

Review of Iranian Blattisociidae (Acari: Mesostigmata), with an updated checklist and identification key

Jalil Hajizadeh

Department of Plant Protection, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran.

*Correspondence author: hajizadeh@guilan.ac.ir

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Abstract

Eighteen species of blattisociid mites were collected from Guilan Province in northern Iran. *Hoploseius bispinosetus* Faraji, Sakenin-Chelav & Karg, 2006 is a new record for the Guilan Province mite fauna. This paper provides a checklist for 43 blattisociid species recorded from Iran and an updated taxonomic key for their identification. *Blattisocius cakmaki* Khanjani & Safarian and *Cheiroseius wisniewskii* Khalili-Moghadam have been added to the previous list of blattisociid mites of Iran. Information on habitat, regional distribution, and diagnostic characteristics for the examined species is also provided.

Keywords: Gamasina, Guilan, Phytoseoidea, checklist, predatory mites

1. Introduction

Superfamily Phytoseioidea comprises the four families Blattisociidae, Otopheidomenidae, Phytoseiidae and Podocinidae. The family Blattisociidae is a diverse group that has adapted to a broad spectrum of terrestrial, arboreal, and semiaquatic habitats. Blattisociidae generally comprises predators and fungivores that are sometimes phoretic on insects. Most species of this family have been reported from litter, while some species have been found on rodents and in bird nests as well as from aerial plant parts (Lindquist *et al.* 2009; Lindquist and Moraza 2010). Predator species feed on small arthropods and nematodes, and some species have potential for use in biological control programs (Moraes *et al.*, 2015). They are characterized morphologically by: podonotal and opisthonotal shields fused or not, smooth or ornamented; anterior end of dorsal shield varying from not deflexed to strongly deflexed; podonotal shield usually with 15–25 pairs of setae; opisthonotal shield with 8–16 pairs of setae; unsclerotised lateral cuticle with 0–16 pairs of setae; with 0–3 pairs of presternal plates or with sclerotised presternal area; sternal shield usually with three pairs of setae and two pairs of lyrifissures (*iv1-iv2*); third pair of sternal lyrifissures (*iv3*) off sternal shield, usually inserted on metasternal plates together with sternal seta *st4* when metasternal plates are present; genital shield including *st5*, truncate to convex posteriorly; opisthogaster with 5–10 pairs of setae; with an anal shield bearing only circumanal setae, or with a ventrianal shield bearing 2 - 7 pairs of

setae; peritrematic shield broadly connected to exopodal shield, curving behind coxa IV; peritreme usually extending from stigma at least to level of *s*₂; all legs with pretarsi, usual setation of legs I–IV, genu: 13 (12), 11 (10), 9 (8), 10 (8,9), tibia: 13 (12), 10 (9), 8 (9), 10 (9); anterior region of epistome smooth or denticulate; palp tarsal apotele two-tined; fixed cheliceral digit with 4–20 teeth and setiform pilus dentilis; movable cheliceral digit often tridentate and without pointed ventral process (mucro); spermathecal apparatus typically of the phytoseiid type (not typically in *Zercoseius*); male spermatodactyl at least as long as movable cheliceral digit (Moraes *et al.*, 2016; Santos *et al.*, 2026).

Species of the family Blattsociidae have been described from a wide range of countries and habitats; the highest species diversity is found in the Neotropical region. Some genera, e.g., *Lasioseius* are cosmopolitan (Santos *et al.*, 2018). The family currently contains about 408 valid species in 15 genera: *Aceodromus* (2 species), *Adhaerenseius* (1 species), *Arrhenoseius* (2 species), *Blattsocius* (21 species), *Calypsoseius* (1 species), *Cheiroseius* (1 species), *Cheiroseius* (131 species), *Discoseius* (1 species), *Fungiseius* (2 species), *Hoploseius* (12 species), *Krantzoseius* (1 species), *Lasioseius* (210 species), *Opiloseius* (1 species), *Platyseius* (22 species), *Zercoseius* (2 species) that grouped into two subfamilies Blattsociinae and Platyseiinae (Lindquist and Moraza 2010; Moraza and Lindquist 2011; Santos *et al.*, 2026).

So far, 43 blattsociid mites species have been reported from Iran, including six in *Blattsocius* Keegan, 14 in *Cheiroseius* Berlese, one in *Hoploseius* Berlese, 19 in *Lasioseius* Berlese and three in *Platyseius* Berlese (Faraji *et al.* 2006; Faraji *et al.* 2008; Zare *et al.* 2012; Kazemi and Rajaei, 2013; Mehranian, 2014; Shams *et al.*, 2016; Kazemi *et al.*, 2016; Javadpour *et al.* 2018; Mohammadi and Hajizadeh, 2022; Riahi and Nemati 2024; Khalili-Moghadam, 2024, Khanjani *et al.*, 2026). The objectives of this work are to provide an updated list of blattsociid species reported from Iran, information on habitat, regional distribution, and diagnostic characteristics for examined species, and an updated dichotomous key for identification of Iranian species of the family.

2. Materials and Methods

New collection records are presented based on examination of samples of plants, soil, rotten wood, stored materials, manure, and litter from Guilan Province, northern Iran. Each soil or litter sample consisted of about 2 kg of material taken down to a depth of 15 cm. Mites were extracted from samples using a Berlese funnel or direct examination of plant material under a stereomicroscope. Specimens were sorted and preserved in 70% ethanol, cleared in Nesbitt's fluid and mounted on microscope slides using Hoyer's medium. All measurements are given in micrometres. The lengths and widths of the idiosoma were taken from the anterior to posterior margins along the midline; lengths of shields were measured along their midlines and widths at their widest point. The classification system follows that proposed by Moraes *et al.* (2016) and Santos *et al.* (2026). Notations of body structures and idiosomal chaetotaxy follow Lindquist and Evans (1965) as slightly modified by Lindquist (1994). Terminology of other anatomical structures follows Evans and Till (1979). Blattsociid mites identification was done using relevant taxonomic keys and papers (Evans 1958; Chant 1963; Westerboer 1963; Bhattacharyya, 1968; Ghilyarov and Bregetova, 1977; Haines, 1978; Halliday *et al.*, 1998; Christian and Karg 2006; Karg 1993; Faraji *et al.*, 2008; Hajizadeh *et al.* 2010; Moraza and Lindquist, 2011; Britto *et al.*, 2012; Shamsi and Saboori, 2013; Moraes *et al.* 2016; Kazemi *et al.*, 2016; Javadpour *et al.* 2018; Moraza and Lindquist, 2018; Argolo *et al.* 2018; Mašán and Halliday, 2023; Hajizadeh *et al.* 2023; Khalili-Moghadam, 2024; Khanjani *et al.*, 2026). A literature search of the blattsociid mites so far reported from Iran was done using electronic and printed data sources. The important checklists of Iranian mesostigmatid mites, the database of the family Blattsociidae, and newly published articles were reviewed to prepare a new checklist of Iranian blattsociid mites (Kazemi and Rajaei, 2013; Riahi and Nemati, 2024; Khalili-Moghadam, 2024; Khanjani *et al.*, 2026; Santos *et al.*, 2026). Information on world

distribution and habitats occupied by the species is based on Moraes *et al.* (2016) and Santos *et al.* (2026). Examination and illustration of the species were done with the use of a phase and interference contrast microscope (Olympus Optical Co., Ltd, Tokyo, Japan) equipped with a camera (Canon, EOS Kiss X5; Japan) and a drawing tube. Voucher specimens were deposited in the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences at the University of Guilan, Rasht, Iran.

3. Results

In this study, 18 blattsociid mite species belonging to two subfamilies and five genera were collected and identified from Guilan Province. *Hoploseius bispinosetus* is recorded for the first time from Guilan Province. So far, 43 species of blattsociid mites belonging to two subfamilies and five genera have been reported from Iran (Table 1). In this paper, an updated key for the identification of subfamilies, genera, and species of mites of the family Blattsociidae reported from Iran is provided.

Table 1. Checklist of the Iranian blattsociid mite species (Blattsociidae).

