

# A New Genus and Four New Species of the Subfamily Tylenchinae de Man, 1876 (Nematoda: Tylenchidae) from Poland

By

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During the survey of strawberry fields in Poland in 1966 and 1967 one species of *Aglenchus* (ANDRÁSSY, 1954) MEYL, 1961, and three species of *Tylenchus* BASTIAN, 1865, different from all described species, were found. They are described herein as new species. Besides, several specimens of *Aglenchus sachsi* (HIRSCHMAN, 1952) MEYL, 1961, were found in two localities and their examination showed that this species differs distinctly from nematodes of the genus *Aglenchus* and other genera of the family Tylenchidae FILIPJEV, 1934. It is therefore redescribed under a new generic name.

In the following descriptions all measurements and drawings are based on specimens fixed in formalin and mounted in glycerin by slow method.

## Taxonomic status of *Aglenchus sachsi* (Hirschmann, 1952) Meyl, 1961

HIRSCHMANN (1952) described a new species under the name *Tylenchus sachsi*. Her description, especially concerning the vulval region in females, was not satisfactory. In her diagnosis she stated, however, that species is similar to *T. costatus* DE MAN, 1921, but differs from it by the number and shape of the longitudinal striae. ANDRÁSSY (1954), revising the genus *Tylenchus* BASTIAN, 1865, established four new subgenera under it, among them the subgenus *Aglenchus*, in which he included *Tylenchus sachsi* HIRSCHMANN, 1952. MEYL (1961) raised the status of all four subgenera to generic rank. GOODEY (1963) objected to this re-ranking, but ANDRÁSSY (1963) again revised genus *Aglenchus* (ANDRÁSSY, 1954) MEYL, 1961, considering it as a valid one. According to his diagnosis the basic character of the genus is presence of lateral vulval membranes. The present author agrees with this opinion and considers *Aglenchus* a valid genus. ANDRÁSSY (1963) again placed

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the species described by HIRSCHMANN (1952) as *Tylenchus sachsi* in the genus *Aglenchus*.

In 1967 three nematode females were found by the author in wet meadow soil around strawberry roots in Dabrowki Bryńskie, distr. Dabrowa Tarnowska, and one female in heavy loam soil also around strawberry roots in Staroniwa, distr. Rzeszów. All specimens appeared to be identical with *Aglenchus sachsi* (HIRSCHMANN, 1952) MEYL, 1961. However, careful examination showed that this species does not fit into the genus *Aglenchus*, mainly because of the lack of typical vulval membranes. It does not fit into any other genus of the family Tylenchidae either. The general appearance and body cuticle striation in this species are similar to those of nematodes in the family Atylenchidae SKARBILOVICH, 1959 (after SHER, 1966). However, because of the lack of setae on lip region and the shape of the head, it comes closer to the family Tylenchidae. In this situation, the new genus *Pleurotylenchus*, assigned to the subfamily Tylenchinae DE MAN, 1876, is proposed to include this species.

### *Pleurotylenchus* n. gen.

**Diagnosis:** Tylenchinae. Cuticle coarsely annulated with prominent protuberances arranged as longitudinal ridges on the cuticle. Lip region with deep transverse striae. Stylet strong, with well developed knobs. Median esophageal bulb well developed, with prominent valve. Terminal bulb distinctly set off from intestine. One prodelphic ovary and postuterine sac in females. Vulva post equatorial, with ventral flap directed backwards. Tail elongate, filiform in both sexes. Male with adanal bursa.

Type, and only species: *Pleurotylenchus sachsi* (HIRSCHMANN, 1952) n. comb.

### *Pleurotylenchus sachsi* (HIRSCHMANN, 1952) n. comb.

(Fig. 1. A-E)

Syn. *Tylenchus sachsi* HIRSCHMANN, 1952

*Tylenchus (Aglenchus) sachsi* HIRSCHMANN, 1952 (ANDRÁSSY, 1954)

*Aglenchus sachsi* (HIRSCHMANN, 1952) MEYL, 1961

Specimens from Dabrowki Bryńskie, distr. Dabrowa Tarnowska, Poland, females (3): L = 0.66–0.69 mm; a = 38–43; b = 6.0–6.2; c = 7.4–7.9; V = 63.5–64.2%; spear = 17.7–18.3  $\mu$

Paratypes (after HIRSCHMANN, 1952), females (2): L = 0.84–0.90 mm; a = 38.9–39.8; b = 7.6–7.7; c = 7.2–7.7; V = 61.2%.

Males (2): L = 0.75–0.86 mm; a = 46.7–54.0; b = 6.9–7.6; c = 9.2–9.3; spicules = 16–19  $\mu$ ; gubernaculum = 6  $\mu$ .

