Persian J. Acarol., 2020, Vol. 9, No. 2, pp. 141–160.
http://dx.doi.org/10.22073/pja.v9i2.58955
Journal homepage: http://www.biotaxa.org/pja

Article

Oribatid mites (Acari: Oribatida) of Taft county, Yazd province of Iran, with new records

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ABSTRACT
Faunal study of oribatid mites (Acari: Oribatida) in Taft township (Yazd province, central Iran) was conducted for the first time. In total, 63 species belonging to 48 genera and 31 families were collected and identified. Among them, five species *Cosmochthonius plumatus* Berlese, 1910, *Thamnacarus smirnovi* Bulanova-Zachvatkina, 1978, *Acrotritia simile* Mahunka, 1982, *Belba bulanovae* Subías, 2016, and *Bipassalozetes lineolatus* (Sitnikova, 1975) are newly recorded for mite fauna of Iran, and 13 families, 25 genera and 36 species are reported for the first time from the Yazd province.

KEY WORDS: Arthropoda; central Iran; Cryptostigmata; fauna; Sarcoptiformes.

PAPER INFO.: Received: 29 December 2019, Accepted: 12 February 2020, Published: 15 April 2020

INTRODUCTION

Yazd province (29° 48' to 33° 30' N and 52° 45' to 56°30' E) is situated in the Central Plateau of Iran (Fig. 1), a region at an oasis where the Dasht-e Kavir and the Dasht-e Lut deserts meet, covering about 74,493 km^2 (4.5% of total area of Iran). Most of the area includes desert plain regions (the desert areas cover about 38% of Yazd province, and the areas include different desert geomorphologic faces) surrounded with mountains, running from a northwestern to a southeastern direction. The climate is cold and moist winters and hot and dry summers. Climatologically, the province is an arid and cold region according to Emberge climatic classification. Precipitation is varied in the province and ranges from 50 mm in hot deserts to 300 mm in high elevated regions (like Shirkuh Mountain with an altitude of 4075 m above sea level), with mean annual precipitation of 60–80 mm. This province has 10 counties, one of which, Taft is located southwest to the city of Yazd. Taft (31° 45′ N and 54° 14′ E) covers an area of more than 6,000 square kilometers rising from 1200 to 4075 m above sea level. Due to the location of Taft on the slopes of Shirkuh Mountain, it can be called the province's roof and has a cooler climate than other counties in the province.

Oribatid biodiversity has been poorly studied in Yazd province. In previous studies by Bayartogtokh and Akrami (2000a, b), Akrami (2001) and Mahunka and Akrami (2001) only thirty-two species were listed from Abarkouh county, while the rest of this wide province has not been investigated. Thus, no information was available on the oribatid fauna of Taft before this research. Therefore, we aimed to investigate the oribatid fauna of the Taft county in Central Iran to add more

How to cite: Akrami, M.A. & Shahedi, A. (2020) Oribatid mites (Acari: Oribatida) of Taft county Yazd province of Iran with new records. *Persian Journal of Acarology*, 9(2): 141–160.

data for this poorly studied region, and to provide information about new country/regional records based on materials collected between 2016 and 2018.

MATERIALS AND METHODS

During 2016–2018, soil and litter samples were collected from various locations in Taft county using standard soil sampling technique and the mites were extracted using modified Berlese-Tullgren apparatus. Oribatid mites were removed, cleared in lactic acid and mounted in Hoyer's medium on glass microscope slides for identification. The slides were placed in an oven at 45 °C for two weeks and then the specimens were examined using a light microscope (Zeiss Standard 20). Identification of adults was based on Ghilarov and Krivolutsky (1975), Balogh and Mahunka (1983), Balogh and Balogh (1992 a, b), and Weigmann (2006). The classification of oribatid mites and data for global distribution of mites are provided after Subías (2004, updated 2019). Data for distribution in Iran are shown after Bayartogtokh and Akrami (2000a, b), Mahunka and Akrami (2001), Akrami and Subías (2008), Akrami and Saboori (2012), Behmanesh *et al*. (2012), Bayartogtokh & Akrami (2014), Akrami (2015), Akrami and Bastan (2015) and Lotfollahi *et al*. (2017). All specimens are deposited in the Acarological Collection of the Department of Plant Protection, School of Agriculture, Shiraz University, Shiraz, Iran.

RESULTS

During this study, 63 species of oribatid mites belonging to 48 genera and 31 families were identified, of which five species are reported for the first time from Iran, and 13 families, 25 genera and 36 species for the first time from Yazd province. Since most of the known species reported here are well recognizable, we do not intend to give redescriptions of them; however, notes on their geographic distribution in the world and Iran are provided for each species.

