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Article

Review of the genus *Lasioseius* Berlese (Acari: Blattisociidae) in Iran, and a key for identification of the Iranian species of the genus

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ABSTRACT
The mites of the genus *Lasioseius* Berlese in Iran are reviewed. New collection data on seven species of the genus are given for Guilan province in Northern Iran. Based on our observations of newly collected specimens, we confirm the synonymy of *L. extremus* (Daneshvar, 1987) with *Lasioseius parberlesei* Bhattacharyya as previously proposed by Moraes *et al.* (2015). In addition, we provide the first description of the male of *L. parberlesei* in Iran. Moreover, this paper provides a checklist for *Lasioseius* species recorded from Iran, with a key for identification of the species.

KEYWORDS: Gamasida, *Lasioseius parberlesei*, Phytoseioidea, predatory mites, taxonomy.

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INTRODUCTION

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). *Lasioseius* Berlese, 1916 is the most diverse and abundant genus in the family Blattisociidae. The genus contains about 210 species that have been reported feeding on phytophagous mites, small insects, springtails and nematodes while some others have also been observed to feed on fungi (Christian and Karg 2006; Moraes *et al*. 2015b, 2016; Abo-Shnaf *et al*. 2016; Moraza and Lindquist 2018; Argolo *et al*. 2018; Mašán 2023; Mašán and Halliday 2023; Santos *et al*. 2023). Some species have been evaluated as potential biological control agents (Moraes *et al*. 2015b). A complete and detailed study for identification of mites of genus *Lasioseius* has not been done in Iran. Scattered faunal surveys in Iran have led to the collection and identification of some species of genus *Lasioseius*. Until now, 19 species from genus *Lasioseius* have been reported in Iran (Kamali *et al*. 2001; Kazemi and Rajaei 2013; Nemati *et al*. 2018; Mohammadi and Hajizadeh 2022). In this article, an alphabetical checklist for 19 species of genus *Lasioseius* recorded from Iran, and a key for identification of the species are provided. Based on the measurements and comparisons, synonymy of the *L. extremus* (Daneshvar, 1987) with *L. parberlesei* Bhattacharyya, 1968 is confirmed.

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MATERIAL AND METHODS

In this study mites were collected from plant foliage, soil, stored products, manure, moss, rotten wood, wild fungi, and litter samples in Guilan province, Northern Iran. Each soil or litter sample contained about two kg that was taken from a depth of 15 cm. Mites were extracted from samples by direct examinations of plant materials under a stereomicroscope or using Berlese funnels. Specimens were sorted and preserved in 70% ethanol, cleared in Nesbitt's fluid and mounted permanently on microscope slides using Hoyer's medium. All measurements are given in micrometres (µm). 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 length of legs was taken from the base of the coxa to the apex of the tarsus, without the pretarsus. Setae were measured from the base of their insertions to their tips. The mean of the measurements is given followed by the range in parentheses. Notations of body structures and idiosomal chaetotaxy follow Lindquist and Evans (1965). Leg setal notation and chaetotactic formulae are based on Evans (1963). Terminology for the other anatomical structures follows Evans and Till (1979).

The *Lasioseius* mites were identified by the relevant taxonomic keys and papers (Christian and Karg 2006; Hajizadeh *et al*. 2009; Moraza and Lindquist 2011, 2018; Moraes *et al*. 2016; Argolo *et al*. 2018; Mašán and Halliday 2023). We also made a search of the literature on the genus *Lasioseius* of Iran published to date, using electronic and printed data sources. In planning the key to the species of the genus *Lasioseius* in Iran, the important characteristics of the species and the pattern of the important keys for this genus have been used (Britto *et al*. 2011; Moraes *et al*. 2015; Moraza and Lindquist 2018; Argolo *et al*. 2018). For precise inspection of morphological characters of prepared specimens, a compound Olympus microscope (Olympus Optical Co., Ltd, Tokyo, Japan) equipped with differential interference contrast and phase contrast optical system, Canon camera (EOS Kiss X5; Japan) and a drawing tube were used. The voucher specimens of each species were preserved as slide-mounted specimens in the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences at University of Guilan, Rasht, Iran.

RESULTS AND DISCUSSION

Checklist of the Iranian *Lasioseius* species

Genus *Lasioseius* Berlese, 1916

Lasiosieus Berlese, 1916: 33; Lindquist and Evans 1965: 40; Christian and Karg 2006: 105; Lindquist and Moraza 2010: 4; Moraes *et al*. 2016: 159.

Lasioseius berlesei (Oudemans, 1938)

Typhlodromus berlesei Oudemans, 1938: 2.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 162).

Habitat and distribution in Iran – Zanjan Province (Zanjan County), soil, rotten wood, fungi, litter, and dung (Zare *et al.* 2012; Nemati *et al*. 2018).

World Distribution – Algeria, Austria, Bulgaria, England, Europe, Germany, Hungary, Iran, Iraq, Italy, Latvia, Moldova, Poland, Russia, Slovakia, Switzerland, Turkey, Ukraine and USA (Santos *et al*. 2023).

Lasioseius confusus Evans, 1958

Lasioseius confusus Evans, 1958: 221.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 164).

Habitat and distribution in Iran – East Azarbaijan Province (forests of Arasbaran Region), soil, leaf-litter and plant debris (Ordoukhanian *et al.* 2017; Nemati *et al*. 2018).

World Distribution – Bulgaria, China, England, Hungary, Moldova, Poland, Russia, Slovakia and USA (Santos *et al*. 2023).

***Lasioseius dentatus* (Fox, 1946)**

Borinquolaelaps dentatus Fox, 1946: 451.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 165).

Material examined – Two females, Lowshan, 36° 37' 46" N, 49° 30' 50" E, 360 m a.s.l., July 2015 collected from soil of olive garden.; two females, Rasht, Khomam, 37° 22' 55" N, 49° 39' 35" E, −16 m a.s.l., May 2019, collected from weeds; one female, Rasht, Kuchesfahan, 37° 16' 42" N, 49° 46' 21" E, 0 m a.s.l., May 2019, collected from weeds.

Habitat and distribution in Iran – Kerman Province (Kerman City, parks, and landscapes), soil (Arjomandi and Kazemi 2014; Nemati *et al*. 2018); Guilan Province (Rasht, Lowshan), wood sorrel, Oxalis *acetosella* L. (Oxalidaceae) leaves infested with spider mites, litter, soil of olive garden (Javadpour *et al*. 2018; Ghasemi and Hajizadeh 2020).

Note – This species was reported by mentioned authors as *Lasioseius scapulatus* Kennett, 1958, but Lindquist (1964) considered it as junior synonym of *L. dentatus* (Moraes *et al*. 2015a; Nemati *et al*. 2018).

World Distribution – China, Egypt, Israel, Japan, Mexico, Puerto Rico, Saudi Arabia, Uganda and USA (Santos *et al*. 2023).

***Lasioseius floridensis* Berlese, 1916**

Lasioseius (*Zercoseius*) *penicilliger* var. *floridensis* Berlese, 1916: 44.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 168).

Material examined – Two females, Rasht, University of Guilan, 37° 17' 0" N, 49° 35' 0" E, −17 m a.s.l., March 2016, collected from rotten wood; one female, Rasht 37° 17' 0" N, 49° 35' 0" E, −17 m a.s.l., July 2016 collected from soil; one female, Ziabar 37° 25' 36" N, 49° 14' 48", 18 m a.s.l., April 2017, collected from sawdust; one female, Lahijan, 37° 12' 0" N, 50° 0' 0" E, 2 m, November 2017, collected from soil of geranium herb (*Pelargonium* sp.).

