

New Data on Ectoparasites of the Caucasian Squirrel *Sciurus anomalus* (Rodentia: Sciuridae) in Türkiye: A Case Report

Türkiye'deki Kafkas Sincabı Sciurus anomalus'un (Rodentia: Sciuridae) Ektoparazitleri Hakkında Yeni Veri: Olgu Sunumu

© Gökhan Eren

Artvin (Borçça) Directorate of Provincial Agriculture and Forestry, Republic of Türkiye Ministry of Agriculture and Forestry, Artvin, Türkiye

Cite this article as: Eren G. New Data on Ectoparasites of the Caucasian Squirrel *Sciurus anomalus* (Rodentia: Sciuridae) in Türkiye: A Case Report. *Turkiye Parazitol Derg.* 2024;48(4):261-3.

ABSTRACT

Sciurus anomalus Gldenstdt, 1785, known as the Caucasian squirrel, is a rodent distributed in all geographical regions of Trkiye. The material of this study consists of ectoparasites collected from male *S. anomalus* found dead on the highway (Karasu, Sakarya, Trkiye). As a result of microscopic examination, the specimens were identified: ticks as *Ixodes ricinus* Linnaeus, 1758 (larvae and nymph), sucking louses as *Neohaematopinus syriacus* Ferris, 1923 (female), and fleas as *Monopsyllus sciurorum sciurorum* (Schrank, 1803) (female and male). In this study, the presence of *Ixodes ricinus* infestation on *Sciurus anomalus* is reported for the first time in Trkiye.

Keywords: *Sciurus anomalus*, *Ixodes ricinus*, *Neohaematopinus syriacus*, *Monopsyllus sciurorum sciurorum*, Trkiye

Z

Kafkas sincabı olarak bilinen *Sciurus anomalus* Gldenstdt, 1785 Trkiye'nin tm coğrafik blgelerinde daėılım gsteren bir rodenttir. Bu alıřmanın materyalini kara yolunda (Karasu, Sakarya, Trkiye) l olarak bulunan erkek *Sciurus anomalus* zerinden toplanan ektoparazitler oluřturmuştur. Mikroskopik inceleme sonunda kene rnekleri *Ixodes ricinus* Linnaeus, 1758 (larva ve nimf), bit rnekleri *Neohaematopinus syriacus* Ferris, 1923 (diři), pire rnekleri ise *Monopsyllus sciurorum sciurorum* (Schrank, 1803) (diři ve erkek) olarak tanımlanmıştır. Bu alıřmayla birlikte Trkiye'de ilk kez *Sciurus anomalus*'da *Ixodes ricinus* enfestasyonu tespit edilmiştir.

Anahtar Kelimeler: *Sciurus anomalus*, *Ixodes ricinus*, *Neohaematopinus syriacus*, *Monopsyllus sciurorum sciurorum*, Trkiye

INTRODUCTION

Sciurus anomalus Gldenstdt, 1785, one of 21 species described within the genus *Sciurus*, is commonly known as the Caucasian squirrel (1). *Sciurus anomalus* is distributed in forests where the habitat is suitable in Iran, Armenia, Azerbaijan, Georgia, Greece, Iraq, Jordan, Lebanon, and Syria, as well as in Trkiye (2).

Apart from *S. anomalus*, *Sciurus vulgaris*, *Spermophilus citellus*, *S. xanthophrymnus* and *S. torosensis* species in the squirrel family (Sciuridae) are also distributed in Trkiye (2,3).

Studies on ectoparasites of squirrels (*Sciurus* spp. and *Spermophilus* spp.) are unfortunately neglected

in the field of veterinary parasitology in Trkiye. In the studies, four of the five squirrel species found in Trkiye have been examined as ectoparasitic, and only two ticks, 11 fleas and one lice species have been reported.

In the Turkish flea list published by Keskin and Hastriter (4), it has been reported of the presence of species that *Chaetopsylla globiceps*, *Ctenocephalides canis*, *Ctenophthalmus turcicus*, *Monopsyllus sciurorum sciurorum*, *Nosopsyllus fasciatus* on the Caucasian squirrel (*Sciurus anomalus*); *Monopsyllus sciurorum sciurorum* on the Eurasian red squirrel (*Sciurus vulgaris*); *Citellophilus simplex simplex*, *Citellophilus transcaucasicus*, *Nosopsyllus fasciatus*, *Oropsylla*



Received/Geliř Tarihi: 21.04.2024 Accepted/Kabul Tarihi: 21.12.2024 Publication Date/Yayınlanma Tarihi: 22.01.2025

Address for Correspondence/Yazar Adresi: Gkhan Eren, Artvin (Bora) Directorate of Provincial Agriculture and Forestry, Republic of Trkiye Ministry of Agriculture and Forestry, Artvin, Trkiye

E-mail/E-Posta: gokhaneren54@gmail.com ORCID ID: orcid.org/0000-0002-2109-5059



©Copyright 2024 Turkish Society for Parasitology - Available online at www.turkiyeparazitolog.org

