

Description of *Dolichodorus cobbi* n. sp. (Nematoda: Dolichodoridae) with Morphometrics and Lectotype Designation of *D. heterocephalus* Cobb, 1914¹

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Abstract: *Dolichodorus cobbi* n. sp. is described and illustrated from soil around roots of "woods" on the Stanley Farm, Scott County, Arkansas. This species is distinguishable from others of the genus by its short tail projection. It is most closely related to *D. marylandicus* but differs in having a short tail projection, longer stylet, greater body length, larger c value, and also in position of excretory pore. A limited number of Cobb's original specimens and drawings of *D. heterocephalus* were examined. A lectotype and paralectotype were designated to establish the taxonomic base for the genus. Cobb's original modified labeled drawing of *D. heterocephalus* is also included. Morphometric data on *D. heterocephalus* from the type locality and several other populations are given. Some variations in female tail shape, body length, and stylet length were noted.

Key words: taxonomy, morphology, new species, *Dolichodorus*, woods.

The genus *Dolichodorus* was erected by N. A. Cobb (3) in 1914 when he described *D. heterocephalus* from fresh water at Silver Springs, Florida, and Douglas Lake, Michigan. For many years no other species was added to the genus until 1957-58 when *D. obtusus* Allen (1) and *D. similis* Golden (5) were added. Since then, more species have been described and placed in this genus. In 1976 Andrassy (2) established *Neodolichodorus* for the species with bluntly rounded tail and four lines in the lateral field and designated *D. obtusus* the type and only species. Siddiqi (8) in 1977 shifted five other species from *Dolichodorus* to *Neodolichodorus*. In 1981 Lewis and Golden (7) described *D. marylandicus* from grass in College Park, Maryland, and also gave a key to genera of Dolichodorinae and nine species of *Dolichodorus*. Recently Smart and Khuong (9) described *D. miradvulvus* from *Anubias nana* Engler in Florida and gave a key to the 13 species of the genus. We describe here a new species of *Dolichodorus*

from Arkansas, designate a lectotype of *D. heterocephalus*, and also present detailed morphometric data on *D. heterocephalus* from its type locality and several other populations.

MATERIALS AND METHODS

Specimens from Arkansas were sent by E. J. Wehunt to A. Morgan Golden for species identification in June 1984 and April 1985. These specimens represented an undescribed species and were obtained from soil around roots in "woods" in Scott County, Arkansas. Specimens of *D. heterocephalus* examined included slides deposited in the USDA Nematode Collection by different workers from three sites in Florida and from East Wareham, Massachusetts. Records indicated Cobb's specimens were treated in "Flemming solution to glycerine." They were in good condition and were remounted individually in glycerine on glass slides. Males and females were recovered from soil by sieving followed by Baermann funnel extraction, heat relaxed in an oven at 43 C for 12 minutes, and fixed in 3% formaldehyde. Procedures used in measuring, drawing, and preparing specimens were the same as those used by Golden and Birchfield (6). All measurements are in micrometers (μm) unless otherwise stated.

SYSTEMATICS

Dolichodorus cobbi n. sp.
(Figs. 1-16)

Female (11): Length 1,948-2,993 (mean 2,434.6, standard deviation [SD] 39.3); width 39.5-60.2 (52.4, SD 7.1); a = 36.8-

