


# Contributions to the knowledge of the plant-inhabiting mite fauna of Hungary and Austria (Acari: Parasitiformes and Acariformes)

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## RESEARCH ARTICLE

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## ABSTRACT

Date-locality-host records for 37 mite species of 15 families are presented for Hungary and Austria. These results include the first record of eight species for Hungary, viz. *Charletonia krendowskyi* (Feider, 1954), *Marantelophus rudaensis* (Haitlinger, 1986), *Cunaxa gazella* (Berlese, 1916), *Eupalopsellus oelandicus* Sellnick, 1949, *Tydeus lindquisti* (Marshall, 1970), *Neoseiulus dungeri* (Karg, 1977), *Neoseiulus tauricus* (Livshitz et Kuznetsov, 1972) and *Proctolaelaps drosophilae* Karg, Baker et Jenkinson, 1995. Observations on habitat preferences, plant associations, co-occurrences and feeding behaviour are also provided.

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**KEYWORDS**

Phytoseiidae, Erythraeidae, Cunaxidae, Eupalopsellidae, Tydeidae

**INTRODUCTION**

A few families of mesostigmatid mites (Acari: Parasitiformes) and considerably numerous families of prostigmatid mites (Acari: Acariformes) inhabit the foliage of plants. These mesostigmatids and prostigmatids are either predators, herbivores, fungivores or scavengers (Walter and Proctor, 1999). Over the past few decades several acarological papers have been devoted to the study of mite fauna of Hungary (Fain and Ripka, 1998a, 1998b; Gabryś and Mąkol, 1991, 1996; Haitlinger, 2007; Ripka and Szabó, 2010, 2011; Ripka et al., 2002, 2005, 2013, 2020a, 2020b, 2022; Szabó and Németh, 2007; Szabó et al., 2009, 2010, 2013a, 2013b; Tempfli et al., 2012, 2014, 2015; Ueckermann and Ripka, 2016). The hyporder Parasitengona is one of the most diverse groups of the order Trombidiformes, comprising about 15 superfamilies (Zhang, 2010; Zhang et al., 2011). The faunistic knowledge on the three superfamilies of terrestrial Parasitengona (Acari: Prostigmata: Calyptostomatoidea, Erythraeoidea, Trombidoidea) present in Hungary is mainly confined to some nature reserves of Hungary. Representatives of terrestrial Parasitengona are distinctly rare on arboreal plants. The majority of the previous records include data from herbaceous plants. From the terrestrial habitats of Bátorliget Nature Reserve, Gabryś and Mąkol (1991) reported 42 species belonging to six families (Calyptostomatidae, Smarididae, Erythraeidae, Trombellidae, Trombiculidae and Trombidiidae). As a result of a survey in the Bükk National Park, 44 taxa of seven families (Calyptostomatidae, Smarididae, Erythraeidae, Johnstonianidae, Microtrombidiidae, Trombiculidae and Trombidiidae) were reported (Gabryś and Mąkol, 1996). On the foliage of 12 ligneous plant species, *Allothrombium pulvinum* Ewing (Trombidiidae), while on the foliage of three ornamental tree species, *Charletonia singularis* (Oudemans) (Erythraeidae) were found in urban habitats (Ripka et al., 2002). A species of the genus *Hauptmannia* Oudemans (Erythraeidae) ectoparasitic on thrips was collected from green pepper plantation (Ripka et al., 2005). From herbaceous plants, Haitlinger (2007) reported seven erythraeid, two trombidiid and one tanaupodid species collected in different counties of Hungary. One new erythraeid species, *Erythraeus budapestensis* Fain et Ripka, and two new trombidiid species, *Podothrombium exiguum* Fain et Ripka and *Podothrombium pannonicum* Fain et Ripka were described from ornamental tree and shrub species in urban habitats of Budapest (Fain and Ripka, 1998a, 1998b). Larval stage of all three mentioned species was collected from different aphid hosts (Hemiptera: Aphidoidea). From herbaceous plants, two erythraeids, *Erythraeus budapestensis* and *Leptus clethrionomydis* Haitlinger were already reported (Ripka and Szabó, 2010). Mites of the family Erythraeidae are generally predators at postlarval stages, feeding upon various arthropods. However larvae of most erythraeids are ectoparasites of different arthropods including soft bodied insects, e.g. aphids, bugs, flies, grasshoppers, etc.

Contrary to the tydeoid, cheyletid and cunaxid mites, the knowledge on plant-inhabiting eupalopsellid mites is scanty.

The members of the family Phytoseiidae (Acari: Mesostigmata) are the most frequent predatory mites living on plants. Out of the 2557 known valid phytoseiid species worldwide



(Moraes et al., 2004; Demite et al., 2021), hitherto 76 species have been recorded from Hungary (Ripka, 2006; Szabó et al., 2013a; Demite et al., 2021). The genus *Neoseiulus* is one of the largest genera, and represented by twenty three species in the Hungarian fauna, viz. *Neoseiulus agrestis* (Karg), *N. alustoni* (Livshitz et Kuznetsov), *N. amicus* (Chant), *N. astutus* (Beglyarov), *N. alpinus* (Schweizer), *N. bellinus* (Womersley), *N. bicaudus* (Wainstein), *N. brevispinus* (Kennett), *N. callunae* (Willmann), *N. californicus* (McGregor), *N. cucumeris* (Oudemans), *N. herbarius* (Wainstein), *N. huron* (Chant et Hansell), *N. marginatus* (Wainstein), *N. marinus* (Willmann), *N. phragmitidis* (Bozai), *N. populi* (Bozai), *N. reductus* (Wainstein), *N. salicicola* (Bozai), *N. setulus* (Fox), *N. umbraticus* (Chant), *N. versutus* (Beglyarov) and *N. zwoelferi* (Dosse) (Ripka, 2006; Szabó et al., 2013a).

In Hungary a total of 12 phytoseiid species have been documented from *Rubus* spp., namely *Amblyseius andersoni* (Chant), *Anthoseius occiduus* Karg, *A. rhenanus* (Oudemans), *Euseius finlandicus* (Oudemans), *Kampimodromus aberrans* (Oudemans), *Neoseiulus alpinus* (Schweizer), *Neoseiulus reductus* (Wainstein), *Phytoseius echinus* Wainstein et Arutunjan, *P. juvenis* Wainstein et Arutunjan, *P. macropilis* (Banks), *Typhlodromus commenticius* Livshitz et Kuznetsov and *T. pyri* Scheuten. Out of these, *P. juvenis* was reported with the highest population density from *Rubus* spp. (Ripka et al., 2020a).

The aim of this study is to present new data to the mite diversity of vascular plants. This article is the continuation of the faunistic studies of the authors and the latest part of a large project focusing on the mite community of plants.

## MATERIAL AND METHODS

Samples of different plant species living in different habitats were collected in plastic bags during the growing season in 2000–2021. All *Rubus* samples were collected by G. Király. Plant material (upper and lower surfaces of the leaves, petioles, shoots, buds, bark, flowers, galls, etc.) was examined under a dissection binocular microscope (Zeiss Stemi 2000-C).

