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SHORT COMMUNICATION

New and interesting lichen records from northeastern Poland

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Abstract
Details are given of the occurrence of three rarely reported and poorly known lichen species from Poland area. Brief taxonomic, distributional, and ecological notes of *Agonimia flabelliformis*, *Bacidia pycnidiata*, and *Vezdaea aestivalis* have been provided. *Agonimia flabelliformis* have been reported for the first time from the northeastern part of Poland and *B. pycnidiata* from the northern part of the country. *Vezdaea aestivalis* has been rediscovered in northeastern Poland, nearly 150 years after its first and only recording in the region.

Keywords
lichenized fungi; rare species, distribution; new localities; NE Poland

Introduction

The northeastern part of Poland is a relatively well-preserved natural environment with a cultural landscape. Compared to other lowland areas of the country, this region is characterized by high species diversity of different groups of organisms, including lichens [1]. At the supra-regional scale, very important refuges for the diversity of lichen species are the large forest complexes of this region. They provide important habitats for a diverse group of stenotopic forest lichens, rarely observed or even absent in other parts of the country [2–5]. However, the state of scientific knowledge on diversity of lichen species in this region is still unsatisfactory. Over the last 10 years, studies on the lichen biota in forest ecosystems in this area has been intensified, and resulted in finding of many interesting taxa, including some that are new to the country [6–8]. In our paper, new localities of three noteworthy lichen species, occurring in Poland in very limited amounts, are presented. Our data will contribute to a better understanding of the habitat requirements and population dynamics of these species.

Material and methods

Lichen specimens described in the present paper was collected in years 2010–2016 as a result of different research projects, realized in the best preserved forest complexes of the Pojezierze Mazurskie Lakeland [9]. The collected specimens were evaluated using standard methods [9]. Identification of sterile specimens was supported by TLC analyses of secondary metabolites [10]. The distribution of the taxa examined is given in the ATPOL grid square system [11], modified by Cieśliński and Fałtynowicz [12]. The collected material is deposited in the herbarium of the Department of Mycology UWM in Olsztyn (OLTC). Abbreviations: FD – forest division, fs – forest section, NR – nature reserve.

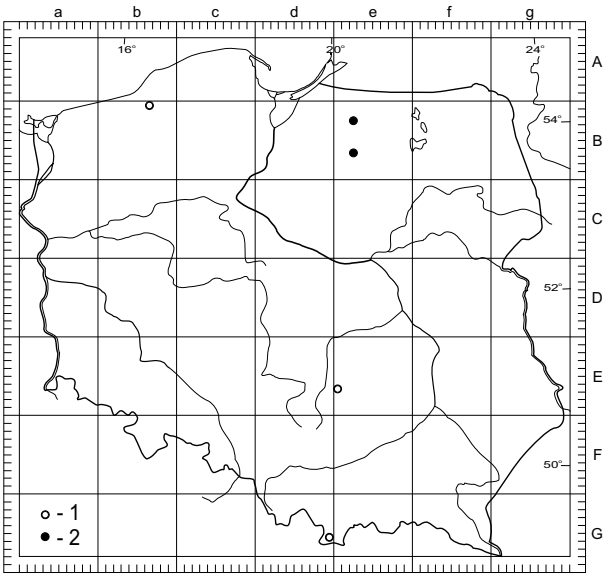

Fig. 1 Distribution of *Agonimia flabelliformis* in Poland. 1 – known localities; 2 – new localities.

Results and discussion

Agonimia flabelliformis Halda, Czarnota & Guzow-Krzemińska

This recently described species [13] is distinguished by distinctly raised, coralloid to palmate (flabelliform) thallus (bright green to pale brown-green) and globose, smooth perithecia (pale brown to dull grey-brown) with eight-spored asci. *Agonimia flabelliformis* is most similar to *A. allobata* due to comparable perithecia, however, the latter species has usually warted to subsquamulouse thallus [13].