Habitat and distribution in Iran – Guilan Province (Rasht, Ziabar, Lahijan), rotten wood, soil of fruit tree, Sawdust,soil (Javadpour *et al*. 2018).

World Distribution – Brazil, Germany, Poland and USA (Santos *et al*. 2023).

***Lasioseius formosus* Westerboer, 1963**

Lasioseius (*Lasioseius*) *formosus* Westerboer, 1963: 269.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 169).

Material examined – Two females, Saravan forest, 37° 04' 22.1" N, 49° 37' 32.7" E, 72 m a.s.l., May 2021, collected from soil.

Habitat and distribution in Iran – Guilan Province (Rasht, Saravan forest), soil (Mohammadi and Hajizadeh 2022).

World Distribution – Germany, Poland (Gwiazdowicz 2007; Santos *et al*. 2023).

Lasioseius frankbakkeri Faraji & Karg, 2005

Lasioseius frankbakkeri Faraji & Karg, 2005: 113.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 169).

Material examined – Three females, Roudsar, Kelachay, 37° 04' 44" N, 50° 23' 43" E, −20 m a.s.l., August 2011, collected from leaves and soil of citrus trees; 15 females, Chaboksar, 36° 58' 0" N, 50° 35' 0" E, 216 m a.s.l., July 2011, collected from weeds; one female, Langarud, 30° 10' 50" N, 11° 37' 0" E, 21m a.s.l., collected from soil of citrus trees. Rasht, Khomam, 37° 22' 55" N, 49° 39' 35" E, −16 m a.s.l., August 2012, Rezvanshahr, Gisum forest, 37° 42' 46" N, 49° 00' 32" E, −15m a.s.l., July 2012, Siahkal, Lounak, 37° 01' 51" N, 49° 53' 31" E, 334 m a.s.l., September 2012, Langarud, Otaqvar, 37 °06' 34" N, 50° 06' 51" E, 51 m a.s.l., October 2012, collected from infected leaves with eriophyid mites; two females, Manjil, 36° 44' 0" N, 49° 25' 0" E, 396 m a.s.l., July 2013, collected on weeds; one female, Ziabar, Bahambar village 37° 25' 36" N, 49° 14' 48" E, 18 m a.s.l., collected from apple leaves, June 2016; 1 female, Rasht, 37° 17' 0" N, 49° 35' 0" E, −7 m a.s.l., collected from rotten fruits, August 2015; four females, Kuchesfahan 37° 28' 11" N, 49° 77' 32" E, 0 m, collected from mint leaves and one female from apple leaves, December 2015; six females, Khomam, 37° 24' 8" N, 49° 35' 37" E, −22 m a.s.l., collected from mint leaves, May 2017; one male, Rasht 37° 17' 0" N, 49° 35' 0" E, −7 m, collected from mushroom soil, May 2017.

Habitat and distribution in Iran – Guilan Province (Sangar, Shaft, Rostamabad, Roodbar, Langarud, Roudsar, Chaboksar, Kelachay), soil, plants, on the olive leaves, mulberry, raspberry, soil of citrus garden, associated with eriophyid mites (Hajizadeh *et al*. 2010a, b; Nazari-Tajani 2012; Adeli *et al.* 2013; Tajmiri and Hajizadeh 2013; Kazemi and Rajaei 2013; Mahjoori *et al.* 2015; Javadpour *et al*. 2018; Nemati *et al*. 2018).

World Distribution – France and Iran (Santos *et al*. 2023).

Lasioseius inconspicuus Westerboer, 1963

Lasioseius (*Lasioseius*) *inconspicuus* Westerboer, 1963: 249.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 171).

Habitat and distribution in Iran – Golestan Province (Gorgan), soil (Malek-Shahkouyi *et al*. 2011; Kazemi and Rajaei 2013).

World Distribution – Germany, Poland, Slovakia and Russia (Mašán 2001; Santos *et al*. 2023).

Lasioseius krantzi Chant, 1963

Lasioseius krantzi Chant, 1963: 281.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 172).

Habitat and distribution in Iran – Khuzestan Province, honey bee hives (Ostovan and Mosaddegh 1999; Kamali *et al.* 2001); Kordestan Province, strawberry (Mansour ghazi *et al.* 2006; Kazemi and Rajaei 2013).

World Distribution – Mexico and USA (Santos *et al.* 2023).

Lasioseius lacunosus Westerboer, 1963

Lasioseius (*Lasioseius*) *lacunosus* Westerboer, 1963: 238.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 173).

Habitat and distribution in Iran – Mazandaran Province (Amol), soil (Sakenin Chelav *et al*., 2006a, 2006b; Kazemi and Rajaei 2013).

World Distribution – Germany and Turkey (Santos *et al*. 2023).

***Lasioseius muricatus* (Koch, 1839)**

Sejus muricatus Koch, 1839: 11.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 176).

Habitat and distribution in Iran – Golestan Province (Gorgan), soil (Malek-Shahkouyi *et al*. 2011; Kazemi and Rajaei 2013).

World Distribution – Austria, Germany, Hungary, Italy, Latvia, Norway, Poland, Slovakia and Switzerland (Fenďa and Mašán 2003; Santos *et al*. 2023).

***Lasioseius ometes* (Oudemans, 1903)**

Hypoaspis ometes Oudemans, 1903: 100.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 178).

Habitat and distribution in Iran – Mazandaran Provinces (Amol), soil (Sakenin Chelav *et al*. 2006a, b; Kazemi and Rajaei 2013).

World Distribution – Australia, Bulgaria, Canada, China, England, Finland, Germany, Hungary, Iran, Kazakhstan, Latvia, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, Southern Ireland, Turkey and USA (Santos *et al*., 2023).

***Lasioseius ometisimilis* Hirschmann, 1962**

Lasioseius ometisimilis Hirschmann, 1962: 30.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 178).

Habitat and distribution in Iran – Fars Province (Marvdasht, Kamfiruz), soil and decayed plants under the oak trees (Beyzavi and Ostovan 2012; Kazemi and Rajaei 2013).

World Distribution – Germany, Iran, Japan, Latvia and Poland (Santos *et al*. 2023).

***Lasioseius parberlesei* Bhattacharyya, 1968 (Figs. 1–10)**

Lasioseius parberlesei Bhattacharyya, 1968: 532.
Indiraseius parberlesei Daneshvar, 1987: 33. Synonymy by Moraes *et al*. (2015a).
Lasioseius parberlesei Bhattacharyya *et al*. 2000: 93; Zhang and Fan 2010: 283; Moraes *et al*. 2016: 180.
Lasioseius (*Lasioseius*) *parberlesei* Christian and Karg 2006: 120.

Description

Female (five specimens measured) – Measurements are given in Table 1.

Dorsal idiosoma (Fig. 1) – Dorsal shield oval, podonotal part scattered reticulate, with 12 pairs of setae (*j2– j6*, *z2*, *z4*, *z5*, *s4*, *s5*, *r2*, *r3*), three pairs of lyrifissures (*id1*, *id4*, *id5*) and three pairs of pores (*gd2*, *gd4*, *gd5*). Opisthonotal part reticulate, with 10 pairs of setae (J2, J4, J5, Z1, Z3-Z5, S3-S5), five pairs of lyrifissures (*idm4*, *idm5*, *idm6*, *idl3*, *idl4*) and three pairs of pores (*gd6*, *gd8*, *gd9*).

