

Description of *Deladenus minimus* sp. n. (Tylenchida: Phaenopsitylenchidae), an entomogenous nematode from Germany

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Summary. Descriptions are given of the infective female and the free-living male of *Deladenus minimus* sp. n. found in wood samples of *Pinus silvestris* L. trunks growing in the vicinity of Braunschweig, Germany. The new species is distinguished from the seven *Deladenus* species, for which the insect parasitic stages are known, by smaller sizes of both the infective female and the free-living male, a stylet with large and separated basal knobs and a conoid, pointed tail in the infective female and a leptoderan bursa in the free-living male.

Key words: entomogenous nematode, morphology, taxonomy, *Deladenus minimus* sp. n., Germany.

Nematodes of the genus *Deladenus* Thorne, 1941, of which there are presently 19 recognized species (Bedding & Akhurst, 1978; Chitambar, 1991; Shahina & Maqbool, 1992), are widely distributed and described from different regions of the world. The life cycle of the species involves one or several amphimictic mycetophagous and one insect parasitic generations. This group of entomogenous tylenchids is of special interest as each of the species in the genus are of potential use for biological control, and *D. siricidicola* is already used for this purpose. For the majority of species only the mycetophagous stages have been described but for the following seven species the insect parasitic generation also has been described: *D. canii* Bedding, 1974, *D. imperialis* Bedding, 1974, *D. nevexii* Bedding, 1974, *D. proximus* Bedding, 1974, *D. rudyi* Bedding, 1974, *D. siricidicola* Bedding, 1968 and *D. wilsoni* Bedding, 1968 (Bedding, 1967, 1968, 1974).

Among nematodes isolated from pine wood samples in Germany an undescribed *Deladenus* species was found, and the entomogenous infective female also was present. This species is described here as *Deladenus minimus* sp. n., it being the smallest among the known insect parasitic species of the genus.

MATERIALS AND METHODS

Wood samples were collected with the aid of a wood drill from the trunks of large pine trees (*Pinus*

silvestris L.) and were placed on a Baermann funnel. The nematodes collected by this method were killed and fixed in hot TAF, transferred to anhydrous glycerine by the slow evaporation method and mounted on microscope slides.

DESCRIPTION

Deladenus minimus sp. n. (Fig. 1)

Measurements. Morphometrics of the holotype, paratype infective females and mycetophagous males are given in Table 1.

Infective female. Body straight. Cuticle with fine annules, in region of stylet annules wider. Lateral field 4-5 μm wide with 8-10 incisures, incisures arranged equidistantly. Deirids dot-like, situated at hemizonid level. Head subspherical, lip region not set off from body, 4-7 μm wide and 2-3 μm high, smooth. Weak head skeleton present. Stylet strong, with visible lumen; posterior part of stylet thickened, with large basal knobs; basal part of stylet with knobs 2-3 μm in diameter. Lining of oesophageal lumen weakly sclerotized. Two oesophageal glands visible. Orifice of the dorsal oesophageal gland 6-8 μm behind stylet base, orifice of subventral oesophageal gland(s) 30-38 μm behind head end. Nerve ring 50-65 μm from head end. Hemizonid 1-2 μm long; hemizonion 15-20 μm posterior to hemizonid. Ger-

