginning well in front of spicula. Spicula massive, about 50μ long.

Eudorylaimus arcus is distinctive because of the wide lateral field, tail form and supplement arrangement. Specimens indexed under *Eudorylaimus* 8.

Habitat: Dry farm soil near Highmore, lawn near Brookings, native sod near Rapid City, South Dakota; and native sod west of Devils Lake, North Dakota.

Eudorylaimus andrassyi (Meyl, 1955) Andrassy, 1959
Synonym: *Dorylaimus andrassyi* Meyl, 1955
(Fig. 16, A-D)

1.7 mm; a=24; b=4.1; c=30; $V=^{20}55^{20}$
1.7 mm; a=27; b=4.2; c=29; T=55

Body slightly arcuate, ventrally bent posteriorly in male. Lateral field about ⅓ body width without visible cells. Lip region angular with conspicuous papillae. Spear 20μ long with aperture ⅓ its length. Guiding ring refractive, ¼ head width. Esophagus expanded rather abruptly in basal 3/7. Cardia conoid, about as long as body width. Intestine with fine, dark, refractive granules. Vulva longitudinal. Ovaries reflexed about ½ their length. Uteri forming huge spermatheca packed with sperms; as many as 5 eggs observed in one female. Prerectum length about twice body diameter. Rectum slightly longer than tail.

Supplements 8 or 9, spaced as illustrated. Spicula unusually long, extending to a point almost opposite first supplement. Specimens indexed under *Eudorylaimus* 9.

Eudorylaimus andrassyi is distinctive because of its size, tail forms, and, especially, number and arrangement of supplements.

Habitat: Grain field, Barnesville, Minnesota; and about roots of young willows, Behrens Ranch, South Dakota.

Eudorylaimus acuticauda (de Man, 1880) Andrassy, 1959
Synonym: *Dorylaimus acuticauda* de Man, 1880
(Fig. 16, E-I)

1.6 mm; a=24; b=4.5; c=31; $V=^{23}57^{21}$
1.5 mm; a=26; b=4.2; c=30; T=57

Bodies of both sexes slightly arcuate, tails usually bent ventrally. Lateral field about ⅓ as wide as body. Lip region slightly angular set off by

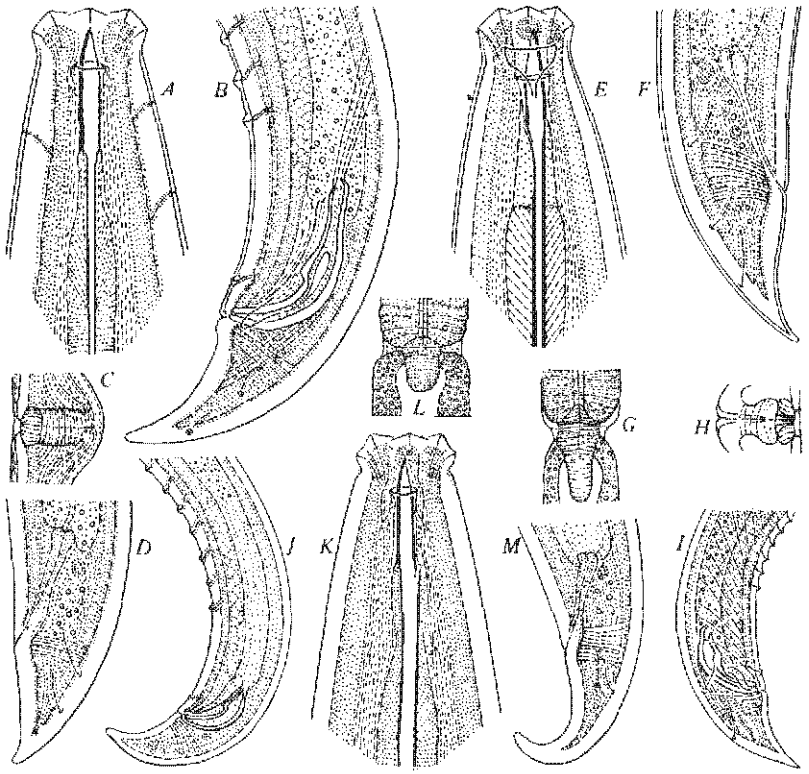


Fig. 16. A-D, *Eudorylaimus andrassyi*. E-I, *E. acuticauda*. J-M, *E. carteri*.

depression. Spear 16-18μ long, the aperture occupying ½ its length. Pharynx about ⅗ head width with refractive guiding ring. Esophagus enlarged near middle by gradual expansion. Cardia elongated with details as illustrated. Vulva longitudinal with vagina as illustrated. Egg slightly longer than body width. Ovaries reflexed about halfway to vulva. Prerectum slightly longer than body width, with short posterior extension. Male with 13-16 closely spaced supplements. Spicula arcuate with strong ventral angle and bent guiding pieces. Tails of both sexes arcuate, acute. Specimens indexed under *Eudorylaimus* 10.

Habitat: Cultivated fields, Gary, Huron, Aberdeen and native sod, Cottonwood, Bear Butte and other points in South Dakota. Native sod, Belmont, Rugby and Dunniston, North Dakota; Baker, Montana and southeast of Boulder, Colorado.

Eudorylaimus carteri (Bastian, 1865) Andrassy, 1959
Synonym: *Dorylaimus carteri* Bastian, 1865
(Fig. 16, J-M)

1.8 mm; a = 26; b = 4.5; c = 20; V = $^{16}46^{16}$

1.7 mm; a = 28; b = 4.2; c = 21; T = 65

Body very arcuate, tapering gradually from near middle. Lateral fields ¼ body width, the cells arranged in 2 lines. Pores not seen. Lip region set off by constriction, with elevated, angular papillae. Spear 20μ long with aperture occupying ⅔ its length; about as wide as adjacent cuticle. Guiding ring refractive, supported by a distinct framework anchored to stoma walls. Hemizonid about opposite nerve ring. Posterior ⅔ of esophagus enlarged by irregular expansion. Cardia elongate conoid, ½ as wide as esophagus base. Intestinal cells packed with minute granules. Vulva transverse with prominent sclerotized labia. Vagina extending ⅔ across body. Ovaries reflexed halfway to vulva. Eggs 20x75μ. Prerectum length 1½ times body width. Tail arcuate to hooked terminus. Two pairs of caudal pores present.

Male tail very arcuate. Supplements 7, spaced a distance equal to twice cuticle width, the series beginning about 1 body width anterior to range of spicula.

Eudorylaimus carteri is distinctive because of the arcuate tail with acute terminus, spear aperture ⅔ its length and arrangement of supplements. Specimens indexed under *Eudorylaimus* 11.

Habitat: Several specimens, both males and females, from swamp area, South Dakota Experiment Station, Brookings. Also 2 females from aspen thicket near St. Annes, Manitoba, collected by L. W. Carlson.

Eudorylaimus angulosus (T. & S. 1936) Andrassy, 1959
Synonym: *Dorylaimus angulosus* Thorne & Swanger, 1936
(Fig. 17, A-D)

1.3 mm; a = 26; b = 4.4; c = 10; V = $^{10}44^{10}$

Body arcuate especially in posterior fourth. Lateral fields ¼ body width without visible cells. Lip region angular with prominent papillae. Spear 15μ long with aperture occupying ⅔ its length. Guiding ring refractive. Extensions and anterior esophagus as illustrated. Esophagus enlarged near middle by gradual expansion, glands typical of genus. Cardia elongate-discoid, then tapering, its length about equal to body width. Intestinal cells partly surrounding cardia. Granules of intestine excessively fine, colorless. Vulva longitudinal; vagina extending about halfway across body. Ovaries reflexed about ½ their length. Prerectum about twice as long as body diameter. Rectum about half length of prerectum. Tail arcuate to small rounded terminus.

Eudorylaimus angulosus is distinctive because of its long, arcuate tail and longitudinal vulva. Specimens indexed under *Eudorylaimus* 12.

Habitat: Soil from bank of Sylvan Lake, Black Hills, South Dakota, collected by R. B. Malek.

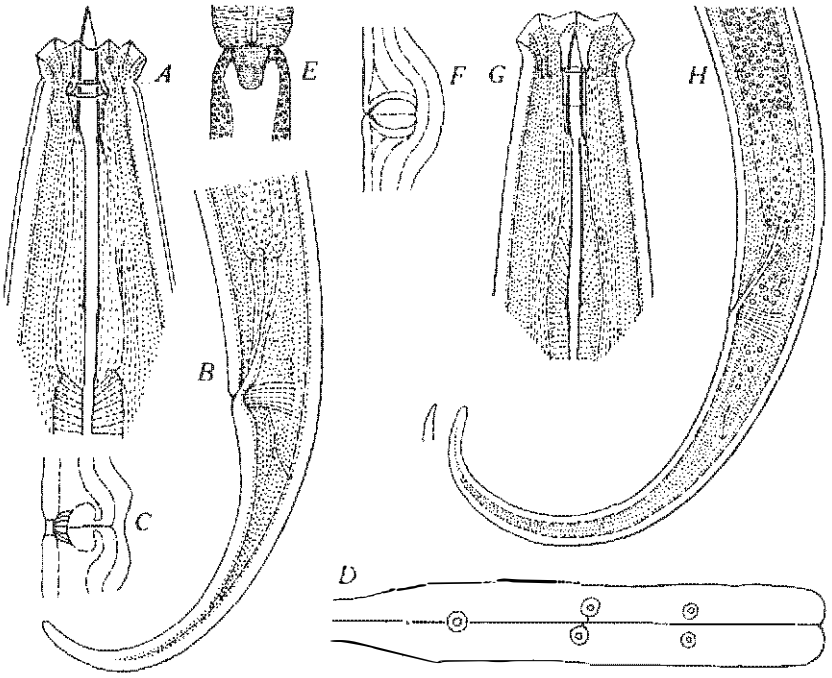


Fig. 17. A-D, *Eudorylaimus angulosus*. E-H, *E. leptus*.

Eudorylaimus leptus Tjepkema, Ferris and Ferris, 1971
(Fig. 17, E-H)

0.72 mm; a = 26; b = 3.8; c = 8.3; V = $^{12}50^{12}$

Body arcuate, especially in posterior ½, ending in a long, curved tail with finely rounded or spicate terminus. Lateral field ¼ body width with fine scattered granules and no visible cells. Pharnyx broad, shallow with refractive guiding ring. A secondary ring often visible where pharyngeal sheath attaches to spear. Spear 9-11μ long with aperture occupying ⅓ its length. Anterior esophagus a slender nonmuscular tube, then rather abruptly expanded until ½ body width, the broad portion occupying ⅔ to ¾ its length. Cardia bluntly conoid. Intestine with fine, scattered brown granules, its lumen often broadly sinuous. Vulva pore-like, with very small sclerotized labia. Ovaries reflexed about ¼ their length. Eggs 2 to 3 times as long as body width. Apparently no males since gravid females contained neither spermatheca nor spermatozoa. Rectum slightly longer than anal body diameter. Prerectum length 1 to 3 times body width. One pair of caudal pores seen.

Eudorylaimus leptus is distinctive because of small size, broad lip region, very small sclerotized vulvar labia and elongate, curved tail. Specimens indexed under *Eudorylaimus* 13.

Habitat: Prairie sod near Fargo and Irvine, North Dakota; Fergus

Falls, Minnesota; Sidney, Montana; Hillside thicket, Wilmot; juniper nursery, Watertown; and mountain soil, Black Hills, South Dakota. Bodies of Minnesota specimens not so arcuate as those from other localities.

Eudorylaimus sabulophilus Tjepkema, Ferris and Ferris, 1971
(Fig. 18, A-D)

0.76 mm; A = 24; b = 3.2; c = 21; $V = ^{19}62^{33}$

Body almost straight except for slight curvature near tail. Lip region angular, set off by constriction. Spear massive, 15μ long with aperture ⅓ its length. Esophagus enlarged by abrupt expansion slightly posterior to middle. Cardia elongate conoid to bluntly conoid. Vulva longitudinal. Ovaries reflexed about halfway to vulva. Rectum longer than anal body diameter. Prerectum length about twice body width. Tail slightly arcuate to small rounded terminus.

Eudorylaimus sabulophilus is distinctive among smaller species of the genus by its relatively massive spear, longitudinal vulva and slightly arcuate, subacute tail. Male not observed and females did not contain sperms. Holotype female and other specimens indexed under *Eudorylaimus* 14.

Habitat: A single collection from alfalfa field near Forestburg, South Dakota.

Eudorylaimus modestus (Altheer, 1952) And. 1959
Synonym: *Dorylaimus modestus* Altheer, 1952
(Fig. 18, E-H)

0.4 mm; a = 15; b = 3.3; c = 12; $V = ^{15}59^{45}$

Body slightly arcuate, tapering both ways from near middle. Lateral field ¼ body width. Lip region angular, set off by broad expansion. Spear about 10μ long with aperture occupying ⅓ its length. Esophagus enlarged in posterior ⅓ by abrupt expansion. Cardia elongate hemispheroid. Vulva transverse, labia continuous with cuticle, without sclerotized pieces. Egg length about twice body width, frequently crowding ovaries out of place. Rectum and prerectum as illustrated. Tail slightly arcuate to elongated, rounded terminus.

Eudorylaimus modestus is distinctive among the very small species of this genus by its body form, set off lip region, rather slender spear with aperture occupying ⅓ of its length, vulva without sclerotized labia and tail form. Tails slightly longer and more arcuate than illustrated by Altheer and Andrassy. Specimens indexed under *Eudorylaimus* 15.

Habitat: Cultivated and virgin soil near Brookings, Centerville, Watertown and Rapid City, South Dakota; Columbus, Stromburg and Fairmont, Nebraska; and Hadashville, Manitoba, Canada.

Eudorylaimus miser (T. & S., 1936) Andrassy, 1959
Synonym: *Dorylaimus miser* T. & S., 1936
(Fig. 19, A-C)

0.5 mm; a = 17; b = 3.3; c = 17-23; $V = ^{12}60^{13}$

Body obese, slightly arcuate, tapering both ways from near middle.

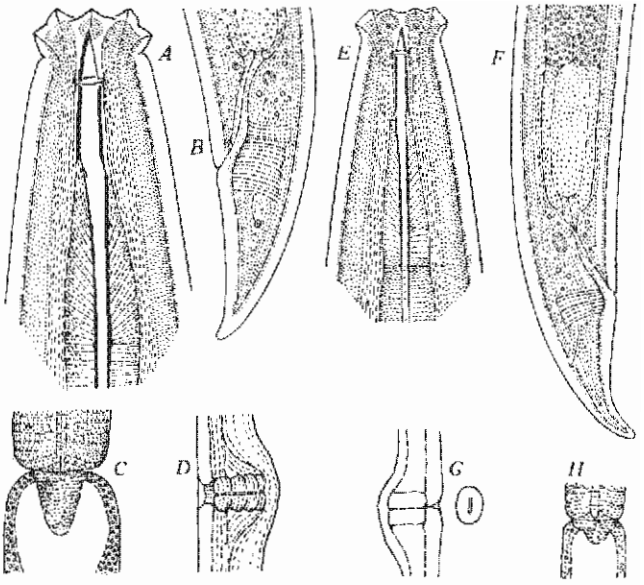


Fig. 18. A-D, *Eudorylaimus sabulophilus*. E-H. *E. modestus*.

Cuticle without median, radially striated layer. Lateral fields ⅓ body width near middle with cells arranged in 2 lines. Lateral pores, if present, so fine that they were not observed. Lip region angular, set off by constriction. Spear about 12μ long, its aperture occupying ⅓ its length. Guiding ring single, refractive. Spear extensions surrounded by hyaline muscular bundle. Esophagus enlarged in posterior half, the basal portion set off by rather sudden expansion. Esophageal gland nuclei 5, very difficult to observe and probably arranged as illustrated. Cardia elongate-cylindroid, without disc. Intestinal cells packed with minute granules. Prerectum length about equal to body width. Vulva probably longitudinal without sclerotized labia. Vagina about ¼ as long as body width. Ovaries short, often reflexed almost to vulva. Eggs 2 to 3 times as long as body width. Tail slightly dorsally convex-conoid to a blunt terminus, with a single pair of pores.

A common species from virgin and cultivated soil throughout the region.

Specimens indexed under *Eudorylaimus* 17.

Eudorylaimus dubius n. sp.
(Fig. 19, D-G)

0.8mm; a = 24; b=3.9; c=24; V=$^{15}60^{16}$

Body practically straight when relaxed. Lateral field about ⅓ body width. Cuticle with minute radial striae. Lip region angular with prominent papillae, set off by constriction. Spear about 11μ long and 3μ wide with aperture occupying ⅔ its length. Pharnyx ⅓ head width, the guiding ring

about opposite the constriction setting off the lips. Esophagus enlarged in posterior ⅖ by rather abrupt expansion. Cardia elongate-hemispheroid, almost ½ body width. Vulva transverse with vagina walls merging with cuticle and no sclerotization. Ovaries sometimes crowded back to vulva by developing oocytes. Prerectum length 2 to 3 times body width. Tail dorsally convex-conoid to blunt terminus. One pair of caudal pores observed.

Eudorylaimus dubius is distinctive among the small species by the long aperture of the broad spear. In this characteristic it resembles an *Aporcelaimellus*. Specimens indexed under *Eudorylaimus* 18.

Habitat: From cultivated fields and prairie sod near Brookings, Parker, Mitchell and Rapid City, South Dakota.

Eudorylaimus angleus n. sp.

(Fig. 19, H, I)

0.5 mm; a = 25; b = 3.0; c = 16; V = $^{10}56^{12}$

Body forming an open "C" when relaxed, tapering both ways from near middle. Lateral field ¼ body width. Lip region very angular, set off by deep constriction, with prominent papillae. Spear about 11μ long with aperture occupying about ⅓ its length. Guiding ring very narrow, about ½ head width. Spear extensions joining esophageal lumen near middle of a conspicuous muscular bulb. Esophagus a clear, slender tube, then expanded in basal ⅖. Cardia discoid, then elongate conoid. Intestinal cells filled with unusually large, dark brown, refractive granules. Vulva longitudinal, without sclerotized labia. Ovaries reflexed about ½ distance back to vulva. An egg was 18x60μ. Prerectum about 1½ times body width. Tail arcuate to subacute terminus. No sperms present in gravid females and males probably are absent.

Eudorylaimus angleus is distinctive because of its small size, very angular lip region, conspicuous bulb surrounding junction of spear extensions and esophageal lumen, and elongate-conoid, sub-acute tail. Holotype female and other specimens indexed under *Eudorylaimus* 19.

Habitat: Hillside thicket west of Wilmot, South Dakota.

Eudorylaimus aquilonarius Tjepkema, Ferris & Ferris, 1971

(Fig. 20, A-F)

0.86 mm; a = 21; b = 3.6; c = 20; V = $^{12}60^{12}$

Body slightly arcuate, cylindroid, tapering gradually at extremities. Lip region very angular, set off by expansion, with prominent papillae. Spear 15μ long with aperture occupying ⅓ its length. About ⅖ of esophagus enlarged by rather abrupt expansion. Cardia discoid, then conoid or spheroid. Intestine thin-walled with scattered dark brown refractive granules. Vulva transverse with slightly sclerotized labia. Vagina spheroid, only about ⅓ as long as body width. Ovaries reflexed about halfway to vulva. Eggs 30x70μ. Prerectum 2 to 3 times as long as body width. Rectum about equal to anal body diameter. Males not found.

Eudorylaimus aquilonarius is distinctive because of its angular, expanded lip region, posteriorly located vulva, form of vulva labia, spheroid

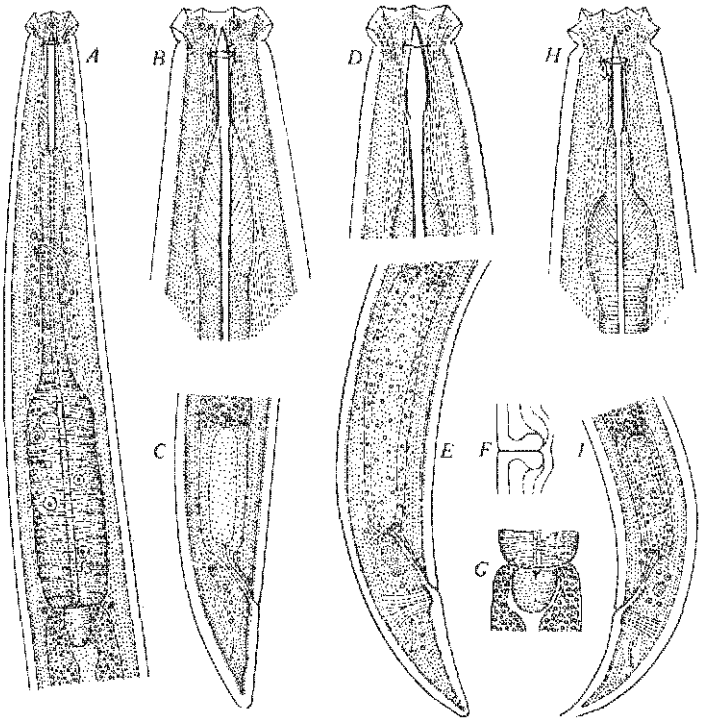


Fig. 19. A-C, *Eudorylaimus miser*. D-G, *E. dubius*. H, I, *E. angleus*.

vagina and arcuate tail with small rounded terminus. Specimens indexed under *Eudorylaimus* 20. Closely resembles type specimens except for more posterior position of vulva, 60%: 47=56.

Habitat: Grain field near Fargo, North Dakota, and soil about roots of juniper in windbreak near Forestburg, South Dakota.

Chrysonema dubium n. sp.

(Fig. 20, G-K)

1.0mm; a=24; b=3.0; c=16; V=$^{10}53^{11}$

Body arcuate, especially in posterior ¼, tapering gradually both ways from near middle. Lateral fields about ⅜ body width. Lip region rounded, set off by slight narrowing of body contour, with very thick cuticle. Spear slender, about 13μ long with aperture occupying about ½ its length. Guiding ring about ½ head width, refractive. Amphid about ⅔ head width, cyathiform, with broad tube extending back to sensillae pouch. Esophagus enlarged rather abruptly near middle with gland nuclei apparently arranged as in *Eudorylaimus*. Cardia discoid, then bluntly conoid. Intestinal granules rather coarse, refractive, sometimes so densely arranged that body contents are obscured. Prerectum length about twice body width. Vulva

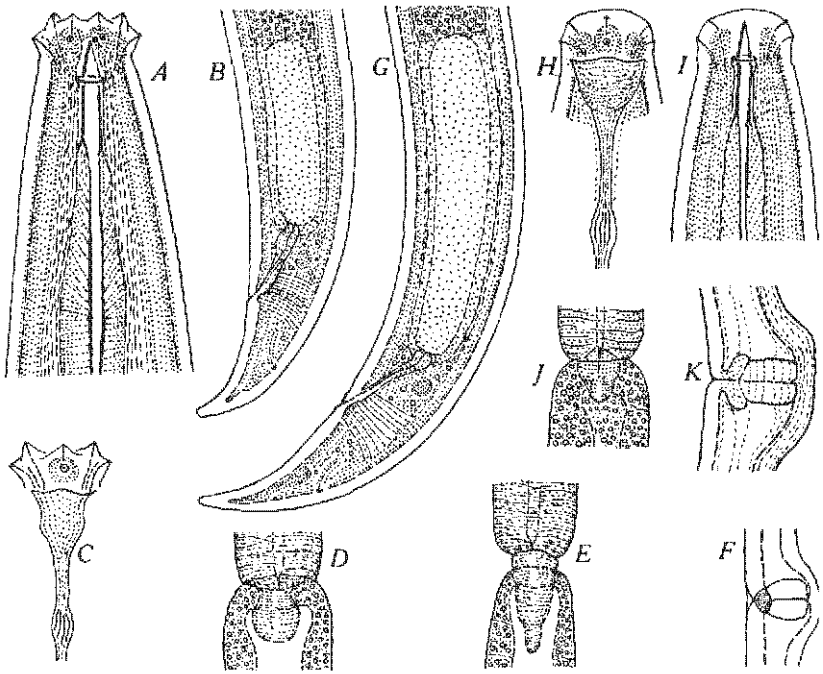


Fig. 20. A-F, *Eudorylaimus aquilonarius*. D, cardia distorted by fixation. G-K, *Chrysonema dubium*. Heads x 1,000, tails x 500.

transverse with infolding cuticle forming the labia which are very lightly sclerotized. Ovaries reflexed about halfway to vulva. Tail arcuate to subacute terminus. Male not collected and gravid females contained no sperm.

Chrysonema dubium appears to be most closely related to *C. aurum* from which it differs in the less arcuate tail, form of vulva labia and vagina and absence of a perioral disc and golden colored intestinal contents. Possibly it is not a *Chrysonema* but some closely related genus.

Habitat: About roots of white oak near Ames, Iowa. Collected by G. E. Cook.

Oonaguntus new genus

Dorylaiminae. Small nemas 1.0 mm long or less. Body slightly arcuate, especially in posterior portion. Head rounded with labial papillae not interfering with the contour. Spear exceedingly thin and slender with very obscure aperture. Actually there is a possibility that the spear is nygolaimoid and has no aperture. Guiding ring appearing as a fine refractive line. Anterior portion of esophagus a slender hyaline tube, gradually expanding to elongated basal portion. Esophageal gland nuclei arranged as in *Eudorylaimus*. Vulva transverse with labia formed by infolding of cuticle which joins with vagina. Ovaries two, reflexed. Male with two, rarely three, ventromedian well spaced supplements.

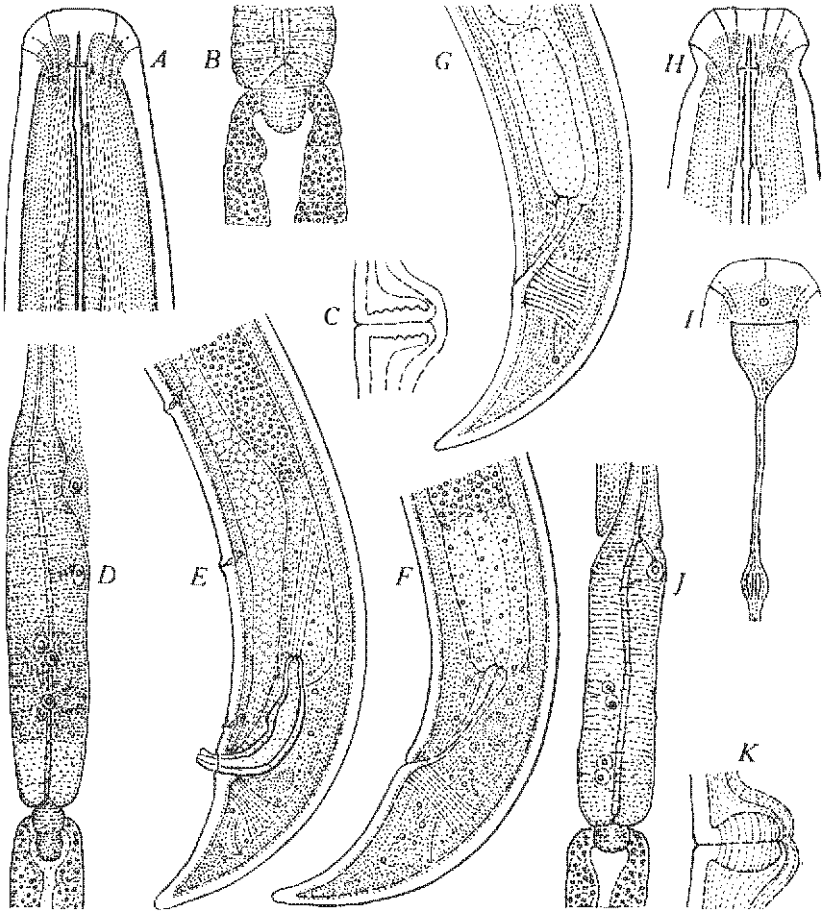


Fig. 21. A-F, *Oonaguntus calvus*. G-K, *O. tenuidens*. Heads x 1,500; tails x 750.

Type species: *Oonaguntus calvus* n. sp.

The generic name is from the Ute Indian word Oonagunt, meaning "bald head," a name which the Indians affectionately bestowed upon my father, George E. Thorne.

Oonaguntus calvus new species

(Fig. 21, A-F)

1.0 mm; a=37; b=4.8; c=32; V=$^{15}51^{15}$

0.9 mm; a=37; b=4.6; c=36; T=51

Body arcuate, twisted until amphids usually are seen from submedian view with lip region appearing to be set off by constriction. Tail subacute, ventrally bent. Cuticle of head abnormally thick. Labial papillae low, obscure, not interfering with head contour. Amphids almost as broad as head,

cup shaped, with easily seen sensillae pouches. Spear 7-8μ long, very slender.

Guiding ring appearing as a slender refractive line about ½ head width. Anterior ⅔ of esophagus a slender hyaline tube, gradually expanding to the basal enlargement. Anterior portion of enlargement crowded by a large gland with prominent nuclei, which displaces the dorsal esophageal gland nucleus. Gland nuclei arranged similar to those of *Eudorylaimus*. Cardia discoid, then bluntly cylindroid. Intestinal cells packed with dark granules which often obscure details of internal morphology. Ovaries reflexed about halfway to vulva. Vulva transverse, its labia formed by infolded cuticle joining the vagina. Prerectum length 1½ times body width. Tail arcuate to bluntly rounded terminus.

Male body similar to that of female. Two, rarely 3 ventromedian supplements widely spaced. Spicula arcuate with strong ventral angle.

Holotype female, allotype male and other specimens indexed under *Oonaguntus* 1.

Habitat: Native sod near Aberdeen, Rapid City, Hammer; declining spruce Black Hills, South Dakota; sod near Baker, Montana and Williston, North Dakota.

Oonaguntus tenuidens n. sp.