*Female:* Body usually ventrally arcuate when killed by heat. Cuticle bearing 10 longitudinal ridges divided in blocks by transverse striae, about 1.7  $\mu$  apart. Longitudinal ridges beginning just behind head base and ending about four anal body width behind anus. Deirids prominent, at the level of anterior part of terminal bulb. Phasmids not seen. Lip region flattened, slightly set off, with relatively deep 5–6 transverse striae. Stylet strong, with three

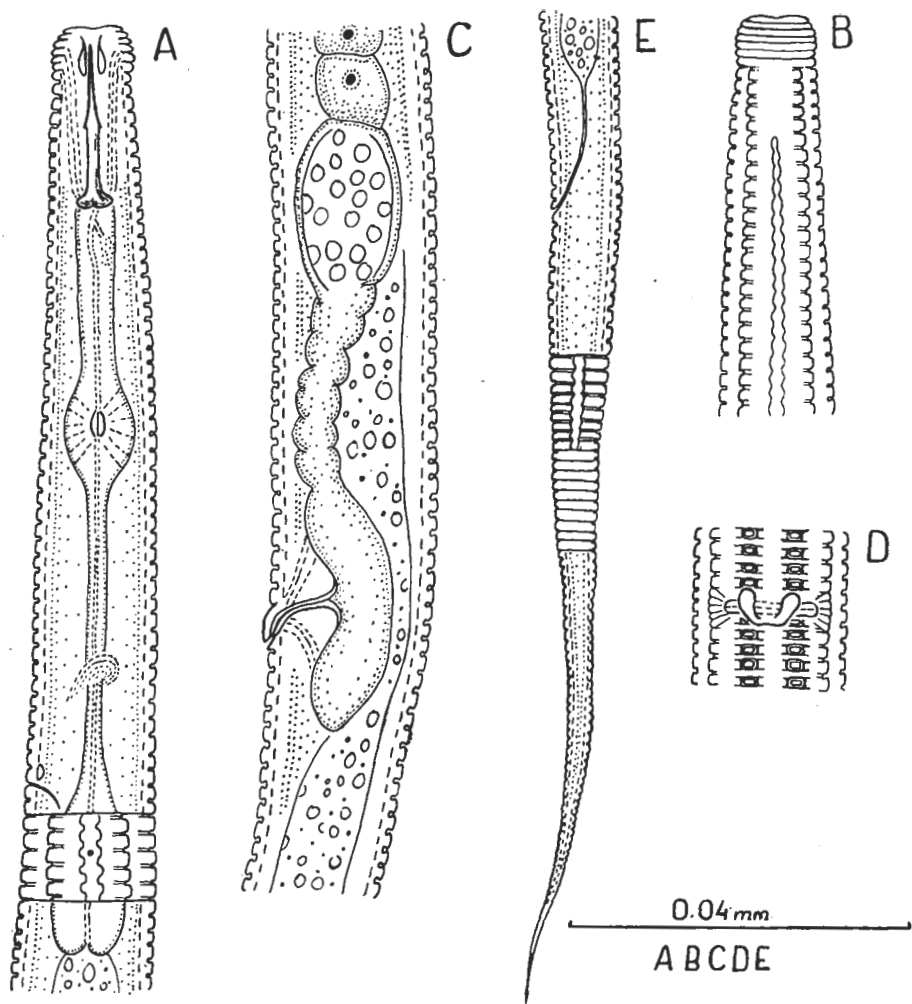


Fig. 1. *Pleurotylenchus sachsi* (HIRSCHMAN) n. comb. A: Anterior part of body; B: Surface view of cuticle in anterior part of body; C: Vulva region in lateral view; D: Vulva region in ventral view. E: Female tail

prominent basal knobs about  $3.5\text{--}4.1\ \mu$  wide. Anterior part of spear as long as posterior one. Outlet of dorsal gland close to spear base. Procorpus massive. Median bulb relatively large, ovate, with prominent valve. Distance from anterior end of body to base of median bulb about 50% of total esophageal length. Isthmus thin. Terminal bulb elongate, distinctly set off from intestine. Cardia not observed. Nerve ring about one third of isthmus length from anterior end of terminal bulb. Excretory pore at level of anterior end of terminal bulb, and hemizonid just anteriorly to this. Vulva posterior, with characteristic ventral flap directed backwards and covering middle part of vulval opening. Vagina somewhat bent backwards. Ovary one, prodelphic.

Spermatheca present, usually with sperms. Oocytes arranged in a single row. Postuterine sac about one body diameter long. Tail elongate, filiform, with sharp terminus. Length of tail is equalling to 56–57% of vulva-anus distance and to 11.5–12.3 anal body diameter.

The above description somewhat differs in certain details from that of HIRSCHMANN (1952), especially in the body length, the postuterine sac length and the length of esophagus in relation to body length. The other characters are identical. HIRSCHMANN did not give spear measurements but these, calculated from her drawing, are about the same.

*Male* (after HIRSCHMANN, 1952): General body form similar to that of females, but more slender. Spicules tylenchoid, gubernaculum simple. A very characteristic feature representing five to six papillae-like arrangements on ventral longitudinal ridges in preanal part of body. Narrow adanal bursa present.

*Type locality and habitat*: Salt lake in Obendorf and ground water in Erlagen, Germany.

The description and illustration of the females are based on specimens found on 15th May, 1967, in Dabrowki Bryńskie, distr. Dabrowa Tarnowska, Poland, in wet sandy soil around strawberry roots. They are deposited in the author's collection. The description of the males is after HIRSCHMANN (1952).