Setae *j4*, *j5*, *j6*, *J2*, *J4*, *J5*, *z5* and *r2* short; other setae longer (reaching base of next setae); most dorsal shield setae lightly serrate. Unsclerotized lateral cuticle with four pairs of short and smooth setae (*r5*, *R1*, *R2* and *R5*).

Venter idiosoma (Fig. 2) – Ventral setae aciculate and smooth, except *JV5*, that is thicker and serrate distally. Tritosternum 86 (74–92) long, base 12 long, laciniae 73 (62–80) long. Presternal region transversely striate. Sternal shield longer than wide, with faint reticulations, bearing three pairs of setae (*st1–st3*) and two pairs of lyrifissures (*iv1*, *iv2*). Metasternal plate rounded, bearing the fourth pair of sternal setae (*st4*) and a pair of lyrifissures (*iv3*). Genital shield with sparse striae; widest at the base, posterior margin truncate, with a pair of simple setae (*st5*); postgenital stripe continues. Two pairs of metapodal plates present, the anterior pair smaller and elongate, posterior pair longer and oval. Posterior section of endopodal shield located as a trifid plate between coxae III–IV. Ventrianal shield subtriangular, reticulated, with six pairs of setae (*JV1–JV4*, *ZV2*, *ZV3*) and three circumanal setae and a pair of pores, located posterolateral of para-anal setae. Soft cuticle around ventrianal shield with setae *JV5* and 3–4 pairs of lyrifissures (*ivo*). Peritreme elongated, anterior end extending to the level between setae *j2*; peritrematic plate fused with dorsal shield at level of setae *j2*.

Table 1. Measurements of idiosma and dorsal setae of *Lasioseius parberlesei* females from five countries.

Character[1]	Iran[2]	Iran[3]	Egypt[4]	India[4]	Pakistan[4]	Saudi Arabia[4]
DSL	376	410 (384–432)	420 (384–438)	400 (375–400)	403	391
DSW	217	239 (230–250)	223 (212–233)	233 (220–228)	223	205
j2	37	32 (30–36)	38 (36–39)	33 (30–35)	34	35
j3	-	34 (30–38)	39 (39–40)	35 (33–38)	39	38
j4	18	20 (18–22)	22 (22–23)	19 (18–20)	17	18
j5	18	21 (18–26)	22 (21–24)	20 (18–20)	22	22
j6	27	27 (24–30)	28 (27–29)	23 (20–25)	24	27
J2	17	18 (16–20)	22 (19–25)	16 (15–18)	16	18
J4	18	16 (14–18)	20 (19–21)	16 (15–18)	-	17
J5	11	14 (12–16)	17 (15–18)	12 (10–13)	14	14
z2	-	36 (34–38)	40 (38–41)	35 (33–38)	37	38
z4	-	34(30–36)	38 (36–40)	33 (30–35)	35	36
z5	29	28 (24–30)	31 (29–32)	28 (28–30)	29	29
Z1	47	48 (46–50)	48 (46–50)	45 (43–48)	45	48
Z3	59	55 (50–60)	57 (55–59)	52 (50–55)	56	57
Z4	59	55 (50–60)	58 (56–60)	53 (53–55)	56	59
Z5	68	70 (64–76)	72 (70–73)	66 (63–70)	71	73
s4	40	40 (36–48)	42 (40–45)	37 (35–38)	41	43
s5	47	44 (42–46)	48 (47–50)	47 (45–48)	47	51
S3	38	41 (36–48)	46 (43–51)	40 (38–43)	42	40
S4	46	44 (40–48)	48 (45–52)	41 (40–43)	44	44
S5	51	50 (44–56)	56 (54–58)	50 (48–53)	55	52
r2	18	18 (14–18)	23 (22–24)	20 (18–23)	19	19
r3	48	47 (40–50)	49 (47–50)	47 (45–48)	47	47
r5	18	16 (14–20)	19	17 (15–18)	15	17
R1	18	18 (14–22)	20 (20–21)	19 (18–20)	17	17

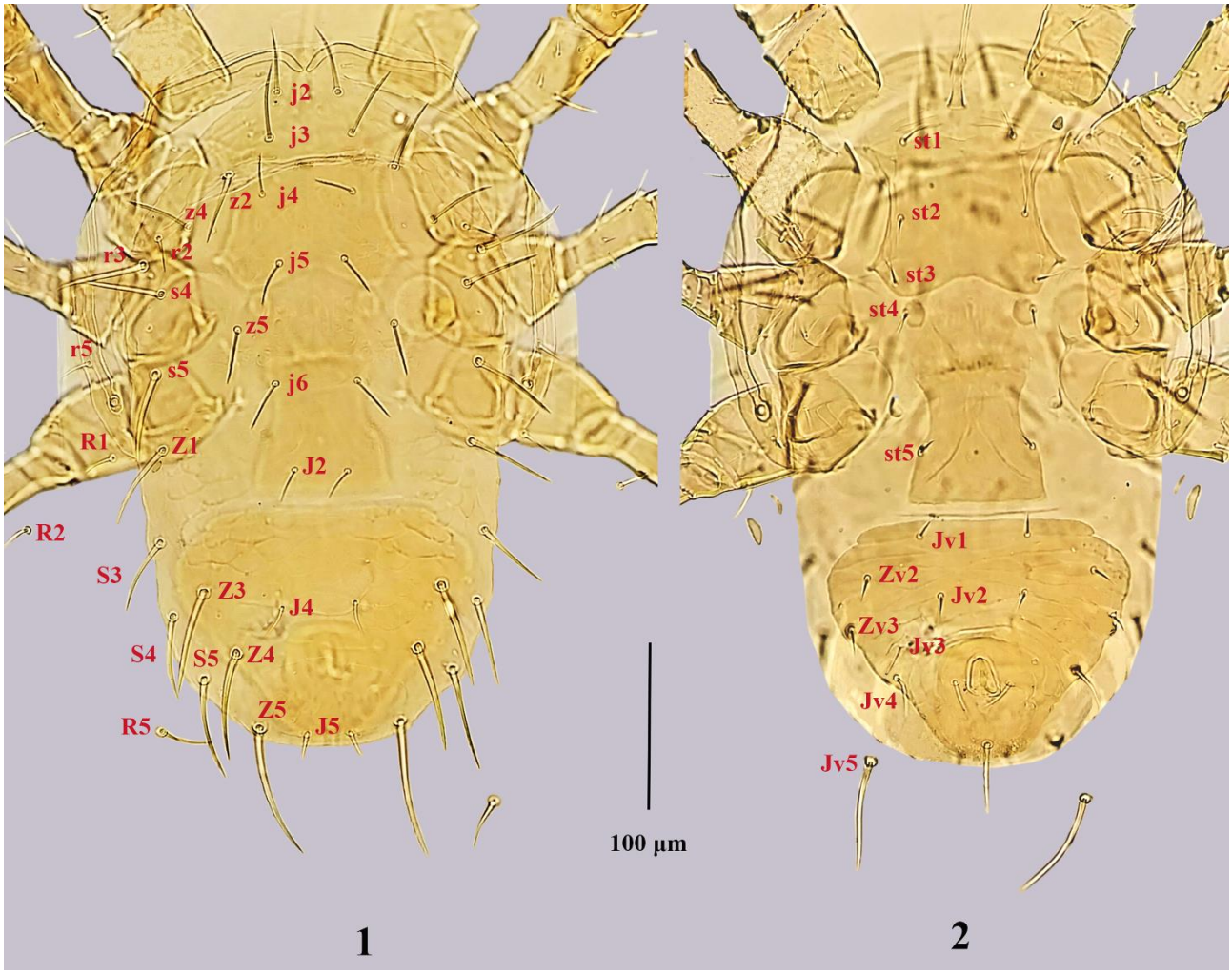
[1] L: length, W: width; [2] Daneshvar 1987; [3] current study; [4] Moraes *et al*. 2015[a].

