Materials to the Zygnemaceae of Poland. III. *Spirogyra lagerheimii* Wittrock 1889, a new species in Poland

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(Received: October 24, 1988. Accepted: February 17, 1989)

Abstract

A species new in the Polish flora, *Spirogyra lagerheimii* Witt, was found in the old riverbed of the Raba River in Mszana Dolna (Nowy Sącz Voivodship) and in a peat bog in Magdalenów (Piotrków Voivodship). Figures showing hitherto unknown scalariform conjugation, germinating zygotes, inflated vegetative cells in conjugating filaments are shown.

Key words: *Spirogyra*, taxonomy, morphology

Spirogyra lagerheimii is a species occurring widely in Europe. Stands of this species are known in the German Federal Republic (Czurda 1932, Kolkwitz and Krieger 1944, Bock and Bock 1956, Müller 1963), the German Democratic Republic, Austria, Sweden, Latvia, Estonia, Finland (Kolkwitz and Krieger 1944) and Bulgaria (Vodeničarov et al. 1971). Voronichin and Krasnoperova (1970) and Komarenko and Vasileva (1978) report *S. lagerheimii* in Asia, while Transeau (1951) in North America. This is a new species in the flora of Poland (Kadłubowska 1984, 1986).

In spite of the numerous reported stands, the literature to date on this species lacks documentation dealing with the morphology of the vegetative and generative stages of this taxon. The only known figures show two cells conjugating laterally, with one zygote. Scalariform conjugation, inflated

Fig. 1. Vegetative filaments and initial lateral conjugation. Fig. 2. Scleriform and lateral conjugation

Fig. 3. Sterile tubby inflated cells. Fig. 4. Germination of zygote

PLATE III

Fig. 5. Young vegetative filament. Fig. 6. Sterile cylindric inflated cells. Fig. 7. Inflated sterile cells with papillae. Initial scalariform conjugation? Fig. 8. Inflated sterile cells with papillae. Initial lateral conjugation? Fig. 9 Zygote. Mesospore with polar thickenings. Fig. 10. Sculpturing of zygote

vegetative cells in conjugating filaments and the germination of zygotes have not been illustrated yet. It should be noted that according to the data of Kolkwitz and Krieger (1944), *S. lagerheimii* conjugates laterally and scalariformly while the vegetative cells in the conjugating filaments may inflate.

The first stand of *S. lagerheimii* in Poland, hitherto unpublished, is the old riverbed of the Raba River in Mszana Dolna (Nowy Sącz Voivodship). Prof. Karol Starmach collected samples from that site on September 29, 1971 and sent them to this author for identification. The *S. lagerheimii* cells from that stand are wider than in the diagnosis and are 34.0-37.5 μm wide. Only lateral conjugation and formed zygotes were observed. The species was identified immediately after the sample was received. No measurements were done at that time making statistical analysis possible.

The second stand is a peatbog in Magdalenów (Piotrków Voivodship, Szczerców Basin, near Lubec). The samples which were used to establish the morphological variability of *S. lagerheimii* were collected from the edge of a peat hole on: April 12, May 10 and June 1, 1988. Peat mosses grow on the rims of that container. The pH of the water is about 6. Bock and Bock (1956) gave a similar pH value of the water in the *S. lagerheimii* stand in Lower Franconia. Vegetative filaments and the initial stages of lateral conjugation of *S. lagerheimii* (Fig. 1) were observed in the sample from April 12. In order to observe further stages of development, a little over 10 filaments were placed in a 1 liter jar of water from its stand. The jar was left in a garden in a place sheltered from rain and direct sun. Zygotes were observed after 16 days. They were surrounded with a smooth exospore and a yellow-brown punctate mesospore. Both lateral and scalariform conjugation (Fig. 2) and inflation of vegetative cells in conjugating filaments (Fig. 3) were visible in the sample from May 10th. The germination of zygotes (Fig. 4) was observed at the end of June in the jar with the sample from April 12th. The dimensions of the first progeny cells were 10.0-22.4 μm $\times$ 320.0-622.5 μm (Fig. 5) while the dimensions of the cells in developed filaments were 28.0-34.2 μm $\times$ 60.0-112.0 μm .

The interesting shape and division of inflated vegetative cells were observed in the filaments cultured for 3 months (the April 12th sample) and in the sample from Magdalenów collected on June 1. The inflated cells went from a tubby shape, typical for this species, to a cylindric shape and began to divide intensely. As the result of these divisions, groups of cylindrical cells with a width of 47.3-62.0 μm (Fig. 6) began to appear among groups of typically shaped cells. These cylindrical cells began to form processes suggestive of the initial stages of scalariform (Fig. 7) and lateral (Fig. 8) conjugation.

During the observations on the development of *S. lagerheimii*, attention was drawn to the occurrence of ten zygotes having dark-brown polar thickenings on their mesospores (Fig. 9). A mesospore with such dark-brown

nodes is a constant trait of *Spirogyra bicalyptata* Czurda, *S. pseudonodifera* O. et W. Bock, *S. nodifera* O. et W. Bock and has been observed sporadically in *S. mirabilis* (Hass.) Kütz. (Rieth 1972).

DESCRIPTION OF *S. LAGERHEIMII* FROM THE PEATBOG IN MAGDALENÓW

The vegetative cells are 28.0-34.2 μm wide (95% confidence interval 30.1-31.2 μm). The transverse cell walls are plane. There is 1 chromatophore. Lateral, very rarely scalariform conjugation. The conjugation canal is formed by both gametangia. The female gametangia are slightly or not at all inflated. The ellipsoid zygotes are 26.0-34.0 μm (95% confidence interval 29.2-31.0 μm) $\times$ 44.0-80.2 μm (95% confidence interval 56.3-61.3 μm). The exospore is smooth and colorless, the mesospore is yellow-brown, punctate (Fig. 10). The vegetative cells in conjugation filaments are tubby inflated, measuring 40.0-64.2 μm (95% confidence interval 49.6-54.3 μm) $\times$ 60.0-110.2 μm (95% confidence interval 82.8-91.2 μm).

Acknowledgments

The author would like to thank Dr. Teresa Lesiak for collecting the samples from Magdalenów. This study received financial support from the Institute of Botany of the Polish Academy of Sciences.

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*Materialy do Zygnemaceae Polski. III. Spirogyra lagerheimii Wittrock 1889,
nowy gatunek dla Polski*

Streszczenie

W próbach ze starorzecza rzeki Raby w Mszanie Dolnej (woj. Nowosądeckie) i z torfowiska w Magdalenowie (woj. Piotrkowskie) natrafiono na nowy dla Polski gatunek *Spirogyra lagerheimii* Wittr. Zamieszczono, dotychczas nieznane, ryciny koniugacji drabinkowej, kielkujących zygot i wzdętych komórek wegetatywnych w nitkach koniugujących.