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## Research Note

**A helminthological research on three Lacertid lizards species: *Acanthodactylus harranensis* Baran *et al*, 2005, *Acanthodactylus schreiberi* Boulenger, 1878, and *Mesalina brevirostris* Blanford, 1874, collected from South and South-eastern regions of Turkey**S. DÜŞEN<sup>1\*</sup>, Y. KUMLUTAŞ<sup>2</sup>, Ç. ILGAZ<sup>2</sup>, A. AVCI<sup>3</sup>, H. YAKA GÜL<sup>1</sup>

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**Summary**

A total of 45 lizards (*Acanthodactylus harranensis* [n = 15], *Acanthodactylus schreiberi* [n = 9] and *Mesalina brevirostris* [n = 21]) were collected from South and Southeastern Regions of Turkey and examined for helminth fauna. *Acanthodactylus harranensis* harbored 1 species of Nematoda (*Skrjabinodon* sp.), 1 species of Cestoda (*Oochoristica tuberculata*) and 1 species of Acanthocephala (*Centrorhynchus* sp. [cystacanth]). *Acanthodactylus schreiberi* harbored unidentified cysticeroids. *Mesalina brevirostris* harbored 1 species of Nematoda (*Spauligodon saxicolae*). All lizards represents new host records for the helminths reported in this study.

**Keywords:** *Acanthodactylus harranensis*; *Acanthodactylus schreiberi*; Lacertidae; *Mesalina brevirostris*; helminth; Turkey

**Introduction**

The Southeastern Anatolia Region of Turkey is a region which influenced by both Mediterranean and continental climatic factors (Rosen, 1998). The region has geographically arid character. According to our current literature knowledge, there is not any helminthological study for the lacertid lizards species in this arid region from Turkey. But, there are some limited helminthological studies of the other lizards species (Gekkonidae and Amphisbaenidae) distributed in close to this region: Mimioğlu *et al* (1963) were reported cysticeroids of *Joyeuxiella pasqualei* from *Hemidactylus turcicus* in Adana province, and they also examined the transmission of this helminth to cats. Similarly, Tinar (1982, 1983) recorded a nematode species *Pharyngodon laevicauda* and a cestode species (*Joyeuxiella pasqualei*) in *H. turcicus* from Adana province. Yıldırımhan *et al*. (2008) were reported one nematoda (*Spauligodon laevicauda*) and one acanthocephala species (*Macracanthorhynchus catulinus*) in *H. turcicus* from Hatay province and Yıldırımhan *et al*. (2009) were also observed two nematode taxa (*Macropharyngodon micipsae* and

Thelastomatoid nematoda) in *Blanus strauchi* from Hatay province. The genus *Acanthodactylus* Wiegmann, 1834 is inhabited dry and sparsely vegetated regions is a large genus of lacertid lizard widespread in the Iberian Peninsula, all of North Africa and in the Arabian Peninsula, the Middle East (northward to S Turkey, including Cyprus), S Iran, Pakistan, Afghanistan, and NW India (Anderson, 1999).

*A. harranensis*, Baran *et al*, 2005 is known from a single locality, including the ruins of the Ancient University in Harran, Şanlıurfa, Turkey and an area covered by hardened grey sand with intermixed blocks of sedimentary fossiliferous rocks. The vegetation is a step, with scattered shrubs mostly less than 50 cm high. It has a plumped body with a total length up to 25 cm (Baran *et al.*, 2005; Baran *et al.*, 2012).

*A. schreiberi* Boulenger, 1878 is a smaller lizard species than the *A. harranensis* with a total length of up to 23 cm and found in known Cyprus and Turkey (Tamar *et al.*, 2014). The specimens of *A. schreiberi* were found within a grassy-bushy-sandy area in Turkey (Baran *et al.*, 2012).

*M. brevirostris* Blanford, 1874 is distributed from the Sinai Desert (southern tip and Tiran Island), Northern Saudi Arabia, Jordan, Lebanon, Iraq, Kuwait, South Western Iran, the islands of the Arabian Gulf, Pakistan, the Iranian Plateau, Bahrain, Qatar to United Arab Emirates (Ilgaz *et al.*, 2005). Its specimens can be found in the semi-desert plain amongst the numerous small stones. Also the various shrubs and annual grasses are commonly used as refuges. The total body length is up to 17 cm (Ilgaz *et al.*, 2005). So far, there have been no helminthological reports on *A. harranensis*, *A. schreiberi*, and *M. brevirostris* from Turkey. In this examination, helminths of these three lacertid species in Turkey are being reported for the first time.

## Materials and Methods

The lizard samples were studied in this study, were obtained from Dokuz Eylül University, Faculty of Science, Department of Biology, Zoology Museum Collection in İzmir, Turkey. Lizards were collected by hand between 2002 and 2009, in spring and summer seasons (April to June), from four different localities in South and South-eastern part of Turkey. *A. schreiberi* (1) (Botaş, Adana, 39 m asl, 36°53'1.01" N; 35°55'59.06" E), *A. harranensis* (3) (Harran, Şanlıurfa, 364 m. asl, 36°52'1.66" N; 39°1'26.93" E), and *M. brevirostris* (2), (4) (Ceylanpınar, Şanlıurfa, 354 m asl, 36°49'36.43" N; 40°0'34.88" E; Akçakale, Şanlıurfa, 350 m. asl, 36°43'19.03" N; 38°58'52.02" E) (Fig. 1).

In total, 15 adult *A. harranensis* (5 males, 10 females), 9 adult *A. schreiberi* (7 males, 2 females), and 21 adult *M. brevirostris* (15 males, 6 females) samples were examined for helminth parasites.