Using a fine minuten pin, mite specimens found on the plants were put directly into lactic acid. After clearing the specimens in lactic acid (for 2–4 weeks at room temperature to obtain the desired extent of clearing), they were mounted on microscope slides in Keifer's F-medium (Keifer, 1975). The slide preparations were dried (for 4–6 weeks) at room temperature, then sealed with commercial nail varnish (Upton, 1991). Specimens were examined with a phase-contrast compound microscope (Nikon Eclipse E600). For acarid mite determination, the keys of Fain (1982) and Zhang (2003) were used. The concepts of the taxonomy and species identification of mesostigmatid mites were based mainly on Karg's key (1993) and partially on keys of Chant and Yoshida-Shaul (1987) and Mašán (2022). For geographical distribution of the mites the world catalogue databases of Beron (2008, 2017, 2020, 2021) and Demite et al. (2021) were followed.

The phytoseiid and melicharid mites; the cunaxid, eupalopsellid and tydeoid mites; the tenuipalpid and oribatid mites; and the eriophyoid, cheyletid, acarid and winterschmidtiiid mites were identified by Á. Szabó, A. Kaźmierski, J. Kontschán, and G. Ripka, respectively.

Nomenclature of host plants was used in accordance with Király (2009), excluding *Rubus* that generally follows Kurtto et al. (2010), and, for some recently described species, Trávníček et al. (2018) and Sochor et al. (2019).



## RESULTS

The current study presents recent findings of mites collected from vascular plants (e.g. ornamental trees and shrubs, and herbs of streets, squares, parks, botanical gardens, private gardens, forests, fields and green-belt in cities), and at the same time follows a series of publications on the eriophyoid mites of Hungary and Austria, too. For each taxa listed collecting data (i.e. host plant species, locality and date) and whenever useful, extensive faunistic information was given (for detailed records of localities see [Table 1](#)). In this research altogether 16 parasitiform mite species from two families and 21 acariform mite species belonging to 13 families have been reported. The data presented extend our knowledge on microhabitat preferences and distribution areas of mite species, and reveals a degree of similarity of Hungarian mite fauna to the fauna of different parts of Europe.

### Superorder Parasitiformes Reuter

#### Family Phytoseiidae Berlese

##### Genus *Amblyseius* Berlese

##### *Amblyseius andersoni* (Chant, 1957)

It was described in Canada and is a widespread cosmopolitan species in almost the whole Europe. In the course of this study *A. andersoni* was collected from the leaves of two bramble species, viz. *Rubus angustipaniculatus* Holub (Rosaceae) at St Jakob in Rosental (Austria, Carinthia), 0.3 km SE of Winkl, N of the Karawanken-highway, in forest clearings, and *Rubus vatavensis* Žila et Trávn. (Rosaceae) in Engelhartzell (Austria, Upper Austria), in the big curve of the road nr. 136 above the village, in forest fringes. On both hosts another phytoseiid species, *Phytoseius juvenis* was collected, too ([Table 1](#)).

##### Genus *Neoseiulus* Hughes

The genus *Neoseiulus* belongs to the largest phytoseiid subfamily Amblyseiinae. Two new representatives of this genus previously unreported from Hungary were collected from *Salvia nemorosa* L. (Lamiaceae) in Vászoly, Öreghegy (Hungary, Veszprém County), viz. *Neoseiulus dungeri* (Karg) and *Neoseiulus tauricus* (Livshitz et Kuznetsov).

##### *Neoseiulus dungeri* (Karg, 1977) NH (= new for Hungary)

The type locality of this species is in the valley of river Leutra, close to the city of Jena (Germany, Thuringia), where the holotype was collected with soil trap in *Seslerietum* plant association (Karg, 1977). No other record was known subsequently. *N. dungeri* ([Fig. 1](#)) belongs to the kangaroo subgroup in the genus *Neoseiulus*; closely related species in Europe is *N. alustoni*. In Hungary it was collected in a seminatural habitat at the village of Vászoly, Öreghegy (Hungary, Veszprém County, Balaton Uplands) from the leaves of *Salvia nemorosa* L. (Lamiaceae) together with the gall-inducing *Aceria salviae* (Nalepa) (Acari: Eriophyidae) ([Ripka, 2016](#)). *Neoseiulus dungeri* is new to the Hungarian fauna.

##### *Neoseiulus tauricus* (Livshitz et Kuznetsov, 1972) NH

It was described based on specimens collected in Crimea from different herbaceous plants (*Teucrium polium*, *Stachys cretica*, *Asperula humifusa*, *Achillea* sp.). Subsequently, the presence



Table 1. Records of mite species investigated in the paper  
 (\* = new species for the Hungarian fauna, ◆ = new host species)

Mite species	Host plant taxon	Locality	Date of sampling
<b>Acari: Mesostigmata</b>			
<b>fam. Phytoseiidae</b>			
<i>Amblyseius andersoni</i> (Chant, 1957)			
	<i>Phyllostachys viridiglauescens</i>	Józsefváros, Budapest VIII (Hungary)	23 August 2011
	<i>Rubus angustipaniculatus</i>	St Jakob in Rosental (Austria, Carinthia)	14 July 2020
	<i>Rubus vatavensis</i>	Engelhartszell (Austria, Upper Austria)	6 July 2020
	<i>Verbena officinalis</i>	Törökvész, Budapest II (Hungary)	24 August 2014
<i>Anthoseius occiduus</i> Karg, 1990			
	<i>Agrimonia eupatoria</i>	Pesthidegkút, Budapest II (Hungary)	27 June 2014
<i>Anthoseius rhenanus</i> (Oudemans, 1905)			
	<i>Petrorhagia prolifera</i>	Soroksár, Budapest XXIII (Hungary)	22 June 2014
	<i>Rubus</i> aff. <i>Seebergensis</i>	Nagylózs (Hungary, Győr-Moson-Sopron County)	12 June 2020
<i>Euseius finlandicus</i> (Oudemans, 1915)			
	<i>Laburnum</i> × <i>watereri</i>	Szentimreváros, Budapest XI (Hungary)	25 May 2017
	× <i>Mahoberberis neubertii</i>	Szentimreváros, Budapest XI (Hungary)	25 May 2017
	<i>Verbena officinalis</i>	Törökvész, Budapest II (Hungary)	24 August 2014
<i>Euseius stipulatus</i> (Athias-Henriot, 1960)			
	<i>Lycium barbarum</i>	Budafok, Budapest XXII (Hungary)	15 July 2014
<i>Neoseiulella tiliarum</i> (Oudemans, 1930)			
	<i>Cornus</i> sp.	Szentimreváros, Budapest XI (Hungary)	28 July 2017
	<i>Rhamnus catharticus</i>	Pesthidegkút, Budapest II (Hungary)	31 May 2014
<i>Neoseiulus cucumeris</i> (Oudemans, 1930)			
	<i>Linaria genistifolia</i>	Soroksár, Budapest XXIII (Hungary)	16 June 2014
	<i>Petrorhagia prolifera</i>	Soroksár, Budapest XXIII (Hungary)	22 June 2014
* <i>Neoseiulus dungeri</i> (Karg, 1977)			
	<i>Salvia nemorosa</i>	Vászoly (Hungary, Veszprém County)	10 August 2014