(Fig. 21, G-K)

0.7 mm; a=25; b=4.1; a=17; V=$^{14}54^{14}$

Body arcuate with ventrally bent subacute tail. Amphid broad, cyathiform with slender tube leading back to sensillae pouch, but usually seen from a submedian view, giving an appearance of a set off lip region. Papillae not interfering with rounded contour of lip region. Labial cuticle very thick. Spear 10-11μ long. Guiding ring obscure, about ½ width of head. Esophagus a slender hyaline tube to near middle, then expanding until ⅔ body width, but somewhat irregular in diameter. Cardia a thin disc, then hemispheroid. Intestine with thin walls, its cells packed with dark granules. Vulva transverse, with muscular labia joining directly to vagina. Ovaries reflexed about half their length. Eggs about twice as long as body width. Neither spermatheca or sperms present and males not collected.

Oonaguntus tenuidens is distinctive because of its small size, longer spear, form of basal portion of esophagus, arrangement of esophageal gland nuclei and form of vagina. Holotype female and other specimens indexed under *Oonaguntus* 2.

Habitat: About roots of dogwood and raspberries, Horticultural Gardens, South Dakota State University, Brookings.

Genus *Malekus* new genus

Dorylaiminae: Body arcuate with ventrally bent tail. Lip region of unusual structure with very prominent forward pointing labial papillae and rather obscure lateral ones. Spear exceedingly slender, sharp pointed with very obscure aperture. Guiding ring obscure but apparently double. Anterior portion of esophagus a slender, non-muscular tube, gradually ex-

panding to form the elongated basal bulb. Esophageal gland nuclei arranged as in *Eudorylaimus*. Ovaries two, reflexed. Vulva without sclerotized labial pieces. Male not collected and mature females contained no sperms indicating that males do not occur, at least in this species.

Named in honor of my former coworker, Dr. R. B. Malek.

Malekus acridens n. g. n. sp.

(Fig. 22, A-F)

0.7 mm; a=27; b=3.6; c=17; V=$^{11}53^{13}$

Body arcuate, especially in posterior portion, more transparent than usual. Lateral fields ⅛ body width, difficult to observe. Lip region set off by slight depression. Anterior circlet of 6 papillae very prominent, posterior circlet of 12 somewhat obscure. Amphids almost as wide as head, cup-shaped. Spear 12μ long, very slender and pointed with aperture not definitely observed. Guiding ring ½ head width, apparently double and fitting snugly about spear. Anterior ⅔ of esophagus a slender tube enlarged by irregular expansion until ½ neck width. Arrangement of anterior pair of esophageal gland nuclei not determined. Cardia hemispheroid. Intestinal cells packed with rather coarse yellow granules, often forming a tesellated pattern. Vulva probably transverse, the labia formed by infolded cuticle which joins the muscular vagina. Ovaries reflexed ⅓-½ way back to vulva. Uterus without spermatheca and no sperms observed, apparently males do not occur. Prerectum length twice body width. Rectum length equal to anal body diameter. A single pair of caudal pores observed. Holotype female and other specimens indexed under *Malekus* 1.

Habitat: Cultivated field near Rapid City and mountain soil, Black Hills, South Dakota. Collected by R. B. Malek.

Andrassy, 1971, described *Drepanodorylaimus macramphidius*, a nema with head and spear similar to that of *Malekus*. However this species is very slender, a=45, and has a subfiliform tail. This and *M. acridens* probably represent a new subfamily of Dorylaimidae.

Ecumenicus new genus

Dorylaimidae: Nemas 1.0-1.4 mm long. Lateral field a single line of cells and from each a minute tubule leads to a pore at the surface. Dorsal gland nucleus located almost adjacent to its pore. Vulva at 33-37%, a transverse slit with slightly sclerotized labia and vagina extending posteriorad. Ovary single, reflexed. No anterior uterine branch. Tail bluntly digitate. Only a single species known.

Type species: *Ecumenicus monohystera* (de Man, 1880) n. comb.

Synonyms: *Dorylaimus monohystera*, de Man, 1880

Eudorylaimus monohystera (de Man, 1880) Andrassy 1959

(Fig. 22, G-J)

1.1 mm; a=30; b=4.5; c=28; V=$^{35}18$

Lips distinct, the region set off by slight expansion. Spear 11μ long with aperture ⅓ its length. Guiding ring refractive, about ⅓ head width.

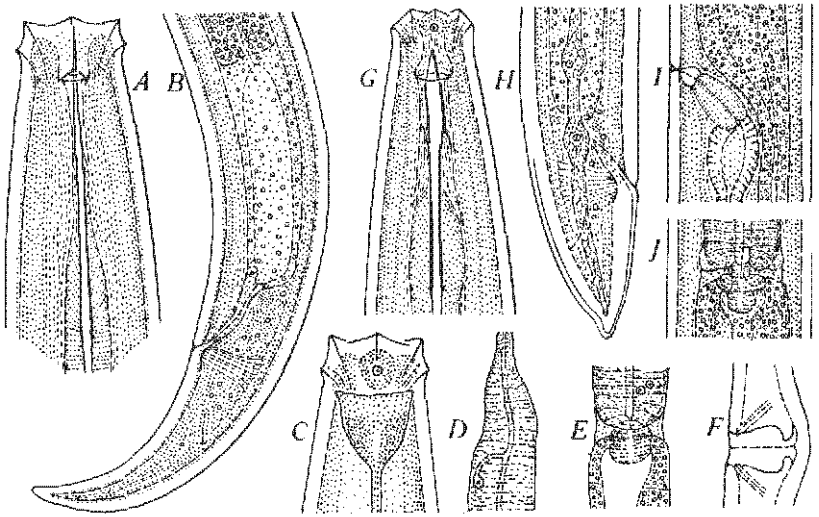


Fig. 22. A-F, *Malenchus acridens*, head 1,500 x, tail x 750. G-J, *Ecumenicus monohystera*, head x 1000, tail x 500.

Esophagus a slender, nonmuscular tube in anterior ⅓, then about half neck width in posterior ⅔. Dorsal esophageal gland nucleus only slightly behind its pore. Pairs of submedian gland pores arranged similar to those of *Eudorylaimus*. A slight isthmus joins esophagus and cardia. Cardia discoid, then bluntly conoid. Small hyaline structures in cardiac region. Cells of intestine with scattered dark granules. Gonad as described above. Prerectum length 2-3 times width body. Tail as illustrated. Eggs 2-3 times as long as body width.

Ecumenicus monohystera is world-wide in distribution. Morphological characters and measurements of specimens from different continents are most remarkable for their similarity. Specimens indexed under *Ecumenicus* 1.

Genus *Mesodorylaimus* Andrassy, 1959

Nemas 1.0-2.0 mm long, rarely slightly longer. Lips rounded to angular. Female tails elongate digitate to uniformly conoid, occasionally with subfiliform terminus. Male tails bluntly rounded with numerous caudal or ventrosubmedian papillae; supplements adjacent or spaced. Prerectum of males usually within range of supplements, rarely 2 or 3 body widths anterior. Vulva transverse or longitudinal. Spear usually slightly longer than head width, aperture occupying ½ or less its length. Microvilli frequently present.

Type species: *Mesodorylaimus mesonyctius* (Kreis, 1930) Andrassy, 1959.

The term "microvilli" is applied to those minute filaments frequently found in the anterior end of the intestine, formerly known as "stabschensaum": a descriptive term introduced by Steiner,

Illustrations of heads are uniformly × 1,000, tails × 500.

Key to species of *Mesodorylaimus*

1. Tails of females elongate digitate 2
   Tails of females uniformly tapering 7
2. Vulva longitudinal 3
   Vulva transverse 5
3. Cardia about as long as body width ..... *cardiacus*
   Cardia length near ½ body width 4
4. Both male and female prerectum unusually long ..... *prerectus*
   Male and female prerectum not unusually long ..... *simplex*
5. Males frequently collected ..... *macrophallus*
   Males unknown or very rare 6
6. Female tail digitate, straight ..... *pseudobastiani*
   Female tail somewhat recurved ..... *recurvus*
7. Spear 16μ long ..... *lissus*
   Spear 10-14μ long 8
8. Neck and tail about equal length ..... *acris*
   Neck much longer than tail 9
9. Spear 9-10μ long ..... *brevidens*
   Spear 12-14μ long 10
10. Female tail uniformly tapering ..... *obscurus*
    Female tail conoid, then filiform ..... *subtilis*

Mesodorylaimus pseudobastiani Loof, 1969
Synonym: *Dorylaimus bastiani* (T. & S., 1936 & Thorne, 1961)
(Fig. 23, A-H)

1.4-1.8 mm; a=34; b=4.4; c=14-28; V=$^{16}53^{16}$
1.5 mm; a=39; b=5.1; c=68; T=57

Body cylindroid except at extremities, straight to slightly arcuate when relaxed. Lateral fields ⅓-1/7 body width. Lip region set off by slight depression, the lips somewhat variable in prominence with the usual number of easily seen papillae. Spear 13-15μ long, with aperture ⅓ to ¾ its length. Guiding ring single. Esophagus enlarged near middle by rather abrupt expansion. Hemizonid just anterior to nerve ring. Cardia elongate conoid, variable in length from ½ to more than one body width. Microvilli present but frequently difficult to see. Intestinal granules fine, dark brown. Vulva transverse, ovaries reflexed about halfway to vulva. Spermatheca and sperms absent. Rectum 1½-2 times anal body width. Prerectum 2-3 times body width. Tail form variable as illustrated. Specimens indexed under *Mesodorylaimus* 1.

A single male was collected from prairie sod near Fargo, North Dakota. Supplements 18 as illustrated. Vas deferens filled with sperms but none found in associated females.

Habitat: A frequent species from practically all types of habitat throughout the Northern Great Plains.

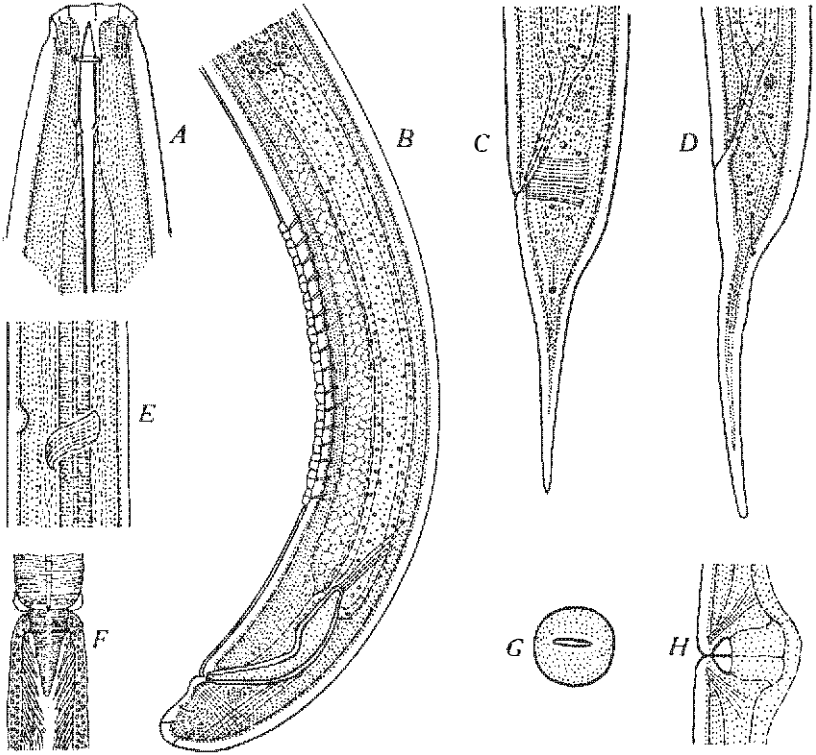


Fig. 23. A-H, *Mesodorylaimus pseudobastiani*: A, B, C, D, head, male tail and variations of female tails. E, region of nerve ring showing hemizonid. F, cardiac region, note microvilli of intestine. G, H, ventral and lateral views of transverse vulva showing sclerotized labia.

Mesodorylaimus obscurus n. sp.

(Fig. 24, A-F)

1.5 mm; a = 34; b = 4.8; c = 10; V = $^{13}44^{13}$

1.3 mm; a = 36; b = 4.0; c = 51; T = 60

Body slightly arcuate when relaxed. Cuticle with a distinct thick outer layer. Lip region rounded, the papillae not interfering with head contour. Lateral fields ¼ body width. Spear 12-14μ long with aperture about ⅓ its length. Esophagus gradually expanded near middle. Intestinal cells packed with excessively fine granules. Cardia almost as long as body width. Microvilli present. Vulva transverse. Uteri packed with spermatozoa. Ovaries reflexed about ½ their length. Prerectum length 3 times body width. Rectum twice anal body diameter.

Male with 7 or 8 supplements. Prerectum extending forward to a point opposite anterior supplement. Ventrosubmedian papillae not observed. Holotype female, allotype male and other specimens indexed under *Mesodorylaimus* 4.

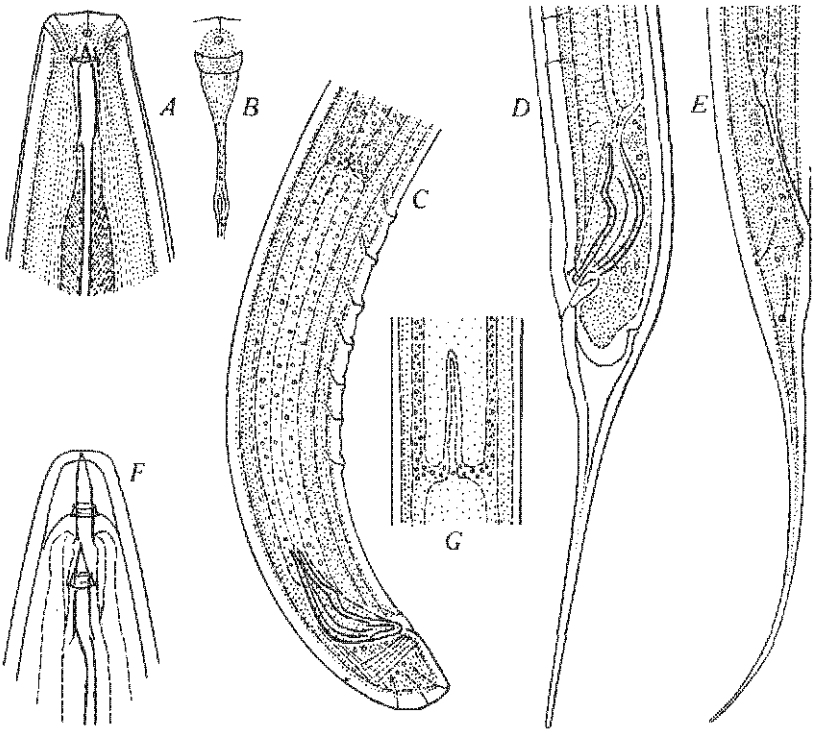


Fig. 24. A-F, *Mesodorylaimus obscurus*: A, B, C, E, head, amphid, male and female tails. D, F, male tail and head prior to final molt, note double guiding ring. G, *M. simplex*: Note peculiar valve-like organ extending from prerectum into intestine.

Mesodorylaimus obscurus is distinctive because of the rounded lip region, unusually long cardia, elongate, conoid tail and small number of supplements.

Habitat: Soil from nursery, Yankton, dying lawn, Aberdeen and golf course, Parker, South Dakota.

Mesodorylaimus macrophallus n. sp.

(Fig. 25, A-F)

1.6 mm; a = 37; b=4.5; c= 15-28; V=^{46}54^{56}

1.6 mm; a=37; b=4.6; c=80; T=55

Body slightly arcuate when relaxed. Lateral field about ¼ body width. Lip region rounded, set off by slight narrowing of body, the papillae not interfering with lip contour. Spear 13-15μ long, tapering, aperture occupying about ½ its length. Esophagus enlarged near middle. Cardia elongate-conoid, variable in length. Microvilli present. Rectum length about twice anal body diameter. Prerectum length twice body diameter. Vulva trans-

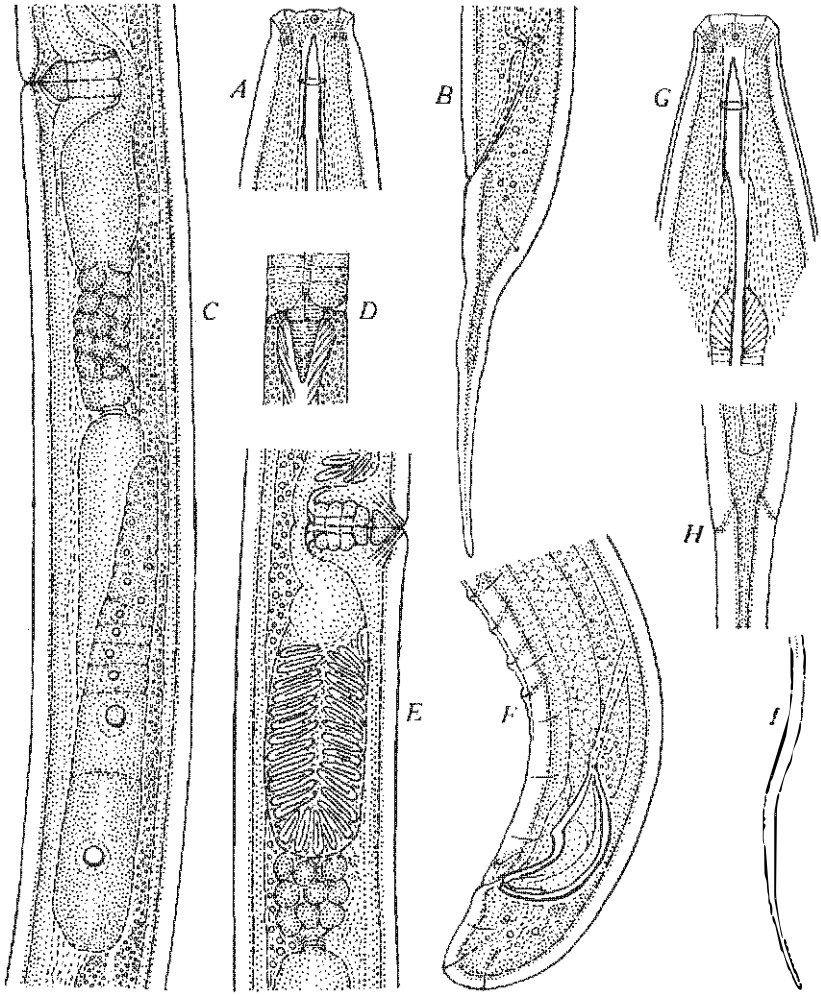


Fig. 25. A-F, *Mesodorylaimus macrophallus*: A, B, F, head, female and male tails. C, vulva-vagina region and posterior ovary of unfertilized female. D, cardiac region, note microvilli. E, fertilized female, note spermatheca formed by posterior uterine branch. G-I, *M. acris*: Head, ventral view of anal region and terminus.

verse. Ovaries reflexed about halfway back to vulva. Eggs about twice as long as body width. Uterus forming a large spermatheca when mating occurs. Female tails variable, short spicate to irregular elongate digitate.

Male cylindroid except at anterior end. Supplements 8-10, low, mammiform. Prerectum extending to a point opposite seventh supplement. Spicula massive, arcuate as illustrated, hence the specific name *macrophallus*. Holotype female, allotype male and other specimens indexed under *Mesodorylaimus* 7.

Habitat: Seven females and 5 males from soil about brush and tree roots beside stream east of Wauneta, Nebraska.

Mesodorylaimus acris (Thorne, 1939) J. B. Goodey, 1963
Synonyms: *Dorylaimus acris* Thorne, 1939
Dorylaimus dreyeri (Van der Linde, 1938) And., 1960.
(Fig. 25, G-I)

1.7 mm; a=42; b=4.9; c=4.6; $V=^{10}41^{10}$

Body fusiform, tapering gradually both ways to the narrow head and posteriorly to an exceedingly slender, filiform tail. Cuticle with a distinct outer layer. Lip region low, rounded with obscure papillae. Spear 17μ long, aperture ¼ its length. Esophagus enlarged near middle by gradual expansion. Cardia conoid, ⅓-½ as long as body width. Microvilli not seen. Intestinal granules tiny, dark. Rectum length about twice anal body diameter. Prerectum length 2 to 3 times body width. Vulva transverse. Ovaries reflexed halfway to vulva. Neither sperms nor spermatheca present, apparently no males occur.

Mesodorylaimus acris is immediately distinguished by the excessively filiform tail about equal to length of neck, rounded lip region with obscure papillae, transverse vulva and absence of males.

Holotype and other specimens as indexed under *Mesodorylaimus* 8.

Habitat: A single collection from soil about roots of grass and willows, Black Hills, South Dakota, by R. B. Malek.

Andrassy, 1960, made *M. acris* a synonym of *Dorylaimus dreyeri* but this act was rejected by J. B. Goodey to which the writer concurs.

Mesodorylaimus brevidens n. sp.
(Fig. 26, A-E, Fig. 29, D-G)

1.3 mm; a=35; b=6.0; c=9.5; $V=^{14}4.5^{14}$

1.2 mm; a=38; b=5.2; c=55; T=48

Lip region set off by slight narrowing of head contour, rounded, with inconspicuous papillae. Vestibule deep in pharynx with double ring. Spear 9-10μ long with aperture occupying about ½ its length. Esophagus enlarged in posterior third by rather abrupt expansion. Cardia elongate conoid. Microvilli present. A variable sized gland often crowding anterior end of intestine. Intestinal cells packed with large golden brown granules. Vulva transverse, in one specimen 2 vulvas and 2 rudimentary ovaries were present in addition to the normal ones. Uteri filled with spermatozoa. Ovaries reflexed almost to vulva. Prerectum 2 to 3 times as long as body width. Rectum twice anal body diameter. Tail long and filiform with terminus sometimes missing.

Male tail cylindroid with 16 low, flat, adjacent supplements. Spicula arcuate with tiny guiding pieces. Prerectum extending forward almost as far as supplements.

Holotype female, allotype male and other specimens indexed under *Mesodorylaimus* 9.

Mesodorylaimus brevidens is immediately distinguished by the small spear, short basal portion of esophagus enlarged, elongated female tail and form, number and arrangements of supplements.

Habitat: Five females and 1 male from stream bank 2 miles west of Brookings, South Dakota.

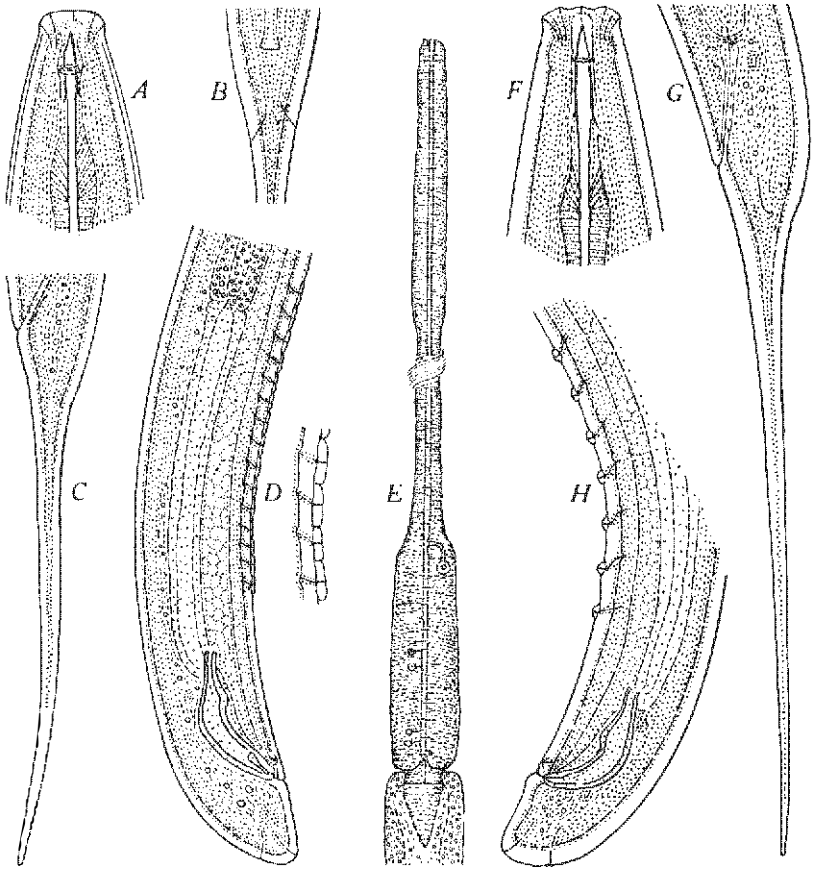


Fig. 26. A-E, *Mesodorylaimus brevidens*. Head, ventral view of anal region, female and male tails and esophagus. F-H, *M. subtilis*: Head, female and male tails.

Mesodorylaimus subtilis (T. & S., 1939) Andrassy, 1960
Synonym: *Dorylaimus subtilis* Thorne & Swanger, 1939
(Fig. 26, F-H)

1.4 mm; a = 38; b = 4.9; c = 8.3; V = $^{15}50^{15}$
1.3 mm; a = 36; b = 4.6; c = 62; T = 53

Body practically straight when relaxed, cylindroid, tapering at extremities. Lateral field ⅓ body width of female, ¼ male. Lip region truncate with slightly elevated papillae. Spear 12μ long, aperture occupying ⅓ its length. Esophagus enlarged near middle by rather abrupt expansion. Cardia elongate conoid. Microvilli not seen. Intestine with minute black granules. Vulva transverse, ovaries reflexed halfway to vulva. Conspicuous spermatheca in uteri, with sperms often arranged symmetrically. Eggs 1½ times as long as body width. Rectum about twice anal body diameter. Prerectum length three times body diameter.

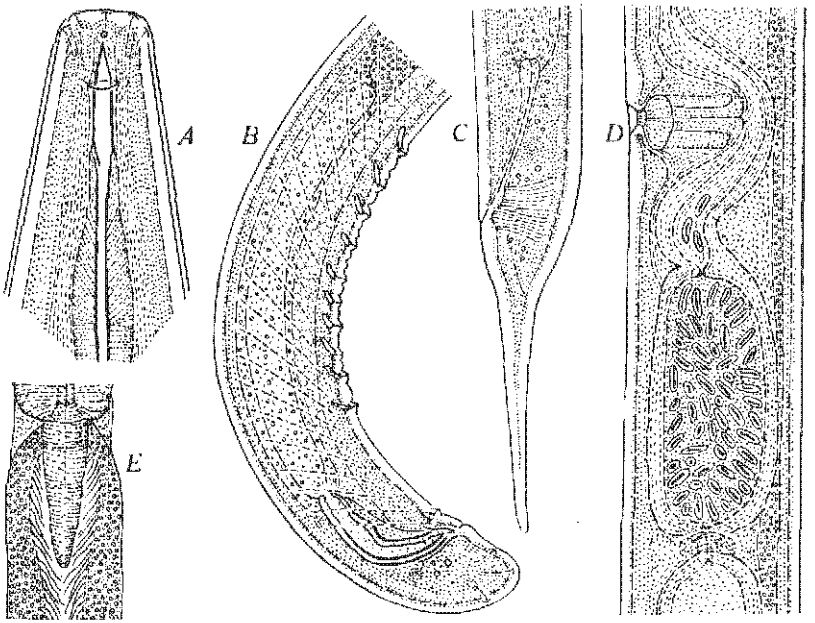


Fig. 27. A-E, *Mesodorylaimus cardiacus*: A, B, C, head, male and female tails. D, vulvar region and spermatheca, note longitudinal vulva. E, cardiac region with microvilli in intestine.

Males with 6 or 7 supplements, prerectum extending forward almost as far as supplements. Spicula and gubernaculum as illustrated.

Mesodorylaimus subtilis is distinctive because of lip region, transverse vulva, conoid then subfiliform tail, arrangement of supplements and minute black refractive intestinal granules. Specimens indexed under *Mesodorylaimus* 10.

Habitat: A single collection of 11 females and 6 males from cantaloupe field½ mile west of Forestburg, South Dakota by R. B. Malek.

Mesodorylaimus cardiacus n. sp.

(Fig. 27, A-E)

1.4 mm; a=34; b=4.3; c=13-15; V=$^{18}52^{22}$

1.3 mm; a=35; b=4.1; c=65; T=61

Body slightly arcuate when relaxed. Lateral field ¼ body width. Lip region rounded with obscure papillae. Spear about 16μ long, aperture ⅓ its length. Esophagus enlarged near middle by abrupt expansion; Cardia often longer than usual. Microvilli abundant. Intestinal cells packed with pale yellow granules. Vulva longitudinal. Uteri forming elongated spermatheca packed with sperms. Ovaries longer than usual, reflexed ½ their length. Prerectum three times body width. Rectum about twice anal body diameter. Tail concave-conoid to rounded terminus, somewhat variable in length.

Male with 8-10 mammiform supplements, well separated. Spicula arcuate. Lateral guiding pieces short, narrow.

Mesodorylaimus cardiacus is distinctive because of its rounded lip region, very elongated cardia, longitudinal vulva, long ovaries and number and arrangements of supplements.

Holotype female, allotype male and other specimens as indexed under *Mesodorylaimus* 2.

Habitat: Small numbers generally distributed throughout virgin and cultivated soil of the Northern Great Plains.

Mesodorylaimus simplex n. sp.
(Fig. 28, A-F, Fig. 24, G)

1.5 mm; a=32; b=5.0; c=16; $V=^{17}49^{20}$

Body cylindroid, tapering at extremities. Lateral field ⅓ body width. Lip region slightly angular, papillae easily seen. Spear 13-15μ long with aperture occupying about ½ its length. Esophagus enlarged in posterior 3/7 by rather abrupt expansion. Cardia elongate conoid. Microvilli present. Intestinal cells packed with coarse, refractive brown granules. Rectum length about twice anal body diameter. Prerectum 1½ times length of rectum. A peculiar valve-like organ occasionally observed extending forward into the intestine from its junction with prerectum, as first recorded by Thorne and Swanger, 1936. Vulva longitudinal. Ovaries reflexed halfway to vulva, usually crowded by eggs twice as long as body width and by uterine spermatheca as long as eggs, packed with sperms. Tail conoid-spicate. Male not collected.