Agonimia flabelliformis prefers humid, shaded, mossy places within deciduous forest ecosystems, where it usually grows epibryophytically over bark (at the base of trees and their roots) or occasionally on soil, rocks, wood, or plant debris [13–17]. At the new collection sites, the species was growing on corticolous bryophytes (*Hypnum cupressiforme*) and directly on bark at the base of mature oak trees.

So far *A. flabelliformis* is known only from Europe, where it has a wide range of occurrence. It has been found in Great Britain, Germany, the Czech Republic, Slovakia, Poland, Lithuania, and Russia [13,14,18,19]. In Poland, it has been noted in only three localities (Fig. 1), in southern [14], central [15], and northwestern parts of the country [20].

The specimens examined. Be-22: Pojezierze Olsztyńskie Lakeland, Wichrowo FD, fs No. 403h, 54°02′04.2″ N, 20°23′36.9″ E, on *Quercus robur*, 20 May 2010, leg. D. Kubiak (OLTC L-3567). Be-62: Pojezierze Olsztyńskie Lakeland, Nowe Ramuki FD, fs No. 234b, 53°40′35.0″ N, 20°25′54.6″ E, on *Q. robur*, 4 Oct. 2014, leg. D. Kubiak (OLTC L-3624).

Bacidia pycnidiata Czarnota & Coppins

Bacidia pycnidiata is a very characteristic member of the genus due to its long-necked whitish or cream pycnidia (usually immersed within green, minutely granular thallus), and more or less straight macroconidia [21]. Very similar pycnidia appear occasionally in *Fellhanera subtilis* (Vězda) Diederich & Sérus., however, conidia in the latter species are short and pyriform, and its thallus is smooth to scurfy.

The species shows preference for moderately shaded, old-growth or undisturbed broad-leaved forests, where it grows on the mossy bark of deciduous trees, and very rarely on mossy soil or limestone [22]. In Poland, it has been noted in forests on the trunks of *Fraxinus excelsior* and *Quercus* sp. [23,24] as well as on the moribund thallus of *Peltigera didactyla* in dry sandy habitats [25]. Some data from strongly industrialized regions of the Czech Republic and southern Poland suggest that *B. pycnidiata* could be a synanthropic species. The species usually occurs there in anthropogenic habitats, where prefers humid niches [21,25,26]. At the new collection site, the species was growing in an anamorphic state only on corticolous bryophytes at the base of a mature oak tree within old-growth oak forest.

Bacidia pycnidiata is found mainly in Central Europe. It has been reported in Belgium, the Czech Republic, Slovakia, Poland, Lithuania, Estonia, Finland, Ukraine, and Russia [22,27]. In Poland, it has so far been reported at five localities (Fig. 2) in the uplands and the mountainous regions in the southern part of the country [21,23,25].

The specimen examined. Be-63: Pojezierze Olsztyńskie Lakeland, Nowe Ramuki FD, fs No. 101f, 53°40′37″ N, 20°31′48″E, on *Q. robur*, 12 Mar. 2016, leg. D. Kubiak (OLTCL-3627).

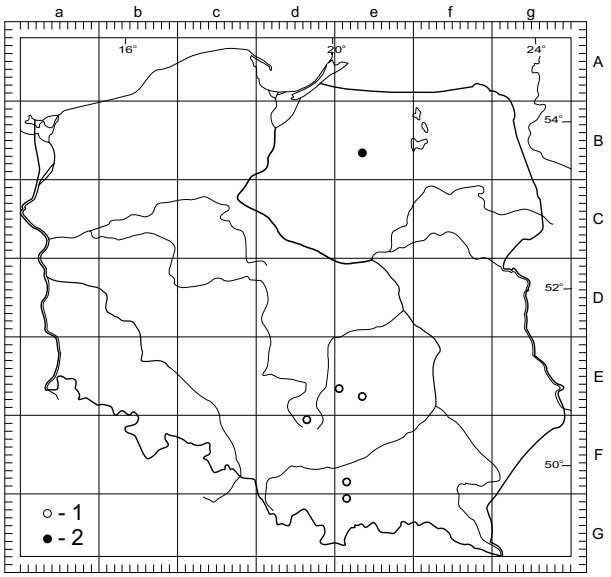

Fig. 2 Distribution of *Bacidia pycnidiata* in Poland. 1 – known localities; 2 – new locality.

