Abh. Ber. Naturkundemus. Görlitz	Band 76 Heft 1	S. 71 – 80	2004

ISSN 0373-7586

Beitrag zum 4. Milbenkundlichen Kolloquium vom 26. bis 27. September 2003
im Zoologischen Institut und Museum der Ernst-Moritz-Arndt-Universität Greifswald

Mesostigmata mites in the Bielinek on the Odra reserve

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Abstract

The Bielinek on the Odra reserve (Poland, NW), slopes of which are covered by downy-leaved oak (*Quercus pubescens*) and xerothermic vegetation, was the object of this faunistic study. A total of 2255 mite specimens from the order Mesostigmata were collected and determined to 129 species. After supplementation with data from literature, 131 species of Mesostigmata mites were found in the reserve area. In spite of the small area of the reserve (77.5 ha), species diversity of mites in these forest communities (in the ravines and on the slopes) may be considered to be relatively large. *Antennoseius borussicus*, *Macrocheles kolpakovae*, *Prozercon lutulentus*, *Rhodacarus sogidanus*, *Trichouropoda moldavica* and *Zercon athiasi* seem to be the most interesting species found in this reserve.

Keywords: mites, Acari, Mesostigmata, forest reserves, biodiversity

Zusammenfassung

Mesostigmata im Bielinik, Odra-Reservat – Der mit *Quercus pubescens* und Xerothermvegetation bestandene Bielinek im Odra-Reservat (NW-Polen) wurde faunistisch untersucht. Insgesamt 2255 Milbenproben der Ordnung Mesostigmata wurden gesammelt, bestehend aus 129 Arten. Zusammen mit Daten aus der Literatur ergibt dies insgesamt 131 Mesostigmata-Arten für das Reservat. Trotz der kleinen Fläche (77,5 ha) kann die Artendiversität der Milben in den Forstgesellschaften (Schluchten und Hänge) als relativ hoch angesehen werden. *Antennoseius borussicus*, *Macrocheles kolpakovae*, *Prozercon lutulentus*, *Rhodacarus sogidanus*, *Trichouropoda moldavica* und *Zercon athiasi* sind die bemerkenswertesten Arten des Reservats.

1. Introduction

The Bielinek on the Odra reserve (Poland, NW) is located on the east bank river, about 4.5 km long. It includes twelve slopes of the escarpment (the highest is over 70 metres) of South and South-West exposition which are divided by ravines and covers an area of 77.5 ha. The slopes are covered by downy-leaved oak (*Quercus pubescens* Willd.) and xerothermic vegetation. The ravines are covered by fresh deciduous forests, mainly with

common beech (*Fagus sylvatica* L.), common and sessile oaks (*Quercus robur* L. and *Q. petrea* L.). It has been an object of numerous studies concerning the invertebrate fauna, which showed a high biodiversity in this area (HEDICKE 1927, 1937, 1941, ZUMPT 1931, LIPP 1935, 1937, 1940, HEDICKE & MICHALK 1936, HESSE 1936, 1937, 1939, ENGEL 1938, KOSTOŁOWSKI & MICHALSKI 1962, BUSZKO & BARANIAK 1989, NOWACKI 1993, STACHOWIAK 1994, KUBISZ & MELKE 1995, WOJAS 1998). However, few studies have been conducted on the mites from the order Mesostigmata. In 1974 BŁASZAK showed in his monograph of the family Zerconidae only *Zercon peltatus* C. L. Koch 1836 to be found in that area. However, later WIŚNIEWSKI & HIRSCHMANN (1989, 1990, 1991) described two species new to science, which were found in that area, i. e. *Dendrolaelaps monodentatus* Wiśniewski & Hirschmann, 1989, and *Dendrolaelaps simplicis* Wiśniewski & Hirschmann, 1991, as well as unknown developmental stages of *Trichouropoda moldavica* Huţu, 1972. The description of the third species new to science, i. e. *Sejus rafalskii* Wiśniewski & Hirschmann, 1991, was presented in the worldwide revision of the genus *Sejus* (HIRSCHMANN et al. 1991). The fact of description new species of mites to science and the high biodiversity of other invertebrates in the reserve seem to be a good reason for faunistic study of Mesostigmata mites in this area.