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial (CC BY-NC-ND) 4.0 International License.

ilovaiskii, *Neopsylla setosa spinea*, and *Pulex irritans* on the Asia minor ground squirrel (*Spermophilus xanthoprimum*). In the Turkish mammal lice list published by Dik (5), *Neohaematopinus syriacus* infestation was reported only on the Caucasian squirrel (*Sciurus anomalus*). Among the tick species, it has been reported the presence of infestation of *Ixodes ricinus* on the Eurasian red squirrel (*Sciurus vulgaris*) (6), *Ixodes laguri* on *Spermophilus citellus* (as *Citellus citellus* in the study) (7), *Haemaphysalis* sp. and *Ixodes* sp. on the Asia minor ground squirrel *Spermophilus xanthoprimum* (as *Citellus citellus* in the study) (8).

CASE REPORT

The specimen of the male Caucasian squirrel (*Sciurus anomalus*) (Rodentia: Sciuridae) (Figure 1), found dead on the highway (geographical coordinates: 41.087834, 30.647195) (Karasu, Sakarya, Türkiye) on April 12, 2024, was subjected to ectoparasitic examination.

Using a flea comb and blunt-ended forceps during ectoparasite examination, the ectoparasite (louse, flea, and tick) specimens were collected from the carcass. After that, all specimens were stored in Eppendorf tubes containing 70% ethanol. In the light of the relevant literature specific to each parasite group [flea (9), ticks (10), and louse (11)] under the light microscope (MIC-B30/B Binocular 45 Economic Microscope-Led-Achromat, SOIF Optical Instruments Factory, China), tick specimens were identified as *Ixodes ricinus* Linnaeus, 1758, louse specimens as *Neohaematopinus syriacus* (Mjöberg, 1910), and flea specimens as *Monopsyllus sciurorum sciurorum* (Schrank, 1803) (Figure 2) (n_{louse} : two females; n_{ticks} : two larvae and four nymphs; n_{fleas} : two males and one female). In addition, all permanent glass slides of louse, tick, and flea species identified are deposited in G. Eren's personal collection.



Figure 1. Dorsal and ventral view of the Caucasian squirrel (*Sciurus anomalus*) from which ectoparasite specimens were collected (photographed by Furkan Eren)

DISCUSSION

It is noteworthy that studies on ectoparasites of wild mammals (ticks, lice, fleas, myiasis flies and keds) in Türkiye have increased compared to the past (5,12). When the studies are carefully examined, it is seen that good results are obtained in terms of host-parasite relationships in studies carried out jointly, that is, multidisciplinary, by biologists, veterinarians or parasitologists (13,14).

Although there are many reports in the world (1,15) about the diversity of ticks infesting *Sciurus anomalus* and *S. vulgaris*, members of the *Sciurus* genus known as tree squirrels or bushy-tailed squirrels, information for Türkiye is limited or insufficient (4-8). It can be considered that the diversity of the ectoparasitic fauna of the Caucasian squirrel (*S. anomalus*) has been revealed to a great extent in studies conducted around the world. As a result of these studies, it is known that the *Ixodes acuminatus* and *I. ricinus* from the tick species; *Chaetopsylla globiceps*, *Ctenocephalides canis*, *Ctenophthalmus turcicus*, and *Monopsyllus sciurorum sciurorum* from the flea species; and *Enderleinellus krochinae*, *E. nitzschi* and *Neohaematopinus sciurinus* from the louse species cause infestation on Caucasian squirrels (1,4). Similarly, in the study carried out in 4 biogeographic regions covering France and Italy, 356 red squirrels (*S. vulgaris*) carcasses specimens were collected from the highways; and many ectoparasite species including flea (*Monopsyllus sciurorum sciurorum*, *Tarsopsylla octodecimdentata octodecimdentata*, *Dasyopsyllus gallinulae gallinulae*), louse (*Enderleinellus nitzschi* and *Neohaematopinus sciurinus*) and tick (*Ixodes acuminatus* and *I. ricinus*) have been reported on these carcasses (15). As mentioned in the introduction of the paper, only 3 of 5 the squirrel species found in Türkiye have been studied as ectoparasites. While flea (4) and lice (5) infestations were reported in previous studies on the Caucasian squirrel (*S. anomalus*) examined in the present study, there is no data on tick infestation. *Ixodes ricinus*, detected on the *Sciurus anomalus* in this study, is one of the most studied ticks in the Western Palearctic region due to its vectorial potential (tick-borne encephalitis, Borreliosis, and Babesiosis). While the larval and nymph stages prefer small mammals, birds and reptiles, the adult stages prefer large mammals (10).

