

Heterodera longicolla, n.sp. (Nematoda: Heteroderidae) from Buffalo-grass (Buchloë dactyloides) in Kansas¹

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Abstract: *Heterodera longicolla* n. sp., a member of the *H. goettingiana* group, is described and illustrated from roots of buffalo-grass, *Buchloë dactyloides* (Nutt.) Engelm., in Manhattan, Kansas. This new abullate species, having second-stage larvae with only three lines in the lateral field, is most closely related to *H. cyperi* Golden, Rau & Cobb, 1962, but differs particularly in having a shorter stylet in larvae, males and females; in possessing only three annules on the head of larvae and males; in having a shorter tail in larvae; and by the presence on cysts of a small anus without a circum-anal pattern. **Key Words:** taxonomy, morphology.

In 1971 a cyst nematode was found in large numbers on the roots of buffalo-grass, *Buchloë dactyloides* (Nutt.) Engelm., near Hays, Kansas. A culture was established on buffalo-grass in a greenhouse at Kansas State University, Manhattan, for morphological and biological studies. This paper describes that nematode as a new *Heterodera* species in the *H. goettingiana* group.

Specimens used in this description were collected from buffalo-grass grown in a greenhouse at Manhattan, Kansas. The procedures used, including fixing, drawing and photographing specimens, were the same as those recently given by Golden & Birchfield (1).

Heterodera longicolla, n. sp.

Females (25): Length (including neck), 474 μ (366-585); width, 255 μ (156-337); 1/w ratio = 1.9 (1.5 - 2.7); neck length, 131 μ (60-186); ratio of length/neck length = 3.7; stylet, 20 μ (19-21); outlet of dorsal esophageal gland from base of stylet, 4 μ (3.5 - 4.6).

Holotype (female): Length, 460 μ ; width, 245 μ ; 1/w ratio = 1.80; neck length, 125 μ ; stylet, 20 μ ; outlet of dorsal esophageal gland, 4 μ .

