

## Helminth Parasites of the Three Racerunner Lizards: *Eremias pleskei* Nikolsky, 1905 (Pleske's Racerunner-Transcaucasian Racerunner), *Eremias strauchi* Kessler, 1878 (Strauch's Racerunner) and *Eremias suphani* Basoglu & Hellmich, 1968 (Suphan Racerunner) collected from Eastern Part of Turkey

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### Summary

In this investigation, a total of 44 racerunner lizard samples (*Eremias pleskei*, *Eremias strauchi*, and *Eremias suphani*) collected from eastern part of Turkey were examined for the first time for helminths. *Eremias pleskei* was harboured 1 species of acanthocephalan (in cystacanth stage), *E. strauchi* was harboured 2 species of nematodes, and *E. suphani* was harboured 3 species of nematodes and 1 species of cestode. *E. strauchi* represents a new host record for *Spauligodon eremiasi*, and *Spauligodon saxicolae*. *E. suphani* represents a new host record for *Spauligodon eremiasi*, *S. saxicolae*, *Physaloptera* sp., and *Oochoristica tuberculata*, and also, *E. pleskei* represents a new host record for unidentified acanthocephalan (in cystacanth stage). Also, Turkey is a new locality record for *Spauligodon eremiasi*.

Keywords: *Eremias pleskei*; *Eremias strauchi*; *Eremias suphani*; Racerunner lizards; Helminth; Turkey

### Introduction

The helminth parasites of three racerunner lizards: *Eremias pleskei* Nikolsky, 1905 (Pleske's Racerunner-Transcaucasian Racerunner), *Eremias strauchi* Kessler, 1878 (Strauch's Racerunner), and *Eremias suphani* Basoğlu & Hellmich, 1968 (Suphan Racerunner) were examined in this study.

The genus *Eremias* Fitzinger, 1834 is inhabited mostly sand, arid steppe, and desert areas which are distributed from northern China, Mongolia, Korea, Central and southwest Asia to southeastern Europe (Rastegar-Pouyani & Nilson, 1997). *E. pleskei* is more slender bodied than *E. strauchi* and *E. suphani* with the total length up to 15 cm. It occurs in the left-bank valley of the river Aras in Armenia and in Nakhichevan (Nahcivan), Azerbaijan in the eastern Transcaucasia. It is also known from extreme east of Turkey and in the north-western Iran (Ananjeva et

*al.*, 2006; Baran et al., 2012). It prefers arid, sandy, partly rock areas with desert conditions. It is very active hides in small spots of sparse herbaceous vegetation on volcanic ground. The vertical distribution of the species varies from 500 and 1.700 m. asl in Turkey (Baran et al., 2004; Baran et al., 2012). *E. strauchi* is larger and thicker bodied than *E. pleskei* with a total length up to 20 cm or longer. In North Eurasia the species is distributed in the eastern Transcaucasia: the valley of the middle current of Aras river, from the south-eastern foothills of the Karabakh range and the valley of Bargushat in the south-east up to the southern spurs of the mountain Aragaz and Oktemberianskaya steppe in the west, in the Karabakh desert and on the plateau Zuvand, as well as in the south-western Turkmenistan (southern slopes of the mountain ranges Kyupendag, Karagez and Kopet Dagh). It occurs in eastern Turkey and the North-west and North-east of Iran, in Iranian Azerbaijan (Ananjeva et al., 2006; Baran et al., 2004; Baran et al., 2012). It inhabits desert-like, dry open places with pebbly substrates and little vegetation with a vertical distribution to 3500 m.asl. *E. suphani* is medium sized lizard with a total length up to 20 cm. It is known from Van, Bitlis, and Ağrı in the eastern Anatolia. It is found in desert-like, dry open places with pebbly substrates and little vegetation. It has been recorded up to 2400 m asl (Franzen & Heckes, 1999; Baran et al., 2012).

So far, there has been no published study on helminths of the Turkish racerunner lizards in Turkey. We report for the first time helminths of three species from Turkey.

### Materials and methods

The lizard samples were used in this study, obtained from Dokuz Eylül University, Faculty of Science, Department of Biology, Zoology Museum Collection in İzmir, Turkey.

Racerunner lizards were collected by hand between 2000 and 2002, from four different localities in eastern part of Turkey: *E. suphani* (1) (Güzelsu district between Başkale (Van) 10th km, 2159 m. asl, 38° 15' 29.65" N; 43° 52' 32.84" E); *E. strauchi* (2) Aralık (İğdir province) between Nakhichevan 5th km, 812 m. asl, 39° 50' 24.56" N; 44° 32' 05.80" E); *E. pleskei* and *E. strauchi* (3) (Aralık between Nakhichevan (Nahçıvan), Gödekli Village 30 km to Nakhichevan, 812 m asl, 39° 49' 16.25" N; 44° 35' 38.07" E), and *E. strauchi* (4) (Aralık-Nakhichevan, between (Torul Paşa Kışlası), 800 m. asl, 39° 39' 38.12" N; 44° 47' 48.35" E) (Fig. 1).