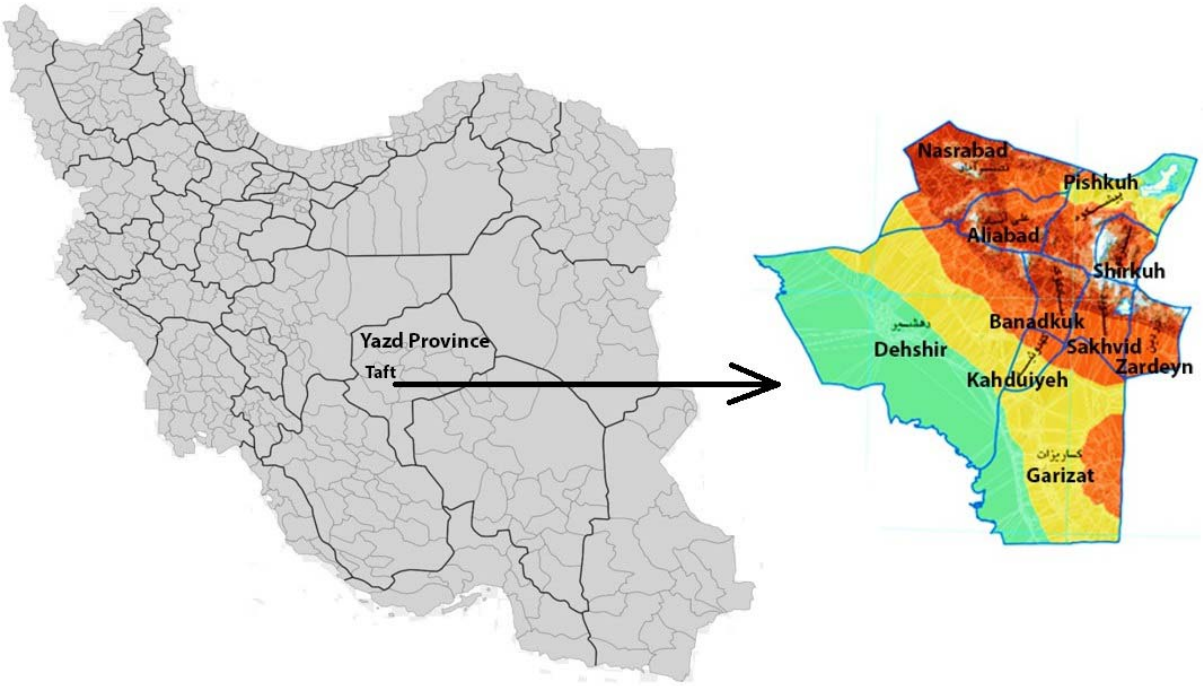

Figure 1. Left: map of Iran, specifying Yazd province and Taft county (the border of the provinces and counties are marked with dark and pale lines, respectively). Right: map of Taft county, specifying main sampling areas (the mountainous areas are marked with darker color).

List of species according to their families

Superfamily Palaeacaroidea Grandjean, 1932
Family Ctenacaridae Grandjean 1954
Genus *Ctenacarus* Grandjean, 1939

***Ctenacarus araneola* (Grandjean 1932)**

Sample code: M8 (refer Table 1 and figure 1 for details of codes and locations).
Global distribution: Pantropical and Subtropical regions.
Distribution in Iran: Yazd (Abarkouh), Fars, Razavi Khorasan and East Azerbaijan provinces.

Genus *Gilarovella* Lange, 1974

***Gilarovella demetrii* Lange, 1974**

Sample code: T15, A7.
Global distribution: Southern Holarctic (Southern Palearctic and U.S.A.: New Mexico).
Distribution in Iran: Yazd (Abarkouh), Fars and East Azerbaijan provinces.

Family Adelphacaridae Grandjean 1954
Genus *Adelphacarus* Grandjean, 1952

***Adelphacarus reticulatus* Lotfollahi, 2017**

Sample code: E5.
Global distribution: Iran.
Distribution in Iran: East Azerbaijan province.

Genus *Aphelacarus* Grandjean, 1932

***Aphelacarus acarinus acarinus* (Berlese 1910)**

Sample code: E4, D23.
Global distribution: Semicosmopolitan (Holarctic, Ethiopian, Neotropical regions).
Distribution in Iran: Yazd (Abarkouh), Hamadan, Khuzestan, Fars, Razavi Khorasan and East & West Azerbaijan provinces.

Superfamily Hypochthonioidea Berlese, 1910
Family Hypochthoniidae Berlese 1910
Genus *Hypochthonius* Koch, 1835

***Hypochthonius luteus* Oudemans 1917**

Sample code: K1, D26, F5, S8, B7, A4, A7, D25, T22, T1, D6, T24, T27, F2.
Global distribution: Holarctic region, northeast of Oriental region, New Zealand.
Distribution in Iran: Yazd (Abarkouh), Hamadan, Fars, Mazandaran, Guilan, Kerman, Zanjan, East Azerbaijan, Razavi Khorasan and Lorestan provinces.

Superfamily Cosmochthonioidea Grandjean, 1947
Family Cosmochthoniidae Grandjean, 1947
Genus *Cosmochthonius* Berlese, 1910

Cosmochthonius (*Cosmochthonius*) *lanatus* (Michael, 1885)

Sample code: T26, D17.
Global distribution: Cosmopolitan (except Australia and Antarctic).
Distribution in Iran: Guilan, East & West Azerbaijan and Razavi Khorasan provinces.
Notes: This is the first record of the genus for Yazd province.

Cosmochthonius (*Cosmochthonius*) *plumatus plumatus* Berlese, 1910

Sample code: M5, D1, E1, T14, T15, E4, E5, D17, F7.
Global distribution: Southern Holarctic, Neotropical and Southeastern China.
Notes: This is the first record of this species for mite fauna of Iran.

Cosmochthonius (*Cosmochthonius*) *reticulatus* Grandjean, 1947

Sample code: K1, F6, B6, D20, D25, E2, S3, D9, T18, T19, T26, F2.
Global distribution: Southern Palearctic, Oriental (south-east China and India: west Bengal) and Neotropical regions.
Distribution in Iran: Fars, Kerman, Kermanshah, East Azerbaijan and Razavi Khorasan provinces.
Notes: This is the first record of this species for Yazd province.

Genus *Phyllozetes* Gordeeva, 1978

Phyllozetes emmae (Berlese, 1910)

Sample code: D23.
Global distribution: Pantropical (except Ethiopian) and Subtropical.
Distribution in Iran: Yazd (Abarkouh), Khuzestan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran and Guilan provinces.

Family Haplochthoniidae Hammen, 1959
Genus *Haplochthonius* Willmann, 1930

Haplochthonius (*Haplochthonius*) *sanctaeluciae* Bernini, 1973

Sample code: M5, D3, T14, D9, P1, A10, G1, K3.
Global distribution: Subtropical: Southern Palearctic (Mediterranean and Central Northwest Asia) and tropical: Senegal and Neotropical (Galapagos and Chile).
Distribution in Iran: Khuzestan, Fars, Zanjan, Kermanshah and Lorestan provinces.
Notes: This is the first record of the family for Yazd province.

Haplochthonius (*Haplochthonius*) *simplex* (Willmann, 1930)

Sample code: E2, E5, D18, S7, F4, F5, R1, F6, K3.
Global distribution: Semicosmopolitan: Holarctic, Ethiopian, Oriental and Brazil.
Distribution in Iran: Razavi Khorasan, Fars, East Azerbaijan and Zanjan provinces.

Family Sphaerochthoniidae Grandjean, 1947
Genus *Sphaerochthonius* Berlese, 1910

Sphaerochthonius splendidus (Berlese, 1904)

Sample code: A4, A5, D23, F6, A8, K1, S7, S10, G1, F4, F5, R2, F2, T8, D4, E2, D9, T18, D17, T27, T22.

