Persian J. Acarol., 2020, Vol. 9, No. 3, pp. 233–242.
http://dx.doi.org/10.22073/pja.v9i3.61223
Journal homepage: http://www.biotaxa.org/pja

Article

New records of mites of the Heterostigmata (Acari: Prostigmata) associated with insects from Golestan Province, northern Iran

Vahid Rahiminejad[1, 2] and Hamidreza Hajiqanbar[1*]

1. *Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, 14115-336, Tehran, Iran; E-mail: hajiqanbar@modares.ac.ir*
2. *Current address: Department of Plant Protection, Faculty of Plant Production, Gorgan University of Agricultural Science and Natural Resource, Golestan, Iran.*

[*] Corresponding author

ABSTRACT
Moderate and humid region in north of Iran is home to a rich arthropod fauna, yet the mite fauna of Golestan province, with moderate Caspian climate, is poorly studied systematically. In this study, we conducted a faunistic study on heterostigmatic mites (Acari: Prostigmata: Eleutherengonides) associated with insects in Golestan Province. We used both day and overnight sampling methods to capture host insects in sampling sites. Thirteen species of seven heterostigmatic families were identified: Dolichocybidae (one species), Caraboacaridae (one species), Trochometridiidae (one species), Neopygmephoridae (three species), Pygmephoridae (three species), Scutacaridae (two species) and Microdispidae (two species). The genus *Formicomotes* and subgenus *Imparipes* (*Sporichneuthes*) are new records for Iran and Asia, respectively. Beyond this, 13 new insect host records are reported for heterostigmatic mites. Finally, the world distribution of the recovered mites is reviewed.

KEY WORDS: Female; insect; new host record; north of Iran; phoresy.

PAPER INFO.: Received: 12 May 2020, Accepted: 24 May 2020, Published: 15 July 2020

INTRODUCTION

More than 2000 described species of Heterostigmata (Acari: Prostigmata) are classified in eight superfamilies (Walter *et al*. 2009; Zhang *et al*. 2011). This cohort includes primarily fungivorous species, along with other representatives with free-living and parasitic lifestyles. Phoresy is observed in majority of the species, generally in association with insects (Kaliszewski *et al*. 1995; Walter *et al*. 2009). The taxonomical and biological aspects of these small-sized mites (140–600 µm) are poorly studied in most parts of the world (Lindquist 1986; Walter *et al*. 2009). Golestan Province, in northern Iran, is located along southern shore of Caspian Sea and north of Alborz mountains. It has a moderate and humid climate providing an ideal habitat for a diverse arthropod fauna including mites. Nevertheless, around three genera and 17 heterostigmatic species have been described from Golestan so far (see Rahiminejad *et al*. 2011a, b, c; Hajiqanbar *et al*. 2012; Hosseininaveh *et al*. 2013; Hajiqanbar and Hosseininaveh 2014; Rahiminejad and Hajiqanbar 2015; Rahiminejad *et al*. 2015a, b; Hosseininaveh *et al*. 2015; Rahiminejad *et al*. 2016). Such limited faunistic knowledge about these

How to cite: Rahiminajad, V. & Hajiqanbar, H. (2020) New records of mites of the Heterostigmata (Acari: Prostigmata) associated with insects from Golestan Province, northern Iran. *Persian Journal of Acarology*, 9(3): 233–242.

mites in this region may prompt more taxonomical studies to better understand their species diversity and complex symbiotic relationships with insects. Pursuant to this objective and along with impact of these mites on the transmission of some plant pathogens and also their beneficiary aspects in biocontrol of agricultural pests (Kaliszewski *et al*. 1995; Moser *et al*. 2010; Rahiminejad *et al*. 2011b), this study was performed in Golestan province, northern Iran.

