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ROADSIDE TEMPORARY WATER POOL AS A HABITAT FOR WATER MITES (ACARI, HYDRACHNIDIA)

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Summary. In an anthropogenic temporary pool in Dąbrowa Tomaszowska (Central Roztocze), in 2002-2003, 274 water mite specimens belonging to 18 species were collected. A species new to the Polish fauna was found – *Piersigia koenikei* Viets. The dominant species in the material collected was *Piona nodata* (48.2%). High species diversity, H = 2.96, was noted in the pool. All the taxa collected belonged to one synecological group – vernal astatic water body species. The greatest number of specimens were found in April (103 specimens). The interesting faunal composition of the pool's Hydrachnidia, particularly the species new to Polish fauna, confirms the vital role of anthropogenic pools as water mite habitats.

Key words: water mites, Hydrachnidia, anthropogenic pools, temporary habitats

INTRODUCTION

Most studies of aquatic invertebrates, including water mites (Hydrachnidia), concern natural water bodies, with little research involving water bodies resulting from human activity. There have been studies on the water mites of fish ponds [Stryjecki 2004a, 2006], acidic and carbonate pools created by peat extraction [Cichocka 1996a, 1998, Kowalik 1996, Kowalik and Stryjecki 2000a, 2000b], pools formed in sand quarries [Kowalik Stryjecki 2000b], reservoirs used for fire extinguishing [Cichocka 1996b], drainage ditches [Cichocka 1996a], drainage channels [Stryjecki 2003], small water bodies in an open-cast coal mine [Biesiadka 1997], and post-mine water bodies [Kowalik 2002].

Anthropogenic pools are often overlooked in research. They are considered less interesting than natural pools, with less abundant and less diverse fauna. Yet the number of these water bodies is increasing, while natural water bodies are disappearing and undergoing degradation. Due to these two concurrent processes, anthropogenic pools are playing an increasingly important role in the surface water system. Their anthropogenic origin does not detract from their natural and scenic amenities. Some of them are even protected as nature reserves [Stryjecki 2004a, 2006].

STUDY SITE, MATERIALS AND METHODS

Samples were taken from the anthropogenic temporary pool in Dąbrowa Tomaszowska (Central Roztocze). The main part of the pool was formed by a roadside ditch which further from the road becomes a shallow backwater. The area of the pool varied considerably during the year: in the early spring it was up to 80 m^2, while in early summer it was just a few m^2. During the summer (June to September) the pool was filled with moist mud or dried up completely. The maximum depth was 0.5 m. Sediments were muddy and covered with large amounts of coarse detritus (dead sedges, fallen alder leaves). In the deeper parts of the pool tufts of sedges dominated. In the shallow backwater *Typha latifolia* occurred. The surface was covered with *Lemna minor* and *L. trisulca*. Filamentous algae were present in the water column. During the year considerable fluctuations were noted in the physical and chemical properties of the water in the pool. The basic physical and chemical factors of the water were as follows: temperature from 13.1 to 25.7° C (19.2 on average), pH 6.80-7.28 (7.00), electrolytic conductivity 638-987 μS cm^{-1} (861), dissolved oxygen 1.7-5.7 mg l^{-1} (3.4), and oxygen saturation 16.0-62.0% O_2 (82.3).

Hydrobiological sampling was carried out once a month, from March to October, in 2002 and 2003. Semi-quantitative samples were taken using a hand net. The following standard indices commonly applied in ecology were used for analysis of the material collected: domination structure (D), stability of occurrence (C), and ecological importance ($Q = \sqrt{D \cdot C}$). Species diversity (H) was calculated using the Shannon-Wiener formula.

RESULTS

In the pool studied, 274 water mite specimens were collected (237 adults and 37 deutonymphs) belonging to 18 species from 5 families (Tab. 1). A species new to the Polish fauna was noted – *Piersigia koenikei* Viets. Four specimens of this species were found. *Piona nodata* clearly dominated in the collected material (48.2%). This species also had the highest stability of occurrence, C = 60.0%, and the greatest ecological importance, Q = 53.8%. The second most dominant species was *Arrenurus inexploratus* (10.2%), but it was found less often than *P. nodata* (C = 40.0%) and had a lower ecological importance (Q = 21.2%) in the Hydrachnidia community of the pool. Also fairly numerous were deutonymphs *Piona* sp. (9.8%), *Arrenurus truncatellus* (4.4%) and *A. integrator* (3.6%). Only a few specimens of the remaining taxa were collected.

