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Parmelia ernstiae and *P. serrana*
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New records of *Parmelia ernstiae* and *P. serrana* (Ascomycota, Parmeliaceae) in Poland

Emilia Ossowska^{1*}, Katarzyna Szczepańska², Maria Kossowska³¹ Department of Plant Taxonomy and Nature Conservation, University of Gdańsk, Wita Stwosza 59, 80-308 Gdańsk, Poland² Department of Botany and Plant Ecology, Wrocław University of Environmental and Life Sciences, pl. Grunwaldzki 24a, 50-363 Wrocław, Poland³ Laboratory of Lichenology, Department of Botany, Institute of Environmental Biology, University of Wrocław, Kanonia 6/8, 50-328 Wrocław, Poland* Corresponding author. Email: emilia.ossowska@biol.ug.edu.pl**Abstract**

The paper reports new localities of lichens *Parmelia ernstiae* and *P. serrana* in Poland. Both species are reported for the first time from the Polish part of the Sudety Mountains (southwestern part of the country). The new localities were found in the area of the Sowie Mountains (central part of the Sudety Mts) as well as Śnieżnik Massif and Bialskie Mountains (eastern part of the Sudety Mts). Most of the recorded specimens were associated with the bark of *Acer platanoides* and *A. pseudo-platanus*. *Parmelia ernstiae* and *P. serrana* are still poorly known species in Poland and often confused with similar taxon *P. saxatilis*. Therefore the morphological characteristics, chemical properties, ecology and distribution of these species are presented and briefly discussed.

Keywords

lichenized fungi; parmelioid lichens; biodiversity; distribution; Sudety Mts

Introduction

The genus *Parmelia* belongs to Parmeliaceae, the largest family of lichenized fungi [1,2]. Generally, members of this genus are characterized by foliose, loosely to closely adnate thalli. Upper surface is grey, whitish grey to greyish brown, smooth to foveolate, sometimes pruinose, with white, linear pseudocyphellae. Lower surface is black with simple or branched rhizines. Soredia and/or isidia are developed on the upper surface in most species [3–5]. In terms of chemistry, atranorin constitute the main cortical secondary metabolite. The species produce also salazinic, consalazinic, lobaric, protocetraric and galbanic acids as well as fatty acids (e.g., lichesterinic acid) in various combinations [3–5].

Seven species of *Parmelia* have been reported from Poland so far, i.e., *Parmelia discordans* Nyl., *P. ernstiae* Feurer & A. Thell, *P. omphalodes* (L.) Ach., *P. saxatilis* (L.) Ach., *P. serrana* A. Crespo, M.C. Molina & D. Hawksw., *P. submontana* Nádv. ex Hale, and *P. sulcata* Taylor. [6–11]. They differ primarily in terms of chemical properties (e.g., production of fatty acids) and also some morphological features, such as pruinosity of upper surface and the shape of rhizines. *Parmelia ernstiae* and *P. serrana* have been recognized in Poland relatively recently, in 2012 and 2014, respectively [9,11]. Therefore, their detail distribution and frequency of occurrence in Poland is still poorly known. Historical and contemporary reports on lichens from the Sudety Mountains are quite numerous (e.g., [12–24]), but the presence of these two *Parmelia* species in the Polish part of this mountain range was not documented until now.

This paper bridge the gap in their distribution in Poland and presents new localities, which have been recently discovered in the Sudety Mts. Additionally notes about morphology, chemistry, distribution and habitat requirements of these species are also provided.

Material and methods

The present study is based on material which is available in Polish lichen herbaria: LOD, UGDA, WRSL and herb. Szczepańska. The morphology of the specimens were examined under a stereomicroscope for: color and structure (pruinosity or epruinosity) on the upper surface, shape of lobes, shape of rhizines, location of pseudocyphellae, shape and location of isidia. Brief descriptions of the species provided in this paper are based on personal observations. The lichen substances were examined by thin-layer chromatography (TLC) in solvent A and C; the methodology follows Orange et al. [25] and Kubiak and Kukwa [26]. Localities of examined specimens are mapped according to the ATPOL grid square system [27], modified by Cieśliński and Fałtynowicz [28].

