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The armoured mite fauna (Acari: Oribatida) from a long-term study in the Scots pine forest of the Northern Vidzeme Biosphere Reserve, Latvia

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Abstract: In 1992–2012, a considerable amount of soil micro-arthropods has been collected annually as a part of a project of the National Long-Term Ecological Research Network of Latvia at the Mazsalaca Scots Pine forest sites of the North Vidzeme Biosphere Reserve. Until now, the data on oribatid species have not been published. This paper presents a list of oribatid species collected during 21 years of ongoing research in three pine stands of different age. The faunistic records refer to 84 species (including 17 species new to the fauna of Latvia), 1 subspecies, 1 form, 5 morphospecies and 18 unidentified taxa. The most dominant and most frequent oribatid species are *Oppiella (Oppiella) nova*, *Tectocepheus velatus velatus* and *Suctobelbella falcata*.

Key words: species list, fauna, stand-age, LTER, Mazsalaca

INTRODUCTION

Most studies of Oribatida or the so-called armoured mites (Subías 2004) have been relatively short term and/or from different ecosystems simultaneously and do not show long-term changes (Winter et al. 1990, Deleporte & Tillier 1999, Starý 1999, Kuriki 2003, Irmler 2004, Sjursen et al. 2005, Eitminavichiute et al. 2008, Cao et al. 2011). It was not possible to find a single long-term (more than fifteen years) study that presented annual continuous observations of the oribatid fauna in the same sampling plots.

In 1992, a research project started at the National Long-Term Ecological Research Network site in the Northern Vidzeme Biosphere Reserve, Latvia. One of the aims was to investigate complexes of soil arthropod species including oribatid mites in Scots pine forest (*Pinaceum myrtilosum*) in Mazsalaca municipality. Three forest stands (further mentioned as 'sample plots') with different tree age were selected and a large number of samples was collected in each sample plot once a year. From time to time, some results were presented in relation to fauna of Collembola (Jucevica & Melecis 2002, 2005, 2006, Melecis et al. 2005, Koehler & Melecis 2010) and Mesostigmata (Salmane 2000), but the material of oribatid mites was left without scientific notice and remained unpublished.

MATERIAL AND METHODS

The study was carried out in coniferous forest (*Pinaceum myrtilosum*), 5 km from the town Mazsalaca (Latvia), Northern Vidzeme Biosphere Reserve (57°53′ N, 24°59′ E) and comprised a part of the monitoring of the National Long-Term Ecological Research Network (Melecis et al. 2005).

Sampling plots were located in three Scots pine (*Pinus sylvestris*) forest stands of different age: an old stand (160–210 years old), a middle aged stand (60–80 years old) and a young stand (40–50 years old). Soils were sandy podzols with raw humus (mor) layer. *Pleurozium schreberi* and *Hylocomium splendens* were the dominant moss species. Common vascular

plants were *Vaccinium* shrubs. Sampling of soil micro-arthropods was started in 1992 and performed annually in the last decade of August until the year 2012. In each forest stand 100 samples were taken using soil borer (area: 5cm^2, max depth: 15cm). Samples from 1992 to 2005 were collected by Viesturs Melecis. Further collecting was carried out by the author. Soil samples were extracted with a modified high-gradient extractor. A more detailed description of the sampling design and extraction has been published by Jucevica and Melecis (2002).

Regarding to the material that was collected from 1992 to 1997, armoured mites were identified by Voldemārs Spuņģis, who additionally mounted 491 individuals in Hoyer's medium (Krantz & Walter 2009) with the purpose of creating a specimen collection. V. Spuņģis used Bulanova-Zachvatkina (1967) keys to identify Oribatida. Juvenile instars were not counted or identified. Later, the collection and the material (sampled from 1992 to 1997) were verified by the author (Kagainis 2012).

The remaining part of the material containing Oribatida collected in 1998–2012 was recently mounted in Hoyer's medium and identified by the author using Weigmann (2006) keys. Identifications have been also verified, when required, by Dr. Biol. Gerd Weigmann (Germany) and Dr. Biol. Ritva Penttinen (Finland). Juvenile instars have only been counted, but not identified. The material is deposited in the Institute of Biology, University of Latvia.

