

## A long-term inventory of lichens and lichenicolous fungi of the Strabrechtse Heide and Lieropse Heide in Noord-Brabant, The Netherlands

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**Summary:** A lichenological survey is presented of a nature reserve in the southeastern part of The Netherlands. The survey is a result of studies that have been carried out by the author over 20 years (1985–2004). This survey includes terricolous, corticolous, lignicolous and saxicolous lichen taxa as well as lichenicolous fungi. In total 175 sites have been visited, being the most extensive lichenological survey ever made in the country in such a relatively small area. Two major habitats have been sampled, namely heathlands and woodlands. 194 taxa are now known from the area, 176 lichens and 18 lichenicolous fungi. During this survey, several species have been found new to the country, but are already published (see introduction). *Tubeufia heterodermiae* is reported as new for northwestern Europe. The discovery of pycnidia with conidia in *Fellhanera viridisorediata* confirms the generic position of the species.

**Zusammenfassung:** Eine 20-jährige (1985 bis 2004) Untersuchung der Flechten und flechtenbewohnenden Pilze in einem Naturschutzgebiet im Südosten der Niederlande wurde durchgeführt. Die Studie enthält Flechtentaxa vom Erdboden, von Rinde, Holz und Gestein sowie flechtenbewohnende Pilze. Insgesamt wurden 175 Flächen beobachtet, dies ist somit die größte jemals in einem relativ kleinen Gebiet durchgeführte Untersuchung. 194 Taxa wurden gefunden, 176 Flechten und 18 flechtenbewohnende Pilze. Verschiedene Arten sind (bereits publizierte) Erstfunde für das Untersuchungsgebiet. *Tubeufia heterodermiae* ist neu für NW Europa. Pycniden und Pycnosporen wurden erstmals in *Fellhanera viridisorediata* gefunden und festigen die Platzierung der Art in dieser Gattung.

The study area is situated between 51°23'–51°25'N and 5°35'–5°40'E (Fig. 1). It has a long history of an endemic agriculture system, from c. 2500 B.C. until c. 1900, in which heathland forms an important element. However, there exists no history in lichenology regarding this area. The only data is from Dr J. DE SMIDT who collected a few specimens of most common species in the middle of the 20<sup>th</sup> century.

The first publication of lichens of the study area is from BOOM (1986) in which some species are mentioned for the area. One “Strabrecht” record of *Nectriopsis micareae* is treated in SÉRUSIAUX & al. (1999). *Cladoniicola staurospora*, recently described by DIEDERICH & al. (2001) is mentioned from the area in the original paper. An extensive population of *Bacidia brandii*, recently encountered in an interesting lichen community on stumps from the area is described by COPPINS & BOOM (2002).

New country records from the area are published in BOOM (2003) with *Marchandio-basidium aurantiacum* as the only known locality for the country and *Hypogymnia farinacea*, as an overlooked species including two records from the study area.

Many a biologist has paid much attention to the area of the large fen “Beuven”

because of the endangering by nitrification by the brooklets throughout the area and the cleaning up of the fen c. 18 years ago (see further below, "the study area").

Since the study area has been indicated as "habitat directive area" it is of international importance.

These habitat-types with (code) as noted in Natura 2000 are:

\*Inland dunes with open *Corynephorus* and *Agrostis* grasslands (2330)

\*Northern Atlantic wet heaths with *Erica tetralix* (4010)

\*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*; Alno-Padion, Alnion incanae and Salicion albae (91E0).

This latter habitat is indicated as priority.

Biodiversity is demonstrated by the occurrence of a wide range of species which are currently under investigation by several specialists. For example, 71 species of bees and 26 species of ants have been found. Nightjar and curlew are breeding birds and crane, great white heron and black stork are season visitors. Black grouse is extinct since 1985 (JAP SMITS, pers. comm.).

The present work is just a part of a survey of the area from the city of Eindhoven (c. 200000 inhabitants), within a radius of 20 km around this city (c. 1250 km<sup>2</sup>). The aim of the study is to give an overview as complete as possible of lichens and lichenicolous fungi of this heathland and woodlands, as well as contributing to the overall diversity of species in this urbanized region.