MATERIALS AND METHODS

The host insect specimens were captured using light trap, netting or direct sampling from their habitats during spring, summer and autumn 2013 and 2014 from various habitats of Golestan province in northern Iran and preserved in 75% ethanol. Mites were collected from their hosts under an Olympus stereomicroscope and cleared in lactophenol. The mites were mounted in Hoyer's medium and studied with a phase contrast microscope (model BX51, Olympus). The taxonomical hierarchy used here follows that of Kaliszewski *et al*. (1995) and the classification system of Pygmephoroidea follows that of Khaustov (2004, 2008b). All obtained specimens were adult females. All materials were collected by the first author. The host insects were identified with the sincere help of some experts: Dr. A. Anichtchenko (Institute of Systematic Biology, Daugavpils University, Latvia) for carabid beetles, Dr. G.V. Nikolajev (Al-Farabi Kazakh National University, Almaty, Kazakhstan) for scarabaeid beetles, Dr. Mikhail Danilevsky (Russian Academy of Sciences, St. Petersburg, Russia) for cerambycid beetles and Dr. Bernhard Seifert (Department of Entomology, Senckenberg Museum für Naturkunde, Berlin, Germany) for ant hosts. All materials are deposited in the Acarological Collection, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran.

NOTES ON THE RESULTS

The mites are arranged alphabetically by families within superfamilies, genera within families and species within genera.

World distribution – Country(ies), host(s) [as given in source publication], source publication(s).
Material examined – All available data about species, host(s), sampling method(s) and location(s).
Remarks – Any relevant information [new record for fauna of Iran and/or new host record(s)].

RESULTS

Cohort Heterostigmata
Superfamily Dolichocyboidea Mahunka, 1970
Family Dolichocybidae Mahunka, 1970
Genus *Formicomotes* Sevastianov, 1980

Formicomotes octipes Sevastianov, 1980

World distribution – Ukraine, 14 females associated with *Lasius fuliginosus* (Latreille) (Hym.: Formicidae) (Sevastianov 1980). Crimea, 31 females in wet forest litter under oriental beech *Fagus orientalis* Lipsky (Khaustov and Frolov 2018).
Material examined – Two females removed from a vial containing 22 *Tetramorium* sp. (Hym.: Formicidae) and 2 females extracted from a vial containing 11 *Tetramorium* sp., both captured by a light trap in shore of Caspian Sea, Bandar-E-Turkmen, 36.89 N, 54.05 E, and altitude 1 m a.s.l., 6 May 2013 and in Oak forest in the Alang-Dareh forest, Gorgan, 36.46 N, 54.26 E, and altitude 301 m a.s.l., 16 August 2014, respectively.

Remarks – Genus *Formicomotes* is new for mite fauna of Asia. Also, this is a new association between this mite and the ant genus *Tetramorium*. Another species of this genus, *F. heteromorphus* Magowski, 1988 reported from Thailand as a pest of cultivated mushroom, *Auricularia polytricha* (Walter *et al*. 2009). Third species of the genus, *Formicomotes brasieliensis* Khaustov and Forolov, 2018 was described associated with termite workers, *Nasutitermes* sp., from Brazil (Khaustov and Frolov 2018).

Superfamily Pygmephoroidea Cross, 1965
Family Microdispidae Cross, 1965
Genus *Premicrodispus* Cross, 1965

Premicrodispus longicaudus Khaustov, 2006

World distribution – Crimea, in a soil sample (Khaustov 2006); Iran, in a soil sample of pomegranate orchards (Filekesh *et al*. 2014).
Material examined – Three colonies of females were obtained in the vials containing beetles *Geotrupes spiniger* (Col.: Geotrupidae) and *Lucanus ibericus* (Col.: Lucanidae) during over-night samplings by a light trap in Alang-Dareh forest, Gorgan, HezarPich hill 36.83 N, 54.39 E, and altitude 430 m a.s.l., Gorgan and Kordkuy forest 36.75 N, 54.11 E, and altitude 50 m a.s.l., during Summer 2014.
Remarks – This is the first phoresy record for this mite.