Table 1. Continued.

Character[1]	Iran[2]	Iran[3]	Egypt[4]	India[4]	Pakistan[4]	Saudi Arabia[4]
R2	18	19 (18–20)	22	19 (18–20)	21	20
R5	-	26 (22–28)	30 (30–31)	26 (25–28)	31	26
VASL	142	138 (120–144)	145 (136–152)	143 (138–148)	145	130
VASW	168	169 (152–182)	170 (162–181)	175 (175–178)	175	168
L base tritosterum	-	12 (12–12)	14 (13–15)	10	16	15
L laciniae	-	73 (62–80)	63 (62–65)	62 (58–65)	66	74
SS L	-	81 (75–87)	91 (90–92)	84 (80–88)	95	93
SS W	-	82 (80–85)	85 (82–89)	85 (83–85)	83	86
GS L	-	91 (87–100)	135 (128–139	125 (125–133)	138	123
GS W at post.	-	78 (75–82)	78 (78–79)	78 (75–80)	83	86
Anus length	-	19 (17–22)	23 (22–24)	23 (25–27)	23	23
St1	-	21 (20–24)	27 (25–29)	19 (18–20)	23	24
St2	-	19 (14–20)	26	19 (18–20)	24	23
St3	-	18 (12–22)	24	23 (20–23)	22	24
St4	-	19 (18–20)	25 (24–25)	23 (20–23)	25	24
St5	-	16 (14–20)	23 (22–23)	19 (18–23)	22	22
JV1	-	16 (14–18)	19 (18–20)	20 (18–20)	Broken	21
JV2	-	17 (12–20)	20	20 (18–20)	Broken	21
JV3	-	25 (22–30)	28 (26–29)	28 (25–28)	29	29
JV4	-	27 (22–30)	31 (26–35)	35 (28–35)	29	28
JV5	-	54 (50–60)	61 (59–62)	57 (55–58)	59	52
ZV2	-	18 (14–20)	22 (20–23)	19 (18–20)	Broken	21
ZV3	-	18 (14–24)	20 (18–21)	19 (18–20)	18	18
Para–anal setae	-	19 (17–25)	23	20 (18–23)	21	22
Post–anal seta	-	36 (32–47)	31 (27–35)	31 (28–33)	36	33
Calyx	20	18	19 (18–20)	15 (16–18)	20	17
L FD	-	34 (30–40)	32 (30–33)	28 (30–32)	30	33
L MD	-	37 (32–40)	36 (36–37)	38 (36–38)	37	37
MET1 L	-	20 (20–22)	-	-	-	-
MET1 W	-	6	-	-	-	-
MET2 L	-	16 (14–16)	-	-	-	-
MET2 W	-	4	-	-	-	-
Sc	-	31 (30–32)	34 (32–36)	32 (32–34)	32	32
h1	-	26 (25–28)	32 (31–32)	23 (30–32)	31	31
h2	-	23 (20–25)	22 (21–22)	19 (18–20)	17	18
h3	-	23 (20–25)	23	24 (25–28)	27	25
leg I	-	410 (400–430)	457 (443–478)	453 (450–465)	465	428
leg II	-	312 (300–330)	385 (365–400)	335 (330–340)	385	368
leg III	-	310 (300–330)	373 (365–378)	310 (340–350)	373	343
leg VI	-	434 (400–480)	532 (521–543)	465 (490–520)	508	483
Genu IV *ad2*	47	49 (45–50)	46 (45–48)	48 (50–52)	43	44
Basitarsus IV *pd3*	62	55 (50–58)	59 (58–60)	53 (50–55)	52	56
Telotarsus IV *pd2*	73	75 (70–85)	82 (77–85)	78 (75–80)	81	82

[1] L: length, W: width; [2] Daneshvar 1987; [3] current study; [4] Moraes *et al*. 2015[a]. Shields: DS: dorsal, GS: genital, SS: sternal, SGS: sternogenital, VAS: ventrianal; MET: metapodal; FD: fixed cheliceral digit; MD: movable cheliceral digit.

Spermatheca (Fig. 9) – Calyx funnel-shaped, with swollen atrium.



Figures 1–2. *Lasioseius parberlesei* (female) – 1. Idiosoma, dorsal view; 2. Idiosoma, ventral view.

Table 2. Measurements of characters of *Lasioseius parberlesei* males from three countries.

Character[1]	Iran[2]	Egypt[3]	India[3]	Character[1]	Iran[2]	Egypt[3]	India[3]
DSL	280	344	290, 300	**L base tritosternum**	6	15	8
DSW	232	186	150	**L laciniae**	50	43	60, 65
j2	24	25	25, 28	**Anus length**	15	18	18
j3	30	31	28, 30	***st1***	15	18	15, 20
j4	14	20	14, 16	***st2***	13	16	15, 19
j5	20	20	15, 18	***st3***	13	14	15, 19
j6	20	21	18, 20	***st4***	13	Broken	13, 14
J2	12	15	11, 13	***st5***	13	Broken	13, 15
J4	12	18	10, 13	***JV1***	13	Broken	12, 13
J5	10	11	8, 9	***JV2***	14	Broken	20, 21
z2	30	32	30, 32	***JV3***	20	Broken	25, 30
z4	26	29	25, 29	***JV5***	26	Broken	28, 31
z5	18	23	22, 23	***ZV3***	14	Broken	-
Z1	30	35	34, 38	**Para-anal setae**	15	Broken	13, 16
Z3	46	45	43, 45	**Post-anal seta**	17	Broken	18, 23

[1] L: length, W: width; [2] current study; [3] Moraes *et al*. 2015[a]. Shields: DS: dorsal, GS: genital, SS: sternal, SGS: sternogenital, VAS: ventrianal; MET: metapodal; FD: fixed cheliceral digit; MD: movable cheliceral digit.

Table 2. Continued.

Character[1]	Iran[2]	Egypt[3]	India[3]	Character[1]	Iran[2]	Egypt[3]	India[3]
Z4	42	46	44, 45	**L FD**	25	25	24
Z5	52	55	52, 54	**L MD**	27	30	30
s4	32	32	24, 30	**Spermatodactyl**	25	29	30
s5	36	37	36, 38	***h1***	11	17	20
S3	22	27	22, 23	***h2***	10	17	18
S4	26	28	23, 25	***h3***	10	17	21
S5	32	31	30, 31	***Sc***	20	17	27
r2	12	20	12, 13	**leg I**	330	395	365
r3	40	41	35, 39	**leg II**	230	323	260
r5	10	15	10, 11	**leg III**	250	298	260
R1	10	15	10, 11	**leg VI**	350	440	368
SGS L	125	144	148, 165	**Genu IV *ad2***	38		
SGS W at *st2*	62	71	62-68	**Basitarsus IV *pd3***	48		
VASL	110	127	110, 115	**Telotarsus IV**	63		
VASW	170	171	160, 175				

[1] L: length, W: width; [2] current study; [3] Moraes *et al*. 2015[a]. Shields: DS: dorsal, GS: genital, SS: sternal, SGS: sternogenital, VAS: ventrianal; MET: metapodal; FD: fixed cheliceral digit; MD: movable cheliceral digit.