When writing down the species, the order of oribatid families followed the taxonomical principles by Seniczak et al. (2012) and Weigmann (2006). Genera and species were ordered alphabetically.

RESULTS

The study presents a species diverse fauna described in a local long-term investigation, which includes 84 species, 1 subspecies, 1 form, 5 morphospecies and 18 unidentified taxa among 215 103 specimens examined. (Table 1).

The collected material contained 183 575 adult individuals and 31 528 juvenile instars. Mean densities of oribatid adults from three pine forest stands investigated were 67 152; 59 453 and 84 738 ind./m^2, in young to old forest respectively. The largest proportion of juvenile instars occurred in the old forest, where their density was 13.7% of the whole oribatid mite population. The dominant oribatid species across all forest stands were *Oppiella (Oppiella) nova* (19.3%) and *Tectocepheus velatus velatus* (13.1%). *Suctobelbella falcata* (4.0%) was evaluated as a subdominant species. *Conchogneta traegardhi* (3.3%), *Nothrus silvestris* (2.6%), *Ceratozetes minimus* (2.4%), *Suctobelbella subpectinata* (1.5%) and *Suctobelbella subcornigera* (1.5 %) formed a recedent group and the remaining 96 taxa, including species as *Adoristes ovatus* (1.0%), *Carabodes subarcticus* (1.0%), *Chamobates cuspidatus* (0.9%), *Scheloribates laevigatus* (0.8%) and *Suctobelbella similis* (0.8%) were subrecedents, according to Engelmann (1978) dominance scale. *Suctobelbella subpectinata* showed significantly lower dominance in the old forest stand, compared to the other two forest stands. *Scheloribates laevigatus* showed significantly lower abundance in the middle-aged forest and *Microtritia minima* had a lower dominance in the young forest stand. Significantly higher abundances were registered for *Steganacarus (Tropocarus) carinatus* f. *carinata*, *Suctobelba trigona* and *Autogneta longilamellata* in the young forest stand. Abundances of *T.velatus velatus* and *Suctobelbella similis* were higher, and *Damaeobelba minutissima* and *Eremaeus hepaticus* lower in older forest stands.

Seventeen oribatid species were registered in Latvia for the first time. The species *Phthiracarus boresetosus* Jacot, 1930 has been registered during previous studies, yet mistakenly left unmentioned as a new species for the fauna of Latvia (Kagainis 2012). Presently, 227 oribatid species are known for the fauna of Latvia

Table 1. Oribatid taxa collected at three different sample plots in Mazsalaca pine forest during the National LTER Network project (1992–2012) with remarks on their density (ind/m^2) and constancy (total number of individuals of the particular species divided by number of collected samples). Sample plots: Y – young pine forest stand (40–50 years old), M – middle aged pine forest stand (60–80 years old), O – old pine forest stand (160–210 years old). Species new to the fauna of Latvia are marked with asterisk (*). Absent calculations are abbreviated with N.

