Some critical remarks about new and rare to Polish flora desmids from the Suwałki Lakeland

GRAŻYNA H. TOMASZEWICZ, ELŻBIETA SKRZECZKOWSKA

Department of Phytogeography, Warsaw University, Al. Ujazdowskie 4, 00-478 Warsaw, Poland

(Received: July 7, 1988. Accepted: September 15, 1988)

Abstract

Species of desmids found in the Suwałki Lakeland are presented; these species are new and rare in the flora of Poland: *Cosmarium contractum* var. *retusum* (W. et G. S. West) W. Krieg. et Gerl., *C. hammeri* var. *protuberans* W. et G. S. West, *C. plicatum* Reinsch var. *plicatum*, *C. pseudoconnatum* var. *pseudoconnatum* f. *latior* Borge, *Staurastrum gemelliparum* Nordst., *S. tohopekaligense* var. *trifurcatum* W. et G. S. West. A critical view is expressed on the creation of infraspecific units within some of these species.

Key words: Desmidiaceae, taxonomic comments, Poland

INTRODUCTION

In the course of studies on communities of aquatic and rush vegetation, H. Tomaszewicz made a single collection in August of water squeezed from floating bog moss turf of 12 "suchars" lying in the vicinity of Suwałki. In two of them, Suchar Drobny and Suchar Tłusty, several species of desmids that are new and rare in the Polish phycoflora were found.

Suchars Drobny and Tłusty lie about 5 km northeast of Suwałki, near the village of Osinki (Fig. 1). They are located on hilly terrain covered with farmland. Their areas are not large: Suchar Drobny — 0.5 ha, Suchar Tłusty — 0.72 ha.

There is a belt of *Carex limosa* and *Rhynchospora alba* on the *Sphagnum*

mat of both "suchars" which passes into a belt of *Sphagnetum medii* et *rubelli* surrounding them. The last one has a hummock structure. The dwarf pine, *Pinus sylvestris* grows on the hummocks. The following mosses are present there: *Sphagnum magellanicum* with small amounts of *Sph. rubellum*, *Hylocomium splendens* and *Entodon schreberi*; *Sphagnum apiculatum* dominates in the hollows. In addition, *Drosera rotundifolia*, *Equisetum limosum*, *Eriophorum angustifolium*, *Andromeda polifolia* and *Oxycoccus quadripetalus* (Sobotka 1967) occur here.

Fig. 1. The localization of the "suchars". 1 — Drobny, 2 — Tłusty

A LIST OF SPECIES WITH TAXONOMICAL REMARKS

Cosmarium contractum var. *retusum* (W. et G. S. West) W. Krieger et Gerloff 1962, morpha (Fig. 2)

Transversely elliptic semicells: somewhat flattened apices which may or may not be slightly retuse in the middle; the sinus at the apex closed, widely open outwards.

Lg. 33.3-37.9 μm , br. 28.7-35.6 μm , isth. 9.2-11.5 μm , lg.: br. 1.05-1.18 $\times$.

Occurrence: Suchar Drobny, Suchar Tłusty.

The shape of the cells with the exception of the sinus is in agreement with the holotype West and West (1905, p. 173. Plate 61, Fig. 29). The specimens described by West and West (1905) have sinus open along their entire lengths.

Fig. 2. *Cosmarium contractum* var. *retusum*, morpha. Fig. 3. ?*C. hammeri* var. *protuberans*, morpha. Fig. 4. *C. plicatum* var. *plicatum*, morpha. Fig. 5. *C. pseudoconnatum* var. *pseudoconnatum* f. *latior*. Fig. 6. *Staurostrum gemelliparum*, morpha. 7-8. ?*S. tohopekaligense* var. *trifurcatum*

Coesel (1979) presents cells with sinus formed the same as in our specimens, but which are not retuse in the middle of their apices. Individuals which are not retuse in the middle of their apices and with sinus that is open along their entire lengths (in accordance with West and West 1905), are described by Palamar-Mordvintseva (1985). It can be seen from this comparison that the sinus and apices in *C. contractum* var. *retusum* can be variously formed.

