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***COSMARIUM RETUSIFORME* VAR. *INCRASSATUM* GUTWIŃSKI**
1890 (*ZYGNEMATOPHYCEAE*, *STREPTOPHYTA*) –
NEW RECORD OF RARE DESMID IN UKRAINE



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***COSMARIUM RETUSIFORME* VAR. *INCRASSATUM* GUTWIŃSKI 1890**
(*ZYGNEMATOPHYCEAE*, *STREPTOPHYTA*) –
НОВА ЗНАХІДКА РІДКІСНИХ ДЕСМІДІЄВИХ В УКРАЇНІ

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ABSTRACT

Purpose. Adding a new taxon of the genus *Cosmarium* to the desmids flora of Chernihiv Polesie.

Methodology. The landscape reserve of national significance «Zamglai» is one of the largest eutrophic swamps in the Chernihiv Polesie, which is an important refugium of hydrophilic phytodiversity of the forest zone, a place of concentration of a number of rare species of the boreal group and representatives of various biotic complexes. During the field research of the Zamglai bog complex, algal samples were collected and fixed with 4 % formalin for further study in laboratory conditions; pH and electrical conductivity of water were measured with a portable pH and conductivity meter. Microscopic examination of the samples was carried out using a light microscope equipped with a camera for taking microphotos. Identification manuals and monographs of the leading Ukrainian (Palamar-Mordvintseva, 1986, 2005) and European desmidiologists (Lenzenweger, 1999) were used for species identification. The iconotype provided in the original description of the newly recorded taxon (Gutwiński, 1892) was used.

Scientific novelty. The second record in Ukrainian desmidioflora of a rare taxon from the genus *Cosmarium* is documented. Previously it was discovered 134 years ago (Gutwiński 1890) in the Roztochchia-Opillja mountain region, namely in the vicinity of Lemberg (former Kingdom of Galicia and Lodomeria, a part of the Austro-Hungarian Monarchy – now Lviv, Ukraine). This taxon was found by the authors for the first time in the Ukrainian Polesie (Chernihiv Polesie). Description, cell dimensions and microphotographs in three views are included in this publication.

Conclusions. The description and photographs of the three cell views of the taxon given in the article fill the gaps in the illustrative material of the national reference publications (Palamar-Mordvintseva 1986: 167, fig. 37 item 16) and create better conditions for identification and new records of this taxon in Ukraine. The distribution area of *Cosmarium retusiforme* var. *incrassatum* Gutwiński 1890 has been expanded. The flora of desmids of the Ukrainian Polesie is enriched with a new infraspecific taxon.

Key words: algae, Chernihiv Polesie, *Desmidiaceae*, landscape reserve «Zamglai», peat bogs, quarries

АНОТАЦІЯ

Мета роботи. Доповнення флори десмідієвих водоростей Чернігівського Полісся новим таксоном роду *Cosmarium*.

Методологія. Ландшафтний заказник загальнодержавного значення «Замглай» є одним з найбільших на Чернігівському Поліссі евтрофних боліт, який є важливим рефугіумом гідрофільного фіторізноманіття лісової зони, місцем концентрації ряду раритетних видів бореальної групи та представників різних біотичних комплексів. В ході проведення експедиційних досліджень болотного комплексу «Замглай» були відібрані альгологічні зразки. Вони були зафіксовані 4 % формаліном для подальшого дослідження в лабораторних умовах. рН та електропровідність води визначали портативним приладом. Мікроскопічне дослідження проб здійснювалось за допомогою світлового мікроскопу обладнаного фотокамерою для мікрофотофіксації. Визначники та монографії провідних українських (Паламар-Мордвінцева, 1986, 2005) та європейських десмідіологів (Lenzenweger, 1999) використовувались для визначення видів. Використовували іконотип виду з первісного його опублікування (Gutwiński, 1890, 1892).

Наукова новизна. Друга знахідка в Україні рідкісного таксону роду *Cosmarium*, який був опублікований 134 року тому (Gutwiński, 1890) для Розтоцько-Опільської горбогірної області, а саме, знайдений в околицях м. Лемберг, (колишнє Королівство Галиції та Лодомерії у складі Австро-Угорської Монархії – нині Львів, Україна). Цей таксон нами знайдений вперше для Українського Полісся (Чернігівське Полісся). Розмірні характеристики, опис та мікрофотографії у трьох проєкціях включені до цієї публікації.

Висновки. Опис та фотографії виду доповнюють прогалини в ілюстративному матеріалі вітчизняного визначника (не має видів клітини зверху та збоку) і створюють кращі умови для визначення та повторних знахідок даного таксону в Україні. Уточнено ареал *C. retusiforme* var. *incrassatum* Gutwiński, альгофлора десмідієвих водоростей Українського Полісся збагачена новим внутрішньовидовим таксоном.