Global distribution: Pantropical: Oriental (Southeast China and Vietnam), Australian (Australia and Polynesia), Neotropical, Ethiopian and Subtropical (southern Holarctic).
Distribution in Iran: Yazd (Abarkouh), Hamadan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi and Kermanshah provinces.

Superfamily Epilohmannioidea Oudemans, 1923
Family Epilohmanniidae Oudemans, 1923
Genus *Epilohmannia* Berlese, 1910

Epilohmannia (*Epilohmannia*) *cylindrica cylindrica* (Berlese, 1904)

Sample code: A12, G5, R3, D25, G1, T26, A12, G4, T27, A4, A7, F4, T17, T22, S10, F2, T27, B4, D6, M7.
Global distribution: Cosmopolitan (Palearctic, Nearctic, Ethiopian: Chad, Oriental, Australian: Hawaii and Neotropical).
Distribution in Iran: Yazd (Abarkouh), Khuzestan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi, Alborz, Kurdistan, Tehran, Golestan, Esfahan, Sistan & Baluchistan and Kermanshah provinces.

Superfamily Lohmannioidea Berlese, 1916
Family Lohmanniidae Berlese, 1916
Genus *Papillacarus* Kunst, 1959

Papillacarus (*Papillacarus*) *aciculatus* (Berlese, 1904)

Sample code: T26, B4, D4, T16, T22, T23, R3.
Global distribution: Southern and Western Palearctic (except north), Vietnam, Tanzania and Iran.
Distribution in Iran: Yazd (Abarkouh), Fars, East Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi and Alborz provinces.

Genus *Thamnacarus* Grandjean, 1950

Thamnacarus smirnovi Bulanova-Zachvatkina, 1978

Sample code: M11.
Global distribution: East Central Asia.
Notes: This is the first record of this species for mite fauna of Iran.

Superfamily Euphthiracaroidea Jacot, 1930
Family Euphthiracaridae Jacot, 1930
Genus *Acrotritia* Jacot, 1923

Acrotritia ardua ardua (Koch, 1841)

Sample code: K1, S10, A5, A7, D20, F4, B3, T1, T6, K2, T19, D10, D11, D6, D17, T24, T27, S8.
Global distribution: Cosmopolitan.
Distribution in Iran: Yazd (Abarkouh), Hamadan, Khuzestan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Zanjan, Markazi, Alborz, Kurdistan, Tehran, Esfahan, Ardabil, Golestan, and Sistan & Baluchistan provinces.

Acrotritia penicillata (Pérez-Íñigo, 1969)
(syn.: *Acrotritia pirovaci* Niedbała, 2006)

Sample code: T9, F5, T1, T24, D2, T23, D19, F4, K2, D25, E6, D24, A6, B2, T20, K3, K1, F2, T3, A4, T26, D25, D6, R2, S8, P1, T27.
Global distribution: Southern Palearctic.
Distribution in Iran: Fars, East Azerbaijan, Guilan and Kermanshah provinces.
Notes: This is the first record of this species for Yazd province.

***Acrotritia simile* Mahunka, 1982**

Sample code: K4, D2, T12, D4, P1.
Global distribution: Pantropical (Australian: Australia and New Guinea) and southern Palearctic (Turkey and Eastern Palearctic).
Notes: This is the first record of this species for mite fauna of Iran.

Superfamily Phthiracaroidea Perty, 1841
Family Phthiracaridae Perty, 1841
Genus *Atropacarus* Ewing, 1917

***Atropacarus* (*Atropacarus*) *striculus* (Koch, 1835)**

Sample code: Z1, P1, B7, D10, T28, D17.
Global distribution: Semi-cosmopolitan (Holarctic, Oriental, Northern Neotropical, Australian and Madagascar).
Distribution in Iran: Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Kerman and Zanjan provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Phthiracarus* Perty, 1841

***Phthiracarus* (*Phthiracarus*) *lentulus* (Koch, 1841)**

Sample code: D25, T24, A8, D6, T28, D26, D11, T1, A6
Global distribution: Holarctic (Palearctic and Neartic), Ethiopian (Angola and Madagascar) and southeastern China.
Distribution in Iran: Yazd (Abarkouh), Fars, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan and Esfahan provinces.

Superfamily Crotonioidea Thorell, 1876
Family Nothridae Berlese, 1896
Genus *Nothrus* Koch, 1835

***Nothrus anauniensis* Canestrini & Fanzago, 1877**

Sample code: S5, T20, G1, M9, D22, T23, T16, D11, T22, S1, B7, A8, T28, D26, R2, F1.
Global distribution: Cosmopolitan (except Antarctic).
Distribution in Iran: Yazd (Abarkouh), Hamadan, Khuzestan, Fars, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Lorestan, Markazi, Kurdistan, Tehran and Kermanshah provinces.

Family Crotoniidae Thorell, 1876
Genus *Camisia* Heyden, 1826

***Camisia* (*Camisia*) sp.**

Sample code: B5.

Notes: This is the first record of the family for Yazd province.

Family Malaconothridae Berlese, 1916
Genus *Malaconothrus* Berlese, 1904

Malaconothrus (*Malaconothrus*) *monodactylus* (Michael, 1888)
(syn.: *Lohmannia* (*Malaconothrus*) *egregia* Berlese, 1904)

Sample code: Z1, S9.
Global distribution: Holarctic and Neotropical.
Distribution in Iran: Mazandaran, Guilan, East Azerbaijan and Fars provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Nanhermannioidea Sellnick, 1928
Family Nanhermanniidae Sellnick, 1928
Genus *Nanhermannia* Berlese, 1913

Nanhermannia (*Nanhermannia*) *nana* (Nicolet, 1855)

Sample code: D11, S9.
Global distribution: Semicosmopolitan (Holarctic, Neotropical, north of Oriental, New Zealand, I. Santa Helena and Antarctica).
Distribution in Iran: East Azerbaijan province.
Notes: This is the second record of this species from Iran and the first record of the family for Yazd province.

