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Research Note

The first helminth study on Brandt's Persian Lizard *Iranolacerta brandtii* (De Filippi, 1863) (Squamata: Lacertidae) from Van Province, Turkey

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Summary

Population of *Iranolacerta brandtii* lizard including 56 (21♀, 34♂, 1 juvenile) samples were examined for helminths. 17 of them were found to harbour one or more helminth parasites, while 39 didn't harbor any. Two helminth species were determined. These belong to Phylum: Nematoda, *Spauligodon aloisei* Casanova, Milazzo, Ribas & Cagnin, 2003 and *Skrjabinodon medinae*. García-Calvente, 1948. This study represents new host and locality records in both host lizard and the helminth species. *Sp. aloisei* is recorded for the first time; *Sk. medinae* is the third report from Turkey nevertheless *Sk. medinae* is a new host record for *I. brandtii.*
Keywords: *I. brandtii*; Helminth; Nematoda; Van; Turkey

Introduction

Parasites may account for half of the total number of species in the world but only a fraction of the diversity within these organisms has been detected and fewer described. (Maia, 2015). Reptiles are commonly infected by a wide range of parasites, serving either as their definitive or intermediate hosts (Al-Moussawi, 2010). Although Turkey has rich reptile fauna in the world, studies on the helminth fauna in these hosts are very scarce.

Lacertidae family contains approximately 39 species in Turkey (Baran & Atatür, 1998; Sindaco *et al*., 2000; Arnold *et al*., 2007; Baran *et al*., 2012). Some helminth studies have been carried out on lizard species including in this genus in Turkey. These species are European Green Lizard, *Lacerta viridis* (Laurenti, 1768) (Schad *et al*., 1960); Crimean Wall Lizard *Podarcis tauricus* (Pallas, 1814) (Schad *et al*., 1960); Dwarf Lizard, *Parvilacerta parva*(Boulenger, 1887) (Saygı & Olgun, 1993); Danford's Lizard*, Anatololacerta danfordi* (Günther, 1876) (Gürelli *et al*., 2007), Balkan Emerald Lizard*, L. trilineata* Bedriaga, 1886 (Yıldırımhan *et al*., 2011); Pleske's Racerunner-Transcaucasian Racerunner**,** *Eremias pleskei* Nikolsky, 1905 Strauch's Racerunner*, E. strauchi* Kessler, 1878, Suphan Racerunner, *E. suphani* Başoğlu & Helmich, 1968 (Düsen *et al*., 2013) Anatolian Lizard, *Apathya cappadocica* (Werner, 1902) (Birlik *et al*., 2015), Spiny-Tailed Lizard, *Darevskia rudis* (Bedriaga, 1886) (Roca *et al*.,2015a) *D. uzzelli* (Darevsky, 1977), *D. bendimahiensis* (Schmidtler, Eiselt & Darevsky, 1994), *D. sapphirina* (Roca *et al*., 2015b) (Schmidtler, Eiselt & Darevsky, 1994), *D. clarkorum* (Darevsky & Vedmederja, 1977) *D. raddei* (Boettger, 1892), *D. parvula* (Lantz & Cyrén, 1913), *D. valentini* (Boettger, 1892), *D. armeniaca* (Méhely, 1909) *D. unisexualis* (Darevsky, 1966) (Roca *et al*., 2016); Lebanon lizard *Phoenicolacerta laevis* (Gray, 1838) (Birlik *et al*., 2016), *Acanthodactylus harranensis* Baran, Kumlutaş, Lanza, Sindaco, Ilgaz, Avci & Crucitti, 2005 *A. schreiberi* Boettger, 1878 *Mesalina brevirostris* Blanford, 1874 (Düşen *et al*., 2016). *Iranolacerta brandtii* (De Filippi, 1863) has been reported for the first time from Van province in eastern Anatolia neighboring to Turkish and Iranian border (Avcı *et al*., 2015). The aim of this study is to evaluate the helminth fauna of *I. brandtii* from Turkey.

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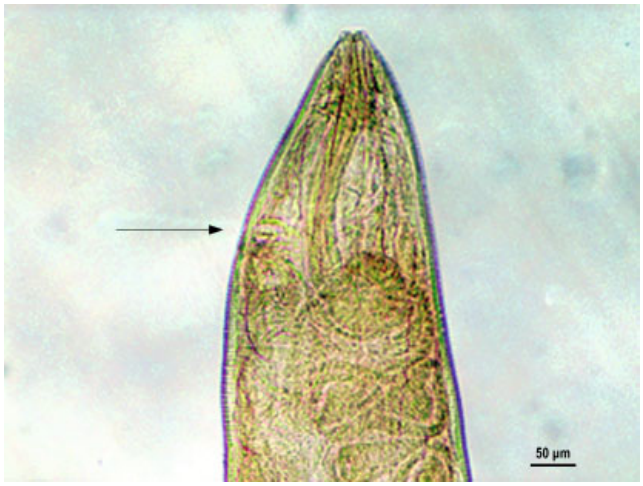

Fig.1. *Spauligodon aloisei* female anterior (prebulbar vulva) 10×.

