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RESEARCH ARTICLE

A complementary description of *Kampimodromus corylosus* Kolodochka (Acari: Phytoseiidae) and a revised key for the genus *Kampimodromus* Nesbitt

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ABSTRACT: *Kampimodromus corylosus* Kolodochka (Acari: Phytoseiidae), which is reported for the first time from Türkiye, is re-described and illustrated, based on female specimens collected from hazelnut (*Corylus avellana* L., Betulaceae). In addition, the reinstatement of *K. adrianae* Ferragut and Peña-Estévez as a valid species is proposed. A revised identification key for the world's *Kampimodromus* Nesbitt species is also provided.

Keywords: Identification key, Kampimodromini, new record, Phytoseiidae, predatory mites, redescription
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INTRODUCTION

Kampimodromus Nesbitt (Acari: Phytoseiidae) species are generalist predators predominantly living on pubescent leaves and exhibiting "*Type IIIa*" feeding behavior (McMurtry et al., 2013). *Kampimodromus aberrans* (Oudemans, 1930), which was the first species described, is widely distributed, having been documented across various areas of the Western Palearctic Region and the USA (Demite et al., 2014). In Europe, this species is naturally found on a broad range of cultivated plants, including grapes, hazelnuts and apples, and is considered an efficient predator of phytophagous mites (Kasap, 2005; Ozman-Sullivan, 2006; Duso et al., 2014).

In Türkiye, five species of the genus — *K. aberrans, K. ericinus* Ragusa Di Chiara and Tsolakis, 1994, *K. keae* (Papadoulis and Emmanouel, 1991), *K. langei* Wainstein and Arutunjan, 1973 and *K. ragusai* Swirski and Amitai, 1997 — have been reported, based on specimens collected from various host plants, especially from *Quercus* spp. (Fagaceae) (Kasap, 2005, 2010; Ozman-Sullivan, 2006; Döker et al., 2017, 2018; Sağlam et al., 2022).

In this study, we collected *K. corylosus* Kolodochka, 2003 from hazelnut [*Corylus avellana* L. (Betulaceae)] in Samsun Province on the Black Sea coast of Türkiye. It is redescribed and illustrated, based on female specimens, to further improve diagnosis. We also propose the reinstatement of *K. adrianae* Ferragut and Peña-Estévez, 2003 as a valid species. Moreover, we provide a revised identification key for the *Kampimodromus* species of the world.

MATERIALS AND METHODS

Leaves were collected from hazelnut plants in the Gürgenyatak/Canik district of Samsun Province on the north coast of Türkiye. The collected samples were wrapped in paper, placed in labelled plastic bags, and stored in an icebox until they were transferred to the laboratory. The leaves were then examined for mites under a stereomicroscope and all collected mites were stored in 70% alcohol until they were cleared in 60% lactic acid and mounted on slides in Hoyer's medium. The slides were then incubated at 50 °C for a week. Permanent slides were examined with an Olympus® CX-41 microscope. Illustrations were prepared with a U-Da drawing attachment (Camera Lucida). The taxonomic system used followed that of Chant and McMurtry (2007), with setal nomenclature according to Lindquist and Evans (1965), as adapted by Rowell et al. (1978). The dorsal and ventral setal pattern references were from Chant and Yoshida-Shaul (1989, 1991, 1992), the nomenclature for solenostomes on the dorsal idiosoma followed that of Athias-Henriot (1975), and the leg chaetotaxy followed that of Evans (1963). Measurements are provided in micrometers, presented as the mean, followed by the range in parentheses. The examined specimens are deposited in the mite collection of the Acarology Laboratory, Cukurova University, Adana, Türkiye.

RESULTS AND DISCUSSION

Firstly, *Kampimodromus corylosus,* which is reported from Türkiye for the first time, is redescribed from female specimens collected in Samsun Province. Secondly, a justification for the reinstatement of *K. adriane* as a valid species is provided. Thirdly, a revised key for *Kampimodromus* species is included to reflect that change.

Diagnosis and redescription of *Kampimodromus corylosus* Kolodochka

Kampimodromus corylosus Kolodochka, 2003: 51.

Kampimodromus corylosus Kolodochka: in Cargnus et al., 2012: 590; Döker et al., 2022: 1073.

Diagnosis. Idiosomal setal pattern 10A:8C/*JV*–3: *ZV* (*r3* and *R1* off shield). Dorsal shield sclerotized, mostly striated; with slight waist at level of *R1*; with five pairs of solenostomes (*gd1*, *gd2*, *gd6*, *gd8*, and *gd9*); dorsal setae serrated except *j4*, *j5*, *j6*, *J2*, *z5* and *Z1* smooth. Peritremes extending between setae *j3-z2*. All ventral shields smooth, except ventrianal shield with a few posterior striations; sternal shield with three pairs of setae; ventrianal shield elongated, with three pairs of preanal setae and a pair of minute preanal solenostomes located posteromesad to setae *JV2*; seta *JV5* serrated. Spermatheca with short, cup-shaped calyx and nodular atrium, attached to calyx without neck. Fixed digit of chelicera with three subapical teeth and movable digit without tooth. Leg IV with one serrated macroseta. Genu II and IV each with eight (2 2/1 2/0 1) setae and tibia IV with seven setae (1 1/1 2/0 2).

Re-description

Female (n=4).

Dorsal idiosoma (Fig. 1A). Dorsal setal pattern 10A: 8C (*r3* and *R1* off shield). Dorsal shield mostly striated, with slight waist at level of seta *R1*, with five pairs of solenostomes (*gd1*, *gd2*, *gd6*, *gd8* and *gd9*). Muscle-marks (sigillae) visible mostly on podosoma; length of dorsal shield 282 (280–284), width at level of *s4* 160 (156–163), width at level of *S2* 164 (163–165). Dorsal setae serrated, except *j4*, *j5*, *j6*, *J2*, *z5* and *Z1* smooth. Measurements of dorsal setae as follows: *j1* 20 (18–21), *j3* 27 (25–30), *j4* 15 (13–17), *j5* 14 (12–15), *j6* 16 (14–18), *J2* 20 (17–23), *J5* 8 (6–9), *z2* 25 (24–26), *z4* 34 (32–37), *z5* 16 (14–18), *Z1* 21 (18–24), *Z4* 40 (37–43), *Z5* 52 (49–55), *s4* 43 (38–47), *S2* 44 (40–48), *S5* 18 (17–20), *r3* 40 (38–42), and *R1* 25 (23–27). Peritremes extending between setae *j3-z2*.

Ventral idiosoma (Fig. 1B). Ventral setal pattern 14: *JV–3*: *ZV*. Sternal shield smooth, with three pairs of setae (*ST1–ST3*) and two pairs of poroids (*iv1*, *iv2*); distance between bases of setae *ST1–ST3* 59 (56–61), distance between bases of setae *ST2* 56 (55–58); metasternal setae *ST4* and poroids *iv3* on metasternal shields. Genital shield smooth with one pair of setae *ST5*; width at level of *ST5* 49 (48–50); one pair of para-genital poroids *iv5* on soft cuticle. Ventrianal shield elongate, mostly smooth except for some posterior striations, with three pairs of pre-anal setae (*JV1*, *JV2*, and *ZV2*), one pair of para-anal setae *PA*, unpaired post-anal seta *PST*, and a pair of minute solenostomes (*gv3*) posteromedian to *JV2*. Length of ventrianal shield 92 (89–94), width at level of *ZV2* 54 (50–58). Four pairs of caudoventral setae (*ZV1*, *ZV3*, *JV4* and *JV5*) and six pairs of poroids (five *ivo* and *ivp*) on soft cuticle surrounding ventrianal shield. Setae *JV5* serrated, 35 (34–35) in length.

Chelicera (Fig. 1C). Fixed digit 24 (23–25) long, with three teeth clustered sub-apically and pilus dentilis; movable digit 24 (23–25) long, without tooth.

Spermatheca (Fig. 1D). Calyx short, cup-shaped, 8 (6–10) long, atrium nodular, connected to calyx without neck, major duct long, narrow, minor duct visible.

Legs (Figs 2A-D). Leg I 262 (260–264), II 209 (205–213), III 195 (190–200), IV 279 (265–286) in length. Chaetotaxy of legs as follows: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/2 2, genu 2 2/1 2/1 2, tibia 2 2/1 2/1 2. Leg II: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/1 1, genu 2 2/1 2/0 1, tibia 1 1/1 2/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/1 1. Leg IV: coxa 0 0/1 0/0 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 2 2/1 2/0 1, tibia 1 1/1 2/0 2. Leg IV with one macroseta *StIV* (*pd3*) 22 (21–23), usually with two barbs, smooth in one specimen. Other legs without macrosetae.

Male. Not collected in this study.

Material examined. Four females from hazelnut, *C. avellana* in Gürgenyatak village, Canik, Samsun, Türkiye (41° 13' 32 "N, 36° 21' 50" E, 513 meters above sea level); collected by S.K. Ozman-Sullivan and G.T. Sullivan on 01 October 2021.

Discussion. *Kampimodromus corylosus* was described from specimens mostly collected from hazelnut, *C. avellana*, in Ukraine and Moldova. The current study reports *K. corylosus* for the first time from Türkiye. The morphological characters and measurements of the newly collected specimens are almost identical to the original description and redescriptions (Cargnus et al., 2012; Döker et al., 2022). We re-examined the Belgian specimens reported by Döker et al. (2022) and confirm that the measurements of dorsal seta *j3* are not 21 (21–22) but 31 (31–32). Also, the preanal solenostomes in the Belgian specimens are small and circular, not crescentic, as in the original description and the redescription provided here.

Notes on the identification key for the genus *Kampimodromus*

The identification key provided in this study for 16 species of *Kampimodromus* is based on the previous key by Döker et al. (2017). However, in the present study, we resurrected *K. adrianae* to valid species status and included it in the key due to the distinct differences in its dorsal setal length especially for dorsocentral setae and serrations on *j4*, *j5*, *j6*, *J2*, *Z5*, *Z1* and *S5*. Tixier et al. (2006) suspected that *K. adrianae* is a junior synonym of *K. hmiminai* McMurtry and Bounfour, 1989 based on COI sequences from populations collected from *Salix canariensis* Chr. Sm. ex Link (Salicaceae) in the Canary Islands and *Ficus carica* L. (Moraceae) in Meknes, Morocco. The same authors stated that the genetic distance between these two species was similar to the distance between two populations of *K. aberrans* which were collected from *Celtis australis* L. (Ulmaceae) and *Quercus pubescens* Willd. (Fagaceae) in Montpellier, France. However, Döker et al. (2018) used four species of *Kampimodromus* to construct a phylogenetic tree based on their ITS sequences and the sequences available in the GenBank database. The phylogenetic tree of Döker et al. (2018) showed that the sequence, HQ404798, deposited as *K. aberrans*, originating from a population collected from *C. australis* in Montpellier, France is identical to *K. corylosus*. Therefore, at least one of the two *K. aberrans* populations identified by Tixier et al. (2006) is likely to be *K. corylosus*. This situation appears to negate the argument of Tixier et al. (2006) that the genetic difference between *K. hmiminai* and *K. adrianae* is the same as that between two populations of *K.*

aberrans. In that light, we propose the reinstatement of *K. adrianae* as a valid species due to the distinct differences in its dorsal setal lengths, until more accurate morphological and molecular studies, and possibly cross-breeding experiments, are conducted.

Revised key to the genus *Kampimodromus* Nesbitt, 1951 (Modified from Döker et al., 2017)

1. Six pairs of solenostomes on dorsal shield (*gd1*, *gd2*, *gd4*, *gd6*, *gd8* and *gd9*)……………………………………………………**2**

– Less than six pairs of solenostomes on dorsal shield (at least *gd4* absent, *gd1* and *gd8* present/absent)……………………………………………………………**4**

2. Setae *Z1* and *S5* smooth; ratio setae *s4*:*Z1* > 4:1…………**3**

–Setae *Z1* and *S5* serrated; ratio setae *s4*:*Z1* < 3:1……………………………………………***K. adrianae*** Ferragut and Peña-Estévez

3. Preanal solenostomes absent……………………………………………………………***K. hmiminai*** McMurtry and Bounfour

– Preanal solenostomes present……………………………………………***K. florinensis*** Papadoulis, Emmanouel and Kapaxidi

4. Three pairs of solenostomes on dorsal shield (*gd2*, *gd6* and *gd9*)………………………***K. judaicus*** (Swirski and Amitai)

– Four or five pairs of solenostomes on dorsal shield (*gd8* absent or present)…………………………………………………………**5**

5. Four pairs of solenostomes on dorsal shield (*gd8* absent) ……………………………………………………………………………**6**

– Five pairs of solenostomes on dorsal shield (*gd8* present)………………………………………………………………………**10**

6. Movable digit of chelicera smooth……………………………**7**

– Movable digit of chelicera with one tooth……………………**9**

7. Sub-lateral setae *R1* of females inserted on dorsal shield…………………………………… ***K. elongatus*** (Oudemans)

– Sub-lateral setae *R1* of females on soft cuticle……………**8**

8. Macroseta on basitarsus IV short about 20 µm in length; dorsal setae *Z1* almost half-length of setae *S2*…………………………………………***K. aberrans*** (Oudemans)

– Macroseta on basitarsus IV longer, about 30 µm in length; dorsal setae *Z1* longer, about 2/3 length of *S2*)………………………………… ***K. molle*** (Ueckermann and Loots)

9. Peritreme short, extending to level of setae *z4*……………………………………***K. keae*** (Papadoulis and Emmanouel)

– Peritreme longer, extending to level of setae *z2*…………………………………………………***K. ragusai*** Swirski and Amitai

10. Ventrianal shield with two pairs of preanal setae……………………………………… ***K. alettae*** (Ueckermann and Loots)

– Ventrianal shield with three pairs of preanal setae….. **11**

11. Movable digit of chelicera smooth…………………………**12**

– Movable digit of chelicera with one tooth……………….**14**

12. Dorsal setae *J2* shorter than 25 µm……………………………………………***K. corylosus*** Kolodochka

–Dorsal setae *J2* longer than 30 µm……………………………**13**

13. Both dorsal seta *S5* and macroseta on basitarsus IV smooth……………………………***K. karadaghensis*** Kolodochka

– Both dorsal seta *S5* and macroseta on basitarsus IV slightly serrate………………………………………………………………………………………***K. ericinus*** Ragusa Di Chiara and Tsolakis

14. Peritreme short extending to level of sub-lateral setae *r3*……………………………***K. echii*** Ferragut and Peña-Estévez

–Peritreme longer, at least extending to level *z2*…………**15**

15. Macroseta on basitarsus IV pointed apically; peritreme extending to level between setae *j3-z2*….***K. coryli*** Meshkov

– Macroseta on basitarsus IV knobbed apically; peritreme extending to level setae level of *z2*………………………………………………………………………***K. langei*** Wainstein and Arutunjan

Authors' contributions

İsmail Döker: Identification of mite species, visualization, writing original draft, review-editing. **Sebahat K. Ozman-Sullivan:** Material collection, review-editing, funding. **Gregory T. Sullivan:** Material collection, review-editing, resources.

Statement of ethics approval

Not applicable.

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Conflict of interest

The authors declare that they have no conflicts of interest with respect to this study.

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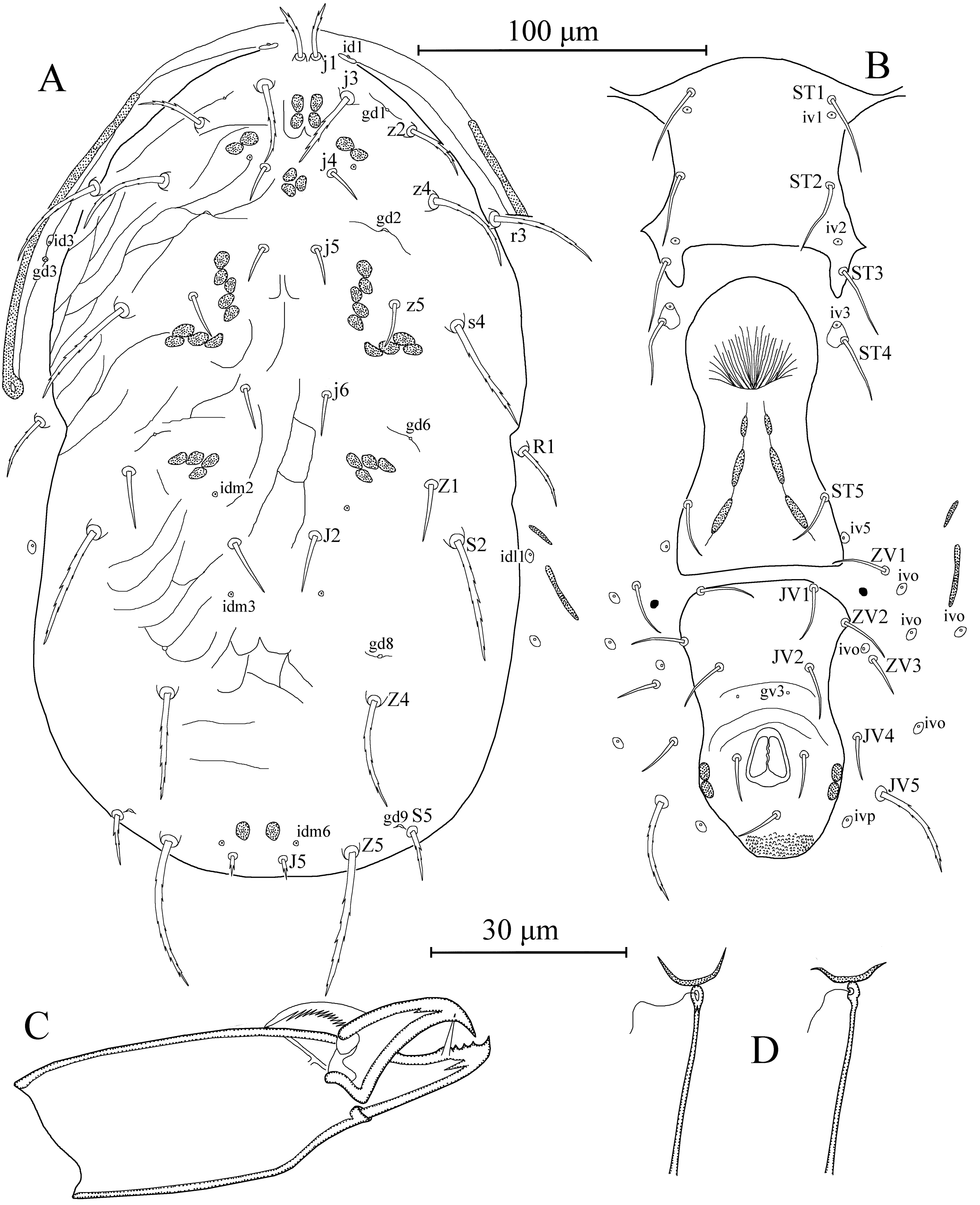

Figure 1. *Kampimodromus corylosus* Kolodochka, 2003, female: A. Dorsal idiosoma, B. Ventral idiosoma, C. Chelicera, D. Spermathecae.

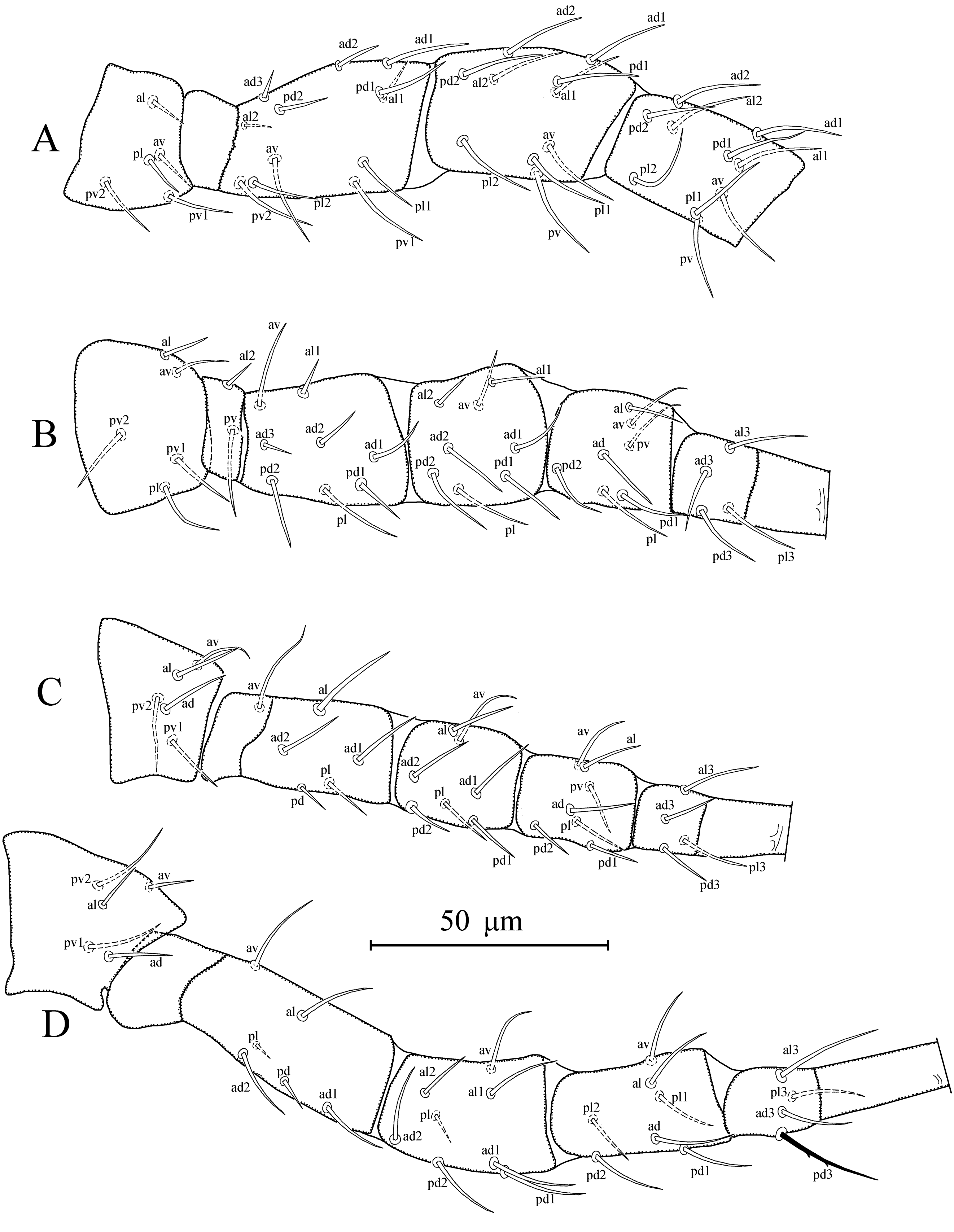

Figure 2. *Kampimodromus corylosus* Kolodochka, 2003 female right legs: A. Leg I (coxa and tarsus omitted), B. Leg II (coxa and tarsus omitted), C. Leg III (coxa and tarsus omitted), D. Leg IV (coxa and telotarsus omitted). Macroseta drawn in solid black for clarity.

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RESEARCH ARTICLE

New record of *Allothrombium incarnatum* Oudemans (Prostigmata: Trombidiidae) from Türkiye, with the report of a new synonym

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ABSTRACT: The larval instar of *Allothrombium incarnatum* Oudemans, 1905 was detected for the first time by experimental rearing from field-collected females. Based on its morphological characters, *Allothrombium monosolenidion* Kamran and Alatawi, 2020 **syn. nov.**, known only from larval instar, is considered a junior synonym of *A. incarnatum*. Data on the habitat and host of this species are also presented.

Keywords: Acari, host preference, laboratory rearing, morphometric data, Parasitengonina
Zoobank: https://zoobank.org/89E245EB-D9A7-4E40-B213-95DB3EEAA6C0

INTRODUCTION

The genus *Allothrombium* Berlese, 1903 (Acari: Parasitengonina: Trombidiidae) currently comprises more than 70 species worldwide (Mąkol and Wohltmann, 2012, 2013; Haitlinger and Šundić, 2018; Kamran and Alatawi, 2020). Most of them are known either only from the postlarval or only from the larval stage, while only seven species of the genus *Allothrombium* are known from both the larval and the postlarval instars (Mąkol and Wohltmann, 2012). Only twelve species of *Allothrombium* have been reported from Türkiye so far (Sevsay, 2017; Yıldırım and Sevsay, 2019; Oner et al., 2021; Karakurt, 2022). *Allothrombium incarnatum* was originally described by Oudemans (1905) based on male and female specimens from The Netherlands. Mąkol (2005) provided a detailed description and illustrations of this species based on active postlarval instars collected in Poland. *Allothrombium monosolenidion*, known only from larval forms, was described and illustrated by Kamran and Alatawi (2020) from Saudi Arabia.

The present work provides the first correlation between larval and postlarval instars of *A. incarnatum* by laboratory rearing. *Allothrombium monosolenidion* Kamran and Alatawi, 2020 is considered here as a junior synonym of *A. incarnatum* Oudemans, 1905. Data on the habitat and host of this species are also presented.