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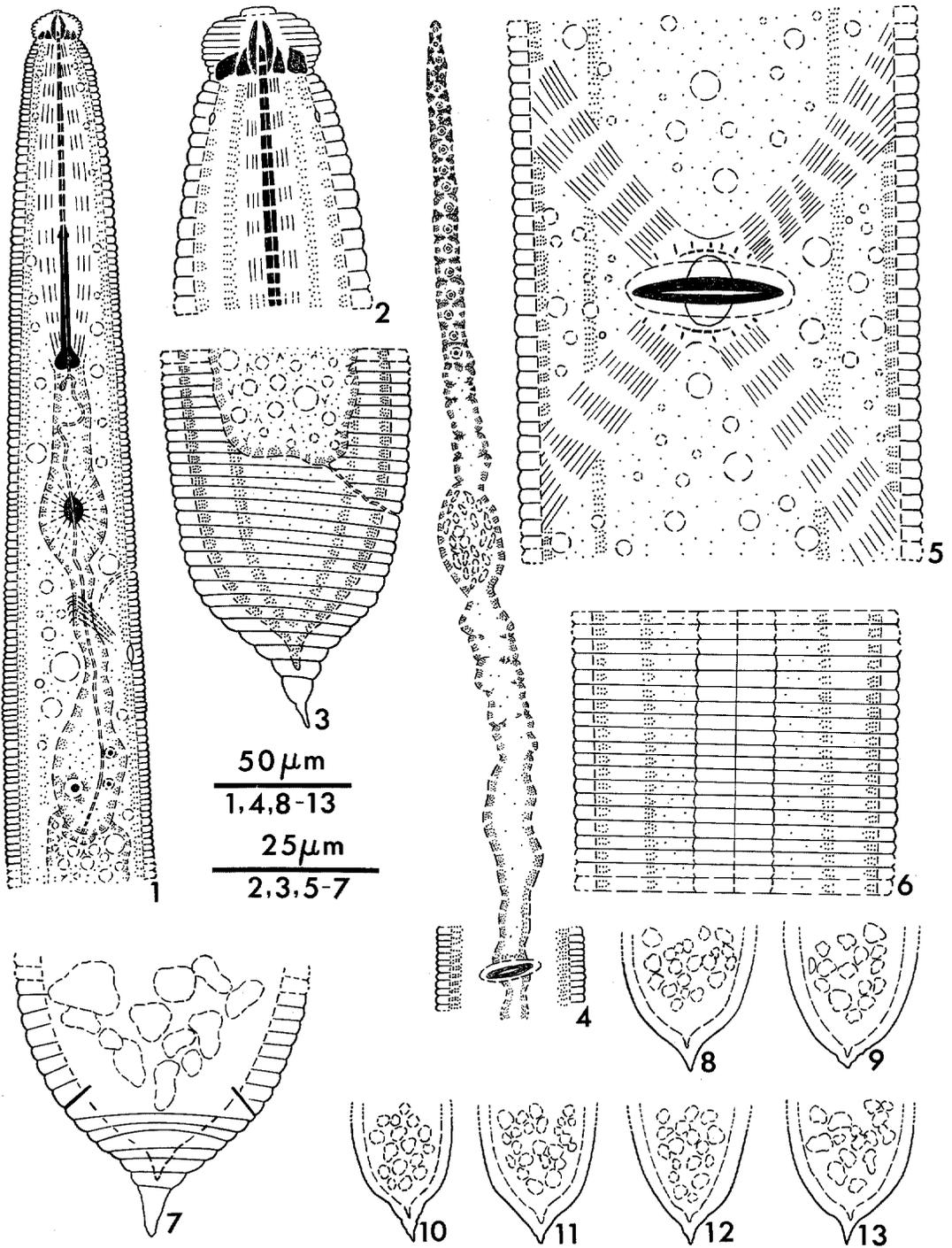
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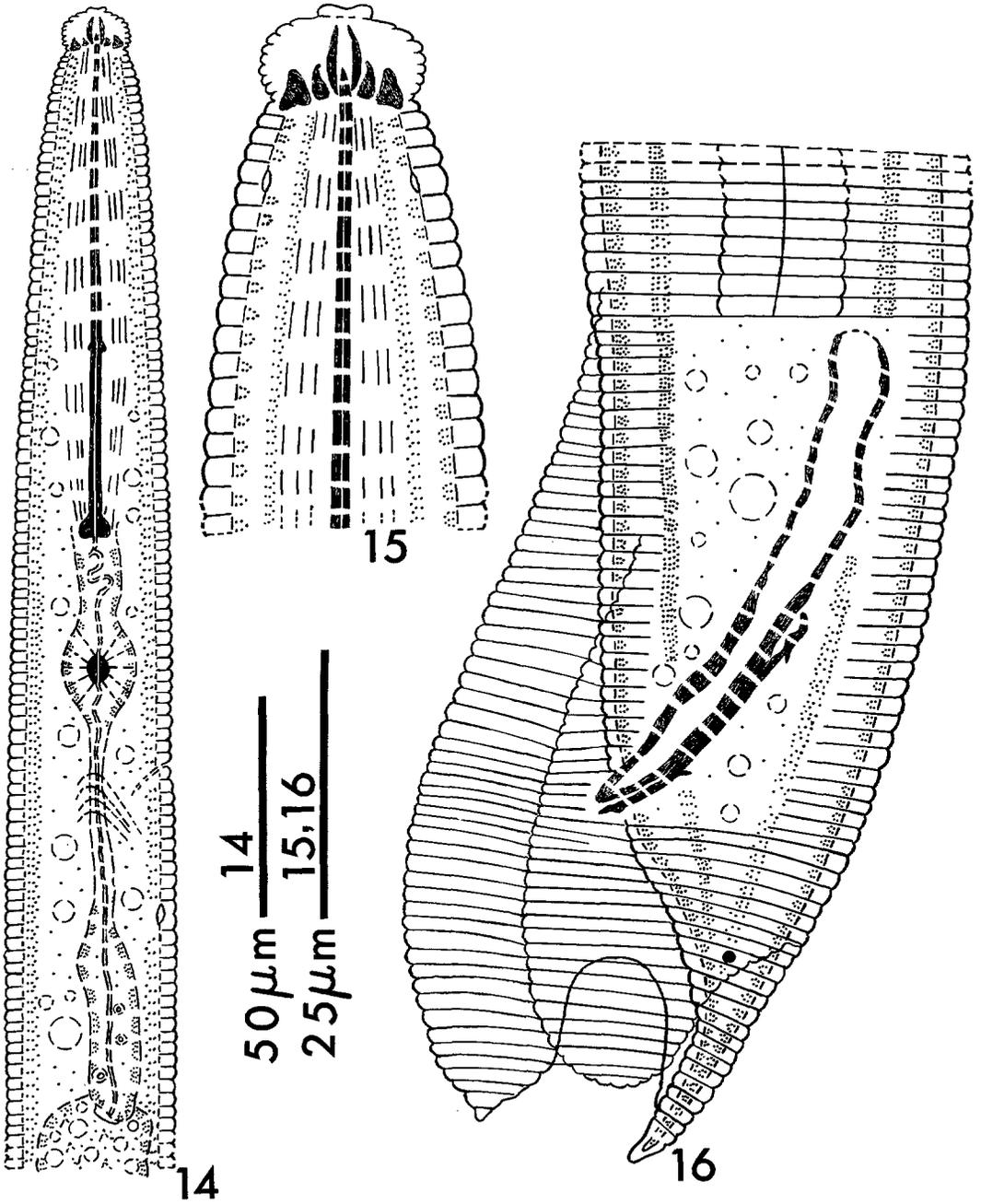
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FIGS. 1-3. Drawings of *Dolichodoros cobbi* n. sp. 1) Anterior region of female. 2) Anterior portion of female showing head annules, cephalic frame work and anterior cephalids. 3) Female tail. 4) Female anterior gonad. 5) Ventral view of vulva. 6) Female lateral field. 7) Female posterior end showing phasmids in dorsal view. 8-13) Variations in female tail shape.



