A New Ataloderinae (Nematoda: Heteroderidae), Thecavermiculatus gracililancea n. gen., n. sp.

R. T. ROBBINS[1]

Abstract: Thecavermiculatus gracililancea n. gen., n. sp. is described from the roots of *Festuca myuros* L. ("rattail fescue") a range grass in Monterey County, California. *Thecavermiculatus* females have a slight terminal prominence on which are located the vulva and anus, while its closest relatives, *Atalodera* and *Sherodera,* have a large terminal prominence. Furthermore, in *T. gracililancea* the hatched second-stage juveniles are retained in the female body while *Atalodera* and *Sherodera* females retain embryonated eggs. *Key Words:* Nematode taxonomy.

In April 1973, second-stage juveniles belonging to the family Heteroderidae were found in rangeland soil samples from Monterey County, California. A second sampling, in May 1973, found numerous saccate females and second-stage juveniles. Females were found attached to the roots of the range grass, *Festuca myuros* L. (rattail fescue), as well as unattached. These nematodes represent a new species, for which I propose the new genus of Heteroderidae (Ataloderinae) described here.

MATERIALS AND METHODS

The nematodes were killed and fixed by slow addition of boiling 4% formalin to water containing the nematodes until the original volume was doubled. They were processed to glycerine by a modification of Seinhorst's rapid method (1, 2). Females were mounted in glycerine jelly. Juveniles were mounted either in glycerine or glycerine jelly. Specimens were also studied with the scanning electron microscope (SEM). Materials and methods for the SEM were as described by Sher and Bell (3).

SYSTEMATICS

Genus: *Thecavermiculatus* n. gen.
Fig. 1-4

Diagnosis: Subfamily Ataloderinae Wouts, 1973 (4, 5). *Female*—Cuticle annulated only in neck region, lacelike pattern on remainder of body. Anus and vulva terminal on slight prominence. Eggs develop quickly into second-stage juveniles and hatch. The saccate body of older females is filled with second-stage juveniles. *Second-stage juveniles*—SEM shows a distinct labial disc. Esophageal glands fill less than half the body width. Phasmids with lenslike structures. *Male*—unknown.

Differential diagnosis: The anus and vulva of *Thecavermiculatis* is located on a very slight terminal prominence, while the anus and vulva of its closest relatives, *Atalodera* (6) and *Sherodera* (5), are located on a large distinct terminal prominence. Eggs of *Thecavermiculatus* develop quickly into second-stage juveniles and hatch. The juveniles are retained in the mature female, whereas mature *Atalodera* and *Sherodera* females retain unhatched eggs.

This genus is named from a statement made by the late S. A. Sher. When shown female specimens he commented, "Now, that's a different bag of worms." The generic name *Thecavermiculatus* is derived by combining the latin words *theca* ("bag or container") and *"vermiculatus"* ("of worms"). The specific name is derived by combining the Latin words *gracil* ("thin") and *lancea* ("spear").

Type Species:

Thecavermiculatus gracililancea n. g., n. sp.
Fig. 1-4

Paratypes 26 ♀♀: L (n = 26) = 582 μm ± 86.9 standard deviation (SD) (438-743); width (n = 26) = 398 μm ± 94.6 SD (242-594); a (n = 26) = 1.5 ± .22 SD (1.1-1.9), stylet (n = 17) = 25 μm ± 0.9 SD (23-26); length median bulb (n = 10) = 33 μm ± 3.7 SD (25-38); width median bulb (n = 10) = 28 μm ± 3.1 SD (23-34); ratio median bulb length/width (n = 10) = 1.2

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[1]Plant Nematologist, Laboratory Services/Nematology, Division of Plant Industry, California Department of Food and Agriculture, 1220 N Street, Sacramento 95814. Appreciation is expressed to E. M. Noffsinger and A. R. Maggenti for offering valuable comments and reviewing the manuscript, and to A. H. Bell and J. L. Imbriani for technical SEM assistance. Special thanks are due Arnold Steele for professional courtesies and help extended in the field, laboratory, and greenhouse.

