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HİKMET SAMİ YILDIRIMHAN

MUSTAFA YAVUZ

MEHMET ÖZ

CHARLES ROBERT BURSEY

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Nematode parasites of *Lyciasalamandra atifi* and *L. fazilae* (Caudata: Salamandridae) from Turkey

Hikmet Sami YILDIRIMHAN^{1,*}, Mustafa YAVUZ², Mehmet ÖZ², Charles Robert BURSEY³

¹Department of Biology, Science and Literature Faculty, Uludağ University, 16059 Bursa - TURKEY

²Department of Biology, Science and Literature Faculty, Akdeniz University, Antalya - TURKEY

³Department of Biology, Pennsylvania State University, Shenango Campus, Sharon, Pennsylvania 16146 - USA

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Abstract: Fifteen *Lyciasalamandra atifi* and 14 *L. fazilae* from Antalya Province, Turkey, were examined for helminths. Three species of nematodes, *Rhabdias bermani*, *Aplectana acuminata*, and *Cosmocerca longicauda*, were found in *L. atifi* and 2 species, *Aplectana linstowi* and *Cosmocerca longicauda*, were found in *L. fazilae*. *L. atifi* represents a new host record for each of the 3 species of nematodes reported; *L. fazilae* represents a new host record for each of the 2 species of nematodes reported.

Key words: Amphibia, Caudata, nematoda, Turkey

Türkiye'den toplanan *Lyciasalamandra atifi* ve *L. fazilae* (Caudata: Salamandridae)'nin nematod parazitleri

Özet: Onbeş *Lyciasalamandra atifi* ve 14 *L. fazilae* helmintleri incelenmek üzere Türkiye'nin Antalya ilinden toplanmıştır. *Lyciasalamandra atifi*'de 3 nematod türü (*Rhabdias bermani*, *Aplectana acuminata*, *Cosmocerca longicauda*), *L. fazilae*'de 2 nematod türü (*Aplectana linstowi*, *Cosmocerca longicauda*) bulunmuştur. *Lyciasalamandra atifi* ve *L. fazilae*'de bulunan nematod türleri için yeni konak kayıdır.

Anahtar sözcükler: Kurbağa, Semender, nematod, Türkiye

The Lycian salamander, *Lyciasalamandra atifi* (Başoğlu, 1967) is known from isolated populations in the region of Alanya in the east to Selge in the west, southern Anatolia, Turkey, at 190-1500 m elevation; Luschan's salamander, *Lyciasalamandra fazilae* (Başoğlu and Atatur, 1974), is found in southwestern Anatolia, Turkey, in the region between Gökçeovak and Üzümlü and from adjacent islands including Tersane and Domuz, up to 1000 m elevation (Frost,

2010). Of the 18 caudate species found in Turkey (Frost, 2010), 8 (44%) have been reported to harbor nematodes, namely the Luschan salamander, *Lyciasalamandra billae*, *Lyciasalamandra antalyana*, *L. luschani*; Caucasian salamander, *Mertensiella caucasica* (Waga, 1876); Anatolia newt, *Neurergus strauchii* (Steindachner, 1887); banded newt, *Ommatotriton vittatus* (Gray, 1835); and Balkan crested newt, *Triturus karelinii* (Strauch, 1870). The

* E-mail: yhikmet@uludag.edu.tr

purpose of this note is to present an initial list of helminth species harbored by *L. atifi* and restate the helminth list for *Lyciasalamandra fazilae*, originally published under *Mertensiella luschani* (Yildirimhan et al., 2005b; Yildirimhan and Öz, 2008).

Fifteen individuals of *L. atifi* (9 female, 6 male; mean snout-vent length range [SVL] = 156 ± 13 mm, range 130-170 mm) were collected by hand at Akseki, Antalya Province, Turkey (36°51'32"N, 31°44'46"E; elevation, 520 m), 18 February 2010; 14 individuals of *L. fazilae* (3 juvenile, 5 female, 6 male; SVL = 107 ± 12 mm, range 90-133 mm) were collected by hand at Dalaman, Antalya Province, Turkey (36°40'13"N, 28°50'46"E; elevation, 110 m), 09 March 2010. The salamanders were examined within 1 week of capture. They were overanesthetized with sodium pentobarbital and the body cavity was opened by an incision from vent to throat. The abdominal cavity, stomach, intestine, heart, lungs, liver, urinary bladder, and mouth were examined separately for helminths using a dissecting microscope. Nematodes were killed in hot saline solution, fixed in 70% ethanol and examined with a compound microscope after clearing in glycerol. Voucher specimens were deposited in the helminth collection of Uludağ University Museum of Zoology, Bursa, Turkey; host specimens were deposited in the Department of Biology, Uludağ University, Bursa, Turkey. Salamander nomenclature follows Frost (2010).

