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Soil mites (Acari, Mesostigmata) of the 'Torfowiska Doliny Izery' Reserve in the Sudety Mountains

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Abstract

The 'Torfowiska Doliny Izery' (Izera Valley Peat bogs) Reserve was established in 2000 and covers 271.39 ha of peat bogs, forests and meadows in Izera River Valley in Izera Mts (Sudety Mts, Poland, SW). This area is one of the largest European complexes of mountain peat bogs with very special microclimate and with the lowest (800 – 840 m above sea level) population of mountain pine in the Sudety Mts. This investigation of Mesostigmata mites is the first in the Reserve. Samples were collected from soil on four different plots: spruce forest, mountain pine forest, peat bogs and a dry meadow. A total of 1519 mite specimens of the order Mesostigmata were collected and determined to 53 species. The following species were the most frequent and had the highest number of specimens: *Veigaia nemorensis*, *Gamasellus montanus, Trachytes montana, Paragamasus vagabundus* and *Trachytes pauperior*. The species composition of these four various plots was very different. *Cheirosieus serratus*, *Leptogamasus cristulifer, Leptogamasus obesus*, *Mixozercon sellnicki*, *Paragamasus crassicornutus, Paragamasus rostriforceps*, *Pergamasus ruehmi*, *Platyseius italicus* and *Veigaia mollis* are species rarely found in Poland.

Keywords: mountain peat bogs, Sudety Mountains, mites, Acari, Mesostigmata

Zusammenfassung

Das Naturreservat 'Torfowiska Doliny Izery' (Izera Valley Peat bogs) wurde 2000 ausgerufen und umfasst 271,39 ha Torfmoore, Forste und Wiesen im Izeratal (Isertal) im Izera-Gebirge (Isergebirge, Sudeten, SW-Polen). Dieses Gebiet ist eines der größten Torfmoor-Areale Europas, mit einem besonderen Mikroklima sowie dem geringsten Bestand an Latschenkiefern in den Sudeten. Die vorliegende Untersuchung der Mesostigmata ist die erste für das Reservat. Proben wurden von vier verschiedenen Flächen entnommen: einem Fichtenforst, einem Latschenkieferbestand, Torfmoore und einem Trockenrasen. Insgesamt 1519 Milben der Ordnung Mesostigmata wurden gesammelt und 53 Arten zugeordnet. Die folgenden Arten waren am häufigsten und machten auch die größe Anzahl an Proben aus: *Veigaia nemorensis*, *Gamasellus montanus, Trachytes montana, Paragamasus vagabundus* and *Trachytes pauperior.* Die vier Flächen unterschieden sich erheblich in der Artenzusammensetzung. *Cheirosieus serratus*, *Leptogamasus cristulifer, Leptogamasus obesus*, *Mixozercon sellnicki*, *Paragamasus crassicornutus, Paragamasus rostriforceps*, *Pergamasus ruehmi*, *Platyseius italicus* und *Veigaia mollis* sind für Polen selten.

1. Introduction

The lowest growing population of mountain pine, subalpine meadows, transitional peatlands, and spruce forest (*Plagiothecio-Piceetum hercynicum* R. Tx.) are unusually interesting microhabitats of invertebrates, particularly arachnida. No research concerning Mesostigmata mites has been conducted in the 'Torfowiska Doliny Izery' Reserve before, which makes the current investigation unique. Only a few papers have been published about Mesostigmata mites in the Izery Mountains and the closest neighbouring mountains (Gwiazdowicz 2002, 2003, Gwiazdowicz & Biernacik 2000, Skorupski 2005, Skorupski et al. 2005). The aim of this paper is to identify the mite species living in this area, and to find out which areas of the ecosystem may act as refuges for mites in the event of a significant habitat conversion.

2. Investigation area

The Izera Mts are a mid-sized western range of the Sudety Mts, stretching from NW to SE, with a total length of 45 km and a width of 30 km. The mountain range runs latitudinally, with a granite central part and a metamorphic aureole. The hilltops are wide, concave in some places, covered with peatlands or forests, and here and there topped by domes. The Izera Mts peat bogs are considered a specific type of mountain subarctic peat bogs and show many features in common with Far North peat bogs, particularly those in Scandinavia (Tołpa 1949, Potocka 1996, Matuła et al. 1997, Wojtuń et al. 1997).