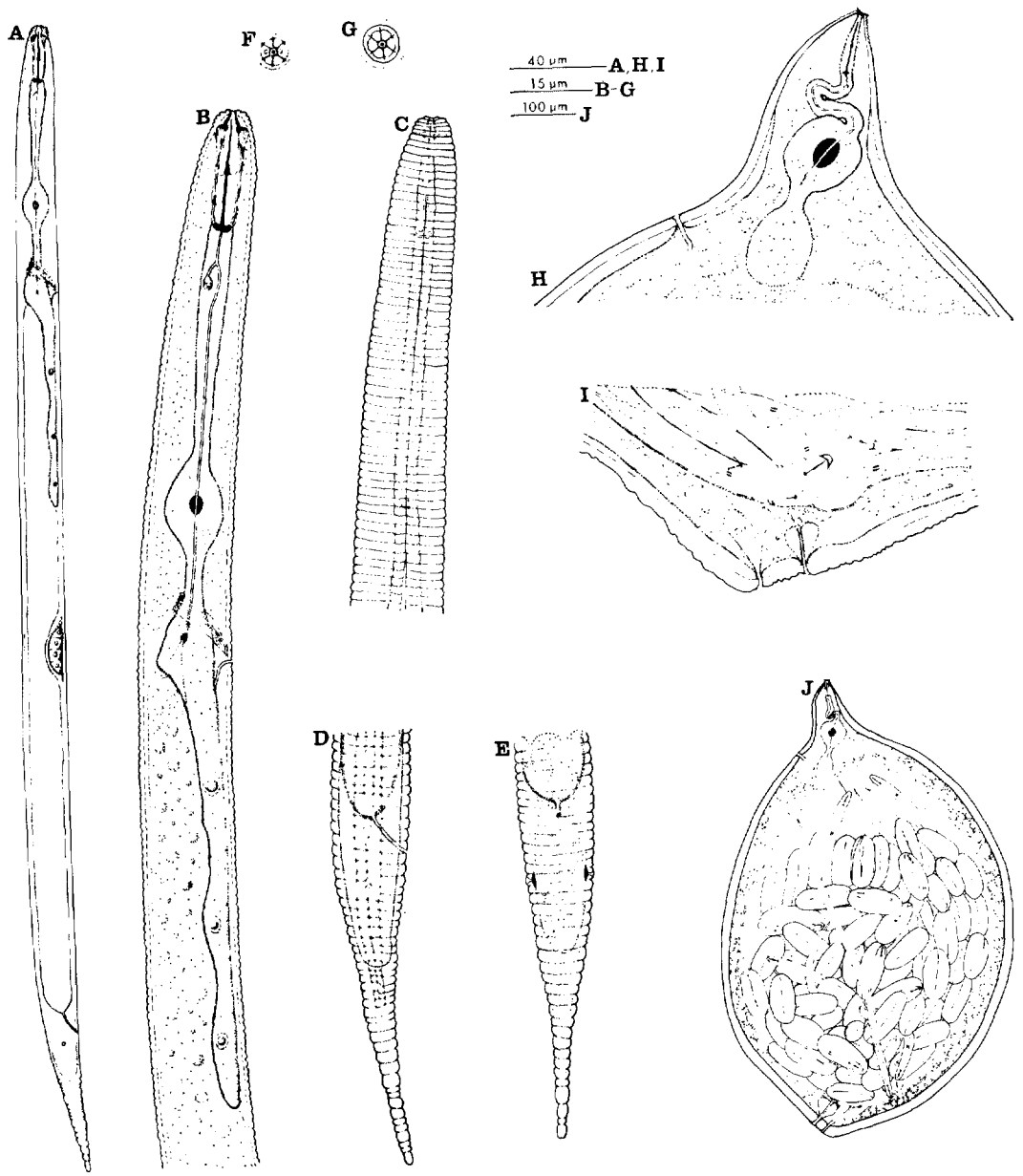

FIG. 1. Drawings of *Thecavermiculatus gracililancea* n. gen., n. sp. A-G) Second-stage juveniles. *A)* Whole. *B-C)* Anterior. *D)* Tail, lateral. *E)* Tail, ventral. *F)* Face view, surface. *G)* Face view, at lip annules base. H-J) Female. *H)* Anterior. *I)* Vulval-anal prominence. *J)* Whole.

± .13 SD (1.0-1.3); distance to excretory pore from anterior end (n = 8) = 117 µm ± 16.3 SD (91-138); distance from anus to vulva (n = 26) = 19 µm ± 3.3 SD (13-25); length vulva slit (n = 12) = 24 µm ± 1.4 SD (22-26).

