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APHELENCHOIDES COMPOSTICOLA N.SP. AND *A. SAPROPHILUS* N.SP. FROM MUSHROOM COMPOST AND ROTTING PLANT TISSUES [1])

BY

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The genus *Aphelenchoides* includes not only important parasites of higher plants but also species inhabiting soil and decaying plant tissues. The most commonly recorded species from soil and plant remains is *A. parietinus* (Bastian, 1865) Steiner, 1932. For some time it has been the opinion of nematologists that this probably comprises a group of closely related species.

The first step towards elucidating the position was the re-description of *A. parietinus* obtained from the same place as Bastian's specimens (FRANKLIN, 1955). The second is to describe two new species closely resembling *A. parietinus,* the former being commonly found in the compost prepared from straw and dung, which is used in the cultivation of mushrooms, and the latter in rotting plant tissues and soil.

Measurements given in the following descriptions were all made on specimens relaxed in water by gentle heat and transferred to TAF fixative, except for measurements of stylets and spicules, when some specimens were in fixative and some in glycerine.

Aphelenchoides composticola n.sp.
(Fig. 1, A-D)

This species is one of the causes of failure of mushroom beds (MORETON, JOHN & GOODEY, 1956). Males and females have been found in compost from a number of places where mushrooms had failed to grow. Populations from several sources have been cultured on agar plates with mushroom mycelium (*Agaricus hortensis* Cooke) and with *Alternaria tenuis* Nees. This is therefore a fungivorous species.

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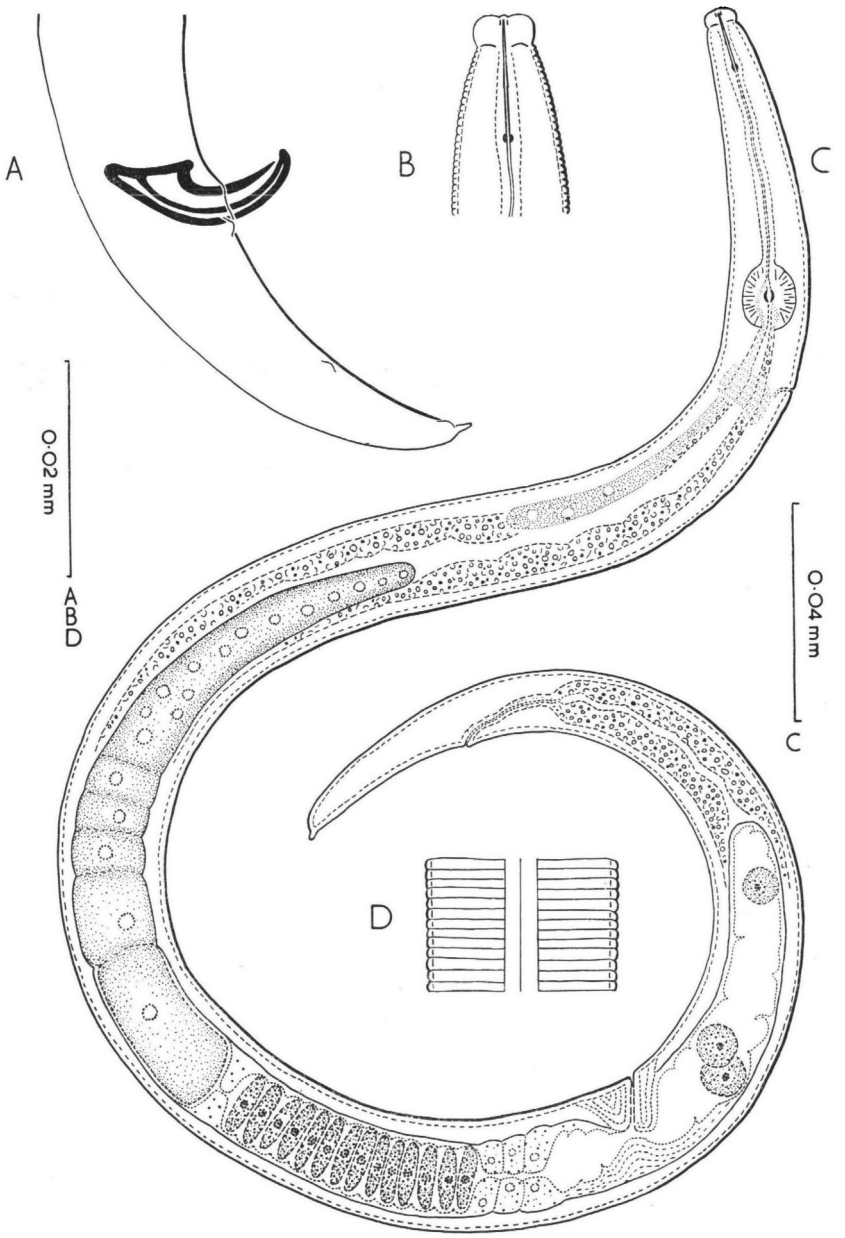

Fig. 1. *Aphelenchoides composticola* n.sp. A. Male tail. B. Head. C. Female. D. Annules and lateral field.

