

## Lichens and lichenicolous fungi from graveyards of the area of Eindhoven (the Netherlands), with the description of two new species

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### Abstract

This is the first survey of a long-term inventory of lichens and lichenicolous fungi of all (93) graveyards in an area of 950 km<sup>2</sup> in the surrounding of Eindhoven, in the south of the Netherlands, province Noord-Brabant. Two species are described as new for science, *Plaeospora bernadetae* and *Roselliniella muralis*, five species are new for the country, *Cladonia cyathomorpha*, *Hawksworthiana peltigericola*, *Lecania sordida*, *Physciella chloantha* and *Pterygiopsis neglecta* and several very rare species are recorded. Totally 257 species are recorded, including 34 lichenicolous fungi, in a commented list with notes on substrate and distribution. Additional foliicolous lichens are reported for the Netherlands.

**Keywords:** ecology of lichens and lichenicolous fungi, gravestones, epiphytic species, *Plaeospora*, *Roselliniella*

### Introduction

Between the year 1985 and 2014, an extensive inventory of lichens and lichenicolous fungi had been carried out. Corticolous, lignicolous, saxicolous and terricolous species from graveyards have been studied in the city of Eindhoven and surroundings (the Netherlands). The study area is situated between 51° 16'–51° 35'N and 5° 15'–5° 35'E, which lies mainly between 25 and 30 m s.m., southeastern of the province Noord-Brabant. A highly urbanized region with the city of Eindhoven, having c. 200,000 inhabitants (Fig. 1). The many smaller villages in the surroundings are the reason of the high density of graveyards (93) of the study area (Fig. 2). The climate conditions are the same as published for another survey in this part of the province Noord-Brabant by VAN DEN BOOM (2004).

The graveyards are interesting habitats for lichens and appeared to include a relative high biodiversity. The city of Eindhoven, the centre of the study area, with 23 graveyards, has as one of most important, the Catherina graveyard since 1877 (fig. 2A). The oldest graveyard, outside the city, c. 15 km to the south, Heeze, just outside the village, is a settlement having existed since the 11th or 12th centuries with a church and a graveyard 'De Oude Kerkhof'. Rarely, people were buried recently. The church was burned by lightning in 1827 but the fundaments are still present and they are now a national monument. The trees at the entrance of this graveyard are about one hundred years old.

Another very old graveyard, east of Eindhoven is the small 'Algemene Begraafplaats Nuenen c.a.'. It is centuries old and has its roots in the Middle Ages. Now, the oldest gravestone (1885) is that of Theodorus van Gogh. He is the father of the famous painter

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Fig. 1: Locality of Eindhoven as centre of the study area.

Vincent van Gogh. The graveyard is no more than  $20 \times 25$  meters and is rather shaded by several mature trees. There are 28 species recorded from this place. In general, the graveyards in this study are from the second part of the 19th century or early of the 20th century. Some are younger and from the second half of the 20th century.

In many graveyards, lichen diversity is limited because of the regularly cleaning of the gravestones. This is a general prudence in many graveyards.

As result of this study, several records are already published as new to the Netherlands: *Acarospora moenium* (VAN DEN BOOM & al. 1994), *Graphium aphthosae* (DIEDERICH & al. 2012), *Verrucaria virens* (BRAND & al. 1988), *Zwackhiomyces calcariae* (VAN DEN BOOM & BRAND 2008).

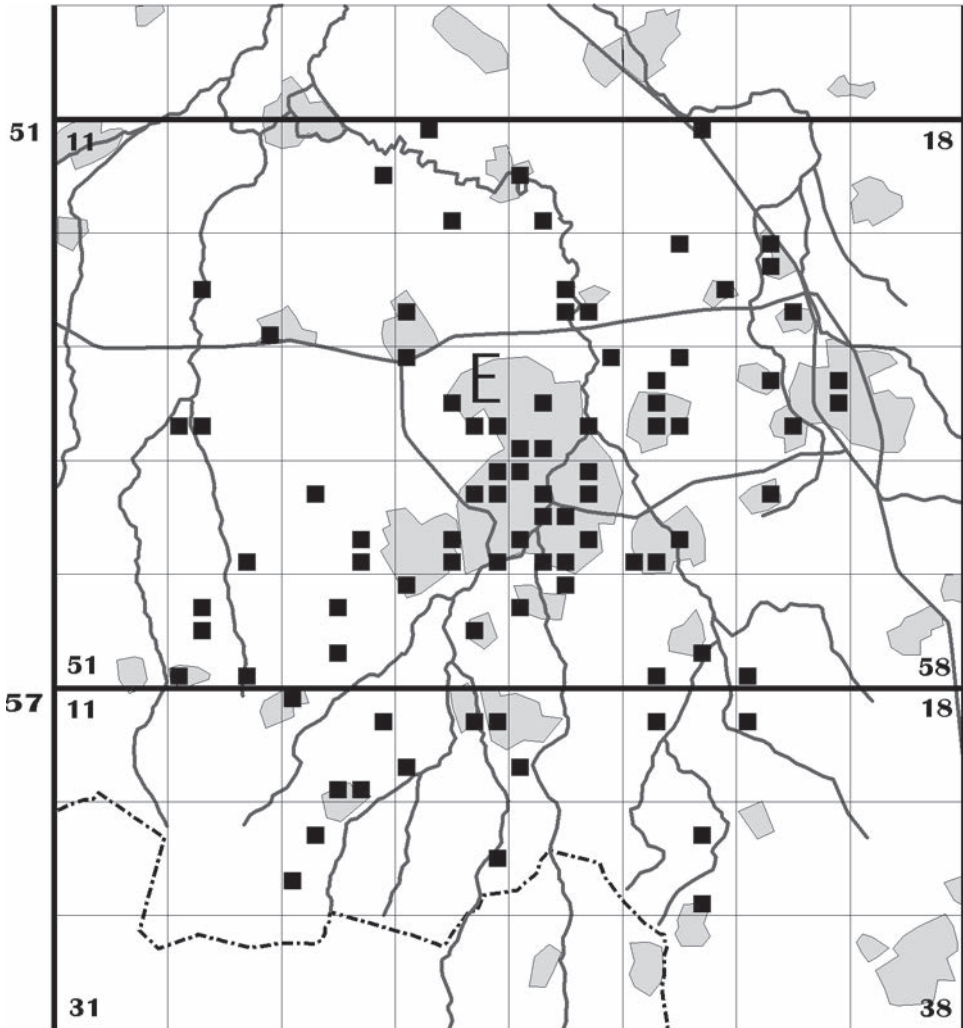


Fig. 2: Schematic map of the distribution of the grid ref. of  $1 \times 1$  km in which the graveyards have been found. Note that in some grids there are two graveyards (in three occasions). E = city of Eindhoven.

Two species are described as new to science *Plaeospora bernadetae* and *Roselliniella muralis* and five species are new for the country, *Cladonia cyathomorpha*, *Hawksworthiana peltigericola*, *Lecania sordida*, *Physciella chloantha* and *Pterygiopsis neglecta*.

A comparable survey about graveyard lichens and/or lichenicolous fungi in western Europe could not be found, except for one article by WADE (1978), which include fifty-eight species, recorded from forty-one graveyards in the Vale of Glamorgan (Wales, UK). However there is a working group on churchyard lichens in UK. Although they now have approximately 450,000 records for 8,200 churchyards in the BLS database, so far none of it has yet been published in an academic journal (Simkin pers. com.).

### Ecology

Most important substrate in a graveyard is calcareous rock, which support the greatest range of species, with upper surfaces of gravestones and tombs being particularly subject to nutrient input from rainfall, well-illuminated, bird droppings etc. In such situations, lichens species include *Caloplaca saxicola*, *Candelariella aurella*, *Lecanora dispersa* and *L. muralis*, *Physcia adscendens*, *P. caesia*, *Phaeophyscia orbicularis* and *Xanthoria parietina*. The commonest on flat, well-drained surfaces being *Aspicilia calcarea*, *A. contorta*, *Caloplaca flavovirescens*, *C. oasis*, *C. saxicola*, *C. teicholyta*, *Candelariella aurella*, *Lecania erysibe*, *Lecanora dispersa*, *L. hagenii*, *L. muralis*, *L. semipallida*, *Phaeophyscia nigricans*, *P. orbicularis*, *Physcia caesia*, *Rinodina oleae*, *Verrucaria nigrescens*, *V. viridula* and *Xanthoria parietina*. Vertical surfaces of headstones support species such as *Caloplaca citrina*, *Catillaria lenticularis*, *Lecanora albescens*, *L. dispersa*, *Phaeophyscia orbicularis*, *Xanthoria parietina*.

Brick has often been used as a border just above the soil, to mark a grave. The most frequent species on the horizontal surface is *Lecania rabenhorstii*.

Clinker has been found in pavements and can be covered by species such as *Lecania rabenhorstii*, *Lecanora campestris*, *L. muralis*, *L. polytropa*, *Physcia caesia* and *Rinodina oleae*.

Schist is a common rock which often has been used as a kind of pavement around a tombstone and it supports a similar lichen flora to that of acid, carrying widely distributed species such as *Candelariella vitellina*, *Lecanora muralis*, *L. polytropa*, *Polysporina simplex* and *Trapelia coarctata*.

Acid gravestones support quite a different flora of lichens, with species including, *Amandinea punctata*, *Caloplaca arenaria*, *Candellariella vitellina*, *Psilolechia lucida* and *Xanthoparmelia pulla*. Acid gravestones are more and more in use in recent times. Pebbles are rather common and often found in gravestones, imbedded in soil, or as a thick layer up to one decimetre high. However the lichen population is rather poor. Only half a dozen species occur in this kind of habitat, *Acarospora moenium*, *Caloplaca flavocitrina*, *Micarea erratica*, *Physcia caesia*, *Porpidia soledizodes* and *Rhizocarpon reductum*.

An important element in a graveyard is a tree which are frequently present in many varieties. The most rare epiphytic species which are one or two times encountered are *Physciella chloanta*, *Pleurosticta acetabulum*, *Physconia distorta*, *Physconia perisidiosa* and *Protoparmelia hypotremella*. One epiphytic species, *Lecanora conizaeoides* has become extinct in the graveyards in recent years. This acidophytic species was common when this survey began in the 1980's. It was a period that the atmospheric pollution by SO<sub>2</sub> was very high in the Netherlands (VAN DOBBEN & TER BRAAK 1999). In contrast, *Hyperphyscia adglutinata* was very rare in the 1980's and 1990's because of the sensitiveness to SO<sub>2</sub>. However now, the SO<sub>2</sub> level is very low in the Netherlands. In recent years this latter species rapidly increased and is very common now. A few epiphytic species with a pronounced southern distribution in Europe also occur in the visited graveyards. These are *Flavoparmelia soledians*, *Physcia clementei*, *Physciella chloanta* and *Punctelia borreri*. Two of them are rather frequent, *F. soledians* and *P. borreri*. *P. clementei*, *P. chloanta* are very rare and known from one locality.

Terricolous communities are common but restricted to soils where stress factors such as nutrient deficiency, drought, compaction or toxicity, limit the vegetation of vascular plants to a level where it is dominated by acrocarpous bryophytes. The pioneer lichen of such sites is *Cladonia humilis* which locally forms extensive patches on mineral soils or mosses. Well developed populations of *Cladonia scabriuscula* have been found among more grassy soils. *Peltigera didactyla* and *P. extenuata* are rather common in such situations and carry sometimes several lichenicolous fungi. Some ephemeral species have also been found. Most common is *Veizdaea leprosa*. *Thelocarpon lichenicola* and *Veizdaea acicularis* are very rare species in the graveyards. *Veizdaea aestivalis* has been found twice as well developed populations.

Foliicolous lichens have been found for the first time about seven years ago in the province (VAN DEN BOOM & VAN DEN BOOM 2009). This survey has added a second locality with *Bacidina chlorotricula*, *Fellhanera viridisorediata* and an unidentified crust on *Rhododendron* leaves. It must be a very rare element in the study area, because *Rhododendron* shrubs are very common, they occur in most graveyards and they are always carefully checked for foliicolous lichens.

### Lichenicolous fungi

As a result of this survey, 34 species of lichenicolous fungi have been recorded, including two species newly described, *Plaeospora bernadetae* and *Roselliniella muralis*. *Hawksworthiana peltigericola* is a first record for the Netherlands. Eight species are found on epiphytic hosts and thirteen species from saxicolous hosts. On terricolous hosts eleven species have been found, on a lignicolous host one species. *Illosporopsis christiansenii* is the only species occurring on both, saxicolous and corticolous hosts. Further study is needed to identify material which has been found in additional collections.

