

## ***BATRACHOSPERMUM ATRUM* (RHODOPHYTA) – FIRST RECORD IN POLAND**

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**Abstract.** The paper gives new data on the occurrence of *Batrachospermum atrum* (Hudson) Harvey, a freshwater Rhodophyta species rare in Poland. It was found growing on stony bottom in a small stream in northwestern Poland; at this site it was associated mainly with *Potamogeton nodosus* Poir., green algae *Cladophora glomerata* (L.) Kützing and *Mougeotia* sp. Its occurrence in Poland and some ecological data are discussed, and original photographs of the plant and its habitat are presented.

**Key words:** *Batrachospermum atrum*, Rhodophyta, freshwater red algae, North-West Poland

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### INTRODUCTION

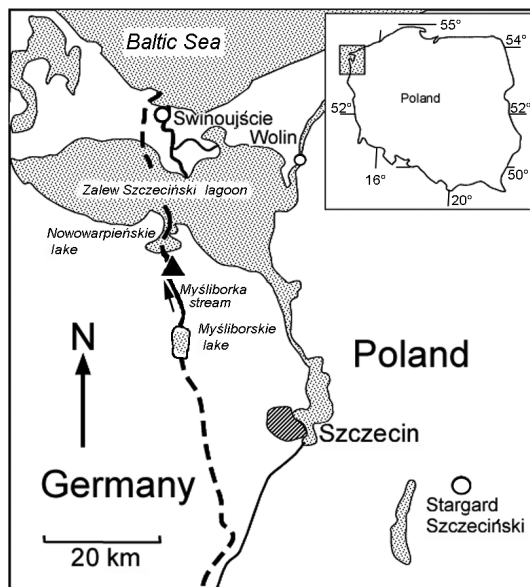
During research under a project on the diversity, ecology and occurrence of freshwater Rhodophyta in Poland and comprehensive studies of the genetic structure of European populations, the first locality of *Batrachospermum atrum* (Hudson) Harvey in Poland was found.

*Batrachospermum atrum* (Hudson) Harvey is the only European species within sect. *Setacea* (Eloranta *et al.* 2011). The section is characterized by very short, reduced and separated whorls closely appressed to the main axis, very short carpogonial branches arising from the pericentral cells, and carposporophytes on the main axis as wart-like protuberances. The species is known from standing and running waters all over Europe (Kumano 2002; Eloranta *et al.* 2011), but until now was not found in Poland. This paper reports the first record of *B. atrum* in Poland.

### MATERIAL AND LOCATION

*Batrachospermum atrum* was found on 25 June 2011 in a small stream named Myślíborka (width 2–2.5 m, depth 30–35 cm, current velocity *ca* 40 cm s<sup>-1</sup>), which runs along the Polish-German border in Western Pomerania

(53°41'16.52"N, 14°16'25.47"E). The stream is *ca* 6 km long between Myślíborskie lake and Nowowarpienskie lake (part of the Zalew Szczeciński lagoon) (Fig. 1),



**Fig. 1.** Location of *Batrachospermum atrum* (Hudson) Harvey record in Poland (triangle).



Fig. 2. Sampling site of *Batrachospermum atrum* (Hudson) Harvey (Photo W. Kowalski).

flowing through a forest and in some sections through intensively used meadows.

*Batrachospermum atrum* was found associated with the macrophyte *Potamogeton nodosus* Poir., *Cladophora glomerata* (L.) Kütz. and *Mougeotia* sp. on stony bottom in an open section of the stream (Fig. 2).

Conditions at the site during June–July 2011 were as follows: water temperature 16.8–21.0°C, pH 7.6–8.2, conductivity 330–340  $\mu\text{S cm}^{-1}$ , water color 45 mg l<sup>-1</sup> Pt, total nitrogen 1.7 mg l<sup>-1</sup> N and total phosphorus 0.15 mg l<sup>-1</sup> P (Regional Inspectorate for Environmental Protection 2011).

## RESULTS AND DISCUSSION

*Batrachospermum atrum* (Hudson) Harvey 1841  
Fig. 3a–d

*Conferva atra* Hudson 1798, *Batrachospermum tenuissimum* Bory 1823, *B. dillenii* Sirodot 1884, *B. gallaei* Sirodot 1884, *B. angolense* W. West & G. S. West 1897, *Sirodotia angolensis* (W. West & G. S. West) Skuja in Reis 1960.