In total, 10 *E. pleskei* (6 males, 4 females), 14 *E. strauchi* (10 males, 4 females), and 20 *E. suphani* (14 males, 6 females) samples were examined for helminth parasites. The mean  $\pm$ SD snout-vent length (SVL) of specimens were *E. pleskei* 45.45  $\pm$  8.17 mm, with a range from 36.34 to 55.84 mm, *E. strauchi* 56.44  $\pm$  7.19 mm, with a range from 46.08 to 70.72 mm, and *E. suphani* 63.89  $\pm$  5.16 mm, with a range from 45.14 to 70.08 mm, respectively.



Fig. 1. The collection locations of *Eremias pleskei*, *E. strauchi*, and *E. suphani* from the eastern part of Turkey (For location numbers see the Material and methods section)

Body cavities of lizard samples were opened by a longitudinal ventral incision. The alimentary canal were excised and separated into stomach, small intestine, large intestine and rectum. The contents of each part and other organs were poured into petri dishes for examination under a stereomicroscope. Cestode, nematode and acanthocephalan samples were stained with acetocarmine, dehydrated, cleared in cedar oil or xylol; nematodes were cleared in glycerol and samples were mounted in Canada Balsame or Entellan<sup>®</sup>. Intensities are presented as mean values ( $\pm$ SD) followed by the range. Voucher host specimens were deposited in Dokuz Eylül University, Faculty of Science Department of Biology, Zoology Museum, and parasite specimens were deposited in Pamukkale University, Faculty of Sciences and Arts, Department of Biology, Denizli, Turkey (PAU-HELM-1-5/2013).

## Results and discussion

In summary, eleven individuals of one acanthocephalan species (unidentified cystacanths) were collected 10 *E. pleskei* samples examined. Helminths were observed the embedded small intestine mucosa of this species, 4 (40 %) individuals of *E. pleskei* were harboured only one helminth; the remaining 6 (60 %) were uninfected. There were 2.75  $\pm$  1.50 helminth individuals per infected host.

Fourteen *E. strauchi* examined, individuals of 2 helminth species were collected. Helminths were recorded the small intestine, large intestine and rectum of this species. No individual host was harboured more than 2 helminth species. Of the infected lizards, 4 (50 %) were harboured 2 species of helminth, 4 (50 %) were harboured 1 species of helminth. There were 9.12  $\pm$  8.46 helminth individuals per infected host.

Twenty *E. suphani* examined, 310 individuals of 4 helminth species were collected. Helminths were recorded the stomach, small intestine, large intestine, rectum of this species. No individual host was harboured more than 3 helminth species. Of the infected lizards, 3 (15 %) were harboured 3 species of helminth, 9 (45 %) were harboured 2 species of helminth, 6 (30 %) was harboured 1 species of helminth. There were 1.83  $\pm$  0.70 helminth species per infected host and 17.22  $\pm$  10.53 helminth individuals per infected host. No helminths were observed in lungs and body cavities of these examined three *Eremias* species. Data on helminth infections of *E. pleskei*, *E. strauchi*, and *E. suphani* are recorded in Table 1.

The genus, *Spauligodon* includes a cosmopolitan group of nematode parasites of reptiles according to Bursey and Goldberg (2011) comprising at least 47 described species, with 20 of them occurring in the Palearctic region (Jorge *et al.*, 2012). Ikromov and Cho (2004) reported *S. saxicolae* from *Eremias velox* in Uzbekistan; Uhlířová (2005) reported *S. saxicolae* from *Darevskia caucasica* in Zakatali province, Azerbaijan. Murvanidze *et al.* (2008) reported *S. saxicolae* in *Lacerta strigata*, *L. saxicola*, *L. rudis* and *Coluber jugularis* in Georgia; Carretero *et al.* (2011) observed *S. saxicolae* from *Podarcis vaucheri* Complex in Algeria. In Turkey Yıldırımhan (1999) reported *S. saxicolae* from *L. danfordi*, *L. saxicola*, *L. siculus*, and *Podarcis muralis* (Northwestern part of Turkey).

Uhlířová (2005) reported *S. eremiasi* from *Eremias velox caucasica* in Baku province, Azerbaijan; Murvanidze *et al.* (2008) reported *S. eremiasi* from *E. velox* in Georgia; Bakiyev and Kirillov (2007) reported *S. eremiasi* from a viperid snake, *Vipera ursinii* in Volga Basin, Russia.