High species diversity, H = 2.96, was noted in the pool. All the taxa collected belonged to one synecological group – vernal astatic water body species.

The largest number of water mites was collected between March and May (Fig. 1), with the peak in April (103 specimens). Adult forms were collected from March to August, the most in April (95 specimens) – Figure 1. Deutonymphs were only collected between March and May, despite the presence of water in the succeeding months in one year of the study – 2002 (Fig. 1). The largest number of deutonymphs was collected in March (25 specimens).

Table 1. Species composition and numbers of water mites collected in the pool in Dąbrowa Tomaszowska (years 2002-2003)
Tabela 1. Skład jakościowy i liczby złowionych wodopójek w zbiorniku w Dąbrowie Tomaszowskiej (lata 2002-2003)

No. – Nr	Taxon – Takson	Numbers – Liczby
1.	*Hydrachna leegei* Koen.	2
2.	*Piersigia koenikei* Viets	4
3.	*Piersigia intermedia* Williams.	3
4.	*Hydryphantes crassipalpis* Koen.	1
5.	*Hydryphantes octoporus* Koen.	5
6.	*Hydryphantes planus* Thon	6
7.	*Hydryphantes ruber* (Geer)	2
-	*Hydryphantes* sp. (deutonymphs)	4
8.	*Thyas dirempta* Koen.	5
9.	*Thyas palustris* Koen.	2
10.	*Piona clavicornis* (Müll.)	6
11.	*Piona nodata* (Müll.)	132
-	*Piona* sp. (deutonymphs)	27
12.	*Tiphys latipes* (Müll.)	6
13.	*Tiphys ornatus* Koch	3
-	*Tiphys* sp. (deutonymphs)	6
14.	*Pionopsis lutescens* (Herm.)	2
-	*Pionacercus* sp.	2
15.	*Arrenurus bisulcicodulus* Piers.	6
16.	*Arrenurus inexploratus* Viets	28
17.	*Arrenurus integrator* (Müll.)	10
18.	*Arrenurus truncatellus* (Müll.)	12
	Total – Ogółem	274

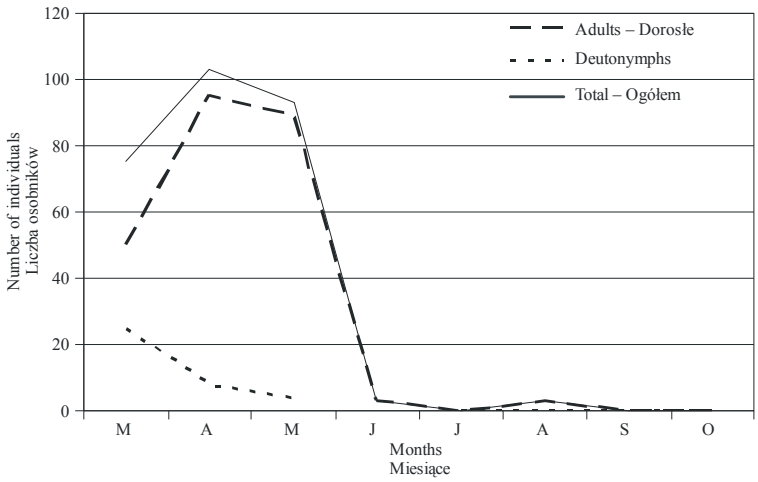

Fig. 1. Seasonal changes in the numbers of water mites in the pool in Dąbrowa Tomaszowska (total for 2002-2003)
Rys. 1. Sezonowe zmiany liczebności wodopójek w zbiorniku w Dąbrowie Tomaszowskiej (łącznie lata 2002-2003)

DISCUSSION

The Hydrachnidia composition of the pool studied is typical for this type of habitats, i.e. temporary pools. Similar species composition and domination distribution have been noted in other pools of this type in the Lublin region [Kowalik 1980, Stryjecki 2004b] and in other parts of Poland [Biesiadka 1972, Cichocka 1996b]. The 18 species in the roadside ditch in Dąbrowa Tomaszowska – a small, temporary, anthropogenic pool that dries up in the summer – must be considered to be significant. In similar water bodies in the Lasy Janowskie Landscape Park, which adjoins Roztocze, from 8 to 10 water mite species have been found [Stryjecki 2004b].