Mesodorylaimus simplex is distinctive because of longitudinal vulva, presence of microvilli and tail form.

Holotype female and other specimens indexed under *Mesodorylaimus* 3.

Habitat: Oat field near Lake Preston, South Dakota.

Mesodorylaimus prerectus n. sp.
(Fig. 28, G-K)

1.7 mm; a=30; b=5.5; c=13; $V=^{17}47^{17}$

1.5 mm; a=35; b=4.7; c=70; T=45

Female tail elongate-digitate, male bluntly rounded, slightly arcuate. Lips slightly elevated with prominent papillae. Spear 12μ long with aperture occupying ⅔ its length. Guiding ring about ¾ head width. Esophagus enlarged slightly past middle by gradual expansion. Cardia discoid, then conoid, about ⅔ as long as body width. Microvilli not observed. Intestinal cells packed with golden brown granules, tesellated in posterior portion. Masses of brilliant green material generally present in intestines. Prerectum length 4 times body width, rectum twice anal body diameter. Vulva longitudinal, vagina as illustrated. Uteri forming spermatheca about 3 times as long as body width, packed with spermatozoa. Ovaries reflexed about ½ distance to vulva.

Male prerectum extending 1 to 2 body widths anterior to supplements. Supplements 14 to 17, closely approximated. Submedian papillae not ob-

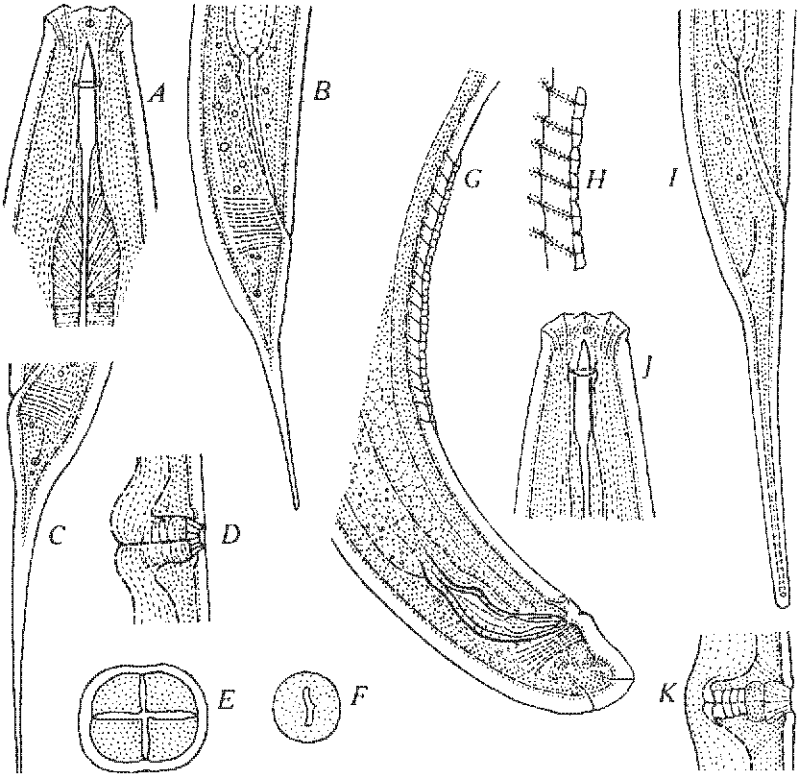


Fig. 28. A-F, *Mesodorylaimus simplex*. A-C, head and variants of female tails. D, F, lateral and ventral views of longitudinal vulva. E, cross section through vagina. G-K, *M. prerectus*. G, H, male tail. I, J, K, female tail, head and lateral view of longitudinal vulva.

served. Spicula 40μ long with simple lateral guiding pieces. Holotype female, allotype male and other specimens indexed under *Mesodorylaimus* 11.

Mesodorylaimus prerectus is immediately recognized by the unusually long prerecturn of both sexes.

Habitat: About willow roots, Behrens Ranch, South Dakota.

Mesodorylaimus lissus n. sp.

(Fig. 29, A-C)

1.6 mm; a=32; b=5.9; c=6.0; V=^{14}42^{14}

1.6 mm; a=34; b=4.1; c=45; T=63

Female neck and tail of about equal length. Lip region well set off, ¼ as wide as neck base. Spear 16μ long with aperture about ⅓ its length. Guiding ring usually seen as double, especially when spear is partly ex-

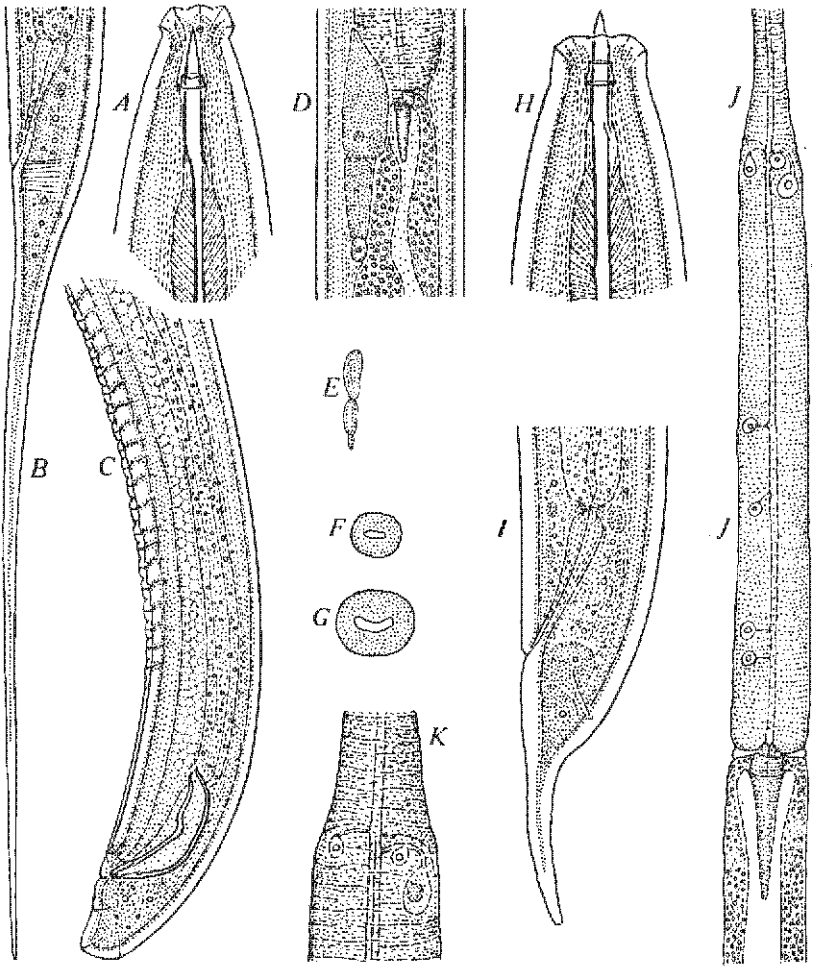


Fig. 29. A-C, *Mesodorylaimus lissus*. D-G, *M. brevidens*: D, large gland crowding anterior end of intestine. E, similar gland from another specimen showing little development. F, G, two vulvae from aberrant female. H-K, *M. recurvus*: H, I, head and female tail. J, esophagus showing arrangement of gland nuclei. K, anterior end of basal enlargement showing two small additional gland nuclei.

truded. Esophagus enlarged near middle by gradual expansion. Microvilli not seen. Cardia elongate conoid, variable in length. Intestinal cells filled with very fine brownish granules. Vulva longitudinal. Ovaries reflexed ⅔ their length. Uteri packed with spermatozoa. Prerectum 2-3 times as long as body width. Rectum length twice anal body diameter. A portion of the extremely fine filiform tail sometimes missing.

Male with 20 low, flat, adjacent supplements. Spicula typical, about 40μ long. Prerectum extending forward about 3 body widths anterior to range of supplements. At least 3 pairs of caudal pores present. Ventrosubmedian papillae not observed.

Holotype female and allotype male indexed under *Mesodorylaimus* 5.

Habitat: A single collection of 4 females and 1 male from river bank soil near Parker, South Dakota.

Mesodorylaimus recurvus n. sp.

(Fig. 29, H-K)

1.8-2.1 mm; a = 40; b = 4.8; c = 32-46; V = $^{125}3^{12}$

Body distinctly arcuate when relaxed. Lateral field ¼ body width. Lip region rounded with slightly elevated papillae. Spear 15μ long, the aperture occupying ⅓ its length. Esophagus enlarged near middle by gradual expansion. Cardia elongate-conoid, varying in length from ½ to more than 1 body width. Intestinal granules excessively fine, dark brown. Microvilli not observed. Ovaries reflexed ¾ way to transverse vulva. Eggs twice as long as body width. No spermatheca or sperms present in gravid females indicating that males do not occur. Rectum length 1½ times anal body diameter. Prerectum length twice body width. Tail slightly bent dorsally.

Mesodorylaimus recurvus is distinctive because of transverse vulva, arcuate body, gradual expansion of esophagus and spicate, dorsally bent tail. Holotype female and other specimens as indexed under *Mesodorylaimus* 6.

Habitat: Three females from prairie sod near Tagus, North Dakota.

Of special interest are the two additional gland nuclei located near the dorsal one, making a total of seven. A similar number is reported herein for *Laimydorus incae*. There are disturbing similarities between this species and *Laimydorus reversus* Fig. 31, A-H.

Genus *Laimydorus* Siddiqi, 1969

Nemas 1.8-4.0 mm long. Females with elongate-conoid to filiform tails; males with short bluntly rounded tails. Lip region rounded or slightly set off. Spear longer than head width with aperture ⅓ or less its length. Guiding ring double. Esophagus enlarged gradually near middle. Supplements a ventromedian series, adjacent or closely spaced. Numerous caudal pores and papillae present on males.

Type species: *Laimydorus prolificus* (T. & S, 1936) Siddiqi, 1969.

Synonym: *Dorylaimus prolificus* T. & S. 1936

Key to species of *Laimydorus*

1. Length near 5.0 mm ..... *crassus*
   Length under 2.5 mm 2
2. Female tail often with hooked terminus, c = about 7.0 ..... *flexus*
   Female tail elongate digitate or conoid 3
3. Female tail elongate digitate, c = 28 ..... *reversus*
   Female tails elongate conoid 4
4. Supplements contiguous ..... *incae*
   Supplements uniformly separated by short distances ..... *paraincae*

Magnifications of heads are uniformly x 800, tails x 400.

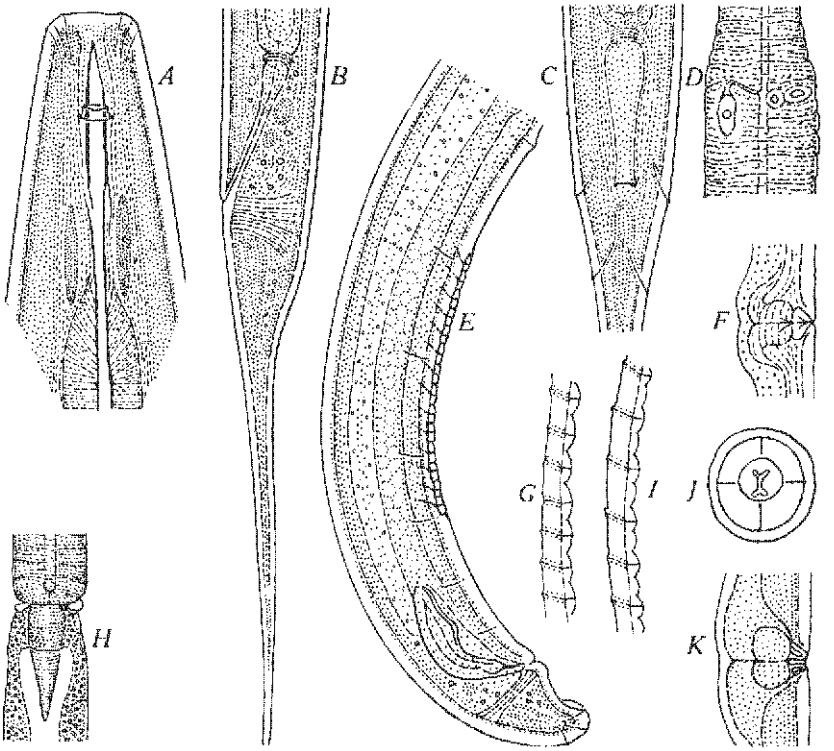


Fig. 30. A-H, *Laimydorus incae*: A, B, E, head, female and male tails. In A, note 2 of the 4 glands posterior to the spear. C, ventral view of anal region. D, anterior end of basal portion of esophagus showing 2 small gland nuclei. F, lateral view of transverse vulva. G, details of supplement series. H, cardiac region. I-K, *L. paraincae*: Detail of supplement series and lateral and ventral view of longitudinal vulva.

Laimydorus incae (Steiner, 1920) n. comb.
Synonyms: *Dorylaimus incae* Steiner, 1920
Mesodorylaimus incae (St., 1920) Goodey, 1963
(Fig. 30, A-H)

1.8 mm; a = 44; b = 5.4; c = 13; V = $^{15}45^{15}$
1.8 mm; a = 44; b = 6.0; c = 70; T = 56

Bodies of both sexes very slender and perfectly straight when relaxed except for ventrally bent tail of male. Lip region rounded, papillae scarcely interfering with contour. Spear 20μ long with aperture occupying ⅓ its length. Guiding ring double, about ½ head width. Four fusiform, obscure bodies just posterior to spear which probably indicate organs similar to

those of *Laimydorus flavomaculatus* which are yellow in living specimens. Esophagus gradually enlarged near middle, the basal portion irregular in width. Two very small extra esophageal gland nuclei about opposite dorsal gland nucleus, making a total of 7 gland nuclei. Cardia conoid, as long as body width. Small hyaline bodies in cardiac region. Intestine with rather coarse refractive yellow granules, sometimes forming a tesellated pattern. Prerectum length 4-5 times body width. Vulva transverse with sclerotized labia. Uterus serving as an elongated spermatheca packed with sperms. Ovaries reflexed halfway back to vulva.

Male with 14-16 adjacent supplements. Spicula strongly arcuate with pointed lateral guiding pieces. Specimens indexed under *Laimydorus* 4.

Habitat: Collected from shore of Lake Waubay, South Dakota by R. B. Malek.

Andrassy, 1960, made *L. incae*, a synonym of *L. flavomaculatus* but this act is not recognized herein.

Laimydorus paraincae n. sp.

(Fig. 30, I-K)

2.3 mm; a=59; b=5.8; c=16; $V=^{16}49^{16}$

2.4 mm; a=59; b=5.9; c=75; T=58

Laimydorus parairicae so closely resembles *L. incae* that a detailed description would be almost identical. Three diagnostic characters separate them: The larger size of *L. paraincae;* longitudinal vulva and arrangement of supplements. Compare Figs. G and I and F and K.

Habitat: Soil from bank of Lake Waubay, South Dakota. Associated with *L. incae* to which it is obviously closely related. Both are conspicuous for their free-swimming ability. The 4 gland-like bodies near the head perhaps are yellow when specimens are alive.

Holotype female, allotype male and other specimens as indexed under *Laimydorus* 3.

Laimydorus reversus n. sp.

(Fig. 31, A-H)

2.1 mm; a=42; b=5.0; c=28; $V=^{15}53^{15}$

2.2 mm; a=36; b=5.2; c=86; T=63

Body almost straight when relaxed. Lip region with slightly elevated lips bearing distinct papillae. Spear 20μ long with aperture occupying ⅓ its length. Guiding ring double. Esophagus enlarged near middle by gradual expansion. Cardia discoid, then conoid, as long as body width. Intestine packed with very small, dark granules, sometimes obscuring other organs in the body. Prerectum 2-3 times as long as body width. Vulva transverse with sclerotized labia. Ovaries reflexed ½ to ¾ distance back to vulva. Egg length about twice body diameter. Uterus forming an elongate spermatheca. Tail sometimes straight but usually bent dorsally.

Male with 20 contiguous supplements and 8 pairs of submedian papillae. Spicula 30μ long, slightly arcuate with distinct ventral angle. Lateral guiding pieces tapering from a broad base.

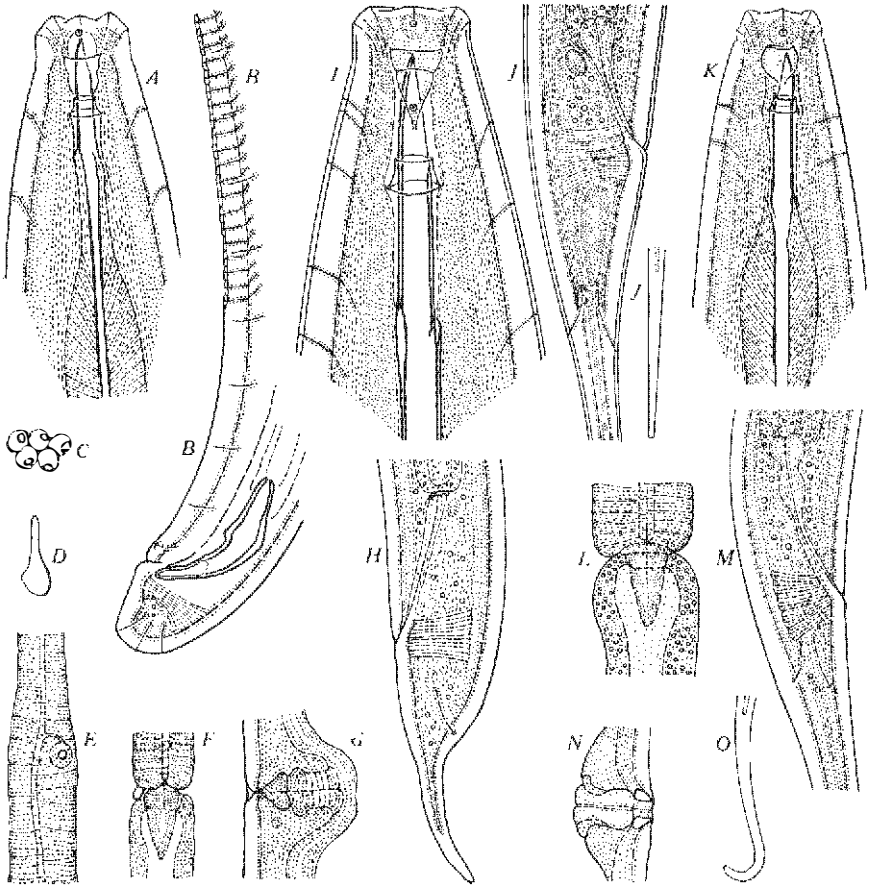


Fig. 31. A-H, *Laimydorus reversus*: A, B, H, head, male and female tails. C, sporozoan parasites in body cavity. D, lateral guiding piece of spiculum. E, F, dorsal gland nucleus and cardiac region. G, lateral view of transverse vulva. I, J, *L. crassus*, head and tail. K-O, *L. flexus*: K, M, O, head and tail. M, N, cardiac and vulvar regions.

Laimydorus reversus is distinctive because of the short digitate tail, and 20 adjacent supplements located far anterior to the proximal ends of the spicula. Holotype female, allotype male and other specimens indexed under *Laimydorus* 5.

Habitat: Swamp area, South Dakota Experiment Station field, Brookings.

This species has a puzzling combination of characters resembling in many respects a *Mesodorylaimus* yet more prominently characters of *Laimydorus*. Body cavity of one specimen filled with *Duboscquia* sp. and in this individual the ovaries had failed to develop.

Laimydorus crassus (de Man, 1884) n. comb.
Synonym: *Dorylaimus crassus* de Man, 1884
(Fig. 31, I, J)

3.8 mm; a=42; b=5.1; c=17; V=$^{8}48^{8}$

Body slightly arcuate when relaxed. Lip region set off by slight depression with low rounded lips. Spear massive, 45μ long with aperture ⅓ length. Guiding ring double, the framework conspicuous. Esophagus beginning as a muscular tube ⅓ neck width, very gradually expanding as the neck widens with no abrupt expansion at any point. Cardia conoid, half as long as body width. Intestine with coarse, brilliant yellow granules sometimes forming a slightly tesellated pattern. Vulva longitudinal. Ovaries reflexed halfway to vulva. Prerectum length 4-6 times body width. Rectum somewhat longer than anal body diameter. Males not collected and females contained no sperms.

Laimydorus crassus is distinguished by its length, large spear; gradually tapering esophagus, longitudinal vulva, long prerectum and straight, conoid tail. Specimens indexed under *Laimydorus* 2.

Habitat: Recently plowed pasture near Minden, Nebraska.

There is a question as to the identity of this species since the specimens are much more slender than those described by deMan, A=42:25. However, de Man's illustration shows the head expanding abnormally from the lips, indicating a badly flattened specimen.

Laimydorus flexus (T. & S., 1936) Andrassy, 1959
Synonyms: *Dorylaimus flexus* Thorne and Swanger, 1936
Mesodorylaimus flexus (T. & S., 1936) J. B. Goodey, 1963
(Fig. 31, K-O)

1.8 mm; a=3[illegible]; b=4.0; c=7.2; V=$^{12}52^{12}$

Body slightly arcuate when relaxed. Cuticle plain, 3μ thick near head, thicker on tail. Lateral fields almost half body width. Lip region tapering with slightly elevated papillae. Amphids cyathiform. Spear 25-28μ long, aperture occupying from ¼ to ½ its length. Typically the spear is slightly bent but frequently is almost straight. Esophagus enlarged near middle until ⅔ neck width. Vulva longitudinal. Ovaries reflexed about ½ distance to vulva. What apparently are syngonic sperms occasionally observed. Rectum length twice prerectum, 4 or 5 times anal body diameter. Tail ending in a slender terminal portion which frequently is bent into hook. Specimens from dry soil frequently have lost this terminal portion. Specimens indexed under *Laimydorus* 1.

Laimydorus flexus occurred in small numbers from collections near Fairmont, Nebraska, Ames, Iowa, Brookings, Cottonwood and Forestburg, South Dakota, Devils Lake, North Dakota, Fergus Falls, Minnesota and Baker, Montana.

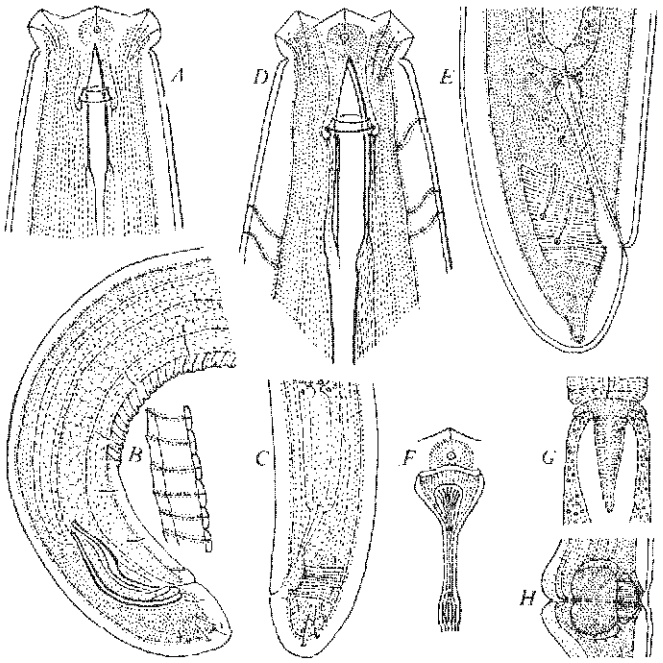


Fig. 32. A-C, *Labronema ferox*. Head 400 X, tails 200 X. D-H, *L. obesum*. Head 1,000 X, tail 500 X.

Genus *Labronema* Thorne, 1939

Dorylaiminae. Strong, robust nemas 2.0-4.0 mm long. Tails of both sexes bluntly rounded to subdigitate. Lip region broad with thick inner flaps arched over a wide pharnyx. Spear strong with aperture ½ or less its length. Guiding ring sclerotized, double. Anterior portion of esophagus generally stronger than in related genera, enlarged by gradual expansion. Vulva longitudinal or transverse, ovaries two, reflexed. Male tail with numerous papillae. Supplements an adanal pair and a series of juxtaposed median ones.

Type species: *Labronema vorax* Thorne, 1929.

Certain species predatory on other nemas and small oligochaetes. Others sometimes have intestinal contents resembling green chlorophyll, perhaps from moss or algae. This plant-like material may have been devoured while feeding on animal organisms associated with it.

Key to species

1. Tails of both sexes subhemispherical 2
   Tails of both sexes subdigitate 3
2. Length over 3.0 mm ..... *ferox*
   Length about 2.0 mm ..... *obesus*
3. Vulva transverse ..... *mauritiense*
   Vulva longitudinal ..... *rapax*

Magnifications of heads are uniformly x 800, tails x 400.

Labronema ferox Thorne, 1939

(Fig. 32, A-C)

3.5 mm; a = 36; b = 4.2; c = 115; $V = {}^{16}51^{16}$

3.7 mm; a = 37; b = 4.7; c = 100; T = 62

Body cylindroid, tapering only at extremities. Lip region width ½ that at base of neck. Lips set off by a deep constriction, angular with prominent papillae. Six low, rounded liplets about oral opening. Spear massive with aperture ⅔ its length. Guiding ring double. Esophagus about half as wide as neck, slightly narrowing as it passes through nerve ring, then rather abruptly expanded to the strong basal portion which is half as wide as neck. Cardia conoid, ⅔ as long as body width. Intestinal granules bright brown, densely packed in cells, sometimes slightly tesellated. Vulva longitudinal, ovaries reflexed about halfway to vulva. Rectum and prerectum as illustrated.

Male with arcuate tail when relaxed. Supplements low, flat, 24-26 in number. Spicula arcuate with strong ventral angle. Lateral guiding pieces small, simple in form. Numerous caudal and ventrosubmedian papillae present. Specimens indexed under *Labronema* 1.

Habitat: Cultivated and virgin soil Rapid City, Cottonwood, Martin, Wilmot, South Dakota; Ames, Iowa; Fargo, North Dakota; Downer, Minnesota, and several other points of the area. This strong, vigorous predator is always present in only small numbers, often solitary, feeding largely on small oligochaetes.

Labronema obesum n. sp.

(Fig. 32, D-H)

2.2 mm; a = 25; b = 4.1; c = 60; $V = {}^{17}53^{20}$

Body practically straight. Lateral field ⅓ body width. Lips angular, set off by deep constriction. Amphid a prominent feature as illustrated. Spear almost as wide as adjacent cuticle, 33μ long with aperture occupying ⅔ its length. Guiding ring double. Esophagus ⅓ neck width narrowing to ⅙ as it passes through nerve ring, then gradually expanding until half as wide as neck. Cardia elongate conoid, half as long as body width. Intestinal cells with scattered dark brown granules, often slightly tesellated. Prerectum length twice body width. Vulva longitudinal. Ovaries reflexed about halfway back to vulva. Males not collected and females contained no sperms. Holotype female and other specimens indexed under *Labronema* 3.

Labronema obesum is distinctive because of its massive body, unusual amphid, monosexuality, and elongate hemispheroid tail with distinctive central core.

Habitat: A single collection from prairie sod west of Sidney, Montana.

Labronema mauritiense Williams, 1959

(Fig. 33, A-F)

1.4 mm; a = 21; b = 4.1; c = 47; $V = {}^{16}60^{16}$

1.4 mm; a = 22; b = 4.1; c = 64; T = 64

Body practically straight. Lip region set off by deep constriction, the lips distinctly angular. Spear 18-20μ long with aperture ½ its length. Guiding ring double, ⅓ head width. Esophagus enlarged near middle by abrupt

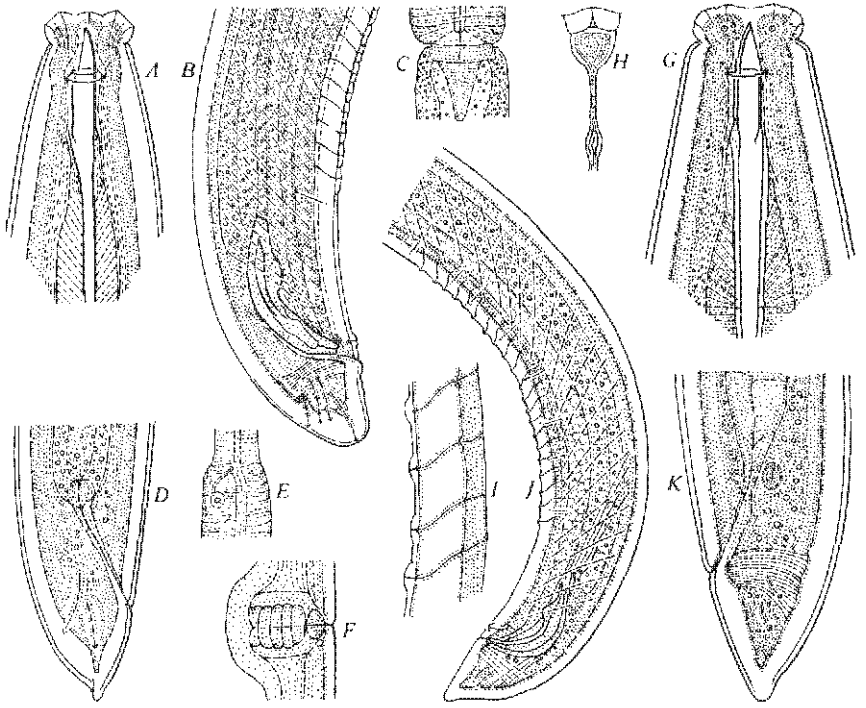


Fig. 33. A-F, *Labronema mauritiense*. Head 800 X, tails 400 X. G-K, *L. rapax*. Head 800 X, female tail 400 X, male tail 200 X.

expansion. Cardia discoid, then conoid, about half as long as body width. Intestinal cells packed with fine, light brown granules. Prerectum length twice body diameter. Vulva transverse with unusual shaped labia as illustrated. Eggs fill body cavity, twice as long as wide. Ovaries reflexed halfway to vulva. Uteri forming spermatheca which are packed with spermatozoa.

