The Collembola of North Forests of Iran, List of Genera and Species

Masoumeh Shayanmehr¹ and Elliye Yahyapour²

Department of Plant Protection, Faculty of Crop Sciences, Sari University of Agricultural Sciences and Natural Resources, Sari, Mazandaran 582, Iran

Department of Entomology, Faculty of Agricultural Sciences, Islamic Azad University, Arak-Branch, Arak 38135/567, Iran

Abstract: The Collembola fauna of Iran has received little attention and this applies in particular to the Hyrcanian forests in northern Iran. In this study, the list of Collembola from north forests of Iran, and collected information such as study site, until March 2019 are listed. At present, 107 species, belonging to 14 families and 51 genera are known from northern forests of Iran.

Key words: Collembola, checklist, forest, Iran.

1. Introduction

Hyrcanian forests are located in northern Iran and mostly are composed of deciduous trees. The climate of south Caspian region is humid with most precipitation occurring in autumn, winter and spring. Soil and leaf litter in these forests are occupied by different soil-dwelling animals especially Collembola [1]. The Collembola, commonly called “spring-tails”, is small, entognathous, wingless hexapods possessing a spring-like forked jumping organ, the furcula, underneath the fourth abdominal segment. There are about 9000 described species of Collembola worldwide [2]. The first Iranian species of Collembola is from wheat and alfalfa fields in Khuzestan [3]. Cox who travelled to Northern Provinces in Iran, collected and identified 70 species of 30 genera and five families [4]. During last decade, many researchers worked on Collembola fauna of Iran [5] and provided a list of their reported genera and species from Iran up to 2013. Amongst these species, there are several reported species from forests. High abundant of Collembola in forest soil gets researchers’ attention to

work on their fauna [6-22]. Here, authors provide an update to the list of Collembola from northern forests of Iran published from 2013 to 2019. Obviously, the fauna of forests of Iran is unknown, this present study aims at contributing to close this gap of knowledge, concentrating the unique Hyrcanian forests and providing information on the fauna of Collembola in different soil layers and their seasonal variation.

2. Materials

A search of the literature was undertaken for any published reference to any member of the Collembola in forests of Mazandaran in north Iran. In almost all cases, authors were able to access an electronic version of the published work (in pdf format). Data on species were abstracted from these sources then maintained and managed in a Word file in preparation for publication. The samples were placed in dark polythene bags. Collembola was extracted from soil and leaf litter by Berlese funnels. Animals were collected in water and separated under a dissecting microscope. Some specimens were cleared in Nesbit’s solution, then were mounted on Hoyer’s medium to make microscopic slides. Then they were identified as genera and species levels using valid keys.

Corresponding author: Eliye Yahyapour, Ph.D., research field: entomology.

3. Results and Discussion

The checklist of genera and species of Collembola of Mazandaran forests in north of Iran presented here includes a total of 107 species and 51 genera belonging to 14 families. The most diverse families

are Entomobryidae, Isotomidae and Onychiuridae with 24, 22 and 14 reported species, respectively. The less diverse families are Oncopoduridae, Sminthuridae, Tullbergiidae and Arrhopalitidae with 1, 1, 2 and 2 reported species, respectively.

Table 1 Checklist of Collembola from the Northern forest of Iran.