Premicrodispus rackae Khaustov, 2006

World distribution – Crimea, in nest of an undetermined small mammal (Khaustov 2006); Iran, Golestan province, in bottom of a vial containing ethanol and two beetles *Oryctes nasicornis* L. (Coleoptera: Scarabaeidae) (Badoodam *et al*. 2015).
Material examined – Several colonies of this species were extracted from vials containing beetles of the *Geotrupes spiniger* (Col.: Geotrupidae) during over-night samplings by a light trap in Alang-Dareh forest, Gorgan, AliAbad forest 36.88 N, 54.89 E, and altitude 155 m a.s.l., during Spring and Summer 2013.
Remarks. The *G. spiniger* is a new host record for this mite.

Family Neopygmephoridae Cross, 1965
Genus *Kerdabania* Khaustov, 2009

Kerdabania minuta Khaustov, 2009

World distribution – Ukraine, from soil (Khaustov 2009); Iran, associated with *Ophion obscuratus* Fabricius (Hym.: Ichneumonidae) (Loghmani *et al*. 2014a).
Material examined – One mite colony including four specimens of the mite associated with *Geotrupes spiniger* (Marsham, 1802) (Col.: Geotrupidae) was found. The hosts captured by a light trap in AlangDareh forest, Gorgan, 08 August 2014.
Remarks – This is a newly uncovered association between this mite and a beetle.

Genus *Petalomium* Cross, 1965

Petalomium crinitus Khaustov and Trach, 2013

World distribution – Ukraine, associated with *Lasius* sp. (Hym.: Formicidae) (Khaustov and Trach 2013). It was also recorded from Western Siberia, Russia in association with *Lasius niger* (Khaustov and Tolstikov 2016). This species is also reported from an unidentified species of *Lasius* from Isfahan, Iran (Tajodin 2013).
Material examined – One specimen associated with *Tetramorium* sp. (Hym.: Formicidae) was found, the hosts captured by a light trap in Alang-Dareh forest, Gorgan, 30 June 2014.
Remarks – This is the first known phoretic association between the mite and the ant genus *Tetramorium*.

***Petalomium nataliae* (Sevastianov, 1967)**

World distribution – This species was described from Belarus and Ukraine where it was collected from the ant *Lasius niger* (L.) (Hym.: Formicidae) (Sevastianov 1967). It was also recorded from Japan (Kurosa 1980), Hungary (Mahunka 1986) and Switzerland (Mahunka 1977) from *L. niger*. Finally, Khaustov (2014) reported it from Russia associated with *Tetramorium caespitum* (L.) and *Lasius niger*.
Material examined – Six specimens obtained from *Tetramorium* sp. (Hym.: Formicidae). The hosts captured by a light trap in Nokandeh forest, Bandar-E-Gaz, 36.70 N, 53.94 E, and altitude 15 m a.s.l., 05 July 2014.
Remarks – This is a new record for mite fauna of Iran.

Family Pygmephoridae Cross, 1965
Genus *Elattoma* Mahunka, 1969

***Elattoma kornilovi* Khaustov, 2000**

World distribution – Crimea, in association with beetles *Dryocoetes villosus* (Fabricius) and *Taphrorychus villifrons* (Dufour) (Col.: Curculionidae: Scolytinae) (Khaustov 2000).
Material examined – One mite colony including six specimens attached to ventral body surface (around coxae II-III) of *Morimus verecundus* (Faldermann) (Col.: Cerambycidae) was found. The hosts captured directly in forest of Gorgan, Bandar-E-Gaz, Nokandeh and Kordkoy during Summer 2013–14.
Remarks – *Morimus verecundus* is a new host record for this mite. Also, this species is a new record for mite fauna of Asia.

Genus *Pediculaster* Vitzthum, 1931

***Pediculaster camerikae* Khaustov, 2008**

World distribution – Crimea, in cow dung (Khaustov 2008a); Western Siberia, in cow dung (Khaustov 2020).
Material examined – One mite colony including 21 specimens attached to ventral body surface of *Helina* sp. (Diptera: Muscidae) was found. The hosts captured by a light trap in shore of Caspian Sea, Bandar-E-Turkmen, 30 May 2014.
Remarks – This species is recorded from Iran for the first time. Also, it is the first record of phoresy for this mite.