The mean±SD snout-vent length (SVL) of specimens were *A. harranensis* 83.44±4.80 mm, with a range from 74.90 to 90.48 mm; *A. schreiberi* 58.78±11.03 mm, with a range from 46.94 to 77 mm, and *M. brevirostris* 54.97±2.49 mm, with a range from 49.30 to 58.94 mm, respectively.

The body cavities of the lizards were opened by a standard longitudinal ventral incision. The alimentary canals were excised and separated into stomach, lungs, liver, small-large intestine and rectum. The contents of each part and other organs were poured into glass petri dishes for examination under a stereomicroscope with saline solution. Cestode samples were stained with acetocarmine, dehydrated, cleared in cedar oil; nematodes were also cleared in glycerol. Helminth samples were mounted in Canada Balsame or Entellan®. Acanthocephalan and cestode cyst samples were opened and larvae separated with thin dissection needles and thin brushes under a stereomicroscope. Intensities are presented as mean values 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-1-5/2014).

The data collected from adult hosts (*A. harranensis*) were analysed using Chi-square test with Minitab Version 14 (between two adult sexes and each observed helminth taxa individual numbers), *M. brevirostris* and *A. schreiberi* were not analysed due to insufficient observed helminth individual numbers in these lizard species. Also, simple linear regression analyses (Minitab Version 14) were performed (between host SVL and each observed helminth taxa individual numbers) for all studied lizards taxa.

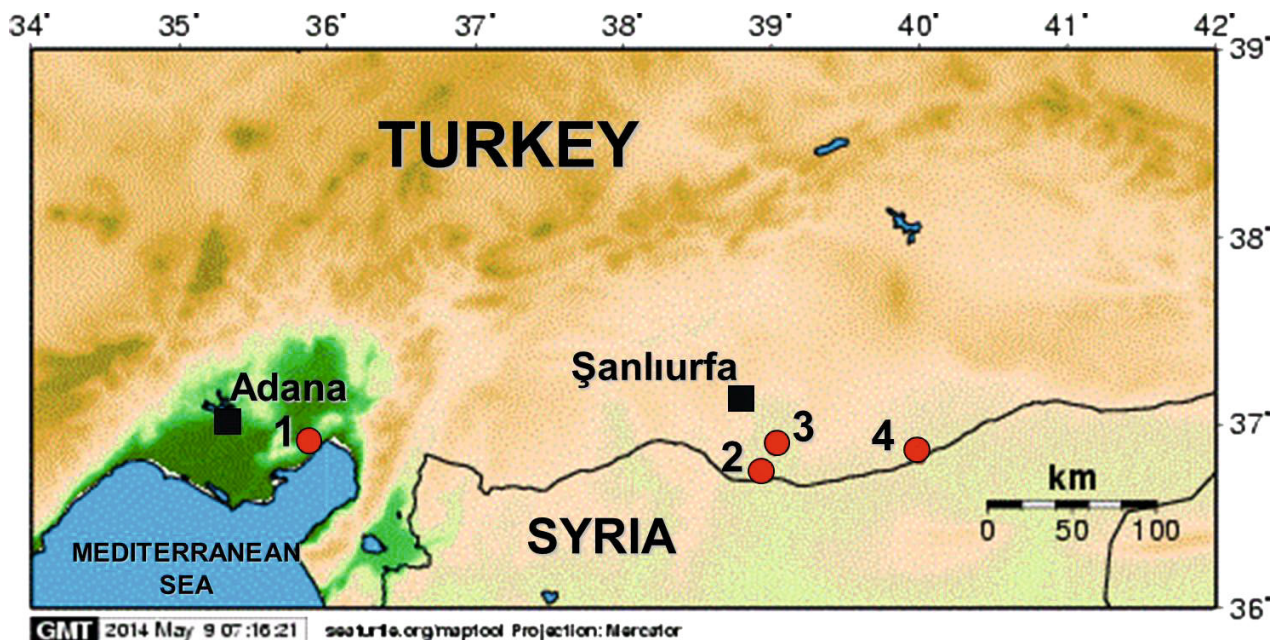


Fig. 1. The collection localities of *A. schreiberi*, *A. harranensis* and *M. brevirostris* from the South and Southeastern Region of Turkey (For localities numbers please see the Material and methods section)

## Results and Discussion

*A. harranensis* harbored 1 species of nematode (*Skrjabinodon* sp.), 1 species of cestode (*Oochoristica tuberculata*), and 1 species of acanthocephalan (*Centrorhynchus* sp., in cystacanth stage); *A. schreiberi* harbored only 1 unidentified cestode species (in cysticeroid stage) and *M. brevirostris* harbored 1 species of nematode (*Spauligodon saxicolae*).

Fifteen *A. harranensis* examined, 304 individuals of 3 helminth species were determined. Helminths were recorded the embedded in liver, mesenteries, the outer surface of stomach wall, small and large intestines of this species. No individual host was harbored more than 3 helminth species. Of the infected lizards, 5 (33.33 %) were harbored 2 species of helminth, 7 (46.66 %) were harbored 1 species of helminth, the remaining 3 (20 %) were uninfected. A total of  $25.10 \pm 14.88$  helminth individuals were found per infected host.

Five individuals of 1 unidentified cysticeroid stage cestode species were found 9 *A. schreiberi* samples. Helminths were recorded embedded in the small intestine mucosa of this species, 1 (11.11 %) individuals of *A. schreiberi* was harbored only 1 helminth; the remaining 8 (88.89 %) were uninfected. There is 1 helminth individual per infected host.

