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農 学 彙 報

第 26 号

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On a new species of Shoot gall Nematode
(*Tylenchidae: Anguina*) found from the
galls on the leaves of Moxa
(*Artemisia saiatica* NAKAI)

Tamio YOKOO *

and

Young Euion CHOI **

In December, 1966 Mr. Young Euion Choi sent some nematodes collected from the galls on the leaves of Moxa (*Artemisia saiatica* NAKAI) requesting my identification of these nematodes. But I could not investigate on these nematodes in these days on account of the incomplete samples and the school troubles in our university. In 1967 Mr. Young Euion Choi sent again some complete samples.

This paper reports the results of investigations on these nematodes sent by Mr. Choi.

Anguina moxae sp. nov. (Fig. 2.)

Descriptions:

Female: Body coils ventrally and in some specimens curves slightly dorsally behind vulva. Cuticle with very fine transverse striae. Lateral field as plain band with 4 minute incisures. Head narrow, flattish and offset hardly from the body. Spear about $10\ \mu$ with small basal knobs. Median oesophageal bulb ovate or rounded with crescentic valve. Hemizonid locates on the halfway of large posterior oesophageal bulb. Isthmus not so long, enlarging gradually to posterior oesophageal bulb. Nerve ring around Isthmus on anterior end of posterior bulb. Excretory pore locates near the end of terminal posterior bulb. Vulva, a wide transversely depressed slit with elevated lip locates at about 90% of body length. Ovary prodelphic, anterior ovary reaching about almost to the end of posterior oesophageal bulb, reflexed one or two times.

* Laboratory of Plant Protection, Agricultural Faculty, Saga University, Saga, Japan.

** Department of Horticulture, Agricultural College, Kyungpook, National University, Taegu, Korea.

Postuterine sac present, about half of the corresponding body width long.

Tail tapering with sharply pointed tip.

Male: Body curves ventrally or dorsally in the posterior part of body. Isthmus short. Hemizonid present. Deirids can be seen on the level of spear base. Testis single outstretched, reaching to near the end of posterior oesophageal bulb, reflexed one time in the terminal part. Gubernaculum simple, trough-like, about 10μ long. Tail tapering with a sharply pointed tip. Spicula paired, amalgamate in the posterior part, about 40μ long. Bursa originating anterior to spicules, reaching to the tail tip. Tail conical, with pointed tip.

2nd stage larva: Body very finely transversely annulated and curves slightly ventrally. Head flattish in front.

Spear about 10μ long. Dorsal oesophageal gland opens at about 2.5μ behind the spear knobs. Median oesophageal bulb ovate or rounded with crescentic valve. Isthmus comparatively long. Nerve ring crosses isthmus on approximately halfway along its length. Excretory pore locates near the anterior end of terminal bulb. Tail tapering slightly. Terminal part of tail conical without transverse striations. Sexual rudiment locates at about 60 % of total body length ventrally.

Dimensions:

Female (n=13): L=1.400 mm (1.260-1.510mm); a=20.8(17.5-25.2); b=9.7 (8.1-11.2); b'=23.1(20.0-27.1); c=25.6(22.0-32.0); e=12.2(10.4-14.4); v(%)=89.9%(88.0-91.2%); spear 10.8μ (10.0-12.5 μ)

Holotype Female: L=1.420mm; a=20.3; b=10.4; b'=20.3; c=23.7; e=10.7; V(%)=88.2; spear 10.0μ

Male(n=10): L=1.281mm (1.180-1.380mm); a=26.6(21.7-28.8); b=8.6(7.6-9.3); b'=22.3(19.1-26.0); c=19.3(16.4-21.7); e=11.7 (8.2-13.4); T(%)47.7(44.6-50.8); spear 10.3μ (10.0-12.5)

Allotype Male: L=1.290mm; a=27.2; b=8.1; b'=19.1; c=20.6; e=11.7; spear 10.0μ

2nd stage Larva; L=0.83mm(0.78-0.86mm); a=36.4(32.9-38.2); b=6.2 (5.7-6.8); b'=16.9(16.1-17.9); c=14.1(12.3-15.5); e 111.7 μ (100.0-117.5) from head end; Sexual rudiment 56.7-63.7% from head end

** b' . . . Body length / Centre of medianoesophageal bulb from head end

e . . . Body length / Excretory pore from head end

Relationships:

This species is comparatively small type of the genus *Anguina*. Body length is about 1.2-1.5 mm long. Referring to the body length this species is similar to the known species such as *Anguina tumefaciens* (COBB, 1932) FILIPJEV and SCHUUR. Stekh, 1941 and *Anguina spermophaga* STEINER, 1937, as shown in the following table.