Terricolous as well as epiphytic (including lignicolous) species are well represented. The saxicolous lichen flora is lacking, except the very poorly developed communities found on concrete poles, which are rare in this area. The present paper only deals with own collections. Totally 194 taxa of lichens and lichenicolous fungi are recognized and listed below, including 18 red list lichen species (see Table 2).

### **Climate**

The eastern part of the province Noord-Brabant has an oceanic climate which has mild winters and cool summers, without extremes of temperature and frosts. Frost days average 8-10 days for the months December to February. The annual rainfall averages c. 700 mm, the annual temperature 9-10°C. From May to August, the number of days with a temperature above 25°C is more than 25. The mean annual wind velocity is 3.5 m/s. Snowfall occurs throughout the country but is usually light. On rare occasions, snow may lie in November or December. More often snow has been recorded in January and February, but never for a long time.

### **Materials and methods**

During two decades (1985-2004), two major habitats have been sampled, namely heathlands and damp woodlands, including the natura 2000 habitats. Even the railing vegetation is investigated.

Lichens and lichenicolous fungi were recorded from km<sup>2</sup> grids, totally from 20 grids (1 x 1 km). In average eight sites for each grid were visited and investigated exhaustively, dependent on the real chance of occurring of some lichens. The distance between each site varied from c. (50-)100 to 250 m. Some sites were surveyed nearby some years later for a second time, or even for a somewhat different habitat. Vascular plants and most dominant bryophytes were noted. 176 lichens and 18 lichenicolous fungi were recognized

and are listed below. From all species the complete range of substrata on which they occur, including all their habitats are given in the species list.

From 175 spots, c. 2400 lichens and lichenicolous fungi were recorded, c. 1500 specimens were collected and deposited in the herbarium of the author. For each spot, a species list and ecological notes were made. All data is databased in Access. Some duplicates are in the herbarium of MAARTEN BRAND. From one species, *Fellhanera viridisorediata*, material will be distributed as exsiccata in the near future.

Air dried specimens were examined anatomically and morphologically with a stereo-microscope and a light microscope. The standard microchemical methods have been used according to ORANGE & al. (2001). The specimens collected have been studied mostly following WIRTH (1995) and PURVIS & al. (1992). Nomenclature of lichens follows HAFELLNER & TÜRK (2001) and COPPINS (2002), for lichenicolous fungi HAWKSWORTH (2003) and DIEDERICH & SÉRUSIAUX (2000) were consulted. Red list species are mentioned in Table 2. Nomenclature of lichens syntaxa generally follows WIRTH (1995).

### Study area (Fig. 2)

The study area has the status of a nature reserve and can be regarded as a uniformity, a heathland area mostly bordered by different, rather small woodlands. The area is divided into two parts, belonging to different municipalities: "Strabrechtse Heide" (Heeze) and "Lieropse Heide" (Someren). They are situated in the southeastern part of the country, with a general altitude between 20 and 25 m s. m. The study area measures 20 km<sup>2</sup> and is delimited by a highway in the north, a secondary road at the southern and eastern side and a stream "Kleine Dommel" at the west side. In fact, this area is situated among a strongly urbanized region. C. 10 km NW, a city (Eindhoven) of 200000 inhabitants is situated. There are five villages with a distance of c. 5 km, having c. 10000 inhabitants altogether (average). The study area is dominated by heathland belonging to Calluno-Ulicetea, in which *Ericaceae* have a principal part. Calluno-Genistion pilosae is present throughout the study area with a well developed Genisto anglicae-Callunetum association.

Scattered (heathland) trees such as *Betula spec.*, *Quercus robur* L. and *Sorbus aucuparia* L., are important phorophytes for corticolous lichen communities, *Pinus sylvestris* L. trees often are completely devoid of lichens.