No.	Species	Related references
1	<i>Blattsocius damghaniae</i> Shams, Kazemi & Saboori, 2016	Shams <i>et al.</i> , 2016
2	<i>Blattsocius dentriticus</i> (Berlese, 1918)	Riahi and Nemati, 2024; Current study
3	<i>Blattsocius keegani</i> Fox, 1947	Riahi and Nemati, 2024; Current study
4	<i>Blattsocius mali</i> (Oudemans, 1929)	Riahi and Nemati, 2024
5	<i>Blattsocius tarsalis</i> (Berlese, 1918)	Riahi and Nemati, 2024; Current study
6	<i>Blattsocius cakmaki</i> Khanjani & Safiarian, 2026	Khanjani <i>et al.</i> , 2026
7	<i>Cheiroseius borealis</i> (Berlese, 1904a)	Riahi and Nemati, 2024
8	<i>Cheiroseius bryophilus</i> (Karg, 1969)	Riahi and Nemati, 2024; Current study
9	<i>Cheiroseius cascadenis</i> (De Leon, 1964)	Riahi and Nemati, 2024; Current study
10	<i>Cheiroseius curtipes</i> (Halbert, 1923)	Riahi and Nemati, 2024; Current study
11	<i>Cheiroseius longipes</i> (Willmann, 1949)	Riahi and Nemati, 2024; Current study
12	<i>Cheiroseius manouchehrui</i> Shamsi & Saboori, 2013	Shamsi and Saboori, 2013
13	<i>Cheiroseius necorniger</i> (Oudemans, 1903a)	Riahi and Nemati, 2024; Current study
14	<i>Cheiroseius nepalensis</i> (Evans & Hyatt, 1960)	Kazemi and Rajaei, 2013
15	<i>Cheiroseius samani</i> Mehranian, 2014	Mehranian, 2014
16	<i>Cheiroseius serratus</i> (Halbert, 1915)	Riahi and Nemati, 2024
17	<i>Cheiroseius sistaniensis</i> Faraji, Arjmandi-Nezhad & Karg, 2008	Faraji <i>et al.</i> 2008; Kazemi and Rajaei, 2013
18	<i>Cheiroseius viduus</i> (C.L. Koch, 1839a)	Kazemi and Rajaei, 2013
19	<i>Cheiroseius unguiculatus</i> (Berlese, 1887f)	Riahi and Nemati, 2024
20	<i>Hoploseius bispinosetus</i> Faraji, Sakenin-Chelav & Karg, 2006	Faraji <i>et al.</i> 2006; Riahi and Nemati, 2024; Current study
21	<i>Cheiroseius wisniewskii</i> Khalili-Moghadam 2024	Khalili-Moghadam, 2024
22	<i>Lasioseius berlesei</i> (Oudemans, 1938)	Zare <i>et al.</i> 2012
23	<i>Lasioseius confusus</i> Evans, 1958	Riahi and Nemati, 2024
24	<i>Lasioseius dentatus</i> (Fox, 1946)	Kazemi and Rajaei, 2013; Current study
25	<i>Lasioseius floridensis</i> Berlese, 1916a	Javadpour <i>et al.</i> 2018; Current study
26	<i>Lasioseius formosus</i> Westerboer, 1963	Mohammadi and Hajizadeh, 2022; Current study
27	<i>Lasioseius frankbakkeri</i> Faraji & Karg, 2005	Javadpour <i>et al.</i> , 2018; Current study
28	<i>Lasioseius inconspicuus</i> Westerboer, 1963	Kazemi and Rajaei, 2013
29	<i>Lasioseius krantzi</i> Chant, 1963	Kazemi and Rajaei, 2013
30	<i>Lasioseius lacunosus</i> Westerboer, 1963	Kazemi and Rajaei, 2013
31	<i>Lasioseius muricatus</i> (C.L. Koch, 1839a)	Kazemi and Rajaei, 2013
32	<i>Lasioseius ometes</i> (Oudemans, 1903b)	Riahi and Nemati, 2024

No.	Species	Related references
33	<i>Lasioseius ometisimilis</i> Hirschmann, 1962	Riahi and Nemati, 2024
34	<i>Lasioseius parberlesei</i> Bhattacharyya, 1968	Riahi and Nemati, 2024; Current study
35	<i>Lasioseius penicilliger</i> Berlese, 1916a	Kazemi and Rajaei, 2013
36	<i>Lasioseius phytoseioides</i> Chant, 1963	Kazemi and Rajaei, 2013
37	<i>Lasioseius qianensis</i> Gu & Wang, 1990	Riahi and Nemati, 2024
38	<i>Lasioseius sugawarae</i> Ehara, 1964	Riahi and Nemati, 2024; Current study
39	<i>Lasioseius thermophilus</i> Willmann, 1942	Kazemi and Rajaei, 2013; Current study
40	<i>Lasioseius youcefi</i> Athias-Henriot, 1959b	Riahi and Nemati, 2024; Current study
41	<i>Platyseius italicus</i> (Berlese, 1905)	Kazemi and Rajaei, 2013
42	<i>Platyseius persicus</i> Kazemi, Payandeh & Saberi, 2016	Kazemi <i>et al.</i> , 2016
43	<i>Platyseius tendens</i> (Schränk, 1803)	Riahi and Nemati, 2024; Current study

Checklist and collection information of the blattisociid mite species of Guilan Province

Family Blattisociidae Garman, 1948

Genus *Blattisocius* Keegan, 1944

Blattisocius dentriticus (Berlese, 1918) (Figure 1)

Differential diagnosis (female): Idiosoma oval, dorsal shield 480 µm long, dorsal setae long (reaching well beyond the base of the next seta in the series); ventrianal shield with four pairs of preanal setae; peritreme long extending to the level of the posterior half of coxa I; fixed cheliceral digit normal, extends as long as movable digit; leg IV with a long macroseta on the basitarsus.

Material examined: One female and one male, Rasht, 37° 16' 28" N 49° 35' 20" E, collected from a rice warehouse, September 2020.

Distribution and habitat: Iran, Fars Province, Shiraz, stored products and insectary cultures; Guilan Province, Rasht and Sangar, stored rice and colony of *Ephestia*; Khuzestan Province, honeybee hives (Riahi and Nemati 2024). Also reported from Asia, Africa, Australia, Brazil, Europe and the USA, in soil, stored products, manure, on plants, nests of birds, etc. (Santos *et al.*, 2026).

Blattisocius keegani Fox, 1947 (Figure 2)

Differential diagnosis (female): Idiosoma oval, dorsal shield 480 µm long, dorsal setae somewhat short; ventrianal shield rectangular with three pairs of pre-anal setae; peritreme short, extending just beyond the level of the posterior of coxa III; fixed cheliceral digit shorter than movable digit (about two-thirds); movable cheliceral digit with one tooth; leg IV without macroseta.

Material examined: Five males and 20 females, Rasht, 37° 16' 28" N 49° 35' 20" E, collected from rice warehouse and colony of *Ephestia* sp., July 2020; five females and one male, Sangar, 37° 10' 42" N 49° 41' 38" E, collected from rice warehouse, July 2019; two male, Shaft, 37° 10' 13" N 49° 24' 06" E, collected from rice warehouse, August 2020; four females, Kuchesfahan, 37° 15' 25" N, 49° 46' 30" E, collected from apple leaves, September 2021; two males, Khomam, 37° 23' 21" N 49° 39' 30" E, collected from rice bran, November 2021; two females, Ziabar, 37° 25' 36" N 49° 14' 48" E, collected from Sawdust, March 2020, one female, Talesh, 37° 47' 51" N, 48° 54' 15" E, collected from soil, July 2020.

Distribution and habitat: Iran, Guilan Province, Rasht, Sangar, Shaft, Kuchesfahan, Khomam, soil, plants, warehouses, stored rice, manure and decaying plants; Kurdistan Province, associated with stored flour and wheat; Semnan Province, decaying hay; West Azerbaijan Province, associated with rats (Riahi and Nemati 2024). Also reported from Asia, Africa, Australia, Brazil, Canada, Europe, South America and the USA in soil, stored products, dust, litter, manure, on plants, nests of birds and insects, etc. (Santos *et al.*, 2026).

***Blattisocius tarsalis* (Berlese, 1918) (Figure 3)**

Differential diagnosis (female): Idiosoma oval, dorsal shield 550 µm long; dorsal setae with medium length; ventrianal shield rectangular with three pairs of pre-anal setae; peritreme short, extending to posterior margin of coxa II; fixed cheliceral digit very short (about one-third the length of the movable digit), edentate; movable cheliceral digit with three teeth.

Material examined: Ten females, Rasht, 37° 17' 0" N 49° 35' 0" E, collected from colony of *Plodia* sp., soil and rice warehouse, October 2020; one female, Rasht, Saravan forest, 37° 4' 15" N 49° 39' 55" E, collected from soil, March 2019; three females, Sowme'eh Sara, 37° 18' 0" N 49° 18' 0" E, collected from rice warehouse, November 2021.

