

# Some new records of mesostigmatid mites (Acari: Mesostigmata) associated with greenhouse plants from Iran

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## Abstract

During 2018-2019, fauna of mesostigmatic mites (Acari: Mesostigmata) associated with greenhouse plants were collected and identified in Rasht region, Guilan Province, Northern Iran. Totally, 62 species belonging to 36 genera and 17 families were collected and identified. Among them, 6 species *Cilliba sellnicki* (Hirschmann & Zirngiebl-Nicol, 1964), *Epicrius canestrinii* (Haller, 1881), *Vulgarogamasus trouessarti* (Berlese, 1892), *Rhodacarellus epigynalis* Sheals, 1956, *Gamasolaelaps excisus* (Koch, 1879) and *Proctolaelaps holovertris* Moraes et al., 2016 are new record for mite's fauna of Iran.

**Keywords:** Acari, fauna, greenhouse, Guilan, new record

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## 1 Introduction

Greenhouses are sustainable environments for growing a variety of crops such as vegetable and ornamental plants. These optimum conditions are the favorite for most insect and plant feeder's mites. They can reproduce rapidly in these conditions. Mites not only are considered as one of the most important pests in greenhouses, but also they are natural enemies used for biological control of pests in greenhouses, so they are taken among the most important arthropods (Zhang, 2003; Dhooria, 2016).

Mesostigmata is the major groups of mites with about 70 families and about 11,000 species. About half of them are free-living predators in soil-litter, compost, rotting wood, herbivore dung, carrion, nests, house dust or similar detritus-based systems. A few species of mesostigmatic mites feed on fungi, fungal spores and hyphae and also some feed on pollen, nectar and other plant fluids (Lindquist, Krantz & Walter, 2009; Walter & C. Proctor, 2013).

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Some greenhouse mites such as Tetranychidae, Tarsonemidae, Tenuipalpidae, Eriophyidae, Acaridae, etc. causing economic injury to greenhouse crops and some of them such as Phytoseiade, Lealapidae, etc. are natural enemy used in the biological control of pest insects and mites in greenhouses (Zhang, 2003). Greenhouse mites are poorly studied in Iran and only a few articles can be found on this matter (Baradaran et al., 2008; Mojib Haghghadam and Arbabi, 2012). There is also little information about mesostigmatid mites associated with greenhouse plants in Iran and it needs more studies to explore the unknown species (Ghasemi & Hajizadeh, 2020). Hence, the purpose of this survey is identification of the mesostigmatid mites associated with greenhouse plants in Rasht County, Guilan Province, Iran. The collection records of the identified species are given along with a brief description and figures of the new reported species from Iran.

## 2 Materials and Methods

This study was carried out in Rasht County, Northern Iran, during 2018–2019. A total twenty-two greenhouses were sampled in Rasht County and its suburbs (Khomam, Khoshkbijar, Kuchesfahan, Lashtenesha and Sangar Cities). Sampling localities are listed in following table (Table 1). Different parts of vegetable plants (such as strawberry, cucumber, tomato, potato, etc.), ornamental plants (rose, croton, rubber fig, etc.), weeds and soil samples were collected from greenhouses. Plant specimens were identified by the botanical specialist of Faculty of Agricultural Sciences, University of Guilan. Mites were extracted from samples using Berlese funnel or direct examinations of plant materials under a stereomicroscope. The samples were deposited temporary in 75% ethanol and then dipped in Nesbitt's solution for clarification. Mites were mounted in Hoyer's medium on microscopic slides. Mites were examined under an Olympus BX51 phase-contrast microscope (Olympus Optical Co., LTD., Tokyo, Japan) at 1000× magnification. Mites were identified by use of valid references and keys (Ghilyarov and Bregetova, 1977; Karg, 1993; Mašán, 2001; Christian and Karg, 2006; Masan, 2007; Mašán, 2008; Hajizadeh et al., 2010; De Moraes et al., 2016; Hajizadeh and Faraji, 2016; Masan, 2017; Hajizadeh and Joharchi, 2018; Mojahed et al., 2019; Hajizadeh and Hosseini, 2020). All the measurements are given in micrometer ( $\mu\text{m}$ ); the average followed (in parentheses) by the respective ranges. All specimens collected by first author. The voucher specimen of each species was preserved as slide-mounted specimens and they are deposited in the Mite Collection of the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran.

