

Aphelenchoides involutus n. sp. (Tylenchida:
Aphelenchoididae) from Ishigaki Is., Japan

Nozomu MINAGAWA

日本線虫研究会誌第22巻別刷

1992年12月

Reprinted from

Japanese Journal of Nematology Vol. 22

December 1992

Aphelenchoides involutus n. sp. (Tylenchida:
Aphelenchoididae) from Ishigaki Is., Japan

Nozomu MINAGAWA*

Aphelenchoides involutus n. sp. is described from *Macropitilium atropurpureum* (purple bean or siratro) in Ishigaki Is., Okinawa, Japan. This new species resembles *A. africanus* DASSONVILLE & HEYNS, 1984 and *A. jacobi* HUSAIN & KHAN, 1967 in the long and slender tail with pointed terminus, but differs from them in the presence of basal thickenings of stylet, longer tail, smaller c-value, more anterior located vulva, and absence of male adults. By SEM observation, face view of *A. involutus* has basically the same pattern of those of some other species of this genus reported. *Jpn. J. Nematol.* 22: 21-25 (1992).

Key words: *Aphelenchoides involutus* n. sp., Ishigaki Is., *Macropitilium atropurpureum*, morphology, taxonomy.

Aphelenchoides spp. is known as bud or leaf nematodes, and also as soil forms¹⁾. Females of this genus usually have conical tails with one or more mucrones at their termini, but few species have elongated tails without such terminal structures^{2, 4)}. An undescribed species of this genus with a elongated tail was found to occur in the field soil of the Okinawa Branch of the Tropical Agriculture Research Center (TARC) in Ishigaki Is., Okinawa, Japan. This is described under the name of *A. involutus* n. sp. herein.

The nematodes studied were extracted from soil samples by the double-layer centrifugal-flotation method⁵⁾, killed by gentle heat treatment, fixed by TAF fixative, mounted in pure glycerin after dehydration process by a modified slow method, and measured under an optical microscope. Specimens examined by SEM were killed and fixed as the same procedures mentioned above, dehydrated in a series of ethanol (from 50% to 100%), dried from pure ethanol by a critical point dryer in CO₂, coated with 300 Å platinum-vanadium, and observed by Hitachi X-650 at 20 kV.

Aphelenchoides involutus n. sp.

(Figs. 1-3)

MEASUREMENTS. *Female*. Holotype: L=517 μm, a=30.4, b=8.8, b'=4.4, c=7.1, c'=8.0, V=62.1, stylet=15.7 μm, prorhabdion=5.9 μm. Paratypes: n=25, L=447-563 μm (499±25.1; mean±s.d.), a=27.4-32.5 (30.1±1.26), b=7.4-9.3 (8.5±0.49), b'=3.6-5.2 (4.1±0.39), c=6.1-7.9 (6.9±0.48), c'=6.9-9.3 (8.3±0.66), V=60.5-63.4 (62.1±0.88), stylet=14.0-16.3 μm (14.9±0.71), prorhabdion=5.2-7.5 μm (6.0±0.50).

DESCRIPTIONS. *Female*. Body slender, open C-shaped after treatment by gentle heat, gradually reducing body width to tail terminus in posterior part of vulva (Fig. 1A, 2A). Tail slender, strongly bent ventrally like a hook after gentle heat treatment, terminus bluntly pointed (Fig. 1A, 3E). Lateral field 2.6-3.6 μm (3.3±0.11 μm, mean±standard deviation, n=25) in width, with three faint insicures (Fig. 3A), inner one sometimes very obscure. Body annuli fine, ca. 1 μm apart around mid-body.

Head round and convex, set-off from body, 2.6-3.7 μm (3.1±0.30) high and 5.2-5.9 μm (5.5±

*National Institute of Agro-Environmental Sciences, Kannondai 3-1-1, Tsukuba, Ibaraki, 305 Japan.