Female Length: 517 μ (447-614 μ) (n = 24)
Breadth: 15 μ (11-19 μ) (n = 24)
a — 34 (30-42) (n = 24)
b — 9 (8-10) (n = 21)
c — 14 (11-17) (n = 23)
V — 70% (67-72%) (n = 24)
Stylet: 11 μ (n = 2)

The body is slender with offset lips. The head is without annules or papillae. The body annules are 0.9 μ- 1.0 μ wide and the lateral field occupies one fifth of the body width and has three longitudinal incisures. These are reduced to two, then one, posteriorly on the tail and anteriorly in the region of the oesophageal bulb. The tail tapers to a rounded point bearing a terminal mucro which is usually ventral (Fig. 1 C). The vulva is a transverse slit and is not prominent. The anus is more easily seen; the anterior lip is slightly prominent. The stylet is made up of anterior conical and posterior cylindrical parts with three small basal swellings. There are short guiding rods anteriorly. The stylet lumen is continuous with the oesophageal lumen which leads back to the well-developed muscular median bulb. The points of entry of the oesophageal gland ducts are visible as interruptions of the lumen of the bulb in front of and behind the median valve. Behind the bulb the oesophagus widens into the intestine. The oesophageal glands form a lobe overlying the intestine dorsally, about three body-widths long. The nerve ring surrounds the beginning of the intestine and the excretory pore is situated ventrally at about the same level or a little behind. The ovary is a single row of cells for most of its length, without flexures, starting at a point one or two body-widths behind the end of the oesophageal glands. Behind the ovary the spermatheca is often found tightly packed with sperms compressed into a single row of disc-like bodies. The post-vulval sac also serves as spermatheca, reaching one half to two thirds the distance to the anus.

Eggs Length: 46 μ. Breadth: 19 μ. Ratio L/B: 2.4 (n = 9)

Male Length: 489 μ (412-581 μ) (n = 25)
Breadth: 15 μ (11-18 μ) (n = 25)
a — 34 (28-41) (n = 25)
b — 8.5 (7-9) (n = 24)
c — 15 (11-20) (n = 25)
Stylet: 11 μ (n = 3)
Spicules: dorsal limb 21 μ (n = 5)

Males are easily distinguished from females when dead by the hooked tail and slightly smaller size. The testis is a single row of cells stretching forward nearly to the end of the oesophageal glands. The paired spicules are typically aphelenchoid: the dorsal limb is smoothly curved and the tip of the ventral limb reaches nearly to that of the dorsal. The transverse bar joining the limbs proximally has a ventral protuberance. There is no gubernaculum but the usual three pairs of caudal papillae are present, one adanally, one midway along the tail and the third at the base of the mucro.

Relationships

A. composticola differs from *A. parietinus* in size and proportions, in the length of the stylet (11.75 μ in *A. parietinus*), the number of incisures on the lateral line (four in *A. parietinus*) and the occurrence of males.

Type habitat: Mushroom compost.

Type locality: Ormskirk, Lancashire.

Type material: Collection no. 86/15/TC and slides nos 86/15/1-6, Nematology Department, Rothamsted Experimental Station.

Aphelenchoides saprophilus n.sp.
(Fig. 2, A-D)

This nematode is very frequently found, amongst others, in rotting plant tissues which have been in contact with soil, such as roots, stems, tubers and bulbs. It is very similar to *A. parietinus* and has probably been referred to that species many times in the past. Like *A. composticola* it is easily cultured on agar plates with *Alternaria tenuis*, and males are common.