2. Materials and Methods

Samples with the volumes ranging from 100 cm^3 to 1000 cm^3 were collected at random from various microenvironments in March and May, 1999. A total of 84 samples were analysed. 45 samples were collected on the slopes, of which 30 contained litter, soil and moss, and 15 contained decaying tree trunks. The next 39 samples were collected in the ravines and 21 contained litter, soil and moss and 18 contained decaying tree trunks. Mites were extracted in a Tullgren apparatus. The specimens were determined to species level (adult forms and frequently also juvenile stages) and in exceptional cases only to the genus level (e. g. from the family Phytoseiidae).

3. Results

A total of 2255 mite specimens from the order Mesostigmata were collected and determined to 129 species. A list of the species collected in the reserve is presented in Tab. 1, following the systematic classifications of BŁASZAK & MADEJ (1997) and WIŚNIEWSKI (1997).

From the samples collected on the slopes, 73 species of mites were found. 66 species were collected in litter, soil and moss, and only 23 species were found in decaying tree trunks. The mean number of specimens found in one sample was 19.5 in soil microhabitats and 11 in microhabitats of tree trunks. The mean number of mite species found in one sample was 7.8 in soil microhabitats and 3.1 in microhabitats of tree trunks.

From the samples collected in the ravines, 105 species of mites were found. 65 species were collected in litter, soil and moss, and 69 species were found in decaying tree trunks. The mean number of specimens found in one sample was 43.6 in soil microhabitats and 32.7 in microhabitats of tree trunks. The mean number of mite species found in one sample was 11.3 in soil microhabitats and 7 in microhabitats of tree trunks.

4. Discussion and conclusions

In spite of the relatively small area of the reserve, as many as 129 species of mites from the order Mesostigata were found here during the very short time of the investigations. It undoubtedly indicates a high biodiversity of this area, at least in terms of these arachnids. There have been a few studies in Poland in which the number of collected species was similar or higher (Błoszyk et al. 1994, Skorupski & Gwiazdowicz 1996, Gwiazdowicz 2000, Skorupski 2001), but the areas investigated were usually several to hundred times larger than the area of the Bielinek reserve. After supplementation with data from literature, 131 species of Mesostigmata mites were found in the reserve area.

The most frequently observed species were *Veigaia* sp. 1 (in 28 samples), *Paragamasus digitulus* (27), *Pergamasus crassipes* (24), *Veigaia nemorensis* (20), *Paragamasus vagabundus* (19), *Trichouropoda ovalis* (18), *Celaenopsis badius* (17) and *Trachytes aegrota* (16). Most of the observed mite species inhabited in larger numbers forested areas of the reserve in the ravines (Tab. 1). The species abundance of this area was evidenced by the occurrence of species rarely observed elsewhere in Poland, such as e. g. *Amerosieus imparsetosus*, *Hypoaspis brevipilis*, *Macrocheles kolpakovae*, *Paragamasus wasmanni*, *Pergamasus canestrini*, *Sejus rafalskii*, *Trichouropoda moldavica* or *Uropoda athiasae*. An interesting example here is also the occurrence of a rare species, *Geholaspis hortorum*, which occupies the same ecological niche as *Geholapsis mandibularis*, also found in the reserve. Finding such species, especially in the same samples, additionally indicates the abundance of prey for these mites.

Tab. 1 Mites from the order Mesostigmata found in the Bielinek on the Odra reserve; x litter – species found in a litter, soil and moss on the slopes covered by downy-leaved oak and xerothermic vegetation; x wood – species found in decaying tree trunks on the slopes covered by downy-leaved oak and xerothermic vegetation; r litter – species found in a litter, soil and moss in forests growing in ravines; r wood – species found in decaying tree trunks in forests growing in ravines; asterisk (*) denotes species found in that area only by other authors

List of collected mite species	number of collected specimens			
	x litter	x wood	r litter	r wood
Suborder: Antennophorina				
Family: Celaenopsidae				
Celaenopsis badius C. L. Koch, 1839	2	34	23	51
Suborder: Microgyniina				
Family: Microgyniidae				
Microgynium rectangulatum Trägardh, 1942				3
Suborder: Sejina				
Family: Ichthystomatogasteridae				
Asternolaelaps querci Wiśniewski et Hirschmann, 1984				13
Family: Sejidae				
Sejus rafalskii Wiśniewski et Hirschmann, 1991				4
Sejus sejiformis (Balogh, 1938)			1	
Sejus togatus C. L. Koch, 1836				7