Twenty-one *M. brevirostris* examined, 138 individuals of 1 helminth species were observed. Helminths were recorded in the large intestine and rectum of this species, 14 (66.67 %) individuals of *M. brevirostris* was harbored only 1 helminth; the remaining 7 (33.33 %) lizard samples were uninfected. There were  $9.85 \pm 8.28$  helminth individuals were found per infected host. No helminths were observed in body cavities and the other organs of these three

lizard species. Data on helminth infections of *A. harranensis*, *A. schreiberi*, and *M. brevirostris* are presented in Table 1.

There is a significant difference between adult sexes of *A. harranensis* and observed helminth taxa individual numbers ( $X^2=34.113$ ; d.f.=2;  $P<0.05$ ). *Skrjabinodon* sp. and *O. tuberculata* individuals were observed in female lizards, *Centrorhynchus* sp. individuals is observed in male lizards. *M. brevirostris* and *A. schreiberi* were not analysed due to insufficient observed helminth individual numbers in these lizard species. According to results of the simple linear regression analyses: There is no significant correlation existing between SVL of *A. harranensis* and each observed individual numbers with *Skrjabinodon* sp. ( $f=0.03$ ; d.f.= 13;  $R^2 = 0.2$ ;  $P>0.05$ ), *O. tuberculata* ( $f=1.78$ ; d.f.= 13;  $R^2=12.1$ ;  $P>0.05$ ) and *Centrorhynchus* sp. ( $f=0.41$ ; d.f.= 13;  $R^2 = 3.1$ ;  $P>0.05$ ); there is no significant correlation was detected between SVL of *A. schreiberi* and each observed individual numbers with Unidentified cestode species (in cysticeroid stage) ( $f=0.00$ ; d.f.= 7;  $R^2 = 0$ ;  $P>0.05$ ). Similarly, there is no significant correlation reported between SVL of *M. brevirostris* and each observed individual numbers with *S. saxicolae* ( $f=0.94$ ; d.f.= 19;  $R^2=5$ ;  $P>0.05$ ).

The genus, *Spauligodon* includes a cosmopolitan group of nematode parasites of reptiles according to Bursley and Goldberg (2011a) 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*; Uhlřřov (2005) recorded *S. saxicolae* from *Darevskia caucasica*; Murvanidze *et al.* (2008) reported *Spauligodon saxicolae* in *Lacerta strigata*, *Darevskia saxicola* (formerly known as *Lacerta saxicola*), *D. rudis* (formerly known as *Lacerta rudis*) and *Dolichopsis jugularis*

Table 1. Helminths of *A. harranensis*, *A. schreiberi* and *M. brevirostris* from Turkey

HELMINTH, (Helm. Coll. No.)	Host	Developmental stage	Site of infection	No. of infected host (%)	Mean intensity	Range
<b>NEMATODA, Pharyngodonidae</b> <i>Spauligodon saxicolae</i> Sharpilo, 1961 (PAU-HELM-1/2014)	<i>M. brevirostris</i>	Adult	LI, R	66.67	9.85	2 – 35
<b>NEMATODA, Pharyngodonidae</b> <i>Skrjabinodon</i> sp. (PAU-HELM-2/2014)	<i>A. harranensis</i>	Adult	LI	66.67	25.10	5 – 62
<b>CESTODA</b> Unidentified cestode species (in cysticeroid stage) (PAU-HELM-3/2014)	<i>A. schreiberi</i>	Larval	SI	11.11	5	5
<b>CESTODA, Anoplocephalidae</b> <i>Oochoristica tuberculata</i> (Rudolphi, 1819) Luhe, 1898 (PAU-HELM-4/2014)	<i>A. harranensis</i>	Adult	SI	13.33	6	1 – 11
<b>ACANTHOCEPHALA, Centrorhynchidae</b> <i>Centrorhynchus</i> sp. (PAU-HELM-5/2014) (in cystacanth stage)	<i>A. harranensis</i>	Larval	ESS, M, L	33.33	8.20	2 – 24

ESS: External Surface of Stomach, L: Liver, LI: Large intestine, M: Mesenteries, R: Rectum, SI: Small intestine

(formerly known as *Coluber jugularis*); Carretero *et al.* (2011) observed *S. saxicolae* from *Podarcis vaucheri* complex. In Turkey, Yildirimhan (1999) reported *S. saxicolae* from *Anatololacerta danfordi* (formerly known as *Lacerta danfordi*), *D. saxicola*, *Podarcis siculus* and *P. muralis* (Northwestern part of Turkey); *S. saxicolae* was observed in *Eremias trauchi* and *E. suphani* collected from Eastern Part of Turkey (Dusen *et al.*, 2013). Also, Roca *et al.* (2015) reported *S. saxicolae* in the samples of *Darevskia rudis* from northern part of Turkey. In this study, *S. saxicolae* was observed for first time from *A. harranensis*.