Taxonomy/order/family/genera/species	References	Habitat
Poduromorpha (Börner, 1906)		
Family Neanuridae (Börner, 1901)		
Genus Pseudachorutes (Tullberg, 1871)		
<i>Pseudachorutes corticolus</i> (Schaffer, 1897)	Sari, Semeskandeh [18]	Forest, leaf litter
<i>Pseudachorutes parvulus</i> (Börner, 1901)	Sari, Shahid Zare forest, Chahardangeh, Langar village; Dasht-e-Naz [20]	Soil and leaf litter
<i>Pseudachorutes suberassus</i> (Tullberg, 1871)	Sari, Semeskandeh [18]	Forest, soil and leaf litter
Subfamily Neanurinae		
Genus Bilobella (Caroli, 1912)		
<i>Bilobella aurantiaca</i> (Caroli, 1912)	Mazandaran [5]	Soil, leaf litter
Genus Endonura (Cassagnau, 1979)		
<i>Endonura longirostris</i> (Smolis et al., 2017)	Behshahr, Abbas-Abad forest; Noor, Kadirsar [15]	leaf litter and soil rotting wood
<i>Endonura paracentauria</i> (Smolis et al., 2017)	Behshahr, Abbas-Abad forest [15]	Soil, leaf litter
Genus Deutonura (Cassagnau, 1979)		
<i>Deutonura decolorata</i> (Gama and Gisin, 1964)	Mazandaran [5]	Soil, leaf litter
<i>Deutonura persica</i> (Smolis et al., 2018)	Neka, Hezar Jarib forest [16]	Dead wood, moss on tree, leaf litter, dead wood in a hole of Persian ironwood
Genus Neanura (MacGillivray, 1893)		
<i>Neanura deharvengi</i> (Smolis et al., 2018)	Behshahr, Abbas-Abad forest; Noor, Kadirsar [16]	Leaf litter and soil
<i>Neanura muscorum</i> (Templeton, 1835)	Sari [5]	Leaf litter
Genus Persanura (Mayvan et al., 2015)		
<i>Persanura hyrcanica</i> (Mayvan et al., 2015)	Sari, Semeskandeh [13, 18]	Soil and litter, oak-hornbeam
Family Hypogastrurida (Börner, 1906)		
Genus Ceratophysella (Börner, 1932)		
<i>Ceratophysella denticulata</i> (Bagnall, 1941)	Sari; Noor; Savadkooh; Babol [5, 7, 8, 10, 17]	Diva, leaf litter
<i>Ceratophysella stercoraria</i> (Stach, 1963)	Babol; Sari, Chahardangeh, Langar village, Salar Darreh forest; Fereydunkenar; Savadkooh; Qaemshahr; Neka; Behshahr; Amol, Razakeh forest, Halumsar forest; Babolsar; Tonekabon, Soil [7, 10, 12, 18, 20, 23]	Soil, leaf litter
Genus Hypogastrura (Bourlet, 1839)		
<i>Hypogastrura manubrialis</i> (Tullberg, 1869)	Amol [5]	Soil, leaf litter
<i>Hypogastrura martiani</i> (Skarżyński and Kaprus, 2009)	Babol, Shiadeh forest [23]	Oak forest
<i>Hypogastrura purpureascens</i> (Lubbock, 1867)	Fereydunkenar [6, 10]	Soil and leaf litter, oak forest