Most significant was the discovery of a species new to the Polish fauna – *Piersigia koenikei* Viets. This is an extremely rare species with northern and central European distribution; sometimes only a single occurrence is noted in a given country [Smit and van der Hammen 2000]. This species, like the other two of the genus *Piersigia* (*P. intermedia* and *P. limnophilla*), is characteristic of temporary and even semiaquatic habitats, e.g. quagfens, flooded reed marshes and ditches which are becoming terrestrialized [Smit and van der Hammen 2000]. Its presence in a temporary pool in Poland confirms its preference for this type of habitat.

The species diversity of the pool was high for this type of habitat, with a Shannon-Wiener index of H = 2.96. Two factors contributed to this high value – the large number of species and the relatively uniform level and distribution of dominance (with the exception of *Piona nodata*). Temporary habitats usually have low species diversity. In the astatic pools of Lasy Janowskie Landscape Park, Stryjecki [2002] found considerably lower species diversity for water mites – H from 1.51 to 1.91. Low biodiversity in temporary pools is a result of one or very few species occurring in large numbers. These species are better adapted to extremely unfavourable habitat conditions (drying out of pools). The clear domination of one species and the small percentage of the others contributes to lower biodiversity.

Water mite communities in temporary pools consist mainly of water mites characteristic of vernal astatic water bodies, but species belonging to other synecological groups are often noted as well, mainly small water body species [Biesiadka 1972, Kowalik 1980, Cichocka 1996b, Stryjecki 2004b]. The considerable instability of the pool studied was the main reason for the exclusive occurrence of species associated with temporary habitats. The lack of water mites belonging to other synecological groups (small water body, pond, lake and peat-bog pool species) was also the result of the spatial isolation of the pool studied; this made it difficult for species characteristic of other types of water bodies to occupy it by chance.

The greatest number of water mites were collected between March and May, with a peak in April. This seasonal distribution pattern is typical of vernal species, whose life cycles are adapted to water bodies which are present for a short time during the year. Among water mites occupying temporary water bodies, species with northern distribution dominate; these species appear the earliest and their adult period is the shortest [Biesiadka 1972]. The sharp decrease in the number of adults and the lack of deutonymphs found in the pool after the spring peak confirm data on the biology of vernal species. However, Stryjecki [2004b] in his study of the astatic water bodies of Lasy Janowskie Landscape Park found that in favourable conditions (the presence of water), deutonymphs and adult forms of vernal species can occur throughout the year, though in much smaller numbers than in spring.

CONCLUSION

The data obtained, particularly the identification of a species new to Poland in the pool studied, confirm the thesis that abundant and diverse Hydrachnidia can occur in artificial water bodies. In addition to common species, there also occur species rare in Poland, or even new to Poland. These water bodies should thus be treated as an important element of the surface water network. They play an essential and increasingly important role as a habitat for aquatic invertebrates, including water mites.

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PRZYDROŻNY ZBIORNIK ASTATYCZNY JAKO SIEDLISKO ŻYCIA WODOPÓJEK (ACARI, HYDRACHNIDIA)

Streszczenie. W antropogenicznym astatycznym zbiorniku w Dąbrowie Tomaszowskiej (Roztocze Środkowe) w latach 2002-2003 złowiono 274 osobniki wodopójek, należące do 18 gatunków. Stwierdzono tu gatunek nowy dla fauny Polski – *Piersigia koenikei* Viets. W zebranym materiale dominowała *Piona nodata* (48,2%). W zbiorniku stwierdzono wysoką różnorodność gatunkową H = 2,96. Wszystkie złowione taksony należały do jednej grupy synekologicznej – gatunków wiosennych wód astatycznych. Szczyt liczebności stwierdzono w kwietniu (103 osobniki). Interesujący skład faunistyczny Hydrachnidia badanego zbiornika, a w szczególności stwierdzenie gatunku nowego dla fauny Polski, potwierdza istotną rolę zbiorników antropogenicznych jako siedliska życia wodopójek.

Słowa kluczowe: wodopójki, Hydrachnidia, zbiorniki antropogeniczne, siedliska astatyczne