Superfamily Hermannielloidea Grandjean, 1934
Family Hermanniellidae Grandjean, 1934
Genus *Hermanniella* Berlese, 1908

Hermanniella picea (Koch, 1839)
(syn.: *H. punctulata* Berlese, 1908)

Sample code: T26.
Global distribution: Holarctic (Palearctic and U.S.A.: Virginia) and Oriental.
Distribution in Iran: Fars and Kerman provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Plateremaeoidea Trägårdh, 1926
Family Licnodamaeidae Grandjean, 1954
Genus *Licnodamaeus* Grandjean, 1931

Licnodamaeus pulcherrimus (Paoli, 1908)

Sample code: D17.
Global distribution: Palearctic (except North) and Mexico.
Distribution in Iran: Fars, Razavi Khorasan, West Azerbaijan, Mazandaran and Alborz provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Gymnodamaeoidea Grandjean, 1954
Family Gymnodamaeidae Grandjean, 1954
Genus *Jacotella* Banks, 1947

***Jacotella frondeus* (Kulijev, 1979)**
(syn.: *Plesiodamaeus ornatus* Mahunka, 1979)

Sample code: A7, T22, S10, B7, A5, B4, D21, F7, D17, A8, A9, D18, D11, B3, B2, S1, Z1, T26, T27, E3, M9.
Global distribution: Eastern Mediterranean and Iran.
Distribution in Iran: Hamadan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Kerman, Zanjan, Markazi, Kurdistan and Kermanshah provinces.
Notes: This is the first record of the family for Yazd province.

Family Aleurodamaeidae Paschoal & Johnston, 1985
Genus *Aleurodamaeus* Grandjean, 1954

***Aleurodamaeus setosus* (Berlese, 1883)**

Sample code: D17.
Global distribution: Southern Palearctic and Mexico.
Distribution in Iran: Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran and Esfahan provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Damaeoidea Berlese, 1896
Family Damaeidae Berlese, 1896
Genus *Belba* Heyden, 1826

***Belba* (*Belba*) *bulanovae* Subías, 2016**

Sample code: D17.
Global distribution: Southern Palearctic (Romania and Central-West Asia).
Notes: This is the first record of this species for mite fauna of Iran and the first record of the family for Yazd province.

***Belba* (*Belba*) *sculpta* Mihelčič, 1957**

Sample code: D17.
Global distribution: Southern Palearctic (Mediterranean and Iran).
Distribution in Iran: Mazandaran province.

Superfamily Ameroidea Bulanova-Zachvatkina, 1957
Family Eremulidae Grandjean, 1965
Genus *Eremulus* Berlese, 1908

***Eremulus avenifer* Berlese, 1913**

Sample code: T19, M9, S8, F3, A3, P1, T25, T23, F5, T20.
Global distribution: Southern Palearctic (Italy and south-eastern Palearctic), Oriental, Polynesia (Tahití) and Ethiopian.
Distribution in Iran: Yazd (Abarkouh), Fars, Razavi Khorasan, Mazandaran, Guilan, Zanjan, Markazi and Golestan provinces.

Family Damaeolidae Grandjean, 1965
Genus *Fosseremus* Grandjean, 1954

***Fosseremus laciniatus* (Berlese, 1905)**
(syn.: *F. quadripertitus* Grandjean, 1965)

Sample code: T1.
Global distribution: Cosmopolitan (except Antarctic).
Distribution in Iran: Fars, Hamadan, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Kerman, Zanjan, Lorestan and Esfahan provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Oppioidea Sellnick, 1937
Family Oppiidae Sellnick, 1937
Genus *Lasiobelba* Aoki, 1959

***Lasiobelba* (*Lasiobelba*) *pori* (Vasiliu & Ivan, 1995)**
(syn.: *L. neonominata* Subías, 2004)

Sample code: T1, T8.
Global distribution: Southern Palearctic (Mediterranean and Iran), Ethiopian and Hawaii.
Distribution in Iran: Khuzestan, Fars, Mazandaran, Kerman and Alborz provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Corynoppia* Balogh, 1983

***Corynoppia kosarovi kosarovi* (Jeleva, 1962)**

Sample code: T22.
Global distribution: Mediterranean, Panama and Iran.
Distribution in Iran: Fars and East Azerbaijan provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Lauroppia* Subías & Mínguez, 1986

***Lauroppia* sp.**

Sample code: D6, S8, A11, E4.
Notes: This is the first record of the genus for Yazd province.

Genus *Ramusella* Hammer, 1962

***Ramusella* (*Ramusella*) *persica* Akrami, Behmanesh & Subías, 2015**

Sample code: F2, D25.
Global distribution: Iran.
Distribution in Iran: Fars, Alborz and West Azerbaijan provinces.
Notes: This is the first record of this species for Yazd province.

***Ramusella* (*Ramusella*) *puertomonttensis* Hammer, 1962**

Sample code: T27, A7, T24, B7, S9.
Global distribution: Tropical: Oriental (India: West Bengal and Vietnam), Australian (Melanesia: I. Fiji), Neotropical (Chile and Brazil) and Subtropical: southern Palearctic (Mediterranean, Iran and east of Asian Russia).

Distribution in Iran: Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi, Alborz, Golestan and Kermanshah provinces.
Notes: This is the first record of this species for Yazd province.

***Ramusella* (*Rectoppia*) *damavandica* Akrami & Subías, 2008**

Sample code: K4.
Global distribution: Iran.
Distribution in Iran: Fars, East Azerbaijan, Mazandaran, Kerman, Zanjan, Lorestan, Markazi, Alborz, Golestan and Kermanshah provinces.
Notes: This is the first record of this species for Yazd province.

***Ramusella* (*Rectoppia*) *mihelcici* (Pérez-Íñigo, 1965)**

Sample code: A4.
Global distribution: Palearctic and Venezuela.
Distribution in Iran: Fars, East Azerbaijan and Markazi provinces.
Notes: This is the first record of this species for Yazd province.

Genus *Anomaloppia* Subías, 1978

***Anomaloppia iranica* Bayartogtokh & Akrami, 2000**

Sample code: R2, R3, B2, F7, A8, A7, G3, D11, T18, K3.
Global distribution: Iran.
Distribution in Iran: Yazd (Abarkouh), Razavi Khorasan, East & West Azerbaijan, Kerman, Zanjan, Lorestan and Alborz provinces.

Genus *Multioppia* Hammer, 1961

***Multioppia* (*Multioppia*) *biciliata* Akrami & Bastan, 2015**

Sample code: D1, M5, M7.
Global distribution: Iran.
Distribution in Iran: Markazi and East Azerbaijan provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Discoppia* Balogh, 1983

***Discoppia* (*Cylindroppia*) *cylindrica* (Pérez-Íñigo, 1965)**

Sample code: M4, T2.
Global distribution: Southern Palearctic, Oriental, north of Neotropical and Tanzania.
Distribution in Iran: Khuzestan, Fars, East & West Azerbaijan, Mazandaran and Kerman provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Oppiella* Jacot, 1937

***Oppiella* (*Oppiella*) *nova nova* (Oudemans, 1902)**

Sample code: T9, K2.
Global distribution: Cosmopolitan.