The cold mountain climate is accompanied by high precipitation (up to 1500 mm a year), frequent fog and low average yearly temperature (5.5 – 6º C). The Hala Izerska pasture was announced the Polish cold pole (Migoń 1999), there is the lowest mean annual temperature and the highest fluctuation of diurnal temperature. The growing season lasts 190 days (Staffa 1989). On the basis of acid granite and porphyry rock the poorest soils can be found, with an acid reaction between pH 2.4 and 2.9.

From the plant geographical perspective, this area is categorised as a western Sudety region. The mountains are not high, which is why most of the area belongs to the lower forest zone, i.e. not higher than 1000 metres above sea level. Only a small part of this area ranges higher, with flora characteristic of the higher forest zone (Staffa 1989). Specific water conditions and landform features enabled vast high peat bogs, protected as a reserve. This flora reserve protects the tundra and post-glacial relict: dwarf birch (*Betula nana* L.) (Samojło 1996), which is rarely found in Poland. In the reserve there are 4 types of peat bogs: high peat bogs with dwarf mountain pine (*Pinus mugo* Turra), high peat bogs with spruce, high peat bogs as non-forest open stands, and transitional peat bogs. Seventeen types of plant communities and 110 plant species, including 56 vascular species, were identified in the valley. Due to this area's unique features, the 'Torfowiska Doliny Izery' (Izera Valley Peatland) Reserve of 271.39 ha was established in 2000. This enables the extension of the Karkonosze Bilateral Biosphere Reserve over the Izera Mts (both the Polish and Czech area) (Wojtuń et al. 2000).

3. Materials and methods

To examine the mite species composition of the 'Torfowiska Doliny Izery' Reserve, the following sampling plots, reflecting all main types of habitats, were chosen:

Plot 1 (area 133 h) (mountain pine in a peat bog) – covers 4.46 ha and ranges between 810 and 830 metres above sea level, i.e. the lower subalpine forest zone. The plot is characterised by high stand density of a natural mountain pine forest, with 85-year-old and 3-metre-high mountain pine and Norway spruce (*Picea abies* L.). The soil foundation comprises clayey soils that enabled the development of the tier peat bog flora, considered as high mountain peat bogs.

The peat bog floor is covered by shrubs, including red whortleberry (*Vaccinium vitis-idaea* L.), bilberry (*Vaccinium myrtillus* L.), cranberry (*Oxycoccus palustris* L.), common hemp-nettle (*Galeopsis tetrahit* L.) and bog bilberry (*Vaccinium uliginosum* L.) (Plan urządzenia lasu… 2000).

Plot 2 (area 133b) (spruce) covers 1.56 ha, with a, for a mountain area, strongly flattened surface. Stony formations are covered with dust, clay and podzol soils, on which there is a natural mountain forest, dominated by larch (*Larix decidua* Mill.) and spruce. In 1970/1980 the natural forest flora was strongly damaged due to the industrial pollution, for which reason an artificial reforestation was introduced 5 years ago, with spruce, arolla (*Pinus cembra* L.), larch, mountain pine, birch (*Betula pendula* L.) and 20 – 30 years earlier by spruce. The forest floor flora includes wavy hairgrass (*Deschampsia flexuosa* L.), reed grass (*Calamagrostis arundinacea* L.), bog bilberry and peat moss.

Plot 3 (area 127l) (cotton-grass) covers 3.71 ha between 830 and 845 metres above sea level, close to the Izera River spring.

There is no forest in the central part of the peat bog, its borders are covered with a natural spruce swamp forest and clumps of dwarf mountain pine. Characteristic features include numerous small ponds and troughs, and high humidity. The ground cover is dominated by different species of cotton-grass (*Eriophorum angustifolium* Honck., *E. vaginatum* L., *Baeothryon caespitosum* L.) (Plan urządzenia lasu… 2000).

Plot 4 (area 129m) (dry meadow) ranges between 830 and 860 metres above sea level, i.e. within the lower sub-alpine forest zone.

Part of this area is a natural swamp with peat on clayey formations, covered with a mountain forest dominated by 30-year-old spruce and 75-year-old mountain pine making up 10 % of all forest stands. As in the previous plots, the peat forms tiers. In the ground cover hair cap moss (*Polytrichum* sp.), wavy hairgrass, thread rush (*Juncus filiformis* L.) and reed grass can be found.