Distribution and habitat: Iran, Fars Province, Kazeron, Shiraz, stored products, insectary cultures, dust; Guilan Province, Rasht, Sowme'eh Sara, soil, plants, warehouses, stored rice, manure, litter, plants; Golestan Province, Gorgan, soil; Isfahan Province, Isfahan, soil (Riahi and Nemati 2024). Also reported from Asia, Africa, Australia, Belize, Brazil, Europe and the USA in soil, stored products, debris, litter, manure, on plants, nests of birds and insects, etc. (Santos *et al.*, 2026).

Genus *Cheiroseius* Berlese, 1916***Cheiroseius bryophilus* (Karg, 1969) (Figure 4)**

Differential diagnosis (female): Idiosoma oval, dorsal shield 540 µm long, reticulated; ventrianal shield widely rounded frontally, widest at the level of the anal opening, with three pairs of preanal setae; poststigmatic part of peritreme short, not reaching beyond posterior margin of coxa IV; tarsus I with claws, longer than tibia I.

Material examined: Five females and two males, Rasht, 37° 4' 15" N 49° 39' 55" E, collected from soil, June 2020; one female, Ziabar, 37° 25' 36" N 49° 14' 48" E, collected from soil, July 2019; one female, Rudсар, 37° 8' 0" N 50° 17' 0" E, collected from soil, June 2020; four females, Hashtpar, 37° 48' 6" N 48° 54' 26" E, collected from soil, June 2021; 15 females, Rezvanshahr, 37° 33' 4" N 49° 8' 22" E, collected from soil, June 2019; three females, Rostamabad 36° 53' 54" N 49° 29' 26" E, collected from soil, June 2020; one female, Lashmesha 37° 21' 58" N 49° 51' 34" E, collected from soil, July 2021; one female, Astaneh ye Ashrafiyeh, 37° 15' 54" N 49° 56' 40" E, collected from soil, August 2019; one female, Daylaman, 36° 53' 20" N 49° 54' 20" E, collected from soil, June 2021; two females, Chubar, 38° 10' 57" N 48° 53' 33" E, collected from soil, July 2021; three females, Sowme'eh Sara, 37° 18' 0" N 49° 18' 0" E, collected from soil, August 2021.

Distribution and habitat: Iran, Guilan Province, Rasht, Astaneh ye Ashrafiyeh, Chubar, Daylaman, Hashtpar, Rudсар, Rezvanshahr, Ziabar, Rostamabad, Lashmesha, in soil, plants, warehouses, manure, decaying plants; West Azerbaijan Province, Urmia, in soil (Riahi and Nemati 2024). Also reported from Germany, Latvia, Poland, Russia and Slovakia in soil, litter and silt (Santos *et al.*, 2026).

***Cheiroseius cascadenis* (De Leon, 1964) (Figure 5)**

Differential diagnosis (female): Idiosoma oval, dorsal shield 550 µm long, reticulated, strongly sclerotized; *J* setae reaching to following setae in series; anterior medial region of the sternal shield with an M-shaped pattern; ventrianal shield with three pairs of preanal setae; poststigmatic part of peritreme long, reaching well beyond posterior margin of coxa IV; leg I shorter than idiosoma; tarsus I with claws, longer than tibia I.

Material examined: One female, Langarud 37° 11' 16" N 50° 9' 27" E, collected from soil, May 2019.

Distribution and habitat: Iran, Guilan Province, Rasht, Langarud, soil; Semnan Province, moss, decaying matter, soil (Riahi and Nemati 2024). Also reported from the USA; habitat not mentioned (Santos *et al.*, 2026).

***Cheiroseius curtipes* (Halbert, 1923) (Figure 6)**

Differential diagnosis (female): Idiosoma oval, dorsal shield 530 µm long, reticulated; sternal shield with fine pattern; ventrianal shield with three pairs of preanal setae; poststigmatic part of peritreme long, reaching well beyond posterior margin of coxa IV; leg I shorter than idiosoma; tarsus I with claws, longer than tibia I.

Material examined: Five females, Rasht, 37° 4' 15" N 49° 39' 55" E, collected from soil and plant leaves infested with spider mites, July 2020; four females, Khomam, 37° 23' 28" N, 49° 39' 35" E, collected from soil, September 2021.

Distribution and habitat: Iran, Guilan Province, Rasht, Khomam, in soil, on plants; Semnan Province, Damghan, in soil, moss; West Azerbaijan Province, Urmia, in soil (Riahi and Nemati 2024). Also reported from Asia, Africa, Canada, Europe, Jamaica and Russia, in soil, litter, decay materials, rotten wood, plants, meadow and nests of birds (Santos *et al.*, 2026).

Cheiroseius longipes (Willmann, 1949) (Figure 7)

Differential diagnosis (female): Idiosoma oval, dorsal shield 480 µm long, reticulated; dorsal setae short, setae J4 short, about 1/3 distance J4–J5; ventrianal shield oval, wider than long, with three pairs of preanal setae; peritreme very wide, poststigmatic part of peritreme long, reaching well beyond posterior margin of coxa IV; leg I strikingly longer than idiosoma; tarsus I with claws, shorter than tibia I.

Material examined: Five females, Langarud 37° 11' 16" N 50° 9' 27" E, collected from soil, May 2020; six females, Rasht, 37° 4' 15" N 49° 39' 55" E, collected from soil, October 2019.

Distribution and habitat: Iran, Guilan Province, Fuman, Shaft, Khomam and Manjil, in soil, associated with eriophyid mites; West Azarbaijan Province, Urmia, soil and litter (Riahi and Nemati 2024). Also reported from Europe (Austria, Finland, Germany, Poland, Slovakia), in soil, litter, moss, on plants, and nests of birds (Santos *et al.*, 2026).

Cheiroseius necorniger (Oudemans, 1903) (Figure 8)

Differential diagnosis (female): Idiosoma oval, dorsal shield 490 µm long, reticulated; sternal shield with 2 halfbend-shape structure in front; ventrianal shield nearly as long as wide, with three pairs of preanal setae; poststigmatic part of peritreme long, reaching well beyond posterior margin of coxa IV; legs I longer than idiosoma, tarsus I with claws, longer than tibia I, terminal claws of tarsus I smaller than those of tarsi II–IV.

Material examined: One female, Fuman, 37° 13' 13" N, 49° 18' 34" E, collected from soil, August 2020; two females, Masuleh, 37° 9' 37" N, 48° 59' 32" E, collected from soil, July 2021.

Distribution and habitat: Iran, Guilan Province, Masuleh, Fuman, in soil; Chaharmahal va Bakhtiari Province, Shahrekord, soil; Kerman Province, Kerman, soil; Lorestan Province, Khorramabad, soil; Khuzestan Province, Ahvaz, soil; Semnan Province, Damghan, soil; Zanjan Province, Zanjan, soil, rotten wood, fungi, litter, and dung (Riahi and Nemati 2024). Also reported from Asia, Africa, Europe and South America (Argentina) in soil, litter, moss, compost, nests of birds and insects and plants (Santos *et al.*, 2026).

Genus *Hoploseius* Berlese, 1914

Hoploseius bispinosetus Faraji, Sakenin-Chelav & Karg, 2006 (Figure 9)

Differential diagnosis (female): Idiosoma broad oval, dorsal shield 560 µm long, with 34 pairs of dorsal setae; dorsal setae J4 enlarged and spine-like; sternal shield moderately reticulated; epigynial shield truncate posteriorly, moderately reticulated; ventrianal shield roughly octagonal and reticulate, with 6 pairs of setae (JV1, JV2, JV3, JV4, ZV2, ZV3); with two pairs of metapodal plates; tectum smooth, subtriangular; genu of leg IV with nine setae; ventral seta on basifemur leg III thickened and spurred; ventral seta on genu leg III setiform.

Material examined: Fifty females and 40 males, during November to December 2022, Rasht County, campus of University of Guilan, 37° 11' 44.5" N 49° 38' 30.7" E, collected from mushrooms on rotten tree trunks; one female and one male, December 1, 2022, Rezvanshahr, 37° 32' 53" N 49° 08' 08" E, collected from mushrooms on forest floor.

Distribution and habitat: Iran, Chaharmahal va Bakhtiyari Province, associated with *Fomes* sp., ants' nest; Mazandaran Province, Amol, wood fungi and decomposing wood; Zanjan Province, Zanjan, soil, rotten wood, fungi, litter, and dung (Faraji *et al.*, 2006; Riahi and Nemati 2024). Also reported from Italy, associated with wild fungi (Santos *et al.*, 2026).