Table 1 to be continued

<i>Hypogastrura tullbergi</i> (Schäffer, 1900)	Mazandaran [5]	Soil, leaf litter
Genus <i>Schoetella</i> (Schäffer, 1896)		
<i>Schoetella ununguiculata</i> (Tullberg, 1869)	Larijan; Savadkooh; Babol, Shiadeh forest, Bezchaft forest [7, 10, 11, 23]	Soil, leaf litter
Genus <i>Triacanthella</i> (Schäffer, 1897)		
<i>Triacanthella intermedia</i> (Dunger and Zivadinovic, 1984)	Juybar [8]	Leaf litter
Genus <i>Xenylla</i> (Tullberg, 1869)		
<i>Xenylla maritima</i> (Tullberg, 1869)	Neka; Savadkooh; Amol, Halumsar forest; Babol, Bzchaft forest [7, 10, 23]	Soil, leaf litter, moss on tree
<i>Xenylla mediterranea</i> (da Gama, 1964)	Amol, Halumsar Forest Park; Babol, Bezchaft forest park [23]	Moss on tree and rock
<i>Xenylla welchi</i> (Folsom, 1916)	Sari [5]	Leaf litter
Family Onychiuridae (Lubbock, 1867)		
Subfamily Onychiurinae		
Genus <i>Heteraphorura</i> (Bagnall, 1948)		
<i>Heteraphorura iranica</i> (Kaprus' <i>et al.</i> , 2017)	Nowshahr, Kajour, Lashkenar; Babolsar, Bahnamir; Sari, Semeskandeh forest [19]	Leaf litter
<i>Heteraphorura japonica</i> (Yosii, 1967)	Sari, Semeskandeh forest; Juybar [12, 18]	Leaf litter
Genus <i>Hymenaphorura</i> (Gervais, 1841)		
<i>Hymenaphorura sibirica</i> (Tullberg, 1876)	Mazandaran [5]	Soil
Genus <i>Onychiuiroides</i> (Bagnall, 1948)		
<i>Onychiuiroides granulosus</i> (Stach, 1930)	Mazandaran [5]	Soil
<i>Onychiuiroides pseudogranulosus</i> (Gisin, 1951)	Mazandaran [5]	Soil
Genus <i>Orthonychiurus</i> (Stach, 1954)		
<i>Orthonychiurus folsomi</i> (Schäffer, 1900)	Sari [5]	Leaf litter, soil and leaf litter under pine and oak
<i>Orthonychiurus rectopapillatus</i> (Stach, 1933)	Mazandaran [5]	Soil
Genus <i>Protaphorura</i> (Absolon, 1901)		
<i>Protaphorura bicampata</i> (Gisin, 1956)	Mazandaran (Shayanmehr <i>et al.</i> , 2013)	Soil
<i>Protaphorura fimata</i> (Gisin, 1952)	Larijan (Shayanmehr <i>et al.</i> , 2013; Balvasi <i>et al.</i> , 2015)	Soil, leaf litter
<i>Protaphorura ombrophila</i> (Stach, 1960)	Sari, Semeskandeh forest (Ghasemi Cherati, 2017)	Soil
<i>Protaphorura quadriocellata</i> (Gisin, 1947)	Mazandaran (Shayanmehr <i>et al.</i> , 2013)	Soil
<i>Protaphorura sakatoi</i> (Yosii, 1966)	Noor, Sisangan wildlife refuge; Nowshahr, Kojur, Lashkenar; Babol, Khoshrudpay; Sari, Semeskandeh forest; Juybar (Yoosefi Lafooraki, 2014; Yoosefi Lafooraki and Shayanmehr, 2015a; Alijani-Ardeshtir <i>et al.</i> , 2017; Ghasemi Cherati, 2017)	Soil and leaf litter under elm tree
Genus <i>Thalassaphorura</i> (Bagnall, 1949)		
<i>Thalassaphorura encarpata</i> (Denis, 1931)	Sari; Mahmoodabad; Noor; Babolsar; Qaemshahr (Yoosefi Lafooraki, 2014; Yoosefi Lafooraki and Shayanmehr, 2013, 2015a)	Soil under oak trees
Family Tullbergiidae (Bangel, 1935)		
Genus <i>Mesaphorura</i> (Börner, 1901)		
<i>Mesaphorura krausbaueri</i> (Börner, 1901)	Mazandaran (Shayanmehr <i>et al.</i> , 2013)	Soil
Genus <i>Tullbergia</i> (Lubbock, 1876)		
<i>Tullbergia simplex</i> (Gisin, 1958)	Savadkooh (Yoosefi Lafooraki and Shayanmehr, 2013; Yoosefi Lafooraki, 2014)	Soil