Table 1. Sampling localities in the Guilan Province, Rasht County, Northern Iran

Code	Location	Geographical coordination	Sampling date
1	Bazar Jomeh city	37°24'21"N, 49°7'320"E, 3 m	23.11.2018
2	Bijar Boneh Village	37°18'10"N 49°39'10"E, -6 m	1.5.2019; 25.4.2019; 28.2.2019
3	Dalecheh Village	37°13'15"N 49°41'21"E, 14 m	11.4.2019; 25.4.2019
4	Deh Baneh-ye, Eslamabad Village	37° 6'12"N 49°39'32"E, 65 m	24.2.2019; 26.2.2019
5	Esfahani Educational Institute	37°11'47"N 49°39'9"E, 26 m	24.11.2018; 15.1.2019; 24.4.2019; 8.1.2019; 17.4.2019
6	Guilan University	37°11'47"N 49°39'9"E, 26 m	11.11.2018

Code	Location	Geographical coordination	Sampling date
7	Imam Khomeini Institute	37°13'18"N 49°38'39"E, 16 m	19.2.2019
8	Jirdeh Village	37°12'43"N 49°32'51"E, 22 m	18.4.2019; 1.3.2019
9	Keshel Varzal Village	37°10'59"N 49°38'42"E, 34 m	24.2.2019; 28.2.2019
10	Lakan Village	37°13'37"N 49°34'46"E, 14 m	18.4.2019
11	Omesheh Village	37°12'3"N 49°38'55"E, 25 m	10.3.2019; 21.2.2019; 28.2.2019; 27.7.2019
12	Pasikhan Village	37°17'28"N 49°31'46"E, -13 m	15.4.2019
13	Pir Bazar Village	37°19'57"N 49°28'59"E, -18 m	8.12.2018; 4.5.2019; 21.7.2019; 4.3.2019
14	Rice Research Institute	37°12'23"N 49°38'48"E, 23 m	19.11.2018
15	Sima Manzar Organization	37°15'54"N 49°35'30"E, 2 m	27.11.208
16	Vatan Abadi greenhouse	37°16'50"N 49°34'28"E, -4 m	21.11.2018
17	Vishka Nanak Village	37°14'13"N 49°43'31"E, 10 m	26.2.2019

### 3 Results and Remarks

In the current study 62 species belonging to 36 genera and 17 families of mesostigmatid mites (Acari: Mesostigmata) were collected and identified. The 6 species are new for mite fauna in Iran. The collection records of the identified species are as follow. Brief description and figures of the new reported species from Iran are also provided.

#### Family Ameroseiidae Evans

*Sertitympanum aegyptiacum* Nasr & Abow-Awad

Material examined Locality 6, bell pepper, *Capsicum annuum* L. (Solanaceae) leaves, 4 females; locality12, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, infested with spider mites, 2 females.

*Ameroseius eumorphus* Bregetova

Material examined

Locality 11, litter, 5 females.

*Ameroseius lidiae* Bregetova

Material examined

Locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves infested with spider mites, 7 females; Locality 13, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, infested with spider mites, 8 females; locality 3, soil, 2 females; Locality 10, orange, *Citrus sinensis* (Rutaceae) leaves, 3 females; locality 2, rose, *Rosa damascena* (Rosaceae) leaves, 3 females.

*Ameroseius lanceosetis* Livshitz and Mitrofanov

Material examined

Locality 11, soil, 5 females.

Remarks: Most of ameroseiid mites are saprophagous and mycophagous, some species are nectar- and pollen-feeders (Mašán, 2017).

**Family Ascidae Oudemans***Protogamasellus massula* (Athias-Henriot)

Material examined

Locality 15, rose, *Rosa damascena* (Rosaceae) leaves, 3 females; locality 5, 17 April 2019, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 6 females.

**Family Digamasellidae Evans***Dendrolaelaps zwoelferi* Hirschmann

Material examined

Locality 7, plant debris, 1 female; locality 6, soil, 2 females.

**Family Dinychidae Berlese***Uroobovella fimicola* (Berlese)

Material examined

Locality 13, soil, 3 females.

*Uroobovella obovata* (G. Canestrini & Berlese)

Material examined

Locality 9, litter, soil, tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 5 females and 1 male; locality 12, soil, 2 females; locality 10, soil, 3 females.

**Family Epicriidae Berlese***Epicrius canestrinii* (Haller, 1881)

Material examined

Locality 13, weed leaves, 1 female.

Diagnosis. Dorsal shield 488 long and 352 wide, with network of tubercles and 29 pairs of setae, setae D2 and D4 are considerably shorter than setae D3, but setae D7, D8 and D9 are approximately equal in length; with a pair of presternal shields and setae; sternal shield with three pairs of setae (st1–st3); between the genital and anal shields there are 2 pairs of small scutella, each bearing 1 seta; genital shield with two pairs of setae; anal shield with 3 setae (Fig. 5).