Four species of Nematoda were found: *Rhabdias bermani* Rausch, Rausch and Atrashkevich, 1984; *Aplectana acuminata* (Schrank, 1788); *A. linstowi* Yorke and Maplestone, 1929; *Cosmocerca longicauda* (Linstow, 1885). Number of nematodes, prevalence, and mean intensity by host species are given in the Table.

R. bermani was originally described from *Salamandrella keyserlingii* collected in the Upper Kolyma Valley, Russia (Rausch et al., 1984). *L. atifi* represents the second host species reported for *R. bermani*.

A. acuminata was originally described from *Pseudepidalea viridis* (listed as *Bufo viridis*) collected in Germany (Schrank, 1788) and has been reported from a number of frogs and toads (see Baker, 1987; Yildirimhan et al., 2005a). Also in the host list are 4 species of salamanders: *Mertensiella caucasica* from Russia and Turkey (Sharpilo, 1978, Yildirimhan et al., 2005a), *Triturus cristatus* from Western Europe (Ryzhikov et al., 1980), *Salamandra salamandra* from Czechoslovakia (Prokopic and Krivanec, 1975), and *Lyciasalamandra antalyana* from Turkey (Yildirimhan et al., 2011). *L. atifi* represents a new host for *A. acuminata*.

A. linstowi was established when Yorke and Maplestone (1926) transferred *Nematoxys unguiculatus* Linstow, 1906 to *Aplectana* under a new name to avoid creating a homonym with *Aplectana unguiculata* (Rudolphi, 1819) Miranda, 1924. The original host was *Pseudepidalea viridis* (listed as *Bufo viridis*) collected in Greece (Linstow, 1906). It was also reported as *P. viridis* from Ukraine by Ivanitzky (1940) and from Czechoslovakia by Vojtkova (1976). Additional hosts include *Bufo bufo* (Ivanitzky, 1940; Vojtkova, 1976), *Hyla arborea* (Vojtkova, 1976), and *Rana temporaria* (Vojtkova, 1976). This is the first report of *A. linstowi* in a salamander; *L. fazilae* represents a new host for *A. linstowi*.

C. longicauda was originally described as *Nematoxys longicauda* from *Triturus alpestris* collected in western Europe (Linstow, 1885)

Table. Number of helminths, prevalence (%), mean intensity (\pm SD), and range of infection in *Lyciasalamandra atifi* and *L. fazilae* from Turkey.

	<i>Lyciasalamandra atifi</i>				<i>Lyciasalamandra fazilae</i>			
	N	%	M \pm SD	Range	N	%	M \pm SD	Range
<i>Rhabdias bermani</i>	16	40	2.7 \pm 2.3	1-7	---	--	-----	---
<i>Aplectana acuminata</i>	2	7	2	0	---	---	-----	---
<i>Aplectana linstowi</i>	--	--	----	--	8	21	2.7 \pm 1.2	2-4
<i>Cosmocerca longicauda</i>	55	67	5.5 \pm 3.9	1-14	29	64	3.2 \pm 1.8	1-6

and is currently known only from salamanders: *Lyciasalamandra luschani* (reported as *Mertensiella luschani*) from Turkey (Yildirimhan et al., 2005b; Yildirimhan and Öz, 2008); *Mertensiella caucasica* from Turkey (Yildirimhan et al., 2005a); *Ichthyosaura alpestris* (reported as *Triturus alpestris*) from Austria (Sattmann, 1986), Czechoslovakia (Barus and Groschaft, 1962; Barus et al., 1963; Moravec and Vojtkova, 1974; Vojtkova, 1976), and Poland (Grabda-Kazubska, 1974); *Lissotritition helveticus* (reported as *Triturus helveticus*) from western Europe (Baker, 1987); *Lissotritition montandoni* (reported as *Triturus montandoni*) from Czechoslovakia (Moravec and Vojtkova, 1974; Vojtkova, 1976) and Poland (Grabda-Kazubska, 1974); *Lissotritition vulgaris* (reported

as *Triturus vulgaris*) from Czechoslovakia (Barus and Groschaft, 1962; Barus et al., 1963; Moravec and Vojtkova, 1974; Vojtkova, 1976); and *Triturus cristatus* from Czechoslovakia (Barus et al., 1963; Moravec and Vojtkova, 1974). *L. atifi* and *L. fazilae* represent new host records for *C. longicauda*

The nematodes found in this study are generalist species, i.e. parasites capable of infecting 2 or more host species. Further study will be necessary in order to determine why differential prevalence of infection occurs within these 2 hosts. Are they related to sample size or to ecological or physiological attributes?

The current parasite list for *L. fazilae* is *C. longicauda* (Yildirimhan et al., 2005a; this paper), and *A. linstowi* (this paper).

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