Genus *Lasioseius* Berlese, 1916

Lasioseius dentatus (Fox, 1946) (Figure 10)

Lasioseius scapulatus Kennett 1958)

Differential diagnosis (female): Idiosoma oval, dorsal shield 390 µm long, with 36 pairs of setae, seta *r4* usually tricarinate; sternal shield with nearly straight posterior margin; ventrianal shield with four pairs of preanal setae; with two pairs of metapodal plates; leg IV with macroseta on tibia and tarsus.

Material examined: Two females, Khomam, 37° 22' 55" N, 49° 39' 35" E, May 2019, collected from weeds; two females, Lowshan, 36° 37' 46" N, 49° 30' 50" E, July 2019 collected from soil; one female, Rasht, Kuchesfahan, 37° 16' 42" N, 49° 46' 21" E, May 2019, collected from weeds.

Distribution and habitat: Iran, Fars Province, Shiraz, soil; Guilan Province, Rasht, Lowshan, on plants, soil, litter; Kerman Province, Kerman, soil; Khuzestan Province, Ahvaz, soil (Riahi and Nemati 2024). Also reported from China, Egypt, Israel, Japan, Mexico, Puerto Rico, Saudi Arabia, Uganda and the USA, soil, on plants, debris and manure (Santos *et al.* 2026).

Lasioseius floridensis Berlese, 1916 (Figure 11)

Differential diagnosis (female): Idiosoma oval, dorsal shield 480 µm long, reticulated, with 36 pairs of setae, setae *z1*, *s2*, *r2* and *r4* short and aciculate; first pair of sternal setae on weakly sclerotized anterior region of sternal shield; ventrianal shield transversely lineate, with four pairs of preanal setae; peritreme extending anteriorly to base of setae *j1*; fixed cheliceral digit with 12 teeth, movable cheliceral digit tridentate; tarsus III with seta *ad2* slightly (1.1) longer but not more attenuated than *pd2*; spermatheca conspicuous, with a strongly sclerotized, shallowly cup-shaped calyx and long, relatively thick minor duct.

Material examined: Four females, Rasht, University of Guilan, 37° 17' 0" N, 49° 35' 0" E, March 2020, collected from rotten wood and soil; one female, Ziabar 37° 25' 36" N, 49° 14' 48" E, April 2019, collected from sawdust; two females, Lahijan, 37° 12' 0" N, 50° 0' 0" E, November 2019, collected from soil.

Distribution and habitat: Iran, Guilan Province, Rasht, Ziabar, Lahijan, in rotten wood and soil (Javadpour *et al.* 2018). Also reported from Brazil, Germany, Poland and the USA, on plants, insect nests, soil, bark, compost, moss and fungi (Santos *et al.* 2026).

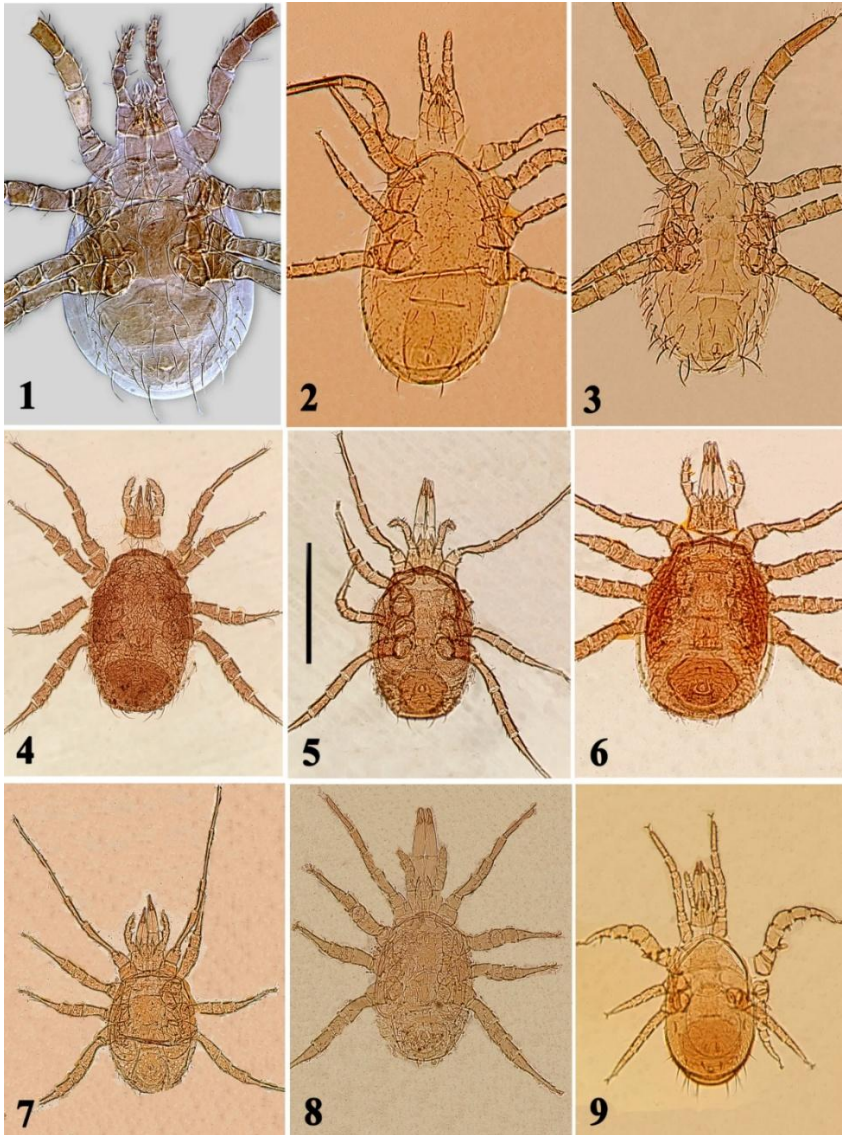
Lasioseius formosus Westerboer, 1963 (Figure 12)

Differential diagnosis (female): Idiosoma oval, dorsal shield 496 µm long, reticulated, most dorsal shield setae simple, some posterior setae serrated, seta *r4* tricarinate; sternal shield with nearly straight posterior margin; with two pairs of metapodal plates; ventrianal shield broadly oval, with six pairs of preanal setae; peritreme short, extends only to the middle of coxa III; tectum conger-like, with serrated margin.

Material examined: Two females, Rasht, Saravan forest, 37° 04' 22.1" N, 49° 37' 32.7" E, May 2021, collected from soil.

Distribution and habitat: Iran, Guilan Province, Rasht, soil (Mohammadi and Hajizadeh 2022).

Also reported from Germany and Poland from dung (Santos *et al.* 2026).



Figures 1-9: Idiosomal view, 1. *Blattisocius dentriticus*, 2. *B. keegani*, 3. *B. tarsalis*, 4. *Cheiroseius bryophilus*, 5. *Ch. cascadiensis*, 6. *Ch. curtipes*, 7. *Ch. longipes*, 8. *Ch. necorniger*, 9. *Hoploseius bispinosetus*. Scale bar: 210 μm for 1, 240 μm for 2, 295 μm for 3, 400 μm for 4, 420 μm for 5, 400 μm for 6, 450 μm for 7, 368 μm for 8, and 440 μm for 9.

***Lasioseius frankbakkeri* Faraji & Karg, 2005 (Figure 13)**

Differential diagnosis (female): Idiosoma oval, dorsal shield 405 μm long, moderately reticulated, with 31 pairs of dorsal setae, only with 3 pairs of simple marginal setae (*r4*, *R1* and *R6*) on soft integument; sternal shield smooth, lateral margins with a few striations; metasternal platelets smooth; epigynial shield smooth, posteriorly truncate; ventrianal shield triangular,

moderately reticulate with four pairs of preanal setae; tectum with anterior margin triangular and serrate; fixed digit of chelicerae with a row of 10 teeth, movable digit with four teeth; macroseta present only on the tarsus of leg IV.