Remarks: This species was originally described from France, it also recorded from England and Switzerland (Evans, 1955; Ghilyarov & Bregetova, 1977). This is first record of *Epicrius canestrinii* from Iran.

**Family Eviphididae Berlese***Evimirus uropodinus* (Berlese)

Material examined

Locality 10, soil, 3 females; locality 8, litter, 4 females; Locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 7 females; locality 2, soil, 5 females, cucumber, *Cucumis sativus* L. (Cucurbitaceae) leaves, 8 females; locality 13, litter, 5 females.

**Family Laelapidae Berlese***Androlaelaps casalis* (Berlese)

Material examined

Locality 13, soil, 5 females and 2 males.

*Cosmolaelaps lutegiensis* (Shcherbak)

Material examined

Locality 7, soil, 5 females and 4 males; locality 9, litter, 3 males; locality 13, soil, 3 females.

*Euandrolaelaps karawaiewi* (Berlese)

Material examined

Locality 13, soil, 3 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 5 females.

*Euandrolaelaps sardoa* (Berlese)

Material examined

Locality 12, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 5 females.

*Gaeolaelaps aculeifer* (Canestrini)

Material examined

Locality 12, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 3 females; locality 2, soil, 5 females; locality 13, Strawberry, litter, 5 females and 2 males.

*Gaeolaelaps queenslandicus* (Womresley)

Material examined

Locality 16, soil, 2 females; locality 6, soil, 3 females and 2 males; locality 13, soil, 3 females; locality 2, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 8 females and 4 males; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves infested with spider mites, 4 females; locality 9, soil, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 4 females; locality 7, litter, 3 females; locality 17, soil, 4 females.

*Gymnolaelaps messor* Joharchi et al.

Material examined

Locality 15, rose, *Rosa damascena* (Rosaceae) leaves, 3 females.

*Gymnolaelaps myrmophilus* (Michael)

Material examined

Locality 15, rose, *Rosa damascena* (Rosaceae) leaves, 3 females.

*Laelaspis pennatus* Joharchi & Halliday

Material examined

Locality 17, soil, 4 females.

*Pneumolaelaps lubrica* (Voigts & Oudemans)

Material examined

Locality 13, soil, 3 females; locality 17, litter, 2 females. Remarks: The family Laelapidae is ecologically diverse, including obligate and facultative parasites of vertebrates, insect paraphages, and free-living predators that inhabit soil-litter habitats and the nests of vertebrates and arthropods (Lindquist et al., 2009).

**Family Melicharidae Hirschmann***Proctolaelaps holovertris* Moraes et al., 2016

Material examined

Locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 4 females and 1 male.

Diagnosis. Dorsal shield 395 (392–400) long and 287 (276–304) wide at widest level; with 44 pairs of setae; most dorsal shield setae of uniform length and shape, aciculate, smooth except Z5 stout and longest; podonotal region of the dorsal shield with transverse striae; unsclerotised lateral cuticle without setae; all setae of venter idiosomal shield aciculate and smooth, except JV5 and post-anal seta, stout; presternal region transversely striate, with a pair of ellipsoidal punctuate anterior region; sternal shield mostly reticulated, with three pairs of setae (st1–st3) and two pairs of lyrifissures; genital shield with few longitudinal striae; anal shield mostly smooth, with a few arched anterolateral striae; opisthogaster with 10 pairs of setae on unsclerotised cuticle; with two pairs of metapodal plates, the most internal smaller; peritreme extending forward to level of z1; spermathecal apparatus distinguishable as a mostly unsclerotised pair of tubuli; anteromedian region of epistome triangular, with margin denticulate; with two transverse lines of denticles near base; fixed cheliceral digit with 12 teeth and large antiaxial membranous lobe; movable digit with three teeth; hypostome with h1 slightly thicker than h2, h3 and sc; corniculi horn shape; legs I–IV pretarsi each with a pair of claws and pulvillus with three rounded lobules; leg IV without macrosetae (Figs. 1-4).

Remarks: This species was originally described from Egypt, then re-described base on specimens collected from same country (Nasr, 1978; Zaher, 1986; Abo Shnaf & Moraes, 2016). This is first record of *Proctolaelaps holovertris* from Iran.

*Proctolaelaps pygmaeus* (Müller)

Material examined

Locality 13, soil, 5 females; locality 5, Geraniums, *Pelargonum zonale* L. (Geraniaceae) leaves, 6 females; wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 6 females; locality 11, soil, 6 females; locality 2, cucumber, *Cucumis sativus* L. (Cucurbitaceae) leaves, 4 females; locality 9, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 4 females and 3 males.