(continued)



Table 1. Continued

<i>Neoseiulus marginatus</i> (Wainstein, 1961)	<i>Verbena officinalis</i>	Alsó-Rákoshegy, Budapest XVII (Hungary)	2 July 2014
* <i>Neoseiulus tauricus</i> (Livshitz et Kuznetsov, 1972)	<i>Salvia nemorosa</i>	Vászoly (Hungary, Veszprém county)	10 August 2014
<i>Paraseiulus triporus</i> (Chant et Yoshida-Shaul, 1982)	<i>Verbena officinalis</i>	Törökvész, Budapest II (Hungary)	24 August 2014
<i>Phytoseius juvenis</i> Wainstein et Arutunjan, 1970	<i>Rubus angustipaniculatus</i>	St Jakob in Rosental (Austria, Carinthia)	14 July 2020
	<i>Rubus bifrons</i>	Nagylózs (Hungary, Győr-Moson-Sopron County)	12 June 2020
	<i>Rubus ser. Radula</i>	Aschach a.d. Donau (Austria, Upper Austria)	7 July 2020
	<i>Rubus rudis</i>	Otterskirchen, 0.4 km E of Besensandbach (Germany, Bavaria)	8 July 2020
	<i>Rubus vatavensis</i>	Engelhartszell (Austria, Upper Austria)	6 July 2020
	<i>Rubus vatavensis</i>	Hofkirchen im Mühlkreis (Austria, Upper Austria)	7 July 2020
<i>Typhloseiulus peculiaris</i> (Kolodochka, 1980)	<i>Quercus cerris</i>	Mátrafüred (Hungary, Heves County)	14 September 2015
<i>Typhlodromus pyri</i> Scheuten, 1857	<i>Viburnum lantana</i>	Ezüst-hegy, Pilisborosjenő (Hungary, Pest County)	30 June 2015
<i>Typhlodromus tiliae</i> Oudemans, 1929	<i>Salix alba</i>	Óbuda, Budapest III (Hungary)	17 June 2014
fam. <b>Melicharidae</b>			
* <i>Proctolaelaps drosophilae</i> Karg, Baker et Jenkinson, 1995	<i>Beta vulgaris</i>	Debrecen-Dózsa (Hungary, Hajdú-Bihar County)	2 September 2021
<b>Acari: Prostigmata</b>			
fam. <b>Trombidiidae</b>			
<i>Allothrombium fuliginosum</i> (Hermann, 1804)	<i>Agrimonia eupatoria</i>	Mesteri (Hungary, Vas County)	13 July 2013
<i>Allothrombium pulvinum</i> Ewing, 1917	<i>Quercus robur</i>	Telki (Hungary, Pest County)	9 April 2000
fam. <b>Erythraeidae</b>			
<i>Abrolophus quisquiliaris</i> (Hermann, 1804)	<i>Agrimonia eupatoria</i>	Mesteri (Hungary, Vas County)	18 July 2013

(continued)



Table 1. Continued

<i>Balaustium</i> sp.	<i>Verbena officinalis</i>	Alsó-Rákoshegy, Budapest XVII (Hungary)	2 July 2014
* <i>Charletonia krendowskyi</i> (Feider, 1954)	<i>Quercus cerris</i>	Zánka (Hungary, Veszprém County)	15 May 2009
* <i>Marantelophus rudaensis</i> (Haitlinger, 1986)	<i>Agrimonia eupatoria</i>	Pesthidegkút, Budapest II (Hungary)	27 June 2014
fam. <b>Cunaxidae</b>			
* <i>Cunaxa gazella</i> (Berlese, 1916)	<i>Rubus caesius</i>	Sopronkövesd (Hungary, Győr- Moson-Sopron County)	14 July 2019
fam. <b>Cheyletidae</b>			
<i>Cheletogenes ornatus</i> (Canestrini et Fanzago, 1876)	<i>Cupressus sempervirens</i>	Törökvész, Budapest II (Hungary)	24 June 2019
fam.			
<b>Eupalopsellidae</b>			
* <i>Eupalopsellus oelandicus</i> Sellnick, 1949	<i>Bassia prostrata</i>	Érd, Százhalombatta (Hungary, Pest County)	12 June 2021
fam. <b>Stigmaeidae</b>			
<i>Zetzellia mali</i> (Ewing, 1917)	<i>Carya cordiformis</i>	Szarvas (Hungary, Békés County)	23 May 2022
fam. <b>Tydeidae</b>			
<i>Lorryia pulchra</i> (Oudemans, 1929)	<i>Acer buergerianum</i>	Szarvas (Hungary, Békés County)	23 May 2022
* <i>Tydeus lindquisti</i> (Marshall, 1970)	<i>Rubus angustipaniculatus</i>	Kétvölgy (Hungary, Vas County)	13 August 2021
fam.			
<b>Triophtydeidae</b>			
<i>Triophtydeus flatus</i> Kuznetsov, 1973	<i>Acer buergerianum</i>	Szarvas (Hungary, Békés County)	23 May 2022
	<i>Carya cordiformis</i>	Szarvas (Hungary, Békés County)	23 May 2022
<i>Triophtydeus immanis</i> Kuznetsov, 1973	<i>Rubus angustipaniculatus</i>	Kétvölgy (Hungary, Vas County)	13 August 2021
fam.			
<b>Tenuipalpidae</b>			
<i>Cenopalpus pulcher</i> (Canestrini et Fanzago, 1876)	<i>Fraxinus pennsylvanica</i>	Balf (Hungary, Győr-Moson- Sopron County)	15 April 2019
<i>Pentamerismus oregonensis</i> McGregor, 1949	<i>Cupressus sempervirens</i>	Törökvész, Budapest II (Hungary)	24 June 2019

(continued)



Table 1. Continued

## fam. Eriophyidae

*Anthocoptes rubicolens* Roivainen, 1953

◆ <i>Rubus amphistrophus</i>	Neukirchen an der Enknach (Austria, Upper Austria)	7 July 2021
◆ <i>Rubus angustipaniculatus</i>	Kétvölgy (Hungary, Vas County)	13 August 2021
◆ <i>Rubus apricus</i>	Neukirchen an der Enknach (Austria, Upper Austria)	7 July 2021
<i>Rubus bifrons</i>	Nagylózs (Hungary, Győr- Moson-Sopron County)	12 June 2020
◆ <i>Rubus</i> ser. <i>Radula</i>	Aschach a.d. Donau (Austria, Upper Austria)	7 July 2020
◆ <i>Rubus</i> aff. <i>seebergensis</i>	Nagylózs (Hungary, Győr- Moson-Sopron County)	12 June 2020
◆ <i>Rubus vatavensis</i>	Engelhartszell (Austria, Upper Austria)	6 July 2020
◆ <i>Rubus wimmerianus</i>	Bakonyszentkirály (Hungary, Veszprém County)	20 August 2021