Male similar to female with slightly arcuate tail. Supplements low, flat, adjacent, 16-23 in number. Spicula 53μ long with stong ventral angle. Lateral guiding pieces about 20μ long, irregular in contour.

Labronema mauritiense is immediately distinguished by its smaller size, shape of spear, transverse vulva and type and arrangement of supplements. Specimens indexed under *Labronema* 6. There are slight variations between these specimens and those described by Williams from Mauritius, but considering the geographical separation there is a remarkable similarity.

Including this species in *Labronema* is questionable because of the aberrant form of the vulva.

Habitat: Corn field near Fairmont, Nebraska and alfalfa field near Forestburg, South Dakota.

Labronema rapax n. sp.

(Fig. 33, G-K)

2.3 mm; a=30; b=4.1; c=56; V=^{16}53^{19}

2.3 mm; a=34; b=4.3; c=51; T=50

Body cylindroid, slightly arcuate. Lip region ⅓ width of neck base. Lateral fields ¼ body width containing large cells obscured by dense granules. Lip region set off by deep constriction with rounded lips. Spear about as wide as adjacent cuticle, 18μ long, the aperture ⅔ its length. Guiding ring double but usually collapsed until appearing single, refractive, about ½ head width. Esophagus at first ⅓ then ¼ as wide as neck, expanding gradually until ½ body width. Cardia discoid, then conoid, about ½ as long as body width. Intestine packed with dense yellowish granules. Prerectum length 3 times body width. Vulva longitudinal. Ovaries reflexed ½ way back to vulva. Uterus serving as a spermatheca and an additional spherical spermatheca at entrance to each oviduct.

Male more arcuate posteriorly with 21-28 supplements extending as far forward as the prerectum. Supplements sometimes closely approximated, or slightly spaced as illustrated. Spicula with strong ventral angle, lateral guiding pieces simple. Holotype female, allotype male and other specimens indexed under *Labronema* 4.

Labronema rapax is immediately distinguished by the low, rounded, set off lip region, short, massive spear, spheroid spermatheca, supplement numbers and arrangement and bluntly subdigitate tails.

Habitat: Small numbers from cultivated and virgin soil Milbank, Waubay Preserve and Black Hills, South Dakota; Tagus and Rugby, North Dakota; Downer, Minnesota; Baker, Montana; Hadashville, Manitoba, and Moosomin, Saskatchewan, Canada.

Genus *Paraxonchium* Krall, 1958

Synonym: *Drepanodorus* Altheer, 1954

Paraxonchium magnidens, n. sp.

(Fig. 34, A-J)

1.5 mm; a=26; b=3.6; c=30-37; V=^{18}60^{18}

Body tapering rapidly until lip region is only ⅓ of neck base. Lateral fields about ¼ body width with obscure cells from which series of obscure pores arise, while ventrally another more prominent series come from gland-like bodies, about 40 anterior to vulva and 25 posterior. Lip region set off by deep constriction with angular unsymmetrical lips which are best observed from a face view. Amphids shallow, cup-like, about half as wide as lip region. Spear 15μ long with aperture occupying ⅓-½ its length. Spear often somewhat bent, asymmetrical. Hemizonid conspicuous, opposite nerve ring. Esophagus enlarged near middle with gland nuclei usually visible. Three nygolaimoid glands at base of esophagus. Cardia an elongate disc, then conoid. Intestine usually gorged with detritus which appears to have been derived from decaying organic material. Ovaries symmetrical, reflexed about half their length. Eggs 46x90μ. Vulva transverse with sclero-

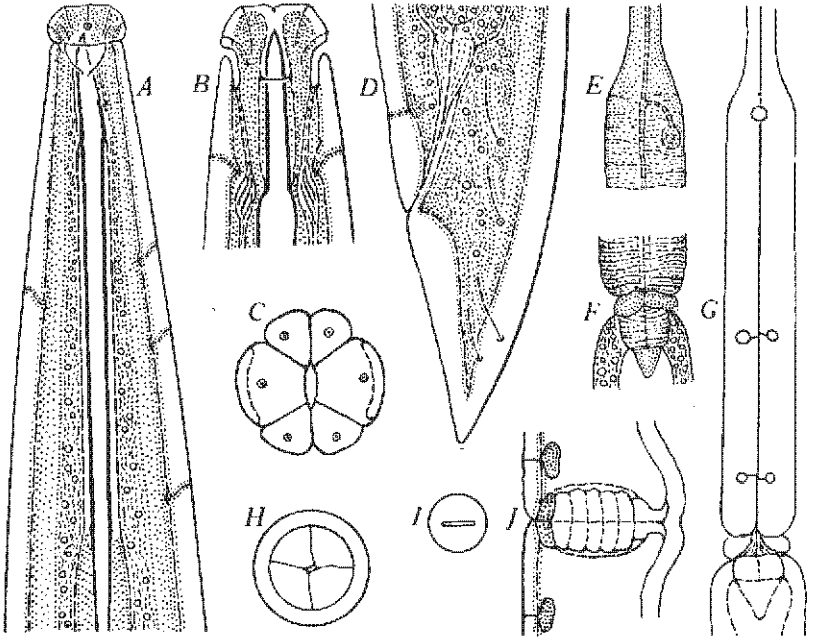


Fig. 34. A-J. *Paraxonchium magnidens*. A, anterior end 1,000 X. B. dorsal view of head, 1,500 X. C, face view about 2,000 X. D, female tail 500 X. E, Dorsal esophageal gland region. F, cardiac region, note 3 nygolaimoid glands at base of esophagus. G, arrangement of esophageal gland nuclei. H, cross section of vagina. I, transverse vulva. J, vaginal region.

tized labia. Prerectum length 2-3 times body width. Rectum and tail as illustrated. Males not collected and gravid females contained no sperms. Holotype female and other specimens as indexed under *Paraxonchium* 1. *Paraxonchium magnidens* is distinctive because of its size, monosexuality, dorylaimoid spear and asymmetrical lips.

Habitat: Small numbers from virgin and cultivated soil in numerous localities of South Dakota, State line between North Dakota and Montana on Highway 94, Fonda and Minot, North Dakota and Elizabeth, Minnesota. Specimens from Minot, North Dakota and Hammer, South Dakota had slightly shorter necks: b=4.0: 4.3.

The taxonomic position of *Paraxonchium* is questionable. Jairajpuri (1966) assigned it to Dorylaimninae but it may represent an entirely new group.

Subfamily Discolaiminae (Siddiqi, 1969) Ferris, 1971

Genus *Discolaimus* Cobb, 1913

Nemas between 1.0 and 3.0 mm long. Lips widely expanded, discoid. Spear strong with aperture occupying about ½ its length. Esophagus abruptly enlarged near or slightly anterior to middle. Tails bluntly rounded or conoid with obtuse terminus.

Type species: *Discolaimus texanus* Cobb, 1913

Key to species of *Discolaimus*

1. Length well under 1.5 mm ..... *texanus*
   Length near 2.0 mm or more 2
2. Tail convex conoid to bluntly rounded terminus ..... *major*
   Tail uniformly conoid to small rounded terminus ..... *similis*

Discolaimus texanus Cobb, 1913

(Fig. 35, A-D)

1.2 mm; a = 36; b = 3.7; c = 40; V = $^{10}41^{10}$

Body slightly curved when relaxed, usually a true lateral view. Lateral field a series of conspicuous cells, each with a pore. Lip region broadly expanded, petaloid with conspicuous papillae. Spear 15-16μ long with aperture occupying ½ its length. Guiding ring a muscular sheath appearing as a fine line across the pharynx. Anterior part of esophagus somewhat bulbous, then becoming a tube only ⅓ as wide as neck; very abruptly expanding to the enlarged posterior ⅓. Cardia a thin disc followed by bluntly conoid valvular portion. Intestinal granules fine, colorless. Vulva transverse with muscular labia. Ovaries reflexed almost to vulva. Eggs about 4 times as long as body width, crowding ovaries from their normal position. Rectum and prerectum both about as long as body width. Tail convex conoid to blunt rounded terminus.

Males not collected in the Northern Great Plains but rather common in the Intermountain and Western States. The accompanying figure from a Utah specimen.

Discolaimus texanus is immediately distinguished by its small size, enlarged posterior ⅓ of esophagus and bluntly convex-conoid tail.

Habitat: Frequently found in both virgin and cultivated soil from many localities in South Dakota; Wauneta and Madison, Nebraska; Grand Forks, North Dakota and Ames, Iowa.

Discolaimus major Thorne, 1939

(Fig. 35, E-G)

2.2 mm; a = 40; b = 4.4; c = 55; V = $^{12}47^{12}$

Body almost straight when relaxed. Lateral fields with the usual series of glandular cells, each with a distinct pore. Lip region massive, petaloid with prominent papillae. Spear 23μ long with aperture occupying half its length. Details of neck region as shown (Fig. 35 E). Intestinal cells containing scattered fine brown granules. Ovaries reflexed almost to vulva except when displaced by eggs which are twice as long as body width. Rectum and prerectum each about as long as body width. Males not collected and gravid females contained no sperms. Tails of Northern Plains specimens slightly longer and more conoid than those illustrated from Utah.

Discolaimus major is recognized by its large size, long spear, massive enlarged portion of esophagus, and tail form.

Habitat: Native sod and cultivated soil from Columbus, Nebraska; Ames, Iowa; De Smet and Custer Forest, South Dakota and Stanley and Devils Lake, North Dakota.

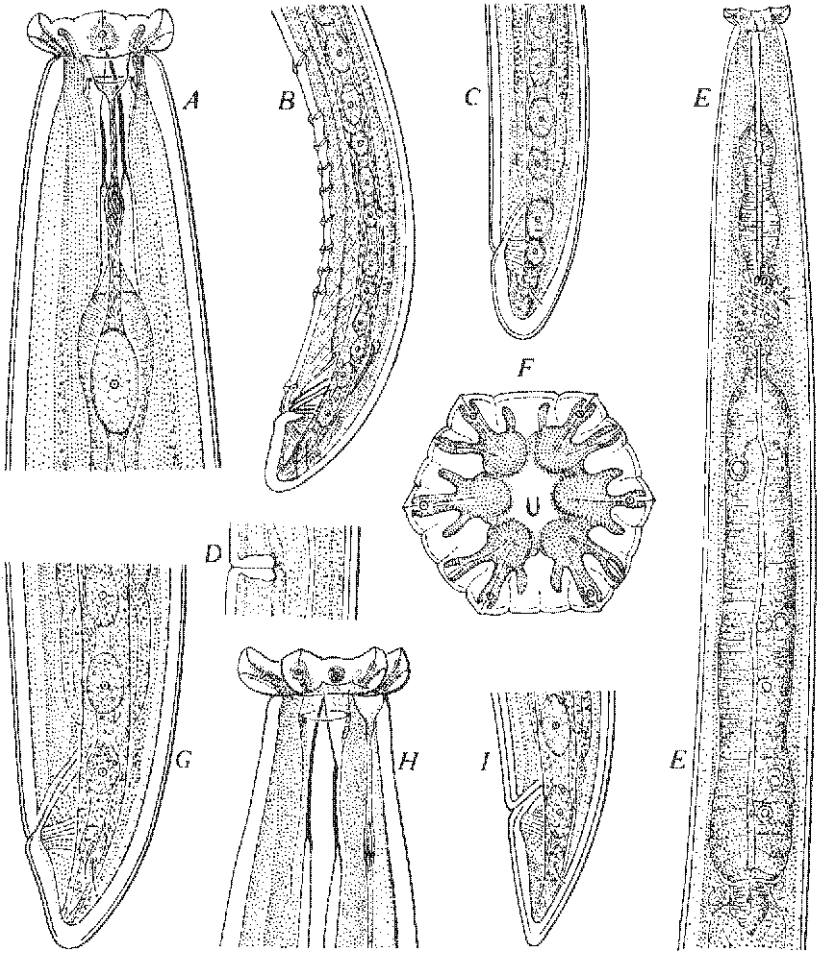


Fig. 35. A-D, *Discolaimus texanus*. Note large cells in lateral fields. E-G, *D. major*. Note distribution of esophageal gland nuclei in E, and arrangement of cephalic papillae in F, H, I. *D. similis*. After Thorne, 1939, courtesy of Martinus Nijhoff.

Discolaimus similis Thorne, 1939

(Fig. 35, H-I)

2.2 mm; a = 36; b = 5.2; c = 54; V = $^{14}48^{14}$

Body slightly arcuate when relaxed. Cells of lateral fields conspicuous with easily visible pores. Lip region broadly discoid, much wider than the adjacent head. Labial papillae prominent. Spear 20μ long, its aperture occupying slightly more than half its length. Spear guide an obscure muscular sheath. Esophagus abruptly expanded near middle. Cardia a thin

disc, then bluntly conoid. Intestinal cells with scattered, light brown granules. Vulva transverse with muscular labia. Ovaries reflexed about ⅔ their length. Eggs about twice as long as body width. Prerectum and rectum each about as long as body width. Tail conoid with slightly rounded terminus. Males unknown and gravid females contained no sperms. Specimens filed under *Discolaimus* 2.

Discolaimus similis is recognized by its large size with lip region much wider than adjacent head, and slightly rounded terminus of conoid tail.

Habitat: A rather frequent species in both cultivated and virgin soil from numerous localities in South Dakota; Holbrook and Columbus, Nebraska; Clendive and Powder River, Montana; Stanley, North Dakota, and Elizabeth and Downer, Minnesota.

Subfamily Nordiinae Jairajpuri and A. H. Siddiqi, 1964

Genus *Enchodorella* Kahn, 1964

Synonym: *Nordia* Jairajpuri and A. H. Siddiqi, 1964

Small plump nemas under 1.0 mm long with slender spears and spear extensions. Esophagus enlarged near middle. Ovaries two. Tail dorsally convex conoid to small blunt terminus.

Type species: *Enchodorella penetrans* (T. & S. 1936) Kahn, 1964

Synonym: *Dorylaimus penetrans* Thorne and Swanger, 1936

(Fig. 36 A, 37 E)

0.6 mm; a=18; b=3.0; c=15; $V=^{15}61^{15}$

Body almost straight when relaxed, tapering both ways from near middle. Lip region set off by depression with slightly prominent papillae. Spear length 34-37μ, its extensions of a similar length. Guiding ring double. Esophagus enlarged in posterior ⅓. Cardia ½ body width, without disc. Vulva a transverse slit with muscular labia. Ovaries reflexed halfway to vulva except when crowded out of place by eggs which average twice as long as body width and are almost always present when specimens are collected. Specimens filed under *Enchodorella* 1.

Habitat: Frequently collected in small numbers from many points between Trinidad, Colorado north to eastern Montana, in both virgin and cultivated soil. Nothing is known of its feeding habits but the spear type indicates that it must attack the roots of plants.

Subfamily Pungentinae Siddiqi, 1969

Key to genera of Pungentinae

1. Four refractive pieces arranged about oral opening ..... *Pungentus*
Refractive pieces not present about oral opening ..... *Enchodelus*

Genus *Pungentus* Thorne and Swanger, 1936

Nemas 0.8-2.5 mm long. Refractive pieces arranged about oral opening. Spear usually longer than width of lip region, slender with very short aperture. Ovaries 1 or 2. Tails hemispheroid to bluntly conoid always with saccate bodies present.

Type species: *Pungentus pungens* Thorne and Swanger, 1936

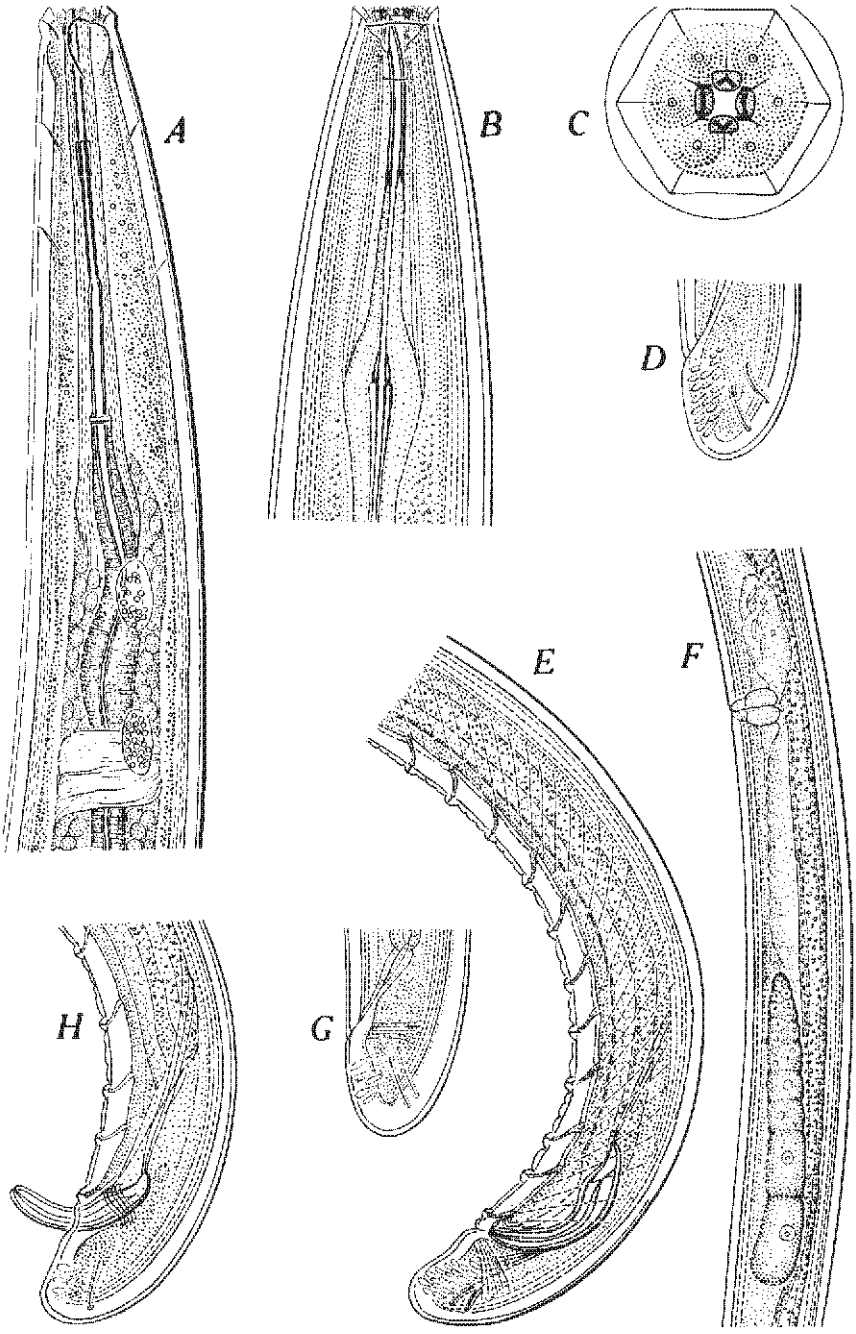


Fig. 36. A, *Enchodorella penetrans*. B-E, *Pungentus pungens*, note arrangement of cephalic papillae and perioral plates in C. F-H, *P. monhystra*. After Thorne and Swanger, 1936, courtesy of Martinus Nijhoff.

Pungentus pungens Thorne and Swanger, 1936

(Fig. 36, B-E)

1.8mm; a=36; b=5.2; c=60; V=$^{11}50^{11}$

Body cylindroid, slightly arcuate when relaxed with anterior end usually somewhat twisted. Lateral field ¼ body width without definite cells but a series of exceedingly fine tubules extend out to pores, when observed from a dorsal view. Lip region rounded, set off by slight depression with inconspicuous papillae. Four sclerotized plates about oral opening. Spear 22μ long, slender, slightly curved with short aperture. Guiding ring appearing as a single obscure line but doubtless double. Extensions about as long as spear. Esophagus enlarged slightly anterior to middle, basal portion half neck width. Cardia a thin disc, then elongate hemispheroid. Vulva a deep transverse slit. Ovaries reflexed half their length. Eggs 2-2½ times as long as body width. Prerectum length 3 times body width. Rectum slightly longer than anal body diameter. Tail bluntly rounded with numerous saccate bodies. Males not found in northern Great Plains, consequently illustration of Utah specimens is used.

Pungentus pungens is distinctive because of the slender body, very long, slightly arcuate spear and numerous saccate bodies in tail. Specimens indexed under *Pungentus* 3.

Habitat: An infrequent species from native sod near Opal, South Dakota; Stanley, North Dakota; Elizabeth, Minnesota and Holbrook, Nebraska.

Pungentus monhystra Thorne and Swanger, 1936

(Fig. 36, F-H)

1.8 mm; a=35; b=5.0; c=60; V=40^{10}

Except for the single ovary, *Pungentus monhystra* is almost identical to *P. pungens*. Perioral plates conspicuous. Spear and its extensions each about 20μ long. Esophagus expanded near middle by gradual enlargement. Cardia elongate hemispheroid with only slight traces of a disc. Anterior ovary reduced to rudimentary branch. Posterior ovary reflexed about halfway to vulva. Eggs twice as long as body diameter. Prerectum length 5 times body width. Rectum length slightly longer than anal body diameter. Saccate glands present in tail but not as numerous as in *P. pungens*.

Pungentus monhystra is readily distinguished from other species with a single ovary by its much larger size.

Habitat: A very common species from numerous localities in South Dakota; Tagus and Williston, North Dakota; Baker, Montana; Hadashville, Manitoba, Canada; and Ames, Iowa.

Pungentus crassus n. sp.

(Fig. 37, A-D)

2.0 mm; a=31; b=5.0; c=50; V=$^{15}50^{15}$

2.0mm; a=33; b=5.0; c=45; T=62

Bodies of both sexes distinctly arcuate, that of the male with tail strongly ventrally bent. Lip region set off by constriction, ¼ width of neck

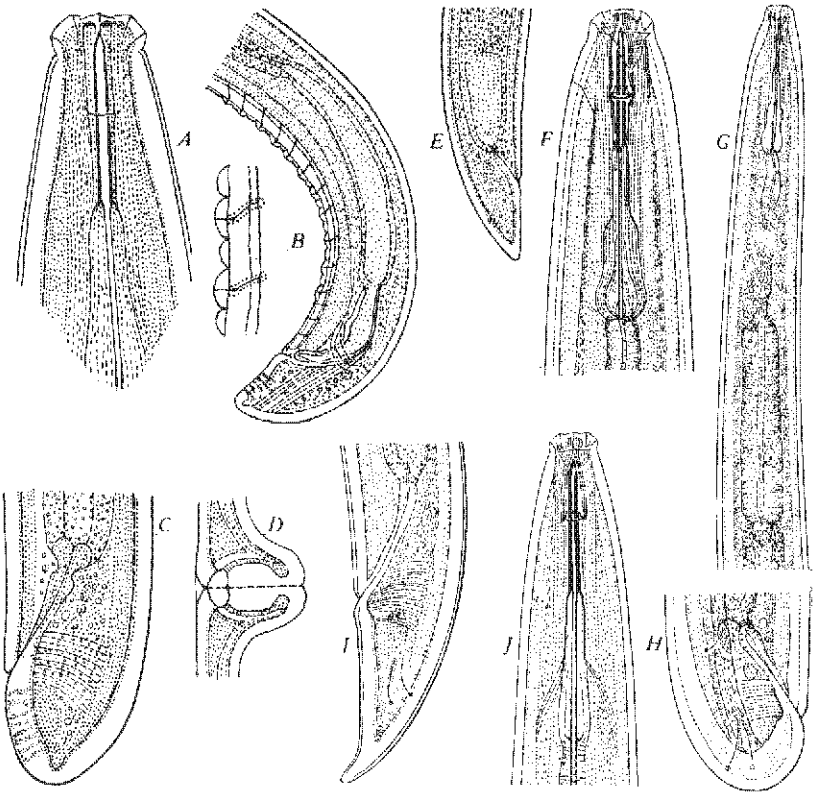


Fig. 37. A-D, *Pungentus crassus*. E, *Enchodorella penetrans*. F-H, *Enchodelus macrodorus*. I, J, *Enchodelus macrodoroides*. F-J after Thorne, 1939, courtesy of Martinus Nijhoff.

base, with distinct papillae slightly elevated above the contour. Cuticle thick in head region. Lateral fields ⅓ body width without visible cells. Perioral plates conspicuous with strong muscles extending back along spear. Spear 30μ long, straight or slightly arcuate, with very short aperture. Spear extensions about same length as spear. Esophagus enlarged rather abruptly near middle, with posterior portion ½ body width. Cardia a small disc about ¼ body width then conoid. Intestine with rather coarse, dark granules, not tesellated. Vulva deep, apparently transverse but this was not definitely determined. Vagina length about half body width. Uteri forming roomy spermathecae. Ovaries reflexed about half their length. Prerectum length about 4 times body width, very hyaline. Male tail strongly arcuate with 11 normal and 3 rudimentary supplements. Spicula arcuate with strong ventral angle. Prerectum extending forward to a point about opposite anterior supplement. Strong ventrosubmedian saccate bodies near terminus.

Holotype female and allotype male indexed under *Pungentus* 7.

Pungentus crassus is immediately distinguished by the obese body, long prerectum, peculiar type of saccate bodies in tails, and number and arrangement of supplements.

Habitat: Soil about roots of white oak near Ames, Iowa.

Enchodelus macrodorus (de Man, 1880) Thorne, 1939
Synonyms: *Dorylaimus macrodorus* de Man, 1880
Dorylaimus (*Doryllium*) *macrodorus* (de Man) Ditlevsen, 1928
Dorylaimellus macrodorus (de Man) Thorne and Swanger, 1936
(Fig. 37, F-H)

1.5 mm; a=26; b=4.3; c=68; $V=^{12}44^{12}$

Body tapering anteriorly to narrow lip region; posteriorly to a subhemispheroid tail. Lateral cords about twice width of cuticle at mid-body. Ampid apertures almost encompassing lip region, escutcheon shaped. Lips low, obscure, well amalgamated. Spear massive with broad flanges, about one fourth neck. Esophagus enlarged by abrupt expansion near middle. Cardia elongate spheroid. Intestinal granules dark, metallic. Prerectum length 4-5 times body width. Ovaries reflexed about halfway to vulva.

Habitat: Mountain soil east of Powder River, Montana. Only four specimens collected. No males present.

Enchodelus macrodoroides (Steiner, 1914) Thorne, 1939
Synonyms: *Dorylaimus macrodoroides* Steiner 1914
Dorylaimellus macrodoroides (Steiner, 1914) T. & S. 1936
(Fig. 37, I, J)

1.5 mm; a=28; b=4.7; c=28; $V=^{14}56^{14}$

Body robust, tapering both ways from near middle, somewhat arcuate, especially in tail. Lip region set off by slight depression with distinct papillae. Spear 15μ long with aperture ⅓ its length. Spear extensions 19μ long without flanges. Esophagus enlarged in basal third, with 3 conspicuous gland nuclei. Cardia bluntly conoid, ½ as long as body width. Intestine tesellated with bright brown granules. Vulva longitudinal. Ovaries reflexed about ½ their length. Eggs about twice as long as body diameter. No spermatheca or sperms seen and no males collected. Prerectum length about twice body diameter. Green algae-like material observed in the intestine of one specimen. Tail arcuate to bluntly rounded terminus.

Habitat: Small numbers from several localities in North and South Dakota, western Montana; Hadashville, Manitoba and Moosomin, Saskatchewan, Canada.

Family Nygolaimidae (Thorne, 1935) Meyl, 1961

Subfamily Nygolaiminae Thorne, 1935

Nemas 1.0-4.0 mm long. Pharynx in 3 reversible sections, armed with a mural tooth located on the left ventrosubmedian wall. Three conspicuous cardiac glands present at base of esophagus. Vulva transverse except in *Paravulvus* in which it is longitudinal; labia not sclerotized. Ovaries 2, reflexed. Tails of both sexes of similar form. Gubernaculum and ventromedian supplements present or absent.

In his excellent monograph of the family, Heyns, 1968, recognized only *Nygolaimus* and *Nygellus* as valid genera in subfamily Nygolaiminae. However, he divided the species among nine subgenera which the writer considers to be valid genera and these are here elevated to full generic rank:

Nygolaimus (*Nygolaimus*) becomes genus *Nygolaimus* new rank
Nygolaimus (*Paranygolaimus*) becomes genus *Paranygolaimus* new rank
Nygolaimus (*Clavicaudoides*) becomes genus *Clavicaudoides* new rank
Nygolaimus (*Aquatides*) becomes genus *Aquatides* new rank
Nygolaimus (*Laevides*) becomes genus *Laevides* new rank
Nygolaimus (*Solidens*) becomes genus *Solidens* new rank
Nygolaimus (*Feroxides*) becomes genus *Feroxides* new rank
Nygolaimus (*Afronygus*) becomes genus *Afronygus* new rank
Nygolaimus (*Clavicauda*) becomes genus *Clavicauda* new rank
Nygolaimus (*Paravulvus*) becomes genus *Paravulvus* new rank

Key to genera of Nygolaiminae from the Northern Great Plains

1. Vulva longitudinal, tails of both sexes arcuate ..... *Paravulvus*
   Vulva transverse, tails bluntly rounded 2
2. Tooth solident, very slender anteriorly ..... *Solidens*
   Tooth deltoid to linear 3
3. Males rare, supplements reduced or absent ..... *Nygolaimus*
   Bisexual species, supplements numerous 4
4. Tooth length near head width ..... *Aquatides*
   Tooth excessively small, 4-5μ long ..... *Laevides*

Genus *Nygolaimus* Cobb, 1913

Length 1.0-4.0 mm. Body straight to ventrally arcuate, often very twisted anteriorly. Lips amalgamated with low papillae. Tooth acute to broadly deltoid. Esophagus enlarged for more than half its length, sometimes with distinct sheath. Cardiac glands prominent. Ovaries two, reflexed. Vulva transverse. Males usually rare with only one or no ventromedian supplements. Spicula broad, bluntly arcuate with tiny lateral guiding pieces. Gubernaculum absent, but a thickened, refractive section of the cloacal lining frequently visible. Tails hemispheroid to bluntly conoid.

