

## Description of *Trichodorus variabilis* n. sp. (Nemata: Diptherophoroidea) from Greece

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Accepted for publication 2 June 1997.

**Summary** – *Trichodorus variabilis* n. sp. is described and illustrated. It was found during a survey of Longidoridae at Kato Souli, Marathon area, Greece, around roots of artichoke. The new species is characterized by two ventromedian cervical papillae posterior to the onchiostyle region, in a variable location with respect to the secretory-excretory pore, shape of spicules with widened manubrium gradually merging with a slender and equally wide calomus in males, and barrel-shaped vagina with small triangular sclerotized pieces and a pair of postadulvar lateral body pores in female. *T. variabilis* sp. n. closely resembles *T. giennensis* Decraemer *et al.*, 1993 and *T. sparsus* Szczygiel, 1968. © Elsevier - ORSTOM

**Résumé** – *Description de Trichodorus variabilis* n. sp. (Nemata: Diptherophoroidea) provenant de Grèce - Description est donnée de *Trichodorus variabilis* n. sp. Cette nouvelle espèce a été trouvée au cours de récoltes de Longidoridae à Kato Souli, Marathon, Grèce, dans la rhizosphère d'artichaut. Le mâle est caractérisé par la présence de deux papilles cervicales médioventrales, postérieures à la base du stylet, la position du pore excréteur, variable par rapport aux papilles cervicales, la forme du spicule possédant un manubrium élargi joint graduellement à un calomus élancé, de même épaisseur; la femelle est caractérisée par la forme du vagin en tonneau, la sclérotisation vaginale triangulaire et de petite taille, et la présence d'une paire de pores latéraux, post-adulvaires. *Trichodorus variabilis* n. sp. est proche de *T. giennensis* Decraemer *et al.*, 1993 et *T. sparsus* Szczygiel, 1968. © Elsevier - ORSTOM

**Keywords:** Greece, nematodes, Trichodoridae, *Trichodorus variabilis* n. sp.

During a survey of Longidoridae nematodes in artichoke fields in the Marathon area, Greece, a *Trichodorus* population was found at the Kato Souli village in one of 23 soil samples collected from the rhizosphere of artichoke. At first, identification proved impossible because of the variable location of the ventromedian cervical papillae in relation to the secretory-excretory pore. A new and more detailed examination of the population suggested that it should be considered as a new species, which is described herein under the name of *Trichodorus variabilis* n. sp.

The specimens were extracted using Cobb's sieving technique, killed by gentle heat, fixed in 4% formalin solution, processed to anhydrous glycerin according to Seinhorst method (1959, 1962), and mounted on slides for light microscopy. Measurements and drawings were made with the aid of a camera lucida.

### *Trichodorus variabilis* n. sp.

(Fig. 1)