Table 1 to be continued

Order Entomobryomorpha		
Family Oncopoduridae		
(Carl and Lebedinsky, 1905)		
Genus <i>Oncopodura</i> (Carl and Lebedinsky, 1905)		
<i>Oncopodura ambigua</i> (Christiansen, 1957)	Sari (Shayanmehr <i>et al.</i> , 2013)	Soil, leaf litter
Family Tomoceridae (Schäffer, 1896)		
Genus <i>Pogonognathellus</i> (Tullberg, 1871)**		
<i>Pogonognathellus flavescens</i> (Tullberg, 1871)**	Sari, Chahardangeh, Langar village; Tonekabon; Babol, Filband; Neka, Hezar Jarib forest [21]	Soil and leaf litter
Genus <i>Tomocerus</i> (Nicolet, 1842)		
<i>Tomocerus minor</i> (Lubbock, 1862)	Mazandaran [5]	Soil
<i>Tomocerus vulgaris</i> (Tullberg, 1871)	Savadkooh, Forest of Jawarom wildlife refuge; Larijan; Sari, Semeskandeh forest [5, 7, 11, 12, 18]	Soil, leaf litter
Family Isotomidae (Schäffer, 1896)		
Genus <i>Ballistura</i> (Börner, 1906)		
<i>Ballistura schoetti</i> (Dalla Torre, 1895)	Neka [20]	Soil, leaf litter
Genus <i>Hemisotoma</i> (Bagnall, 1949)		
<i>Hemisotoma thermophila</i> (Axelson, 1900)	Mahmood-abad; Noor, Royan; Larijan [5-7, 11]	Soil (<i>Ulmus</i> sp., <i>Ficus</i> sp., <i>Ziziphus</i> sp., <i>Populus</i> sp.) leaf litter, soil and leaf litter under poplar and oak
<i>Hemisotoma orientalis</i> (Stach, 1947)	Mazandaran [5]	Soil, leaf litter
<i>Hemisotoma pontica</i> (Stach, 1947)	Sari; Simorq; Mahmood-abad; Qaemshahr [5-7]	Soil and leaf litter under poplar and common reed
Genus <i>Folsomia</i> (Willem, 1902)		
<i>Folsomia brevifurca</i> (Bagnall, 1949)	Mazandaran [5]	Soil
<i>Folsomia candida</i> (Willem, 1902)	Sari [5]	Soil, leaf litter
<i>Folsomia fimetaria</i> (Linnaeus, 1758)	Mazandaran [5]	Soil
<i>Folsomia inoculata</i> (Stach, 1946)**	Sari, Dasht-e-Naz forest, Shahid Zare forest [22]	soil and leaf litter
<i>Folsomia ksenemani</i> (Stach, 1947)	Noor, Royan, Kodirsar; Savadkooh, Alasht, Serin village; Forest of Jawarom wildlife refuge [6, 7]	Leaf litter under oak and plum
<i>Folsomia penicula</i> (Bagnall, 1939)	Nowshahr, Kojur, Lashkenar; Bahnamir; Sari, Chahardangeh, Langar village, Semeskandeh forest [5-7, 12, 18, 20]	Soil (<i>Quercus</i> sp.), leaf litter under oak
<i>Folsomia quadrioculata</i> (Tullberg, 1871)	Mazandaran [5]	
Genus <i>Folsomides</i> (Stach, 1922)		
<i>Folsomides parvulus</i> (Stach, 1922)	Sari, Dasht-e-Naz forest; Savadkooh, Forest of Jawarom wildlife refuge; Alasht, Serin village; Babolsar; Qaemshahr [5, 7, 20]	Soil (<i>Morus</i> sp.), leaf litter, soil of black cherry garden
Genus <i>Isotoma</i> (Bourlet, 1839)		
<i>Isotoma viridis</i> (Bourlet, 1839)	Sari; Babol, Bandpay Sharghi [5, 17]	Soil, leaf litter
Genus <i>Isotomiella</i> (Bagnall, 1939)		
<i>Isotomiella minor</i> (Schäffer, 1896)	Sari, Semeskandeh forest; Nowshahr; Noor, Forest of Sisangan wildlife refuge [5-7, 12, 18]	Soil (<i>Quercus</i> sp., <i>Prunus</i> sp., <i>Pinus</i> sp.), leaf litter, soil of lawn, soil next to river
Genus <i>Isotomurus</i> (Börner, 1903)		
<i>Isotomurus afghanicus</i> (Yosii, 1963)	Mahmood-abad; Miandorud; Noor, Forest of Sisangan, wildlife refuge; Amol; Neka, Hezarjerib forest [6, 7]	Soil leaf litter