MATERIALS AND METHODS

Two ovigerous females, collected directly in the field, were placed in glass vials containing a mixture of charcoal and plaster of Paris (9:1). After laying eggs, the females were transferred to 70% ethyl alcohol. The eggs were supplied with 2-3 ml of distilled water every three days, which was added to the substrate to maintain humidity. The glass vials were kept at room temperature (22-25 °C). All samples were fixed on microscope slides in Hoyer's medium (Walter and Krantz, 2009). An Olympus BX63-CBH microscope was used for measurements, photographs, and drawings. The morphological terminology follows Mąkol (2005) except for the following terms and abbreviation IL (body length without gnathosoma); IW (body width); L (scutum length); W (scutum width). All measurements are given in micrometers (µm).

Material examined: A female collected manually from soil samples in Tunceli province, Türkiye (39°07'N 39°37'E, 924 m a.s.l., moist moss and grass, 24.05.2019, col. E. Buğa), and 35 larvae obtaining from the collected female. Another female collected manually from soil samples in Erzincan province, Türkiye (39°12'N 38°34'E, 1059 m a.s.l., moist moss, 23.04.2023, col. İ. Karakurt), and 32 larvae obtaining from the collected female. The specimens representing females and remain of larvae freshly obtained from two collected females are deposited in the Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Türkiye (EBYU).

RESULTS AND DISCUSSION

Family Trombidiidae Leach, 1815

Genus *Allothrombium* Berlese, 1903

Type species: *Trombidium fuliginosum* Hermann, 1804, by original designation.

***Allothrombium incarnatum* Oudemans, 1905** (Figures 1-3)

Allothrombidium [*sic*] *incarnatum* Oudemans, 1905: 18 [P].
Allothrombium incarnatum Oudemans, 1905: Mąkol 2005: 178 [P].
Allothrombium monosolenidion Kamran and Alatawi, 2020: 736, **syn. nov.** [L].

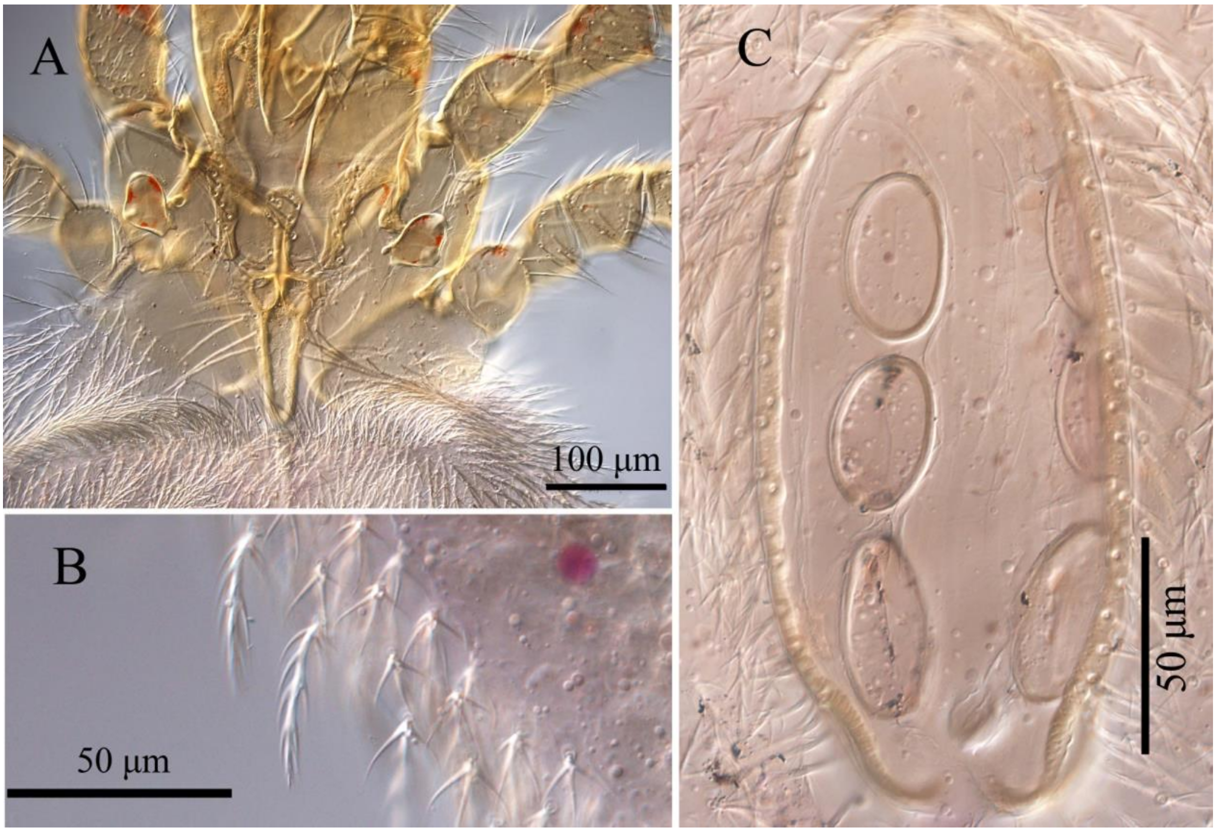

Figure 1. Photomicrographs of *Allothrombium incarnatum* (female): **A.** Crista metopica, **B.** Posterior dorsal setae, **C.** Genital opening.

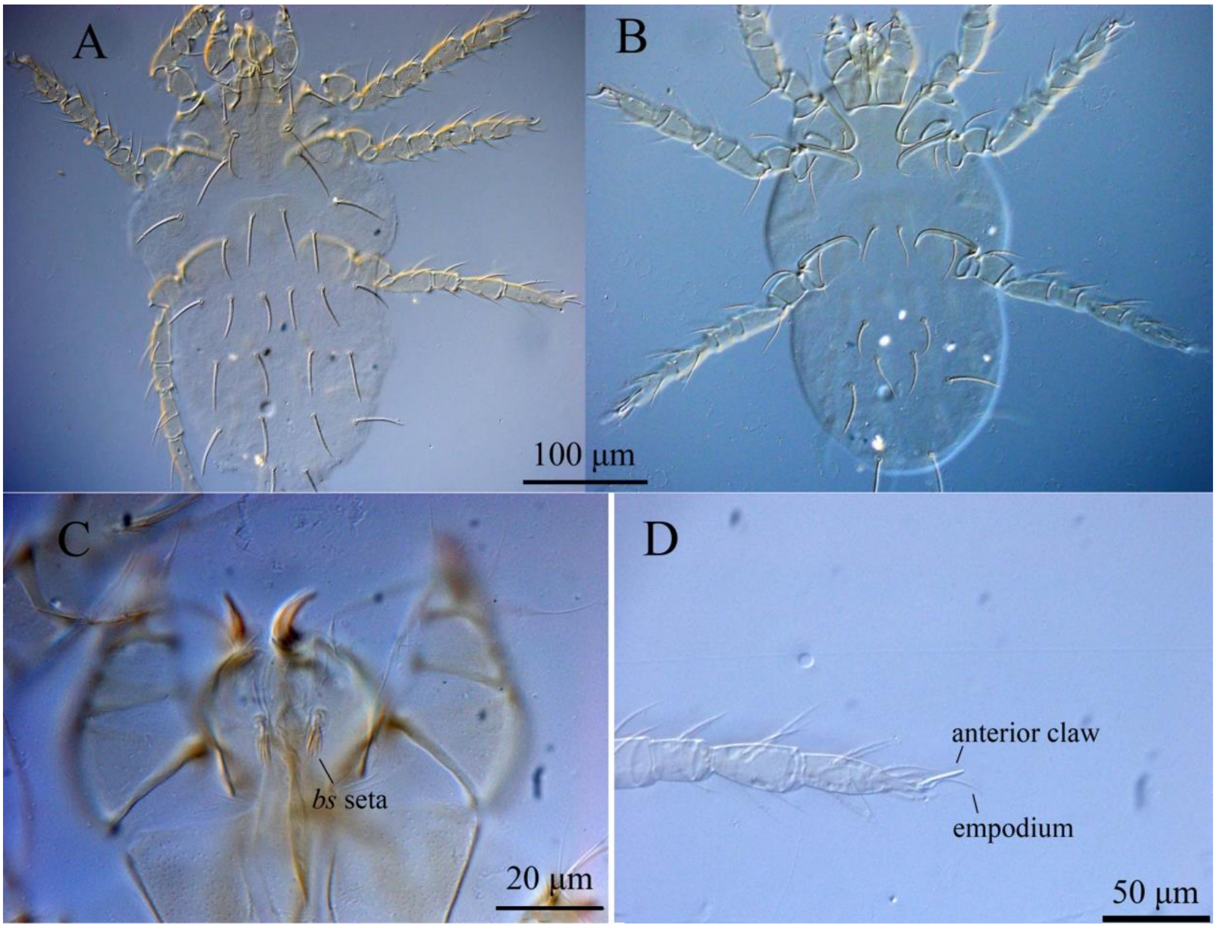

Figure 2. Photomicrographs of *Allothrombium incarnatum* (larva): **A.** Dorsal view, **B.** Ventral view, **C.** *bs* seta, **D.** Leg III (genu-tarsus).

Table 1. Morphometric data on females of *Allothrombium incarnatum*.

Character	from Mąkol (2005)		present work	
	Sample size	Min. –Max.	Sample size	Min. – Max.
IL	9	1062.6-1971.2	2	1335-1678
IW	12	569.8-954.8	2	750-840
IL/IW	7	1.7-2.1	2	1.78-1.99
CML	19	94.8-138.2	2	195-270
S	0	-	1	72-75
E	19	39.5-63.2	2	50-65
SB	19	23.7-43.4	2	32-35
Ch	18	39.5-51.3	2	70-72
Ti Cl	19	35.5-63.2	2	70-72
Pa Ta	19	55.3-86.9	2	70-92
pDS	17	35.5-43.14	1	38-43
GOP l	14	162.-225.1	1	208
GOP w	10	90.8-126.4	1	125
GOP l/w	10	1.5-2.2	1	1.55
Ti I l	19	94.8-142.2	2	180-190
Ta I l	19	158.0-244.9	2	240-255
Ta I w	19	82.9-110.6	2	104-107
Ta I l/w	19	1.8-2.4	2	2.3-2.45

Diagnosis: Adult and Deutonymph. See Mąkol (2005).

Larva (after Kamran and Alatawi, 2020). Colour in live specimens yellowish orange. Hypostomal setae (*bs*) calyx, with 4-7 finger-like digitations. fD = 24, fV = 6, fnCx 2-2-1. Genua II and III each with one solenidion. Pretarsi I and II with two claws and a claw-like empodium. Pretarsus III with anterior claw and a claw-like empodium. Posterior claw on pretarsus III absent.

Description: Adult (Fig. 1) and Deutonymph, See Mąkol (2005).

Larva (Figs 2, 3), See Kamran and Alatawi (2020). Male. Not collected and reared in this study. Deutonymph. Not collected and reared in this study.

Distribution: Hungary, Italy [?], Poland and The Netherlands (Mąkol, 2005, 2007; Mąkol and Wohltmann, 2012). New record from Türkiye (pesent work).

Laboratory observations and biology: The one female, collected on May 2019, laid 40 yellowish-orange eggs in a cluster two days after capture. A total of 35 larvae hatched within 21-22 days after oviposition. Another female, collected on April 2023, laid 35 yellowish-orange eggs in a cluster seventeen days after capture. A total of 32 larvae hatched within 21-22 days after oviposition.

Ten unfed members of the latter group of larvae were exposed to different host candidates (Diptera, Lepidoptera, Orthoptera and Homoptera). Of these, however, only representatives of *Aphis* (Hemiptera: Sternorrhyncha: Aphididae) were parasitized by the larvae of *A. incarnatum*.

Table 2. Morphometric data on larvae of *Allothrombium incarnatum*.

Character	present work (n=25)	from Kamran and Alatawi (2020) (n=9)
IL	271-375	390-435
IW	159-190	212-260
AA	40-48	42-47
AW	55-61	58-63
PW	60-70	60-69
SB	41-50	39-49
ASB	50-60	46-58
PSB	35-45	-
L	90-104	84-103
W	72-89	70-84
or	4.5-7.2	5-7
bs	7.5-9	8-10
1a	32-44	32-42
1b	30-40	30-37
2a	39-45	40-45
2b	35-41	37-42
3a	33-43	34-42
3b	35-42	38-43
h_1	35-40	33-39
h_2	38-48	38-47
AP	28-34	28-35
AM	30-36	32-36
AL	26-34	26-33
PL	45-55	45-52
S	43-57	49-58
MA	29-35	-
HS	32-40	34-44
LSS	55-74	54-60
SL	40-50	39-50
SS	24-30	24-30
DS_MIN	30-35	30-35
DS_MAX	39-49	41-47
Cx_I	40-57	38-45
Tr_I	28-38	29-33
Fe_I	40-48	40-46
Ge_I	26-32	29-33
Ti_I	35-46	40-47
Ta_I	50-64	55-65
LEG I	240-262	245-260
Cx_II	48-55	47-52
Tr_II	25-32	25-32
Fe_II	38-48	38-49
Ge_II	22-30	25-32
Ti_II	34-42	39-43
Ta_II	49-57	50-58
LEG II	230-247	231-251
Cx_III	48-56	51-54
Tr_III	30-40	30-38
Fe_III	39-50	41-50
Ge_III	25-33	28-34
Ti_III	38-48	45-51
Ta_III	50-60	55-65
LEG III	240-260	254-283
IP	715-765	737-791

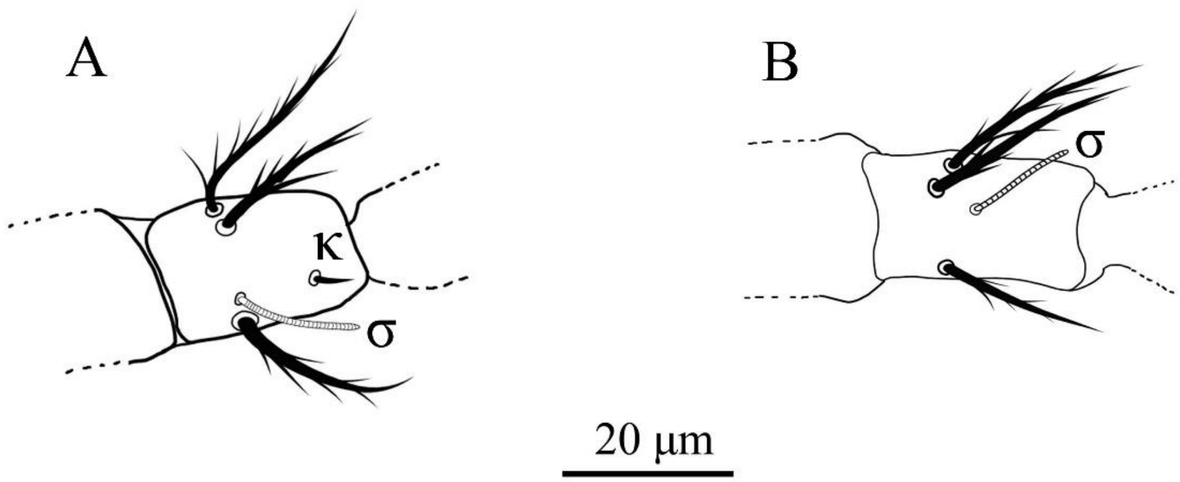

Figure 3. *Allothrombium incarnatum* (larva): **A.** Genu II, **B.** Genu III.

Remarks: The crista metopica and the dorsal seta structures of the females, from which the larvae were obtained, are compatible with the species *A. incarnatum* (Figs 1 A, B). These females have three pairs of papillae in their genital openings (Fig. 1 C). In the morphometric comparison of Polish and Turkish females of *A. incarnatum* (see Table 1), the differences in the length of the following characters are striking; CML (94.8-138.2 vs. 195-270) and tibia I (94.8-142.2 vs. 180-190). However, the structure and length of the pDS setae of both groups of specimens are compatible. In our opinion, the reason for these measurement differences is that the range of variation is larger for some character lengths. The fact that Oudemans (1916) gave the length of tarsus I of the female specimen of this species as 370 (op. cit., p. 42) supports our opinion. Of all the larval species described in the genus *Allothrombium*, only *A. monosolenidion* is characterized by having one solenidion on genua II and III (other species have two solenidia) (Kamran and Alatawi, 2020). The larva of *A. incarnatum* (Fig. 2) also has one solenidion on genua II and III (Fig. 3). Morphologically, there are no differences between the larval forms of these species. Furthermore, the present work shows that the metric data of the larvae of these two species overlap (see Table 2). As a result, we consider *A. monosolenidion* as a subjective junior synonym of *A. incarnatum*.

Additionally, the genus *Monotrombium* Zhang, 1995 in Zhang and Norbakhsh (1995), which is represented by only one larval species, *M. simplicium* Zhang, 1995, is characterized by the presence of a single solenidion on genua II-III and a single seta on coxa II (Zhang and Norbakhsh, 1995). The larva of *M. simplicium* differs from the larva of *A. incarnatum* by the presence of only a single seta on coxa II (coxa II has two setae in the larva of *A. incarnatum*). Future experimental and/or molecular studies could clarify the taxonomic status of the genus *Monotrombium*.

Authors' contributions

İbrahim Karakurt: Supervision, resources, investigation, visualization, writing – review & editing. **Evren Buğa:** Supervision, project administration, investigation, visualization, writing - review & editing. **Sevgi Sevsay:** Supervision, project administration, investigation, visualization, writing - review & editing.

This study is part of the second author's PhD thesis.

Statement of ethics approval

Not applicable.

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Conflict of interest

All authors declare that there is no potential conflict of interest.

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RESEARCH ARTICLE

The first record of the mite family Parholaspididae from Türkiye (Parasitiformes: Mesostigmata)

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ASBTRACT: In this study, female specimens of *Gamasholaspis browningi* were collected under hazelnut trees in a tea garden in Türkiye and described as a new record of the Turkish mite fauna. It was determined that this is the first representative of the family in Türkiye. In addition, an overview of the current status of the Turkish eviphidoid fauna is given.

Keywords: Acari, description, *Gamasholaspis browningi*, hazelnut tree, litter
Zoobank: https://zoobank.org/5A7BCD20-8C43-412D-910A-E4C68CAF9C5D

INTRODUCTION

The order Mesostigmata consists of about 110 families and more than 11000 species worldwide in three suborders, Sejida Kramer, 1885, Trigynaspida Camin and Gorirossi, 1955 and Monogynaspida Camin and Gorirossi, 1955 (Balileu et al., 2011; Walter and Proctor, 2013). In Türkiye, there is little information on the mesostimatic mites, but some groups within the Mesostigmata have been on the rise in recent years, such as the superfamily Eviphidoidea Berlese, 1913 is one of them (Erman et al., 2007). According to Beaulieu et al. (2011), Eviphidoidea comprises five families, namely Eviphididae Berlese, 1913, Macrochelidae Vitzthum, 1930, Pachylaelapidae Berlese, 1913, Parholaspididae Evans, 1956 and Leptolaelapidae Karg, 1978. This superfamily is represented worldwide with more than 1050 species, in Türkiye there are about 78 species in four families (Eviphididae with 10 species, Macrochelidae with 35 species, Pachylaelapidae with 32 species, Parholaspididae with one species in this study), while no species of the Leptolaelapidae have been recorded so far (Özbek 2017, 2023a, b). The present taxonomic study is not sufficient to cover the entire species diversity of this superfamily in Türkiye.

The Parholaspididae is a family of free-living predatory mites. They are usually found in the soil, in organic litter, in decaying plant material, in moss and in tree hollows. The members of the family are mainly distributed in the Oriental region, although some members are also found in the Palaearctic, Nearctic and Neotropical regions. Taxonomically, the family was initially listed by Evans (1956) as the subfamily Parholaspinae within the family Macrochelidae Vitzthum, 1930, but later Krantz (1960) elevated the Parholaspinae to the family level. In total, the family comprises 163 species within 14 genera around the world (Quintero-Gutiérrez and Halliday, 2021). In Türkiye, no species from the Parholaspididae family are known to date. The main aim of this study is to add new records to the mite fauna of Türkiye and to contribute to the knowledge of the species diversity of Eviphidoidea in Türkiye.

MATERIALS AND METHODS

The mites were collected by sieving decomposing organic material. The mites were extracted using modified Berlese-Tullgren funnels and mounted in Hoyer's medium according to the methods of Walter and Krantz (2009). Some specimens of the species were dissected for detailed examination of some structures for identification. The specimens were examined, illustrated, photographed, and measured using an Olympus BX63 upright microscope and an Olympus DP73 camera. The terminology of dorsal and ventral setae used in this paper follows those of Lindquist and Evans (1965) and Moraza and Peña (2006). The specimens are deposited at EBYU (Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Türkiye).

RESULTS

Family Parholaspididae Evans, 1956

Genus *Gamasholaspis* Berlese, 1904

Gamasholaspis browningi (Bregetova and Koroleva)

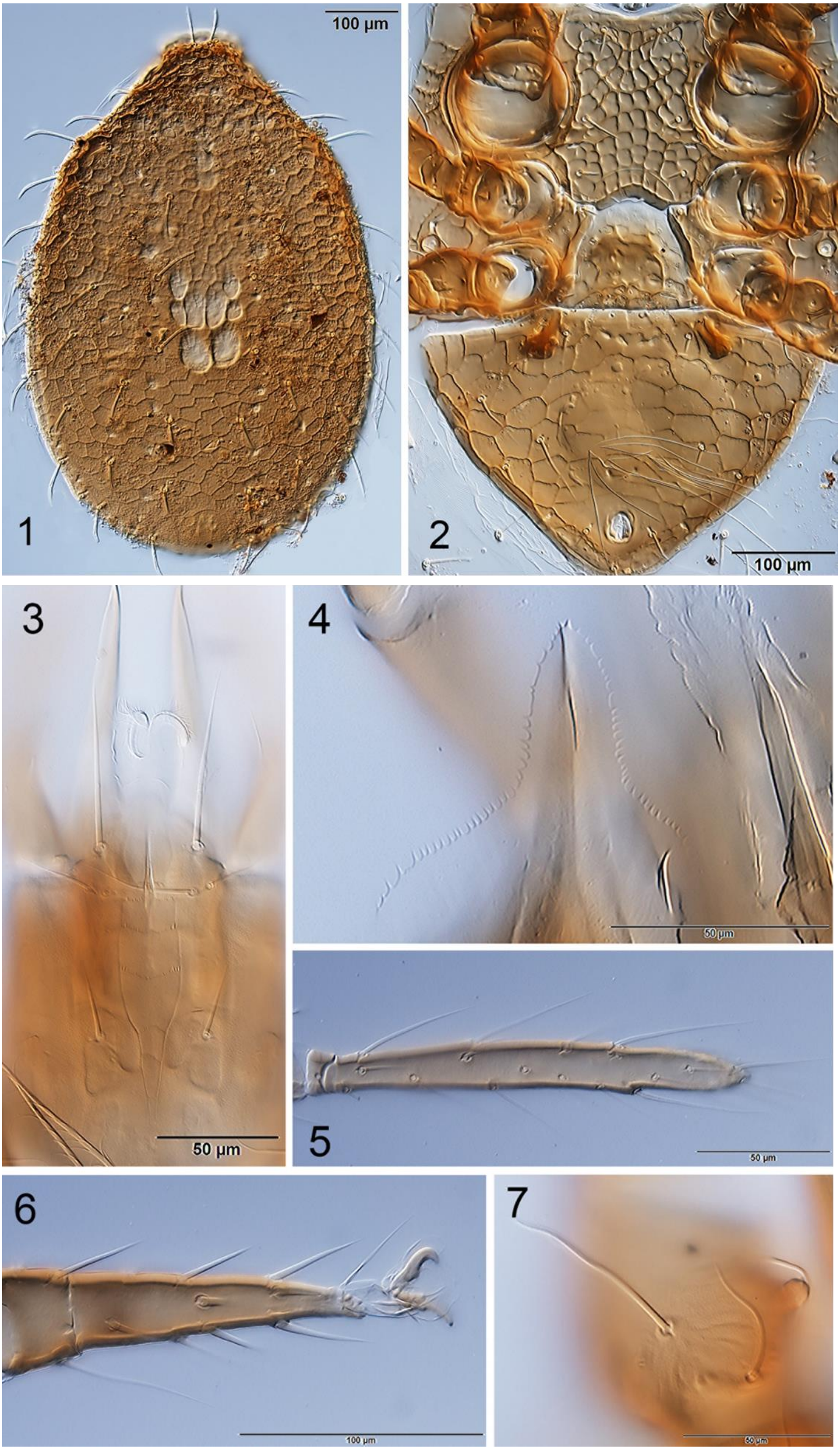
Evansolaspis browningi Bregetova and Koroleva, 1960: 54.

Gamasholaspis browningi — Petrova, 1977: 338; Marchenko, 2002: 41; Kontschán et al., 2014: 20; Quintero-Gutiérrez and Halliday, 2021: 416; Hajizadeh, 2022: 230.

