Paraphelenchus acontioides n. sp. (Nematoda: Paraphelenchidae), a Mycophagous Nematode from Illinois, with Observations on its Feeding Habits and a Key to the Species of Paraphelenchus

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An undescribed species of the genus Paraphelenchus (Micoletzky, 1922) Micoletzky, 1925 was recovered from soil collected around the roots of Kentucky blue grass (Agrostis palustris Huds.) on the Horticulture Research Farm at the University of Illinois, Urbana. This species was established in 1960 on the fungus Pyrenochaeta terrestris (Hansen) Gorenz., J. C. Walker, and Larson, and has been maintained in the laboratory since that time.

Paraphelenchus acontioides n. sp.

**DIMENSION:** Females (n = 60): L = 0.77 ± 0.04 mm (0.71–0.88 mm); a = 28.5 ± 1.4 (25–31); b = 4.8 ± 0.2 (4.4–5.3); c = 25 ± 1.5 (20–30); V = 74.8 ± 0.7 (73–77); Stylet = 15 ± 1 μ (14–16 μ).

**DESCRIPTION:** Body slightly arcuate ventrally when heat-relaxed; gradually tapers anteriorly to a low rounded lip region which is continuous with the body contour. Cuticle marked by fine transverse striae, approximately 1 μ apart. Lateral field occupies one-fourth to one-fifth body width and contains eight incisures throughout most of its length. Number of incisures reduced to six in the isthmus region, lateral field fading out anterior to corpus. Incisures also reduced to six in anal region, becoming indistinct near the tail tip. Body tapers posteriorly to a short tail, less than twice anal body diameter. Dorsal surface of the tail curved more than the rather straight ventral surface. Tail tip with a single mucro as in Figure 1 F, G, and H.

Lip region not striated, consisting of six lips. Neither amphids nor papillae seen. Spear guiding ring a circumoral circle composed of six short pieces fused together (Fig. 1C). Stylet 14–16 μ long with a shorter conical anterior portion and a cylindrical shaft. Stylet has slight basal swellings which are more pronounced on the ventral side. Procorpus slender with conspicuous lumen. Metacorpus large, aphelenchoid, with valvular apparatus slightly posterior to the center. Esophageal gland ducts open into metacorporeal lumen in typically aphelenchoid arrangement. Length of the lumen between the openings of the glands and the beginning of the valve is highly sclerotized. Isthmus slender, gradually widening to form basal bulb. Three esophageal glands confined within basal bulb. Lumen of isthmus and basal bulb less sclerotized than that of corpus. Intestine composed of two rows of easily discernible cells, usually filled with refractive globules in specimens from active cultures. Intestinal lumen forming a wide anterior chamber, becoming narrower and sinuous throughout the rest of its length. Rectum about one and one-half times the anal body diameter. Anal opening about a third the body diameter at that point as in Figure 1F. Nerve ring surrounding the isthmus immediately behind metacorpus. Dierid papillae, conspicuous, located in the lateral field at the level of the nerve ring. Excretory pore opposite nerve ring with canal leading ventrally to a unicellular gland ventral to the junction of esophagus and intestine. Hemizonid just posterior to the excretory pore; hemizonid one body width posterior to it. Phasmids located near the tail terminus appearing as minute papillae each with a fine strand connected to the body content.

Ovary single, outstretched. Oocytes arranged in a single row surrounded by a conspicuous epithelium. Epithelial cells with nuclei slightly larger than in oocytes. Anterior portion of epithelium illustrated in Figure 1A; posterior portion omitted for clarity. Uterus composed of paired ovoid cells ranging from 7–13 in number. Post vulvar sac about twice the vulval body width in length. Vulva a transverse slit with conspicuous vulvar lips, observable in young females prior to escape from fourth stage cuticle. One or two eggs

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may be present at a time in egg-laying females. Eggs laid in the single celled stage, measuring 64–74 μ in length and 28–32 μ in width.

**Holotype:** Female, progeny of a female collected in 1960 and maintained on cultures of *Pyrenochaeta terrestris* growing on Potato Dextrose Agar, slide # P-H-1, Nematode Slide Collection, Department of Plant Pathology, University of Illinois, Urbana.

**Paratypes:** Ten females, date same as for holotype, slide # P-P-1, Nematode Slide Collection, Department of Plant Pathology, University of Illinois, Urbana.

**Type habitat and locality:** Soil around roots of Kentucky blue grass (*Agrostis palustris* Huds.), Horticulture Research Farm, University of Illinois, Urbana.