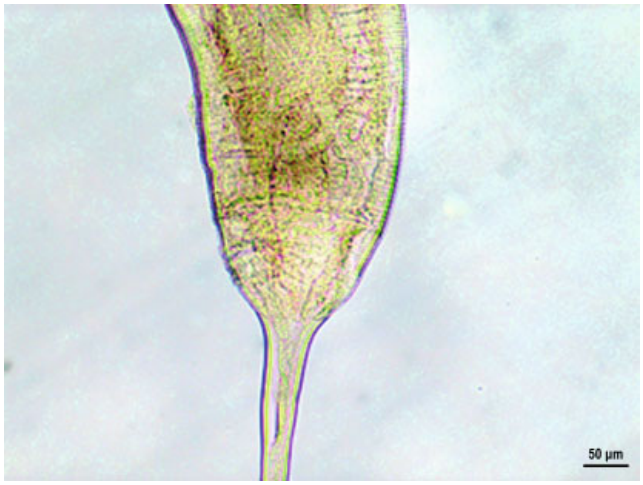

Fig.2. *Spauligodon aloisei* female posterior 10×.

Table 1. The prevalence, mean intensity, abundance and numbers of minimum/maximum helminth and infected host.

Species of helminth	Number of host infected	Helminthes (minimum/maximum)	Prevalence (%)	Mean Intensity	Abundance
Spauligodon aloisei	11	1 – 10	19	2.72	0.53
Skrjabinodon medinae	14	1 – 6	25	2.85	0.71

Materials and Methods

Fifty-six specimens of *I. brandtii* were collected from two populations (Karadulda Village, Çaldıran and Saray, Van province, eastern Turkey) between July in 2015 and 2016. The snout vent length (SVL) of lizard samples was measured with a digital caliper to the nearest 0.01mm.

The body cavity was opened, and the digestive tract removed. The oesophagus, stomach, small and large intestine and lungs were opened and examined for helminths under dissecting microscope. Nematodes were killed in hot saline solution, fixed in 70 % ethanol, and mounted in glycerol. For the morphological examination, the helminth species were cleared gradually in glycerin. Parasites were identified to species level and the number and location of individuals of each species were recorded. Helminth identification was based on keys given by Yamaguti (1961), Petter and Quentin (1976), Baker (1987), Anderson (2000), Anderson and Chabaud (2009). Helminth voucher specimens were deposited in the Department of Biology, Uludağ University, Bursa, Turkey; lizard specimens were deposited in the Department of Biology, Dokuz Eylül University, İzmir, Turkey.

Results

Mean snout-vent length of lizard specimens was found as 68.57 ± 11.46 mm with a range from 46.0 to 87.0 mm. During a helminthological examination of lacertid lizards from Turkey, 17 of 56 *I. brandtii* specimens were found to harbor 70 (9 males and 61 females) nematodes of the *Spauligodon* and the *Skrjabinodon*. The total infection rate of lizards by helminths was 30 %, with 17 of 56. These animals were host to 2 species of Nematoda. Total parasite number was 70. Seven of the 56 lizard specimens (12 %) were infected by two nematode species while 10 (17 %) were infected by one nematode species. The prevalence, mean intensity, abundance and other numerical data are presented in Table 1.

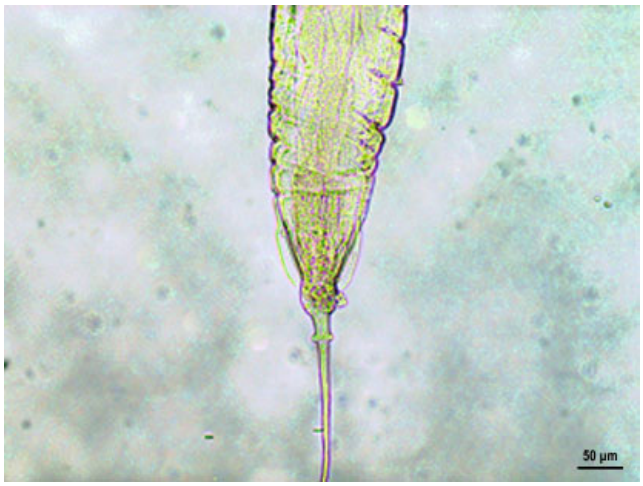

Fig.3. *Spauligodon aloisei* male posterior 10×.