FIGS. 14-16. Drawings of *Dolichodoros cobbi* n. sp. 14) Male anterior region. 15) Male anterior portion showing head annules, cephalic framework, and anterior cephalids. 16) Male tail.

54.7 (46.6, SD 5.7); b = 5.7-9.2 (8.3, SD 1.0); c = 48.7-77.8 (67.1, SD 13.1); V = 51.8-55.3 (53.3, SD 1.1); total stylet 114-129 (121.7, SD 4.4); stylet conus 69-79.5 (74.2, SD 3.3); stylet shaft 44.8-51.6 (47.5, SD 2.2); dorsal esophageal gland orifice (DGO) 3.4-4.3 (3.8, SD 0.4) from base of stylet; center of median bulb 146.2-202

(174.1, SD 15.2) from anterior end; excretory pore 182-214 (203.9, SD 10.1) from anterior end; phasmids 21.5-24.9 (23.1, SD 1.1) from tail terminus; anal body width 34.4-43 (38.0, SD 3.4); hemizonid to excretory pore 19.3-38.7 (27.6, SD 9.4).

Holotype (female): Length 2,748; width 60.2; a = 45.6; b = 9.1; c = 77.1; V = 54.4;

total stylet 122.1; stylet conus 75.6; stylet shaft 46.5; DGO 3.4 from base of stylet; center of median bulb 181 from anterior end; excretory pore 208 from anterior end; phasmids 23.6 from tail terminus; anal body width 43.

Female: Body cylindrical, elongate, slightly arcuate. Lip region set off by a distinct constriction, bearing 7–9 (sometimes 11) fine annules. Perioral disc prominent, distinctly raised. Anterior portion of head with strong cephalic framework, basal plate heavily sclerotized. Cuticle coarsely and distinctly annulated. Anterior cephalids conspicuous, opposite, 4–5 annules posterior to constriction at lip region. Deirids not seen. Lateral field areolated, 7.7–14.1 wide near midbody, incisures three. Stylet long, slender to stout, with strongly developed posteriorly sloping somewhat rounded knobs, conus longer than shaft. Nerve ring near middle of isthmus. Excretory pore 182–214 μm from anterior end, usually located just below the median bulb. Hemizonid 19.3–38.7 below excretory pore. Esophagus typical of the genus. Procorpus expands gradually into the oval median bulb. Isthmus slender, expanding into the elongate basal bulb. Esophageal gland nuclei three, clearly evident. Esophageal-intestinal valve conspicuous. Vulva transverse, slightly posterior to midbody. Gonads amphidelphic, outstretched. Spermatheca prominent, oval, filled with sperm in each gonad. Tail 35.8 (32.2–40), abruptly tapering to a short spicate terminus. Tail shape generally appearing as in Figures 3, 7–13.

Male (7): Length 1,720–2,322 (2,057.8, SD 238.8); width 36–43 (39, SD 2.5); a = 47.6–58.7 (52.6, SD 5.2); b = 7.0–8.4 (7.9, SD 0.5); c = 58.5–79.6 (72.1, SD 8.0); total stylet 111.8–115 (113.1, SD 1.7); stylet conus 68.8–72 (70.1, SD 1.1); stylet shaft 41.2–44.5 (42.9, SD 1.1); DGO 3.4–4.7 (3.8, SD 0.5) from base of stylet; center of median bulb 146.2–172 (158.2, SD 10.3) from anterior end; excretory pore 166–192 (179.5, SD 10.9) from anterior end; spicules 45–52 (49.2, SD 2.5); gubernaculum 24–30.1 (27.2, SD 2.4); tail 25.8–32.2 (29.3, SD 2.2); phasmids 20.4 from tail terminus (found in only one specimen); anal body width 19.3–23.6 (21.1, SD 1.7); hemizonid to excretory pore 22–36.5 (28.8, SD 4.9).

Allotype (male): Length 2,055; width 43; a = 47.7; b = 8.3; c = 79.6; total stylet 111.8; stylet conus 69.7; stylet shaft 42.1; DGO 3.4 from base of stylet; center of median bulb 146.2 from anterior end; excretory pore 172 from anterior end; spicules 51; gubernaculum 26.5; tail 25.8; phasmids 20.4 from tail terminus; anal body width 22.3; hemizonid to excretory pore 25.8.

Male: Similar to the female in digestive tract, nerve ring and excretory pore position, annulation, and lateral field; but body slightly smaller and posterior end slightly hooked ventrally. Tail terminus bifurcate. Caudal alae trilobed striated, enveloping tail. Testis single, outstretched. Spicules massive, heavily sclerotized, almost straight, 45–52 long. Gubernaculum 24–30 in length, generally appearing as shown in Figure 16. Tail pointed.