The genus *Oochoristica* contains medium sized of tapeworm species parasitic as adults in reptiles and mammals (Hughes *et al.*, 1941; Yamaguthi, 1959). Hughes *et al.* (1941) published detailed report for *O. tuberculata* from different reptile species (*Acanthodactylus pardalis*, *Agama agama*, *A. sanguinolenta*, *Chalcides ocellatus*, *Eumeces schneiderii*, *L. agilis*, *L. lepida*, *L. muralis*, *L. ocellata*, *L. viridis*, *Ophisaurus apodus*, *Uromastix acanthinurus*,

Table 1. Helminths of *Eremias pleskei*, *E. strauchi* and *E. suphani* from Turkey

HELMINTH (Helm. Coll. No.)	Host	Developmental Stage	Site of Infection	No. of Infected Host (%)	Mean Intensity ( $\pm$ SD)	Range
<b>PHARYNGODONIDAE</b>						
<i>Spauligodon eremiasi</i> Markov et Bogdanov, 1961 (PAU-HELM-1/2013)	<i>E. strauchi</i>	Adult	SI, LI, R	5 (35.71)	11 ( $\pm$ 7.21)	3 – 21
	<i>E. suphani</i>	Adult	SI, LI, R	5 (25)	4.6 ( $\pm$ 6.42)	1 – 16
<i>Spauligodon saxicolae</i> Sharpilo, 1961 (PAU-HELM-2/2013)	<i>E. strauchi</i>	Adult	SI, LI, R	7 (50)	2.57 ( $\pm$ 1.27)	1 – 4
	<i>E. suphani</i>	Adult	SI, LI, R	6 (30)	8.17 ( $\pm$ 8.42)	1 – 22
<b>SPIRURIDAE</b>						
<i>Physaloptera</i> sp. (PAU-HELM-3/2013)	<i>E. suphani</i>	Adult	S	18 (90)	12.3 ( $\pm$ 9.75)	1 – 32
<b>LINSTOWIIDAE</b>						
<i>Oochoristica tuberculata</i> (Rudolphi, 1819) Lühe, 1898 (PAU-HELM-4/2013)	<i>E. suphani</i>	Adult	LI	4 (20)	4 ( $\pm$ 2.45)	2 – 7
<b>ACANTHOCEPHALA</b>						
Unidentified cystacanth (PAU-HELM-5/2013)	<i>E. pleskei</i>	Larval	SI	4 (40)	2.75 ( $\pm$ 1.50)	1 – 4

S: Stomach, SI: Small intestine; LI: Large intestine, R: Rectum

*Varanus griseus*, *Cerastes vipera*, *Eryx jaculus*, and *Psammophis sibilans*) in Spain and Africa, also Yamaguchi, (1959) reported this cestode from *Mabuya*, *Coelopeltis* (synonym of *Malpolon*) in Europe and Africa. So, there are several reptile host reports for *O. tuberculata* from different countries: Sharpilo *et al.* (2001) recorded *O. tuberculata* from *L. agilis* in Ukrain and Bulgaria; Ibrahim *et al.* (2005) reported *O. tuberculata* from *Chalcides ocellatus* in Libya; Bakiyev and Kirillov (2007) observed *O. tuberculata* from *V. berus* in Volga Basin, Russia; Murvanidze *et al.* (2008) recorded *O. tuberculata* from *A. caucasica*, and *L. strigata* in Georgia; Dugarov *et al.* (2012) recorded *O. tuberculata* from *E. argus* in Zabaikalie province, Russia. Yıldırımhan (1999) reported *O. tuberculata* from *L. viridis*; Yıldırımhan *et al.* (2006) observed *O. tuberculata* from *Laudakia caucasica* in Dogubayazıt (Ağrı Province), Turkey; Yıldırımhan *et al.* (2011) observed *O. tuberculata* from *L. trilineata* in Turkey (northwestern part). In this study, we observed *O. tuberculata* in *E. suphani*.

The genus *Physaloptera* members are parasitic nematodes in digestive tract, generally the stomach of mammals, birds, reptiles, and rarely amphibians. (Irwin-smith, 1921; Ortlepp, 1922; Yamaguthi, 1961). Ortlepp (1922) and Yamaguthi (1961) reported Physalopterid species from some reptile hosts (amphisbaenid, agamid, lacertid, varanid, chamaeleonid, elapid and viperids) from Europe (Spain, Italy), Asia (Turkistan), Africa (Algeria, Belgian Congo Morocco), South America (Brazil), USA and South Australia. Bakiyev and Kirillov (2007) reported a larval Physalopterid species (*P. clausa*) from *Natrix natrix*, *V. ursinii* from *V. berus* in Volga Basin, Russia; Schad *et al.* (1960) published an annotated list about some Turkish

vertebrates. They recorded *Physaloptera* sp. from *L. viridis* in Turkey. Also, Cirak *et al.* (2010) reported the Physalopterid species, (*P. clausa*) it was the highest prevalence which observed in necroscopied hedgehog's (*Erinaceus concolor*) stomachs in Turkey. We observed *Physaloptera* sp. in the stomachs of *E. suphani* samples. *E. strauchi*, represents new host records for *S. eremiasi*, *S. saxicolae*; *E. suphani* represents new host records for *S. eremiasi*, *S. saxicolae*, *Physaloptera* sp., and *O. tuberculata*, and also *E. pleskei* represents new host record for unidentified acanthocephalan (in cystacanth stage) in Turkey.

In conclusion, this study has expanded the geographical and host range distribution of various helminth species. Future studies should also expand the host-parasite list of Turkish reptile helminthofauna.

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