

# Helminths of the Two Mountain Frogs, Banded Frog, *Rana camerani* Boulenger, 1886 and Uludağ Frog *Rana macrocnemis* Boulenger, 1885 (Anura: Ranidae), Collected from the Antalya Province

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**SUMMARY:** In this study, two mountain frogs (*Rana camerani* and *Rana macrocnemis*) were collected in the Antalya Province in south-western Turkey during 2001 and 2002 and were examined for helminths. Out of 15 *Rana camerani*, 10 (66.7%) were infected with 1 or more helminths and out of 20 *Rana macrocnemis*, 17 (85%) were infected with 1 or more helminths. The helminth fauna of *Rana camerani* included 4 species of which were 3 trematode species (*Haplometra cylindracea*, *Pleurogenoides medians*, *Opisthioglyphe rastellus*), and 1 nematode species (*Cosmocerca ornata*). The helminth fauna of *Rana macrocnemis* included 3 species with 1 trematode species (*H. cylindracea*), 1 nematode species (*C. ornata*), and 1 acanthocephalan species (*Acanthocephalus ranae*). *H. cylindracea* and *C. ornata* were observed in both of the mountain frogs.

**Key Words:** *Rana camerani*, *Rana macrocnemis*, helminths, Turkey

## Antalya Yöresinden Toplanan İki Dağ Kurbağasının, *Rana camerani* Boulenger, 1886 (Şeritli Kurbağa) ve *Rana macrocnemis* Boulenger, 1885 (Uludağ Kurbağası) (Anura: Ranidae)'in Helmintleri

**ÖZET:** Bu çalışmada, Türkiye'nin güneybatısında yer alan Antalya yöresinden 2001-2002 yılları arasında toplanan iki dağ kurbağasının (*Rana camerani* ve *Rana macrocnemis*) helmintleri incelenmiştir. 15 *Rana camerani* örneğinin 10 (%66,70)'u ile 20 *Rana macrocnemis* örneğinin 17 (%85)'sinin bir ya da birden fazla helmintle infekte olduğu tespit edilmiştir. *R. camerani*'de 4 helmint türü tespit edilmiş olup, bunlardan 3'ü Trematoda'dan *Haplometra cylindracea*, *Pleurogenoides medians*, ile *Opisthioglyphe rastellus* ve biri de Nematoda'dan *Cosmocerca ornata*'dır; *R. macrocnemis*'te tespit edilen 3 helmint türünden biri Trematoda'dan *H. cylindracea*, biri Nematoda'dan *C. ornata* ve diğeri de Acanthocephala'dan *Acanthocephalus ranae*'dir. *H. cylindracea* ve *C. ornata* her iki dağ kurbağasında da gözlenmiştir.

**Anahtar Sözcükler:** *Rana camerani*, *Rana macrocnemis*, helmint, Türkiye

## INTRODUCTION

The banded frog *Rana camerani* Bolenger, 1886 is inhabits open areas in forests and damp grassland near streams, sometimes seen close to the wetlands in woods. A montane form, it is not present in lowland plains. In Turkey, this species inhabits mountainous areas in west and middle Anatolia and high plains (over 1000 m) in east Anatolia. The Uludağ Frog *Rana macrocnemis* Boulenger, 1885 is usually inhabits the vicinities of small streams in open fields or forested areas, also wet grasslands and other places in close

proximity to water bodies. In Turkey found in west, south and north Anatolia. A typical montane form with vertical distribution between 1000-2300 m (2). To our knowledge, only one study reported helminths in *R. camerani* (17) from southwest of Iran, and one study (39) have been previously reported regarding helminths of *R. camerani* in Turkey; however there are several reports of helminths in *R. macrocnemis* (3, 33, 41). Nothing has been published helminths of *Rana camerani* and *R. macrocnemis* from Antalya province, south-western Turkey.

