Acta Biologica Turcica, 38(2), kswg20250201-7p Received 13 Mar. 2025; Accepted 8 Apr. 2025; Published Online 20 May. 2025

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.com

Research article

Contribution to knowledge of *Schoutedenichia thracica* (Acari, Trombiculidae) from Türkiye

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Abstract: *Schoutedenichia thracica* Kolebinova, 1966 (Acari: Trombidiformes: Prostigmata) was collected from ectoparasitic larvae of *Apodemus* sp. and *Rattus rattus* belonging to the Muridae. The world distribution of this species and the morphological characteristics of the studied specimens are given by comparing them with previous records. In addition, a comprehensive list of the known host species from which this mite has been collected to date is provided.

Keywords: Acari, chiggers, host-parasite interactions, distrubition

Citing: Karağaç, R., Selçuk, A.Y., & Sevsay, S. (2025). Contribution to knowledge of *Schoutedenichia thracica* (Acari, Trombiculidae) from Türkiye *Acta Biologica Turcica,* 38(2), kswg20250201-7p.

Introduction

Trombiculid mites (Actinotrichida: Parasitengona, Trombiculidae) have more than 3000 described chigger species distributed worldwide (Nielsen et al., 2021). The host spectrum of chiggers is wide-ranging and include mammals, birds, amphibians, reptiles and rodents (Goff, 1979, 1982; Arnold, 1986). They mainly parasitize small mammals (mainly rodents) and birds but also reptiles (Li et al., 1997; Wolthmann et al., 2007; Daniel et al., 2010). A few species of chigger mites can parasitize invertebrates (Vercammen-Grandjean et al., 1970).

The maximum number of chigger species recorded from a single host organism during the study by Goff (1979), was 18 species collected from the variable spiny rat (*Rattus ruber* L. 1758). The study furthermore indicated that hosts were on average exploited by three different chigger species.

Even though chiggers are highly euryoecious in terms of host preference, evidence suggest that rodents are important hosts for chiggers globally (Daniel, 1961; Brennan & Reed, 1975; Goff, 1982; Shatrov & Kudryashova, 2006; Mariana et al., 2011). Numerous studies have revealed that a single chigger species is capable of infesting multiple small mammal hosts from different orders (rodentia, chiroptera and insectivora) (Daniel, 1961; Traub & Wisseman, 1974; Goff, 1979, 1982; Dong et al., 2008).

The genus *Schoutedenichia* consists of 104 known species (Stekolnikov et al., 2019; Nielsen et al. 2021; Stekolnikov & Matthee, 2022) and six subgenera. Only three species of the genus have been recorded from Türkiye; *Schoutedenichia anatolica* Kepka, 1962, *Schoutedenichia krampitzi* (Willmann, 1955), *Schoutedenichia thracica* Kolebinova, 1966 (Erman et al., 2024). The last mentioned species belongs to the

subgenus *Schoutedenichia* (*Schoutedenichia*), which includes 76 species (Nielsen et al., 2021; Stekolnikov & Matthee, 2022; Antonovskaia et al., 2024).

In this study, notes on the distribution of Schoutedenichia thracica in Türkiye were provided, its morphological data were compared with previously given specimens, and new host information was introduced.

Material and Methods

Larvae were collected from five *Rattus rattus* and one *Apodemus* sp. belonging to Muridae family. Field work for small mammals was carried out in Seyitler Campus of Artvin Çoruh University (41°11'20"N, 41°51'29" E, 600 m.) For small mammals, Sherman type live traps with high sensitivity were used. *Rattus rattus* specimens were collected from traps placed inside the Artvin Çoruh University building between March 7–28 and on April 7, 2023, while *Apodemus* sp. specimens were obtained from traps set in the Seyitler Campus of Artvin Çoruh University on February 27, 2024, coll. A.Y. Selçuk (Figure 1).