Holotype (♀): L = 625 µm; width = 391 µm; a = 1.6; stylet = 24 µm; length median bulb = 31 µm; width median bulb = 24 µm; ratio median bulb length/width = 1.4; excretory pore from anterior end = 115 µm; distance from anus to vulva = 14 µm. Body pearly white, round to oval in shape, covered with brittle subcrystalline layer. Distinct labial disc. Annualation in region of stylet. Stylet and esophagus indistinct, quite difficult to measure. Eggs and hatched second-stage juveniles present

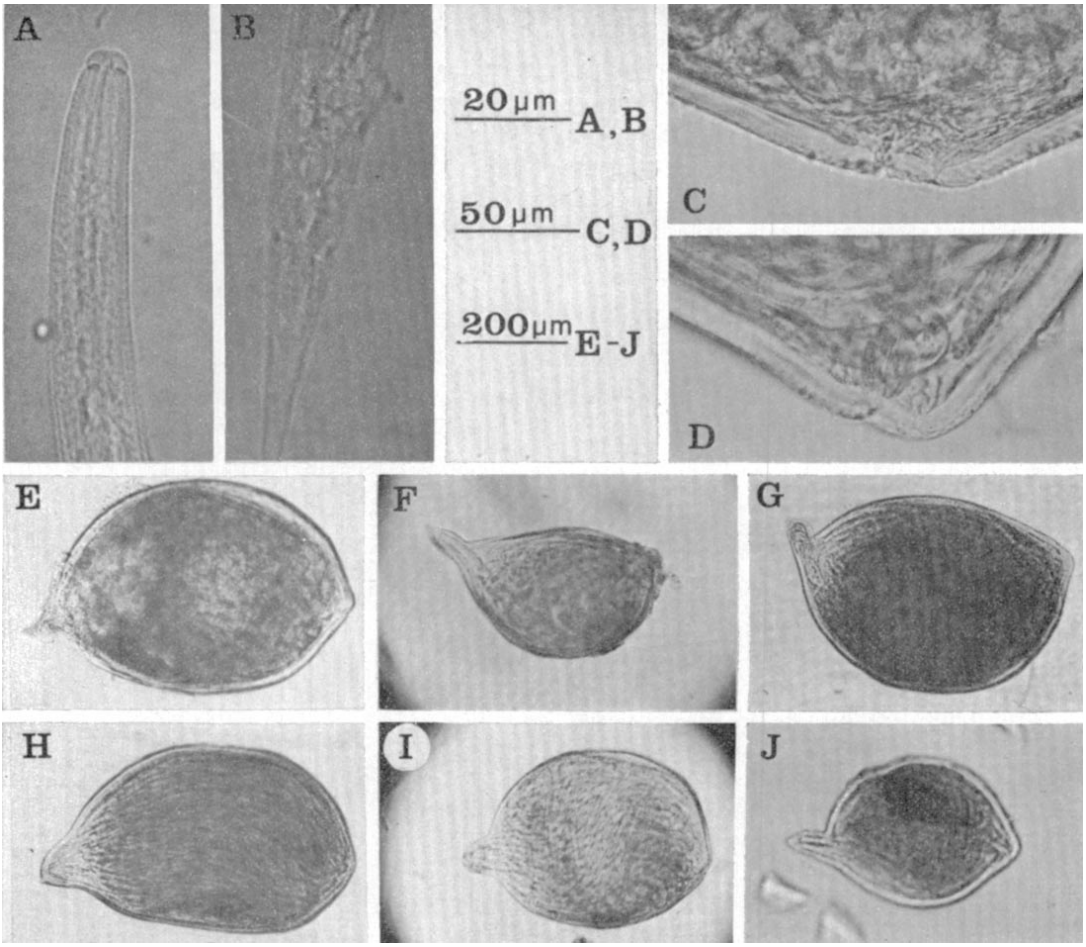

FIG. 2. Photomicrographs of *Thecavermiculatus gracililancea* n. gen., n. sp. A-B) Second-stage juvenile. *A)* Head. *B)* Tail, lenslike phasmids. C-J) Female. C-D) Vulva-anal prominence. E-J) Whole.

internally in young females, including holotype. Only juveniles were observed in older females. Dissected older females (n = 9) revealed an average of 227 (37-387) second-stage juveniles/female. Lacelike cuticular pattern with surface punctations (SEM).

Male: Unknown.