No.	Oribatid species	Density			Constancy		
		Y	M	O	Y [%]	M [%]	O [%]
	Palaeacaridae Grandjean, 1932						
	Palaeacarus Trägårdh, 1932						
1.	*Palaeacarus hystricinus* Trägårdh, 1932*	16	3	13	0.7	0.1	0.5
	Ctenacaridae Grandjean, 1954						
	Adelphacarus Grandjean, 1952						
2.	*Adelphacarus sellnicki* Grandjean, 1952*	1	4	N	0.1	0.2	N
	Brachychthoniidae Thor, 1934						
	Liochthonius van der Hammen, 1959						
3.	*Liochthonius hystricinus* (Forsslund, 1942)	72	81	120	3.1	3.7	4.3
	Mixochthonius Niedbala, 1972						
4.	*Mixochthonius pilososetosus* (Forsslund, 1942)*	4	1	5	0.2	0.1	0.3
	Sellnickochthonius Krivolutskij, 1964						
5.	*Sellnickochthonius cricoides* (Weis-Fogh, 1948)*	16	3	8	0.8%	0.1%	0.4%
6.	*Sellnickochthonius furcatus (Weis-Fogh, 1948)*	9	N	N	0.2	N	N
7.	*Sellnickochthonius zelawaiensis* (Sellnick, 1928)	141	51	72	5.1	2.3	3.1
8.	*Sellnickochthonius* sp. 1	7	3	35	0.3	0.1	1.7
9.	Brachychthoniidea Thor, 1934 spp.	19	9	15	0.9	0.5	0.5
	Cosmochthoniidae Grandjean, 1947						
	Cosmochthonius Berlese, 1910						
10.	*Cosmochthonius lanatus* (Michael, 1885)*	8	4	8	0.4	0.2	0.4
	Haplochthoniidae van der Hammen, 1959						
	Haplochthonius Willmann, 1930						
11.	*Haplochthonius simplex* (Willmann, 1930)*	1	N	N	0.1	N	N
	Hypochthoniidae Berlese, 1910						
	Hypochthonius C.L. Koch, 1835						
12.	*Hypochthonius rufulus* C.L. Koch, 1835	87	5	26	3.7	0.2	1.0
	Eniochthoniidae Grandjean, 1947						
	Eniochthonius Grandjean, 1933						
13.	*Eniochthonius minutissimus* (Berlese, 1903)	39	4	160	1.1	0.2	5.4
	Phthiracaridae Perty, 1841						
	Phthiracarus Perty, 1841						
14.	*Phthiracarus boresetosus* Jacot, 1930	20	23	37	1.0	1.1	1.8
15.	*Phthiracarus* spp.	368	247	241	13.5	9.4	9.1
	Steganacarus Ewing, 1917						
16.	*Steganacarus (Atropacarus) striculus* (C.L. Koch, 1835)	1000	274	366	28.1	10.2	11.8
17.	*Steganacarus (Tropacarus) carinatus* forma *carinata* (C.L. Koch, 1841)	881	71	46	26.7	2.4	1.9
	Euphthiracaridae Jacot, 1930						
	Euphthiracarus Ewing, 1917						
18.	*Euphthiracarus cribrarius* (Berlese, 1904)	5	3	4	0.1	0.1	0.1
	Microtritia Märkel, 1964						
19.	*Microtritia minima* (Berlese, 1904)	78	559	344	1.8	10.7	9.4
	Rhysotritia Märkel et Meyer, 1959						
20.	*Rhysotritia ardua* (C.L. Koch, 1841)	57	49	55	2.8	2.2	2.7
	Malaconothridae Berlese, 1916						
	Malaconothrus Berlese, 1904						
21.	*Malaconothrus monodactylus* (Michael, 1888)	7	3	7	0.3	0.1	0.3

