

Descriptions of *Filenchus angustatus* sp. n. and *F. dorsalis* sp. n. and comments on the genera *Ottolenchus* Husain & Khan, 1967 and *Paramalenchus* Sumenkova, 1988 (Nematoda : Tylenchidae)

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Accepted for publication 21 January 1997.

Summary - Descriptions are given for *Filenchus angustatus* sp. n. and *Filenchus dorsalis* sp. n. originating from Florida, USA, and Mexico, respectively. The differentiating characters of *Ottolenchus* Husain & Khan, 1967 and *Paramalenchus* Sumenkova, 1988 are discussed and both genera are considered junior synonyms of *Filenchus* Andrassy, 1954. Fifteen species formerly in *Ottolenchus* and one species from *Paramalenchus* are transferred to *Filenchus*.

Résumé - *Description de Filenchus angustatus* sp. n. et *F. dorsalis* sp. n. et commentaires sur les genres *Ottolenchus* Husain & Khan, 1967 et *Paramalenchus* Sumenkova, 1988 (Nematoda: Tylenchidae) - *Filenchus angustatus* sp. n. et *F. dorsalis* sp. n. sont décrits provenant respectivement de Floride, Etats Unis d'Amérique, et du Mexique. Les caractères différenciant les genres *Ottolenchus* Husain & Khan, 1967 et *Paramalenchus* Sumenkova, 1988 sont discutés et ces deux genres sont considérés comme synonymes mineurs du genre *Filenchus* Andrassy, 1954. Quinze espèces appartenant précédemment au genre *Ottolenchus* et une espèce au genre *Paramalenchus* sont transférées au genre *Filenchus*.

Key-words: *Filenchus*, nematode, *Ottolenchus*, *Paramalenchus*, taxonomy.

The examination of various collections of tylenchs from America brought the discovery of two previously unknown species of *Filenchus*. These species are described below.

The nematodes were killed by pouring hot formaldehyde 2% on a small drop of water containing the selected specimens. The nematodes were then processed to glycerine by methanol-glycerine modification of Seinhorst method and mounted in pure anhydrous glycerine. All measurements were taken with an ocular micrometer at magnification 1000 × and are given as mean ± SD (range) in micrometers.

Filenchus angustatus sp. n. (Fig. 1)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female: Body arcuate ventrad when relaxed. Cuticle less than 1 μm thick, annulation distinct due to rounded annuli and deep striae, annulus width 0.7-1.0 μm. Lateral field as single band without inner lines, beginning near median bulb and ending near anus, as observed by light microscopy. Head conical anteriorly truncated, with fine annuli. Head width at base 5-5.5 μm, height 2-2.5 μm. Stylet thin, delicate,

knobs rounded, about 1-1.5 μm in diameter. Dorsal gland orifice immediately posterior to knobs. Median bulb very narrow and elongated, with short and flat valve plates. Thin isthmus expanding gradually into a pyriform glandular bulb. Excretory pore few annuli posterior to hemizonid, the latter about three annuli long. Excretory duct narrow, its walls refractive. Deirid in the centre of lateral field, less than a body width posterior to excretory pore. Gonad short, spermatheca rounded to oval, axial in all examined females, filled with sperm of about 1.5 μm in diameter. Vagina with thick walls, slightly longer than half of the corresponding body width, anteriorly curved. Uterine sac up to one body width long, postvulval part of sac either short and finger-shaped or absent. Tail annulated to the end, tapering rather evenly to thin but not thread-like terminal part. Terminus pointed (some irregularities of the thickness of the most posterior part of tail suggesting that this part may get broken).

Male: Similar to female in most respect. Caudal alae narrow and short, hypopygma distinct. Spicules narrow, with parallel walls, not enlarged central part, in distal part arcuate, manubrium differentiated. Gubernaculum simple.