### *Aglenchus fragariae* n. sp.

(Fig. 2. A-E)

Females (15): L = 0.43–0.50 mm; a = 34–35; b = 4.7–5.6; c = 5.2–6.3; V = 64.4–68.8%; spear = 7.2–8.0  $\mu$ .

Female (holotype): L = 0.46 mm; a = 35; b = 4.7; c = 5.7; V = 68.8%; spear = 7.7  $\mu$ .

Males (3): L = 0.35–0.43 mm; a = 31–43; b = 4.3–5.0; c = 5.1–5.4; spear = 7.1–7.7  $\mu$ ; spicules = 11.5–11.8  $\mu$ ; gubernaculum = 4.7–5.3  $\mu$ .

Male (allotype): L = 0.35 mm; a = 43; b = 5.0; c = 5.4; spear = 7.1  $\mu$ ; spicules = 11.8  $\mu$ ; gubernaculum = 5.3  $\mu$ .

*Female*: Body slender and straight when killed by heat. Cuticle delicately transversely striated; annules about 0.8  $\mu$  wide at middle of body. Lateral field occupying about one quarter greatest body diameter, with four equally spaced incisures. Deirids at level of anterior part of terminal bulb. Phasmids not seen. Head continuous with body contour, with very fine transverse striae. Tail uniformly narrowing to sharp terminus. Tail length equalling to 1.2–1.4 vulva—anus distance and to about 10 anal body width. Spear delicate, with small but distinct, rounded knobs. Dorsal gland outlet close to spear base. Distance from anterior end of body to base of median esophageal bulb 46.5–50% of total esophageal length. Median bulb slightly elongate, with distinct valve. Nerve ring at level of middle of isthmus. Excretory pore slightly anterior to beginning of terminal bulb, and hemizonid just anterior to this. Terminal bulb elongate. Small cardia present. Rectum about 0.8 anal body width long. Vulva posterior, with distinct depression and two lateral membranes. True postuterine sac absent or very rudimentary. Spermatheca present, usually with sperms. Oocytes arranged in a single row.

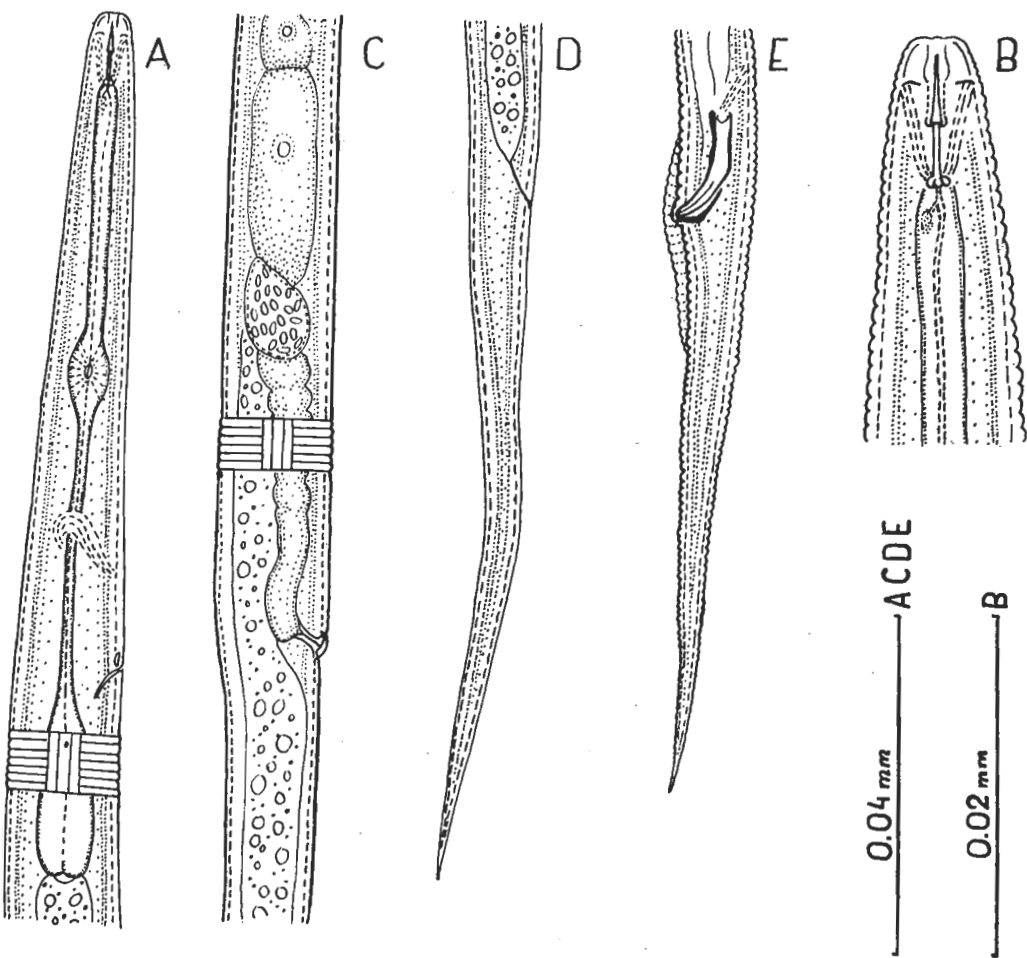


Fig. 2. *Aglenchus fragariae* n. sp. A: Anterior part of body; B: Head region; C: Vulva region in lateral view; D: Female tail; E: Posterior part of male

*Male*: Similar to females in general body form, but usually smaller. Bursa present, but weakly developed. Spicules typical for the genus, ventrally arcuate in proximal half. Gubernaculum about  $5 \mu$  long, slightly bent proximally.

