

Distribution and ecology of *Biatoridium monasteriense* J. Lahm ex Körb in Poland

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Abstract

A new site of *Biatoridium monasteriense* was discovered during a lichenological investigation in Białowieża National Park. The paper presents information on the distribution of this species in Poland.

Keywords: Białowieża Forest, *Biatoridium*, lichens, Poland

Introduction

Biatoridium monasteriense is a very rare lichen in Poland. It is one of only two known representatives of the genus *Biatoridium* J. Lahm ex Körb. which have been found in only a few places in Europe. It is characterized by a bright, cream apothecia, a green, minutely areolate thallus, and grows in shady and damp places. *Biatoridium monasteriense* is very similar to *B. delitescens* (Arnold) Hafellner. The latter, however, is distinguished by a very bright yellow apothecia and a very thin, almost invisible thallus [1]. This species has not yet been found in Poland, and its nearest site can be found in Germany.

During the lichenological research conducted in Białowieża National Park another site of *Biatoridium monasteriense* in Poland was found. The paper provides information on the distribution of the species in Poland, based on historical and current data, and its environmental characteristics.

Material and methods

The data on the occurrence of *Biatoridium monasteriense* J. Lahm ex Körb. [*Biatora monasteriensis* (J. Lahm) Müll. Arg., *Biatorella monasteriensis* (J. Lahm ex Körb.) J. Lahm, *B. elegans* (Hepp) Reinke, *B. resiniae* sensu Mudd p.p., *Lecidea monasteriensis* (J. Lahm) Nyl.] in Poland were taken from published literature and from the author's own field research conducted in Białowieża National Park in 2009. The data were divided into two time periods. The first period includes information on

the presence of *B. monasteriense* in the past, that is until 1990. The second period includes information about the currently existing localities recorded during the last 20 years. Sites of the species are presented on a map of Poland divided into squares in the ATPOL system [2]. In the case of two historical sites the ATPOL square could not be accurately determined, and so the sites are marked with the symbol "?".

A specimen has been deposited in the Herbarium of Jan Kochanowski University (KTC).

Results and discussion

Distribution in Poland

In the past the species was known from eight sites (Fig. 1). Two of them do not have an exact location. These are the sites mentioned in the work by Eichler [3,4] – in the surroundings of Międzyrzec (probably the ATPOL square Df48) and in the work by Magnusson [5,6] – in the surroundings of Rybnik in Silesia (probably the ATPOL square Fc69). The next two sites were located in Borecka Forest – the forestry Knieja, forest section No. 4 and near the lake Łękuk (the ATPOL squares Bf03, Bf13; [1,7]). Other sites determined before 1990 were located in the southern part of Poland: the Western Bieszczady Mts – by the Wołosaty stream; (the ATPOL square Gf59; [8]), the Beskid Śląski Mts – Malinowska rock (the ATPOL square Gd13; [9]), the Pogórze Spiskie – by the Piekienik stream (the ATPOL square Ge41; [10]), and the Gorc Mts – Gorc Kamienicki (the ATPOL square Ge12; [11]).

Currently the species has been found at two sites in the northern and north-eastern part of Poland, i.e. in the Gdańsk Pomerania – N of Wejherowo by the Reda river (the ATPOL square Ac58; [12]), the Północnomazowiecka Lowland – in the Dziektarzewo nature reserve (the ATPOL square Ce61; [13]), Borecka Forest – forestry Lipowo (the ATPOL square Bf13; [14,15]) and at two sites in the southern part of Poland in the Western Bieszczady Mts – Wołosate (the ATPOL square Gg70; Kościelniak 2010, unpublished data, see also [16]) and

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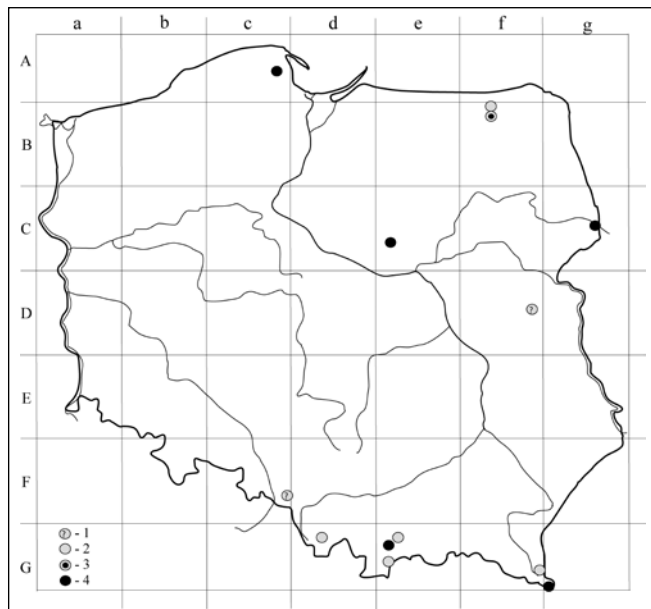


Fig. 1 Distribution of *Biatoridium monasteriense* J. Lahm ex Körb. in Poland. Site: 1 – historical of possible location; 2 – historical; 3 – historical and currently existing; 4 – currently existing.

Gorce Mts – Gorce National Park (five records of the species; the ATPOL square Ge21; [17]).

The new site of the species was found in the eastern part of Poland in Białowieża National Park.