Distribution in Iran: Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi, Alborz and Golestan provinces.
Notes: This is the first record of the genus for Yazd province.

Superfamily Hydrozetoidea Grandjean, 1954
Family Hydrozetidae Grandjean, 1954
Genus *Hydrozetes* Berlese, 1902

Hydrozetes lemnae (Coggi, 1897)

Sample code: P1.
Global distribution: Semicosmopolitan (Western Palearctic, Eastern Palearctic: Iran, Nearctic: U.S.A.: New York, Ethiopian: Yemen, Oriental: Bali, Australian and Neotropical).
Distribution in Iran: Yazd (Abarkouh) and Mazandaran provinces.

Superfamily Tectocepheoidea Grandjean, 1954
Family Tectocepheidae Grandjean, 1954
Genus *Tectocepheus* Berlese, 1896

Tectocepheus velatus (Michael, 1880)

Sample code: S10, T1, B2, M7, T16, T10, T11, T6, S8, G2, T9, R2, T21, D4, D22, D17, D25, T1, T12, S5, D19, T4, T8, K1, S2, D6, T7, K4, D6, E4, K2, D5, T2, M9.
Global distribution: Cosmopolitan.
Distribution in Iran: Yazd (Abarkouh), Hamadan, Khuzestan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi, Alborz, Kurdistan, Tehran, Sistan & Baluchistan and Kermanshah provinces.

Tectocepheus minor Berlese, 1903

Sample code: M9, K3, M7, T20, D20.
Global distribution: Semicosmopolitan: Palearctic (western Palearctic, Iran and Japan), U.S.A. (Virginia), Oriental, Neotropical (Ecuador and I. Galapagos) and New Zealand.
Distribution in Iran: Yazd (Abarkouh), Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Zanjan, Markazi and Tehran provinces.

Superfamily Licneremaeoidea Grandjean, 1954
Family Passalozetidae Grandjean, 1954
Genus *Passalozetes* Grandjean, 1932

Passalozetes (*Passalozetes*) *africanus* Grandjean, 1932

Sample code: K4, M7, K5, A9, R3, G4, F3, T15, M3
Global distribution: South-central Palearctic and Equatorial Guinea.
Distribution in Iran: Yazd (Abarkouh), Fars, East & West Azerbaijan, Mazandaran, Kerman and Zanjan provinces.

Genus *Bipassalozetes* Mihelčič, 1957

Bipassalozetes (*Bipassalozetes*) *lineolatus* (Sitnikova, 1975)

Sample code: A11.
Global distribution: East Central Asia.

Notes: This is the first record of this species for mite fauna of Iran and the genus for Yazd province.

Superfamily Zetomotrichoidea Grandjean, 1934
Family Zetomotrichidae Grandjean, 1934
Genus *Ghilarovus* Krivolutsky, 1966

Ghilarovus hispanicus hispanicus Subías & Pérez-Íñigo, 1977

Sample code: D6, S10.
Global distribution: Southern Palearctic (Spain, Caucasus and Iran).
Distribution in Iran: Fars and Kerman provinces.
Notes: This is the first record of the family for Yazd province.

Superfamily Oripodoidea Jacot, 1925
Family Oribatulidae Thor, 1929
Genus *Oribatula* Berlese, 1896

Oribatula (*Zygoribatula*) *connexa connexa* Berlese, 1904

Sample code: S8, S9, T11, T7.
Global distribution: Mediterranean.
Distribution in Iran: Yazd (Abarkouh), Hamadan, Khuzestan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Kerman, Zanjan, Alborz, Tehran, Golestan, Ardabil and Kermanshah provinces.

Oribatula (*Zygoribatula*) *undulata* Berlese, 1916

Sample code: T9, D17
Global distribution: Pantropical (except Neotropical) and Subtropical.
Distribution in Iran: Hamadan, Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Markazi, Tehran, Sistan & Baluchistan and Hormozgan provinces.
Notes: This is the first record of this species for Yazd province.

Oribatula (*Oribatula*) sp.

Sample code: UN1.

Family Scheloribatidae Grandjean, 1933
Genus *Scheloribates* Berlese, 1908

Scheloribates (*Scheloribates*) sp.

Sample code: UN2.

Family Protoribatidae J. & P. Balogh, 1984
Genus *Protoribates* Berlese, 1908

Protoribates (*Protoribates*) *paracapucinus* (Mahunka, 1988)

Sample code: T16, D10, D2, T27, M3, T11, A7, D17, D5, B2, T1, A4, K3, P1, T26, T22, K4, G3, T8, T9, D26, D6, M8, G1, D11, R3, D25, A12.
Global distribution: Tropical: Oriental, Ethiopian, Neotropical and Australiana (New Hebrides [Vanuatu]) and Subtropical: eastern Palearctic (Iran).

Distribution in Iran: Yazd (Abarkouh), Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Guilan, Kerman, Zanjan, Lorestan, Markazi, Alborz, Kurdistan, Tehran, Sistan & Baluchistan and Kermanshah provinces.

***Protoribates* (*Triaunguis*) *obtusus* (Mihelčič, 1956)**

Sample code: F5.
Global distribution: Southern Palearctic (Mediterranean and Iran).
Distribution in Iran: Yazd (Abarkouh), Fars and Guilan provinces.

Family Haplozetidae Grandjean, 1936
Genus *Indoribates* Jacot, 1929

***Indoribates* (*Haplozetes*) *fusifer* (Berlese, 1908)**

Sample code: D6, S10.
Global distribution: Southern Palearctic (Mediterranean and Iran) and India (Tripura).
Distribution in Iran: Fars, Zanjan, Kerman and East Azerbaijan provinces.
Notes: This is the first record of the genus for Yazd province.

Superfamily Phenopelopoidea Petrunkevitch, 1955
Family Phenopelopidae Petrunkevitch, 1955
Genus *Eupelops* Ewing, 1917

***Eupelops* sp.**

Sample code: UN3.
Notes: This is the first record of the family for Yazd province.