*Diagnosis*: A slender species, with distinct vulval depression and two lateral unstriated membranes, without longitudinal striation of cuticle, transverse striation very delicate, four equally spaced incissures on lateral fields, without true postuterine sack in female and with weakly developed bursa in males.

Because of lack of longitudinal striae on cuticle and presence of four incissures on lateral fields, *Aglenchus fragariae* n. sp. resembles *A. agricola* (DE MAN, 1884) MEYL, 1961 and *A. bryophilus* (STEINER, 1914) MEYL, 1961. It differs, however, from both. From *A. agricola*, by a finer striation of cuticle

(width of annules  $0.8 \mu$  against  $1.7 \mu$ ), a more delicate stylet and stylet knobs, by equally spaced incissures on lateral fields (in *A. agricola* two inner incissures are close together), a not so filiform tail, a less strongly chitinized vagina and a weakly developed bursa in males. From *A. bryophilus*, it differs by a longer and more slender body, a finer striation of cuticle, a lack of true uterine sac, shorter spicules and a longer gubernaculum (in *A. bryophilus* 14.0–17.6 and 2.2–2.3, respectively), and also by a weakly developed bursa (it is very prominent in *A. bryophilus*).

**Type specimens:** Holotype, allotype and paratypes (14 females and 2 males) collected on 27 May, 1966, are deposited in the author's collection.

**Type locality and habitat:** Sandy soil with relatively high contents of organic matter around strawberry roots, in the farm of K. Grzybowski, Plebanka, distr. Gostynin.

*Aglenchus fragariae* n. sp. was identified in the soil from strawberry plantations in many localities in Poland, although never in great numbers. It occurred more often in strawberry roots than in the surrounding soil. Its specific name refers therefore to the strawberry plants *Fragaria* sp.

### *Tylenchus andrassyi* n. sp.

(Fig. 3 A–F)

Females (7): L = 0.80–0.93 mm; a = 30–37; b = 6.1–7.0; c = 6.3–7.2; V = 66.5–68.8%; spear = 8.1–8.8  $\mu$ .

Female (holotype): L = 0.83 mm; a = 37; b = 6.1; c = 6.9; V = 68.8%; spear = 8.7  $\mu$ .

Males (5): L = 0.68–0.81 mm; a = 34–44; b = 4.8–6.0; c = 5.3–6.2; spear = 8.0–8.8  $\mu$ ; spicules = 18–20  $\mu$ ; gubernaculum = 6.4–7.1  $\mu$ .

Male (allotype): L = 0.80 mm; a = 40; b = 5.9; c = 6.2; spear = 8.0  $\mu$ ; spicules = 20  $\mu$ ; gubernaculum = 6.4  $\mu$ .

**Female:** A relatively large species, with body tapering on both ends, and slightly ventrally arcuate when killed by heat. Cuticle with coarse transverse striae, 1.8  $\mu$  apart in middle of body. Four equally spaced incissures on lateral fields, outer ones crenate. Deirids about half body width, posteriorly to excretory pore. Phasmids not seen. Lip region continuous with body contour, with delicate but distinct transverse striae. Stylet relatively short and delicate, with small rounded knobs. Outlet of dorsal gland just posterior to spear base. Median bulb ovate. Distance from anterior end of body to base of median bulb 41–43% of total esophageal length. Nerve ring in middle of isthmus. Excretory pore opposite to anterior end of terminal bulb, and hemizonid just anteriorly to excretory pore and distinct. Terminal bulb elongate and set off from intestine. Rectum about one anal body width long. Tail distinctly arcuate ventrally, with sharp, needle-like, unstriated terminus. Length of tail equal to 0.8–1.0 vulva–anus distance and to 7.4–9.4 anal body diameter. Vulva without lateral membranes. Vagina in form of a transverse slit, about one third body width long. Spermatheca relatively large, elongate, usually with sperms. Oocytes arranged in a single row.

