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Short Communication / *Kısa Bilimsel Çalışma*

Eimeria species (Apicomplexa: Eimeriidae) detected from the Anatolian ground squirrel, *Spermophilus xanthophrymnus* (Rodentia: Sciuridae) in Niğde province, Turkey

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Summary: Intestinal contents of 105 Anatolian ground squirrels (*Spermophilus xanthophrymnus*) caught from Niğde province were examined to determine the types and prevalence of eimerian species. Eimerian oocysts were found in 27.6 % of all the samples examined by sucrose-flotation. Four species were recovered from Anatolian ground squirrels, including *Eimeria callospermophili* (prevalence: 25.7 %), *E. morainensis* (2.8 %), *E. pseudospermophili* (1.9 %), and *E. lateralis* (0.9 %).

Key words: *Eimeria*, prevalence, *Spermophilus xanthophrymnus*

Niğde yöresinde Anadolu tarla sincabı, *Spermophilus xanthophrymnus* (Rodentia : Sciuridae)'da bulunan *Eimeria* türleri

Özet: Niğde yöresinde yakalanan 105 Anadolu tarla sincabı (*Spermophilus xanthophrymnus*)'na ait bağırsak içeriği *Eimeria* türleri ve prevalans değerleri yönünden muayene edildi. Şekerli su-yüzdürme yöntemiyle incelenen dışkı numunelerinin % 27.6'da *Eimeria* oosistleri bulundu. Anadolu tarla sincaplarında *Eimeria callospermophili* (prevalans: % 25.7), *E. morainensis* (% 2.8), *E. pseudospermophili* (% 1.9) ve *E. lateralis* (% 0.9) olmak üzere 4 tür tespit edildi.

Anahtar sözcükler: *Eimeria*, prevalans, *Spermophilus xanthophrymnus*.

In a recent review of the coccidian parasites of rodents, Levine and Ivens (4) reported 17 named and two unnamed species of *Eimeria* from 18 species of ground squirrels, *Spermophilus* spp. There is little information on the coccidian parasites of squirrels in Turkey (1, 2, 9). In this paper, we report prevalence of coccidia in Anatolian ground squirrel in Niğde province and *S. xanthophrymnus* to be host for *E. pseudospermophili*.

The study was conducted in Niğde (38º 58´ N and 33º 10´ E) province of Turkey, between April and August 2003. The Anatolian ground squirrels (65 adult females and 40 adult males) were captured and brought alive to the laboratory in a cage. Fecal samples collected from each animal were put into a solution of 2.5 % equeous (w/v) potassium dichromate ($K_2Cr_2O_{7)}$ and were allowed to sporulate. Oocysts were concentrated by flotation in saturated sucrose solution (specific gravity: 1.2). At least 30 sporulated oocysts from each sample were measured by ocular micrometer of Nikon Eclipse i-Series 80 i trinocular research microscope with 100 x magnification. Oocyst identification was done according to Levine and Ivens (4).

Four species of *Eimeria* were identified from the faecal samples of 105 Anatolian ground squirrels (*Spermophilus xanthophrymnus*). The species detected and their prevalence were *Eimeria callospermophili* (25.7 %), *E. morainensis* (2.8 %), *E. pseudospermophili* (1.9 %) and *E. lateralis* (0.9 %). The morphological characteristics of the various sporulated oocysts are shown in Fig.1.

Of 105 the animals examined, 29 (27.6 %) were found positive for eimerian oocysts. Of 105 animals, 25 (23.8 %) were found to be infected with single and 4 (3.8 %) with two species.