### Material and Methods

All the graveyards from Eindhoven and its surroundings, within a radius of c. 20 km, have been investigated. The total number of graveyards which have been investigated is 93. The presence of all lichens and lichenicolous fungi was recorded on each investigated graveyard during a single or serie of visits between 1985 and 2000. This was repeated between 2001 and 2014. Gravestones of all kinds of substrate are investigated, but they consist mainly of concrete, granite or schist. All trees and shrubs have been checked, even terricolous lichens are part of the study, as well as wooden structures such as seats and fences. From 93 graveyards, c. 5900 samples of lichens or lichenicolous fungi were recorded and c. 1100 specimens were collected. From all species, material is hosted in the private herbarium of P. van den Boom, including at least several specimens from common species. In the chapter 'Most interesting species' is mentioned the herbarium number after the collectors which means that the specimen is in the herbarium of P. van den Boom. Duplicates of some specimens are in L (Leiden), or hb Brand. Many specimens have been checked by specialists during all these years (see acknowledgements). An impression of some graveyards is presented in Fig. 3.

Observations and measurements were made using a stereo-microscope and a light microscope (Olympus BX2). For the latter the sections were observed and measured in water.



Fig. 3: Impression of some graveyards; A = Eindhoven (St. Catharina), B = St. Oedenrode, C = St. Oedenrode, D = Westerhoven.

The collected specimens have been studied mostly according to WIRTH (1995) and SMITH & al. (2009). Nomenclature of lichens follows APTROOT & al. (2004) and DIEDERICH & al. (2014). For lichenicolous fungi HAWKSWORTH (2003) and DIEDERICH & al. (2014) were consulted. The occurring and distribution of lichens and lichenicolous fungi in the Netherlands have been taken from the “BLWG Dutch Lichen Atlas online” published by the Dutch Bryological and Lichenological Society. [<http://www.blwg.nl/lichatlas/>]. All data, including a list of all visited graveyards are stored in a database (access). Gr. = grid. ref.; 51-35-51 means  $1 \times 1$  km square; 51-35 means  $5 \times 5$  km square. Fig. 2 shows the schematic map of the distribution of the grid. ref. of  $1 \times 1$  km in which the graveyards have been found. Note that (on three occasions) in some grids there are two graveyards.

## Results

### Biodiversity in graveyards

The survey yielded 223 species of lichens, c. 32% of the species occurring in the Netherlands and 34 lichenicolous fungi, which is c. 34% of the species occurring in the country (APTROOT & al. 2004). In general, biodiversity in graveyards varies from c. 20 species as the most poor localities and rarely it reaches c. 90 species. The richest graveyard has been found in St. Oedenrode (Fig. 2B,C) with 90 species including the rare *Agonimia tristicula* and *Physconia distorta*. The old gravestones in the old graveyard in Bergeyk seem to be free from cleaning as is indicated by several well developed thalli of *Caloplaca flavescens* (Fig. 4B), a species which is mostly found only in very small quantities.

At least eleven red list lichen species have been encountered, species which are threatened or vulnerable and marked mainly with zz or zzz as rarity class for the country (APTROOT & al. 2011). It regards *Arthonia muscigena*, *Bacidia bagliettoana*, *Cladonia pocillum*, *Parmelina tiliacea*, *Peltigera rufescens*, *Physcia aipolia*, *Physcia perisidiosa*, *Placynthium nigrum*, *Polyblastia albida*, *Trapelia glebulosa* and *Xanthoparmelia conspersa*.

Several specimens have not yet been identified and are still in need of study, especially lichenicolous fungi.

In this study we represent the results of a survey of the lichen flora including lichenicolous fungi in more than ninety graveyards in Eindhoven and its surroundings from nearly thirty years of intensive investigation.

### Most interesting species

#### *Agonimia tristicula* (NYL.) ZAHLBR.

Our specimens were found on old gravestones and terricolous. Specimen 43382 is fertile and has muriforme ascospores (2 per ascus). In the Netherlands it is known to be from coastal areas APTROOT & al. (2004). This is new for the province.

Specimens examined: St. Oedenrode centre of village, churchyard, on gravestones, concrete or schist, mature *Fagus* trees, *Robinia* and dead decorticated standing tree, gr. 51-15-31, 03/07/2009, P. & B. van den Boom 43382,43391. Eindhoven, Kronehoef, along Boschdijk, churchyard St. Paulus, with many mixed shrubs and trees, terricolous, gr. 51-35-51, 03/03/2012, P. & B. van den Boom 47358.

#### *Arthonia apotheciorum* (A.MASSAL.) ALMQ.

There is only one recent collection known from the Netherlandish province of Noord-Holland (APTROOT & al. 2004). It was found on the concrete of a gravestone on *Lecanora dispersa*.

Specimen examined: Best (S), Wilhelminadorp, churchyard with gravestones of concrete and granite and mixed trees, a.o. *Picea*, *Betula*, conifers and mature *Quercus rubra* (1.1 m diam.), gr. 51-34-11, 17/03/2013, P. & B. van den Boom 49359.

#### *Bacidia bagliettoana* (A.MASSAL. & DE NOT.) JATTA

We found this species abundantly on calcareous stones, mortar and growing over mosses, on a monument. According to APTROOT & al. (2004) this is a very rare species in the

country, a red list species not recorded from the province before and mainly known from coastal areas.

Specimen examined: SSW of Erp, Keldonk centre, near RK church, churchyard, gravestones and monument, *Platanus* trees at entrance, gr. 51-16-14, 13/09/2013 P. & B. van den Boom 50100.

***Bacidina chloroticula* (NYL.) A.L.SM. – Fig. 4A.**

Although this species is widely distributed in the country and known epiphytic, saxicolous and lignicolous, it has only once been recorded as a foliicolous species before (VAN DEN BOOM & VAN DEN BOOM (2009) from leaves of *Rhododendron* on a country-seat. This is another example of a foliicolous record from *Rhododendron*, but for the first time from a graveyard.

Specimen examined: W of Veldhoven, ESE of Zandoerle, churchyard, mainly gravestones of granite with many *Rhododendron* shrubs and *Quercus rubra*, gr. 51-43-54, 07/04/2013. P. & B. van den Boom 49408. Further specimens found in grid.: [51-45]

***Buellia badia* (FR.) A.MASSAL.**

This species is especially rare in the country and mainly known from the centre and the north of the country. It is known from megalithic monuments, from calcareous rock, schist and wood. We have only two records, both from a gravestone, on schist, one growing over *Lecanora muralis*.

Specimens examined: N of Nuenen, Roosdonck, churchyard, gravestones of concrete and granite and a *Fagus* tree, on schist, gr. 51-36-22, 19/07/2013, P. & B. van den Boom 49979. Nuenen centre, churchyard, on tombstones, of schist, gr. 51-36-32, 19/04/2014, P. & B. van den Boom 51236.

***Buelliella physciicola* POELT & HAFELLNER**

Only once recorded from the country but as mentioned in the list below it seems to be a common species in the study area. It is found only on concrete, on *Phaeophyscia orbicularis*.

Specimens examined: Spoorndonk, RK churchyard with concrete tombstones, sometimes with schist and rarely on granite, 51-22-32, 14/10/2011, P. & B. van den Boom 46492. Eindhoven (SW), Blaarthem, churchyard, on gravestones and mature *Quercus rubra* (c. 60 cm), gr. 51-44-55, 22/09/2012, P. & B. van den Boom 48248. Veldhoven, centre of old village, churchyard, mainly gravestones of concrete, some of granite, gr. 51-54-53, 20/04/2012, P. & B. van den Boom 47427. Further specimens found in grid.: [51-32,34,37,45,46,47,53; 57-13,14,26].

***Caloplaca crenulatella* (NYL.) H.OLIVIER**

In the Netherlands it is a rare species known from several provinces except from Noord-Brabant. In the study area it is recorded nine times.

Specimens examined: Mierlo centre, churchyard, on tombstones, gr. 51-47-22, 20/11/2010, P. & B. van den Boom 45418. Eindhoven centre, churchyard (since 1870) “Catharina”, on tombstones of concrete, sandstone, schist and terricolous, gr. 51-45-32, 18/07/2009, P. & B. van den Boom 43397. Valkenswaard centre, churchyard since 1887, tombstones of concrete, brick and schist, including a monument and mixed trees, gr. 57-14-25, P. & B. van den Boom 43478. Further specimens found in grid.: [51-34,36,37,46,57; 57-14].

***Caloplaca phlogina* (ACH.) FLAGEY**

This is not a rare species in the Netherlands but in the checklist (APTROOT & al. 2004) it is recorded under *Caloplaca citrina*, although it has clearly different characters (SMITH & al. 2009).



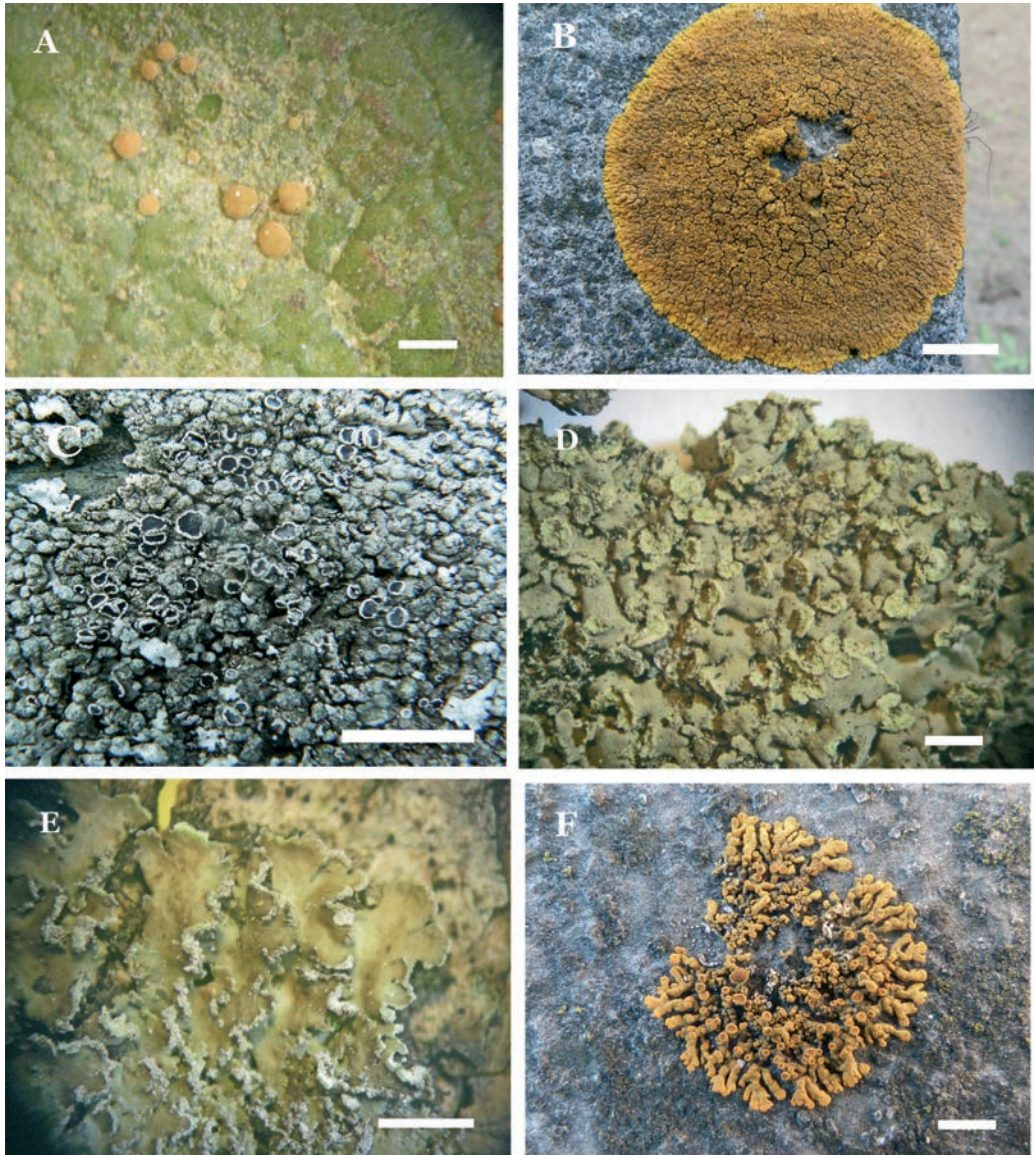


Fig. 4: A= *Bacidina chlorotricula*, B = *Caloplaca flavescens*, C = *Physcia caesia*, D = *Physciella chloantha*, E = *Physconia perisidiosa*, F = *Xanthoria elegans*. Scales: A, E, F = 2 mm; B, C = 5 mm; D = 1 mm.

Even in DIEDERICH & al. (2014), it is recorded as a separated species. In VAN DEN BOOM (2004) and VAN DEN BOOM & VAN DEN BOOM (2009) it is already published from the south eastern part of the province.