On the basis of our own observations and the drawings in the following publications: West and West (1905), Thomasson (1973), Coesel (1979), Palamar-Mordvintseva (1985), we conclude that a more stable characteristic which allows easy differentiation of the discussed taxon from its very close relative, *C. contractum* var. *ellipsoideum* (Elfv.) W. et G. S. West 1902, is

the flattening of the apices of the semicells, rather than the occurrence of retuse on them, since the latter may or may not be present.

This is a very rarely encountered variety. It has been reported in the Netherlands, Ireland, USSR and New Zealand. This is the first time it is reported in Poland.

?*Cosmarium hammeri* var. *protuberans* W. et G. S. West 1896, morpha (Fig. 3)

The cells are small, deeply constricted; truncate-pyramidate, the basal and apical angles are rounded, the upper part of the sides retuse, the apices are flat and slightly concave; the sinus is closed with a slightly dilated apex, widely open outwards; in a vertical view elliptic with a median tumor on each side.

Lg. 24.1-25.3 μm , br. 20.7-21.8 μm , isth. 6.9-8.0 μm , th. 11.5 μm , lg.: br. 1.16 $\times$.

Occurrence: Suchar Thusty.

The individuals are very similar to *C. hammeri* var. *protuberans* W. et G. S. West. In comparison with many specimens identified as *C. hammeri* var. *protuberans*, these cells are clearly relatively shorter. The ratio of length to breadth as reported in many papers, e.g.: West and West (1905), Cholnoki (1952), Hirano (1957), Ito (1965a, 1966), Grönblad and Croasdale (1971), Goto (1975), Prescott et al. (1981), ranges from (1.28)-1.4-1.5 $\times$. Specimens flattened in the same way as ours (ratio of lg.: br. 1.11-1.18 $\times$) are reported by Ito (1965b, 1968, 1974), Kanetsuna (1960). Most of the specimens found by us oscillate around the lower size limit of this taxon.

The shape and proportions of these cells are also in agreement with the original drawings of *C. hammeri* var. *schmidlei* Scott et Grönblad 1958, published in Grönblad et al. (1958). There, the ratio lg.: br. is 1.10-1.23 $\times$. However, ours differ from them in their smaller size and by the presence of a median tumor. In some papers, e.g. Krieger and Gerloff (1965), Prescott et al. (1981) drawings of this taxon can be found with distinct tumors when viewed vertically. We can say nothing about the number of pyrenoids since we found only empty cells. As is well known, the number of pyrenoids is a very important diagnostic trait in this variety. It may be that the specimens found by us should be identified as var. *schmidlei* forma *minor*, not var. *protuberans*, morpha.

The general outline and size of the cells also correspond to the drawing of the taxon identified by Gutwiński (1891; Plate II, Fig. 12) as *C. retusifforme* nob. The species was probably improperly identified. When the holotype of the above taxon, that is, the drawings of *C. hammeri* var. *retusifforme* Wille 1880 (Plate I, Fig. 16), is analysed, distinct differences between the drawings of Wille (1880) and Gutwiński (1891) are evident. In the former, the cells have open sinus; sharp, rectangular apical angles; straight, unretuse apices. Whereas

in the drawings by Gutwiński, as in our specimens, the sinus is closed; the apical angles are rounded; the apices are slightly convex or somewhat concave. These traits correspond more with the taxon *C. hammeri* var. *protuberans* than *C. hammeri* var. *retusiforme* (= *C. retusiforme*).

We consider the proposed incorporation of *C. hammeri* var. *protuberans* into the synonyms of *C. retusiforme* (= *C. hammeri* var. *retusiforme*) (Pala-mar-Mordvintseva 1982) to be incorrect. The differences between the two above-mentioned taxa are distinct. Therefore, they should be treated as separate taxonomic units.

C. hammeri var. *protuberans* is frequently listed in the world's flora. In Poland it is noted for the second time only. It was first found in the vicinity of Lwów by Gutwiński (1891) and identified as *C. retusiforme* nob.

