

## THREE MORPHOTYPES OF CHRYSOPHYCEAN STOMATOCYSTS FROM POLAND

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**Abstract:** A study in the Budzyń peat bog on the Wyżyna Krakowsko-Częstochowska upland (S Poland) yielded descriptions of three morphotypes of chrysophycean stomatocysts. One is new to science (stomatocyst #4 Cabała J.). Two are new to Poland and found for the second time in Europe: stomatocyst 183 Brown & Smol and stomatocyst 207 Duff & Smol. These stomatocysts are illustrated in SEM images and described according to International Statospore Working Group (ISWG) guidelines.

**Key words:** Chrysophyceae, stomatocysts, morphology, taxonomy, ecology, Wyżyna Krakowsko-Częstochowska upland, Poland

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### INTRODUCTION

In supplementary studies of chrysophycean stomatocysts occurring in the Budzyń peat bog in the Wyżyna Krakowsko-Częstochowska upland (S Poland) (Cabała 2002, 2003), three interesting morphotypes were detected. Previously, 32 morphotypes of stomatocysts were recorded from the Budzyń peat bog (Cabała 2002, 2003). Among them, three were new morphotypes and several new to Europe. The present stomatocysts were found later during a study of diatom community composition and are described in this paper. One (stomatocyst #4 Cabała J.) is new to science and two appear to be new to Poland (stomatocysts 183 Brown & Smol and 207 Duff & Smol), recorded from Europe for the second time.

### MATERIAL AND METHODS

The material was collected from the Budzyń peat bog (50°06'N, 19°52'E) in November 1999 in 120 ml plastic containers from seven sites (for details see Cabała 2002). This peat bog was dominated by *Aulacomnium palustre* (Hedw.) Schwägr., *Calliergonella cuspidata* (Hedw.) Loeske, *Sphagnum magellanicum* Brid. and *S. rubellum* Wils. The samples were preserved in 4% formaldehyde solution. Each sample was placed in a glass

scintillation vial, covered with 10% HCl (to remove carbonates) and allowed to stand for 24 h, boiled for 15 min and rinsed several times with distilled water. The samples were covered with 30% H<sub>2</sub>O<sub>2</sub> and allowed to stand for 24 h, then boiled for 30 min with a pinch of ClO<sub>3</sub> added at *ca* 15 min intervals, and rinsed several times with distilled water, with a settling time of 24 h between each aspiration. Finally the samples were slurried in glass vials and covered with 95% alcohol.

For SEM analysis, another aliquot of each slurry was pipetted onto clean glass, air-dried, and affixed to an aluminum stub with double-sided transparent tape. The stubs were sputter-coated with gold using an IEE 4B and viewed with a PHILIPS XL30 ESEM, with a working distance of 21 or 31 mm. The stomatocysts were measured and described from scanning electron micrographs according to International Statospore Working Group (ISWG) guidelines (Cronberg & Sandgren 1986), and following taxonomy proposed by Duff *et al.* (1995), Facher & Schmidt (1996), van de Vijver & Beyens (1997a, b), Hansen (2001), Pla (2001) and Wilkinson *et al.* (2001). The new stomatocyst not previously published by Cabała (2002, 2003) was assigned a new number, stomatocyst #4. Numbers given in parentheses ( ) refer to the number of scanning electron micrographs used for the description. Negatives are deposited in the Iconotheca of Algae (KRAM) housed in the Department of Phycology of the W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.

## RESULTS AND DISCUSSION

Two stomatocysts belong to the group of unornamented stomatocysts, with a simple cylindrical collar (stomatocyst 183) and with a simple obconical collar (stomatocyst #4 Cabała J.); one belongs to the group of ornamented stomatocysts with verrucae or conula (stomatocyst 207).

