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Desmatractum bipyramidatum (Chodat) Pascher 1930 (Chlorophyceae, Chlorococcales) – a new locality in Poland

Introduction

Genus *Desmatractum* West et G.S. West 1902 (= *Bernardinella* Chodat, *Calyptobactron* Geitler) includes species found in various habitats on almost all continents of the Eart. According to Guiry, Guiry (2022) currently eight species are recognised (*Desmotractum bipyramidatum* (Chodat) Pascher; *D. delicatissimum* Korshicov; *D. elongatum* Pascher; *D. indutum* (Geitler) Pascher; *D. nyanzae*, (Wołoszyńska) G.S. West ex Printz; *D. obtusum* Pascher; *D. plicatum* Weste & G.S. West, and *D. spryii* Nicholls) of which only four has been found in Poland: *D. bipyramidatum*, *D. delicatissimum*, *D. indutum*, and *D. nyanzae* (classified earlier by Wołoszyńska (1914) as a *Peniococcus nyenzae*).

A characteristic feature of the cells of this genus are thick protrusions of the cell wall running along the long axis of the cell, in the form of ribs. This feature is more pronounced in most species. The cells are bipolar, with a spherical or oval protoplast with one pyrene. Towards the pole, the cells are more or less narrowing, having a spindle-shaped form, with a spike of various lengths.

Habitat and plant material

Registered in the Goleniów Forest in Western Pomerania (Fig. 1), in the habitat of the mid-forest peat bog *Desmatractum bipyramidatum*, it is the second place of occurrence of the species.

Earlier, its occurrence in Poland was noted only by Mrozińska (1984). On the analysed site, a floristic list of vascular plants was made, for the general characteristics of the habitat, as well as a list of other algae species accompanying *D. bipyramidatum*.