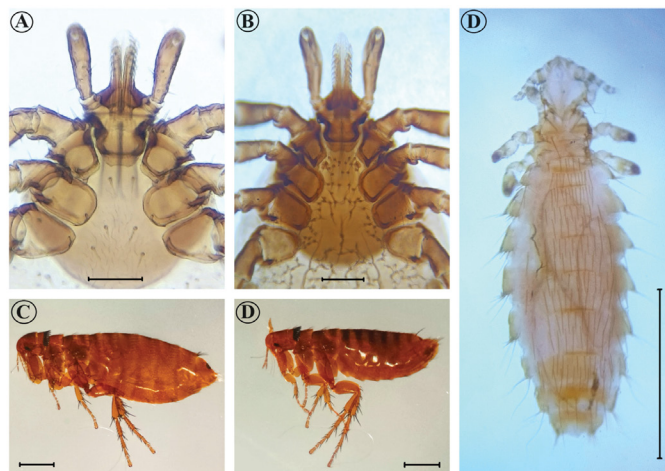


Figure 2. Species of ectoparasites identified: Larvae (A) and nymph (B) of *Ixodes ricinus* (scale bar: 100 μm); female (C) and male (D) of *Monopsyllus sciurorum sciurorum* (scale bar: 500 μm); female (E) of *Neohaematopinus syriacus* (scale bar: 1000 μm)

CONCLUSION

As a result of the literature review, it was found that *Ixodes ricinus* had previously been reported on *Sciurus vulgaris* in Türkiye (7) but not on *Sciurus anomalus*. Such case reports, according to the author, *Ixodes ricinus* species ticks can contribute to future studies by revealing the host-parasite relationships and vectorial potential.

This study aims to report *Ixodes ricinus* infestation on the *Sciurus anomalus* for the first time in Türkiye.

*Ethics

Informed Consent: Since ectoparasite specimens were collected from a dead squirrel carcass, neither owner consent forms nor ethics committee approval was required.

Acknowledgments: The author is grateful to wildlife photographer Furkan Eren for his support in collecting and transporting the specimens of ectoparasite.

Footnotes

Financial Disclosure: The author declared that this study received no financial support.

REFERENCES

- Koprowski JL, Gavish L, Dumas SL. *Sciurus anomalus* (Rodentia: Sciuridae). Mammalian Species 2016; 48: 48-58.
- Kryštufek B, Vohralík, V. Mammals of Turkey and Cyprus: Rodentia 1: Sciuridae, Dipodidae, Gliridae, Arvicolinae. Slovenia: Knjižnica Annales Majora; 2005.
- Özkurt SÖ, Sözen M, Yiğit N, Kandemir I, Çolak R, Gharkheloo MM, et al. Taxonomic status of the genus *Spermophilus* (Mammalia: Rodentia) in Turkey and Iran with description of a new species. Zootaxa. 2007; 1529: 1-15.
- Keskin A, Hastriter MW, Beaucournu JC. Fleas (Siphonaptera) of Turkey: species composition, geographical distribution and host associations. Zootaxa. 2018; 4420: 211-28.
- Dik B. Türkiye'deki evcil ve yabani memelilerde görülen bit (Phthiraptera) Türleri. Türkiye Parazitoloji Derneği İzmir: 2020; 26: 67.
- Merdivenci A. Türkiye keneleri üzerine araştırmalar, Kutulmuş Matbaası, İstanbul: Türkiye; 1969.
- Merdivenci A. Türkiye parazitleri ve parazitolojik yayımları. İstanbul Üniversitesi, Cerrahpaşa Tıp Fakültesi Yayınları, Kutulmuş Matbaası, İstanbul: Türkiye; 1970.
- Uslu U, Dik B, Gökçen A. Ectoparasites of the ground squirrel (*Citellus citellus* (L.)) in Turkey. Türkiye Parazit Derg. 2008; 32: 142-5.
- Brinck-Lindroth G, Smit FGAM. The fleas (Siphonaptera) of Fennoscandia and Denmark. Brill Publishers, Boston, United States: 2007.
- Estrada-Peña A, Mihalca AD, Petney TN. Ticks of Europe and North Africa: a guide to species identification. Springer, Switzerland: 2008.
- Ferris GF. Contributions toward a monograph of the sucking lice. Part IV. Stanford University Publications, California, United States, Biological Sciences. 1923; 2: 179-270.
- Orkun Ö, Vatanserver Z. Rediscovery and first genetic description of some poorly known tick species: *Haemaphysalis kopetdaghica* Kerbabaev, 1962 and *Dermacentor raskemensis* Pomerantzev, 1946. Ticks Tick Borne Dis. 2021; 12: 101726.
- Açıcı M, Demirtaş S, Umur Ş, Gürler AT, Bölükbaş CS. Infestations of flea species on small, wild mammals in the provinces of Aydın and Manisa in the Aegean Region, Turkey. Turk J Vet Anim Sci. 2017; 41: 449-52.
- Keskin A, Dik B. First data on the ectoparasites (ticks, lice and fleas) of the stone marten, *Martes foina* (Erxleben) in Turkey. Arthropods. 2023; 12: 141-7.
- Romeo C, Pisanu B, Ferrari N, Basset F, Tillon L, Wauters LA, et al. Macro parasite community of the Eurasian red squirrel (*Sciurus vulgaris*): poor species richness and diversity. Parasitol Res. 2013; 112: 3527-36.