Cosmarium plicatum Reinsch 1867 var. *plicatum*, morpha (Fig. 4)

Widely trapezoid semicells, narrowing from the basal angles in the direction of slightly rounded apices; slightly convex sides.

Lg. 51.7-62.1 μm , br. 26.4-35.6 μm , isth. 17.2-19.5 μm , lg.: br. 1.70-1.95 $\times$.

Occurrence: Suchar Drobný.

The cells differ slightly from the holotype in Reinsch (1867). The semicells narrow from the base to the slightly rounded apices.

Migula (1907) and Hirano (1957) report specimens very similar to those found by us, but with truncate apices.

The shape of the semicells is somewhat different from the drawings of *C. plicatum* given by Taylor (1934), Skuja (1964, 1976), Hirano (1979) and Prescott et al. (1981). The semicells of those specimens are square with parallel, straight or somewhat convex sides. They narrow just near the apices which are more or less truncate. Probably, *C. plicatum* is a species characterized by a high variability of shape.

It is reported often in the flora of the world. This is the first time it is reported in Poland.

Cosmarium pseudoconnatum var. *pseudoconnatum* f. *laticus* Borge 1925 (Fig. 5)

Cells are widely elliptic, almost round with a distinct apical thickening of the wall; the sinus is very broad and shallow; the pores are delicate, slightly larger above the isthmus, arranged in one row.

Lg. 64.4 μm , br. 56.3 μm , isth. 54.0 μm , lg.: br. 1.15 $\times$.

Occurrence: Suchar Tlustý.

The appearance of the specimens is identical with the form described by Borge (1925), *C. pseudoconnatum* f. *laticus*, although they are slightly larger. Förster (1974) gave it the rank of variety (var. *borgei*), although in a later paper (Förster 1982) he includes it in the synonyms of the typical variety.

Both the specimens of f. *laticor* described by Borge (1925) and found by us, as well as some identified as *C. pseudoconnatum* e.g. Grönblad (1924; Fig. 54), Förster (1969; Plate 12, Fig. 13, 1972; Plate 9, Fig. 11, 1974 — var. *borgei*), Islam (1970), are more widely elliptic, almost round in comparison with the holotype of the typical form (Prescott et al. 1981 show its drawing). The ratio of the length to breadth in our individuals is $1.15 \times$. In the papers cited above it is $1.20-1.24 \times$; in the typical form, $1.4-1.5 \times$. They have a shallower sinus. Their shape is very much like that of *C. alpestre* Roy et Bisset 1894, although their sculpture and vertical views are different.

We do not think that the above specimens should be identified as typical taxon, but rather that they should be assigned to a separate unit because they differ considerably from the type. However, we are of the opinion that the rank of form, as proposed by Borge (1925) is appropriate for them, not the rank of variety as given by Förster (1974).

The above form is rarely noted in the world's flora. This is the first time it is reported from Poland.

Staurostrum gemelliparum Nordstedt 1869, morpho (Fig. 6)

The cells are somewhat broader than long, processes long, narrow with small, delicate spines.

Lg. $19.5-21.8 \mu\text{m}$, lg. with pr. $27.6-31.0 \mu\text{m}$, br. $18.4-21.8 \mu\text{m}$, br. with pr. $28.7-32.2 \mu\text{m}$, isth. $9.2 \mu\text{m}$, lg. pr. $4.6-5.7 \mu\text{m}$, lg. with pr.: br. with pr. $0.94-0.96 \times$.

Occurrence: Suchar Thusty.

Upon analysis of the descriptions and drawings of *S. gemelliparum* found in only a few works, it is seen that the individuals of this species exhibit a rather large morphological variability. Specimens with short, broad processes (West et al. 1923, Hirano 1959; Plate 42, Fig. 9, Palamar-Mordvintseva 1982) or with long, narrow ones (Gutwiński 1896 f. *simplex*, Borge 1918, Hirano 1959; Plate 42, Fig. 20) ending with more or less delicate or massive spines, as seen in Borge (1918), are to be found. Most of the specimens in vertical view have triangular cells, but quadrangular individuals can also be seen (Hirano 1959; Plate 42, Fig. 20). The proportions of cell dimensions are also variable. The cells can be somewhat longer than wide (including processes), the same, or somewhat wider than long.