**Male:** Similar to females in general body form, but usually smaller. Spicules typical for the genus, proximally arcuate. Gubernaculum a small, bent struc-

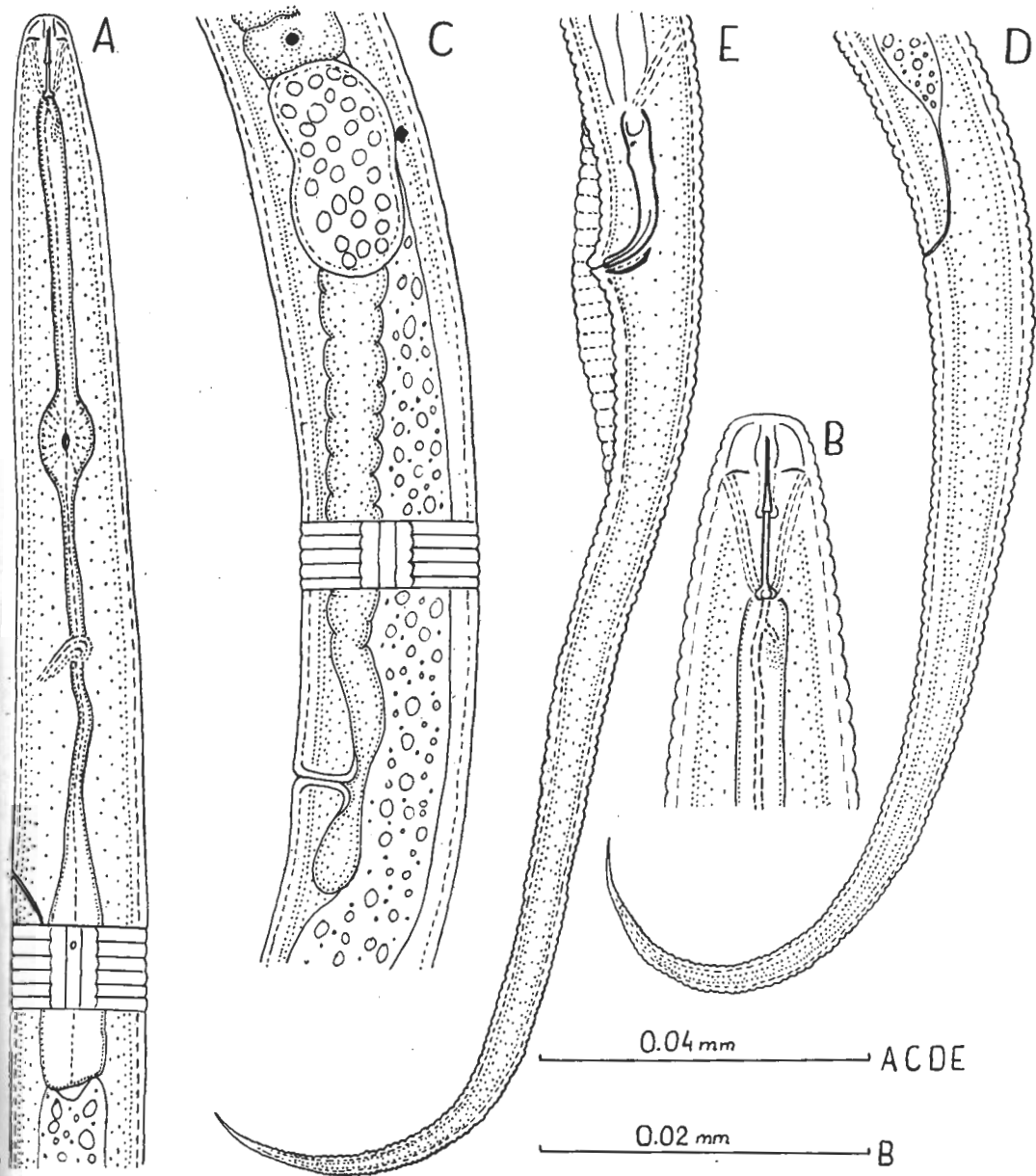


Fig. 3. *Tylenchus andrassyi* n. sp. A: Anterior part of body; B: Head region; C: Vulva region in lateral view; D: Female tail; E: Posterior part of male

ture. Bursa relatively narrow, about three and half anal body width long, with transverse striae.

**Diagnosis:** A relatively large species, with coarsely striated body cuticle, with four equally spaced incissures on lateral fields, with relatively short and delicate stylet and ventrally arcuate tail.

Because of the tail curvature, it comes close to some species of the *T. davainei* group. From *T. davainei* BASTIAN, 1865, it differs by a shorter stylet, longer tail and sharp tail terminus. From *T. intactus* KIRIANOVA, 1951 it differs by four incissures on lateral fields (five in *T. intactus*), a pointed tail terminus and shorter stylet ( $15\ \mu$  in *T. intactus*). From *T. kirjanovae* ANDRÁSSY, 1954, it differs by a slightly shorter stylet, shorter tail and pointed tail terminus (bluntly rounded in *T. kirjanovae*), and by a posterior vulva ( $V = 48-50\%$  in *T. kirjanovae*). From *T. ritae* SIDDIQI, 1963 and *T. arcuatus* SIDDIQI, 1963 it differs mainly by a shorter stylet ( $14-15\ \mu$  in *T. ritae* and  $15\ \mu$  in *T. arcuatus*), a more anterior position of median bulb and excretory pore. Besides it differs from *T. ritae* by a more posterior vulva ( $V = 59-60\%$  in *T. ritae*), and from *T. arcuatus* by a much shorter tail in relation to vulva-anus distance.

**Type specimens:** Holotype, allotype and paratypes (six females and four males) collected on 13 June, 1966, deposited in the author's collection.