Female:	L mm	a	b	c
<i>Anguina tumefaciens</i>	1.400	22.2	?	26.8 *
<i>Anguina spermophaga</i>	1.700-1.800	35.8-37.6	8.9-10.0	33-35

<i>Anguina sp. nov.</i>	1.400	20.8	9.7	25.6
	(1.260-1.510)	(17.5-25.2)	(8.1-11.2)	(22-32)

	V (%)	spear (μ)
<i>Anguina tumefaciens</i>	88.0 *	11.2 *
<i>Anguina spermophaga</i>	88-91	?
<i>Anguina sp. nov.</i>	89.9	10.0
	(88.0-91.2)	

Male :	L mm	a	b	c
<i>Anguina tumefaciens</i>	1.200	31.2 *	?	16.7 *
<i>Anguina spermophaga</i>	1.300-1.400	31-35	8-9	21.6-24.0
<i>Anguina sp. nov.</i>	1.281	26.6	8.9	19.3
	(1.180-1.380)	(21.7-28.8)	(7.6-9.3)	(16.4-21.7)

	T (%)	spear (μ)
<i>Anguina tumefaciens</i>	?	13.3 *
<i>Anguina spermophaga</i>	?	?
<i>Anguina sp. nov.</i>	47.7	10.0
	(44.6-50.8)	

* Data culculated by Yokoo from Cobb's formula described by Filipjev and Schuur. Stekh. (1941)

Details of body of *Anguina tumefaciens* and *Anguina spermophaga* are shown in Fig. 1.

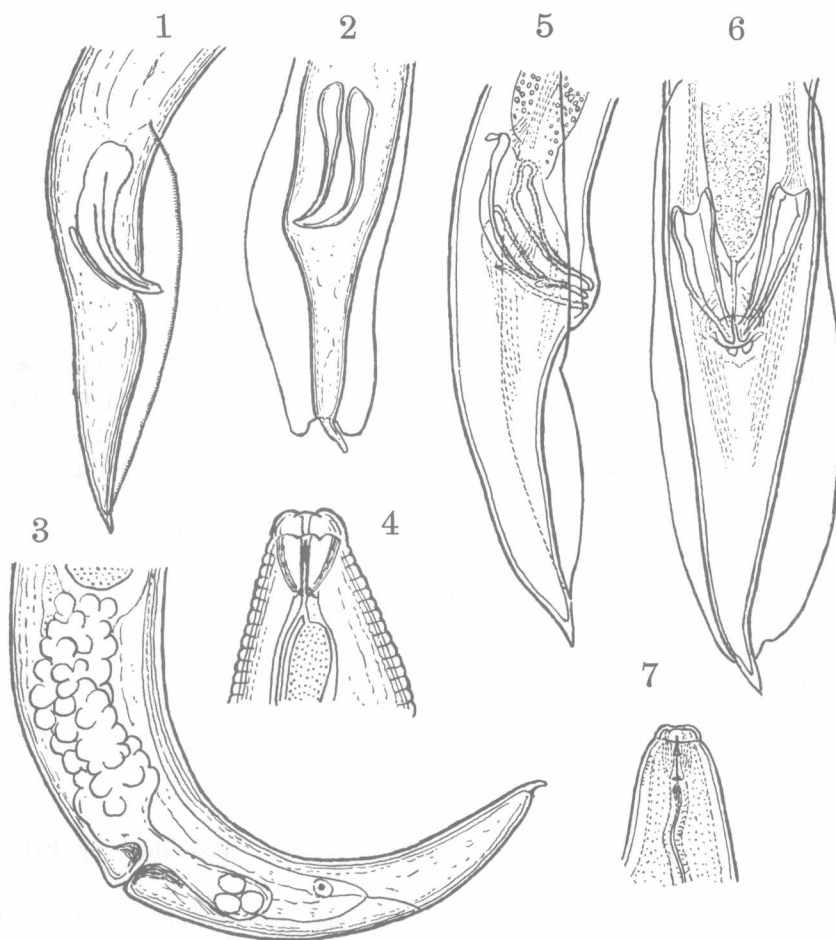


Fig.1

Anguina spermophaga (after STEINER)