No.	Oribatid species	Density Y	Density M	Density O	Constancy Y [%]	Constancy M [%]	Constancy O [%]
	Trhypochthoniidae Willmann, 1931						
	Trhypochthonius Berlese, 1904						
22.	*Trhypochthonius cladonicola* (Willmann, 1919)*	N	5	12	N	0.2	0.5
23.	*Trhypochthonius nigricans* Willmann, 1928*	N	7	N	N	0.3	N
	Nothridae Berlese, 1896						
	Nothrus C.L. Koch, 1835						
24.	*Nothrus silvestris* Nicolet, 1855	1745	1624	1700	45.3	43.9	42.8
	Camisiidae Oudemans, 1900						
	Camisia von Heyden, 1826						
25.	*Camisia biurus* (C.L. Koch, 1839)	40	51	33	1,9	2,1	1,6
26.	*Camisia solhoeyi* Colloff, 1993	2	1	2	0.1	0.1	0.1
27.	*Camisia spinifer* (C.L. Koch, 1835)	51	63	51	2.3	2.9	2.4
	Heminothrus Berlese, 1913						
28.	*Heminothrus longisetosus* Willmann, 1925	60	30	59	2.3	1.3	2.4
	Nanhermanniidae Sellnick, 1928						
	Nanhermannia Berlese, 1913						
29.	*Nanhermannia* spp.	1184	521	878	30.8	15.2	20.7
	Damaeidae Berlese, 1896						
	Damaeobelba Sellnick, 1928						
30.	*Damaeobelba minutissima* (Sellnick, 1920)*	117	53	N	5.0	1.9	0.2
	Porobelba Grandjean, 1936						
31.	*Porobelba spinosa* (Sellnick, 1920)	176	225	230	7.1	7.8	8.8
	Spatiodamaeus Bulanova-Zachvatkina, 1957						
32.	*Spatiodamaeus verticillipes* (Nicolet, 1855)	40	46	30	1.9	2.1	1.4
33.	Damaeidae spp.	94	33	51	2.8	1.4	1.9
	Cepheidae Berlese, 1896						
	Cepheus C.L. Koch, 1835						
34.	*Cepheus cepheiformis* (Nicolet, 1855)	15	7	1	0.5	0.3	0.1
	Tritegeus Berlese, 1913						
35.	*Tritegeus bisulcatus* Grandjean, 1953*	1	N	N	0.1	N	N
	Eremaeidae Oudemans, 1900						
	Eremaeus C.L. Koch, 1835						
36.	*Eremaeus hepaticus* C.L. Koch, 1835	226	176	2	9.2	6.4	0.1
	Eueremaeus Mihelçiç, 1963						
37.	*Eueremaeus oblongus* (C.L. Koch, 1835)	N	1	5	N	0.1	0.3
38.	*Eueremaeus silvestris* (Forsslund, 1956)	112	43	75	4.2	2.0	2.6
39.	Eremaeidae spp.	34	17	31	1.5	0.9	1.1
	Caleremaeidae Grandjean, 1965						
	Caleremaeus Berlese, 1910						
40.	*Caleremaeus monilipes* (Michael, 1882)	15	3	N	0.5	0.1	N
	Gustaviidae Oudemans, 1900						
	Gustavia Kramer, 1879						
41.	*Gustavia microcephala* (Nicolet, 1855)	N	4	N	N	0.1	N
	Astegistidae Balogh, 1961						
	Furcoribula Balogh, 1943						
42.	*Furcoribula furcillata* (Nordenskiöld, 1901)	376	311	234	13.5	11.5	9.2
	Liacaridae Sellnick, 1928						
	Adoristes Hull, 1916						
43.	*Adoristes ovatus* (C.L. Koch, 1839)	703	543	766	25.2	20.1	26.4