Lichen diversity is high due to the damp woodlands, dominated by *Salix* which are situated central to more eastern in the study area and origin from the banks of the brooklets "Peelrijt" and "Rielloop" running in east-west direction throughout the area via a large fen, called "Beuven" (75 ha). Coming from the agricultural area, the brooklets supplied wasted material (including much nutrients), particular the "Beuven" which was strongly polluted in the eighties, with c. 40 cm high layer of detritus on the bottom. A very large project was necessary to clean up the fen and to give the brooklets another direction (BUSKENS 1989). Now this fen is a national monument. The most important vascular plants are *Elatine hexandra*, *Isoetes echinospora*, *Lobelia dortmanna* and *Luronium natans*.

Only a less valuable contribution regarding the lichen flora has been found from man-made substrata such as concrete fence posts which carry a reduced pionier lichen vegetation.

The railing vegetation is rather diverse and consists of small *Populus* or *Quercus robur* woodlands, damp *Alnus* woodlands (sometimes in association with *Betula* or *Fraxinus*), more or less open *Pinus* forests, roadside trees along fields (western part) or mixed trees along forests. These latter two habitats form sometimes elements of the Xanthorion communities.

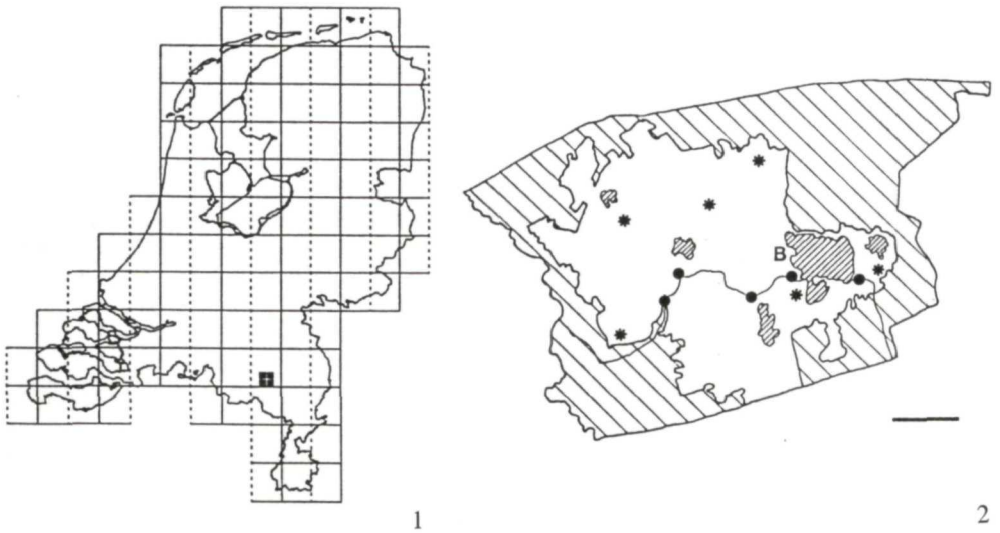


Fig. 1. Map showing the study area in southeastern Netherlands. Fig. 2. Schematic map of the survey area, showing the position of the best collecting sites; asterisk = most important *Corynephorum* communities, dot = damp *Salix* woodlands, B = Beuven. Broadly hatched area = mainly forests. Bar: 500 m. Fig. 3. Heathland with *Corynephorum* community, including dominating *Nardus stricta*.



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Fig. 4. Heathland with small *Betula* woodland and scattered *Juniperus communis*. Fig. 5. Alnetea community, with *Alnus glutinosa* and *Betula spec.*

## The habitats

### 1) Heathlands (Figs. 3, 4)

Terricolous lichens are an important element in heathland vegetations in The Netherlands. There are many reports of studies of such habitats in the northern and central part of the country, in particular the province of Drente and the province of Gelderland. However, although the southeastern part of the province Noord-Brabant has a rich history of *Calluna* heathlands, no extensive lichen survey has been published of such habitats (APTROOT & al. 1998).