## MATERIALS AND METHODS

Fiveteen *R. camerani* (5 males and 10 females) mean snout-length (SVL) = 58.50 mm ± 7.72 SD were collected by

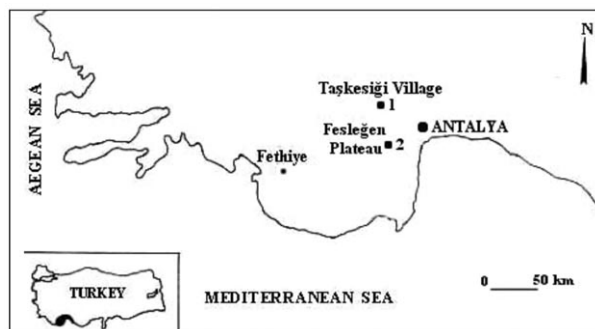
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dip net in April to October 2001 from the Fesleğen plateau in the Taurus Mountains, 1850 m elevation (36° 51' N, 30° 24' E), and 20 *R. macrocnemis* (13 males and 7 females) mean snout-vent length (SVL) = 51.33 mm ± 14.79 were collected by dip net and by hand between 2001 and 2002 (April to November) from the Taşkesiği Village (Korkuteli) 1515 m elevation (37° 11' N – 30° 00' E) were examined for helminth parasites. Within 48 hr, frogs were over-anaesthetized in ether-filled glass containers. The body cavity was opened by a longitudinal ventral incision. The alimentary canal was excised and separated into stomach, small intestine, large intestine and rectum. The contents of each part and other organs (lungs, liver, gall bladder, kidneys and urinary bladder) were each mixed with 0.5% saline solution and were poured into petri dishes for examination under a stereomicroscope. The muscles, plus portions of peritoneum and spinal cord, were teased out with needles and examined under a stereomicroscope. Trematodes were immobilized by heat, fixed, and stored in 70% ethanol. Nematodes were straightened by heat, fixed, and stored in 70% ethanol with 5% glycerol. Acanthocephalans were relaxed in saline and heat-fixed under slight coverslip pressure in warm alcohol-formalin-acetic acid. Digeneans and acanthocephalans were stained with aceto-carmin, dehydrated, cleared in cedar oil or xylol, and mounted in Canada balsam; nematodes were cleared in glycerol and examined. Parasite species were identified using different references (1, 5, 21, 27, 28, 29, 30, 31). Intensities are presented as mean values (± SD) followed by the range.

## RESULTS

### *Rana camerani* Boulenger, 1886

Fifteen *R. camerani* (5 males and 10 females) were collected in April to October 2001 from the Fesleğen plateau in the Taurus Mountains, 1850 m elevation in Antalya province in south-western Turkey, ranging from 36° 51' N to 30° 24' E (Fig 1).



**Figure 1.** Collecting localities of *Rana camerani* and *Rana macrocnemis* in south-west Turkey; elevations and coordinates given in parentheses: 1. Taşkesiği Village (Korkuteli) (37° 11' N, 30° 00' E; 1515 m), 2. Fesleğen Plateau (36° 51' N, 30° 24' E; 1850 m)

## Trematoda

### *Pleurogenoides medians* (Olsson, 1876) Travassos, 1921

Synonym: *Distomum medians* Olsson, 1876; *Pleurogenes medians* (Olsson, 1876).

Prevalence and intensity: Hosts infected, 3 of 15 (20%); mean intensity 3.33 ± 2.51, (1-6). Temporal distribution: April 2001, 1 host with 4; May 2001, 3 hosts with 6, 1, 6 respectively.

Locality: Fesleğen Plateau

Sites of infection: Small intestine

Other reported hosts: *Bufo vulgaris* (28); *Triturus vulgaris*, *Bombina bombina*, *B. variegata*, *Bufo viridis*, *B. calamita*, *Rana arvalis* (27); *Bufo bufo* (24, 25); *R. esculenta* (5, 16, 27); *R. temporaria* (7, 27); *R. dalmatina* (5); *Lacerta trilineata* (35); *Rana ridibunda* (5, 9, 16, 20, 31, 38); *H. arborea* (8, 27), and *Rana macrocnemis* (41).

Geographic range: Europe, Asia (28); Australasian Regions (21).

### *Haplometra cylindracea* (Zeder, 1800) Loos, 1899

Synonym: *Distoma cylindraceum* Zeder, 1800.

Prevalence and intensity: Hosts infected, 9 of 15 (60%); mean intensity 5.33 ± 8.21, (1- 27). Temporal distribution: April 2001, 1 host with 1; May 2001, 3 hosts with 2, 4, 27 respectively; June 2001, 3 host with 1, 4, 2 respectively; October 2001, 2 hosts with 2, 5 respectively.

Locality: Fesleğen Plateau

Site of infection: Lung

Other reported hosts: *Bufo bufo*, *Bombina bombina*, *B. variegata*, *Rana dalmatina*, *R. esculenta*, *R. lessonae* (27), *B. viridis* (19, 27), *R. ridibunda* (5, 27), *R. temporaria*, *R. arvalis* (7, 27), *R. macrocnemis* (21), *Rana holtzi* (41).