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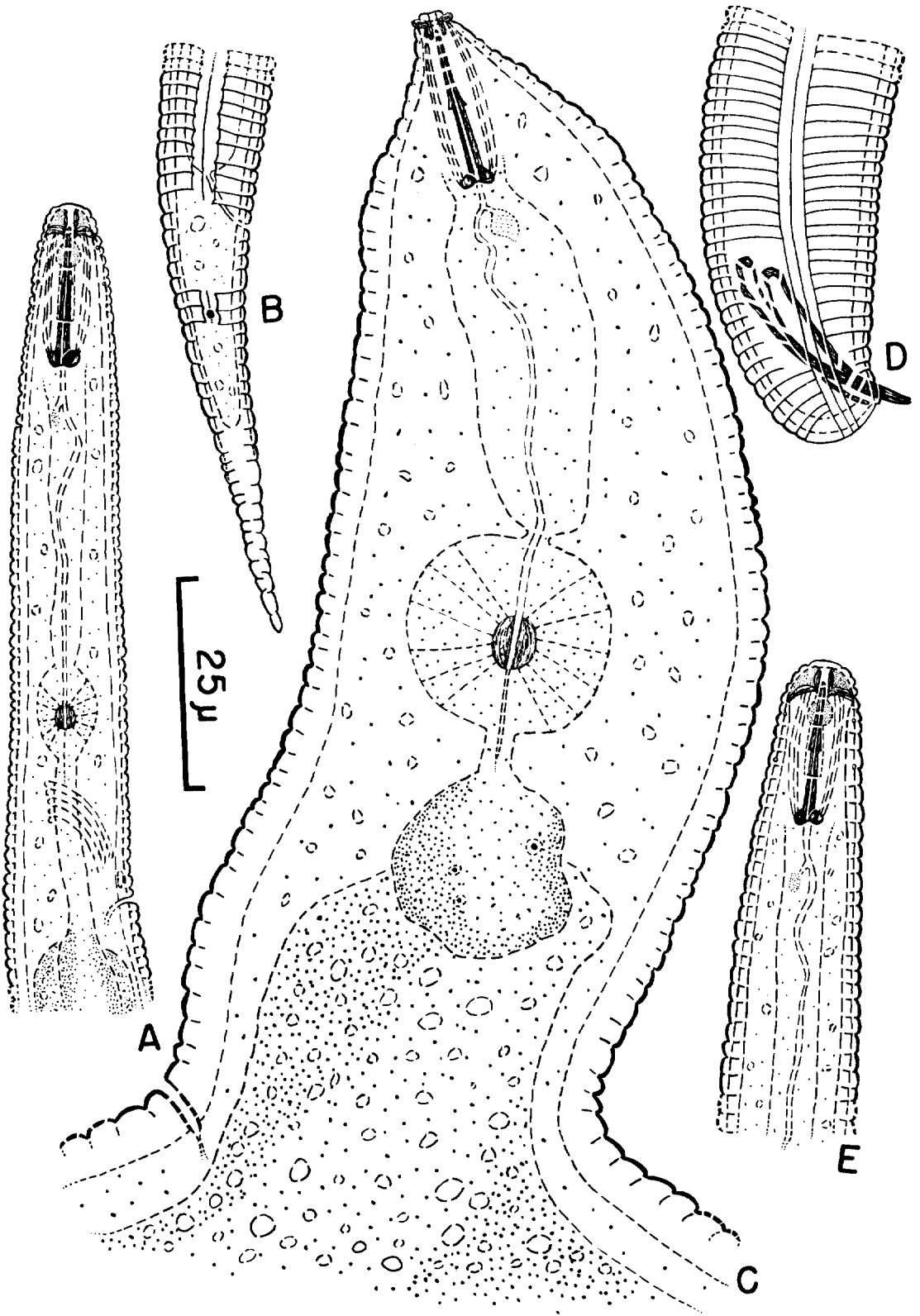
Description: Body pearly white, basically lemon-shaped, with protruding neck and vulva (Fig. 2). Neck unusually long, slender, and well-defined. Thick cuticle with zig-zag pattern and subcuticular punctation. Head set off from neck, variable in shape, and bearing two annules with second one generally larger than first (Fig. 1C). Cephalic sclerotization distinct but weak. Stylet strong, with well-developed knobs sloping posteriorly. Esophageal region appearing about as illustrated, with excretory pore commonly at base of neck (Fig. 1C). Vulva prominent, with vulval slit in 12 specimens averaging 32 μ (28-37) in length (Figs. 4, 5, 6 and 7). Anus small, inconspicuous and located about 10% of body length from posterior end.

