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MATERIALS TO KNOWLEDGE OF UROPODINA (ACARI: MESOSTIGMATA) OF POZNAŃ DISTRICT

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Abstract: The aim of the research was to examine the state of knowledge of Uropodina mites in forest communities in the Poznań District over the five study periods: from the 60s in the last century to 2005. During the study from Poznań District area, 34 species of Uropodina mites have been recorded. The studies have shown that the number of communities of Uropodine mites is larger in non-urban areas, than in urban areas. The number of species in separate study periods was different. The largest number of species was 26 – found in the years 2001–2005, whereas the smaller number was 13 – found in the first decade.

Keywords: mites, community structure, species composition, anthropopression

INTRODUCTION

Poznań District is situated in the centre of Wielkopolska Province around the Poznań city, which is the separate Municipal District. Poznań District is one of the largest in Poland – an area of the district is 189 995 ha (by http://bip.powiat.poznan.pl/). The district comprises of 17 municipalities which constitute one agglomeration with Poznan city. The population density of inhabitants is 154 people per km^2 (by http://bip.powiat.poznan.pl/ in 2006), which puts the district among one the most densely populated districts in Poland. An important transport routes of national and international importance which converge in Poznan run through this area: there are A2 motorway and national road No 5, 11 and 92.

One of the characteristic features of the structure of land use in the District of Poznań is relatively low forest cover (21.9% vs. 25.3% in the Wielkopolska Province) and the high proportion of non-agricultural and non-forest areas (16.1%). The structure of agricultural land is relatively low participation of grassland (5.6%) (by http://bip.powiat.poznan.pl/). This structure is the result of a long tradition of intensive development of agriculture and rapid progress of urbanization. Participation of areas under various forms of protection in the total area of the district amounts about 26% (as of 2005). The 8.76% is the Wielkopolski National Park, 0.35% are nature reserves, and 38.52% are the sites of the Natura 2000 Web.

The decrease of participation of forest areas, shrinkage of woodlands and isolation brings about that existence of many species of forest flora and fauna is endangered (Pullin 2005). This phenomenon's applies also to soil organisms – including mites from the suborder Uropodina (Acari: Mesostigmata), most of which are typically forest species – associated with soil and litter of various types of forests (Błoszyk 1999; Napierała 2008). Loss of forest areas is a threat to the functioning of the populations of these mites, therefore the area of the Poznań district and the whole of Wielkopolska region is a very interesting area to conduct research on communities of this group of mites (Błoszyk 1999; Napierała 2008; Napierała et al. 2009). Moreover, mites belonging to this group are good indicators of ecological condition of the soil environment, since most of them (70%) are stenobionts and oligobionts – closely associated with the specific type of habitat (Błoszyk 1999). Harmful changes in soil environment may cause a decline of number of population of particular species or total elimination of rare, sensitive species (Błoszyk 1999; Napierała 2008).

The aim of this publication was to study the investigation state of Uropodina of forest areas of Poznań District in five study periods: from the sixties until 2005. Poznań District has been an area of research of acarologists from Poznań since many years (Skorupski 2000; Krysiak et al. 2001; Napierała et al. 2003; Bajerlein, Błoszyk 2004; Krysiak 2007). Studies in this territory have been conducted not only because of the neighborhood of this area, but mainly because the localization of the big city – Poznań has a large impact on the environment of the entire district. Strong pressure of urbanization: buildings, industry, and involving the contamination of water, air and soil environment largely contributed to changes in natural flora and fauna of this area. The city itself is also interesting area of research. Despite of the pressure that the city exerts on the natural environment, it may be, due to the rich mosaic of habitats a good habitat for many species of plants and animals (Niedbała et al. 1981; Niedbała et al. 1982; Jackowiak 1990; Niedbała et al. 1990; Jackowiak 1993; Skubała, Dziuba 1995; Jackowiak 1998). It should also be noted that there were some environments, for example parks (eg. park – "Citadel" in Poznań), communal forests or undergrowth, which occurring within the area of the city and which may have similar character to the natural ecosystems (Krysiak 2007).