Soil samples of 40 cm^2 (with organic layer and mineral soil to the depth of 5 cm or sometimes on the plots 1 and 3 only with organic layer to the depth of 20 cm) were taken in May and November 2005. Every time 10 samples were taken from each experimental plot. The material was extracted in Tullgren funnels.

The analysis of the results was conducted with the aid of the AnalizaTOR 2.0 program, using typical rates: the similarity rates for the domination rates of species between microhabitats (Mo): $Mo=2\Sigma x_i y_i/(\Sigma x_a^2 + \Sigma y_a^2)$, where: $x_i y_i$ – percentage amount of number of species common for both microhabitats, x_a, y_a – percentage amount of particular species, i – total number of species; domination rate (D): D = (100s/S), where: s- number of specimens

of species; S- number of specimens of all species in this coenotic unit; occurrence rate (C): C=100q/Q, where: q denotes the number of samples, in which the given species was found and Q denotes the number of examined species (Odum 1982). In occurrence stability index following classes was taken: euconstants – 75 % and more samples, constants – 50 – 74 % samples, accessory species – 25 – 49% samples, accidents – 24 % and less samples. In domination rate following classes was taken: eudominants – more than 10 % specimens, dominants – 5.1 – 10 %, subdominants – 2.1 – 5.0 %, recedents – 1.1 – 2.0 %, subrecedents – less than 1.1 % (Niedbała et al. 1981). The species names and *Mesostigmata* mites taxonomy was taken from Błaszak & Madej (1997) and Wiśniewski (1997).

Tab. 1 List of Mesostigmata mite species collected in plot 1 (mountain pine in a peat bog), number of collected specimens, domination rate and occurrence rate

Species	Sum	Domination rate	Occurrence rate
Veigaia nemorensis (C. L. Koch, 1839)	142	30.80	90.00
Trachytes montana Willmann, 1953	46	9.98	50.00
Leptogamasus obesus (Holzmann, 1969)	37	8.03	65.00
Gamasellus montanus (Willmann, 1936)	32	6.94	55.00
Trachytes pauperior Berlese, 1914	32	6.94	40.00
Paragamasus homopodoides Athias-Henriot, 1967	22	4.77	25.00
Veigaia mollis Karg, 1971	22	4.77	35.00
Prozercon kochi Sellnick, 1943	21	4.56	40.00
Paragamasus crassicornutus (Willmann, 1954)	21	4.56	30.00
Geholaspis mandibularis (Berlese, 1904)	10	2.17	20.00
Hypoaspis vacua (Michael, 1891)	9	1.95	10.00
Paragamasus vagabundus (Karg, 1968)	8	1.74	10.00
Parasitidae sp.	7	1,52	20.00
Pergamamsus sp.	7	1.52	15.00
Pergamasus ruehmi Willmann, 1938	6	1.30	20.00
Paragamasus sp.	5	1.08	15.00
Leptogamasus sp.	4	0.87	10.00
Ololaelaps veneta (Berlese, 1903)	3	0.65	10.00
Veigaia cervus (Kramer, 1876)	3	0.65	15.00
Macrocheles opacus (C. L. Koch, 1839)	3	0.65	15.00
Veigaia kochi (Trägardh, 1901)	3	0.65	10.00
Trachytes aegrota (C. L. Koch, 1841)	2	0.43	5.00
Parazercon radiatus (Berlese, 1910)	2	0.43	10.00
Uropoda minima Kramer, 1882	2	0.43	10.00
Leptogamasus cristulifer (Athias-Henriot, 1967)	2	0.43	10.00
Hypoaspis praesternalis Willmann, 1949	1	0.22	5.00
Gamasellodes bicolor (Berlese, 1918)	1	0.22	5.00
Veigaia exigua (Berlese, 1916)	1	0.22	5.00
Paragamasus conus (Karg, 1971)	1	0.22	5.00
Eviphis ostrinus (C. L. Koch, 1836)	1	0.22	5.00
Paragamasus rostriforceps Athias-Henriot, 1967	1	0.22	5.00
Uropoda misella (Berlese, 1916)	1	0.22	5.00
Pergamasus crassipes (Linnè, 1758)	1	0.22	5.00
Cheiroseius serratus (Halbert,1915)	1	0.22	5.00
Pachylaelaps sp.	1	0.22	5.00
Total	461	100.00	

Tab. 2 List of Mesostigmata mite species collected in plot 2 (spruce), number of collected specimens, domination rate and occurrence rate