No.	Oribatid species	Density Y	Density M	Density O	Constancy Y [%]	Constancy M [%]	Constancy O [%]
	Carabodidae C.L. Koch, 1843						
	Carabodes C.L. Koch, 1835						
44.	*Carabodes femoralis* (Nicolet, 1855)	59	9	N	1.9	0.3	N
45.	*Carabodes labyrinthicus* (Michael, 1879)	45	51	125	2.1	2.3	5.4
46.	*Carabodes marginatus* (Michael, 1884)	61	20	119	1.6	0.5	3.3
47.	*Carabodes ornatus* Storkan, 1925	580	245	244	19.5	9.7	8.5
48.	*Carabodes rugosior* Berlese, 1916	37	1	3	1.4	0.1	0.1
49.	*Carabodes subarcticus* Trägårdh, 1902	989	309	1656	24.5	8.7	21.9
50.	*Carabodes* spp.	324	95	379	9.0	4.7	7.5
	Tectocepheidae Oudemans, 1900						
	Tectocepheus Berlese, 1895						
51.	*Tectocepheus minor* Berlese, 1903*	3	15	1	0.1	0.5	0.1
52.	*Tectocepheus velatus velatus* (Michael, 1880)	5574	8179	13232	57.4	62.1	72.9
	Quadroppiidae Balogh, 1983						
	Quadroppia Jacot, 1939						
53.	*Quadroppia quadricarinata* (Michael, 1885)	55	59	113	2.3	2.2	4.5
	Oppiidae Grandjean, 1951						
	Berniniella Balogh, 1983						
54.	*Berniniella* spp.	4	N	N	0.2	N	N
55.	*Microppia minus* (Paoli, 1908)	91	87	347	3,5	2.9	7.6
	Oppiella Jacot, 1937						
56.	*Oppiella (Moritzoppia) keilbachi* (Moritz, 1969)*	27	77	49	0.7	0.8	0.7
57.	*Oppiella (Oppiella) nova* (Oudemans, 1902)	16663	15524	22391	84.5	82.3	89.1
58.	*Oppiella (Rhinoppia) subpectinata* (Oudemans, 1900)	2511	597	1051	46.2	13.9	27.7
59.	*Oppiella* sp. 1	108	145	196	3.3	5.5	6.9
60.	*Oppiella* spp.	4	8	21	0.2	0.3	0.9
	Suctobelbidae Jacot, 1938						
	Suctobelba Paoli, 1908						
61.	*Suctobelba regia* Moritz, 1970	1	80	51	0.1	3.2	2.0
62.	*Suctobelba trigona* (Michael, 1888)	153	7	3	2.9	0.2	0.1
63.	*Suctobelba* spp.	5	1	N	0.1	0.1	N
	Suctobelbella Jacot, 1937						
64.	*Suctobelbella acutidens* (Forsslund, 1941)*	1	3	N	0.1	0.1	N
65.	*Suctobelbella falcata* (Forsslund, 1941)	4145	3676	3161	63.1	56.3	53.2
66.	*Suctobelbella longirostis* (Forsslund, 1941)*	721	431	380	23.9	15.1	13.7
67.	*Suctobelbella similis* (Forsslund, 1941)	397	812	1052	14.5	22.7	28.5
68.	*Suctobelbella subcornigera* (Forsslund, 1941)	1345	1480	1237	32.4	29.5	34.3
69.	*Suctobelbella subtrigona* (Oudemans, 1916)	639	515	688	21.5	18.6	23.8
70.	*Suctobelbella* sp. 1	316	287	467	11.7	11.7	17.4
71.	*Suctobelbella* spp.	2815	2371	2539	54.5	48.6	55.3
	Autognetidae Grandjean, 1960						
	Autogneta Hull, 1916						
72.	*Autogneta longilamellata* (Michael, 1885)	73	9	4	1.7	0.4	0.2
73.	*Autogneta parva* Forsslund, 1947*	5	11	3	0.3	0.2	0.1
	Conchogneta Grandjean, 1963						
74.	*Conchogneta traegardhi* (Forsslund, 1947)	3569	1465	4464	41.5	24.1	45.8
75.	Oppioidea 1951 spp.	7663	8294	12281	34.8	33.5	35.6
	Limnozetidae Grandjean, 1954						
	Limnozetes Hull, 1916						
76.	*Limnozetes ciliatus* (Schrank, 1803)	1	N	N	0.1	N	N
	Cymbaeremaeidae Sellnick, 1928						
	Cymbaeremaeus Berlese, 1896						
77.	*Cymbaeremaeus cymba* (Nicolet, 1855)	1	3	1	0.1	0.1	0.1