Material examined: Three females, Roudsar, Kelachay, 37° 04' 44" N, 50° 23' 43" E, August 2019, collected from leaves and soil of citrus trees; 15 females, Chaboksar, 36° 58' 0" N, 50° 35' 0" E, July 2019, collected on weeds; five female, Langarud, 30° 10' 50" N, 11° 37' 0" E, July 2019, collected from soil and leaves of citrus trees; eight females, Khomam, 37° 22' 55" N, 49° 39' 35" E, collected from soil and mint leaves, May 2020; two females, Rezvanshahr, Gium forest, 37° 42' 46" N, 49° 00' 32" E, collected from soil, July 2019; five females, Siahkal, 37° 01' 51" N, 49° 53' 31" E, from soil, September 2019; two females, Manjil, 36° 44' 0" N, 49° 25' 0" E, collected on weeds, July 2019; one female, Ziabar, 37° 25' 36" N, 49° 14' 48" E, collected from apple leaves, June 2020; one female, Rasht, 37° 17' 0" N, 49° 35' 0" E, collected from rotten fruits, August 2019; four females, Kuchesfahan 37° 16' 42" N, 49° 46' 22" E, collected from mint and apple leaves, December 2019; one male, Rasht 37° 17' 0" N, 49° 35' 0" E, collected from mushroom soil, May 2020.

Distribution and habitat: Iran, Guilan Province, Sangar, Shaft, Rostamabad, Roodbar, Langarud, Roudsar, Chaboksar, Kelachay, Kuchesfahan, Khomam; in soil, plant leaves, mulberry, raspberry, associated with eriophyid mites (Riahi and Nemati 2024). Also reported from France, on weeds (Santos *et al.*, 2026).

Lasioseius parberlesei Bhattacharyya, 1968 (Figure 14)

Indiraseius parberlesei Daneshvar, 1987: 33

Differential diagnosis (female): Idiosoma oval, dorsal shield 410 µm long, podonotal part scattered reticulate, with 22 pairs of dorsal setae; without setae *j1* and *z1*, leaving setae *j2* as anteromedial most pair; setae *r2* present; setae *s4* normal; setae *S2* absent; setae *j5* and *j6* long; setae *J2* 1/4 distance *J2-J4*; sternal shield longer than wide with faint reticulation; genital shield sparsely striate; posterior margin truncate; ventrianal shield subtriangular, reticulate, with six pairs of opisthogastric setae (*JV1-JV4*, *ZV2*, *ZV3*) in addition to the circumanal setae; peritreme extending forward to region between *j2* setae; calyx spermatheca funnel-shaped, 16–18 µm long, atrium swollen; leg IV with three macrosetae: on genu (*ad2*), basitarsus (*pd3*) and telotarsus (*pd2*).

Material examined: Two females, Rasht, Fakhrabad, 37° 24' 20" N, 49° 52' 47" E, September 2019, collected from infected leaves with eriophyid mites; two females, Masuleh, 37° 9' 37" N, 48° 59' 32" E, August 2020, collected from rice farm; one female, Daylaman 36° 53' 20" N, 49° 54' 20" E, June 2020, collected from soil; four females, Sangar, 37° 10' 59" N, 49° 38' 42" E, July 2019, collected on greenhouse plants; 10 females, Rasht, 37° 16' 51" N, 49° 34' 59" E, September 2019, collected from light traps; one female, Bandar Anzali, 37° 28' 22" N, 49° 27' 44" E, October 2020, collected on citrus leaves.

Distribution and habitat: Iran, Chaharmahal va Bakhtiyari Province, nest of ants, Guilan Province, Bandar Anzali, Lahijan, Rasht, Masuleh, Sangar, Daylaman, Rasht on mulberry, tea, citrus, rice farm, fig, raspberry, decaying plants, soil, plants and associated with eriophyid mite and beetles; Mazandaran Province, Behshahr, on fig tree; Isfahan Province, Najaf Abad, Zarrin Shahr, Falavarjan, Dorcheh, in soil (Daneshvar, 1987; Riahi and Nemati 2024). Also reported from Egypt, India, Pakistan, Philippines, Saudi Arabia, Syria and Taiwan, on plants, soil, and litter (Santos *et al.* 2026).

Lasioseius sugawarae Ehara, 1964 (Figure 15)

Differential diagnosis (female): Idiosoma oval, dorsal shield 420 µm long, reticulated, with 36 pairs of setae; seta *r4* tricarinate; sternal shield longer than wide; ventrianal shield large, wider than long, with four pairs of preanal setae; with two pairs of metapodal plates; tectum with three denticulate processes; tarsus III with seta *ad2* more attenuated and clearly (ca 1.5) longer than *pd2*; spermatheca small, weakly sclerotized, bulbous, without discernible minor duct.

Material examined: Twenty females and two males Rezvanshahr, 37° 32' 53" N 49° 08' 08" E, November 1, 2022, collected on mushrooms; 21 females, Langarud, 30° 10' 50" N, 11° 37' 0" E, October 2019, collected from soil and leaves of citrus trees and weeds; 28 females, Chaboksar, 36° 58' 0" N, 50° 35' 0" E, August 2019, collected from soil of citrus trees and weeds; four females, Roudsar, 37° 13' 0" N, 50° 3' 0" E, July 2019, collected from soil of citrus trees; 12 females, Lahijan, 27° 15' 0" N, 50° 2' 0" E, July 2019, collected from soil of citrus garden, tea and mulberry leaves; two females, Manjil, 36° 44' 0" N, 49° 25' 0" E, July 2020, collected from soil of olive garden; two females, Rostamabad, 36° 53' 58" N, 49° 29' 35" E, June 2019, collected from soil of olive tree; two females, Rasht, Emanzadeh Hashem, 37° 01' 27" N, 49° 37' 32" E, August 2019, collected from soil; one female, Astaneh ye Ashrafiyeh, 37° 15' 54" N, 49° 56' 40" E, July 2019, collected from citrus leaves; one female, Rasht 37° 17' 0" N, 49° 35' 0" E, August 2019, collected from rotten fruits; five females, Chaboksar 36° 58' 34" N, 50° 33' 37" E, October 2020, collected from soil of citrus garden; five females, Khomam, 37° 22' 55" N, 49° 39' 35" E, December 2019, collected on weeds; 12 females, Rasht, 37° 16' 51" N, 49° 34' 59" E, January 2019, collected from soil, weeds and flowers; three females, Sangar, 37° 10' 59" N, 49° 38' 42" E, February 2019, collected from soil; two females, Kucheshahan, 37° 16' 42" N, 49° 46' 21" E, May 2019, collected from soil and weeds.

Distribution and habitat: Iran, Alborz Province, Eshtehard, compost; Fars Province, Jahrom, soil of citrus orchards; Guilan Province, Manjil, Lahijan, Emanzadeh Hashem, Langarud, Astaneh ye Ashrafiyeh, Rezvanshahr, Rasht, Chaboksar, Rahimabad, Roudsar, soil, plants, olive leaves, tea and mulberry leaves, citrus leaves, rotten fruits, litter, Isfahan Province, Shahreza, Esfahan, soil; Mazandaran Province, Amol, soil (Riahi and Nemati 2024). Also reported from Japan, Malaysia, South Korea, Taiwan and the USA, on plants, soil, and bird nests (Santos *et al.* 2026).

Lasioseius thermophilus Willmann, 1942 (Figure 16)

Differential diagnosis (female): Idiosoma oval, dorsal shield 460 µm long, reticulated, with 36 pairs of dorsal setae; dorsal setae relatively long, most of dorsal shield setae tricarinate except for *z1*, *s2*, *r2*, *r4*, *R1*–*R8* short, smooth and aciculate; peritreme extending forward to level of setae *j1*; sternal shield punctate, longer than wide, retracted in coxae II region, posterior margin slightly concave; genital shield punctate, rectangular; two pairs of metapodal shields are present; ventrianal shield is almost triangular, punctate, broader than long, with rounded corners, with transverse striae and finely punctate, with four pairs of preanal setae; fixed cheliceral digit with 13–14 teeth and apical hook, pilus dentilis short; movable digit tridentate; legs I–IV with paired claws and rounded pulvilli, tibia and tarsus leg IV without macroseta; spermathecal apparatus well developed and pear-shaped, with a well-sclerotised neck and spherical vesicle.

Material examined: Forty females and 10 males, Rasht county, campus of University of Guilan, 37° 11' 44.5" N, 49° 38' 30.7" E, August to October 2023, collected on rotten tree trunks.

Distribution and habitat: Iran, Golestan Province, Gorgan, soil; Guilan Province, Rasht, rotten tree trunks (Riahi and Nemati 2024; Hajizadeh, 2024). Also reported from Bulgaria, Germany, Japan, Latvia, Poland and Turkey, on plants, litter and associated with insects (Santos *et al.* 2026).

