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Summary

Lungwort lichen, *Lobaria pulmonaria* (L.) Hoffm., was surveyed in the southwestern Baltic Area in 2016–2018. At each of the localities, the habitat ecology and lichen viability were investigated. A substantial decline was noted, particularly in Skåne. The commonest habitats for *L. pulmonaria* in southernmost Sweden are lime-maple and species-poor, oligotrophic beech forests, and the commonest substrates were trunks of beech and maple, followed by oak. *Lobaria pulmonaria* often survived on trees growing on rocky boulder-rich, meso- to oligotrophic soils in the upper part of steep slopes. Localities with a locally cool climate and a stable environment in terms of light, moisture and temperature, with only a minor influence of air pollution, agriculture and forestry practices are preferred. Current and historical distributions in Denmark, northern Germany, northwestern Poland and nemoral parts of Skåne, Blekinge, southwesternmost Småland and southern Öland are presented.

Inventory work 2016–2018

During three summers, an inventory for *Lobaria pulmonaria* was compiled for the nemoral zone of Sweden, from Skåne to southern Öland by checking localities reported to Artportalen (www.artportalen.se) after 1990. Literature and databases were consulted to study the historical distribution.

Distribution in the southwestern Baltic area

Lobaria pulmonaria has a very wide distribution range covering the Northern Hemisphere and Southern Africa (LITTERSKI 1999). It was formerly widespread in the nemoral zone of southern Sweden, Denmark and northern Germany, where it is now either extinct, rare or threatened. The species disappeared from southwestern Skåne a long time ago. Only a single specimen remains in southwestern Småland and a single transplanted specimen in southern Öland (SCHIEFELBEIN et al. 2016, 2017, SCHIEFELBEIN & THELL 2018, THELL & SCHIEFELBEIN 2018). It is very rare south of the Baltic Sea, being found in only 16 localities since 2000 (2 in Schleswig-Holstein, 3 in Mecklenburg-W Pomerania and 19 in NW Poland). To the south of these, the closest localities are in Rhön, a mountainous area in the border area between Bavaria, Hesse and Thuringia in the southwest, and at the Polish-Czech border in the southeast (HALDA 2006). It is extinct in the Netherlands, but in Denmark, although the last specimens in Zealand died a few years ago, it is recently found more often in Jutland.

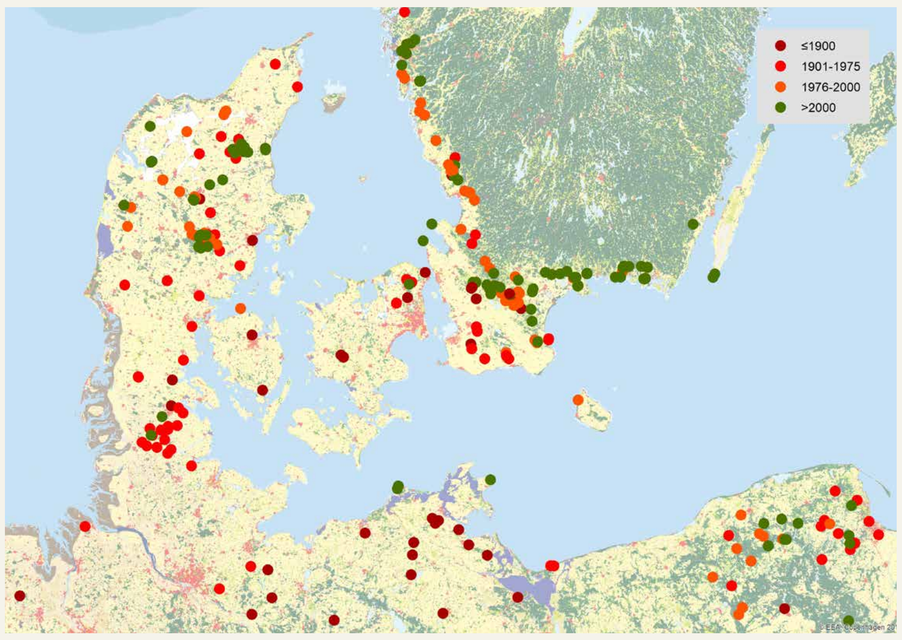
The distribution of *L. pulmonaria* in the nemoral zone was earlier much wider, as shown on the map of current and historical localities available in the databases Danmarks svampeatlas (www.svampeatlas.dk) Flechtendatenbank Mecklenburg-Vorpommern (www.flora-mv.de) and Sweden's Virtual Herbarium (www.herbarium.emg.umu.se), as well as in literature sources (KRAWIEC 1933, SAXEN 1963, IZYDOREK 1987, FAŁTYNOWICZ 1988, SØCHTING & CHRISTENSEN 1989, CHRISTENSEN & SØCHTING 1996, LITTERSKI 1999, FAŁTYNOWICZ & KUKWA 2000, FAŁTYNOWICZ ET AL. 2000, DOLNIK 2004, HALDA 2006, RYŚ 2005, 2007, SCHIEFELBEIN ET AL. 2016, 2017, SCHIEFELBEIN & THELL 2018, THELL & SCHIEFELBEIN 2018, NEUMANN & DOLNIK 2018)