A total of 116 larvae were extracted from the ears of five *R. rattus* specimens, three larvae were extracted from the ears of one *Apodemus* sp. Larvae-bearing ears of captured host specimens were placed in separate Eppendorf tubes. Then mites were detached using an entomological pin and preserved in 75% ethanol, cleared in Nesbitt's solution and mounted on glass microscope slides using Hoyer medium. Measurements (given in micrometers) were made and photos were taken using a Bx63 phase contrast Olympus microscope. The terminology follows Goff et al. (1982), Kudryashova (1998), and Stekolnikov & Daniel (2012). The specimens are deposited in the Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Türkiye (EBYU).

Figure 1. Habitat type from which *Apodemus* sp. samples were collected from Seyitler Campus of Artvin Çoruh University (Photo by A.Y. Selçuk)

Table 1. Comparison of the morphological data of *Schoutedenichia thracica* with the previously given examples

	Given in this study specimens (For SIF, eyes, fPp, Pc, Gn, fSc, fCx, fSt, fsp n= 47, for other variables n = 6)	**Kolebinova, 1966**	***Stekolnikov and Daniel, 2012** (For AL n = 8, for S n = 4, for Vmin and Vmax n = 2, for other variables n = 9)
SIF	4B-B-3-2110.0000	4B-B-3-2110.0000	4B-B-3-2110.0000
Eyes	2+2		
fPp	B/B/BB(N)B	B/B/BN(B)B	B/B/BNB
Pc	3	3	
Gn	2	2	
fSc	PL > AM > AL	PL > AM < AL	PL > AM > AL
fCx	1.1.1	1.1.1	1.1.1
fSt	2.?	2.4	2.?
fsp	7.7.7	7.7.7	
AW	53-55	57	53-61
PW	66-78	68	67-77
SB	33-56	33	34-41
ASB	22-26	25	24-28
PSB	15-20	19	17-22
P-PL	4-8		5-9
SD	40-45	44	41-49
AP	34-37	34	33-36
AM	28-37	39	30-38
AL	27-30	29	24-28
PL	40-48	38	36-46
S	30-38	38	32-36
H	46-51	48/40	43-47
Dmin	24-29	36/30	23-29
Dmax	38-40		35-40
Vmin	11-18	20/35	20-20
Vmax	30-37		32-34
pa	231-244	234	257-279
pm	205-215	210	223-239
pp	234-252	248	263-279
lp	676-711	692	749-792
TaIIIL	63-68	68	67-72
TaIIIW	14-16		
S_1	16-18		
S_2	14-19		
fD	2H-(12-16)-(12-14)-(8-14)-(10-12)-(10-12)-(8-16)-(8-12)	2/2H/+/6.10/./8.8/.2.10.6.12.8.8.6.4.2	2H-(12–16)-(14–20)-(11–17)-(12–20)-…
DS (including humeral setae)	74-90	94	77-105
fV	2-(84-130)	6.6.6.6.10.8.12.12.2.16.10.8.6.4	
VS (including sternal setae)	86-132	112	93-118
NDV (including S and H)	170-216	206	180-220

Taxonomy

Family: Trombiculidae Ewing, 1944
Subfamily: Trombiculinae Ewing, 1929
Tribe: Schoengastiini Vercammen-Grandjean, 1960
Genus: *Schoutedenichia* Jadin and Vercammen-Grandjean, 1954.

Schoutedenichia thracica Kolebinova, 1966

Scutum trapezoidal, sensilla clavate to globose, covered with setules. Distance between sensilla larger than distance between sensillum and lateral scutal margin (Figure 2A, 2B).

SIF = 4B-B-3-2110.0000; fPp = B/B/BN(B)B; fCx = 1.1.1; fSt = 2.?; fSc: PL > AM > AL; Ip = 749–792; fD = 2H-(12–16)-(14–20)-(11–17)-(12–20)-…; DS = 77–105; VS = 93–118; NDV = 180–220. Posterior sternal setae are not separated from ventral setae. Standard measurements of specimens from Türkiye are given in Table 1.