Remarks: Many species of family Melicharidae are predatory, others have adapted to feeding on fungi, pollen, and nectar (Lindquist et al., 2009).

**Family Macrochelidae Vitzthum***Glypholaspis confusa* (Foà)

Material examined

Locality 13, soil, 5 females, locality 9, soil, 3 females; locality 2, soil, 5 females.

*Macrocheles insignitus* Berlese

Material examined

Locality 11, soil, 5 females.

*Macrocheles merdarius* (Berlese)

Material examined

Locality 7, litter, 5 females; locality 12, soil, 4 females; locality 13, litter, 6 females.

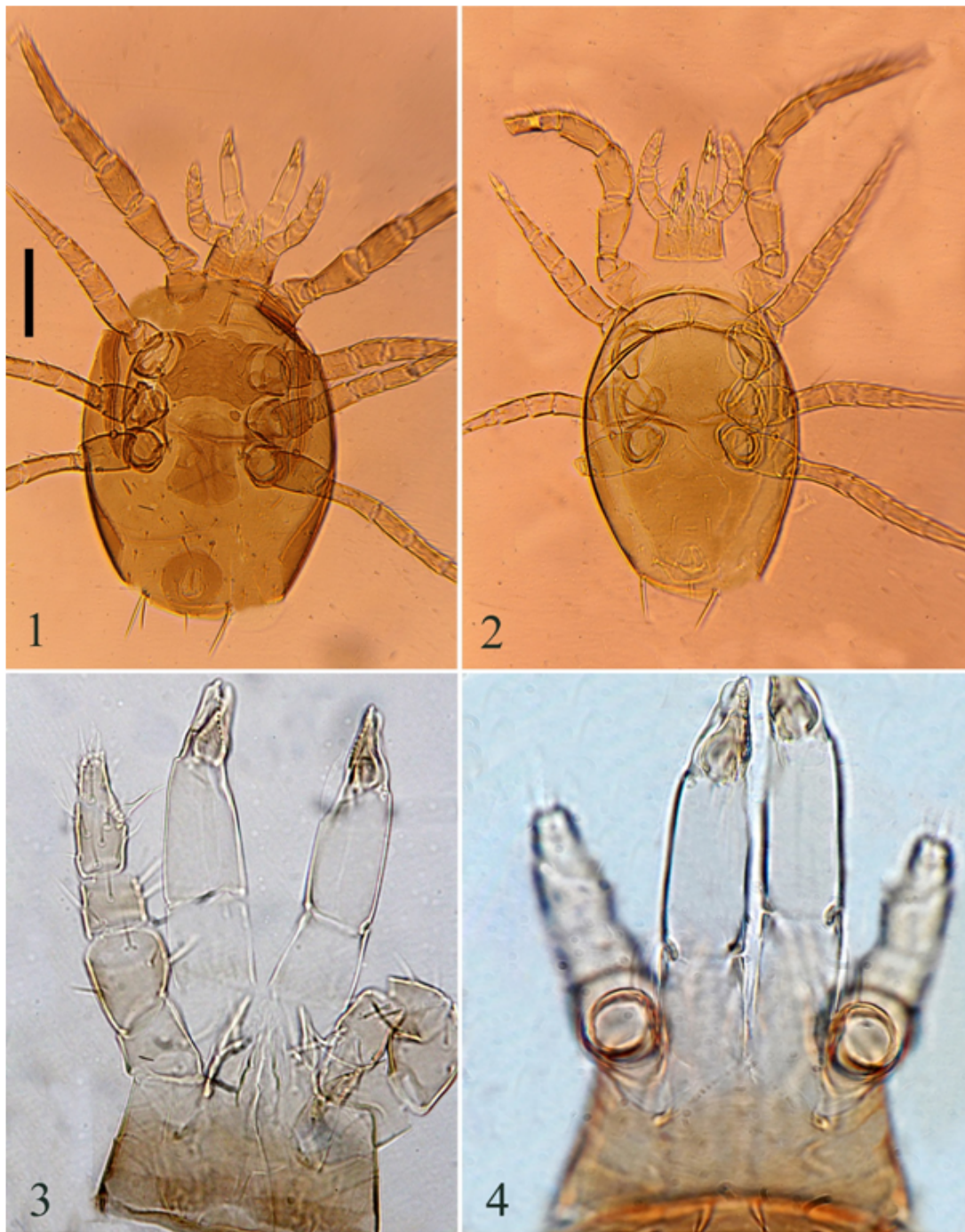


Figure 1. *Proctolaelaps holovenstris* Moraes et al.: 1. Female, 2. Male, 3. Gnathosoma ventral view, 4. Gnathosoma dorsal view; scale bar 100  $\mu\text{m}$  for 1 & 2 and 30  $\mu\text{m}$  for 3 & 4.