It is possible that the differences among individuals listed above fall within the limits of population variability, although it is also valid to presume that this species is not uniform and infraspecific units should be established within it.

This species is rather rare in the flora of the world. The typical form has not been reported from Poland, whereas Gutwiński (1896) described the

form *simplex* from the vicinity of Skawa. His drawing, however, is not detailed enough and the description is too scanty to allow a definite position to be taken on the validity of establishing this form. It should probably be treated as a synonym of the typical taxon, not as an independent unit.

?*Staurastrum tohopekaligense* var. *trifurcatum* W. et G. S. West 1895 (Figs. 7-8)

Elliptic semicells, somewhat flattened apices; rather massive processes, laterals — parallel or slightly convergent terminating in three long divergent spines; the sinus is more or less widely open; in vertical view — triangular, straight sides, processes shorter than diameter of semicell.

Lg. 33.3-34.5 μm , lg. with pr. 56.3-62.1 μm , br. 32.2 μm , br. with pr. 58.6-62.1 μm , isth. 14.9 μm , lg. pr. 13.8-16.1 μm , lg. sp. 3.4-4.6 μm , lg.: br. 1.03-1.07 $\times$.

Occurrence: Suchar Drobny.

There is a certain difference of opinion among desmidiologists on the identification of specimens of this variety. Individuals of various appearances are classified here. Our specimens are very similar to those found in the works of: West et al. (1923), Hirano (1959), Lind (1967), Palamar-Mordvintseva (1982), but have processes which may be a bit more massive and sometimes have somewhat less open sinus (Fig. 7). They are, however, clearly unsimilar to those given by Scott and Prescott (1961), Prescott (1966). The semicells of those specimens are oval, have processes which are long, narrow, distinctly longer than the diameter.

The specimens found here could also be identified as *S. tohopekaligense* var. *robustum* Scott et Prescott 1961. The shape of the cells is very much like that seen on the drawing of var. *robustum* found in the work by Grönblad et al. (1964), although they somewhat differ from the holotype given by Scott and Prescott (1961). The lateral processes of these specimens are distinctly divergent, the sinus widely open, almost rectangular.

The shape of the semicell also corresponds to that of specimens of *S. tohopekaligense* f. *minus* (Turn.) Scott et Prescott 1961 found by Scott and Prescott (1961; Plate 48, Fig. 4), Thomasson (1972; Fig. 9:1) and Croasdale and Scott (1976). Our individuals are, however, much larger and have wider processes.

S. tohopekaligense is a very variable species. Smith (1924), Thomasson (1972) take notice of it also. A whole series of intermediate forms between distinguished infraspecific taxa can be found. This species needs a very detailed critical review.

In the world's flora, var. *trifurcatum* is listed often. *S. tohopekaligense* has hitherto been unknown in Poland.

Acknowledgement

The authors would like to express their gratitude to Doc. H. Tomaszewicz for collecting so valuable material. Their thanks are also extended to Prof. J. Siemińska for enabling them to use the Algae of Poland Index.