1. posterior part of body(male)(lateral)
2. " (subventral)
3. posterior part of body(female)(lateral)
4. anterior part of body

Anguina tumefaciens (after FILIPJEV & SCHUUR, STEKH.)

5. posterior part of body(male)(lateral)
6. " (ventral)
7. anterior part of body

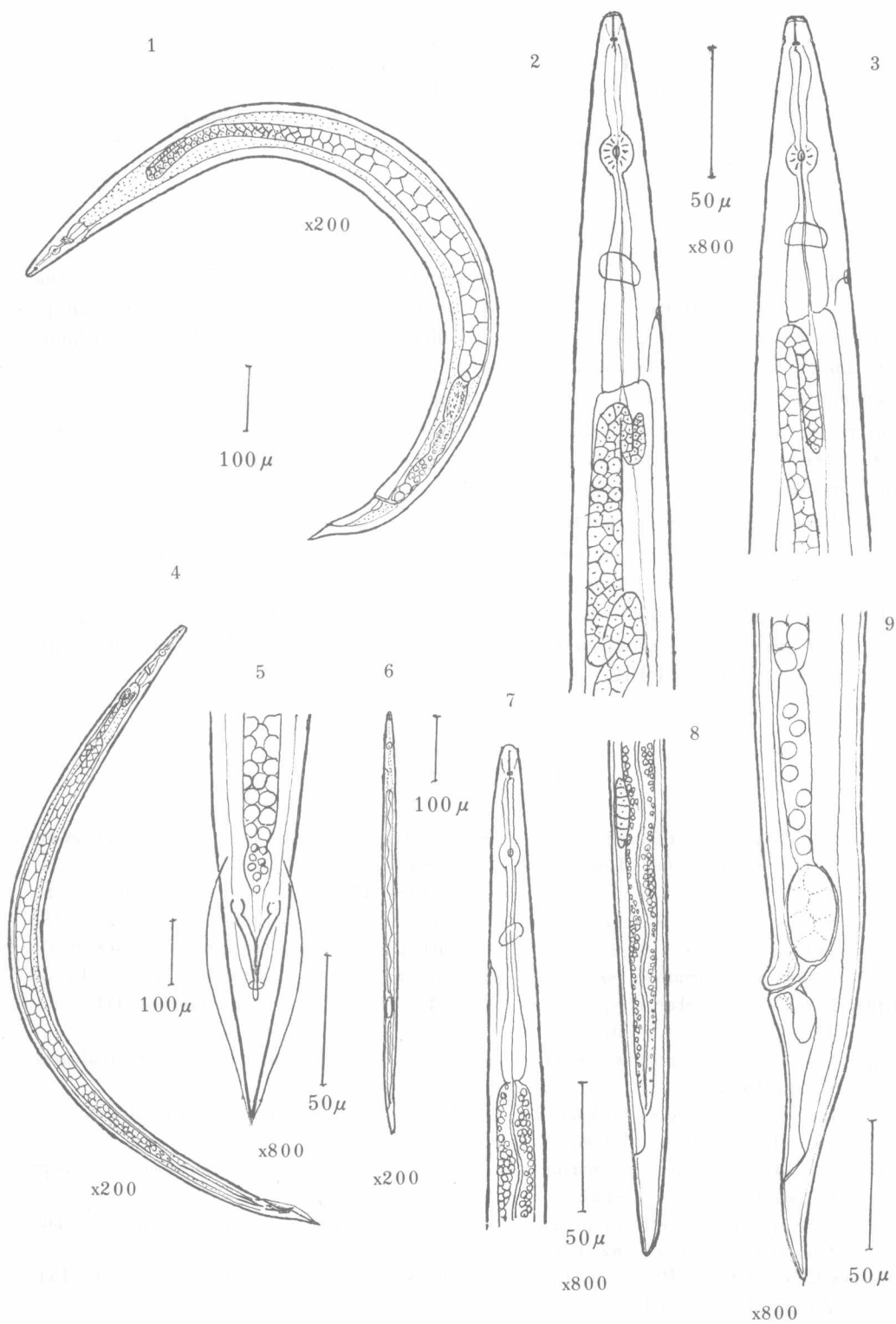


Fig. 2.

