


Two New Nematode Species for Turkey Helmint Fauna in Roe Deer (*Capreolus capreolus*), *Spiculoptera spiculoptera* (Guschanskaia, 1931) and Minor Morph S. (*Rinadia*) *mathevossiani* (Ruchliadev, 1948) [1]

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Summary

Severe injury or dead six roe deer (*Capreolus capreolus*) which were brought to the clinics of the Faculty of Veterinary Medicine of Ondokuz Mayıs University by Provincial Directorate of Environment and Forest were examined for parasitological at 2007 to 2010. All roe deer were found infected with different gastro intestinal nematodes. Identified 17 nematode species are the first report in roe deer, and also *Spiculoptera spiculoptera* and its dimorphic species S. (*Rinadia*) *mathevossiani* are the first record in Turkey.

Keywords: Nematode, *Spiculoptera spiculoptera*, S. (*Rinadia*) *mathevossiani*, Roe deer, *Capreolus capreolus*, Turkey

Türkiye Faunası İçin Karacalarda İki Yeni Nematod Türü: *Spiculoptera spiculoptera* (Guschanskaia, 1931) ve Küçük Varyetesi S. (*Rinadia*) *mathevossiani* (Ruchliadev, 1948)

Özet

İl Çevre ve Orman Müdürlüğü tarafından fakültemiz kliniklerine ağır yaralı olarak 2007 - 2010 tarihleri arasında getirilip ölen altı karaca ölüm sonrası parazitolojik olarak incelenmiştir. Tüm karacalar mide bağırsak nematodları ile enfekte bulunmuş ve 17 nematod türü saptanmıştır. Bulunan nematodların tümü karacalar için Türkiye'de ilk kayıttır. Bu türlerden *Spiculoptera spiculoptera* ve bunun küçük varyetesi S. (*Rinadia*) *mathevossiani* Türkiye'den ilk kez bildirilmektedir.

Anahtar sözcükler: Nematod, *Spiculoptera spiculoptera*, S. (*Rinadia*) *mathevossiani*, Karaca, *Capreolus capreolus*, Türkiye

INTRODUCTION

The roe deer (*Capreolus capreolus*) is distributed the greater part of Europe and Asia Minor. In Turkey, they occur in the forests of Mount Ida and Black Sea Cost from Kocaeli to the Georgian border. The wild roe deer population is increasing due to public awareness and also nature conservation methods in recent years in Turkey.

There is no paper about helminth of roe deer and also *Spiculoptera* species was not previously reported in Turkey ¹. This paper describes the morphology of the

Spiculoptera spiculoptera and S. *mathevossiani* recovered from the abomasa of *Capreolus capreolus*, including their measurement, studied by light microscopy.

MATERIAL and METHODS

Necropsies and the parasitological examinations of the six roe deer died by severe injuries were performed in Samsun, Turkey between August 2007 and July 2010. After



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the macroscopic inspection of the abdominal and thoracic cavities; lungs, livers and digestive systems of roe deer were examined separately. The digestive system contents were first filtered through 150 µm sieve and then examined using a stereo microscope. Every nematode recovered from the contents was cleaned with physiologic saline and fixed in hot 70% alcohol. Nematodes were prepared as temporary whole mounts cleared in phenol - alcohol (80 parts melted phenol crystals and 20 parts absolute ethanol) and examined and measured with a microscope (Eclipse 80i, Nikon Corporation) connected to a digital camera with a liquid crystal display and a measurement specific software (Nikon Digital Sight1 DS-L1). Identification of *Spiculoptera* nematodes examined in our material corresponds morphologically to descriptions by the different literatures²⁻⁹. After examination, specimens were preserved in ethanol-glycerine-formalin protective solution (92 part 70% ethanol, 5 part glycerine, and 3 part commercially available formalin). Used all measurements are in millimeters.