The main part of the study area is *Calluna* heathland (Genisto anglicae-Callunetum), varying from typical well developed Corynephoretum communities to poorly developed vegetation, dominated by *Calluna vulgaris* (L.) HULL. in association with mainly *Molinia caerulea*. Corynephoretum communities are often associated with bryophytes such as *Campylopus pyriformis*, *C. flexuosus*, *C. introflexus*, *Dicranum scoparium*, *Pohlia nutans*, *Polytrichum juniperinum*, *P. piliferum*. These all are characteristic in pioneer communities in association with most common vascular plants such as *Agrostis vinealis*, *Calluna vulgaris*, *Corynephorus canescens*, *Deschampsia flexuosa*, *Festuca filiforme*, *Nardus stricta* and *Spergula morisonii*. *Hypnum jutlandicum* and *Pleurozium schreberi* are most common bryophytes growing in association with *Calluna vulgaris* in more sheltered situations. For the most important heathland sites see Fig. 2.

Free standing trees are an important habitat for epiphytic lichens in the *Calluna* heathlands. Particular *Quercus robur* trees are most rich in lichen vegetation. It varies from a few to a maximum of 27 species on one tree. Free standing *Betula* trees are also rather common and 16 species on one phorophyte in most favourable situations have been counted. At a few sites there are *Sorbus aucuparia* trees, *Sambucus nigra* shrubs and *Juniperus communis* shrubs (sometimes occurring in the form of small trees). This latter species is endangered in the area.

The association Ericetum tetralicis is widely distributed throughout the country and appears to have its centre in the southeastern part of the province. In the study area it is the second large community of this type in the country. Internationally it is of rather high importance, because it has a remarkable small distribution pattern (WEEDA & al. 2000). The main plants in the study area are *Erica tetralix* and *Molinia caerulea*, *Trichophorum cespitosum* subsp. *germanicum* and sometimes *Calluna vulgaris*. Accompanying species are, e.g., *Eriophorum angustifolium*, *Drosera rotundifolia*, *Potentilla erecta*, *Carex panicea*, *Gentiana pneumonanthe* and *Narthecium ossifragum*. This community is extremely poor in lichen growth.

### 2) Woodlands (Fig. 5)

The origin of damp, fluvial *Salix* woodlands took place soon after the year 1936. In that year an air photograph was taken (J. SMITH, pers. comm.) and it was clear that such woodlands did not exist at that time. However soon after the area was affected increasingly by air pollution from agriculture and later also bio-industries. These activities are concentrated very close (southeastern) of the area. Ammonia (NH<sub>3</sub>) air pollution caused by intensive cattle breeding in the eighties in relation with the study area is shown in Fig. 6, at the beginning of the survey. The brooklets, running in east-west direction throughout the area, starting at the agriculture area, supplied nutrients. It was the influence of these alluvial

brooklets that the *Salix* woodlands developed. For the most important *Salix* woodlands see Fig. 2.

Damp (alluvial) *Salix* woodlands in the study area are one of the most important brookdale habitats for the country. They are present at the most damp adjacent site of the Alnetea and although the composition of vascular plant communities is rather comparable, the lichen flora is much richer in *Salix* woodlands.

Culture technical measures have led to a lower ground water level in many damp woodlands and to clearly declining the quality of water. The consequence of this was a strong disturbance. This disturbance was accompanied by the extensive increasing of *Urtica dioica* and *Rubus fruticosus* s. l., at the cost of characteristic vascular species (STORTELDER & al. 1998).

However according to the Dutch Red List of threatened lichen species, Salicion cinereae communities can be very rich in lichen growth (APTROOT & al. 1998). Indeed the study area has one of the most important lichen vegetation which can occur in this type of habitats. There have been found 66 species of lichens and 11 species of lichenicolous fungi.

Extensive investigations in damp *Salix* woodlands over longer periods in The Netherlands were never made. The only notes on lichen communities in comparable habitats in the province of Noord-Brabant were made by BOOM (1984), BOOM & al. (1994), PLUIJM (1995). This latter publication contains the most extensive survey over ten years in a relatively large area of c. 60 km<sup>2</sup> with emphasis on bryophytes. 82 species of lichens are mentioned in that work.

In general, the specific meaning regarding lichens of the Alnion glutinosae (class: Alnetea) is of less importance. In this community *Urtica dioica*, *Glechoma hederacea* and *Galium aparine* are the most dominating vascular plants. It is known from a few sites, however, this alliance is rather poor in epiphytic lichen growth. Rarely, there is an association with *Fraxinus excelsior* and *Populus* spec. which carry a better developed lichen community. Even the Alno-Betuletum pubescentis has sometimes been found in association with small *Salix* woodlands (Salicion cinereae). The Alnetea are extensively treated in STORTELDER & al. (1998).