Materials used in this study mainly come from the city of Poznań, because in this area an intensive studies had been conducted, for many years (2001–2005) which detailed results have been described in the publication of Krysiak (2007). Due to the volume of this interesting material, in this paper a comparison of diversity of species Uropodina in the Poznań and outside its borders – i.e. the various types of forest complexes in Poznań District, was also made.

Present publication opens a series of studies on the state of investigation of mites from suborder Uropodina from various areas of Wielkopolska.

MATERIALS AND METHODS

Mite collection and extraction

The materials have been collected since 1961 (Tab. 1) in various areas of Poznań District (Wielkopolska province, Western Poland) (for detailed description see Skwierczyński 2010).

From among 1166 samples which have been collected from the area of the District most samples – 1041, originated from the area of Poznań (Tab. 1). Samples have been collected from soil and litter of various types of forests: mixed deciduous forests, parks, oak, meadows, pine forest, multispecies mixed forests with spruce, beech forest, scrubs, mammal nests, sedge, mixed deciduous forests, riparian, multispecies mixed forests – pine, birds nests, xerophilous grasses, rotting logs, sedge, peat bogs, larch forests. Soil was sampled either quantitatively (using the soil corer 30 cm^2 to the depth of 10 cm) or qualitatively (using sieve). Mites from various types of microhabitatas (dead wood, nests of mammals), have been collected each with a volume of 0.5–0.8 l.

Tabela 1. Typ i liczba prób zebranych w poszczególnych okresach badawczych
Table 1. Type and number of samples collected in different periods of time

Study Period	Quantitative samples	Quality samples
1961–1970	0	26
1972–1985	21	205
1988–1989	28	19
1993	0	7
1998–2005	638	225
Total	687	482

Mites were extracted from samples in Tullgren funnels for ~ 4-6 days (depending on the level of moisture) and preserved in 75% ethanol. Permanent and temporary microscope slides were made (Hoyer liquid was used as slides mounting medium) and the specimens were identified using keys in Kadite and Petrova (1977), Evans and Till (1979), Karg (1989), Błoszyk (1999) and Mašan (2001).

The materials used in the paper have been deposited in “Soil-fauna database” (Natural History Collections, Faculty of Biology AMU, Poznań).

RESULTS

Species diversity of Uropodina in various periods of study

Samples collected in the District of Poznań came from five research periods: the first period – the 60th, the second period – from 1972 to 1980, the third – from 1981 to 1989, the fourth – the years: 1993, 1998, 1999, 2000 and the fifth period covers a range of 2001–2005.

In the material from five above mentioned decades (study periods) collected in the district of Poznań 34 species of mites from the suborder Uropodina have been found (Tab. 2). Study has shown differences in the number of species in different periods of research. Most species – 26 – have been found between 2001 and 2005, while the least species – only 13 have been stated in the first studied decade (Fig. 1).

After comparison of the species composition of the Uropodine mites communities in Poznań District from five studied decades it can be seen that in the sixties in the area of studied district have not been stated such species as: *T. pauperior, A. infirmus*, *T. elegans*, *O. spatulifera*, *T. penicillata*, *L. orbicularis*, *P. calcarata*, *P. structura, U. pannonica*, *O. kargi*, *J. pulchella*, *U. obovata*, *U. appendiculata*, *P. rackei*, *T. willmanni*, *U. formicarius*, *U. hamulifera*, *U. orbicularis*, *N. stylifera*, *D. arcuatus*, *D. inermis*, *D. woelkiei*. In subsequent years there has been observed a tendency to increase diversity of species in the samples collected in the studied area. In the second decade there have been noted the appearance of such species as: *T. pauperior*, *T. elegans*, *I. penicillata*, *T. calcarata*, *Ph. rackei*, *N. stylifera*. In the third decade a several new species also occurred: *A. infirmus*, *O. spatulifera, L. orbicularis*, *T. structura*, *U. pannonica, J. pulchella*, *D. arcuatus and D. inermis*. In the fourth decade the following species: *U. obovata*, *U. formicaria*, *U. hamulifera*, *U. orbicularis*, *N. stylifer*a, have been additionally found. In the fifth – the last considered period, there have been noted an occurrence of the following species: *U. appendiculata*, *T. willmanni, D. woelkei*. It should also be added that there are a group species which constitute a constant element of the communities and has always occurred in studied material in every periods. These are common species which are usually numerous in samples from soil, i.e.: *T. aegrota*, *U. tecta*, *O. ovalis*, *O. karawaiewi* and *D. modesta* (Tab. 2). The latter two species are often found in the samples from athropogenically transformed areas (Krysiak 2007).

