

WATER MITES (*ACARI, HYDRACHNIDIA*) OF IMIELTY ŁUG RESERVE

Robert Stryjecki

Katedra Zoologii
Akademia Rolnicza, ul. Akademicka 13, 20-950 Lublin
e-mail: robstry@wp.pl

Summary. In the Imielty Ług reserve a pond and peat-bog pools were studied. All together 50 species of water mites were found. Lake species were most numerous in the pond. In peat-bog pools species typical of this kind of waters predominated. Migration of water mites from the pond to peat-bog pools was observed. This phenomenon concerned mainly deutonymphs of the *Piona* genus. The natural values of the reserve can be confirmed by: high biodiversity, faunistic composition, quantitative relations within *Hydrachnidia* populations, differentiation of habitats and limnological character of the water bodies examined.

Key words: water mites, *Hydrachnidia*, fish pond, peat-bog pools

INTRODUCTION

Imielty Ług reserve is one of the six reserves located in the boundaries of Łasy Janowskie Landscape Park in Kotlina Sandomierska (Sandomierska Dale). It was created in 1988. Its area amounts to 738 ha. The reserve encompasses Imielty Ług Pond together with the adjoining highmoors and transitional moors and it is of an aquatic-swamp-forest character [Fijałkowski *et al.* 1992].

There has been much research conducted on the flora of the reserve. Its detailed description can be found in Fijałkowski *et al.* [1992]. According to the authors, Imielty Ług reserve is one of the most interesting nature sites in Kotlina Sandomierska. Invertebrates fauna of this site is known only partly. Some data concerning water invertebrates of the reserve can be found in Paleolog *et al.* [1996, 1997], Buczyński [1998], Czachorowski *et al.* [2000] and Lechowski *et al.* [2000].

This paper aims to explore the faunistic importance and to provide ecological data on the structure of water mite communities inhabiting the water bodies of Imielty Ług reserve.

STUDY SITES, MATERIAL AND METHODS

The research was conducted in the area of Imielty Ług reserve. Water mites were caught in Imielty Ług Pond and peat-bog pools.

In Imielty Ług Pond, near the shore the bottom was sandy, covered with detritus composed of slightly decomposed coarse particles. Further from the shore-line and in the middle of the pond, the sediments were muddy. The colour of the water was brownish, with periodical algae blooms. Rushes were predominated by Cyperaceae: *Carex canescens*, *C. acutiformis* and *C. gracilis*, locally occurring in clumps in some distance from the shore. The helophytes zone was mainly covered by *Typha angustifolia* and – not numerous – *Schoenoplectus lacustris*. The basic physical and chemical factors of the water were as follows: temperature from 5.2 to 26.0°C (14.6 on average), pH 5.80-8.26 (6.66), electrolytic conductivity 43-359 $\mu\text{S}/\text{cm}$ (109), dissolved oxygen 5.8-10.1 mg/dm^3 (8.1), saturation with oxygen 60.0-105.1 % O_2 (82.3).

The whole water column in the small and shallow peat-bog pools was occupied by a dense bed of *Sphagnum*, with a small proportion of *Utricularia vulgaris*. At the shore of the pools, flooded clumps of *Carex acutiformis* and sporadically *Typha latifolia* and *Juncus effusus* occurred. The pools dried up periodically. From June to October 1996 they were totally deprived of water. The basic physical and chemical factors of water reached the following values: temperature from 4.3 to 22.0°C (16.8 on average), pH 4.63-6.09 (5.03), electrolytic conductivity 46-147 $\mu\text{S}/\text{cm}$ (78), dissolved oxygen 3.6-9.7 mg/dm^3 (6.3), saturation with oxygen 42.0-101.0 O_2 (65.7).

Hydrobiological sampling was carried out once a month, from March to November, between 1996 and 1997. Semi-quantitative samples were taken using a hand net (in the Pond and in the peat-bog pools) and a dredge (in the Pond). The following standard indices commonly applied in ecology were used for the analysis of the material collected: domination structure (D), stability of occurrence (C), ecological importance ($Q = \sqrt{D \cdot C}$) and faunistic similarity (Jaccard's formula). Quantitative faunistic similarity was calculated according to Biesiadka's formula [1977].

