

*Zoology*

## New Species of Nematode of *Dolichorhabditis dux* sp. n. (Nematoda: Rhabditidae) from *Cerambyx dux*

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**ABSTRACT.** *Dolichorhabditis dux* sp. n., ectoparasitic on *Cerambyx dux*, is described and illustrated from Georgia. Descriptions of females, males and dauer juveniles are provided. The new species is closely related morphologically to *Dolichorhabditis dolichura*. © 2010 Bull. Georg. Natl. Acad. Sci.

**Key words:** *Dolichorhabditis dux* sp. n., *Cerambyx dux*, dauer juvenile, hermaphroditically.

**Introduction.** Many species belonging to the genus *Dolichorhabditis* are ectoparasites of insects [1,2]. Nematodes of this type can reduce the genus reproductive capabilities of the host-insect, or cause morbidity and death [3]. The genus *Dolichorhabditis* is recorded for the first time from Georgia. Investigation of insects collected in Imereti Region in 2007 revealed a new species, which is described here.

**Materials and methods.** *Dolichorhabditis dux* sp. n. was recovered on *Cerambyx dux* in the village of Ilemi (Zestaponi district, Western Georgia). *Cerambyx dux* and its larvae were collected from old stumps of apple and pear trees. To study the nematofauna, 35 imago and 62 larvae were dissected. Nematode juveniles were located under the elytra and between the larval segments. The percentage of infestation reached 12% on adult beetles and 18% on larvae. The rate of infestation varied from 3 to 45 specimens per beetle with a maximum of 72. Only juvenile nematodes occurred on the beetle adults and larvae.

In order to get mature female and male of the new species larval forms were reproduced on hemolymph and adipose tissue of (*Galleria mellonella*) worms according to White's rule [4].

Measurements are given in microns. Dissection of the insect, fixation of nematodes, preparing of preparations and identification of nematodes were carried out according to international rules [5-7].

**Results.** Diagnosis of Peloderinae: Genus-*Dolichorhabditis* Andrassy, 1983

Body length varies from 0.3 mm to 1.1 mm. Head slightly offset. Lips slightly separated by comparatively long bristle- papillae. Amphids are very small and located on lateral lips. Stoma 1.2 to 2 times as long as its diameter. Cheilostoma is not cuticularized. Promesostoma is well developed. It has parallel walls. Thickenings of mesostom are equal; each swelling has bristle-like denticles. Oesophageal collar is distinct. Oesophagus corpus is cylindrical or slightly swollen as a rule. Gonads of female are pair. Vulva is in the centre of the body. Spicules separated. Bursa is peloderan, wide open, distally rounded. Genital papillae are always of nine pairs (3 pair pre anal, but post anal pairs make two groups). Tail of female is conic, male's tail is also conic but shorter.

Description of *Dolichorhabditis dux* sp. n. (Fig. 1)

For measurements and ratios see Table 1.

**F e m a l e:** Body cylindrical, with smooth surface (Fig. 1. A). Lips have thin papillae (Fig. 1. H). They are

Table 1.

Dolichorhabditis dux n. sp. (paratype)			
Character	Female	Male	Dauer juvenile
n	8	12	7
Length	980 (860-1100)	640 (520-720)	507 (380-620)
Width	63 (53-68)	36 (30-41)	23 (15-30)
Stoma length	15	14 (13-15)	15
Stoma width	3	3	3 (2-3)
Head-excretory pore	147 (133-159)	117 (110-125)	99 (83-114)
Head-nerve ring	116 (114-121)	92 (83-102)	90 (83-95)
Head-base oesophagus	160 (152-167)	127 (121-136)	128 (114-144)
Tail length	101 (95-106)	27 (22-30)	70 (49-79)
Anal diameter	27 (26-34)	19 (15-26)	-
Rectum length	51 (47-53)	-	-
Hyaline past of tail	-	-	35 (30-41)
Head-Vulva	481 (399-532)	-	-
Spicule length	-	26 (22-30)	-
Spicule width	-	3.8 (3-4)	-
Gubernaculum length	-	8	-
a	15.5 (14.6-16.2)	17.6 (16.0-21.3)	21.7 (19.2-25.3)
b	5.8 (5.0-6.9)	5.0 (4.2-5.7)	3.9 (3.3-4.6)
c	9.6 (8.2-10.7)	23.7 (20.0-30.0)	7.2 (6.5-7.8)
Vulva (%)	49.0 (44.4-53.7)	-	-