List of collected mite species	number of collected specimens			
	x litter	x wood	r litter	r wood
Suborder: Gamasina				
Family: Zerconidae				
Prozercon kochi Sellnick, 1943	1		1	
Prozercon lutulentus (Halaškova, 1963)		6		
Prozercon traegardhi (Halbert, 1923)	2		6	
Zercon athiasi Vincze, 1965	2	1		
Zercon peltatus C. L. Koch, 1836	21		8	2
Zercon triangularis C. L. Koch, 1836				1
Family: Parasitidae				
Amblygamasus mirabilis Willmann, 1951	1			
Gamasodes spiniger (Trägardh, 1910)	1			
Holoparasitus calcaratus (C. L. Koch, 1839)	3		23	5
Leptogamasus suecicus Trägardh, 1937	2			1
Leptogamasus tectegynellus (Athias-Henriot, 1967)	1		15	2
Paragamasus (*Aclerogamasus*) *holzmannae* (Micherdziński, 1969)			1	
Paragamasus (*Anidogamasus*) *conus* (Karg, 1971)	6			
Paragamasus (*Anidogamasus*) *digitulus* (Karg, 1963)	43	4	37	1
Paragamasus (*Anidogamasus*) *jugincola* (Athias-Henriot, 1967)	7			
Paragamasus (*Anidogamasus*) *puerilis* (Karg, 1971)			2	
Paragamasus (*Anidogamasus*) *runcatellus* (Berlese, 1903)	9		54	2
Paragamasus (*Anidogamasus*) *vagabundus* (Karg, 1968)	8		61	29
Paragamasus (*Anidogamasus*) *wasmanni* (Oudemans, 1902)	3	1	4	16
Pergamasus (*Pergamasus*) *canestrini* Berlese, 1905			4	1
Pergamasus (*Pergamasus*) *crassipes* (Linne, 1758)	58	1	29	
Pergamasus (*Pergamasus*) *mediocris* Berlese, 1904			2	
Pergamasus (*Thenargamasus*) *quisquiliarum* (Canestrini, 1882)		1	4	6
Porrhostaspis lunulata Müller, 1859	2			8
Vulgarogamasus kraepelini (Berlese, 1904)			24	
unidentified Parasitidae	9		9	1
Family: Macrochelidae				
Geholaspis (*Geholaspis*) *longispinosus* (Kramer, 1876)	2		18	1
Geholaspis (*Longicheles*) *hortorum* (Berlese, 1904)			2	
Geholaspis (*Longicheles*) *mandibularis* (Berlese, 1904)	5		11	4
Holostaspella ornata (Berlese, 1904)			2	
Macrocheles kolpakovae Bregetova et Koroleva, 1960				1
Macrocheles montanus Willmann, 1951	1		2	
Macrocheles opacus (C. L. Koch, 1839)			12	1
Macrocheles tardus (C. L. Koch, 1841)			1	2
Macrocheles vagabundus (Berlese, 1889)				1
Family: Eviphididae				
Eviphis ostrinus (C. L. Koch, 1836)	1	2	25	15