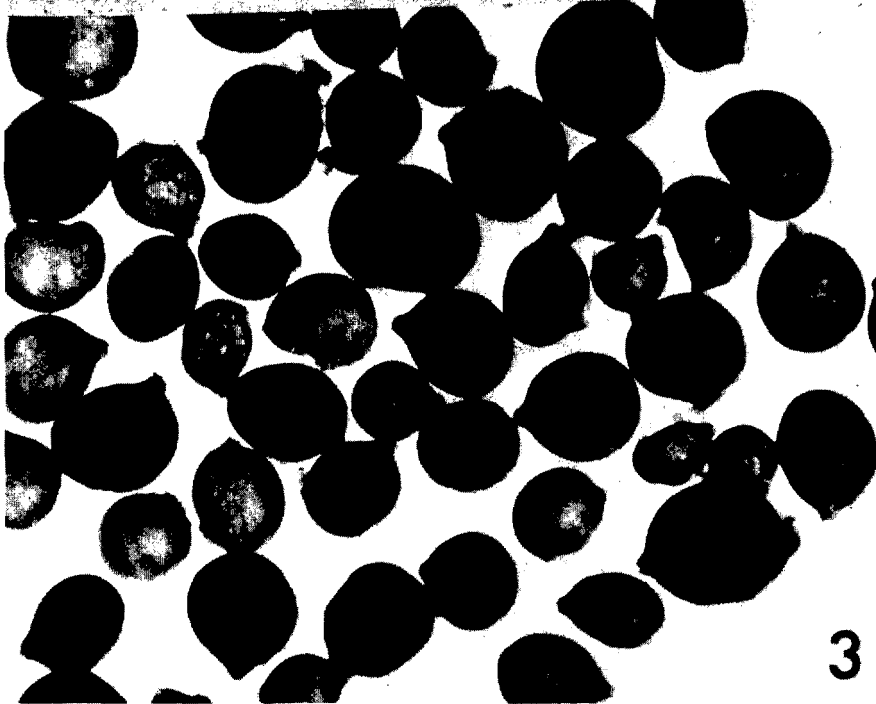
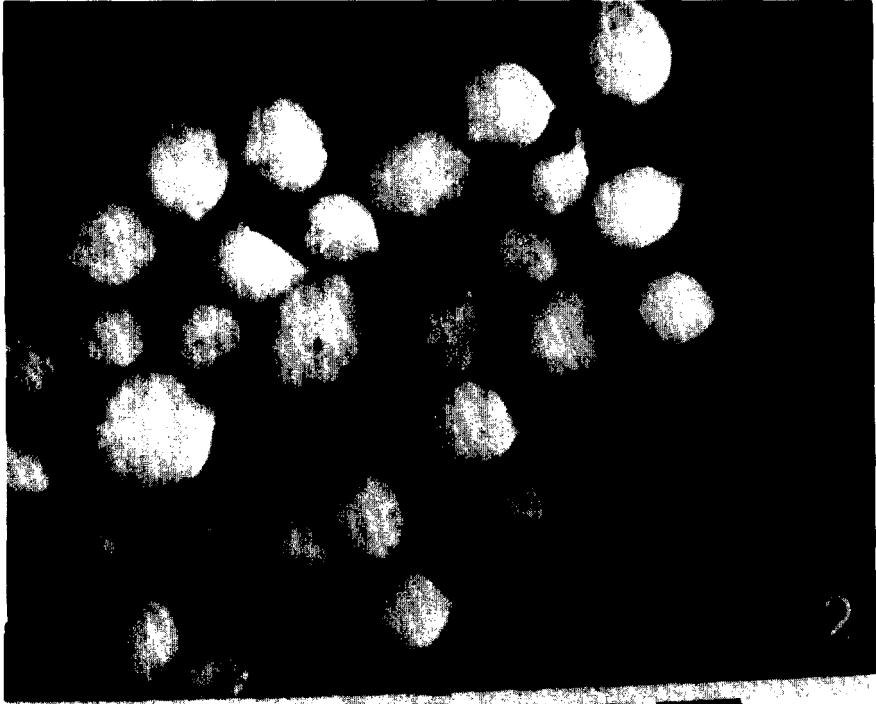
Cysts (25): Length (including neck), 496 μ (362-632); width, 359 μ (275-459); 1/w ratio = 1.4 (1.1 - 1.8); neck length, 136 μ (101-185); ratio of length/neck length = 4.4 (3.3 - 5.8).

Description: Cysts light to very dark brown in color, basically lemon-shaped, with protruding neck and vulva (Fig. 3); abullate, ambifenestrate (Figs. 8, 9, 10 and 11). External cyst pattern zig-zag (Figs. 12 and 13) and generally with conspicuous, irregularly arranged subcuticular punctation (Fig. 14). Vulval bridge weak, averaging 45 μ in length in 12 specimens, and sometimes appearing as remnants in older cysts when the semifenestrae disintegrate. Anus small, without surrounding pattern and located about 10% of cyst length from vulval cone terminus.