### 3) Other sites mentioned

*Pinus sylvestris* forests are extremely poor in lichen vegetation. *Lecanora conizaeoides* and *Lepraria incana* are the only two species which are able to colonize the trunks in nearly all occasions.

Roadside trees, mainly at the western part of the area carry an additional lichen community, often dominated by nitrophytic species such as *Physcia tenella*, *P. adscendens*, *Xanthoria parietina* and *X. polycarpa*. Some rare species are encountered such as *Caloplaca obscurella*, *Catillaria nigroclavata* and *Rinodina pityrea*.

The edges of most of the damp woodlands carry a conspicuous lichen community, caused by the heavy eutrophication by the urbanized surroundings, including the dominating agriculture. A dozen of most common nitrophytic species are recognized from

such situations.

## Results

### Heathlands with terricolous communities and lichens on stumps

In the study area, at least 15 localities represent well-developed terricolous lichen communities. The most important site is situated in the north, "Galgeberg" a hilly site with low sand dunes, covered with *Agrostis vinealis*, *Corynephorus canescens*, *Deschampsia flexuosa*, *Nardus stricta*, *Polytrichum piliferum*, was most interesting at the first part of the survey, with well-developed and dominating *Cladonia monomorpha*, a species found in 1987 for the first time and described recently in APTROOT & al. (2001), material from this site is distributed by VĚZDA (2001). Such a population has been found on at least ten scattered spots, always on hilly places, with a constant accompanying lichen vegetation of *Cladonia crispata*, *C. foliacea*, *C. gracilis*, *C. portentosa*, *C. ramulosa* and *C. zopfii*. In some occasions, *C. borealis* and *C. strepsilis* have also been found.

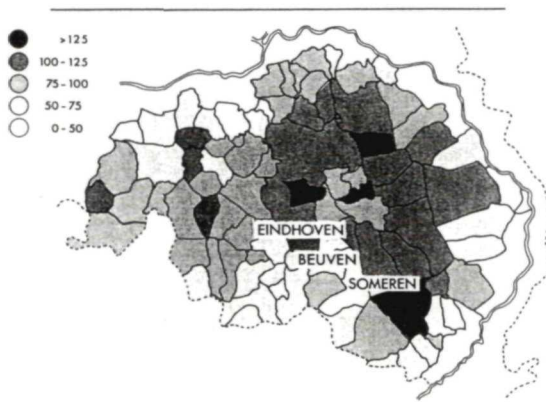
Ericetum tetralicis communities are very poor in lichen growth. In several places, only squamules of *Cladonia* have been found. Rarely *Cladonia bacillaris*, *C. coniocraea*, *C. fimbriata*, *C. portentosa*, *Micarea viridileprosa* and the parasitical *Nectriopsis micareae* are recorded. The latter two have rarely been found at the lower (dead) parts of *Molinia* tufts.

An important substrate among the open heathlands are stumps of *Betula*, *Pinus* and more rarely *Quercus*. They can support well-developed communities. An extensive population of *Bacidia brandii* accompanied by *Bacidina chloroticula* and *Lecania cyrtella* has been found in grid 51-47-51, which is unique in the country (see also COPPINS & BOOM 2002). In general, macrolichens are rather sparse on stumps, only *Evernia prunastri*, *Hypogymnia physodes*, and *Parmelia sulcata* are occasionally found. The most important record is *Physcia stellaris*, only two thalli on one *Pinus* stump were found in the centre of the area.