Specimens examined: Five females from litter under hazelnut tree in a tea garden, Fındıkoba village, Of town, Trabzon province, Türkiye, 39°36'N 38°39'E, 3 May 2015.

Description. Female (n=5) (Figures 1-7)

Dorsum (Fig. 1). Dorsal shield oval, 720-760 long, 480-490 wide at level of widest point; covered with punctations and reticulations, with 29 pairs of setae, all setae expanded in distal ½, length 50-80 long (*j1* 50-60, *J5* about 50). Peritremes relatively shortened, anterior end not reaching dorsal surface of idiosoma.



Figures 1-7. *Gamasholaspis browningi* (female). 1. Dorsal shield, 2. Ventral shields, 3. Ventral surface of gnathosoma, 4. Epistome, 5. Tarsus I, 6. Tarsus II, 7. Ventral side of femur II.

Table 1. Leg setation of *Gamasholaspis browningi* (female**).**

Leg	coxa	trochanter	femur	genu	tibia	tarsus
I	2	4	13	11	12	not counted
II	2	5	11	11	10	18
III	2	5	6	8	8	18
IV	1	5	6	8	8	18

Venter (Fig. 2). A pair of well sclerotized presternal shields present. Sternal shield 180-186 long, 120-130 wide at level of coxae II, surface ornamented with well-defined polygonal patterns, two pairs of lyrifissures and three pairs of needle-like setae of equal length (*st1-3* 60-70). Metasternal shield fused with endopodal shield and with a pair of needle-like setae, *st4*. Genital shield helmet-shaped, 100-115 long and 150-160 wide, its surface ornamented with polygonal patterns and with a pair of needle-like setae, st5. Ventrianal shield triangular, 260-280 long and 370-400 wide, longer than wide, ornamented with reticulate lines, with four pairs of preanal setae (60-80), two anal setae and one postanal needle-like seta. Peritrematal shields fused to podal shields or sternal shield.

Gnathosoma. Setae *h1* longest, *h2* similar in length to pc and *h3* longer than *h2*. Corniculi long and sword shaped. Deutosternal groove with five rows of denticles (Fig. 3). Epistome one-piece, serrate at the margins and with a conspicuously large central process (Fig. 4). Chelicerae well developed, with a movable digit of about 90 long, and a fixed digit of about 70 long from the base of the dorsal seta. Movable digit with a short and relatively thick pilus dentilis and a dorsal seta. Base of chelicerae with two arthrodial brushes, one of which considerably longer than the other.

Legs. Claws on tarsus I absent (Fig. 5), tarsi of other legs bear claws (Fig. 6). Ventral surface of femur II with distinct short, round and thick process (Fig. 7), femur III with flat large process, coxae with small triangular process. Leg setation of *G. browningi* is shown in Table 1.

Male and immature stages. Not found.

DISCUSSION

Quintero-Gutiérrez and Halliday (2021) present a comprehensive study of the family Parholaspididae and give a clear description of the genus *Gamasholaspis*, which differs from the other genera of parholaspids by the following characters: 1) the peritrematal shield is not fused with the ventrianal shield and the expulsory vesicles are usually absent, 2) the metasternal setae are located on separate metasternal shields or on fused metasternal or endopodal shields, 3) a pair of free and elongate presternal plates are present, 4) the setae on the dorsal shield are often modified, 5) the seta *z1* is absent, 6) the cheliceral seta is expanded, 7) the ventrianal shield is sometimes expanded anteriorly and surrounds the genital shield, and 8) four or more pairs of preanal setae are present on the ventrianal shield.

Gamasholaspis browningi was first described and illustrated on three females and one protonymph by Bregetova and Koroleva (1960) from the soil and litter under trees in Batumi, Georgia, and later this species was reported from different regions of the Palaearctic (Quintero-Gutiérrez and Halliday, 2021; Hajizadeh, 2022). The Turkish specimens of this species were collected in Trabzon province, an area geographically close to the region where the type specimens were found. According to the detailed study of the species, the Turkish specimens are morphologically similar to the specimens originally described from Georgia. The length of the dorsal shield is 700-720 long in the Georgian specimens (see Bregetova and Koroleva 1960) and 720-760 in the Turkish specimens (five females) compared to the previously described specimens. In addition, *G. browningi* is a new addition to the Turkish mite fauna and the first representative of the family in Türkiye.

Statement of ethics approval

Not applicable.

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Conflict of interest

There is no potential conflict of interest.

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RESEARCH ARTICLE

Checklist of the mites (Acari) of Türkiye. Third supplement

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ABSTRACT: As new species are described, taxonomic modifications or revisions are made and distributional data are increased, the checklists are frequently updated regularly. The present paper is a comprehensive supplementary document that aims to list the current species of mites (Acari) found in Türkiye. The species list is arranged alphabetically orders and includes the published records. According to the current information, among the 1241 taxa, 241 belong to the Mesostigmata, 19 to the Ixodida, 728 to the Trombidiformes and 253 to the Sarcoptiformes. This supplement might be a valuable resource for researchers and ecologists interested in understanding the biodiversity of mites in this region.

Keywords: Fauna, mite, record, species list, taxonomy, Türkiye
Zoobank: https://zoobank.org/E2EE9B40-3009-49D1-80C7-A6D50171F82F

INTRODUCTION

Among all arachnids, Acari is a highly diverse group with a wide range of ecological roles. They are found in many habitats such as soil, litter, water, plants and animals as predators, parasites and decomposers, which are vital components of ecosystems. Approximately 63,000 mite species have been described and a million or more species are currently living (Doğan and Sullivan, 2023).

Taxonomic checklist is widely used to obtain information about biodiversity. In addition to three previous checklists on mites in Türkiye, checklists on various mite groups have been published by various researchers (Erman et al., 2010, 2019, Cakmak et al., 2011; Faraji et al., 2011; Sevsay, 2017; Baran et al., 2018; Durucan, 2018, 2020a; Doğan, 2019, 2022a; Murvanidze et al., 2020; Çobanoğlu et al., 2023b; Denizhan et al., 2023). In this process, the need to update the lists of Türkiye's mite fauna has emerged with new publications.

The aim of this study is to provide up-to-date information on the interpretation of taxonomic and biodiversity data with the current checklist of the Turkish mites.

MATERIALS AND METHODS

The species list is created alphabetically within orders, and accompanied by documentation of records from Türkiye. The list has been combined by mainly using the catalogues and checklists (Erman et al., 2010, 2019, Cakmak et al., 2011; Faraji et al., 2011; Sevsay, 2017; Baran et al., 2018; Durucan, 2018, 2020a; Doğan, 2019, 2022a; Murvanidze et al., 2020; Çobanoğlu et al., 2023b; Denizhan et al., 2023) and updated from recent publications. The species names mentioned in theses that are not considered officially published are not included in this work. The classification system follows that of Lindquist et al. (2009).

RESULTS

Subclass: Acari

Super order: Parasitiformes

I. Order: Opilioacarida

Not recorded in Türkiye.

II. Order: Holothyrida

Not recorded in Türkiye.

III. Order: Mesostigmata

Amblydromalus limonicus (Garman and McGregor): Baş et al., 2022.
Amblyseiella setosa Muma: Faraji et al., 2011.
Amblyseius adjaricus Wainstein and Vartapetov: Döker et al., 2016.
Amblyseius armeniacus Arutunjan and Ohandjanian: Faraji et al., 2011.
Amblyseius bryophilus Karg: Döker et al., 2014b.
Amblyseius decolor (Westerboer): Çobanoğlu et al., 2018.
Amblyseius herbicolus Chant: Akyazı et al., 2016.
Amblyseius meridionalis Berlese: Döker et al., 2016.
Amblyseius nemorivagus Athias-Henriot: Döker et al., 2020.
Amblyseius rademacheri Dosse: Soysal and Akyazı, 2018.
Ameroseius corbiculus (Sowerby): Cakmak et al., 2011.
Ameroseius lidiae Bregetova: Joharchi et al., 2022.
Ameroseius plumosus (Oudemans): Cakmak et al., 2011.
Ameroseius sculptilis Berlese: Joharchi et al., 2022.
Blattisocius keegani Fox: Cakmak et al., 2011.
Blattisocius mali (Oudemans): Cakmak et al., 2011.
Blattisocius tarsalis (Berlese): Cakmak et al., 2011.
Celaenopsis badius (C.L. Koch): Özbek and Gwiazdowicz, 2016.

Chelaseius valliculosus Kolodochka: Döker et al., 2016.
Dendrolaelaps casualis Huhta and Karg: Qayyoum et al., 2016a.
Dendrolaelaspis lobatus (Shcherbak and Chelebiev): Joharchi et al., 2022.
Eharius denizliensis Döker and Kazak: Döker et al., 2017a.
Eharius karuti Döker: Döker, 2018b.
Eharius stathakisi Döker: Döker, 2018b.
Euseius amissibilis Meshkov [=*Euseius gallicus* Kreiter and Tixier, syn.]: Döker et al., 2014c.
Euseius scutalis (Athias-Henriot): Faraji et al., 2011.
Eyndhovenia euryalis (Canestrini): Beron, 2020
Gamasholaspis browningi (Bregetova and Koroleva): Özbek, 2024.
Geholaspis longispinosus (Kramer): Özbek and Bal, 2014.
Glyptholaspis confusa (Foà): Özbek et al., 2015a.
Glyptholaspis saprophila Mašán: Özbek et al., 2015a.
Graminaseius graminis (Chant): Faraji et al., 2011.
Graminaseius neograminis Döker, Kazak and Karut: Döker et al., 2019.
Graminaseius recebi Döker, Kazak and Karut: Döker et al., 2019.
Holostaspella bidentata Özbek: Özbek, 2017b.
Hypoaspis larvicolus Joharchi and Halliday: Cakmak and da Silva, 2018.
Kampimodromus corylosus Kolodochka: Döker et al., 2024b.
Kampimodromus ericinus Ragusa and Tsolakis: Döker et al., 2016.
Kampimodromus keae (Papadoulis and Emmanouel): Döker et al., 2017b.
Kampimodromus langei Wainstein and Arutunjan: Sağlam et al., 2022.
Kampimodromus ragusai Swirski and Amitai: Döker et al., 2017b
Kleemannia nova Nasr and Abou-Awad: Joharchi et al., 2022.
Lasioseius lacunosus Westerboer: Cakmak et al., 2011.
Lasioseius ometes (Oudemans): Cakmak et al., 2011.
Longicheles ayyildizi Özbek, Bal and Doğan: Özbek et al., 2013.
Longicheles hortorum (Berlese): Özbek and Bal, 2012a; Özbek et al., 2013.
Longicheles lagrecai Valle: Özbek et al., 2013.
Longicheles longisetosus (Balogh): Özbek and Bal, 2012a; Özbek et al., 2013.
Longicheles mandibularis (Berlese): Özbek et al., 2013.
Longicheles ozkani Özbek, Bal and Doğan: Özbek et al., 2013.
Macrholaspis evansi (Balogh): Özbek, 2013.
Macrholaspis recki Bregetova and Koreleva: Özbek and Bal, 2012.
Macrocheles insignitus Berlese: Özbek, 2017.
Macrocheles mammifer Berlese: Özbek and Durucan, 2024.
Macrocheles merdarius (Berlese): Özbek et al., 2015b.
Macrocheles niksarensis Özbek: Özbek, 2017b.
Macrocheles peniculatus Berlese: Özbek, 2017b.
Macrocheles perglaber (Filipponi and Pegazzano): Özbek et al., 2015b.
Macrocheles scutatus (Berlese): Özbek et al., 2015b.
Macrocheles similis Krantz and Filipponi: Özbek and Durucan, 2024.
Macrocheles subbadius (Berlese): Özbek et al., 2015b.
Macronyssus aristippe (Domrow): Sümer et al., 2023.
Melichares agilis Hering: Cakmak et al., 2011.
Multidendrolaelaps putte Huhta and Karg: Qayyoum et al., 2016a.
Neopodocinum meridionalis (Sellnick): Geçit and Özbek, 2017.
Neoseiulella kazaki Döker: Döker, 2018a.
Neoseiulus alpinus (Schweizer): Faraji et al., 2011.
Neoseiulus alustoni (Livshitz and Kuznetsov): Döker et al., 2016.
Neoseiulus bicaudus (Wainstein): Faraji et al., 2011.
Neoseiulus cinctutus (Livshitz and Kuznetsov): Döker, 2019.
Neoseiulus cucumeris (Oudemans): Faraji et al., 2011.
Neoseiulus fauveli (Athias-Henriot): Baş et al., 2022.
Neoseiulus insularis (Athias-Henriot): Faraji et al., 2011.
Neoseiulus karandinosi Papadoulis, Emmanouel and Kapaxidi: Döker et al., 2016.
Neoseiulus marginatus (Wainstein): Faraji et al., 2011.
Neoseiulus neomarginatus Stathakis, Kapaxidi and Papadoulis: Döker et al., 2015.
Neoseiulus pseudomarginatus Döker, Stathakis and Kolodochka: Döker et al., 2023a.
Neoseiulus reductus (Wainstein): İnak et al., 2020.
Neoseiulus roumelioticus Papadoulis, Emmanouel and Kapaxidi: Döker et al., 2022.
Neoseiulus sekeroglui Döker and Stathakis: Döker et al., 2014a.
Neoseiulus sharonensis (Rivnay and Swirski) [=*Neoseiulus knappi* Zannou, Moraes, Ueckermann and Oliveira, syn.]: Döker et al., 2014a.
Neoseiulus umbraticus (Chant): Faraji et al., 2011.
Nothrholaspis anatolicus Özbek and Bal: Özbek and Bal, 2013.
Nothrholaspis bilobatus Özbek and Halliday: Özbek and Halliday, 2015c.
Nothrholaspis dogani Özbek and Bal: Özbek and Bal, 2013.
Nothrholaspis scutivagus Özbek: Özbek, 2017a.
Nothrholaspis turcicus Özbek and Bal: Özbek and Bal, 2013.
Olopachys (*Olopachylaella*) *transversalis* Özbek and Halliday: Özbek and Halliday, 2015a.
Olopachys (*Olopachys*) *caucasicus* Koroleva: Özbek and Halliday, 2024.
Olopachys (*Olopachys*) *crescentus* Özbek: Özbek, 2016.
Olopachys (*Olopachys*) *digitus* Özbek: Özbek, 2016.
Olopachys (*Olopachys*) *elongatus* Özbek and Halliday: Özbek and Halliday, 2015a.
Olopachys (*Olopachys*) *hallidayi* Özbek: Özbek, 2014.
Olopachys (*Olopachys*) *ovatus* Özbek and Halliday: Özbek and Halliday, 2015a.
Olopachys (*Olopachys*) *prolixus* Özbek and Halliday: Özbek and Halliday, 2015a.
Olopachys (*Olopachys*) *semicirculus* Özbek: Özbek, 2016.
Onchodellus acrophilus Özbek: Özbek, 2023.
Onchodellus circularis Özbek: Özbek, 2023.
Onchodellus karawaiewi (Berlese): Özbek, 2023.
Onchodellus kosensis Özbek: Özbek, 2023.
Onchodellus marginatus Özbek and Halliday: Özbek and Halliday, 2024.
Onchodellus montanus Şahin and Özbek: Şahin and Özbek, 2018.

Onchodellus turcicus Şahin and Özbek: Şahin and Özbek, 2018.
Ornithonyssus desultarius (Radovsky): Sümer et al., 2023.
Pachydellus giresunensis Özbek: Özbek, 2017b.
Pachylaelaps (*Longipachylaelaps*) *bayburtensis* Şahin and Özbek: Şahin and Özbek, 2018.
Pachylaelaps (*Longipachylaelaps*) *vermiger* Özbek and Halliday: Özbek and Halliday, 2024.
Pachylaelaps (*Longipachylaelaps*) *vicarious* Mašán: Şahin and Özbek, 2018.
Pachylaelaps (*Longipachys*) *anatolicus* Özbek: Özbek, 2015.
Pachylaelaps (*Pachylaelaps*) *armiger* Özbek and Mašán: Özbek and Mašán, 2018.
Pachylaelaps (*Pachylaelaps*) *evansi* Costa: Özbek and Mašán, 2018.
Pachylaelaps (*Pachylaelaps*) *imitans* Berlese: Özbek and Halliday, 2024.
Pachylaelaps (*Pachylaelaps*) *pectinifer* Canestrini: Şahin and Özbek, 2017.
Pachyseius destitutus Özbek and Halliday: Özbek and Halliday, 2015b.
Pachyseius masani Özbek and Halliday: Özbek and Halliday, 2014.
Pachyseius quadrigeminus Özbek and Halliday: Özbek and Halliday, 2015b.
Pachyseius siranensis Özbek and Halliday: Özbek and Halliday, 2014.
Paragigagnathus insuetus (Livshitz and Kuznetsov): Döker et al., 2015.
Paraseiulus incognitus Wainstein and Arutunjan: Döker et al., 2023b.
Paraseiulus triporus (Chant and Yoshida-Shaul): Faraji et al., 2011.
Phytoseius ibrahimi Döker and Kazak: Döker et al., 2015.
Phytoseius ribagai Athias-Henriot: Faraji et al., 2011.
Phytoseius salicis Wainstein and Arutunjan: Faraji et al., 2011.
Podocinum pacificum Berlese: Çobanoğlu et al., 2020b.
Proctolaelaps cossi (Duges): Cakmak et al., 2011.
Proctolaelaps pomorum (Oudemans): Cakmak et al., 2011.
Proctolaelaps scolyti Evans: Cakmak et al., 2011.
Proprioseiopsis ovatus (Garman): Döker et al., 2016.
Proprioseiopsis sororculus (Wainstein): Çobanoğlu et al., 2018.
Prozercon balikesirensis Urhan: Urhan, 2008e.
Prozercon banazensis Urhan, Karaca and Duran: Urhan et al., 2015b.
Prozercon bulbiferus Ujvári: Karaca and Urhan: 2015a.
Prozercon bulgariensis Ujvári: Urhan and Karaca, 2020.
Prozercon buraki Urhan: Urhan, 2008e.
Prozercon carpathofimbriatus Mašán and Fend'a: Duran and Urhan, 2017.
Prozercon celali Urhan: Urhan, 2010a.
Prozercon didimensis Keçeci, Urhan and Karaca: Keçeci et al., 2021.
Prozercon erdogani Urhan: Urhan, 2010d.
Prozercon giresunensis Urhan: Urhan, 2013.
Prozercon graecus Ujvári: Karaca and Urhan, 2015a.
Prozercon martae Ujvári: Karaca and Urhan, 2015b.
Prozercon miraci Urhan and Karaca: Urhan, 2020b.
Prozercon morazae Ujvári: Urhan et al., 2015.
Prozercon murati Urhan: Urhan, 2013.
Prozercon plumosus Ivan and Calugar: Duran et al., 2017.
Prozercon rekeae Ujvári: Urhan et al., 2019b.
Prozercon sellnicki Halašková: Urhan et al., 2019a.
Prozercon sultani Duran and Urhan: Duran and Urhan, 2015b.
Spinturnix myoti (Kolenati): Beron, 2020.
Spinturnix plecotina (C.L. Koch): Beron, 2020.
Spinturnix psi (Kolenati): Beron, 2020.
Spinturnix punctata (Sundevall): Beron, 2020.
Transeius begljarovi (Abbasova): Faraji et al., 2011.
Transeius herbarius (Wainstein): Faraji et al., 2011.
Transeius wainsteini (Gomelauri): Faraji et al., 2011.
Typhlodromina conspicua (Garman): Döker et al., 2024a.
Typhlodromips sessor (De Leon): Baş et al., 2022.
Typhlodromus (*Anthoseius*) *athenas* Swirski and Ragusa: Ersin et al., 2020.
Typhlodromus (*Anthoseius*) *bagdasarjani* Wainstein and Arutunjan: Faraji et al., 2011.
Typhlodromus (*Anthoseius*) *bakeri* (Garman): Faraji et al., 2011.
Typhlodromus (*Anthoseius*) *caucasicus* (Abbasova): Çakar et al., 2020.
Typhlodromus (*Anthoseius*) *caudiglans* (Schuster): Çobanoğlu et al., 2020a.
Typhlodromus (*Anthoseius*) *commenticius* Livshitz and Kuznetsov: Döker, 2018a.
Typhlodromus (*Anthoseius*) *foenilis* Oudemans: Faraji et al., 2011.
Typhlodromus (*Anthoseius*) *inopinatus* (Wainstein): Faraji et al., 2011.
Typhlodromus (*Anthoseius*) *invectus* Chant: Faraji et al., 2011.
Typhlodromus (*Anthoseius*) *karaisaliensis* Döker and Kazak: Döker et al., 2017a.
Typhlodromus (*Anthoseius*) *kerkirae* Swirski and Ragusa: Döker et al., 2016.
Typhlodromus (*Anthoseius*) *psyllakisi* Swirski and Ragusa: Kumral and Çobanoğlu, 2016.
Typhlodromus (*Anthoseius*) *rapidus* Wainstein and Arutunjan: Döker et al., 2023b.
Typhlodromus (*Anthoseius*) *tamaricis* (Kolodochka): Faraji et al., 2011.
Typhlodromus (*Typhlodromus*) *andrei* Karg: Faraji et al., 2011.
Typhlodromus (*Typhlodromus*) *antakyaensis* Stathakis and Döker: Döker et al., 2014a.
Typhlodromus (*Typhlodromus*) *exhilaratus* Ragusa: Döker et al., 2016.
Typhlodromus (*Typhlodromus*) *octogenipilus* Kreiter, Tixier and Duso: Döker et al., 2014a.
Typhlodromus (*Typhlodromus*) *papadoulisi* Döker and Kazak: Döker et al., 2017a.
Typhlodromus (*Typhlodromus*) *phialatus* Athias-Henriot: Döker et al., 2014a.
Typhlodromus (*Typhlodromus*) *pritchardi* Arutunjan: Döker et al., 2016.
Typhlodromus (*Typhlodromus*) *tulinae* Döker: Döker et al., 2023a.
Typhloseiella isotricha (Athias-Henriot): Döker et al., 2014a.
Typhloseiella perforata (Wainstein): Faraji et al., 2011.
Typhloseiulus anatolicus Döker: Döker et al., 2023b.

Typhloseiulus calabriae (Ragusa and Swirski): Döker, 2018a.
Typhloseiulus carmone (Chant and Yoshida-Shaul): Döker et al., 2016.
Typhloseiulus peculiaris (Kolodochka): Döker et al., 2016.
Veigaia cerva (Kramer): Akyol and Özbek, 2024.
Zercon afyonensis Urhan and Duran: Urhan and Duran, 2017.
Zercon alattini Urhan: Urhan, 20011.
Zercon anatolicus Urhan: Urhan, 2008c.
Zercon arslani Duran, Karaca and Urhan: Duran et al., 2017.
Zercon bulancakensis Urhan: Urhan, 2012.
Zercon carpathicus Sellnick: Urhan, 2007a.
Zercon cokelezicus Urhan: Urhan, 2009a.
Zercon cretensis Ujvári: Duran and Urhan, 2017.
Zercon denizliensis Urhan: Urhan, 2011.
Zercon dilekensis Urhan and Karaca: Urhan and Karaca, 2023.
Zercon dogani Bilki, Urhan and Karaca: Bilki et al., 2022.
Zercon domanicensis Urhan: Urhan, 2010c.
Zercon ekizi Urhan, Duran and Karaca: Urhan et al., 2016.
Zercon emirdagicus Urhan, Duran and Karaca: Urhan et al., 2016.
Zercon filiformis Karaca and Urhan: Karaca and Urhan, 2016.
Zercon foveolatus Halašková: Urhan, 2008d.
Zercon geliboluensis Karaca and Urhan: Karaca and Urhan, 2016.
Zercon hispanicus Sellnick: Urhan and Duran, 2019b.
Zercon honazicus Urhan: Urhan, 2009b.
Zercon huseyini Urhan: Urhan, 2008b.
Zercon imperfectsetosus Urhan: Urhan, 2012.
Zercon inonunensis Urhan: Urhan, 2007b.
Zercon istanbulensis Duran and Urhan: Duran and Urhan, 2015a.
Zercon izmirensis Urhan, Duran and Karaca: Urhan et al., 2020a.
Zercon juvarae Călugăr: Urhan et al., 2015b.
Zercon kadiri Karaca: Karaca, 2019.
Zercon kallimcii Urhan: Urhan, 2010b.
Zercon karacamehmeti Urhan and Duran: Urhan and Duran, 2017.
Zercon karacasuensis Bulut, Urhan and Karaca: Bulut et al., 2021.
Zercon karadaghiensis Balan: Urhan et al., 2012.
Zercon kastamonuensis Urhan and Karaca: Urhan and Karaca, 2019.
Zercon laczii Ujvári: Duran and Urhan, 2017.
Zercon longisetosus Urhan: Urhan, 2008a.
Zercon magdae Ivan and Călugăr: Karaca and Urhan, 2014.
Zercon manisaensis Urhan, Duran and Karaca: Urhan et al., 2020a.
Zercon marinae Ivan and Călugăr: Duran and Urhan, 2017.
Zercon marmarisensis Bilki, Urhan and Karaca: Bilki et al., 2022.
Zercon mehmeturhani Urhan: Urhan, 2009a.
Zercon mirabilis Urhan: Urhan and Öztaş, 2013.
Zercon muglaensis Bilki, Urhan and Karaca: Bilki et al., 2022.
Zercon osmanelinensis Urhan: Urhan, 2008a.
Zercon peltatus C.L. Koch: Urhan et al., 2004.
Zercon salebrosus Błaszak: Urhan et al., 2013.
Zercon saphenous Błaszak: Urhan and Duran, 2019a.
Zercon semizi Urhan, Duran and Karaca: Urhan et al., 2020a.
Zercon similifoveolatus Ivan and Călugăr: Karaca and Urhan, 2016.
Zercon sklari Balan: Karaca and Urhan, 2014.
Zercon sklarisimilis Karaca and Urhan: Karaca and Urhan, 2016.
Zercon soguticus Urhan and Duran: Urhan and Duran, 2017.
Zercon tefenniensis Urhan: Urhan, 2010d.
Zercon tekirdagensis Karaca and Urhan: Karaca and Urhan, 2016.
Zercon thracicus Karaca and Urhan: Karaca and Urhan, 2016.
Zercon tripolisensis Urhan, Karaca, Kassen: Urhan et al., 2024.
Zercon uludagicus Urhan: Urhan, 2008b.
Zercon yusufi Urhan: Urhan, 2010c.