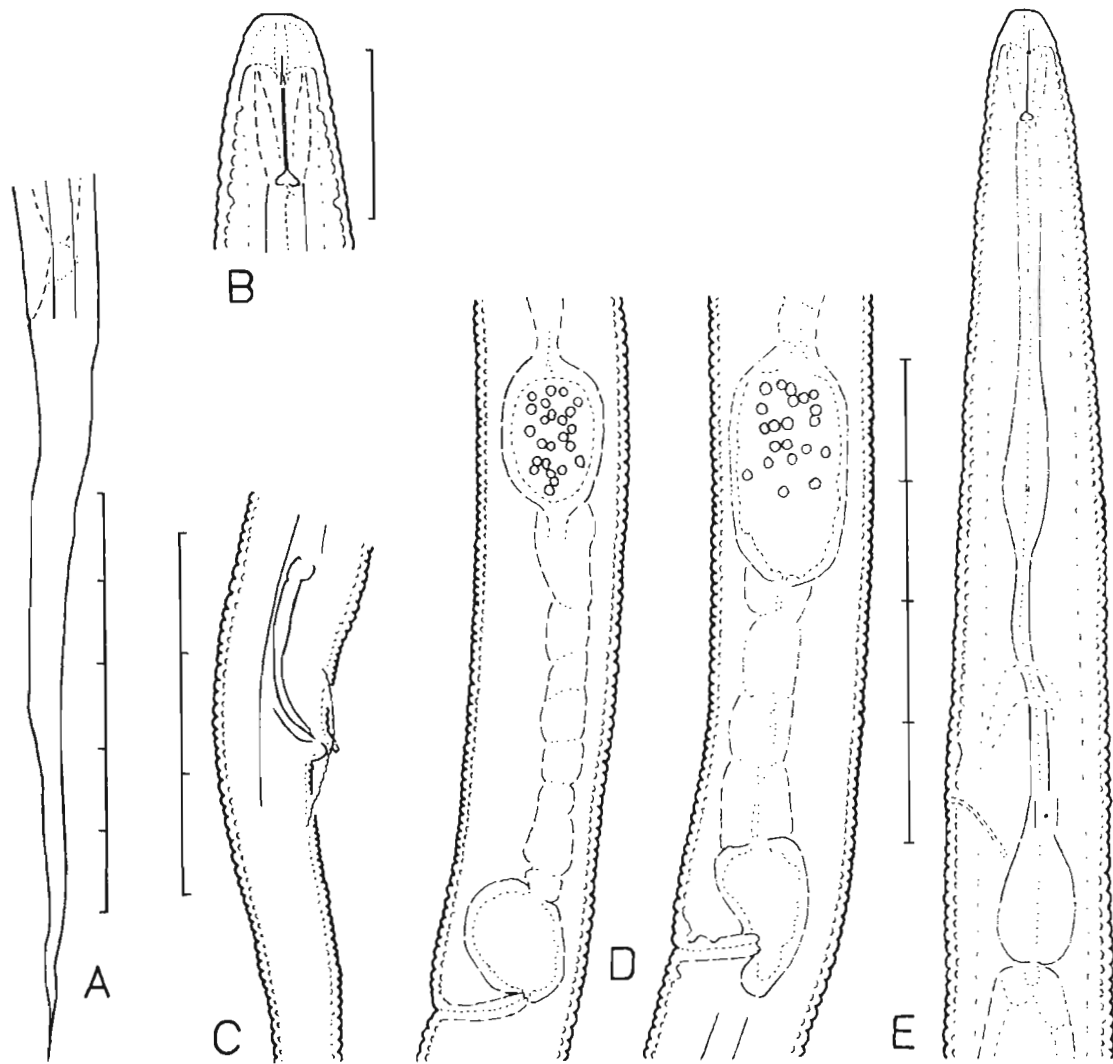


Fig. 1. *Filenchus angustatus* sp. n. A: Female tail; B: Female head; C: Cloacal region; D: Part of female reproductive system showing variation in postovulval uterine sac; E: Pharyngeal region (Smallest unit of scale bar=10 μ m).

TYPE LOCALITY

Arable soil, Perrine near Miami, FL, USA. Collected by Ms. M. Staniaszek, April 1995.

TYPE SPECIMENS

Holotype female and paratypes (seventeen females and thirteen males) in the collection of Muzeum i Instytut Zoologii PAN, Warszawa, Poland. One female and one male paratypes deposited in each of the following collections: Instituut voor Dierkunde, Universiteit Gent, Belgium; Muséum National d'Histoire Naturelle, Paris, France, and Vakgroep Nema-

tologie, Landbouwniversiteit Wageningen, The Netherlands.

DIAGNOSIS AND RELATIONSHIPS

F. angustatus sp. n. is distinct because of its measurements, fine but prominent cuticular annulation, lateral field with two incisures, thin stylet with small knobs, median bulb very narrow and posterior in position, axial spermatheca, form of uterine sac and long anteriorly curved vagina. Spicules narrow, arcuate.