No.	Oribatid species	Density Y	Density M	Density O	Constancy Y [%]	Constancy M [%]	Constancy O [%]
	Micreremidae Grandjean, 1954						
	Micreremus Berlese, 1908						
78.	*Micreremus brevipes* (Michael, 1888)	7	N	5	0.3	N	0.3
79.	*Micreremus gracilior* Willmann, 1931*	7	4	1	0.3	0.2	0.1
	Licneremaeidae Grandjean, 1931						
	Licneremaeus Paoli, 1908						
80.	*Licneremaeus licnophorus* (Michael, 1882)	N	3	5	N	0.1	0.1
	Phenopelopidae Petrunkevich, 1955						
	Eupelops Ewing, 1917						
81.	*Eupelops torulosus* (C.L. Koch, 1840)	369	178	224	13.7	7.9	8.9
	Achipteriidae Thor, 1929						
	Parachipteria van der Hammen, 1952						
82.	*Parachipteria punctata* (Nicolet, 1855)	424	95	121	16.7	3.8	4.1
83.	Achipterioidea spp.	136	8	57	4.7	0.4	2.3
	Galumnidae Jacot, 1925						
	Galumna von Heyden, 1826						
84.	*Galumna lanceata* (Oudemans, 1900)	310	338	402	12.8	13.6	15.9
	Pergalumna Grandjean, 1936						
85.	*Pergalumna nervosa* (Berlese, 1914)	181	696	575	7.5	24.5	18.8
	Ceratozetidae Jacot, 1925						
	Ceratozetes Berlese, 1908						
86.	*Ceratozetes minimus* Sellnick, 1928	1591	2151	3193	28.1	29.5	38.7
88.	*Ceratozetes gracilis* (Michael, 1884)	15	5	1	0.7	0.3	0.1
87.	*Ceratozetes thienemanni* Willman, 1943	424	276	260	12.7	9.4	7.0
	Diapterobates Grandjean, 1936						
89.	*Diapterobates humeralis* (Hermann, 1804)	5	N	3	0.1	N	0.1
	Fuscozetes Sellnick, 1928						
90.	*Fuscozetes setosus* (C.L. Koch, 1839)	391	194	207	13.1	6.3	6.3
91.	Ceratozetidae spp.	420	497	838	11.9	10.2	11.8
	Chamobatidae Grandjean, 1954						
	Chamobates Hull, 1916						
92.	*Chamobates borealis* (Trägårdh, 1902)	67	31	369	3.1	1.4	13.1
93.	*Chamobates cuspidatus* (Michael, 1884)	743	436	538	22.2	16.2	18.7
94.	*Chamobates* spp.	2	2	4	0.1	0.1	0.2
	Mycobatidae Grandjean, 1954						
	Minunthozetes Hull, 1916						
95.	*Minunthozetes semirufus* (C.L. Koch, 1841)	23	13	1	1.1	0.5	0.1
	Punctoribates Berlese, 1908						
96.	*Punctoribates punctum (C.L. Koch, 1839)*	9	13	7	0.4	0.5	0.3
	Scheloribatidae Grandjean, 1933						
	Liebstadia Oudemans, 1906						
97.	*Liebstadia humerata* Sellnick, 1928	3	3	4	0.1	0.1	0.2
	Scheloribates Berlese, 1908						
98.	*Scheloribates laevigatus* (C.L. Koch, 1836)	957	208	1277	31.9	8.1	36.3
99.	*Scheloribates initialis* (Berlese, 1908)	1253	1604	1721	42.0	46.6	50.4
100.	*Scheloribates latipes* (C.L.Koch 1844)	1256	1081	1017	38.1	33.6	34.0
101.	*Scheloribates* spp.	3	4	15	0.1	0.1	0.6
	Oribatulidae Thor, 1929						
	Oribatula Berlese, 1895						
102	*Oribatula exilis* (Nicolet, 1855)	1	1	N	0.10	0.10	N
103.	*Oribatula tibialis* (Nicolet, 1855)	493	641	640	18.70	22.70	21.60
104.	*Oribatula* sp. 1	N	1	3	N	0.10	0.10
105.	*Oribatula* sp. 2	7	13	N	0.30	0.70	N

No.	Oribatid species	Density			Constancy		
		Y	M	O	Y [%]	M [%]	O [%]
	Phauloppia Berlese, 1908						
106.	*Phauloppia lucorum* (C.L. Koch, 1841)	1	5	N	0.10	0.30	N
107.	Oripodoidae Jacot, 1925 spp.	1129	817	1099	20.50	18.10	20.90
108.	Oribatida Dugés, 1834 juv spp.	15351	11064	15623	89.70	84.10	89.90
109.	Oribatida Dugés, 1834 spp.	112	110	149	4.20	4.50	4.40

DISCUSSION

In Latvia armoured mites have been studied irregularly, until the revised checklist was published (Kagainis 2011). Soon after, a few more articles were prepared (Kagainis & Eitminavichute 2011, Kagainis & Spungis 2011, 2013) and the status of 209 oribatid species for the fauna of Latvia was proposed. Considering that the Lithuanian fauna of Oribatida consists of 312 species (Eitminavichute 2003), the author expects a large increase in the number of Latvian species in future investigations.