*Epitrimerus gibbosus* (Nalepa, 1892)

◆ <i>Rubus scarbantinus</i>	Nagykapornak (Hungary, Zala County)	2 July 2021
◆ <i>Rubus</i> aff. <i>seebergensis</i>	Nagylózs (Hungary, Győr- Moson-Sopron County)	12 June 2020
◆ <i>Rubus wimmerianus</i>	Bakonyszentkirály (Hungary, Veszprém County)	20 August 2021

*Phyllocoptes gracilis* (Nalepa, 1890)

◆ <i>Rubus amphistrophus</i>	Neukirchen an der Enknach (Austria, Upper Austria)	7 July 2021
◆ <i>Rubus angustipaniculatus</i>	St Jakob in Rosental (Austria, Carinthia)	14 July 2020
<i>Rubus angustipaniculatus</i>	Kétvölgy (Hungary, Vas County)	13 August 2021
◆ <i>Rubus apricus</i>	Neukirchen an der Enknach (Austria, Upper Austria)	7 July 2021
◆ <i>Rubus balatonicus</i>	Oroszlány (Hungary, Komárom- Esztergom County)	22 June 2021
<i>Rubus bifrons</i>	Nagylózs (Hungary, Győr- Moson-Sopron County)	12 June 2020
◆ <i>Rubus</i> ser. <i>Radula</i>	Aschach a.d. Donau (Austria, Upper Austria)	7 July 2020
◆ <i>Rubus liubensis</i>	St. Johann an Steinfelde, Mt. Gfieder (Austria, Lower Austria)	14 July 2021
◆ <i>Rubus vatavensis</i>	Engelhartszell (Austria, Upper Austria)	6 July 2020
<i>Rubus vatavensis</i>	Hofkirchen im Mühlkreis (Austria, Upper Austria)	7 July 2020

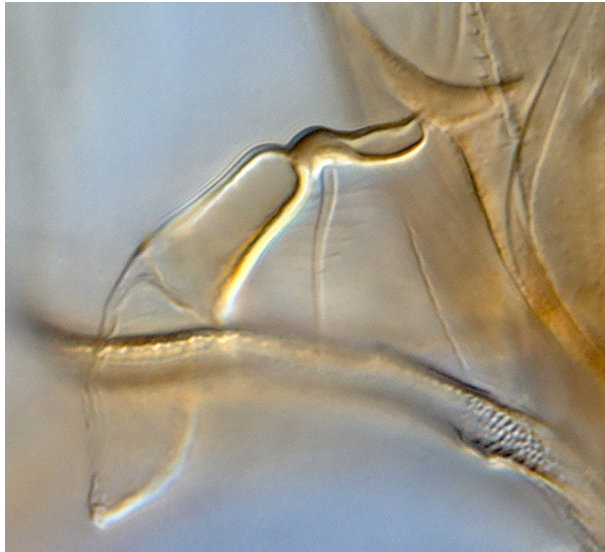
(continued)





**Table 1.** Continued

<b>Acari: Astigmata</b>			
fam. <b>Winterschmidtidae</b>			
<i>Czenspinksia transversostriata</i> (Oudemans, 1927)			
	<i>Carya cordiformis</i>	Szarvas (Hungary, Békés County)	23 May 2022
	<i>Malus domestica</i>	Pusztaszabolcs (Hungary, Fejér County)	21 October 2014
fam. <b>Acaridae</b>			
<i>Rhizoglyphus echinopus</i> (Fumouze et Robin, 1868)			
	<i>Allium giganteum</i>	Kecskemét (Hungary, Bács-Kiskun County)	27 August 2014
<b>Acari: Oribatida</b>			
fam. <b>Micreremidae</b>			
<i>Micreremus brevipes</i> (Michael, 1888)			
	<i>Hippophaë rhamnoides</i>	Gödöllő (Hungary, Pest County)	2 July 2019

Fig. 1. Spermatheca of *Neoseiulus dungeri* (Photo: Árpád Szabó)

of *Neoseiulus tauricus* was recorded in Armenia, Azerbaijan, China – Inner Mongolia, France, Greece, Iran and Ukraine (Morales et al., 2004; Demite et al., 2021). *Neoseiulus tauricus* (Fig. 2) belongs to the ceratoni subgroup in the genus *Neoseiulus*; closely related species from Europe are *N. agrestis* and *N. vasoides* (Karg).

The species was collected from the leaves of *Salvia nemorosa* by the senior author in seminatural habitat near Vászoly, Öreghegy (Hungary, Veszprém County, Balaton Uplands), in association with *Aceria salviae* (Ripka, 2016). This record is the first occurrence of *N. tauricus* in Hungary.





Fig. 2. Spermatheca of *Neoseiulus tauricus* (Photo: Árpád Szabó)

### ***Neoseiulus marginatus* (Wainstein, 1961)**

The species was described based on specimens collected in Kazakhstan from *Teucrium* sp. It was subsequently recorded in Algeria, Armenia, Azerbaijan, France, Georgia, Greece, Hungary, Iran, Israel, Kazakhstan, Kenya, Latvia, Moldova, Russia, Serbia, Turkey, Turkmenistan and Ukraine (Moraes et al., 2004; Demite et al., 2021). In Hungary, it was collected from *Verbena officinalis* L. (Verbenaceae) growing in roadside vegetation in Alsó-Rákoshegy, Budapest (Central Hungary). *Acaralox bognari* Ripka (Acari: Eriophyidae) and a *Balaustium* species (Acari: Erythraeidae) co-occurred with *N. marginatus* (Ripka, 2015a). On *Verbena officinalis* two other phytoseiid mites were found in Budapest as well, *Amblyseius andersoni* and *Euseius finlandicus*.

### ***Neoseiulus cucumeris* (Oudemans, 1930)**

It was described from *Cucumis melo* in France and reported from all continents except the Antarctica (Demite et al., 2021). From *Petrorhagia prolifera* (L.) P.W. Ball et Heywood (Caryophyllaceae) and *Linaria genistifolia* (L.) Mill. (Plantaginaceae) living in seminatural habitat, *Neoseiulus cucumeris* was collected in Budapest, Soroksár (Central Hungary). *Anthoseius rhenanus* (Acari: Phytoseiidae) and *Aceria feketestivani* Ripka (Acari: Eriophyidae) co-occurred with *N. cucumeris* on *P. prolifera* (Ripka, 2016).