Eimeria callispermophili is one of the most ubiquitous species of coccidia. It has been reported from numerous host species and localities, including Richardson's ground squirrels, *S. richardsonii* from Alberta (6), Townsend's ground squirrels, *S. townsendii* from Idaho (10), Wyoming ground squirrel, *S. elegans elegans* from southern Wyoming (5), black prairie dogs, *Cynomys ludovicianus* and white-tailed prairie dogs, *C. leucurus* from Wyoming (7). In addition, arctic ground squirrels, *S. parryii* have been infected with this

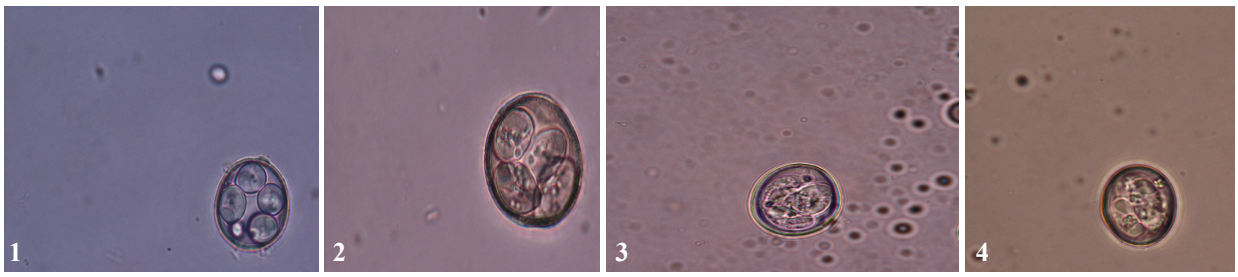

Fig.1. Photomicrographs of sporulated *Eimeria* oocysts in the faeces of Anatolian ground squirrels.
(1) *Eimeria callospermophili*; (2) *E. lateralis*; (3) *E. pseudospermophili*, (4) *E.morainensis*. Scale bar: 10 µm for all figures
Şekil.1. Anadolu tarla sincabının dışkısında sporlanmış *Eimeria* oosistlerinin mikrometrik ölçümlü fotoğrafları.
Ölçü çizgisi: bütün şekiller için 10 µm

coccidium in Alaska and Siberia (8). In Turkey, this species was identified from the faecal samples of 7 Anatolian ground squirrels from Niğde province (9).

Eimeria lateralis originally described by Levine et al. (3) from *Spermophilus lateralis* has since been reported twice from *S. richardsonii* in Alberta (6). Wilber et al. (10) detected this species in fecal samples from *S. townsendii* in Idaho. *Eimeria lateralis* was also identified from *C. ludovicianus*, *C. leucurus* in Wyoming (7), from Anatolian ground squirrels, *S. xanthophrymnus* in Turkey (9).

Eimeria morainensis has been reported previously from Townsend's ground squirrels, *S. townsendii* in Idaho (10), from Richardson's ground squirrels, *S. richardsonii* in Alberta (6), from Wyoming ground squirrel, *S. elegans elegans* in southern Wyoming (5), from *C. ludovicianus* and *C. leucurus* in central and southeast Wyoming (7). *Eimeria morainensis* was also reported from arctic ground squirrels, *S. parryii* in Alaska and Siberia (8), and from Anatolian ground squirrels, *S. xanthophrymnus* in Turkey (9).

Eimeria pseudospermophili was recently described from Townsend's ground squirrels, *S. townsendii* in Idaho (10). It has also been reported infecting black prairie dogs, *C. ludovicianus* from Wyoming (7). *Eimeria pseudospermophili* recovered from Anatolian ground squirrels represent new host and a new geographic record.

Stanton et al. (5) suggested that of all *S. elegans elegans* examined, 69 % harbored 1 or more of 6 species of *Eimeria.* Stanton et al. (5) reported that squirrels in relatively mesic habitats have a higher prevalence of infection than do those in xeric habitats. According to these investigators (5), oocyst survivorship is expected to be higher more dense vegetation cover may offer some protection from high temperatures, UV radiation, and desication. For the same reasons as stated above (5), increased oocyst survivorship should increase the number 2-6 species infections. In this study, the prevalence of eimerian oocysts in faecal samples was 27.6 % for *S. xanthophrymnus* and individuals were infected with from 1 to 2 species with infections of 1 species most common (23.8 %). The low prevalence of infection and the low multispecies infection rates is probably due to xeric habitats, and the immune response of the host.

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