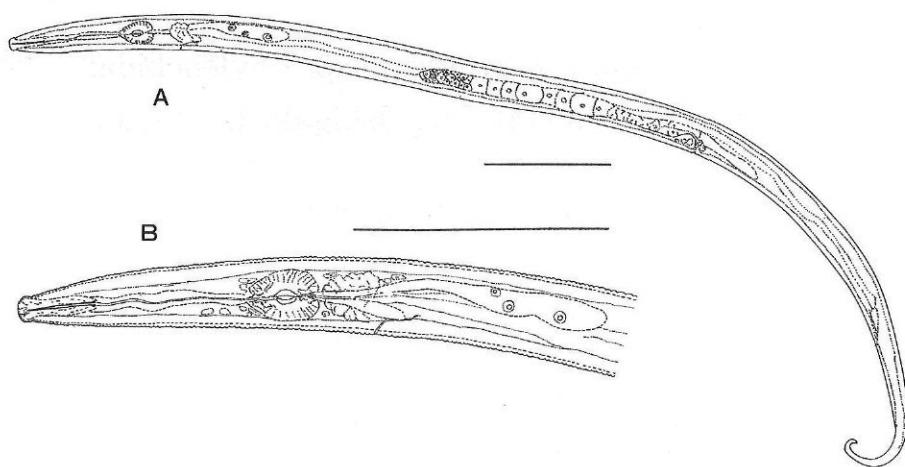


Fig. 1. *Aphelenchoides involutus* n. sp. Female. A: general shape, B: anterior body. Scale bars indicate 50 μ m.

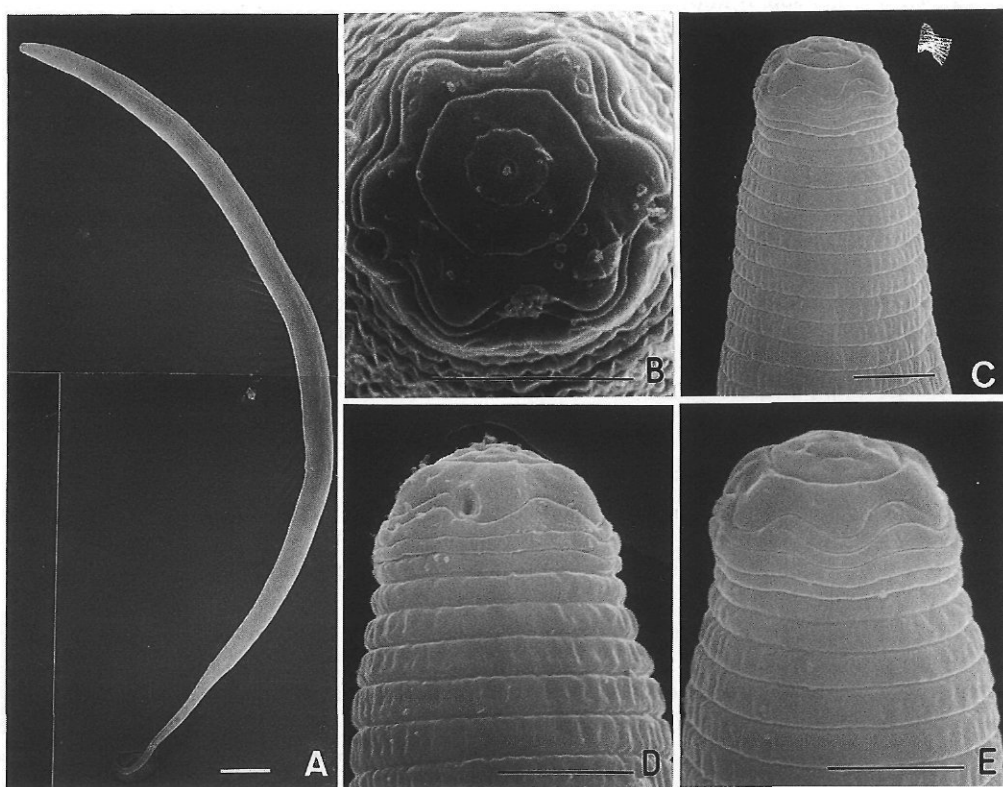


Fig. 2. SEM photographs of *Aphelenchoides involutus* n. sp. Female. A: general shape, B: face view, C: anterior body, D: head (latero-ventral view), E: head (dorsal view). Scale bars indicate 20 μ m for A, 2 μ m for B-E.