Geographic range: *H. cylindracea* is common parasite of frogs throughout Europe and northern Asia, as far as eastern Siberia (21).

### *Opisthioglyphe rastellus* (Olsson, 1876) Loos 1907

Synonym: *Distomum rastellus* Olsson, 1876; *Distomum Endolobum* Linstow, 1888; *Opisthioglyphe hystrix* Nicoll, 1926; *Opisthioglyphe rastellus* Loos, 1907; *Lecithophyge rastellus rastellus* Perkins, 1928; *Lecithophyge rastellus subulatum* Perkins, 1928; *Lecithophyge rastellus cylindracea* Perkins, 1928, *Dolichosaccus rastellus* (Olsson, 1876) Travassos, 1930.

Prevalence and intensity: Hosts infected, 10 of 15 (66.66%); mean intensity 6.27 ± 5.62, (2-22). Temporal distribution: April 2001, 2 hosts with 6, 8 respectively, May 2001, 2 hosts with 7, 22 respectively; June 2001, 3 hosts with 3, 6, 4 respectively; October 2001, 3 hosts with 4, 3, 6 respectively.

Locality: Fesleğen Plateau

Site of infection: Intestine

Other reported hosts: *Bombina bombina* (27), *R. temporaria* (5, 7, 27), *R. arvalis* (7, 27), *R. ridibunda* (5, 13), *R. graeca* (4, 5), *B. variegata* (10, 27), *R. ridibunda* (5, 13), *Mertensiella caucasica* (39), *Rana macrocnemis* and *R. holtzi* (41).

Geographic range: Europe, Asia (27).

#### Nematoda

##### ***Cosmocerca ornata* (Dujardin, 1845) Diesing, 1861**

Synonym: *Cosmocerca miniscula* Travassos, 1931; *Cosmocercella polissensi* Maguza, 1972; *Paracosmocerca mucronata* Kung and Wu, 1945; *Cosmocerca indica* Nama and Khichi, 1973; *Paracosmocerca spinocerca* Rao, 1979; *Cosmocerca macrogubernaculum* Rao, 1979)

Prevalence and intensity: Hosts infected, 2 of 15 (13.33%); mean intensity  $25.5 \pm 34.64$  (1-50). Temporal distribution: October 2001, 2 host with 1, 50 respectively.

Locality: Fesleğen Plateau

Site of infection: Large intestine.

Other reported hosts: *Triturus* sp., *Bufo* sp., and *Rana* sp. (29), *Rana ridibunda* (5, 6, 12, 13, 14, 15, 16, 18, 19), *Triturus alpestris*, *Pelobates syriacus*, *Hyla arborea*, *R. dalmatina*, *R. temporaria*, *R. esculenta* (5), *Bombina bombina* (5, 11), *Bombina variegata* (5, 11, 14), *R. graeca* (4, 5), *Bufo bufo* (5, 10), *B. viridis* (5, 19, 24, 26), Microhylid Frog *Chiasmocleis capixaba* (25), *Rana holtzi*, *Rana macrocnemis* (41), *Anguis fragilis* (23).

Geographic range: Europe (29); Turkey (34) and South America (25).

##### ***Rana macrocnemis* Boulenger, 1885**

Twenty *R. macrocnemis* (13 males and 7 females) were collected in April to November 2001-2002 from the Taşkesiği Village (Korkuteli), 1515 m elevation in Antalya province in south-western Turkey, ranging from 37° 11' N – 30° 00' E

#### Trematoda

##### ***Haplometra cylindracea* (Zeder, 1800) Loos, 1899**

Prevalence and intensity: Hosts infected, 13 of 20 (65%); mean intensity  $5.53 \pm 2.69$ , (2- 11). Temporal distribution: April 2001, 2 host with 6, 9; May 2001, 3 hosts with 7, 6, 7 respectively; June 2001, 4 hosts with 2, 3, 7, 4 respectively; September 2002, 2 host with 2, 2 respectively; October 2002, 1 host with 6; November 2001, 1 host with 11.

Locality: Taşkesiği Village

Site of infection: Lung

Other reported hosts: *Rana camerani* (35).

Remarks: General information is reported under *R. camerani*.