***Pediculaster pseudomanicatus* Camerik, 2001**

World distribution – This species was described from the USA for the first time (Camerik 2001). It also was reported from Germany (Rack 1974) as *P. manicatus* (Berlese, 1904). Then, Khaustov (2008a) found it in the soil and reported for the Ukrainian fauna. The species reported from Iran in several cases (Hajiqanbar 2002; Haddad Irani-Nejad *et al*. 2005).
Material examined – One mite colony including 12 specimens detached from ventral body surface of *Helina* sp. (Diptera: Muscidae). The hosts captured by a light trap in shore of Caspian Sea, Bandar-E-Turkmen, 06 June 2013.
Remarks – The genus *Helina* is a new host record for this mite.

Family Scutacaridae Oudemans, 1916
Genus *Archidispus* Karafiat, 1959

Archidispus szaboi Mahunka, 1977

World distribution – Hungary and Ukraine, under elytra of *Pogonistes rufoaeneus* Dej (Col.: Caraidae) (Khaustov 2008b).
Material examined – Three females of the species extracted from *Amara* sp. (Col.: Carabidae) which were collected by a light trap in shore of Caspian Sea, Bandar-E-Turkmen, 15 September 2013.
Remarks – This is a new record for mite fauna of Iran.

Genus *Imparipes* Berlese, 1903

Imparipes (*Sporichneuthes*) *intermedius* Paoli, 1911

World distribution – Italy and Ukraine, collected from forest soil and litter (Khaustov 2008b).
Material examined – One specimen of the species was obtained in a vial containing alcohol and beetles *Onthophagus* sp. (Col.: Scarabaeidae) during over-night sampling by a light trap in Alang-Dareh forest, Gorgan, 5 August 2014.
Remarks – This is the first record of phoresy for this mite species. The subgenus *Imparipes* (*Sporichneuthes*) is reported from Asia for the first time.

Superfamily Pyemotoidea Oudemans, 1937
Family Caraboacaridae Mahunka, 1970
Genus *Caraboacarus* Kraczal, 1959

Caraboacarus stammeri Krczal, 1959

World distribution – The species has been recorded from Holarctic, and has the most distribution and least host specificity among all caraboacarid mites (Katlav *et al*. 2015).
Material examined – Three large colonies of females obtained under the elytra of ground beetles of *Calosoma* Weber, 1801 and *Harpalus* Latreille, 1802. The host beetles were collected from all over the Golestan Province during Summer 2014.
Remarks – This is the first report of the family Caraboacaridae in Golestan Province.

Superfamily Trochometridioidea Mahunka, 1970
Family Trochometridiidae Mahunka, 1970
Genus *Trochometridium* Cross, 1965

Trochometridium kermanicum Mortazavi & Hajiqanbar, 2011

World distribution – Iran: Kerman Province, collected from *Paulusiella* sp. (Col.: Elateridae); Razavi Khorasan Province, ex. *Komarowia tartara* (Saussure) (Hym.: Tiphiidae); Mazandaran Province, under elytra of *Coccobius schreberi* (L.) (Col.: Scarabaeidae) (Mortazavi *et al.* 2011; Loghmani *et al*. 2014b; Hajiqanbar and Arjomandi 2019).
Material examined – Two specimens of the mite *Trochometridium kermanicum* found in a vial containing ethanol 75% and five earwigs of the *Labidura riparia* (Pallas, 1773) (Derm.: Labiduridae) and three specimens of the mite associated with *Gryllus desertus* Pall (Orthoptera: Gryllidae) in shore of Caspian Sea, Bandar-E-Turkmen, 36.89 N, 54.05 E, and altitude 1 m a.s.l., 12 July 2013 and three September 2014.
Remarks – The *G. desertus* is a new host record for the mites of the family Trochometridiidae. This is the first record of phoresy of this mite on earwigs. Also, this is the second report of phoresy of the family Trochometridiidae and the order Dermaptera. Previously, *T. chinensis* (Mahunka, 1966) was reported in association with an earwig belonging to the family Labiduridae from North Khorasan province (Hajiqanbar *et al*. 2009; Mortazavi *et al*. 2011).