F. angustatus sp. n. keys to *F. nemorosus* (Brzeski, 1986) using the key of Raski and Geraert (1987). The measurements also are similar, but the new species differs from *F. nemorosus* by much narrower median bulb with flattened valve plates and axial spermatheca (in *F. nemorosus*, the median bulb is ovoid but much wider, the thickenings of lumen walls are distinctly convex, almost rounded, spermatheca is always offset).

The new species should also be compared with *F. neonanus* Raski & Geraert, 1987, *F. chilensis* Raski & Geraert, 1987 and *F. porosus* (Siddiqi & Lal, 1992) comb. n. (= *Ottolenchus porosus* Siddiqi & Lal, 1992, following the new combination proposed below) because of similar measurements and posterior position of median bulb. However, it differs from *F. neonanus* by having longer vagina, apparently smaller stylet knobs, less distinct thickenings in median bulb, and shorter tail. *F. neonanus* is characterised by Raski and Geraert (1987) as having "vagina short, thin walled, perpendicular to ventral body line", stylet knobs "well-developed, backwardly directed", median bulb is drawn almost rounded with convex valve plates, tail=90-113, $c'=11.2-13.3$.

F. chilensis differs from *F. angustatus* sp. n. in the following characteristics: tail=116-173, $c=3.1-4.2$, $c'=14.2-19.6$, T/VA=1.4-1.8, V=54-60, a=38-50, median bulb plates rounded, "vagina thin walled, nearly half body width, almost perpendicular to ventral line", tail end "curls to give sinuous outline hooked ventrally or dorsally" (Raski & Geraert, 1987), spicules 12-14 μm long, widening near middle.

The differences between *F. angustatus* sp. n. and *F. porosus* are seen in excretory pore and duct, which were described for *F. porosus* as "excretory pore large, about 2 μm in diameter, leading into wide sclerotized duct" (Siddiqi & Lal, 1992). *F. porosus* also has a shorter vagina, postvulval sac about three-quarters body width long, and slightly longer tail (98-113 μm , $c=4-4.2$, $c'=12.2-16.0$).

***Filenchus dorsalis* sp. n.**
(Figs 2, 3)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female: Stout nematodes, body slightly arcuate to straight. Cuticular annulation prominent, annuli rounded, annulus width 2.0 (1.7-2.4) μm at midbody region. Annulation of subcuticular zone indistinct, whenever visible then similar in width to the cuticular annulation. Lateral field 3-4 μm wide, marked by two lines, beginning near median bulb and ending just posteriorly to anus. Deirid at centre of lateral field, near excretory pore level. Head rounded, annulation

well visible, head width at base 5-6 μm . Head often slightly narrower than adjacent body. Amphidial openings not seen on lateral side of head. Cephalic framework weak, lateral ribs extending posteriorly for 1.5-2 annuli. Stylet with thin conus about half of shaft length, shaft diameter slightly larger toward knobs, the latter with obliquely sloping, then rounded, about 2 μm across. Dorsal gland orifice 2-3 μm posterior to knobs. Median bulb fusiform, with very small and indistinct plates posterior bulb short, cardia more or less triangular. Large vacuolated body visible posterior to pharynx in most of specimens, at various stages of development (or activity?), at a distance from pharynx base equal to 2.5-3.5 body width at cardia level. Spermatheca a rounded axial chamber with extended offset pouch; size of this pouch depending on the amount of sperm filling the spermatheca. Sperm diameter 3-4 μm . Vagina perpendicular to ventral line, up to half of body width long. Postvulval sac 33-50% of body width long. 29 (26-32) annuli between vulva and anus. Tail short and thick, always bent dorsad in posteriorly part, tip broadly rounded.

Male: Shorter but generally similar to female except for sexual organs and relatively longer pharynx (see values of index b). Body narrowing near cloaca; cloacal lips protruding, hypopygmata very small. Spicules anteriorly distinctly cephalated, posterior part bent. Bursa crenated, small, extending approximately at the same distance anteriorly and posteriorly from cloaca. Tail similar to that of female, bent dorsad.

TYPE LOCALITY

Tlaminas near Texcoco, Mexico state, Mexico, collected in moist organic soil under moss in a valley near a small stream, elevation about 2800 m. Collected by Prof. L. S. Jankiewicz, 15 January 1984.