RESULTS

In all the examined water bodies 2749 specimens of *Hydrachnidia* belonging to 50 species from 10 families were collected (Tab. 1). In the collected material, *Pionidae* family predominated both in terms of taxa richness and density (18 species, 61.2% of water mites caught). Other families such as: *Arrenuridae* (13.7%, 14 species), *Limnesiidae* (9.6%, 3 species) and *Hygrobatidae* (7.2%, 7 species) were prosperous, too. The following rare and very rare species of Polish fauna were found: *Oxus nodigerus*, *Unionicola figuralis*, *U. minor*, *Pionacercus uncinatus*, *Arrenurus buccinator* and *A. forpicatus*.

In Imielty Ług Pond, 2498 specimens of water mites were caught (2116 adults and 382 deutonymphs) – they belonged to 41 species (Tab. 1). *Piona paucipora* predominated (13.5% of the collected material). The species was characterized by high stability of occurrence ($C = 68.7\%$) and the highest ecological importance in the pond examined ($Q = 30.4\%$). Apart from *P. paucipora* also *P. pusilla* (10.0%), *P. coccineus* (8.8%), *Arrenurus crassicaudatus* (8.2%) and *Limnesia maculata* (7.8%) were numerous. These species were caught more often than *P. paucipora* (C from 75.0 to 93.7%), but they had lower ecological importance in the *Hydrachnidia* communities of the pond (Q from 24.2 to 28.5%), due to their lower abundance.

Among the water mites caught in the reserve, the following ecological groups were distinguished: lake species, small water bodies species, species typical of spring astatic waters and species typical of peat-bog waters.

Table 1. Species composition and numbers of water mites collected in the Imielty Ług reserve (years 1996-1997)

Tabela 1. Skład jakościowy i liczby złowionych wodopójek w rezerwacie Imielty Ług (lata 1996-1997)

No.	Taxon – Takson	Imielty Ług Pond Staw Imielty	Peat-bog pools near the pond Zbiorniki torfowiskowe przy stawie	Total in Imielty Ług reserve Razem w rezerwacie Stawu Imielty
1	2	3	4	5
1.	<i>Hydrachna globosa</i> (Geer)	2		2
2.	<i>Limnochares aquatica</i> (L.)	99		99
3.	<i>Hydrodroma despiciens</i> (Müll.)	4	1	5
4.	<i>Oxus nodigerus</i> Koen.		20	20
5.	<i>Oxus ovalis</i> (Müll.)	12		12
6.	<i>Oxus strigatus</i> (Müll.)	9		9
7.	<i>Limnesia connata</i> Koen.	5	37	42
8.	<i>Limnesia maculata</i> (Müll.)	195	1	196
9.	<i>Limnesia undulata</i> (Müll.)	16		16
-	<i>Limnesia</i> sp. (deutonymphs)	10		10
10.	<i>Hygrobates longipalpis</i> (Herm.)	1		1
11.	<i>Unionicola crassipes</i> (Müll.)	143		143
12.	<i>Unionicola figuralis</i> (Koch)	3		3
13.	<i>Unionicola minor</i> (Soar)	16		16
14.	<i>Unionicola parvipora</i> Lbdl.	9		9
-	<i>Unionicola</i> sp. (deutonymphs)	12		12
15.	<i>Neumania deltoides</i> (Piers.)	6		6
16.	<i>Neumania vernalis</i> (Müll.)	8		8
17.	<i>Piona alpicola</i> (Neum.)		19	19
18.	<i>Piona coccinea</i> (Koch)	220		220
19.	<i>Piona conglobata</i> (Koch)	13	1	14
20.	<i>Piona imminuta</i> (Piers.)	5		5
21.	<i>Piona neumani</i> (Koen.)	2		2
22.	<i>Piona nodata</i> (Müll.)	2	12	14
23.	<i>Piona paucipora</i> (Thor)	337		337
24.	<i>Piona pusilla</i> (Neum.)	251	24	275
25.	<i>Piona rotundoides</i> (Thor)	27	3	30
26.	<i>Piona stjoerdalensis</i> (Thor)	34		34
27.	<i>Piona variabilis</i> (Koch)	113	15	128
-	<i>Piona</i> sp. (deutonymphs)	260	59	319
28.	<i>Hydrochoreutes krameri</i> Piers.	3	2	5
29.	<i>Tiphys latipes</i> (Müll.)	1		1
30.	<i>Tiphys ornatus</i> Koch		6	6
31.	<i>Tiphys scaurus</i> (Koen.)		2	2
-	<i>Tiphys</i> sp. (deutonymphs)		13	13
32.	<i>Pionacercus uncinatus</i> (Koen.)		1	1