Second-stage juveniles (n = 50): L = 474 μm ± 24.7 SD (429-555); a = 27 ± 1.3 SD (25-30); b = 4.5 ± .18 SD (4.2-5.1; b^1 = 2.4 ± 0.10 SD (2.3-2.6); c = 8.7 ± .44 SD (7.9-9.4); c^1 (tail/anal body diameter) = 4.3 ± .27 SD (3.6-4.8); stylet = 20.5 μm ± .75 SD (19-22); stylet knob width = 3.3 μm ± .27 SD (2.7-3.7); stylet knob length = 1.5 μm ± .18 SD (1.2-1.8); distance from stylet knobs to dorsal gland orifice = 6.2 μm ± .93 SD (4.5-7.8); o = 30 ± 4.1 SD (23-37); hemizonid from anterior end = 97 μm ± 4.9 SD (85-112); valve of median bulb from anterior end = 68.5 μm ± 2.8 SD (63-78); H = 32 μm ± 2.6 SD (28-37); phasmid from tail terminus = 47 μm ± 3.4 SD (41-55); tail = 55 μm ± 4.0 SD (48-62). Labial framework slightly sclerotized. Three lip annules (SEM) appear as four under light microscope. Stylet very slender. Stylet knobs small flattened anteriorly. Lateral field with four incisures, merging into three about 6 annules anteriorly to phasmids. Phasmids conspicuous with distinct lenslike structure in muscle layer.

Holotype: Female collected May 1973, by R. T. Robbins. Deposited on slide number UCNC 1596, University of California Nematode Collection, Davis, California.

Type Host: Festuca myuros L. "rattail fescue."

Type habitat and locality: Soil and roots of *F. myuros* growing in shallow clay soil, containing much undecomposed plant

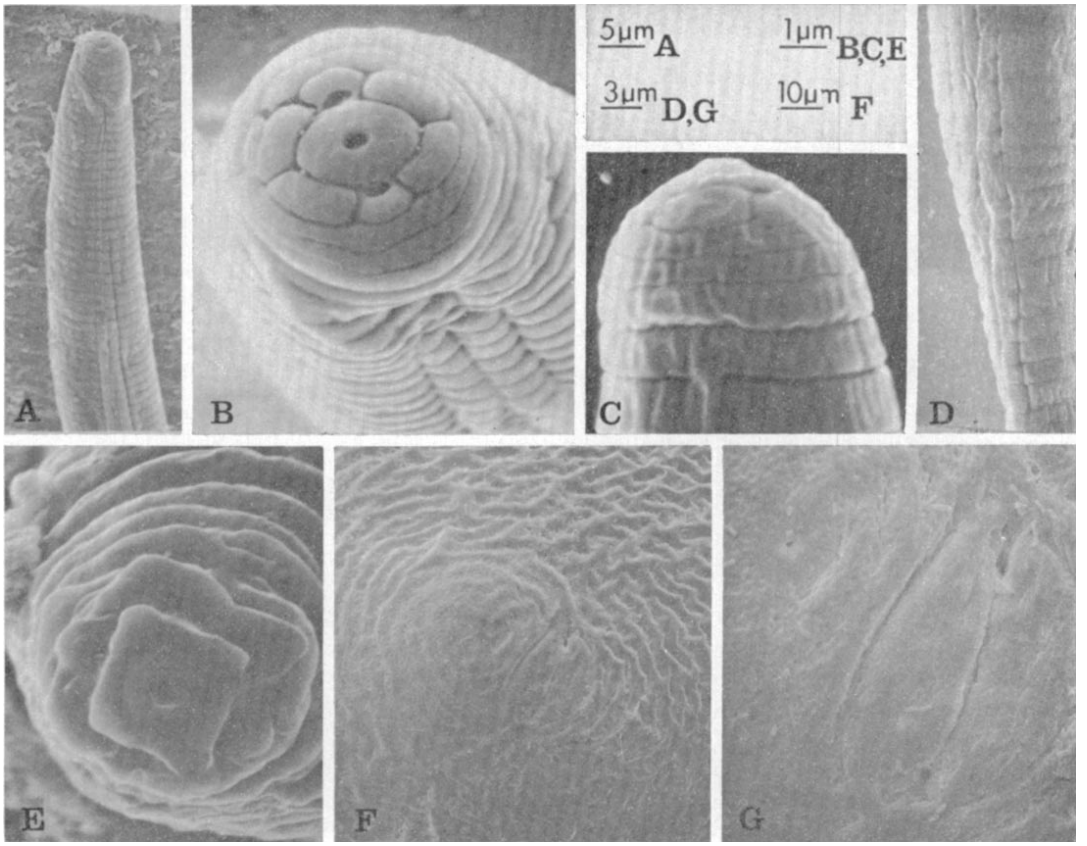

FIG. 3. Scanning electron micrographs of *Thecavermiculatus gracililancea* n. gen., n. sp. A-D) Second-stage juvenile. *A)* Anterior. *B)* Face view. *C)* Lateral, face view. *D)* Posterior. E-G) Female. *E)* Face view. *F)* Vulval-anal region. *G)* Vulval-anal closeup.