Table 1 to be continued

<i>Isotomurus italicus</i> (Carapelli <i>et al.</i> , 1995)	Sari, Semeskandeh forest [12, 18]	Soil leaf litter
<i>Isotomurus palustris</i> (Muller, 1776)	Sari [5]	Soil leaf litter
Genus <i>Parisotoma</i> (Bagnall, 1940)		
<i>Parisotoma notabilis</i> (Schäffer, 1896)	Noor, Royan, Kodirsar; Sari, Shahid Zare forest, [5-7, 20]	Soil (Platanus sp., Ulmus sp., Cupressus sp.), leaf litter under oak
Genus <i>Proisotoma</i> (Börner, 1901)		
<i>Proisotoma minima</i> (Absolon, 1901)	Sari; Qaemshahr [5-7]	Leaf litter
<i>Proisotoma minuta</i> (Tullberg, 1871)	Mahmood-abad; Larijan [5-7, 11]	Soil, leaf litter
<i>Proisotoma subminuta</i> (Denis, 1931)	Amol [6, 7]	Soil (Ulmus sp.), soil
Genus <i>Pseudisotoma</i> (Handschin, 1924)		
<i>Pseudisotoma sensibilis</i> (Tullberg, 1876)	Noor, Royan [6, 7]	Dead wood
Family Entomobryidae (Schäffer, 1896)		
Subfamily Entomobryinae		
Genus <i>Entomobrya</i> (Rondani, 1861)		
<i>Entomobrya obscuralla</i> (Brown, 1926)	Sari, Semeskandeh forest [18]	Leaf litter
<i>Entomobrya atrocincta</i> (Schött, 1986)	Sari, Semeskandeh forest, Dasht-e-Naz forest; Savadkooh [5, 18, 22]	Leaf litter
<i>Entomobrya corticalis</i> (Nicolet, 1841)*	Sari, Shahid Zare forest [21]	Soil and leaf litter
<i>Entomobrya dollfusi</i> (Denis, 1924)	Sari [5]	Leaf litter
<i>Entomobrya lindbergi</i> (Stach, 1960)	Sari [6, 7]	Soil (Alnus sp. and Ulmus sp.), Soil and leaf litter under walnut trees
<i>Entomobrya lanuginosa</i> (Nicolet, 1841)	Mazandaran [5]	Soil
<i>Entomobrya multifasciata</i> (Tullberg, 1871)	Sari, Semeskandeh forest; Galugah; Juybar [5, 6] [18]	Leaf litter
<i>Entomobrya nigrocincta</i> (Denis, 1923)	Sari, Chahardangeh, Langar village, Dasht-e-Naz, Salar Darreh forest [21]	Soil
<i>Entomobrya schoetti</i> (Stach, 1922)	Neka, Hezar Jarib forest [21]	Leaf litter
Genus <i>Sinella</i> (Brook, 1882)		
<i>Sinella curviseta</i> (Brook, 1882)	Savadkooh, Forest of Jawarom wildlife refuge; Qaemshahr [5, 6]	Soil, leaf litter under poplar
<i>Sinella tenebricosa</i> (Folsom, 1902)	Babol, Ganjkola [17]	Leaf litter and soil
Subfamily Lepidocyrtinae		
Genus <i>Lepidocyrtus</i> (Bourlet, 1839)		
<i>Lepidocyrtus cyaneus</i> (Tullberg, 1871)	Mazandaran [5]	Soil
<i>Lepidocyrtus lanuginosus</i> (Gmelin, 1788)	Mazandaran [5]	Soil
<i>Lepidocyrtus ruber</i> (Schött, 1902)	Mazandaran [5]	Soil
Genus <i>Pseudosinella</i> (Schaefer, 1897)		
<i>Pseudosinella imparipunctata</i>	Mazandaran [5]	Soil
<i>Pseudosinella octopunctata</i> (Böner, 1901)	Sari, Semeskandeh forest; Babolsar; Larijan [5-8, 11, 18]	Soil, leaf litter, moss on rocks
Subfamily Seirinae		
Genus <i>Seira</i> (Lubbock, 1870)		
<i>Seira domestica</i> (Nicolet, 1842)	Sari, Salar Darreh forest; Qaemshahr, Jadeh-Nezami, Semeskandeh forest; Neka, Hezar Jarib forest; Babol, Filband [5, 18, 21]	Leaf litter, soil (Magnolia sp., Ficus sp., Ulmus sp., Prunus sp.)