Lasioseius youcefi Athias-Henriot, 1959 (Figure 17)

Differential diagnosis (female): Idiosoma oval, dorsal shield 470 µm long, reticulated, with 23 pairs of dorsal setae, without setae *j1* and *z1*, leaving setae *j2* as anteromedial most pair; posterior region of dorsal shield with 10 or 11 pairs of setae; peritreme extending forward to level of setae *j1*; sternal shield wider than long, reticulated; ventrianal shield wide, almost triangular,

with six pairs of opisthogastric setae; two pairs of metapodal shields are present; fixed cheliceral digit with 10-13 teeth, movable cheliceral digit tridentate.

Material examined: Two females, Langarud, 30° 10' 50" N, 11° 37' 0" E, June 2019, collected from citrus leaves; seven females, Chaboksar, 36° 58' 0" N, 50° 35' 0" E, October 2019, collected from soil of citrus garden; four females, Lahijan, 37° 12' 25" N, 50° 00' 14" E, October 2020, collected from tea leaves; one female, Rudsar, 37° 8' 0" N, 50° 17' 0" E, October 2019, collected from soil; one female, Kuchesfahan, 37° 16' 42" N, 49° 46' 21" E, May 2019, collected from soil; one female, Khomam, 37° 22' 55" N, 49° 39' 35" E, May 2019, collected on weeds.

Distribution and habitat: Iran, widely distributed in most provinces (Chaharmahal va Bakhtiyari, East Azarbaijan, Fars, Golestan, Guilan, Hamedan, Isfahan, Kerman, Kermanshah, Khuzestan, Lorestan, Qom, Semnan, Sistan va Baluchestan, Tehran, West Azarbaijan, Zanzan), on plants, soil, litter, plant debris, decaying woods, manure, compost, insects nest, associated with eriophyid mite, ants nest (Riahi and Nemati 2024). Also reported from Algeria, Austria, Azerbaijan, Bulgaria, China, Egypt France, Germany, Hungary, Iran, Italy, Japan, Latvia, Moldova, Poland, Slovakia, South Africa, South Korea, Switzerland, Taiwan, United Arab Emirates and USA, on plants, weeds, fungi, bark beetle galleries, debris, humus, litter, rotting wood, soil, nest of ants and nest of birds (Santos *et al.* 2026).

Genus *Platyseius* Berlese, 1916

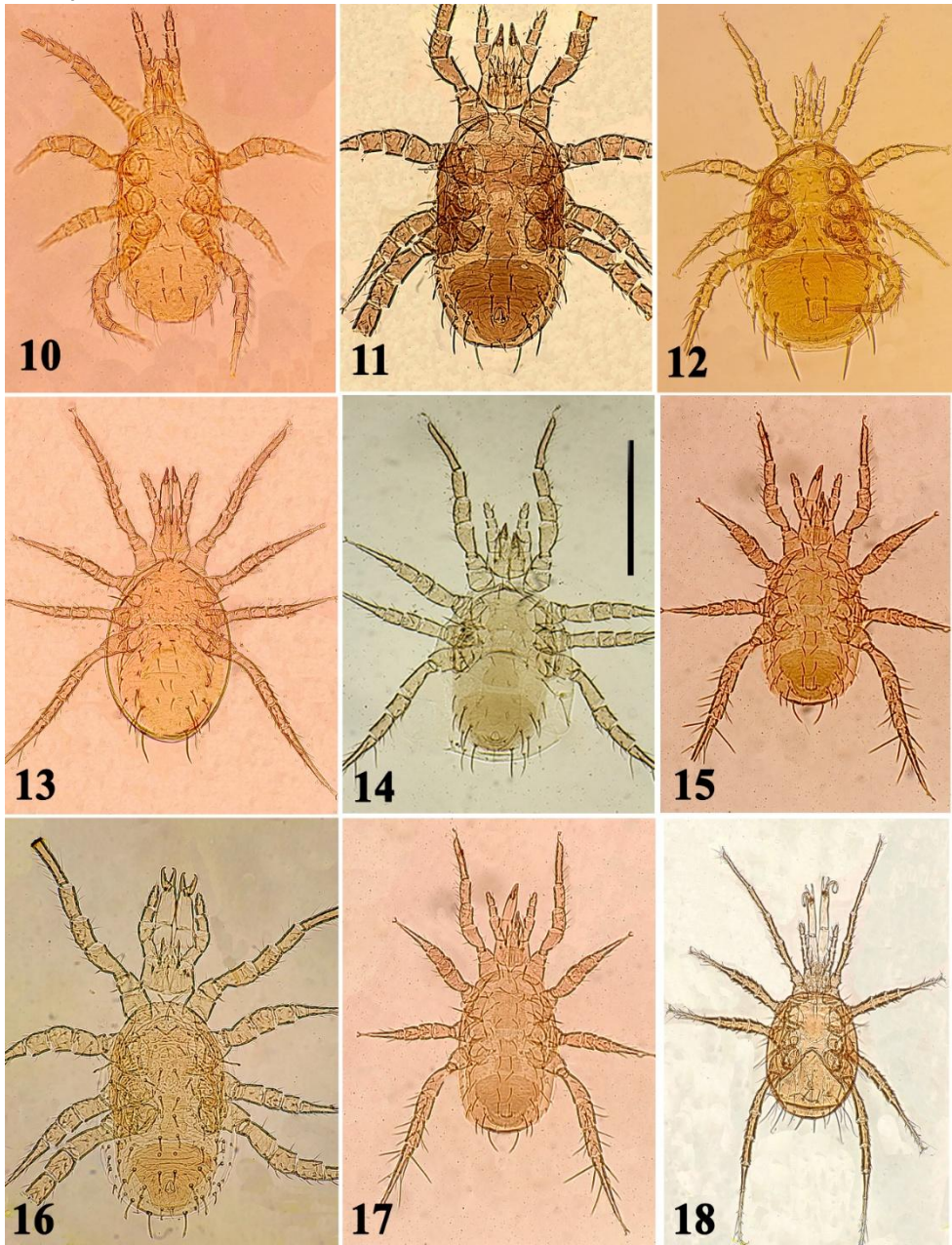
Platyseius tendens (Schränk, 1803) (Figure 18)

Hypoaspis subglabra Oudemans, 1903

Differential diagnosis (female): Idiosoma nearly rounded, dorsal shield 560 µm long, ornamentation restricted to several small punctate areas, with 31 pairs of dorsal setae, setae *J1-J3* absent, setae *j3* almost as long as *j4*; setae *j6* shorter than *J4*; sternal shield smooth; genital shield wedge shaped; ventrianal shield wider than long, with thirteen setae; six small sclerotized plates are present between genital and ventrianal shields; peritreme extending forward to level of setae *r1*; tectum three-pronged; movable cheliceral digit with 1-2 teeth; tarsus II-IV with a pair of long lanceolate setae; ambulacrum of tarsus I short, with small claws; empodium of legs II-IV trifurcated and pointed.

Material examined: One female and one male, Rasht, Saravan forest, 37° 4' 15" N 49° 39' 55" E, collected from soil, May 2019.

Distribution and habitat: Iran, Chaharmahal va Bakhtiyari Province, Shahrekord, soil nest of ant; Guilan Province, Rasht, soil (Riahi and Nemati 2024). Also reported from Algeria, England, Germany, Italy, Latvia, Norway, Poland, Slovakia, and Southern Ireland, in soil and litter (Santos *et al.* 2026).



Figures 10-18: Idiosomal view, 10. *Lasioseius dentatus*, 11. *L. floridensis*, 12. *L. formosus*, 13. *L. frankbakkeri*, 14. *L. parberlesei*, 15. *L. sugawarai*, 16. *L. thermophilus*, 17. *L. youcefi*, 18. *Platyseius tendens* (male). Scale bar 234 μm for 10, 267 μm for 11, 310 μm for 12, 300 μm for 13, 340 μm for 14, 350 μm for 15, 276 μm for 16, 390 μm for 17, and 460 μm for 18.