Specimen examined: Eindhoven centre, Jewish churchyard, gravestones of concrete, mature *Fagus* trees, *Crataegus* and one very big *Sambucus* shrub (30 cm diam.), gr. 51-44-15, 07/08/2014, P. & B. van den Boom 51925.

**\**Cladonia cyathomorpha* W.WATSON**

According the flora of Great Britain (SMITH & al. 2009), this is a species from vertical rocks and walls. However we have also found it on soil among stones and pebbles.

Specimen examined: W of Veldhoven, ESE of Zandoerle, churchyard, mainly gravestones of granite with many *Rhododendron* shrubs and *Quercus rubra*, gr. 51-43-54, 07/04/2013, P. & B. van den Boom 49407 (L).

***Graphium aptosae* ALSTRUP & D.HAWKSW.**

Recently this species was published as new to the Netherlands in DIEDERICH & al. (2012), it regards the specimen van den Boom 47364, from one locality, a graveyard at the north side of Eindhoven. Here two more specimens have been added and a second locality to the south of Eindhoven.

Specimens examined: Eindhoven, Kronehoef, along Boschdijk, churchyard, St. Paulus, with many mixed shrubs and trees, gr. 51-35-51, 03/03/2012, P. & B. van den Boom 47359. Aalst, near centre, churchyard, on gravestones, terricolous and with several mature trees, gr. 51-55-21, 08/09/2012, P. & B. van den Boom 48238.

**\**Hawksworthiana peltigericola* (D.HAWKSW.) U.BRAUN**

It seems to be a rare species in the Benelux. It is recorded in one locality in northern Belgium and a few in the southern part of Luxemburg (DIEDERICH et al. 2014). We here report it from four localities, eastern and southern of Eindhoven.

Specimens examined: Eindhoven, Kronehoef, along Boschdijk, churchyard, St. Paulus, on gravestones, soil and on mixed shrubs and trees, gr. 51-35-51, 13/03/2012, P. & B. van den Boom 47365 (L). N of Nuenen, Roosdonck, churchyard, gravestones of concrete and granite and a *Fagus* tree, gr. 51-36-22, 19/07/2013, P. & B. van den Boom 49978. Aalst, near centre, churchyard, on gravestones, terricolous and with several mature trees, gr. 51-55-21, 08/09/2012, P. & B. van den Boom 48264. Further specimens found in grid.: [51-45]

***Illosporiopsis christiansenii* (B.L.BRADY & D.HAWKSW.) D.HAWKSW.**

It is rather widely distributed in the Netherlands, but has been only two times recorded from the province before, from heathlands (VAN DEN BOOM 2004, VAN DEN BOOM & VAN DEN BOOM 2009), so this is the only known graveyard specimen. It was found on *Physcia tenella*, on a *Tilia* tree

Specimen examined: Leende centre, near church, churchyard, gravestones of mainly concrete and many *Tilia* trees, gr. 57-16-22, 02/06/2013, P. & B. van den Boom 49473.

***Intralichen christiansenii* (D.HAWKSW.) D.HAWKSW. & M.S.COLE**

We have two collections from the same area growing on different hosts and one further specimen on a new host (*Lecanora albescens*). Although it is only twice recorded in the Netherlands, it has probably been overlooked, but it must be a common species. It is new for the province Noord-Brabant.

Specimens examined: Son, centre, churchyard with tombstones of concrete and schist, trees and shrubs, gr. 51-25-43, 29/01/2014, on *Lecanora albescens*, P. & B. van den Boom 50300. Nuenen centre, churchyard, on tombstones, gr. 51-36-32, 02/12/2006, on *Candelariella vitellina*, P. & B. van den Boom 37375; *ibid.* on *Lecania erysibe* P. & B. van den Boom 37377.

**\**Lecania sordida* REESE NAESBORG**

In a revision of *Lecania* from the Netherlands (VAN DEN BOOM 1992) specimens of this species has possibly been confused with *Lecania sylvicola*, in a recent paper (REESE

NAESBORG 2008) it is formally described and one record from the author is from Germany.

Specimens examined: N of Son, Wolfswinkel, churchyard with gravestones of granite and concrete, *Fraxinus*, *Pinus* and *Quercus* trees, gr. 51-25-33, 22/07/2013, P. & B. van den Boom 49987. Eindhoven, N of centre, Woensel, big churchyard with many mature trees, including *Acer* and *Fraxinus*, gravestones are very clean, gr. 51-35-52, 22/03/2012, P. & B. van den Boom 47387 (L). Waalre, W of centre, churchyard, on gravestones of concrete, schist and basalt, mature *Quercus* trees and young *Robinia*, gr. 51-54-34, 27/09/2013, P. & B. van den Boom 50120. Further specimens found in grid.: [51-45,46,57]

***Marchandiobasidium aurantiacum* DIEDERICH & SCHULTHEIS**

APTROOT & al. (2004) record only one specimen from the Netherlands. However in VAN DEN BOOM (2004) this species was recorded once, but in VAN DEN BOOM & VAN DEN BOOM (2009) seven times, all from the province Noord-Brabant. We have added several graveyard records from this study. It is found on a wide range of hosts such as *Physcia tenella* and *Xanthoria parietina*.

Specimen examined: Best, centre, churchyard, on concrete of tombstones, *Acer*, *Betula*, *Fraxinus*, *Magnolia*, *Quercus* and *Robinia* trees, on *Magnolia*, gr. 51-24-41, 01/08/2007, P. & B. van den Boom 38343. Further specimens found in grid.: [51-44,45,47; 57-13,15,16]

***Neocoleroa inundata* (VAIN.) DIEDERICH**

Only two records are known from the Netherlands (APTROOT & al. 2004). We added here several more records, all growing on thallus of *Bacidina caligans*, over soil, concrete or a stump.

Specimens examined: Eindhoven, Tongelre, 't Hofke, St. Martinus churchyard, gravestones of concrete and terricolous among grassy and mossy soil, gr. 51-45-14, 31/10/2013, P. & B. van den Boom 50163. Gestel, near St. Lambertus church, churchyard, up to 100 year old gravestones, on concrete, gr. 51-45-41, 10/04/2010, P. & B. van den Boom 44801. Budel, village, churchyard, gravestones, terricolous, trees and stumps, gr. 57-26-54, 14/05/2010, P. & B. van den Boom 44839,44841.

***Peltigera extenuata* (VAIN.) LOJKA**

According to APTROOT & al. (2004) this is a very rare species in the Netherlands and previously only known from two localities. Here we add several more records.

Specimens examined: Best (S), Wilhelminadorp, churchyard with gravestones of concrete and granite and mixed trees, a.o. *Picea*, *Betula*, conifers and mature *Quercus rubra* (1.1 m diam.), gr. 51-34-11, 17/03/2013, P. & B. van den Boom 49352. Waalre centre, near old church, churchyard, on gravestones and small brick wall inside the churchyard, *Fagus*, *Prunus*, *Tilia* and *Robinia*, gr. 51-54-34, 26/05/2013, P. & B. van den Boom 49466. Aalst, near centre, churchyard, on gravestones, terricolous and with several mature trees, gr. 51-55-21, 22/09/2012, P. & B. van den Boom 48270. Further specimens found in grid.: [51-45].

**\**Physciella chloantha* (ACH.) ESSL. – Fig. 4D.**

This is the first recorded find of the species in the Benelux since 1868 (DIEDERICH & al. 2014, as *Phaeophyscia chloantha* (ACH.) MOBERG). It has an Atlantic Mediterranean distribution in Europe and is not rare in most of the south-western part of Europe (VAN DEN BOOM & GIRALT 2012).

Specimen examined: Eindhoven (south), churchyard 'gemeentelijke begraafplaats Stratum', gravestones of granite and concrete with poor lichen growth and with mixed trees, on *Amelanchier*, gr. 51-45-53, 15/01/2014, P. & B. van den Boom 50257 (L).

***Pleospora bernadetae* VAN DEN BOOM sp.n.**

Mycobank No.: MB810822

Lichenicole fungus. Ascomata perithecioid in thallus of *Lecanora muralis*, globose to obpyriforme, up to 400 µm in diameter; hymenium I+ reddish, KI-. Paraphysoids branched and anastomoses. Asci cylindrical to slightly clavate with a small ocular chamber, wall I-, 8-spored, 150–200 × 18–26 µm. Ascospores pale to dark brown, 3–5 transsepta, 1–3 longisepta per level, 22–32 × 15–17 µm.

Type: The Netherlands: Noord-Brabant, Veldhoven, graveyard, on concrete of grave-stones, gr. 51-54-11, alt. 25 m, 20 April 2012, P. & B. van den Boom 47430 (holotype BR, isotype herb. v. d. Boom) – Fig. 5.

Infection not gall-inducing causing a discoloration of the host thallus, the colour becomes whitish, pale gray to pale brownish. Vegetative hyphae inconspicuous. Ascomata perithecioid, up to 400 µm diam., dispersed to a few crowded, globose to obpyriforme, black, immersed in the thallus, especially when young, protruding with the ostiolar region when mature, visible in optical section as a very small black dot, up to c. 100 µm, ostiole apical. Excipulum dark brown at outer rim, pigmentation fading towards the inner part, lateral consisting of 3–6 layers, somewhat elongate cells, cells 5–11 × 2–3 µm. Paraphyses inconspicuous. Hymenium hyaline, not inspersion, I+ reddish, KI-. Paraphysoids persistent, branched and anastomoses, c. (2–) 2.5–3 (–5) µm thick. Asci cylindrical to slightly clavate, fissitunicate, endoascus apically with a small ocular chamber, ascus wall I-, 8-spored, 150–200 × 18–26 µm. Ascospores irregularly biserially arranged and overlapping in the ascus, broadly ellipsoid, rounded at the apices at first (very) pale brown and 1-septate, later dark brown, with 3–5 transsepta, 1–3 longisepta per level, up to 18 cells visible in optical section. Slightly to strongly constricted at the median septum, without a perispore, 22–32 × 15–17 µm.

Host: *Lecanora muralis*.

Etymology: The epithet refers to Bernadet van den Boom, who was the person who observed the new species for the very first time and collected useful material for this project.

Distribution: *Pleospora bernadetae* is known from several graveyards occurring only in the Netherlands, in the south east of the province Noord-Brabant. It grows on horizontal surfaces of the concrete of gravestones in open situation. Despite intensive search in habitats in northern Belgium just some km from known localities in the Netherlands, we never found this species.

None of the known *Pleospora* species has been recorded from the the same or related host (CLAUZADE & al. 1989, HAFFELNER & ZIMMERMANN 2012). In the Netherlands or Belgium, not any *Pleospora* species is known. A recently described *Pleospora*, *P. physciae* known from Germany and central Europe (HAFFELNER & ZIMMERMANN 2012) has much smaller ascospores, 14.5–16.5 × 6–7 µm and they are somewhat clavate and is only known from *Physcia*.

A recently described species from *Lecanora muralis* and related to the new species is *Dacampia muralicola* HALICI & D. HAWKSW. described from apothecia of *Lecanora muralis* (HALICI & HAWKSWORTH 2008). It can be confused with the new species because