Gnathosoma (Figs. 6, 8) – Fixed digit of chelicera multidentate, bearing 14 teeth in addition to apical tooth; movable digit of chelicera with three teeth in addition to the apical tooth. Epistome obscure. Deutosternum with seven transverse lines of denticles.

Legs (Fig. 10) – All legs pretarsi with a pair of claws and pulvillus. Leg IV with three macrosetae: on genu (*ad2*), basitarsus (*pd3*) and telotarsus (*pd2*). Leg chaetotaxy for coxa I-IV: 2; 2; 2; 1; for trochanter I-IV: 6; 5; 5; 5; for femur I-IV: 12 (2, 3/1, 2/2, 2); 11 (2, 2/1, 3/2, 1); 6 (1, 2/1, 1/0, 1); 6 (1, 2/1, 1/0, 1); for genu I-IV: 13 (2, 3/2, 3/1, 2); 11 (2, 3/1, 2/1, 2; 9 (2, 2/1, 2/1, 1); 9 (2, 2/1, 3/0, 1) and for tibia I-IV: 13 (2, 3/2, 3/1, 2); 10 (2, 2/1, 2/1, 2); 8 (2, 1/1, 2/1, 1); 10 (2, 1/1, 3/1, 2).

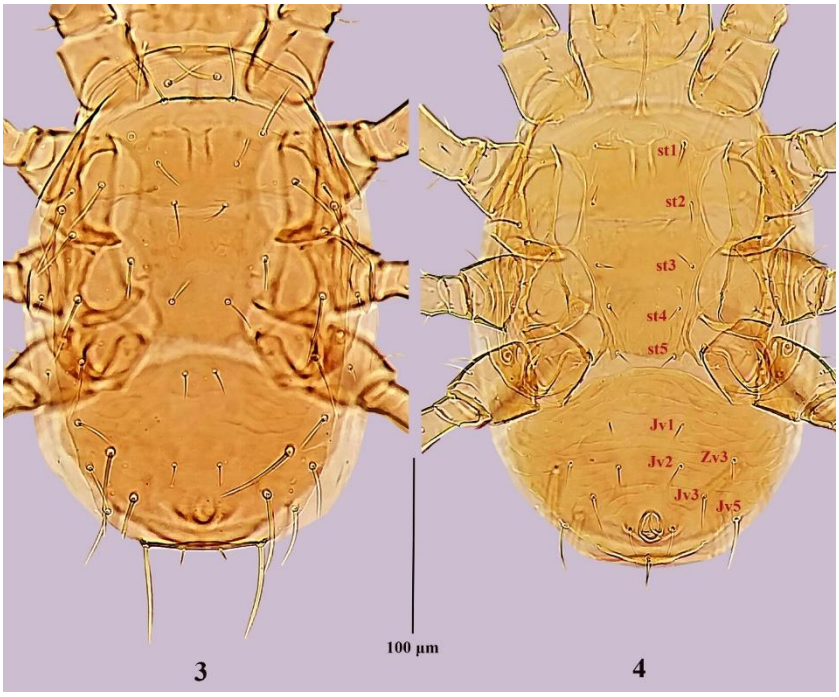
Male (one specimen measured) – Measurements are given in Table 2.

Dorsal idiosoma (Fig. 3) – Dorsal shield oval, podonotal and opisthonotal shields similar to those of females; setal measurements are given in Table 2. Unsclerotized lateral cuticle with two pairs of setae (*r5* and *R1*), both short and smooth.

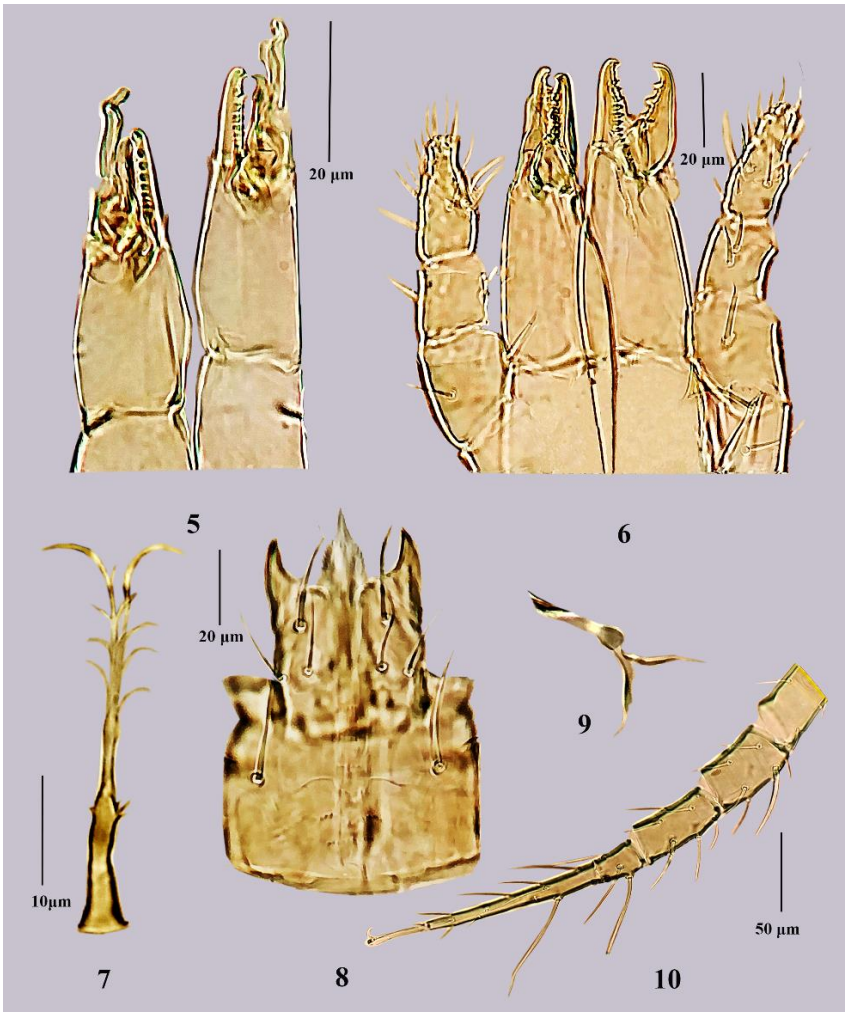
Venter idiosoma (Fig. 4) – Ventral setae aciculate and smooth, except *JV5*, that is thicker and serrate distally. Tritosternum 56 long, base 6 long, laciniae 50 long. Presternal region transversely striate. Sternogenital shield slightly striated on the lateral sides, with five pairs of setae (*st1–st5*) and three pairs of lyrifissures (*iv1- iv3*). Ventrianal shield subtriangular, reticulate, with five pairs of setae (*JV1–JV3*, *JV5* and *ZV3*) in addition to the circum-anal setae and a pair of marginal pores located posterolateral of para-anal setae. Soft cuticle around ventrianal shield without opisthogastric setae. Peritreme elongated, anterior end extending to the level between setae *j2*; peritrematic plate fused with dorsal shield at level of setae *r2*.

Gnathosoma (Fig. 5) – Fixed digit of chelicera bearing eight to nine teeth and setiform pilus dentilis in addition to apical tooth; movable digit of chelicera with one tooth in addition to the apical tooth; spermatodactyl long, cylindrical, with a hook-like bend tip in distal section. Epistome obscure. Deutosternum with six transverse lines of denticles.

Legs – Legs similar to female. Leg IV with three macrosetae: on genu (*ad2*), on basitarsus (*pd3*) and telotarsus (*pd2*). Leg chaetotaxy as in adult female.



