

# **Longidorus breviannulatus n. sp. (Nematoda: Longidoridae)**

## **Associated with Stunted Corn in Iowa<sup>1</sup>**

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*Abstract:* *Longidorus breviannulatus* n. sp. was associated with stunted corn in Iowa. The nematode has wide bilobed amphidial pouches, a guiding ring 21-26  $\mu\text{m}$  from the anterior end of the body, an odontostyle 81-88  $\mu\text{m}$  long, and a spear extension 28-45  $\mu\text{m}$  long. The most frequent collections and the greatest numbers of the nematode in the field occurred in sandy soils. Nematodes increased in greenhouse culture from an initial population of 100 to 4,120 individuals in 322 days. *Key Words:* soil texture, taxonomy, morphology.

Nematodes belonging to the genus *Longidorus* were associated with stunted corn in three counties of southeastern Iowa in 1971 and 1972. Morphological characters were dissimilar to any recorded account, and the nematode is described herein as a new species. Specimens associated with corn in Delaware were found to be the same species. Measurements were made from nematodes relaxed in water by gentle heat, fixed in 5% formalin at 44 C, and mounted in glycerine (4).

*Longidorus breviannulatus* n. sp.

Fig. 1.

*Measurements* (Female Holotype): L = 4,875  $\mu\text{m}$ ; a = 100; b = 18.8; c = 132; odontostyle = 85  $\mu\text{m}$ ; spear extension = 35

$\mu\text{m}$ ; tail = 37  $\mu\text{m}$ ; V = 46.4; guiding ring from anterior of nematode = 24  $\mu\text{m}$ .

(14 Female Paratypes): L = 4,755  $\mu\text{m}$  (4,019-5,151); a = 94 (86-114); b = 16.9 (12.3-23.8); c = 123 (111-143); V = 46.7 (43.1-50.2); odontostyle 83.2  $\mu\text{m}$  (81-88); spear extension 35  $\mu\text{m}$  (28-45); guiding ring from anterior of nematode = 23  $\mu\text{m}$  (21-26).

(Juveniles): Measurements of 15 juveniles are provided in Table 1. As with other species of *Longidorus*, the a, b, and c values generally increased with increasing length of the nematode.

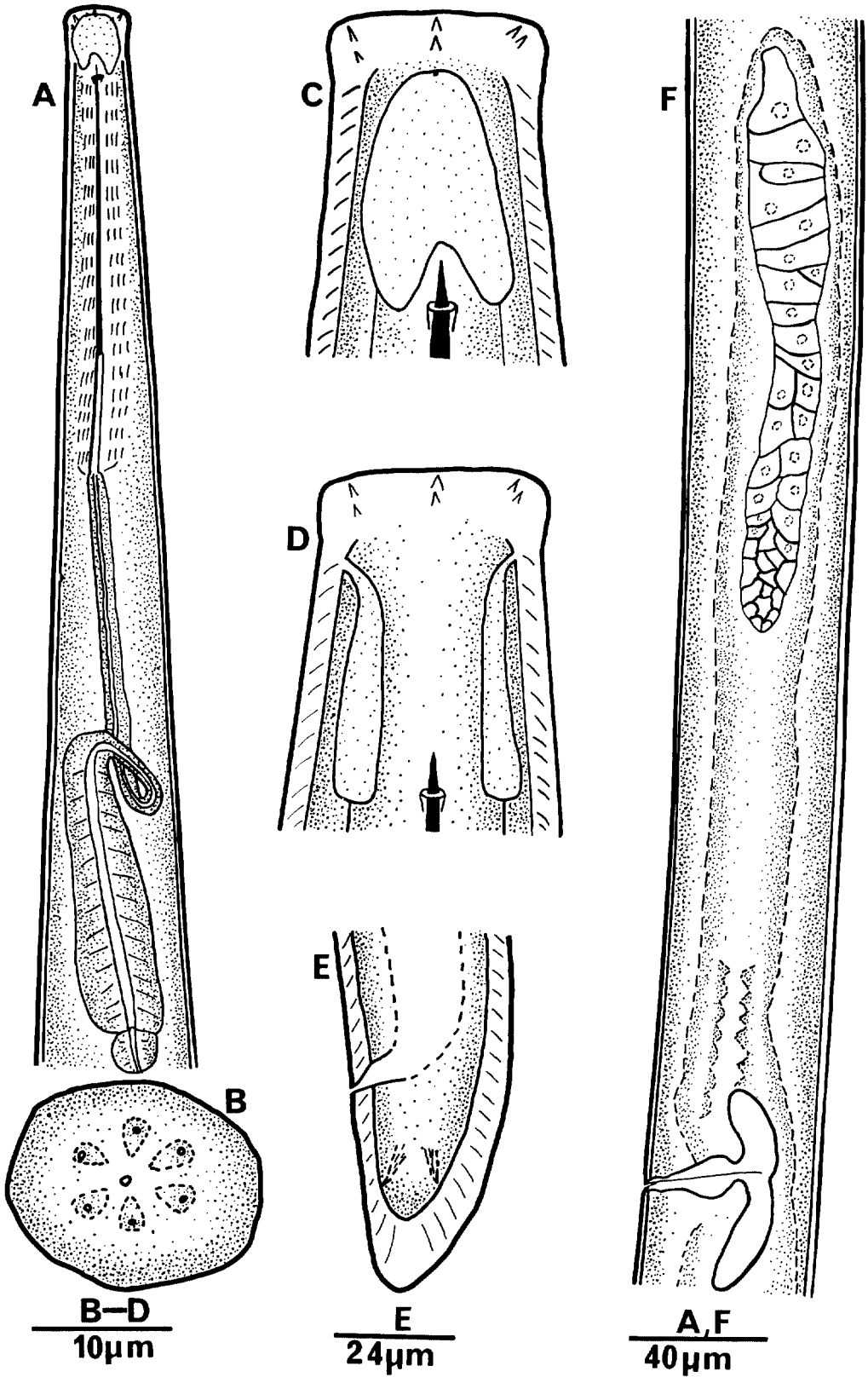
*Description:* Males unknown. Female body often in loose open C when relaxed by gentle heat, but sometimes irregular. Body slender, of uniform width 50  $\mu\text{m}$  (49-54) except for tapering extremities and, frequently, a slight protrusion at vulva. Lips flattened, set off by a knob-like expansion (Fig. 1-C, D). Wide