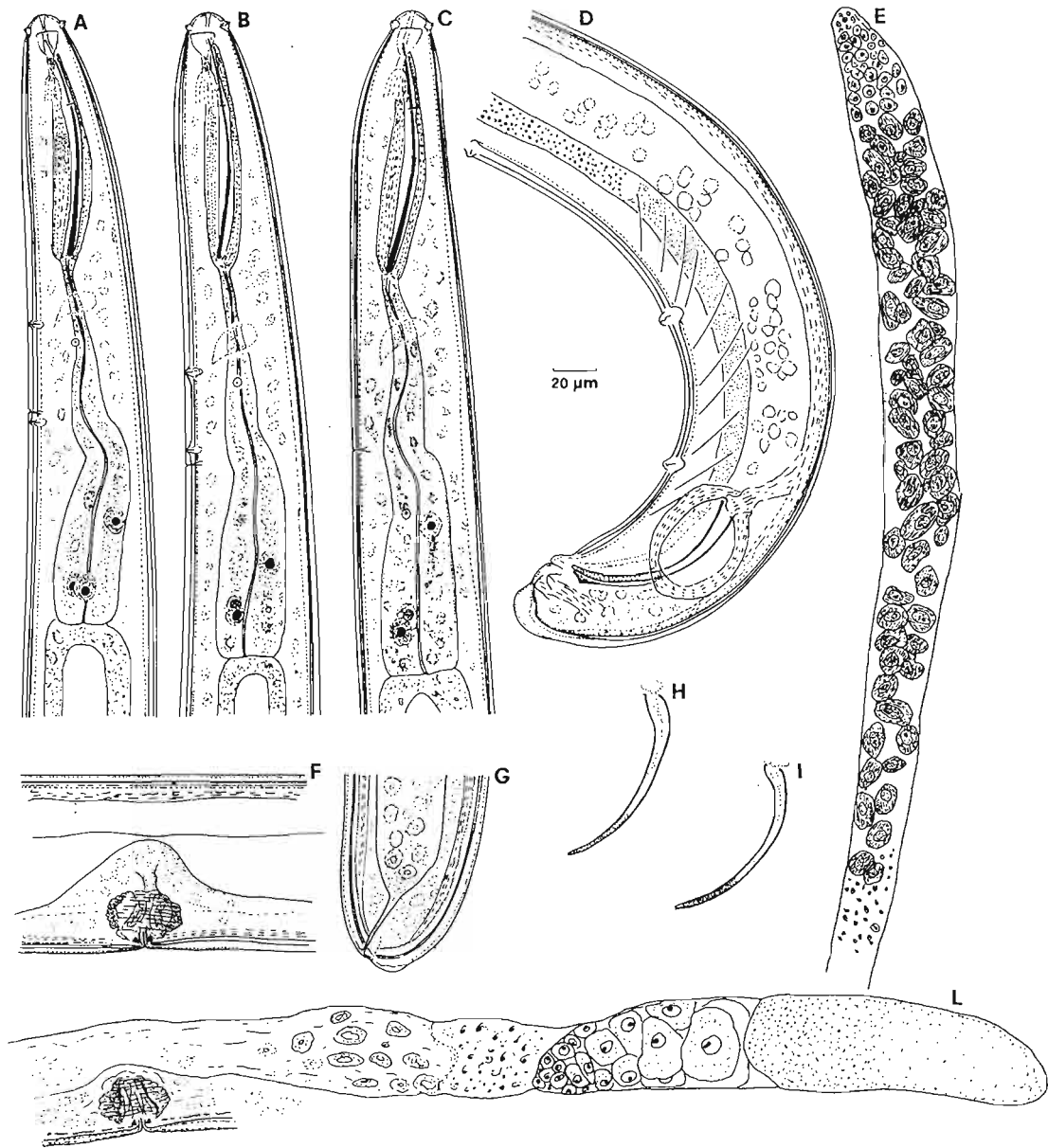
#### MEASUREMENTS

See Table 1.

#### DESCRIPTION

**Male:** Body cylindrical, slightly curved ventrally, tapering gradually anteriorly from oesophageal region,

more pronounced posteriorly. Body cuticle little swollen upon fixation, 3–4.5  $\mu\text{m}$  thick at mid-body, with three cuticular layers: outer usually slightly swollen due to fixation, second layer thin, and third layer thick and demarcated by fine pseudoannulations. Lip region rounded with distinct labial papillae; amphideal fovea typical of the genus. Onchiostyle ventrally curved; guiding ring at 20–24  $\mu\text{m}$  from anterior end. Posterior pharynx gradually widening into a large bulb with five gland nuclei: one large dorsal gland nucleus located near the middle or in the posterior third of the bulb, a posterior pair of large subventral gland nuclei in the posterior fourth of the bulb, and the small anterior ventro-sublateral gland nuclei, usually difficult to see, at mid-bulb or in the anterior half of the bulb, anterior to the level of the dorsal gland nucleus. Two conspicuous ventromedian cervical papillae (Cp1 - Cp2), posterior to the onchiostyle region. Out of 37 males observed, one had only one ventromedian cervical papilla and another one apparently had no cervical papillae. Secretory-excretory pore (EP) located posterior to both ventromedian cervical papillae, at 4.5  $\mu\text{m}$  (1.5–6.5  $\mu\text{m}$ ) from Cp2, in 9 of the 35 males with two ventromedian cervical papillae; in the remaining 26 males, EP located between Cp1 and Cp2, at 5  $\mu\text{m}$  (1.0–9.5  $\mu\text{m}$ ) from Cp2. Lateral cervical pore (LP) located on each side lying generally



