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The lichen genus *Myriospora* in the Baltic coastal zone of Germany

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Information on the ecology and distribution of *Myriospora* species in the Baltic coastal zone of Germany is provided. The three species (*M. myochroa, M. rhagadiza, M. smaragdula*) occurring in the study area are widely distributed, but show differences in frequency and distribution pattern. *Myriospora rhagadiza* is rather common but strictly restricted to the Baltic shoreline in contrast to the other two species.

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This paper is dedicated to Tassilo Feuerer (University of Hamburg) on the occasion of his retirement as curator of cryptogams in Hamburg.

Introduction

The genus *Myriospora* represents the former *Acarospora smaragdula* group, which is characterized by the pale, whitish, greyish to brownish irregular areoles or squamules, usually with several more or less punctiform, immersed apothecia and an algal layer that is disrupted at irregular intervals by bundles of medullary hyphae reaching the cortex above the algae (Arcadia & Knudsen 2012, Knudsen 2005, 2007, Roux & Navarro-Rosines 2011, Westberg et al. 2011). The species delimitation within the *Acarospora smaragdula* group was unclear for a long time, but the studies by Wedin et al. (2009) and Westberg et al. (2011) brought light into the darkness of this difficult complex.

Six species of this genus (*M. myochroa, M. rhagadiza, M. smaragdula, M. rufescens, M. dilatata* and *M. scabrida*) are known from Germany (Wirth et al. 2013), but the first four mentioned are reported from the northern German lowland where previously only *M. smaragdula* had been recognized before the studies by Westberg et al. (2011); however, Erichsen (1957) had already distinguished *Acarospora amphibola*, a species, which Westberg et al. (2011) re-established in the genus *Silobia* (= *Myriospora*) under the name *S. rhagadiza*. In Dolnik et al. (2012) recent records of *M. rhagadiza* were published under the name *Trimmatothelopsis versipellis* (Nyl.) Zschacke according to Roux & Navarro-Rosines (2011), who synonymized *Silobia rhagadiza* with that species. Arcadia & Knudsen (2012) synonymised *Trimmatothelopsis* with *Myriospora* and accepted *M. rhagadiza* as distinct from *M. versipellis* (Nyl.) K. Knudsen & L. Arcadia.
The first two authors of the current paper collected material on several excursions to the German Baltic coastal zone during systematic investigations of lichens which are strictly bound to saltwater or salt spray. The results of this work include new information on the occurrence and distribution of *Myriospora* species in northern Germany.

**Material and methods**

The study area comprises the Baltic coastal zone of Germany, which includes the Baltic shore and inland regions adjacent to the shore and indirectly influenced by the Baltic Sea. The material was collected during the study of coastal lichens and several field trips during the past decade. Cited specimens are kept in the Botanical Institute of Kiel University (KIEL) and the private herbaria of C. Dolnik and U. Schiefelbein. Specimens were examined using standard microscopic techniques. Some specimens were analysed by thin-layer chromatography (TLC) in solvent system A, B and C (Culberson & Ammann 1979).

All presented localities are provided with the number of the German ordnance map (TK25) and geographic latitude and longitude coordinates.

**The species**

*Myriospora myochroa* (M. Westb.) K. Knudsen & L. Arcadia

*Myriospora myochroa* is characterized by its strongly convex areoles, more or less dilated apothecia with an uneven disc, and crystals (norstictic acid) in the upper cortex that are visible in polarized light. In the German material the cortex mostly reacts with K+ yellow.

The species occurs predominantly along the Baltic coast, where it inhabits the epilittoral zone, on siliceous rocks on boulder-covered beaches, and on coastal protection and harbour walls. It has also been found in inland areas on megalithic tombs, in churchyards and once on mortar. The localities are more or less sunny and enriched in nutrients.

Currently, two distribution centres can clearly be distinguished (Fig. 1), the first located in northern Schleswig-Holstein between the fjord Flensburger Förde and the bay Eckernförder Bucht, and the second on Isle of Rügen in the northeast of Mecklenburg-Western Pomerania. Its absence along the coast between the Isle of Rügen and Rostock is probably due to the lack of suitable habitats, whereas between the Wismarmer Bucht and the Eckerförder Bucht it appears to have been overlooked.

**Selected specimens examined: Mecklenburg-Western Pomerania:** 1346/1, Isle of Rügen, Nobbin, megalithic tomb, 54°39'12"N, 13°23'36"E, alt. 20 m, megalithic tomb in open situation, 26 Oct. 2013, leg. C. Dolnik, U. de Bruyn & U. Schiefelbein (herb. Schiefelbein 3764); 1747/2, Isle of Rügen, Zickersches Höft, western edge, 54°18'02"N, 13°39'07"E, alt. 1 m, boulder beach, on granite, 23 Sept. 2009, leg. U. Schiefelbein (herb. Schiefelbein 2716). **Schleswig-Holstein:** 1225/1, Geltingmole, Bay of Gelting, 54°39'12"N, 13°23'36"E, alt. 20 m, granite boulders of habour, 26 Aug. 2011, leg. & det. C. Dolnik, conf. M. Westberg & U. Schiefelbein (herb. Dolnik 1877); 1325/4, Sundsacker, Schlei fjord, 54°37'45.8"N, 9°56'14.8"E, alt. 1 m, granite boulders of habour, 26 Aug. 2011, leg. & det. C. Dolnik (herb. Dolnik 2375); 1422/4, Hüsby, 54°30'05"N, 9°29'14"E, alt. 42 m, stones around megalithic dolmen, 1 March 2013, leg. & det. C. Dolnik (herb. Dolnik 2632).

