



## Some species of Oedogoniales (Chlorophyceae) from small astatic water bodies in the post-agricultural landscape (Masurian Landscape Park, NE Poland)

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### Abstract

This paper presents a report on epiphytic green algae belonging to Oedogoniales from astatic and moderately eutrophic small ponds in the Masurian Landscape Park, NE Poland. During this investigation, 26 species of Oedogoniales have been identified and described including one variety (*O. oblongum* var. *longisporum*) new to science and two species (*O. fremyi* and *O. irregulare*) new to the algal flora of Poland.

**Key words:** astatic water bodies, *Bulbochaete*, *Oedogonium*

### Introduction

The Masurian Landscape Park is located in the NE Poland, in an area characterized by the post-glacial landscape, shaped during the Vistulian glacial period. The Park comprises a part of the Masurian Lake District and a part of the Puszcza Piska Forest. There are over 60 lakes with an area larger than 1 hectare in the Masurian Landscape Park, as well as many small humotrophic lakes situated in the forests and numerous water bodies in the agricultural and post-agricultural areas.

Work has been conducted on 20 small moderately eutrophic water bodies located on the fallows inside the borders of the Masurian Landscape Park or in the vicinity of its northern border. Previous research carried out on small water bodies in the agricultural and post-agricultural areas in Poland (Paczuska *et al.* 2002, Messyasz 2009), showed a great diversity of algae, including taxa new to science (Zakryś *et al.* 2013). In such small water bodies, members of Oedogoniales were frequently found.

Oedogoniales are common in periphytic communities in different water bodies: big and small lakes, fish ponds, pools, draining ditches or small astatic water bodies (Bock & Bock 1954). Within the order Oedogoniales, identification is based mainly on reproductive features, particularly sexual strategy and morphology of gametangia and oospores. Till now, only two species of *Oedogonium*, viz. *O. cardiacum* (Hassal 1845b: pl. 51: 4) Kützing (1849: 369) and *O. sociale* Wittrock in Wittrock & Nordstedt (1882: No. 401) have been identified from small water bodies in agricultural and post agricultural areas in Poland (Paczuska *et al.* 2002). This paper presents a report on epiphytic oedogonialean algae from 20 small astatic water bodies located in post-agricultural areas in the Masurian Landscape Park. 26 taxa have been identified and described; one variety is new to science.

### Materials and methods

**Study area:**—The study area is located in the Łuknajno Lake catchment, which partly belongs to the UNESCO Biosphere Reserve and is also protected by the Ramsar Convention. This post-glacial area had been drained and intensively used by farmers since 1850s till 1990s. With the implementation of water retention program in the neighbouring Puszcza Piska Forest (2009), on previously drained post-agricultural areas numerous small ponds emerged, increasing

**Dimensions:**—Vegetative cells (20–)28–30(–32)  $\mu\text{m}$  in diameter, 56–73  $\mu\text{m}$  long; oogonia 49–56(–58)  $\mu\text{m}$  in diameter, 54–66(–68)  $\mu\text{m}$  long; oospores 43–51  $\mu\text{m}$  in diameter, 43–51  $\mu\text{m}$  long; antheridia 25–27  $\mu\text{m}$  in diameter, 8–11  $\mu\text{m}$  long; basal cells: 23–27  $\mu\text{m}$  in diameter, 52–72  $\mu\text{m}$  long. Filaments (incomplete) up to 34 mm long.

**Reproductive season:**—June.

**Localities:**—Water bodies # 1, 6 (exceptionally abundant), 7, 10, 11, 13, 14 and 18; the highest amounts of filaments were observed in floating mats, on *Lemna trisulca* and *L. minor* roots. In the water body # 1 significantly bigger filaments were observed: vegetative cells (20–)25–37  $\mu\text{m}$  in diameter, 48–89  $\mu\text{m}$  long; oogonia 57–60  $\mu\text{m}$  in diameter, 52–63  $\mu\text{m}$  long; oospores 49–53  $\mu\text{m}$  in diameter, 47–50  $\mu\text{m}$  long. The same form was found by Mrozińska (1984) near Olsztyn (N Poland) and Piekary (S Poland). The species is common in Poland (Mrozińska 1985).

## Conclusions

Small, shallow and often astatic water bodies in the agricultural landscape are characterized by substantial variability in ecological conditions. They may completely dry up in summer and freeze up to the bottom in winter, they also show considerable variation in diurnal temperature range and in pH (Bock & Bock 1954). In spite of these harsh environmental conditions, they are colonized by numerous species of algae including the members of Oedogoniales. In both permanent and astatic water bodies in southern Germany (Bock & Bock 1954) or in temporary ponds and rain pools flooded through 6–8 months a year in India (Gonzalves 1981), Oedogoniales are abundant. In harsh climate of the northeastern Poland, the algal flora is not that rich but still very interesting.

Oedogoniales constituted a constant component of the phycoflora of investigated water bodies. They colonized various substrates including both living plants and their remains; they were also frequent in tychoplankton. The most common species that reproduced sexually (with different regularity) *in situ* are *Oedogonium fragile*, *O. vaucherii*, *O. pringsheimii*, *O. ahlstrandii* and *O. tyrolicum*. Several specimens of *O. pringsheimii* and *O. inversum* were identified based on sexual reproduction of these species in laboratory natural cultures. One species reproduced sexually only in natural cultures, several taxa reproduced sporadically, some other taxa did not reproduce at all and therefore remained unidentified.

During this investigation, several interesting taxa of Oedogoniales have been recorded including a new variety: *Oedogonium oblongum* var. *longisporum* var. *nov.*, and two species new to Poland: *Oedogonium fremyi* and *O. irregulare*. We also found new localities of distribution of taxa that were previously not reported from north-eastern Poland.

## Acknowledgements

This research was a part of a scientific project realized in the years 2009–2012 and financed by the National Science Centre of Poland (N N305 034637). Authors wish to thank Anna Zaborowska and Grzegorz Górecki from the Faculty of Biology Field Station in Urwitął for their great help during field work and the reviewers for their effort and inspiring comments. All included photos were made by Agnieszka Krzyk and Hanna Szymańska.

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