List of collected mite species	number of collected specimens			
	x litter	x wood	r litter	r wood
Family: Ascidae				
Antennoseius borussicus Sellnick, 1945	7			
Arctoseius cetratus (Sellnick, 1940)			1	
Arctoseius semiscissus (Berlese, 1892)	2			
Asca aphidioides (Linne, 1758)	43	2		
Gamasellodes bicolor (Berlese, 1918)	5	2	9	4
Iphidozercon gibbus Berlese, 1903	4			
Iphidozercon minutus (Halbert, 1915)			1	2
Lasioseius lawrencei Evans, 1958	2			
Lasioseius muricatus (C. L. Koch, 1839)			1	1
Lasioseius ometes (Oudemans, 1903)				1
Lasioseius sp. 1				1
Proctolaelaps juradeus (Schweizer, 1949)	2			
Proctolaelaps pygmaeus (Müller, 1860)	2			5
Proctolaelaps sp.				1
Family: Laelapidae				
Androlaelaps casalis (Berlese, 1887)	1	1		4
Androlaelaps sp. 1				1
Eulaelaps stabularis (C. L. Koch, 1839)	1			1
Hypoaspis (*Alloparasitus*) *oblonga* (Halbert, 1915)		38	8	57
Hypoaspis (*Alloparasitus*) *sardoa* (Berlese, 1911)			1	
Hypoaspis (*Cosmolaelaps*) *cuneifer* (Michael, 1891)	1			
Hypoaspis (*Cosmolaelaps*) *miles* (Berlese, 1892)				2
Hypoaspis (*Cosmolaelaps*) *vacua* (Michael, 1891)	11			4
Hypoaspis (*Cosmolaelaps*) sp. 1				1
Hypoaspis (*Geolaelaps*) *aculeifer* (Canestrini, 1883)	5	1	8	
Hypoaspis (*Geolaelaps*) *brevipilis* Hirschmann, 1969				2
Hypoaspis (*Geolaelaps*) *praesternalis* Willmann, 1949	4			
Hypoaspis (*Holostaspis*) *montana* (Berlese, 1904)	5			
Hypoaspis (*Pneumolaelaps*) *berlesei* Hirschmann, 1969				7
Hypoaspis (*Pneumolaelaps*) *grandiporus* Hirschmann, 1969				4
Hypoaspis (*Pneumolaelaps*) *lubrica* Voigts et Oudemans, 1904				1
Hypoaspis sp.	2	2	1	6
Family: Dermanyssidae				
Dermanyssus gallinae De Geer, 1778	1		1	8
Family: Veigaiaidae				
Gamasolaelaps tuberculatus Bregetova, 1961				1
Veigaia cervus (Kramer, 1876)	9	1	24	1
Veigaia decurtata Athias-Henriot, 1961	1		4	1
Veigaia exigua (Berlese, 1916)	10		5	1
Veigaia mollis Karg, 1971	1			

List of collected mite species	number of collected specimens			
	x litter	x wood	r litter	r wood
Veigaia nemorensis (C. L. Koch, 1839)	16		30	7
Veigaia planicola (Berlese, 1892)	4		3	
Veigaia sp. 1	66	2	23	1
Family: Rhodacaridae				
Rhodacarellus silesiacus Willmann, 1936			1	
Rhodacarus (*Rhodacarus*) *coronatus* Berlese, 1921			4	
Rhodacarus (*Multidentorhodacarus*) *sogidanus* Shcherbak, 1980	6			
Family: Halolaelapidae				
Leitneria granulata (Halbert, 1923)	5		2	
Family: Pachylaelapidae				
Pachylaelaps (*Pachylaelaps*) *dubius* Hirschmann et Krauss, 1965	1		2	
Pachylaelaps (*Pachylaelaps*) *furcifer* Oudemans, 1903	3	2	3	
Pachylaelaps (*Pachylaelaps*) *ineptus* Hirschmann et Krauss, 1965			2	
Pachylaelaps (*Pachylaelaps*) *longisetis* Halbert, 1915	6		5	
Pachylaelaps (*Pachylaelaps*) *magnus* Halbert, 1915			1	
Pachylaelaps sp. 1				1
Pachyseius humeralis Berlese, 1910			7	
Family: Digamasellidae				
Dendrolaelaps (*Cornodendrolaelaps*) *cornutulus* Hirschmann, 1960			3	6
Dendrolaelaps (*Cornodendrolaelaps*) *uncinatus* Hirschmann, 1960				2
Dendrolaelaps (*Cornodendrolaelaps*) sp. 1				30
Dendrolaelaps (*Insectolaelaps*) *armatus* Hirschmann, 1960 s. lato				1
Dendrolaelaps (*Insectolaelaps*) sp. 1				2
Dendrolaelaps (*Monodendrolaelaps*) *monodentatus* Wiśniewski et Hirschmann, 1989*				
Dendrolaelaps (*Monodendrolaelaps*) *simplicis* Wiśniewski et Hirschmann, 1991*				
Dendrolaelaps (*Punctodendrolaelaps*) sp. 1				24
Dendrolaelaps (*Sellnickidendrolaelaps*) *sellnicki* Hirschmann, 1960		1		
Dendrolaelaps sp.	1			2
Dendroseius reticulatus Sheals, 1956	2			
Family: Ameroseiidae				
Ameroseius furcatus Karg, 1971	3	1		
Ameroseius imparsetosus Westerboer, 1963				2
Ameroseius sp. 1				1
Epicriopsis horridus (Kramer, 1876)	3		2	1
Family: Phytoseiidae				
Amblyseius sp.	12		13	1
Anthoseius sp.	1	52	1	
Typhlodromus sp.		1		1
unidentified Gamasina	32		35	8