Fig.4. *Skrjabinodon medinae* female anterior post bulbar vulva 10×.

Discussion

Three genera of pharyngodonid nematodes are commonly found in reptiles and exhibit a vulvar opening in the anterior part of the body, just posterior to the postbulbar excretory pore: Two of these genera are *Skrjabinodon* Inglis, 1968 and *Spauligodon* Skrjabin, Schikhobalova and Lagodovskaja, 1960. These genera can be separated by the relationship of the caudal alae to the genital papillae (Bursey & Goldberg, 1995).

Pharyngodonid nematodes of *Spauligodon* currently including 50 species are parasites of reptiles. Based upon the zoogeographic regions described by Holt *et al*. (2013) 16 *Spauligodon* species is known from the Palaeractic region. The Turkish helmint fauna represents 5 species including the *Spauligodon*. These species are *Spauligodon* sp. from *Parvilacerta parva* (Saygı & Olgun 1993), *Sp. atlanticus*, Astasio-Arbiza *et al*., 1987 from *Apathya cappadocica* (Birlik *et al*., 2015), *Sp. eremiasi* Markov & Bogdanov, 1961 from *Eremias strauchi* and *E. suphani* (Düşen *et al*., 2013); *Sp. laevicauda* Seurat,1924 from *Hemidactylus turcicus; Sp. saxicolae,* Sharpilo,1961 from *Eremias strauchi*, *E. suphani* (Düşen *et al*., 2013), *Darevskia clarkorum*, *D. parvula*, *D. raddei*, *D. valentini*, *D. unisexualis* (Roca *et al*., 2016).

Spauligodon aloisei was described in Italy (Casanova *et al*., 2003). It was described as parasite of *Podarcis siculus* (Reptilia: Lacertidae). In Turkey, this helminth species is reported for the first time (Figs. 1, 2, 3). While spins are found in the tail filament of male specimens, there is no spicule that is diagnostic characters of the *Spauligodon*. The male specimens also have lateral alae. The female specimens found in lizard specimens having prebulbar vulva position that the most important diagnostic chaacter for *S. aloisei*. *S. aloisei* is only one species having prebulbar vulva location for females in Palearctic region. All of the morphological and metrical features of our specimens were in agreement with the information given in the previous literature for *S. aloisei*..

Two species of *Skrjabinodon* Inglis, 1968 are currently known from Turkey. These species are *Skrjabinodon aegyptiacus* Moravec, Barus & Rysavy, 1987 and *Sk. medinae,* García-Calvente, 1948. *Sk. medinae* was reported from *L. trilineata* (Yıldırımhan *et al*. 2011), *A. cappadocica* (Birlik *et al*., 2015) and *P. laevis* (Birlik *et al*., 2016). *Sk. aegyptiacus* was reported from *Chalcides ocellatus* (Forskal, 1775) (Incedogan *et al*., 2014). Males of *Skrjabinodon* do not have caudal alae and all genital papillae are embedded in the caudal alae (Figs. 4 and 5). Our male specimens have a spicule and the length of the spicule ranges from 55 to 60 µ. Obtained data are compatible with the data given in the previous literature for *Sk. medinae*. The female specimens have postbulbar vulva position (Fig. 4). They also posses a single pair of sessile pre-cloacal papillae. In this study, *Sk. medinae* is a new host record for *I. brandtii.*

In our study, *Spauligodon* and *Skrjabinodon* have been found in coexistence. This correlates with usual pattern found in different European lacertid lizards, in which other *Spauligodon* species frequently share reptile hosts with members of the genera *Skrjabinodon* (Jorge *et al*., 2014).

The component community of the helminths in amphibians and reptiles present fundamental differences in having low parasite richness when compared with other classes of vertebrates. Because they are poikilothermic animals, the environmental condi-

Fig.5 *Skrjabinodon medinae* male posterior (spicule) 40×.

tions limit the recruitment of potential parasite helminths, and the development of the parasitic community is affected by the feeding rates, as well as the forage behavior. (Aho, 1990) Besides all this, low infection rates and low species richness are correlated with a strictly entomophagous diet in many studies (Roca *et al*., 1989; Galdón *et al*., 2006; Roca *et al*., 2006).

Until this time, there have been many studies on the helminth fauna of reptile species in Turkey. In these studies, many helminth species have been identified and it has been determined that the nematodes are dominant helminth communities in lacertid hosts. However, these studies are still inadequate to evaluate helminth fauna of Turkey. To identify new species, contributing biodiversity of Turkey, linking host characteristics with their parasite helminthes, further researches on helminth fauna of this group are needed.

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