A considerable amount of oribatid mites have been sampled during the twenty one years of the National LTER Network project. This study indicates high regional species diversity. According to latest keys of Weigmann (2006), all 80 named species (including subspecies and forms) from this local study represents 12.9% of the known species diversity of Central Europe, and thus can be considered as high local species diversity. This long-term study has provided biologists also with valuable ecological data (Jucevica & Melecis 2002, 2005, 2006, Melecis et al. 2005, Koehler & Melecis 2010). The identified material of oribatid mites represents 37% of recently known species diversity of the oribatid fauna of Latvia.

Because of the lack of comparable literature showing annually obtained long-term data, further detailed comparisions can not be made. However, there are a few long-term investigations dealing with various ecosystems but not with the pine forest (Winter et al. 1990, Deleporte & Tillier 1999, Starý 1999, Irmler 2004, Sjursen et al. 2005, Eitminavichiute et al. 2008, Cao et al. 2011). Nevertheless, individuals from *T. velatus velatus* and *O. (Oppiella) nova* species have been described as the most abundant also in coniferous forest (Eitminavichiute et al. 2008) in Lithuania and oak forest (Starý 1999) in Czech Republic similarly to our study. Cao et al. (2011) mentioned *T. velatus velatus* also as a recedent species, but agroecosystems were investigated in that study. Some of the literature on long-term studies unfortunately does not characterize fauna by species level and much higher taxa e.g. families or orders are discussed (Winter et al. 1990, Deleporte & Tillier 1999, Sjursen et al. 2005). Investigations of Irmler (2004) showed different dominance strategies of oribatid species.

Several publications exist on short-time investigations in choosing Scots pine forest. Similar to our study, high preference to pine forest stand was observed for *O. (Oppiella) nova* (37 800 ind/m^2) and *T. velatus velatus* (64000 ind/m^2), in comparision of other habitats, and these two species also were registered as dominants (Seniczak et al. 2006). Sylwestrowicz-Maliszewska et al. (1993) described *T. velatus velatus* (3 593–13 304 ind/m^2) as dominant in pine forest ecosystems of Poland.

Additional remarks on oribatid mite densities and constancies attached to the species list of this article can be useful for valuable comparisons during further studies of the fauna (Table 1). The material has been carefully prepared and stored; it can be used as both illustrative material and as a valuable specimen collection for taxonomical research, species verification, and educational purposes during international collaborations.

The National LTER Network project in Mazsalaca forest was closed in 2012, representing a 21 year-long period of collecting data. Moreover, in 2009 intensive forestry has been started at the middle aged forest stand. In this regard, more publications on oribatid mite fauna and ecology are planned to be prepared.

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STRESZCZENIE

[Fauna roztoczy (Acari: Oribatida) zebrana w długoterminowych badaniach w sosnowych lasach w Północnym Rezerwacie Biosfery Vidzeme, Łotwa]

W pracy prezentowane są wyniki 21-letnich badań nad fauną roztoczy, wykonanych w ramach projektu the National Long-Term Ecological Research Network of Latvia w lasach sosnowych Rezerwatu Biosfery Północnej Vidzeme na Łotwie. Materiał zbierany był w drzewostanach w różnych fazach rozwoju: 40–50, 60–80 i 160–210 lat. Łącznie zebrano 215 103 osobników. Z 84 wykazanych gatunków 17 okazało się nowymi dla fauny Łotwy. Za gatunki dominujące uznano: *Oppiella (Oppiella) nova*, *Tectocepheus velatus velatus* i *Suctobelbella falcata*.

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