Table 1 to be continued

Subfamily Orchesellinae		
Genus <i>Heteromurus</i> (Wankel, 1860)		
<i>Heteromurus gigans</i> (Mari Mutt and Stomp, 1980)	Sari, Semeskandeh forest, Dasht-e-Naz forest, Shahid Zare forest; Babol, Filband [18, 22]	Leaf litter
<i>Heteromurus major</i> (Moniez, 1889)	Sari, Salar Darreh forest, Dasht-e-Naz, Shahid Zare forest, Semeskandeh forest; Savadkooh, Lafoor; Noor, Katel-shani, Noor, Forest of Sisangan wildlife refuge; Larijan; Qaemshahr, Jadeh-Nezami; Neka, Hezar Jrib forest; Babol, Filband [5, 6, 8, 12, 18, 21]	Soil, leaf litter
<i>Heteromurus nitidus</i> (Templeton, 1835)	Savadkooh; Sari, Semeskandeh forest; Babol, Ganjkola village, Diva village, Babolkenar, Derazkola village [5, 6, 8, 12, 18]	Soil, leaf litter
<i>Heteromurus sexoculatus</i> (Brown, 1926)	Mazandaran [5]	Soil
<i>Heteromurus variabilis</i> (Martynova, 1974)	Sari, Semeskandeh forest [18]	Leaf litter
Genus <i>Orchesella</i> (Templeton, 1836)		
<i>Orchesella cincta</i> (Linnaeus, 1758)	Savadkooh, Forest of Jawarom wildlife refuge; Alasht, Serin village; Larijan; Babol, Filband; Neka, Hezar Jarib forest [6, 8, 11, 21]	Leaf litter, moss on the rock
<i>Orchesella spectabilis</i> (Stach, 1960)	Sari, Semeskandeh forest [18]	Leaf litter
Order Neelipleona (Massoud, 1971)		
Family Neelidae (Folsom, 1896)		
Genus <i>Megalothorax</i> (Willem, 1900)		
<i>Megalothorax incertus</i> (Börner, 1903)	Savadkooh [6, 7]	Soil, leaf litter
<i>Megalothorax willemi</i> (Schneider and D'Haese, 2013)	Neka; Behshahr; Noo; Sari, Semeskandeh forest [6, 7, 18]	Soil, leaf litter
<i>Megalothorax perspicillum</i> (Schneider and D'Haese, 2013)	Neka, Hezar Jrib forest; Behshahr, Abbas-Abad forest [6, 7]	Soil, leaf litter, dead wood
Genus <i>Neelus</i> (Folsom, 1896)		
<i>Neelus murinus</i> (Folsom, 1896)	Sari, Semeskandeh forest [5, 18]	
Order Symphypleona (Börner, 1901)		
Family Sminthurididae (Börner, 1906)		
Genus <i>Sphaeridia</i> (Linnaniemi, 1912)		
<i>Sphaeridia pumilis</i> (Krausbauer, 1898)	Neka, Hezar jrib forest; Sari; Behshahr, Abbas-Abad forest; Noor, Royan [5, 6, 9]	
Family Katiannidae (Börner, 1913)		
Genus <i>Sminthurinus</i> (Börner, 1901)		
<i>Sminthurinus aureus</i> (Lubbock, 1862)	Sari [5]	Leaf litter
<i>Sminthurinus elegans</i> (Fitch, 1863)	Sari, Semeskandeh forest; Noor, Royan; Neka, Hezar jrib forest; Behshahr, Abbas-Abad forest; Juybar [5, 6, 12, 9, 18]	Soil, leaf litter moss on tree
<i>Sminthurinus gisini</i> (da Gama, 1956)	Neka, Hezar jrib forest; Savadkooh, Alasht [6, 9]	Split of tree, moss on tree
Family Arrhopalitidae (Stach, 1956)		
Genus <i>Arrhopalites</i> (Börner, 1906)		
<i>Arrhopalites caecus</i> (Tullberg, 1871)*	Tonekaon, Sari, Chahardangeh, Langar village [20]	Soil, leaf litter
<i>Arrhopalites principalis</i> (Stach, 1945)**	Sari, Chahardangeh, Langar village [20]	Soil, leaf litter
Family Sminthuridae (Lubbock, 1862)		
Genus <i>Allacma</i> (Börner, 1906)		