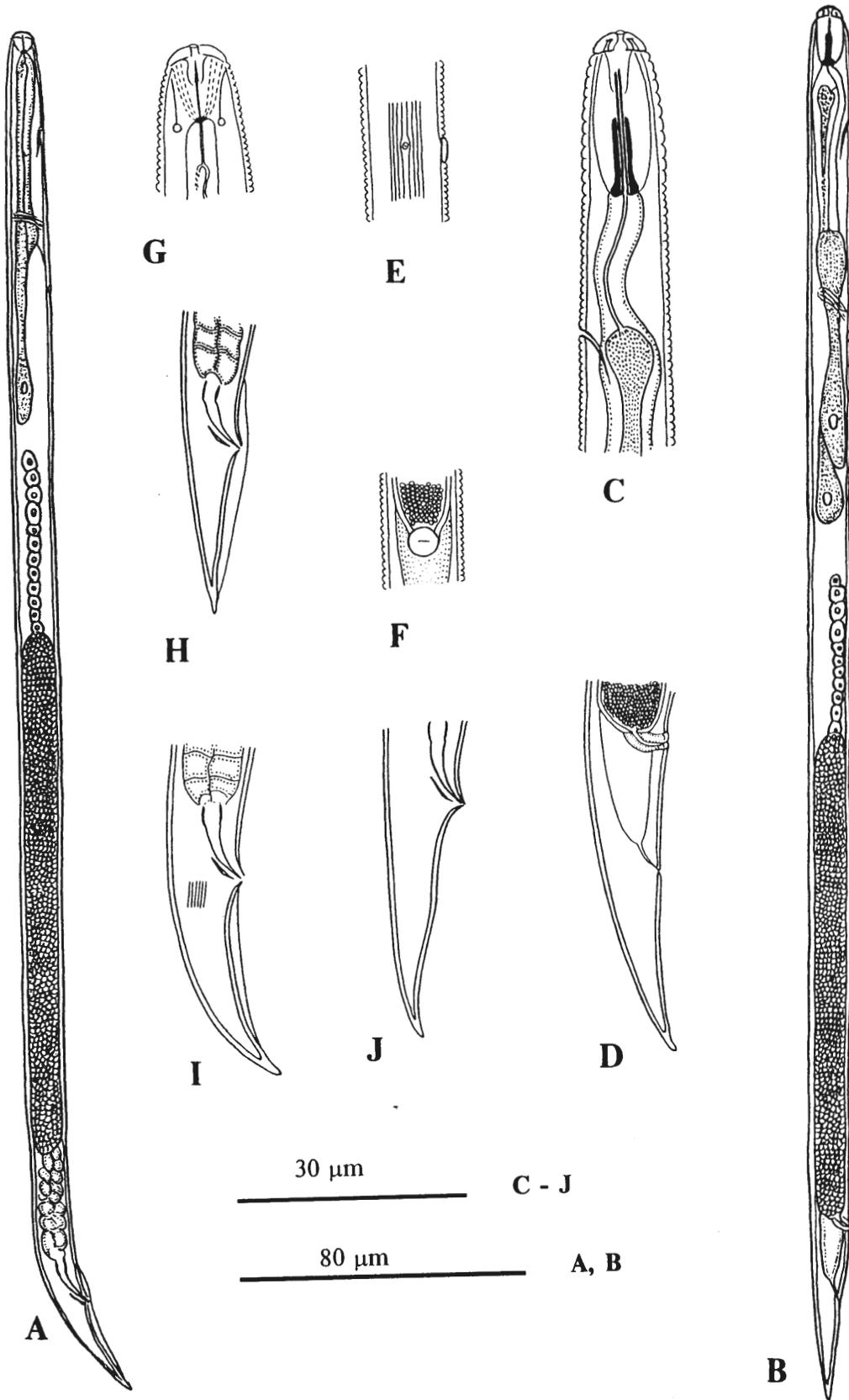


Fig. 1. *Deladenus minimus* sp. n. A: Free-living male; B: Invasive female; C: Anterior end of invasive female; D: Posterior end of invasive female; E: Hemizonid region; F: Vulva region; G: Anterior end of male; H - J: Tails of males.

Table 1. Morphometrics of infective females and mycetophagous males of *Deladenus minimus* sp. n. (measurements are given in μm).

Characters	Infective females		Mycetophagous males
	Holotype	Paratypes (n=25)	Paratypes (n=25)
L	467	412±44 (338-511)	414±35 (343-484)
a	34.6	35.7±3.9 (28.2-43.6)	31.3±2.5 (26.5-36.4)
b	6.1	6.0±0.5 (5.0-6.5)	6.6±0.6 (5.4-7.8)
c	16.0	13.4±1.4 (10.7-16.0)	14.3±2.3 (11.7-18.7)
c'	2.9	4.1±0.5 (2.9-5.0)	3.6±0.4 (2.9-4.4)
Stylet	18	16±4.1 (9-20)	7±0.7 (7-9)
V%	90	89±0.8 (87-91)	—
Spicules	—	—	12±0.5 (10-14)
Excretory pore to anterior end	35	35±8.3 (20-44)	33±5.4 (27-43)
Hemizonid to anterior end	79	79±6.1 (73-90)	71±4.8 (62-80)
Excretory pore to hemizonid	44	42±5.2 (36-51)	38±8.5 (23-53)
Body width	13	12±1.3 (9-14)	13±1.1 (11-15)
Vulva - anus	18	15±2.5 (10-18)	—
Tail	29	30±2.7 (28-34)	29±4.8 (23-37)

minative zone of the gonad with 4-24 cells, its anterior end 140-300 μm from head, sometimes reaching dorsal oesophageal gland base. Uterus wide and filled with small sperm. Vulval plate circular, 3.0-3.5 μm in diameter, vulval slit 1.3-1.5 μm long. Tail elongated conical with pointed terminus.

Mycetophagous female. Not found.