The genus *Skrjabinodon* Inglis, 1968 has a widely distributed group of nematode parasites of reptile families. Inglis (1968) revised *Parathelandros* Diesing, 1861, retaining the genus for parasites of Australian amphibians and erecting *Skrjabinodon* as a new genus for parasites of reptiles (Burse & Goldberg, 1999). There are several reptile family members infected by different *Skrjabinodon* species were recorded by various researchers: Gekkonidae (Moravec & Baruš, 1990; Bursey & Goldberg, 1999; Hering-Hagenbeck *et al.*, 2002; Matsuo & Oku, 2002; Jones, 2013; Bursey & Brooks, 2010), Agamidae (Rezazadeh *et al.*, 2012), Corytophanidae (Burse & Brooks, 2010), Iguanidae (Bundy *et al.*, 1987; Bursey & Brooks, 2010; Bursey & Goldberg, 2007), Phrynosomatidae (Burse & Brooks, 2010), Polychrotidae (Burse & Brooks, 2010), Gymnophthalmidae (Burse & Goldberg, 2011b), Lacertidae (Roca & Ferragut, 1989; Hornero & Roca, 1992; Vicente *et al.*, 2000; Yildirimhan *et al.*, 2011), Anguidae (Burse & Goldberg, 2006), Teiidae (Burse & Brooks, 2010), and Scincidae (Vicente *et al.*, 2000; Hering-Hagenbeck *et al.*, 2002; Vicente *et al.*, 2002; Rocha *et al.*, 2003; Bursey *et al.*, 2008; Incedogan *et al.*, 2014). In this study, we observed for the first time *Skrjabinodon* sp. from *A. harranensis*.

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*, *Podarcis muralis* (formerly known as *Lacerta muralis*), *L. ocellata*, *L. viridis*, *Pseudopus apodus* (formerly known as *Ophisaurus apodus*), *Uromastix acanthinurus*, *Varanus griseus*, *Cerastes vipera*, *Eryx jaculus*, and *Psammophis sibilans*); also Yamaguthi, (1959) reported this cestode from *Mabuya*, *Coelopeltis* (synonym of *Malpolon*); Sharpilo *et al.* (2001) recorded *O. tuberculata* from *L. agilis*; Ibrahim *et al.* (2005) reported *O. tuberculata* from *Chalcides ocellatus*; Bakiyev and Kirillov (2007) observed *O. tuberculata* from *V. berus*; Murvanidze *et al.* (2008) recorded *O. tuberculata* from *A. caucasica*, and *L. strigata*; Dugarov *et al.* (2012) recorded *O. tuberculata* from *E. argus*. In Turkey, Yildirimhan (1999) reported *O. tuberculata* from *L. viridis* in Bursa Province; Yildirimhan *et al.* (2006) observed *O. tuberculata* from *Laudakia caucasica* in Dogubayazit (Ağrı Province); Yildirimhan *et al.* (2011) observed *O. tuberculata* from *L. trilineata* in Bursa Province. Also, Dusen *et al.* (2013) reported *O. tuberculata* from *E. suphani* collected from Eastern Part

of Turkey. Incedoğan *et al.* (2014) observed *O. tuberculata* from *Chalcides ocellatus* from middle and western parts of Mediterranean region of Turkey. In this study, we observed for the first time *O. tuberculata* from *A. harranensis*.

The adults of the acanthocephalan genus *Centrorhynchus* Lühe, 1911 (Polymorphida: Centrorhynchidae) are parasites mainly of birds of the orders Falconiformes and Strigiformes, but a few species are known from mammals and reptiles. With almost 90 species, this is the largest acanthocephalan genus occurring in birds of prey (Golvan, 1994; Richardson and Nickol, 1995). There are numerous amphibian, reptile, bird, and mammalian hosts records for *Centrorhynchus* species were presented by different researchers. Nickol (1969) observed cystacanths of *C. conspectus* from mesenteries in *Desmognathus fuscus* and *Plethodon glutinosus*; Marchand and Grita-Timoulali (1992) recorded a paratenic host *Bufo regularis*; Yildirimhan *et al.* (2005) observed cystacanths of *Centrorhynchus* sp. in *Pelophylax ridibundus* (formerly known as *Rana ridibunda*); Dos Santos *et al.* (2010) observed cystacanths of *Centrorhynchus* sp. in *Rhinella fernandezae* (in amphibian hosts). Ward (1940) reported cystacanths of *Centrorhynchus* sp. in intestinal wall of *Natrix sipedon*; Schmidt and Kuntz, (1969) reported the paratenic reptile hosts of *C. spilornae* in *Dinodon rufozonatum*, *Psammodynastes pulverulentis* *Agkistrodon acutus* and *Trimeresurus stejnegeri* (in reptile hosts).

Vanceleave (1918) recorded *C. pinguis* intestine of *Pica pica*; Ward (1956) observed *C. milvus* in *Milvus migrans*; Schmidt and Neiland (1966) reported *C. kuntzi* in *Buteo magnirostris*, *C. nicaraguensis* in *Dromococcyx phasianellus*, *C. crotophagicola* in *Playa cayana* and *Crotophaga sulcirostris*, *C. albidus* in *Ictinia plumbea*, and 1 unidentified *Centrorhynchus* species from *Tyto alba*; Schmidt and Kuntz (1969) observed *C. spilornae* and *C. amphibius* in *Spilornis cheela*, *Accipiter soloensis*, *A. virgatus affinis*, and *Hirundo rustica*; Thatcher and Nickol, (1972) observed *C. giganteum* and *C. tumidulus* in *Buteogallus urubitinga*, *Leucopternis semiplumbea* *Heterospizias meridionalis* and also, unidentified *Centrorhynchus* sp. in *Leucopternis princeps*. Nickol (1983) reported *C. kuntzi* and *C. spinosus* in *Bubo virginianus*, *Buteo jamaicensis*, *B. lineatus*, *B. platypterus*, *Melanerpes carolinus*, and *Strix varia*; Ewald and Crompton (1993) reported *C. aluconis* in *Strix aluco*; Tezel *et al.* (2014) recorded *C. amphibius* in *B. buteo* (in bird hosts).