RESULTS

All of the roe deer examined were found to be infected with various nematode species. Results concerning the prevalence and range of intensity of gastrointestinal nematodes in infected animals are presented in the *Table 1*. Except of *S. spiculoptera* and *S. mathevossiani* all nematodes were previously reported in Turkey. Four animals were infected with *S. spiculoptera* and average worm burden was 75.5 (9-175). Only one animal was infected *S. mathevossiani*. Labelled specimens were

deposited in the Helminth Coll. No. 2010-5-6 Department of Parasitology, Faculty of Veterinary Medicine, Samsun, Turkey.

Description of the *Spiculoptera spiculoptera* (Guschanskaia, 1931) (Fig.1)

They are small and thin nematodes. Body length 6.5-7.4 (average 6.8) mm, width at the level of prebursal papillae 0.101-0.120 (av. 0.111) mm. Cuticle has longitudinal striation over the anterior body length except anterior end. The neck papillae and excretion pore is well defined (*Fig. 1-A*). Genital cone (proconus) is weakly developed typically. Dorsal rib is greatly reduced and bifurcates twice and each branch again is divided into two branches (*Fig. 2-B*) and also there is a style of half-ring chitinized structure in the between tips of dorsal ribs (*Fig. 2-B pointed*).

The spicules equal or close to equal, extend distal extremities which expand into fan-shaped appendages. The number and exit site of fringe-like structures is differs from each other (*Fig. 1-B,C*). There is a half moon-shaped structure appears on the ramification place of the spicules (*Fig. 1-B*). There is a chitinized structure between tips of dorsal ribs in the style of the belt (*Fig. 1-B, pointed*). Papilla 0 and papilla 7 are shown in the *Fig. 1-D*.

***S. (Rinadia) mathevossiani* Ruchliadev, 1948 (Fig.2)**

Description: They are small and thin nematodes. Body length is 6.6-7.9 (av. 7.4) mm and width at the level of prebursal papilla 0.106-0.131 (av.0.116) mm. Cuticle has longitudinal line pattern almost over the whole body except anterior end. Cuticle at the anterior portion, except

Table 1. The prevalence of gastrointestinal nematodes in roe deer

Tablo 1. Karacalarda bulunan mide-bağırsak nematodlarının dağılımı

Organ	Species	Number of Infected Animals	Range of Intensity Min. - Max. (Average)
Abomasum	<i>Ostertagia leptospicularis</i>	6	8-184 (84.2)
	<i>Haemonchus contortus</i>	3	2-9 (4.7)
	<i>Spiculoptera spiculoptera</i>	5	7-107 (53.4)
	<i>S. (Rinadia) mathevossiani</i>	1	12
	<i>Skrjabinagia kolchida</i>	5	1-45 (18)
	<i>Teladorsagia circumcincta</i>	3	6-78 (34)
	<i>Trichostrongylus axei</i>	5	3-52 (23.25)
Small intestine	<i>T. vitrinus</i>	3	3-14 (7)
	<i>T. longispicularis</i>	2	3-10 (6.5)
	<i>T. colubriformis</i>	1	8
	<i>Nematodirus filicollis</i>	5	1-90 (21.4)
	<i>Cooperia oncophora</i>	2	4-4 (4)
	<i>C. punctata</i>	1	1
	<i>Capillaria bovis</i>	2	1-2 (1.5)
Large intestine	<i>Chabertia ovina</i>	2	4-14 (9)
	<i>Oesophagostomum venulosum</i>	3	1-9 (8.5)
	<i>Trichuris ovis</i>	2	1-2 (1.5)