Distribution

Bulgaria, Saudi Arabia, Türkiye (Çorum, Adana, Antalya and Artvin province in this study) (Kolebinova, 1966; Stekolnikov & Daniel 2012; Stekolnikov et al., 2019). Figure 3 given the distribution of *Schoutedenichia thracica* in Türkiye.

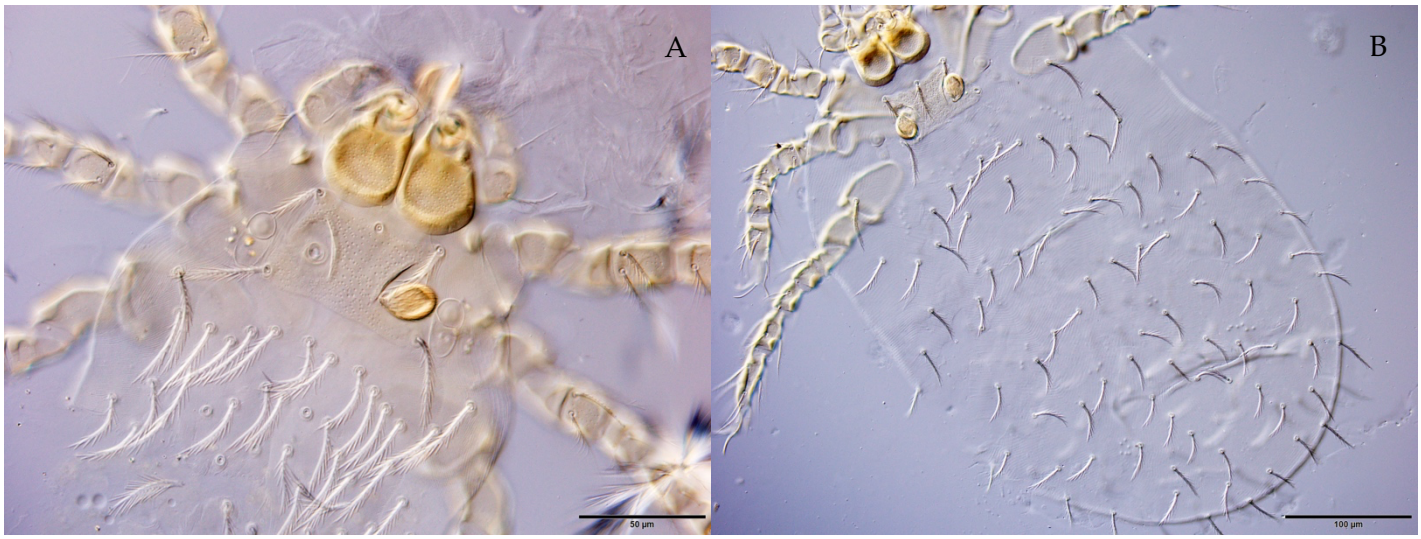

Figure 2. *Schoutedenichia thracica,* larva **(A);** scutum and eyes (**B);** dorsal aspect of idiosoma