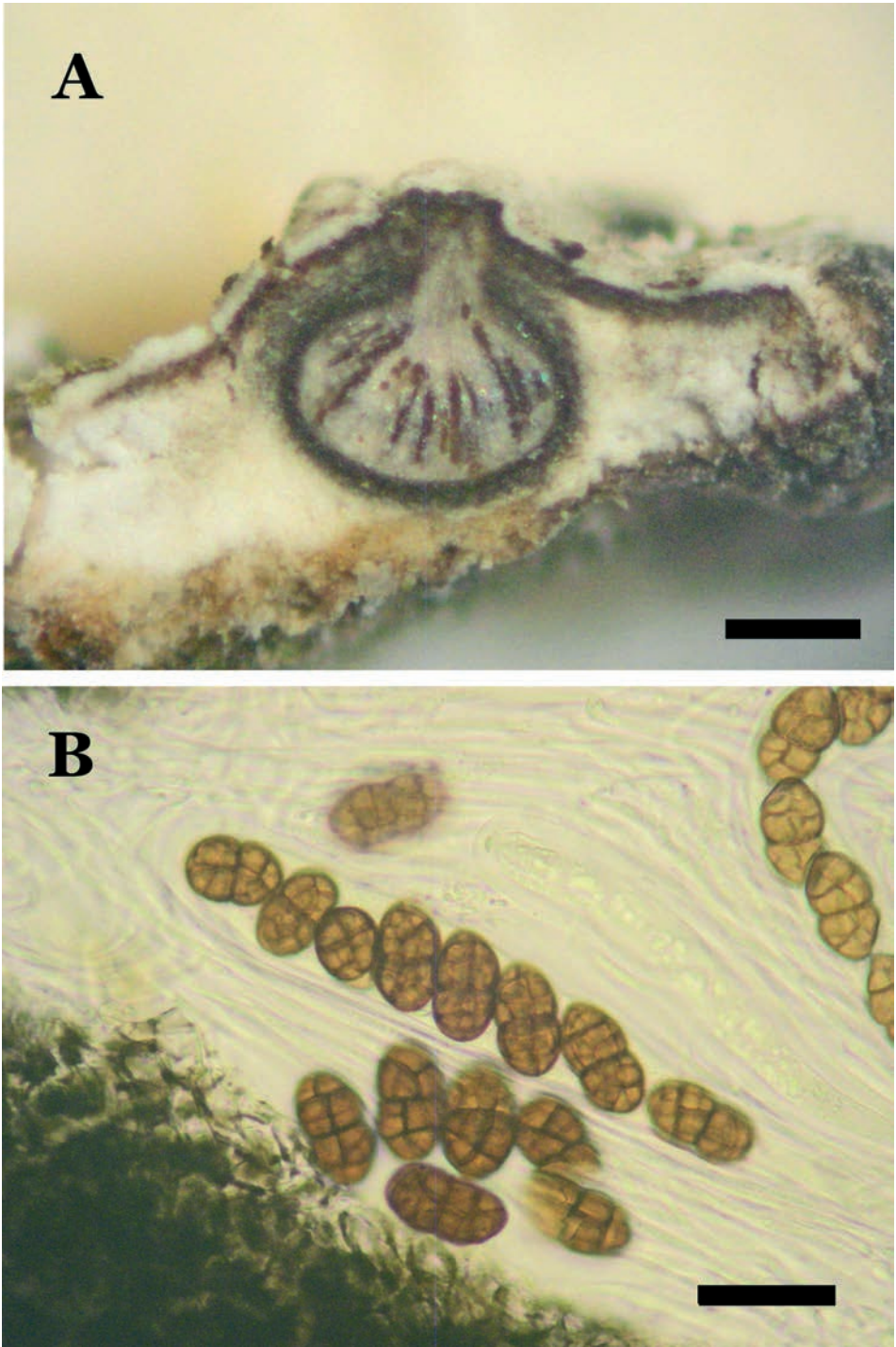


Fig. 5: *Plaeospora bernadetae*; A = section through a perithecium, B = ascospores. Scale: A= 200  $\mu$ m, B = 40  $\mu$ m.

it has dark brown muriforme ascospores, often slightly constricted at the median septum, they are somewhat smaller than the new species, 21–26 (–31.5) × (7–) 9–12.5 (–14.5) µm. *Plaeospora bernadetae* has never been found on the apothecia of the host. The new species is most easily overlooked for *Roselliniella muralis*, because it is known from the same host, occurring in the same habitat and in surface view it appears as a very small dot on the thallus of the host.

Additional specimens: **The Netherlands**: Noord-Brabant; Son, centre, churchyard with tombstones of concrete and schist, trees and shrubs, gr. 51-25-43, 29 January 2014, P. & B. van den Boom 50298. Stiphout centre, churchyard, gravestones of concrete and granite, young *Acer* trees and two mature *Fraxinus* trees, gr. 51-37-22, 20 June 2012, P. & B. van den Boom 48162. Eindhoven, De Doornakkers, churchyard, NW part, old gravestones of concrete, terricolous and on mature *Betula* trees, gr. 51-45-24, 3 February 2013, P. & B. van den Boom 49343. Bergeyk centre, old churchyard, on gravestones of concrete, schist and brick and trees (*Acer* and *Robinia*), gr. 57-13-54, 17 May 2012, P. & B. van den Boom 48130. Bergeyk centre, new churchyard, on gravestones of concrete and scattered trees (*Tilia*), gr. 51-13-53, 17 May 2012, P. & B. van den Boom 48119. Luyksgestel centre, churchyard, on gravestones and terricolous, gr. 57-23-41, 17 May 2012, P. & B. van den Boom 48162.

### *Physconia distorta* (WITH.) J.R.LAUNDON

Although this species was not rare in the last century in our country. Now it is a red list species and very rare in the province. Here we add two more records. The former is from *Fagus*, the latter from *Acer*.

Specimen examined: St. Oedenrode centre of village, churchyard, on gravestones, concrete or schist, gr. 51-15-31, P. & B. van den Boom 43387. Stiphout centre, churchyard, on gravestones, young *Acer* trees and two mature *Fraxinus* trees, gr. 51-37-22, P. & B. van den Boom 48160.

### *Physconia perisidiosa* (ERICHSEN) MOBERG – Fig. 4E.

This is a red list species which is mainly known from coastal areas. Only a few inland specimens are known. Our specimen was abundantly present on *Fraxinus*. New for the province.

Specimen examined: N of Son, Wolfswinkel, churchyard with gravestones of granite and concrete, *Fraxinus*, *Pinus* and *Quercus* trees, gr. 51-25-33, 22/07/2013, P. & B. van den Boom 49988.

### *Polycoccum pulvinatum* (EITNER) R.SANT.

According to APTROOT & al. (2004), this species is very rare in this country. Here we record it as new for the province, however it appeared to be a very common species in the study area. It is nearly always found: on concrete, rarely on schist, always on *Physcia caesia*.

Specimens examined: Eindhoven (SE of centre), Stratum, churchyard, on tombstones, gr. 51-45-33, 18/10/2001, P. & B. van den Boom 28098. St. Oedenrode, along Reformed-church, churchyard with gravestones and shrubs, including *Rhododendron molle*, gr. 51-15-31, 22/08/2013, P. & B. van den Boom 50043. Geldrop, Dwarsstraat, churchyard, gravestones of concrete, brick and schist with *Betula* and *Tilia*, gr. 51-46-43, 24/08/1997, P. & B. van den Boom 37367. Further specimens found in grid.: [51-14,25,27,34,35,36,37,44,52,53; 57-13,16]

### *Porocyphus byssoides* HEPP

This species is known from three localities in the Netherlands and was collected in Geldrop (Zes Gehuchten) which is the first record for the country. However it was not yet published. It was found on the concrete of a tombstone from the year 1950.

Specimen examined: W of Geldrop, Zes Gehuchten, churchyard, tombstones mainly of concrete, gr. 51-46-51, 04/04/1986, P. & B. van den Boom 3353 (hb Brand).

***Pronectria robergei* (MONT. & DESM.) LOWEN**

This very rare species was previously known from three localities in the Netherlands. Here we record it as new for the province from three localities where it was abundantly present, always on *Peltigera extenuata*.

Specimens examined: Best (S), Wilhelminadorp, churchyard with gravestones of concrete and granite and mixed trees, a.o. *Picea*, *Betula*, conifers and mature *Quercus rubra* (1.1 m diam.), gr. 51-34-11, 17/03/2013, P. & B. van den Boom 49357. Eindhoven, De Doornakkers, churchyard, NW part, on old tombstones, terricolous and on mature *Betula* trees, gr. 51-45-24, 03/02/2013, P. & B. van den Boom 48861. Aalst, near centre, churchyard, on gravestones, terricolous and with several mature trees, gr. 51-55-21, 08/09/2012, P. & B. van den Boom 48237; Ibid. 22/09/2012, P. & B. van den Boom 48269.

**\**Pterygiopsis neglecta* (ERICHSEN) M.SCHULTZ & THÜS**

In THÜS & SCHULTZ (2009), *P. neglecta* is recorded from all kind of boulders, in the fresh water tidal zone along the river Elbe in and around Hamburg (Germany) and is known from a few recent collections. Our collection is from low calcareous stones in a gravestone, sheltered and shaded.

Specimen examined: NNE of Nuenen, Gerwen (N), churchyard with completely grassy soil, on gravestones, with one mature *Acer* and two *Quercus* trees, gr. 51-36-13, 01/04/2012, P. & B. van den Boom 47408 (L).

***Pyrenidium* aff. *actinellum* NYL.**

According to APTROOT & al. (2004) it was known from one locality in the Netherlands, but is now thought to be extinct. Here we have recent records from one locality. It was found on concrete on *Aspicilia contorta*. It fits well with the description of the species except that we have found more than 4 ascospores per ascus. This species is known from a wide range of substrata and hosts, it is in need for further study. Most probably, this taxon accommodates more than one species.

Specimens examined: SE side of Eindhoven, Tivoli, churchyard, on concrete of tombstones, gr. 51-45-44, 28/08/2013, P. & B. van den Boom 50061 (hb. v.d. Boom); Ibid. 05/09/2013, P. & B. van den Boom 50088.

***Roselliniella muralis* VAN DEN BOOM sp.n.**

Mycobank No.: MB810823

Lichenicolous fungus. Ascomata perithecioid hidden among squamulus of the host thallus *Lecanora muralis*, black, subglobose to obpyriforme, up to 350 µm wide and 400-500 µm high, ostiolate, apical pseudoparenparenchymatous, to prosoplectenchymatous. Vegetative hyphae abundant around the perithecia. Periphyse simple, septate, up to 3 µm wide. Paraphyse simple to ramificate, septate. Ascus unitunicati, cylindrical to slightly cavate, 8-spored, I-. Ascospores simple, ellipsoid, young hyaline, dark brown when mature, 20–25 × 10–15 µm, without a perispore, 1–3 bigger oil droplets. Host: *Lecanora muralis*.

Type: The Netherlands: Noord-Brabant, SW of Heeze, Sterksel, graveyard, on concrete of gravestone, gr. 57-17-21, alt. 25 m, 12 June 2013, P. van den Boom 49478 (holotype BR, isotype herb. v. d. Boom) – Fig. 6.

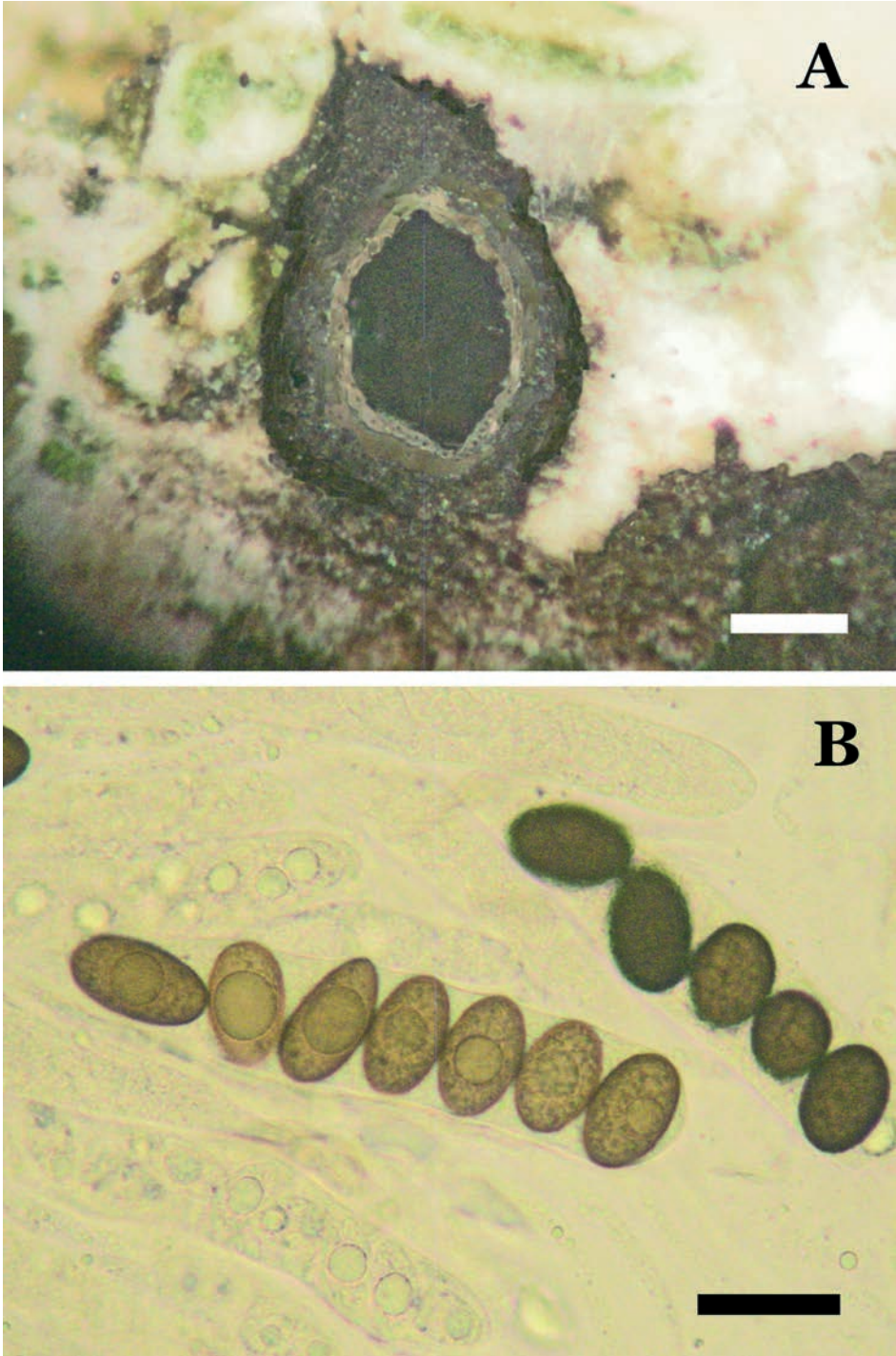


Fig. 6 A-B: *Roselliniella muralis*; A = section through a perithecium, B = ascospores. Scale: A = 100  $\mu$ m, B = 25  $\mu$ m.