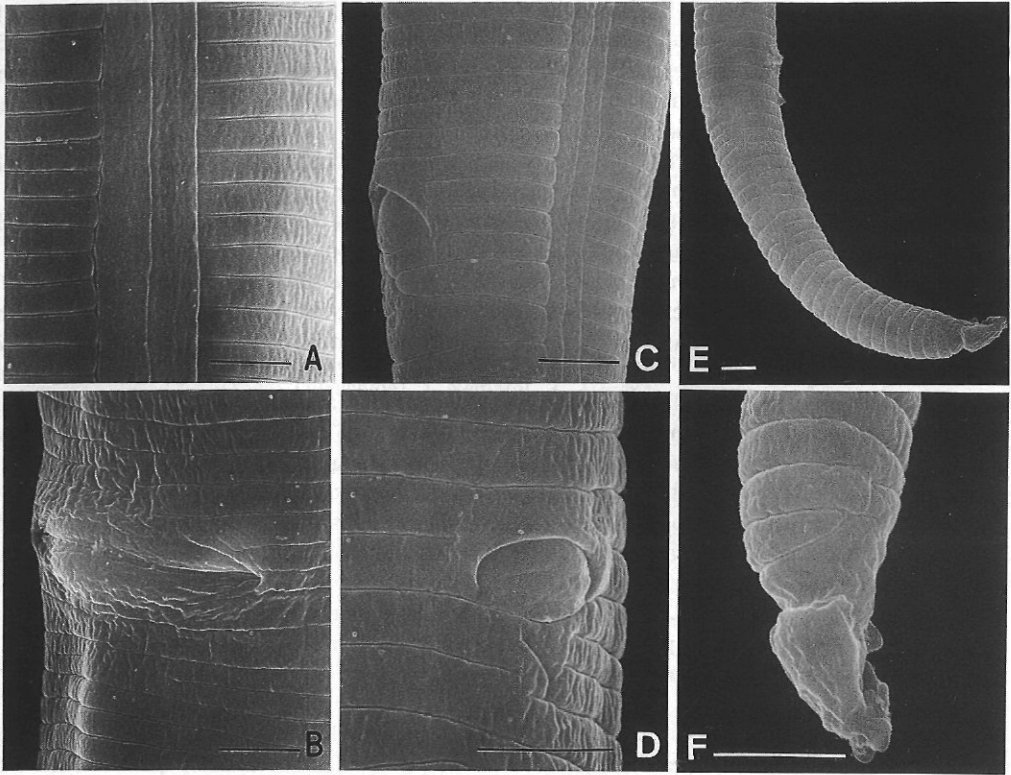


Fig. 3. SEM photographs of *Aphelenchoides involutus* n. sp. Female. A: lateral field, B: vulva (latero-ventral view), C-D: anus, E: tail, F: tail terminus. Scale bars indicate 2 μ m.

0.30) across, with two or three annuli observed by a scanning electron microscope (SEM) (Fig. 2C-E) but hardly visible by an optical microscope. *En face* view by SEM, inner labial disc circular, outer labial disc hexagonal, cephalic plate hexagram in shape; amphid apertures round and located at the dorsal sides of lateral lip sectors (Fig. 2B, D); cephalic papillae small punctations, located at subdorsal and subventral lip sectors (Fig. 2B). Stylet thin, anterior part sharply pointed at tip; posterior part also thin with very minute thickening at base.

Median bulb of esophagus muscular, oblong to rectangular, 13.0-15.0 μ m (14.3 ± 0.54) long and 8.5-10.4 μ m (9.8 ± 0.47) wide. Glandular lobe of esophagus slender, one-third to one-fourth of corresponding body diameter, extending to the dorsal side of body. Excretory pore around the same level of nerve ring, 68.4-78.3 μ m (74.4 ± 2.90) from the anterior end of body, 13.7-16.0% (14.8 ± 0.55) of the body from lip.

