The Genus Malenchus (Nematoda:Tylenchida) with Descriptions of Two Species from Michigan

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Abstract: Malenchus truncatus n. sp. and *M. bryanti* n. sp. from Michigan are described and presented as the first record of *Malenchus* in North America. *M. acarayensis* Andrassy, 1968 is recorded and males of this species described. Notes on the geographical distribution of *Malenchus* and a key to the species are given. *Key word:* Taxonomy.

Andrassy, in 1968, described the genus *Malenchus* with *Malenchus machadoi* Andrassy, 1963 as the type species. *Malenchus* differs from *Tylenchus* and *Aglenchus* in these characters: strong and pronounced cuticular striae; lateral field bordered with two incisures; cephalic region narrower than adjacent body; body narrowing behind vulva until width at anus is about one-half that at level of vulva.

There are presently three described species in the genus. *Malenchus machadoi* was collected in Angola, West Africa (1). In 1968, Andrassy (2) described *Malenchus acarayensis* from the vicinity of Rio Acaray in Paraguay, but he found no males in the population. Merny (3) described *Malenchus andrassyi,* in 1970, from flooded rice fields of the Ivory Coast, Africa. Wasilewska (5) published the first collection record for *M. acarayensis* in Europe, in 1970, from sand dunes of the Kampinos Forest, Poland.

Malenchus of Michigan

Soil samples collected in September and November 1970 from wooded areas in the Douglas Lake area (Cheboygan County, site of University of Michigan Biological Station) contained two species of the genus *Malenchus.* A high population of *M. acarayensis,* in which males were present, was found. The second species was new. Another undescribed species of *Malenchus* was isolated from soil collected in July and December 1974 in a bog-like, low area near woods in the Michigan State University Water Quality Management Project site in East Lansing.

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Specimens were heat-relaxed, fixed in 4% formalin, and processed to glycerin according to the method of Seinhorst (4). Measurements were made with a Wild ocular micrometer from camera lucida tracings. A Wild drawing tube was used for illustrations.

In the following descriptions, the term *cephalic region* refers to the anterior end of the nematode which is sometimes described by authors as *labial region, lip region* or *head.* Since there is no visible cephalic sclerotization in *Malenchus* spp., the cephalic region in species which have cephalic annules is the area anterior to the point at which the transverse cuticular striae suddenly change from being conspicuous to being exceedingly fine. In species with no cephalic striae, the cephalic region is that area anterior to the point at which no striae are visible. When the cephalic region is "set off," there is an abrupt contraction of body contour. When it is "not set off or continuous," there is a gradual narrowing of body contour and no abrupt demarcation is visible.