IV. Order: Ixodida

Dermacentor raskemensis Pomerantzev: Orkun and Vatansever, 2021.
Haemaphysalis kopetdaghica Kerbabaev: Orkun and Vatansever, 2021.
Haemaphysalis pospelovashtromae Hoogstraal [=*Haemaphysalis aksarensis* Özkan, syn.]: Guglielmone et al., 2014.
Hyalomma turanicum Pomerantzev: Bursalı et al., 2012.
Hyalomma asiaticum Schulze and Schlottke: Bursalı et al., 2012.
Ixodes acuminatus Neumann: Kar et al., 2017.
Ixodes arboricola Schulze and Schlottke: Keskin et al., 2014.
Ixodes ariadnae Hornok: Hekimoglu et al., 2022.
Ixodes crenulatus Koch: Bursalı et al., 2012.
Ixodes eldaricus Djaparidze: Keskin and Erciyas-Yavuz, 2019.
Ixodes festai Rondelli: Keskin and Erciyas-Yavuz, 2019.
Ixodes inopinatus Estrada-Peña, Nava and Petney: Bursalı et al., 2020.
Ixodes kaiseri Arthur: Orkun and Karaer, 2018.
Ixodes simplex Neumann: Bursalı et al., 2012.
Ixodes trianguliceps Birula: Keskin and Selçuk, 2021.
Otobius megnini (Duges): Bursalı et al., 2012.
Ornithodoros erraticus (Lucas): Bursalı et al., 2012.
Rhipicephalus rossicus Yakimov and Kol-Yakimova: Bursalı et al., 2012.
Rhipicephalus secundus Feldman-Muhsam: Mumcuoglu et al., 2022.

Super order: Acariformes

V. Order: Trombidiformes

Abacarus hystrix (Nalepa): Denizhan et al., 2015.
Abalakeus gonabadensis Ahmadi, Hajiqanbar and Saboori: Sabori et al., 2023.
Abrolophus artemisiae (Schrank): Karakurt, 2023a.
Abrolophus balkanicus Haitlinger and Šundić: Çobanoğlu et al., 2023a.

Abrolophus boleticolus Sevsay, Ozyurek, Balci and Ozman-Sullivan: Sevsay et al., 2024.
Abrolophus miniatus (Hermann): Karakurt, 2023a.
Abrolophus poljankus Haitlinger and Šundić: Çobanoğlu et al., 2023a.
Abrolophus quisquiliarus (Hermann): Karakurt, 2023a.
Abrolophus rhopalicus (Koch): Karakurt, 2023a.
Abrolophus silesiacus (Haitlinger) [=*Hauptmannia amilberti* Haitlinger, syn.]: Karakurt, 2023a.
Abrolophus strojnyi Gabryś: Karakurt, 2023a.
Abrolophus viburnicolus (Fain and Çobanoğlu): Sevsay, 2017.
Acalitus essigi Hassan: Denizhan et al., 2015.
Acarochelopodia cuneifera Bartsch: Durucan, 2018.
Acarochelopodia delamarei Angelier: Durucan, 2020a
Acaromantis monnioti Morselli: Durucan, 2018.
Acaropsella rohdendorfi (Volgin): Doğan, 2022a.
Acaropsellina docta (Berlese): Doğan, 2022a.
Acaropsellina sollers (Kuzin): Doğan, 2022a.
Aceria acroptiloni Shevtchenko and Kovalev: Denizhan et al., 2015.
Aceria aegyptica (Rasmy and Abou-Awad): Denizhan et al., 2015.
Aceria angustifoliae Denizhan, Monfreda, de Lillo and Çobanoğlu: Denizhan et al., 2015.
Aceria anthocoptes (Nalepa): Denizhan et al., 2015.
Aceria avanensis Bagdasarian: Denizhan et al., 2015.
Aceria balasi Farkas: Denizhan et al., 2015.
Aceria calaceris Keifer: Denizhan et al., 2015.
Aceria camdeboo (Meyer): Denizhan et al., 2022.
Aceria campestricola (Frauenfeld): Denizhan et al., 2015.
Aceria carduui Petanovic, Boczek and Shi: Diler and Sullivan, 2022.
Aceria cerrea (Nalepa): Denizhan et al., 2015.
Aceria chondrillae (Canestrini): Denizhan et al., 2015.
Aceria cichorii Petanović, Boczek and Shi: Denizhan et al., 2015.
Aceria dioicae (Keifer): Denizhan et al., 2015.
Aceria diospyri (Keifer): Denizhan, 2018.
Aceria drabae (Nalepa): Denizhan et al., 2015.
Aceria edirnensis Denizhan, Çobanoğlu and Metz: Denizhan et al., 2023.
Aceria elaeagnicola Farkas: Denizhan et al., 2015.
Aceria erinea (Nalepa): Denizhan et al., 2015.
Aceria fraxinivora (Nalepa): Denizhan et al., 2015.
Aceria ilicis (Canestrini): Denizhan et al., 2015.
Aceria kiefferi (Nalepa): Denizhan et al., 2015.
Aceria malherbae Nuzzaci: Denizhan et al., 2015.
Aceria onosmae Kiedrowicz, Denizhan, Bromberek, Szydło and Skoracka: Kiedrowicz et al., 2016.
Aceria petanovicae Amrine and de Lillo: Denizhan et al., 2015.
Aceria salicina (Nalepa): Denizhan et al., 2015.
Aceria salviae (Nalepa): Denizhan et al., 2015.
Aceria sawatchense Keifer: Denizhan et al., 2023.
Aceria sheldoni (Ewing): Denizhan et al., 2015.
Aceria sobhiani Sukhareva: Diler and Sullivan, 2022.
Aceria tamaricis (Trotter): Denizhan et al., 2015.
Aceria tenella (Nalepa): Denizhan et al., 2015.
Aceria thessalonicae Castagnoli, 1991: Denizhan et al., 2015.
Aceria tosichella Keifer: Denizhan et al., 2015.
Aceria trifolii (Nalepa): Denizhan et al., 2022.
Aceria tuberculata (Nalepa): Denizhan et al., 2015.
Aceria tulipae (Keifer): Denizhan et al., 2015.
Aceria tussilagofoliae Boczek: Denizhan et al., 2015.
Aceria vanensis Kiedrowicz, Denizhan, Bromberek, Szydło and Skoracka: Kiedrowicz et al., 2016.
Aceria verbasci Boczek: Denizhan et al., 2015.
Acherontacarus anatolicus Boyacı, Özkan and Didinen: Erman et al., 2019.
Acherontacarus burduricus Gülle, Boyacı and Gülle: Erman et al., 2019.
Acherontacarus rutilans E. Angelier: Erman et al., 2019.
Actacarus bacescui Konnerth-Ionescu: Durucan, 2018.
Actacarus ponticus Bartsch: Durucan, 2020a.
Aculops montenegrinus (Petanović and de Lillo): Denizhan et al., 2015.
Aculops rhodensis (Keifer): Denizhan et al., 2015.
Aculops thymi (Nalepa): Denizhan et al., 2023.
Aculus aegirinus (Nalepa): Denizhan et al., 2015.
Aculus gebeliae Kiedrowicz, Denizhan, Bromberek, Szydło and Skoracka: Kiedrowicz et al., 2016.
Aculus ligustri (Keifer): Denizhan et al., 2015.
Aculus lydii Kiedrowicz, Denizhan, Bromberek, Szydło and Skoracka: Kiedrowicz et al., 2016.
Aculus mogeri (Farkas): Denizhan et al., 2015.
Aculus olearius Castagnoli: Denizhan et al., 2015.
Aculus parakarensis (Bagdasarian): Denizhan et al., 2022.
Aculus spectabilis Kiedrowicz, Denizhan, Bromberek, Szydło and Skoracka: Kiedrowicz et al., 2016.
Aculus taihangensis Hong and Xue: Sullivan et al., 2023.
Aculus tetanothrix (Nalepa): Denizhan et al., 2015.
Aegyptobia aletes (Pritchard and Baker): Çobanoğlu et al., 2016.
Aegyptobia beglarovi Livshitz and Mitrofanov: Çobanoğlu et al., 2016.
Aegyptobia cupressus Baker and Tuttle: Çobanoğlu et al., 2016.
Aegyptobia juniperi Ueckermann, Çobanoğlu and Sağlam: Çobanoğlu et al., 2016.
Aegyptobia mccormicki (Baker and Pritchard): Çobanoğlu et al., 2016.
Aegyptobia tragardhi Sayed: Çobanoğlu et al., 2016.
Agaue chevreuxi (Trouessart): Durucan, 2018.
Agaue panopae (Lohmann): Durucan, 2019a.
Agauopsis brevipalpus (Trouessart): Durucan, 2018.
Agauopsis conjuncta Viets: Durucan, 2018.
Agauopsis ibssi Bartsch: Durucan, 2018.
Agauopsis microrhyncha (Trouessart): Durucan, 2018.
Agauopsis nonornata Bartsch: Durucan, 2018.
Agauopsis pteropes Bartsch: Durucan, 2018.
Agistemus collyerae Gonzalez-Rodriguez: Doğan, 2019.
Agistemus terminalis (Quayle): Doğan, 2019.
Albaxona lundbladi Motaş and Tanasachi: Erman et al., 2019.
Allocaeculus multispinosus Franz: Per et al., 2019.
Allocaeculus turcicus Per, Doğan, Zeytun and Ayyıldız: Per et al., 2017.
Allothrombium adustum Oudemans: Karakurt, 2022.
Allothrombium clavatum Saboori, Pešić and Hakimitabar: Oner et al., 2021.
Allothrombium incarnatum Oudemans: Karakurt et al., 2024.
Allothrombium molliculum (C.L. Koch): Yıldırım and Sevsay, 2019.

Allothrombium polikarpi Haitlinger: Oner et al., 2021.
Anomalohalacarus similis Bartsch: Durucan, 2018.
Anoplocheylus tauricus Livshitz and Mitrofanov: Bayram and Cobanoğlu: Beron, 2022.
Anthocoptes aspidophorus (Nalepa): Denizhan et al., 2015.
Anthocoptes cellatus Denizhan, Monfreda, de Lillo and Çobanoğlu: Denizhan et al., 2015.
Anthocoptes cornicolus Farkas: Denizhan et al., 2015.
Anthocoptes salicis Nalepa: Denizhan et al., 2015.
Anystis baccarum (Linnaeus): Gokce et al., 2020.
Aplonobia eurotiae (Mitrofanov and Strunkova): Çobanoğlu et al., 2021b.
Apodicheles heteropalpus (Mégnin) *Species inquirenda* [=*Cheyletiella heteropalpa* (Mégnin)]: Doğan, 2022a.
Arrenurus (*Arrenurus*) *antalyensis* Gülle, Boyacı and Gülle: Erman et al., 2019.
Arrenurus (*Arrenurus*) *berolinensis* Protz: Erman et al., 2019.
Arrenurus (*Arrenurus*) *kermanensis* Pešić, Smit and Asadi: Erman et al., 2019.
Arrenurus (*Arrenurus*) *ovatipetiolatus* Esen and Erman: Erman et al., 2019.
Arrenurus (*Arrenurus*) *vavrai* Thon: Erman et al., 2019.
Arrenurus (*Megaluracarus*) *cylindratus* Piersig: Erman et al., 2019.
Arrenurus (*Micruracarus*) *bifidicodulus* Piersig: Erman et al., 2019.
Arrenurus (*Micruracarus*) *biscissus* (Lebert): Erman et al., 2019.
Arrenurus (*Micruracarus*) *cyprioticus* Smit and Pešić: Erman et al., 2019.
Arrenurus (*Truncaturus*) *corsicus* (E. Angelier): Erman et al., 2019.
Ascoschoengastia latyshevi (Schluger): Stekolnikov and Daniel, 2012.
Asensilla prassei Rack: Khaustov et al., 2017.
Atelopsalis pasifica Bartsch: Durucan, 2020a.
Atelopsalis tricuspis Trouessart: Durucan, 2018.
Atractides (*Atractides*) *anatolicus* Pešić, Erman and Esen: Erman et al., 2010.
Atractides (*Atractides*) *arcuatus* Thor: Erman et al., 2019.
Atractides (*Atractides*) *concavus* Pešić and Smit: Pešić and Smit, 2021
Atractides (*Atractides*) *dentipalpis* (Walter): Erman et al., 2019.
Atractides (*Atractides*) *distans* (K. Viets): Erman et al., 2010.
Atractides (*Atractides*) *elazigensis* Esen and Pesic: Esen and Pesic, 2014.
Atractides (*Atractides*) *ermani* Esen and Pesic: Esen and Pesic, 2014.
Atractides (*Atractides*) *fissus* Walter: Erman et al., 2019.
Atractides (*Atractides*) *fonticolus* (Viets): Erman et al., 2010.
Atractides (*Atractides*) *glandulosus* (Walter): Erman et al., 2019.
Atractides (*Atractides*) *gomerae* Lundblad: Erman et al., 2019.
Atractides (*Atractides*) *graecus* K. Viets: Erman et al., 2019.
Atractides (*Atractides*) *inflatipalpis* K. Viets: Erman et al., 2010.
Atractides (*Atractides*) *inflatipes* (Lundblad): Erman et al., 2019.
Atractides (*Atractides*) *martini* Pešić, Erman and Esen: Erman et al., 2010.
Atractides (*Atractides*) *nahavandii* Schwoerbel and Sepasgozarian: Erman et al., 2019.
Atractides (*Atractides*) *nikooae* Pešić: Erman et al., 2019.
Atractides (*Atractides*) *nodipalpoides* Aşçı, Boyacı and Özkan: Erman et al., 2019.
Atractides (*Atractides*) *pennatus* K. Viets: Erman et al., 2010.
Atractides (*Atractides*) *protendens* K. O. Viets: Erman et al., 2019.
Atractides (*Atractides*) *reinhardi* Gülle, Gülle and Boyacı: Erman et al., 2019.
Atractides (*Atractides*) *remotus* Szalay: Erman et al., 2010.
Atractides (*Atractides*) *spinipes* Koch: Erman et al., 2019.
Atractides (*Atractides*) *turcicus* Aşçı: Erman et al., 2010.
Atractides (*Atractides*) *zagrosensis* Pešić, Saboori and Asadi: Pesic et al., 2023b.
Atractides (*Polymegapus*) *orghidani* Motaş and Tanasachi: Erman et al., 2010.
Atractides (*Polymegapus*) *persicus* Pešić and Asadi: Erman et al., 2019.
Atractides (*Polymegapus*) *polyporus* (K. Viets): Erman et al., 2019.
Atractides (*Polymegapus*) *rutae* (Lundblad): Boyacı and Gülle, 2020.
Atractides (*Tympanomegapus*) *longirostris* (Walter): Erman et al., 2019.
Atractothrombium brevisetosum Karakurt and Sevsay: Sevsay, 2017.
Atractothrombium sylvaticum (C.L. Koch): Sevsay, 2017.
Aturus (*Aturus*) *asserculatus* Walter: Erman et al., 2019.
Aturus (*Aturus*) *karamani* Viets: Erman et al., 2019.
Aturus (*Aturus*) *natangensis* Protz: Erman et al., 2019.
Aturus (*Aturus*) *rotundus* Romijn: Erman et al., 2019.
Aturus (*Aturus*) *villosus* Kramer: Erman et al., 2019.
Axonopsis (*Axonopsis*) *complanata* (Müller): Erman et al., 2019.
Axonopsis (*Brachypodopsis*) *guadarramensis* Valdecasas: Erman et al., 2019.
Axonopsis (*Brachypodopsis*) *inferorum* Motaş and Tanasachi: Erman et al., 2019.
Axonopsis (*Hexaxonopsis*) *romijni* Viets: Erman et al., 2019.
Axonopsis (*Navinaxonopsis*) *persica* Pešić: Erman et al., 019.
Axonopsis (*Paraxonopsis*) *vietsi* Motaş and Tanasachi: Erman et al., 2019.
Balaustium akramii Noei, Asadollahzadeh, Cakmak and Hadizadeh: Noei et al., 2017.
Balaustium izmirensis Noei and Ersin: Noei et al., 2019.
Balaustium madeirense Willmann: Beron, 2008.
Balaustium murorum (Hermann): Karakurt, 2023a.
Barbaxonella bingolensis Esen, Pešić and Erman: Erman et al., 2019.
Barbaxonella taurusensis Boyacı, Gülle and Didinen: Erman et al., 2019.
Barbutia anguineus (Berlese): Doğan, 2019.
Barbutia iranensis Bagheri, Navaei and Ueckermann: Doğan, 2019.

Biskratrombium persicum Majidi, Hajiqanbar and Saboori: Pekağırbaş et al., 2023.
Boczekiana celtidis Petanović: Denizhan et al., 2015.
Brachypoda (*Hemibrachypoda*) *baderi* Di Sabatino and Cicolani: Erman et al., 2019.
Brachypoda (*Hemibrachypoda*) *orientalis* Pešić and Esen: Erman et al., 2019.
Brachypoda (*Parabrachypoda*) *montii* Maglio: Erman et al., 2019.
Brachytydeus armindae (Momen and Lundqvist): Çobanoğlu et al., 2021d.
Brachytydeus maga (Kuznetzov, Kuznetzov and Livshitz): Ueckermann et al., 2019.
Brevipalpus obovoides DeLeon: Çobanoğlu et al., 2016.
Brevipalpus recki Livshitz and Mitrofanov: Çobanoğlu et al., 2019a.
Brevipalpus rotai Castagnoli and Pegazzano: Çobanoğlu et al., 2016.
Brevulacus reticulatus Manson: Denizhan et al., 2015.
Brunehaldia brunehaldi (Vercammen-Grandjean): Stekolnikov and Daniel, 2012.
Brunehaldia bulgarica (Vercammen-Grandjean and Kolebinova): Stekolnikov and Daniel, 2012.
Brunehaldia curtinae (Kepka): Stekolnikov and Daniel, 2012.
Bryobia cagani Çobanoğlu, Ueckermann and Cilbircioğlu: Çobanoğlu et al., 2021b.
Calacarus carinatus (Green): Denizhan et al., 2015.
Caligonella brevia Uğurlu, Doğan and Doğan: Uğurlu et al., 2023.
Caligonella haddadi Bagheri and Maleki: Doğan, 2019.
Caligonella quinqueocellata Khaustov: Doğan et al., 2022.
Caligonella urhani Akyol: Doğan, 2019.
Calyptostomata velutinus (Müller): Doğan et al., 2015.
Camactognathus tesselatus (Morselli and Mari): Durucan, 2018.
Camerotrombidium rasum Berlese: Sevsay, 2017.
Cecidophyes gymnaspis (Nalepa): Denizhan et al., 2015.
Cenopalpus bagdasariani (Livshitz and Mitrofanov): Çobanoğlu et al., 2016.
Cenopalpus bakeri Düzgüneş: Çobanoğlu et al., 2016.
Cenopalpus irani Dosse: Çobanoğlu et al., 2019a.
Cenopalpus lanceolatisetae Attiah: Çobanoğlu et al., 2016.
Cenopalpus lineola (Canestrini and Fanzago): Çobanoğlu et al., 2016.
Cenopalpus pennatisetis (Wainstein): Çobanoğlu et al., 2019a.
Cenopalpus pritchardi Düzgüneş: Çobanoğlu et al., 2016.
Cenopalpus quadricornis (Livshitz and Mitrofanov): Çobanoğlu et al., 2019a.
Cenopalpus spinosus (Donnadieu): Çobanoğlu et al., 2016.
Charletonia cilissa (Cooreman): Sevsay, 2017.
Charletonia damavandica Karimi Iravanlou, Kamali and Talebi: Kapankaya et al., 2023b.
Charletonia krendowskyi (Feider): Beron, 2022.
Cheladonta deserticola Stekolnikov and Daniel: Stekolnikov and Daniel, 2012.
Cheladonta flava (Schluger): Stekolnikov and Daniel, 2012.
Cheladonta ikaoensis (Sasa, Sawada, Kano, Hayashi and Kumada): Stekolnikov and Daniel, 2012.
Cheletacarus raptor Volgin: Doğan, 2022a.
Cheletomimus (*Hemicheyletia*) *leytensis* Corpuz-Raros: Kabasakal and Doğan, 2021.
Cheletomimus bakeri (Ehara): Çakmak and Çobanoğlu, 2012.
Cheletomimus berlesei (Oudemans): Yeşilayer and Çobanoğlu, 2012.
Cheletomorpha bochkovi Kabasakal and Doğan: Kabasakal and Doğan, 2021.
Cheletomorpha lepidopterorum (Shaw): Doğan et al., 2019b.
Chenophila marmaronetta Zmudzinski and Unsoeld: Beron, 2021a.
Cheyletiella blakei Smiley: Doğan, 2022a.
Cheyletiella yasguri Smiley: Doğan, 2022a.
Cheyletus cacahuamilpensis Baker [=*Cheyletus baloghi* Volgin, syn.]: Doğan, 2022a.
Cheyletus carnifex Zachvatkin [=*Cheyletus aversor* Rohdendorf, syn.]: Doğan, 2022a.
Cheyletus kuznetzovi Bochkov and Khaustov: Doğan, 2022a.
Cheyletus trouessarti Oudemans: Doğan, 2022a.
Cheyletus trux Rohdendorf [=*Cheyletus tenuipilis* Fain, Feldman-Muhsam and Mumcuoglu, syn.]: Doğan, 2022a.
Cheylostigmaeus californicus Summers and Ehara: Doğan, 2019.
Cheylostigmaeus mirabilis Wood: Doğan, 2019.
Cheylostigmaeus occultatus Doğan and Doğan, 2022.
Cheylostigmaeus pannonicus Willmann: Doğan and Fan, 2022.
Cheylostigmaeus salinus Evans: Doğan, 2019.
Cheylostigmaeus tarae Khanjani: Doğan, 2019.
Cheylostigmaeus urhani Dönel and Doğan: Doğan, 2019.
Cheylostigmaeus variatus Doğan, Dilkaraoğlu and Fan: Doğan, 2019.
Coloboceras drachi Monniot: Durucan, 2019c.
Copidognathides ampliatus Bartsch: Durucan, 2018.
Copidognathus brachystomus Viets: Durucan, 2018.
Copidognathus dentatus Viets: Durucan, 2019b.
Copidognathus dissimilis Bartsch: Durucan, 2018.
Copidognathus gibbus (Trouessart): Durucan, 2019b.
Copidognathus lamelloides Bartsch: Durucan, 2019b.
Copidognathus longirostris (Trouessart): Durucan, 2019b.
Copidognathus loricifer André: Durucan, 2019b.
Copidognathus magnipalpus (Police): Durucan, 2018.
Copidognathus majusculatus (Trouessart): Durucan, 2019b.
Copidognathus mucronatus Viets: Durucan, 2018.
Copidognathus oculatus (Hodge): Durucan, 2019b.
Copidognathus quadricostatus (Trouessart): Durucan, 2019b.
Copidognathus remipes (Trouessart): Durucan, 2019b.
Copidognathus sculptus (Police): Durucan, 2018.
Copidognathus septentrionalis (Halbert): Durucan, 2019b.
Copidognathus tabellio (Trouessart): Durucan, 2018.
Copidognathus tectiporus (Viets): Durucan, 2018.
Cryptofavognathus anatolicus Doğan and Dönel: Doğan, 2019.
Cryptofavognathus bellus Doğan and Doğan, 2024a.
Cryptognathus ayyildizi Akyol and Koç: Doğan, 2019.
Cryptognathus karabagiensis Akyol: Akyol 2021b.
Cryptognathus khaustovi Mohammad Doustaresharaf, Bagheri and Saber: Akyol, 2021b.