Changes in abundance of Uropodina in particular study periods

In samples collected in subsequent decades differences in the number Uropodina have been stated. The following diagram (Fig. 2) shows changes in abundance of mites tested in particular periods of research.

Table 2. The occurrence of particular species of Uropodina in study periods (where + / - - a species found / not found)

Tabela 2. Występowanie określonych gatunków Uropodina w poszczególnych okresach badawczych (gdzie: +/- - gatunek stwierdzony/nie stwierdzony)

Study period Species	60th	70th	80th	90th	2001–2005
Trachytes aegrota (C.L. Koch, 1841)	+	+	+	+	+
Discourella modesta (Leonardi, 1889)	+	+	+	+	+
Oodinychus ovalis (C.L. Koch, 1839)	+	+	+	+	+
Oodinychus karawaiewi (Berlese, 1903)	+	+	+	+	+
Urodiaspis tecta (Kramer, 1876)	+	+	+	+	+
Olodiscus minima Kramer, 1882	+	+	+	+	+
Janetiella pyriformis (Berlese, 1920)	+	+	+	-	-
Trachyuropoda coccinea (Michael, 1891)	+	+	-	-	-
Nenteria breviunguiculata (Willmann, 1949)	+	+	-	-	+
Dinychus carinatus Berlese 1903	+	+	-	-	-
Dinychura cordieri (Berlese, 1916)	+	-	+	+	+
Dinychus perforatus Kramer, 1882	+	-	+	+	+
Trachytes pauperior (Berlese, 1914)	-	+	+	-	+
Trematurella elegans (Kramer, 1882)	-	+	-	-	+
Trichouropoda penicillata Hirschmann, 1961	-	+	-	-	-
Trichouropoda calcarata Hirschmann, 1961	-	+	-	+	+
Phaulodiaspis rackei (Oudemans, 1912)	-	+	-	-	-
Nenteria stylifera (Berlese, 1904)	-	+	-	+	+
Apionoseius infirmus (Berlese, 1887)	-	-	+	-	-
Oodinychus spatulifera (Moniez, 1892)	-	-	+	-	-
Leiodinychus orbicularis (C.L.Koch, 1839)	-	-	+	-	-
Trichouropoda structura Hirschmann, 1961	-	-	+	-	-
Urodiaspis pannonica (Willmann, 1952)	-	-	+	-	-
Janetiella pulchella (Berlese, 1904)	-	-	+	-	+
Dinychus arcuatus (Trägårdh, 1922)	-	-	+	-	-
Dinychus inermis (C.L. Koch, 1841)	-	-	+	-	+
Olodiscus kargi Hirschamann, 1969	-	-	-	-	+
Uroobovella obovata (Berlese, 1884)	-	-	-	+	-
Uroobovella appendiculata (Berlese, 1910)	-	-	-	-	+
Trachyuropoda willmanni Hirschmann, 1969	-	-	-	-	+
Urotrachytes formicaria (Lubbock, 1881)	-	-	-	+	-
Uropoda hamulifera Michael, 1894	-	-	-	+	+
Uropoda orbicularis (Müller, 1776)	-	-	-	+	+
Dinychus woelkiei Hirschmann, 1969	-	-	-	-	+