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FIG. 1. *Longidorus breviannulatus* n. sp.: A) lateral view of anterior region of female; B) en face view of female; C) lateral view of amphidial pouches; D) dorsal view of amphidial pouches; E) lateral view of female tail; F) lateral view of anterior gonad.



bilobed amphidial pouches extending nearly to or reaching guiding ring (Fig. 1-C, D). Amphidial apertures obscure, just behind lateral lips. Cuticle and subcuticle  $2\ \mu\text{m}$  thick for most of body length, becoming thicker at extremities, markedly so at tail (Fig. 1-E). Hemizonid  $159\ \mu\text{m}$  (150-173) from anterior end and seen best on fresh nematodes, or those relaxed and fixed in 5% formalin.

TABLE 1. Measurements of 15 juveniles of *Longidorus breviannulatus* n. sp. associated with corn on the Robert Erwin farm, Section 17, Jefferson Township; coordinates T-73-N, R-2-W, Louisa County, Iowa, 28 June 1971.

Length ( $\mu\text{m}$ )	a	b	c
1,227	37	7.1	34
1,584	44	9.2	35
1,738	50	8.5	50
1,739	37	9.8	46
1,980	41	8.9	46
2,533	46	12.2	79
2,659	58	15.2	62
2,952	60	9.7	70
3,062	61	11.7	75
3,201	65	12.6	74
3,217	67	17.1	80
3,247	62	12.8	70
3,364	69	17.3	89
3,548	72	15.8	96
4,347	84	17.3	86

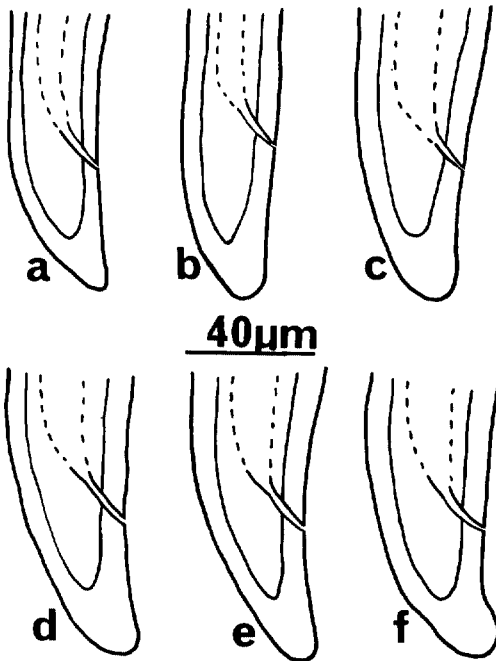


FIG. 2-(A to F). Variations in tail shapes of *Longidorus breviannulatus* n. sp.: A) first stage juvenile; B) second stage juvenile; C) fourth stage juvenile; D-F) adults.