REFERENCES

- Borge O., 1918. Die von Dr A. Löfgren in Sao Paulo gesammelten Süßwasseralgen. Ark. f. Bot. 15, 13: 1-108.
- Borge O., 1925. Die von Dr F. C. Hoehne während der Expedition Roosevelt-Rondon gesammelten Süßwasseralgen. Ark. f. Bot. 19, 17: 1-56.
- Cholnoki B. J., 1952. Beiträge zur Kenntnis der Algenflora von Portugiesisch-Ost-Afrika (Mocambique) I. Bol. Soc. Portu. Cienc. Nat., II, 19, 1: 89-135.
- Coesel P. F. M., 1979. Desmids of the broads area of N. W.-Overijssel (The Netherlands) II. Acta Bot. Neerl. 28: 385-423.
- Croasdale H. T., Scott A. M., 1976. New or otherwise interesting desmids from northern Australia. Nova Hedw. 27: 501-596.
- Förster K., 1969. Amazonische Desmidiaceen. 1. Teil: Areal Santarém. Amazoniana 2, 1/2: 5-232.
- Förster K., 1972. Desmidiaceen aus dem Südosten der Vereinigten Staaten von Amerika. Nova Hedw. 23: 515-644.
- Förster K., 1974. Amazonische Desmidiaceen. 2. Teil: Areal Maués — Abacaxis. Amazoniana 5, 2: 135-242.
- Förster K., 1982. Das Phytoplankton des Süßwassers, Systematik und Biologie. Bd. XVI. Teil 8, 1. *Conjugatophyceae Zygnematales und Desmidiales* (excl. *Zygnemataceae*). E. Schweiz. Verlag., Stuttgart.
- Goto T., 1975. Desmids in swamps Hirumo-Numa and Nishi-Numa in Akita Prefecture. Studies of Freshwater Algae 1: 14-25.
- Grönblad R., 1924. Observations on some desmids. Acta Soc. Fauna Fl. Fenn. 55, 3: 1-18.
- Grönblad R., Croasdale H. T., 1971. Desmids from Namibia (SW Africa). Acta Bot. Fenn. 93: 1-40.
- Grönblad R., Prowse G. A., Scott A. M., 1958. Sudanese desmids. Acta Bot. Fenn. 58: 1-82.
- Grönblad R., Scott A. M., Croasdale H. T., 1964. Desmids from Uganda and Lake Victoria, collected by Dr Edna M. Lind. Acta Bot. Fenn. 66: 1-57.
- Gutwiński R., 1891. Flora glonów okolic Lwowa. Spraw. Kom. Fizyogr. Akad. Umiej. 27: 1-124.
- Gutwiński R., 1896. De nonnullis algis novis vel minus cognitis. Rozpr. Wydz. Matem.-Przyr. Akad. Umiej. 33: 32-63.
- Hirano M., 1957. Flora Desmidiarum Japonicarum. Biol. Lab. Kyoto Univ. 4: 107-165.
- Hirano M., 1959. Flora Desmidiarum Japonicarum. Biol. Lab. Kyoto Univ. 9: 302-386.
- Hirano M., 1979. Notes on Japanese desmids 2. Acta Phytotax. Geobot. 30, 4/6: 119-126.
- Islam A. K. M. N., 1970. Contributions to the knowledge of desmids of East Pakistan I. Nova Hedw. 20: 903-983.
- Ito I., 1965a. Desmids flora of Tsumagoi bog 1. Bull. Japanese Soc. Phycol. 13: 12-17.
- Ito I., 1965b. The freshwater algae study group: The ecological studies of the freshwater algae and *Rhizopoda* of the Morinji-numa. Gunma Biol. Educ. Soc. 14: 1-10.
- Ito I., 1966. On the distribution of desmids in the Ôgemi-ike swamps, Nagano Prefecture (I). Bull. Japanese Soc. Phycol. 14, 2: 41-52.
- Ito I., 1968. Desmid flora Gunma Prefecture. Gunma, pp. 1-26.
- Ito I., 1974. Notes on the freshwater algae of Gunma Prefecture (2). Gunma Kenritsu Shibuka Kotogako 5: 48-74.