Free-living male. Body generally straight, tail region frequently curved ventrally. Cuticle with fine annules uniformly along body. Lateral field 3-4 μm wide, with 6-8 incisures. Deirids dot-like, located at hemizonid level. Head region slightly projecting anteriorly, set off from body contour, 4-6 μm wide, 1.0-1.5 μm high. Weak head skeleton present. Stylet small, weak, differentiated; metenchium (3 μm) slightly shorter than telenchium (4 μm), with developed basal knobs; stylet base about 1.8 μm in diameter. Amphidial glands well developed. Orifice of the dorsal oesophageal gland 3-5 μm (?) posterior to stylet base. Orifice of the subventral glands 30-40 μm from the head end. Metacarpus region not expressed, sometimes slightly widened; widening of oesophageal lumen in metacarpus region absent. Nerve ring 33-50 (39) μm from the head end. Opening of excretory pore and excretory duct heavily sclerotized. Hemizonid 1-1.5 μm long. Dorsal oesophageal gland extended along intestine over a distance of the length of oesophagus. Germinative zone of testis generally straight, 70-110 μm long, sometimes reflexed, its anterior end 65-140 μm from head region, its tip sometimes extending to the dorsal oesophageal gland. Spicules tylenchoid; gubernaculum relatively large (4-5 μm); distal end of the

spicules covered by a small cuticular plate. Bursa of variable appearance: beginning slightly anterior to or at spicule level and extending to 6-8 μm anterior to tail terminus, sometimes appearing as a narrow strip ending in the middle of the tail; sometimes bursa obviously absent. Tail elongated-conical, straight or slightly curved with terminus blunt or short and pointed, sometimes appearing as slightly offset mucro.

Type locality. Forst Lehre, Abt. 28, c. 10 km east of Braunschweig, Germany (UTM grid PC 19). Ex-wood of the trunk of a recently dead pine tree, *Pinus silvestris* L., colonized by blue stain fungi and possibly attacked by Cerambycidae. Sample collected 26 July 1988 by Dr. Marlies Schauer-Blume.

Type specimens. Holotype and paratypes are deposited in the German Nematode Collection at Biologische Bundesanstalt, Institut für Nematologie und Wirbeltierkunde, Münster, Germany. Additional paratypes are deposited in the Nematological collections of the Institute of Parasitology and the Zoological Institute, the Russian Academy of Sciences, Moscow and St. Petersburg, respectively.

Differential diagnosis. The new species is distinguished from all other described *Deladenus* species for which the infective female is known (*D. canii*, *D. imperialis*, *D. nevexii*, *D. proximus*, *D. rudyi*, *D. siricidicola* and *D. wilsoni*) by the smaller body sizes of the free-living male and the infective female. In *D. minimus* sp. n. the maximum lengths of male and infective female are 0.48 mm and 0.51 mm, respectively, whereas in other species of the group the minimum lengths of male and the infective female

are 1.0 mm and 0.80 mm, respectively. The new species differs from these species also in the well-separated stylet knobs in the infective females. Such separation in the basal knobs is absent in the other species or appears as a thickening of the basal part of the stylet (in *D. siricidicola* and *D. imperialis*). *Deladenus minimus* sp. n. is well separated from these species also by the shape of the tail in the infective female, which is elongated-conical with pointed terminus in the new species, whereas other species have a cylindrical or subcylindrical tail with a rounded terminus or a blunt tip (*D. imperialis*). Additionally, the new species is distinguished by its bursa, which does not reach the tail terminus (leptoderan bursa), while it envelops the tail terminus in the above-mentioned species (peloderan bursa).

Similarities to other species of the genus *Deladenus* cannot be assessed and discussed because the insect parasitic stage has not been described. Also, the male of the mycetophagous stage is unknown in several of these species. In its body dimensions *D. minimus* sp. n. may be most similar to *D. parvus* Zell, 1985 having a body length of the mycetophagous female of 388-600 μm .

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Чижов В. Н., Штурхан Д. Описание энтомопаразитической нематоды *Deladenus minimus* sp. n. (Tylenchida: Phaenopsitylenchidae) из Германии.

Резюме. Описываются инвазионная самка и свободноживущий самец *Deladenus minimus* sp. n., обнаруженные в пробах древесины *Pinus silvestris* L. вблизи Брауншвайга, Германия. Новый вид отличается от семи близких видов *Deladenus*, для которых известна энтомопаразитическая стадия, меньшими размерами инвазионной самки и свободноживущего самца, наличием стилета с крупными, хорошо обособленными базальными головками, коническим заостренным хвостом у инвазионных самок и лептодерной бурсой у самца.