#### Nematoda

##### ***Cosmocerca ornata* (Dujardin, 1845) Diesing, 1861**

Prevalence and intensity: Hosts infected, 3 of 20 (15%); mean

intensity  $1.33 \pm 0.57$  (1-2). Temporal distribution: April 2001, 2 hosts with 1, 1 respectively; November 2001, 1 host with 1; September 2002, 1 host with 1.

Locality: Taşkesiği Village

Site of infection: Large intestine.

Remarks: General information and remarks are reported under *R. camerani*.

#### Acanthocephala

##### ***Acanthocephalus ranae* (Schrank, 1788) Lühe, 1911**

Synonym: *Echinorhynchus ranae* Schrank, 1788; *Echinorhynchus haeruca* Rudolphi, 1808.

Prevalence and intensity: Hosts infected, 8 of 258 (40%); mean intensity  $18.42 \pm 17.90$  (2-46). Temporal distribution: April 2001, 1 host with 28, May 2001, 3 host with 4, 7, 36 respectively; June 2001, 2 hosts with 2, 46 respectively; September 2002, 2 hosts with 2, 4.

Locality: Taşkesiği Village

Site of infection: Small intestine.

Other reported hosts: *Rana* sp., *Bombina* sp., *Hyla* sp., *Triturus* sp., *Salamandra* sp., *Notophthalmus viridescens*, *Natrix natrix* (22, 30); *Anguis fragilis* (23), *B. bombina* (5, 11 33); *B. variegata* (11); *R. dalmatina* (5); *B. viridis* (5, 24, 34); *B. calamita* (24); *H. arborea* (8); *R. arvalis*, *R. temporaria* (5, 7, 16); *R. esculenta* (5, 16); *R. ridibunda* (5, 6, 9, 12, 13, 15, 20, 31); *R. macrocnemis* (33, 41), *Mertensiella caucasica* (39), and *R. camerani* (40).

Geographic range: Europe, U.S.A., Russia (30); Turkey (20).

#### DISCUSSION

This is the first published study of helminths for *Rana camerani* and *Rana macrocnemis* from south-western Turkey. In all 390 helminths were collected from 27 frogs (77.10%) [10 (66.7%) *R. camerani* (2 males, 8 females) and 17 (85%) *R. macrocnemis* (11 males, 6 females)] of the 35 mountain frogs examined. Five helminth species were found, 3 trematodes, 1 nematode and one acanthocephalan. No individual host contained more than 3 species: of the infected frog, 18 (67%) harbored 1 species of helminth, 6 (22%) harbored 2 species, and 3 (11%) harbored 3 species. There was a mean of  $1.44 \pm 0.70$  helminth species per infected host and  $8.21 \pm 1.63$  helminth individuals per infected host.

Yıldırımhan et al. (40) reported the helminths of *R. camerani* collected in two different localities from Turkey. They reported 1 species of Monogenea (*Polystoma* sp.), 5 species of Digenea (*Gorgoderia cynoides*, *Gorgoderina vitelliloba*, *Haplometra cylindracea*, *Opisthoglyphe rastellus*, *Pleurogenoides medians*), 1 species of Cestoda (*Nematotaenia dispar*), 3 species of Nematoda (*Cosmocerca ornata*, *Oswaldocruzia filiformis*, *Rhabdias bufonis*), and 1 species of Acanthocephala (*Acanthocephalus ranae*). *O. rastellus* has

been reported previously in *R. camerani* from western Iran (17). In addition Yıldırımhan et al. (33) and Yıldırımhan et al. (41) were investigated the helminths of *R. macrocnemis* in three localities (northern, northwestern, and middle parts of Turkey) of Turkey. They reported 1 species of monogenea *Polystoma macrocnemis*, 5 species of digenea (*Opisthioglyphe rastellus*, *Gorgoderina vitelliloba*, *Haplometra cylindracea*, *Pleurogenes claviger*, *Pleurogenoides medians*) and 3 species of nematode (*Rhabdias bufonis*, *Cosmocerca ornata*, *Oswaldocruzia fliformis*) and one acanthocephalan (*Acanthocephalus ranae*).

In this study the three helminths of *R. macrocnemis* were observed *O. rastellus*, *H. cylindracea*, and one nematode *C. ornata*. Also, four helminths of *R. camerani* were reported 3 species of digenean *P. medians*, *O. rastellus*, *H. cylindracea*, and one nematode *C. ornata*. The nematode *C. ornata* were recorded by Mashaii, (18, 19) and Yıldırımhan et al. (40, 41).

Subsequent helminthological studies should add other metazoan endoparasites to Turkish amphibian helminthofauna.

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