Results and discussion

Parmelia ernstiae Feurer & A. Thell

Mitt. Inst. Allg. Bot. Hamburg 30–32: 52. 2002.

Morphology. *Parmelia ernstiae* is distinguished by the strong pruinose upper surface, isidia and short, broad and not overlapping lobes. Pseudocyphellae are short, white, linear and narrow. In the central parts of the thalli cylindrical isidia are developed. Additionally, small lobulae are often present on the upper surface. Lower surface is black with simple rhizines (see also [4,5,29,30]).

Chemistry. The species is characterized by the production of atranorin, salazinic, consalazinic, protocetraric and lobaric acids as well as fatty acids (e.g., lichesterinic and protolichesterinic) [5,29,30]. In examined specimens all substances, except protocetraric, isonephrosterinic and nephrosterinic acids (probably due to their low quantity) were detected (see also [9,10]).

Notes. *Parmelia ernstiae* is distinguished from morphologically similar taxa by the strong pruinose upper surface and isidia. *Parmelia saxatilis* is softly pruinose whereas *P. serrana* has epruinose upper surface. *Parmelia ernstiae* can be also easily separated from *P. saxatilis* and *P. serrana* based on the chemical properties of the species. It produces lobaric acid (absent in *P. serrana*) and the fatty acids (absent in *P. saxatilis*) [5,29,30].

Habitat requirements. *Parmelia ernstiae* is typically corticolous lichen. In the Sudety Mts it was found on the bark of deciduous trees: *Acer pseudoplatanus* and *A. platanoides*.

General distribution. Generally, *Parmelia ernstiae* is known from Europe, Asia and Africa. It has been reported from: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Ireland, Lithuania, Luxemburg, the Netherlands, Slovenia, Sweden, Spain [5,8,29–35]. Outside Europe it has been reported from NW part of Russia, Algeria and the Canary Islands [8,31].

Distribution in Poland. The species was reported firstly from the Drawskie Lakeland [9] and later from the Elbląska High Plain and the Sławieńska Plain [10]. Eight

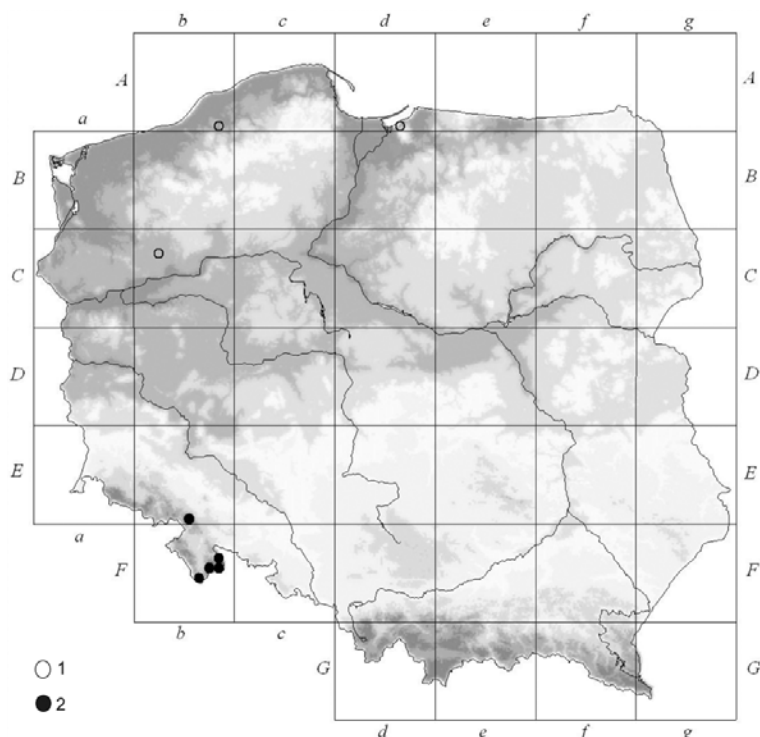


Fig. 1 Distribution of *Parmelia ernstiae* in Poland. 1 – localities reported by Kukwa et al. [9] and Ossowska, Kukwa [10]; 2 – new localities.