### **Genus *Phytoseius* Ribaga**

#### ***Phytoseius juvenis* Wainstein et Arutunjan, 1970**

*Phytoseius juvenis* proved to be the most frequent and abundant phytoseiid mite species on brambles collected from the leaves of five *Rubus* taxa: *Rubus angustipaniculatus* in St Jakob in Rosental (Austria, Carinthia), 0.3 km SE of Winkl, N of the Karawanken-highway, in forest clearings; *Rubus bifrons* Vest (Rosaceae) in Nagylózs (Hungary, Győr-Moson-Sopron County), 3.2 km NE of the village, Haraszt Forest, in sunny forest fringes; *Rubus* ser. *Radula* (Focke)



Focke (Rosaceae) in Aschach a.d. Donau (Austria, Upper Austria), in forest fringes at the hydroelectric power station; *Rubus rudis* Weihe (Rosaceae) in Otterskirchen (Germany, Bavaria), 0.4 km E of Besensandbach, in forest fringes on the left bank of the Danube; *Rubus vatavensis* in Hofkirchen im Mühlkreis (Austria, Upper Austria), from bushes close to the Danube W of Marsbach; *R. vatavensis* Engelhartszell (Austria, Upper Austria), in the big curve of the road nr. 136 above the village, in forest fringes.

### Genus *Typhloseiulus* Chant et McMurtry

#### *Typhloseiulus peculiaris* (Kolodochka, 1980)

The species was described from *Tilia tomentosa* Moench in Moldova. It is known from Greece, the Czech Republic, Iran, Moldova and Turkey (Demite et al., 2021). However, Kontschán et al. (2014) recently recorded it from oaks close to Óbarok (Central Hungary, Fejér County), but not referenced at international level (Demite et al., 2021). Our specimens were collected from *Quercus cerris* L. (Fagaceae) in an oak forest, near Mátrafüred (Hungary, Heves County).

### Family Melicharidae Hirschmann

#### Genus *Proctolaelaps* Berlese

The genus *Proctolaelaps* includes nearly 90 described species. They occur in association with bark beetles, bumblebees and other insects, in nests of birds and mammals, in flowers visited by hummingbirds, in various decaying organic substances, or are synanthropic (OConnor and Klimov, 2012). Some species feed on small arthropods (including acarid mites), nematodes, fungi, or pollen (Nawar, 1995). Adults of several species are phoretic on insects. Many species are cosmopolitan (Halliday et al., 1998).

#### *Proctolaelaps drosophilae* Karg, Baker et Jenkinson 1995 NH

*Proctolaelaps drosophilae* was described by Karg et al. (1995) and recently redescribed in detail by Abo-Shnaf and Moraes (2016) using specimens from the *Drosophila* culture (Diptera: Drosophilidae) maintained in a laboratory at the University of Leeds in England. It is probably a non-native species introduced to Europe (Mašán, 2022). In Hungary it was collected in Debrecen-Dózsa (Eastern Hungary, Hajdú-Bihar County) from the decaying root of sugar beet infected with *Fusarium* sp., in association with histiostomatid mites (Acari: Histiostomatidae). It is the first occurrence of *Proctolaelaps drosophilae* in Hungary (Figs 3–6).

### Superorder Acariformes Reuter

#### Family Erythraeidae Robineau-Desvoidy

#### Genus *Abrolophus* Berlese

#### *Abrolophus quisquiliarus* (Hermann, 1804)

From the leaves of *Agrimonia eupatoria* L. (Rosaceae) a trombidiid and an erythraeid species were identified in Mesteri (Western Hungary, Vas County), viz. a larva of *Allothrombium fuliginosum* (Hermann) and an orange-coloured deutonymph of *Abrolophus quisquiliarus*, respectively. Both species co-occurred with *Aculus castriferrei* Ripka (Acari: Eriophyidae) and *Tydeus reticoxus* Ueckermann (Acari: Tydeidae) (Ripka, 2014; Ripka et al., 2022).





Fig. 3. Habitus of *Proctolaelaps drosophilae* female (Photo: Árpád Szabó)

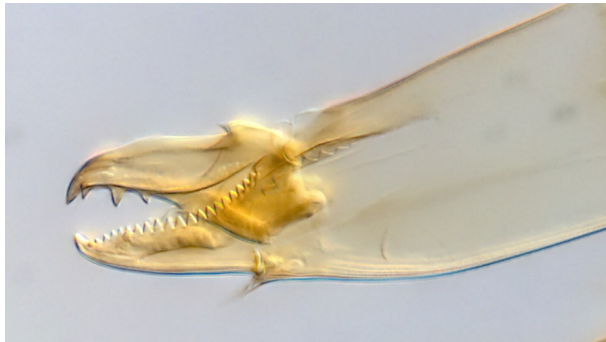


Fig. 4. Chelicera of *Proctolaelaps drosophilae* female (Photo: Árpád Szabó)

*Abrolophus quisquiliaris* is known from Austria, Belgium, England, France, Finland, Germany, Hungary, Italy, Poland, Russia, Serbia, Spain, Switzerland and the Netherlands (Beron, 2008, 2017).

#### Genus *Balaustium* von Heyden

From *Verbena officinalis* (growing in roadside vegetation), a reddish female of the genus *Balaustium* was collected in Budapest (Central Hungary). It co-occurred with *Neoseiulus marginatus* and *Acaralox bognari* (Ripka, 2015a).





Fig. 5. Hypognathal groove of *Proctolaelaps drosophilae* female (Photo: Árpád Szabó)

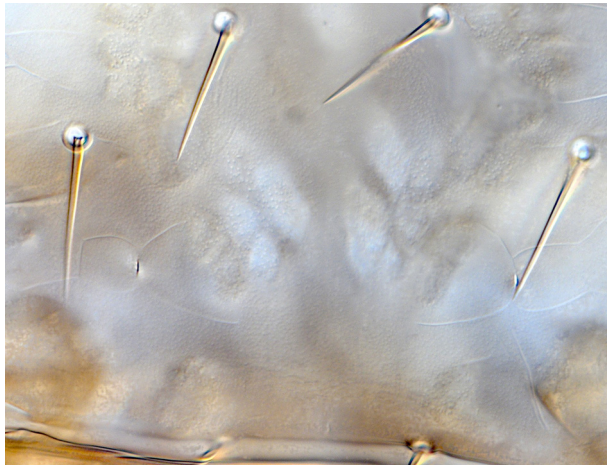


Fig. 6. Dorsal hexagonal area of *Proctolaelaps drosophilae* female delimited by setae *j*<sub>5</sub>, *z*<sub>5</sub> and *j*<sub>6</sub> (Photo: Árpád Szabó)



**Genus *Charletonia* Oudemans*****Charletonia krendowskyi* (Feider, 1954) NH**

In Zánka (Veszprém County, Balaton Uplands, Hungary), an orange-coloured larva of *Charletonia krendowskyi* was found on the leaf of *Quercus cerris* L. (Fagaceae) infested by *Aceria cerrigemmarum* (Nalepa) (Acari: Eriophyidae) (Ripka and Csóka, 2010). *Charletonia krendowskyi* is a new species in the acarofauna of Hungary. It was previously recorded from Albania, Bulgaria, Croatia, Rhodes (Greece), continental Greece, Italy, Macedonia, Moldova, Romania, Ukraine and Iran (Haitlinger, 2003, 2007; Haitlinger and Saboori, 2007; Beron, 2008, 2017).