- Kanetsuna Y., 1960. Studies on the diatom- and desmid-flora of the reclaimed paddy fields by drainage in the city of Toyohashi, Aichi Prefecture. J. Japanese Limnol. 21, 2: 73-86.
- Krieger W., Gerloff J., 1965. Die Gattung *Cosmarium*. 2. Verlag J. Cramer, Weinheim.
- Lind E. M., 1967. Some East Africa desmids. Nova Hedw. 13: 361-387.
- Migula W., 1907. Kryptogamen-Flora von Deutschland, Deutsch-Österreich und der Schweiz. Flora von Deutschland 2, 1, Leipzig.
- Palamar-Mordvintseva G. M., 1982. Opredelitel presnovodnykh vodoroslej SSSR. vol. 11, 2. *Conjugatophyceae, Desmiales*. Leningrad.
- Palamar-Mordvintseva G. M., 1985. New for algoflora of the Ukrainian SSR representative from genus *Cosmarium* Corda (*Desmiales*). Ukr. Bot. Zhurn. 42, 4: 55-59.
- Prescott G. W., 1966. Algae of the Panama Canal and its tributaries — II. *Conjugales*. Phykos 5, 1/2: 1-49.
- Prescott G. W., Croasdale H. T., Vinyard W. C., Bicudo C. E. M., 1981. A synopsis of North American Desmids. Part II. *Desmidiaceae: Placodermatae*. Sec. 3. Univ. Nebraska Press.
- Reinsch P., 1867. De speciebus generibusque nonnullis novis ex algarum et fungorum classe. Abh. d. Senckenb. Ges. 6: 111-144.
- Scott A. M., Prescott G. W., 1961. Indonesian desmids. Hydrobiologia 17: 1-132.
- Skuja H., 1964. Grundzüge der Algenflora und Algenvegetation der Fjeldgegenden um Abisko in Schwedisch-Lappland. Nova Acta Reg. Soc. Sci. Upsaliensis, IV, 18, 3: 1-465.
- Skuja H., 1976. Zur Kenntnis der Algen Neuseeländischer Torfmoore. Nova Acta Reg. Soc. Sci. Upsaliensis, V, 2: 7-158.
- Smith G. M., 1924. Phytoplankton of the Inland Lakes of Wisconsin II. *Desmidiaceae*. Bull. Wisconsin Geol. Nat. Hist. Surv. 57, 2: 1-221.
- Sobotka D., 1967. Roślinność sfery zarastania bezodpływowych jezior Suwalszczyzny. Monogr. Bot. 23, 2: 175-259.
- Taylor W. M. R., 1934. The freshwater algae of Newfoundland. I. Pap. Mich. Acad. Sci. Arts Lett. 19: 217-278.
- Thomasson K., 1972. Some planktic *Staurastrum* from New Zealand 2. Svensk Bot. Tidskr. 66: 257-274.
- Thomasson K., 1973. *Actinotaenium*, *Cosmarium* and *Staurodesmus* in the plankton of Rotorua Lakes. Svensk. Bot. Tidskr. 67: 127-141.
- West W., West G. S., 1905. A monograph of the British *Desmidiaceae*. 2. Ray Soc., London.
- West W., West G. S., Carter N., 1923. A monograph of the British *Desmidiaceae*. 5. Ray Soc., London.
- Wille N., 1880. Bidrag til Kundskaben om Norges Ferskvandsalger. Christiania Vid.-Selsk. Forh. 11: 1-72.

Krytyczne uwagi o nowych i rzadkich dla flory Polski desmidiach z Pojezierza Suwalskiego

Streszczenie

Na dwóch sucharach (Drobnym i Tłustym) położonych na Pojezierzu Suwalskim w okolicy wsi Osinki (rys. 1) znaleziono następujące nowe oraz rzadko notowane w Polsce taksony desmidi: *Cosmarium contractum* var. *retusum* (W. et G. S. West) W. Krieg. et Gerl., *C. hammeri* var. *protuberans* W. et G. S. West, *C. plicatum* Reinsch var. *plicatum*, *C. pseudoconnatum* var. *pseudoconnatum* f. *latior* Borge, *Staurastrum gemelliparum* Nordst., *S. tohopekaligense* var.

trifurcatum W. et G. S. West. Niektóre z wyżej wymienionych taksonów, a mianowicie: *Cosmarium contractum* var. *retusum*, *C. pseudoconnatum* f. *latior* i *Staurastrum gemelliparum* bardzo rzadko są spotykane we florze światowej. Podano także w pracy parę uwag odnośnie zmienności poszczególnych taksonów. Krytycznie ustosunkowano się do wydzielania niektórych taksonów wewnątrzgatunkowych.