**Fig. 1.** *Trichodorus variabilis* n. sp.. Male paratypes. A - B: Anterior body region; D: Posterior body region (holotype); E: Shape of sperms in testis; H - I: Spicules, paratypes: Females. C: Anterior body region; G: Posterior body region; F: Vaginal region lateral view; L: Female reproductive system, posterior branch.

almost at level of Cpl or just posteriorly, 3-6 µm posterior to level of nerve ring. No overlap of the subventral pharyngeal bulb; one specimen had a minute anterior-dorsal intestinal overlap (4 µm). Reproductive system with a single testis, outstretched: sperm cells with a large oval granular nucleus, their surface with fine striation, clearly visible in few specimens only. Spicules ventrally curved; manubrium wide, gradually

merging with an equally wide calomus, posteriorly tapering to a sharp distal end, and with very fine transverse striations at the distal third of the spicules. Bristles not observed. Gubernaculum distally with a finely striated keel. Three medioventral precloacal supplements: the posterior one located at the level of the anterior end of the spicules; the anteriormost supplement less developed. One pair of postcloacal sub-

**Table 1.** Morphometric data of *Trichodorus variabilis* n. sp. (All measurements in  $\mu\text{m}$ ).

	Holotype	Females	Males
n		11	36
L	951.5	851.5-1041.0 (953.0 $\pm$ 61.32)	773.5-1101.5 (930.5 $\pm$ 69.41)
Body width	37.5	34.7-43.5 (39.0 $\pm$ 2.40)	31.2-40.5 (37.5 $\pm$ 2.23)
Pharynx length	145.5	147.0-160.5 (153.5 $\pm$ 4.17)	132.5-191.0 (153.0 $\pm$ 11.06)
Onchiostyle length	53.0	50.5-57.5 (54.0 $\pm$ 2.11)	47.5-59.5 (52.0 $\pm$ 2.64)
Ant. end to excretory pore	103.5	97.0-113.0 (106.5 $\pm$ 5.14)	86.5-121.5 (104.0 $\pm$ 8.07)
Ant. end to lat. cerv. body pore	84.0		76.5-101.5 (91.0 $\pm$ 6.56)
Ant. end to Cp1*	82.5		70.5-101.0 (86.0 $\pm$ 6.78)
Ant. end to Cp2*	102.5		90.5-118.0 (107.0 $\pm$ 6.68)
Spicule length	47.5		44.0-51.5 (48.0 $\pm$ 2.08)
Gubernaculum length	20.0		13.0-23.0 (19.5 $\pm$ 2.03)
Anus to Sp1	27.5		21.0-41.0 (32.5 $\pm$ 4.27)
Sp1 to Sp2	27.0		22.5-45.5 (32.5 $\pm$ 5.79)
Sp2 to Sp3	36.0		34.0-73.5 (48.5 $\pm$ 9.36)
Anterior genital branch		195.5-244.0 (224.5 $\pm$ 17.0)	
Posterior genital branch		182.5-273.5 (226.5 $\pm$ 27.43)	
a	25.5	21.0-29.5 (24.5 $\pm$ 2.40)	21.0-29.5 (25.0 $\pm$ 2.07)
b	6.5	5.7-6.8 (6.0 $\pm$ 0.36)	5.0-6.8 (6.1 $\pm$ 0.44)
V		50.5-56.3 (52.5 $\pm$ 1.66)	
T	71.5		54.0-75.7 (67.5 $\pm$ 4.82)
Ratio G1 (%)		20.0-27.0 (23.5 $\pm$ 2.09)	
Ratio G2 (%)		18.0-28.0 (24.0 $\pm$ 2.81)	
Ant. end to EP-Phar. length (%)	71.0	64.2-75.6 (69.5 $\pm$ 4.06)	56.5-77.0 (68.5 $\pm$ 5.56)
Onchiostyle length-Phar. length (%)	36.5	33.6-37.3 (35.0 $\pm$ 1.12)	29.2-39.1 (34.2 $\pm$ 2.21)
Anus to Sp1-Spicule length (%)	58.0		45.5-84.0 (68.0 $\pm$ 9.12)
Anus to Sp2-Spicule length (%)	115.0		93.5-169.0 (136.0 $\pm$ 18.70)
Anus to Sp3-Spicule length (%)	190.0		167.0-315.5 (237.5 $\pm$ 36.08)

\* Males with one or no ventromedian cervical papillae omitted.

ventral papillae just posterior to cloacal aperture. Tail broadly rounded, less than one anal body-width long, with drop-like thickened cuticle at tail tip. One pair of subventral subterminal caudal pores present.