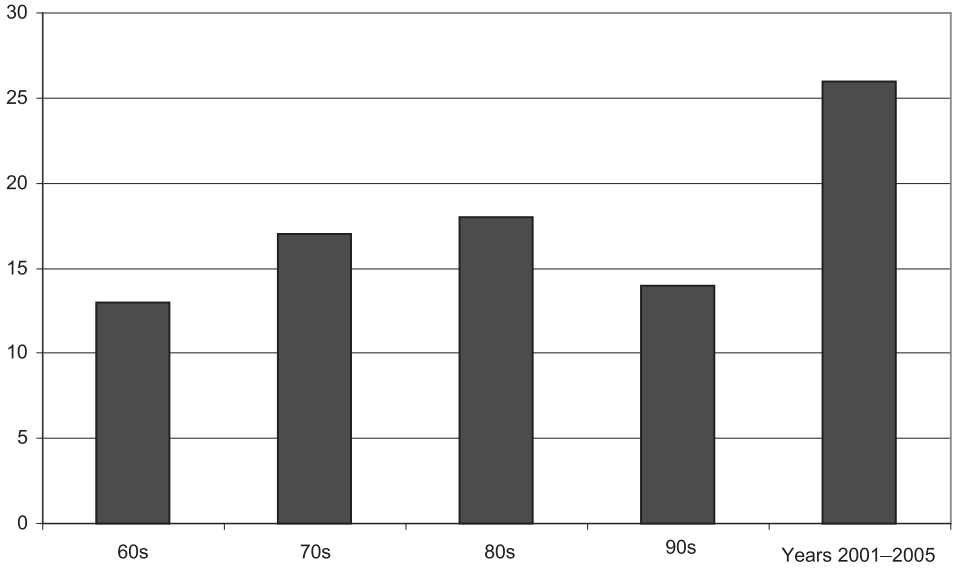

Fig. 1. Number of species collected Uropodina in Poznan District in the different research periods

Ryc. 1. Liczba gatunków Uropodina zebranych na terenie Powiatu poznańskiego w poszczególnych okresach badawczych

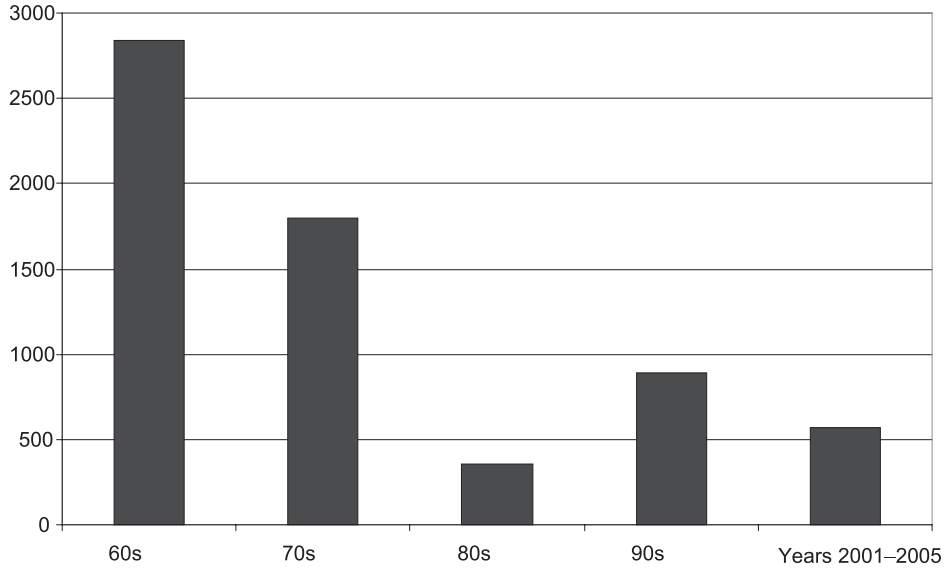

Fig. 2. Average number of Uropodina per sample in five study periods

Ryc. 2. Średnia liczebność Uropodina na próbę na przestrzeni 5 okresów badawczych