Ключові слова: *Desmidiaceae*, водорості, кар'єри, ландшафтний заказник «Замглай», торф'яні болота, Чернігівське Полісся

Introduction

Cosmarium retusiforme var. *incrassatum* Gutwiński 1890 was introduced by outstanding Polish phycologist Roman Gutwiński (1860-1932) who was working on the algal flora of Lemberg city environs (former Kingdom of Galicia and Lodomeria within Austro-Hungarian Monarchy – now Lviv, Ukraine) since 1884. In order to maintain priority, he published preliminary information about some new algae species and varieties from the Lemberg area (Gutwiński, 1890) containing only diagnoses without illustrations of new species, varieties and forms. The manuscript with detailed descriptions and line drawings of the new taxa «On the algae flora of the Lemberg` neighborhood» was submitted to the Physiographical

Commission of the Imperial and Royal Academy of Sciences in Krakow and it was published in 1892. Thus *C. retusiforme* var. *incrassatum* diagnosis was first published in 1890 (Gutwiński, 1890: 69) and the line drawing appeared in 1892. Unfortunately, only one semicell face view of this taxon was presented by the author (Gutwiński, 1892: plate II, fig. 13). This variety was discovered together with the type variety in a small lake near Hołosko (Ukrainian: Голоско, Polish: Hołosko). In the end of 19th century it was a village in Lwów Voivodeship, eastern Poland, before the Nazi German and Soviet invasions of Poland in September 1939. It is now a suburb of Lviv city, Ukraine. This was the only published occurrence of this taxon in Ukraine since 1890 until now (see original drawing in Figure 1).

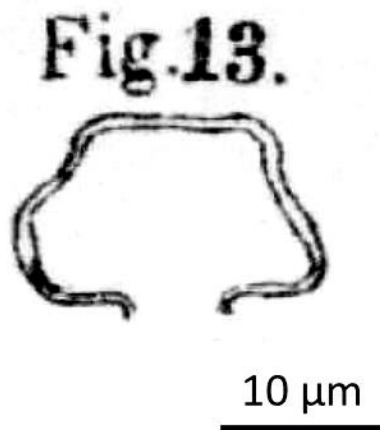


Fig. 1. *Cosmarium retusiforme* var. *incrassatum* original line drawing by R. Gutwiński (1892)

The original drawings with face (front), apical (top) and lateral (side) views of *C. retusiforme* var. *incrassatum* can be found in the publication of Rupert Lenzenweger (1999). The variability of this taxon was illustrated by the author in face views of two cells (Lenzenweger, 1999:175, pl. 52, fig. 9).

The distribution of this taxon in Europe is limited to 4 countries: Austria (Lenzenweger, 1999), Germany (Stutz & Mattern (eds) & al., 2018), Italy (Abdelahad & al., 2003), and Ukraine (Gutwiński 1890, 1892; Petlovany & Tsarenko, 2015; Barinova & al., 2019) according to Algaebase searched on 16 March 2024 (Guiry

& Guiry, 2024) and our additions. Apart of the Europe this variety also known from freshwaters of USA, Brazil, Turkey, Thailand, Russian Federation, and New Zealand (Guiry & Guiry, 2024).

The purpose of the study was adding a new taxon of the genus *Cosmarium* to the desmids flora of Chernihiv Polesie.

Materials and methods

Locality: Landscape reserve of national significance «Zamglai» is the largest swamp at various stages of development, located in Chernihiv district of Chernihiv region, between the villages of Ripki, Zamglai and Lovyn.

A channel nearby the disused peat cutting fields within Zamglai bog complex is situated approximately 5 km from urban village Ripky (Chernihiv district, Chernihiv region, Ukraine, 51°48'15.8"N, 31°11'13.4"E) on the territory of the landscape reserve «Zamglai».

The territories of the landscape reserve «Zamglai» and adjacent to it is a part of the restoration territory «Zamglai» (with an area of 19,633.0 hectares) of the regional eco-network of the Chernihiv region. It is one of the largest eutrophic bogs in the Chernihiv Polesie, and it is a location of mesotrophic complexes in the upper reaches of the Zamglai River. From the point of view of scientific value, the research area is an important refugium of hydrophilic biodiversity of the forest zone, as well as a place of concentration of a number of rare plant

species of the boreal group and representatives of various faunal complexes (Karpenko & Pototska, 2019).

The territory of the wetlands is a system of canals, marshy depressions and elevations of different levels, occupied by different types of vegetation (Fig.2).

Aquatic and coastal-aquatic vegetation is specific, as it is practically absent in natural water bodies, and these types of vegetation are mainly associated with peat quarries, reclamation channels and often represent fragments of groups. Among aquatic communities, *Elodea canadensis* Michx, *Spirodella polyrrhiza* (L.) Schleid most often forms, in between them *Potamogeton natans* L., less often *Hottonia palustris* L. and others were singularly noted.