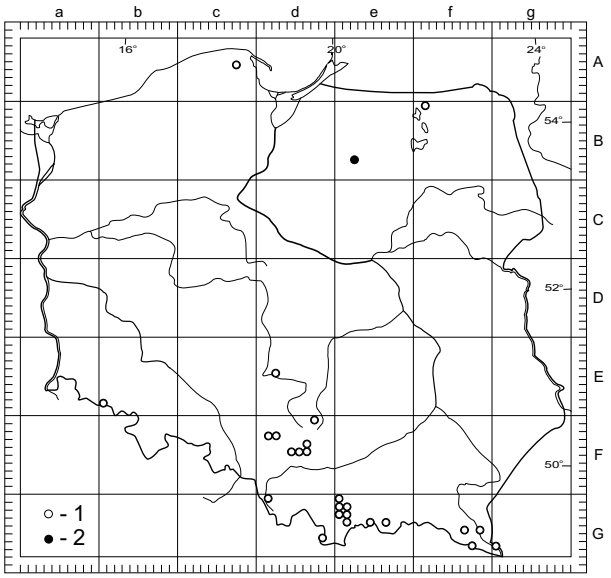

Fig. 3 Distribution of *Vezdaea aestivalis* in Poland. 1 – known localities; 2 – new locality.

Vezdaea aestivalis (Ohlert) Tscherm.-Woess & Poelt

This is the largest and most conspicuous species of the genus *Vezdaea* [28], distinguished from other species by relatively large apothecia (up to 1 mm in diam.) and certain anatomical characteristics [e.g., paraphyses closely clasp the asci, 1(–3)-septate and verrucose spores, goniocysts with short conical spines] [29]. *Vezdaea aestivalis* superficially resembles the *Micarea* species, but short-lived convex tomentose apothecia without exciple and hypothecium are diagnostic characteristics [30].

The species has been found in Europe (Belarus, the British Isles, the Czech Republic, Denmark, Estonia, Germany, Lithuania, Poland, Romania, Russia, Slovakia, Spain) and Australia [28,31,32]. The first report of *V. aestivalis* within Polish territory (as *Lecidea aestivalis* Ohlert) comes from the nineteenth century [33], but for more than one hundred years there were no new sightings recorded. Since the last report from Alstrup and Olech [34], many new localities with it have been published. *Vezdaea aestivalis* is currently known to be in dozens of localities in the southern part of the country (upland and mountainous areas), but only one report has come from the northern part [35–38]. The species has been studied in detail and mapped in Poland by Czarnota and Kiszka [35] and Czarnota and Kukwa [29].

Vezdaea astivalis has a huge ecological plasticity. It is found on mosses, terricolous lichens and plant remains amongst or on rocks (mainly calcareous), in limestone grassland, on walls, rubble, building ruins, and waste ground. It has also been found in shaded or moist sites, and amongst mosses on trees with base-rich bark [35]. In Poland, the species has been noted both in habitats strongly influenced by human activities, e.g., abandoned zinc-lead mines and piles of old artificial fertilizers [37,38], and undisturbed areas, e.g., natural forests [35]. The specimen presented in this paper is an example of the latter situation; it was found at the base of a mature oak between corticolous bryophytes (*Pylaisia polyantha*), in an oak-hornbeam forest.

The specimen examined. Be-62: Pojezierze Olsztyńskie Lakeland, Nowe Ramuki FD, fs No. 784g, 53°36′49″ N, 20°27′36″ E, on a trunk of *Q. robur*, 3 Oct. 2015, leg. D. Kubiak (OLTC L-3625).

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