Esophagus  $292\ \mu\text{m}$  (195-405), with anterior part often convoluted. Prerectum length variable, but 3.4 (0.6-4.8) times body width. Rectum shorter than anal body diameter. Tail conoid, but sometimes with short broad peg in adults (Fig. 2-F).

Ovaries didelphic, reflexed. Vagina reaching about half-way across body. Vulva slit slightly oblique posteriorly in most Iowa specimens (Fig. 1-F). The species name refers to the short distance between the guiding ring and the anterior end of the nematode.

*Type habitat and locality:* Holotype.—Female collected 28 June 1971 around corn roots on Robert Erwin farm, Section No. 17, Jefferson Township; coordinates T-73N; R-2-W, Louisa County, Iowa. Soil: 94% sand, 5% silt, 1% clay; pH 6.4; < 1% organic matter.

Paratypes.—14 Females: Same data as holotype.

*Specimens:* Holotype on slide T-240 t; paratypes on slides T-1615p-T-1617p, and en face views on slides T-1618p and T-1619p, U.S. Dept. of Agriculture Nematode Collection, Beltsville, Md., USA. Other specimens have been deposited with A. Dalmasso, Station de Recherches sur les Nématodes, Antibes, France; in nematode collections at the University of Florida, Gainesville; University of California, Davis; and the Entomology Research Institute, Canadian Department of Agriculture, Ottawa, Canada.

*Diagnosis:* *L. breviannulatus* has close affinities with *L. elongatus* (de Man, 1876) Thorne & Swanger, 1936 (1, 2, 8), *L. closelongatus* Stoyanov, 1964 (6), *L. tarjani* Siddiqi 1962, (5) and *L. vineacola* Sturhan & Weischer, 1964 (7). It can be differentiated from all of these by the more forward position of the guiding ring. It is further differentiated from *L. elongatus* by the wide bilobed amphidial pouches, and the less conical tail; from *L. closelongatus* by the shorter stylet; from *L. tarjani* by the shorter body, shorter odontostyle, and tail shape; and from *L. vineacola* by the much shorter body and tail shape. In Iowa, the nematode is known from Lee, Louisa, and Muscatine counties, all of which border on the Mississippi River.

*Delaware specimens* (4 females): Specimens found around field corn at Millsboro, Delaware, and sent by A. M. Golden have the following measurements: L =  $5,303\ \mu\text{m}$  (4,821-5,714); a = 113 (110-118); b = 18.9

(18.2-20.4); c = 147 (138-154); odontostyle = 84  $\mu$ m (81-87); spear extension = 36  $\mu$ m (31-40); V = 47.1 (45.4-48.9); guiding ring from anterior end of nematode = 23.3  $\mu$ m (23-24). These specimens also possess a slight oblique vulva slit.

*Canadian specimens* (8 females): Specimens maintained in a greenhouse on sorghum were received from Frank Marks. The original population was collected from a tobacco field at the Research Station, Delhi, Ontario, Canada (3). Measurements are: L = 5,652  $\mu$ m (5,368-5,947); a = 109 (99-119); b = 17.4 (15.8-19.0); c = 134 (119-143); odontostyle 82  $\mu$ m (76-85); spear extension 33  $\mu$ m (28-37); V = 47.5 (45.4-49.6); guiding ring from anterior end of nematode = 24.5  $\mu$ m (23-26). Besides being somewhat longer than the Iowa specimens, the vulva slit in the Canadian material was not oblique in most specimens examined. These differences are not considered of sufficient magnitude to warrant speciation, at least until further observations are made.

Although *L. breviannulatus* was found in soils with as low as 49% sand during surveys for nematodes in Iowa in 1971-1973, most occurrences and the largest populations occurred in soils containing more than 90% sand. In preliminary studies in a greenhouse,

*L. breviannulatus* increased on corn from an original 100 to as many as 4,120 individuals after 322 days in one test using sterilized sand.

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