**Genus *Marantelophus* Haitlinger NH*****Marantelophus rudaensis* (Haitlinger, 1986), NH**

From *Agrimonia eupatoria*, a larva of *Marantelophus rudaensis*, a new species for the Hungarian fauna, has been recorded. It co-occurred with *Aculus castriferrei*, *Acaralox hungarorum* Ripka (both Acari: Eriophyidae) and *Anthoseius occiduus* (Acari: Phytoseiidae) in a seminatural habitat at Pesthidegkút, Budapest (Central Hungary) (Ripka, 2015b). *Marantelophus rudaensis* was described from Poland, and subsequently recorded from Greece, Moldova, Montenegro, Switzerland and Turkey (Beron, 2008, 2017).

**Family Trombidiidae Leach****Genus *Allothrombium* Berlese*****Allothrombium fuliginosum* (Hermann, 1804)**

An orange-coloured larva of *Allothrombium fuliginosum* was found on an aphid larva which fed on the leaf of *Agrimonia eupatoria*. An eriophyid mite species, viz. *Aculus castriferrei* was found as well (Ripka, 2015b). This species is widely distributed in the Palaearctic region. From the aphid infested shoot of *Helianthemum ovatum* (Viv.) Dunal in DC. (Cistaceae), larvae of *A. fuliginosum* were previously reported in the Buda Protected Landscape Area (Budapest, Central Hungary) (Ripka and Szabó, 2010).

***Allothrombium pulvinum* Ewing, 1917**

Purple adults of *Allothrombium pulvinum* were collected close to ground level from the trunk of *Quercus robur* L. (Fagaceae) which was previously reported as *Allothrombium* sp. (Ripka et al., 2005). It is a common species throughout Europe. The larvae of *Allothrombium pulvinum* are ectoparasites on aphids, while deutonymphs and adults are free-living predators of different arthropods, e.g. spider mites (Kontschán et al., 2017).

**Family Cunaxidae Thor****Genus *Cunaxa* von Heyden*****Cunaxa gazella* (Berlese, 1916) NH**

The species was described from decaying wood in Somalia. A single larva of *Cunaxa gazella* was collected from the lower side of the leaflet of *Rubus caesius* L. (Rosaceae), at the forest fringes in Sopronkövesd, along the public road between Lövő and Rőjtökmuzsaj (Hungary, Győr-Moson-Sopron County). This little known species co-occurred with *Homeopronematus anconai* (Baker)



and *Homeopronematus staerki* (Schruff) (both Acari: Iolinidae) (Ripka et al., 2022). It is the first occurrence of *Cunaxa gazella* in Hungary.

### Family Cheyletidae Leach

#### Genus *Cheletogenes* Oudemans

##### *Cheletogenes ornatus* (Canestrini et Fanzago, 1876)

It was described from Italy. Being one of the most widespread cheyletid mite species in the world, it is distributed in many countries of Europe, Asia, Africa, Australia, North and South America (Beron, 2021). On the shoot of *Cupressus sempervirens* L. (Cupressaceae) the orange-coloured adult and nymph of *Cheletogenes ornatus* were found in association with *Pentamerismus oregonensis* McGregor (Acari: Tenuipalpidae) and *Epitrimerus cupressi* (Keifer) (Acari: Eriophyidae) in a private garden in Budapest (Central Hungary) (Ripka et al., 2020b). On deciduous and evergreen trees and shrubs infested by scale insects this predatory mite species was frequently found in considerably low number (Ripka et al., 1999, 2005).

### Family Eupalopsellidae Willmann

#### Genus *Eupalopsellus* Sellnick

##### *Eupalopsellus oelandicus* Sellnick, 1949 NH

On the shoot of *Bassia prostrata* (L.) Beck (Amaranthaceae) the carmine and orange red females of *Eupalopsellus oelandicus* were collected together with *Aceria bassicola* Ripka et Takács (Acari: Eriophyidae) (Ripka and Takács, 2021) in seminatural habitat between the cities of Érd and Százhalombatta (Central Hungary, Pest County) (Figs 7–12). This species is new to the Hungarian acarofauna. *Eupalopsellus oelandicus* was described from Sweden, and recorded in Belgium, Crimea, England, Germany, Iran, Turkey and the USA (Beron, 2020).

### Family Tydeidae Kramer

#### Genus *Tydeus* Koch

##### *Tydeus lindquisti* (Marshall, 1970) NH

Yellowish white young female of *Tydeus lindquisti* in tritonymphal exuvium was collected from the underside of the leaflet of *Rubus angustipaniculatus*, in Kétyölgy, Ritkaháza, 1.0 km S of crossroads to Felsőszőlnök, at the forest fringes along the road to Čepinci border crossing (Hungary, Vas County). *Anthocoptes rubicolens* Roivainen, *Phyllocoptes gracilis* (Nalepa) (both Acari: Eriophyidae) and a tarsonemid mite (Acari: Tarsonemidae) co-occurred with *T. lindquisti*. It is the first occurrence of this species in Hungary. Recently it was recorded in Austria from the leaflet of *Rubus vatavensis* (Ripka et al., 2022).

### Family Triophtydeidae André

#### Genus *Triophtydeus* Thor

##### *Triophtydeus immanis* Kuznetsov, 1973

Yellowish white female from the lower side of the leaflet of *Rubus angustipaniculatus* was found in Kétyölgy, Ritkaháza, 1.0 km S of crossroads to Felsőszőlnök, at the forest fringes along the





Fig. 7. Dorsal view of *Eupalopsellus oelandicus* female (Photo: Mateusz Zmudziński)



Fig. 8. Ventral view of *Eupalopsellus oelandicus* female (Photo: Mateusz Zmudziński)





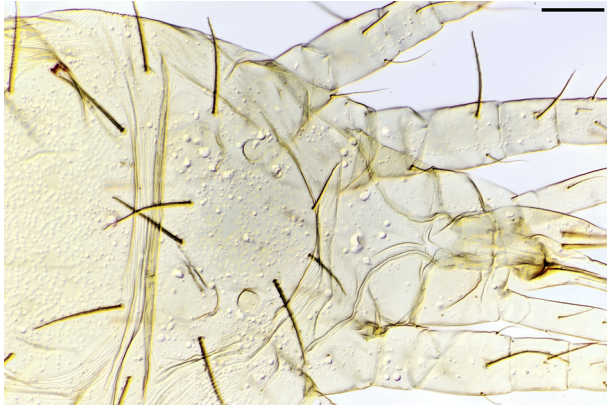


Fig. 9. Prodorsal shield of *Eupalopsellus oelandicus* female (Photo: Mateusz Zmudziński)

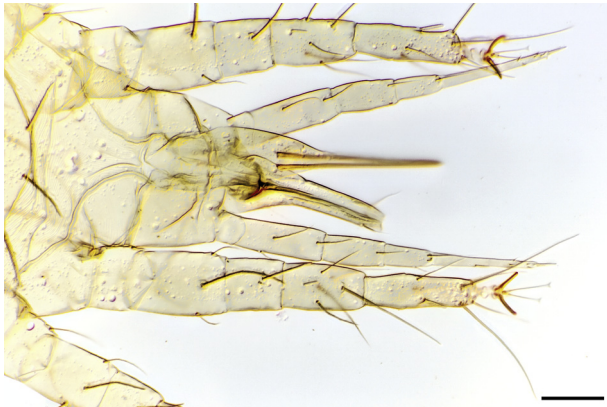


Fig. 10. Gnathosoma and legs I of *Eupalopsellus oelandicus* female, in dorsal view (Photo: Mateusz Zmudziński)

new public road to Čepinci border crossing (Hungary, Vas County). *Anthocoptes rubicolens*, *Phyllocoptes gracilis*, *Tydeus lindquisti* and a tarsonemid mite were collected, too.