Female

Length:	546 μ	(454-623 μ)	(n = 20)
Breadth:	19.5 μ	(16.5-28 μ)	(n = 20)
a —	28	(26-33)	(n = 20)
b —	9.5	(8-12)	(n = 19)
c —	16	(12-18)	(n = 17)
V	69%	(66-70%)	(n = 20)

Stylet: 11μ (n = 5)

This species strongly resembles *A. composticola* but is somewhat stouter in proportion. The body annules are about 0.7-0.9 μ. The lateral field is one fifth of the body width wide, with four longitudinal incisures. The tail is slightly more tapering than that of *A. com-*

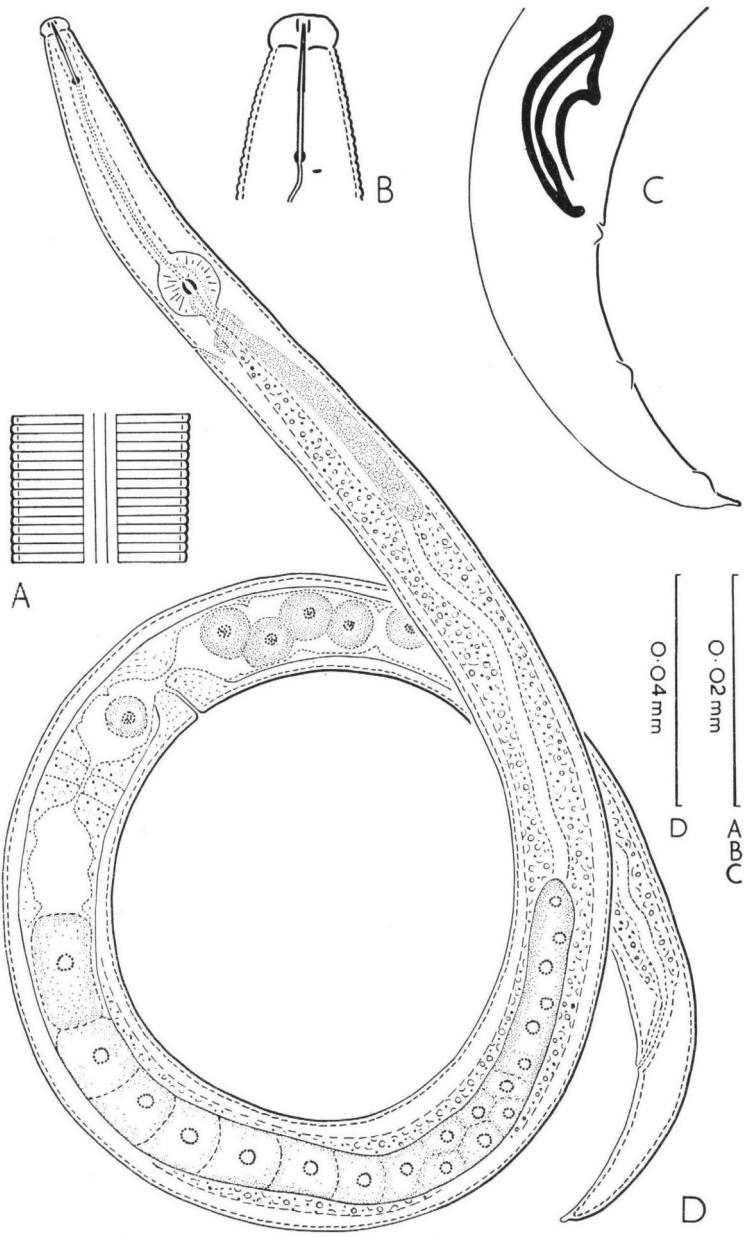

Fig. 2. *Aphelenchoides saprophilus* n.sp. A. Annules and lateral field. B. Head. C. Male tail. D. Female.

posticola. The alimentary tract and reproductive organs are essentially similar to that species.

Eggs Length: 46 μ Breadth: 18 μ Ratio L/B: 2.6 (n = 7)

Male Length: 545 μ (476-627 μ) (n = 20 for all values except stylet and spicules)

Breadth: 18 μ (16-21 μ)

a — 30 (27-34)

b — 9 (8-11)

c — 15 (13-18)

Stylet: 12 μ (n = 4)

Spicules: dorsal limb 23 μ (n = 4)

The male of this species is distinguished from that of *A. composticola* by having four incisures on the lateral line instead of three, and by the shape and slightly larger size of the spicules. The latter are aphelenchoid in form but the dorsal limb is stouter and less smoothly curved and its tip is slightly knobbed. The ventral limb is shorter in proportion to the dorsal and the protuberance at the dorsal end of the transverse bar joining the limbs is more marked (compare Fig. 1 A with 2 C). The tail is similar to that of *A. composticola* with the usual three pairs of papillae and a well-developed mucro.