TYPE SPECIMENS

Holotype female and paratypes (49 females and 24 males) in the collection of the Muzeum i Instytut Zoologii PAN, Warszawa, Poland. One female and one male paratypes deposited in the Instituut voor Dierkunde, Universiteit Gent, Belgium. One female paratype deposited in the following collections: Muséum National d'Histoire Naturelle, Paris, France, and Vakgroep Nematologie, Landbouwniversiteit Wageningen, The Netherlands.

DIAGNOSIS AND RELATIONSHIPS

F. dorsalis sp. n. is characterised by wide cuticular annuli, two incisures on lateral field, fusiform median bulb with indistinct plates, posterior vulva (V=74-76, V'=86-88), short, thick tail always bent dorsad, and tail tip broadly rounded. In addition a large vacuolated body is visible about 2.5-3.5 body width posterior to pharynx base.

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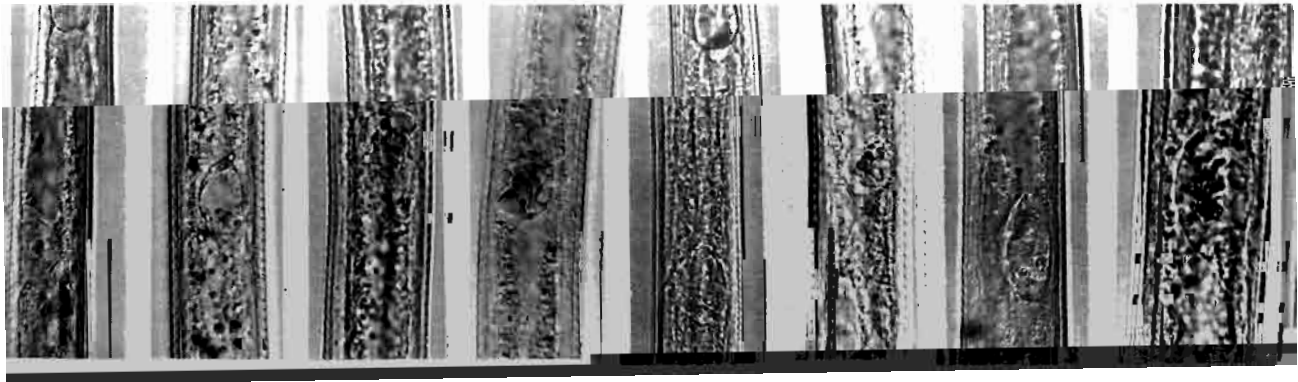


Fig. 3. Photomicrographs of *Filenchus dorsalis* sp. n. showing various stages of development of the vacuolated body.

The other species of *Filenchus* with posterior vulva and short, thick tail all have four lateral lines. However, as the lateral field of these nematodes is a stretchable zone of cuticle and the internal incisures are not always visible. Consequently the species with a similar vulva position are enumerated below and their characters differentiating these species from *F. dorsalis* are given:

F. acris (Brzeski, 1985): V=66-69, V'=83-86, stylet 5-6 μ m, tail end spicate.

F. brevicaudatus (Brzeski, 1985): V=71-73, V'=79-81, annuli 0.7-0.9 μ m wide, head with offset disc-shaped lip region.

F. butteus (Thorne & Malek, 1968): V=67-73, V'=78-84, stylet=9-10 μ m, annuli 0.8-1.4 μ m wide, c'=5.6-9.1, T/VA=0.7-1.0, tail bent ventrad or straight.

F. hamatus (Thorne & Malek, 1968): V=64-69, V'=77-82, MB=40-48, c'=6.1-8.4, annuli 0.8-1.2 μ m wide, tail bent ventrad.

F. sandneri (Wasilewska, 1965): V=73-76, V'=82-85, stylet=7-11 μ m, annuli 0.7-1.0 μ m wide, tail bent ventrad.

The data for *F. butteus*, *F. hamatus* and *F. sandneri*, as given above, are from Brzeski (in press).

Another species possibly similar to *F. dorsalis* is *F. obtusicaudatus* (Erzhanova, 1964). The description is based on single female, which had the following characteristics: L=560 μ m, stylet=5.4 μ m, tail=56 μ m, a=35, b=5.6, c=10.0, c'=3.9, T/VA=0.7, V=75, V'=83, annulation fine, lateral field present but number of incisures not mentioned.