Anguina moxae sp. nov.

- | | |
|---------------------------------|----------------------------------|
| 1. Female Adult(Lateral) | 6. 2nd stage Larva |
| 2. Anterior part of Female Body | 7. Anterior part of Larval Body |
| 3. Anterior part of Male Body | 8. Posterior part of Larval Body |
| 4. Male Adult(Lateral) | 9. Posterior part of Female Body |
| 5. Posterior part of Male Body | (Lateral) |
| (Ventral) | |

(T. YOKOO & Y. E. CHOI, 1968)

Discussing from the above mentioned table and Figures 1-2, Head of *Anguina* sp. nov. is comparatively narrow, flattish and offset hardly from body, but in other species with rounded side or cap-like shaped, and distinctly offset from body. Body appears to be more stout (a value is smaller). Spear length is shorter. Gubernaculum length is about $1/4$ of spicula length, but it is about $1/2$ (in *Anguina spermophaga*) or $1/3$ (in *Anguina tumefaciens*). Bursa ends shortly in the front of tail tip, but in this new species reaches to the tip. Spicula length is comparatively longer (about $40\ \mu$: $30\ \mu$ in *Anguina tumefaciens*; ? in *A. spermophaga*). Length of posterior uterine sac is about $1/2$ of vulval body width, but it is equal in *A. spermophaga* or not clear described in *A. tumefaciens*.

In general this new species is closely related to *Anguina tumefaciens* (COBB, 1932) FILIPJEV and SCHUUR. STEKH., 1941, giving rise to tinny galls tumors on *Cyanodon transvaaliensis* (Bradley grass), found at Transvaal in South Africa by N. A. COBB in 1932.

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Nematological studies on the Yellow Patch of Green grass of the Golf Link

II. On the Nemic-fauna in the green grass of International Golf Link of Isahaya, Nagasaki Prefecture, with descriptions on New species of *Neotylenchus* (Nematoda: Neotylenchidae)

Tamio YOKOO

Laboratory of Plant Protection
Faculty of Agriculture
Saga University

Introduction

The "Yellow Patch" of the green grass in the Golf Links in Japan has been considered to be originated from the parasitism of *Fusarium* or the damages of the cutworms. But in recent years the opinion that yellow patch is not always originated from these causes known hitherto, but another causes appear to be connected is supported. From these standpoint I hit on the idea that the yellow patch may be caused by plant parasitic nematodes partly. In 1963 I reported the results of investigations on the nemic fauna in the green grass of Golf Links of the "B. S. Golf Link", near Tosu-City, Saga Prefecture. And I found the fact that from the soils at where yellow patch occurred the stubby root nematode *Trichodorus mirzai* SIDDIGUI, 1960), Ring Nematode (*Criconemoides sagaensis* YOKOO, 1964), and Root lesion Nematode (*Pratylenchus penetrans* (COBB, 1917) Chitwood and OTEIFA, 1952) were detected in abundance (1.2.3).

In 1967 I also reported another results of investigations on the soils collected from Keya-Golf Link, Itoshima, Fukuoka Prefecture showing that about 24% of all detected nematodes belonged to the plant parasitic nematodes, and of all plant parasitic nematodes *Ditylenchus* sp. occupied 44%, *Aphelenchoides* sp. 32%, and *Tylenchus* sp. 24% respectively. (4)

In June, 1967, I collected soils from the yellow patched green grass of the International Golf Link, Isahaya, Nagasaki Prefecture, and investigated on the nemic fauna.

This paper reports the results of this investigations and descriptions on a new species of *Neotylenchus* (Nematoda: Neotylenchidae) found from the soils at where the yellow patch occurred.