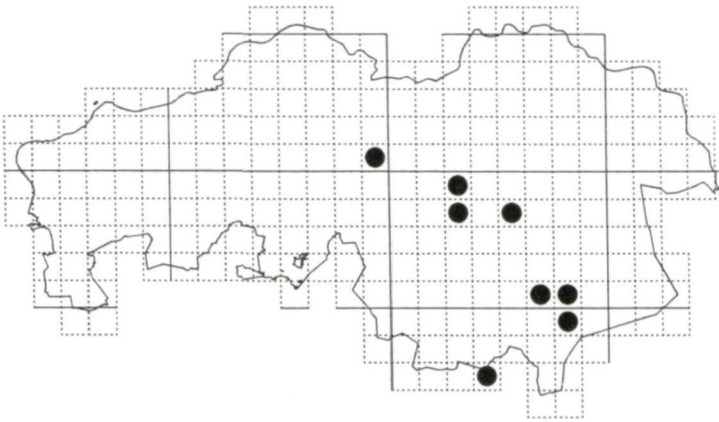
Table 1. The number of species recorded in each 1-km<sup>2</sup> grid square

Grid square	Number of species	Grid square	Number of species
51.46.55	49	51.57.13	64
51.47.51	65	51.57.14	58
51.47.52	54	51.57.21	76
51.47.53	69	51.57.22	103
51.56.14	89	51.57.23	82
51.56.15	60	51.57.24	97
51.56.25	81	51.57.31	92
51.56.35	91	51.57.32	62
51.57.11	64	51.57.33	55
51.57.12	58	51.57.34	68





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Fig. 6. Emission of ammonia from cattle manure in the southeastern part of the province Noord-Brabant, including the study area. Ammonia-emission in kg/ha/year (BUJSMAN 1983). Fig. 7. Known distribution of *Tubefuia heterodermiae* in The Netherlands (only occurring in the province Noord-Brabant), based on grid squares of 5 x 5 km. Fig. 8. Field work of the author on a free-standing *Quercus robur* tree in a heathland.

### Epiphytic communities in damp woodlands

During this survey over two decades, 77 species (including 11 lichenicolous fungi) were found corticolous on *Salix* trunk or branches, including living or dead trees. At the edge of this habitats species (the most common ones) of the Xanthorion are present. For example *Candelariella reflexa*, *Phaeophyscia orbicularis*, *Physcia tenella*, *Xanthoria parietina* and *X. polycarpa*. The floristic composition inside this woodlands is rather interesting. Macrolichens such as *Flavoparmelia soredians*, *Hypotrachyna revoluta*, *Parmotrema chinense*, *P. reticulatum* are not very rare in the country but the populations of these species are rather rich and well-developed. The latter two have been found in specimens of c. 11 cm diam. *Hypotrachyna revoluta* is sometimes found in patches of c. 0.5 m length. Two species from southern Europe, never found in the first part of the survey, *Punctelia borreri* and *Flavoparmelia soredians* increased rapidly in abundance. At the beginning of the survey, several times *Usnea* material has been collected but never longer than 2 cm. Since 15 years never has been found any *Usnea* until in the year 2002, a 10 cm long *Usnea hirta* was collected. One of the most important microlichen is *Fellhanera viridisorediata* a species which is known since 1984 from the area. For a long time it was known only sterile, but since 2001 it is fertile in different sites, and in the northeastern part of the study area it has been also found (for the first time) with pycnidia and at the same time abundantly fertile, and it will be distributed by TØNSBERG in the near future.

*Absconditella pauxilla* has been found in 1992, a second locality in the country. Previously it was mentioned from one locality at Maarheeze (BRAND & al. 1988). This species is only known from France (western Pyrenees), northeastern Scotland and southern England. It is easily overlooked because the apothecia are c. 0.2 mm in diam.

Another rarity is *Marchandiobasidium aurantiacum*, it was found on only one young trunk of *Salix*. A rather extensive population, growing over a length of several dm (only the anamorph). Previously this species was known only from southeastern Belgium and southern Luxembourg where it is a very common species. Recently it has also been found in the British Islands and Germany. The teleomorph is known only from two localities in southern Belgium and Luxembourg and was recently described by DIEDERICH & al. (2003). A more common lichenicolous fungus in this habitat is *Paranectria oropensis*. At some sites it has been found abundantly, mostly on *Candelariella reflexa*, but other hosts are *Bacidina arnoldiana*, *Hypotrachyna revoluta*, *Melanelia exasperatula*, and *Physcia tenella*. A remarkable species is *Psilolechia clavulifera*. Its distribution in the country is limited to the southeastern part of the province and it is known only from damp forests. It has been recorded six times here, always on fallen trees, from the vertical surface of exposed root systems. In one site it was abundantly fertile and well developed.