closed, low and rounded. Stoma is rhabditoid, straight and anisotropic. Metastoma swellings are equipped with macro tubercles by two. Stoma is straight with thin walls. Stoma length is 5 times longer than its width. Half of the protostoma cylinder is bounded by oesophageal collar. Oesophagus corpus is cylindrical, slightly wide at the end. Cardial bulbus is elongated or sometimes of rounded shape. Its valvular apparatus is sclerotized. Gonads are long and didelphic. Tail is long and conical shaped; bent at the dorsal side. It gradually tapers and changes into short thread-like terminus (Fig. 1. C). Tail is about 4 times as long as anal diameter, but that of rectum 2 times.

**Male:** Male is equipped with peloderan bright burs (Fig. 1. F). It has nine pairs of papillae. Bursa papillae are located by scheme 1-1-1-3-3. Pre anal three pairs of papillae are represented by one and separated from each other at an equal distance. Tail terminus does not reach bursa membrane up to the end. Spicules paired, bent at the ventral side and are not aggregated. Their length varies from 22 to 30  $\mu\text{m}$ . Spicula head prolonged, end conical. Gubernaculum is narrow, straight and less cuticularized, 3 times smaller than spicula length.

**Development cycle.** Nematodes reproduce quickly, getting on the rotten body of the insect or in phoretic locus. Adult females of nematodes of the 1<sup>st</sup> generation are twice as long as mature forms of the 2<sup>nd</sup> generation. Mass exit of dauer juvenile from tissues is marked during the reduction of food on the substrate. Such larvae are characterized by "seeking" movement and by aggregation like small colonies (from 3 to 100

specimens). Larvae have the ability to fasten to the substrate with the tail and take the form of small colonies.

On the feeding area dauer juvenile of *D. dux* sp. n. reaches adult form at optimal temperature (24<sup>0</sup> C) during 5-6 days. 10-11 ova (of 51X34  $\mu\text{m}$  in size) always develop synchronously in the matrix of the mature form. Both ova and larvae formation takes place in the body of adult female, i.e. viviparity of larvae takes place. Both nematodes of the 1st and the 2nd generation reproduce

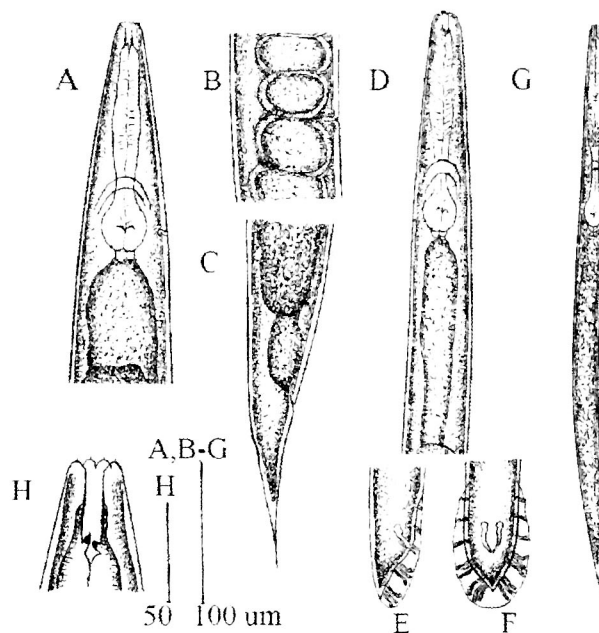


Fig. 1. *Dolichorhabditis dux* sp. n.

Female: A-anterior part of the body; B-vulva region; C-posterior part of the body; H-stoma region.

Male: D-anterior part of the body; E-tail laterally and F-ventrally; G-dauer juvenile.

hermaphroditically. Male specimens are rare in the second generation.

Larvae of 1-4 ages are stored in water from +1 to 10 °C for three months, but forms of dauer juvenile (2nd age) cultivated from the feeding area more than a year. When dauer juvenile of nematodes get into the body of the insect they do not cause their death.