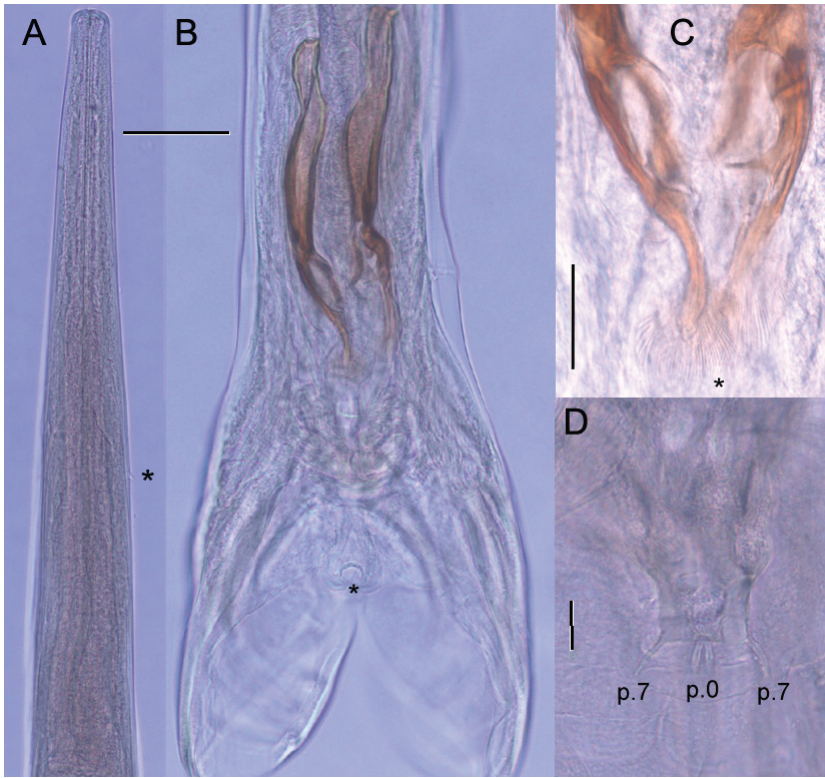


Fig 1. *S. spiculoptera* (Bar 50 μ m in A-B, 20 μ m in C-D)

Şekil 1. *S. spiculoptera* (Çubuk A-B'de 50 μ m, C-D'de 20 μ m)

- A. Anterior end and cervical papilla (pointed)
 B. Male, bursa copulatrix and half-ring style between dorsal ribs (pointed)
 C. Fan-shaped appendages on the tip of the spicules.
 D. Genital conus and papilla 0 (p.0) and papilla 7 (p.7)

the end, shows slightly thickening in some examples. The cervical papillae are clearly pronounced. The bursa is divided by a deep incision in to two lateral lobes, while the dorsal lob is hardly noticeable. Prebursal papillae well developed. Accessory bursal membrane is absent. Spicules are equal in size and shape; length 0.188-0.222 (0.202). Spicules well chitinized brown in colour and split into three branches (Fig. 2-B,C) and the proximal ends of the spicules and cap-like formations. The middle branch is thick, long and the distal tip of the introverted into medially (Fig. 2-C). The dorsal rib thick and shortly, distal end has two branches. It is like reversed letter T or Y are as, or in between form (Fig. 2-B,D). The some important morphological measurement for the identification was given in the Table 2.

Some morphological observations of *S. spiculoptera* and *S. mathevossiani* were showed in Fig. 1 and 2. The females are similar in both of two species cannot be

separated morphologically from each other. And also similar to each other anterior part of the males in two species.

There are no article and related papers about the helminths of the roe deer and other cervids in Turkey. For that reason briefly informations were given taxonomy and about of the *Spiculoptera* genus and other recorded nematodes. The purpose of the present study was to announce new records for Turkey.

DISCUSSION

Some parasitic nematodes especially Trichostrongyloidea are polygamous nematodes that exhibits morphological polymorphism¹⁰. Several studies have shown that some species *Teladorsagia*, *Ostertagia*, *Spiculoptera* and others contains polymorphic species and interbreed^{10,11}.