*Macrocheles muscaedomesticae* (Scopoli)

Material examined

Locality 7, litter, 5 females; locality 11, soil, 5 females; locality 2, litter, 5 females.

*Macrocheles robustulus* (Berlese)

Material examined

Locality 11, soil, 5 females; locality 13, croton, *Codiaeum variegatum* (Euphorbiaceae) leaves, 6 females.

*Macrocheles penicilliger* (Berlese)

Material examined

Locality 7, litter, 5 females; locality 3, litter, 5 females.

*Macrocheles subbadius* (Berlese)

Material examined

Locality 4, soil, 3 females; locality 9, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 3 males; locality 12, soil, 2 females; locality 8, litter, 4 females; locality 2, soil, 5 females, litter, 4 females; locality 13, litter, 5 females.

*Reductholaspis analis* (Hyatt & Emberson)

Material examined

Locality 2, soil, 5 females; locality 13, litter, 3 nymphs.

Remarks: Mites in the family Macrochelidae are predators and found wherever organic matter is decomposing, such as in soil, leaf-litter, dung, carrion and compost (Mašán, 2003).

**Family Ologamasidae Ryke**

*Gamasiphis lanceolatus* Karg

Material examined

Locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 12 females; locality 14, soil, 4 females and 2 male; locality 15, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 6 females; locality 13, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 4 females, litter, soil, 5 females and 2 males; locality 7, soil, 5 females and 4 males; locality 2, soil, 5 females, litter, cucumber, *Cucumis sativus* L. (Cucurbitaceae) leaves, 8 females; locality 4, soil, 3 females; locality 17, litter, 5 males; locality 11, soil, 5 females; locality 9, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 3 females; locality 3, litter, 5 females; locality 12, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, infested with spider mites, 2 females.

**Family Pachylaelapidae Berlese**

*Olopachys compositus* Koroleva

Material examined

Locality 17, litter, 5 males; locality 2, soil, 8 females.

*Onchodellus alpinus* (Willmann)

Material examined

Locality 12, litter, 4 females.

*Pachylaelaps grandis* Koroleva

Material examined

Locality 2, litter, 3 females.

Remarks: Mites of the family Pachylaelapidae include a cosmopolitan group of predatory mites with considerable ecological and behavioral diversity (Mašán and Halliday 2014).



**Family Parasitidae Oudemans***Cornigamasus lunaris* (Berlese)

Material examined

Locality 12, soil, 4 females.

*Eugamasus berlesei* Willmann

Material examined

Locality 17, litter, 5 females; locality 4, soil, 4 females; locality 9, litter, 3 males; locality 12, soil, litter, 6 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 4 females; locality 10, litter, 3 females; locality 2, soil, 8 females; locality 13, litter, 6 females.

*Eugamasus cavernicola* Trägårdh

Material examined

Locality 6, soil, 3 females; locality 13, Strawberry, *Fragaria ananassa* (Rosaceae) leaves, 5 females, 4 May 2019, soil, 5 females; locality 2, soil, litter, cucumber, *Cucumis sativus* L. (Cucurbitaceae) leaves, 8 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 7 females; locality 12, litter, 6 females; locality 4, soil, 2 females.

*Gamasodes fimbriatus* Karg

Material examined

Locality 2, soil, 5 females.

*Gamasodes spiniger* (Trägårdh)

Material examined

Locality 9, litter, 3 females; locality 12, litter, 2 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 7 females.

*Parasitus beta* Oudemans and Voigts

Material examined

Locality 2, litter, 5 females.

*Parasitus coleopratorum* (Linnaeus)

Material examined

Locality 13, litter, 5 females.

*Parasitus consanguineus* Oudemans and Voigts*(Rhabdocarpais consanguineus* (Oudemans and Voigts)

Material examined

Locality 12, litter, 2 females; locality 2, soil, 4 females; locality 17, litter, 5 females; locality 13, litter, 6 females.

*Parasitus fimetorum* (Berlese)

Material examined

Locality 15, soil, 6 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 6 females; locality 13, croton, *Codiaeum variegatum* (Euphorbiaceae) leaves, 6 males; locality 8, soil, hollyhocks, *Alcea biennis* (Malvaceae) leaves, 4 females; locality 12, wood sorrel, *Oxalis acetosella*

L. (Oxalidaceae) leaves, 4 females; locality 7, soil, 5 females and 4 males; locality 17, soil, 5 females; locality 11, soil, 5 females.