Method of Investigation

Date of Soil Collection : 26th, June, 1967

Method of Collection : By Holecutter; about 15 cm soil depth (Fig.1)

Method of isolation of

nematodes from soils : Baermanns' Funnel Method; 24hr. 25 °C.

Results of Investigations

I. Nemic Fauna

(1) In Soils around the roots of turf

The nemic fauna of soils at where the yellow pellow patch were recognized as follows:

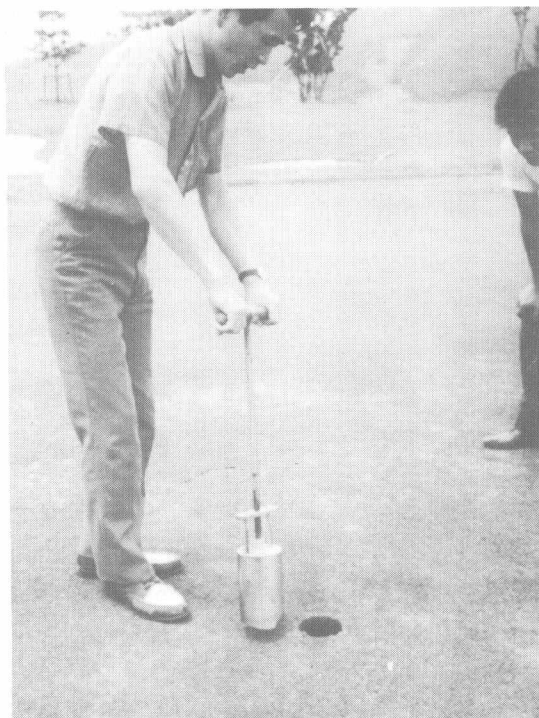
Table 1.

Green No. & Sample No.	3		6		8	
	(1)	(2)	(1)	(2)	(1)	(2)
Nemas						
* Plant parasitic						
<i>Aphelenchus avenae</i>	2	0	0	0	0	0
<i>Aphelenchoides sp.</i>	1	0	0	0	0	1
<i>Helicotylenchus sp.</i>	2	0	1	0	0	0
<i>Neotylenchus sp.</i>	0	1	21	6	13	6
Total	5	1	22	6	13	7
%	33.3	7.0	31.9	9.0	38.2	12.5
* Free living						
<i>Cephalobus sp.</i>	9	13	43	60	6	13
<i>Rhabditis sp.</i>	0	0	2	0	8	2
<i>Dorylaimus spp.</i>	1	0	0	0	4	27
<i>Monhystera sp.</i>	0	0	2	1	0	0
<i>Plectus sp.</i>	0	0	0	0	0	6
Total	10	13	47	61	18	48
%	66.7	93.0	68.1	91.0	53.0	85.7
* Predaceous						
<i>Granonchulus sp. sp.</i>	0	0	0	0	2	0
<i>Mononchus sp.</i>	0	0	0	0	1	1
Total	0	0	0	0	3	1
%	0	0	0	0	8.8	1.8
Total	15	14	69	67	34	56
Turf Conditions **	I	IV	III	III	II	IV
** I : somewhat yellowish III : partly withered						
II : somewhat withated IV : almostly withered						

Summarized from the above table 1, nemic faunas according to the turf conditions were follows:

Fig. 1

(1)



Collection of Soils by Hole-Cutter

(2)



Green grass of Golf Link
(Isahaya, Nagasaki Pref.)

Table 2.

Turf Conditions	Plant parasitic	Free-living	Predaceous
I	33.3 %	66.7 %	0 %
II	38.2	53.0	8.8
III	20.5	79.5	0
IV	9.8	89.3	0.9

Generally speaking, with the progress of withering of turf the percentage of Plant parasitic nematodes seems to decrease, and that of Free-living nematodes to increase.

Neotylenchus sp. was most numerous at places of Class II or III of turf condition, and scanty at places of Class I or IV. of the free-living nematodes detected *Cephalobus sp.* was dominant species.

