

Flavoparmelia soledians new to Poland

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Abstract: OSET, M. & OTTE, V.: *Flavoparmelia soledians* new to Poland – Herzogia 34: 524–527.

A total of nearly 700 *Flavoparmelia* specimens from Poland were checked, complemented by recent field observations. Among them, nine specimens of *F. soledians* were revealed. Most of them were found in the last few years, but the oldest collections date back to the year 1964. These observations indicate a recent spread which may represent the effect of long-term climate change, with a considerable delay in the colonisation process due to persistent air pollution.

Zusammenfassung: OSET, M. & OTTE, V.: *Flavoparmelia soledians* neu für Polen. – Herzogia 34: 524–527.

Es wurden fast 700 *Flavoparmelia*-Belege aus Polen geprüft, ergänzt durch aktuelle Geländebeobachtungen. Darunter fanden sich neun Proben von *F. soledians*, die meisten aus der jüngsten Zeit, aber bis zum Jahre 1964 zurückreichend. Diese Beobachtungen sprechen für eine Ausbreitung in jüngerer Zeit könnte, die einen Effekt klimatischer Veränderungen eines längeren Zeitraums widerspiegeln könnte, mit einer starken Verzögerung im Kolonisierungsprozess infolge langandauernder Luftverschmutzung.

Key words: Distribution dynamics, climate change, air pollution dynamics.

Introduction

It was less than 25 years ago that *Flavoparmelia soledians* (Nyl.) Hale [as *Parmelia* s. Nyl.] was first reported from Germany; at a site located only a few kilometres from the Netherlands, where the species had first been found in 1990 and had then rapidly spread within a few years (SPIER 1998). It had since colonised other parts of western Germany as well but it was still extremely rare in the eastern parts of the country (WIRTH et al. 2013). More recently, it has been observed also at numerous eastern German sites (e.g. OTTE et al. 2018), and the last few years finally revealed also some dozens of records from the Oberlausitz region, the easternmost part of Germany close to the 15th meridian (VO, unpubl.). It was therefore not a surprise to finally encounter it also on the Polish site of the border in the same region. More remarkably, a subsequent thorough study of *Flavoparmelia* specimens collected in Poland revealed that it was present here for some decennia already, but was not recognised, being hidden under the labelling *F. caperata* (L.) Hale. Here, we give an overview on what we know on the distribution of the species in Poland to date.

Materials and methods

All available material of *Flavoparmelia* from Poland in the following Polish herbaria was studied: KRAM, KRAP, KTC, LOD, OLS, POZ, SLTC, SZUB and UGDA. In total, 658 specimens were examined by the first author. Moreover, our paper includes recent field observa-

tions of the second author from southwestern Poland, and 27 *Flavoparmelia* specimens from Poland available at GLM.

All samples were examined for anatomical, morphological and chemical characters. The morphological characters were studied using a stereomicroscope. Lichen metabolites were analyzed by thin layer chromatography (TLC) in solvent systems C, according to the methods proposed by CULBERSON & KRISTINSSON (1970) and ORANGE et al. (2001). All examined localities were mapped according to the ATPOL grid square system (see ZAJĄC 1978; modified by CIEŚLIŃSKI & FAŁTYNOWICZ 1993). Labels originally written in Polish or German were translated into English.

Results

Flavoparmelia soledians

Distribution in Poland: *Flavoparmelia soledians* was found at nine localities (Fig. 1).

Specimens examined: **Cc-27** – Kotlina Toruńska valley, near Bydgoszcz city, Żółtwin forest district, forest section no. 82fx, 53°04'42"N/18°07'55"E, on *Betula pendula*, 28.07.2020, R. Szymczyk s.n. (UGDA L-39421); **Cf-39** – Dolina Górnej Narwi valley, about 1 km N of Zawyki village, on wood, 27.08.1991, S. Cieśliński s.n. (KTC); **Ea-15** – Bory Dolnośląskie, Puszcza Zgorzelecka forest, by forest road "Alte Glaserberglinie", on twig of *Larix*, 51°21'26"N/15°03'E, 12.06.2021, leg. V. Otte (GLM-L-68411); outskirts of Polana village, abandoned orchard surrounded by forest, on *Prunus domestica*, 51°23'27"N/15°05'18"E, 12.06.2021, leg. V. Otte (GLM-L-68418); **Ea-16** – Bory Dolnośląskie near Olobok village, on *Quercus* at forest margin, 51°21'11.3"N/15°15'54.0"E, 26.09.2021, V. Otte (two individuals observed, one of them collected for GLM-L, so far s.n.); **Ea-25** – Bory Dolnośląskie, near Bielawa Dolna village, young oak forests, on oak, 51° 18.033' N/15° 3.458' E, 14.06.2020, leg. V. Otte (GLM-L-0064442) and 51°17.99'N/15°3.537'E, 14.06.2020, leg. V. Otte (GLM-L-0064486); **Ea-79** – Karkonosze Mts, between Cieplice Śląskie-Zdrój town and Podgórzyn town, in the alley at the junction of the road through the floodplain, 50°50.375'N/15°40.727'E, 16.07.2017, leg. V. Otte (GLM-L- 0049160); **Ee-47** – Przedgórze Iłżeckie foreland; Małyszyn village, forest section No. 103, about 7 km NE of Starachowice town, on *Quercus* sp., 08.1988, leg. A. Lenard s.n. (KTC); **Gd-32** – Beskid Żywiecki Mts, near Wielka Racza Mt., valley of the stream between Śrubita pass and Wielka Racza Mt., alt. ca. 717 m, on *Ulmus* sp., 09.08.1964, leg. J. Nowak s.n. (KRAM L-14437).