**Diagnosis:** *Paraphelenchus acontioides* n. sp. can be distinguished by the presence of a macro on the tail tip from *P. batavicus* Filipjev, 1934, *P. myceliophthorus* J. B. Goodey, 1958, and *P. tritici* Baranovskaya, 1958, all of which lack such a terminal process. Each of those species possessing mucrones has a characteristic number of lines in the lateral field: *P. basili* Das, 1960 has four; *P. amblyurus* Steiner, 1934 has six; nine were illustrated in *P. pseudoparietinus* Micoletzky, 1922; whereas *P. acontioides* n. sp. has eight. The new species also differs from *P. pseudoparietinus*, its closest relative, in that the lip region in the former is continuous with the body contour and males are not known, whereas the lip region in the latter is offset and males are known.

**Key to the Species of the Genus Paraphelenchus**

1. Tail tip with one or more mucrones .......... 2
2. Tail tip tapering evenly dorsally and ventrally to a blunt terminus, lateral field with 4–6 lines ............... 3
3. Tail tip with prominent curvature on the dorsal surface, lateral field with 8–9 lines ............... 4
4. Lateral field with 4 lines, lip region offset .......... *P. basili* Das, 1960
5. Lateral field with 6 lines, lip region continuous with the body contour ............... *P. amblyurus* Steiner, 1934
6. Lateral field with 8 lines, lip region continuous with the body contour .......... *P. acontioides* n. sp.
7. Lateral field with 9 lines, lip region offset .......... *P. pseudoparietinus* (Micoletsky, 1922) Micoletsky, 1925
8. Female tail with a pair of subterminal papillae, lip region continuous with the body contour ............... *P. myceliophthorus* J. B. Goodey, 1958

**Feeding Habits of P. acontioides**

Observations were made using nematodes which had been transferred from stock cultures to 4-day-old fungus cultures growing in a very thin layer of 2% water agar in petri dishes. After a cover slip was placed over them it was possible to observe details with a 90X oil immersion lens. Feeding habits described here are based on observations made while the nematodes were feeding on the fungus, *Pyrenochaeta terrestris*.

This nematode is a voracious feeder, emptying a cell within a few seconds and then moving to the next cell in a very short time. The same general area of feeding was sometimes used for more than an hour during which the posterior half of the body remained at the same place, with only occasional movements, while the anterior half moved in various directions to feed on cells within its reach.

Movement of *P. acontioides* was of the usual type with the head turning to the sides accom-
panied by occasional protrusion of the stylet. Once the head touched a hypha, the nematode stopped and fed on it, or bypassed it. When a cell was chosen for feeding the nematode thrust its stylet into the cell with the head appressed to the cell wall. The number of stylet thrusts usually varied from 10–15 at a rate of 15–20 thrusts per second; but in some cases penetration was achieved with only 4–8 stylet thrusts. Number of stylet thrusts required for penetration could not be correlated with the proximity of the septum, nature of the cell wall, or the turgidity of the cell. The action of the stylet was always associated with a twitching movement at the esophagus-intestinal junction. This movement was also observed during the metacorporeal pumping and esophago-intestinal valve action. Once the stylet gained entry into the cell there was a short pause, lasting only a fraction of a second, and soon the metacorporeal pump action started. After five to eight pumpings at a rate of about four per second the nematode left the cell. As a rule this nematode withdrew all the cell contents. When pumped into the intestine the cell contents formed a jelly-like mass that was retained in the transparent anterior chamber until the next feeding when it was pushed down as such into the lumen. As the food passed along the lumen of the intestine it decreased in bulk suggesting digestion and assimilation were occurring. The jelly-like mass moved back and forth in the intestine with body movements. Even after continuous feeding for 30 minutes there were not more than four or five such jelly masses in the length of the lumen suggesting that the rate of digestion was fast enough to keep up with the ingestion, though the nematodes were voracious feeders.

The feeding process took 2 to 3 seconds; 1 second for stylet insertion followed by 1 to 2 seconds of metacorporeal pump action. The action of the metacorporeal bulb allowed the withdrawal of the cell contents and presumably also aided the flow of saliva into the esophageal lumen. Thus, food was mixed with the saliva before it reached the intestine.

Feeding habits of an isolate of *Aphelenchus avenae* Bastian, 1865 were studied for comparison and it differed in the following details. *A. avenae* usually required about 20–50 stylet thrusts for penetration of a cell wall, whereas *P. acontioides* required only 10–15 stylet thrusts. The twitching movement associated with the stylet action was in the upper quarter of the median bulb in *A. avenae*, whereas *P. acontioides* exhibited a twitching movement at the esophageal-intestinal junction and not at the median bulb. As a rule *P. acontioides* withdrew all the cell content from the cell, whereas *A. avenae* frequently left the cell partially emptied. In *A. avenae* the cell contents appeared as globules when pumped into the intestinal lumen, and not as a jelly-like cytoplasmic mass. The feeding habits of both the species were similar in other details.

**Summary**

*Paraphelenchus acontioides* n. sp., recovered from soil samples around the roots of Kentucky blue grass (*Agrostis palustris* Huds.) is described, its feeding habits compared with those of *Aphelenchus avenae*, and a key to the species of the genus *Paraphelenchus* is given.

**Literature Cited**