localities of *P. ernstiae* in the Sudety Mts are presented in this paper. The localities are situated in the Sowie Mountains as well as in the Śnieżnik Massif and Bialskie Mountains (Fig. 1).

Specimens examined. **Eb-95:** Sudety Mts, Sowie Mts, near Kamionki residential, on *Acer* sp., 24 Mar. 2015, leg. E. Ossowska, K. Szczepańska, A. Szczepański (UGDA-L); Sudety Mts, Sowie Mts, on *Acer* sp., 24 Mar. 2015, leg. E. Ossowska, K. Szczepańska, A. Szczepański (UGDA-L). **Fb-38:** Sudety Mts, Bialskie Mts, Nowy Gierałtów village, on *Acer platanoides*, 27 Jul. 2003, leg. K. Szczepańska (WRSL-512). **Fb-47:** Sudety Mts, Śnieżnik Massif, Wilczka stream valley, on *Acer pseudoplatanus*, 10 Jul. 2003, leg. K. Szczepańska (WRSL-2573). **Fb-48:** Sudety Mts, Bialskie Mts, Śnieżna Białka nature reserve, on tree, 23 Aug. 1993, leg. E. Koziół (WRSL); Sudety Mts, Bialskie Mts, Puszcza Jaworowa nature reserve, on *Acer pseudoplatanus*, 8 Jul. 2003, leg. K. Szczepańska (WRSL-1030); Sudety Mts, Bialskie Mts, Młynkówka stream valley, on *Acer platanoides*, 6 Aug. 2003, leg. K. Szczepańska

(WRSL-352); Sudety Mts, Śnieżnik Massif, Road below Leje, alt. ca. 760 m, on *Acer pseudoplatanus*, 27 May 2004, leg. K. Szczepańska 121 (herb. Szczepańska). **Fb-56:** Sudety Mts, Śnieżnik Massif, road between Pisary and Potoczek villages, on *Acer platanoides*, 21 Aug. 2003, leg. K. Szczepańska (WRSL-1129).

Parmelia serrana A. Crespo, M.C. Molina & D. Hawksw.

Lichenologist 36(1): 48 (2004).

Morphology. *Parmelia serrana* is distinguished by epruinose upper surface (occasionally the lobes are softly pruinose) with short, broad and sometimes overlapping lobes. White, linear or irregular pseudocyphellae are developed on the upper surface and also on the margins of lobes. Cylindrical isidia are concentrated along ridges of the thalli. Lower surface is black with simple or branched rhizines (see also [4,5,33]).

Chemistry. The species is characterized by the production of atranorin, salazinic, consalazinic and protocetraric acids as well as fatty acids, e.g., lichesterinic and protolichesterinic. In examined material from Sudety Mts protocetraric, nephrosterinic and isonephrosterinic acids were not confirmed, probably due to their low quantity (see also [11,33]).

Notes. *Parmelia serrana* can be distinguished from *P. ernstiae* by epruinose upper surface and isidia concentrated to the ridges. The species can be also confused with *P. saxatilis* which has softly pruinose upper surface and sublinear lobes. Moreover, those three species differ in terms of chemical properties. *Parmelia serrana* produces fatty acids (absent in *P. saxatilis*) and does not produce lobaric acid (present in *P. saxatilis* and *P. ernstiae*) [5,29,33].