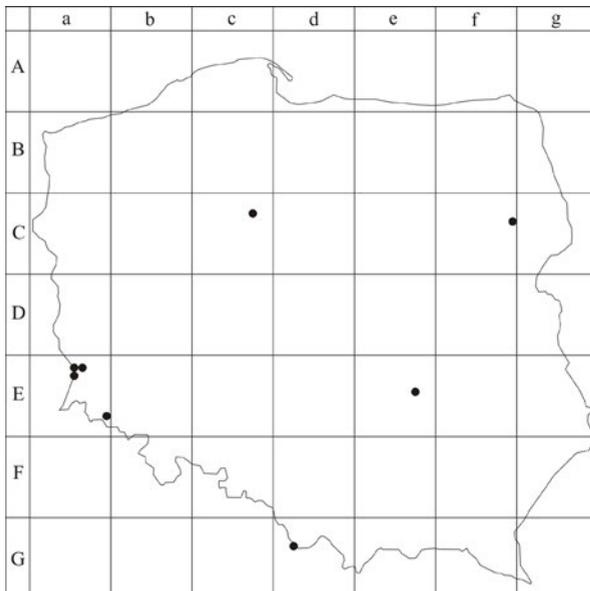


Fig. 1. Distribution of *Flavoparmelia soledians* in Poland

Discussion

Flavoparmelia soredians has been reported from several parts of the world; in particular such with Mediterranean-type climate, as e.g. southern Australia (ELIX 1994) and South Africa (THOMAS 1996), and from oceanic parts of Europe. POELT (1969) mentions it only for an area extending from the western Mediterranean to Ireland, and CLAUZADE & ROUX (1985) for “Atlantica k U-Mediterranea Regionoj”; thus, from a European perspective, the species appears representing a (sub)Mediterranean-(sub)Atlantic distribution type. At a first glance a recent advance eastward via the Netherlands and Germany to Poland, could be connected with climate change just toward milder winter temperatures.

The more remarkable are the results of the study of *Flavoparmelia* specimens from Poland that revealed presence of the species here back to the 1960ies. This may change our ideas on distribution and recent spread of *F. soredians* in Europe to some degree. It should be noted that the oldest specimen collected in 1964 is from southernmost Poland, near the Slovak border, and also the second oldest one, collected in 1988, is from southern Poland. Farther to the north, the species has been collected only in more recent years. From this perspective, its recent spread appears not just as an advance from the west to the east (possibly supported by milder winter temperatures), but simultaneously from the south to the north, which may be made possible by warmer climate. Also for *F. caperata*, SØCHTING (2004) referred to climate warming as a possible explanation for its recent spread in Denmark.

It should though not be overlooked that lichens containing usnic acid are among those particular sensitive to acidic air pollution (HAUCK & JÜRGENS 2008). Even for areas in southwestern Germany which were less affected by pollutants compared to the notorious “Black Triangle” region of the wider German-Polish-Czech border triangle, WIRTH (1995) reported *F. caperata* as “oft mit geschädigten Lagern oder absterbend” and only “in neuester Zeit gebietsweise sich erholend”. Due to industrial pollution, *F. caperata* had disappeared almost completely from vast areas of Germany north of the river Main until the 1990ies (ibidem), and *F. soredians* was not known there. The rapid recent spread of *F. soredians* might therefore not just indicate effects of climate change during recent years, but might also include “catching up” effects of colonisation in all those areas that may have become climatically suitable earlier, but where colonisation had been delayed by air pollution over several decennia. Supposing a movement from south to north, following gradual warming during the last 100 or more years, the areas becoming climatically suitable first would be the industrialized regions of southern East Germany, Bohemia and southern Poland that heavily suffered from air pollution during the 20th century. Explosive development of *F. soredians* in some of these areas during the last few years might be explained by the considerable climatic changes of a longer period and a delay in their colonisation caused by high SO₂ levels.

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