1	2	3	4	5
33.	<i>Forelia brevipes</i> (Neum.)	54		54
34.	<i>Forelia liliacea</i> (Müll.)	107		107
-	<i>Forelia</i> sp. (deutonymphs)	96	1	97
35.	<i>Midea orbiculata</i> (Müll.)	51	5	56
36.	<i>Mideopsis orbicularis</i> (Müll.)	24		24
37.	<i>Arrenurus albator</i> (Müll.)	14		14
38.	<i>Arrenurus batillifer</i> Koen.		1	1
39.	<i>Arrenurus bifidicodulus</i> Piers.	1	2	3
40.	<i>Arrenurus buccinator</i> (Müll.)	3		3
41.	<i>Arrenurus crassicaudatus</i> Kram.	205		205
42.	<i>Arrenurus cuspidator</i> (Müll.)	1		1
43.	<i>Arrenurus forpicatus</i> Neum.		1	1
44.	<i>Arrenurus globator</i> (Müll.)	71	15	86
45.	<i>Arrenurus latus</i> Barr. et Mon.	29		29
46.	<i>Arrenurus maculator</i> (Müll.)		2	2
47.	<i>Arrenurus neumani</i> Piers.	1		1
48.	<i>Arrenurus simulator</i> (Müll.)	16		16
49.	<i>Arrenurus stecki</i> Koen.		7	7
50.	<i>Arrenurus tubulator</i> (Müll.)	3		3
-	<i>Arrenurus</i> sp. (deutonymphs)	4	1	5
	Total individuals	2498	251	2749
	species	41	21	50

In Imielty Ług Pond species typical of lakes were definitely the most numerous. This ecological group consisted of 27 species – it constituted 84.6% of the collected material. Small water bodies species (10.2%, 8 species) and species typical of peat-bog waters (4.9%, 3 species) contributed to the community to a lesser extent. The community of water mites typical of spring astatic waters was the least developed – only 3 species constituting hardly 0.2% in the total number of water mites caught.

In the peat-bog pools near Imielty Ług Pond, 250 specimens of water mites (176 adults and 74 deutonymphs) belonging to 21 species were caught (Tab. 1). In the collected material deutonymphs *Piona* sp. predominated – they constituted 23.6% of the caught water mites. The most numerous species were: *Limnesia connata* (14.8%), *Piona pusilla* (9.6%), *Oxus nodigerus* (8.0%) and *Piona alpicola* (7.6%). Their presence was noted in a half of the collected samples (C = 50%), and their ecological importance (Q) was between 19.5 and 27.2%.

Among the water mites caught in the peat-bog pools, tyrfobionts and tyrfophilous species predominated. This ecological group consisted of 5 species – it constituted 47.4% of the collected material. The contribution of the other groups amounted to: lake species – 20.3% (6 species), small water bodies species – 19.8% (6 species), species typical of spring astatic waters – 12.4% (4 species).

Between the Pond and the peat-bog pools, small faunistic similarity was noted. Qualitative similarity was equal to 24%, and quantitative similarity – to only 4.9%.

DISCUSSION

The faunistic composition of *Hydrachnidia* of Imielty Ług reserve can be regarded as typical of peat-bog and astatic water habitats. *Pionidae*, *Limnesiidae* and *Arrenuridae* families also predominated in other water bodies of stagnant water in Łasy Janowskie Landscape Park [Stryjecki 1999b].