Infection no gall inducing, causing a discoloration, of the host thallus, the host thallus becomes paler without a different tinge, whitish to pale grey. Perithecia blackish, subglobose to obpyriforme, up to 350 µm wide and 400–500 µm high, ostiolate, wall dark brown, inner layer paler, wall up to 100 µm wide, scattered or two or three slightly tuberculate, hidden among squamulus of the host thallus, growing close against the lower surface and often erumpent and visible at the underside, in optical section only the ostiole visible. Vegetative hyphae abundant around the perithecia, brown, smooth-walled, septate, 2.5–4 µm wide, up to 60 µm long. Excipulum with several layers, paraplectenchymatous at the outer surface and prosoplectenchymatous to inner part, brown pigment strongly at the outer part becoming less intense to the inner margin. Paraphyses simple to rarely branched, septate, 3–9 µm wide. Periphyses present, hyaline, 2–3 µm wide, not branched. Ascus unitunicati, cylindrical to slightly clavate, 8-spored, thin-walled, without a visible apical structure, I-. Ascospores simple, ellipsoid, young hyaline, dark brown when mature, 20–23 (–25) × 10–15 µm, without a perispore, 1–3 bigger oil droplets and many smaller ones.

Host: *Lecanora muralis*

Etymology: The epithet refers to the host species on which the species occurs.

Discussion: *Roselliniella muralis* is known from several localities in the south of the Netherlands and from two in northern Belgium. All records are from horizontal surfaces of concrete of gravestones in open situations on *Lecanora muralis*.

All species of *Roselliniella* appear to be specialized on a single lichen genus or group of closely related genera (APTROOT & al. 1997). The new species is most related to *Roselliniella cladoniae*, growing in the thallus of *Cladonia* (a wide range of species). This latter has 4-spored asci, perithecia are up to 700 µm, larger and often immersed in the thallus, ascospores up to 52 µm long, which can be 2–5 septate, a character which was never observed in our specimens. Vegetative hyphae are much longer, up to 160 µm. It is a very variable species (MATZER & HAFFELNER 1990). The new species lacks of variability in size of perithecia and ascospores. *Roselliniella atlantica* has halonate ascospores somewhat longer than in the new species, up to 29 µm long and is known from Parmeliaceae. The new species is easily confused with *Pleospora bernadetiae*, because it caused the same discoloration of the (same) host. This latter has also perithecia which are hidden between squamules of the host and even the upper part is visible, c. 100 µm diam.

Additional specimens: **The Netherlands:** Noord-Brabant; Eindhoven (NW), Prinsejagt, Gemeentelijke Begraafplaats Woensel, churchyard, gravestones of concrete and granite and mixed trees including *Fagus* and *Platanus* of c. 1 m diam., and several conifers, gr. 51-34-45, 24 January 2014, P. & B. van den Boom 50292; Tongelre, 't Hofke, St. Martinus churchyard, gravestones of concrete and terricolous among grassy and mossy soil, gr. 51-45-14, 31 October 2013, P. van den Boom 50167. Geldrop, Dwarsstraat, churchyard, tombstones of concrete, brick and schist and mature *Beula* trees, gr. 51-46-43, 4 January 2014, P. van den Boom 50311. SW of Valkenswaard, Westerhoven, old churchyard, on concrete of gravestones, gr. 57-14-41, 31 August 2013, P. & B. van den Boom 50064. Borkel & Schaft, Borkel, churchyard, on gravestones, gr. 57-24-35, 31 May 2012, P. & B. van den Boom 48150.

**Belgium:** Limburg; Lommel, SE of village, churchyard, mainly gravestones of concrete and mixed trees, including mature *Fagus*, IFBL C6.27, 31 August 2013, P. & B. van den Boom 50082. ESE of Lommel, S of Overpelt, Steenovenstraat, churchyard, gravestones of concrete and granite, IFBL C6.38, 31 August 2013, P. & B. van den Boom 50086.

***Roselliniella cladoniae* (ANZI) MATZER & HAFFELNER**

This is a very rare species for the Netherlands, only two coastal localities are known. New record for the province. We found it terricolous on cups and squamules of an unidentified *Cladonia* species.

Specimens examined: SE side of Eindhoven, Tivoli, churchyard, concrete of tombstones, terricolous, *Thuja* and *Quercus*, gr. 51-45-44, 28/08/2013, P. & B. van den Boom 50057; Ibid. 31/10/2013, P. & B. van den Boom 50152.

***Stigidium mycobilimbiae* CL.ROUX, TRIEBEL & ETAYO**

Only three localities are known of this very rare species in the country (APTROOT & al. 2004). This species has been found only once sparsely growing on *Bilimbia sabuletorum*, but the latter was abundantly present.

Specimen examined: SSW of Erp, Keldonk centre, near RK church, churchyard, gravestones and monument, *Platanus* trees at entrance, gr. 51-16-14, 13/09/2013, P. & B. van den Boom 50099.

***Verrucaria elaeina* BORRER**

This is a rare species in the Netherlands and a new record for the province Noord-Brabant (APTROOT & al. 2004). Our sample was found on a sandstone embedded in the ground in a rather shaded area.

Specimen examined: Nuenen (E), Algemene Begraafplaats Nuenen c.a., churchyard with a few tombstones and some mature mixed trees, gr. 51-36-42, 07/08/2014, P. & B. van den Boom 51917.

***Veздаea aestivalis* (OHLERT) TSCHERM.-WOESS & POELT**

This coastal species is very rarely recorded in inland localities (APTROOT & al. 2004). We add here two inland records, new to the province.

Specimens examined: Eindhoven, W of centre, Strijp, St. Trudo churchyard, with many mature *Fagus* trees (up to 90 cm diam.), on gravestones, terricolous among and over mosses, gr. 51-44-25, 28/03/2012, P. & B. van den Boom 47391. Heeze centre, churchyard with gravestones of concrete, gr. 51-56-44, 07/04/1997, P. & B. van den Boom 18271.

***Xanthoparmelia conspersa* (ACH.) HALE**

This is a rather rare species in the country and mainly known from the centre and the north. Only a very few records are known from the western part of the province Noord-Brabant (APTROOT & al. 2004). It has been found on smooth granite gravestones.

Specimens examined: Lieshout centre, churchyard, on gravestones of granite and concrete and on young *Acer* trees, gr. 51-26-35, 18/10/2012, P. & B. van den Boom 48282. Eindhoven (NW), Prinsejagt, Gemeentelijke Begraafplaats Woensel, churchyard, gravestones of concrete and granite and mixed trees including *Fagus* and *Platanus* of c. 1 m diam., and several conifers, gr. 51-34-45, 24/01/2014, P. & B. van den Boom 50286. Tongelre, 't Hofke, St. Martinus churchyard, gravestones of concrete and terricolous among grassy and mossy soil, gr. 51-45-14, 31/10/2013, P. & B. van den Boom 50168.

***Zwackhiomyces calcariae* (FLAGEY) HAFFELNER & NIK.HOFFM.**

This is a very rare species in western Europe and so far it was only known from one locality in the study area (Heeze) (VAN DEN BOOM & BRAND 2008). Here we add a few further records all from *Aspicilia contorta*.

Specimens examined: Valkenswaard centre, churchyard since 1887, gravestones of concrete, brick, schist and granite, including a monument and mixed trees, gr. 57-14-25, 27/9/2013, P. & B. van den Boom 50118. Leende centre, near church, churchyard, on gravestones, mainly concrete, gr. 57-16-22, 2/6/2013, P. & B. van den Boom 49475. SE of Heeze, Sterksel centre, churchyard with gravestones of concrete and granite, gr. 57-17-21, 12/6/2013, P. & B. van den Boom 49477. Further specimens found in grid.: [51-25,46].

### Annotated species list of lichens

#### Legenda:

Ac = <i>Acer</i> sp.	Cs = <i>Castanea sativa</i>	Rd = <i>Rhododendron</i> sp.
Ae = <i>Aesculus</i> sp.	Fa = <i>Fagus sylvatica</i>	Rm = <i>Rhododendron molle</i>
Ame = <i>Amelanchier</i> sp.	Fr = <i>Fraxinus exelsior</i>	Ro = <i>Robinia</i> sp.
Apl = <i>Acer platanoides</i>	Gi = <i>Ginkgo</i> sp.	Rs = <i>Rosaceae</i>
Aps = <i>Acer pseudoplatanus</i>	Ju = <i>Juglans nigra</i>	Sa = <i>Salix</i> sp.
Ara = <i>Araucaria</i> sp.	Pc = <i>Picea</i> sp.	Sm = <i>Sambucus nigra</i>
Be = <i>Betula</i> sp.	Pl = <i>Platanus</i> sp.	Sr = <i>Sorbus aucuparia</i>
Bu = <i>Buxus sempervirens</i>	Po = <i>Populus</i> sp.	Sy = <i>Syringa</i> sp.
Ca = <i>Calluna vulgaris</i>	Pr = <i>Prunus</i> sp.	Th = <i>Thuja</i> sp.
Cg = <i>Crataegus</i> sp.	Py = <i>Pyrus</i> sp.	Ti = <i>Tilia</i> sp.
Chr = <i>Chrysophyllum</i> sp.	Qro = <i>Quercus robur</i>	Ul = <i>Ulmus</i> sp.
Co = <i>Corylus avellana</i>	Qru = <i>Quercus rubra</i>	
Cr = <i>Carpinus betulus</i>	Qu = <i>Quercus</i> sp.	
b = brick	ir = iron	so = stone
bfb = bark of fallen branch	pe = pebbles	st = stump
c = calcareous rock/mortar	s = acidic rock	t = terricolous
cli = clinker (pavement)	san = sandstone	ut = unidentified tree/shrub
con = conifer	sh = schist	w = wood (unidentified)
excl. = excluding		

species	substrate	grid reference
<i>Acarospora fuscata</i> (NYL.) ARNOLD	b, s	51-15, 32, 34
<i>Acarospora moenium</i> (VAIN.) RÄSÄNEN	c, pe	51-26, 34, 37
<i>Acarospora veronensis</i> A.MASSAL.	sh	51-36
<i>Acarospora versicolor</i> BAGL. & CARESTIA	c, sh	57-24, 26
<i>Agonimia tristicula</i>	(see above)	
<i>Agonimia vouauxii</i> (DE LESD.) BRAND & DIEDERICH	c	51-45
<i>Amandinea punctata</i> (HOFFM.) COPPINS & SCHEID.	b, c, s, sh, st, w, Ac, Ae, Be, Cs, Fa, Fr, Ju, Pc, Pl, Po, Pr, Py, Qu, Ro, Sa, Th, Ti, Ul	51-13.....57-26 excl. {51-43}
<i>Anisomeridium polypori</i> (ELLIS & EVERH.) M.E.BARR	Ac	51-36
<i>Arthonia muscigena</i> TH.FR.	c	51-16
<i>Arthonia radiata</i> (PERS.) ACH.	ut	57-15
<i>Aspicilia calcarea</i> (L.) MUDD	c	51-13, 15, 32, 36, 37, 42, 43, 45, 46, 47; 57-13, 14, 17
<i>Aspicilia contorta</i> (HOFFM.) KREMP.	c	51-13.....57-26 excl. {51-16, 55; 57-15}