Reproductive system single, outstretched, 109.1-196.0 μ m (143.5 ± 20.65) long; ovary with a row and partly double rows of oocytes. Vulva slightly prominent to body contour, slit like (Fig. 3B), opened at 60.5-63.4% (62.1 ± 0.23) of the body from the anterior end. Post-vulval uterine-sac not differentiated, 22.5-38.5 μ m (29.5 ± 4.2) in length, 1.5-2.4 times (1.9 ± 0.23) body width at vulva. Tail 60.7-82.2 μ m (73.7 ± 5.74) long, gradually reducing the width towards the terminus, terminal annule conical and bluntly pointed (Fig. 3E, F). Anus crescent-shaped posteriorly in ventral view (Fig. 3C, D).

Male. Not found.

TYPE MATERIAL. Holotype: Deposited in the Herbarium and Insect Museum of the National Institute of Agro-Environmental Sciences (NIAES), Tsukuba, Ibaraki, Japan. Paratypes: 25 females. Two paratype females will be distributed to the following each institute: Museum national d'Histoire naturelle, Laboratoire des Vers, Paris, France; USDA Nematode Collection, Beltsville, Maryland, U.S.A.; and the rest in NIAES.

TYPE LOCALITY AND HABITAT. Okinawa Branch of TARC, Ishigaki Is., Okinawa, Japan. Soil around the root of *Macroptilium atropurpureum* (purple bean or siratro).

DIAGNOSIS AND RELATIONSHIPS. *A. involutus* n. sp. is characterized with the dome-shaped head; slender, strongly curved and hook-like tail-shape; and conical and pointed tail terminus.

The present new species is most closely related to *A. africanus* DASSONVILLE & HEYNS, 1984²⁾ from South Africa by its same characteristics mentioned above, but it can be distinguished from the latter by the presence of basal thickenings of stylet (absent in the latter), longer tail (73.7 (60.7-82.2) μm vs. 52 (50-54) μm), smaller c-value (6.8 (6.1-7.9) vs. 10.5 (9.5-12.3)), more anteriorly located vulva ($V=62.1$ (60.5-63.4) vs. 64.5 (63-66)), and absence of male adults. *A. involutus* n. sp. also differs from *A. jacobii* HUSAIN & KHAN, 1967⁴⁾ from India in the larger body (498 (447-563) μm vs. 360-490 μm), presence of basal thickenings of stylet (absent in the latter), smaller c-value (9-12 in the latter), and more anteriorly located vulva ($V=65-71$ in the latter).

REMARKS. *A. involutus* n. sp. commonly occurred in the soil samples (clay rich soil) collected from root around the following leguminous plants but not from gramineous ones in the type locality: *Centrosema acutifolium*, *C. carpum*, *C. pubescens*, *Cicer arietinum* (chick pea), *Crotalaria spectabilis* (showy rattlepod), *C. sp.*, *Desmodium discolor* (horse marmalade), *D. heterophyllum* (desmodium), *Glycine wightii* (perennial soybean), *Macrotylona uniflorum* (poor man's pulse), *Medicago sativa* (alfalfa), *Notania sp.*, and *Stylosanthes gracilis* (= *S. guianensis*: Brazilian lucerne).

The present new species is distinct and easily recognizable among soil nematodes by its rounded and prominent (aphelenchid type) median esophageal bulb, slightly posterior to the median body of vulval opening ($V=60.5-63.4$), and slender but not filiform tail with bluntly pointed terminus (Fig. 1A, 2A). *A. involutus* n. sp. has unique feature of general appearance and tail shape in the genus, and rather resembles *Tylenchus* (s. str.) spp. at a glance. Shape and length of tail, and number of their terminal mucrones in *Aphelenchoides* vary by species over a wide range^{2, 7)}. *A. involutus* n. sp. has the longest and the most slender tail in the genus, and has not any mucrones at its posterior terminus like other species bearing the similar shape of tails.

The slender tail also resembles those of *Aprutides* spp. The tail termini of two known species of this genus indicate clavate but not conical^{8, 9)}. This genus now belongs to family Seinuridae⁷⁾, and face view of *Seinura* is unlike those of *Aphelenchoides* spp.⁸⁾ and of the present new species (Fig. 2B). The face view of *A. involutus* n. sp. is typical to those of *Aphelenchoides* spp. as follows⁹⁾: labial disc fused and circular shaped; oral aperture rounded; and absence of distinct radial grooves emphasizing the individual lips.