ACKNOWLEDGMENTS

We would like to express our thanks to Gorgan University of Agricultural Science and Natural Resource and Tarbiat Modares University for their support. The authors would like to thank the referees for their valuable comments which helped to improve the manuscript.

REFERENCES

Badoodam, S., Hajiqanbar, H. & Talebi, A.A. (2015) New species and records of the family Microdispidae (Acari: Prostigmata) from Golestan province, Iran. *International Journal of Acarology*, 41(7): 600–605.
DOI: 10.1080/01647954.2015.1084047

Berlese, A. (1904) Diagnosi di alcune nuove specie di Acari italiani, mirmecofili e liberi. *Zoologischer Anzeiger*, 27: 12–28.

Camerik, A.M. (2001) Description of holotype of *Pediculaster manicatus* (Berlese), 1904 and description of *P. pseudomanicatus* n. sp. (Acari: Pygmephoridae). *International Journal of Acarology*, 27(1): 13–28.

Filekesh, M., Hajiqanbar, H. & Jabaleh, I. (2014) New records of three species of the superfamily Pygmephoroidea (Acari: Heterostigmata) from Asia. *Persian Journal of Acarology*, 3: 277–283.
DOI: 10.22073/pja.v3i4.10170

Gao, J.R. & Zou, P. (2010) Dolichocyboidea, Pygmephoroidea, Scutacaroidea and Trochometridioidea of China: a review of progress, with a checklist. *Zoosymposia*, 4: 165–174.

Haddad Irani-Nejad, K., Hajiqanbar, H. & Talebi Chaichi, P. (2005) An introduction of the prostigmatic mites in sugarbeet fields in Miandoab plain. *Iranian Journal of Agricultural Science*, 36(1): 247–262.

Hajiqanbar, H. (2002) *Mite fauna of the sugarbeet fields of Miandoab plain*. M. Sc. thesis. *Department of Plant Protection, Faculty of Agriculture, Tabriz University, Tabriz, Iran*, 280 pp.

Hajiqanbar, H. & Arjomandi, E. (2019) Heterostigmatic mites (Acari: Trombidiformes: Prostigmata) associated with Coleoptera and Hymenoptera in Mazandaran province, northern Iran. *Persian Journal of Acarology*, 8(4): 343–352.

Hajiqanbar, H. & Hosseininaveh, F. (2014) A new genus and species of the family Microdispidae (Acari: Prostigmata) associated with *Oryctes nasicornis* (Coleoptera: Scarabaeidae) and redescription of the monotypic genus *Vietodispus* Mahunka, 1975. *Zoological Studies*, 53: 58. DOI: 10.1186/s40555-014-0058-7.

Hajiqanbar, H., Khaustov, A.A., Kamali, K., Saboori, A. & Kamali, H. (2009) New taxa of the family Trochometridiidae (Acari: Heterostigmata) associated with insects from Iran. *Journal of Natural History*, 43 (43–44): 2701–2722.

Hajiqanbar, H., Rahiminejad, V. & Fathipour, Y. (2012) New insect host records for mites of the family Microdispidae (Acari: Heterostigmatina), with description of a new species of the genus *Paramicrodispus*. *Entomological Science*, 15(3): 309–313. DOI: 10.1111/j.1479-8298.2012.00515.x

Hosseininaveh, F., Hajiqanbar, H. & Talebi, A.A. (2013) First record of the *Premicrodispus akermanae* (Sevastianov and Al Douri, 1988) (Acari: Microdispidae) from Iran. *In*: Joharchi, O. & Saboori, A. (Eds.), *Abstract book of the 2nd International Persian Congress of Acarology*, *Tehran*, *Iran*, p. 15.