**Type locality and habitat:** Sandy soil round strawberry roots in the farm of L. Bidawa, Kamienica Szlachecka, distr. Kartuzy.

*Tylenchus andrassyi* n. sp. was identified from several other localities in Poland, from the soil around strawberry roots.

The specific name was given in recognition of the taxonomic work of Dr. I. ANDRÁSSY (Budapest) in the genus *Tylenchus*.

### *Tylenchus helenae* n. sp.

Fig. (4 A-D)

Females (7):  $L = 0.43-0.48\ \text{mm}$ ;  $a = 37-46$ ;  $b = 4.6-5.4$ ;  $c = 3.4-3.8$ ;  $V = 55.5-59.5\%$ ; spear =  $7.1-7.7\ \mu$ .

Female (holotype):  $L = 0.43\ \text{mm}$ ;  $a = 37$ ;  $b = 4.6$ ;  $c = 3.6$ ;  $V = 57.5\%$ ; spear =  $7.3\ \mu$ .

**Female:** A small and slender species. Body usually straight when killed by heat. Cuticle marked with delicate transverse striae,  $0.8-0.9\ \mu$  apart in middle of body. Lateral fields in form of plain bands without inner incissures, occupying about one fifth body diameter. Deirids and phasmids not seen. Lip region rounded, continuous with body contour. Transverse striae very delicate, inconspicuous. Spear small, delicate, with weakly developed but distinct, slightly elongate knobs. Outlet of dorsal gland close to spear base. Distance from anterior end of body to base of median bulb about 43% of esophageal length. Median bulb ovate. Isthmus thin and relatively long. Terminal bulb sacculiform. Nerve ring slightly anterior to middle of isthmus. Excretory pore slightly posterior to nerve ring, and hemizonid just anteriorly to excretory pore. Vulva a transverse slit, without lateral membranes. Vagina thin walled, at right angles to body axis. Postuterine sac relatively large; about one or more body diameter long and more than half body diameter wide. Spermatheca not seen. Egg about four times as long as broad ( $41 \times 10\ \mu$ ). Ovary



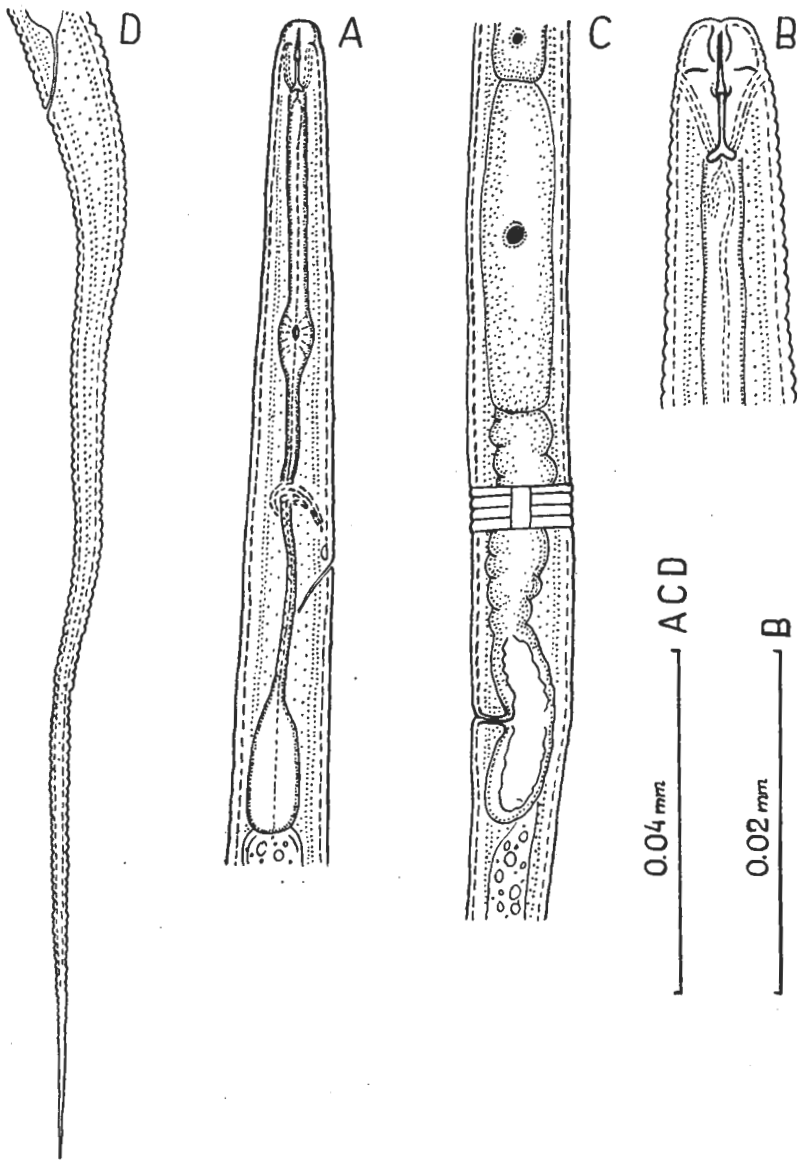


Fig. 4. *Tylenchus helenae* n. sp. A: Anterior part of body; B: Head region; C: Vulva region in lateral view; D: Female tail

prodelphic, well developed. Oocytes arranged in a single row. Anus obscure. Rectum about one anal body width long. Tail filiform and long, ending with a needle-like terminus. Length of tail equalling to about twice vulva-anus distance and to 15-18 anal body diametres.