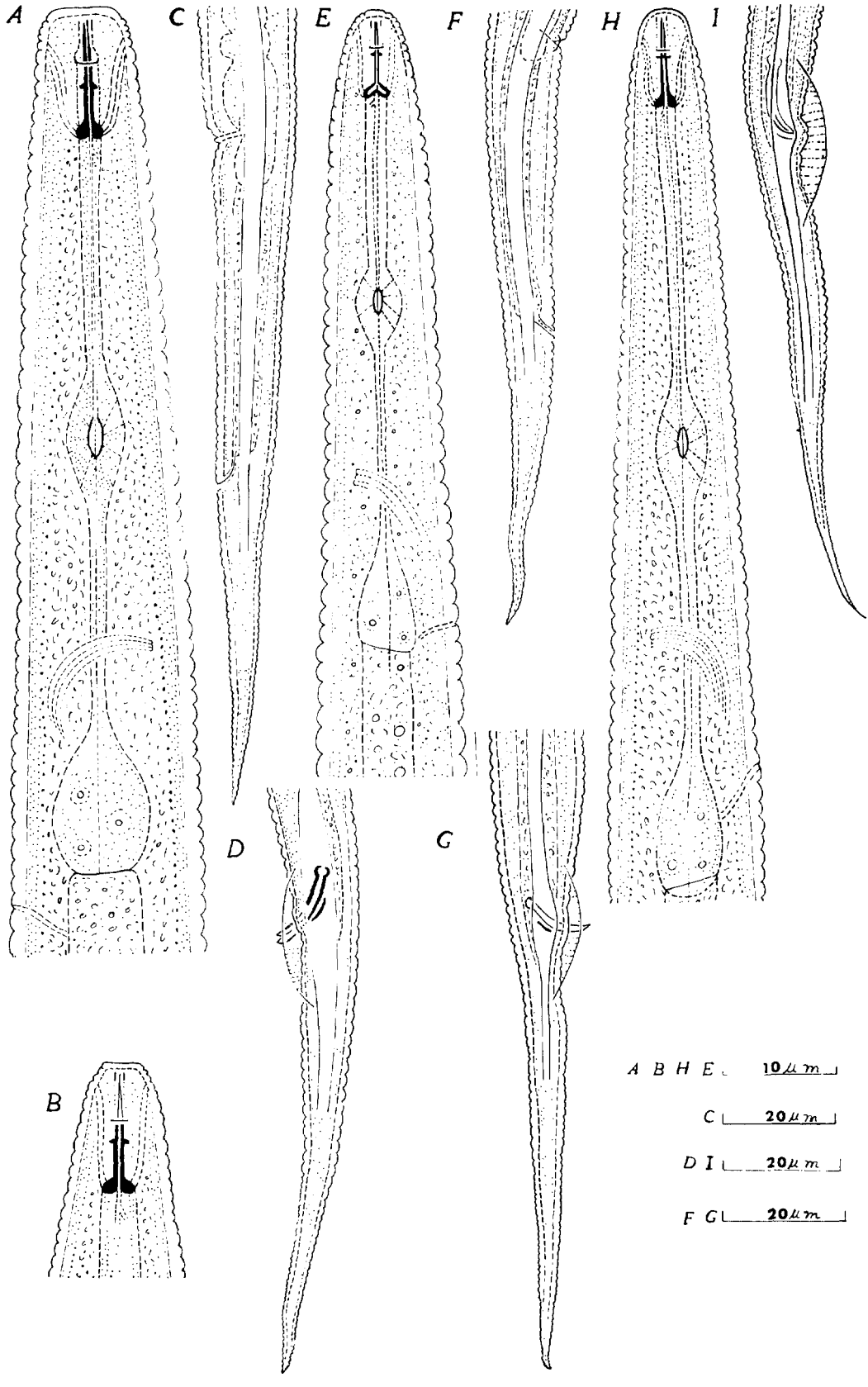
Malenchus truncatus n. sp. (Fig. 1, A-D)

Holotype female: L = 0.40 mm; a = 23; b = 4.9; c = 6.3; V = ^{34}69%; stylet = 11 μm; CSE (CSE = Cuticular striae in esophageal region) = 56; T/ABW = (Tail length divided by anal-body width) = 6.7.

Allotype male: L = 0.39mm; a = 24; b = 4.9; c = 5.1; T = 53; stylet = 10.6 μm; spicules = 16 μm; gubernaculum = 5 μm; T/ABW = 7.0.

Paratype females (8): L = 0.40 (0.38-0.42) mm; a = 21(18-23); b = 5.2(4.7-5.3); c = 6.2(5.2-7.2); V = ^{35}69%($^{34-38}$67-70%); stylet = 10.5(10.0-11.9) μm; CSE = 53(49-56); T/ABW = 6.3(5.9-7.2).

Paratype males (4): L = 0.40(0.39-


A
C
E
F
H
I
D
G
B
A B H E 10 μm
C 20 μm
D I 20 μm
F G 20 μm

0.42)mm; a = 22(19-24); b = 4.9 (4.7-5.2); c = 5.3(5.1-5.6); T = 55(52-59); stylet = 11.0(10.0-11.4) μm; spicules = 16(15-16) μm; gubernaculum = 5 μm; T/ABW = 7.5 (6.8-7.9).