species	substrate	grid reference
<i>Bacidia bagliettoana</i>	(see above)	
<i>Bacidia fuscoviridis</i> (ANZI) LETTAU	c	51-52
<i>Bacidina adastr</i> a (SPARRIUS & APTROOT) M.HAUCK & V.WIRTH	st	51-13, 45; 57-14, 26
<i>Bacidina arnoldiana</i> (KÖRB.) V.WIRTH & VÉZDA	s	51-16
<i>Bacidina caligans</i> (NYL.) A.L.SM.	c (moss)	51-15, 25, 26, 27, 35, 43, 45, 46; 57-26
<i>Bacidina chlorotricula</i>	(see above)	
<i>Bacidina delicata</i> (LARBAL. ex LEIGHT.) V.WIRTH & VÉZDA	c	51-57; 57-14
<i>Bacidina egenula</i> (NYL.) ARNOLD	b, c	51-15, 26, 45
<i>Bacidina neosquamulosa</i> (APTROOT & VAN HERK) EKMAN	c	51-13, 15, 16, 34, 35, 36, 44, 45, 46, 55, 56; 57-14
<i>Bacidina sulphurella</i> (SAMPAIO) M.HAUCK & V.WIRTH	Py, Ro	51-15, 56
<i>Baeomyces rufus</i> (HUDS.) REBENT.	b	51-45
<i>Bilimbia sabuletorum</i> (SCHREB.) ARNOLD	b, c (moss), s, t	51-15, 16, 34, 36, 42, 43, 45, 52, 54; 57-14
<i>Buellia aethalea</i> (ACH.) TH.FR.	b, s	51-22, 24, 27, 36, 45, 53, 54; 57-23
<i>Buellia badia</i>	(see above)	
<i>Buellia griseovirens</i> (TURNER & BORRER ex SM.) ALMB.	w, Ro, Ti	51-27, 45, 55; 57-13
<i>Buellia ocellata</i> (FLOTOW) KÖRB.	b	51-32
<i>Caloplaca albolutescens</i> (NYL.) H.OLIVIER	c	51-45
<i>Caloplaca arcis</i> (POELT & VÉZDA) ARUP	c	51-34, 35, 44
<i>Caloplaca arenaria</i> (PERS.) MÜLL.ARG.	s, sh	51-27, 34, 36, 37, 44, 45, 53; 57-26
<i>Caloplaca aurantia</i> (PERS.) J.STEINER	c	51-14, 15, 22, 25, 27, 35, 37, 44, 45, 46; 57-13
<i>Caloplaca cerinella</i> (NYL.) FLAGEY	Pl	51-27
<i>Caloplaca citrina</i> (HOFFM.) TH.FR.	c	51-13, 14, 15, 22, 24, 25, 26, 27, 34, 35, 36, 37, 42, 43, 44, 45, 47, 52, 53, 54, 55; 57-13, 14, 16, 17, 23, 24, 26
<i>Caloplaca crenulatella</i>	(see above)	
<i>Caloplaca decipiens</i> (ARNOLD) BLOMB. & FORSELL	c	51-13, 14, 15, 16, 22, 24, 25, 27, 32, 34, 35, 36, 37, 43, 44, 45, 46, 47, 52, 53, 54; 57-13, 14, 23, 26
<i>Caloplaca dichroa</i> ARUP	c	51-13, 14, 15, 22, 24, 25, 26, 27, 34, 35, 36, 37, 42, 43, 44, 45, 47, 52, 53, 54, 55; 57-13, 14, 16, 17, 23, 24, 26

species	substrate	grid reference
<i>Caloplaca flavescens</i> (HUDS.) J.R.LAUNDON – Fig. 4B.	c	51-15, 24, 25, 27, 32, 36, 37, 45, 47, 52, 53, 56; 57-13, 14, 23, 26
<i>Caloplaca flavocitrina</i> (NYL.) H.OLIVIER	c, pe	51-13, 14, 15, 16, 22, 25, 26, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 52, 53, 54, 56, 57; 57-13, 14, 17, 24, 26
<i>Caloplaca flavovirescens</i> (WULFEN) DALLA TORRE & SARNTH.	c, s	51-13, 14, 15, 16, 22, 25, 26, 27, 34, 35, 36, 37, 42, 45, 46, 53, 54, 55, 56, 57; 57-13, 15, 16, 17, 23
<i>Caloplaca holocarpa</i> (HOFFM.) A.E.WADE	c, s	51-43, 44, 52; 57-13
<i>Caloplaca oasis</i> (A.MASSAL.) SZATALA	b, c	51-13, 14, 15, 16, 22, 24, 25, 26, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 52, 53, 54, 55, 56; 57-13, 14, 15, 16, 17, 23, 24, 26
<i>Caloplaca obscurella</i> (J.LAHM) TH.FR.	ut	51-45, 57
<i>Caloplaca phlogina</i>	(see above)	
<i>Caloplaca pyracea</i> (ACH.) TH.FR.	Po	51-15, 25, 36
<i>Caloplaca ruderum</i> (MALBR.) J.R.LAUNDON	c	51-13, 14, 15, 16, 22, 25, 27, 32, 36, 37, 42, 43, 44, 45, 47, 52, 53, 54; 57-13, 14, 23
<i>Caloplaca saxicola</i> (HOFFM.) NORDIN	c	51-13, 14, 15, 16, 22, 25, 26, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 52, 53, 54, 55, 56; 57-13, 14, 15, 16, 17, 23, 26
<i>Caloplaca teicholyta</i> (ACH.) J.STEINER	c	51-13, 14, 15, 16, 22, 24, 25, 26, 27, 34, 36, 37, 43, 44, 45, 46, 47, 52, 53, 54; 57-13, 14, 16, 17, 23, 24, 26
<i>Candelaria concolor</i> (DICKS.) STEIN	b, c, s, sh, w, Ac, Be, Ca, Cr, Fr, Oro, Pl, Qru, Rm, Ro, Sy, Ti, Ul	51-13, 14, 15, 16, 22, 25, 26, 27, 32, 34, 35, 36, 37, 44, 45, 46, 52, 53, 54, 55, 56, 57; 57-13, 14, 15, 16, 23, 26
<i>Candelariella aurella</i> (HOFFM.) ZAHLBR.	c	51-13, 14, 15, 16, 22, 24, 25, 26, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 52, 53, 54, 55, 56, 57; 57-13, 14, 15, 16, 17, 23, 24, 26
<i>Candelariella medians</i> (NYL.) A.L.SM.	c	51-16, 34, 36, 37, 43, 52, 56; 57-14, 23
<i>Candelariella reflexa</i> (NYL.) LETTAU	c, Ac, Be, Cr, Fa, Fr, Pl, Pr, Qu, Ro, Sr, ThTi, Ul	51-14, 15, 16, 24, 25, 26, 27, 34, 35, 36, 37, 42, 43, 44, 45, 46, 52, 53, 54, 55, 56; 57-13, 14, 15, 16, 23
<i>Candelariella vitellina</i> (HOFFM.) MÜLL.ARG.	b, c, ir, s, sh, Fa, Ju, Qru, Ti	51-13, 15, 16, 22, 24, 25, 26, 27, 32, 34, 35, 36, 37, 43, 44, 45, 46, 52, 53, 54, 55; 57-13, 14, 16, 17, 23, 24, 26

species	substrate	grid reference
<i>Candelariella xanthostigma</i> (ACH.) LETTAU	Ara	57-14
<i>Catillaria chalybeia</i> (BORRER) A.MASSAL.	b, c, s, sh	51-13, 15, 16, 25, 26, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 47, 53, 54, 56; 57-13, 14, 16, 17, 23
<i>Catillaria lenticularis</i> (ACH.) TH.FR.	c	51-15, 22, 2735, 327, 44, 45, 46; 57-16, 26
<i>Catillaria nigroclavata</i> (NYL.) SCHULER	Ac, Fr, Pl, Qu, Rm	51-15, 24, 27, 35, 36, 45, 57; 57-15
<i>Cladonia bacillaris</i> (ACH.) GENTH.	c	51-45
<i>Cladonia chlorophaea</i> (SOMMERF.) SPRENG. s.l.	c, t	51-15, 44, 45, 46, 52; 57-26
<i>Cladonia coccifera</i> (L.) WILLD.	t	51-46
<i>Cladonia coniocraea</i> (FLÖRKE) SPRENG.	b, t	51-26, 32, 43, 44, 45, 47, 54, 55; 57-23, 26
<i>Cladonia cyathomorpha</i>	(see above)	
<i>Cladonia fimbriata</i> (L.) FR.	b, c, t, Fa	51-13, 15, 26, 32, 34, 37, 44, 45, 46, 47, 52, 54, 55; 57-13, 14, 15, 23
<i>Cladonia furcata</i> (HUDS.) SCHRAD.	t	51-45, 55
<i>Cladonia glauca</i> FLÖRKE	t	51-34, 37, 45; 57-26
<i>Cladonia humilis</i> (WITH.) J.R.LAUNDON	t	51-27, 34, 44, 45, 55; 57-23
<i>Cladonia merochlorophaea</i> ASAH.	t	51-46
<i>Cladonia pocillum</i> (ACH.) O.J.RICH.	t	51-34
<i>Cladonia ramulosa</i> (WITH.) J.R.LAUNDON	c	51-32
<i>Cladonia rei</i> SCHAER.	t	51-56
<i>Cladonia scabriuscula</i> (DELISE) NYL.	t	51-34, 44, 45, 46, 55; 57-26
<i>Cladonia subulata</i> (L.) F.H.WIGG.	t	51-45, 46, 54, 55; 57-13
<i>Coenogonium pineti</i> (SCHRAD. ex ACH.) LÜCKING & LUMBSCH	Fr, Qro	51-25, 34, 43, 45
<i>Collema crispum</i> (HUDS.) F.H.WIGG.	t	51-13, 45; 57-14
<i>Collema limosum</i> (ACH.) ACH.	t	51-34; 57-14
<i>Diploicia canescens</i> (DICKS.) A.MASSAL.	c, b	51-15, 27, 32, 53; 57-16
<i>Diploschistes muscorum</i> (SCOP.) R.SANT.	t, on <i>Cladonia</i>	51-45, 46
<i>Diplotomma ambiguum</i> (ACH.) FLAGEY	b, c	51-15, 32
<i>Dirina massiliensis</i> DURIEU & MONT. f. <i>sorediata</i> (MÜLL.ARG.) TEHLER	c	51-15
<i>Epigloea soleiformis</i> DÖBBELER	t	51-35, 45

species	substrate	grid reference
<i>Evernia prunastri</i> (L.) ACH.	w, Ac, Be, Fa, Fr, Qro, Sa, Ti	51-22, 24, 27, 32, 34, 35, 36, 37, 44, 45, 46, 52, 53, 54, 55; 57-13, 14, 16, 26
<i>Fellhanera viridisorediata</i> APTROOT, M.BRAND & SPIER	Rd	51-36, 43
<i>Flavoparmelia caperata</i> (L.) HALE	c, Ac, Be, Cr, Fa, Fr, Pr, Qro, Ti, Ul	51-15, 32, 35, 36, 37, 43, 44, 45, 46, 54, 55; 57-14, 15, 23
<i>Flavoparmelia soredians</i> (NYL.) HALE	Be, Cr, Fa, Qru, Ti	51-36, 44, 45, 46, 53, 54, 55; 57-14, 16
<i>Gregorella humida</i> (KULLH.) LUMBSCH	t	51-35, 44, 45, 55
<i>Halecania viridescens</i> COPPINS & P.JAMES	Ac, Fr	51-24, 35, 45, 57
<i>Hyperphyscia adglutinata</i> (FLÖRKE) H. MAYRHOFER & POELT	Ac, Cr, Fa, Fr, Pl, Pr, Rm, Th	51-14, 15, 16, 25, 26, 27, 34, 35, 36, 37, 44, 45; 57-15
<i>Hypogymnia farinacea</i> ZOPF	Be, Fr, Qru, Ti	51-34, 35, 44, 45; 57-13
<i>Hypogymnia physodes</i> (L.) NYL.	b, s, w, Ae, Be, Fa, Fr, Po, Pr, Qru, Sa, Ti	51-14, 22, 27, 32, 35, 37, 44, 45, 46, 54, 55; 57-13, 14, 26
<i>Hypotrachyna afrorevoluta</i> (KROG & SWINSCOW) KROG & SWINSCOW	w, Ac, Be, Fa, Pr, Qro, Qru	51-27, 34, 44, 45, 46, 55, 57
<i>Hypotrachyna revoluta</i> (FLÖRKE) HALE	Be, Fr, Pr, Qru, Sa	51-24, 34, 35, 44, 45, 46, 55, 57; 57-14, 26
<i>Jamesiella anastomosans</i> (P.JAMES & VÉZDA) LÜCKING, SÉRUS. & VÉZDA	Fa	51-15, 34, 42
<i>Lecania cyrtella</i> (ACH.) TH.FR.	Ara, Pl, Po, Qu, Ro, Sm, Ul	51-15, 22, 24, 27, 36, 52; 57-14, 15, 16
<i>Lecania erysibe</i> (ACH.) MUDD	b, c	51-13, 14, 15, 16, 22, 24, 25, 26, 27, 32, 34, 35, 36, 37, 43, 44, 45, 46, 52, 53, 54, 55, 56, 57; 57-13, 14, 15, 16, 23, 24, 26
<i>Lecania inundata</i> (KÖRB.) M.MAYRHOFER	c	51-26
<i>Lecania naegeli</i> (HEPP) DIEDERICH & VAN DEN BOOM	Po, Ti	51-15, 35
<i>Lecania rabenhorstii</i> (HEPP) ARNOLD	b, c	51-14, 15, 16, 27, 35, 36, 37, 43, 45, 46, 54, 55, 57; 57-14, 23, 24, 26
<i>Lecania sordida</i>	(see above)	
<i>Lecania turicensis</i> (HEPP) MÜLL.ARG.	c	51-45
<i>Lecanora albescens</i> (HOFFM.) FLÖRKE	c	51-13.....57-26 excl. {51-47}
<i>Lecanora barkmaniana</i> APTROOT & VAN HERK	Ac, Be, Fa, Fr, Po, Pr, Qru, Ro, Ti	15-25, 27, 34, 35, 36, 43, 44, 45, 46, 55; 57-13, 16

