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SHORT NOTE

A case of domestic goat parasitism by *Neotrombicula heptneri* (Acariformes: Trombiculidae) in Turkey

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ABSTRACT — A chigger mite *Neotrombicula heptneri* Kudryashova, 1973, which was originally described from three gerbillid species in Iran, is for the first time recorded in Turkey and on the domestic goat *Capra hircus* L. It is the second chigger species found infesting livestock in Turkey.

KEYWORDS — chiggers; Asia Minor; goat parasites; trombiculiasis

Although chigger mites parasitize a wide variety of mammal species, their records on ungulate animals (including livestock) are rare (e.g. Kolomiyets 1948; Brennan and Yunker 1964; Takahashi *et al.* 2008; Rehbein *et al.* 2011; Shatrov and Stekolnikov 2011; Gomez-Puerta *et al.* 2012). Therefore, each new such finding contributes greatly to knowledge on the veterinary and medical importance of these mites, known as causative agents of trombiculiasis in domestic animals and humans.

The present report is based on a chigger sample collected at a goat farm (37°9.784' N, 36°21.941' E, 270 – 280 m a.s.l.) in the east part of the Mediterranean region of Turkey, Osmaniye Province. The grazing area around the farm is partly covered with

Mediterranean vegetation, predominantly maquis (a characteristic shrubland biome). According to personal communications of the farm owners, they saw chiggers on goats for many years between November and April, with the peak abundance in January and February.

Chiggers were collected by S. Kar between 15–25 February in three consecutive years (2013, 2014, and 2015). Visual examination of 80 goats (55 ♀ and 25 ♂, aging from 1 to 4 years old) carried out in February 2013 showed a 100 % prevalence of infestation with chiggers. The mites were observed in the eyelids of all examined goats (20–80 specimens per animal). Groups of parasites were found attached around the hair follicles (Figure 1).



FIGURE 1: *Neotrombicula heptneri* attached around the eye of a goat.

Additionally, chiggers were observed in the posterior fossa of hind leg pastern of 12 animals, and on both front and hind legs of 4 animals (4-10 mites per animal).

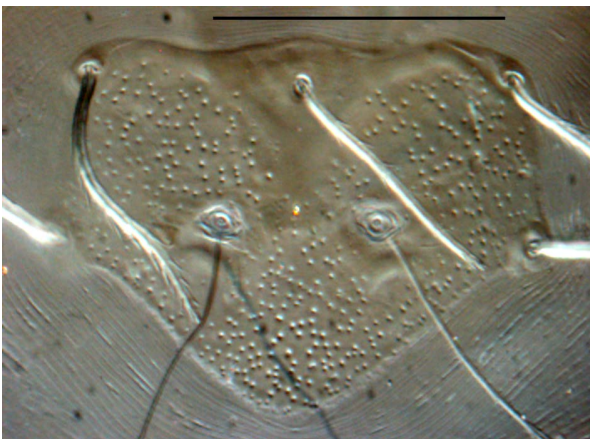


FIGURE 2: Scutum of *Neotrombicula heptneri* from Turkey. Scale bar: 50 μ m.

In total, about 50 chigger specimens from several goats were collected; the host animals and their

individual characteristics were not documented. Twelve specimens fixed in 70 % ethanol were sent to A.A. Stekolnikov for identification. All specimens were mounted on microscopic slides in Faure-Berlese medium and examined with the use of a compound microscope MBI-3 (LOMO plc, St Petersburg, Russia) supplied with phase contrast optics, drawing tube, and ocular micrometer. The microphotograph (Figure 2) was made by a Leica DM5000B microscope equipped with a DFC320 digital camera (Leica Microsystems Wetzlar GmbH), using differential interference contrast microscopy.

Because all mites in the sample were fully engorged, the quality of a half of slides was not good enough to make measurements. Therefore, standard measurements were taken from six specimens only. Abbreviations for morphometric variables are given after Stekolnikov and Daniel (2012) with few modifications. The sample is deposited in the collection of Zoological Institute RAS, Saint Petersburg, Russia (Nos. 9787-9798).

All 12 chiggers were identified as *Neotrombicula heptneri* Kudryashova, 1973 on the basis of the original description and our measurements of the holotype and one paratype deposited in the Zoological Museum of Moscow State University, Moscow, Russia (ZMMU). According to our experience, presence of several chigger species with the same pattern of localization and the same shape (e.g. sympatric *Neotrombicula* species) in a sample from one host species can usually be revealed by the first ten slides. Therefore, we believe that infestation of the goats with only one chigger species is highly probable in our case.

According to the original description, *N. heptneri* is characterized by nude galeal seta, branched setae on palpal femur, genu, and tibia, three genualae I, presence of mastitarsala on the leg tarsus III, $fD = 2H-6-6-8-2-4-(4)-2-(2)$, number of ventral idiosomal setae 26 – 37, total idiosomal setae excluding coxal and sternal 60 – 69, Ip (sum of leg lengths) = 910 – 1010, posterior scutal setae and idiosomal setae long ($PL = 62 - 70$, $H = 55 - 68$), scutum large ($PW = 78 - 82$, $SD = 62 - 65$), with prominent posterior margin and sensillary bases situated slightly anterior to bases of posterolateral scutal setae, and flag-

TABLE 1: Standard measurements (in μm) for *Neotrombicula heptneri* holotype (ZMMU, No. Tdt-33, I-65-2159), paratype (ZMMU, No. Tdt-34, I-64-2524), and sample from Turkey.