Type species: *Nygolaimus pachydermatus* Cobb, 1913.

Key to species of *Nygolaimus*

1. Length 2.5 to 3.5 mm 2
   Length 2.0 mm or less 6
2. Tail with elongated core ..... *parabrachyurus*
   Tail without elongated core 3
3. Tooth very slender, acute ..... *acridens*
   Tooth broadly deltoid 4
4. Length near 3.5 mm ..... *macrobrachyurus*
   Length under 3.0 mm 5
5. Terminus hemispheroid ..... *papilloides*
   Terminus dorsally convex conoid ..... *butteus*
6. Body practically straight when relaxed 7
   Body arcuate, twisted 8
7. Length 1.3 mm ..... *hyans*
   Length near 2.0 mm ..... *cylindricus*
8. Length near 1.3 mm ..... *parvus*
   Length near 2.0 mm 9
9. Tooth broadly deltoid ..... *paratenuis*
   Tooth slender, acute ..... *dorotheae*

Nygolaimus macrobrachyurus (Heyns, 1968) new rank
Synonym: *Nygolaimus* (*Nygolaimus*) *macrobrachyurus* Heyns, 1968
(Fig. 38, A-E)

3.5 mm; a = 54; b = 3.3; c = 76; V = 60%

Body cylindroid, slightly arcuate in posterior half. Lateral field ¼ body width. Lip region slightly angular, set off by deep constriction, with easily visible papillae. Tooth about 16μ long, or slightly less than width of lip region, broadly deltoid. Esophagus enlarged in posterior ⅓ by a very gradual expansion, its glands obscured by massive musculature. Cardia cylindroid, surrounded by three very prominent cardiac glands. Intestinal cells packed with minute light brown granules. Vulva transverse, vagina elaborately developed as illustrated. Ovaries reflexed about halfway to vulva. Prerectum very short, slightly less than one body width. Rectum slightly longer than anal body diameter. Central core of tail extending to cuticle. Two pairs of conspicuous caudal pores present. Males not collected and mature females contained no sperms.

Nygolaimus macrobrachyurus is immediately recognized by the central core of the tail, short prerectum and broad deltoid tooth. The tooth is slightly longer and the prerectum somewhat shorter than in the specimens described by Heyns.

Habitat: Native prairie pasture, Cottonwood Experiment Station, South Dakota. Collected by J. K. Lewis.

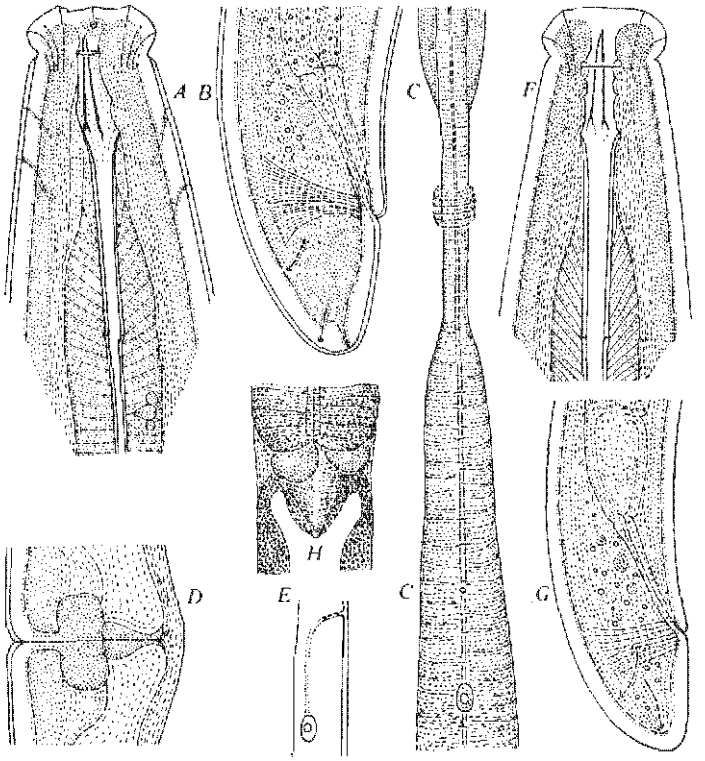


Fig. 38. A-E, *Nygolaimus macrobrachyurus*. F-H, *N. parabrachyurus*. Note intestinal cells surrounding cardia in H. Heads 800 X, tails, 400 X.

Nygolaimus parabrachyurus (Heyns, 1968) new rank
Synonym: *Nygolaimus (Nygolaimus) parabrachyurus* Heyns, 1968
(Fig. 38, F-H)

3.4 mm; a = 50; b = 3.4; c = 85; V = $^{8}60^{8}$

Body twisted until a true lateral view rarely is seen, arcuate especially in posterior fourth. Lips rounded, set off by definite constriction. Tooth 15μ long, or about ¾ width of lip region, broadly deltoid. Esophagus ¼ width of lip region, narrowing slightly as it passes through nerve ring, then very gradually expanding until posterior ¾ fills neck cavity. Esophageal gland nuclei obscured by dense tissues until their arrangement cannot be determined. Cardia conoid, its length about equal to ½ body width, surrounded by intestinal cells, which are packed with exceedingly fine brown granules. In one specimen the posterior portion of the intestinal tract was filled with parasites, a species of *Duboscquia*. Prerectum almost vestigial, shorter than body width. Rectum slender, much longer than anal body diameter. Vulva

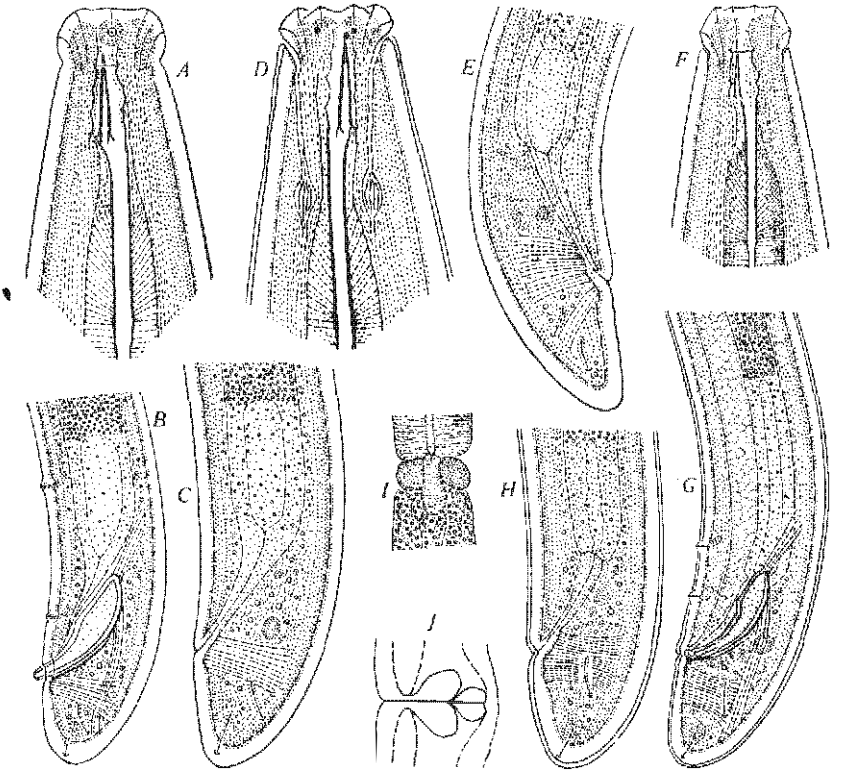


Fig. 39. A-C, *Nygolaimus papilloides*. D-E, *N. butteus*. F-J, *N. acridens*. Heads 800X, tails 400X.

a transverse slit; vagina extending ⅔ across body. Ovaries reflexed about ½ their length. Caudal papillae as illustrated. Core of tail rounded, not extended into the cuticle. Males not collected and females did not contain spermatozoa.

Nygolaimus parabrachyurus is most closely related to *N. macrobrachyurus* from which it is immediately distinguished by not having an extended core in the tail.

Habitat: Native grass pastures Presho and Cottonwood Experiment Station, and tomato field near Mitchell, South Dakota. Native grass sod near Minot, Stanley and Tagus, North Dakota.

Nygolaimus papilloides n. sp.

(Fig. 39, A-C)

2.8 mm; a=43; b=3.0; c=70; V=$^{12}62^{12}$

2.2 mm; a=51; b=3.7; c=87; T=45

Female body comparatively straight except for posterior ¼ which is slightly arcuate. Neck region usually somewhat twisted. Lip region round-

ed with papillae not interfering with contour. Tooth 1.3μ long, broadly deltoid, slightly shorter than lip region width. Lateral fields about ¼ body width. Esophagus at first about ½ head width, then slightly expanded until near nerve ring where it narrows. Expansion very gradual until posterior ⅔ well fills the body cavity. Cardia bluntly conoid, generally obscured by cardiac glands. Intestinal cells packed with fine dark brown granules. Vulva and vagina typical. Ovaries reflexed about halfway to vulva. Eggs 3 times as long as wide, one being present in each ovary at same time. Prerectum and rectum each about as long as body width. Males rare, somewhat similar to females. Spicula 44μ long, slightly arcuate with simple guiding pieces. Only 1 ventromedian supplement seen, that apparently rudimentary. Tails of both sexes with a pair of almost terminal papillae, and a second pair near middle of tail.

Nygolaimus papilloides is distinctive because of its size, broad, deltoid tooth and single pair of almost terminal, caudal pores.

Habitat: Fallow soil Highmore Experiment Station, Centerville Station and juniper nursery, Watertown, South Dakota.

Nygolaimus butteus n. sp.

(Fig. 39, D, E)

3.0-3.4 mm; a=51; b=3.2; c=74; V=$^{s}58^{s}$

Body very arcuate especially in posterior third. Neck twisted until lip region is seen dorsoventrally. Lip region width ⅔ that of neck base. Lateral fields ¼ body width. Tooth 15μ long, broadly deltoid. Esophagus somewhat enlarged anteriorly, narrowing as it passes through the nerve ring, then gradually expanding until it fills body cavity. Dorsal gland nucleus almost 1 body width posterior to orifice of its duct. Cardia bluntly conoid, obscured by flattened cardiac glands. Anterior end of intestine crowded by hyaline area. Prerectum length about equal to body width. Rectum length twice anal body diameter. Ovaries reflexed about halfway to vulva. No males collected and females contained no sperms. Holotype female and other specimens indexed under *Nygolaimus* 7.

Nygolaimus butteus is distinctive among the larger species by the arcuate body, dorsally convex conoid tail and arrangement of caudal papillae.

Habitat: Prairie sod on summit of Medicine Butte, South Dakota, collected by J. K. Lewis. Medicine Butte is a solitary pinnacle rising from the prairie and was the site of Indian ceremonials.

Nygolaimus acridens n. sp.

(Fig. 39, F-J)

2.8 mm; a=50; b=4.0; c=96; $V^{10}54^{10}$

2.9 mm; a=52; b=4.1; c=84; T=51

Body slightly arcuate when relaxed, twisted in anterior portion until amphid apertures usually are seen from a dorsoventral view. Lateral fields about ¼ body width. Lips slightly angular with easily visible papillae. Pharynx about ¼ head width, tooth 10μ long, very slender with minute core

extending almost to apex. Esophagus slender in anterior third, then gradually expanding until posterior portion completely fills neck cavity. Cardia cylindroid, frequently hidden by the three large cardiac glands. Intestinal cells filled with fine, dark brown granules. Prerectum length equal to body width, rectum about same. Vulva and vagina typical. Uteri serving as spermathecae, usually well packed with spermatozoa. Ovaries reflexed about ½ their length. Male with slightly arcuate spicula about 40μ long with simple lateral guiding pieces. One or 2 ventromedian supplements which usually are vestigial. Presence of sperms in females indicates that males are functional, the only instance observed among the larger species of *Nygolaimus*.

Nygolaimus acridens is immediately distinguished among the larger species by the very slender spear, narrower head and bisexuality.

Habitat: Prairie sod east of Miles City, Montana.

Nygolaimus dorotheae (Heyns, 1968) new rank
Synonym: *Nygolaimus* (*Nygolaimus*) *dorotheae*, Heyns, 1963
(Fig. 4●, A-C)

2.0 mm; a=52; b=3.2; c=72; V=$^{8}57^{8}$

Body slightly arcuate, twisted in about ¼ spiral. Lateral field ⅓ body width. Lip region rounded, set off by constriction. Tooth deltoid, 10μ long. Esophagus slender in anterior fourth, then abruptly expanded until posterior ⅔ almost fills body cavity. Cardia about ¼ body width, crowded by cardiac glands. Intestinal cells filled with excessively fine, dark refractive granules. Vulva a transverse slit with prominent labial muscles. Ovaries reflexed about halfway to vulva. Rectum and prerectum each about as long as body width. Tail with single pair of caudal papillae. Males not collected and females contained no sperms. Specimens indexed under *Nygolaimus* 7.

Nygolaimus dorotheae is distinctive because of its slender, twisted body, very long neck and details of vulva-vagina region.

Habitat: Native prairie sod Brookings, Highmore and Cottonwood, South Dakota and Valentine, Nebraska.

Nygolaimus paratenuis n. sp.
(Fig. 4●, D-F)

1.8 mm; a=42; b=3.2; c=68; V=$^{1●}57^{10}$
1.7 mm; a=41; b=3.1; c=58; T=5●

Body twisted until sometimes it forms a half spiral with amphids seen from a dorsal view. Lateral fields ¼ body width. Lip region rounded with distinct papillae. Tooth about 11μ long, slender, deltoid, almost as long as width of lip region. Esophagus a slender tube in anterior third, then gradually expanding until it fills body cavity. Cardia cylindroid, ½ body width, usually obscured by cardiac glands. Vulva transverse, vagina typical. Ovaries reflexed about ⅔ distance back to vulva. Rectum and prerectum each about length of anal body diameter. Tail dorsally arcuate to bluntly rounded terminus.

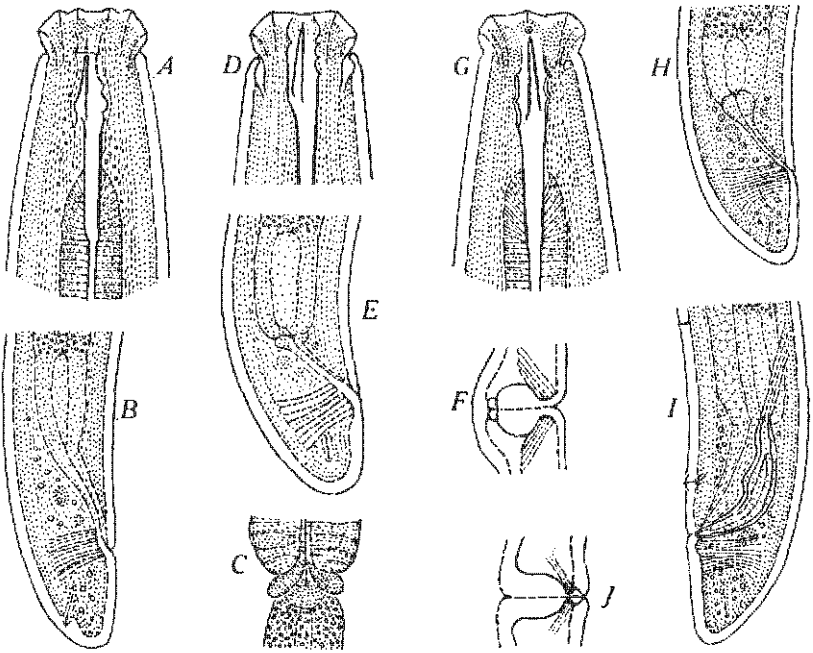


Fig. 40. A-C, *Nygolaimus dorotheae*. D-F, *N. paratenuis*. G-J, *N. parvus*. Heads x 1,000, tails x 500.

The single male collected possessed normal testes but associated females were not spermatized. Tail similar to that of *Nygolaimus parvus*.

Nygolaimus paratenuis somewhat resembles *N. tenuis* but the pharynx is shorter, the spear longer and body width greater. Holotype female, allotype male and other specimens indexed under *Nygolaimus* 9.

Habitat: a very common species throughout the Northern Great Plains from both cultivated and virgin soils.

Nygolaimus parvus n. sp.
(Fig. 40, G-J)

1.4 mm; a = 39; b = 3.0; c = 65; V = $^{12}58^{12}$
1.3 mm; a = 38; b = 3.3; c = 55; T = 45

Body twisted until heads and tails are sometimes seen only from a dorsal or ventral view. Lip region apparently set off by slight constriction, papillae low, rounded. Lateral field ¼ body width. Tooth deltoid, 22μ long, somewhat less than width of lip region. Esophagus at first a slender tube, then gradually expanding until posterior ⅔ practically fills body cavity. Cardia elongate hemispheroid, ¼ body width, usually obscured by cardiac glands. Intestinal granules light brown, sometimes forming a slightly tesellated pattern. Vulva transverse; vagina as illustrated extending ⅔ across body. Ovaries reflexed about ⅔ distance back to vulva. Eggs 3-4 times as

long as body width. Rectum and prerectum both about as long as anal body diameter. Males rare and apparently not functional since associated females did not contain sperms. Specimens filed under *Nygolaimus* 6.

Nygolaimus parvus is distinctive among the smaller species of the genus since it is the smallest of all. The neck occupies about ⅓ of the body length and the vulva is smaller and of a different form than those of related species.

Habitat: Native sod near Brookings, Cottonwood, Presho, Medicine Butte and other points in South Dakota; Minot, North Dakota; Elizabeth, Minnesota, and Monument Park on the Powder River, Montana.

Nygolaimus cylindricus n. sp.
(Fig. 41, A-E)

1.8 mm; a = 34; b = 3.1; c = 65; V = $^{10}61^{10}$

Body cylindroid, straight when relaxed. Lateral field ⅓ body width. Lip region rounded, set off by slight constriction, with distinct papillae. Tooth 10μ long, deltoid. Esophagus a slender tube in anterior third, then gradually expanding until it fills body cavity. Cardia cylindroid, crowded by massive cardiac glands. Intestinal cells packed with dark brown, refractive granules. Vulva transverse. Vagina characteristic as illustrated. Eggs 2½ times as long as body width. Ovaries reflexed about halfway to vulva. Male not collected and gravid females contained no sperms. Rectum and prerectum slightly longer than tail. Two pairs of pores on the symmetrical convex-conoid tail. Holotype female and other specimens indexed under *Nygolaimus* 11.

Nygolaimus cylindricus is distinctive because of the straight, rather robust body, uniformly conoid tail and long esophagus. It is most closely related to *N. directus* Heyns from which it differs in having two pairs of caudal papillae instead of one and the absence of an extension on the caudal core.

Habitat: Seven females from soil in corn field near Fremont, Nebraska.

Nygolaimus hyans n. sp.
(Fig. 41, F, G)

1.3 mm; a = 40; b = 3.7; c = 64; V = $^{9}57^{9}$

Body cylindroid, straight when relaxed, only extremities tapering. General body and intestinal contents very clear. Lip region rounded, set off by distinct constriction. Cephalic papillae very obscure. Tooth 9μ long, deltoid, slender, tapering. Anterior third of esophagus slender, then tapering gradually to the broader posterior portion which is often irregular in width. Esophageal gland nuclei not observed. Cardia elongate hemispheroid, usually obscured by the 3 cardiac glands. Intestine with excessively fine, scattered, dark granules which are present even in the prerectum, leaving the intestine practically hyaline. Rectum and prerectum each about as long as body diameter. Ovaries very short but eggs usually large, filling the body cavity and from 3-4 times as long as wide. Gravid females contained no

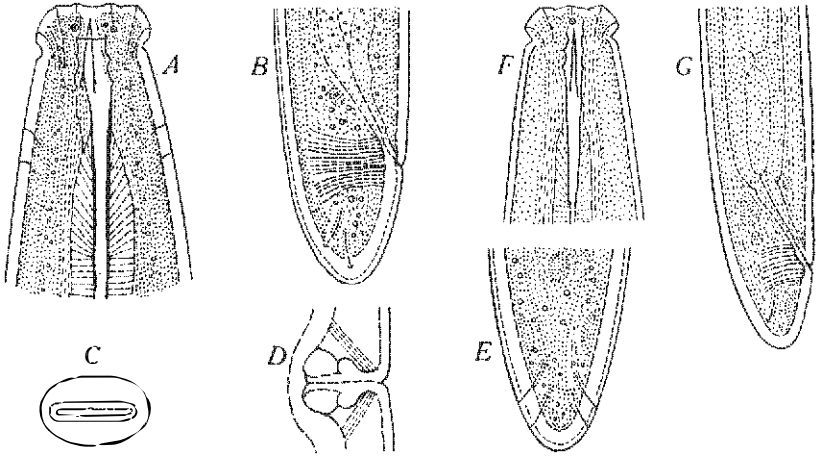


Fig. 41. A-E, *Nygolaimus cylindricus*. F, G, *N. hyans*. Heads x 1,000, tails x 500.

sperms and males not collected. Tail uniformly convex conoid to rounded terminus. Holotype female and other specimens indexed under *Nygolaimus* 12.

Nygolaimus hyans probably is most closely related to *N. directus* from which it differs in the tail which is uniformly convex-conoid and never bent dorsally, and the protoplasmic core of the tail is not branched or otherwise unsymmetrical.

Genus *Aquatides* (Heyns, 1968) new rank

Synonym: *Nygolaimus* (*Aquatides*) Heyns, 1968

Nemas 2.0 to 4.0 mm long. Bodies practically straight when relaxed. Heads rounded with obscure lips. Tooth linear, usually as long or longer than lip region width. Esophagus often with slight sheath at base. Vulva transverse. Tails hemispheroid to bluntly conoid, rarely longer than anal body diameter. Spicula massive, arcuate with gubernaculum. Ventromedian supplements 4-7, low, flat or rounded, well spaced.

Type species: *Aquatides aquaticus* (Thorne, 1930) new rank.

Aquatides aquaticus (Thorne, 1930) new rank

Synonyms: *Nygolaimus aquaticus* Thorne, 1930

Nygolaimus (Aquatides) aquaticus (Thorne, 1930) Heyns, 1968

(Fig. 42, A-E)

2.2-2.6 mm; a = 46; b = 4.3; c = 70; V = $^{12}50^{12}$

2.2 mm; a = 47; b = 4.0; c = 61; T = 56

Body cylindroid, slightly arcuate, tapering near extremities. Lip region rounded with papillae slightly elevated. Tooth cylindroid, 18-20μ long. Anterior fourth of esophagus slender, then gradually expanded to form the massively muscled basal two thirds. As Heyns, 1968, observed, many speci-

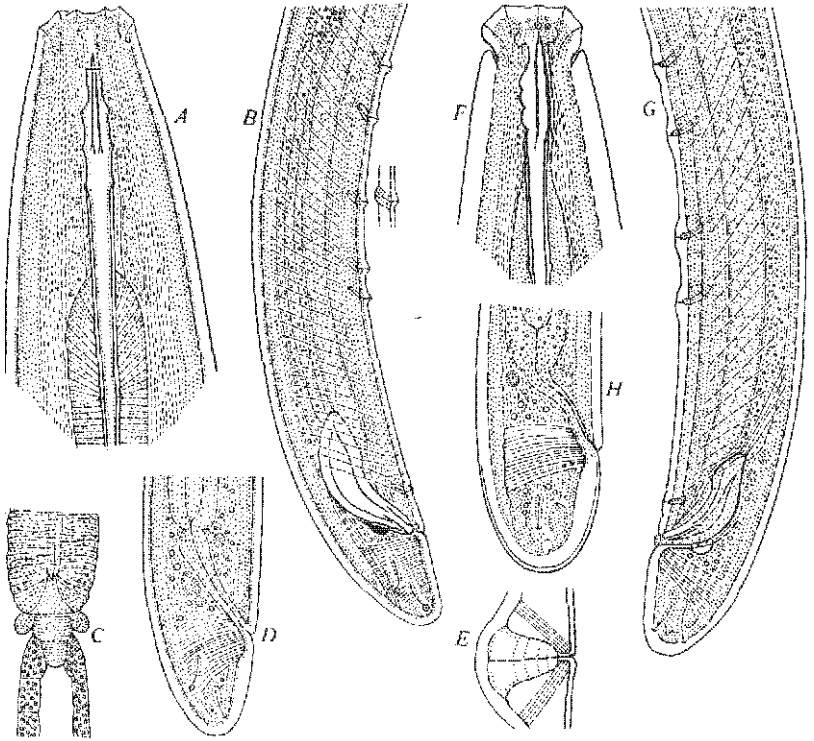


Fig. 42. A-E, *Aquatides aquaticus*. F-H, *A. roundicaudatus*. Heads x 800, tails x 400, except B and G x 340.

mens exhibit a distinct sheath about the basal portion of the esophagus which was overlooked by the writer in the original description. Cardia obscured by cardiac glands, except on rare occasions. Intestine packed with small dark granules. Vulva transverse with strong labial muscles. Vagina somewhat conical as illustrated. Ovaries reflexed halfway to vulva, the uteri acting as spermathecae. Prerectum length twice body diameter. Rectum as illustrated.

Male generally slightly smaller than females with posterior ⅓ somewhat ventrally bent. Supplements 4-5, mammiform. Spicula massive, slightly arcuate with cephalated lateral guiding pieces. Specimens indexed under *Aquatides* 1. In general specimens from the Great Plains area are somewhat larger than those originally described from lakes in mountains of Utah.

Habitat: Soil from stream bank west of Brookings, native sod near Faith and Huron, South Dakota and Rugby, North Dakota.

Aquatides rotundicaudatus n. sp.

(Fig. 42, F-H)

3.3 mm; a=55; b=5.0; c 83; V=$^{20}44^{20}$

3.0 mm; a=60; b=4.8; c=76; T=70

Bodies practically straight and cylindroid except anteriorly. Lateral fields ⅛ body width. Lip region ¼ width of neck base, generally set off by a partial view of amphid apertures due to the twisted anterior portion of the body, but probably rounded if a true lateral view could be secured. Tooth very acute, cylindroid-deltoid about 20μ long, the basal portion difficult to determine. Esophagus slender in anterior ⅓ then gradually expanding until posterior ½ fills body cavity. Musculature so dense that esophageal gland nuclei not observed. Cardia obscured by large glands. Intestinal cells packed with dark brown granules. Vulva and vagina similar to those of *A. aquaticus*. Ovaries and uteri unusually long. Uterine spermatheca 4-5 times as long as body width, packed with sperms. Prerectum length 4-5 times body width. Rectum and tail as illustrated. Male with the usual thick, slightly arcuate spicula and small furcate lateral guiding pieces. Four elongate, slightly elevated supplements. Diagonal copulatory muscles a prominent feature. Holotype female, allotype male and other specimens indexed under *Aquatides* 3. *Aquatides rotundicaudatus* is immediately distinguished by the narrow lip region, short esophagus, very elongated gonads and elongate hemispheroid tails.

Habitat: Small swamp area, Experiment Station field, Brookings, South Dakota.

Aquatides christei (Heyns, 1968) new rank

Synonym. *Nygolaimus* (*Aquatides*) *christei* Heyns, 1968

(Fig. 43, A-E)

2.4 mm; a=40; b=3.8; c=66; V=$^{10}49^{10}$

2.3 mm; a=39; b=4.0; c=59; T=57

Body slightly arcuate, tapering at extremities. Lateral field ¼ body width. Lip region asymmetrical with ventral side lower than dorsal. Lips rounded with easily seen papillae. Amphids cup-shaped, ⅔ width of head. Tooth elongate, deltoid, about 22μ long. Esophagus expanding gradually until posterior ⅔ fills body cavity. Cardia elongate conoid, with 3 usually well developed glands. Intestinal cells packed with small dark brown granules. Prerectum length 1½ times body width. Rectum slightly longer than anal body diameter. Vulva transverse with muscular labia and vagina. Uteri usually packed with sperms.

Male somewhat more arcuate in posterior portion with 50-60 conspicuous diagonal copulatory muscles. Supplements 4-6, low, flattened. Spicula massive with cephalated guiding pieces. Spermatozoa unusually large and conspicuous. Prerectum length about 3 times body width.

Aquatides christei is distinctive because of the asymmetrical lip region, convex-conoid elongate hemispheroid tail and form of vagina. These specimens differ from those reported by Heyns in having rounded lip region not set off by slight expansion as in type specimens.

Habitat: Recently plowed pasture just east of Minden, Nebraska.

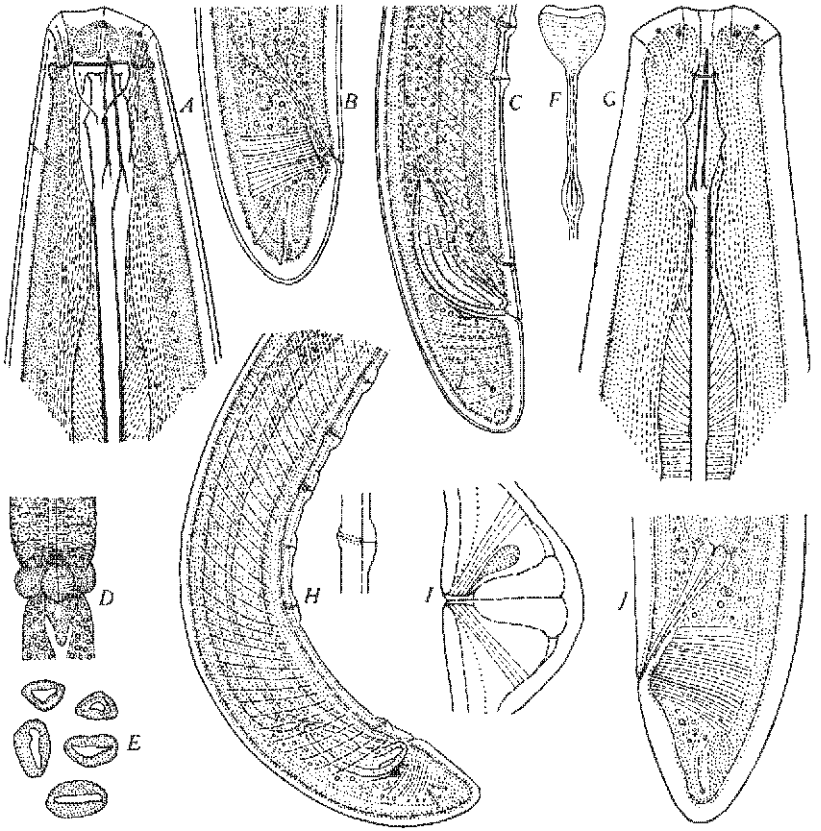


Fig. 43. A-E, *Aquatides christei*, E. spermatozoa x 800. F-J, *A. smoliki*. Heads x 800, tails x 400.