matter, on a hilltop in unirrigated rangeland about 4 miles North of Chualar, Monterey County, California. Township 15 South, Range 5 East, Section 20.

Paratypes: 40 ♀♀, same data as above. Distributed as follows: 6 ♀♀, UCNC, Davis; 4 ♀♀, USDA Nematode Collection, Beltsville, Maryland; 3 ♀♀, Nematology Department, Rothamsted Experimental Station, Harpenden, England; 3 ♀♀ Laboratorium Voor Nematologie, Wageningen, The Netherlands; 3 ♀♀, Laboratoire des Vers, Museum, 43 Rue Cavier, Paris; remaining specimens in the CFDA Nematode Collection, Sacramento.

Diagnosis: Since this is the type and only species of this genus, see genus diagnosis.

DISCUSSION

Thecavermiculatus was placed in the subfamily Ataloderinae Wouts, 1973 (4, 5), because the mature saccate female body does not form a cyst (i.e., the body remains white, no tanning occurs); the vulva and anus are on a terminal prominence; the second-stage juveniles have narrow esophageal glands; and the phasmids of the second-stage juveniles have a lenslike structure.

The eggs of *T. gracililancea* must hatch relatively soon after formation. In one young female, eggs only were observed. Several young females contained both eggs and hatched second-stage juveniles. Older females contained only hatched second-stage juveniles. All observations suggest that the second-stage juveniles retained in the mature female body are a resistant oversummering stage.

Festuca myuros, the host of this nematode, is a short-lived annual grass which sprouts with the coming of the winter rains and dies by late spring. Oversummering as resistant second-stage juveniles may be an

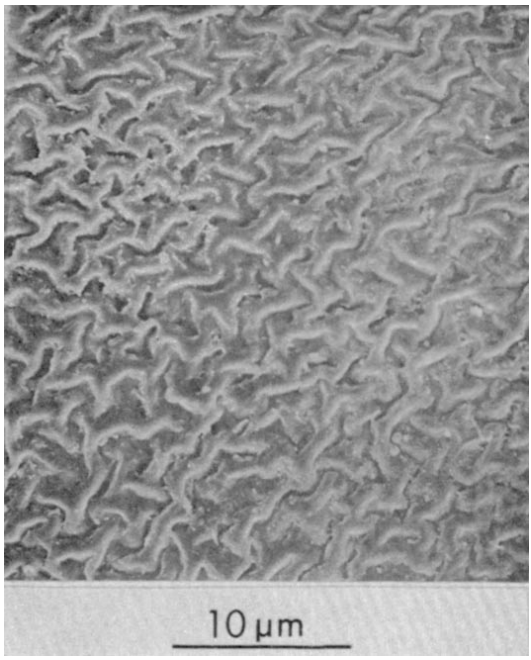

FIG. 4. Scanning electron micrograph of *Thecavermiculatus gracililancea* n. gen., n. sp., midbody wall pattern.

adaptation saving time and energy expended in the hatching of eggs. Seasonal rains provide sufficient moisture for germination and growth of host plants, as well as nematode locomotive activities associated with host finding and invasion. The cool temperatures at this time may be needed also; the juveniles were active and readily escaped from older saccate females stored at slightly below 10 C. Since the host is short lived, the timing of infection may be critical, for the life cycle must be completed before the host dies.

KEY TO FEMALES OF THE GENERA OF THE SUBFAMILY ATALODERINAE

1. Vulval prominence slight, indistinct, hatched juveniles retained in females ..... *Thecavermiculatus* n.gen.
   Vulval prominence large, distinct, eggs retained in females 2
2. Dorsal vulva lip larger than ventral vulval lip ..... *Atalodera* Wouts and Sher, 1971
   Vulval lips the same size ..... *Sherodera* Wouts, 1973

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