Cryptognathus kutahyaensis Uluçay and Koç: Doğan, 2019.
Cryptognathus scutellatus Summers and Chaudhri: Doğan and Doğan, 2020c.
Cunaxa capreolus (Berlese): Döker et al., 2017c.
Cunliffella variegata (Barilo): Doğan, 2022a.
Curteria curticristata (Willmann): Karakurt, 2021.
Curteria duzgunesae (Saboori, Çobanoğlu and Bayram): Sevsay, 2017.
Dactylothrombium pulcherrimum (Haller): Sevsay, 2017.
Diplothrombium rackae Wohltmann, Mąkol and Gabryś: Buğa and Sevsay, 2021b.
Diplothrombium tunceliensis Buğa and Sevsay: Buğa and Sevsay, 2021b.
Diplothrombium zbigniewi Haitlinger: Buğa and Sevsay, 2021b.
Diplothrombium. longipalpe (Berlese): Buğa and Sevsay, 2021b.
Diplothrombium. sansaensis Buğa and Sevsay: Buğa and Sevsay, 2021b.
Dolichothrombium anatoliae Mąkol and Sevsay: Sevsay, 2017.
Dolichothrombium insidiosum (André): Sevsay, 2017.
Eatoniana plumipes (L. Koch): Sevsay, 2017.
Echinothrombium spinosum (Canestrini): Adil et al., 2017a.
Emitrombidium giocondi Mąkol and Sevsay: Sevsay, 2017.
Empitrombium makolae Sevsay and Karakurt: Sevsay, 2017.
Enemothrombium bifoliosum (Canestrini): Sevsay, 2017.
Eotetranychus quercicola Auger and Migeon: İnak et al., 2022.
Eotetranychus rubiphilus Reck: Altunç and Akyazı, 2020.
Eothrombium siculum Berlese: Karakurt and Sevsay, 2020a.
Epitrimerus tanaceti Boczek and Davis: Denizhan et al., 2015.
Ereynetes (*Ereynetes*) *septentrionalis* (Berlese): Çobanoğlu et al., 2020c.
Ericotrombidium hasei (Feider): Stekolnikov and Daniel, 2012.
Eriophyes euphorbiae (Nalepa): Denizhan et al., 2015.
Eriophyes platani Domes: Denizhan et al., 2015.
Eriophyes septemlineatus Petanović: Denizhan et al., 2015.
Eriophyes similisprunianus Massee: Denizhan et al., 2015.
Eriophyes sorbi (Canestrini): Denizhan et al., 2015.
Eriophyes viburni (Nalepa): Denizhan et al., 2015.
Eryngiopus anatolicus Doğan, Dilkaraoğlu and Fan: Doğan, 2019.
Eryngiopus coheni Vacante and Gerson: Doğan, 2019.
Eryngiopus siculus Vacante and Gerson: Doğan, 2019.
Eryngiopus tauricus Kuznetsov: Doğan, 2019.
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Shivatonia turcicus Boyacı: Erman et al., 2010.
Simognathus adriaticus Viets: Durucan, 2018.
Smaris erzincanensis Karakurt: Karakurt, 2023b.
Smaris squamata (Hermann): Karakurt, 2023a.
Soldanellonyx monardi Walter: Durucan, 2020b.
Sperchon (*Hispidosperchon*) *algeriensis* (Lundblad): Erman et al., 2019.
Sperchon (*Hispidosperchon*) *beckeri* Bader and Sepasgozarian: Esen, 2021.
Sperchon (*Hispidosperchon*) *denticulatus* Koenike: Erman et al., 2010.
Sperchon (*Hispidosperchon*) *hibernicus* Halbert: Erman et al., 2019.
Sperchon (*Hispidosperchon*) *oezkani* Esen, Pešić and Erman: Erman et al., 2010.
Sperchon (*Hispidosperchon*) *serapae* Boyacı, Gülle and Özkan: Erman et al., 2019.
Sperchon (*Hispidosperchon*) *tarnogradskii* Sokolow: Erman et al., 2010.
Sperchon (*Sperchon*) *ayyildizi* Esen, Pešić and Erman: Erman et al., 2010.
Sperchon (*Sperchon*) *brevirostris* Koenike: Erman et al., 2010.
Sperchon (*Sperchon*) *glandulosus* Koenike: Erman et al., 2010.
Sphairothrombium gabrysi Karakurt and Sevsay: Karakurt and Sevsay, 2022.
Stenacis triradiata (Nalepa): Denizhan et al., 2015.
Stibarokris brevisetosus Skoracki and Zmudzinski: Beron, 2021a.
Stibarokris phoeniconaias (Skoracky and OConnor): Beron, 2021a.
Stigmaeus additicius Dönel and Doğan: Doğan, 2019.
Stigmaeus amasyanus Dönel, Doğan, Sevsay and Bal: Doğan, 2019.
Stigmaeus angustus Dönel and Doğan: Doğan, 2019.
Stigmaeus ayyildizi Dönel and Doğan: Doğan, 2019.
Stigmaeus berwariensis Uluçay: Doğan, 2019.
Stigmaeus bifurcus Bingül, Doğan and Dilkaraoğlu: Doğan, 2019.
Stigmaeus ceylani Uluçay: Doğan, 2019.
Stigmaeus communis Doğan, Doğan and Erman: Doğan, 2019.
Stigmaeus creber Barilo: Doğan, 2019.
Stigmaeus dazkiriensis Akyol and Koç: Doğan, 2019.
Stigmaeus devlethanensis Akyol and Koç: Doğan, 2019.
Stigmaeus dogani Akyol: Doğan, 2019.
Stigmaeus erzincanus Doğan, Bingül, Dilkaraoğlu and Fan: Doğan, 2019.
Stigmaeus exilis Doğan and Doğan: Doğan and Doğan, 2021.
Stigmaeus fidelis Kuznetsov: Doğan, 2019.
Stigmaeus fimus Doğan, Doğan and Erman: Doğan, 2019.
Stigmaeus furcatus Dönel and Doğan: Doğan, 2019.
Stigmaeus glabrisetus Summers: Doğan, 2019.
Stigmaeus harsitensis Doğan, Doğan and Erman: Doğan, 2019.
Stigmaeus hashtrudensis Bagheri and Maleki: Doğan, 2019.
Stigmaeus indivisus Doğan: Doğan, 2019.
Stigmaeus karabagiensis Akyol and Koç: Doğan, 2019.
Stigmaeus kelkitensis Dönel and Doğan: Doğan, 2019.
Stigmaeus kumalariensis Akyol and Koç: Doğan, 2019.
Stigmaeus livschitzi Kuznetsov: Doğan, 2019.
Stigmaeus longiclipeatus Doğan, Doğan and Erman: Doğan, 2019.
Stigmaeus miandoabiensis Bagheri and Zarei: Doğan, 2019.
Stigmaeus mitrofanovi Khaustov*:* Doğan and Doğan, 2020g.
Stigmaeus pricei Summers: Doğan, 2019.
Stigmaeus pseudoparmatus Doğan, Doğan and Erman: Doğan, 2019.
Stigmaeus pulchellus Kuznetsov: Doğan, 2019.
Stigmaeus pulumurensis Doğan and Doğan: Doğan and Doğan, 2020f.
Stigmaeus quercus Akyol: Akyol, 2023.
Stigmaeus sariensis Bagheri: Doğan, 2019.
Stigmaeus shabestariensis Haddad Irani-Nejad, Lotfollahi and Akbari: Akyol, 2021d.
Stigmaeus solidus Kuznetsov: Doğan, 2019.
Stigmaeus sphagneti (Hull): Doğan, 2019.
Stigmaeus tokatensis Dönel, Doğan, Sevsay and Bal: Doğan, 2019.
Stigmaeus tolstikovi Khaustov: Doğan, 2019.
Stigmaeus uzunolukensis Özçelik and Doğan: Doğan, 2019.
Storchia ardabiliensis Safasadati, Khanjani, Razmjou and Doğan: Doğan, 2019.
Storchia hakkariensis Uluçay: Doğan, 2019.
Storchia hendersonae Fan and Zhang: Doğan, 2019.
Storchia mehrvari Bagheri and Gheblealivand: Doğan, 2019.
Sucidothrombium sucidum (Koch): Sevsay, 2017.
Syringophilopsis borini Bochkov and Mironov: Beron, 2021a.
Tadjikothyas connexa Skolow: Özdilek et al., 2023.
Tarsonemus aequalis Livshits, Mitrofanov and Sharonov: Çobanoğlu et al., 2021a.
Tarsonemus bilobatus Suski: Çobanoğlu et al., 2021a.
Tarsonemus smithi Ewing: Erdoğan and Çobanoğlu, 2020.
Tarsonemus talpae Schaarschmidt: Çobanoğlu et al., 2021a.
Tegolophus califraxini (Keifer): Denizhan et al., 2015.
Tegolophus hassani (Keifer): Denizhan et al., 2015.
Teneriffia sebahatae Ueckermann and Durucan: Ueckermann and Durucan, 2020.

Tenuipalpus granati Sayed: Çobanoğlu et al., 2016.
Tenuipalpus punicae Pritchard and Baker: Döker et al., 2013.
Tetra concava (Keifer): Denizhan et al., 2015.
Tetranychus evansi Baker and Pritchard: Kazak et al., 2017.
Tetranychus kanzawai Kishida: Altunç and Akyazı, 2020.
Tetranychus solanacearum Çobanoğlu and Ueckermann: Çobanoğlu et al., 2015.
Teutonia cometes (Koch): Erman et al., 2019.
Thalassarachna affinis (Trouessart): Durucan, 2018.
Torrenticola (*Megapalpis*) *persica* Pesic: Özdilek and Esen, 2023.
Torrenticola (*Torrenticola*) *baueri* Bader and Sepasgozarian: Pesic et al., 2023b.
Torrenticola (*Torrenticola*) *eseni* Pešić, Zawal and Smit: Pesic et al., 2023b.
Torrenticola (*Torrenticola*) *ischnophallus* Lundblad: Erman et al., 2019.
Torrenticola (*Torrenticola*) *laskai* Di Sabatino: Özdilek and Esen, 2023.
Torrenticola (*Torrenticola*) *meridionalis* Di Sabatino and Cicolani: Erman et al., 2010.
Torrrenticola (*Torrenticola*) *lesbica* Di Sabatino and Gerecke: Erman et al., 2010.
Traegaardhia distosolenidia Zacharda: Beron, 2022.
Trichotrombidium muscarum (Riley) [previously given as *Trichotrombidium rafieide*]: Sevsay, 2017.
Troglotrombidium dolichopodum Sevsay and Elverici: Sevsay and Elverici 2023.
Trombicula (*Neotrombicula*) *träghardiana* Feider: Kepka, 1962.
Trombidium brevimanum (Berlese): Sevsay, 2017.
Trombidium demirsoyi Sevsay and Buğa: Sevsay et al., 2020.
Trombidium geniculatum (Feider): Sevsay, 2017.
Trombidium holosericeum (Linnaeus): Sevsay, 2017.
Trombidium latum C.L. Koch: Sevsay, 2017.
Trombidium mediterraneum (Berlese): Sevsay, 2017.
Trombidium rimosum C.L. Koch: Sevsay, 2017.
Tycherobius anatolicus Uluçay, Koç and Akyol: Doğan, 2019.
Tycherobius farsiensis Khanjani, Yazyanpanah, Ostovan and Fayaz: Doğan, 2019.
Tycherobius iranensis Khanjani, Yazyanpanah, Ostovan and Fayaz: Doğan, 2019.
Tycherobius izmirensis Akyol and Koç: Doğan, 2019.
Tycherobius sahragardi Khanjani, Hajizadeh, Hoseini and Jalili: Doğan, 2019.
Tydeus goetzi Schruft: Akyazi et al., 2017.
Tydeus plumosus Karg: Ueckermann et al., 2019.
Unionicola (*Majumderatax*) *hankoi* (Szalay): Erman et al., 2010.
Unionicola (*Unionicola*) *gracilipalpis* (Viets): Erman et al., 2019.
Valgothrombium alpinum Willmann: Karakurt and Sevsay, 2020b.
Valgothrombium confusum (Berlese): Buğa and Sevsay, 2020.
Valgothrombium major (Halbert): Buğa and Sevsay, 2020.
Valgothrombium valgum (George): Buğa and Sevsay, 2020.
Vasates immigrans (Keifer): Denizhan et al., 2015.
Walchia cognata Schluger and Amanguliev: Stekolnikov and Daniel, 2012.
Woolastookia rotundifrons (Viets): Erman et al., 2010.
Xinjiangsha lyciaensis Stekolnikov and Daniel: Stekolnikov and Daniel, 2012.
Xinjiangsha montana (Kudryashova): Stekolnikov and Daniel, 2012.
Xinjiangsha tarda (Schluger): Stekolnikov and Daniel, 2012.
Zetzellia crassirostris (Leonardi): Doğan, 2019.
Zetzellia erzincanica Bingül and Doğan: Doğan, 2019.
Zetzellia kamili Akyol and Gül: Doğan, 2019.

VI. Order: Sarcoptiformes

Acrotritia duplicata (Grandjean): Baran et al., 2018.
Adoristes ammonoosuci Jacot*:* Susyal and Baran, 2017.
Adoristes (*Adoristes*) *ovatus ovatus* (Koch): Akman et al., 2018.
Adoristes (*Adoristes*) *poppei* (Oudemans): Ağcakaya and Ayyıldız, 2020.
Adoristes (*Gordeeviella*) *krivolutskyi* Shtanchaeva, Subías and Arillo: Baran et al., 2018.
Adrodamaeus striatus (Aoki): Baran, 2023.
Alloptes aythinae (Dubinin): Gürler et al., 2013.
Alloptes obtusolobus Dubinin: Eren et al., 2022.
Amerobelba decedens Berlese: Baran et al., 2018.
Amerus (*Amerus*) *polonicus* Kulczynski: Baran et al., 2018.
Analges mucronatus (Buchholz): Eren and Açıcı 2022.
Analges passerinus (Linnaeus): Gürler et al., 2013.
Analges spiniger Giebel*:* Per and Aktaş, 2018.
Analges turdinus Mironov: Gürler et al., 2013.
Archipteria coleopterata (Linnaeus): Doğan et al., 2015.
Ardeacarus ardeae (Canestrini): Eren et al., 2023.
Astegistes piliosus (Koch): Doğan et al., 2015.
Austrocarabodes (*Austrocarabodes*) *ensifer* (Sellnick): Toluk and Ayyıldız, 2021.
Austrocarabodes (*Austrocarabodes*) *foliaceisetus foliaceisetus* Krivolutsky: Toluk and Ayyildiz, 2021.
Autogneta (*Autogneta*) *parva* Forsslund: Baran et al., 2018.
Autogneta (*Rhaphigneta*) *flagellata* (Mahunka): Baran et al., 2018.
Autogneta (*Rhaphigneta*) *numidiana* (Grandjean): Baran et al., 2018.
Avenzoaria totani Dubinin: Gürler et al., 2013.
Banksinoma lanceolata (Michael): Baran et al., 2018.
Berniniella (*Berniniella*) *parasigma* Iturrondobeitia: Baran et al., 2018.
Berniniella (*Berniniella*) *serratirostris hauseri* (Mahunka): Baran et al., 2018.
Caleremaeus monilipes (Michael): Baran et al., 2018.
Campachipteria (*Triachipteria*) *patavina* (Oudemans): Zoroğlu and Ayyıldız, 2018.
Campachipteria (*Triachipteria*) *petiti* (Travé): Zoroğlu and Ayyıldız, 2018.
Campachipteria fanzagoi (Jacot): Baran et al., 2018.
Carabodes (*Carabodes*) *labyrinthicus* (Michael): Toluk and Ayyildiz, 2021.
Carabodes (*Carabodes*) *pirinensis* Kunts: Toluk and Ayyildiz, 2021.
Carabodes (*Carabodes*) *rugosior* Berlese: Toluk and Ayyildiz, 2021.

Carabodes (*Flexa*) *djaparidzae* Murvanidze and Weigmann: Toluk and Ayyildiz, 2021.
Carabodes (*Flexa*) *dubius* Kulijev: Toluk and Ayyildiz, 2021.
Carabodes (*Flexa*) *intermedius* Willman: Baran et al., 2018.
Carinogalumna erciyesi Seniczak and Seniczak: Seniczak and Seniczak, 2023a.
Carpoglyphus lactis (Linnaeus): Beron, 2021b.
Cepheus dentatus (Michael): Baran et al., 2018.
Cepheus heterosetosus (Sitnikova): Ayyıldız et al., 2017.
Ceratoppia quadridentata (Haller): Akman et al., 2018.
Ceratoppia sexpilosa Willmann: Toluk et al., 2017.
Ceratozetes (*Ceratozetes*) *colchicus* Murvanidze and Weigmann: Murvanidze et al., 2020.
Ceratozetes (*Ceratozetes*) *conjunctus* Mihelčič: Murvanidze et al., 2020.
Ceratozetes (*Ceratozetes*) *minutissimus* Willmann: Murvanidze et al., 2020.
Chaetodactylus reaumuri (Oudemans): Beron, 2021b.
Chamobates (*Xiphobates*) *voigtsi* (Oudemans): Ayyıldız et al., 2017.
Chauliacia canarisi (Gaud and Atyeo): Per and Aktaş, 2018.
Chauliacia securigera (Robin): Eren et al., 2023.
Coleopterophagus megnini (Berlese): Beron, 2021b.
Conchogneta dalecarlica (Forsslund): Baran et al., 2018.
Corynoppia andulau sakaryaensis Mahunka, 2001; Baran and Gökyeşil, 2015.
Corynoppia kosarovi (Jeleva): Baran et al., 2018.
Crabrovidia popovi (Zachvatkin): Beron, 2021b.
Ctenobelba (*Caucasiobelba*) *urhani* Baran: Baran et al., 2018.
Ctenobelba (*Ctenobelba*) *ayyildizi* Baran: Baran et al., 2018.
Ctenobelba (*Ctenobelba*) *pilosella* Jeleva: Baran and Bilici, 2017.
Damaeolus asperatus (Berlese): Baran et al., 2018.
Damaeolus ornatissimus Csiszár: Baran et al., 2018.
Diplaegidia columbae (Buchholz): Eren and Açıcı 2022.
Discoppia (*Cylindroppia*) *cylindrica cylindrica* (Pérez-Íñigo): Ay and Ayyıldız, 2019.
Dissorhina uludagensis Ayyıldız, Toluk and Taşkıran: Baran et al., 2018.
Dolichodectes edwardsi (Trouessart): Per and Aktaş, 2018.
Ensliniella dignotus Klompen and OConnor: Beron, 2021b.
Ensliniella floricola Klompen and OConnor: Beron, 2021b.
Ensliniella kostylevi Zakhvatkin: Beron, 2021b.
Epilohmannia imreorum Bayoumi and Mahunka: Baran et al., 2018.
Epimerella ankaraensis Baran, Ayyildiz and Kence: Baran et al., 2018.
Epimerella luxtoni Toluk, Ayyildiz and Baran: Baran et al., 2018.
Epimerella marasensis Toluk and Ayyıldız: Baran et al., 2018.
Epimerella smirnovi longisetosa Kulijev: Ay and Ayyıldız, 2019.
Epimerella subiasi Toluk and Ayyıldız: Baran et al., 2018.
Eremaeus translamellatus Hammer: Per et al., 2021.
Eremobelba geographica Berlese: Baran et al., 2018.
Eueremaeus oblongus quadrilamellatus (Hammer): Murvanidze et al., 2020.
Eupelops acromios (Hermann): Ocak et al., 2008.
Eupelops plicatus (Koch): Murvanidze et al., 2020.
Eupterotegaeus hendekensis Susyal, Ayyildiz and Baran, 2018.
Eustathia cultrifera (Robin): Eren et al., 2023.
Falculifer rostratus (Buchholz): Eren and Açıcı 2022.
Freyana anatina (Koch): Aksın, 2007.
Freyana nyrocae Dubinin: Gürler et al., 2013.
Gabucinia delibata (Robin): Eren et al., 2023.
Galumna elimata (Koch): Ocak et al., 2008.
Galumna (*Galumna*) *alata* (Hermann): Murvanidze et al., 2020.
Galumna (*Galumna*) *lanceata* (Oudemans): Murvanidze et al., 2020.
Glycyphagus ornatus Kramer: Bayram and Çobanoğlu, 2007.
Grallolichus minutus Gaud and Mouchet: Gürler et al., 2013.
Graptoppia (*Graptoppia) paraanalis* Subias and Rodriguez: Murvanidze et al., 2020.
Gymnodamaeus barbarossa Weigmann: Baran et al., 2018.
Gymnodamaeus bicostatus (Koch): Baran et al., 2018.
Haplocthonius simplex (Willmann): Zeytun et al., 2017.
Heminothrus (*Platynothrus*) *peltifer* (Koch): Baran et al., 2018.
Heminothrus humicola (Forsslund): Doğan et., 2015.
Hermannia (*Hermannia*) *gibba* (Koch): Baran et al., 2018.
Hermanniella multipora Sitnikova: Baran et al., 2018.
Hermanniella picea (Koch): Karabörklü and Ayyıldız, 2018.
Hieracolichus ramosus (Gaud and Mouchet): Eren et al., 2022.
Hoplophorella (*Rhacaplacarus*) *ortizi* (Pérez-Íñigo): Per et al., 2021.
Jacotella frondeus (Kulijev): Baran et al., 2018.
Joshuella meyeri (Bayartogtokh and Schatz): Baran, 2019.
Joubertophyllodes modularis (Berlese): Gürler et al., 2013.
Jugatala angulata (Koch): Murvanidze et al., 2020.
Kaszabanoetus ulomae Mahunka: Beron, 2021b.
Kramerella aluconis (Lönnfors): Eren et al., 2023.
Kramerella lunulata (Haller): Eren et al., 2023.
Lamellocepheus personatus (Berlese): Toluk and Ayyıldız, 2022.
Lasiobelba (*Lasiobelba*) *kuehnelti* (Csiszár): Baran et al., 2018.
Lauritzenia elegans (Kunst): Doğan et al., 2015.
Lauroppia maritima acuminata (Strenzke): Baran et al., 2018.
Lauroppia tenuipectinata Subías and Rodríguez: Baran et al., 2018.
Lauroppia tridentata (Forsslund): Baran et al., 2018.
Lepidozetes singularis Berlese: Baran et al., 2018.
Liacarus (*Dorycranosus*) *splendens* (Coggi): Akman et al., 2018.
Liacarus (*Dorycranosus*) *zachvatkini* Kulijew: Ağcakaya and Ayyıldız, 2020.
Liacarus (*Liacarus*) *xylariae* (Schrank): Ağcakaya and Ayyıldız, 2020.
Liacarus brevilamellatus Mihelcic: Ocak et al., 2008.
Licneremaeus licnophorus (Michael): Baran et al., 2018.
Licnobelba caesarea (Berlese): Baran et al., 2018.
Liebstadia (*Liebstadia*) *humerata* Sellnick: Baran et al., 2018.
Liebstadia (*Liebstadia*) *longior* (Berlese): Per et al., 2021.