Superfamily Galumnoidea Jacot, 1925
Family Galumnidae Jacot, 1925
Genus *Galumna* Heyden, 1826

***Galumna* (*Galumna*) *iranensis* Mahunka & Akrami, 2001**

Sample code: A2, T26, B4, T11.
Global distribution: Iran.
Distribution in Iran: Yazd (Abarkouh), Khuzestan, Fars, East & West Azerbaijan, Mazandaran, Alborz, Kerman, Kermanshah and Zanjan provinces.

***Galumna* (*Galumna*) *karajica* Mahunka & Akrami, 2001**

Sample code: F3, M6, F2, M5, S4, F5.
Global distribution: Iran and Caucasus.
Distribution in Iran: Yazd (Abarkouh), Fars, Razavi Khorasan, East & West Azerbaijan, Mazandaran, Kerman, Zanjan, Markazi and Alborz provinces.

***Galumna* (*Galumna*) *flabellifera* Hammer, 1958**

Sample code: T6, M3, K4, T16, T20, T2.
Global distribution: Pantropical and Subtropical.
Distribution in Iran: Fars, Alborz, Kerman and Kermanshah provinces.
Notes: This is the first record of this species for Yazd province.

Genus *Pilogalumna* Grandjean, 1956

Pilogalumna tenuiclava (Berlese, 1908)

Sample code: T28, K4, M9, D4, P1, T28, S9.
Global distribution: Holarctic.
Distribution in Iran: Yazd (Abarkouh), Fars, East Azerbaijan, Kerman, Zanjan and Markazi provinces.

Genus *Acrogalumna* Grandjean, 1956

Acrogalumna lanceolata Bayartogtokh & Akrami, 2014

Sample code: T1, T9.
Global distribution: Iran.
Distribution in Iran: Fars, Razavi Khorasan, Mazandaran, Kerman and Kermanshah provinces.
Notes: This is the first record of the genus for Yazd province.

Genus *Pergalumna* Grandjean, 1936

Pergalumna (*Pergalumna*) *microtuberculata* Bayartogtokh & Akrami, 2014

Sample code: T1.
Global distribution: Iran.
Distribution in Iran: Fars, Mazandaran and Zanjan provinces.
Notes: This is the first record of the genus for Yazd province.

DISCUSSION

In total, 63 species from 48 genera and 31 families were collected from Taft county, Yazd province. Among them five species are represented as new records for mite fauna of Iran and 36 species for Yazd province, and of course all species are recorded for the first time from Taft county. Based on our results, Oppiidae (with 11 species), Galumnidae (with six species), Cosmochthoniidae (with four species), Euphthiracaridae (with three species) and *Ramusella* (with four species), *Galumna*, *Cosmochthonius* and *Acrotritia* (each with three species) are the families and genera with highest number of species. Of these 63 species, nine species (16%) have a Tropical (Pantropical and Subtropical) distribution, 11 species (19%) are distributed in the Palearctic, and five species (9%) in Mediterranean regions. Twenty-one species (37%) are semicosmopolitan and cosmopolitan, and nine species (16%) are known only from Iran. There are some rare species, such as *Thamnacarus smirnovi*, *Bipassalozetes lineolatus* and *Belba bulanovae* previously known from Central Asia, which are recorded here for the first time from Iran. Although our results contribute to the enrichment of knowledge of the regional mite fauna by five species, our knowledge on the diversity and distribution of oribatid mites of Yazd and most Iranian provinces is still in initial stages of investigation and much more work is needed to get a good understanding of total diversity of Iranian oribatid mites.

ACKNOWLEDGEMENT

We are very grateful to anonymous reviewers for their comments and advice. This study was partly supported by the project “Fauna of oribatid mites of Taft county, Yazd province” funded by Shiraz University.

Table 1. Sampling data.

Code	Latitude		Longitude		Altitude (m)	Habitat (soil of)	Sampling date	Sampling location	
	Degree	Minute	Degree	Minute					
M1	31	18	53	45	1480	Saxaul, *Haloxylon* sp. (Chenopodiaceae)	19.03.2016	Desert	Mortazieh
M2	31	19	53	50	1705	Bean caper, *Zygophyllum* sp. (Zygophyllaceae)	19.03.2016	Desert	Mortazieh
M3	31	21	53	52	1839	Tamarisk, *Tamarix* sp. (Tamaricaceae)	19.03.2016	Desert	Mortazieh
M4	31	16	53	43	1505	Pomegranate, *Punica granatum* L. (Punicaceae)	08.04.2016	Desert	Mortazieh
M5	31	16	53	43	1494	Desert plant	05.09.2016	Desert	Mortazieh
K1	31	23	53	55	2027	Pine, *Pinus* sp. (Pinaceae)	05.09.2016	Urban park	Kahduiyeh
M6	31	15	53	54	1490	Pine	26.09.2016	Desert	Mortazieh
B1	31	28	53	56	2300	willow, *Salix* sp. (Salicaceae)	02.10.2016	Mountain	Banadak
B2	31	33	53	55	2490	Persian walnut, Juglans regia L. (Juglandaceae)	02.10.2016	Mountain	Bidakhavid
Z1	31	29	53	56	2515	Mountain plants	11.11.2016	Mountain	Zardeyn
A1	31	30	53	47	2071	Pine	25.02.2017	Desert	Ahmadabad
D1	31	27	53	45	1863	Eucalyptus (= gum tree), *Eucalyptus* sp. (Myrtaceae)	12.03.2017	Urban	Dehshir
S1	31	32	54	12	2351	Mountain plants	12.03.2017	Hillside	Sanij
S2	31	28	53	57	2336	Mountain plants	12.03.2017	Top of the mountain	Sanij
F1	31	23	53	56	2105	Bermuda grass, *Cynodon dactylon* (L.) (Gramineae)	24.03.2017	Desert	Fathabad
A2	31	37	53	49	2445	Bermuda grass	09.04.2017	Mountain	Aliabad
D2	31	30	53	46	2020	Bermuda grass	24.04.2017	Desert	Dehshir
B3	31	38	53	53	2399	Bermuda grass	25.04.2017	Mountain	Bidakhavid
B4	31	35	53	54	2506	Mountain plants	25.04.2017	Mountain	Bidakhavid
E1	31	44	54	10	1685	Pine	26.04.2017	Urban	Eslamiyeh
D3	31	28	54	46	1860	Without plant	26.04.2017	Desert	Dehshir
B5	31	28	53	57	2336	Without plant	30.04.2017	Desert	Banadkuk
T1	31	45	54	12	1520	Box tree, *Buxus hyrcana* Pojark (Buxaceae)	10.07.2017	Urban	Taft
T2	31	44	54	12	1557	Pine	10.07.2017	Urban	Taft
T3	31	44	54	12	1523	Bermuda grass	17.01.2018	Urban	Taft
T4	31	44	54	12	1565	Box tree	17.01.2018	Urban	Taft
T5	31	44	54	12	1574	Bermuda grass	17.01.2018	Urban	Taft
T5	31	44	54	12	1574	Bermuda grass	17.01.2018	Urban	Taft
T6	31	44	54	12	1564	Pine	17.01.2018	Urban	Taft
T7	31	44	54	12	1559	Box tree	17.01.2018	Urban	Taft
T8	31	45	54	13	1501	Box tree	17.01.2018	Urban	Taft
T9	31	45	54	13	1491	Pine	17.01.2018	Urban	Taft