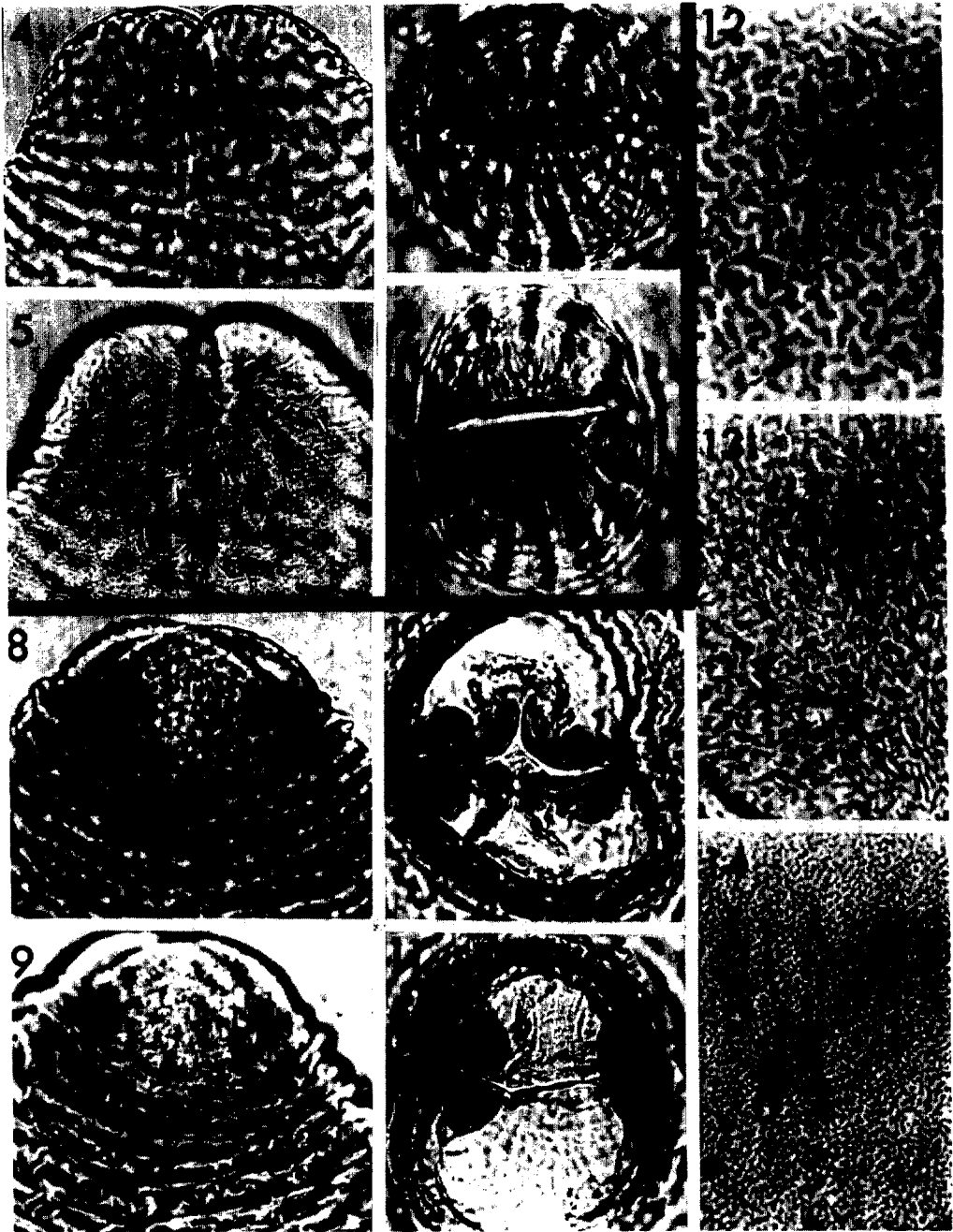
Males (25): Length, 784 μ (660-885); a = 29 (23-32); b = 5.1 (4.1 - 7.0); c = 590 (215-1580); stylet, 19.2 μ (17.9 - 20.2); outlet of dorsal esophageal gland from base of stylet, 5.4 μ (5.0 - 6.2); head width at base, 7.7 μ (6.7 - 8.4); head height, 3.3 μ (2.8 - 3.9);

FIG. 1. Drawings of *H. longicolla*, n. sp. Second stage larvae: A = Anterior. B = Posterior. Female: C = Anterior. Male: D = Posterior. E = Anterior.





FIGS. 2-3. Photomicrographs of whole specimens of *H. longicolla*, n. sp. 2. White females ($\times 25.2$). 3. Cysts of varying ages ($\times 25.2$).



FIGS. 4-14. Photomicrographs of portions of females and cysts of *H. longicolla*, n. sp. 4. Lateral view of female vulval area beneath surface. 5. Same view as Fig. 4 but at outer surface. 6. End-on view of female vulval area a few microns beneath surface. 7. Same view as Fig. 6 but at outer surface. 8. Cyst vulval cone view beneath surface. 9. Same view as Fig. 8 but at outer surface. 10. End-on view of cyst vulval cone undergoing fenestration. 11. End-on view of cyst vulval cone. 12, 13. Cyst walls of two different cysts at midbody, showing variation in zig-zag pattern (focal plane same on both). 14. Punctation in cyst wall near midbody (X 760).

spicules, 26.9 μ (25.2 - 28.6); gubernaculum, 9.9 μ (9.0 - 10.6).