The genera *Ottolenchus* Husain & Khan, 1967 and *Paramalenchus* Sumenkova, 1988

The genus *Ottolenchus* was fully discussed and synonymized with *Filenchus* by Raski and Geraert (1987). However, Siddiqi and Lal (1992) enumerated nine

characteristics of *Ottolenchus* and concluded: "The characters of lateral field, cephalic region and amphid aperture shape differentiate this genus from *Filenchus*". I concur with the action of Raski and Geraert (1987) for the following reasons:

- the number of lines visible in the lateral field in this group of nematodes depends on the degree of maturity of a specimen. In wider, mature, nematodes the inner lines become invisible and as the body width increases (e.g., in egg-bearing females) the outer lines also may disappear, at least in the central part of body. This suggests that the lateral field is a stretchable zone of cuticle and explains the low visibility of internal incisures in many SEM micrographs (e.g., Raski & Geraert, 1987, Karegar & Geraert, 1995; Torres & Geraert, 1996). These light microscope observations are supported by SEM observation of the closely related *Irantylenchus vicinus* (Szczygiel, 1970) by Brzeski and Sauer (1982). Zeidan and Geraert (1991, Fig. 7D, E) published SEM micrograph of *F. afghanicus* (Khan & Khan, 1978) with one faint line between the two outer incisures, whereas this species was originally described as having four lines in the lateral field. Sometimes short irregular lines within the lateral field are observed on SEM micrographs, e.g., in *F. adelinae* Raski & Geraert, 1987 (Fig. 8 D in Raski & Geraert, 1987), *F. balcarceanus* Torres & Geraert, 1996 (Fig. 9 H in Torres & Geraert, 1996), and *F. facultativus* (Szczygiel, 1969) as shown by Zeidan and Geraert (1991, Fig. 9 D), Karegar and Geraert (1995, Fig. 6 D), and Torres and Geraert (1996, Fig. 4 D). This discussion leads to the conclusion that the structure of the lateral field is not a constant feature that could be used as a generic character in Tylenchinae.

- the cephalic region of *Ottolenchus* was characterised as "low ... less than three adjacent body annules high" and with "amphid aperture curved, sinuate, often S-shaped slits originating from anterior and

Table 1. Measurements of *Filenchus angustatus* sp. n. and *F. dorsalis* sp. n. (All measurements in μm).

	<i>Filenchus angustatus</i> sp. n.			<i>Filenchus dorsalis</i> sp. n.		
	Holotype	Paratypes		Holotype	Paratypes	
		Females	Males		Females	Males
n	1	19	10	1	40	14
L	449	445 \pm 20.8 (401-489)	416 \pm 23.1 (386-455)	516	508 \pm 27.0 (453-565)	453 \pm 20.5 (407-482)
L'	368	359 \pm 20.6 (323-403)	328 \pm 19.7 (299-353)	447	441 \pm 24.0 (392-491)	385 \pm 19.3 (343-491)
a	37	32.2 \pm 3.4 (24-38)	32.7 \pm 2.5 (29-37)	24	24.5 \pm 1.9 (20-29)	28.5 \pm 2.3 (25-35)
b	5.6	5.5 \pm 0.2 (5.1-6.0)	5.2 \pm 0.2 (4.8-5.5)	5.3	5.3 \pm 0.2 (4.9-5.8)	4.8 \pm 0.2 (4.5-5.1)
c	5.6	5.3 \pm 0.4 (4.8-6.1)	4.6 \pm 0.2 (4.3-5.1)	7.5	7.6 \pm 0.3 (7.0-8.2)	6.7 \pm 0.2 (6.3-7.0)
c'	9.9	9.7 \pm 0.7 (8.0-10.6)	9.2 \pm 0.7 (7.6-10.3)	5.2	5.2 \pm 0.4 (4.5-6.3)	5.5 \pm 0.3 (5.2-6.3)
V	63	62.7 \pm 1.5 (61-66)		75	75.1 \pm 0.5 (74-76)	
V'	77	77.5 \pm 1.2 (74-80)		87	86.7 \pm 0.6 (86-88)	
Stylet	8	8.0 \pm 0.3 (7-8.5)	8.1 \pm 0.6 (7-9)	8.5	8.3 \pm 0.3 (8-9)	8.2 \pm 0.3 (8-9)
Excretory pore	65	65 \pm 2.4 (62-70)		87	82 \pm 3.9 (76-91)	76 \pm 2.4 (72-79)
Pharynx	81	80 \pm 2.5 (77-87)	62 \pm 1.8 (60-65)	97	96 \pm 3.2 (90-103)	94 \pm 2.2 (90-98)
MB	48	48.8 \pm 1.4 (47-53)	49.9 \pm 1.5 (48-52)	41	41.0 \pm 1.0 (38-43)	41.1 \pm 1.0 (39-42)
Tail	81	84 \pm 5.3 (74-93)	91 \pm 6.9 (82-105)	69	67 \pm 4.1 (58-76)	68 \pm 1.9 (64-70)
Tail/VA	1.0	1.0 \pm 0.1 (0.8-1.2)		1.2	1.1 \pm 0.1 (1.0-1.3)	
Spicules			17 \pm 0.7 (16-18)			19 \pm 1.1 (17-21)
Gubernaculum			5.1 \pm 0.6 (4-6)			3.2 \pm 0.4 (3-4)