Male not found.

**Diagnosis:** *Tylenchus helenae* n. sp. is distinctive because of its small and slender body, a short and delicate stylet, a tail about twice as long as vulva-anus distance, a delicate striation of body cuticle, lack of inner incissures on lateral fields and presence of relatively large uterine sac.

Having no lateral incissures on lateral fields and a tail twice as long as vulva-anus distance, it resembles *T. parvus* SIDDIQI, 1963, and *T. ruatus* EGUNJOBI, 1967. From the first species, it differs by a delicate striation of cuticle (width of annules 0.8–0.9  $\mu$  against about 2  $\mu$  in *T. parvus*), a more slender body ( $a = 28-33$  in *T. parvus*), more anterior position of vulva ( $V = 61-66\%$  in *T. parvus*), and by a larger postuterine sac. From *T. ruatus*, it differs by having a smaller body ( $L = 1.1-1.5$  in *T. ruatus*), smaller stylet (10–17  $\mu$  in *T. ruatus*), by a longer isthmus, shorter terminal bulb and larger uterine sac.

**Type specimens:** Holotype and paratypes (six females) collected on 18 of May, 1966; deposited in the author's collection.

**Type locality and habitat:** Sandy soil around strawberry roots in the farm of A. Jaworski, Ryczywół, distr. Kozenice.

*T. helenae* n. sp. was also identified from several other localities in Poland, in the soil from strawberry plantations.

### *Tylenchus quartus* n. sp.

(Fig. 5. A-E)

Females (9):  $L = 0.41-0.56$  mm;  $a = 37-46$ ;  $b = 4.4-5.3$ ;  $c = 4.2-5.3$ ;  $V = 60-66\%$ ; spear = 9.4–11.8  $\mu$ .

Female (holotype):  $L = 0.56$  mm;  $a = 39.5$ ;  $b = 4.7$ ;  $c = 5.3$ ;  $V = 65.2\%$ ; spear = 11.8  $\mu$ .

Males (4):  $L = 0.43-0.52$  mm;  $a = 37-40$ ;  $b = 4.1-5.0$ ;  $c = 4.2-4.4$ ; spear = 9.5  $\mu$ ; spicules = 13  $\mu$ ; gubernaculum = 4.9–5.3  $\mu$ .

Male (allotype):  $L = 0.44$  mm;  $a = 37$ ;  $b = 5.0$ ;  $c = 4.3$ ; spear = 9.5  $\mu$ ; spicules = 13  $\mu$ ; gubernaculum = 4.9  $\mu$ .

**Female:** Body straight when killed by heat, or slightly ventrally bent behind anus. Cuticle transversely striated (width of annules 1.1–1.2  $\mu$  on middle of body). Lateral fields about one quarter body diameter wide, marked with four incissures, outer ones crenate. Deirids very prominent, posterior to excretory pore (in beginning of terminal bulb). Phasmids not seen. Lip region continuous with body contour, marked with delicate transverse striae. Spear with conspicuous rounded knobs. Outlet of dorsal gland close to spear base. Distance from anterior end of body to base of median bulb about 34–45% of total esophagus length. Procorpus wide, about half as long as isthmus. Median bulb elongate, fusiform. Isthmus thin. Nerve ring about one third isthmus length from median bulb. Excretory pore just anterior to beginning of terminal bulb, hemizonid about 2.5 annules anteriorly to this. Terminal bulb elongate. Vulva a transverse slit without lateral membranes. Vagina at right angles to body axis. Postuterine sac about half body width long or slightly shorter. Spermatheca rounded, usually with sperms. Ovary prodelphic, outstretched. Oocytes arranged in a single row. Rectum about two third anal body width long. Tail uniformly tapering to very sharp pointed terminus.