Key to subfamilies, genera and species of Blattisociidae reported from Iran (females)

1a. Legs II–IV with median lobe of pulvillus slender, acute or narrowly rounded; para-anal setae inserted at level with or posterior to hind margin of anus, and usually longer than post-anal seta; femora I and II with 11 and 10 setae, respectively (each lacking *v-3*); genu I with 12 or 13 setae; anterior hypostomatic seta and internal palptrochanter seta long, whip-like, tapering only near tip **Subfamily Platyseiusinae** → 2

1b. Legs II–IV with median lobe of pulvillus broadly rounded; para-anal setae inserted anterior to hind margin of anus (in line with posterior anal margin in *Aceodromus* and *B. thaicocolloris*), and subequal to or slightly shorter than postanal seta; femur I with 11 or 12 setae and femur II with 11 setae; genu I with 11 or 13 setae; anterior hypostomatic seta and internal palptrochanter seta gradually tapering along entire length, not whip-like, usually not elongate **Subfamily Blattisociinae** → 3

2a. Opisthonotal region of dorsal shield with 2–4 pairs of *J* setae; seta *st1* distinctly shorter than *st3*; tibia II with nine setae (*pd1* absent); distance between fifth and sixth rows of deutosternal denticles nearly twice that between fourth and fifth rows **Platyseius** Berlese, 1916 → 5

2b. Opisthonotal region of dorsal shield with five pairs of *J* setae; setae *st1* and *st3* subequal in length; tibia II with ten setae (*pd1* present); distance between fifth and sixth rows of deutosternal denticles similar to or only slightly greater than that between fourth and fifth rows **Cheiroseius** Berlese, 1916 → 7

3a. Leg II usually much thicker than other legs, with strong spine-shaped setae either on ventral faces of several segments or on dorsal face of tarsus **Hoploseius** Berlese, 1914; *H. bispinosetus* Faraji et al., 2006

3b. Leg II not thickened, lacking strong spine-shaped setae on ventral faces of segments or on dorsal face of tarsus → 4

4a. Corniculi usually close to each other, convergent and slender (at least three times as long as basal width); anterior margin of epistome convex and smooth; fixed cheliceral digit with few or no teeth; peritrematic shield slender, barely wider than stigma at level of stigma; humeral seta (*r3*) usually on unsclerotised cuticle **Blattisocius** Keegan, 1944 → 20

4b. Corniculi well separated, subparallel and stout (rarely more than twice as long as basal width); anterior margin of epistome convex or with three anterior extensions, smooth or denticulate; fixed cheliceral digit usually multidentate; peritrematic shield clearly wider than diameter of stigma at level of stigma; *r3* on dorsal shield **Lasioseius** Berlese, 1916 → 25

5a. Posterior region of dorsal shield with distinct protuberance between setae *J4*, its posterior margin strongly sclerotized **Platyseius italicus** (Berlese, 1905)

5b. Posterior region of dorsum with at most a slight elevation between setae *J3*, without a sclerotized posterior margin → 6

- 6a.** Setae $j3$ almost as long as $j4$, $j6$ shorter than $J4$ *Platyseius tendens* (Schrank, 1803)
- 6b.** Setae $j3$ more than 4.5 times longer than $j4$, $j6$ longer than $J4$ *Platyseius persicus* Kazemi et al., 2016
- 7a.** Tarsus I without terminal claws *Cheiroseius viduus* (Koch, 1839)
- 7b.** Tarsus I with terminal claws → 8
- 8a.** Terminal claws of tarsus I larger than those of tarsi II–IV; preanal seta ZVI absent; dorsal shield almost smooth, minutely punctured *Cheiroseius unguiculatus* (Berlese, 1887)
- 8b.** Terminal claws of tarsus I smaller than those of tarsi II–IV; preanal seta ZVI present; dorsal shield reticulate, without punctures → 9
- 9a.** Poststigmatic part of peritreme absent *Cheiroseius wisniewskii* Khalili-Moghadam, 2024
- 9b.** Poststigmatic part of peritreme present → 10
- 10a.** Tarsus I longer than tibia I → 11
- 10b.** Tarsus I shorter than tibia I, or both segments similar in length → 17
- 11a.** Ventrianal shield with four pairs of preanal setae → 12
- 11b.** Ventrianal shield with three pairs of preanal setae → 13
- 12a.** Setae $JV2$ – $JV4$ and $ZV2$ on ventrianal shield *Cheiroseius borealis* (Berlese, 1904)
- 12b.** Setae $JV2$ – $JV3$ and $ZV2$ – $ZV3$ on ventrianal shield *Cheiroseius manouchehrii* Shamsi & Saboori, 2013
- 13a.** Poststigmatic part of peritreme short, not reaching beyond posterior margin of coxa IV *Cheiroseius bryophilus* (Karg, 1969)
- 13b.** Poststigmatic part of peritreme long, reaching well beyond posterior margin of coxa IV → 14
- 14a.** Leg I longer than idiosoma *Cheiroseius necorniger* (Oudemans, 1903)
- 14b.** Leg I shorter than idiosoma or equal in length → 15

- 15a.** Sternal shield with two arch-like marks in anteromedian part
→ 16
- 15b.** Sternal shield without pattern *Cheiroseius curtipes* (Halbert, 1923)
- 16a.** Dorsal shield strongly sclerotized (606 µm long); *J* setae reaching the following setae in the series or extending beyond them *Cheiroseius cascadenis* (De Leon, 1964)
- 16b.** Dorsal shield reticulate (710 µm long); *J* setae (except *J*3) not reaching the following setae in the series *Cheiroseius samani* Mehranian, 2014
- 17a.** Ventrianal shield remarkably wider than long → 18
- 17b.** Ventrianal shield length and width equal → 19
- 18a.** Dorsal setae short; *J*4 short, about one-third of distance *J*4-*J*5; idiosoma 620-700 µm long *Cheiroseius longipes* (Willmann, 1949)
- 18b.** Dorsal setae not extremely short; *J*4 longer, about three-quarters of distance *J*4-*J*5; idiosoma 440-570 µm long *Cheiroseius serratus* (Halbert, 1915)
- 19a.** Leg I at most one-half longer than idiosoma; dorsal setae short; *J* setae reaching the following setae in the series except *J*4 *Cheiroseius nepalensis* (Evans & Hyatt, 1960)
- 19b.** Leg I at most one-quarter longer than idiosoma; dorsal setae extremely short; *J* setae not reaching the following setae in the series *Cheiroseius sistaniensis* Faraji, Arjmandi-Nezhad & Karg, 2008
- 20a.** Peritreme normal, extending at least to coxa I; fixed cheliceral digit normal, extending as long as movable digit → 21
- 20b.** Peritreme reduced, not extending beyond coxa II; fixed cheliceral digit short, extending at most half the length of movable digit → 22
- 21a.** Sternal shield distinctly transverse; dorsal setae long, usually reaching well beyond base of next seta in same series; leg IV with long macroseta on basitarsus; movable digit with one tooth *Blattisocius dentriticus* (Berlese, 1918)
- 21b.** Sternal shield quadrate; dorsal setae short, reaching about two-thirds of distance to base of next seta in same series; leg IV without macroseta on basitarsus; movable digit with two teeth *Blattisocius mali* (Oudemans, 1929)
- 22a.** Movable digit of chelicera with three or four teeth → 23
- 22b.** Movable digit of chelicera with one tooth → 24

23a. Movable digit of chelicera with three teeth *Blattisocius tarsalis* (Berlese, 1918)

23b. Movable digit of chelicera with four teeth *Blattisocius cakmaki* Khanjani & Safarian, 2026

24a. Setae $j\delta$ and $J1$ – $J4$ shorter, not reaching the next setal base; ventrianal shield length/width ratio 1.8–2.0; fixed cheliceral digit only slightly shorter than movable digit *Blattisocius damghaniae* Shams et al., 2016

24b. Setae $j\delta$ and $J1$ – $J4$ longer, usually reaching the next setal base; ventrianal shield length/width ratio 1.4; fixed cheliceral digit conspicuously shorter than movable digit *Blattisocius keegani* Fox, 1947

25a. Dorsal shield lacking setae $j1$ and $z1$, leaving $j2$ as anteromedialmost pair; posterior region of dorsal shield with 10 or 11 pairs of setae; peritremes with anterior apices curving posteromedially above level of $j2$; female ventrianal shield with six pairs of opisthogastric setae → 26

25b. Dorsal shield with setae $j1$ and usually $z1$ present; posterior region of dorsal shield with 13–15 pairs of setae; peritremes with anterior apices not curving posteromedially, ending at level beside or short of $z1$; female ventrianal shield with 2–6 pairs of opisthogastric setae → 28

26a. Seta $r2$ absent; seta $J2$ one-half of distance $J2$ – $J4$ *Lasioseius youcefi* Athias-Henriot, 1959

26b. Seta $r2$ present; seta $J2$ one-quarter of distance $J2$ – $J4$ → 27

27a. Seta $s4$ minute; seta $S2$ present; setae $j5$ and $j6$ short *Lasioseius phytoseioides* Chant, 1963