Species	Sum	Domination rate	Occurrence rate
Paragamasus vagabundus (Karg, 1968)	59	8.42	60.00
Rhodacarellus sp.	51	7.28	25.00
Trachytes montana Willmann, 1953	44	6.28	45.00
Veigaia nemorensis (C. L. Koch, 1839)	44	6.28	55.00
Leptogamasus suecicus (Trägardh, 1936)	41	5.85	40.00
Gamasellus montanus (Willmann, 1936)	40	5.71	65.00
Prozercon kochi Sellnick, 1943	39	5.56	45.00
Leptogamasus obesus (Holzmann, 1969)	36	5.14	55.00
Parazercon radiatus (Berlese, 1914)	34	4.85	50.00
Paragamasus conus (Karg, 1971)	33	4.71	20.00
Zercon gurensis Mihelcic, 1962	29	4.14	45.00
Asca bicornis (Can. et Fanz., 1887)	17	2.43	30.00
Paragamasus homopodoides Athias-Henriot, 1967	17	2.43	30.00
Ololaelaps placentula (Berlese, 1887)	15	2.14	30.00
Mixozercon sellnicki (Schweizer, 1948)	15	2.14	20.00
Leptogamasus succineus Witaliński, 1973	14	2.00	5.00
Hypoaspis praesternalis Willmann, 1949	11	1.57	25.00
Trachytes aegrota (C. L. Koch, 1841)	11	1.57	20.00
Trachytes pauperior Berlese, 1914	11	1.57	35.00
Veigaia exigua (Berlese, 1916)	10	1.43	15.00
Paragamasus sp.	8	1.14	30.00
Hypoaspis vacua (Michael, 1891)	8	1.14	5.00
Eviphis ostrinus (C. L. Koch, 1836)	8	1.14	15.00
Urodiaspis tecta (Kramer, 1876)	8	1.14	20.00
Hypoaspis procera Karg, 1965	7	1.00	30.00
Zercon sp.	6	0.86	10.00
Paragamasus crassicornutus (Willmann, 1954)	5	0.71	15.00
Pergamasus sp.	4	0.57	10.00
Parasitidae sp.	3	0.43	15.00
Uropoda minima Kramer, 1882	3	0.43	10.00
Paragamasus runcatellus (Berlese, 1903)	2	0.29	10.00
Ololaelaps veneta (Berlese, 1903)	2	0.29	10.00
Gamasellodes bicolor (Berlese, 1918)	2	0.29	10.00
Veigaia cervus (Kramer, 1876)	2	0.29	10.00
Veigaia mollis Karg, 1971	2	0.29	10.00
Amblyseius sp.	2	0.29	10.00
Uropoda misella (Berlese, 1916)	2	0.29	10.00
Geholaspis mandibularis (Berlese, 1904)	1	0.14	5.00
Macrocheles opacus (C. L. Koch, 1839)	1	0.14	5.00
Leptogamasus sp.	1	0.14	5.00
Pergamasus brevicornis (Berlese, 1904)	1	0.14	5.00
Rhodacarellus silesiacus Willmann, 1936	1	0.14	5.00
Total	650	100.00	

Tab. 3 List of Mesostigmata mite species collected in plot 3 (cotton grass), number of collected specimens, domination rate and occurrence rate

Species	Sum	Domination rate	Occurrence rate
Veigaia mollis Karg, 1971	10	31.25	15.00
Platyseius italicus (Berlese, 1905)	4	12.50	10.00
Trachytes montana Willmann, 1953	3	9.38	5.00
Paragamasus vagabundus (Karg, 1968)	3	9.38	10.00
Prozercon kochi Sellnick, 1943	2	6.25	5.00
Cheirosieus serratus (Halbert, 1915)	2	6.25	5.00
Veigaia nemorensis (C. L. Koch, 1839)	1	3.13	5.00
Gamasellus montanus (Willmann, 1936)	1	3.13	5.00
Paragamasus sp.	1	3.13	5.00
Paragamasus homopodoides Athias-Henriot, 1967	1	3.13	5.00
Trachytes pauperior Berlese, 1914	1	3.13	5.00
Pergamasus brevicornis (Berlese, 1904)	1	3.13	5.00
Cheirosieus borealis (Berlese, 1904)	1	3.13	5.00
Pergamasus mediocris (Berlese, 1905)	1	3.13	5.00
Total	32	100.00	

Tab. 4 List of Mesostigmata mite species collected in plot 4 (dry meadow), number of collected specimens, domination rate and occurrence rate