Figures 3–4. *Lasioseius parberlesei* (male) – 3. Idiosoma, dorsal view; 4. Idiosoma, ventral view.



Figures 5–10. *Lasioseius parberlesei* – 5. Male, Chelicera. 6–10. Female. 6. Chelicera; 7. Tritosternum; 8. Hypostome; 9. Spermatheca (without scale); 10. Femur-tarsus of leg IV.

Material examined – Two females, Rasht, Fakhrabad, 37° 24' 20" N, 49° 52' 47" E, −22 m a.s.l., September 2012, collected from infected leaves with eriophyid mites; two females, Masuleh, 37° 9' 37" N, 48° 59' 32" E, 1050 m a.s.l., August 2015, collected from rice farm; one female, Daylaman 36° 88' 83" N, 49° 90' 64" E, 2200 m a.s.l., June 2015, collected from soil; four females, Rasht, Sangar, 37° 10' 59" N, 49° 38' 42" E, 34 m a.s.l., July 2019, collected from plant in the greenhouse; 10 females, Rasht, 37° 16' 51" N, 49° 34' 59" E, 4 m a.s.l., September 2019, collected from light traps; one female, Bandar Anzali, 37° 28'22" N, 49° 27' 44" E, −26 m, October 2020, collected on Citrus tree.

Habitat and distribution in Iran – Guilan Province (Lahijan, Rasht, Masuleh, Sangar, Daylaman), mulberry, tea, rice farm, fig, raspberry, decaying plants, soil, plants and associated with eriophyid mite, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) and rose, *Rosa damascena* (Rosaceae) leaves infested with spider mites (Daneshvar 1987; Kamali *et al*. 2001; Hajizadeh *et al*. 2010a, b, 2020; Adeli *et al.* 2013; Javadpour *et al*. 2018; Ghasemi and Hajizadeh 2020; Navran and Hajizadeh 2021); Mazandaran Province (Behshahr), on fig tree (Daneshvar 1987); Isfahan Province (Najaf Abad, Zarrin Shahr, Falavarjan, Dorcheh), soil of fruit trees orchards (Jalaeian *et al*. 2006).

World Distribution – Egypt, India, Iran, Pakistan, Philippines, Saudi Arabia, Syria and Taiwan (Santos *et al*. 2023; Daneshvar 1987).

Taxonomic note on synonymy of Indiraseius extremus *with* Lasioseius parberlesei

The genus *Indiraseius* was established by Daneshvar (1987) based on mite specimens collected from Northern Iran (Guilan and Mazandran Provinces). He designated *Lasioseius parberlesei* Bhattacharyya, 1968 as the type species for the genus *Indiraseius* and described *Indiraseius extremus* as the second species within this genus. However, Walter and Lindquist (1997) considered the genus *Indiraseius* Daneshvar as a synonym of *Lasioseius* Berlese. Moraes *et al.* (2015a) also regarded *Lasioseius extremus* (Daneshvar, 1987) as a synonym of *Lasioseius parberlesei* Bhattacharyya, 1968. However, they did not have access to the type material of *Lasioseius extremus* for close examination. Moraes *et al.* (2016) chose to retain these two species as distinct species but did not provide an explanation for this decision, nor did they provide details of the examined specimens.

In the present study, we collected specimens of *Lasioseius parberlesei* from the same locations where Daneshvar (1987) collected the type material of *Indiraseius extremus*. We conducted a comparison of setal measurements and other characteristics of female specimens of *Lasioseius parberlesei* collected from Iran (including Daneshvar's 1987 measurements for *Indiraseius extremus*) and those from four different countries (Egypt, India, Pakistan, and Saudi Arabia), which are presented in Table 1. The results demonstrate a close similarity between the characteristics of *Indiraseius extremus* and *Lasioseius parberlesei* from Iran and the four other countries (Table 1). Only one male specimen of *L. parberlesei* was collected in this study. We compared setal measurements and other characteristics of the male specimen from Iran with specimens from Egypt and India, and the results are presented in Table 2. The data indicate a close similarity between the characteristics of the Iranian male specimen and those of male specimens from Egypt and India (Table 2). Based on these findings, it can be concluded that *Indiraseius extremus* is a synonym of *Lasioseius parberlesei*.

***Lasioseius penicilliger* Berlese, 1916**

Lasioseius (*Zercoseius*) *penicilliger* Berlese, 1916: 44.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 180).

Habitat and distribution in Iran – Mazandaran Province, honey bee hives (Mossadegh 1997; Kamali *et al*. 2001); Tehran, Golestan, Sistan and Baluchestan Provinces**,** bird nests (Ardeshir *et al*. 2010); Golestan Province (Gorgan), soil (Malek-Shahkouyi *et al*. 2011; Kazemi and Rajaei 2013).

World Distribution – Egypt, Fiji, Germany, Iran, Italy, Mexico, Scotland and Slovakia (Santos *et al*. 2023).

Lasioseius phytoseioides **Chant, 1963**

Lasioseius phytoseioides Chant, 1963: 275.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 181).

Habitat and distribution in Iran – Khuzestan Province (Safiabad), grapevine yards (Kamali *et al*. 2001; Darvishzadeh and Kamali 2009; Kazemi and Rajaei 2013).

World Distribution – Iran and USA (Santos *et al*. 2023).

Lasioseius qianensis **Gu & Wang, 1990**

Lasioseius qianensis Gu & Wang, in Gu *et al*. 1990: 178.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 183).

Habitat and distribution in Iran – Fars Province (Estahban), soil, leaves, litter, bark and saffron bulb (Naghibinejad *et al*. 2011; Kazemi and Rajaei 2013).

World Distribution – China and Iran (Santos *et al*. 2023).

Lasioseius sugawarai **Ehara, 1964**

Lasioseius sugawarai Ehara, 1964: 390.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 187).

Material examined – 15 females, Langarud, 21m a.s.l., 30° 10' 50" N, 11° 37' 0" E, October 2011, collected from soil and leaves of citrus trees and weeds; 28 females, Chaboksar, 216 m a.s.l., 36° 58' 0" N, 50° 35' 0" E, August 2011, collected from soil of citrus trees and weeds; four females, Roudsar, −12 m, 37° 13' 0" N, 50° 3' 0" E, July 2011, collected from soil of citrus trees; 11 females, Lahijan, 2 m, 27° 15' 0" N, 50° 2' 0" E, July 2011, collected from soil of citrus tree; two females, Manjil, 396 m a.s.l., 36° 44' 0" N, 49° 25' 0" E, July 2013, collected from soil of olive tree; two females, Rostamabad, 36° 88' 33' N, 49° 48' 33' E, 1020 m a.s.l., June 2013, collected from soil of olive tree; one female, Lahijan, 37° 12' 0" N, 50° 0' 0" E, 2 m a.s.l., July 2015, collected from tea and mulberry leaves; two females, Emamzadeh Hashem, 37° 01' 27" N, 49° 37' 32" E, 115 m a.s.l., August 2015, collected from Alder tree soil; six females, Langarud, 37° 11' 16" N, 50° 9' 27" E, −14 m, June 2015, collected from soil; one female, Astaneh ye Ashrafiyeh, 37° 15' 54" N, 49° 56' 40" E, –2 m, July 2015, collected from citrus leaves; one female, Rezvanshahr, 37° 33' 4" N, 49° 8' 22" E, 15 m a.s.l., October 2015, collected from soil; one female, Rasht 37° 17' 0" N, 49° 35' 0" E, –7 m a.s.l., August 2015, collected from rotten fruits; five females, Chaboksar 36° 58' 34" N, 50° 33' 37" E, 216 m a.s.l., October 2015, collected from soil of citrus garden; five females, Rasht, Khomam, –16 m a.s.l., 37° 22' 55" N, 49° 39' 35" E, December 2018, collected from weeds; 12 females, Rasht, 4 m a.s.l., 37° 16' 51" N, 49° 34' 59" E, January 2019, collected from soil, weeds and flower; three females, Sangar, 37° 10' 59" N, 49° 38' 42" E, 34 m a.s.l., February 2019, collected from soil and weeds; two females, Kuchesfahan, 0 m, 37° 16' 42" N, 49° 46' 21" E, May 2019, collected from plant peat and weeds.