A further record has been published by Schiefelbein et al. (2014).
Figure 1. Distribution of Myriospora myochroa in the German Baltic coastal zone.

Myriospora rhagadiza (Nyl.) K. Knudsen & L. Arcadia

In the German Baltic zone, M. rhagadiza is often macroscopically distinguishable from other species of the genus by the rather large apothecia with a distinctive raised margin. Sometimes it facultatively accumulates iron, which gives the areoles an orange to pale brick-red colouration (Westberg et al. 2011).

Myriospora rhagadiza is a coastal species, usually occurring on siliceous boulders in the epilittoral zone. Most records are from boulder-covered beaches, but it can also occur on pebbles in shingle beaches and coastal protection walls.

Due to its adaptation to salt spray, the species is restricted to the immediate coast, and the apparently inland records in Schleswig-Holstein are located at the Kiel Canal (Nord-Ostsee-Kanal). It is not clear if the higher density of records in the northwestern part of the study area (Fig. 2) is related to the higher salt concentration of the Baltic Sea in this region or if the species is under-recorded in Mecklenburg-Western Pomerania.

Selected specimens examined: Mecklenburg-Western Pomerania: 1547/4, Isle of Rügen, nature reserve “Granitz”, coast between Granitzer Ort and Sellin, E of Granitzer Ort, 54°24′04″N, 13°40′14″E, alt. 1 m, boulder beach, on granite boulder, 21 Sept. 2009, leg. U. Schiefelbein (herb. Schiefelbein 2744); 1647/3, Isle of Rügen, Greifswalder Bodden, coast E of Lauterbach, 54°20′25″N, 13°31′38″E, alt. 1 m, boulder beach, on siliceous boulders, 24 Oct. 2013, leg. C. Dolnik, U. de Bruyn & U. Schiefelbein (herb. Schiefelbein 3742); 1932/3, Lübeck bay, coast NW of Brook, 54°00′19″N, 11°20′14″E, alt. 1 m, boulder beach, 12 Sept. 2013, leg. & det. U. Schiefelbein (herb. Schiefelbein 3814); Schleswig-Holstein: 1224/2, Nieby upon Neukirchen, 54°47′53.8″N, 09°45′57″E, alt. 1 m, granite boulders at the coastal cliff, 26 Aug. 2011, leg. & det. C. Dolnik (herb. Dolnik 2629); 1325/2, Kappeln, Schlei fjord, 54°39′36.3″N, 09°56′17.4″E, alt. 1 m, coastal protection boulders of Schlei bridge, 7 June 2012, leg. & det. C. Dolnik (herb. Dolnik 2432).

Further records have been published by Dolnik et al. (2012) under the name Trimmatalhelopsis versipellis (Nyl.) Zschacke.
Figure 2. Distribution of Myriospora rhagadiza in the German Baltic coastal zone.

Myriospora smaragdula (Wahlenb. ex Ach.) K. Knudsen & L. Arcadia

This species occurs in churchyards and on boulders and stonewalls in both coastal habitats and inland areas (Fig. 3). It grows on slightly base-rich, more or less eutrophicated siliceous rocks in open or somewhat sheltered situations.

Myriospora smaragdula, known only from the Schleswig-Holstein coast, seems to be the rarest of the three species in the German Baltic coastal zone. Distribution patterns as well as key factors influencing them are as yet indeterminable.

Myriospora smaragdula is usually easily recognized in the field. It forms small rounded, flat, white or greyish-white to pale brown areoles with several small, punctiform apothecia (Westberg et al. 2011). Currently, yellow-green, Cu-rich forms are unknown from the coastal zone in Germany. This species can be distinguished from all other Myriospora species by the strong reaction after application of potassium hypochlorite (forming needle-shaped crystals in sections) due to the presence of norstictic acid in the cortex.

Selected specimens examined: Schleswig-Holstein: 1321/4, Kleinjörl, churchyard, 54°36'07.8''N, 09°18'37.6''E, alt. 13 m, granite next to water pump, 1 Oct. 2008, leg. & det. C. Dolnik, TLC: norstictic acid (herb. Dolnik 1197); 1325/2, Maasholm, Schlei fjord, 54°41'11.9''N, 09°59'27.5''E, alt. 1 m, coastal protection boulders, 7 June 2012, leg. & det. C. Dolnik (herb. Dolnik 2722); 1525/2, Lindhéöft, 54°27'54.6''N, 09°57'23.3''E, alt. 1.5 m, shingle beach at the Baltic sea coast, on flintstone, 5 Sept. 2003, leg. & det. C. Dolnik (herb. Dolnik 444).

Discussion

As a result of our detailed studies of the coastal lichen flora, the habitat requirements and distributions and of Myriospora species in the Baltic coastal zone of Germany are now better known. All species are widely distributed and currently not threatened, but differ in frequency and distribution pattern. Myriospora rhagadiza is quite common and restricted to the shoreline, whereas the two other species are rather rare in the study area. The latter two species have
localities along the coast but also inland areas. Since *M. myochroa* and *M. rhagadiza* generally occur only in coastal zones, the conservation bodies of Mecklenburg-Western Pomerania and Schleswig-Holstein bear a high responsibility for the conservation of these species in Germany.

**Figure 3.** Distribution of *Myriospora smaragdula* in the German Baltic coastal zone.

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**References**