Aquatides smoliki n. sp.
(Fig. 43, F-J)

3.6 mm; a=38; b=4.5; c=66; V=$^{12}49^{12}$
3.3 mm; a=41; b=4.4; c=66; T=70

Body cylindroid, gradually tapering near extremities, usually slightly arcuate. Lip region rounded, practically symmetrical with easily visible papillae. Amphids beaker-shaped, usually difficult to observe. Teeth 24-26μ long, subhneate, tapering, with very acute point. Anterior third of esophagus slender, then gradually expanding until basal half is strongly developed with tissues so dense that gland nuclei are invisible. Cardiac glands strongly developed, completely obscuring details of cardia. Intestinal cells densely packed with fine dark granules. Ovaries reflexed about halfway to vulva, the uteri filled with sperms. Eggs fill body cavity and are slightly longer than body width, three observed in one specimen. Prerec-

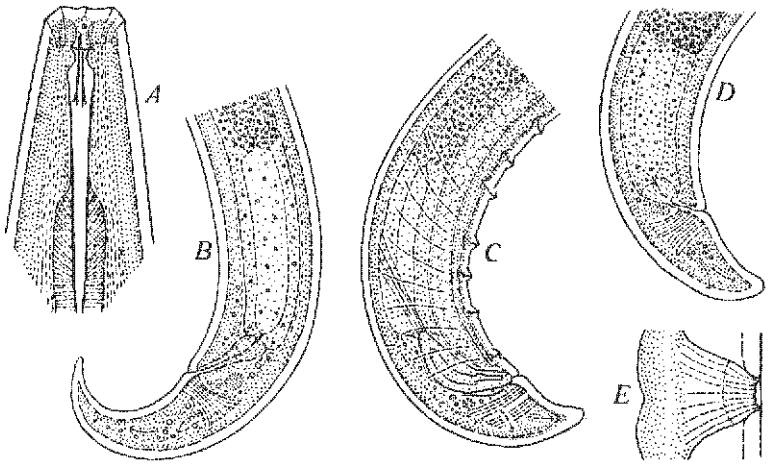


Fig. 44. *Paravulvus hartingii*. Note B and D, variations in female tails.

tum 2-3 times as long as body width. Rectum slightly longer than the uniformly convex conoid, bluntly rounded tail.

Male with arcuate posterior with massive copulatory musculature. Ventromedian supplements 3-5, low, slightly rounded, usually slightly irregular in arrangement. Holotype female, allotype male and other specimens filed under *Aquatides* 4.

Aquatides smoliki is distinctive because of its symmetrical, rounded lip region, long, tapering sublineate tooth and type and arrangement of ventromedian supplements. Named in honor of James Smolik, my coworker.

Habitat: Swamp area, South Dakota Experiment Station, Brookings, South Dakota.

Genus *Paravulvus* (Heyns, 1968) new rank

Synonym: *Nygolaimus* (*Paravulvus*) Heyns, 1968

Nemas 1.0-2.0 mm long. Bodies curved ventrally, often twisted. Lip region rounded, sometimes slightly set off by shallow depression. Elongate glandular organs at base of esophagus. Vulva longitudinal. Gubernaculum present. Supplements conspicuous.

Type species: *Paravulvus acuticaudatus* (Thorne, 1930) new rank

Paravulvus hartingii (de Man, 1880) new rank

Synonyms: *Dorylaimus hartingii* de Man, 1880

Nygolaimus hartingii (de Man, 1880) Thorne, 1930

Nygolaimus (*Paravulvus*) *hartingii* (de Man, 1880) Heyns, 1968

Nygolaimus dubius (Thorne, 1930) Heyns, 1968

(Fig. 44, A-E)

1.4 mm; a = 40; b = 4.6; c = 27; V = $^{19}48^{10}$

0.8 mm; a = 25; b = 4.0; c = 35; T = 55

Body arcuate, especially in posterior fifth where it frequently ends in a ventrally bent or hooked tail. Lip region continuous with neck contour but usually appearing set off because of amphidial openings on the twisted neck. Lips rounded with papillae not interfering with contour. Tooth 8-10μ long, elongate deltoid. Esophagus enlarged near middle by gradual expansion with gland nuclei obscured by dense tissues. Cardiac glands enveloping cardia, not extending out over anterior end of intestine. Intestinal cells packed with dark brown granules. Vulva longitudinal with broad vagina. Ovaries often reflexed almost to vulva. Eggs about 2½ times as long as body width. Prerectum 2 to 3 times as long as body width. Rectum length about equal to anal body diameter.

A single male collected from native prairie sod near Opal, South Dakota. Spicula slightly arcuate resting on a thin trough-like gubernaculum. Supplements sub-mammiform, six in number spaced as illustrated. Testes not present. Obviously a nonfunctional individual.

Habitat: Widely distributed in both virgin and cultivated soil in Colorado, Nebraska, North and South Dakota, Minnesota and Manitoba and Saskatchewan, Canada.

Paravulvus teres (Thorne, 1930) new rank
Synonyms: *Nygolaimus teres* Thorne, 1930
Nygolaimus (*Paravulvus*) *teres* (Thorne, 1930) Heyns, 1968
(Fig. 45, A-D)

1.3 mm; a=25; b=4.0; c=50; V="50"
1.3 mm; a=31; b=3.8; c=50; T=60

Body very arcuate, tapering both ways from near middle. Lip region set off by depression and expansion, ⅓ width of neck at its base. Tooth about 12μ long, slightly deltoid. Esophagus slender in anterior ½, then gradually expanded near middle until posterior is ⅔ neck width. Cardia cylindroid, obscured by 3 cardiac glands which adhere closely instead of extending outward. Elongated gland-like organs crowd anterior end of intestine. Intestinal cells packed with small granules which may be brilliant yellow and tesellated. Vulva longitudinal with spheroid vagina. Paravulvae not present on 7 females collected. Sperms not observed in gravid females although males were present. Female prerectum length as long as body width, that of male slightly longer. Spicula massive, slightly arcuate with pointed lateral guiding pieces. Gubernaculum a thin, shallow trough. Supplements sub-mammiform, 8 on both males collected. Specimens filed under *Paravulvus* 3.

Paravulvus teres is immediately distinguished by the robust arcuate body with bluntly rounded tails.

Habitat: Corn field near Fairmont, Nebraska and prairie sod east of Miles City, Montana.

Genus *Solidens* (Heyns, 1968) new rank
Synonym: *Nygolaimus* (*Solidens*) Heyns, 1968

Nemas less than 2.0 mm long. Body usually arcuate, sometimes twist-

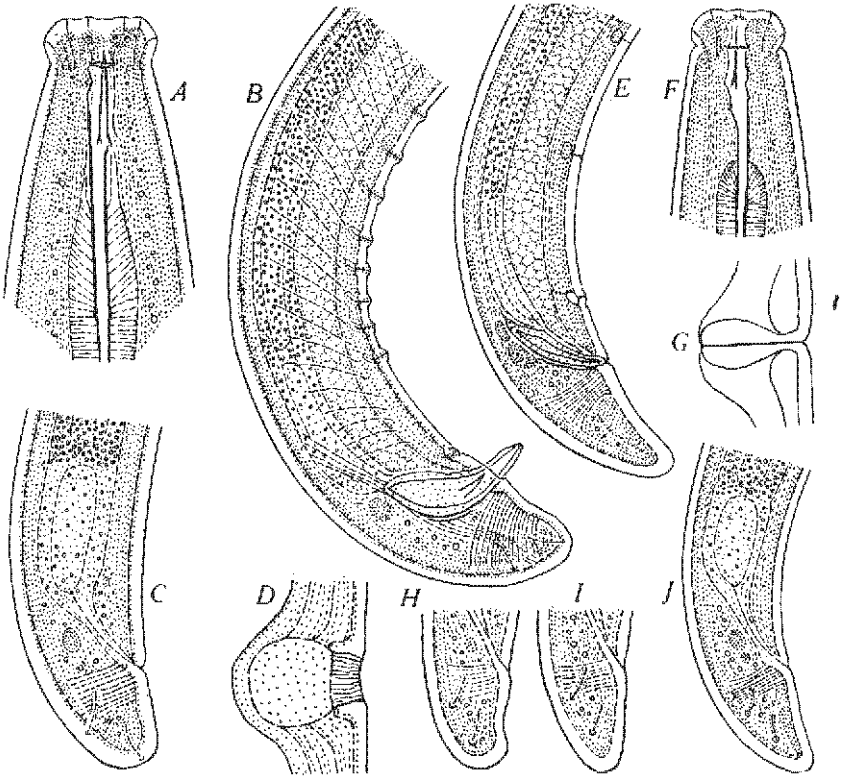


Fig. 45. A-D, *Paravulvus teres*. E-J, *Solidens vulgaris*. Note H, I, variations in female tails. Heads x 1,000, tails x 500.

ed until S-shaped. Lip region set off by constriction. Tooth exceedingly slender. Vulva transverse. Gubernaculum absent. Supplements obscure.

Type species: *Solidens bisexualis* (Thorne, 1930) new rank.

Solidens vulgaris (Thorne, 1930) new rank

Synonyms: *Nygolaimus vulgaris*, Thorne 1930

Nygolaimus (*Solidens*) *vulgaris* (Thorne, 1930) Heyns, 1968

(Fig. 45, E-J)

1.3 mm; a = 40; b = 3.6; c = 46; V = 51.[9]

1.3 mm; a = 41; b = 3.4; c = 43; T = 54

Body slightly arcuate, twisting until anterior and posterior ends rarely are seen from a lateral view. Tooth 8-10μ long, needle-like with short, furcate base. Anterior third of esophagus slender, gradually expanding through the second third until the posterior third almost fills neck cavity. Cardiac glands prominent, obscuring the small cardia. Vulva transverse, vagina extending ¼ across body. Ovaries reflexed about half their length. Prerectum about as long as body width; rectum about same length.

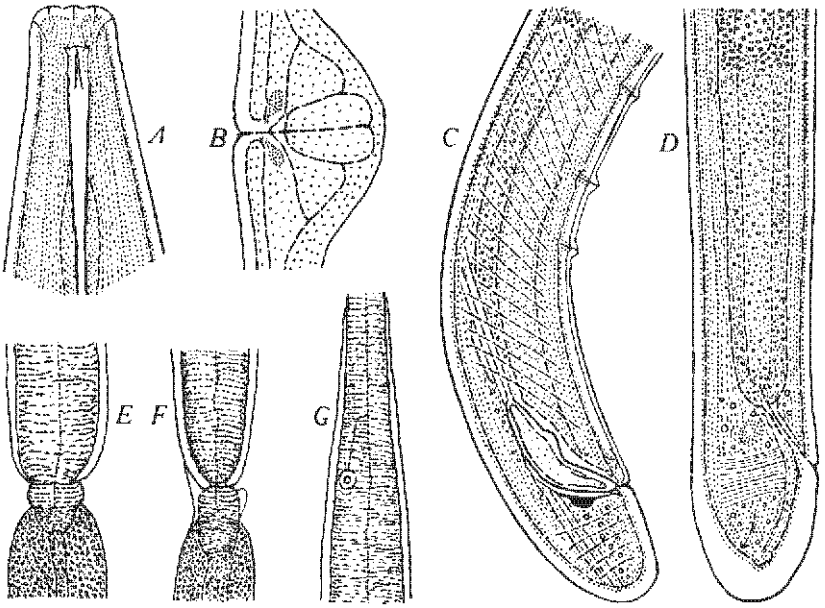


Fig. 46. *Laevides microdens*. Note E and F, variations in cardiac regions. Head and vulva x 1,000, tails and esophagus x 500.

A single male observed among several hundred specimens. Testes and supplements apparently rudimentary. Spicula almost straight with tiny lateral guiding pieces. A thin trough-like gubernaculum may be present. Specimens indexed under *Solidens* 1.

Habitat: Widely distributed in both cultivated and virgin soil from Colorado through Nebraska; North and South Dakota; Minnesota and Iowa.

Genus *Laevides* (Heyns, 1968) new rank

Synonym: *Nygolaimus (Laevides)* Heyns, 1968

Slender elongate species. Body straight when relaxed. Lip region not set off. Tooth somewhat dorylaimoid, shorter than lip region width. Vulva transverse. Tails hemispheroid to bluntly conoid, rarely somewhat clavate. Male with gubernaculum and supplements.

Type species: *Laevides laevis* (Thorne, 1939) new rank

Laevides microdens n. sp.

(Fig. 46, A-G)

2.3 mm; a = 44; b = 4.9; c = 64; V = $^{11}45^{11}$

2.0 mm; a = 46; b = 4.7; c = 63; T = 62

Body usually almost straight, cylindroid except anteriorly where the neck tapers to a lip region ⅓ width of neck base. Lip region rounded, papillae not interfering with contour. Pharynx nygolaimoid with tooth 4-6μ long, deltoid with minute aperture. Esophagus a slender tube until near middle where it gradually expands until ½ to ⅔ width of body, with strong muscu-

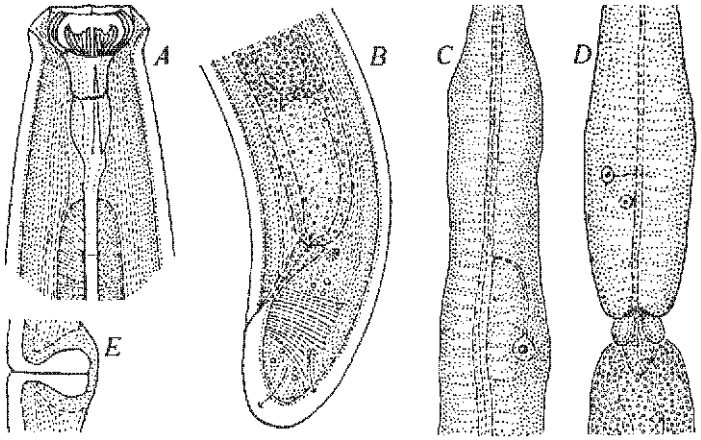


Fig. 47. *Aetholaimus gracilis*. Head x 1,000, other x 500.

lature and obscure, sinuous lumen. Anterior esophageal gland nucleus usually visible but others hidden by dense tissues. Expanded portion surrounded by a conspicuous sheath, its musculature apparently longitudinal. Cardia variable, cylindroid or with disc as illustrated, sometimes with hyaline bodies attached which do not resemble the true cardiac glands of *Nygolaimus*. Intestinal cells packed with golden brown granules. Ovaries reflexed about halfway to vulva with uterine tracts forming elongate spermathecae. Prerectum length about 3 times body width in both sexes.

Males with massive diagonal copulatory muscles, slightly angular spicula and simple lateral guiding pieces. Gubernaculum small, refractive. Supplements 3 or 4. Holotype female, allotype male and other specimens indexed under *Laevides* 1.

Laevides microdens appears to be most closely related to *L. timmi* from which it differs in the much smaller spear, form of cardia and absence of wide-spreading cardiac glands.

Habitat: Soil from swamp, Agricultural Experiment Station, Brookings, South Dakota.

Subfamily Aetholaiminae Jairajpuri, 1965

Lip region broad. Pharyngeal armature basket-like, sclerotized, highly refractive. Three conspicuous glands at base of esophagus as in Nygolaimus. Tails bluntly rounded.

Genus *Aetholaimus* Williams, 1962

Aetholaimus gracilis n. sp.

(Fig. 47, A-E)

1.7 mm; a = 36; b = 4.3; c = 76; V = $^{10}50^{13}$

Body arcuate, especially in posterior third, tapering slightly at extremities. Lip region ⅔ width of neck base, set off by slight depression. Labial

papillae sometimes indistinct, especially the submedian circlet. Lateral field ¼ body width, granular, without distinct cells. Pharyngeal armature reminiscent of *Carcharolaimus* with strongly ribbed bowl-like stoma bearing refractive jagged denticles which form a spear guide. Spear 10-12μ long, tapering, deltoid. Esophagus at first ⅓ neck width, narrowing to ¼ as it passes through the nerve ring, then gradually expanding near middle until ⅔ neck width. Esophageal tissues granular, rather than muscular. Dorsal esophageal gland nucleus unusually far back as illustrated. Median gland nuclei not seen. Cardia hemispheroid, ¾ body width, accompanied by three large nygolaimoid glands. Intestinal cells obscure, packed with fine grayish granules. Prerectum slightly longer than body diameter; rectum length about equal to anal body diameter. Vulva transverse, the labia not sclerotized. Ovaries reflexed ⅔ their length. Vagina length equal to ¼ body width. Eggs about 30 x 100μ. Male not collected and gravid females contained no sperms.

Aetholaimus gracilis is immediately distinguished by the massive stoma armature. Holotype female and other specimens indexed under *Aetholaimus* 1.

Habitat: Shrubbery at roadside rest a few miles north of Elm River, North Dakota.

Family Tylencholaimidae (Filipjev, 1934) Siddiqi, 1969
Subfamily Tylencholaiminae Filipjev, 1934
Genus *Tylencholaimus* de Man, 1876

Position of Tylencholaiminae has long been subject to question. Loof and Jairajpuri (1968) suggested that the subfamily should be placed in Leptonchidae because of certain morphological characters which show a relationship between true dorylaims and leptonchs. However Siddiqi, (1969) resolved the problem by erecting a family to receive them, an act which Ferris (1971) recognized as does the writer. Further studies on the group will doubtless demonstrate the wisdom of this arrangement.

Genus *Tylencholaimus* de Man, 1876

Robust nemas usually less than 1.0 mm in length. Cuticle marked by fine radial striae. Lip region usually cap-like, set off by constriction. Spear length near width of lip region with extensions bearing knob-like expansions. Esophagus usually enlarged near middle by gradual expansion. Ovaries 1 or 2, when single it usually is anterior to the vulva. Tails varying from hemispherical to elongate conoid.

Type species: *Tylencholaimus mirabilis* (Buetschli, 1873) de Man, 1876.

Key to species.

1. Ovaries two ..... *teres*
   Ovary one 2
2. Tail hemispheroid ..... *nanus*
   Tail elongate conoid ..... *proximus*

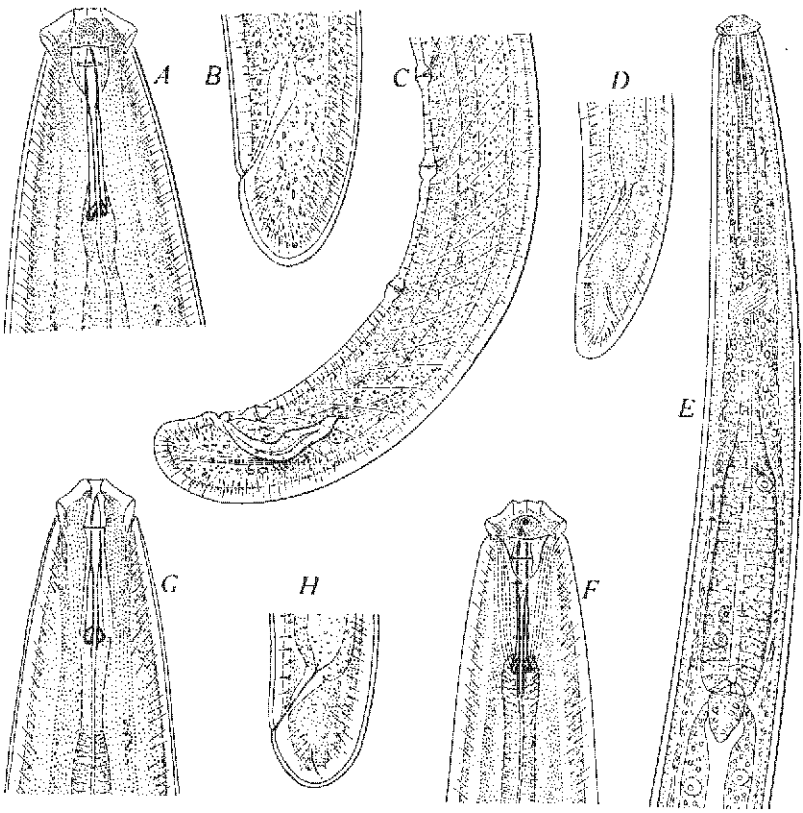


Fig. 48. A-C, *Tylencholaimus teres*. D-F, *T. proximus*. G-H, *T. nanus*. Heads x 1,000, tails x 500. After Thorne, 1939. Courtesy of Martinus Nijhoff.

Tylencholaimus teres Thorne, 1939
(Fig. 48, A-C)

0.8 mm; a = 20; b = 4.7; c = 58; V = $^{17}51^{17}$

Body practically straight when relaxed. Lips set off by constriction, conical, the region about ⅔ width of neck base. Spear length ⅔ head width with well knobbed extensions. Œsophagus enlarged in posterior half by gradual expansion. Cardia cylindroid, ⅓ body width. Ovaries reflexed about halfway to vulva. Eggs were 30 x 80μ. Tail hemispheroid. Male not collected. Specimens slightly smaller, 0.8 : 1.0 mm, than those from Utah. Indexed under *Tylencholaïmus* 3.

Habitat: Native grass sod and cultivated soil from Opal and Emmig, South Dakota; Fargo, North Dakota; Elizabeth, Minnesota and Columbus, Nebraska.

Tylencholaimus proximus Thorne, 1939

(Fig. 48, D-F)

●.4 mm; a=17; b=3.●; c=31; V=^{22}65

Body practically straight when relaxed. Lip region angular, set off by constriction, about ½ width of neck base. Spear length about equal to lip region width, with aperture occupying ⅓ its length. Extensions slightly longer than spear with minute basal swellings. Esophagus enlarged in basal ⅔, with dorsal and 1 pair of gland nuclei visible. Cardia elongate conoid, ½ body width. Anterior ovary very long, reflexed about halfway to vulva. Posterior uterine branch absent. Eggs about ⅓ body length and completely fill body cavity. Prerectum length 3 times body width. Tail elongate conoid with rounded terminus.

Tylencholaimus proximus is immediately recognized by its small size, long neck and single long anterior ovary. Specimens indexed under *Tylencholaimus* 1.

Habitat: A very common inhabitant of both cultivated and virgin soil from many localities in North and South Dakota, Hadashville, Manitoba; Eastern Montana, Ames, Iowa; and Wauneta, Nebraska.

Tylencholaimus nanus Thorne, 1939

(Fig. 48, G, H)

0.64 mm; a=25; b=3.0; c=64; =^{22}72

Body arcuate when relaxed. Lip region set off, conical with easily visible papillae. Spear length equal to lip region width, extensions about the same length bearing distinct knobs. Esophagus gradually enlarged near middle, the neck being unusually long. Cardia cylindroid, about ½ body width. The single anterior ovary is very long, the eggs 20 x 72μ. Prerectum length about 3 times body width. Tail hemispheroid with prominent radial striae.

Tylencholaimus nanus is distinguished by its arcuate body, long neck, single anterior ovary and hemispheroid tail. Specimens filed under *Tylencholaimus* 2.

Habitat: Native sod from Watertown, Mitchell, Presho, Parker and other points in South Dakota and near Miles City, Montana.

Family Longidoridae (Thorne, 1935) Meyl, 1961

During recent years several species of the Longidoridae have been demonstrated to he carriers of certain plant viruses, proving that they are of considerable economic importance. The widespread interest in their hosts and life histories will doubtless prove that they must be involved in numerous other instances of crop decline.

Family *Longidoridae* is characterized by long slender bodies and exceedingly elongate spears with or without flange-like extensions.

Key to genera

Spears with flange-like extensions ..... *Xiphinema*

Spears without flange-like extensions ..... *Longidorus*

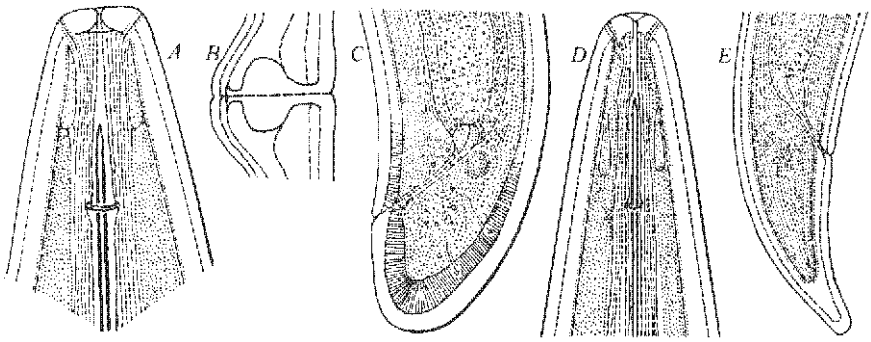


Fig. 49. A-C, *Longidorus crassus*. D, E, *L. fragilis*. Heads x 800, tails x 400.

Genus *Longidorus* (Micol., 1922) Meyl, 1961

Exceedingly long slender nemas with large amphidial pouches and elongated, slender spears without flanges on their extensions.

Type species: Longidorus elongatus (de Man, 1876) T. & S. 1936.

Nemas of this genus usually occur in small numbers and were found in only four localities in the Northern Great Plains.

Longidorus crassus n. sp.

(Fig. 49, A-C)

5.0-6.0 mm; a = 80-107; b = 11.0; c = 118-134; V = 45-51

Body very arcuate to almost spiral. Lip region rounded, papillae not interfering with contour. Tails sub-hemispheroid to slightly conoid. Lateral fields ¼ body width, often appearing as a series of large cells, each with a pore in anterior portion of body while posteriorly these cells are not so conspicuous. Cuticle much thicker just back of head and on tails where it is marked by strong radial striae. Spear 105-115μ long; extensions 65-70μ. Guiding ring conspicuous and the entire lip region is strongly cuticularized to form an additional guiding apparatus. Basal enlargement of esophagus 2.5-3 times body width. Intestinal lumen very narrow. Prerectum length 3-5 times body width. Vulva transverse. Ovaries reflexed ⅓ distance back to vulva (young females). Males not collected and females contained no sperms.

As might be expected for nemas of this type there is considerable variation in total length and in a and c measurements.

Habitat: Small numbers from native sod, Cottonwood Experiment Station and Presho, South Dakota and about roots of white oak, Ames, Iowa.

Longidorus fragilis n. sp.

(Fig. 49, D, E,)

5.3 mm; a = 103; b = 13.2; c = 81; V = 49

Body arcuate, almost spiral. Head rounded, the papillae not interfering with contour. Tail elongate conoid, ventrally arcuate to bluntly round-

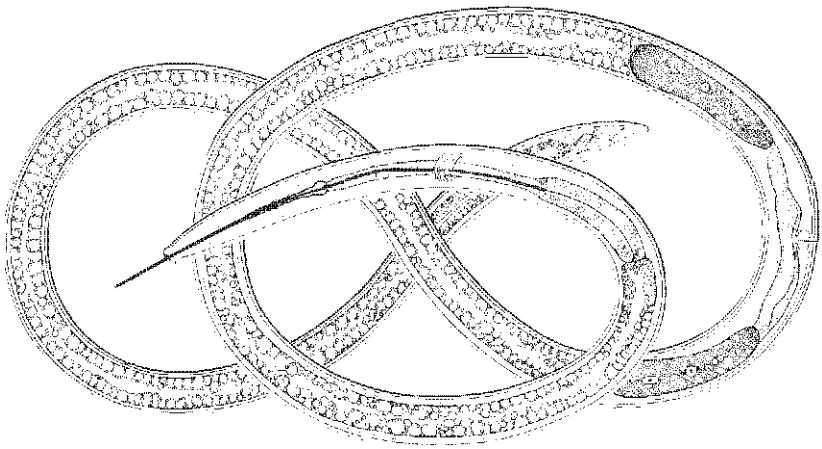


Fig. 50. *Xiphinema americanum*. After Cobb. Courtesy of Nematology Investigations, U. S. Department of Agriculture.

ed terminus. Lateral field ¼ body width, a series of large cells each with a pore. Cuticle with thick layers on anterior and posterior parts of body. Spear 94μ long, very slender, about 1μ in width, hence the specific name *fragilis*. Basal portion of esophagus 2½ times body width. Cardia conoid. Intestine with large spheroid granules. Prerectum 7-10 times body width. Vulva transverse with muscular labia. Ovaries reflexed ⅔ back to vulva. Males unknown.

Longidorus fragilis is distinctive because of its length, tapering, rounded lip region, very slender spear, elongate-conoid, arcuate tail with blunt, rounded terminus and monosexuality. Most closely related to *L. longicaudatus* Siddiqi, 1962 and *L. afzali* Kahn, 1964 from which it differs in the tapering, rounded lip region.

Habitat: Two well developed females from river bank soil near Breckenridge, Minnesota.

Genus *Xiphinema* Cobb, 1913

Spear greatly attenuated with extensions bearing elongate, basal flanges. Spear guiding ring deep in the pharynx. Basal part of esophagus 2-4 times as long as body width. Vulva transverse with muscular labia. Ovaries 1 or 2. Tails hemispheroid to elongate cylindroid. Males often unknown or rare. Species are not assigned to subgenera as outlined by Cohn and Sher, 1972.

Type species: *Xiphinema americanum* Cobb, 1913

Key to species found in the Great Plains Region.