Species	Sum	Domination rate	Occurrence rate
Veigaia nemorensis (C. L. Koch, 1839)	76	20.21	60.00
Zercon gurensis Mihelčič, 1962	35	9.31	45.00
Paragamasus sp.	25	6.65	45.00
Veigaia mollis Karg, 1971	24	6.38	30.00
Paragamasus vagabundus (Karg, 1968)	23	6.12	60.00
Trachytes pauperior Berlese, 1914	22	5.85	60.00
Prozercon kochi Sellnick, 1943	20	5.32	30.00
Trachytes montana Willmann, 1953	19	5.05	45.00
Parazercon radiatus (Berlese, 1910)	18	4.79	30.00
Gamasellus montanus (Willmann, 1936)	14	3.72	40.00
Paragamasus conus (Karg, 1971)	13	3.46	10.00
Paragamasus runcatellus (Berlese, 1903)	8	2.13	25.00
Trachytes aegrota (C. L. Koch, 1841)	8	2.13	30.00
Mixozercon sellnicki (Schweizer, 1948)	8	2.13	15.00
Hypoaspis procera Karg, 1965	5	1.33	15.00
Pergamasus barbarus (Berlese, 1905)	5	1.33	20.00
Leptogamasus obesus (Holzmann, 1969)	4	1.06	10.00
Pergamasus quisquiliarum (G. et R. Canestrini, 1882)	4	1.06	10.00
Hypoaspis vacua (Michael, 1891)	3	0.80	10.00
Veigaia cervus (Kramer, 1876)	3	0.80	15.00
Veigaia exigua (Berlese, 1916)	3	0.80	5.00
Geholaspis mandibularis (Berlese, 1904)	3	0.80	15.00
Macrocheles opacus (C. L. Koch, 1839)	3	0.80	10.00
Eviphis ostrinus (C. L. Koch, 1836)	3	0.80	10.00

Tab.4 (cont.)

Species	Sum	Domiation rate	Occurrence rate
Asca aphidioides (Linné, 1758)	3	0.80	10.00
Urodiaspis tecta (Kramer, 1876)	3	0.80	10.00
Asca bicornis (Can. et Fanz., 1887)	2	0.53	10.00
Ololaelaps veneta (Berlese, 1903)	2	0.53	5.00
Oloalelaps placentula (Berlese, 1887)	2	0.53	10.00
Gamasellodes bicolor (Berlese, 1918)	2	0.53	10.00
Geholaspis longispinosus (Kramer, 1876)	2	0.53	10.00
Hypoaspis praesternalis Willmann, 1949	1	0.27	5.00
Amblyseius sp.	1	0.27	5.00
Zercon sp.	1	0.27	5.00
Uropoda misella (Berlese, 1916)	1	0.27	5.00
Veigaia kochi (Trägardh, 1901)	1	0.27	5.00
Uropoda minima Kramer, 1882	1	0.27	5.00
Cheiroseius serratus (Halbert, 1915)	1	0.27	5.00
Pergamasus ruehmi Willmann, 1938	1	0.27	5.00
Hypoaspis montana (Berlese, 1904)	1	0.27	5.00
Uropodina sp.	1	0.27	5.00
Pergamasus sp.	1	0.27	5.00
Total	376	100.00	

4. Results

A total of 1519 Mesostigmata mites from 53 species were collected. The most numerous mites species include: *Veigaia nemorensis* (C. L. Koch, 1839), *Gamasellus montanus* (Willmann, 1969), *Trachytes montana* Willmann, 1953, *Paragamasus vagabundus* (Karg, 1968) and *Trachytes pauperior* Berlese, 1914. In plot 1 a total of 461 mites from 31 species were collected (tab.1). The following species were dominant there: *Veigaia nemorensis* (eudominant and euconstant), *Trachytes montana*, *Leptogamasus obesus* (Holzmann, 1969), *Gamasellus montanus* (dominants and constants) and *Trachytes pauperior* (dominant and accessory species). In plot 2 a total of 650 mites from 38 species were collected (Tab. 2). The following species were in the dominant class there: *Paragamasus vagabundus*, *Veigaia nemorensis*, *Gamasellus montanus* and *Leptogamasus obesus* (constants) and *Rhodacarellus* sp., *Trachytes montana*, *Leptogamasus suecicus* (Trägardh, 1936) and *Prozercon kochi* Sellnick, 1943 (accessory species). In plot 3 only a total of 32 mites from 13 species were collected (Tab. 3). The following species were in the eudominant class there: *Veigaia mollis* Karg, 1971, *Platyseius italicus* (Berlese, 1905) and in dominants class: *Trachytes montana*, *Paragamasus vagabundus*, *Prozercon kochi* and *Cheiroseius serratus* (Halbert, 1915), but all of the species were classified as accidents. In plot 4 a total of 376 mites from 39 species were collected (Tab. 4). The following species were in dominant class there: *Veigaia nemorensis* (eudominant and constant), *Paragamasus vagabundus* and *Trachytes pauperior* (dominants and constants), and *Zercon gurensis* (Mihelcic, 1962), *Paragamasus* sp., *Veigaia mollis*, *Prozercon kochi* and *Trachytes montana* (dominants and accessory species).