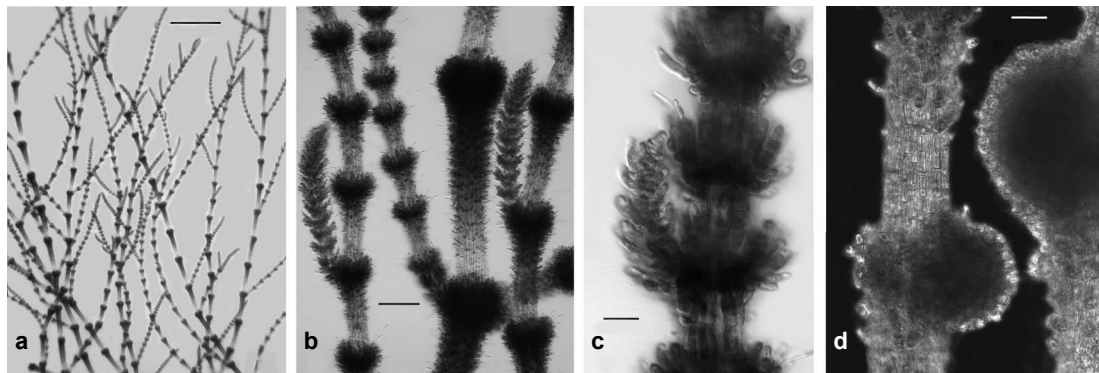
In the collected material the thalli were monoeocious, ca 3–6 cm high, dark green, poorly mucilaginous, with typical obovoid reduced whorls, numerous secondary fascicles, regular cortication with cylindrical cells only, single well-developed hemispherical carposporophytes having sessile elongated trichogynes, and rare antheridia located terminally on fascicles.

This record for *Batrachospermum atrum* is the first for Poland. Starmach (1984) reported it from

one locality, the outlet of a mountain peat bog in Zieleniec village in the Bystrzyckie Mts (Sudeten Mts). However, the photographs as well as drawings in Starmach's report show clearly that the taxon identified as *B. atrum* is *B. keratophyllum* Bory (sect. *Turfosa*), with typical thallus structure, carposporogonial branch and carposporophyte (Starmach 1984, Fig. 1, Phot. 1–4). That species is close to *Batrachospermum turfosum* Bory, which also belongs to sect. *Turfosa* (Eloranta *et al.* 2011). *Batrachospermum turfosum* does not have carposporophytes (they are aborted) and it also has monospores. Thus both *B. turfosum* and *B. keratophyllum* are typical for peat bog waters.

*Batrachospermum atrum* occurs in clean and also eutrophic environments but prefers higher alkalinity and calcareous waters. In a eutrophic environment it often occurs in masses. Most often it occurs in running waters but can be found in lakes and pools: Lake Vättern in Sweden on stalks of *Equisetum* sp. and *Scirpus* sp. (Israelson 1942); Blue Pool (Berkshire) and Giant's Grave Spring (Cambridge) in Great Britain with *B. arcuatum* and *B. gelatinosum* (J. Kwadrans & D. John, unpublished). In Europe the species is known from Belgium, Finland, France, Germany, Portugal, Sweden and the UK, but is not very common in any of those countries (Starmach 1977; Kumano 2002; Eloranta *et al.* 2011).

According to Israelson (1942), *Batrachospermum atrum* was found in Sweden at 33 locations, all of them lowlands with somewhat higher productivity and alkaline water. In Finland it is known from 3 locations, also lowlands and with higher trophic conditions (Eloranta & Kwadrans 2007). In the northernmost Finnish location in the Jolosjoki River (65°08'N, 25°41'E), water pH was 6.4, conductivity 47  $\mu\text{S cm}^{-1}$ , TN 1.25 mg l<sup>-1</sup>, TP 52  $\mu\text{g l}^{-1}$  and water color 280 mg l<sup>-1</sup> Pt (Environment Data Bank/OIVA, Finnish Environment Institute 2010). The water at two locations in Great Britain had pH 7.3 and conductivity 609–676  $\mu\text{S cm}^{-1}$  (J. Kwadrans & D. John, unpublished). The values at six sites (rivers and streams) in England, Ireland and Scotland were pH 6.8–8.6, conductivity 60–460  $\mu\text{S cm}^{-1}$  and current velocity 20–74 cm s<sup>-1</sup> (Sheath & Sherwood 2011).



**Fig. 3.** *Batrachospermum atrum* (Hudson) Harvey. a – habitus, b – thalli with characteristic reduced whorls and branching, c – main axis with whorls and apex of new branch, d – main axes with two hemispherical carposporophytes. Scale bars: a – 1 mm, b – 100 µm, c & d – 20 µm (Photo P. Eloranta).

The ‘Red data list of algae in Poland’ (Siemińska *et al.* 2006) categorized *Batrachospermum atrum* as a rare species (taxa not endangered or vulnerable but at risk). Similarly, in Finland *B. atrum* is one of 12 algal species in the near threatened (NT) category (Rassi *et al.* 2001).

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