*Parasitus hyalinus* (Willmann)

Material examined

Locality 1, soil, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 4 females.

*Parasitus insignis* (Holzmann)

Material examined

Locality 13, soil, 12 females and 4 males; locality 2, soil, litter, 4 females, soil, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 8 females and 4 males; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 7 females; locality 10, soil, 3 females; locality 12, litter, soil, 4 females; locality 9, soil, litter, 7 males; locality 11, 5 females; locality 3, litter, 4 females; locality 17, February 2019, litter, 3 males; locality 7, soil, litter, 5 females.

*Parasitus kempersi* Oudemans

Material examined

Locality 13, soil, 5 females, 4 May 2019, litter, 5 females; locality 7, soil, litter, 5 nymph; locality 4, paperflower, *Bougainvillea glabra* (Nyctaginaceae) leaves, 2 females; locality 17, soil, 5 females; locality 9, litter, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 6 females; locality 11, soil, 5 females; locality 12, litter, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 4 females; locality 8, litter, 4 females; locality 2, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 5 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 7 females.

*Parasitus mustelarum* Oudemans

Material examined

Locality 2, litter, 4 males.

*Parasitus evertsi* Oudemans

Material examined

Locality 9, litter, 3 females.

*Vulgarogamasus trouessarti* (Berlese, 1892)

Material examined

Locality 2, soil, 4 males; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 3 females.

Diagnosis: Dorsal shield 560 long and 375 wide, reticulated, podonotal shield bears 24 pairs of setae, setae r3 are the longest, opisthonotal shield bears 14 pairs of setae, opisthonotal shield pear shaped and considerably narrower than the podonotal shield; opisthogastric shield with 8 pairs of setae; presternal plates are triangular and granular, genital shield is broad and triangular, anal shield with 3 pilose and slender setae, postanal seta is the longest; peritreme extends just to coxa I; tectum three branched, central branch in the form of a single broad tooth and the two lateral branches are toothed (Fig. 6).

Remarks: This species is recorded from England, France, Germany and Norway (Hyatt, 1980). This is first record of *Vulgarogamasus trouessarti* from Iran.

*Vulgarogamasus kraepelini* (Berlese)

Material examined

Locality 4, soil, 3 females; locality 2, soil, 5 females.

*Vulgarogamasus oudemansi* (Berlese)

Material examined

Locality 2, soil, 6 females.

Remarks: Mites of the family Parasitidae are free-living predatory mites that can be found in soil, moss, litter, debris, animal dung and decaying organic matters. They feeding on eggs and immature stages of other soil-inhabiting microarthropods and nematodes (Hyatt 1980; Karg 1993).

### Family Parholaspididae Evans

*Gamasholaspis incisus* Petrova

Material examined

Locality 2, soil, 5 females; locality 9, bell pepper, *Capsicum annuum* L. (Solanaceae) leaves, 4 males; locality 12, litter, 4 females.

*Gamasholaspis gamasoides* Berlese

Material examined

Locality 12, litter, 4 females; locality 13, soil, 6 females.

*Holaspulus tenuipes* (Berlese)

Material examined

Locality 8, litter, 4 females; locality 5, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 3 females; locality 2, soil, 5 females.

*Neparholaspis arcuatus* Petrova

Material examined

Locality 9, litter, 4 females; locality 8, soil, 4 females; locality 2, litter, 5 females.

Remarks: Mites of the family Parholaspididae are free-living predatory mites that found in soil, litter, moss and the nests of small mammals (Marchenko, 2016).

### Family Rhodacaridae Oudemans

*Multidentorhodacarus sogdianus* (Shcherbak)

Material examined

Locality 9, soil, 3 males.

*Rhodacarellus epigynalis* Sheals, 1956

Material examined

Locality 2, soil, 5 females.

Diagnosis: Dorsal shield 244 long and 136 wide, oval; podonotal shield with 17 pairs of setae, opisthonotal shield with 14 pairs of setae; posterior margin of the sternal the shield is concave, anterior edge of the genital shield with a sharp wedge penetrated into the sternal shield, ventrianal shield with five pairs of setae, tectum five branched, fixed cheliceral digit with 3 teeth, two basal teeth are larger than the third, movable digit with five teeth (Fig. 7).

Remarks: This species is recorded from Europe (Shcherbak, 1980). This is first record of *Rho-*

*dacarellus epigynalis* from Iran.

