ODONATE LARVAE OF GRAVEL AND CLAY PITS IN THE MAZURIAN LAKE DISTRICT (NE POLAND), WITH NOTES ON EXTREMELY NORTHERN LOCALITIES OF SOME MEDITERRANEAN SPECIES

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Abstract – Larvae of 30 spp. were collected during 1998 and 1999 in gravel and clay pits at 6 localities. The most interesting are the "mediterranean" spp., *Orthetrum albistylum*, *Sympetrum depressiusculum*, *S. fonscolombei*, *S. meridionale* and *S. striolatum*. The localities for *O. albistylum* lie far from its hitherto known area of distribution.

Introduction

Post-exploitation reservoirs in surface rocks constitute an important odonate habitat. They are secondary habitats for still-water species, many of which are threatened by the lowering of the water table. An interesting aspect is also the fact that they are often inhabited by thermophilous "mediterranean" species.

The research presented here was aimed at studying larval communities living in clay pits and gravel pits in northern Poland and identifying breeding sites in this region for rare "mediterranean" species.

Study area and methods

Mazurian Lake District lies in northeastern Poland, between the Vistula River and Belarussian Lake District. This territory is the coldest region in Poland; the average annual temperature is 6-7°C, in the warmest month (July) it is below 18°C, in the coldest month (January) it is from -3 to 5°C (PANFIL, 1985).

The territory of the Mazurian Lake District was covered by land ice during the last glaciation. The glacial deposits of sand and boulder

clay are often exploited and result in creation of multiple anthropogenic reservoirs filled with rain and/or ground water.

The research encompassed reservoirs located in: (1) Mątki (20°21'E, 53°50'N), gravel pits; – (2) Kronowo (20°44'E, 53°53'N), clay pits; – (3) Najdymów (20°55'E, 53°52'N), clay pits; – (4) Giławy (20°48'E, 53°44'N), gravel pits; – (5) Parleza Wielka (21°00'E, 53°51'N), clay pits; – (6) Parleza Mała (21°05'E, 53°50'N), gravel pits. The reservoirs studied were in different stages of succession. Generally, they can be divided into: newly created, without flora (at most with mats of filiform algae) and older, well-established ones overgrown fully or partly by helophytes (*Typha* sp., *Phragmites australis*, *Carex* sp., *Juncus* sp.), hydrophytes (*Elodea canadensis*, *Ceratophyllum demersum*, *Potamogeton natans*, *Hydrocharis morsus-ranae*) and willows.

Larvae were collected using a hydrobiological scoop. The collected material was preserved in 70% ethanol. In total, 158 samples were collected containing 816 odonate larvae (Mątki: 25 samples = 175 larvae; Kronowo: 6 = 69; Najdymów: 22 = 48; Giławy: 12 = 28; Parleza Wielka: 49 = 244; Parleza Mała: 44 = 252).

Table I – Dragonfly larvae collected in gravel and clay pits in the Mazurian Lake District – [1-6: localities (numbering like in text); – %L: % of collected larvae; – %S: % of samples in which the species was present]

Species	Gravel pits					Clay pits				
	1	4	6	%L	%S	2	3	5	%L	%S
Lestes virens (Charp.)								+	0,3	1,2
L. viridis (VanderL.)								+	0,6	2,5
Ischnura elegans (VanderL.)			+	0,9	6,5		+	+	1,1	4,9
I. pumilio (Charp.)			+	5,5	7,8			+	0,8	2,5
Enallagma cyathigerum (Charp.)		+	+	0,2	3,9		+	+	2,2	6,6
Pyrrhosoma nymphula (Sulz.)			+	0,2	1,3			+	0,6	2,5
Coenagrion hastulatum (Charp.)			+	0,2	1,3	+	+	+	3,0	12,3
C. lunulatum (Charp.)								+	1,1	4,9
C. puella (L.)	+	+	+	11,0	26,0	+	+	+	37,1	60,5
C. pulchellum (VanderL.)			+	0,2	1,3	+	+	+	3,0	11,1
Erythromma najas (Hansem.)		+	+	4,6	14,3		+	+	15,2	34,6
Brachytron pratense (Müll.)			+	0,4	2,6					
Aeshna cyanea (Müll.)			+	1,1	3,9					
A. grandis (L.)			+	0,4	1,3	+		+	3,6	11,1
A. mixta Latr.								+	0,3	1,2
Anax imperator Leach			+	0,2	1,3			+	0,8	2,5
Cordulia aenea (L.)						+		+	3,0	8,6
Somatochlora metallica (VanderL.)								+	0,3	1,2
Libellula depressa L.	+	+	+	37,4	57,1			+	5,0	4,9
L. quadrimaculata L.	+	+	+	35,8	53,2	+	+	+	54,0	19,8
Orthetrum albistylum (Sél.)			+	0,4	1,3		+	+	1,1	3,7
O. cancellatum (L.)	+		+	1,5	11,7	+	+	+	1,9	6,6
Sympetrum depressiusculum (Sél.)								+	0,3	1,2
S. flaveolum (L.)			+	0,7	3,9					
S. fonscolombii (Sél.)			+	0,2	1,3					
S. meridionale (Sél.) (?)								+	0,3	1,2
S. sanguineum (Müll.)			+	0,4	2,6	+		+	1,1	4,9
S. striolatum (Charp. (?)	+		+	0,7	3,9					
S. vulgatum (L.)			+	0,4	2,6	+			0,6	2,5
Leucorrhinia pectoralis (Charp.)						+		+	0,6	2,5
Coenagrionidae n.det.								+	1,1	1,2

Results and discussion

The material collected represented 30 species: 21 from gravel pits, 25 from clay pits (Tab. I). Eurytopical and pioneer species predominated, the most common ones were: *Coenagrion puella*, *Erythromma najas*, *Libellula depressa* and *L. quadrimaculata*.