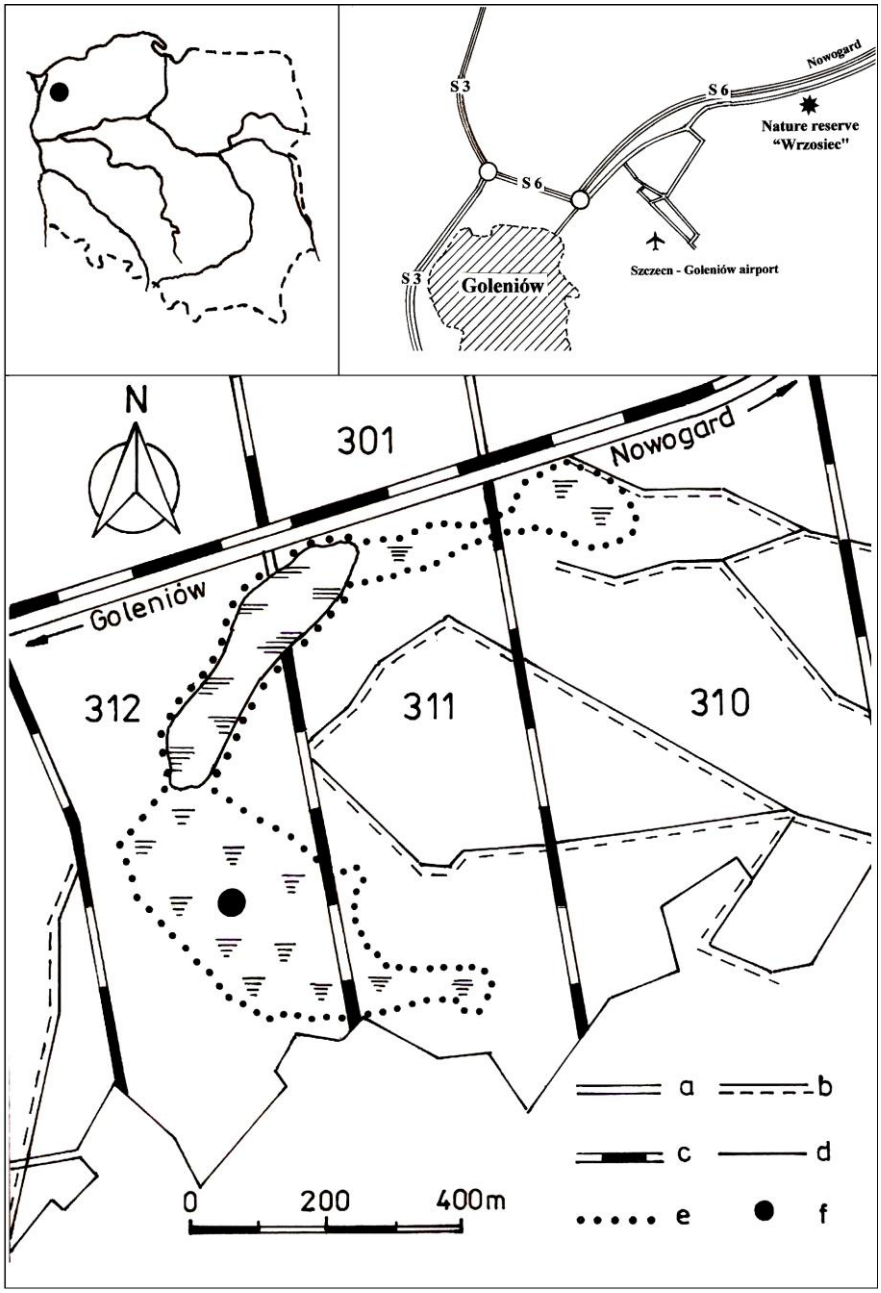

Fig. 1. The location of the "Wrzosiec" nature reserve (53°37′03″N 14°57′41″E) and the location of the habitat of *Desmatractum bipiramidatum*;

a – roads, b – forest roads, c – borders of forest divisions, d – borders of forest areas, e – border of nature reserve, f – location of species locality

D. bipyramidatum cells occur on the flooded organic substrate, covering the synusions in *Caricetum elatae* Koch 1926. Small pits in area, 0.5–1.5 m^2, trough-shaped pits between the *Carex elata* All. clumps are covered with an organic substance consisting mainly of dead shoots with varying degrees of decomposition of shoots *C. elata* and bryophytes. Mineral substances deposited by the peatland flowing from the periphery also have a small share in the length. The habitat is characterised by poor vegetation. Locally, the substrate is inhabited by small grasses of bryophytes: *Sphagnum auriculatum* Schimp., *S. rufescens* (Nees & Hornsch.) Warnst., *Fossombronia foveolata* Lindb., *Drepanocladus exannulatus* (Schimp.) Warnst. and a few vascular plants: *Juncus bulbosus* L., *Hydrocotyle vulgaris* L., *Drosera intermedia* Hayne, less often *D. rotundifolia* L. Coverage of the vascular layer is 5–20%, and the moss layer 5–50%. The low position of depressions between the *Carex elata* clumps, in relation to the neighbouring plant communities of the remaining parts of the fen, causes constant runoff and stagnation of waters in the habitat. Hence, in most of the year they are flooded with a 1.0–1.5 cm layer of water, or it stagnates evenly with their surface, giving them the character of a bush. From spring to late autumn, this habitat is a place of mass development of various systematic groups of algae covering the surface of the substrate with a gelatinous layer. The development of algae in synusias is favoured by favourable light conditions. The leaves of the tall clumps of sedges diffuse the sun's rays, but without limiting the good illumination of the synapse substrate.