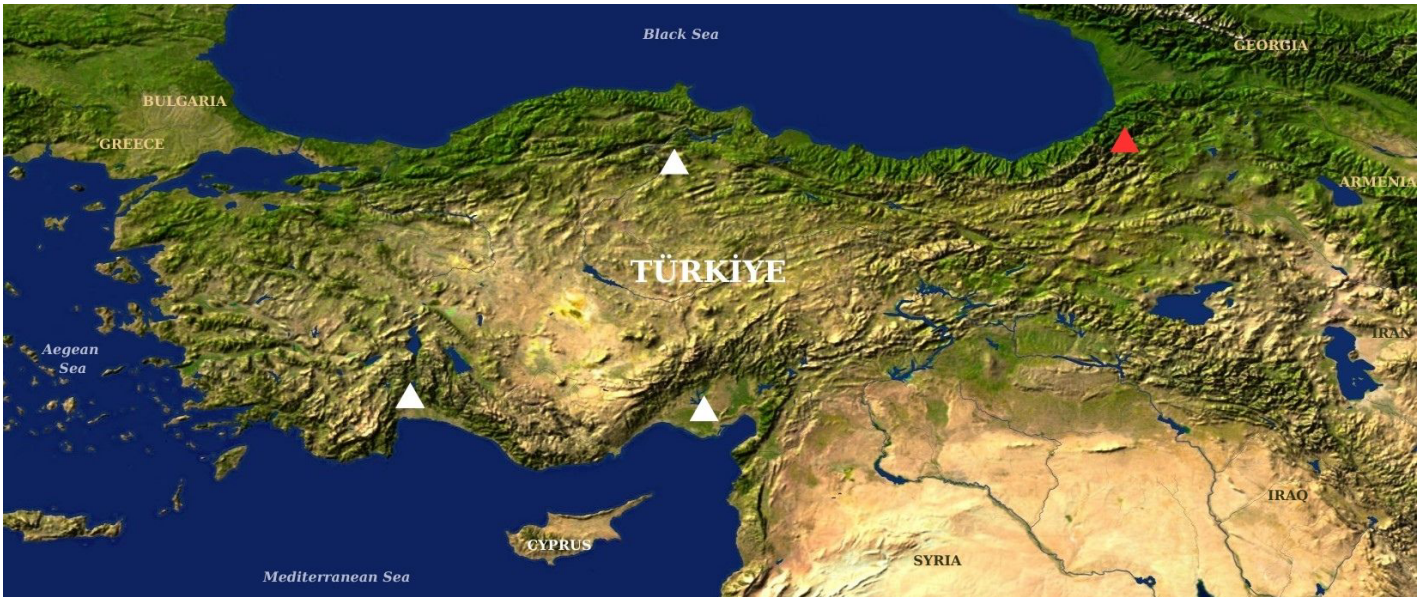

Figure 3. Map of collection sites of *Schoutedenichia thracica* in Türkiye (Red triangles indicate specimens collected in this study, whereas white triangles represent specimens from previous studies).

Remarks

In total, larvae were collected and examined on five hosts *R. rattus* and one host *Apodemus sp*. (from Artvin). The map in Figure 3 shows the areas where samples were taken in Türkiye. 80% of the larvae feeding on *R. rattus* were detected inside the ears, while 20% were collected from around the ear. The larvae inside the ear had adapted themselves in both color (light yellow) and structure to be completely invisible. Their colors were light yellow and dark yellow, compatible with earwax and soil residues. In addition, the larvae removed from inside the ear settled in the lesions they had created in the ear. It was observed that the larvae feeding around the ear also caused deformation in the ear (Figure 4).

According to Stekolnikov and Daniel (2012), the leg lengths of the specimens given by Kolebinova from Bulgaria are shorter than those of their own specimens (Ip 636–731 vs. 749–792). Since the Tarsus III lengths of both their specimens and those given by Kolebinova are the same, Stekolnikov and Daniel, hypothesized that this difference in leg lengths may have resulted from Kolebinova measuring the legs without the coxae (Kolebinova, 1966; Stekolnikov & Daniel 2012). However, in this study, although the coxae were included in the measurements, the leg lengths correspond to the Ip lengths reported for the specimens from Bulgaria. The result, the observed difference may be attributed to variations in measurement methodologies or natural intraspecific variation among the specimens.

In this study, *S. thracica* collected from *R. rattus* for the first time. This represents the first host record for this species. The previously recorded hosts of these larvae are given in Table 2.