Table 1. Continued.

Code	Latitude		Longitude		Altitude (m)	Habitat (soil of)	Sampling date	Sampling location	
	Degree	Minute	Degree	Minute					
D4	31	33	53	48	2281	Bermuda grass	28.01.2018	Desert	Dehshir
T10	31	44	54	11	1599	Pomegranate	28.01.2018	Urban	Taft
T11	31	43	54	10	1623	Rose, *Rosa* sp. (Rosaceae)	28.01.2018	Urban	Taft
T12	31	43	54	09	1621	Willow	28.01.2018	Urban	Taft
M7	31	44	54	11	2248	Alfalfa, *Medicago sativa* L. (Papilionaceae)	02. 02.2018	Mountain	Mahdiabad
T13	31	45	54	12	1438	Pomegranate	09. 02.2018	Urban	Taft
T14	31	43	54	08	1612	Mountain plants	10. 02.2018	Urban	Taft
T15	31	43	54	08	1664	Tamarisk	10. 02.2018	Desert	Taft
E2	31	43	54	07	1723	Oriental plane tree, *Platanus orientalis* L. (Platanaceae)	10. 02.2018	Urban	Eslamiyeh
E3	31	43	54	06	1733	Dried water canal	10. 02.2018	Urban	Eslamiyeh
E4	31	43	54	05	1779	Box tree	10.02.2018	Urban	Eslamiyeh
E5	31	42	54	06	1807	Mountain fig, *Ficus* sp. (Moraceae)	10. 02.2018	Near spring	Eslamiyeh
K2	31	21	53	52	1934	Alfalfa	26.04.2018	Desert	Kahduiyeh
K3	31	42	53	56	1970	Oleaster, *Elaeagnus angustifolia* L. (Elaeagnaceae)	29.04.2018	Desert	Khoshkabad
K4	31	42	53	56	1970	Bermuda grass	29.04.2018	Desert	Khoshkabad
M8	31	34	53	55	2022	Bermuda grass	29.04.2018	Desert	Mazraeh-e-Akhund
M9	31	34	53	55	2022	Oleaster	29.04.2018	Desert	Mazraeh-e-Akhund
M10	31	34	53	55	2022	Alfalfa	29.04.2018	Desert	Mazraeh-e-Akhund
S3	31	35	53	59	2040	Rose	29.04.2018	Mountain	Sakhvid
M11	31	21	53	51	1759	Common reed, *Phragmites australis* (Cav.) (Gramineae)	11.05.2018	Desert	Mortazieh
D5	31	37	54	08	2324	Pine	29.05.2018	Mountain	Dehbala
D6	31	36	54	07	2400	Willow	29.05.2018	Mountain	Dehbala
D7	31	36	54	07	2400	White poplar, *Populus alba L.* (Salicaceae)	29.05.2018	Mountain	Dehbala
D8	31	36	54	07	2458	Almond, *Amygdalus* sp. (Rosaceae)	29.05.2018	Mountain	Dehbala
D9	31	35	54	06	2602	White poplar	29.05.2018	Mountain	Dehbala
T16	31	44	54	10	1519	False acacia, *Robina pseudoacacia* L. (Papilionaceae)	04.06.2018	Urban	Taft
T17	31	44	54	10	1592	Pine	04.06.2018	Urban	Taft
T18	31	44	54	10	1557	Common fig, *Ficus carica* L. (Moraceae)	05.06.2018	Urban	Taft
T19	31	44	54	10	1555	Pomegranate	05.06.2018	Urban	Taft
T20	31	47	54	13	1422	Alfalfa	05.06.2018	Urban	Taft
T21	31	47	54	13	1453	Box tree	05.06.2018	Urban	Taft

Table 1. Continued.