D. bipyramidatum cells are accompanied by various cyanobacteria and algae taxa represented mainly by *Chlorophyceae*, *Cyanoprokaryota* and *Bacillariophyceae* species. The absolutely dominant taxonomic group are *Chlorophyceae* species of the *Desmidiales* order, among which the largest numbers are: *Netrium digitus* (Ehrenb.) Itzigs. et Rothe, *Tetmemorus granulatus* (Bréb.) Ralfs ex Ralfs, *Euastrum ansatum* Ralfs var. *ansatum*, *Closterium baileyanum* (Bréb.) Bréb., *Closterium dianae* (Ehrenb.) Ralfs, *Pleurataenium ehrenbergii* (Bréb.) De Bary, *Euastrum pectinatum* (Bréb.) ex Bréb. The cells are singly present: *Cylindrocystis brebissonii* (Ralfs) De Bary, *Penium exiguum* W. West var. *glaberrimum* Grönbl., *P. spirostriolatum* Bark var. *spirostriolatum*, *Closterium costatum* Corda ex Ralfs var. *costatum*, *Cl. gracile* Bréb. ex Ralfs, *Cosmarium debary* Arch. in Pritchard, *C. margaritiferum* Menegh. ex Ralfs var. *margaritiferum*, *C. portianum* Arch. var. *portianum*, *C. quadratum* Ralfs ex Ralfs var. *quadratum*, *Euastrum gayanum* De Toni var. *gayanum*, *E. verrucosum* Ehrenb. ex Ralfs,

Micrasterias thomasiana Arch. var. *notate* (Nordst.) Grönbl., *M. truncate* (Corda) ex Bréb. var. *truncata*, *Staurastrum teliferum* Ralfs. Diatoms represent: *Frustulia rhomboides* var. *saxonica* (Rabenhorst) De Toni = *Frustulia saxonica* Rabenhorst, *Eunotia exigua* (Brébisson ex Kützing) Rabenhorst, *E. lunaris* = *Eunotia bilunaris* (Ehrenberg) Schaarschmidt, *Tabellaria flocculosa* (Roth) Kützing var. *flocculosa*, *Pinularia* sp. div. Less common along with *D. bipyramidatum* cells are the species: *Merismopedia glauca* (Ehrenb.) Kützing, *Chroococcus turgidus* (Kützing) Nägeli, *Oscillatori*a sp. (*Cyanobacteria*), *Pediastrum tetras* (Ehrenb.) Ralfs, *P. angulosum* (Ehrenb.) (*Chlorophyceae*) and *Pseudostaurastrum enorme* (*Xanthophyceae*).

Cell description

Desmatractum bipyramidatum (Chodat) Pascher 1930

Basionym: *Bernardinella bipyramidata* Chodat 1921. Bull, Soc. Bot. Geneva, ser. 2, 12;

Fusiform cells (Fig. 2), widened in the equatorial plane into a ring surrounding the cell, tapering conically towards the apexes and stretched on both sides into short appendages, sharply rounded at the ends. The total length of cells 23.6–28.6 μm, width in the equatorial plane 10.2–12.9 μm, length of the apical processes 4.2–4.5 μm. Cell wall smooth, colourless or slightly reddish with 5–8 ribbed projections along the long axis of the cell. In plan, the cells are round with slightly concave walls between the ribbed projections. The inside of the cell is a spherical protoplast 7.7–9.7 μm in diameter, with a chloroplast containing one clearly visible pyrenoid and several (usually 4–6) distinct grains with a diameter of 0.6–0.7 μm. The shape of the cells is identical to *D. bipyramidatum* sensu Skuja (1964). Taper more or less evenly conically towards the ends, drawn into a short spike, rounded at the top.

In the collected material, *D. bipyramidatum* cells were observed only in two samples collected during the summer period, when the water level is stabilised and not too high. W. Their occurrence, however, was sporadic. These were 6–8 cell clusters. In spring and autumn, the depressions are flooded with water and are characterised by completely different ecological conditions. Reporting the occurrence of the species on different continents indicates that it is a taxa with a cosmopolitan range, but very rarely observed.