Cable and Quick (1954) reported cystacanths of *Centrorhynchus* sp. from *Herpestes javanicus auropunctatus*; Richardson (1993) cystacanths of *C. wardae* in *Didelphis virginiana*; Yabsley and Noblet, (1999) observed the cystacanths of *C. conspectus* in *Procyon lotor*; Kirillova and Kirillov (2007) reported cystacanths of *C. aluconis* in *Sorex araneus* (in mammalian hosts). In this study, we observed for the first time *Centrorhynchus* sp. from *A. harranensis*, in view of the results obtained, it can be concluded that *Centrorhynchus* sp. parasitised *A. harranensis* as a paratenic host in Turkey.

In summary: *A. harranensis* represents new host records for *O. tuberculata*, *Skrjabinodon* sp., and *Centrorhynchus* sp. (in

cystacanth stage), *A. schreiberi* represents new host record for unidentified cestode species (in cysticeroid stage), and also, *M. brevirostris* represents new host records for *S. saxicolae*; from Turkey. In this investigation, we expanded the zoogeographical and host-range distribution of various helminth species of Turkish reptile helminth fauna.

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## References

- ANDERSON, S.C. (1999): The lizards of Iran. *Contributions to Herpetology*. Society for the Study of Amphibians and Reptiles. Saint Louis, Missouri, Vol. 15, i – vii, 1 – 442 pp.
- BARAN, I., İLGAZ, Ç., AVCI, A., KUMLUTAŞ, Y., OLGUN, K. (2012): *Türkiye Amfibi ve Sürüngenleri (Turkish Amphibians and Reptiles)*. TÜBİTAK Popüler Bilim Kitapları, TÜBİTAK, Ankara. 204 pp. ISBN: 9789754037036 (In Turkish)
- BAKIEV, A.G. KIRILLOV, A.A. (2007): Preliminary results of research on snake parasites from the Volga basin. Report 1 “The protozoa and helminths”. The Bulletin of the Biological Sciences of Mordovia University 4: 60 – 69 (In Russian)
- BARAN, İ., KUMLUTAŞ, Y., LANZA, B., SINDACCO, R., İLGAZ, Ç., AVCI, A., CRUCITTI, P. (2005): *Acanthodactylus harranensis*, A new species of lizard from Southeastern Turkey. *Mus. Reg. Sci. Nat. (Torino)*, 23(1): 323 – 341
- BUNDY, D.A.P., VOGEL, P. HARRIS, E.A. (1987): Helminth parasites of Jamaican anoles (Reptilia: Iguanidae): A comparison of the helminth fauna of 6 *Anolis* species. *J. Helminthol.*, 61(1): 77 – 83. DOI: 10.1017/S0022149X00009767
- BURSEY, C.R., GOLDBERG, S.R. (1999): *Skrjabinodon piankai* sp. n. (Nematoda; Pharyngodonidae) and other helminths of Geckos (Sauria: Gekkonidae: *Nephruros* spp.) from Australia. *J. Helminthol. Soc. W.*, 66(2): 175 – 179
- BURSEY, C.R., GOLDBERG, S.R. (2006): Helminths in *Mesaspis monticola* (Squamata: Anguillidae) from Costa Rica, with the description of a new species of *Entomelas* (Nematoda: Rhabdiasidae) and a new species of *Skrjabinodon* (Nematoda: Pharyngodonidae). *Parasite*, 13(3): 183 – 191. DOI: 10.1051/parasite/2006133183
- BURSEY, C.R., GOLDBERG, S.R. (2007): New species of *Skrjabinodon* (Nematoda: Pharyngodonidae) in *Uracentron flaviceps* (Squamata: Iguanidae) from Ecuador and Peru. *J. Parasitol.*, 93(4): 866 – 869. DOI: 10.1645/GE-1136R.1
- BURSEY, C.R., BROOKS, D.R. (2010): Nematode parasites of 16 lizard species from the area de conservación Guanacaste, Costa Rica. *Comp. Parasitol.*, 77(2): 232 – 235. DOI: 10.1654/4429.1
- BURSEY, C.R., GOLDBERG, S.R. (2011a): A new species of *Spauligodon* (Nematoda: Oxyuroidea: Pharyngodonidae) in *Latastia longicaudata* (Sauria: Lacertidae) from Kenya. *J. Parasitol.*, 97(3): 460 – 462. DOI: 10.1645/GE-2645.1
- BURSEY, C.R., GOLDBERG, S.R. (2011b): Helminths of *Pholidobolus montium* (Sauria: Gymnophthalmidae) from Ecuador with description of a new species of *Skrjabinodon* (Nematoda: Oxyuroidea: Pharyngodonidae). *J. Parasitol.*, 97(1): 94 – 96. DOI: 10.1645/GE-2591.1
- BURSEY, C.R., GOLDBERG, S.R., KRAUS, F. (2008): Gastrointestinal helminths from two species of skink from Papua New Guinea, including two new species of *Skrjabinodon* (Nematoda, Pharyngodonidae). *Acta Parasitol.*, 53(3): 268 – 273. DOI: 10.2478/s11686-008-0037-4
- CABLE, R.M., QUICK, L.A. (1954): Some Acanthocephala from Puerto Rico with the description of a new genus and three new species. *T. Am. Microsc. Soc.* 73(4): 393 – 400. DOI: 10.2307/3223584.
- CARRETERO, M.A., ROCA, V., LARBES, S., FERRERO, A., JORGE, F. (2011): Intestinal helminth parasites of wall lizards, *Podarcis vaucheri* complex (Sauria: Lacertidae) from Algeria. *J. Herpetol.*, 45(3): 385 – 388. DOI: 10.1670/10-118.1
- DOS SANTOS V.G.T., AMATO, S.B. (2010): *Rhinella fernandezae* (Anura, Bufonidae) a paratenic host of *Centrorhynchus* sp. (Acanthocephala, Centrorhynchidae) in Brazil. *Rev. Mex. Biodivers.*, 81:53 – 56
- DUGAROV, ZH.N., BALDANOVA, D.R., KHAMNUEVA, T.R. (2012): Parasite of the Lizard *Eremias argus* Peters, 1869 in Zabaikalie. *Parazitologiya*, 46(6): 463 – 471 (In Russian with English abstract)
- DUSEN, S., KUMLUTAŞ, Y., İLGAZ, Ç., YAKA, H., KARADAYI, F. (2013): 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. *Helminthologia*, 50(2), 108 – 111. DOI: 10.2478/s11687-013-0117-3
- EWALD, J.A., CROMPTON, D.W.T. (1993): *Centrorhynchus aluconis* (Acanthocephala) and other helminth species in Tawny Owls (*Strix aluco*) in Great Britain. *J. Parasit.*, 79(6): 952 – 954. DOI: 10.2307/3283737
- GOLVAN, Y.J. (1994): Nomenclature of the Acanthocephala. *Res. Rev. Parasitol.*, 54: 135 – 205
- HERING-HAGENBECK, S.F.B.N., PETTER, A.J., BOOMKER, J.D.F. (2002): Redescription of some *Spauligodon* spp. and *Parapharyngodon* spp., and of *Skrjabinodon mabuyae* (Sandground, 1936) Inglis, 1968 (Pharyngodonidae: Oxyuroidea) from insectivorous South African lizards. *Onderstepoort J. Vet.*, 69: 7 – 29.
- HORNERO, M.J., ROCA, V. (1992): Redescription of *Skrjabinodon medinae* (García-Calvente, 1948) (Nematoda: Pharyngodonidae) from the cloaca of *Podarcis pityusensis* (Bosca, 1883) (Sauria: Lacertidae) of the Balearic Islands (Spain). *Syst. Parasitol.*, 23(1), 31 – 35. DOI 10.1007/BF00008006
- HUGHES, R.C., BAKER, J.R., DAWSON, C.B. (1941): The Tapeworms of