**Differential diagnosis:** The described new species is closely related to *Dolichorhabditis dolichura* (Schneider, 1866) [8], by morphological and anatomic features, but differs from it by the following signs: Has closed, low and rounded lips. *D. dolichura* has isotropic stoma, macro tubercle absent in metastom, Stoma of *D. dux* sp. n. is anisotropic and has two macro tubercles in stoma. Bursa papillae of *D. dux* sp. n. are located by scheme: 1-1-1- -3-3, but of *D. dolichura*: 3- - 3-3.

#### Determinant of species of the genus *Dolichorhabditis* [8].

1. Rectum of the female is unusually long. About 3 times as long as anal body diameter.

Female: L=700-1100 µm; a=14-20; b=5.3-8.6; c=8-11; V=49-55 %;

Male: L=500-900 µm; a=16-22; b=4.5-5.8; c=19-30;

Bursa papillae of male are located in the following way 3-----3-----3.

Revealed in Germany, Czechoslovakia, Hungary, Poland, Bulgaria, Italy, Russia, Kazakhstan, Uzbekistan, Sri Lanka, Egypt, Algeria, USA, New Zealand. Was found in the soil, decayed plant material and in crumbs.

.....*dolichura* (Schneider, 1866) [8];

– The rectum of females is not very long.....2

2. Tail of the female is 6 times as big as anal diameter. Very small species.

Female: L=300-460 µm; a=17-24; b=3.9-4.6; c=3.5-7.0; V=45-56 %;

Revealed in Germany, Switzerland, Bulgaria, Corsica, Russia, New Zealand. Was found in the soil especially in crumbs.

Male unknown.....*rara* (Korner in Osche, 1952) [8];

– Tail of female 2-3 times as big as anal diameter.....3

3. Tail of females is 3 times as big as anal diameter.

Length of its body-430-700 µm;

a=17-20; b=3.6-4.2; c=9-12; V=50-53 %;

Revealed in Czechoslovakia and Russia, was found in the soil sphagnum.

Male unknown.....*carpatica* (Soos, 1941) [8];

– Body of male is longer. Males are known.....4

4. Collar takes 2/3 part of the stoma length. Length of spicule of male is 29 µm. Length of gubernaculum is 14 µm. Tail sharply narrows after the anal pore, labial papillae are minute.

Female: L=750 µm; a=21; b=6.4; c=10; V=51 %;

Male: L=530 µm; a=19; b=4.7; c=24;

Revealed in Germany, Austria, Russia, Uzbekistan and Lithuania, was found in bedding and under the bark.....

.....*debilicauda* (Fuchs, 1973) [8];

5. Collar takes 1/2 part of the stoma length. Length of the male's spicule varies (22-30 µm). Length of gubernaculum-8 µm. Tail gradually narrows after anal pore, labial papillae are well developed.

Female: L=860-1100 µm; a=14-16; b=5.0-6.9; c=8-10; V=44-53 %;

Male: L=500-700 µm; a=16-21; b=4.2-5.7; c=20-30;

Revealed in Georgia (village of Ilemi, Zestaponi district) in the fruit garden; are found under *Cerambyx dux* elitra and in their crumbs.

.....*dux* sp. n.

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## ზოოლოგია

# ნემატოდის ახალი სახეობა *Dolichorhabditis dux sp. n.* (Nematoda: Rhabditidae) ნაყოფის დიდი ხარაბუზადან (*Cerambyx dux*)

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(წარმოდგენილია აკადემიის წევრის ი. ელიაშვილის მიერ)

აღწერილია ნაყოფის დიდი ხარაბუზის (*Cerambyx dux*) ნემატოდის ახალი სახეობა *Dolichorhabditis dux sp. n.* მოცემულია მდედრის, მამრისა და ინგუზიური ლარვების სრული განაზომები. სახეობისათვის დამახასიათებელია დახურული, დაბალი და მომრგვალებული ტუჩები, ანიზოტროპული სტომა. მეტასტომაში აქვს ორ-ორი მაკრო ტუბერკული. მამრის ბურსალური პაპილები განლაგებულია სქემით 1-1-1—3-3. აღწერილი ნემატოდა მორფოლოგიური და ანატომიური ნიშნებით ყველაზე ახლოს დგას *Dolichorhabditis dolichura*-ს სახეობასთან.

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