### Family Tenuipalpidae Berlese

#### Genus *Cenopalpus* Pritchard et Baker

#### *Cenopalpus pulcher* (Canestrini et Fanzago, 1876)

The purple *Cenopalpus pulcher* is a common species on woody rosaceous hosts in Hungary (Kontschán and Ripka, 2017). It was collected from the shoot of *Fraxinus pennsylvanica* Marshall (Oleaceae).



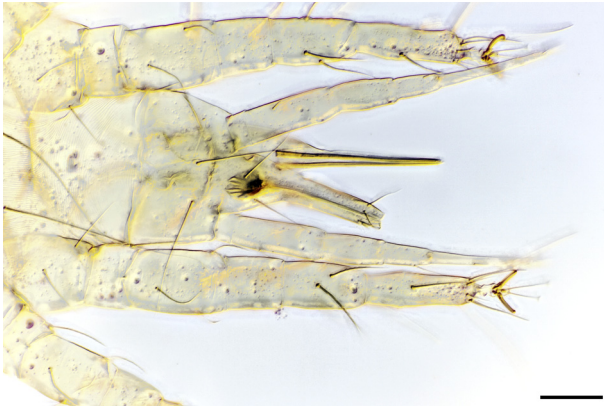


Fig. 11. Gnathosoma and legs I of *Eupalopsellus oelandicus* female, in ventral view (Photo: Mateusz Zmudziński)



Fig. 12. Ano-genital region of *Eupalopsellus oelandicus* female (Photo: Mateusz Zmudziński)

### Genus *Pentamerismus* McGregor

#### *Pentamerismus oregonensis* McGregor, 1949

From the bases of scale-like leaves of *Cupressus sempervirens*, the carmine *Pentamerismus oregonensis* was collected in a private garden in Budapest (Central Hungary). In Hungary it is a frequent species on cupressaceous hosts (Kontschán and Ripka, 2017). Near *P. oregonensis*, *Cheletogenes ornatus* (Acari: Cheyletidae) was found.

### Family Eriophyidae Nalepa

#### Genus *Anthocoptes* Nalepa

##### *Anthocoptes rubicolens* Roivainen, 1953

It was described from Spain, and recently first recorded in Hungary and Austria (Ripka et al., 2020a). Females, males and nymphs of *Anthocoptes rubicolens* were collected together with



*Phyllocoptes gracilis* and *Phytoseius juvenis* from the petioles and veins on the lower side of the leaves of *Rubus bifrons* in Nagylózs, Haraszt Forest, in sunny forest fringes, 3.2 km NE of the village (Hungary, Győr-Moson-Sopron County).

From the veins on the underside of the leaves of *Rubus* aff. *seebergensis* Pfuhl ex Srib. (Rosaceae) females of *A. rubicolens* was found in association with *Eptrimerus gibbosus* (Nalepa) (Acari: Eriophyidae) and females and males of *Anthoseius rhenanus* (Acari: Phytoseiidae) in Nagylózs, Haraszt Forest, in sunny forest fringes, 3.2 km NE of the village (Hungary, Győr-Moson-Sopron County).

Females of *Anthocoptes rubicolens* co-occurred with *P. gracilis*, *Amblyseius andersoni* and *Phytoseius juvenis* on the lower side of the leaflets of *Rubus vatavensis* in Engelhartzell, at the forest fringes close the road nr. 136 (Austria, Upper Austria).

On *Rubus* ser. *Radula* females of *Anthocoptes rubicolens* from dirty white erinea caused by *P. gracilis* were collected together with *P. juvenis* in Aschach a.d. Donau, at the forest fringes at the hydroelectric power station (Austria, Upper Austria).

From silvery and light green erinea on leaf underside of *Rubus apricus* Wimm. (Rosaceae) females of *Anthocoptes rubicolens* were collected in Ranshofen, Enknach, in coniferous forests along the road nr. 156 (Austria, Upper Austria).

From the leaf underside of *Rubus amphistrophus* (Focke) Sabr. (Rosaceae) a female of *Anthocoptes rubicolens* was found in Ranshofen, Enknach, in coniferous forests along the road nr. 156 (Austria, Upper Austria). Light green and yellowish green irregular spots were present on the upper side of the leaves.

From the underside of the leaflets, near veins of *Rubus angustipaniculatus* females and males of *Anthocoptes rubicolens* were found in Kétvölgy, Ritkaháza, 1.0 km S of crossroads to Felsőszölnök, at the forest fringes along the road to Čepinci border crossing (Hungary, Vas County).

Females and males of *Anthocoptes rubicolens* were found on and close to the veins on the lower side of the leaflets of *Rubus wimmerianus* (Sprib. ex Sudre) Sprib. (Rosaceae) together with *Eptrimerus gibbosus* in Bakonyszentkirály, in an old European beech forest along the road to Réde (Hungary, Veszprém County). Distinct round, irregular, yellowish and light green spots were visible on the upper side of the leaflets.

## Genus *Eptrimerus* Nalepa

### *Eptrimerus gibbosus* (Nalepa, 1892)

On the foliage of *Rubus* aff. *seebergensis* *Eptrimerus gibbosus* co-occurred with *Anthocoptes rubicolens* and *Anthoseius rhenanus* in Nagylózs, Haraszt Forest, in sunny forest fringes, 3.2 km NE of the village (Hungary, Győr-Moson-Sopron County).

From the lower side of the leaflets of *Rubus scarbantinus* Király et Trávn. (Rosaceae) females and males of *Eptrimerus gibbosus* were collected in Nagykapornak, along a forest road to „Remetekert” (Hungary, Zala County). Distinct round, irregular and partly mosaic-like yellowish and brownish spots were the damage symptom on the upper side of the leaflets.

Females and males of *Eptrimerus gibbosus* were found together with *A. rubicolens* on and close to the veins, and in erinea on the lower side of the leaflets of *Rubus wimmerianus* in Bakonyszentkirály, in an old European beech forest along the road to Réde (Hungary, Veszprém County). The mite damage symptoms were distinct, e.g. round, irregular, yellowish and light green spots on the upper side of the leaflets.