- Reptiles, Part I. *Am. Mid. Nat.*, 25(2): 454 – 468. ISSN: 00030031
- IBRAHIM, H.M.S., FADIEL, M.M., NAIR, G.A. (2005): Gastrointestinal helminths of the lizard *Chalcides ocellatus* from Benghazi, Libya. *J. Helminthol.*, 79, 35 – 39. DOI: 10.1079/JOH2004258
- IKROMOV, E.K., CHO, M.R. (2004): On new representatives of the helminth fauna of reptiles (Testudines and Sauria) in Uzbekistan. *J. Asia-Pacific. Entomol.*, 7: 13 – 17. DOI: 10.1016/S1226-8615(08)60196-X
- ILGAZ, Ç., BARAN, İ., KUMLUTAŞ, Y., AVCI, A. (2005): A new record of *Mesalina brevisrostris* (Reptilia: Sauria: Lacertidae) from South-eastern Anatolia. *J. Herpetol.*, 12(3): 230 – 236
- INCEDOGAN, S., YILDIRIMHAN, H.S., BURSEY, C.R. (2014): Helminth parasites of the Ocellated Skink, *Chalcides ocellatus* (Forsk., 1775) (Scincidae) from Turkey. *Comp. Parasitol.*, 81(2): 260 – 269. DOI: 10.1654/4708.1
- INGLIS, W.G. (1968): Nematodes parasitic in western Australian frogs. *Bull. Br. Mus. Nat. Hist. Zool.*, 16: 161 – 183
- JONES, H.I. (2013): Gastrointestinal nematodes from three species of Australian Leaf-tailed Geckos (Reptilia: *Saltuarius* spp.), with descriptions of new species of *Skrjabinodon* (Oxyuroidea: Pharyngodonidae) and *Hedruris* (Habronematoidea: Hedruridae). *Comp. Parasitol.*, 80(1): 47 – 59. DOI: 10.1654/4590.1
- JORGE, F., CARRETERO, M.A., PERERA, A. HARRIS, D.J., ROCA, V. (2012): A new species of *Spauligodon* (Nematoda: Oxyurida: Pharyngodonidae) in geckos from São Nicolau Island (Cape Verde) and its phylogenetic assessment. *J. Parasitol.*, 98(1): 160 – 166. DOI: 10.1645/GE-2856.1
- KIRILLOVA, N.JU., KIRILLOV, A.A. (2007): First finding of the *Centrorhynchus aluconis* (Muller, 1780) (Giganthorhynchidae) and *Moniliformis moniliformis* Bremser, 1811 (Moniliformidae) larvae in Shrews (Insectivora: Soricidae) of the fauna of Russia. *Parazitologija*, 41(1): 82 – 85 (In Russian, with English abstract)
- MARCHAND, B., GRITA-TIMOULALI, Z. (1992): Comparative ultrastructural study of the cuticle of larvae and adults of *Centrorhynchus milvus* Ward, 1956 (Acanthocephala, Centrorhynchidae). *J. Parasitol.*, 78(2): 355 – 359. DOI: <http://dx.doi.org/10.2307/3283488>
- MATSUO, K., OKU, Y. (2002): Endoparasites of three species of house geckoes in Lampung, Indonesia. *J. Helminthol.*, 76(1): 53 – 57. DOI: 10.1079/JOH200197
- MILLER ROSEN, A. (1998): *Early to Mid-Holocene Environmental Changes and Their Impact on Human Communities in Southeastern Anatolia*. (Water, Environment and Society in Times of Climatic Change. Eds. Arie S. Issar and Neville Brown). Volume 31 of the series Water science and Technology Library, Springer-Science+Business Media, B.V. 215 – 240 pp. DOI: 10.1007/978-94-017-3659-6
- MIMIOĞLU, M., SAYIN, F. (1963): The Cysticercoides in Lizard (*Hemidactylus turcicus*) and their Transmission to a Cat", *Ankara Üniv. Vet. Fak. Derg.* 10: 103 – 109. DOI: 10.1501/vetfak\_0000001998
- MORAVEC, F., BARUŠ, V. (1990): Some nematode parasites from amphibians and reptiles from Zambia and Uganda. *Acta Soc. Zool. Bohem.*, 54(3): 177 – 192