Habitat and distribution in Iran – Fars Province (Jahrom), soil of citrus orchards (Khademi *et al*. 2006); Mazandaran Province (Amol), soil (Sakenin Chelav *et al*. 2006a, b); Alborz Province (Eshtehard), compost (Kheradmand *et al*. 2007); Guilan Province (Manjil, Lahijan, Emamzadeh Hashem, Langarud, Astaneh ye Ashrafiyeh, Rezvanshahr, Rasht, Chaboksar, Rahimabad, Roudsar),

soil, plants, soil and on the olive leaves, soil of citrus garden, tea and mulberry leaves, citrus leaves, rotten fruits, litter, *Schefflera arboricola* (Araliaceae) 1eaves infested with mealybugs, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves and *Rosa damascena* (Rosaceae) infested with spider mites, soil of tea gardens (Hajizadeh *et al*. 2010a, b; Nazari-Tajani 2012; Mahjoori *et al.* 2015; Nemati *et al*. 2018; Javadpour *et al*. 2018; Ghasemi and Hajizadeh 2020; Hajizadeh *et al*. 2020); Isfahan Province (Shahreza, Esfahan), soil (Kavianpour *et al*. 2011; Kazemi and Rajaei 2013; Kadkhodaei *et al.* 2013).

World Distribution – Iran, Japan, Malaysia, South Korea, Taiwan and USA (Santos *et al*. 2023).

***Lasioseius thermophilus* Willmann, 1942**

Lasioseius (*Zercoseius*) *thermophilus* Willmann, 1942: 242.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 189).

Habitat and distribution in Iran – Golestan Province (Gorgan), soil (Malek-Shahkouyi *et al*. 2011).

World Distribution – Bulgaria, Germany, Japan, Latvia, Poland and Turkey (Santos *et al*. 2023).

***Lasioseius youcefi* Athias-Henriot, 1959**

Lasioseius youcefi Athias-Henriot, 1959: 177.

More information about the synonyms and nomenclatural history of this species are available in Moraes *et al*. (2016: 191).

Material examined – One female, Langarud, 30° 10' 50" N, 11° 37' 0" E, 21 m a.s.l, June 2011, collected from citrus leaves; three females, Chaboksar, 36° 58' 0" N, 50° 35' 0" E, 216 m a.s.l., October 2011, collected from soil of citrus tree; four females, Lahijan, 37° 12' 25" N, 50° 00' 00" E, 4 m a.s.l., October 2012, collected from infected leaves with eriophyid mites; one female, Chaboksar 36° 58' 34" N, 50° 33' 37" E, 216 m a.s.l., August 2015, collected from soil; one female, Rudsar, 37° 8' 0" N, 50° 17' 0" E, −19 m, October 2015, collected from soil; three female, Chaboksar 36° 58' 34" N, 50° 33' 37" E, 216 m a.s.l., October 2015, collected from soil of citrus and pomegranate garden; one female, Rasht, Kuchesfahan, 0 m, 37° 16' 42" N, 49° 46' 21" E, May 2019, collected from plant peat; one female, Rasht, Khomam, −16 m, 37° 22' 55" N, 49° 39' 35" E, May 2019, collected from weeds.

Habitat and distribution in Iran – Hamedan Province (Sarab Gamasiab of Nahavand vicinity), bean, clover (*Trifolium* sp.), apple, alfalfa, darnel, liquorice and chick pea, soil and litter of Russian knapweed, *Acroptilon repens* (L.) (Khanjani and Kamali 2000; Kamali *et al*. 2001; Masoudian and Khanjani 2013); East Azerbaijan Province (Tabriz), soil of orchards, soil (Kamali *et al*. 2001; Hashemi Khabir *et al*. 2013); West Azerbaijan Province (Urmia), predator of European red mite (Kamali *et al*. 2001); (Miandoab Plain), foliage and soil of sugarbeet fields (Haddad Irani-Nejad *et al*. 2003); (Salmas), soil and plant debris of apple orchards (Alizadeh and Shirdel 2012); Semnan Province (Dibaj, Cheshmeh-Ali, Tooyehdarvar Village, Agareh Village, Chambari's orchards, Tazareh, Astaneh Village, Damghan, Jafar Abad Village, Mehmandust Village, Astaneh, Cheshmeh gholghol spring, Darvar Village), moss, soil of garden and fields, decaying trunk contents of poplar tree, chicken manure, decaying wood of oleaster trunk with woodborer galleries (Shamsi *et al*. 2008); Kermanshah Province (Rijab), fruit orchards (Babakfard *et al*. 2008); Guilan Province (Rasht, Manjil, Rostamabad, Rudsar, Chaboksar, Langarud) soil, plants, decaying plants, litter, associated with eriophyid mite, *Oxalis acetosella* L. (Oxalidaceae) leaves infested with spider mites (Hajizadeh *et al*. 2010a, b; Nazari-Tajani 2012; Adeli *et al*. 2013; Javadpour *et al*. 2018; Ghasemi and Hajizadeh 2020); Esfahan Province (Shahreza, Esfahan City), Soil (Kavianpour *et al*. 2011; Kadkhodaei *et al*. 2013); Golestan Province (Gorgan). Soil (Malek-Shahkouyi *et al*. 2011); Fars Province (Marvdasht, Kamfiruz), soil and decayed plants under the oak trees, soil (Beyzavi and Ostovan 2012; Asadpoor

et al. 2012); soil, debris (Abolghasemi and Kazemi 2016); Kerman Province (Rafsanjan), soil of fruit orchards (Mohammadi *et al*. 2012); (Jiroft), soil (Balooch Shahryari *et al*. 2012); Sirjan county, soil, leaf litter and manure (Masnavipour *et al*. 2014); (Kerman City, parks and landscapes), soil (Arjomandi and Kazemi 2014); Lorestan Province (Kakareza District), soil of apple orchard (Hasanvand *et al*. 2014); Khuzestan Province (Ahvaz). Soil (Nemati *et al*. 2012); Chaharmahal and Bakhtiari Province (Shahrekord). Soil (Nemati *et al*. 2012); associated with *Fomes* sp. (Fungi: Polyporaceae) (Khalili-Moghadam and Nemati 2014); (Boldaji City, Cheghakhor and Shahrekord), soil of ant nests, *Tapinoma* sp. (Hym.: Formicidae) (Khalili-Moghadam and Saboori 2015); (Lordegan County, Khanmirza Region, Salehat Village), soil from different parts of oak forests (Bagheri Kordeshami *et al*. 2015); Zanjan Province, soil (Bigdeli *et al*. 2014); Tehran Province (Tehran City, Police Park), soil (Maleki *et al*. 2016); Qom Province, soil, dung, compost and plant-litters of crops, lawns, shrubs and trees in farms, forests, orchards and parks (Agha Alikhani *et al*. 2017).