The average number of Uropodina per sample has been the highest in the first period of the study and amounted to up to 2,837 individuals per sample. In the subsequent decades, the average number of Uropodina in samples has changed: in the second decade it has been 1795 individuals, whereas in the third the number of mites has been the lowest and amounted only 353 individuals. In the fourth decade the number increased to 891 individuals per sample, and finally in the fifth decade, the number of individuals in the sample have reached a value of about 568 – this value is almost five-times decline in comparison to the number noted in the first decade (Fig. 2).

Analysis of the structure of communities of Uropodina in studied periods has shown that in particular decades the dominant species -–forming the core of the community have changed (Tab. 3). In the first period *O. karawaiewi*, *O. ovalis* and *T. aegrota* have been dominant species. In the second decade *Ph. rackei* has appeared in the group of the most numerous species, but *O. karawaiewi* has not been noted. In the third decade of the dominant species were *O. minima, T. aegrota* and *O. ovalis*. In the fourth period of study, *O. karawaiewi* with *T. aegrota* and *O. ovalis* prevailed. In the fifth decade species which constitutes the core of the communities were *O. karawaiewi* and *O. ovalis*. It should be noted that *O. ovalis* is the only species which has occurred in all the studied decades and has always achieved the highest number in the communities.

Comparison of abundance and species diversity Uropodina urbanized and non-urbanized areas

Diagram (Fig. 3) shows the average number of Uropodina in urban and non-urbanized areas of Poznań District.

Studies have shown that the number of Uropodina in non-urbanized areas has been higher and amounted to 1,231 individuals per sample, while in the urban areas only 759 individuals of Uropodina per sample have been found.

On the basis of the collected samples it may be noted that species diversity of Uropodina urbanized area is twice higher than in comparison to non-urbanized areas (Tab. 4). Number of Uropodina species in urbanized area amounted 35 species, whereas in non-urbanized areas only 17 species have been stated.

DISCUSSION

The results presented above shows that the species composition and abundance of communities of Uropodina in the District of Poznań have changed in particular decades. Studies have shown a relatively steady increase of Uropodina diversity in various periods of research. However, these results cannot

Tabela 3. Szczegółowa charakterystyka zmian Uropodina na przestrzeni pięciu dekad. Środowiska: Ś: 1 – murawy kserotermiczne, Ś: 5 – łąki, Ś: 7 – torfowiska, Ś: 8 – turzycowiska, Ś: 11 – olesy, Ś: 12 – łęgi, Ś: 13 – mieszane lasy liściaste, 13b – mieszane lasy liściaste – więcej, Ś: 13a – lasy grądowe, Ś: 14a – buczyny – pomorska, Ś: 15 – dąbrowy, Ś: 16 – bory sosnowe, Ś: 19 – lasy modrzewiowe, Ś: 20b – lasy mieszane z sosną, Ś: 20c – lasy mieszane, ze świerkiem, Ś: 22 – krzewy, Ś: 23 – parki, Ś: 25 – gniazda ssaków, Ś: 26 – gniazda ptaków, Ś: 29 – dziuple, Ś: 32 – gnijące kłody

Table 3. Detailed description of the changes of Uropodina communities over five studied periods. Environments: Ś: 1 – xerophilous grasses, Ś: 5 – meadows, Ś: 7 – peat bogs, Ś: 8 – sedge, Ś: 11 – alder forests, Ś: 12 – marshy forests, Ś: 13 – mixed deciduous forests, 13b – mixed deciduous forests – more, Ś: 13a – hornbeam forests, Ś: 14a – beech woods on lowlands, Ś: 15 – oak – woods, Ś: 16 – pine forests, Ś: 19 – larch forests, Ś: 20b – mixed forests with pine, Ś: 20c – mixed forests with spruce, Ś: 22 – shrubs, Ś: 23 – parks, Ś: 25 – mammals' nests, Ś: 26 – birds nest, Ś: 29 – tree hollows, Ś: 32 – rotting logs