1. Ovary single ..... *chambersi*
   Ovaries two 2
2. Tail conoid, bluntly rounded ..... *americanum*
   Tail hemispheroid with peg like terminus ..... *vuittenezi*

Xiphinema americanum, Cobb, 1913. The American Dagger Nematode (Fig. 50. Fig. 51, A-C)

2.0 mm; a=52; b=7.0; c=54; V=$^{18}50^{18}$
2.0 mm; a=58; b=5.5; c=55; T=50

Body spiral when relaxed, cylindroid except at extremities. Lateral field ¼-⅓ body width, composed of a series of chain-like cells, each with a distinct pore. Lip region set off by slight depression, the papillae slightly elevated. Spear 80-90μ long with 44-50μ long extensions which are modified into elongate, flange-like expansions. Guiding ring fragile, double. Cuticle about the vestibule must be very strong for it functions as a spear guide without being sclerotized. Basal portion of esophagus 2½-3 times as long as neck width. Cardia simple, conoid. Intestinal cells packed with coarse, hyaline granules. Prerectum length 4-6 times body width. Rectum length near anal body diameter. Tail varying from bluntly conoid to dorsally convex-conoid, sometimes almost subacute.

Males rather common in Great Plains populations but in no instance have they been observed fertilizing the associated females. Many have normally developed testes producing spermatozoa while in others the testes are rudimentary. Supplements 5-8, mammiform. Spicula slightly arcuate. Muscle bands 14-22. Tail slightly arcuate, usually somewhat shorter than that of female.

Habitat: One of the most common nemas of the Great Plains. Found about roots of all kinds of plants from native grass to cottonwood trees, feeding ectoparasitically with apparently no indication of choosing hosts. Especially prevalent in windbreaks where decline and dieback are present. Doubtless it is the primary parasite making openings through which fungi and bacteria enter to join in the destruction of root systems. In severely infested trees it generally is almost impossible to find a single live feeder root.

Xiphinema americanum is attacked by a bacterial parasite which enters the body through the vulva, migrates through the gonads and completely destroys the ovaries. It is not unusual to find a specimen in which one ovary has been destroyed while the other is producing eggs. In the Great Plains area and other north central states the incidence of infested females usually ranges from 5% to 10%. However, in Puerto Rico in the vicinity of the Agricultural Experiment Station near Rio Piedras, it is difficult to find *X. americanum* and almost every one is parasitized by the bacterium. Under these humid, warm conditions the parasite gives an almost complete control.

When processing soil for *X. americanum* use cold water and work rapidly, which will give a recovery of 90-95% through the funnels. But if the water is warm the nemas go into shock, cease movement and only a small portion will be recovered.

In the writer's opinion, *X. americanum* causes more damage to crops, orchards and timber than any one species of nematode in the United States.

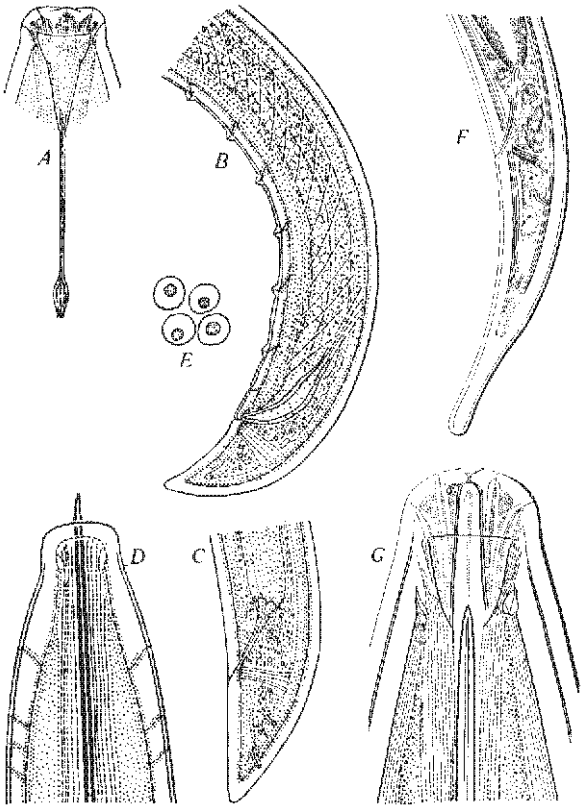


Fig. 51. A-C, *Xiphinema americanum*. D, *X. vuittenezi*. E-G, *X. chambersi*, F, G, by Chambers. Courtesy of Nematology Investigations, U. S. Department of Agriculture.

Xiphinema chambersi Thorne, 1939
(Fig. 51, E-G)

2.5 mm; a=55; b=6.1; c=21; V=25

Body slightly arcuate, especially posteriorly, cylindroid except at extremities. Lateral field ¼ body width with obscure cells in which granular nuclei can occasionally be seen. Cuticle with 2 distinct layers, much thicker in head region. Lips rounded with distinct papillae. Entrance to pharynx strongly cuticularized to form a guide for the spear, but this is not refractive. Guiding ring near base of spear, frail, double and moves forward as the spear is extruded. Spear 130μ long with 80μ long well flanged extensions. Enlarged portion of esophagus 2½ to 3 times width of neck. Cardia a simple convex conoid body ½ body width. Intestinal cells packed with

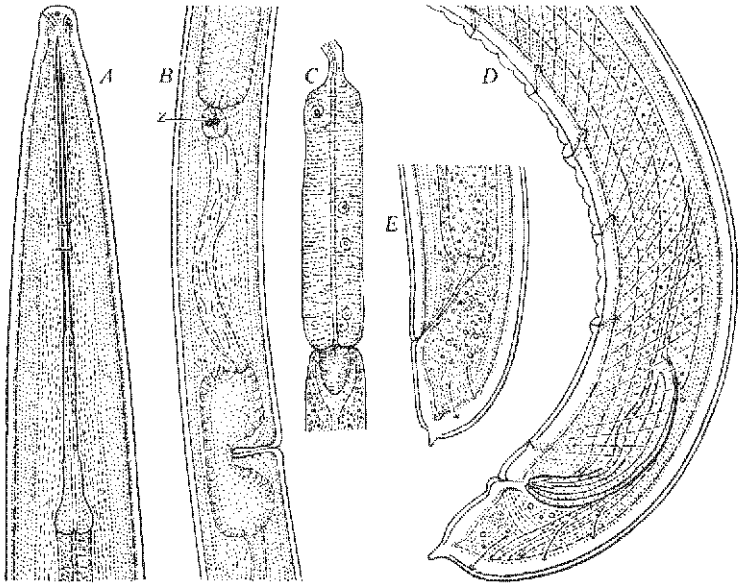


Fig. 52. *Xiphinema vuittenezi*. B, note "Z" organ.

coarse hyaline granules. Prerectum length 2-3 times body width. Rectum about 1½ times anal body diameter. Vulva a deep, transverse slit with muscular labia. The single ovary is reflexed about ⅓ its length in the young females examined and doubtless would be longer in mature specimens. The body cavity of one specimen contained great numbers of a parasite, *Duboscquia*? Males not collected and females had not been spermatized. In larger collections from Wisconsin males were not present and probably are very rare.

Xiphinema chambersi is immediately recognized by the single ovary and the long tail with cylindroid terminal third, often slightly bent dorsally.

Habitat: About roots of white oak near Ames, Iowa.

Xiphinema vuittenezi Luc et al, 1964

(Fig. 51, D, Fig. 52, A-E)

3.8 mm; a=76; b=9.0; c=120; V=$^{10}47^{10}$

3.7 mm; a=79; b=9.4; c=116; T=53

Body arcuate, especially posteriorly. Lateral fields ¼ body width with obscure cells and pores. Cuticle with distinct outer layer, doubly thick just posterior to lip region. Lip region set off by slight depression. Amphid apertures high on lips, seen as an obscure line. Spear 100μ long (94-105), extensions 69μ (64-72). Guiding ring double but very frail. Esophagus at first a slender tube, then abruptly expanded to a basal enlargement 75-90μ long. Esophageal gland nuclei as illustrated, the submedian usually obscure. Cardia conoid without disc. Intestinal cells with few colorless granules and very narrow lumen. Vulva a deep, transverse slit with muscular labia. Spermatheca 2 to 3 times as long as body width. Z organ usually visi-

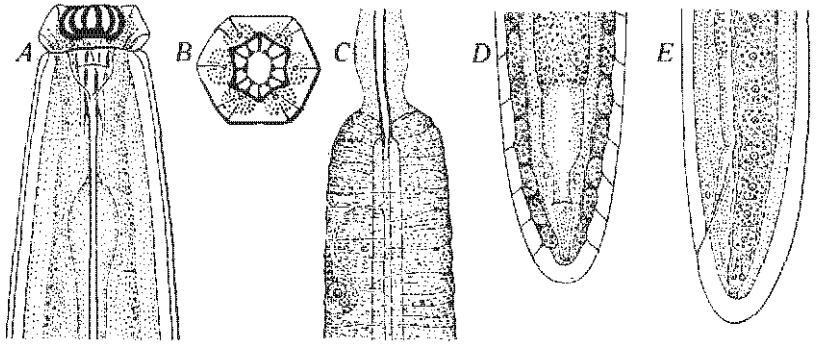


Fig. 53. *Carcharolaimus teres*. After Thorne, 1939. Courtesy of Martinus Nijhoff.

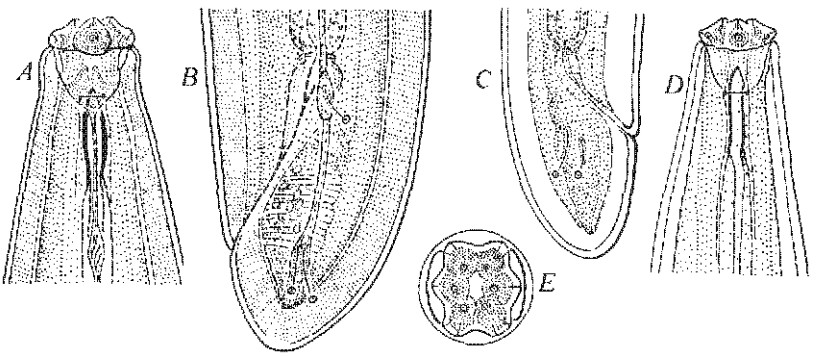
ble. Ovaries reflexed about halfway to vulva. Slender bodies, unidentified, 8-10μ long usually present in uteri. Prerectum about 10 times as long as body width. Males numerous with 5 or 6 low, mammiform supplements, sometimes closer together than those illustrated. Spicula arcuate, massive with tiny lateral guiding pieces. Tails of both sexes ending in a small cuticular process or peg.

Xiphinema vuittenezi is immediately recognized by its large size, terminal peg, symmetrical ovaries and median located vulva.

Habitat: Native prairie sod, Cottonwood Experiment Station and near Presho and Howes, South Dakota.

This species was collected by M. Luc, M. B. Lima, B. Weischer and J. J. M. Flegg in France, Portugal, Germany and England and their joint observations combined in one description. Specimens without a terminal peg were found in Portugal, otherwise the South Dakota nemas correspond very closely with those from Europe. Males rare in Europe but numerous in South Dakota.

Fig. 54. A, B, *Axonchium micans*. C-E, *A. solitare*. After Thorne, 1939. Courtesy of Martin Nijhoff.



Superfamily ACTINOLAIMOIDEA Thorne, 1967
Family CARCHAROLAIMIDAE, Thorne 1967
Subfamily CARCHAROLAIMINAE Thorne, 1967
Genus *Carcharolaimus* Thorne, 1939
Carcharolaimus teres Thorne, 1939
(Fig. 53, A-E)

1.6 mm; a=37; b=4.2; c=65; V=$^{10}47^{10}$

Body cylindroid, very slightly arcuate. Lateral fields ⅛ body width composed of conspicuous cells, each with a pore. Lip region set off by deep constriction with prominent papillae. Pharynx armed with a massive sclerotized, basket-like framework with jagged denticles in its base. Spear about 15μ long, its aperture occupying ¼ to ⅓ its length. Esophagus at first a slender non-muscular tube, suddenly expanded just anterior to middle. Basal portion cylindroid, filling body cavity. Cardia a thick disc followed by a convex conoid valve. Vulva with muscular labia, ovaries reflexed ½ distance back to vulva. Spermathecae not present nor were sperms present in the uterine tract. Males not collected in the Great Plains area. Among specimens from widely separated collections there are occasionally variations in the spear length, enlarged portion of the esophagus, neck length and tail shape which may vary from hemispheroid to conoid.

Habitat: Both cultivated and virgin soil from southern Colorado to Manitoba, Canada.

Collections from swamps, stream banks and other wet areas would doubtless reveal some of the truly aquatic species of actinolaims.

Superfamily BELONDIROIDEA Thorne, 1964
Family AXONCHIIDAE (Thorne, 1964) Siddiqui, 1968
Genus *Axonchium* Cobb, 1920

Nemas with unusually long, slender, pointed necks. Enlarged portion of esophagus set off by constriction and surrounded by a sheath of muscles which may be spiral. Anterior ovary rudimentary, posterior normal. Tails bluntly rounded. Males bearing a series of ventromedian supplements which may be adjacent or spaced.

Type species: *Axonchium amplicolle* Cobb, 1920.

Small numbers of *Axonchium* were collected throughout the region but the number of species was surprisingly small, only 2 being definitely identified.

Axonchium micans Thorne, 1939
(Fig. 54, A, B)

2.8 mm; a=40; b=3.8; c=70; V=$^{4}53^{14}$

Head set off by slight depression. Spear somewhat fusiform, about as long as width of lip region. Amphids forming a deep pocket about lips. About ⅔ of esophagus enlarged. Cardia cylindroid. Anterior uterine branch 2-3 times as long as body width. Posterior ovary reflexed about ½ its length. Prerectum length 4-5 times body width. Tails bluntly rounded with conspicuous radial striae, slightly longer than those of type specimens from forest soil near Washington, D. C.

Habitat: A rare species from native sod, Columbus and Valentine, Nebraska, Norwich, North Dakota, and cottonwood near Brookings, South Dakota.

Axonchium solitare Thorne, 1939

(Fig. 54, C-E)

1.8 mm; a = 41; b = 3.0; c = 65; V = $^{5}52^{14}$

Body arcuate, twisting anteriorly until amphids usually are seen from a dorsoventral view. Spear length about 10μ with 2μ aperture. Esophagus enlarged in posterior ⅓ to⅖. Muscular sheath apparently not spiral. Anterior rudimentary uterine branch varying from a slender flaccid tube to a slightly enlarged chamber with cellular extensions 2-3 times as long as body width. Prerectum 6-8 times as long as body width. Tail varying from almost hemispherical to bluntly convex conoid. Males unknown. Specimens indexed under *Axonchium* 2.

Axonchium solitare is identified by its size, very narrow, twisted lip region, slender spear with short aperture and monosexuality.

Habitat: Common in prairie sod from many localities in North and South Dakota, eastern Montana and from Moosomin, Saskatchewan and Hadashville, Manitoba, Canada. Usually only 1 or 2 specimens in a collection.

Belaxellus new genus

Diagnosis: Belondiroidea. Body resembling that of a belondirid with tapering neck and bluntly rounded tail. Oral opening with 4 sclerotized plates as in *Dorylaimellus*. Esophagus expanded without a constriction as in *Belondira*. Ovaries two, reflexed. Supplements in a ventromedian series as in *Axonchium*. This generic name is composed of portions of the three named genera, which it resembles in the characters listed. Designation to family is questionable.

Type species: ***Belaxellus elegans*** n. sp.

(Fig. 55, A-I)

2.2 mm; a = 46; b = 5.3; c = 73; V^{10}45^{13}

2.0 mm; a = 53; b = 5.3; c = 73; T = 48

Lateral field in esophageal region about as wide as cuticle, expanding to ¼ body width near middle. Lateral cells conspicuous with a single pore arising from dorsal side of cell. A series of ventromedian cells also present, each with a slender ampulla extending through cuticle. Hemizonid prominent, opposite nerve ring. Lip region angular with amphids almost surrounding head. Spear 12μ long with aperture ⅓ its length; extensions 17μ long. Esophagus a slender tube until it rather abruptly expands to the basal ⅖ which is ⅔ neck width. This expanded portion is enveloped by a muscular sheath which apparently is not spiral. A thin shield present at base of esophagus. Cardia almost spheroid, differing from that of any other known belondirid. Intestine with fine, scattered brown granules. Vulva transverse with muscular labia. Ovaries reflexed. Uteri packed with spermatozoa. A developing egg was 4 times as long as body width.

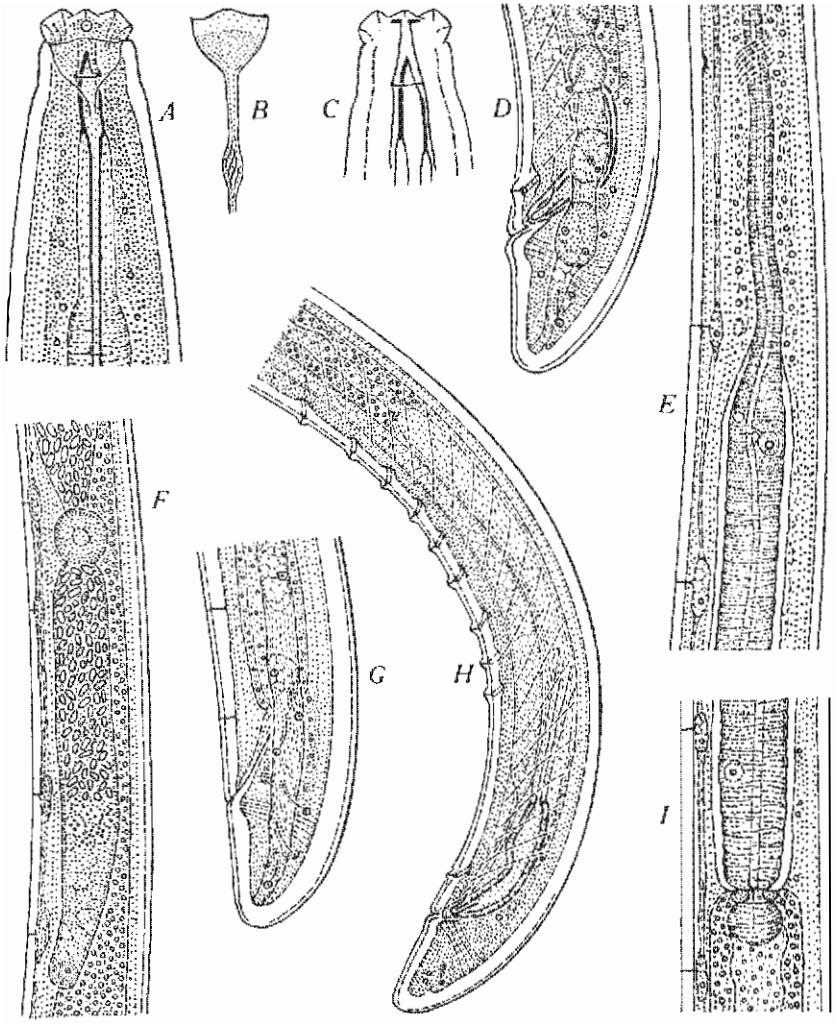


Fig. 55. *Belaxellus elegans*. C, note sclerotized pieces about oral opening. E, anterior portion of esophagus not set off by constriction. H, arrangement of supplements as in *Axonchium*.

Male slightly more slender than female. Supplements 5-9. Details as shown in Fig. 55, A, D and H.

Holotype female and allotype male from alfalfa field near Huron, South Dakota. Tails were somewhat longer in a collection from windbreak 5 miles west of Clark, South Dakota.

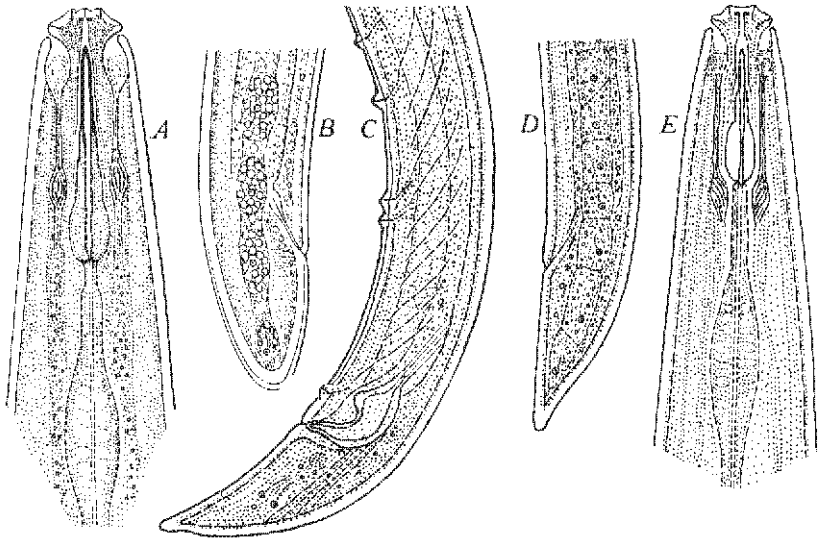


Fig. 56. A, B, *Dorylaimellus occidentalis*. After Thorne, 1939. Courtesy of Martinus Nijhoff. C-E, *D. virginianus*.

Family DORYLAIMELLIDAE (Jairajpuri, 1964) Thorne, 1964

Genus *Dorylaimellus* Cobb, 1913

Refractive, sclerotized pieces about oral opening. Spear with flanges. Enlarged portion of esophagus with a strong muscular sheath which may be slightly spiral in some instances. Spicula relatively short but massive, with strong ventral angle. Supplements with an unusual arrangement as illustrated.

Type species: ***Dorylaimellus virginianus*** Cobb, 1913

(Fig. 56, C-E)

1.5 mm; a = 37; b = 3.3; c = 43; V = $^{13}58^{11}$

1.5 mm; a = 43; b = 3.7; c = 37; T = 57

Body usually twisted until the huge amphid pouches are seen from a dorsal or ventral view, setting off lip region by deep constriction. Lateral fields composed of series of conspicuous cells, each with a distinct pore. Refractive pieces about entrance to oral opening. Spear tripartite with well developed basal flanges. A fusiform enlargement in esophagus a short distance behind spear. Esophagus enlarged in posterior ⅓ with strong muscular sheath which may sometimes be slightly spiral. Cardia elongate conoid. Prerectum length of female about 4 times body width, that of male extending slightly past range of supplements. Tails slightly digitate to conoid.

Small numbers of *Dorylaimellus* were found scattered about the region but only two species were definitely identified, the remainder must await a study of over 40 species of the genus which have been described.

Habitat: A single collection from native prairie sod by highway just east of Dunniston, North Dakota.

Dorylaimellus occidentalis Thorne, 1939

(Fig. 56, A, B)

0.8 mm; a=28; b=3.3; c=36; V=$^{48}53^{48}$

Body twisted until amphids are usually seen from a dorsal or ventral view. Lateral field a chain of large cells with the usual pores. Sclerotized pieces about oral opening prominent. Spear slightly longer than lip region width with characteristic extensions and flanges. Esophagus with usual fusiform expansion posterior to spear, then a very slender tube until it gradually expands to form the basal portion which is about ⅔ the total length. Cardia bluntly cylindroid. Intestine with scattered colorless granules. Vulva transverse with muscular labia. Ovaries short, often forced out of place by eggs which are 4-5 times as long as body width. Prerectum about 4 times body width. Tail bluntly convex conoid with usual conspicuous cells of lateral field.

Habitat: Prairie sod near Boulder, Colorado, Dunniston and Tagus, Highway 281, state line between North Dakota and Montana. Stream bank west of Brookings, South Dakota.

Superfamily Leptonchoidea (Thorne, 1935) Ferris, 1971

Family Leptonchidae Thorne, 1935

Genus *Leptonchus* Cobb, 1920

Nemas under 2.0 mm long. Subcuticle strongly striated, often separated from outer layer. Lateral cords with 2 lines of coarse pores. Spear very small with sclerotized, arch-like guide. Esophagus with a fusiform or pyriform basal bulb less than 2 body widths long. Intestinal cells with coarse dark brown granules, often arranged in tesellated pattern. Prerectum 2-5 body widths long or extending far forward past reproductive system. Post rectal blind sac present. Caudal pores near terminus. Tails hemispheroid to bluntly conoid.

Type species: *Leptonchus granulosus* Cobb, 1920

Key to species

1. Prerectum extending forward past reproductive organs ..... *granulosus*
   Prerectum 2-5 times body width 2
2. Vulva with lateral membranes ..... *fimbriatus*
   Vulva without lateral membranes ..... *microdens*

Leptonchus granulosus Cobb, 1920

(Fig. 57, A-C)

1.2 mm; a=26; b=4.6; c=79; V=$^{16}60^{14}$

Body slightly arcuate when relaxed. Subcuticle coarsely striated, frequently separated from outer layer. Lateral cords ⅓ body width with 2 rows of coarse pores. Lip region cap-like, set off by constriction. Amphids beaker shaped, almost as wide as head. Spear very slender, often slightly curved with indistinct aperture. Spear extensions well developed. Esophagus a slender tube with fusiform to pyriform basal bulb. Intestine a conspicuous feature because it is only 2 to 5 times longer than body width. Prerectum

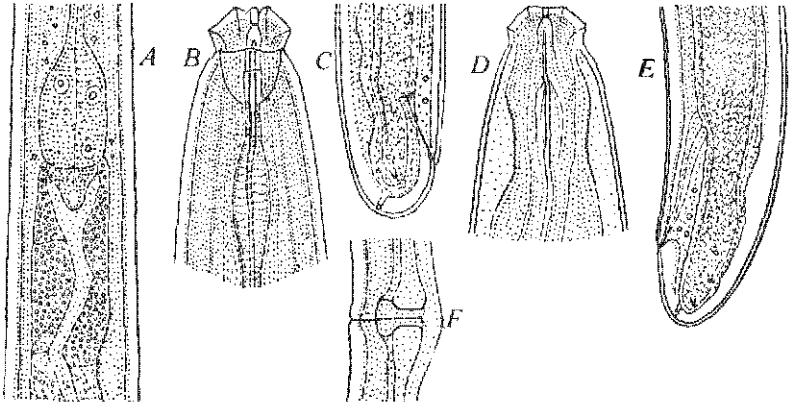


Fig. 57. A-C, *Leptonchus granulosus*. D-F, *L. microdens*.

extending forward past reproductive system, a most unusual feature of this species. Vulva transverse with muscular labia. Ovaries reflexed half way to vulva. Eggs about 3 times body width, forcing ovaries out of position when present. Males not found in this area, and very infrequently in other regions where associated females do not contain sperms.

Leptonchus granulosus is immediately recognized by the elongated prerectum and very short, hemispheroid tail. Specimens indexed under *Leptonchus* 1.

Habitat: A common inhabitant of virgin and cultivated soil from Nebraska to eastern Montana, Minnesota, Iowa and the Dakotas.

Leptonchus microdens n. sp.
(Fig. 57, D-F)

1.2 mm; a = 26; b = 4.6; c = 69; V = $^{20}58^{17}$

Body almost straight when relaxed. Subcuticle strongly striated with many areas separated and forming clear areas in body cavity. Lateral fields about ½ body width with conspicuous row of pores. Lip region set off by depression with low, obscure papillae. Oral opening sclerotized with arch shaped spear guiding ring. Spear exceedingly slender with aperture and lumen difficult to observe. Junction of spear extensions and esophageal lumen not definitely determined. Anterior esophagus a slender tube with a fusiform basal enlargement about 1½ times as long as body width. Cardia conoid. Intestinal cells with coarse dark brown granules which frequently form a tesellated pattern. Prerectum length 2-3 times body width. Vulva transverse. Ovaries reflexed ⅔ way back to vulva. Eggs about twice as long as body diameter. Spermatozoa present in uterine tract but males not collected.

Leptonchus microdens is immediately distinguished by the exceedingly small, slender spear, short prerectum and bisexuality.

Habitat: Wheat and barley plots, Experiment Station, Watertown, South Dakota.

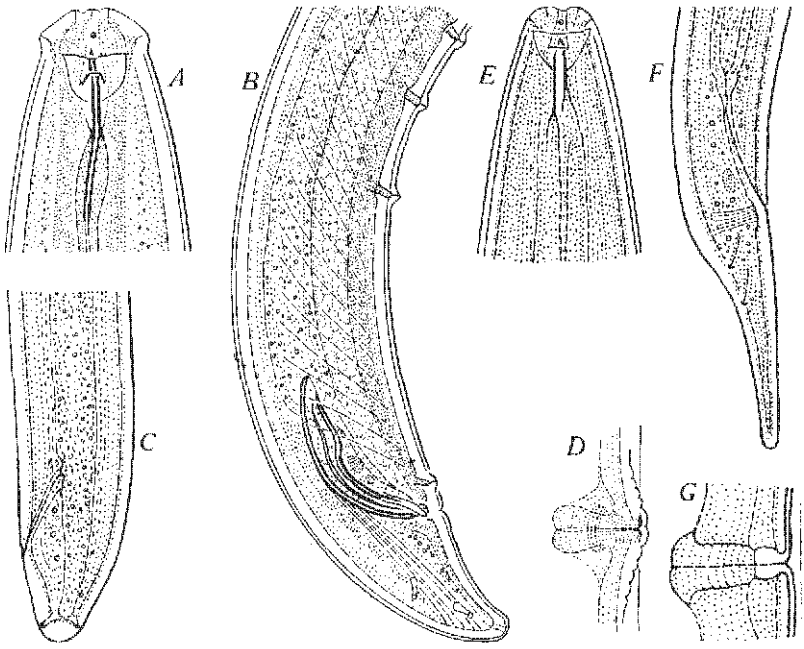


Fig. 58. A-D, *Leptonchus fimbriatus*. After Thorne, 1939. Courtesy of Martinus Nijhoff. E-G, *Dorylaimoides micoletzkyi*.