#### **Family Trematuridae Berlese**

*Nenteria stylifera* (Berlese)

Material examined

Locality 17, soil, 5 females; locality 11, soil, 5 females; locality 4, litter, 2 nymphs; locality 13, litter, 2 females and 2 nymphs.

#### **Family Veigaiidae Oudemans**

*Gamasolaelaps excisus* (Koch, 1879)

Material examined

Locality 2, soil, 1 male.

Diagnosis: Dorsal shield 544 long and 416 wide, body bright oranges; dorsal shield with 17 pairs of setae; sternal shield with 3 pairs of setae, ventral shield with 2 pairs of setae, anal shield with three setae; tectum three branched, fixed cheliceral digit with 4 teeth, all legs with tarsal claws and empodium (Fig. 8).

Remarks: This species is recorded from Europe (Ghilyarov & Bregetova, 1977). This is first record of *Gamasolaelaps excisus* from Iran.

#### **Family Uropodidae Kramer**

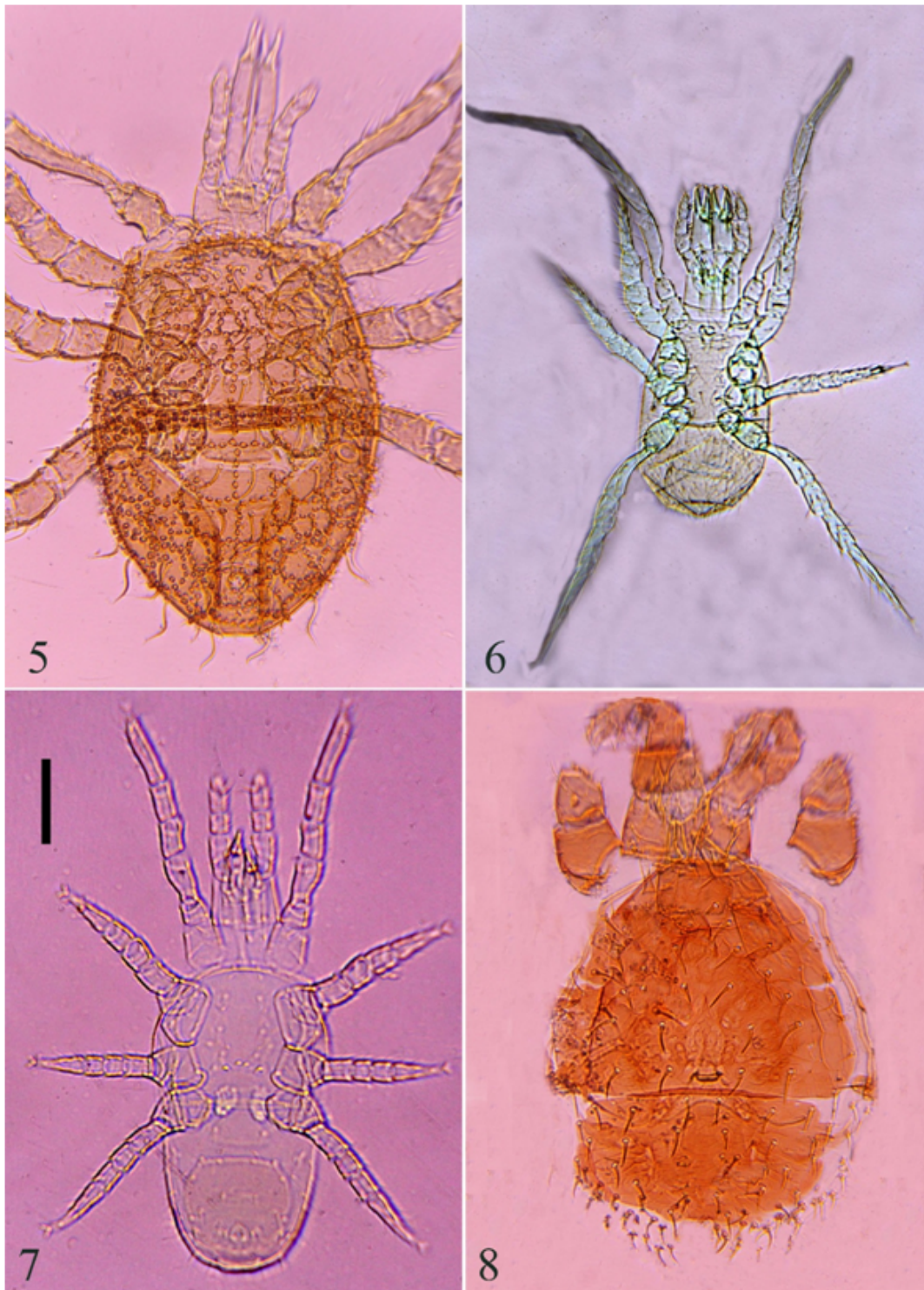
*Cilliba sellnicki* Hirschmann & Zirngiebl-Nicol, 1964