Table 1 to be continued

<i>Allacma fusca</i> (Linnaeus, 1758)	Sari, Zare forest [24]	Leaf litter
Genus <i>Lipothrix</i> (Börner, 1906)		
<i>Lipothrix lubbocki</i> (Tullberg, 1872)	Sari, Semeskandeh forest; Tonekabon [12, 20]	Leaf litter
Genus <i>Paralipothrix</i> (Bretfeld, 1999)		
<i>Paralipothrix natalicius</i> (Ellis, 1974)	Sari, Semeskandeh forest [12]	Leaf Litter
Genus <i>Sminthurus</i> (Latreille, 1804)		
<i>Sminthurus ghilarovi</i> (Stebaeva, 1966)	Sari, Semeskandeh forest [12]	Leaf litter
Genus <i>Caprainea</i> (Dallai 1970)		
<i>Caprainea marginata</i> (Schott, 1893)	Sari, Semeskandeh forest [12]	Soil, leaf litter
Family Dicyrtomidae (Börner, 1906)		
Genus <i>Dicyrtomina</i> (Börner, 1903)		
<i>Dicyrtomina ornata</i> (Nicolet, 1842)	Sari [5]	Leaf litter
Genus <i>Dicyrtoma</i> (Bourlet, 1841)		
<i>Dicyrtoma ghilarovi</i> (Bretfeld, 1996)	Sari, Semeskandeh forest [12]	Leaf litter
<i>Dicyrtoma minuta</i> (Fabricius, 1783)	Mazandaran [5]	Soil
<i>Dicyrtoma fusca</i> (Lubbock, 1873)	Sari [5]	Leaf litter

** New for Iranian fauna, *New for Mazandaran Province.

3. Conclusions

In this study, the list of Collembola from North Forests of Iran and collected information such as study site, habitats, e.g. soils, leaf litter, vegetation, and collectors have been presented between years 2013-2018. Moreover some samples were collected and identified by the author during 2016-2018. An up-to-date systematic checklist of Collembolans has been provided.

References

- [1] Siadati, S., Moradi, H., Attar, F., Etemad, V., Hamzeh'ee, B., and Naqinezhad, A. 2010. "Botanical Diversity of Hyrcanian Forests: A Case Study of a Transect in the Kheyrud Protected Lowland Mountain Forests in Northern Iran." *Phytotaxa* 7: 1-18.
- [2] Bellinger, P. F., Christiansen, K. A., and Janssens, F. 1996-2019. *Checklist of the Collembola of the World*. Available from: <http://www.Collembola.org/taxa>.
- [3] Farrahbakhsh, G. 1961. *A Checklist of Economically Important Insect and Other Enemies of Plant and Agricultural Products in Iran*, Vol. 1. Department of Plant Protection, Ministry of Agriculture, Tehran, Iran, 153. (in press)
- [4] Cox, P. 1982. "The Collembola Fauna of North and North Western Iran." *Entomologist's Monthly Magazine* 118: 39-43.
- [5] Shayanmehr, M., Yahyapour, E., Kahrarian, M., and Yoosefi Lafooraki, E. 2013. "An Introduction to Iranian Collembola (Hexapoda): An Update to the Species list." *Zookeys* 335: 69-83.
- [6] Yoosefi Lafooraki, E. 2014. "Morphological and Biological Identification of Collembola (Hexapoda) in Mazandaran Province." MSc thesis, Sari Agricultural Science and Natural Resources University.
- [7] Yoosefi Lafooraki, E., and Shayanmehr, M. 2014. "A Survey on Entomobryomorpha (Collembola, Hexapoda) Fauna in Northern Iran with an Identification Key." *Iranian Journal of Animal Biosystematics* 10 (2): 101-17.
- [8] Yoosefi Lafooraki, E., and Shayanmehr, M. 2015. "New Addition to Fauna and a Checklist of the Order Poduromorpha (Collembola) of Mazandaran Province, Iran." *Far Eastern Entomologist* 298: 1-10.
- [9] Yoosefi Lafooraki, E., and Shayanmehr, M. 2015. "Identification Key and Introduction of New Species of Order Symphypleona (Collembola, Hexapoda) from Iran." *Journal of Plant Protection* 29 (2): 259-64. (in Persian)
- [10] Yoosefi Lafooraki, E., and Shayanmehr, M. 2015. "First Record of the Genus *Schoettella* and Three New Records of the Family Hypogastruridae (Collembola, Hexapoda) for Fauna of Iran with an Identification Key for Mazandaran Province." *Taxonomy and Biosystematics* 7 (23): 1-12.
- [11] Balvasi, A., Chelav, H. S., Khashaveh, A., and Shayanmehr, M. 2015. "New Report of Collembola