Hosseininaveh, F., Hajiqanbar, H. & Talebi, A.A. (2015) Two new species of the genus *Premicrodispus* (Acari: Microdispidae) associated with beetles (Coleoptera: Lucanidae: Tenebrionidae), with a key to Palaearctic species of the genus. *Journal of Natural History*, 49: 915–931. DOI: 10.1080/00222933.2014.953225

Kaliszewski, M., Athias-Binche, F. & Lindquist, E.E. (1995) Parasitism and parasitoidism in Tarsonemina (Acari: Heterostigmata) and evolutionary consideration. *Advances in Parasitology*, 35: 335–367.

Katlav, A., Hajiqanbar, H. & Talebi, A.A. (2015) A contribution to the knowledge of heterostigmatic mites (Acari: Prostigmata) in western Mazandaran Province, Northern Iran. *Acarologia*, 55(3): 311–320. DOI: 10.1051/acarologia/20152175

Khaustov, A.A. (2000) Mites of the genus *Elattoma* (Acariformes: Pygmephoridae) from Crimea and North-West Russia. *Vestnik Zoologii*, 34(1–2): 77–83.

Khaustov, A.A. (2004) Mites of the family Neopygmephoridae Cross, 1965 stat. n. and their position in Heterostigmata, *In*: Balashov, Y.S. (Ed.), *VIII Russian Acarological Conference*. Zoological Institute of RAS, St. Petersburg. p. 137.

Khaustov, A.A. (2006) A review of the genera *Premicrodispus* Cross, 1965 and *Dolichodispus* gen. nov. (Acari: Microdispidae) of Crimea. *Acarina*, 14(2): 155–174.

Khaustov, A.A. (2008a) A new mite genus of the family Pygmephoridae (Acari, Heterostigmata) from Russia. *Entomological Review*, 88: 491–496.

Khaustov, A.A. (2008b) *Mites of the family Scutacaridae of Eastern Palaearctic*. Akademperiodyka, Kiev, 291 pp.

Khaustov, A.A. (2009) A new genus and three new species of the family Microdispidae (Acari: Heterostigmata) from Crimea. *Acarina*, 17(1): 65–73.

Khaustov, A.A. (2014) A new species of the genus *Petalomium* (Acari: Heterostigmatina: Neopygmephoridae) from Western Siberia with redescription of *Petalomium nataliae* (Sevastianov, 1967). *Acarina*, 22: 100–108.

Khaustov, A.A. (2020) Three new species and new records of *Pediculaster* (Acari: Pygmephoridae) from Western Siberia, Russia. *Acarologia*, 60(2): 317–337.

Khaustov, A.A. & Frolov, A.V. (2018) A new species of *Formicomotes* Sevastianov (Acari: Heterostigmata: Dolichocybidae) associated with termites (Isoptera: Termitidae) from Brazil, with redescription of *Formicomotes octipes* Sevastianov, 1980. *Zootaxa*, 4382(2): 393–400.

Khaustov, A.A. & Tolstikov, A.V. (2016) The diversity, mite communities, and host specificity of pygmephoroid mites (Acari: Pygmephoroidea) associated with ants in Western Siberia, Russia. *Acarina*, 24(2): 113–136.

Khaustov, A.A. & Trach, V.A. (2013) New and little-known species of myrmecophilous mites of the genus *Petalomium* (Acari: Heterostigmata: Neopygmephoridae) from Ukraine. *Acarina*, 21(1): 43–52.

Kurosa, K. (1980) Caraboacaridae, Pygmephoridae, Scutacaridae. *In*: Ehara, S. (Ed.), *Illustrations of the mites and ticks of Japan*. Zenkoku Noson Kyoiku Kyokai, Tokyo, pp. 214–241.

Lindquist, E.E. (1986) The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetic and systematic revision with a reclassification of family-group taxa in the Heterostigmata. *Memoirs of the Entomological Society of Canada*, 136: 1–517.