Machuella ventrisetosa bilineata Weigmann: Toluk and Ayyıldız, 2017.
Megninia ginglymura Megnin: Aksın, 2011.
Mesoplophora (*Mesoplophora*) *michaeliana* Berlese: Baran and Yaşa, 2018.
Mesotritia (*Mesotritia*) *nuda* (Berlese): Per et al., 2021.
Michaelia heteropus (Michael): Eren et al., 2023.
Microppia arcuata Gordeeva and Tarba: Baran et al., 2018.
Monojoubertia microphylla (Robin): Gürler et al., 2013.
Moritzoppia acuta Toluk and Ayyildiz: Baran et al., 2018.
Moritzoppia escotata (Subías and Rodríguez): Baran et al., 2018.
Moritzoppia keilbachi (Moritz): Baran et al., 2018.
Moritzoppia problematica Mahunka and Mahunka-Papp: Baran et al., 2018.
Moritzoppia turcica Toluk and Ayyıldız: Baran et al., 2018.
Moritzoppia unicarinata unicarinata (Paoli): Ay and Ayyıldız, 2019.
Multioppia (*Multioppia*) *turcica* Toluk, Ayyıldız and Subias: Baran et al., 2018.
Nanhermannia comitalis Berlese: Bingül et al., 2017.
Nanhermannia (*Nanhermannia*) *nana* (Nicolet): Baran et al., 2018.
Neochauliacia minuscula (Gaud and Atyeo): Eren et al., 2023.
Neoliodes theleproctus (Hermann: Baran et al., 2018.
Nothrus anauniensis Canestrini and Fanzago: Bingül et al., 2017.
Nothrus borussicus Sellnick: Zeytun et al., 2017.
Nothrus silvestris Nicolet: Baran et al., 2018.
Ophidiotrichus tectus (Michael): Baran et al., 2018.
Oppiella (*Oppiella*) *nova uliginosa* (Willmann): Ay and Ayyıldız, 2019.
Oppiella (*Perspicuoppia*) *ozkani* Baran, Ayyıldız and Kence: Baran et al., 2018.
Oppiella (*Perspicuoppia*) *turcica* Toluk and Ayyıldız: Baran et al., 2018.
Oribatella (*Oribatella*) *foliata* Krivolutsky: Per et al., 2021.
Oribatula (*Oribatula*) *interrupta* (Willmann): Baran et al., 2018.
Oribatula (*Zygoribatula*) *nicora* (Djaparidze): Murvanidze et al., 2018.
Oribatula (*Zygoribatula*) *propinqua* (Oudemans): Murvanidze et al., 2020.
Oribotritia (*Oribotritia*) *krivolutskyi* Liu, Niedbała, and Starý: Güven and Baran, 2022.
Oxyoppia (*Dzarogneta*) *baranae* Toluk and Ayyıldız: Baran et al., 2018.
Papillacarus ondriasi Mahunka: Baran et al., 2018.
Paralopheremaeus hispanicus arifi Baran: Baran et al., 2018.
Parapyroppia cornuta (Berlese): Baran et al., 2018.
Pelargodacna heteromorpha Perez and Atyeo*:* Eren and Açıcı 2022.
Periexocaulus acanthus (Gaud and Mouchet): Per and Aktaş, 2018.
Perlohmannia (*Perlohmannia*) *turcica* Ayyıldız, Subias and Baran: Baran et al., 2018.
Phauloppia lucorum (Koch): Baran et al., 2018.
Phauloppia rauschenensis (Sellnick): Murvanidze et al., 2020.
Photia graeca Cooreman: Beron, 2021b.
Photia procera adanensis Samšinák: Beron, 2021b.
Photia procera turcica Samšinák: Beron, 2021b.
Photia procustidis (Berlese): Beron, 2021b.
Phthiracarus (*Phthiracarus*) *ferrugineus* (Koch): Murvanidze et al., 2020.
Phthiracarus (*Phthiracarus*) *lentulus* (Koch): Baran et al., 2018.
Pilogalumna ayildizi Seniczak and Seniczak: Seniczak and Seniczak, 2023b.
Platyliodes doderleini (Berlese, 1883): Per et al., 2016.
Poroliodes farinosus (Koch): Baran et al., 2018.
Procericola bourgognei (Oudemans): Beron, 2021b.
Procericola ichthyoides scabricola Samšinák: Beron, 2021b.
Procericola ichthyoides transversicola Samšinák: Beron, 2021b.
Proctophyllodes cetti Badek, Mironov and Dabert: Per and Aktaş, 2018.
Proctophyllodes clavatus Fritsch: Per and Aktaş, 2018.
Proctophyllodes doleophyes Gaud: Per and Aktaş, 2018.
Proctophyllodes lusciniae Burdejnaja and Kivganov: Gürler et al., 2013.
Proctophyllodes mesocaulus Mac-Fira and Cristea: Gürler et al., 2013.
Proctophyllodes musicus Vitzthum: Eren et al., 2023.
Proctophyllodes rubeculinus (Koch): Gürler et al., 2013.
Proctophyllodes scolopacinus (Koch): Gürler et al., 2013.
Proctophyllodes stylifer (Buchholz): Eren and Açıcı, 2022.
Proctophyllodes sylviae Gaud: Gürler et al., 2013.
Proctophyllodes troncatus Mégnin: Gürler et al., 2013.
Provertex forsslundi Krivolutsky: Baran et al., 2018.
Pterodectes rutilus Robin: Eren et al., 2023.
Pterolichus anacanthus (Gaud and Mouchet): Aksın, 2011.
Pteronyssoides striatus (Robin): Gürler et al., 2013.
Ptiloxenus major (Megninand and Trouessart): Per and Aktaş, 2018.
Quadroppia (*Coronoquadroppia*) *foveolata* Toluk and Ayyıldız: Baran et al., 2018.
Quadroppia (*Coronoquadroppia*) *michaeli michaeli* Mahunka: Ay and Ayyıldız, 2019.
Quadroppia (*Coronoquadroppia*) *micheali turcica* Baran, Toluk and Ayyildiz: Baran et al., 2018.
Quadroppia (*Coronoquadroppia*) *nasalis* Gordeeva: Baran et al., 2018.
Quadroppia (*Coronoquadroppia*) *sezeki* Baran and Ayyıldız: Baran et al., 2018.
Quadroppia (*Quadroppia*) *maritalis* Lions: Baran et al., 2018.
Quadroppia (*Quadroppia*) *squarrosa* Toluk and Ayyıldız: Baran et al., 2018.
Quadroppia paolii (Woas); Baran and Ayyıldız: Baran et al., 2018.
Ramusella (*Insculptoppia*) *ermani* Baran: Baran et al., 2018.
Ramusella (*Insculptoppia*) *golbasiensis* Baran: Baran et al., 2018.
Ramusella (*Insculptoppia*) *neonominata* Subías: Baran et al., 2018.
Ramusella (*Insculptoppia*) *pinarbasiensis* Ayyildiz, Toluk and Taskiran: Baran et al., 2018.
Ramusella (*Insculptoppia*) *salmani* Toluk and Ayyıldız: Baran et al., 2018.
Ramusella (*Ramusella*) *sengbuschi* Hammer: Baran et al., 2018.

Ramusella (*Rectoppia*) *mihelcici* (Pérez-Íñigo): Ay and Ayyıldız, 2019.
Rhinoppia (*Bipectinoppia*) *emarginata* Toluk and Ayyıldız: Baran et al., 2018.
Rhinoppia (*Bipectinoppia*) *tasdemiri* Toluk and Ayyıldız: Baran et al., 2018.
Rhinoppia (*Bipectinoppia*) *variopectinata* Toluk and Ayyıldız: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *alidagiensis* Toluk: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *artvinensis* Toluk and Ayyıldız: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *elifae elifae* Toluk, Ayyıldız and Subías: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *exobothridialis* Toluk and Ayyıldız: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *heterotricha* (Ivan and Vasiliu): Ay and Ayyıldız, 2019.
Rhinoppia (*Rhinoppia*) *hygrophila* (Mahunka): Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *loksai* (Schalk): Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *mahunkai* Toluk, Ayyıldız and Subías: Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *nasuta* (Moritz): Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *parapectinata* (Ryabinin): Baran et al., 2018.
Rhinoppia (*Rhinoppia*) *trilobata* (Khanbekjan and Gordeeva): Baran et al., 2018.
Rhynchobelba ozkani Sarıal and Baran: Baran et al., 2018.
Sancassania polyphyllae (Zachvatkin): Cakmak et al., 2010.
Scheloribates (*Scheloribates*) *barbatulus* Mihelčič: Murvanidze et al., 2020.
Scheloribates (*Scheloribates*) *xylobatoides* Mahunka: Baran et al., 2018.
Scutomegninia phalacrocoracis Dubinin and Dubinina: Eren et al., 2023.
Scutulanyssus hirundicola (Mironov): Gürler et al., 2013.
Sennertia (*Sennertia*) *cerambycina* (Scopoli): Doğan, 2022b.
Sennertia (*Sennertia*) *gargantua* Zachvatkin: Doğan, 2022b.
Sennertia (*Sennertia*) *zhelochovtsevi* Zachvatkin: Doğan, 2022b.
Siculobata (*Paraleius*) *leontonycha* (Berlese): Murvanidze et al., 2020.
Steganacarus (*Tropacarus*) *carinatus carinatus* (Koch): Murvanidze et al., 2020.
Strelkoviacarus quadratus (Haller): Gürler et al., 2013.
Subiasella (*Dividoppia*) *aperta* (Mahunka): Baran et al., 2018.
Suctobelba (*Suctobelba*) *atomaria* Moritz: Baran et al., 2018.
Suctobelba (*Suctobelba*) *beringiana* Krivolutsky: Baran et al., 2018.
Suctobelbella (*Flagrosuctobelba*) *subtrigona* (Oudemans): Baran et al., 2018.
Suctobelbella (*Suctobelbella*) *acutidens* (Forsslund): Baran et al., 2018.
Tectocepheus alatus Berlese: Baran et al., 2018.
Tectocepheus punctulatus Djaparidze: Murvanidze et al., 2020.
Temnalges mesalgoides Gaud and Atyeo: Gürler et al., 2013.
Trachymolgus purpureus Fisher and Dowling, 2011: Per et al., 2016.
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Tyrophagus perniciosus Zachvatkin: Bayram and Çobanoğlu, 2007.
Xoloptes claudicans (Robin): Aksın, 2011.
Zachvatkinia larica Mironov: Eren et al., 2022.
Zetorchestes grandjeani Krisper: Baran et al., 2018.
Zygoribatula frisiae (Oudemans): Kumral and Çobanoğlu, 2016.

REMARK

Özkan et al. (1988, 1994) and Erman et al. (2007) produced mite lists of Türkiye and highlighted the scarcity of records. According to their data, the total number of species and subspecies recorded from Türkiye to date is 950 (Erman et al., 2007). With the release of an additional 1241 taxa from Türkiye, a new supplementary list is needed, and that is what this supplement attempts to do. There are numerous other mite species living in different ecosystems in Türkiye. It may be necessary to provide new additional lists in the future, based on further studies on mite taxonomy and distribution in Türkiye.

The present list may contribute to understanding the inventory of mites in Türkiye. It can also provide a basis for upcoming studies on mites in Türkiye. Such checklists greatly aid in the identification of conservation priorities, greatly advance our knowledge of regional biodiversity, and supply vital information for studies pertaining to ecology.

Authors' contributions

Orhan Erman: Data curation (lead), validation (equal), visualization, writing-original draft (lead), writing-review and editing (lead). **Salih Doğan:** Conceptualization, supervision, data curation (supporting), validation (equal), writing-original draft (supporting), writing-review and editing (supporting). **Nusret Ayyıldız:** Validation (equal), writing-original draft (supporting), writing-review and editing (supporting). **Muhlis Özkan:** Validation (equal), writing-original draft (supporting), writing-review and editing (supporting).

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Conflict of interest

The authors declare that there is no conflict of interest.

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RESEARCH ARTICLE

Bibliometric and scientometric analysis of acarological publications in Türkiye between the years 1992-2023

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ASBTRACT: A bibliometric and scientometric analysis of acarological studies conducted in Türkiye between 1992 and 2023 were performed by searching the Clarivate Thomson Reuters WoS database using 525 keywords. The first publication from Türkiye appeared in WoS in 1992. A total of 1,344 articles, 52 reviews, 30 progress reports, eight letters, eight early access documents, seven editorials, three conference abstracts and one note were found. The 1,453 articles written by Turkish scientists were published in 420 different sources (books, journals, etc.) with an annual growth rate of 16.3% and an average number of references of 10.39. Overall, 149 (10.25%) of the publications were written by a single author, while the remaining 1,304 articles had an average of 4.36 authors and 23.47% of them were written in collaboration with international experts. With some slight fluctuations, the number of publications increased over the years, with the highest number of publications being recorded in 2021 and 2023. Again, a steady increase in total and annual citations was observed, with some slight fluctuations. Systematic and Applied Acarology and International Journal of Acarology were the journals with the highest number of publications, while Experimental and Applied Acarology (n=1,202) was the journal with the highest number of citations to Turkish publications. Experimental and Applied Acarology and Veterinary Parasitology were the journals with the highest H-index. The most prolific authors were Salih Doğan (n=77), İsmail Döker (n=67) and Sultan Çobanoğlu (n=64), while the most cited publications were those of Salih Doğan, Nusret Ayyıldız and Adem Keskin. Münir Aktaş, Salih Doğan and Adem Keskin were the authors with the highest H-index. With 199 publications, Ankara University was the institution with the highest number of publications. The 1,453 publications were produced in collaboration with researchers from 87 countries. The highest number of collaborative publications was with researchers from the United States of America (n=89). The Scientific and Technological Research Council of Türkiye was the institution that founded the highest number of studies.

Keywords: Bibliometric analysis, scientometric analysis, acarology, Türkiye
Zoobank: https://zoobank.org/CEA84796-055C-4511-A01E-EA457BEA22CF

INTRODUCTION

Acarology, the study of mites and ticks, is a scientific field of growing interest in Türkiye due to the country's diverse ecosystems and the significant impact of mites and ticks on human and animal health, agriculture, and the environment. Over the years, Turkish researchers have contributed significantly to acarology through their studies on the taxonomy, biology, ecology, and control of mites and ticks. This paper provides an overview of acarology research and publication trends in Türkiye, highlighting key contributions and future directions in the field.

Several factors have influenced public health awareness of mites and ticks. The first one is the epidemic of Crimean-Congo haemorrhagic fever in Türkiye which started at the beginning of the 2000s. The disease is transmitted by ticks mainly and the fatality rate of it is approximately 4-5% (Karti et al., 2004; İnci et al., 2016; HSGM-MoH Türkiye, 2024). Another factor is the dramatically increased prevalence of allergic diseases due to house dust mites which is a global problem in developed countries (Aydin et al., 2009; Gökce et al., 2010; Zeytun et al., 2017; Mumcuoğlu and Taylan-Özkan, 2020; Türkiye Ulusal Alerji ve Klinik İmmünoloji Derneği, 2024). Developments in agricultural and livestock policies are another factor that increases interest in acarology. Such as precision agriculture envisages ensuring the economy by using inputs effectively (in the required amount) and thus reducing their impact on the environment. This can also contribute to ensuring uniformity in product quality. In these respects, some of the goals of precision agriculture related to acarology are: Reducing chemical input expenses such as fertilizer and pesticides, reducing environmental pollution, and providing high quality products in high quantities (Yaldız et al., 2005; Kılıç and Alkan, 2018; Akıllı Tarım Platformu, 2019).

Scientometric analysis and bibliometric analysis are two similar, but different methods used to measure, evaluate and analyze scientific publications and research activities. Bibliometric analysis is the collection, analysis, and interpretation of numerical data about scientific publications. This analysis specifically aims to examine the sources of scientific publications (authors, institutions, and journals), publication numbers, citations, and circulation of publications. It is used for purposes such as determining which fields, which topics, and which methodologies scientific publications deal with, analyzing research trends on a particular subject, and monitoring developments in a field of science. It can especially help the researcher in finding funds and grants (Aria and Cuccurullo, 2017; Şenel et al., 2020; Koç and Gürler, 2022). On the other hand, scientometric analysis takes an overall measure of scientific activities, it can also include citation networks, scientific collaborations, and scientific interactions in addition to bibliometric analysis. Accordingly, scientometric analysis is determined as the measurement, quantitative analysis, and interpretation of scientific activities (publications, citations, patents). This analysis is used to understand the overall growth, interactions, diversity, and innovations in a field of science. It can also be used to identify important researchers, institutions, and research trends in a particular field of science (Aria and Cuccurullo, 2017; Koç and Gürler, 2022; Mumcuoglu et al., 2023).

This study aimed to list the publications done in acarology in Türkiye between the years 1992-2023, the trends of the publications during the years, the journals in which the most number of publications in acarology were done, the collaboration between Turkish and foreign acarologists, the most cited articles, their impact to our knowledge, the most prolific authors, those who were most cited in other publications, the authors with the highest H-indexes and the institutions in which they are working.

MATERIALS AND METHODS

Bibliometric and scientometric analysis

Data were collected by searching the Clarivate Thomson Reuters WoS Database (Thomson Reuters, New York, USA) using 525 keywords (Supplementary Table 1). The search was filtered by country, i.e., “Turkey” and “Türkiye” and by year, specifically between 1992 and 2023. Only publications authored by Turkish scholars were included. Even if the materials were collected from Türkiye, if the scientist who conducted the research was affiliated with an organization outside Türkiye, he/she was excluded from the list.

Visualization

The data were analyzed and visualized using the R-based Bibliometrix 4.1 Analysis Program (Aria and Cuccurullo, 2017) and the web interface provider Biblioshiny and the VOSviewer software.

RESULTS

The search yielded a total of 1,344 articles, 52 reviews, 30 progress reports, eight letters, eight early access documents, seven editorials, three conference abstracts and one note.

Table 1 shows the types of publications, their total and average number, and whether they were single- or multi-authored. The 1,453 articles written by Turkish scientists were published in 420 different sources (books, journals, etc) when the annual growth rate was 16.3%, and the average number of references was 10.39. The majority of the publications (1,344) were journal articles written by 3,774 authors with 3,426 keywords (whose number was reduced to 2,757 by the WOS system). Of the 1,453 publications, 149 (10.25%) were written by a single author, while the remaining 1,304 articles had an average of 4.36 authors and 23.47% of them were written in collaboration with international experts.

As can be seen in Figure 1, the highest number of publications took place in 2021 and 2023. Although an overall increase was observed over the years, a gradual decrease in the number of publications was still observed during 2010-2014 and 2016-2018, as compared to 2010 and 2016, respectively.

The average ratio of total and yearly citations is shown in Figure 2, where with some slight fluctuations a steady increase in the ratio of total and yearly citations can be seen.

Figure 3 shows the top 20 journals in which most of the studies originating from Türkiye were published. Systematic and Applied Acarology and International Journal of Acarology are the journals with the most publications, followed by the Turkish Journal of Entomology, Zootaxa, and Turkish Journal of Zoology.

The journals in which the most cited Turkish publications appear are shown in Figure 4. Accordingly, Experimental and Applied Acarology, followed by Veterinary Parasitology, and Zootaxa were the journals in which the highest number of citations to Turkish publications were observed.

The list of journals with the highest H-index in which Turkish publications were cited is shown in Figure 5. Accordingly, Experimental and Applied Acarology and Veterinary Parasitology were the journals with the highest H-index.

Figure 6 shows the 20 most prolific authors. Accordingly, S. Doğan (n=77), İ. Döker (n=67) and S. Çobanoğlu (n=64) were the authors who published the most papers in acarology. The publications of S. Doğan, N. Ayyıldız, and A. Keskin were the most cited papers (Fig. 7).

The productivity of the seven authors with the most publications over time is shown in Figure 8. Overall, the authors were either consistently productive or their productivity increased over time.

Table 2 shows the 20 most locally and internationally cited articles published by Turkish acarologists between the years 1992-2023. Accordingly, the papers of Erman et al. (2007), Aktaş et al. (2014), Bursalı et al. (2012), and Doğan (2007) were the most cited publications.

Table 1. Details of publications on acarology in Türkiye, between the years 1992-2023.

Description	Results	Description	Results
PUBLICATIONS		**AUTHORS AND COLLABORATIONS**	
Timespan	1992-2023	Single-authored publications	149
Sources (Journals, Books, etc.)	420	Average number of co-authors per publications	4.36
Documents	1,453	International co-authorships %	23.47
Annual Growth Rate %	16.3	**DOCUMENT TYPES**	
Document Average Age of the Publication (years)	9.22	Article	1,344
Average citations per doc	10.39	Article: Early access	8
References	31,626	Article: Proceedings paper	30
DOCUMENT CONTENTS		Editorial	7
Keywords Plus (ID)	2,757	Letter	8
Author's Keywords (DE)	3,426	Meeting abstract	3
AUTHORS		Note	1
Authors	3,774	Review article	52
Authors of single-authored publications	84		

Table 2. List of the 20 most locally and internationally cited articles published by Turkish acarologists between the years 1992-2023.

Publication	Local and International Citations
Erman et al. (2007), Zootaxa	149
Aktas et al. (2014), Veterinary Parasitology	121
Bursalı et al. (2012), Experimental and Applied Acarology	112
Doğan (2007), Zootaxa	82
Aktas et al.(2012), Veterinary Parasitology	74
Faraji et al. (2011), International Journal of Acarolology	70
Ay and Gürkan (2005), Phytoparasitica	64
Doğan (2003), Archives des Sciences	63
Altay et al. (2008), Research in Veterinary Science	61
Kaya et al. (2008), New Microbiologica	60
Seyhan et al. (2004), Journal of International Medical Research	59
Sen et al. (2011), Ticks and Tick-borne Diseases	54
Bursalı et al. (2011), Journal of Medical Entomology	53
Doğan (2006), International Journal of Acarology	52
Erman et al. (2010), Zootaxa	51
Karaer et al. (2011), Experimental and Applied Acarology	48
Keskin et al. (2014), Journal of Medical Entomology	42
Urhan (2002), Journal of Natural History	29
Koç and Akyol (2004), Annales Zoologici	28
Urhan (2008), Turkish Journal of Zoology	27

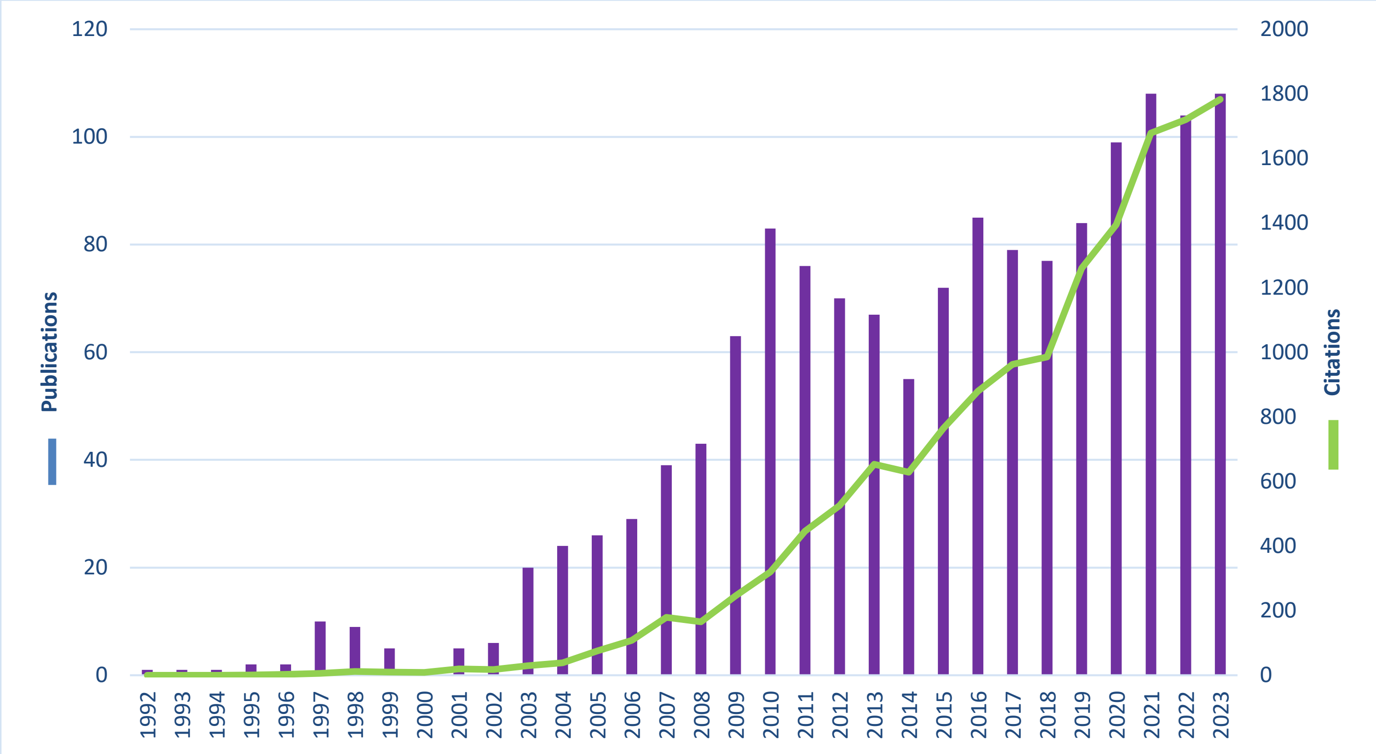

Figure 1. Distribution of published studies on acarology by years and number of citations (1992-2023).