New location

Specimen examined: Poland, Białowieża Forest, Białowieża National Park, forest section No. 372, on the bark of *Carpinus betulus*, 2009.06.24 (the ATPOL square Cg46; KTC). The species was growing in the company of: *Arthothelium ruanum*, *Pyrenula nitida*, *P. nitidella*, *Opegrapha vermicellifera* and *O. vulgata*.

Morphology

The specimens of *Biatoridium monasteriense* found in Białowieża National Park are characterized by a very well formed thallus. It is thickly granular, widespread and without clear boundaries. When the thallus is dry it is a green-grey colour when it is wet the colour changes to bright-green. The apothecia are very numerous and are scattered all over the thallus. Young apothecia are stuck slightly into the thallus, the older ones are in the sitting position. Apothecia achieve diameters of 0.3–0.5 mm. Apothecia are pale pink or yellowish when dry or almost colourless and translucent when wet. The discs of the apothecia are flat or slightly convex and are surrounded by a clearly visible thin margin. Under the influence of dampness the discs become convex. The hypothecium in the apothecia is yellowish and approximately 40–80 nm thick and very convex. The hymenium is colourless and about 60–80 nm thick. The hypothecium and hymenium become blue-coloured from J+. Asci in the apothecia are narrowly-clavate and have from 100 to 200 spherical spores of 3–3.5 nm diameter.

European distribution

The species is widespread in Europe (Fig. 2), but in every place it is a rather rare lichen. It has been found in: Austria [18], Belgium [19], Croatia [20], the Czech Republic [21], Estonia [22], Finland [23], Germany [24], Great Britain and Ireland

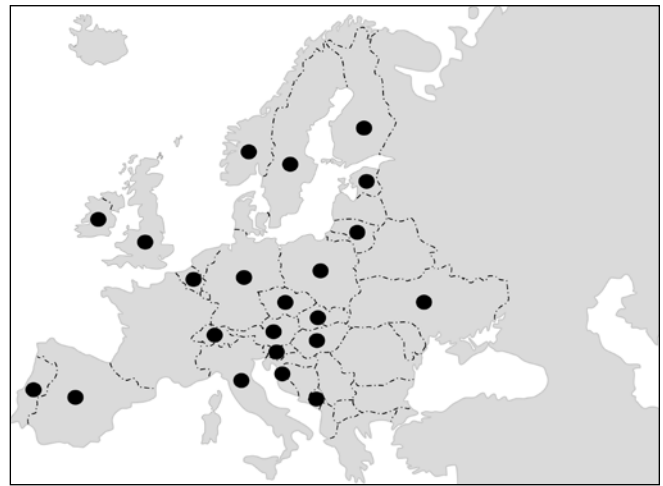


Fig. 2 The occurrence of *Biatoridium monasteriense* J. Lahm ex Körb. in Europe.

[25], Hungary [26], Italy [27], Lithuania [28], Montenegro [29], Portugal [30], Slovakia [31], Slovenia [32], Spain [33], Sweden and Norway [34], Switzerland [35], and Ukraine [36]. Apart from Europe the species is also known in India [37].

Ecology

In the foreign literature *Biatoridium monasteriense* is described as a species which grows in the shade, on base-rich bark of broadleaved trees such as *Ulmus glabra*, *Fraxinus excelsior*, *Alnus glutinosa*, *Sambucus nigra*, *Quercus* sp., *Tilia* sp., or *Corylus avellana* in sheltered ancient woodland habitats, often in stream valleys. It usually grows in crevices in the bark. On the few Polish sites this species usually grows in damp and shady places, often near streams, on the bark of trees such as *Fagus sylvatica*, *Fraxinus excelsior*, *Acer pseudoplatanus*, *Alnus glutinosa*, *Ulmus glabra* and *Picea abies*. It grows in natural beech, alder, beech-fir or riparian forests. *B. monasteriense* has been found at different heights above sea level, both in the lowlands and in mountainous terrain (up to 1140 m a.s.l.).

B. monasteriense appears to be selective for bark chemistry – pH and nutrient levels and physical bark characteristics – porosity and water absorption. It prefers shade and is moisture-demanding, and therefore it is often found growing along sheltered crevices at the lower parts of the tree trunks.

Threat

Because of its rarity, this species is considered threatened in many countries. It is Critically Endangered (CR) in Slovakia [38], Endangered (EN) in Great Britain [39], Vulnerable (VU) in the Czech Republic [21] and Austria [40] and Least Concern (LC) in Switzerland [41] and Sweden [42]. In Poland the species is also placed in the category Near Threatened (NT) [43]. Sites of *Biatoridium monasteriense* are generally situated in well-preserved forest communities. Therefore, it is regarded as an indicator of the ecological continuity of forests in some countries, e.g. in Sweden [44].

Present sites of the species on Polish territory have also been found in forests of natural character. The attachment of the species to habitats associated with old forests, and its occasional occurrence on such sites, shows that it is a highly stenotopic lichen. In the Białowieża National Park, on the site where *B. monasteriense* was found, there are other very rare species, such as *Opegrapha vermicellifera*, *O. viridis*, *Pyrenula*

nitidella, *Chrysothrix candelaris*, and *Chaenotheca brachypoda*. Possibly *B. monasteriense*, like other stenotopic species, belongs to a group of lichens which are indicators of the ecological continuity of primeval forests. It possesses characteristics of species which are indicators of natural lowland old-growth forest [45], i.e. it is a stenotopic lichen with strict ecological amplitude and occurs only in natural forests. It is advisable to add this species to the list of those which require special care and monitoring research.

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