species	substrate	grid reference
<i>Lecanora campestris</i> (SCHAER.) HUE	b, c, cli, s	51-14, 15, 16, 24, 26, 27, 32, 34, 36, 37, 42, 43, 45, 47, 52, 54, 56; 57-13, 14, 16, 17, 24, 26
<i>Lecanora carpinea</i> (L.) VAIN.	Ac, Cr, Fa, Fr, Ro, Ti, Ul	51-15, 22, 32, 35, 46, 55, 56; 57-15, 16
<i>Lecanora chlarotera</i> NYL.	Ac, Cr, Fa, Fr, Pr, Ro, Rs, Ti, Ul	51-13, 15, 22, 25, 32, 36, 37, 43, 44, 46, 47, 55, 56; 57-16
<i>Lecanora conizaeoides</i> CROMB.	b, s, w, Ac, Ae, Cr, Fa, Po, Pr, Qu, Ro, Rs, Th, Ti	51-13, 14, 15, 24, 26, 27, 36, 37, 42, 44, 45, 46, 52, 54, 56; 57-13, 14, 26
<i>Lecanora crenulata</i> HOOK.	c	51-14, 15, 27, 35; 57-14, 17, 26
<i>Lecanora dispersa</i> (PERS.) SOMMERF.	b, c, s	51-13.....57-26
<i>Lecanora expallens</i> ACH.	b, Ac, Be, Cr, Fa, Fr, Ju, Po, Pr, Py, Qro, Qru, Ro, Sa, Ti, Ul	51-14, 15, 22, 26, 27, 34, 35, 36, 37, 42, 43, 44, 45, 46, 52, 53, 54, 55, 56; 57-13, 14, 15, 16, 23, 26
<i>Lecanora hagenii</i> (ACH.) ACH.	b, c, ir, s, sh	51-15.....57-26 excl. {51-42, 47; 57-15}
<i>Lecanora horiza</i> (ACH.) LINDS.	b	51-15
<i>Lecanora muralis</i> (SCHREB.) RABENH.	b, c, cli, Ac, Be, Fa, Fr, Pr, Ti	51-13.....57-26
<i>Lecanora pannonica</i> SZATALA	b	51-27
<i>Lecanora persimilis</i> (TH.FR.) NYL.	Ac, Ara, Fa, Pl, Po, Sm, Ti	51-15, 22, 24, 27, 35, 36, 44, 45; 57-14, 26
<i>Lecanora polytropa</i> (HOFFM.) RABENH.	b, cli, s, sh, w	51-13.....57-26 excl. {51-14, 26, 42, 47, 55; 57-15, 17}
<i>Lecanora saligna</i> (SCHRAD.) ZAHLBR.	w, Be, Cr, Po, Ro	51-15, 27, 34, 45, 46, 47, 52, 55; 57-14
<i>Lecanora semipallida</i> H.MAGN.	c	51-13.....57-26 excl. 57-15
<i>Lecanora soralifera</i> (SUZA) RÄSÄNEN	b	51-27
<i>Lecanora xanthostoma</i> WEDD. ex CL. ROUX	c	51-46
<i>Lecidea fuscoatra</i> (L.) ACH.	b, s, sh, w	51-13, 15, 22, 24, 26, 27, 32, 35, 36, 37, 44, 45, 46, 54; 57-14, 26
<i>Lecidella achristotera</i> (NYL.) HERTEL & LEUCKERT	Ac, Ae, Be, Cr, Fa, Fr, Ju, Po, Pr, Ro, Sr, Ti	51-15, 24, 25, 27, 32, 34, 35, 36, 37, 43, 44, 45, 46, 47, 52, 54, 55, 56; 57-15, 16, 23, 26
<i>Lecidella carpathica</i> KÖRB.	b	51-25
<i>Lecidella scabra</i> (TAYLOR) HERTEL & LEUCKERT	c, b, s, sh, Fa, Qro, Rm, Ro, Ti	51-14, 15, 16, 22, 24, 25, 27, 32, 37, 44, 45, 47, 52, 56; 57-13, 14, 16



species	substrate	grid reference
<i>Lecidella stigmata</i> (ACH.) HERTEL & LEUCKERT	b, c	51-13.....57-26 excl. {51-16}
<i>Lempholemma chalazanum</i> (ACH.) DE LESD.	c	51-45
<i>Lepraria incana</i> (L.) ACH.	b, c, w, Be, Fa	51-14.....57-26 excl. {51-13; 57-17}
<i>Lepraria lobificans</i> NYL.	c, Qu	51-15, 16, 34, 45, 52, 54; 57-14, 15, 16, 26
<i>Lepraria rigidula</i> (DE LESD.) TØNSBERG	Ame	51-35, 45
<i>Lepraria vouauxii</i> (HUE) R.C.HARRIS	c	51-16, 27; 57-13, 14
<i>Leptogium schraderi</i> (BERNH.) NYL.	t	51-22, 25, 42, 43, 45, 47, 52, 56; 57-14, 23
<i>Leptogium turgidum</i> (ACH.) CROMB.	t	51-22
<i>Melanelixia glabratula</i> (LAMY) SANDLER & ARUP	Ac, Fa, Qru	51-34, 44, 45, 46; 57-13
<i>Melanelixia subaurifera</i> (NYL.) O.BLANCO & al.	c, s, Ac, Be, Cr, Fa, Fr, Pr, Qro, Qru, Ti	51-15, 24, 25, 27, 34, 35, 36, 37, 44, 45, 46, 52, 53, 54, 55; 57-13, 14, 15, 16
<i>Melanohalea elegantula</i> (Z AHLBR.) O.BLANCO & al.	Pr, Qro	51-45, 54; 57-14
<i>Melanohalea exasperatula</i> (NYL.) O.BLANCO & al.	Ac, Be, Fa, Fr, Ti	51-35, 44, 45; 57-14, 15
<i>Micarea denigrata</i> (FR.) HEDL.	b, c, w, Be, Ro, Ti	51-13, 15, 22, 26, 27, 36, 37, 45, 46, 52, 54, 55, 56; 57-13
<i>Micarea erratica</i> (KÖRB.) HERTEL, RAMBOLD & PIETSCHM.	pe	51-35; 7-26
<i>Myriospora rufescens</i> (ACH.) ULOTH	b, s, sh, w	51-13, 22, 25, 26, 27, 35, 36, 37, 43, 44, 45, 46, 52, 53, 54; 57-13, 16, 17, 23
<i>Normandina pulchella</i> (BORRER) NYL.	ut	51-45
<i>Parmelia sulcata</i> TAYLOR	b, c, s, Ac, Be, Fa, Po, Pr, Qro, Ro, Sa, Ti	51-13.....57-26 excl. {51-13, 26, 42, 43, 47, 56; 57-17-24}
<i>Parmelina tiliacea</i> (HOFFM.) HALE	Fa, Qru	51-27, 44
<i>Parmotrema perlatum</i> (HUDS.) M.CHOISY	Ac, Be, Cr, Fa, Fr, Qro, Qru, Ti	51-27, 35, 37, 43, 44, 45, 46, 54, 55, 57; 57-13
<i>Peltigera didactyla</i> (WITH.) J.R.LAUNDON	t	51-25, 34, 35, 36, 37, 44, 45, 55; 57-14, 23
<i>Peltigera extenuata</i>	(see above)	
<i>Peltigera rufescens</i> (WEISS) HUMB.	t	51-47, 55
<i>Phaeophyscia nigricans</i> (FLÖRKE) MOBERG	b, c	51-13.....57-26 excl. {51-14, 55; 57-15}
<i>Phaeophyscia orbicularis</i> (NECK.) MOBERG	b, c, ir, s, Ac, Apl, Ara, Chr, Fa, Py, Rm, Sm, Ti	51-13.....57-26

species	substrate	grid reference
<i>Phlyctis argena</i> (SPRENG.) FLOT.	Ac, Be, Fa, Qu	51-27, 34, 35, 36, 44, 46, 54, 57
<i>Physcia adscendens</i> H.OLIVIER	ac, b, c, s, sh, Ac, Be, Ju, Fa, Fr, Qu, Rm, Ro, Th, Ti	51-13.....57-26 excl. {57-24}
<i>Physcia caesia</i> (HOFFM.) FÜRNR. – Fig. 4C.	b, c, cli, ir, s, sh, pe, Ac, Ae, Be, Fa, Py, Rm, Ti, Ul	51-13.....57-26
<i>Physcia clementei</i> (TURNER) MAAS GEEST.	Fr	51-15
<i>Physcia dubia</i> (HOFFM.) LETTAU	b, c, s, Fa, Fr, Ti, Ul	51-15, 16, 25, 26, 27, 34, 35, 36, 37, 43, 44, 45, 46, 52, 53, 54; 57-13, 17, 23, 26
<i>Physcia stellaris</i> (L.) NYL.	bfb	51-34
<i>Physcia tenella</i> (SCOP.) DC.	s, Ac, Bu, Cr, Fa, Fr, Pl, Po, Pr, Qu, Rm, Ul	51-13.....57-26 excl. {51-13, 22; 57-24}
<i>Physciella chloantha</i>	(see above)	
<i>Physconia distorta</i>	(see above)	
<i>Physconia grisea</i> (LAM.) POELT	b, c, Ac, Cr, Fa, Fr, Pl, Rm, Ro, Ti	51-13, 15, 16, 22, 25, 27, 35, 36, 37, 42, 44, 45, 46, 52, 53, 54, 55; 57-13, 14, 15, 16
<i>Physconia perisidiosa</i>	(see above)	
<i>Placynthiella dasaea</i> (STIRT.) TØNSBERG	b, s, st, t, w, Ac, Be	51-27, 43, 46, 47, 55; 57-26
<i>Placynthiella icmalea</i> (ACH.) COPPINS & P.JAMES	t	51-46, 47; 57-13
<i>Placynthiella oligotropha</i> (J.R.LAUNDON) COPPINS & P.JAMES	t	51-45
<i>Placynthiella uliginosa</i> (SCHRAD.) COPPINS & P.JAMES	t	51-37; 57-13
<i>Placynthium nigrum</i> (HUDS.) GRAY	c	51-22, 24, 26, 36; 57-14
<i>Pleurosticta acetabulum</i> (NECK.) ELIX & LUMBSCH	Ac	51-37
<i>Polyblastia albida</i> ARNOLD	c	51-47
<i>Polyblastia dermatodes</i> A.MASSAL.	c	51-22, 45, 52; 57-26
<i>Polysporina simplex</i> (DAVIES) VĚZDA	s, sh	51-16, 25, 34, 35, 36, 43, 45, 46; 57-14
<i>Porocyphus byssoides</i>	(see above)	
<i>Porina aenea</i> (WALLR.) ZAHLBR.	Bu	51-25, 36
<i>Porpidia soledizodes</i> (NYL.) J.R.LAUNDON	b, pe, s, sh	51-14, 15, 16, 22, 27, 32, 34, 36, 37, 43, 45, 46, 47, 52, 53, 54; 57-13, 16, 26