Substrate in southernmost Sweden

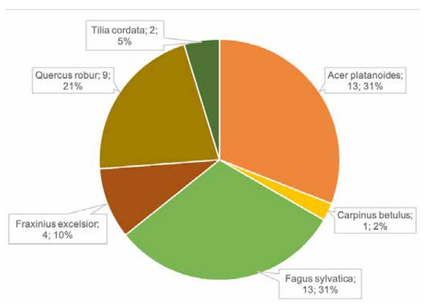
Lobaria pulmonaria was found on six different tree species. The commonest host tree is maple, *Acer platanoides,* and beech, *Fagus sylvatica*, followed by oak, *Quercus robur. Lobaria pulmonaria* was most frequently found on trees with a circumference between 100 and 150 cm at breast height. When *L. pulmonaria* grew on lime trees, *Tilia cordata*, the circumference exceeded 2 m, whereas it colonizes rather young or thin maples and hornbeams, *Carpinus betulus*.

Habitat in southernmost Sweden

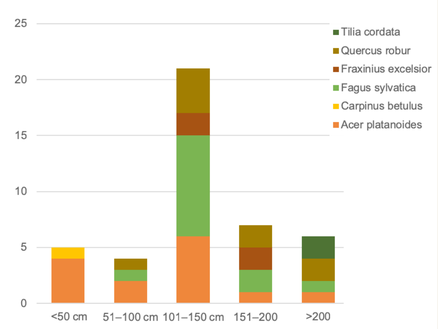
Lobaria pulmonaria is restricted to certain regions, habitats and locations where forest communities on rather nutrient-poor soils naturally dominate. In regions, where eutrophic beech forests or oak-hornbeam forests would form the natural vegetation cover, *L. pulmonaria* is now absent. 23 of the investigated localities and 42 host trees, respectively, are located in forests, and only two specimens are on trees in wooded meadows.



Historical and current distribution of *Lobaria pulmonaria* in the southwestern Baltic area based on literature, collections and reports.



Number of records and proportion (%) of *Lobaria pulmonaria* on different host tree species in southern Sweden.



Frequency of the circumferences of the host trees in southern Sweden. When *Lobaria pulmonaria* grew on lime trees the circumference exceeded 2 m, whereas it colonizes rather young or thin maples and hornbeams.

Climatic factors

Lobaria pulmonaria avoids very warm areas in Skåne and Blekinge, and occurs almost exclusively in regions where acidophilous beech or oak forests potentially form the natural vegetation. In contrast, the annual precipitation seems to have had less influence on its distribution in the study area.

Lobaria pulmonaria does not appear to be very tolerant to light in the study area, as it almost always occurs on half-shaded habitats, and only exceptionally in sunny or dark-shaded places. The sunny locations are wooded meadows, but here it occurs on the sheltered sides of trunks of very old trees, and on exposed trees at the lakeshore.

A further very important factor for the occurrence of *L. pulmonaria* is air humdity (e.g. GAUSLAA 2013). In the study area, favourable conditions for this occur almost exclusively in old growth forests, the only exceptions being localities on the Kullen Peninsula near the seashore and at Lake Ivösjön, where the air humidity is guaranteed by the adjacent waters.

Conclusion

Lobaria pulmonaria has survived in the study area almost entirely at very special sites offering a stable environment in terms of light, moisture and temperature, which has been little influenced by air pollution, agriculture and forestry practices.

Typical locality for *Lobaria pulmonaria*, half-shaded, just above the shelf of a steep rocky slope, seen here on a maple in Nättraby parish, Blekinge, southwestern Sweden.

Lobaria pulmonaria on a young maple in Nättraby parish, Blekinge, southwestern Sweden.

Lobaria pulmonaria on an old lime pollard in dense vegetation, the only specimen in southwesternmost Småland.

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