*Female:* General appearance typical of the genus. Body cylindrical almost straight or slightly ventrally curved upon fixation, tapering anteriorly from oesophageal region. No dorsal intestinal overlap and no subventral or ventral overlap of the pharyngeal glands. Excretory pore at level of the anterior end of the pharyngeal bulb. Reproductive system didelphic-amphidelphic with reflexed ovaries. Oviduct consisting of two large granular cells, a spermatheca with sperm cells, and a large uterine sac. Vagina barrel-shaped sometimes more or less cylindrical, occupying 41% (37-46) of the corresponding body diameter. Vagina with small oblique triangular sclerotized pieces in lateral view, tips 0.9-1.1  $\mu\text{m}$  apart. Vulva opening pore-like in ventral view. One pair of lateral advulvar body pores 31 (15.5-38)  $\mu\text{m}$  behind the vulva. Anus subterminal. Tail rounded, slightly thickened at the tip, with a pair of subterminal pores.

#### TYPE HABITAT AND LOCALITY

Rhizosphere of artichoke at Kato Souli village, Marathon area, Greece.

#### TYPE MATERIAL

Holotype male, 30 male and 5 female paratypes in the Collection of Istituto di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; two female and two male paratypes each in the following collections: Muséum National d'Histoire Naturelle, Laboratoire de Biologie Parasitaire, Protistologie, Helminthologie, Paris, France; Entomology and Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, UK; Plant Nematology Laboratory Collection, U.S.D.A., Beltsville, MD, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*T. variabilis* n. sp. is characterized by body length and onchiostyle length in males and females. Males are characterized by two well developed medioventral cervical papillae posterior to the onchiostyle base, secretory-excretory pore variably located (in about 26% of specimens with two ventromedian cervical papillae, the EP is located posteriorly, in the remaining 74% of specimens, the EP is located between the medioventral cervical papillae), shape of the spicules with wide manubrium, slender calomus distally

tapered and with fine striations, arrangement of the three precloacal supplements with the posteriormost at level of the spicules head (when the spicules are retracted), and tail with thickened terminal cuticle. Females are characterized by barrel-shaped vagina, small triangular sclerotized vaginal pieces in lateral view, and a single pair of postadvulvar lateral body pores.

*T. variabilis* n. sp. is close to *T. sparsus* Szczygiel, 1968 by its morphometry and also by having two ventromedian cervical papillae and by similar tail shape, with a caudal thickness. In males, the new species differs from *T. sparsus* in having the EP located between Cp1 and Cp2 in 74% of the specimens, differently shaped spicules, and absence of bristles. In females, the new species differs from *T. sparsus* by apparently shorter vagina, slightly longer onchiostyle (50.5-57.5 vs. 46-50  $\mu\text{m}$ ), more offset pharyngeal bulb, and smaller sclerotized vaginal pieces.

*T. variabilis* n. sp. is also similar to *T. giennensis* Decraemer, Roca, Castillo, Peña-Santiago & Gomez-Barcina, 1993, but differs in having slightly longer body, position of the EP very close to Cp2, between the two ventromedian cervical papillae in the majority (74%) of the specimens (in *T. giennensis*, EP located posterior and farther to Cp2), spicules with an equally widened calomus, without indentation or bristles but with fine transverse striae, intestine not overlapping oesophageal glands and oesophageal glands not overlapping intestine, completely different shape of sperm cells (without a fibrillar internal structure; only the surface appears striated). In females, the new species differs from *T. giennensis* in having slightly anterior situated vulva, apparently shorter vagina and more posteriorly located lateral advulvar body pores (15.5-38 vs. 7-17  $\mu\text{m}$  behind the vulva in *T. giennensis*).

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