### Epiphytic communities on freestanding trees

The most important phorophytes outside the *Salix* woodlands are the *Quercus robur* trees scattered over the heathland and mostly growing solitary (see Fig. 8). Nearly all trees (over 100 specimens) were examined and 46 lichen species were recorded on this substrata (trunks as well as branches). Half the trees host a rather poor lichen community. The most rich *Quercus robur* tree carried a community with 27 species (including lichenicolous fungi) at the centre of the area. A very common accompanying epiphytic bryophyte in the area was *Dicranoweissa cirrata*, a species rapidly spreading in the area for the last five years. *Orthotrichum* spp. occurred occasionally. Interesting macrolichens are *Hypogymnia farinacea* and *Parmotrema reticulatum*, both are only rarely recorded for the country.

From the crustose lichens *Fuscidea lightfootii* and *Protoparmelia hypotremella* were only recorded once. Trunks of free standing *Pinus sylvestris* are extremely poor in lichen vegetation. Only *Amandinea punctata*, *Hypogymnia physodes*, *Lecanora conizaeoides*, *Parmelia sulcata* and *Xanthoria polycarpa* have occasionally been found on this phorophyte.

Among the lichenicolous fungi on *Quercus robur*, *Tubeufia heterodermiae* is the most important species. It is mostly found on horizontal surfaces of branches, associated with *Physcia tenella*. Only once the host was *Physcia adscendens*.

Free standing *Sorbus aucuparia* trees are rather rare in the heatlands and their lichen flora is rather poor except two dead standing trees. They had a rich covering in both macrolichens and microlichens. The rare *Melanelia elegantula* and *Lichenocodium xanthoriae* were present. *Juniperus communis*, a threatened species is a characteristic feature in the landscape. The following species have been found on exposed trunks and rarely on branches of this phorophyte. *Amandinea punctata*, *Candelariella reflexa*, *Flavoparmelia soredians*, *Hypogymnia physodes*, *H. tubulosa*, *Lecanora conizaeoides*, *L. saligna*, *L. symmicta*, *Lepraria incana*, *Melanelia subaurifera*, *Micarea denigrata*, *Parmelia sulcata*, *Physcia tenella*, *Punctelia subrudecta*, *P. ulophylla*, *Trapeliopsis granulosa*, *Xanthoria candelaria*, *X. parietina* and *X. polycarpa*.

The maximum number of species found on solitary *Betula* trees is 22, most of them are very common. However, most interesting is *Hypogymnia farinacea*, known from two trees. Also the relatively rare species *Melanelia glabratula* has been found once on a solitary *Betula* trunk.

### Small forests

*Pinus* woodlands are very poor in lichen vegetation. The following species are able to colonize such habitats: *Hypogymnia physodes*, *Lecanora conizaeoides*, *L. expallens*, *Lepraria incana*, *Micarea micrococca*, *M. prasina*, *M. viridileprosa*, *Nectriopsis micareae*, and *Parmelia sulcata*.

The only important habitat for the lichen flora is the edge of these forests. In some occasions, rare species have been found. *Micarea confusa*, a terricolous species was found at a small *Calluna* community rim between a footpath and a forest. The only record of *Cladonia furcata* was from a site in a similar situation.

### Discussion

In total 176 lichen taxa were recorded of which 96 are epiphytic, 20 saxicolous, 45 terricolous, 54 lignicolous (including stumps). However eight species, which are less substrate specific, have been found epiphytic, terricolous as well as lignicolous. 73 macrolichens, 103 microlichens and 18 lichenicolous fungi are known from the area. The most rare lichen species in the country, occurring in the study area and known in this province only are *Absoconditella pauxilla*, *Hypogymnia farinacea*, *Psilolechia clavulifera*, and *Strangospora ochrophora*. For red list species see Table 2.