Table 2. Some important measurements of the *Spiculoptera* species

Tablo 2. *Spiculoptera* türlerinin bazı önemli ölçüleri

Measured Part	<i>S. spiculoptera</i> ♂ (mm) n: 10	<i>S. mathevossiani</i> ♂ (mm), n: 5
Length	6.5-7.4 (6.8)	6.6-7.9 (7.4)
Width, prebursal papilla	0.101-0.120 (0.111)	0.106-0.131 (0.116)
Spicula length	0.155-0.192 (0.174)	0.188-0.222 (0.202)
Esophagus length	0.562-0.622 (0.590)	0.592-0.716 (0.654)
Excretory pore-anterior end	0.256-0.304 (0.281)	0.298-0.327 (0.312)
Servical papilla-anterior end	0.275-0.330 (0.308)	0.305-0.363 (0.339)



Fig 2. *S. (R.) mathevossiani* (Bar 50 μ m, in A-B-C, 20 μ m in D)

Şekil 2. *S. (R.) mathevossiani* (Çubuk A-B-C 0 μ m, D 20 μ m)

A. Anterior end and excretion porus (pointed)

B. Male, bursa copulatrix

C. Detailed of the spicules

D. Dorsal ribs (pointed) and chitinized structure in the genital conus (pointed)

The systematic of the Trichostrongylina and also Ostertagiinae nematodes are still unclear due to the existence of polymorphic species^{3,11,12}.

Abomasal nematodes (Ostertagiinae) currently include 15 genera in the world fauna⁴. Subfamily Ostertagiinae morphologically, 2 distinct groups are recognized based on the structure and relative positions of rays that support of copulatory bursa of the males¹².

Six genera are characterized by a 2-2-1 bursal formula; i.e. *Cervicaprostrongylus*, *Hyostrongylus*, *Mazamostrongylus*, *Spiculoptera*, *Teladorsagia*, *Sarwaria*; other groups, a 2-1-2 pattern is typical among species of 9 genera; i.e. *Camelostrongylus*, *Longistrongylus*, *Marshallagia*; *Orloffia*, *Ostertagia*, *Pseudommarshallagia*, *Africanostongylus*, *Hamulonema*, *Robustostongylus*^{4,12}.

The taxonomic position of the *Spiculoptera* genus is below¹³.

Nematoda
Rhabditida Chitwood, 1933
Strongylida Molin, 1861
Suborder: Trichostrongylina Durette-Desset ve Chabaut, 1974
Superfamily: Trichostrongyloidea Leiper 1907 (Cram, 1927)
Family: Trichostrongylidae Leiper 1912
Subfamily: Ostertagiinae Lopez-Neyra, 1947
Genus: *Spiculoptera* (*Rinadia*) Orloff, 1933 (Travassos, 1937)

Spiculoptera genus (Orloff, 1933) Travassos, 1937 was synonym with genera of (= *Altaevia* Sarwar, 1957; = *Apteragia* Jansen, 1958; = *Mazamostrongylus* Cameron,

1935; = *Rinadia* Grigorian, 1951; *Sarwaria* Drozd, 1965; *Spiculoptera* (*Petrowiagia*) Ruchljadew, 1961; = *Spiculopteroide* Jansen, 1958)^{4,5}.

Spiculoptera genus resembles *Ostertagia* but differs in that males have no gubernaculum and their spicules have fan shaped membranes at the posterior end. However there is no fan shaped membrane in the minor morph *S. (Rinadia) mathevossiani*. Also dorsal lobe and ray of the *Rinadia* genus are peculiar. The dorsal lobe is conic and the dorsal ray bifurcate at the distal end only^{8,14}.

In this genus, ray 4 is shorter than ray 5. Parasites of cervidae were found rarely in domestic ruminants⁴. Anterior end without cuticular thickening. There are longitudinal ridges on cuticle. Cervical papillae present and clearly pronounced⁸.

Spiculoptera is the parasitic nematode species in the abomasa many species of cervidae and domestic animals in Europe, Asia and America^{6,8,15-19}.