Female: Body usually straight or with slight ventral curve posterior to vulva. Width of cuticular striae about 1.5 μm in mid-body. Fifty-six transverse cuticular striae in esophageal region. Lateral field with two crenate incisures; field occupies about 1/6 body width and extends from midway between stylet knobs and metacorpus to near middle of tail. Cephalic region continuous with 5-6 transverse striae; no cephalic sclerotization observed. Anterior end appears truncate. Stylet length 11 μm with knobs slanting posteriorly. Metacorpus ovoid with valve; basal bulb pyriform. Excretory pore 5-6 μm posterior from basal bulb. Hemizonid not seen. Vagina thick-walled. In some specimens, vulva opening has more conspicuous vulval flaps than observed in other species. Posterior uterine branch slightly more than half the corresponding body width. Ovary single, outstretched; spermatheca ovoid, filled with spermatozoa. Tail tapered to acute terminus, finely striated to tip. Anus obscure. Tail 1.1 times longer than vulva-anus distance, about 6-7 times anal body width. No phasmids observed.

Male: General morphology similar to that of female. Cephalic region narrower than in female. Testis single, outstretched; spicules and gubernaculum as illustrated. Caudal alae adanal, finely crenate, typical of genus.

Diagnosis: *Malenchus truncatus* n. sp. differs from all known species in the genus by the truncate anterior end. It is distinguished from *M. andrassyi* by continuous cephalic region with 5-6 transverse striae, fewer transverse cuticular striae in esophageal region, more posterior vulva, shorter tail with acute terminus. *M. andrassyi* has contracted cephalic region, no cephalic striae, eighty cuticular striae in esophageal region, vulva at 55-64%, tail length 80-102 μm, and, according to drawings, 10-11 times anal body width with rounded terminus. Male of *M. truncatus* has longer stylet; shorter, less filiform tail. *M. andrassyi* male stylet length 8-9 μm; filiform tail 12-13 times anal body width. From *M. machadoi,* the new species differs in size, cephalic region shape, and tail shape. *M. machadoi* is 0.52-0.56 mm in length with definitely contracted and rounded cephalic region; tail 8.5-9.5 times anal body width with a more acute terminus.

Holotype: Female collected December 1974 by John Davenport. Slide T-249t deposited with the USDA Nematology Collection at Beltsville, Maryland, USA.

Allotype: Male. Slide T-250t. Data same as holotype.

Paratypes, females and males: Slide T-1745p, 1 female. Slide T-1813p, 1 male. Data same as holotype. All other paratype slides in the Nematology Collection in Entomology Department, Michigan State University, E. Lansing, Michigan, USA.

Type habitat and locality: Soil under moss and leaf litter in low, bog-like area near woods in Michigan State University Water Quality Management Project site in East Lansing, Ingham County, Michigan, USA.

Malenchus bryanti n. sp.
(Fig. 1, E-G)

Holotype female: L = 0.26 mm; a = 20; b = 4.7; c = 5.8; V = ^{37}66%; stylet = 8 μm; CSE (CSE = cuticular striae in esophageal region) = 36; T/ABW = 6.0; T/V-A (T/V-A-ratio of tail divided by distance between vulva and anus) = 1.0.

Allotype male: L = 0.30 mm; a = 20; b = 4.5; c = 4.5; T = 47; spicules = 13 μm; gubernaculum = 3 μm; stylet = 7 μm; CSE = 45; T/ABW = 7.6.

Paratype females (20): L = 0.28 (0.25-0.30) mm; a = 20 (16-24); b = 4.8 (4.3-5.5); c = 5.8 (5.0-6.6); V = ^{34}66% ($^{30-40}$65-68%); stylet = 7 (7-8) μm; CSE = 35 (32-38); T/ABW = 6.4(5.5-7.0); T/V-A = 1.1 (1.0-1.1).