Tab. 5 Similarity rates for the domination rates (Mo) of Mesostigmata mite species taken in each plot (1 – mountain pine on a peat bog, 2 – spruce, 3 – cotton-grass, 4 – dry meadow)

Plots	4	2	3
1	54.75	41.04	34.192
4		54.995	35.642
2			32.186

5. Discussion

The number of identified species is higher than in the studies on neighbouring mountain areas (Gwiazdowicz & Biernacik 2000, Gwiazdowicz 2002, 2003, Skorupski 2005, Skorupski et al. 2005), where under the similar conditions only 42 – 46 species were identified in the area between the Czech Izera Mts and the Karkonosze Mts. This proves an important protective role of this Reserve for the whole ecosystem of the surrounding mountains. Also *Cheiroseius serratus, Leptogamasus cristulifer* (Athias-Henriot, 1967), *Leptogamasus obesus, Mixozercon sellnicki* (Schweizer, 1948)*, Paragamasus crassicornutus* (Willmann, 1954)*, Paragamasus rostriforceps* Athias-Henriot, 1967*, Pergamasus ruehmi* Willmann, 1938*, Platyseius italicus* (Berlese, 1905) and *Veigaia mollis* are species rarely found in Poland.

Species composition of different ecosystems of the Reserve differed significantly from each other. The similarity rates of the examined plots are shown in Tab. 5. Figures higher than 50 indicate some similarity of species compositions with respect to domination rates. This table shows that pairs of plots 1 and 4, and 2 and 4 have the most similar species composition of mites. One of the reasons of the result could be, that the plot 4 is situated among plot 1 and 2, so possibly migration of mites from neighbouring plots could make the species composition more similar. Clearly there is no similarity between mite populations of an open peat bog (plot 3) and of a forest area or a temporarily deforested area (plots 1, 2, and 4). One can consider the reserve as a mosaic of different habitats, showing various species compositions and mite groupings of relatively low similarity rates.

More species of Mesostigmata mites were found in the mountain pine area in a peat bog (1). The amount of mites of the family Parasitidae is about 25 %, and of the suborder Uropodina over 15 %. A higher rate of domination for Parasitidae is characteristic for coniferous forests (Skorupski 2001, Skorupski et al. 2003). Also in the spruce plot (2) over 30 % of the specimens were from this family. On the other hand, the dominance of mites of the suborder Uropodina was lower, about 10 %. This again proves the strong influence of coniferous forests on Mesostigmata mite fauna. The peat bog habitats were the poorest habitat from the investigated plots, with the lowest number of species and specimens. In the plot characteristic for the habitat *Platyseius italicus* was found. Also the dominance of a rare species *Veigaia mollis* in the plot, that is found only in a few places in Europe (Błaszak et al. 2006), gives more information about the microhabitat preferences of the species. The 4th plot is an area with quite large mite species diversity. This is an open area (with only a small part covered by trees). In similar research in the Czech Izery Mountains, these habitats were more diverse from the species point of view than older, even-aged spruce stands (Skorupski et al. 2005). In the class of dominants there are several species in different families: Veigaiaidae, Zerconidae, Parasitidae, Trachytide, and the last one is a part of the suborder Uropodina.

The high dominance of Uropodina with more than 15 % is characteristic for subalpine mixed forests (Skorupski & Gwiazdowicz 1996, Skorupski et al. 2006), therefore, the site of this area is probably quite fertile and destined to introduce in the future a mixed forest with European beech (*Fagus sylvatica* L.) and Silver fir (*Abies alba* Mill.).

6. References

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