(2) In Roots of Turf

After the removing the soils around the roots of turf, I washed the roots of turf, and cut the roots into small pieces and immersed these finely cut rootlets in water in petri dish. After one-week immersion the nematodes isolated from these rootlets were sucked up by glass squirt and identified by microscope. The result of this investigation was as follows :

Table 3.

Green No.	3		6		8	
Sample No.	(1)	(2)	(1)	(2)	(1)	(2)
<i>Neotylenchus sp.</i>	1	0	5	1	1	1
<i>Cephalobus sp.</i>	18	38	64	7	7	11
<i>Dorylaimus spp.</i> 0	0	0	4	0	0	0
<i>Mononchus sp.</i>	1	0	0	0	0	0
Total	20	38	73	8	8	12
Turf Conditions	I	IV	III	III	II	IV

As shown in Table 3 four species of nematode were detected, but these species are mainly saprophagous or carnivorous except *Neotylenchus sp.*, and these species seem to be secondary invaders.

In order to confirm the parasitism of *Neotylenchus sp.* I investigated by another method, that is, Goodey's Dyeing method the leaves of turf, but I could not recognize the parasitism of *Neotylenchus sp.*

II. More important Species detected from Soil around the roots of yellow-patched green grass

(1) *Neotylenchus turfus* sp. nov.

Cuticle finely striated. Lateral field with 4 incisures. Body tapering a little anteriorly and considerably behind anus to tail. Tail of both sex conoid, tapering to a sharply pointed tip. Head, a low flattish disk without annules. Basal knobs of spear are unequal. Corpus of oesophagus is cylindrical without distinct median bulb. Isthmus long and slender. Posterior part of oesophagus rather lobed, slightly overlapping the junction of oesophagus and intestine dorsally. Nerve ring crosses at anterior part of oesophageal posterior lobed part. Excretory pore situates behind nerve ring. Opening of dorsal oesophageal glands locates comparatively posteriorly behind basal knobs of spear; distance about $3/5$ length of spear.

Female: (Fig. 2)

Vulva very posteriorly placed. Gonad prodelphic. Posterior gonad degenerates to a post-vulval sac. length about 1.5 times of vulval body width. Vulva with slightly protuberant lip. Anterior gonad with cylindrically elongated spermatheca. Vulva transverse slit, about $1/2$ of vulval body width. Vagina almost at right angles to body wall.

Male (Fig. 2)

Spicula tylenchoid; arcuate, slightly cephalated, about 19μ long. Gubernaculum thin and trough-like, about 9μ long. Bursa arising anteriorly to Spicules reaching to tail tip.

Dimensions:

Female (n=20): L=0.800 mm (0.87-0.70 mm); a=42.5 (21.2-50.5); b=6.2 (4.5-8.5); b'=14.6 (9.9-19.5); c=13.2 (8.8-16.0); e=7.9 (7.1-9.5); V=80.5% (71.5-84.8%); Gi=43.6% (32.2-57.7%); postvulval sac (G2)=4.8% (3.1-6.9%); spear=7.5 μ

Holotype Female: L=0.83 mm; a=41.5; b'=16.6; c=13.8; e=8.3; V=82.0%; Gi=46.0%; G2=6.0%; spear=7.5 μ

Male (n=7): L=0.727 mm (0.65-0.82 mm); a=34.2 (25.6-43.3); b=5.6 (4.6-6.6); b'=15.3 (13.2-18.2); c=12.3 (11.0-13.6); e=7.0 (6.1-7.5); T(%)=49.3% (37.0-59.9%); spear=7.5 μ ; Spicula=18.6 μ ; Gubernaculum 8.6 μ

Allotype Male: L=0.730 mm; a=36.5; b=6.7; b'=14.6; c=12.2; e=7.3; T(%)=52.0; Spicula=7.5 μ ; Gubernaculum=7.5 μ ; spear=7.5 μ

Relationships:

Body is very slender (a=30-40). Body length is closely related to that of *N. abulbosus*, *A. acutus*, *N. beligavae*, *N. latus*, *N. obesus*, and *N. linfordi*. But discussing from b-value, only *N. beligaevae*, *N. obesus*, and *N. latus* are closely related to this species. And males of *N. beligaevae*, *N. obesus*, and *N. acutus* are not known.