- MURVANIDZE, L., LOMIDZE, T.S., NIKOLAISHVILI, K., JANKARASHVILI, E. (2008): The annotated list of reptile helminths of Georgia. *Proceedings of the Institute of Zoology Tbilisi*, 23, 54 – 61
- NICKOL, B.B. (1969): Acanthocephala of Louisiana caudata with notes on the life history of *Centrorhynchus conspectus*. *Am. Midl. Nat.*, 81(1): 262 – 265. DOI: 10.2307/2423672
- NICKOL, B.B. (1983): *Centrorhynchus kuntzi* from the USA with description of the male and redescription of *C. spinosus* (Acanthocephala: Centrorhynchidae). *J. Parasitol.*, 69(1): 221 – 225. DOI: 10.2307/3281303
- REZAZADEH, E., TAJBAKHS, F., BURSEY, C.R., MOBEDI, I., KIABI, B.H., HEMMATI, F., AHMADZADEH, F. (2012): Helminth parasites of the Caucasian agama, *Laudakia caucasia* (Squamata: Agamidae), from Iran. *Comp. Parasitol.*, 79(1): 160 – 163. DOI: 10.1654/4537.1
- RICHARDSON, D.J. (1993): Acanthocephala of the *Virginia opossum* (*Didelphis virginiana*) in Arkansas, with a note on the life history of *Centrorhynchus wardae* (Centrorhynchidae). *J. Helminthol. Soc.*, 60(1): 128 – 130
- RICHARDSON, D.J., NICKOL, B.B. (1995): The genus *Centrorhynchus* (Acanthocephala) in North America with description of *Centrorhynchus robustus* n. sp., redescription of *Centrorhynchus conspectus*, and a key to species. *J. Parasitol.* 81(5): 767 – 772. DOI: <http://dx.doi.org/10.2307/3283971>
- ROCA, V., FERRAGUT, M.V. (1989): The helminth fauna of *Lacerta schreiberi* in Central Iberia. *Rev. Iber. Parasitol.*, 49(4): 291 – 300
- ROCHA, C.F.D., VRCIBRADIC, D., VICENTE, J.J., CUNHA-BARROS, M. (2003): Helminths infecting *Mabuya dorsivittata* (Lacertilia, scincidae) from a high-altitude habitat in Itatiaia National Park, Rio de Janeiro State, Southeastern Brazil. *Braz. J. Biol.*, 63(1): 129 – 132. DOI: 10.1590/S1519-69842003000100017
- ROCA, V., JORGE, F., ILGAZ, C., KUMLUTAS, Y., DURMUŞ, S.H., CARRETERO, M. A. (2015): The gastrointestinal helminth community of the Spiny-Tailed lizard *Darevskia rudis* from Northern Turkey. *J. Helminthol.*, DOI:10.1017/S0022149X14000911
- SCHMIDT, G.D., NEILAND, K.A. (1966): Helminth fauna of Nicaragua. III. some Acanthocephala of birds, including three new species of *Centrorhynchus*. *J. Parasitol.*, 52(4): 739 – 745. DOI: 10.2307/3276447
- SCHMIDT, G.D., KUNTZ, R.E. (1969): *Centrorhynchus spilomae* sp. n. (Acanthocephala), and other Centrorhynchidae from the Far East. *J. Parasitol.*, 55(2): 329 – 334. DOI: 10.2307/3277401
- SHARPILO, V.P., BISERKOV, V., KOSTADINOVA, A., BEHNKE, J.M., KUZMIN, Y. I. (2001): Helminths of the sand lizard, *Lacerta agilis* (Reptilia, Lacertidae), in the Palaearctic: faunal diversity and spatial patterns of variation in the composition and structure of component communities. *Parasitology*, 123(4): 389 – 400. DOI: 10.1017/S0031182001008587
- TAMAR, K., CARRANZA, S., SINDACO, R., MORAVEC, J., MEIRI, S. (2014): Systematics and phylogeography of *Acanthodactylus schreiberi* and its relationships with *Acanthodactylus boskianus* (Reptilia: Squamata: Lacertidae). *Zool J Linn Soc*, 172 (3): 720–739. DOI: 10.1111/zoj.12170