Study period	60th	70th	80th	90th	2001–2005
Number of samples collected in the period	26	68	202	213	625
Type of tested environments	Ś: 13, Ś: 23, Ś: 15, Ś: 29, Ś: 5, Ś:16, Ś: 20	Ś: 14a, Ś: 22, Ś: 16, Ś: 23, Ś: 25, Ś: 5, Ś: 8, Ś: 11, Ś: 13a, Ś: 13b, Ś: 12, Ś: 15, Ś: 16, Ś: 20, Ś: 25	Ś: 23, Ś: 26, Ś:1, Ś: 11, Ś: 13, Ś: 5, Ś: 20, Ś: 12, Ś: 15, Ś: 16, Ś: 22, Ś: 32, Ś: 7, Ś: 7, Ś: 8, Ś: 12	Ś: 1, Ś: 11, Ś: 16, Ś: 22, Ś: 7, Ś: 12, Ś: 13, Ś: 19, Ś: 20, Ś: 23, Ś: 5	Ś: 13, Ś: 15, Ś: 16, Ś: 20, Ś: 23, Ś: 5, Ś: 1, Ś: 22, Ś: 12, Ś: 11
Dominant Species	*O. ovalis, T. aegrota, O. karawaiewi*	*O. ovalis, T. aegrota, Ph. rackei*	*O. ovalis, T. aegrota, O. minima*	*O. ovalis, T. aegrota, O. karawaiewi*	*O. ovalis, O. karawaiewi*
The most frequent species	*O. ovalis, T. aegrota, O. karawaiewi*	*O. ovalis, T. aegrota, O. karawaiewi*	*O. ovalis, T. aegrota, O. minima*	*T. aegrota, O. karawaiewi, O. minima*	*O. ovalis, T. aegrota, O. karawaiewi*
Rare species	*T. coccinea, N. breviunguiculata, D. modesta*	*N. breviunguiculata, D. carinatus, T. coccinea*	*P. structura, O. spatulifera, J. pulchell*	*P. calcarata, U. obovata, U. hamulifera*	*D. woelkiei, O. karg,*
The increase in diversity compared to the previous decade [%]	-	30	6	-	85
Biodiversity decline over the previous decade [%]	-	-	-	22	-

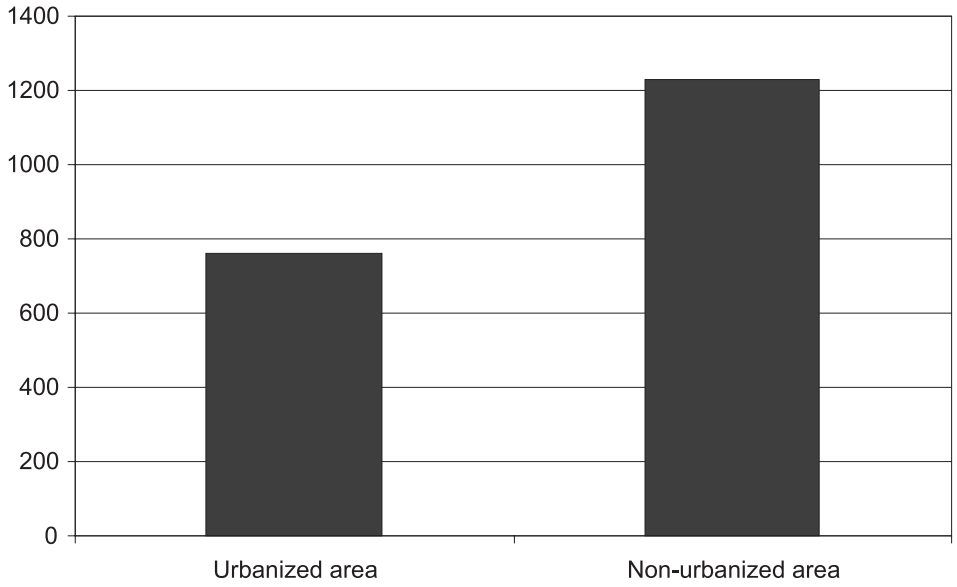

Fig. 3. Mean (aggregate) number of Uropodina in urban and non-urbanized areas Poznan district in five study periods