Relationships

A. saprophilus has spicules very similar in shape to those of *A. blastophthorus* but distinctly smaller (dorsal limb 23 μ as compared with 28 μ). The mouth stylet also is shorter (12 μ as compared with 17.5 μ), and the body broader in proportion to its length (a = 30 as compared with 41). From *A. parietinus* it differs in being slightly longer and more slender and in having a relatively shorter egg (L/B = 2.6 as compared with nearly 4), and finer annulations (0.7-0.9 μ as compared with 1.0-1.3 μ). It can easily be cultured on an agar-fungus medium while *A. parietinus* is hard to establish. Males of *A. parietinus* have never been found either in its natural habitat or in the one culture which the author has been able to establish.

Type habitat: Soil.

Type locality: Docking, Norfolk.

Type material: Collection no 86/16/TC and slides nos 86/16/1-6, Nematology Department, Rothamsted Experimental Station.

As mentioned above, both *A. composticola* and *A. saprophilus* are easily cultured on fungus-agar plates. It has been found that after

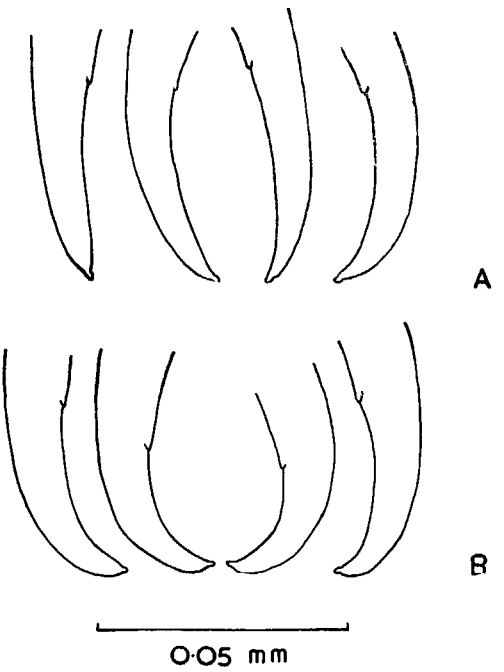

Fig. 3. A. Tails of female *A. saprophilus.* n.sp. B. Tails of female *A. parietinus.* (Bastian, 1865) Steiner, 1932.

culture for some weeks the mean size of the population may have altered considerably. Some examples are given in Table I.

TABLE I

Measurements of Aphelenchoides spp. after various periods of cultivation on agar-fungus medium

	A. composticola			*A. saprophilus*		
	Original population	11 weeks culture	9½ months culture	Original population	6 weeks culture	9 months culture
Female						
Mean length	517	528	592	546	494	421
Range μ	(447-614)	(462-623)	(512-648)	(454-623)	(412-581)	(370-481)
Mean *a*	34	31	32	28	27	25
Range	(30-42)	(28-35)	(28-38)	(26-33)	(22-31)	(20-29)
Male						
Mean length	489	513	578	545	507	423
Range μ	(412-581)	(423-650)	(494-679)	(476-627)	(423-562)	(370-475)
Mean *a*	34	32	32	30	30	25
Range	(28-41)	(26-38)	(26-41)	(27-34)	(24-35)	(20-30)

It is obvious, therefore, that size alone may be unreliable as a specific character, though it can be a guide to identification.

The two species of *Aphelenchoides* herein described as new have been shown to have clear morphological differences. *A. composticola* is also clearly distinguishable from *A. parietinus* by its greater length, smaller relative width and by the number of lines on the lateral field. *A. saprophilus,* however, is extremely close to *A. parietinus.* Although the original population from Docking was 100 μ longer than *A. parietinus* (451 μ), after culture on *Alternaria tenuis* for some months this difference disappeared, as did also an initial difference in the values for a (26.3 in *A. parietinus*). The differences which remain are in the shape and curvature of the female tail (Fig. 3), the relative length of the egg, the absence of males in *A. parietinus* and the difficulty of culturing that species on an artificial medium. These are considered sufficient to warrant the designation of *A. saprophilus* as a species.

ZUSAMMENFASSUNG

Aphelenchoides composticola n.sp., eine Ursache für das Versagen der Pilzbeete, ähnelt *A. parietinus,* ist aber länger, relativ schlanker und hat drei Incisuren auf dem Seitenfeld anstatt vier. Männchen sind häufig. *A. saprophilus* n.sp. tritt im Boden und in faulenden Pflanzenteilen auf. Er unterscheidet sich von *A. composticola* durch seine grössere Breite im Vergleich zur Länge, durch vier Längsincisuren und durch die Form der Spicula. Von *A. parietinus* unterscheidet er sich durch die Form des weiblichen Schwanzes, die relative Grösse der Eier, das häufige Auftreten von Männchen und, wie *A. composticola,* durch die Leichtigkeit mit der er auf Agar in Verbindung mit dem Pilz *Alternaria tenuis* kultiviert werden kann.

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