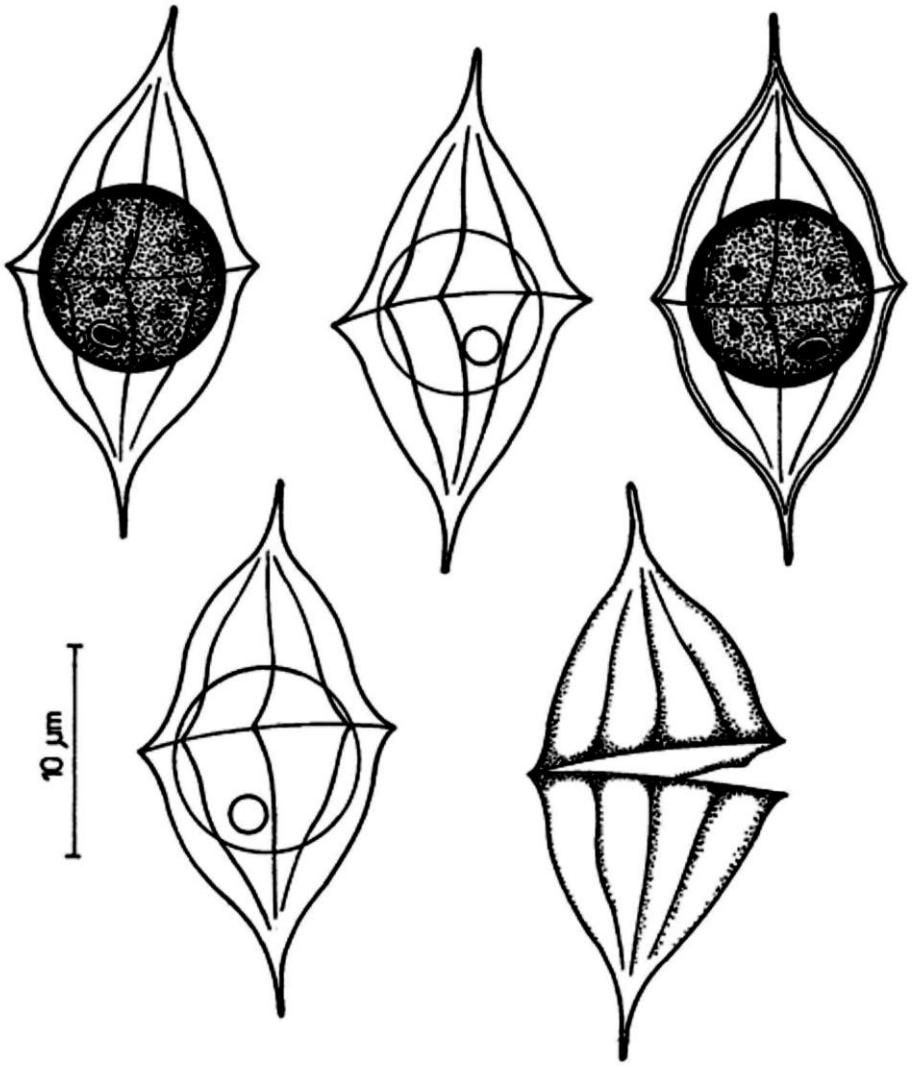

Fig. 2. *Desmatractum bipyramidatum* sensu Skuja (1964) from a high Atlantic peat bog in the Goleniów Forest (original)

Distribution

Distribution in Poland

According to the information contained in the study (Siemińska, Wołowski, 2003) and in the icon library and species records of the Department of Algology, IB PAN in Krakow, the occurrence of *Desmatractum bipyrimidatum* has been recorded so far only in the Tatra Mountains from the peat bog in the valley Dolina Pięciu Stawów (Mrozińska, 1984). In unpublished materials from the peat bogs of the Śnieżka region in Karkonsze, it is mentioned by Matuła. The site from Western Pomerania is therefore the second documented place of its occurrence in Poland.

General distribution

D. bipyramidatum cells have so far been found in marshy habitats of peat bogs in Central Europe; this species should be considered cosmopolitan in the area (Tsarenko et al., 2011; Guiry, Guiry, 2022). There are known localities from this region in Bulgaria (Vodeničarov, 1960), Sweden (Suja, 1964), Great Britain (Lund, 1942), and the Tyrolean Alps (Ettl, 1968). According to Komarek and Fott (1983), who give the positions of *D. bipyramidatum* also from Denmark, Germany, France, Czechoslovakia and the territory of the former USSR (Koršikov, 1953). Outside Europe, single *D. bipyramidatum* sites are also known from the state of Michigan in the USA (Taft, 1939, Prescott, 1962), New Zealand (Skuja, 1976); Asia (China, Japan, Russia); South West Asia (Bangladesh, India); Africa (Ivory Coast); Australia, Papua New Guinea (Guiry, Guiry, 2022). Prescott (1962) believes that the taxon is definitely related to the acidic habitats of bog bogs.