Ryc. 3. Średnia (sumaryczna) liczebność Uropodina na terenach zurbanizowanych i niezurbanizowanych Powiatu poznańskiego w pięciu okresach badawczych

be interpreted as an effect of positive changes in the soil environment, but it is rather the result of changes in state of exploration of this region of Wielkopolska. Number of samples gathered in the District has increased systematically – particularly in the years 2001–2005. It is also important to take into account the difference in the number of environments, from which the samples have been collected. In the sixties only eight habitats was examined, in the eighties – 21 habitats and from 2001 to 2005 samples have been collected from 16 different habitats. This may indicate the irregularity of studies which have been carried out so far, thus the data presented in the paper do not necessarily reflect the actual abundance and biodiversity Uropodina. It is planned to continue research in the district of Poznań and explore mainly rural areas, taking into account the various types of forests and microenvironments.

The highest average number of Uropodina has been observed in the sixties, whereas the lowest abundance has been noted distinguished themselves in the eighties and the years 2001 to 2005. This result is probably caused by deterioration of soil environment in Wielkopolska. This conclusion could be also confirmed by high and stable participation in the analyzed communities synantrophic species – *O. karawaiewi,* which presence in the communities indicates

Table 4. Occurrence of Uropodina in urban and non-urban areas (where + / - - a species found / not found)

Tabela 4. Występowanie określonych gatunków Uropodina na terenach: zurbanizowanym i niezurbanizowanym (gdzie: +/- - gatunek stwierdzony/ nie stwierdzony)

Species	Urbanized areas	Non-urbanized areas
T. aegrota	+	+
D. modesta	+	+
T. elegans	+	+
O. ovalis	+	+
O. karawaiewi	+	+
U. tecta	+	+
U. pannonica	+	+
O. minima	+	+
Ph. rackei	+	+
D. cordieri	+	+
N. breviunguiculata	+	+
N. stylifera	+	+
D. perforatus	+	+
T. pauperior	+	-
A. infirmus	+	-
L. orbicularis	+	-
T. calcarata	+	-
T. structura	+	-
O. kargi	+	-
J. pulchella	+	-
J. pyriformis	+	-
U. obovata	+	-
U. appendiculata	+	-
T. willmanni	+	-
U. formicaria	+	-
U. hamulifera	+	-
U. orbicularis	+	-
D. inermis	+	-
D. carinatus	+	-
D. woelkiei	+	-
O. spatulifera	-	+
T. penicillata	-	+
T. coccinea	-	+
Total	30	16

anthropogenic changes in soil environment (Błoszyk et al. 2006; Krysiak 2007; Napierała 2008).

The main reason of decrease of number of Uropodina over studied decades has been anthropopression. Deforestation, agriculture, expanding of urban development, industry and contamination of the environment connected with all these human activities, have significantly worsen conditions for the functioning of ecosystems. This phenomenon also applies to the soil. Because of these rapid changes, many populations of Uropodina getting less numerous. Moreover rare and sensitive species – become extinct and have been replaced by common, more resistant and synanthropic species (i.e. *T. aegrota*, *O. ovalis*, *O. karawaiewi*). Still, other species reduce their acreage, retiring to place to relatively "safe" areas which are not vulnerable to human activities. That's why these species can be found only in nature reserves or in old, less transformed tree stands, which become unfortunately very rare in Wielkopolska (Napierala 2008). It is particularly applied to highly urbanized area of district of Poznań (Krysiak 2007; Napierała 2008).