- (Hexapoda: Entognatha) from North of Iran (Larijan Region)." *International Journal of Agriculture and Biosciences* 5 (1): 24-8.
- [12] Mehrafrooz Mayvan, M., Shayanmehr, M., and Scheu, S. 2015. "Depth Distribution and Inter-annual Fluctuations in Density and Diversity of Collembola in an Iranian Hyrcanian Forest." *Soil Organisms* 87 (3): 239-47.
- [13] Mehrafrooz Mayvan, M., Shayanmehr, M., Smolis, A., and Skarżyński, D. 2015. "*Persanura hyrcanica*, a New Genus and Species of Neanurinae (Collembola: Neanuridae) from Iran, with a Key to Genera of the Tribe Neanurini." *Zootaxa* 3918 (4): 552-8.
- [14] Potapov, M., Kahrarian, M., Deharveng, L., and Shayanmehr, M. 2015. "Taxonomy of the *Proisotoma* Complex. V. Sexually Dimorphic *Ephemerotoma* Gen. Nov. (Collembola: Isotomidae)." *Zootaxa* 4052 (3): 345-58.
- [15] Smolis, A., Shayanmehr, M., Kuznetsova, N., and Yoosefi Lafooraki, E. 2017. "Three New Remarkable Species of the Genus *Endonura* Cassagnau, 1979 from the Middle East and Central Asia (Collembola, Neanuridae, Neanurinae, Neanurini)." *Zoo Keys* 673: 135-51.
- [16] Smolis, A., Shayanmehr, M., and Yoosefi Lafooraki, E. 2018. "New Members of the Genera *Neanura* MacGillivray, 1893 and *Deutonura* Cassagnau, 1979 (Collembola: Neanuridae) from the Middle East." *European Journal of Taxonomy* 406: 1-16.
- [17] Alijani-Ardeshtir, M., Shayanmehr, M., and Amiri-Besheli, B. 2017. "Faunistic Survey of Collembola in Babol Regions, Mazandaran Province: Introduction New Species for Iranian Fauna." *Plant Protection (Scientific Journal of Agriculture)* 40 (2): 45-61. (in Persian)
- [18] Ghasemi-Cherati, M. 2017. "The Comparison Fauna, Diversity and Density of Collembola in an Agricultural Ecosystem versus a Forest Ecosystem." MSc thesis, Sari Agricultural Science and Natural Resources University.
- [19] Kaprus', I., Shayanmehr, M., Kahrarian, M., and Yoosefi Lafooraki, E. 2017. "Three New Species of Onychiuridae Lubbock, 1871 (Collembola, Poduromorpha) from Iran." *Zootaxa* 4291 (2): 335-46.
- [20] Yahyapour, E., Vafaei-Soushtari, R., and Shayanmehr, M. 2018. "Fauna Introduction and New Records of Collembola (Hexapoda) from Some Forests of Mazandaran (Iran)." *Journal of Insect Biodiversity and Systematics* 4 (4): 307-16.
- [21] Yahyapour, E., Vafaei-Soushtari, R., Shayanmehr, M., and Arbea, J. 2018. "A Survey on Entomobryomorpha (Collembola) Fauna in northern Iran." *Journal of Insect Biodiversity and Systematics* 4 (4): 307-16.
- [22] Yahyapour, E., Vafaei-Shoushtari, R., Shayanmehr, M., Goderio, N. N., and Bellini, B. C. 2018. "First Report of Genus *Aethiopella* Handschin, 1942 and Species *Folsomia inoculata* Stach, 1947 (Hexapoda: Collembola) from Iran."
- [23] Mohammadi Nodeheki, L., Shayanmehr, M. & Yazdani, M. 2017. "A Survey on Hypogastruridae (Collembola: Poduromorpha) fauna in Babol, Babolsar and Amol, Mazandaran Province." 2th National Conference of New Achievement in Agronomy and Plant Breeding.
- [24] Bakhshi, S., et al. 2014. "The First Record of the genus *Allacma* Börner and the Species *Allacma fusca* (Collembola: Sminthuridae) from Iran. Taxonomy and Biosystematics." 18: 13-18.