- TEZEL, M., GIRIŞGIN, A.O., BIRLIK, S., YILDIRIMHAN, H.S., ŞENLİK, B. (2014): Helminths of the digestive tract in *Buteo buteo* (Falconiformes: Falconidae) in Bursa province of Northwest Turkey. *Turk. J. Zool.*, 38, 1 – 5. DOI: 10.3906/zoo-1403-24
- THATCHER, V.E., NICKOL, B.B. (1972): Some Acanthocephalans from Panama and Colombia. *J. Helminthol. Soc. W.*, 39(2): 245 – 248
- TINAR, R. (1982): Une nouvelle observation chez les lézards (*Hemidactylus turcicus*) de la région au sud de l'Anatolie: *Phryngodon laevicauda* Seurat, 1914 (Güney Anadolu bölgesi *Hemidactylus turcicus* türü kertenkelelerde *Phryngodon laevicauda* Seurat, 1914 bulgusu). *Ankara Üniv Vet Fak Derg*, 29(1 – 2): 164 – 174. DOI: 10.1501/vetfak\_0000000102 (In Turkish with French Abstract)
- TINAR, R. (1983): Recherches Helminthologiques chez les Lézards (*Hemidactylus turcicus*) de la Région sud de l'Anatolie (Güney Anadolu bölgesinden yakalanan *Hemidactylus turcicus* türü kertenkelelerde *helmintholojik araştırmalar*). *Uludağ Üni Vet Fak Derg*, 2(1): 1 – 7 (In Turkish with French Abstract)
- UHLIŘOVÁ, M. (2005): Comparative study on the fauna of parasitic Oxyuroidea (Nematoda: Oxyuroidea) of reptiles from Azerbaijan and selected areas of the Near East. *Helminthologia*, 42(3): 171 – 186
- VANCLEAVE, H. J. (1918): *Centrorhynchus pinguis* n. sp. from China. *J. Parasitol.*, 4(4): 164 – 167. DOI: 10.2307/3271243.
- YABSLEY, M.J., NOBLET, G.P. (1999): Nematodes and Acanthocephalans of Raccoons (*Procyon lotor*), with a new geographical record for *Centrorhynchus conspectus* (Acanthocephala) in South Carolina, U.S.A. *J. Helminthol. Soc. W.*, 66(2): 111 – 114
- VICENTE, J.J., VRCIBRADIC, D., MUNIZ-PEREIRA, L.C., PINTO, P.M. (2000): *Skrjabinodon heliocostai* sp. n. (Nematoda, Pharyngodonidae) parasitizing *Mabouya frenata* (Cope) (Lacertilia, Scincidae) in Brazil and the reallocation of *Skrjabinodon capacyupanquii* (Freitas, Vicente & Ibanez) in the genus *Thelandros* Wedl. *Rev. Bras. Zool.*, 17(2): 361 – 367. DOI: 10.1590/S0101-81752000000200006
- VICENTE, J.J., VRCIBRADIC, D., ROCHA, C.F.D., PINTO, R.M. (2002): Description of *Skrjabinodon spinosulus* sp. n. (Nematoda, Oxyuroidea, Pharyngodonidae) from the Brazilian lizard *Mabouya dorsivittata* Cope, 1862 (Scincidae). *Rev. Bras. Zool.*, 19(1): 157 – 162. DOI: 10.1590/S0101-81752002000100014
- YAMAGUTI, S. (1959): *Systema Helminthum: The Cestodes of Vertebrates*. Vol. II. Intersciences Publishers, London, England 860 pp.
- WARD, H. L. (1940): Notes on Juvenile Acanthocephala. *J. Parasitol.*, 26(3): 191 – 194. DOI: 10.2307/3272207
- WARD, H.L. (1956): A new species of *Centrorhynchus* (Acanthocephala) from the Kite, *Milvus migrans*, in Egypt. *J. Parasitol.*, 42(1): 39 – 41. DOI: 10.2307/3274618
- YILDIRIMHAN, H.S. (1999): Helminth fauna of lizards species belonging to Lacertidae (Reptilia) family distributed in Bursa and its around (PhD thesis). Uludağ University, Institute of Science. 120 pp, Bursa (In Turkish, with English abstract)
- YILDIRIMHAN, H.S., KARADENİZ, E., GÜRKAN, E., KOYUN, M. (2005): Türkiye'nin değişik bölgelerinden toplanan Ova Kurbağası (*Rana ridibunda* PALLAS, 1771; Anura)'nın Metazoon parazitleri. *Acta Parasitol. Turcica*, 29(2): 135 – 139 (In Turkish with English abstract)
- YILDIRIMHAN, H.S., GOLDBERG, S.R., BURSEY, C.R. (2006): Helminth parasites of the Caucasian agama, *Laudakia caucasia*, and the rougtail rock agama, *Laudakia stellio* (Squamata: Agamidae), from Turkey. *Comp. Parasitol.*, 2(73): 257 – 262. DOI: 10.1654/4205.1
- YILDIRIMHAN, H.S., SÜMER N., YILMAZ, N. (2008): Helminth Fauna of *Hemidactylus turcicus* (Linnaeus, 1758) (Turkish Gecko) Collected From Hatay. *Acta Parasitol. Turcica*, 32(4): 393 – 395 (In Turkish with English abstract)
- YILDIRIMHAN, H.S., YILMAZ, N., İNCEDOĞAN, S. (2009): Helminth Fauna of the Anatolian Worm Lizard, *Blanus strauchi* (Bedriaga, 1884) from Hatay. *Acta Parasitol. Turcica*, 33(4): 327 – 329
- YILDIRIMHAN, H.S., BURSEY C.R., ALTUNEL, F.N. (2011): Helminth parasites of the Balkan green lizard, *Lacerta trilineata* Bedriaga 1886, from Bursa, Turkey. *Turk. J. Zool.*, 35(4): 519 – 535. DOI: 10.3906/zoo-0910-1