Material examined

Locality 2, cucumber, *Cucumis sativus* L. (Cucurbitaceae) leaves, 4 males; locality 17, litter, 5 males; locality 9, soil, Tomato, *Solanum lycopersicum* L. (Solanaceae) leaves, 4 males and 2 nymphs; locality 3, litter, 5 males; locality 12, soil, 2 males; locality 10, soil, 3 males; locality 13, litter, 5 males.

Diagnosis: Body sclerotized, brown; dorsal shield with 840 long and 640 wide, subcircular with scattered circular pits in the posterior half, marginal shield smooth, with numerous lyrifissures; dorsal setae numerous, simple, submarginal setae simple, marginal setae numerous, very short, hook-like; ventral idiosomal surface smooth, genital opening tongue-shaped, anal opening small, oval; peritremes V-shaped, tritosternum 6-branched, epistome narrow, laterally serrated, fixed digit of chelicerae with globular sensillus and small denticles on the internal surface, movable digit shorter than fixed digit, with single denticle on internal surface (Figs. 9-10).

Remarks: This species is recorded from Europe (Stachowiak et al., 2008). This is first record of *Cilliba sellnicki* from Iran.



Figures 5-8. 5. *Epicrius canestrinii* (Haller, 1881); 6. *Vulgarogamasus trouessarti* (Berlese, 1906); 7. *Rhodacarellus epigynalis* Sheals, 1956; 8. *Gamasolaelaps excisus* (Koch, 1879); scale bar 100  $\mu\text{m}$  for 5, 250  $\mu\text{m}$  for 6, 70  $\mu\text{m}$  for 7, 130  $\mu\text{m}$  for 8.

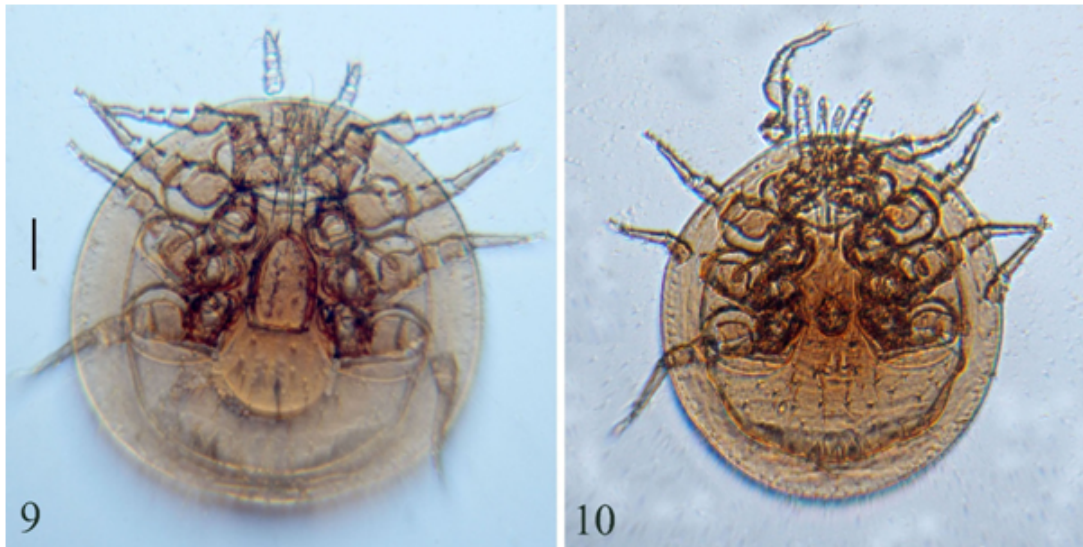
*Neodiscopoma splendida* (Kramer)

Material examined

Locality 2, soil, 4 females; locality 17, litter, 5 females.

*Uropoda orbicularis* (Müller)

Material examined

Locality 12, wood sorrel, *Oxalis acetosella* L. (Oxalidaceae) leaves, 2 females.

Figures 9-10. *Cilliba sellnicki* Hirschmann & Zirngiebl-Nicol, 1964, 9. Female, 10. Male, scale bar 200  $\mu\text{m}$ .

## Conflict of interests

The authors declare that they have no conflict of interest.

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