extending over most of cephalic region" (Siddiqi & Lal, 1992). The relative height of the cephalic region of *Filenchus* species show a continuous variation from very low to relatively high, and is independent from the structure of lateral field. For example, *F. baloghi* (Andrássy, 1958) is a species with remarkably low head and two distinct ridges on lateral field, whereas *F. discrepans* (Andrássy, 1954) has a rather high head

and a lateral field without inner lines. The shape of amphidial slit also shows continuous variation from straight to variously curved slits and is not consistent with other generic characters proposed for *Ottolenchus*. SEM micrographs of *F. adelinae* (Fig. 8 B in Raski & Geraert, 1987) and many published micrographs of *F. facultativus* support the above statement.

In conclusion, no distinct limits can be found in *Ottolenchus* and the synonymy of this genus with *Filenchus* is substantiated. The synonymization does not exclude existence of some natural holophyletic groups of species within *Filenchus* and further analyses may show that some (but not all) species of *Ottolenchus sensu* Siddiqi & Lal, 1992 belong to such group(s).

The synonymization of these genera causes some changes in nomenclature. The following species described under *Ottolenchus* are transferred to *Filenchus* and new combinations are proposed: *F. macramphis* (Siddiqi & Lal, 1992) comb. n., *F. malayensis* (Siddiqi & Lal, 1992) comb. n., *F. longibulbus* (Siddiqi & Lal, 1992) comb. n., *F. megabulbosus* (Siddiqi & Lal, 1992) comb. n., *F. crassatus* (Siddiqi & Lal, 1992) comb. n., *F. callosus* (Siddiqi & Lal, 1992) comb. n., *F. crassistylus* (Siddiqi & Lal, 1992) comb. n., *F. porosus* (Siddiqi & Lal, 1992) comb. n., *F. longiurus* (Siddiqi & Lal, 1992) comb. n., *F. fortis* (Siddiqi & Lal, 1992) comb. n., *F. cephalatus* (Siddiqi & Lal, 1992) comb. n., *F. crassimus* (Siddiqi & Lal, 1992) comb. n., *F. conflexus* (Siddiqi & Lal, 1992) comb. n., *F. trichuris* (Siddiqi & Lal, 1992) comb. n. and *F. microdentatus* (Siddiqi & Lal, 1992) comb. n.

Paramalenchus was described as a monotypic genus with *P. anthrisculus* Sumenkova, 1988 as type species. The genus was distinguished from *Ottolenchus* by "well separated and anteriorly directed spermatheca with large spermatozoa, large and well visible renette and M-shaped basal plate of cephalic framework" and from *Malenchus* by "cuticular annulation, closed vulva without lateral vulval dikes, cylindrical body and large renette" (Sumenkova, 1988). Ebsary (1991) synonymized *Paramalenchus* with *Malenchus*, but gave no reasons for his action. Comparison of the description of *Paramalenchus* with many *Filenchus* species examined showed that the only difference is the presence of a large renette cell. Lack of other differentiating char-

acters was also stated by Dr. I.N. Sumenkova (*in litt.*). The large body, interpreted as a renette cell by Sumenkova (1988), appears similar to the vacuolated body described for *F. dorsalis*. This is not considered a generic character and the two genera are synonymised. Consequently, *P. anthrisculus* Sumenkova, 1988 is transferred to *Filenchus* as *F. anthrisculus* (Sumenkova, 1988) comb. n.

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