Dominants of coastal aquatic vegetation occupy shallow areas of quarries and overgrown reclamation channels; there are typical hydrophilic *Carex* species (*Carex elata* All., *C. rostrata* Huds., occasionally *C. pseudocyperus* L.), among rare grasses – *Alisma plantago-aquatica* L., *Iris pseudacorus* Schur, *Rumex hydrolapatum* Huds., and in some places *Bidens cernua* L. and *Valeriana officinalis* L. form thickets.

The algal samples were collected in July 2018, at water temperature of 23.5 °C, pH 7.1–7.3, conductivity 59-60 µS. Figure 2 shows the sampling location.



Fig. 2. Photograph of the sampling site

Ecological variables were measured with EZODO 8200M pocket multimeter (EZODO, Taiwan). Identification was done based on R. Lenzenweger's *Desmidiaceenflora von Österreich* (1999), and Palamar-Mordvintseva (1986). Microphotographs were made with a Canon EOS 1000D digital camera.

Description

The basal angles are raised and sides of semicells rise almost perpendicularly, the upper

corners and the membrane at the apex are thickened (see Figure 3), these are the main differentiating features indicated in the original description by R. Gutwiński (1890, 1892). This taxon has a central chloroplast with one pyrenoid. The size of our observed cells (1 cell was measured) are very close to the dimensions indicated by Gutwiński (1890: 69) and presented in Table 1.

Table 1

Dimensions of *Cosmarium retusifforme* var. *incrassatum* Gutwiński cells as measured by different authors

Dimensional features	Our cells from Zamglai, μm	Gutwiński (1890), μm	Lenzenweger (1999), μm
Length	24.7	24	25-29
Breadth	18.8	19	20-25
Thickness	12.7	-	13-14
Isthmus	7.4	7	7-9
Length / breadth ratio	1.3	-	-

We observed variance within our studied cells (8 cells were observed). The variability of *C. retusifforme* var. *incrassatum* appeared in varying cell dimensions and in different

intensity of the cell wall thickening. The general outline of the cells does not indicate significant variability.

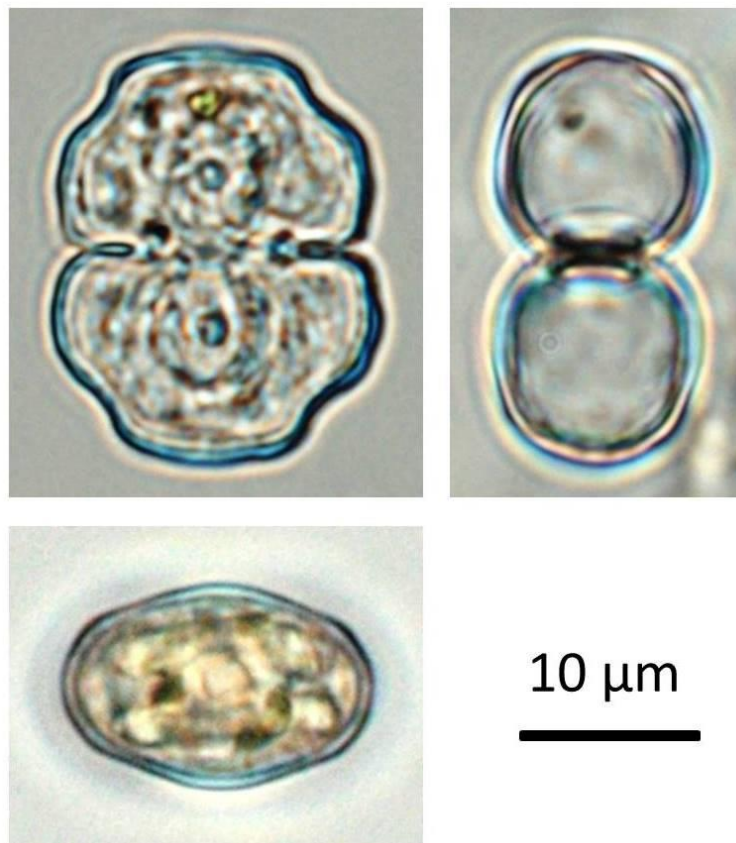


Fig. 3. Morphology of *Cosmarium retusifforme* var. *incrassatum* Gutwiński cells. Microphotographs of the front, apical and lateral view of the cells found in Zamglai bog.

Conclusions

Our publication is the second documentation of *C. retusiforme* var. *incrassatum* in Ukraine in over 130 years of its study. The area of this taxon distribution now includes Ukrainian Polesie (northern part of Ukraine).

We provided pictures of front, lateral and apical views of the Ukrainian material that had only one semicell present in the first publication (Gutwinski, 1892). Detailed description of the cell and its variability, illustrations of front, apical and lateral views of *C. retusiforme* var. *incrassatum* creates a basis for its clear identification and further floristic records.

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