Leptonchus fimbriatus Thorne, 1939
(Fig. 58, A-D)

1.2 mm; a=30; b=5.4; c=47; V=$^{14}58^{14}$
1.2 mm; a=37; b=5.6; c=44; T=56

Female body practically straight, male arcuate in posterior fourth. Inner cuticle with numerous folds and striae. Lateral fields with the usual series of conspicuous pores. Lip region set off by depression. Spear very slender, about as long as width of lip region. Esophagus with basal bulb slightly longer than body width. Intestine tesellated with rather coarse bright brown granules. Female prerectum 4-6 times as long as body width; that of male extending somewhat anterior to supplement series. Male tail slightly arcuate. Vulva transverse, bordered by serrate membranes. Ovaries reflexed about halfway to vulva.

Leptonchus fimbriatus is immediately distinguished by presence of numerous males with slightly elongated arcuate tails and membranes bordering the vulva. Specimens filed under *Leptonchus* 3. Note that these specimens are considerably smaller than those from the mountains of Utah, 1.2 : 1.8 mm.

Habitat: Small numbers from native prairie sod near Sidney and Miles City, Montana, and Coleman, South Dakota.

Family DORYLAIMOIDIDAE Siddiqi, 1969

Genus *Dorylaimoides* Thorne and Swanger, 1936

Nemas less than 2.0 mm long with lip region set off by slight depression. Spear more asymmetrical than that of *Dorylaimus* with extensions branching out forming a slight chamber. Esophagus with a weak elongated muscular bulb. Vulva transverse with muscular labia. Supplements dorylaimoid in arrangement. Tails bluntly rounded to digitate.

Type species: *Dorylaimoides teres* Thorne and Swanger 1936.

Key to species

1. Tails bluntly rounded ..... *teres*
   Tails subdigitate to digitate 2
2. Tails subdigitate ..... *elegans*
   Tails elongate-digitate ..... *micoletzkyi*

Dorylaimoides teres Thorne and Swanger, 1936

(Fig. 59, A-E)

1.2-1.6 mm; a = 36; b = 5.6; c = 31-45; V = $^{15}48^{15}$

1.2-1.5 mm; a = 41; b = 5.5; c = 43; T = 54-60

Body distinctly arcuate, somewhat hooked in male, twisted anteriorly until the head usually seen dorsoventrally. Lateral fields about ¼ body width without visible pores. Labial papillae low, rounded. Spear 16-18μ long with very short aperture and flaring basal extensions. Esophagus a slender flaccid tube with basal expansion 2-3 body widths long, this expanded portion only about ½ neck width. Cardia conoid without disc. Intestine usually rather hyaline with minute scattered granules. Prerectum 3-4 body widths long. Rectum slightly longer than anal body diameter. Vulva transverse. Ovaries reflexed ½-⅔ distance back to vulva. Uterus forming an elongate spermatheca often packed with sperms.

Male similar to female in general body form. Supplements 5-7, mammiform. Spicula arcuate with slight ventral angle.

Dorylaimoides teres is frequently found in North and South Dakota, with one collection from Barnesville, Minnesota. Males usually are found and spermatized females indicate that they are functional. Considerable variation in size and tail length will be noted but not sufficient to justify establishing new species. Specimens filed under *Dorylaimoides* 2.

Dorylaimoides elegans Thorne and Swanger, 1936

(Fig. 59, F-J)

1.4 mm; a = 38; b = 5.8; c = 31; V = $^{15}45^{15}$

1.2 mm; a = 42; b = 4.6; c = 28; T = 47

Body slightly arcuate, somewhat hooked in male. Anterior end twisted until amphids are seen dorsoventrally. Spear about 8μ long. Esophagus a slender tube until gradually expanded in basal portion which is about 2½ times as long as body width. Cardia conoid. Intestine hyaline with scattered fine granules. Prerectum length 4-5 times body width. Ovaries reflexed ⅔ distance back to vulva. An egg was 18μ long. Males with 4-6 small, mammiform supplements. Specimens filed under *Dorylaimoides* 1.

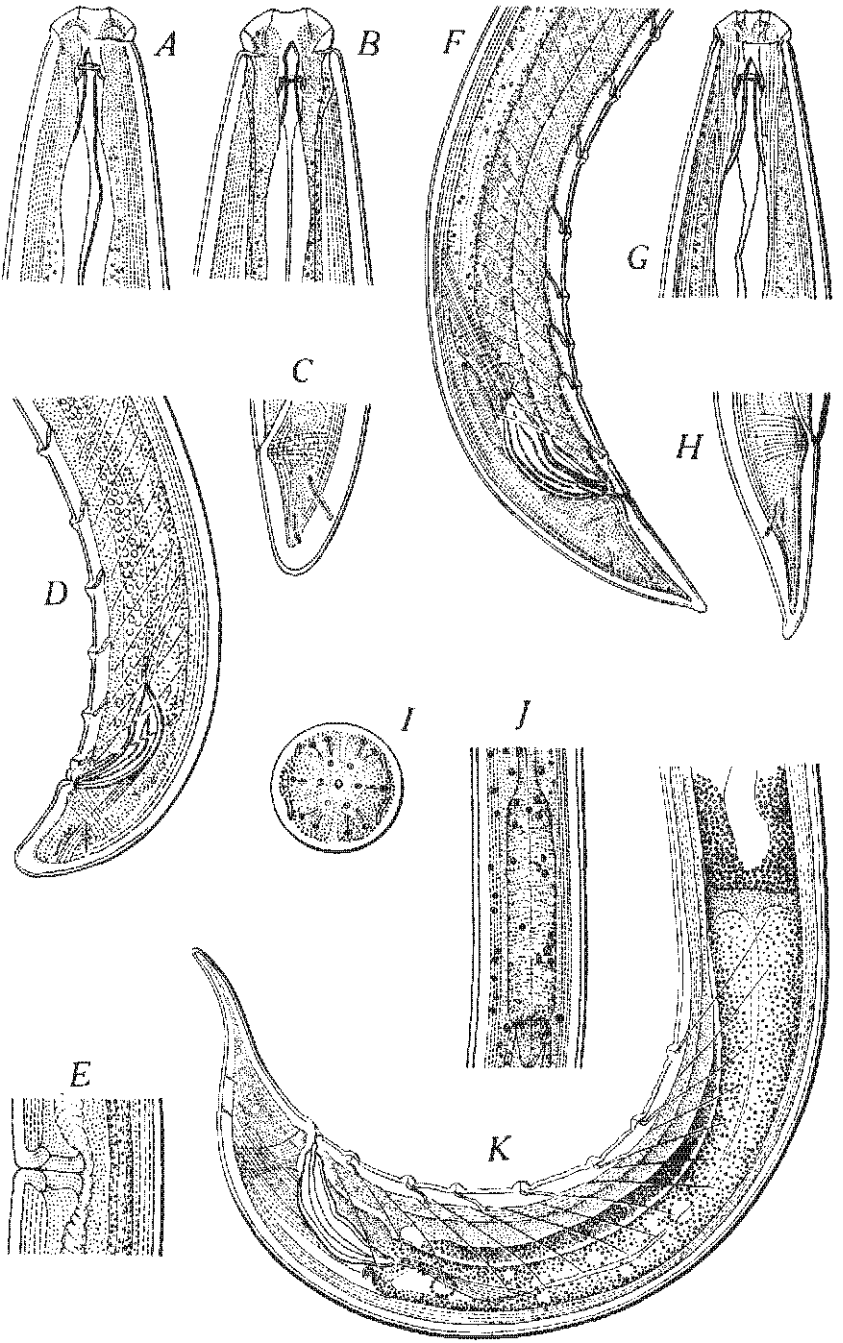


Fig. 59. A-E, *Dorylaimoides teres*. F-J, *D. elegans*. K, *D. micoletzkyi*. After Thorne, 1939. Courtesy of Martinus Nijhoff.

Dorylaimoides elegans is generally distributed from Boulder, Colorado north into Manitoba and Saskatchewan, Canada.

Dorylaimoides micoletzkyi (de Man, 1921) T. & S., 1936

Synonym: *Dorylaimus micoletzkyi* de Man, 1921

(Fig. 58, E-G, 59, K)

1.6 mm; a = 37; b = 6.1; c = 22; V = $^{12}44^{12}$

1.4 mm; a = 38; b = 5.8; c = 21; T = 64

Body very arcuate, especially in posterior portion of male. Tails of both sexes digitate, often slightly bent dorsally, a very distinct, identifying feature. Lip region rounded, not twisted as frequently occurs in other species. Lateral fields about ⅛ body width, without visible pores. Spear 10μ long with dorsal side extended much farther than ventral with very short aperture. Guiding ring narrow, refractive. Esophagus with posterior enlargement about 2½ body widths long and ½ body width. Cardia conoid. Intestine with rather large, dark refractive granules, especially in anterior portion. Prerectum length 4-5 times body width, rectum much longer than anal body diameter. Vulva with muscular labia. Vagina extending about halfway across body. Uterine branches acting as elongate spermathecae, often packed with great numbers of sperms. Ovaries reflexed ⅓ distance to vulva. Males numerous, their tails usually bent dorsally. Supplements 4-6, mammiform. Spicula with small ventral angle.

Dorylaimoides micoletzkyi is immediately recognized by the tail form.

Habitat: Cultivated and virgin soil from Bear Butte, Wilmot, Sisseton and other points in South Dakota; Belmont, North Dakota and Barnesville, Minnesota.

Family TYLENCHOLAIMELLIDAE (Jair., 1964) Siddiqi, 1969

Genus *Tylencholaimellus* M. V. Cobb, 1915

Nemas under 2.0 mm long, usually less than 1.0 mm. Adanal pair of supplements, ventromedian absent or only 1 or 2. Lip region rounded to angular. Spear with unusual dorsal stiffening piece and flange-like knobs. Esophagus a slender tube with short basal bulb. Posterior ovary present, anterior uterine branch absent or as long as 3 times body width. Vulva transverse. Tails bluntly rounded.

Type species: *Tylencholaimellus diplodorus* M. V. Cobb, 1915

Members of this group frequently appear in collections throughout the region. Only 4 species are included herein but there are specimens of at least 4 more in the collection. The massive spear and incongruous small, weak basal esophageal bulb make it difficult to envision the host and method of feeding. Details of the spear are illustrated (Fig. 60 D).

Key to species of *Tylencholaimellus*

1. Lip region with sclerotized disc ..... *coronatus*
   Lip region without sclerotized disc 2
2. Lips rounded ..... *magnidens*
   Lips angular 3
3. Tail length about equal to anal body diameter ..... *grandis*
   Tail length about 1½ times anal body diameter ..... *striatus*

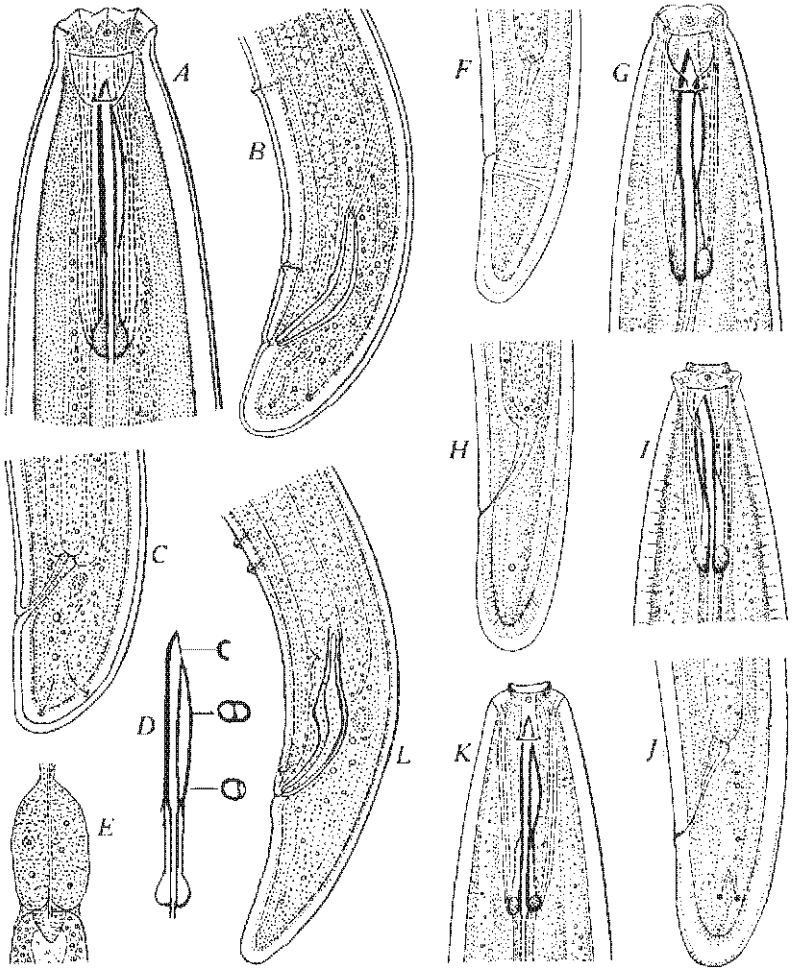


Fig. 60. A-E, *Tylencholaimellus grandis*. Note structure of spear as shown in D. F, G, *T. magnidens*. H, I, *T. striatus*. J-L, *T. coronatus*. F-K courtesy Martinus Nijhoff.

Tylencholaimellus grandis n. sp.

(Fig. 60, A-E)

1.1 mm; a = 26; b = 6.0; c = 42; V = $^{8}40^{22}$

1.1 mm; a = 24; b = 6.0; c = 48; T = 41

Body slightly arcuate, usually somewhat twisted. Lip region angular, set off by narrowing and depression. Spear 35μ long with broad flanged knobs, the duplex portion occupying ⅔ its length. Esophagus a slender tube until suddenly expanded into the basal bulb which is about half the neck width and twice as long as wide. Cardia simple, conoid. Anterior uterine

branch a rudimentary pouch 2-3 times as long as body width, forming a large spermetheca which often is filled with sperms. Posterior ovary slender and elongated, often reflexed almost to vulva and composed of 25-30 oocytes in single file. Female prerectum length 4-5 times body width.

Male tail more arcuate, with or without a single ventromedian supplement. Spicula with a slight ventral angle. Specimens indexed under *Tylencholaimellus* 1.

Habitat: Native prairie sod in numerous locations from Trinidad, Colorado north through Nebraska and South Dakota. Sometimes also collected from windbreaks.

Tylencholaimellus magnidens Thorne, 1939)

(Fig. 60, F, G)

0.8 mm; a = 31; b = 5.5; c = 28; V = $^{3}32^{24}$

Body slightly arcuate, tapering gradually both ways from near middle. Lip region set off by slight depression, the lips low and rounded. Spear massive, 20μ long. Esophageal bulb half as wide as neck and 3 times as long as wide. Cardia flatly conoid. Intestine usually rather hyaline. Vulva transverse. Anterior uterine branch rudimentary, posterior very long, reflexed about ⅔ distance to vulva. Eggs about 3 times as long as wide, filling body cavity and sometimes forcing their way into the rudimentary anterior uterine branch. Males not collected and gravid females contained no sperms. Details of tail region as illustrated.

Tylencholaimellus magnidens is distinguished by the slightly set off lip region, elongated spear, short anterior uterine branch and monosexuality. Specimens filed under *Tylencholaimellus* 7.

Habitat: A single collection from wheat field soil just west of Minot, North Dakota.

Tylencholaimellus striatus Thorne, 1939

(Fig. 60, H-I)

0.7 mm; a = 28; b = 4.7; c = 24; V = $^{34}22$

Body rather arcuate, slightly twisted. Cuticle marked by easily visible transverse striae and very prominent radial striae. Lip region very angular with disc-like structure around oral opening. Spear 16μ long with well knobbed extensions. Esophagus ending in a cylindrical bulb about twice as long as wide. Cardia a flat disc. Intestine with zig-zag lumen. Anterior uterine branch absent but in one instance an egg had been forced forward almost 2 body widths past the vulva. Posterior ovary reflexed almost to vulva. Eggs 4 to 5 times as long as wide. Prerectum length about 4 times body width. Tail elongate hemispheroid with very prominent radial striae.

Tylencholaimellus striatus is immediately recognized by the coarse transverse and radial striae and form of lip region. Specimens indexed under *Tylencholaimellus* 2.

Habitat: Native prairie sod plots on experiment stations at Brookings and Cottonwood, South Dakota.

Tylencholaimellus coronatus Thorne, 1939

(Fig. 60, J-L)

1.0 mm; a=34; b=5.9; c=36; V=$^{6}33^{23}$

0.9 mm; a=37; b=5.3; c=31; T=46

Body usually almost straight. Lip region rounded with conspicuous, sclerotized, refractive perioral disc. Spear 16-18μ long. Esophageal bulb half as wide as body and three times as long as wide. Intestine with conspicuous zig-zag lumen. Anterior uterine branch about twice as long as body width forming a pouchlike spermatheca which was usually packed with sperm. Posterior branch elongated and reflexed. Eggs fill body cavity and 3 times as long as wide. Tail elongate-hemispheroid with conspicuous radial striae.

A single male was collected which differed from the female by its much longer, tapering tail. In addition to the preanal pair of supplements, a closely approximated pair of ventromedian ones were present (Fig. 60 L). The sclerotized labial disc and supplement arrangement may indicate a group of generic standing but additional males should be studied before a decision is made.

Habitat: A single collection from stream bank near Williston, North Dakota.

Superfamily DIPHTHEROPHOROIDEA Clark, 1961

Family DIPHTHEROPHORIDAE (Micol. 1922) Thorne, 1955

Genus *Diphtherophora* de Man, 1880

Obese nemas with thick cuticle which frequently forms wrinkles when the body is bent. Spear of an unusually complicated structure. Spear guide an assembly of plates and rods. Esophagus with an elongate-conoid basal bulb. Body contents usually obscured by many granular bodies.

Type species: *Diphtherophora communis* de Man, 1880

Diphtherophora obesum Thorne, 1939

(Fig. 61, A-D)

0.5 mm; a=10-15; b=3.7; c=19; V=$^{20}57^{17}$

0.5 mm; a=12-17; b=3.8; c=19; T=45

Bodies practically straight when relaxed. Cuticle very thick, resembling a loose sheath which shifts and wrinkles as the nema moves. Lip region continuous with neck contour with the usual obscure cephalic papillae. Spear and pharynx a very complicated assembly with strong protrudor muscles. Basal esophageal bulb elongate conoid, usually hidden by the dense body tissues. Ovaries very long, reflexed. Tails with subdigitate termini.

Males frequently found, slightly less obese than females. Spicula almost straight with spiral muscles about proximal ends. A single ventromedian porelike supplement present.

Diphtherophora obesum is immediately recognized by form of anterior end and subdigitate tails.

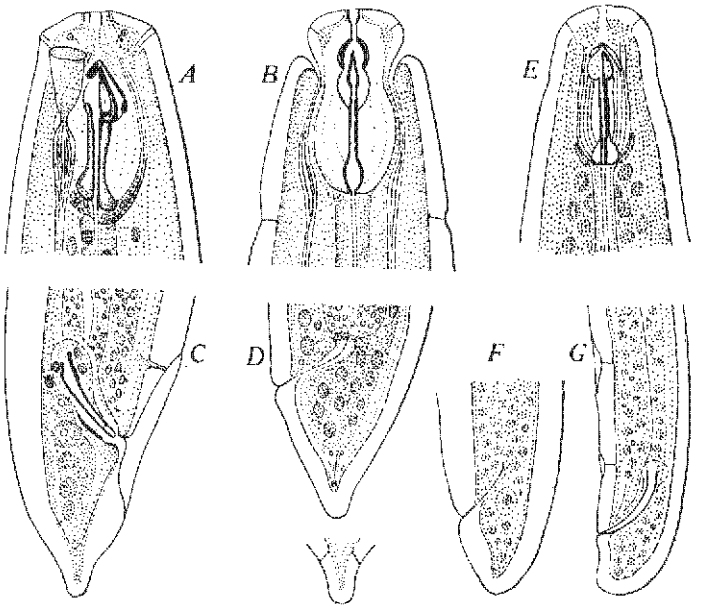


Fig. 61. A-D, *Diphtherophora obesum*. Courtesy of Martinus Nijhoff. E-G, *D. latum*.

Habitat: A very common species collected from virgin and cultivated soil from Boulder, Colorado north to Glendive, Montana, Downer, Minnesota and Ames, Iowa.

Diphtherophora latum n. sp.

(Fig. 61, E-G)

0.5 mm; a = 13-18; b = 4.7; c = 40; V = $^{22}55^{16}$

0.6 mm; a = 20; b = 4.6; c = 39; T = 44

Female body straight when relaxed, young specimens being much narrower than adults. Lip region set off by slight narrowing with low rounded lips and obscure papillae. Amphid aperture oval, ½ width of head. Spear 16μ long of usual complicated structure as illustrated. Protrudor muscles a conspicuous feature. Esophagus almost completely hidden by dense granular body contents, the basal bulb being elongate conoid. Cardia not seen. Vulva transverse. Ovaries reflexed. Female tail convex-conoid to rounded terminus.

Male much more slender than female, cylindroid throughout most of its length. Posterior portion of body slightly arcuate. Spicula tapering, arcuate, probably resting on a thin trough-like gubernaculum. Two pore-like ventromedian supplements, their positions indicated by depressed points in the thick cuticle. Males almost as numerous as females.

Habitat: Native prairie sod on summit of Medicine Butte and in pasture plots Cottonwood Experiment Station, South Dakota.

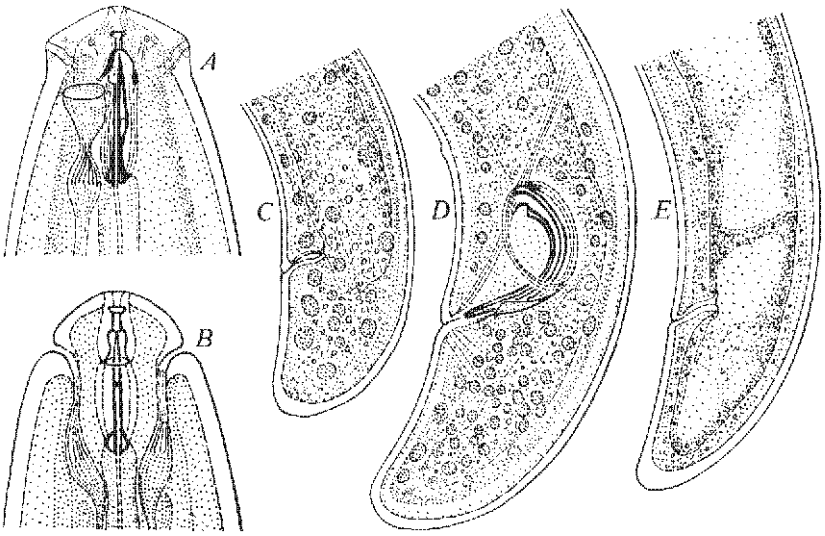


Fig. 62. A-D, *Triplonchium cylindricum*. E, *T. parvum*. Courtesy of Martinus Nijhoff.

Genus *Triplonchium* Cobb, 1920*

Nemas 2.0 mm long or less with exceedingly dense, granular bodies which obscure details of the anatomy. Spear with arch-like structure in dorsal sector but difficult to accurately observe. Esophagus a slender tube with pyriform basal bulb. Vulva probably transverse. Ovaries two, reflexed. Intestine with blind sac extending into tail and rectum attached to ventral side.

Type species: *Triplonchium cylindricum* Cobb, 1920
(Fig. 62, A-D)

1.4 mm; a=30; b=8.5; c=30; V=^{15}54^{18} Males not collected.

Body arcuate, tapering to a very narrow lip region. Posteriorly it ends in a broad, bluntly rounded tail. Lip region slightly set off, papillae not interfering with head contour. Details of spear and amphids as illustrated. Esophagus a slender tube ending in a pyriform basal bulb. Internal anatomy obscured by dense bodies and granular material. Vagina extending about ⅓ distance across body. Ovaries of young females reflexed about half way to vulva. Gubernaculum a conspicuous and distinctive feature as illustrated from males collected in Utah.

Habitat: A single collection of 6 females and 5 young from soil about roots of brush and trees by river 2 miles west of Brookings, South Dakota. Specimens indexed under *Triplonchium* 2.

*J. B. Goodey in T. Goodey, 1963 made *Triplonchium* a synonym of *Tylolaimophorus* de Man, 1880 but this act is not herein recognized as valid.

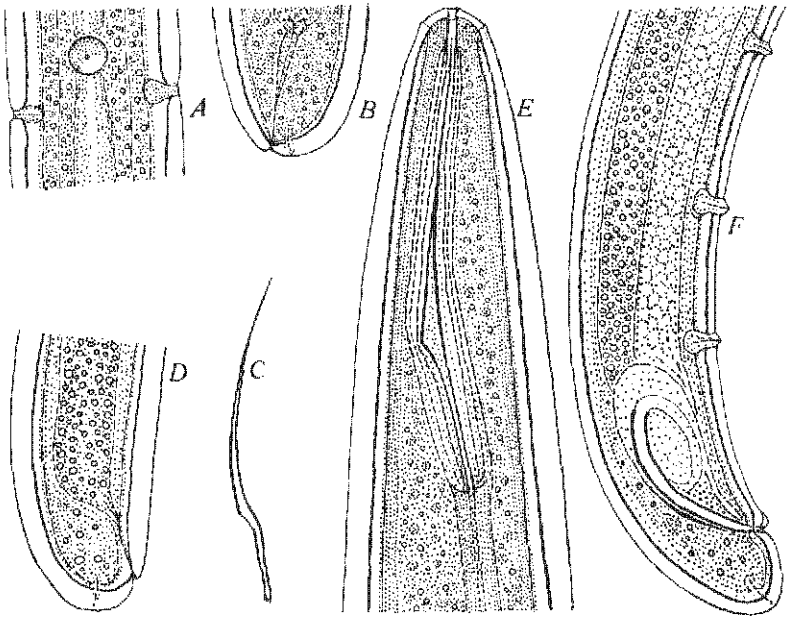


Fig. 63. A-D, *Trichodorus obtusus*. Note circular vulva and large lateral pores. E, F, *T. proximus*.

Triplonchium parvum Thorne, 1939
(Fig. 62, E)

0.4-0.7 mm; a = 16; b = 6.1; c = 18; V = $^{23}52^{20}$

Body contents so dense that observations on internal anatomy are practically impossible. Lip region only about ¼ width of neck base. Spear similar to that illustrated for *T. cylindricum*. Basal bulb of esophagus pyriform. Vulva a minute transverse slit, with vagina only about ⅓ body width. Ovaries elongated, reflexed about halfway to vulva. Rectum about ½ body width, attached to ventral side of intestine which forms a blind sac extending well into tail cavity.

Triplonchium parvum is immediately distinguished by its smaller size and dorsally convex-conoid, bluntly rounded tail.

Habitat: Small numbers from native sod, wind breaks and forest shrubs and trees, Medicine Butte, Mitchell, and Hammer, South Dakota, Stanley, North Dakota, Eastern Montana, Elizabeth, Minnesota and Ames, Iowa. Specimens indexed under *Triplonchium* 1. It is quite possible that more than one species is represented in these specimens but their small size and dense body tissues make determination practically impossible.

Screen residues should be examined for members of *Triplonchium* since they are very torpid and fail to work their way through funnels. In fact, the writer has never seen a specimen moving.

Family Trichodoridae (Thorne, 1935) Clark, 1961

Genus *Trichodorus* Cobb, 1913

Bodies obese with unusually thick cuticle which frequently forms wrinkles as the nema moves. Females straight when relaxed, males posteriorly arcuate. Body contents dense, often obscuring details of morphology. Female tail bluntly rounded with anus terminal or subterminal. Supplements 1-3, mammiform, well spaced, the anal pair absent. Spear elongate, slender, slightly arcuate. Spicula slender, arcuate with conspicuous circular muscles.

Type species: *Trichodorus primitivus* (de Man, 1876) Micol, 1922

Synonym: *Dorylaimus primitivus* de Man, 1876

Interest in *Trichodorus* species has greatly developed since the discovery that they transmit certain virus diseases of plants. Typical injury is known as "stubby root" since roots fail to make additional growth after the nemas feed on the terminal cells.

Trichodorus obtusus Cobb, 1913

(Fig. 63, A-D)

1.1 mm; a = 23; b = 5.1; c = terminal; V = $^{15}56^{15}$

1.0 mm; a = 28; b = 6.6; c = 80; T = 40

Characters of the genus. Spear 40-45μ long. Excretory pore and 2 or 3 hypodermal pores visible on the neck. A pair of hypodermal lateral pores present just posterior to vulva, a conspicuous feature from a ventral view. Uteri forming elongate spermathecae. Anus and caudal pores almost terminal. Males with 3 ventromedian supplements arranged as illustrated for *T. proximus*.

Habitat: A single collection from native turf near Milbank, South Dakota.

These specimens are slightly longer than those reported by Allen from the Netherlands, Maryland and Pennsylvania. They most closely resemble *T. proximus* from which they are readily distinguished by the shorter spear, 45μ : 60μ, large hypodermal lateral pores just posterior to vulva, and terminal anus.

Trichodorus proximus Allen, 1957

(Fig. 63, E, F)

1.1 mm; a = 20; b = 6.7; c = subterminal; V = $^{12}49^{12}$

1.1 mm; a = 29; b = 7.1; c = 78; T = 56

Excretory pore about opposite anterior end of esophageal bulb. Lip region rounded with slightly elevated papillae. Spear 60μ long, about ⅔ neck length. Esophageal bulb elongate conoid. Vulva a circular pore-like depression. Uteri forming elongate spermathecae which were packed with spermatozoa. Anus and caudal pores almost terminal. Male more slender than female with slightly arcuate posterior. Three ventromedian supplements arranged as illustrated. The anterior one may sometimes be slightly farther forward.

Habitat: Dying lawn in Rapid City, South Dakota. These specimens appear to closely resemble those described by Allen from St. Augustine grass near Tampa, Florida.

Trichodorus species usually are torpid, slow moving nemas and may fail to come through the funnels during processing and screen residues should be examined to determine if they are present.

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