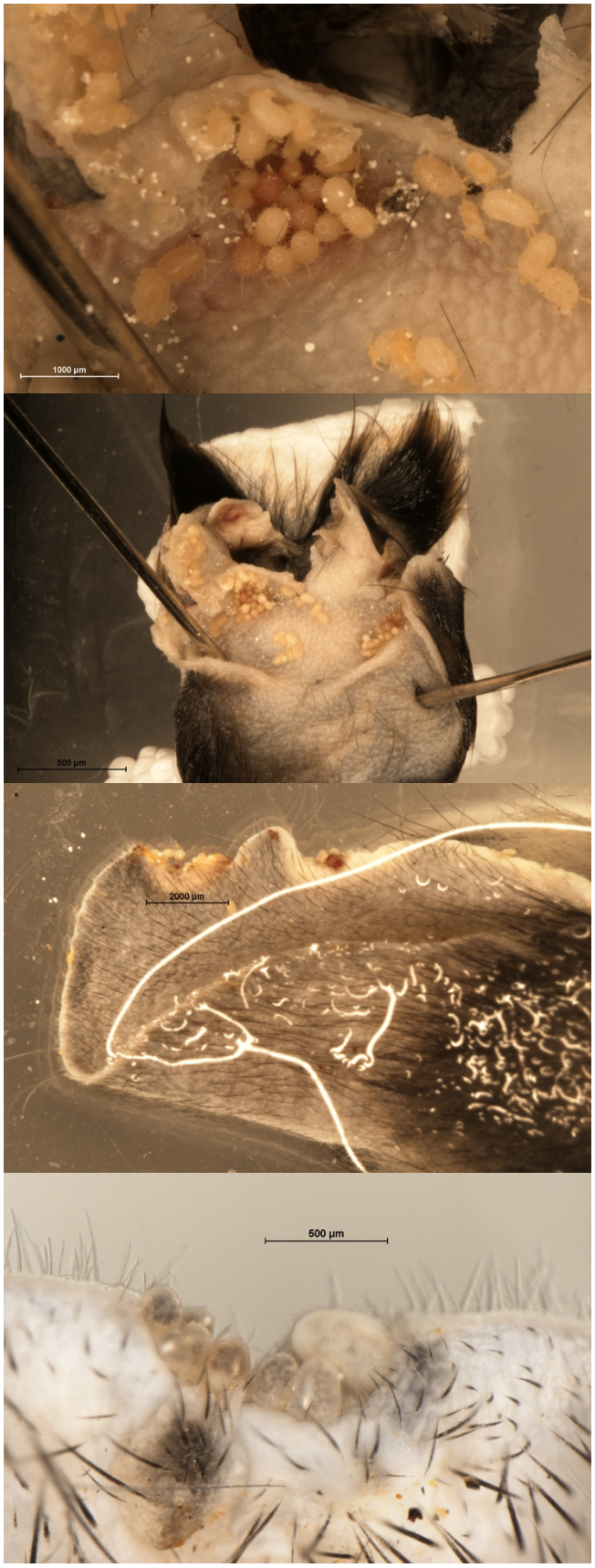

Figure 4. Larvae that infest the inner and surrounding areas of the ears of different hosts.

Table 2. Host and distribution locations of *Schoutedenichia thracica* species according to this study and previous studies.

Host	Distribution	References
Apodemus sylvaticus *Apodemus mystacinus* *Crocidura suaveolens*	Bulgaria	Kolebinova 1966, 1992
Apodemus flavicollis *Apodemus mystacinus* *Apodemus witherbyi* *Chionomys nivalis* *Microtus schidlovskii*	Türkiye (Adana, Antalya, Çorum)	Stekolnikov & Daniel, 2012
Acomys dimidiatus	Saudi Arabia	Stekolnikov et al., 2019
Rattus rattus *Apodemus* sp.	Türkiye (Artvin)	This study

Acknowledgement

We also thank Dr. Perinçek Seçkinozan ŞEKER (Artvin Çoruh University) for his help in laboratory analyses of small mammals.

Ethical Approval

No need to ethical approval for this study.

Conflict of interest

The authors have no conflict of interest.

Funding Statement

This research was supported by Erzincan Binali Yıldırım University Scientific Research Projects Coordinatorship, research project number FBA-2024-965.

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