List of collected mite species	number of collected specimens			
	x litter	x wood	r litter	r wood
Suborder: Uropodina				
Family: Trachytidae				
Trachytes aegrota (C. L. Koch, 1841)	29		92	1
Trachytes pauperior (Berlese, 1914)			1	
Family: Polyaspidae				
Polyaspis (*Dipolyaspis*) *criocephali* Wiśniewski, 1980			1	21
Family: Trematuridae				
Nenteria breviunguiculata (Willmann, 1949)	3			
Trichouropoda elegans (Kramer, 1882)	1	7	17	58
Trichouropoda moldavica Huţu, 1972				16
Trichouropoda ovalis (C. L. Koch, 1839)	15		43	33
Trichouropoda querceti Hirschmann, 1972	16		17	2
Trichouropoda spatulifera (Moniez, 1892)		1		
Trichouropoda sp. 1 (*ovalis* group)				7
Trichouropoda sp. 2 (*sociata* group)				4
Family: Urodinychidae				
Dinychus carinatus Berlese, 1903			6	3
Dinychus perforatus Kramer, 1886				3
Dinychus woelkei Hirschmann et Zirngiebl-Nicol, 1969				11
Urodiaspis tecta (Kramer, 1876)	7		16	
Uroobovella pulchella (Berlese, 1904)				4
Uroobovella pyriformis (Berlese, 1920)		1		36
Family: Trachyuropodidae				
Trachyuropoda coccinea (Michael, 1891)	1			
Family: Uropodidae				
Discourella cordieri (Berlese, 1916)	19		40	1
Discourella modesta (Leonardi, 1899)	1			
Uropoda (*Uropoda*) *minima* Kramer, 1882	1		42	
Uropoda (*Cilliba*) *athiasae* Hirschmann et Zirngiebl-Nicol, 1969			7	
Uropoda (*Cilliba*) sp. 1	22		50	
unidentified Uropodina	1		2	3
Total	586	165	916	588

On the slopes of the escarpment species more typical for soil and xerothermic sites and those better adapted to these conditions were found, such as e. g. *Antennoseius borussicus*, *Prozercon lutulentus*, *Rhodacarus sogidanus*, *Veigaia mollis* or *Zercon athiasi* (Błaszak 1974, Bregetova 1977, Shcherbak 1980, Skorupski & Gołojuch 1996). However, xerophilous species were found in the collected samples very rarely and in very limited numbers. Nevertheless, at the same time numerous ubiquitous species from the genera *Veigaia* and *Paragamasus* were found in the samples, which is understandable because

these mites are fast predators, common in every stage of forest succession (MADEJ & BŁASZAK 1993, MADEJ 1996, MADEJ & SKUBAŁA 1996). In addition, species typical for forest communities were also found on the slopes, usually the same that were found in the neighbouring forest stands, from ravines or those covering the top of the escarpments. On the other hand, this also points to the already existing environmental changes, making it possible for non-xerophilous species to survive.

Thus, the following conclusions may be drawn:

1. The Bielinek on the Odra reserve exhibits a specific mite fauna, among which three mite species have been described as new to science. Several other species may also be the object for the description of new taxa, while for a few species it is the only site in Poland, and for several others one of the few sites in Poland.
2. In spite of the small area of the reserve, species diversity of mites in forest communities (in the ravines and on the slopes) may be considered to be relatively large.
3. On the surface of escarpments, covered by downy-leaved oaks, xerophilous species were observed.
4. The process of the displacement of xerophilous species from the escarpment slopes, which is probably being observed, may be stopped only by the activation of natural erosion processes, which will restore previous microclimatic conditions and make the regeneration of xerophilous species populations possible.

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Manuscript accepted: 24 August 2004

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