Type specimens: Holotype (female): Collected June 1984 by E. J. Wehunt from soil around roots in woods on Stanley Farm, Scott County, Arkansas. Slide No. T-417t, deposited in the U.S. Department of Agriculture Nematode Collection (USDANC), Beltsville, Maryland. Allotype (male): Slide No. T-418t, same data as holotype. Paratypes (males and females): Same data as holotype.

Type host and locality: From soil around roots in woods on the Marvin Stanley Farm, Section 21, T4N, R29W, Scott County, Arkansas.

Diagnosis: *Dolichodoros cobbi* n. sp. differs from all known species of *Dolichodoros* by its short tail projection. It is most closely related to *D. marylandicus* Lewis and Golden, 1981, but it differs further in having a longer stylet, greater body length, larger c value, and also in position of excretory pore (longer tail projection, stylet 83.5–92.4, body length 1,646–2,489, c = 30–51 and excretory pore from anterior end 156.6–193.9 in *D. marylandicus*).

MORPHOMETRICS

Dolichodoros heterocephalus COBB, 1914
(Fig. 17 [original drawings of Cobb])

Lectotype (female): Length 3,573; width 81.7; a = 43.7; b = 11.7; c = 38.8; V = 51.5; total stylet 95; stylet conus 55; stylet shaft 40; center of median bulb 192 from anterior end; excretory pore 224 from an-

Specimens from Gainesville, Florida

Female (6): Length 1,914–2,245 (2,115, SD 121.4); width 48–55 (52, SD 2.6); a = 39.8–41.3 (40.5, SD 0.5); b = 7.7–9.3 (8.6, SD 0.5); c = 36.2–45.6 (40.2, SD 3.6); V = 54.3–56.7 (55.2, SD 1.0); total stylet 100–106.1 (102.6, SD 2.7); stylet conus 62.3–66.6 (64.3, SD 1.6); stylet shaft 36.5–39.5 (38.2, SD 1.2); DGO 4.3–5.2 (4.6, SD 0.5) from base of stylet; center of median bulb 141–159 (150.1, SD 6.2) from anterior end; excretory pore 156–180 (165.8, SD 8.1) from anterior end; phasmids 34.4–36.5 (35.2, SD 1.1) from tail terminus; tail 49–62 (53.7, SD 5.2); anal body width 33.1–36.5 (34.8, SD 1.2); hemizonid to excretory pore 23.6–33.1 (29.2, SD 4.9).

Male (6): Length 1,669–2,001 (1,861.5, SD 124.7); width 39.5–43 (41.8, SD 1.4); a = 40.5–46.8 (44.5, SD 2.8); b = 8–8.3 (8.1, SD 0.1); c = 55–59.3 (57.6, SD 1.7); total stylet 99.5–104 (102.3, SD 1.5); stylet conus 63–66.6 (64.9, SD 2.1); stylet shaft 36.5–39.5 (37.2, SD 1.1); DGO 4.3 from base of stylet; center of median bulb 129–150.5 (144, SD 8) from anterior end; excretory pore 137–164 (149.7, SD 9.4) from anterior end; spicules 43–47 (45.3, SD 1.5); gubernaculum 26.6–30 (28.4, SD 1.4); tail 30–35.2 (32.9, SD 2.2); anal body width 19.3–21.5 (20.6, SD 1.0).

Specimens from Largo, Florida

Female (4): Length 1,939–2,283 (2,081, SD 148.8); width 37.8–46.4 (42.1, SD 3.5); a = 46.7–55.4 (49.5, SD 4); b = 7.2–9.4 (8.6, SD 0.9); c = 39.5–46.7 (43.8, SD 3.4); V = 53.1–57.8 (55.1, SD 1.9); total stylet 100.1–105.3 (102.1, SD 2.3); stylet conus 61.9–64.5 (63, SD 1.2); stylet shaft 36.5–43 (39.1, SD 2.7); DGO 4.3–5.1 (4.8, SD 0.4) from base of stylet; center of median bulb 142.7–177 (153.8, SD 15.8) from anterior end; excretory pore 157.7–196 (171.9, SD 20.9) from anterior end; phasmids 32.2–36.5 (34, SD 1.8) from tail terminus; tail 43–49 (47.5, SD 3); anal body width 25.8–30.1 (27, SD 2).