Variable*	Iran			Turkey		Sample size
	Holotype (our data)	Paratype (our data)	Holotype (original description)	Mean	Range	
AW	79	81	70	76	72-79	6
PW	89	93	78	85	80-88	6
SB	31	30	28	30	26-32	6
ASB	34	36	30	34	31-36	6
PSB	34	34	32	34	32-36	6
SD	68	70	62	69	64-71	6
P-PL	31	32	-	29	25-32	6
AP	32	33	30	32	29-35	6
AM	43	44	38	45	43-46	5
AL	47	44	42	48	44-50	6
PL	72	75	68	72	72-73	6
S	76	74	62	74	68-79	2
H	69	71	62	67	65-69	6
D _{min}	49	53	45	48	47-50	6
D _{max}	64	68	52	64	61-66	6
V _{min}	35	34	25	31	27-33	6
V _{max}	50	52	42	53	46-58	6
pa	414	409	342	377	364-387	5
pm	353	346	292	318	313-324	5
pp	401	401	330	364	353-374	5
Ip	1168	1156	964	1059	1037-1085	5
DS	32	32	-	32	30-37	6
VS	32	33	-	37	35-40	6
NDV	64	65	-	69	66-72	6
TaIIIL	104	101	-	95	94-97	5
TaIIIW	19	18	-	19	18-19	5
m-t	0.13	0.143	-	0.142	0.125-0.154	3

*Abbreviations: AW — distance between anterolateral scutal setae; PW — distance between posterolateral scutal setae; SB — distance between sensillary bases; ASB — distance from the level of sensillary bases to extreme anterior margin of scutum; PSB — distance from the level of sensillary bases to extreme posterior margin of scutum; SD — length of scutum (ASB + PSB); P-PL — distance from the level of posterolateral scutal setae to extreme posterior margin of scutum; AP — distance between antero- and posterolateral scutal seta on one side; AM — length of anteromedian scutal seta; AL — length of anterolateral scutal setae; PL — length of posterolateral scutal setae; S — length of sensilla; H — length of humeral setae; D_{min} — length of the shortest dorsal idiosomal seta; D_{max} — length of the longest dorsal idiosomal seta; V_{min} — length of the shortest ventral idiosomal seta; V_{max} — length of the longest ventral idiosomal seta; pa — length of leg I (including coxa); pm — length of leg II (including coxa); pp — length of leg III (including coxa); Ip — sum of leg lengths (pa + pm + pp); DS — number of dorsal idiosomal setae (including humeral); VS — number of ventral idiosomal setae (excluding coxal and sternal); NDV — number of idiosomal setae (DS + VS); TaIIIL — length of leg tarsus III; TaIIIW — width of leg tarsus III; m-t — ratio between distance from mastitarsala to the base of leg tarsus III and length of leg tarsus III.

elliform sensilla with rather short branches in distal one-third.

Our measurements taken from the Turkish sample (Table 1) are somewhat larger than those of the type series given by Kudryashova *et al.* (1973). However, because our metric data for the *N. heptneri* holotype systematically exceed the original ones, these morphometric differences should be regarded as a measurement artifact. Using our measurements exclusively, we can conclude that *N. heptneri* from Turkey differs from the type series in somewhat shorter legs (variables pa-Ip and TaIIIL), in slightly more numerous ventral (VS) and, consequently, total idiosomal setae (NDV), while values of all other variables are very close or coincide in these two samples. Moreover, our material differs from the type series of *N. heptneri* in generally more angulate posterior scutal margin (Figure 2), although some variation of this trait in the Turkish sample suggests that it is not reliable. The last probable difference between Iranian and Turkish *N. heptneri* is the presence of nude dorsal palpal tibial setae in the latter vs. having few branches (fPp = B/B/NBB vs. B/B/BBB). However, in the holotype, according to our examination, this paired seta is nude on one side and invisible on the other; therefore, this trait can also be variable in *N. heptneri*, as in *N. autumnalis* (Shaw, 1790) (Imaz *et al.* 2006) and all species of the *N. talmiensis* (Schluger, 1955) species group (Stekolnikov 1996). Thus, there are no sufficient grounds for a description of Turkish *N. heptneri* as a new species.

Neotrombicula heptneri is very similar to *N. kepkaei* Kolebinova, 1971 described from two mouse species in Bulgaria and differs from it in the proportions of the scutum, which is much narrower in *N. heptneri* than in *N. kepkaei*, and in the dorsal palpal tibial seta with few branches (or nude) in *N. heptneri* vs. heavily branched in *N. kepkaei*. The relationship between these two species requires further investigation.

N. heptneri was described from *Meriones persicus* (Blanford), *M. libycus* Lichtenstein, and *Tatera indica* (Hardwicke) (Rodentia: Muridae: Gerbillinae) in Iran, Fars Province (a locality 40 km SE Abadeh and a locality between Fasa and Jahrom)

(Kudryashova *et al.* 1973). Here, we record it in Turkey and from domestic goats *Capra hircus* L. for the first time. *Neotrombicula heptneri* is 12th species of *Neotrombicula* Hirst, 1925 recorded in Turkey (Stekolnikov and Daniel 2012) and the second chigger species found infesting artiodactyls in the country. Previously, *Neotrombicula dicoxalae* Vercammen-Grandjean, Kolebinova, Göksu et Kepka, 1971, later synonymized with *Keptatrombicula odessana* (Simonovich, 1958), was described from sheep *Ovis aries* L. in Samsun Province (Vercammen-Grandjean *et al.* 1971).

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