These stomatocysts were found in oligo-mesotrophic water confirmed by the occurrence of *Euglena mutabilis* F. Schmitz, *E. viridis* Ehrenb., *Menoidium pellucidum* Perty, *Closterium intermedium* Ralfs, *C. striolatum* Ehrenb. ex Ralfs, *Euastrum ansatum* Ehrenb. ex Ralfs and *Ophiocytium parvulum* A. Braun, with water temperature 3.2–3.4°C, pH 7.3, and conductivity 88 µS, 43 mV.

**Stomatocyst 183**, Brown & Smol in Brown *et al.* 1994 (4) (Fig. 1a & b)

BIOLOGICAL AFFINITY. Unknown.

SEM DESCRIPTION. Smooth and spherical stomatocyst, 8.1–8.3 µm in diameter. The collar slightly cylindrical, with highly irregular and usually thickened apex (2.5–2.8 µm diameter, 0.5–0.6 µm height), separated from the pore by a large annulus. The pore regular, 0.4–0.6 µm in diameter.

REMARKS. This stomatocyst is distinguished from stomatocyst 274 Gilbert & Smol and stomatocyst 375 Pla on the basis of collar morphology, and from stomatocyst 45 van de Vijver & Beyens on the basis of the shape of the cyst body and shape of collar.

DISTRIBUTION. Stomatocyst 183 Brown & Smol has been found so far in Greenland, the U.S.A. (Duff *et al.* 1995), and the Spanish part of the Pyrenees in Europe (Pla 2001).

**Stomatocyst #4**, Cabała J., this paper (1) (Fig. 1c)

NEGATIVE NUMBER. J. Cabała, negative Bot18.

BIOLOGICAL AFFINITY. Unknown.

SEM DESCRIPTION. Small, spherical stomato-

cyst, 4 µm in diameter, smooth or slightly lay with conula (0.25 µm in diameter, 0.15 µm height). The collar obconical with very rudimentary and irregular apex, ca 1.5 µm in diameter, 0.3–0.6 µm height. The pore regular, 0.4 µm in diameter.

REMARKS. This stomatocyst is described as a new morphotype; it is very unique in its characteristic size and collar morphology which are quite visible in the SEM image. It was found only once among the samples analyzed by LM and SEM, among a large number of diverse stomatocysts (Cabała 2002, 2003).

This remarkable stomatocyst is distinguished from stomatocyst 61 van de Vijver & Beyens and stomatocyst 274 Gilbert & Smol on the basis of its size and complex collar morphology, and from stomatocyst 12 van de Vijver & Beyens on the basis of collar morphology.