FIG. 1 (A-D). *Malenchus truncatus* n. sp. A) Female, anterior region; B) Male, cephalic region; C) Female, posterior region; D) Male tail. E-G. *Malenchus bryanti* n. sp. E) Female, anterior region; F) Female, posterior region; G) Male tail. H-I. *Malenchus acarayensis* Andrassy, 1968; H) Male, anterior region; I) Male tail.

Paratype males (3): L = 0.28 (0.27-0.30)mm; a = 20(18-21); b = 4.7 (3.9-5.8); c = 4.4 (4.4-4.5); T = 31 (18-47); spicules = 13 (12-13) μm; gubernaculum = 3.5 (3-4) μm; stylet = 8 μm; CSE = 42 (37-51); T/ABW = 7.6 (7.0-8.3).

Female: Body ventrally curved when heat relaxed. Cuticle with coarse transverse striae; width of striae at mid-body 1.8 μm. Thirty-six cuticular striae in esophageal region. Lateral field a plain band bordered on each side by a single incisure; field occupies about 1/5 body width and extends from behind stylet knobs to near middle of tail. Cephalic region continuous with 4-5 fine striae; no cephalic sclerotization observed. Stylet length 7 μm, delicate, with small knobs slanting posteriorly. Metacorpus ovoid with valve; basal bulb pyriform. Excretory pore varies from near posterior margin of basal bulb to 5 μm posterior. Vagina conspicuous, walls thickened. Vulval flaps small. Posterior uterine branch less than half as long as corresponding body width. Ovary single, outstretched. Spermatheca oval, filled with spermatozoa. Body diam slightly posterior to anus 1/2 body diam at vulva. Anus obscure. Striae on posterior half of tail very fine and extending to acute terminus. Tail six times anal body width and about equal to vulva-anus distance. Phasmids not observed.

Male: Morphology similar to that of female. Testis single, outstretched. Spicules, gubernaculum, and caudal alae as illustrated. Tail about 7.6 times anal body width.

Diagnosis: The only species of *Malenchus* as small as *M. bryanti* n. sp. is *M. acarayensis,* as revised to include the Michigan population. It is distinguished from *M. machadoi* by the continuous cephalic region and shorter tail. *M. machadoi* has a distinctly contracted cephalic region, and tail 8.5-9.5 times anal body width. Coarser cuticular striae, continuous striated cephalic region, fewer cuticular striae in esophageal region, and shorter tail with less acute tip distinguish it from *M. acarayensis. Malenchus acarayensis* has less conspicuous cuticular striation, slightly contracted cephalic region with no cephalic striae, 54-68 cuticular striae in esophageal region, and tail tip is finely drawn out. The species *M. bryanti* is distinguished from *M. andrassyi* by coarser cuticular striae, shorter stylet, more posterior vulva, continuous cephalic region with transverse striae, fewer cuticular striae in esophageal region, and tail with acute terminus. *M. andrassyi* has 1.0-1.3 μm striae width, 10-11 μm stylet length, vulva 55-64%, cephalic region distinctly contracted, 80 cuticular striae in esophageal region, and tail 10-12 times anal body width with rounded tip.

Holotype female: Collected 15 June 1970 by N. Knobloch in Douglas Lake area, Cheboygan County, Michigan, USA at edge of Bryant's Bog in soil around white birch, *Betula papyrifera* Marsh. Slide T-247t deposited with the USDA Nematology Collection at Beltsville, Maryland, USA.

Allotype male: Slide T-248t. Same data as holotype.

Paratypes, females and males: Slide T-1744p, 4 females. Slide T-1812p, 1 male. All other paratypes deposited in Department of Entomology Collection, Michigan State University, East Lansing, Michigan, USA.

Type habitat and locality: Soil around white birch, *Betula papyrifera* Marsh. near Bryant's Bog, Douglas Lake area, Cheboygan County, Michigan, USA.