Male (2): Length 1,695–1,733 (1,714, SD 26.9); width 30.9–39.5 (35.2, SD 6.0); a = 43.8–54.8 (49.3, SD 7.7); b = 8–8.2 (8.1, SD 0.1); c = 56.5–62.1 (59.3, SD 3.9); total stylet 97; stylet conus 63; stylet shaft 34; center of median bulb 116.9–137.6 (127.2, SD 14.6) from anterior end; spicules 43;

gubernaculum 25.8; tail 27.9–30 (28.9, SD 1.4); anal body width 16.7–21.5 (19.1, SD 3.3).

Specimens from East Wareham, Massachusetts

Female (2): Length 2,584–2,817 (2,700, SD 164.7); width 48.1–51.6 (49.8, SD 2.4); a = 53.7–54.5 (54.1, SD 0.5); b = 11.7–12.1 (11.9, SD 0.2); c = 37.2; V = 53.4–54.2 (53.8, SD 0.5); total stylet 90–98 (94, SD 5.6); stylet conus 55–58 (56.5, SD 2.1); stylet shaft 35–40 (37.5, SD 3.5); DGO 5.1 from base of stylet; center of median bulb 146.2 from anterior end; phasmids 48 from tail terminus.

Male (2): Length 2,438–2,576 (2,507, SD 97.5); width 46.4–51.6 (49, SD 3.6); a = 49.9–52.5 (51.2, SD 1.8); b = 9.9–11 (10.4, SD 0.7); total stylet 96.7–98 (97.3, SD 0.9); stylet conus 58; stylet shaft 38.7–40 (39.3, SD 0.9); center of median bulb 150.5–154.8 (152.6, SD 3.0) from anterior end; excretory pore 183–185 (184, SD 1.4) from anterior end; spicules 53.7–56 (54.8, SD 1.6); gubernaculum 32.2; anal body width 20.6.

DISCUSSION

A full redescription of *D. heterocephalus* is not given because the details we observed fit its original description (3) and the one published in 1974 by Williams (10). Additional morphometric data is given however, based on a limited number of Cobb's original specimens and extensive morphometric data with new information on *D. heterocephalus* from various populations of the United States. Some variations in tail shape, stylet length, and body length were noted. A lectotype female and a male from Silver Springs, Florida, were selected to establish the taxonomic base for the genus. Cobb's original drawings are also included. It should be pointed out that in Cobb's original publication (3) the various structures in the drawings were identified by single letters only. However, before republishing the original drawings in 1918 (4), Cobb added one or more letters to each of the previous letters to better identify the various structures. Thus, the drawings included here are the same as the original ones except for additional letters for the various structures.

Lectotype (female): Collected by N. A. Cobb on an unknown date prior to 1914 from fresh water at Silver Springs, Florida.

Slide No. T-153t, USDANC, Beltsville, Maryland. Cobb's original male specimen from this same location (morphometrics above) is also deposited in USDANC, Slide No. T-424t.

Specimens from three populations near Sanford, Florida (males and females): Collected by A. L. Taylor from celery roots on 15 December 1945; by H. L. Rhoades from soil on 8 April 1963; and by H. L. Rhoades from greenhouse culture on 7 October 1969. Slides G-501, G-795, G-2662 and G-3987, USDANC, Beltsville, Maryland.

Specimens from Gainesville, Florida (males and females): Collected by D. W. Dickson and received via Stephen A. Lewis from turf in greenhouse on 24 March 1980. Slides G-6243 and G-6244, USDANC, Beltsville, Maryland.

Specimens from Largo, Florida (males and females): Collected by R. P. Esser from *Citrus* sp. and received via Stephen A. Lewis on 22 May 1980. Slides G-6032 and G-6033, USDANC, Beltsville, Maryland.

Specimens from East Wareham, Massachusetts (males and females): Collected by B. M. Zuckerman from unknown plant on 8 September 1964. Slide No. G-839, USDANC, Beltsville, Maryland.

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