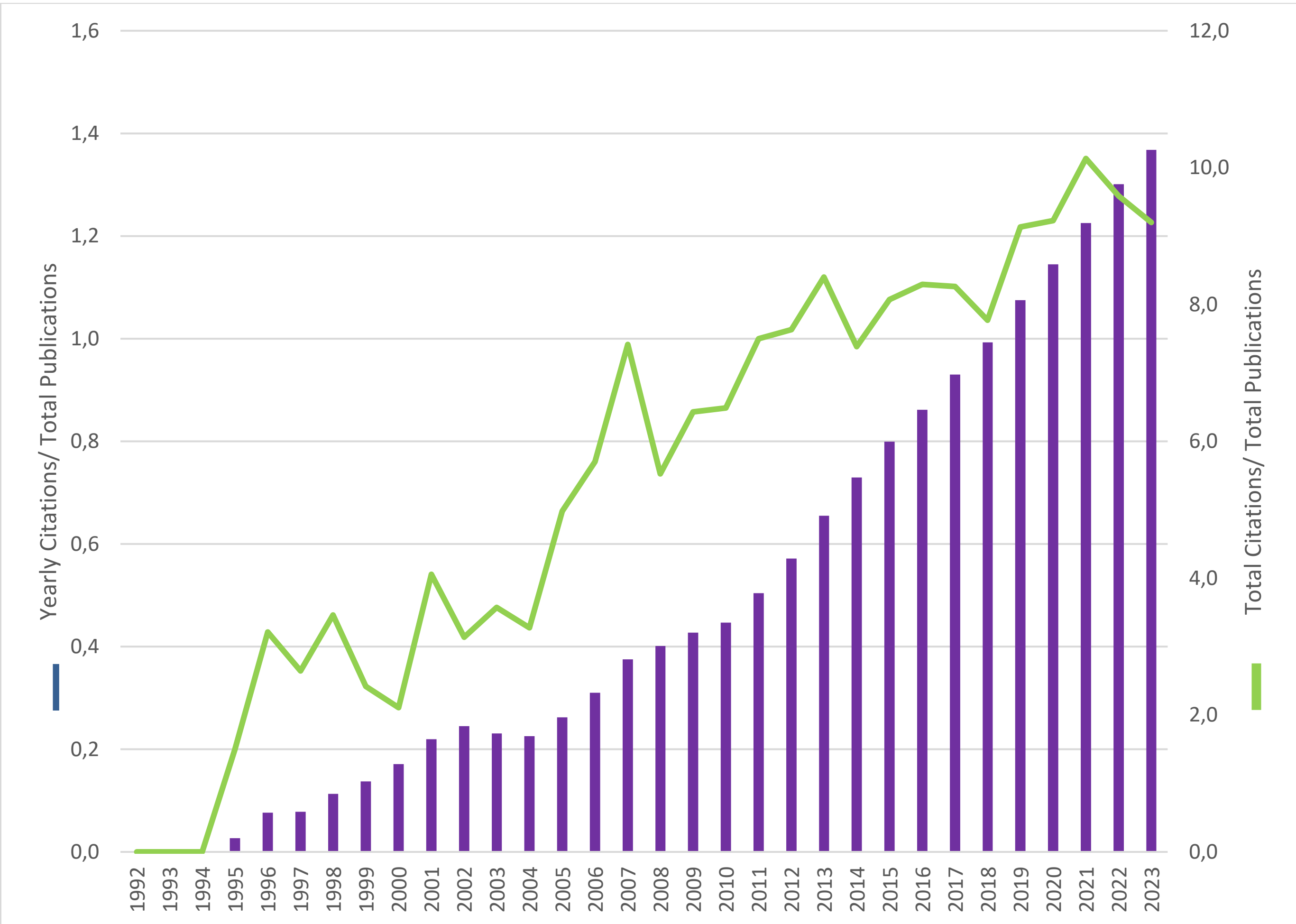

Figure 2. Average annual citation rate of acarological publications in Türkiye between the years 1992-2023.

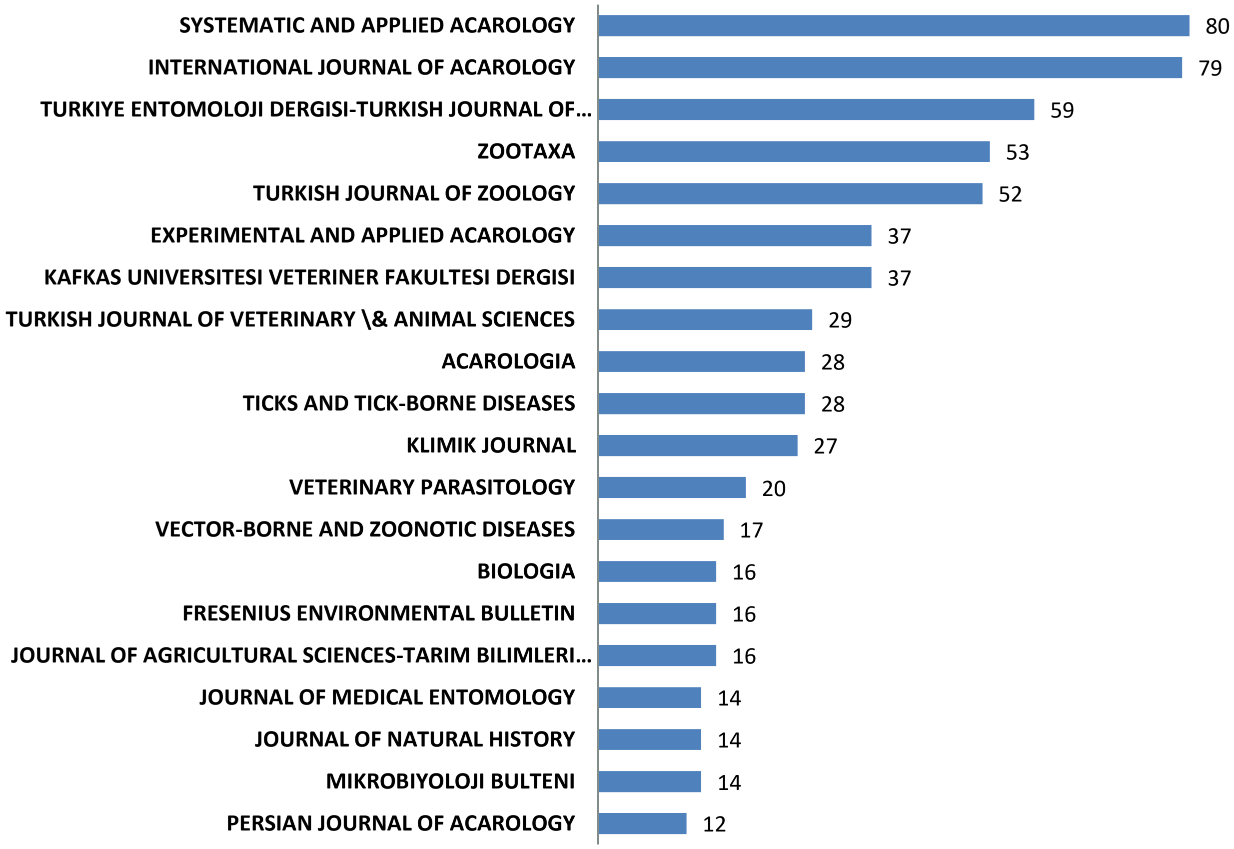

Figure 3. Academic journals in which most of the acarological studies originating from Türkiye were published (1992-2023).

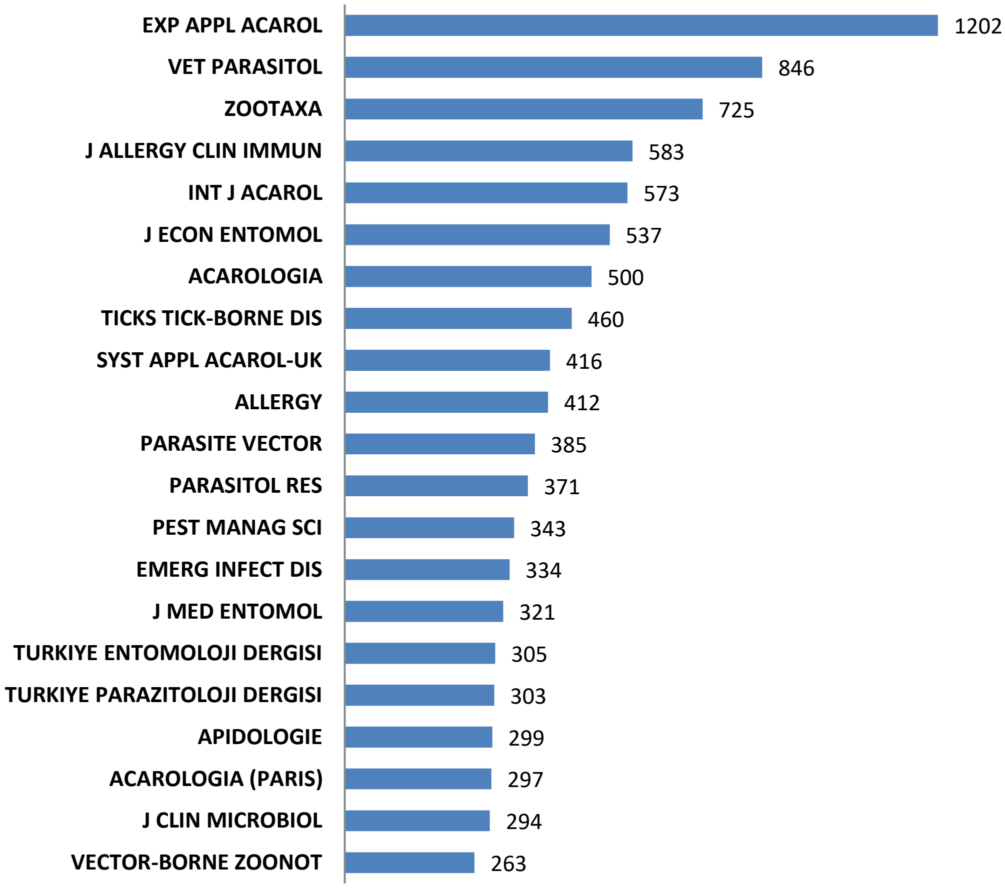

Figure 4. Journal in which the highest number of citations regarding Turkish acarological publications were recorded between the years 1992-2023.

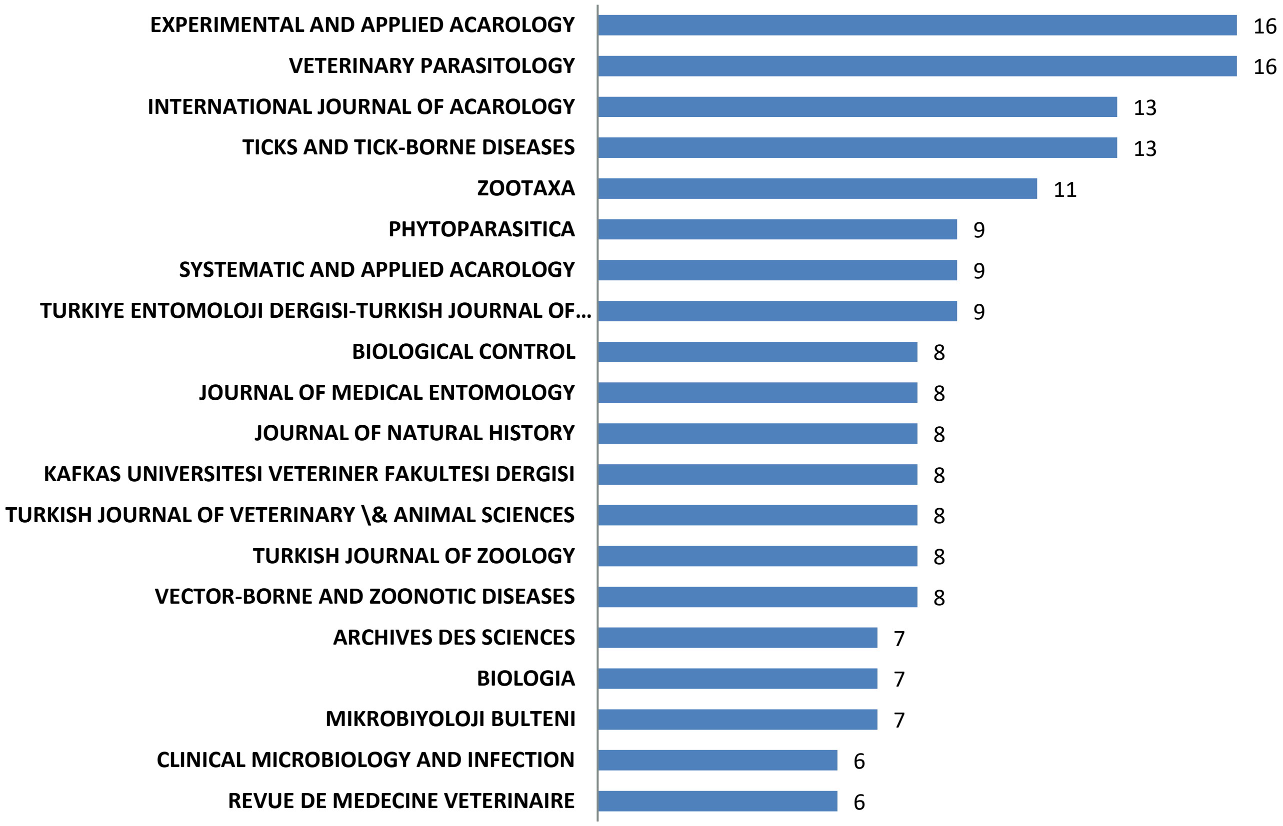

Figure 5. Journals with the highest H-index in which acarological publications from Türkiye between the years 1992-2023 were included.

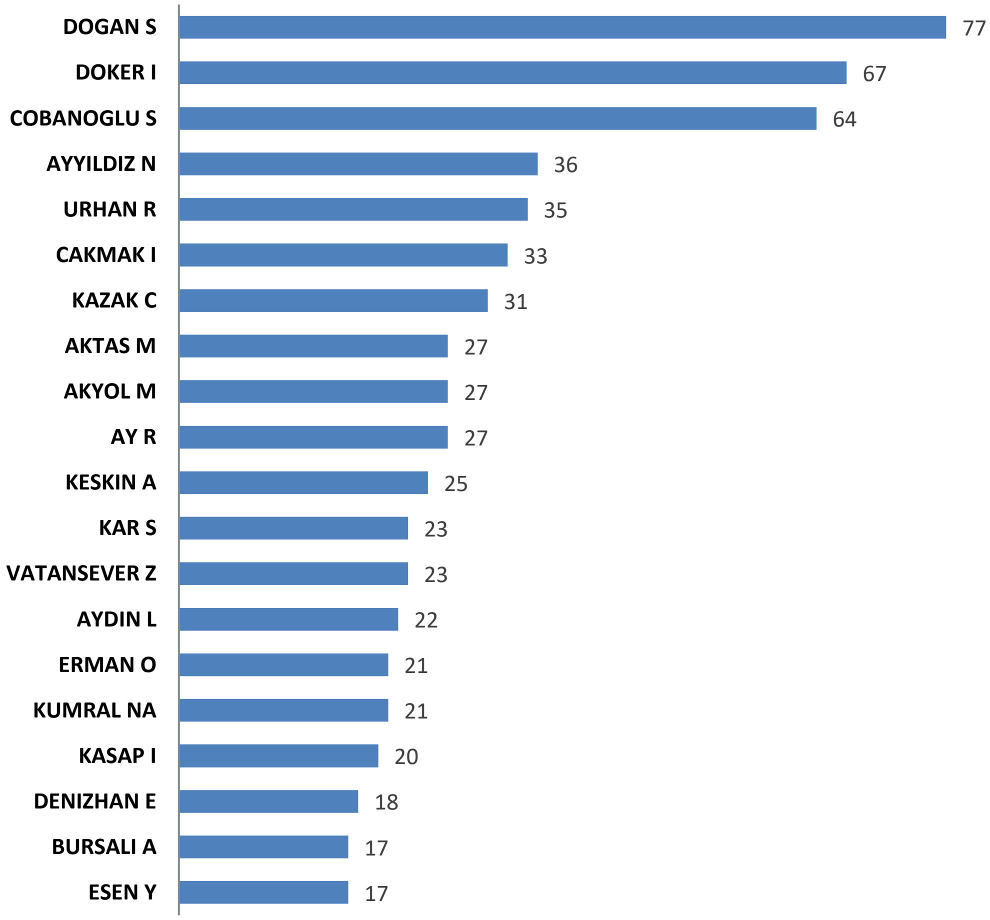

Figure 6. List of the 20 most prolific authors on the subject of acarology in Türkiye between the years 1992-2023.

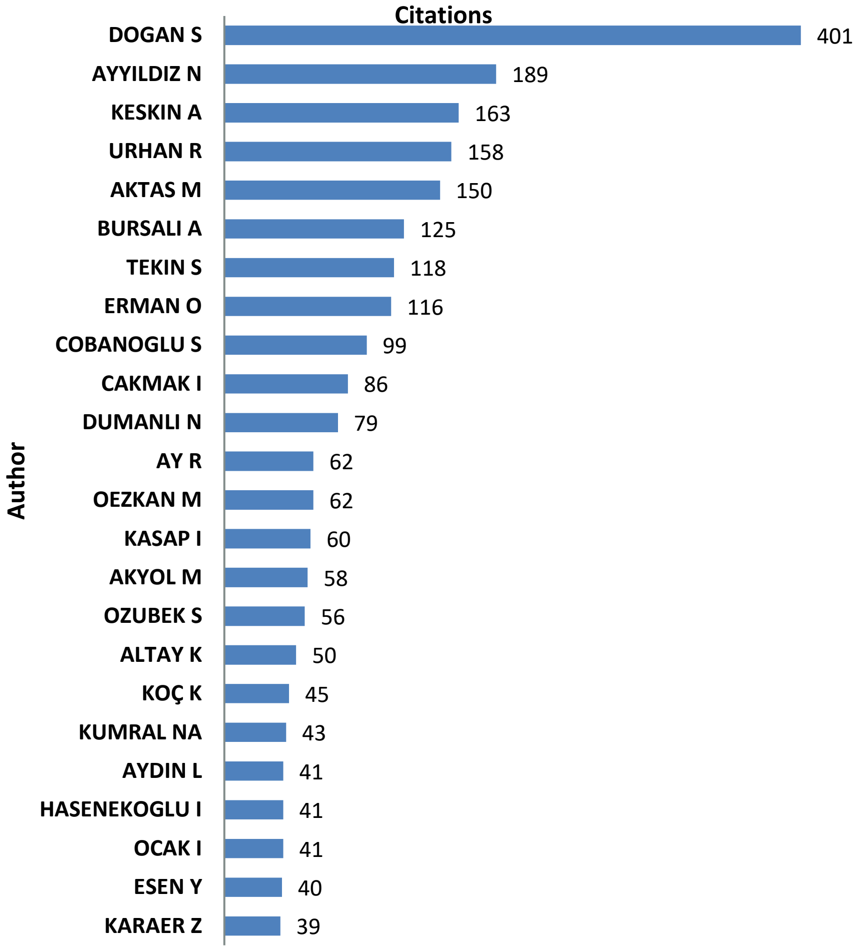

Figure 7. List of the most cited 20 Turkish authors with acarological publications between the years 1992-2023.

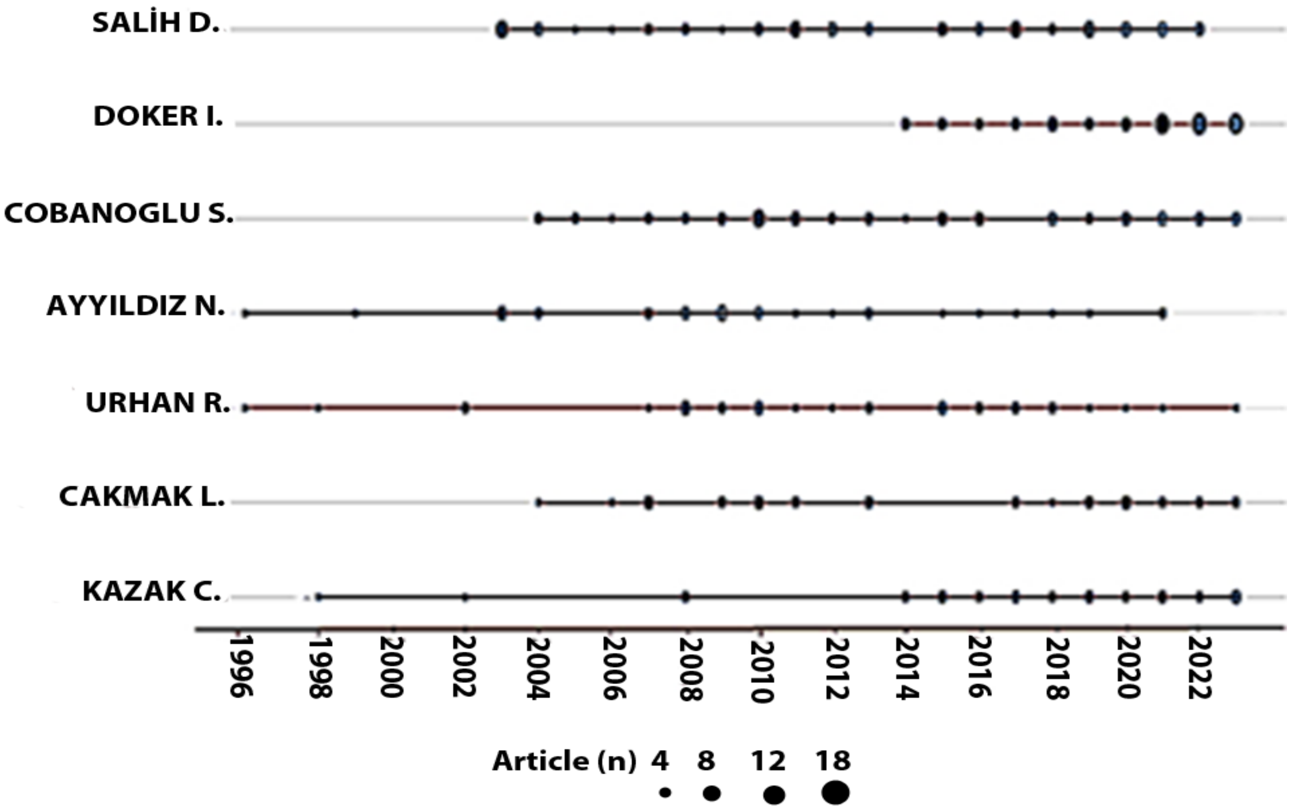

Figure 8. Author’s productivity between the years 1992-2023.

Figure 9 shows the 20 most influential authors according to the H-index. Hence, M. Aktaş, S. Doğan, İ. Çakmak, S. Çobanoğlu, and A. Keskin were the authors with the highest H-index.

Figure 10 shows the names of the 20 universities with the highest number of publications in acarology. Accordingly, Ankara University (n=199), Çukurova University (n=154), and Atatürk University (n=150) were the institutions that produced the highest number of publications.

The number of publications in acarology of the five most productive universities over the years can be seen in Figure 11. With some slight fluctuations, there is a steady increase in the number of publications between 2002 and 2023 in all five universities.

Table 3 shows the countries of the scientists with whom at least five collaborative studies were conducted. The 1,453 publications mentioned in the present study were done with scientists from 87 countries. The highest number of collaborative publications was done with scientists from the USA (n=89), followed by Iran (n=42), and Russia (n=39).

The WordCloud created in proportion to the frequency of the 200 keywords used is shown in Figure 12. The most frequently used keywords were "mites", "Acari", "prevalence", "infection", "two-spotted spider mite", "resistance", "identification", and "Mesostigmata".

The trend of keywords used over the years is shown in Figure 13. The terms "*Neoseiulus californicus*" and "predatory mites" were the most recently used keywords, while "*Tetranychus urticae*" and "cross-resistance" were used the longest duration.

The funding sources for the research studies are shown in Figure 14. Accordingly, The Scientific and Technological Research Council of Türkiye (TÜBİTAK) (f=125), Erzincan Binali Yıldırım University (f=23), and the Russian Science Foundation (f=19) were the institutions which founded the highest number of studies.

The fields of acarology research conducted in Türkiye are shown in Table 4. According to this, "Entomology" (n=413, 28.4%), "Veterinary Sciences" (201, 13.8%), and "Zoology" (169, 11.6%) were the research fields in which the majority of studies were conducted.

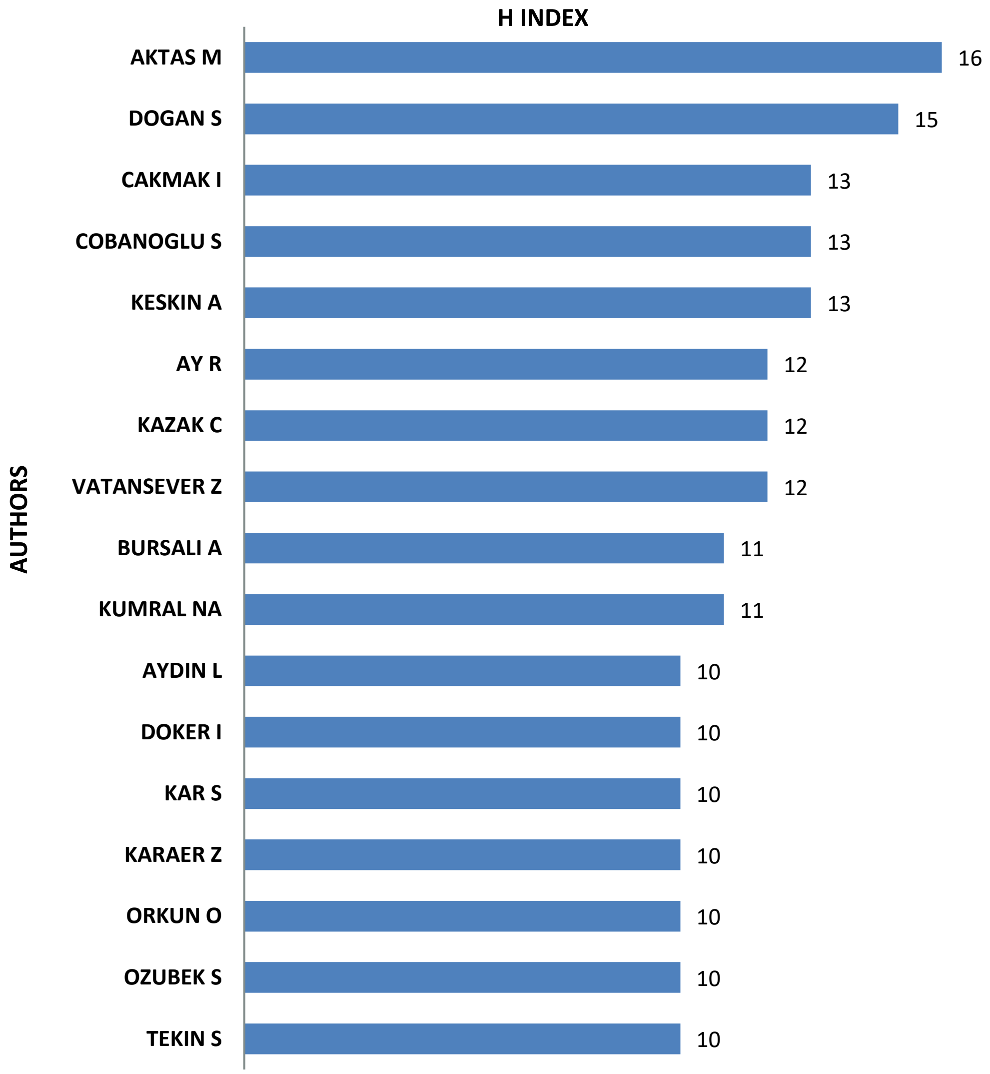

Figure 9. List of 20 authors with the highest H-index with acarological publications in Türkiye between the years 1992-2023.