Studies have shown that the number of communities of Uropodina has been significantly higher in non-urbanized than in urban areas. This confirms the hypothesis that the areas of urban agglomerations do not constitute good conditions for the functioning of communities of mites from suborder Uropodina (Krysiak 2007). However, it should be noted, that the biodiversity of Uropodina in the urban areas is higher than in non-urbanized. It may indicate that the urban areas, despite of its transformation and pollution, are also constitutes a high diversity of habitats, probably they may provide a larger food base for these animals.

It is also worth to mention the fact of spreading with decorative greenery of parks and squares, species which are untypical for this geographical region, even from distant (also climatically) areas. Species which have been brought in this way acclimatize and become a permanent component of the communities of mesofauna of the city (Krysiak 2007).

To conclude, we may say that the progress of civilization unfortunately contributes to reduction of the number and ranges of occurrence of population of many living organisms. Destroying or transformation of natural ecosystems brings about to disastrous consequences. In order to prevent further decrease in the number and biodiversity of Uropodina in the are of Poznań District anthropopression should be reduced: old, well-developed forest areas should be kept and protected, unreasonable treatment drainage should be reduced, also air pollution should be reduced to prevent acid rains which destroy soil environment and agricultural areas should be managed rationally especially according to usage of fertilizers and pesticides.

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MATERIAŁY DO ZNAJOMOŚCI UROPODINA (ACARI: MESOSTIGMATA) POWIATU POZNAŃSKIEGO

Streszczenie

Powiat poznański (Wielkopolska) jest jednym z największych i najgęściej zaludnionych powiatów w Polsce. Charakteryzuje się intensywnym rozwojem rolnictwa oraz szybkim postępem urbanizacji. Spadek udziału powierzchni obszarów leśnych powoduje zmniejszenie się liczby dogodnych miejsc do zasiedlenia dla wielu gatunków fauny i flory. Dotyczy to również organizmów glebowych – w tym roztoczy z podrzędu Uropodina (Acari: Mesostigmata), które są dobrymi wskaźnikami ekologicznymi zmian zachodzących w środowisku glebowym.

Celem pracy było przeanalizowanie stanu zbadania Uropodina zespołów leśnych powiatu poznańskiego na przestrzeni pięciu okresów badawczych (poczynając od lat 60. XX w. do roku 2005).

Podczas badań przeprowadzonych na terenie powiatu poznańskiego w czasie pięciu dekad stwierdzono występowanie 34 gatunków roztoczy z podrzędu Uropodina. Wyniki badań pokazały również znaczne różnice w liczbie gatunków w poszczególnych okresach badawczych: najwięcej gatunków (26) znaleziono w latach 2001–2005, natomiast najmniej (13) w pierwszej badanej dekadzie. Ponadto odnotowano zmiany liczebności Uropodina w próbach zebranych w kolejnych dekadach. Średnia liczebność Uropodina na próbę w pierwszym okresie badań była najwyższa, natomiast liczebność osobników w piątym okresie badań spadła prawie pięciokrotnie. Liczebność Uropodina na terenach niezurbanizowanych była większa niż na terenach zurbanizowanych. Odwrotnie natomiast było w przypadku różnorodności gatunkowej, która była dwukrotnie wyższa na terenach zurbanizowanych.

Skład gatunkowy i liczebność zgrupowań Uropodina na terenie powiatu poznańskiego w poszczególnych dekadach zmieniały się. Główną przyczyną spadku liczebności Uropodina jest intensywne użytkowanie terenów przez człowieka. Ponadto gatunki rzadkie wymierają i zostają zastępowane przez gatunki pospolite. Wyniki badań potwierdzają hipotezę, iż tereny aglomeracji miejskiej nie tworzą dobrych warunków do funkcjonowania zgrupowań Uropodina. Niemniej należy wspomnieć, iż bioróżnorodność Uropodina na terenie zurbanizowanym jest wyższa niż na terenie niezurbanizowanym. Przyczyną takiego stanu może być większa różnorodność płatów siedlisk na obszarach zabudowanych.