27b. Seta $s4$ not minute; seta $S2$ absent; setae $j5$ and $j6$ long *Lasioseius parberlesei* Bhattacharyya, 1968

28a. Seta $r4$ simple, similar to $r2$, short and not more than half as long as tricarinate seta $s4$ neighboring it medially; most dorsal setae tricarinate and moderately long, nearly as long as longitudinal intervals between their bases; anterior pair of sternal setae on weakly sclerotized presternal area, just anterior to sternal shield; sternal shield with anteromedial patch of reticula; tarsus II with midlateral seta $pl-2$ elongated, reaching nearly to base of pretarsus → 29

28b. Seta $r4$ usually weakly to strongly tricarinate and usually more than half as long as adjacent $s4$ (except in *L. thermophilus*, in which $r4$ is short); dorsal setae variable in form and length; anterior pair of sternal setae on or off well-sclerotized surface of sternal shield; sternal shield variably ornamented; tarsus II with or without one or two attenuated setae → 30

29a. Tarsus III with seta *ad2* slightly (1.1×) longer but not more attenuated than *pd2*; spermatheca conspicuous, with strongly sclerotized, shallowly cup-shaped calyx and long, relatively thick minor duct *Lasioseius floridensis* Berlese, 1916

29b. Tarsus III with seta *ad2* more attenuated and clearly (ca. 1.5×) longer than *pd2*; spermatheca small, weakly sclerotized, bulbous, without discernible minor duct *Lasioseius sugawarai* Ehara, 1964

30a. With one pair of metapodal plates, approximately as long as anus; most dorsal setae needle-shaped → 31

30b. With two pairs of metapodal plates, smaller than anal opening; dorsal setae needle-shaped, tricarinate, or serrated → 33

31a. Ventrianal shield with four pairs of preanal setae; epistome with three short branches, equal in length and distally serrate *Lasioseius qianensis* Gu & Wang, 1990

31b. Ventrianal shield with more than four pairs of preanal setae; epistome with three longer branches → 32

32a. With large, strongly sclerotized presternal plates; anterior dorsal shield with 23 pairs of setae; posterior dorsal shield with 15 pairs of setae; setae near posterior margin of dorsal shield long and spinose; posterior dorsal shield with five pairs of setae in dorsocentral series (*J*) *Lasioseius muricatus* (Koch, 1839)

32b. Without presternal plates; anterior dorsal shield with 16 pairs of setae; posterior dorsal shield with 13 pairs of setae; setae near posterior margin of dorsal shield simple; posterior dorsal shield with only three pairs of setae in dorsocentral series (*J*) *Lasioseius berlesei* Oudemans, 1938

33a. Sternal shield with posterior margin deeply excavated to level of seta pair *st2*; epistome with 3–4 groups of points *Lasioseius ometes* (Oudemans, 1903)

33b. Posterior margin of sternal shield nearly straight → 34

34a. Ventrianal shield with four pairs of preanal setae → 35

34b. Ventrianal shield with five or six pairs of preanal setae → 38

35a. Macroseta present on tibia and/or tarsus of leg IV → 36

35b. Macroseta absent from tibia and tarsus of leg IV → 37

36a. Macrosetae present on tibia and tarsus of leg IV; idiosoma with more than three pairs of marginal setae on soft integument *Lasioseius dentatus* (Fox, 1946)

36b. Macroseta present only on tarsus of leg IV; idiosoma with only three pairs of marginal setae (*r4*, *R1*, *R6*) on soft integument *Lasioseius frankbakkeri* Faraji & Karg, 2005

37a. Epistome four-tined, with two smooth median points; anterior margin of sternal shield with median incision; dorsal setae short, with no seta of posterior half of dorsum reaching the next seta of the series *Lasioseius inconspicuus* Westerboer, 1963

37b. Epistome three-tined, with one smooth median point; anterior margin of sternal shield without median incision; dorsal setae relatively long, most setae of posterior half of dorsum reaching the next seta of the series *Lasioseius thermophilus* Willmann, 1942

38a. Ventrianal shield with five pairs of preanal setae; epistome three-tined, middle tine twice as long as lateral tips *Lasioseius lacunosus* Westerboer, 1963

38b. Ventrianal shield with six pairs of preanal setae; epistome of other forms → 39

39a. Most dorsal shield setae serrated → 40

39b. Most dorsal shield setae simple, with some posterior setae serrated → 41

40a. Dorsal seta *j4* as long as dorsal setae *j1* and *j3*; sternal shield without median longitudinal net-like pattern *Lasioseius penicilliger* Berlese, 1916

40b. Dorsal seta *j4* remarkably shorter than other setae in *j* series; sternal shield with median longitudinal net-like pattern *Lasioseius ometisimilis* Hirschmann, 1962

41a. Ventrianal shield broadly oval; peritreme short, extending only to middle of coxa III *Lasioseius formosus* Westerboer, 1963

41b. Ventrianal shield pentagonal; peritreme long, extending to level of seta *j1* → 42

42a. Peritreme with poststigmatic projection; sternal shield dotted; membrane surrounding ventrianal shield with two pairs of setae; two pairs of small plates between genital and ventrianal shields *Lasioseius confusus* Evans, 1958

42b. Peritreme without poststigmatic projection; sternal shield reticulated; membrane surrounding ventrianal shield with four pairs of setae; without small plates between genital and ventrianal shields *Lasioseius krantzi* Chant, 1963

5. Discussion

Blattisociid species have shown diverse habitats, including soil, litter, plants, humus, stored food, flowers, fungi and insect and bird nests. Mites of the family Blattisociidae in general are predators and fungivores, with some parasitic species (Lindquist *et al.* 2009; Lindquist & Moraza 2010; Seeman, 2012). Some species of genus *Blattisocius*, for example *B. dentriticus*, *B. keegani*, *B. mali* (Oudemans) and *B. tarsalis*, several species of genus *Lasioseius* including *L. africanus* Nasr, *L. berlesei* (Oudemans), *L. athiasae* Nawar & Nasr, *L. bisioseius* Evans, *L. chaudhrii* (Wu & Wang), *L. dentatus* Fox, *L. floridensis* Berlese, *L. japonicus* Ehara, *L. Parberlesei*, *L. safroi* (Ewing), *L. scapulatus*, *L. subterraneus* Chant, *L. youcefi*, *L. zaheri* Nasr etc. and some species from *Cheiroseius* and *Platyseius* genera have been mentioned to have potential as biological control agents (Enkegaard and Brødsgaard, 2000; Gerson *et al.*, 2003; Moraes *et al.*, 2015; Silva *et al.*, 2016; Da Silva *et al.*, 2018; Gallego *et al.*, 2020; Manwaring *et al.*, 2020; Gavara *et al.*, 2022; Michalska *et al.*, 2023). Forty-three blattisociid species belonging to five genera (six in *Blattisocius*, 14 in *Cheiroseius*, one in *Hoploseius*, 19 in *Lasioseius* and three in *Platyseius*) have been found in Iran. Seven of these (*Blattisocius damghaniae*, *B. cakmaki*, *Cheiroseius manouchehrii*, *C. samani*, *C. sistaniensis*, *Hoploseius bispinosetus*, and *Platyseius persicus*) were originally described from this country. Among recorded species, *Lasioseius youcefi*, *L. sugawarai*, *Cheiroseius necorniger*, *Blattisocius keegani*, and *B. tarsalis* have a wider distribution range. Among the habitats, soil, plant litter, manure, and stored products contain the most species. The fact that only five genera are represented is not surprising, considering that most genera of blattisociid are composed of few species (except for *Blattisocius* with 21, *Cheiroseius* with 131, *Hoploseius* with 12, *Lasioseius* with 210, and *Platyseius* with 22 species), and most of them have a limited worldwide distribution. Considering the climatic diversity of Iran, it is expected that the number of the blattisociid mite species will increase by intensifying sampling and using appropriate sampling methods in the future.

5. Conclusions

In this study, a complete and updated checklist of mites of the Blattisociidae family in Iran has been prepared. A list of mites of the Blattisociidae family in Guilan Province has been provided along with diagnostic characteristics, distribution, and habitat of the species in the province. A complete and updated taxonomic key has been provided for the identification of mites of the family Blattisociidae in Iran. As a result, this study will facilitate the identification of blattisociid mites of Iran and pave the way for taxonomic and biological studies on the valuable and useful species of this family. Further studies could be useful in both identifying more species and using beneficial mites of the family Blattisociidae for biological control of pests in Iran.

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