World Distribution – 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 (Fenďa and Mašán 2003; Santos *et al*. 2023).

Key to species of genus *Lasioseius* in Iran (females)

1. Dorsal shield lacking setae *j1* and *z1*, leaving setae *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 setae *j2*; female ventrianal shield with 6 pairs of opisthogastric setae 2
– Dorsal shield with setae *j1* and usually *z1* present; posterior region of dorsal shield with 13 to 15 pairs of setae; peritremes with anterior apices not curving posteromedially where ending at level beside or short of setae *z1*; female ventrianal shield with 2 to 6 pairs of opisthogastric setae 4
2. Setae *r2* absent; setae *J2* 1/2 distance *J2-J4* ..... ***L. youcefi*** Athias-Henriot, 1959
– Setae *r2* present; setae *J2* 1/4 distance *J2*-J4 3
3. Setae *s4* minute; setae *S2* present; setae *j5* and *j6* short ..... ***L. phytoseioides*** Chant, 1963
– Setae *s4* not minute; setae *S2* absent; setae *j5* and *j6* long ... ***L. parberlesei*** Bhattacharyya, 1968
4. 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 before anterior margin of sternal shield; sternal shield with anteromedial patch of reticula; tarsus II with one midlateral seta, *pl-2*, elongated, reaching nearly to base of pretarsus 5
– Seta *r4* usually similar in weakly to strongly tricarinate form, usually over half as long as adjacent seta *s4* (except for *L. thermophiles* that r4 is short); dorsal setae variable in form and lengths; 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 6
5. 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 ..... ***Lasioseius floridensis*** Berlese, 1916
– Tarsus III with seta *ad2* more attenuated and clearly (ca 1.5) longer than *pd2*; spermatheca small, weakly sclerotized, bulbous, without discernible minor duct ..... ***L. sugawarai*** Ehara, 1964
6. With 1 pair of metapodal plates, approximately as long as anus; most of the dorsal setae are needle shaped 7
– With 2 pairs of metapodal plates, smaller than anal opening; dorsal setae needle shaped, tricarinate or serrated 9
7. Ventrianal shield with 4 pairs of perianal setae; tectum with 3 short branches, equal in length,

distally serrate ..... ***L. qianensis*** Gu & Wang, 1990
– Ventrianal shield with more than 4 pairs of perianal setae; tectum with 3 longer branches 8
8. With large, strongly sclerotized presternal plates; anterior dorsal shield with 23 pairs of setae; posterior dorsal shield with 15 pairs of setae; setae near the posterior margin of the dorsal shield long, spinose; posterior dorsal shield with 5 pairs of setae in the dorsocentral series (*J*) .... ***L. muricatus*** (C.L. Koch, 1839)
– Without presternal plates; anterior dorsal shield with 16 pairs of setae, posterior dorsal shield with 13 pairs of setae; setae near the posterior margin of the dorsal shield simple; posterior dorsal shield with only 3 pairs of setae in the dorsocentral series (*J*) .....***L. berlesei*** Oudemans, 1938
9. Sternal shield with posterior margin deeply excavated to level of setae pair *St2*, tectum with 3–4 groups of points .....***L. ometes*** (Oudemans, 1903)
– Posterior margin of sternal shield nearly straight 10
10. Ventrianal shield with 4 pairs of peranal setae 11
– Ventrianal shield with 5–6 pairs of peranal setae 14
11. With macroseta on tibia and tarsus of leg IV 12
– Without macroseta on tibia and tarsus leg IV 13
12. Macroseta present on the tibia and tarsus of leg IV; idiosoma with more than 3 pairs of marginal setae on soft integument .....***L. dentatus*** (Fox, 1946)
– Macroseta present only on the tarsus of leg IV; idiosoma with only 3 pairs of marginal setae (*r4*, *R1*, *R5*) on soft integument .....***L. frankbakkeri*** Faraji & Karg, 2005
13. Tectum four-tined, with 2 smooth median points; anterior margin of sternal shield with an incision in the middle; dorsal setae short, no seta of posterior half of dorsum reaching the next seta of the series ..... ***L. inconspicuus*** Westerboer, 1963
– Tectum three-tined, with 1 smooth median point; anterior margin of sternal shield without middle incision; dorsal setae relatively long, most setae of posterior half of dorsum reaching the next seta of the series .....***L. thermophilus*** Willmann, 1942
14. Ventrianal shield with 5 pairs of peranal setae; tectum three-tined, middle tine twice as long as the lateral tips ..... ***L. lacunosus*** Westerboer, 1963
– Ventrianal shield with 6 pairs of peranal setae; tectum in other forms 15
15. Most dorsal shield setae serrated 16
– Most dorsal shield setae simple, some posterior setae serrated 17
16. Dorsal setae *j4* as long as dorsal setae *j1* and *j3*; sternal shield without a median longitudinal net-like pattern .....***L. penicilliger*** Berlese, 1916
– Dorsal setae *j4* remarkably shorter than other setae in *j* series; sternal shield with a median longitudinal net-like pattern ..... ***L. ometisimilis*** Hirschmann, 1962
17. Ventrianal shield broadly oval; peritreme short, extends only to the middle of coxa III ....***L. formosus*** Westerboer, 1963
– Ventrianal shield pentagonal; peritreme long, extending to level of setae j1 18
18. Peritreme with poststigmatic projection; sternal shield dotted; membrane surrounding ventrianal shield with 2 pairs of setae; with 2 pairs of small plates between genital and ventrianal shields .. ..***L. confusus*** Evans, 1958
– Peritreme without poststigmatic projection; sternal shield reticulated; membrane surrounding ventrianal shield with 4 pairs of setae; without small plates between genital and ventrianal shields ..... ***L. krantzi*** Chant, 1963

CONCLUSIONS

Fragmentary faunal surveys in Iran have led to the collection and identification of 19 species of genus *Lasioseius*. Due to the diverse climatic conditions in different parts of Iran more species of *Lasioseius* is expected to be found and reported. Due to the inaccessibility of to the type specimens of *Lasioseius*

extremus from Iran, there could have been some uncertainties regarding the synonomy of this species with *Lasioseius parberlesei*, as suggested by Moraes *et al.* (2015a). In this study, specimens were collected from the same places where the type specimens of *L. extremus* were collected. Measurements and comparisons showed validity of the synonymy.

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مروری بر جنس *Lasioseius* Berlese (Acari: Blattisociidae) در ایران، همراه با کلیدی برای شناسایی گونه‌های جنس در ایران

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چکیده

کنه‌های جنس *Lasioseius* Berlese در ایران بررسی شدند. اطلاعات جمع‌آوری جدید برای هفت گونه جمع‌آوری شده از استان گیلان، شمال ایران ارایه شده است. بر اساس مشاهدات از نمونه‌های جمع‌آوری شده، مترادف بودن گونهٔ *L. extremus* (Daneshvar, 1987) با گونه *Lasioseius parberlesei* Bhattacharyya, 1968 که پیش‌تر مورائس و همکاران (۲۰۱۵) پیشنهاد کرده بودند تایید شد. همچنین نخستین توصیف نر گونه *L. parberlesei* از ایران ارایه می‌شود. افزون بر این، این مقاله فهرستی از گونه‌های جنس *Lasioseius* گزارش شده از ایران و کلیدی برای شناسایی گونه‌ها ارایه کرده است.

واژگان کلیدی: میان‌استیگمایان، *Lasioseius parberlesei*، Phytoseioidea، کنه‌های شکارگر، آرایه‌شناسی.

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