A large number of 2498 specimens of water mites belonging to 41 species found in Imielty Ług indicates high diversity of its fauna. In spite of dystrophic nature of the ecosystems studied, the number of specimens as well as the number of species were the highest in comparison to all the examined ponds of the Park [Stryjecki 1999b]. Also the highest species diversity ($H = 4.03$) was noted in this pond [Stryjecki 1999a]. The high value of this index resulted most probably from high variety of habitats and well developed ecotonal zones. The ecological character of *Hydrachnidia* fauna of Imielty Ług Pond was somewhat different from that of the other fish ponds in the Park. In comparison to other ponds, the fauna of water mites in Imielty Ług Pond consisted of more species typical of lakes. Presumably, it was connected with a large surface area and the pond-lake character of the water body. Relatively low anthropopressure on the ecosystem is also worth mentioning. Undoubtedly these factors influenced the rich and varied fauna of water mites in the pond [Stryjecki 2002]. The peat-bog pools near the pond were characterized by the highest number of species of water mites fauna (21 species) and the largest number of specimens (250) in comparison to other peat-bog pools [Stryjecki 1999b]. Also species diversity was the highest ($II = 3.57$), which was probably influenced by the water connection with the pond.

Another feature distinguishing the pools near Imielty Ług Pond from all the other peat-bog pools of the Park was the domination of species typical of peat-bog waters. Tyrfobionts and tyrfophilous species (5 species) constituted as much as 47.7% of the number of *Hydrachnidia* collected. In other peat-bog pools, species typical of spring astatic waters predominated [Stryjecki 1999b].

Migrations of some water mite species, with the main direction from the Pond to the peat-bog pools, was an interesting phenomenon. *Piona* nymphes, which constituted 23.6% of the water mites caught in the peat-bog, certainly originated from the Pond. Only some, mainly tyrfobiontic species, migrated in the opposite direction.

Also hydrology of the examined water bodies might have influenced the fauna. The largest number of specimens and species were caught at the peat-bog at high level of water in the pond, when water filled the adjoining peat-bog pools. Moreover, due to the direct water connection the pond could function as a refuge for the water mites from the pools during the periods of shortage of water.

In spite of direct water connection, small faunistic similarities were noted between the pond and the peat-bog pools. Qualitative similarity amounted to 24%, and quantitative similarity – to only 4.9%. Such low faunistic similarity was probably caused by large discrepancies in the ecological character of the water bodies. The peat-bog pools were characterized by high instability (periods of water deficiency, fluctuations of physical and chemical factors of the water, low pH of water), which was a barrier for the more stenotopic lake species inhabiting the pond. The natural values of the reserve can be confirmed among others by: high biodiversity, faunistic composition, quantitative relations within *Hydrachnidia* populations, differentiation of habitats, limnological character of the water bodies and landscape values. Taking all these factors into account Imielty Ług reserve can be considered as one of the most naturally valuable areas of Łasy Janowskie Landscape Park.

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WODOPÓJKI (*ACARI*, *HYDRACHNIDIA*) W REZERWACIE IMIELTY ŁUG

Streszczenie. W rezerwacie Imielty Ług badano staw rybny i zbiorniki torfowiskowe. Stwierdzono występowanie 50 gatunków wodopójek. Fauna stawu miała jeziorny charakter. W zbiornikach torfowiskowych dominowały wodopójki typowe dla tego rodzaju wód – tyrfobionty i tyrfofile. Interesującym zjawiskiem była migracja wodopójek ze stawu do zbiorników torfowiskowych. Dotyczyło to głównie deutonimf z rodzaju *Piona*. Duża liczba złowionych gatunków, wysoka liczebność wodopójek, bioróżnorodność, zróżnicowanie siedliskowe oraz charakter limnologiczny zbiorników potwierdzają wysokie walory przyrodnicze rezerwatu.

Słowa kluczowe: wodopójki, *Hydrachnidia*, staw rybny, zbiorniki torfowiskowe