Loghmani, A., Hajiqanbar, H. & Talebi, A.A. (2014a) New records of mites of the superfamily Pygmephoroidea (Acari: Heterostigmatina) associated with insects from northeastern Iran and new host records. *Systematic and Applied Acarology*, 19(2): 154–159.
DOI: 10.11158/saa.19.2.5

Loghmani, A., Hajiqanbar, H. & Talebi, A.A. (2014b) An illustrated key to world species of the mite family Trochometridiidae (Acari: Prostigmata), with description of a new species and new insect host records. *Canadian Entomologist*, 146(5): 471–480.
DOI: 10.4039/tce.2014.3

Mahunka, S. (1977) Neue und interessante Milben aus dem Genfer Museum XiX. Einige Angaben zur Kenntnis der Milbenfauna der Ameisen-Nester (Acari: Acarida, Tarsonemida). *Archives des Sciences Geneve*, 30(1): 91–106.

Mahunka, S. (1986) Tarsonemids of the Kiskunság national park. *In*: Mahunka S. (Ed.), The fauna of the Kiskunság national park I, Series: Natural History of the National Parks of Hungary 4, Akadémiai Kiadó, Budapest, pp. 435–455.

Mortazavi, A., Hajiqanbar, H. & Saboori, A. (2011) A new species of the family Trochometridiidae (Acari: Heterostigmatina) associated with *Paulusiella* sp. (Coleoptera: Elateridae) from Iran. *Zootaxa*, 2746: 57–68.

Moser, J.C., Konrad, H., Blomquist, S.R. & Kirisits, T. (2010) Do mites phoretic on elm bark beetles contribute to the transmission of Dutch elm disease? *Naturwissenschaften*, 97: 219–227.

Rack, G. (1974) Neue und bekannte Milbenarten der Überfamilie Pygmephoroidea aue dem Saalkreis bei Halle (Acarina, Tarsonemida). *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 87(4): 499–521.

Rahiminejad, V. & Hajiqanbar, H. (2015) A new species of the genus *Acarophenax* (Acari: Heterostigmatina: Acarophenacidae) associated with *Sphindus* sp. (Coleoptera: Sphindidae) from Iran. *Persian Journal of Acarology*, 4(3): 277–286.

Rahiminejad V., Hajiqanbar H. & Fathipour Y. (2011a) Redefinition of the genus *Dolichocybe* (Acari: Dolichocybidae), with description of two new species associated with insects. *Annals of the Entomological Society of America*, 104: 627–635.

Rahiminejad, V., Hajiqanbar, H. & Fathipour, Y. (2011b) Two new species of the genus *Elattoma* (Acari: Heterostigmatina: Pygmephoridae) phoretic on *Morimus verecundus* (Coleoptera: Cerambycidae) from Iran. *Zootaxa*, 2903: 48–56.

Rahiminejad, V., Hajiqanbar, H. & Fathipour, Y. (2011c) A new species of the genus *Spatulaphorus* (Acari: Heterostigmatina: Pygmephoridae) phoretic on *Geotrupes spiniger* (Coleoptera: Geotrupidae) from Iran. *Annales Zoologici*, 61: 547–551.

Rahiminejad, V., Hajiqanbar, H. & Talebi, A. (2015a) Three new species of the genus *Caesarodispus* (Acari: Microdispidae) associated with ants (Hymenoptera: Formicidae), with a key to species. *Entomological Science*, 18: 461–469.

Rahiminejad, V., Hajiqanbar, H. & Talebi, A. (2016) A new genus and species of the family Pygmephoridae (Acari: Heterostigmata) associated with *Carpelimusrivularis* (Coleoptera: Staphylinidae). *Systematic and Applied Acarology*, 21(4): 461–470.

Rahiminejad, V., Hajiqanbar, H., Khaustov, A. & Talebi, A. (2015b) A new genus and two new species of the family Pygmephoridae (Acari: Heterostigmata) associated with beetles (Insecta: Coleoptera). *Annals of the Entomological Society of America*, 108(5): 893–901.