In gravel pits, 5 species were collected that did not occur in clay pits, and in clay pits 9 species that did not occur in gravel pits. This seems to be conditioned only partly by the bottom structures, as e.g. in *Coenagrion lunulatum* and *Libellula depressa* (MIELEWCZYK, 1972). However, *Ischnura pumilio*, considered preferring clay bottom, was found mainly in gravel pits. The character of the bottom is surely connected with the occurrence of "mediterranean" species in gravel pits (reservoirs with clayey

bottoms get longer and less rapidly warm).

The composition of the larval community would appear to be conditioned by the age, depth and structure of the reservoir and its vegetation. In new reservoirs pioneer and thermophilous species dominate. Only here were collected *Orthetrum albistylum*, *Sympetrum flaveolum*, *S. fonscolombei*, or *S. meridionale*; a very common species was also *Libellula depressa*. The presence of phytophilous species was connected with those areas of older sectors harbouring a rich vegetation. Older reservoirs were dominated by phytophiles and single specimens of rheophiles (*Pyrrhosoma nymphula*) and tyrphophiles (*Leucorrhinia pectoralis*) were evidenced. The bottom was mainly populated by *Libellula quadrimaculata*. *L. depressa* was found rarely and single specimens only. The fauna of fresh reservoirs corresponded to a coenosis similar to the JACOB's (1969) *Orthetrum-Libellula depressa* community and of older reservoirs *Erythromma-Anax imperator* or *Sympetrum-Aeshna mixta* communities. It corresponds to the assemblages reported by MIELEWCZYK (1972) and BUCZYŃSKI (2000) for similar excavations in Wielkopolska and in south-eastern Poland.

The presence of thermophilous, "mediterranean" species is most interesting. Due to the geographical location of the research area, the number of species and specimens was much lower than in similar reservoirs in more southern locations (BERNARD, 1996; BUCZYŃSKI, 2000). The most important species recorded are: *Orthetrum albistylum* (collected in 1999), *Sympetrum fonscolombei* (1998) and *S. meridionale* (2000). Of these, only *O. albistylum* breeds permanently in Poland.

Sympetrum fonscolombei was reported from northern Poland by BERNARD (1996), BUCZYŃSKI & CZACHOROWSKI (1999), CZEKAJ (1994), KRÜGER (1925), and LE ROI (1911). Some of our larvae or imagines are referable to the second generation, indicating that *S. fonscolombei* migrations reach central Europe up to 54° latitude (LEMPERT, 1997).

A few data are available for *Sympetrum meridionale*; it was collected only at Bory Tucholskie in northern Poland (LA BAUME, 1908). However, in the larval stage this species (and *S. striolatum*), is very difficult to separate from *S. sanguineum*, therefore the possibility of an identification error cannot be excluded (HEIDEMANN & SEIDENBUSCH, 1993) and adult specimens are required for confirmation of the occurrence of *S. meridionale* in the Mazurian Lake District.

Orthetrum albistylum is frequently found in southern and southeastern Poland (BUCZYŃSKI, 1998). Based on the available data, the distribution reaches 51°39'N in the East of Poland (BUCZYŃSKI, 1997) and slightly lower in the centre and West of the country (DRESCHER, 1928; TOŃCZYK, 1998). In recent years, however, the species was found further North in Mazowiecka Lowland (MIELEWCZYK, 1998)

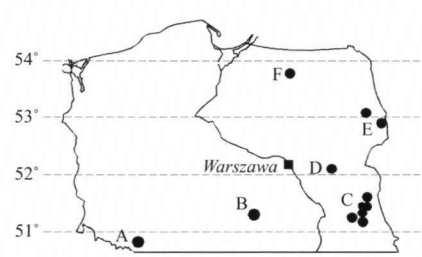

Fig. 1. The northernmost records of *Orthetrum albistylum* in Poland: (A) Ligota Wielka (= Ellguth) (DRESCHER, 1928); – (B) central Poland (TOŃCZYK, 1998); – (C) Polesie and northern Lubelska Upland (BUCZYŃSKI, 1995, 1997; URBAŃSKI, 1948); – (D) Siedlce (MIELEWCZYK, 1998); – (E) Supraśl and Bachury (JÖDICKE R., 1999); – (F) new localities.

and in Podlaska Lowland (JÖDICKE, 1999). The northernmost site is located near Supraśl (53°12'N) (JÖDICKE, 1999). The information provided in this study moves the border of the range by 75 km, to 53°52'N (Fig. 1). All of these sites are far from the hitherto known areas (ASKEW, 1998; D'AGUILAR & DOMMANGET, 1998). Those farthest North are scattered (and probably ephemeral) populations on the edge of their geographical range. However, the compact part of the range may reach further than has been considered so far. The resolution of this problem entails more recording in the areas bordering the range of the species (in Poland: Mazowsze, Podlasie, Mazury and Wielkopolska).

Worth mentioning is a "Siberian" species, *Leucorrhinia pectoralis*, which is protected and at present in Poland redlisted as 'Indeterminate' (ŁABĘDZKI et. al., 1999). This species is not typical for the kind of reservoirs studied and its occurrence can be judged as accidental.

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