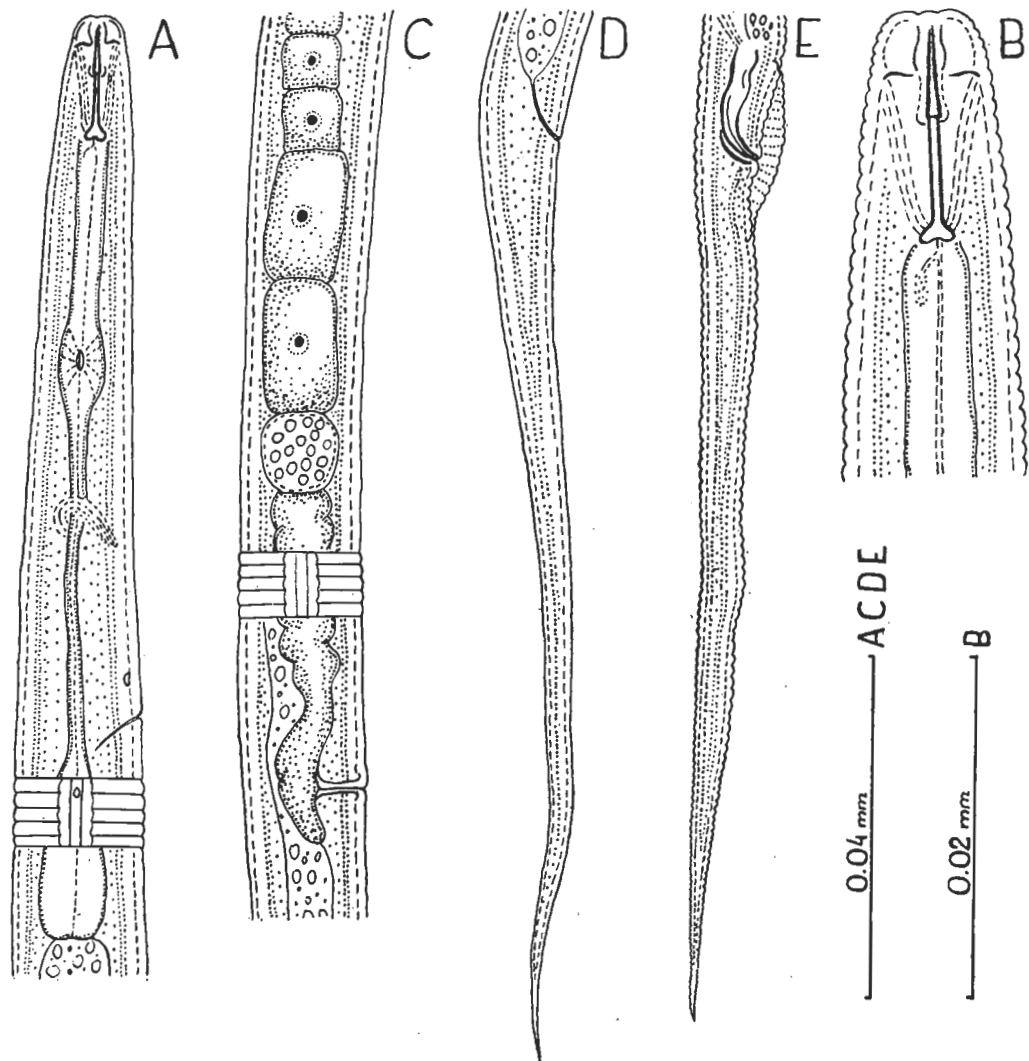


Fig. 5. *Tylenchus quartus* n. sp. A: Anterior part of body; B: Head region; C: Vulva region in lateral view; D: Female tail; E: Posterior part of male

Length of tail equalling 1.2–1.5 vulva–anus distance and 11–15 anal body diameter.

*Male*: Similar to females in body form. Spicules typical for the genus, arcuate proximally. Gubernaculum simple, slightly arcuate. Bursa weakly developed, with transverse striae. Testis single, with cells in a single row.

*Diagnosis*: *Tylenchus quartus* n. sp. is closely related to *T. discrepans* ANDRÁSSY, 1954, from which it differs by a slightly longer stylet ( $7.0\text{--}7.7\ \mu$  in *T. discrepans*), a more slender body ( $a = 27\text{--}32$  in *T. discrepans*), more

anterior position of median esophageal bulb, a more elongate terminal bulb, a more anteriorly situated nerve ring, a continuous lip region, longer gubernaculum in males, and also by the tail shape.

*T. quartus* n. sp. resembles also *T. mirus* HUSAIN and KHAN, 1967 and *T. cynodontus* HUSAIN and KHAN, 1967. It differs from the first by a much more anterior position of the median esophageal bulb, a more slender and larger body and also by a longer gubernaculum in the males. From *T. cynodontus*, it differs by a slender body ( $a = 26-32$  in *T. cynodontus*), longer tail in relation to anal body width, more anteriorly located median bulb and by presence of males. It differs from both species also by the shape of the lip region.

**Type specimens.** Holotype, allotype and paratypes (8 females and 3 males) collected on 16 May, 1966; deposited in the author's collection.

**Type locality and habitat.** Sandy loam soil round strawberry roots in the farm of J. Gwoźdź, Szczaworyż, distr. Busko.

*Tylenchus quartus* n. sp. was also identified in soil samples from strawberry fields in several other localities in Poland.

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#### ZUSAMMENFASSUNG

##### *Eine neue Gattung und vier neue Arten der Unterfamilie Tylenchinae de Man, 1876 (Nematoda: Tylenchidae) aus Polen*

Der Verfasser stellt für die von HIRSCHMANN (1952) beschriebene Art *Aglenchus sachsii* eine neue Gattung, *Pleurotylenchus* n. gen., auf und beschreibt vier neue Tylenchinen aus Polen, und zwar *Aglenchus fragariae*, *Tylenchus andrassyi*, *Tylenchus helenae* und *Tylenchus quartus* n. spp. Die Gattung *Pleurotylenchus* unterscheidet sich hauptsächlich durch die in Längslinien angeordneten vorragenden Warzen der Kutikula von den anderen Gattungen der Unterfamilie Tylenchinae.

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