species	substrate	grid reference
<i>Protoblastenia rupestris</i> (SCOP.) J.STEINER	c	51-13, 14, 15, 16, 27, 34, 36, 43, 45, 52, 56; 57-14
<i>Protoparmelia hypotremella</i> VAN HERK, SPIER & V.WIRTH	Qru	51-14
<i>Psilolechia leprosa</i> COPPINS & PURVIS	b, s	51-15, 16, 26, 27, 32, 37, 44, 45, 46, 47, 52, 54, 56; 57-13, 14, 26
<i>Psilolechia lucida</i> (ACH.) M.CHOISY	b	51-15, 16, 22, 26, 27, 32, 35, 45; 57-13, 14, 26
<i>Psorotichia schaeferi</i> (A.MASSAL.) ARNOLD	c	51-43
<i>Pterygiopsis neglecta</i>	(see above)	
<i>Punctelia borrieri</i> (SM.) KROG	Ac, Apl, Be, Cr, Fa, Fr, Pr, Qru, Ro, Ti, Ul	51-15, 24, 25, 35, 36, 37, 44, 45, 46, 55; 57-13, 14, 15
<i>Punctelia jeckeri</i> (ROUM.) KALB	Ac, Be, Co, Fa, Fr, Pr, Qru, Ro, Ti, Ul	51- 24, 25, 27, 34, 35, 36, 37, 42, 44, 45, 46, 55, 57; 57-13, 14, 15, 16, 26
<i>Punctelia subrudecta</i> (NYL.) KROG	c, Ac, Be, Co, Fa, Fr, Pr, Qru, Ro, Sr, Ti	51-15, 22, 25, 27, 32, 34, 35, 36, 37, 42, 43, 44, 45, 46, 54, 55, 57; 57-13, 14, 15, 16, 23
<i>Ramalina farinacea</i> (L.) ACH.	Ac, Aps, Be, Cr, Fa, Fr, Pr, Qru, Ro, Sr, Ti, Ul	51-24, 32, 35, 36, 37, 44, 45, 46, 53, 54, 55, 57; 57-13, 14, 15
<i>Ramonia interjecta</i> COPPINS	Sm	51-36
<i>Rhizocarpon geographicum</i> (L.) DC.	s	51-34
<i>Rhizocarpon reductum</i> TH.FR.	pe, s	51-15, 34, 43, 44
<i>Rinodina oleae</i> BAGL.	b, c, cli, sh, Fr, Sm	51-15, 22, 25, 26, 27, 32, 34, 35, 36, 37, 43, 44, 45, 46, 53, 54, 55, 56; 57-13, 14, 23, 26
<i>Rinodina oxydata</i> (A.MASSAL.) A.MASSAL. S.I.	c	51-13, 15, 16, 22
<i>Rinodina pityrea</i> ROPIN & H.MAYRHOFER	Fa	51-25
<i>Sarcogyne regularis</i> KÖRB.	c	51-13, 15, 16, 22, 25, 26, 27, 35, 36, 37, 43, 45, 46, 52, 53, 54, 56, 57; 57-13, 14, 16
<i>Sarcosagium campestre</i> (FR.) POETSCH & SCHIED.	st, t	51-44, 45, 55; 57-26
<i>Scoliosporum umbrinum</i> (ACH.) ARNOLD	b, ir, s, sh	51-15, 22, 25, 26, 27, 32, 34, 35, 37, 44, 45, 46, 52, 56; 57-13, 16, 26
<i>Staurothele frustulenta</i> VAIN.	c	51-46
<i>Steinia geophana</i> (NYL.) STEIN	t	51-25, 34, 35, 44, 45, 55; 57-14

species	substrate	grid reference
<i>Stereocaulon nanodes</i> TUCK.	b	51-45; 57-14
<i>Stereocaulon vesuvianum</i> PERS.	b	51-22, 24, 26, 45, 52
<i>Strangospora pinicola</i> (A.MASSAL.) KÖRB.	Be, Qro, Ro	51-45, 55
<i>Thelidium zwackhii</i> (HEPP) A.MASSAL.	b, c	57-13, 14
<i>Thelocarpon laureri</i> (FLOT.) NYL.	w	51-26
<i>Thelocarpon lichenicola</i> (FUCKEL) POELT & HAFELLNER	t	51-45
<i>Trapelia coarctata</i> (SM.) M.CHOISY	b, s, sh	51-15, 16, 22, 25, 26, 27, 32, 34, 35, 37, 44, 45, 46, 47; 57-13, 14, 23, 26
<i>Trapelia glebulosa</i> (SM.) J.R.LAUNDON	b, s	51-22, 27, 45
<i>Trapelia obtegens</i> (TH.FR.) HERTEL	b, s	51-16, 22, 24, 27, 32, 37, 44, 45, 46, 47, 52, 54; 57-13, 14, 26
<i>Trapelia placodioides</i> COPPINS & P.JAMES	b	51-25, 26, 27, 32, 37, 44, 45, 47, 52, 53, 54; 57-13, 26
<i>Trapeliopsis flexuosa</i> (FR.) COPPINS & P.JAMES	w	51-14
<i>Trapeliopsis granulosa</i> (HOFFM.) LUMBSCH	b, s, st, t, w, Fa	51-32, 36, 45, 46, 47
<i>Verrucaria bryoctona</i> (TH.FR.) ORANGE	c, t	51-34, 45
<i>Verrucaria dolosa</i> HEPP	c	57-14
<i>Verrucaria elaeina</i>	(see above)	
<i>Verrucaria glaucina</i> auct.	c	51-26, 36
<i>Verrucaria macrostoma</i> DUFOUR ex DC.	c	51-15, 16, 27, 34, 36, 37, 44, 45, 47, 52, 53, 56; 57-13, 14, 23
<i>Verrucaria maculiformis</i> KREMP.	c	51-13, 15, 37, 45, 56
<i>Verrucaria muralis</i> ACH.	c	51-13, 14, 15, 16, 22, 24, 25, 26, 27, 34, 35, 37, 43, 45, 46, 52, 54, 56; 57-13, 14, 23, 26
<i>Verrucaria nigrescens</i> PERS.	c	51-13.....57-26 excl. {51-42, 55, 56; 57-24}
<i>Verrucaria ochrostoma</i> (LEIGHT.) TREVIS.	c	51-13, 14, 15, 16, 22, 26, 27, 35, 36, 37, 43, 45, 52, 53, 54, 56; 57-13, 14, 23, 26
<i>Verrucaria pinguicula</i> A.MASSAL.	c	51-27
<i>Verrucaria squamulosa</i> BRAND & P.Boom	c	51-47, 52; 57-14
<i>Verrucaria umbrinula</i> NYL.	b, c	51-15, 25, 45, 54
<i>Verrucaria virens</i> NYL.	c	51-16, 22, 24, 26, 45, 52; 57-14, 23, 24
<i>Verrucaria viridula</i> (SCHRAD.) ACH.	b, c	51-13.....57-26 excl. {51-24, 25, 32, 42, 46, 55; 57-15}

species	substrate	grid reference
<i>Vezdaea acicularis</i> COPPINS	t	51-45
<i>Vezdaea aestivalis</i>	(see above)	
<i>Vezdaea leprosa</i> (P.JAMES) VĚZDA	t	51-34, 44, 45, 55; 57-14
<i>Vezdaea retigera</i> POELT & DÖBBELER	t	51-44
<i>Xanthoparmelia conspersa</i>	(see above)	
<i>Xanthoparmelia pulla</i> (ACH.) O.BLANCO, A.CRESPO, ELIX, D.HAWKSW. & LUMBSCH	s	51-26, 27, 34, 36, 44, 45, 46
<i>Xanthoria calcicola</i> OXNER	b, Ro	51-13, 15, 25, 36, 42, 45, 52, 54; 57-13, 17, 23
<i>Xanthoria candelaria</i> (L.) TH.FR.	s, w, Ac, Be, Cr, Fa, Ju, Qu, Ro, Ti	51-15, 27, 32, 37, 45, 46, 54; 57-14, 26
<i>Xanthoria elegans</i> (LINK) TH.FR. – Fig. 4F.	c, s	51-13, 14, 16, 25, 26, 27, 34, 35, 36, 37, 44, 45, 46, 52, 54, 57; 57-13, 14, 17, 23, 26
<i>Xanthoria parietina</i> (L.) TH.FR.	b, c, s, sh, Ac, Apl, Be, Ca, Fa, Qru, Rm, Ro, Ti	51-13.....57-26
<i>Xanthoria polycarpa</i> (HOFFM.) RIEBER	c, s, ut, w, Ac, Be, Cr, Qu, Pl, Po, Ro, Ti	51-15, 27, 34, 35, 37, 44, 45, 46, 55; 57-16, 17, 26

### Annotated list of lichenicolous fungi

species	substrate	grid reference	host species
<i>Arthonia apotheciorum</i>	(see above)		
<i>Arthonia phaeophysciae</i> GRUBE & MATZER	c, w	51-13.....57-26] excl. {51-24, 27, 53; 57- 16, 17, 24}	<i>Phaeophyscia orbicularis</i>
<i>Athelia arachnoidea</i> (BERK.) JÜLICH	Ac, Ro, Ti, Ul	51-24, 35, 37, 53, 54, 55; 57-13, 14, 15, 16	<i>Candelariella reflexa</i> <i>Lepraria incana</i> <i>Melanelixia</i> <i>subaurifera</i> <i>Physcia tenella</i>
<i>Buelliella physciicola</i>	(see above)		
<i>Cercidospora macrosporum</i> (ULOTH) HAFELLNER & NAV.-ROS	c, s, sh	51-13, 25, 26, 27, 34, 35, 36, 37, 45, 46, 47, 53, 56; 57-13, 23, 26	<i>Lecanora muralis</i>
<i>Cladoniicola staurospora</i> DIEDERICH, VAN DEN BOOM & APTROOT	t	51-45, 54, 55, 56; 57-14	<i>Cladonia</i>
<i>Corticifraga fuckelii</i> (REHM) D.HAWKSW. & R.SANT.	t	51-35, 36, 45, 55; 57-14	<i>Peltigera didactyla</i> <i>Peltigera extenuata</i>
<i>Graphium aphotosae</i>	(see above)		

species	substrate	grid reference	host species
<i>Hawksworthiana peltigericola</i>	(see above)		
<i>Illosporopsis christiansenii</i> (B.L.BRADY & D.HAWKSW.) D.HAWKSW.	c, Cr, Fr, Ti	51-22, 35, 45; 57-16	<i>Physcia caesia</i> <i>Physcia tenella</i> <i>Xanthoria parietina</i>
<i>Illosporium carneum</i> FR.	t	51-34, 45, 55	<i>Peltigera didactyla</i> <i>Peltigera extenuata</i>
<i>Intralichen christiansenii</i>	(see above)		
<i>Lawalreea lecanorae</i> DIEDERICH	Po	51-15	<i>Lecanora persimilis</i>
<i>Lichenodiplis lecanorae</i> (VOUAUX) DYKO & D.HAWKSW.	w	51-15, 55	<i>Lecanora saligna</i>
<i>Marchandiobasidium aurantiacum</i> DIEDERICH & SCHULTHEIS	ut, Cr, Fa,	51-24, 44, 45, 47; 57-13, 15, 16	<i>Physcia adscendens</i> <i>Physcia tenella</i> <i>Xanthoria parietina</i>
<i>Muellerella erratica</i> (A.MAS- SAL.) HAFELLNER & V.JOHN	c	51-15, 47, 56	<i>Aspicilia contorta</i>
<i>Neocoleroa inundata</i>	(see above)		
<i>Paranectria oropensis</i> (CES.) D.HAWKSW. & PIROZ.	Ac, Cr, Fa, Fr, Qro	51-15, 24, 27, 32, 34, 35, 36, 37, 42, 44, 45, 46, 55, 57; 57-14, 15, 26	<i>Bacidina</i> <i>Cladonia</i> <i>Candelariella reflexa</i> <i>Lepraria incana</i> <i>Phaeophyscia orbicularis</i> <i>Pyscia adscendens</i> <i>Pyscia tenella</i> <i>Physconia grisea</i>
<i>Pezizella epithallina</i> (W.PHILLIPS & PLOWR.) SACC.	t	51-34, 35, 45, 55	<i>Peltigera extenuata</i>
<i>Plaeospora bernadetae</i>	(see above)		
<i>Phoma peltigerae</i> (P.KARST.) D.HAWKSW.	t	51-45, 55	<i>Peltigera extenuata</i>
<i>Polycoccum peltigerae</i> (FU- CKEL) VÉZDA	t	51-34, 45, 55	<i>Peltigera didactyla</i> <i>Peltigera extenuata</i>
<i>Polycoccum pulvinatum</i>	(see above)		
<i>Pronectria oligospora</i> LOWEN & ROGERSON var. <i>octospora</i> ETAYO	Ac, Fa, Pr, Qu, Ti	51-35, 36, 44, 45, 46; 57-13, 14	<i>Punctelia subrudecta</i>
<i>Pronectria robergei</i>	(see above)		
<i>Pyrenidium</i> aff. <i>actinellum</i>	(see above)		
<i>Roselliniella cladoniae</i>	(see above)		
<i>Roselliniella muralis</i>	(see above)		
<i>Stigmatidium mycobilimbiae</i>	(see above)		
<i>Syzygospora physciacearum</i> DIEDERICH	ut	51-35	<i>Physcia tenella</i>

species	substrate	grid reference	host species
<i>Taeniolella phaeophysciae</i> D.HAWKSW.	c	51-15, 22, 25, 36, 44, 45, 46, 52; 57-14, 16	<i>Phaeophyscia orbicularis</i> <i>Physcia caesia</i>
<i>Tubeufia heterodermae</i> ETAYO	Fa, Ti, Ul	51-24, 37; 57-15, 16	<i>Physcia tenella</i>
<i>Xanthoriicola physciae</i> (KALCHBR.) D.HAWKSW.	Ac, Cr, Fa, Fr, Ti, Ul	51-22, 24, 35, 36; 57-13, 15, 16	<i>Xanthoria parietina</i>
<i>Zwackhiomyces calcariae</i>	(see above)		

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