Many authors list *S.spiculoptera* and *S. boehmi* as synonyms. The other synonyms of the *Spiculoptera* *spiculoptera* (Guschanskaia, 1931) are *Ostertagia spiculoptera* (Guschanskaia, 1931), *Ostertagia boehmi* (Gebauer, 1932), *S. kotkascheni* (Asadov, 1952) and *S. (Petrowiagia) pigulski* (Ruchliadev, 1961), and also minor morph *S. mathevossiani* (Ruchliadev 1948) is synonymized with *Rinadia mathevossiani* Ruchliadev, 1948 (Andreeva, 1957), *R. schulzi* (Grigoryan, 1951), *R. caucasica* (Asadov, 1955), *R. pawlovskiyi* (Kadenatzii ve Andreeva, 1957) and *R.*

quadrifurcata Andrews, 1964^{6,15}.

Reported other species in this genus are; *S. asymmetrica* (Ware, 1925) Orloff, 1933/ *S. quadrispiculata* (Jansen, 1952) Durette-Desset, 1982. (syn. *Ostertagia asymmetrica* Ware, 1924; *S. cervi* (Cameron, 1931) (Syn. *S. quadrispiculata*; *Apteragia quadrispiculata* (Jansen, 1958) Durette-Desset, 1982; *Skrjabinagia monodigitata* Andrews, 1964), *S. alicis* (Schulz, Kadenatzii, Evranova and Schalldybin 1954), *S. dagestanica* (Altaev, 1953), *S. panticola* (Schalldybin, 1950), *S. popovi* (Evranova, 1955); *S. schulzi* (Rajewskaja, 1930); *S. suppereri* (Hinaidy and Prosl, 1978), *S. yamashitai* (Ohbayashi, 1966)^{6,13-17}.

Within *Spiculoptera*, the sole basis for suspecting polymorphism has been the co-occurrence of 2 morphotypes of male nematodes in the same host. For example *S. asymmetrica* and *S. quadrispiculata*, and also *S. spiculoptera* and *S. mathevossiani* dimorphic species in the *Spiculoptera*^{16,17}.

In this study *S. spiculoptera*, excretory pore was evident, cervical papillae were short (7-8 µm) and spicules end were fan-shaped. In both species genital cone is well developed and ventrally bears two small slender papillae which called papilla 0. Papilla 0 basically divides into two parts; it looks like the inverted letter small "V"⁷. However there is a structure like to bow-tie at the base of papillae 0 in the *S. mathevossiani* (Fig. 2-D).

Species of *Spiculoptera* are typical parasites in the abomasum of cervids in the world although rarely records from other ruminants. Primarily regarded as a pathogen of wild ruminants, *Spiculoptera* species is also reported, but less often, as parasites domestic ruminants. Little is known about its epidemiology and pathogenecity in domestic ruminants and other cervid species^{6,18-20}.

S. spiculoptera differ from *S. (R.) mathevossiani* mainly in a well developed caudal bursa in the male and structure of the spicules and dorsal rib in this study.

There have been many studies for the detection of the helminths of domestic ruminants and various species were identified in Turkey⁹. Most of the helminth species detected in this study have also been reported from the domestic ruminants but there has been no evidence about of the roe deer helminthes and also existence of *S. spiculoptera* and *S. (R.) mathevossiani* in Turkey^{1,9}.

Spiculoptera spiculoptera is a common intestinal nematode of wild ruminants which can be observed rarely from domestic ruminants^{16,18-20}. Zaffaroni et al.²¹ found the frequency of the nematode as 85% in roe deer, 70% in red deer and 8% in mountain goats respectively. Rossi et al.²² reported that *S. spiculoptera* and *Ostertagia leptospicularis*, with their "minor" morph *S. mathevossiani* and *O. kolchida* were the dominant abomasal species in the roe deer in Italy²².

Detected nematode species in roe deer in Turkey were identified as *S. spiculoptera* and minor morph *S. mathevossiani* in accordance with general morphology and measurements. However additional studies are needed to asses the prevalence of these nematodes in wild and domestic animals in Turkey and the morphological identifications have supporting with molecular evidence.

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