Summary and conclusion

Registered in the Goleniów Forest in Western Pomerania (Fig. 1), in the habitat of the mid-forest peat bog *Desmatractum bipyramidatum* mesar fen, it is the second place of occurrence of the species. Earlier, its occurrence in Poland was noted only by Mrozińska (1984). *D. bipyramidatum* cells occur on the flooded organic substrate, covering the synusions in *Caricetum elatae* Koch 1926. Small pits in area, 0.5–1.5 m^2, trough-shaped pits between the *Carex elata* clumps are covered with an organic substance consisting mainly of dead shoots with varying degrees of decomposition of *C. elata* and bryophytes. The habitat is characterised by poor vegetation. Coverage of the vascular layer is 5–20%, and the moss layer 5–50%. The location of the depressions between the *C. elata* clumps, in relation to the neighbouring plant communities of the remaining parts of the fen, causes a constant runoff and stagnation of water in the habitat, which is the nature of the marshes.

In terms of shape and other diagnostic features, the cells are identical to the described *D. bipyramidatum* sensu Skuja (1964). They taper more or less evenly conical towards the ends stretched out in a short squeeze, rounded at the top. Their smooth, colourless or slightly reddish cell wall is covered with 5–8 ribbed bulges along the long axis of the cells. The interior of the cell is occupied by a spherical protoplast with a chloroplast containing 1 pyrene and a few (usually 4–6) distinct granules.

Conflict of interest

The author declare no conflict of interest related to this article.

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Abstract

In the materials collected during phycological studies of bog bogs in the Goleniów Forest in Western Pomerania, cells of *Desmatractum bipyramidatum* (Chodat) Pascher 1930, rarely administered from Poland, were found. and bryophytes. In terms of shape, the cells are identical and refer to the described *D. bipyramidatum* sensu Skuja (1964). *D. bipyramidatum* cells are accompanied by various algae taxa represented mainly by species of the *Chlorophyceae*, *Cyanoprokaryota* and *Bacillariophyceae* classes. The absolutely dominant taxonomic group in the habitat are *Chlorophyceae* species of the order *Desmidiales*
Key words: *Chlorococcales*, *Chloropohyceae*, new locality, Western Pomerania
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Desmatractum bipyramidatum (Chodat) Pascher 1930 (Chlorophyceae, Chlorococcales) – nowe stanowisko w Polsce

Streszczenie

W materiałach zebranych w trakcie badań fykologicznych torfowisk mszarnych w Puszczy Goleniowskiej na terenie Pomorza Zachodniego, znaleziono komórki rzadko podawanej z terenu Polski zielenicy *Desmatractum bipyramidatum* (Chodat) Pascher 1930. Komórki *D. bipyramidatum* występowały na przepojonym wodą substracie organicznym, utworzonym z obumarłych szczątków roślin naczyniowych i mszaków. Pod względem kształtu komórki są identyczne i nawiązują formą do opisanego *D. bipyramidatum* sensu Skuja (1964). Komórkom *D. bipyramidatum* towarzyszą różne taksony glonów reprezentowane głównie przez gatunki klasy *Chlorophyceae, Cyanoprokaryota* oraz klasy *Bacillariophyceae*. Bezwzględnie dominującą grupą taksonomiczną, występującą w siedlisku są gatunki *Chlorophyceae*, rzędu *Desmidiales*.
Słowa kluczowe: *Chlorococcales*, *Chloropohyceae*, nowe stanowisko, Pomorze Zachodnie.

Information about the author

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The author is a specialist in the field of algology. His research interests concern both single species of algae and whole groups of marine and freshwater algae, with particular emphasis on rare and endangered taxa. A special taxonomic group of interest are the taxa associated with the ecosystems of bog bogs, as well as freshwater red algae.