## Genus *Phyllocoptes* Nalepa

### *Phyllocoptes gracilis* (Nalepa, 1890)

Females and males of *Phyllocoptes gracilis* together with *Anthocoptes rubicolens*, *Amblyseius andersoni* and *Phytoseius juvenis* were collected from silvery erineae on leaf underside and petioles of *Rubus vatavensis*, in Engelhartzell, at the forest fringes close the road nr. 136 (Austria, Upper Austria).

Females of *Phyllocoptes gracilis* were found on the lower side of the leaflets, close to the veins of *Rubus vatavensis* in Hofkirchen im Mühlkreis (Austria, Upper Austria), from bushes close to the Danube W of Marsbach. *P. juvenis* was found as well.

Females and males of *Phyllocoptes gracilis* were collected from dirty white erineae on the leaves of *Rubus* ser. *Radula* in Aschach a.d. Donau, at the forest fringes at the hydroelectric power station (Austria, Upper Austria). *P. juvenis* was collected, too.

Females, males and nymphs of *Phyllocoptes gracilis* were collected together with *A. rubicolens* and *P. juvenis* from the petioles and the upper side of the leaves of *Rubus bifrons* in Nagylózs, Haraszt Forest, in sunny forest fringes, 3.2 km NE of the village (Hungary, Győr-Moson-Sopron County).

Nymph of *Phyllocoptes gracilis* was collected from silvery and greyish green erineum on the lower side of the leaflets of *Rubus angustipaniculatus* in St Jakob in Rosental, bushes 0.3 km SE of Winkl, N of the Karawanken-highway (Austria, Carinthia). *A. andersoni* and *P. juvenis* co-occurred with *P. gracilis*.

Females, males, and nymphs of *Phyllocoptes gracilis* were collected from the dirty white erineae on the lower side of the leaflets of *Rubus angustipaniculatus* in Kétvölgy, Ritkaháza, 1.0 km S of crossroads to Felsőszőlnök, at the forest fringes along the road to Čepinci border crossing (Hungary, Vas County). Light green and yellowish green spots were seen on the upper side of the leaves.

Females and males of *Phyllocoptes gracilis* were collected from erineae on the leaf of *Rubus balatonicus* Borbás (Rosaceae), in Oroszlány, „Községyi-erdő”, along a forest road 1.3 km S of the town (Hungary, Komárom-Esztergom County). Yellow and brownish spots were seen along veins on upper side of the leaflets.

Females of *Phyllocoptes gracilis* together with *A. rubicolens* were collected from silvery and light green erineae on leaf underside of *Rubus apricus* in Ranshofen, Enknach, in coniferous forests along the road nr. 156 (Austria, Upper Austria).

From light green erineae on leaf underside of *Rubus amphistrophus*, females and males of *Phyllocoptes gracilis* were collected together with *A. rubicolens* in Ranshofen, Enknach, in coniferous forests along the road nr. 156 (Austria, Upper Austria). On the upper side of the leaves light green and yellowish green irregular spots were present.

Females and males of *Phyllocoptes gracilis* were found in whitish and light green erineae on the lower side of the leaves of *Rubus liubensis* W. Maurer (Rosaceae). On the upper side of the leaves light green and yellowish green irregular spots were the visible symptoms in Ternitz, St. Johann am Steinfeld, in coniferous forests at the Edlitzbrunnstrasse (Austria, Lower Austria).

Overall, ten new host taxa for eriophyoid mites, viz. *Rubus amphistrophus*, *Rubus angustipaniculatus*, *Rubus apricus*, *Rubus balatonicus*, *Rubus* ser. *Radula*, *Rubus liubensis*, *Rubus scarbantinus*, *Rubus* aff. *seebergensis*, *Rubus vatavensis* and *Rubus wimmerianus* were found (Table 1). In this continued survey *P. gracilis* was the most frequent gall mite species on brambles. *P. gracilis* is a significant acarine pest of raspberry.



## Family Winterschmidtiiidae Oudemans

### Genus *Czenspinski* Oudemans

#### *Czenspinski transversostriata* (Oudemans, 1931)

In an apple orchard in Pusztaszabolcs (Hungary, Fejér County), *Czenspinski transversostriata* was collected from apple leaves. On the underside of the leaves this species co-occurred with *Eriophyes mali* Nalepa (Acari: Eriophyidae), stigmaeid, phytoseiid and tarsonemid mites (Ripka, 2016). From the lower side of the leaflets of bitternut hickory (*Carya cordiformis* (Wangenh.) K. Koch) *C. transversostriata* was collected together with *Zetzellia mali* (Ewing) (Acari: Stigmaeidae) and *Triophtydeus flatus* Kuznetsov (Acari: Triophtydeidae) in an arboretum at Szarvas (Hungary, Békés County). The parthenogenetic, phytophagous and fungivore *C. transversostriata* is known in Austria, Australia, Brazil, France, Germany, Hungary, Italy, Mexico, Spain, Switzerland, the Netherlands, Turkey and the USA (Hughes, 1962). In Hungary *C. transversostriata* was reported from nine tree and shrub species (Ripka et al., 2002, 2005).

## Family Acaridae Latreille

### Genus *Rhizoglyphus* Berlese

#### *Rhizoglyphus echinopus* (Fumouze et Robin, 1868)

*Rhizoglyphus echinopus* was collected from the bulb of *Allium giganteum* Regel (Alliaceae). The species has been recorded in Argentina, Australia, Canada, Chile, China, Egypt, Fiji, France, India, Ireland, Japan, Korea, New Zealand, Romania, Russia, Spain, the Netherlands, the UK and the USA (Fan and Zhang, 2003). It is an important astigmatid mite pest of bulbs, corms and tubers of many host plants.

## Family Micreremidae Grandjean

### Genus *Micreremus* Berlese

#### *Micreremus brevipes* (Michael, 1888)

*Micreremus brevipes* was collected from the upper side of the leaf of *Hippophaë rhamnoides* L. (Elaeagnaceae) together with *Aceria hippophaena* (Nalepa) and *Anthocoptes hungaricus* Ripka (both Acari: Eriophyidae) in a botanical garden in Gödöllő (Central Hungary, Pest County) (Ripka et al., 2020b). In Hungary *Micreremus brevipes* was reported from four ornamental tree and shrub species (Ripka et al., 1999).

## CONCLUSIONS

In this study carried out in 2000 and 2021 within an international project, we add eight newly recorded species for Hungary, four of which, i.e. *Neoseiulus dungeri*, *Neoseiulus tauricus*, *Marantelophus rudaensis* and *Proctolaelaps drosophilae* from herbaceous hosts; two species, viz. *Cunaxa gazella* and *Tydeus lindquisti* from *Rubus* taxa; one species: *Charletonia krendowskyi* from a forest tree species; and another one: *Eupalopsellus oelandicus* from a subshrub. Our results broaden the knowledge on the host-range of eriophyoid mites with ten additional *Rubus* spp.



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