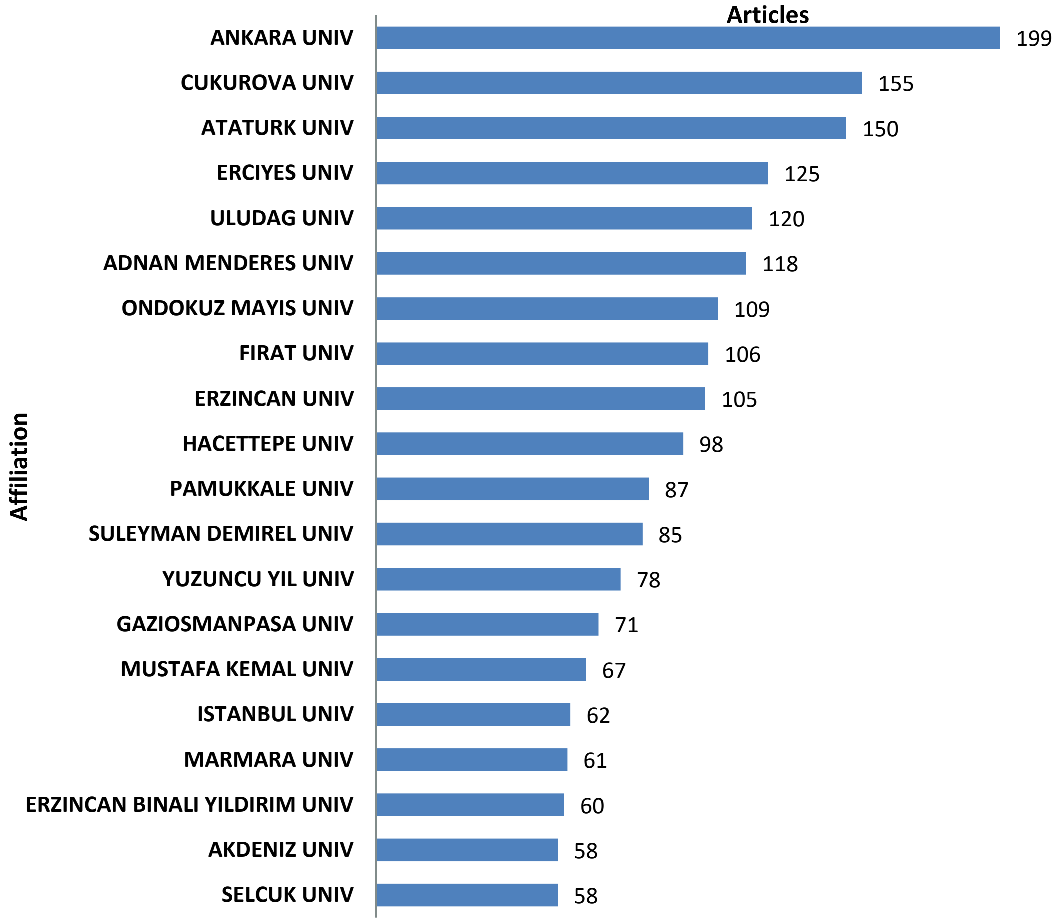

Figure 10. Turkish universities with the highest number of publications in acarology (1992-2023).

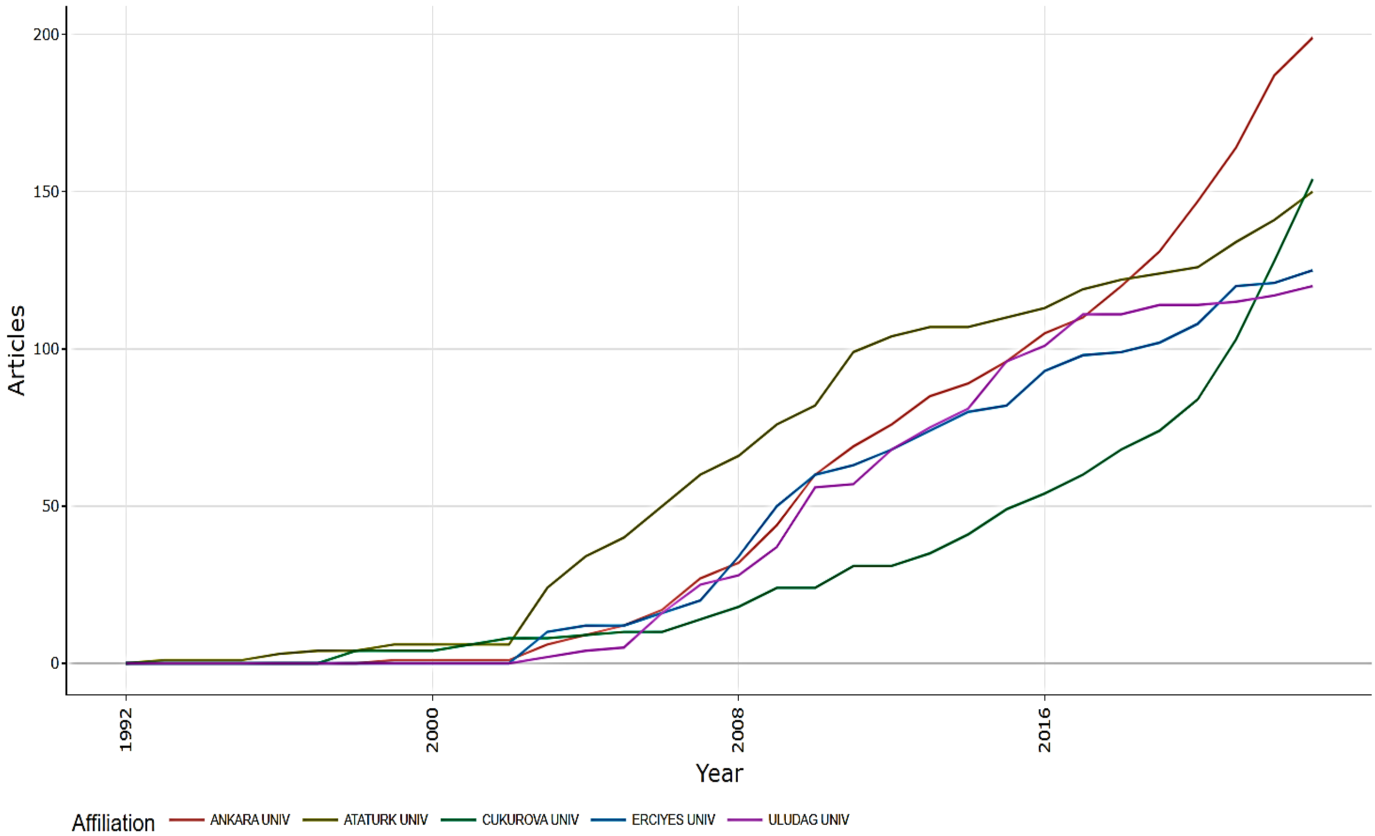

Figure 11. Number of acarology publications over time in the five most productive universities in Türkiye between the years 1992-2023.

Figure 12. WordCloud for the first 200 words used in the publications on acarology in Türkiye between the years 1992-2023.

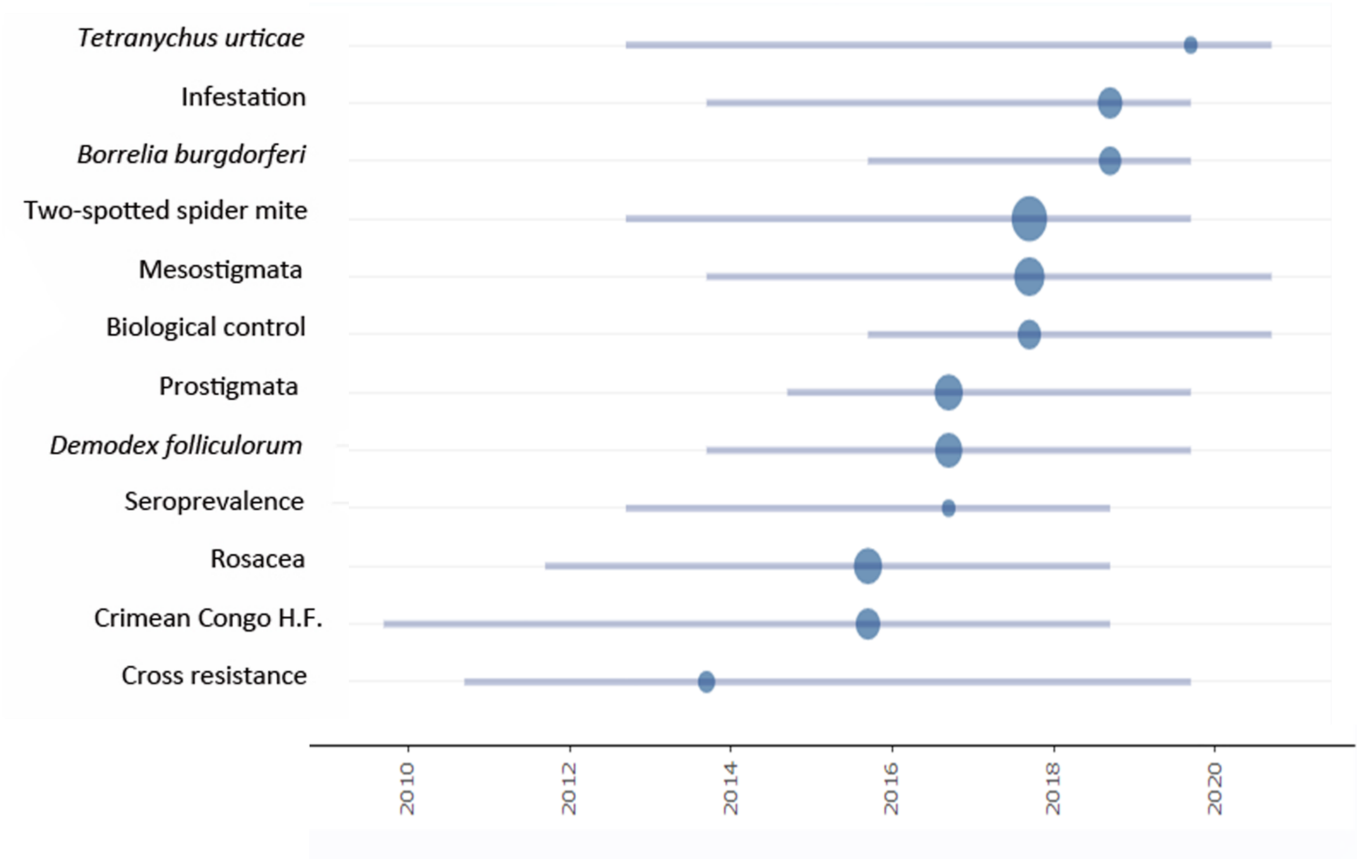

Figure 13. Topic trends over the last 10 years of acarological publications in Türkiye between the years 1992-2023.

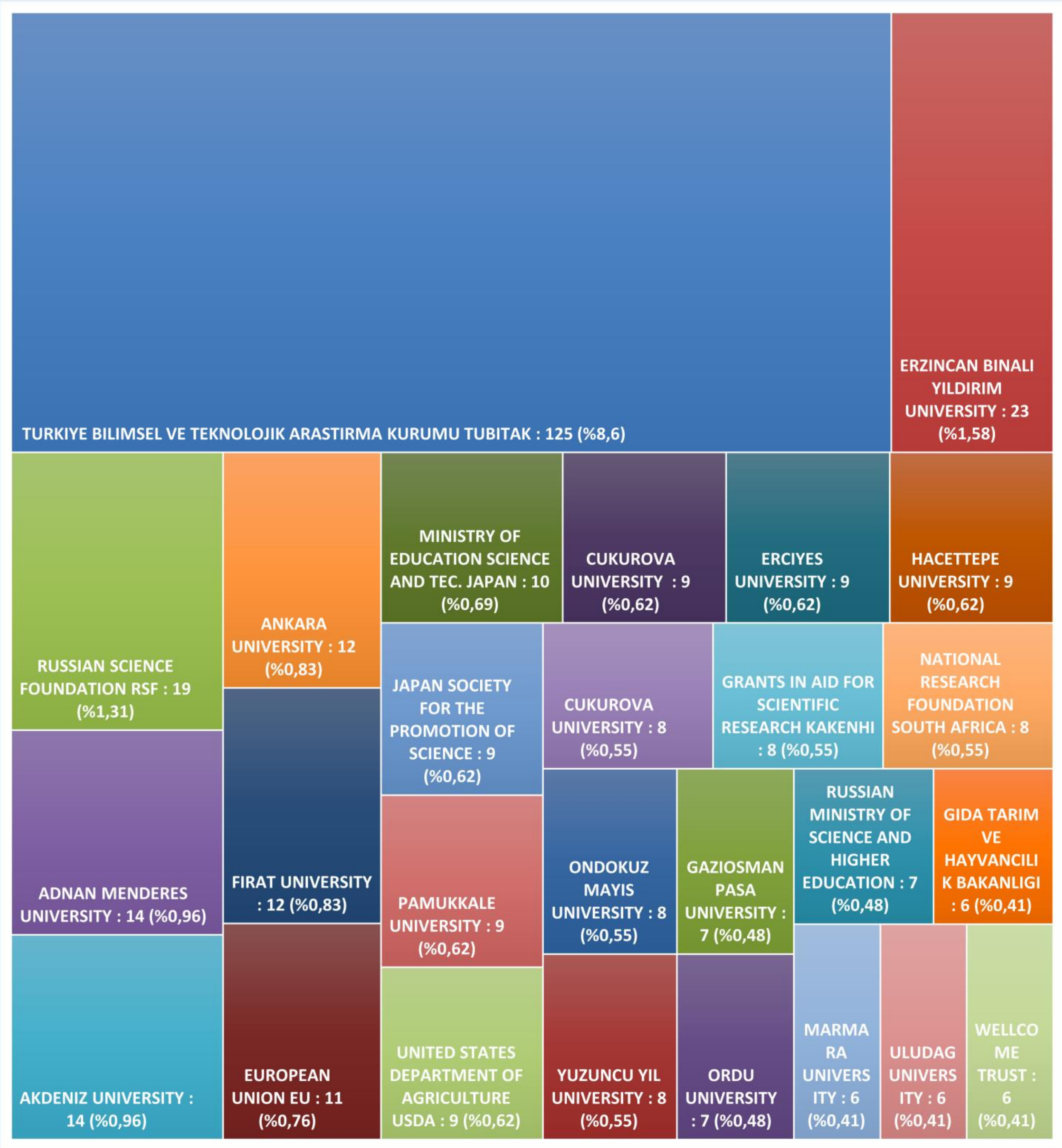

Figure 14. Funding agencies for acarological studies in Türkiye between the years 1992-2023.

DISCUSSION

In Türkiye, the first acarological studies were conducted in the veterinary medicine and mainly on ticks and tick-borne diseases (Doğan and Ecevit, 2023). The first books in this field were written by Hakkı (1929), Oytun (1947), Kurtpınar (1954), Merdivenci (1969), Özkan (1978), and Ecevit (1981), while those in agricultural acarology by Bodenheimer (1951) and Düzgüneş (1954) (Doğan and Ecevit, 2023). The faunistic and taxonomic studies of Özkan (1978) contributed to the discovery of hundreds of new species to the scientific community (Doğan and Ecevit, 2023). Lists of mites and ticks reported from Türkiye have been published by Özkan et al. (1988, 1994), Doğan (2007, 2019, 2022), Erman et al. (2007, 2010, 2019, 2024), Çakmak et al. (2011), Faraji et al. (2011), Bursalı et al. (2012), Denizhan et al. (2015), Sevsay (2017), and Baran et al. (2018). A bibliometric analysis of postgraduate theses prepared on the ticks and mites in Türkiye between 1977 and 2021 and archived in the YÖKTEZ database revealed that a total of 449 theses on acarology were conducted, with 278 being master's and 171 doctoral theses (Doğan and Ecevit, 2023;Karaer et al., 2023).

Acarology research in Türkiye has been influenced by the country's geographical location, which serves as a bridge between Europe, Asia, and Africa, resulting in a rich diversity of mite and tick species (Inci et al., 2016). Turkish researchers have conducted studies on a wide range of mite species, including economically important pests, vectors of human and animal diseases, and beneficial mites used in biological control. One of the significant research trends in Turkish acarology is the study of ticks and tick-borne diseases. Researchers have focused on identifying tick species, their distribution, and the pathogens they transmit to humans and animals. Studies have also investigated the ecology of ticks, including their host preferences, seasonal dynamics, and habitat requirements. The number of publications on ticks have increased sharply after 2002, which could be related to the discovery of the presence of Crimean-Congo haemorrhagic fever (CCHF) in Türkiye. The disease first attracted attention in 2002 and was definitively diagnosed in 2003. Cases of CCHF, which first attracted attention in and around Tokat province, today are mostly concentrated in the north of Central Anatolia, the Central Black Sea and the north of Eastern Anatolia, while the main tick species that transmit the disease is *Hyalomma marginatum*.

Another important area of research in Turkish acarology is the study of mites in agricultural systems. Researchers have studied mite pests that affect crops such as citrus, cotton, and greenhouse vegetables, as well as beneficial mites used in integrated pest management programs. These studies have contributed to the development of sustainable pest management practices in Turkish agriculture. WordCloud and the trend of keywords such as "two-spotted spider mite", "*Neoseiulus californicus*", "predatory mites" and "*Tetranychus urticae*" show that agricultural acarology is getting very important in the country.

Turkish researchers have published their findings in a variety of national and international journals, contributing to the global body of knowledge in acarology. Some of the prominent journals that have published acarology research from Türkiye include Experimental and Applied Acarology, Turkish Journal of Veterinary and Animal Sciences, and Turkish Journal of Zoology.

Overall, there are few bibliometric studies on ticks and some tick-borne diseases (Klingelhöfer et al., 2022). To the best of our knowledge, the present study is the first reported scientometric or bibliometric analysis of acarological publications that covers both mites and ticks in a given country.

Mites of medical importance include *Scabies, Demodex,* and house dust mites. In Türkiye, Tosun (2022) found 1,924 publications on the scabies mite, *Sarcoptes scabiei* worldwide, most of which were published in dermatology journals, with the USA and Australia being the most productive countries. Mumcuoglu et al. (2023) conducted a scientometric evaluation of the itch mite and reported 2,933 articles on this topic worldwide, of which 66.3% were original articles and 663 were published by US scientists. The journal with the highest number of publications on scabies was the International Journal of Dermatology. Using the Web of Science database and the words "house dust mite" and "*Dermatophagoides*" Demir et al. (2020) reported 4,742 publications on house dust mites between 1980 and 2018. The USA was the country that contributed most to the literature, with most papers published in the journal Clinical and Experimental Allergy. In India, Singh et al. (2020) searched the literature on scabies published from 2009 to 2018 using the Scopus database and reported 2,268 publications by 8,639 authors. In addition to research articles, Turkish acarologists have also published books, book chapters, and review articles on various aspects of acarology. These publications have helped disseminate knowledge and raise awareness about the importance of acarology in Türkiye. Lately, an excellent book on acarology has been published, summarizing our knowledge of the systematic, biology, and epidemiology of mites and ticks and their significance in medical and veterinary medicine as well as in agriculture (Doğan and Özman-Sullivan, 2023).

WoS metadata was chosen to analyse acarological publications in Türkiye due to universal acceptance of this data source. However, due to the fact that WOS database contains mainly English language articles and high H-index journals, many of the acarological publications in Türkiye were not included in this study. Using local databases such as Tr Index and DergiPark 1322 additional publications were found mainly in the journals Acarological Studies (94), the Turkish Journal of Entomology (46), and the Plant Protection Bulletin (41), however, these data were not included in the present analysis. It is planned that the remaining publications will be collected by searching local databases and references of published articles in Türkiye.

Looking ahead, acarology research in Türkiye is expected to continue to grow, driven by advances in technology, changes in land use and climate, and emerging issues related to mite pests and diseases. Future research directions in Turkish acarology may include:

- Using molecular techniques to study the genetic diversity and evolution of mites and ticks.
- Investigating the impact of climate change on the distribution and abundance of mite species.
- Developing novel control strategies for mite pests, including the use of biological control agents and acaricides with reduced environmental impact.

In conclusion, acarology research and publications in Türkiye have made significant contributions to our understanding of mites and ticks and their impact on human and animal health, agriculture, and the environment. With continued research and collaboration, Turkish acarologists are well-positioned to address emerging challenges in acarology and contribute to global efforts to reduce the negative impact of mites and ticks on the environment and health.

Table 3. Countries of scientists with whom cooperative studies in acarology were conducted in Türkiye between the years 1992-2023.

Country	N	%	Country	N	%	Country	N	%
USA	89	6.13	Israel	13	0.89	South Korea	7	0.48
Iran	42	2.89	Australia	12	0.83	Georgia	6	0.41
Russia	39	2.68	Belgium	11	0.76	Romania	6	0.41
Germany	29	2.00	Egypt	11	0.76	Scotland	6	0.41
Spain	23	1.58	Greece	11	0.76	Slovakia	6	0.41
Netherlands	22	1.51	Italy	11	0.76	Brazil	5	0.34
England	20	1.38	Montenegro	11	0.76	Hungary	5	0.34
South Africa	19	1.31	Cyprus	10	0.69	Saudi Arabia	5	0.34
France	18	1.24	Canada	9	0.62	Serbia	5	0.34
Japan	18	1.24	Czech Republic	9	0.62	Slovenia	5	0.34
Poland	18	1.24	Pakistan	9	0.62	Switzerland	5	0.34
India	13	0.89	China	9	0.62	Taiwan	5	0.34

Table 4. Research areas of the acarological studies between the years 1992-2023.

Research Areas	n	%	Research Areas	n	%
Entomology	413	28.4	Biodiversity Conservation	15	1.0
Veterinary Sciences	201	13.8	Engineering	14	1.0
Zoology	169	11.6	Science Technology Other Topics	13	0.9
Microbiology	112	7.7	Virology	13	0.9
Agriculture	104	7.2	Materials Science	11	0.8
Parasitology	97	6.7	Emergency Medicine	9	0.6
Infectious Diseases	92	6.3	Research Experimental Medicine	9	0.6
General Internal Medicine	79	5.4	Forestry	8	0.6
Dermatology	62	4.3	Fisheries	7	0.5
Environmental Sciences Ecology	53	3.6	Marine Freshwater Biology	6	0.4
Immunology	48	3.3	Otorhinolaryngology	6	0.4
Allergy	39	2.7	Rheumatology	6	0.4
Public Environmental Occupational Health	39	2.7	Geology	5	0.3
Pediatrics	36	2.5	Neurosciences Neurology	5	0.3
Plant Sciences	29	2.0	Physics	5	0.3
Chemistry	23	16	Physiology	5	0.3
Ophthalmology	20	1.4	Respiratory System	5	0.3
Tropical Medicine	20	1.4	Endocrinology Metabolism	4	0.3
Biotechnology Applied Microbiology	19	1.3	Genetics Heredity	4	0.3
Life Sciences Biomedicine Other Topics	19	1.3	Obstetrics Gynecology	4	0.3
Pharmacology Pharmacy	18	1.2	Surgery	4	0.3
Biochemistry Molecular Biology	15	1.0	Telecommunications	4	0.3

Authors' contributions

Kosta Mumcuoğlu: Conceptualization, data curation, formal analysis, supervision writing-original draft, writing-review & editing. **Naci Bayrak:** Conceptualization, data curation, formal analysis, methodology, software, writing-original draft, writing-review & editing. **Engin Şenel:** Conceptualization, data curation, formal analysis, methodology, software, validation, writing-original draft, writing-review & editing. **Adem Keskin:** Data curation, formal analysis, validation, writing-original draft, writing - review & editing. **Abdulkadir Taşdemir:** Data curation, formal analysis, validation, writing-original draft, writing-review & editing. **Ayşegül Taylan-Özkan:** Data curation, formal analysis, supervision, validation, writing-original draft, writing-review & editing.

Statement of ethics approval

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Conflict of interest

The authors declared that there is no conflict of interest.

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