In the suborder Aphelenchina, morphology of spicules and presence or absence of gubernaculum are important characters to discriminate the genera^{1, 6, 7)}, however, unfortunately any male adults of *A. involutus* n. sp. were not found in populations of this nematodes collected. Spermatheca of *A. involutus* n. sp. is not clearly confirmed, and this species seems to be parthenogenetic.

I am grateful to Dr. H. NAKANO, Okinawa Branch of TARC, who permitted me to examine his fields, and also to Ms. E. YAMAMOTO, TARC in Tsukuba and Mr. N. TONOSHIRO, Okinawa Branch of TARC, who assisted me to collect soil samples.

REFERENCES

- 1) BAUJARAD, P. (1988) Identification of aphelenchids. In: *Nematode Identification and Expert System Technology*. (FORTUNER, R, ed.), Plenum Pr., New York, 153-156.
- 2) DASSONVILLE, A. F. & HEYNS, J. (1984) Freshwater nematodes from South Africa. 7. New and known species collected in Skinnerspruit, Pretoria. *Phytophylactica* **16**, 15-32.
- 3) HOOPER, D. J. & CLARK, S. A. (1980) Scanning electron micrographs of the head region of some species of Aphelenchoidea (Aphelenchina: Nematoda). *Nematologica* **26**, 47-56.
- 4) HUSAIN, S. I. & KHAN, A. M. (1967) On the status of the genera of the superfamily Aphelenchoidea (FUCHS, 1937) THORNE, 1949 with the descriptions of six new species of nematodes from India. *Proc. helminthol. Soc. Wash.* **34**, 167-174.
- 5) MINAGAWA, N. (1979) Efficiencies of two methods for extracting nematodes from soil. *Appl. Ent. Zool.* **14**, 469-477.
- 6) NICKLE, W. R. (1970) A taxonomic review of the genera of the Aphelenchoidea (FUCHS, 1937) THORNE, 1949 (Nematoda: Tylenchida). *J. Nematol.* **2**, 375-392.
- 7) NICKLE, W. R. & HOOPER, D. J. (1991) The Aphelenchina: Bud, leaf, and insect nematodes. In: *Manual of Agricultural Nematology* (NICKLE, W. R., ed.), Marcel Dekker, Inc., New York, 465-507.
- 8) SCOGNAMIGLIO, A. (1974) *Aprutides guidettii* n. sp. (Nematoda: Aphelenchoididae). *Boll. Lab. Ent. agr. Filippo Silvestri* **31**, 17-21.
- 9) SCOGNAMIGLIO, A., TALAME, M. & S'JACOB, J. J. (1970) *Aprutides martuccii* (Nematoda: Aphelenchoididae) n. g., -n. sp. *Boll. Lab. Ent. agr. Filippo Silvestri* **20**, 3-11.

Accepted for publication: July 3, 1992.

和文摘要

石垣島から発見された *Aphelenchoides involutus* n. sp.
(Tylenchida目: Aphelenchoididae 科) の記載

皆川 望

Aphelenchoididae 科に属する未記載の線虫を沖縄県石垣市の農林水産省熱帯農業研究センター沖縄支所のシラトロ (マメ科) の根辺土壌から検出した。本種を *Aphelenchoides involutus* n. sp. と命名して記載するとともに、口唇部、頭部、尾部等外部形態の走査型電子顕微鏡 (SEM) 写真及び内部形態のスケッチを示した。本種は、*Aphelenchoides* 属の既知種の中で、最も尾が長く、また、細い特徴を有し、尾端に刺状の付属物はないが、三角形に尖る等本属でも特異な形態を持つ種である。SEM で見た口唇部の形態は、既に報告されている *Aphelenchoides* 属数種のもと類似のパターンを示した。この種は、雌成虫の全形及び尾部の形態から、南アフリカから報告された *A. africanus* DASSONVILLE & HEYNS, 1984 及びインドから報告された *A. jacobi* HUSAIN & KHAN, 1967 に似るが、これらとは、口針基部に小さな節球のような膨らみをもつこと、尾部は長くて c 値が小さいこと、陰門が体のより前方に位置すること、また、雄成虫を欠くことから区別される。