Male of *Malenchus acarayensis* Andrassy, 1968 (Fig. 1, H-I)

Measurements (5): L = 0.30 (0.27-0.33) mm; a = 25 (21-29); b = 4.3 (3.8-4.7); c = 4.1 (3.6-4.5); T = 37 (32-41); stylet = 8 μm; spicules = 15 (13-16) μm; gubernaculum = 4 (4-5) μm; CSE = 61 (54-68); T/ABW = 10.2(10-11).

Body slender, ventrally curved. Width of cuticular striae at mid-body .7-.9 μm; finer than cuticular striae of female. Lateral field with two incisures; field occupies about 1/6 body width and extends from midway between stylet knobs and metacorpus to middle of tail. Position of excretory pore usually opposite base of isthmus or slightly posterior. Hemizonid not observed. Cephalic region slightly contracted with no cephalic striae. Stylet 8 μm long, delicate, with knobs slanting posteriorly. Distance from anterior end of body to center of metacorpus shorter than that from center of bulb to base of esophagus.

Metacorpus bulb oval with valve; isthmus slender and long with nerve ring near middle. Basal bulb pyriform. Caudal alae adanal, finely crenate. Spicules tylenchoid, 15 μm long. Gubernaculum short, slightly curved, 4 μm long. Tail about 10 times anal body width. Tail filiform, narrowing to extremely fine acute terminus. Tail with striae becoming fine and undistinguishable. Phasmids not observed.

Males: Collected November 1970 by N. Knobloch in low bog-like area around white birch, *Betula papyrifera* Marsh. at the source of the Maple River, Douglas Lake area, Cheboygan County, Michigan, USA. Slide G-4344, 1 male, and slide G-4345, 1 male, deposited with the USDA Nematology Collection at Beltsville, Maryland, USA. All other males deposited in Department of Entomology Collection, Michigan State University, East Lansing, Michigan, USA.

Habitat and locality: Wet soil around roots of *Betula papyrifera* Marsh. at source of Maple River near Douglas Lake, Cheboygan County, Michigan, USA.

Michigan Population of *M. acarayensis*

Females

Females (15): L = 0.30 (0.28-0.35)mm; a = 22 (19-26); b = 4.6 (4.3-5.1); c = 5.3 (4.3-5.4); V = 63%(61-66%); stylet = 8 μm; T/ABW = 8.8 (7.5-10.0); T/V-A = 1.3 (1.2-1.5).

Body measurements and morphological characters are within the range of those described by Andrassy with the exception of length of anterior part of esophagus as compared to posterior and average width of transverse cuticular striae. Andrassy states that the anterior section of the esophagus is slightly longer than the posterior. In Michigan females and males, the anterior portion is slightly shorter. If the esophagus is measured to the base of the metacorpus instead of the center, the anterior section is longer. Average width of cuticular striae is 1.3 μm as compared to 1.7 μm in Andrassy's specimens. This difference is insignificant because of differences in calibration and techniques in making such small measurements.

KEY TO FEMALES of MALENCHUS

1. Body length 0.52-0.56 mm, cephalic region strongly contracted ..... *machadoi* (Andrassy, 1963) Andrassy, 1968
   Body length 0.25-0.47 mm, cephalic region continuous or slightly contracted 2
2. Stylet 7-8 μm, body length 0.25-0.37 mm 3
   Stylet 10-11 μm, body length 0.36-0.47 mm 4
3. Cephalic region with striae, CSE (cuticular striae in esophageal region) = 32-38 ..... *bryanti* n. sp.
   Cephalic region with no striae, CSE = 54-66 ..... *acarayensis* Andrassy, 1968
4. Tail terminus rounded, CSE = 80, V% = 55-64, T/ABW = 10-11 ..... *andrassyi* Merny, 1970
   Tail terminus acute, CSE = 49-56, V% = 67-70, T/ABW = 5.9-7.2 ..... *truncatus* n. sp.

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