Code	Latitude		Longitude		Altitude (m)	Habitat (soil of)	Sampling date	Sampling location	
	Degree	Minute	Degree	Minute					
T22	31	44	54	11	1498	Alfalfa	06.06.2018	Urban	Taft
T23	31	44	54	11	1498	Pomegranate	06.06.2018	Urban	Taft
D10	31	44	54	11	2089	Licorice, *Glycyrrhiza glabra* L. (Papilionaceae)	20.06.2018	Mountain	Dehbala
D11	31	38	54	08	2108	Bermuda grass	20.06.2018	Mountain	Dehbala
T24	31	35	54	09	2351	Next to the river	20.01.2019	Mountain	Tezerjan
T25	31	35	54	09	2422	Next to the river	20.01.2019	Mountain	Tezerjan
T26	31	34	54	09	2443	White poplar	20.01.2019	Mountain	Tezerjan
T27	31	35	54	10	2295	Willow, around the river	20.01.2019	Mountain	Tezerjan
D17	31	35	54	05	2721	Bermuda grass	20.06.2018	Mountain	Dehbala
F2	31	44	54	00	1967	Box tree	27.06.2018	Mountain	Feizabad
F3	31	44	54	00	1967	Dried water canal	27.06.2018	Mountain	Feizabad
P1	31	44	54	11	1842	Bermuda grass	27.06.2018	Desert	Poshtkuh
S4	31	38	53	59	2161	Dried water canal	27.06.2018	Mountain	Sanij
D18	31	38	53	59	2276	Camel's thorn, *Alhagi* sp. (Papilionaceae)	27.06.2018	Desert	Dehshir
S5	31	38	53	59	2279	Box tree	27.06.2018	Mountain	Sanij
S6	31	36	53	59	2408	Oleaster	27.06.2018	Mountain	Sanij
S7	31	36	53	59	2408	Litter	27.06.2018	Mountain	Sanij
S8	31	35	54	00	2481	Wild mint, *Mentha* sp. (Labiatae)	27.06.2018	Mountain	Sanij
S9	31	35	54	00	2481	Bermuda grass	27.06.2018	Mountain	Sanij
S10	31	33	54	02	2784	Mulberry tree, *Morus alba* L. (Moraceae)	27.06.2018	Mountain	Sanij
D19	31	22	53	54	1890	Alfalfa	04.07.2018	Desert	Dizran
K5	31	23	53	54	2004	Alfalfa	04.07.2018	Desert	Kahduiyeh
B6	31	35	53	54	2738	Under a rock	10.07.2018	Mountain	Bidakhavid
B7	31	38	53	52	2416	White poplar	10.07.2018	Mountain	Bidakhavid
B7	31	38	53	52	2416	White poplar	10.07.2018	Mountain	Bidakhavid
A3	31	39	53	50	2300	Pine	11.07.2018	Mountain	Aliabad
A4	31	39	53	50	2305	Persian walnut	11.07.2018	Mountain	Aliabad
A5	31	39	53	50	2309	Willow	11.07.2018	Mountain	Aliabad
A6	31	39	53	50	2319	Sorghum, *Sorghum bicolor* (L.) (Poaceae)	11.07.2018	Mountain	Aliabad
A7	31	39	53	50	2320	Willow, around the river	11.07.2018	Mountain	Aliabad
A8	31	39	53	50	2320	Wild mint, around the river	11.07.2018	Mountain	Aliabad
A9	31	38	53	50	2416	Without plant	11.07.2018	Mountain	Aliabad
A10	31	37	53	49	2474	Almond	11.07.2018	Mountain	Aliabad
A11	31	34	53	48	2498	Mountain almond, *Amygdalus scoparia* Spach	11.07.2018	Mountain	Aliabad

Table 1. Continued.

Code	Latitude		Longitude		Altitude (m)	Habitat (soil of)	Sampling date	Sampling location	
	Degree	Minute	Degree	Minute					
A12	31	33	53	48	2387	Alfalfa	11.07.2018	Mountain	Aliabad
D20	31	20	54	01	2387	White poplar	11.07.2018	Mountain	Dastjerd
T28	31	31	53	51	2340	Bermuda grass	11.07.2018	Mountain	Turan Posht
D21	31	37	53	49	2474	Oleaster	11.07.2018	Mountain	Darreh-e-Zereshk
D22	31	37	53	49	2474	Alfalfa	11.07.2018	Mountain	Darreh-e-Zereshk
D23	31	44	54	11	1828	Bermuda grass	24.07.2018	Desert	Dehshir
D24	31	26	53	44	1819	Camel's thorn	24.07.2018	Desert	Dehshir
D25	31	26	53	44	1833	Pomegranate	24.07.2018	Desert	Dehshir
D26	31	27	53	45	1850	Bermuda grass	24.07.2018	Desert	Dehshir
E6	31	24	53	51	1967	Elm tree, *Ulmus* sp. (Ulmaceae)	24.07.2018	Desert	Erdan
G1	31	24	53	51	1978	Oleaster	24.07.2018	Desert	Garizat
F4	31	20	54	01	2029	Damask rose, *Rosa damascena* Mill. (Rosaceae)	24.07.2018	Desert	Fakhrabad
F5	31	19	54	00	2005	Bermuda grass	24.07.2018	Desert	Fakhrabad
R1	31	18	54	00	1982	Pine	24.07.2018	Desert	Reshkuiyeh
R2	31	27	54	00	1749	Pomegranate	24.07.2018	Desert	Reshkuiyeh
R3	31	45	54	00	1749	Bermuda grass	24.07.2018	Desert	Reshkuiyeh
G2	31	18	54	05	1980	Pine	22.04.2018	Desert	Garizat
G3	31	18	54	05	1985	Bermuda grass	22.04.2018	Desert	Garizat
G4	31	17	54	05	1982	Bermuda grass	22.04.2018	Desert	Garizat
G5	31	18	54	04	1984	Almond	22.04.2018	Desert	Garizat
F6	31	20	54	01	2024	Pomegranate	24.07.2018	Desert	Fakhrabad
F7	31	25	54	02	2205	Bean caper	24.07.2018	Desert	Fakhrabad
UN1	-	-	-	-	-	-	-	-	Taft
UN2	-	-	-	-	-	-	-	-	Taft
UN3	-	-	-	-	-	-	-	-	Taft

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فون کنه‌های اریباتید (Acari: Oribatida) شهرستان تفت (استان یزد ایران) همراه با گزارش‌های جدید

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چکیده

مطالعهٔ فون کنه‌های اریباتید شهرستان تفت (استان یزد، مرکز ایران) برای نخستین بار طی سال‌های ۱۳۹۴ تا ۱۳۹۷ انجام شد. در این مطالعه در مجموع ۶۳ گونه از ۴۸ جنس و ۳۱ خانواده جمع‌آوری و شناسایی شدند که از میان آن‌ها، ۵ گونهٔ *Cosmochthonius plumatus* Berlese, 1910 (Cosmochthoniidae)، *Thamnacarus smirnovi* Bulanova-Zachvatkina, 1978 (Lohmanniidae)، *Acrotritia simile* Mahunka, 1982 (Euphthiracaridae)، *Belba bulanovae* Subías, 2016 (Damaeidae) و *Bipassalozetes lineolatus* (Sitnikova, 1975) (Passalozetidae) برای فون کنه‌های ایران و ۱۳ خانواده، ۲۵ جنس و ۳۶ گونه برای فون کنه‌های استان یزد گزارش جدیدند.

واژگان کلیدی: بندپایان؛ مرکز ایران؛ نهان‌استیگمایان؛ فون؛ Sarcoptiformes.

اطلاعات مقاله: تاریخ دریافت: ۱۳۹۸/۱۰/۸، تاریخ پذیرش: ۱۳۹۸/۱۱/۲۳، تاریخ چاپ: ۱۳۹۹/۱/۲۷