Allotype (male): Length, 745 μ ; a = 30; b = 5.1; c = 414; stylet, 18.6 μ ; outlet of dorsal esophageal gland from base of stylet, 5.2 μ ; head width, 7.9 μ ; head height, 3.4 μ ; spicules, 27 μ ; gubernaculum, 10 μ .

Description: Body slender, vermiform, tapering gradually at both ends. Cuticle with prominent annulation; subcuticular annules less distinct and twice as numerous. Lateral field not areolated, commonly with only 3 lines though 4 can sometimes be seen at midbody on older specimens. At widest part, body of 25 specimens averages 27 μ (24-32). Head low and broadly hemispherical, generally with only 3 annules. Cephalic framework heavily sclerotized. Stylet, knobs, guide ring and cephalids commonly appearing as illustrated (Fig. 1E). Median bulb ellipsoidal, its center 78 μ (72-86) from anterior end. Excretory pore about 3 annules posterior to hemizonid. Spicules slightly arcuate, with bidentate tips. Tail short, 1.8 μ (0.6 - 3.4) in length, and often shaped as illustrated (Fig. 1D).

Second-stage larvae (25): Length, 353 μ (312-378); a = 19.7 (16.8 - 23.4); b = 2.5 (2.2 - 2.9); c = 7.0 (6.5 - 7.6); stylet, 17.5 μ (16.8 - 18.5); outlet of dorsal esophageal gland from base of stylet, 5.2 μ (3.4 - 6.1); head width at base, 6.3 μ (5.6 - 7.3); head height, 2.4 μ (2.2 - 2.8); tail, 50 μ (45-54); hyaline tail terminal, 27 μ (20-33); caudal ratio A = 4.9 (3.9 - 6.6); caudal ratio B = 26.5 (18-60) (2).

Description: Body vermiform, tapering at both extremities but much more so posteriorly. Cuticle clearly annulated; subcuticular annulation less distinct but twice as numerous. Non-areolated lateral field with only 3 lines, outer 2 commonly crenate (Fig. 1B). At widest part, body measures 18 μ (15-21). Head slightly set off, bearing 3 annules and being over twice as wide at its base as in height. Stylet, knobs, guide ring, anterior and posterior cephalids and esophageal region commonly appearing as illustrated (Fig. 1A). Center of valvated median bulb located 61 μ (55-67) from anterior end.

Excretory pore posterior and almost adjacent to hemizonid. Tail tapering to very fine, rounded terminus. Phasmids distinct, located on lateral field in anterior third portion of tail (Fig. 1B).

Eggs (25): Length, 86 μ (78-94); width, 36 μ (33-42); 1/w ratio 2.4 (1.9 - 2.7). Egg shell hyaline, without visible markings.

HOLOTYPE (female): Collected from greenhouse culture by O. J. Dickerson at Manhattan, Kansas, on 25 October 1971. Slide T-81t, United States Department of Agriculture Nematode Collection, Plant Nematology Laboratory, Beltsville, Maryland 20705.

ALLOTYPE (male): Slide T-82t, same data and Collection as holotype.

PARATYPES: Males, females, cysts, larvae and eggs; United States Department of Agriculture Nematode Collection, Beltsville, Maryland. Additional specimens at California Nematode Survey Collection, Davis; Kansas State University Collection of Nematodes, Manhattan, Kansas; and Canadian National Collection of Nematodes, Ottawa, Canada.

TYPE HOST AND LOCALITY: Roots of buffalo-grass, *Buchloë dactyloides* (Nutt.) Engelm., near Hays, Kansas.

DIAGNOSIS: *Heterodera longicolla* n. sp. differs from the most closely related species, *H. cyperi* Golden, Rau & Cobb, 1962, especially by (i) having a shorter stylet in larvae, females and males; (ii) possessing only 3 annules on head of larvae and males; (iii) having a shorter tail in larvae; and (iv) the presence on cysts of a small anus without a circum-anal pattern.

The known distribution of this new *Heterodera* species is limited to Kansas.

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