Sevastianov, V.D. (1967) Mites of the genus *Pygmephorus* (Pyemotidae, Trombidiformes) of the USSR fauna. *Zoologicheskiy zhurnal*, 46 (3): 351–364 (In Russian).

Sevastianov V.D. (1980) New taxa of mites of the family Dolichocybidae (Trombidiformes, Tarsonemina) and phylogenetic relations of its subfamilies. *Zoologicheskiy Zhurnal*, 59: 1453–1462 (In Russian).

Tajodin, M. (2013) *Heterostigmatic mites (Acari: Heterostigmatina) associated with insects in west of Isfahan Province, Iran*. M.Sc. thesis. Department of Plant Protection, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran, 96 pp.

Walter, D.E., Lindquist, E.E., Smith, I.M., Cook, D.R. & Krantz, G.W. (2009) Order Trombidiformes. *In*: Krantz, G.W. & Walter, D.E. (Eds.), *A manual of Acarology*. 3rd edition. Texas Tech University Press, pp. 83–96.

Zhang, Z.-Q., Fan, Q.-H., Pesic, V., Smit, H., Bochkov, A.V., Khaustov, A.A., Baker, A., Wohltmann, A., Wen, T.-H., Amrine, J.W., Beron, P., Lin, J.-Z., Gabrys, G. & Husband, R. (2011) Order Trombidiformes Reuter, 1909. In: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. Zootaxa, 3148: 1–237.

گزارش‌های جدید از کنه‌های هترواستیگما (Acari: Prostigmata) مرتبط با حشرات از استان گلستان، شمال ایران

وحید رحیمی نژاد[۱،۲] و حمیدرضا حاجی‌قنبر[۱*]

۱- گروه حشره‌شناسی کشاورزی، دانشکدهٔ کشاورزی، دانشگاه تربیت مدرس، تهران، ایران؛ رایانامه: hajiqanbar@modares.ac.ir

۲- آدرس فعلی: گروه گیاه پزشکی، دانشکدهٔ تولیدات گیاهی، دانشگاه علوم کشاورزی و منابع طبیعی گرگان، گلستان، ایران.

* نویسندهٔ مسئول

چکیده

ناحیهٔ مرطوب و معتدل در شمال ایران فون غنی از بندپایان را در خود جای داده است، با این حال فون کنه‌های استان گلستان، با آب و هوای معتدل خزری، به میزان اندکی مطالعه شده و بررسی‌های سیستماتیک بیشتری نیاز دارد. در این مطالعه، فون کنه‌های هترواستیگما (Acari: Prostigmata: Eleutherengonides) مرتبط با حشرات در استان گلستان بررسی شد. از هر دو روش نمونه‌برداری روزانه و شبانه برای به دام انداختن حشرات در مناطق نمونه برداری استفاده شد. سیزده گونه از هفت خانوادهٔ هترواستیگما شناسایی شدند: Dolichocybidae (یک گونه)، Caraboacaridae (یک گونه)، Trochometridiidae (یک گونه)، Neopygmephoridae (سه گونه)، Pygmephoridae (سه گونه)، Scutacaridae (دو گونه) و Microdispidae (دو گونه). جنس *Formicomotes* و زیرجنس *Imparipes* (*Sporichneuthes*) به ترتیب گزارش‌های جدید برای ایران و آسیا هستند. افزون بر این، ۱۳ رکورد میزبانی جدید از حشرات برای کنه‌های هترواستیگما گزارش می‌شود. همچنین، مناطق انتشار جهانی کنه‌های جمع‌آوری شده مرور شده است.

واژگان کلیدی: ؛ ماده؛ حشره؛ گزارش میزبانی جدید؛ شمال ایران؛ همسفری.

اطلاعات مقاله: تاریخ دریافت: ۱۳۹۹/۲/۲۳، تاریخ پذیرش: ۱۳۹۹/۳/٤، تاریخ چاپ: ۱۳۹۹/٤/۲۵