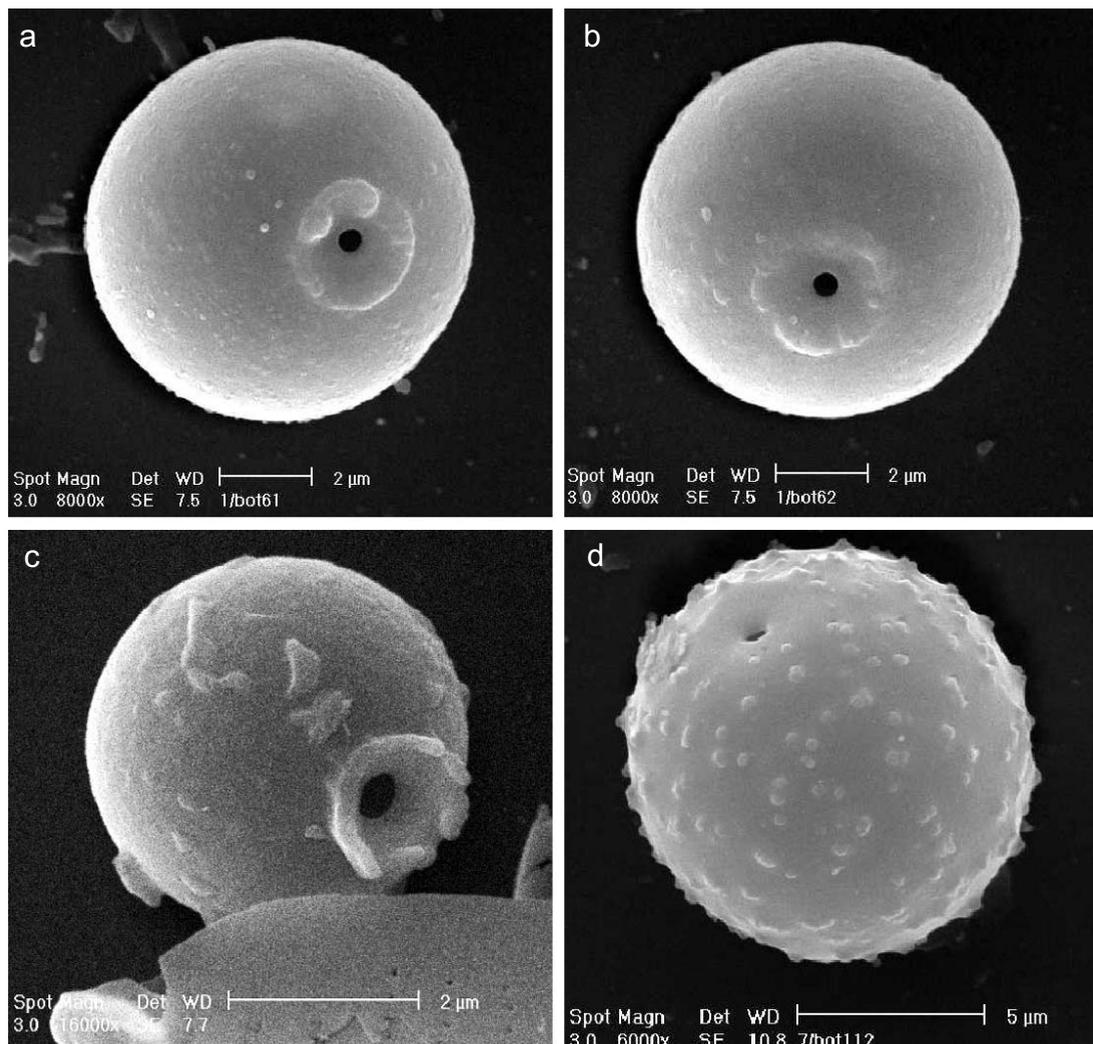
DISTRIBUTION. Known so far from the type locality.

**Stomatocyst 207**, (Duff & Smol 1994) Pla 2001 (3) (Fig. 1d)

BIOLOGICAL AFFINITY. Unknown.

SEM DESCRIPTION. Spherical stomatocyst, 10.2–10.9 µm in diameter, ornamented with verrucae or conula (0.3 µm in diameter, 0.3–0.4 µm height). The pore deep and conical, 0.5–0.6 µm in diameter.

REMARKS. This cyst was initially classified as stomatocyst 207 Duff and Smol (Duff *et al.* 1995: Fig. 65) but the pore, collar structures, and distribution of verrucae and conula over the body surface seems different. My specimen is very similar to stomatocyst 207 Duff & Smol reported by Pla (2001: Fig. 1). This stomatocyst is distinguished from stomatocysts 142 and 206 Duff & Smol on the basis of size, collar morphology and ornamentation, from stomatocyst 320 Pla on the basis of ornamentation, from stomatocyst 341 Pla on the basis of size and collar morphology, from stomatocyst 56 Hansen on the basis of size, and from stomatocyst 42 Facher & Schmidt on the basis of collar and pore morphology.



**Fig. 1.** a & b – Stomatocyst 183 (SEM); c – Stomatocyst #4 Cabala J. (SEM); d – Stomatocyst 207 (SEM). Scale bars = 2 μm (a–c); scale bar = 5 μm (d).

**DISTRIBUTION.** Stomatocyst 207 has been found so far in Canada, the U.S.A. (Duff *et al.* 1995), and the Spanish part of Pyrenees in Europe (Pla 2001).

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