Habitat requirements. *Parmelia serrana* is corticolous lichen and all specimens found in the Sudety Mts were growing on the bark of *Acer pseudoplatanus* and *Fraxinus excelsior*.

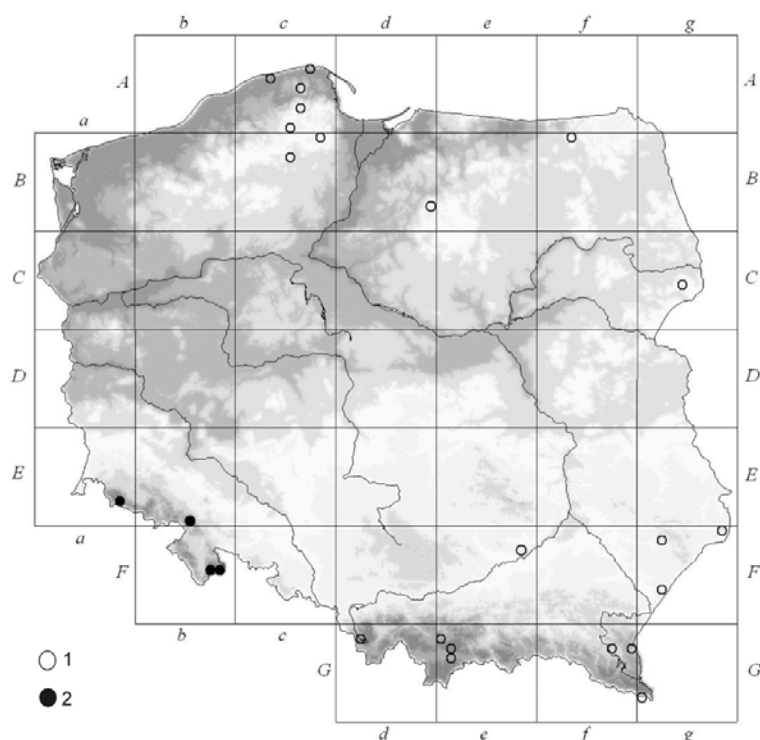


Fig. 2 Distribution of *Parmelia serrana* in Poland. 1 – localities reported by Ossowska et al. [11]; 2 – new localities.

General distribution. *Parmelia serrana* has been reported from Austria, Germany, Finland, Spain, Sweden and Ukraine [5,9,33,35]. The species is known also from NW part of Russia and the Canary Islands [33,35].

Distribution in Poland. The species was known only from the southeastern and northern part of Poland until now [11] and six localities from southwestern Poland presented here are in addition to its distribution in the country (Fig. 2).

Specimens examined. Ea-78: Sudety Mts, Karkonosze Mts, Szklarska Poręba town, Kilińskiego street, on *Fraxinus excelsior*, 3 May 1998, leg. M. Ratajczak (LOD-10429).

Eb-95: Sudety Mts, Sowie Mts, near Kamionki residential, on *Acer* sp., 24 Mar. 2015, leg. E. Ossowska, K. Szczepańska, A. Szczepański (UGDA-L); Sudety Mts, Sowie Mts, near Kamionki residential, on *Acer* sp., 24 Mar. 2015, leg. E. Ossowska, K. Szczepańska, A. Szczepański (UGDA-L); Sudety Mts, Sowie Mts, by the road to Walim village, on branch of tree, 24 Mar.

2015, leg. E. Ossowska, K. Szczepańska, A. Szczepański (UGDA-L). **Fb-47:** Sudety Mts, Śnieżnik Massif, Road under Leje, on *Acer pseudoplatanus*, 27 May 2004, leg. K. Szczepańska (WRS-440). **Fb-48:** Sudety Mts, Bialskie Mts, Rude Krzyże Mt, mixed forest, on *Acer pseudoplatanus*, 28 May 2004, leg. K. Szczepańska (WRS-1599).

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