Regarding the lichenicolous fungi, *Cornutispora ciliata*, *Marchandiobasidium aurantiacum*, *Pronectria oligospora*, *Psammia stipitata*, *Trichonectria rubefaciens*, and *Tubeufia heterodermiae* are very rare in The Netherlands and only known from the province Noord-Brabant. *Tubeufia heterodermiae*, a species recently described from southwestern Europe (ETAYO 2002) and previously only known from the type locality, is very in-

conspicuous, having apothecia up to c. 0.2 mm with the same colour as the host species. It is currently known from the following hosts: *Heterodermia obscurata*, *Physcia adscendens*, *P. caesia*, and *P. tenella*, mainly on *Quercus robur*. The known distribution outside the type locality of *T. heterodermiae* is shown in Fig. 7. It is here recorded for the first time for northwestern Europe. Most common is *Lichenodiplis lecanorae*, exclusively found on the common *Lecanora saligna*. *Lichenocodium erodens* is common on several *Cladonia* species: *C. glauca*, *C. monomorpha* and *C. strepsilis*.

The dominating genus in the area is *Cladonia*, with 32 species, mainly found in dry heathland communities, 22 species in Corynephorum communities, and four species found exclusively in woodlands.

The most remarkable missing species is *Cetraria islandica*. In the middle of the 20<sup>th</sup> century it was a very common species in heathlands or open forests not more than 10 km from the study area. *Cetraria islandica* was the most dominating species, covering sometimes many m<sup>2</sup>, near Leende (forester, pers. comm.) and in that area the last specimen was collected by the author in 1991. However, in spite of the many field trips, *C. islandica* has never been found in the Strabrechtse or Lieropse Heide, and it was also not mentioned in any list of the earlier investigators.

Table 2. Red list (lichen) species with the number of records and the grid-references of the most rare species

<i>Absconditella pauxilla</i>	1	51.57.24
<i>Bryoria fuscescens</i>	1	51.47.51
<i>Catillaria nigroclavata</i>	1	51.56.14
<i>Cladonia pulvinata</i>	10	
<i>Cladonia strepsilis</i>	15	
<i>Cladonia zopfii</i>	27	
<i>Fuscidea lightfootii</i>	1	51.57.11
<i>Lecania naegelii</i>	2	51.56.14/51.57.24
<i>Lecanora varia</i>	1	51.57.22
<i>Micarea confusa</i>	1	51.57.31
<i>Normandina pulchella</i>	2	51.57.22/51.57.31
<i>Parmelina tiliacea</i>	1	51.57.22
<i>Parmotrema reticulatum</i>	2	51.56.25/51.57.22
<i>Rinodina pityrea</i>	1	51.56.35
<i>Scoliosporum chlorococcum</i>	1	51.57.22
<i>Thelocarpon epibolum</i>	1	51.57.24
<i>Trapeliopsis percrenata</i>	1	51.57.21
<i>Usnea hirta</i>	2	51.47.53/51.57.21

The influence of the environment from the adjacent pollution sources such as intensive factory farming and industrial activities is significant. The pollution of the air with ammonia and other pollutant concentrations has a negative effect on the vegetation. *Molinia caerulea* is the most dominating vascular plant which drive away the native vegetation. The decline of the lichen vegetation is inevitable.

Recreation is another factor with negative influence. The area is not accessible for cars or other motor traffic. However, there are several bicycle-trails which cause a lot of touristic activities, mainly from spring to autumn.

In terms of bioclimate, the area is clear homogeneous, so there is no gradient determining the distribution of species within the area. The medium large city (Eindhoven), NW of the area and the dominating agriculture, eastern alongside the area, have a spherical of influence all over the area. The nutrient enrichment in the form of ammonia deposition is present on all places (BUJSMAN 1983, Fig. 6).

### Phytogeographic notes

The species list includes 194 infrageneric taxa (191 species and 3 varieties). There is no data available regarding phytogeography for lichenicolous fungi, however the lichen species have been subdivided into six phytoclimatical groups, based on their latitudinal and longitudinal ranges in Europe, according to WIRTH (1995) and NIMIS & TRETJACH (1995).

The rather mild climate in connection with the strict lowland situated area with a strong oceanic influence may explain the extreme high occurring of the temperate element (see Table 3). It is formed by wide ranging species that occur from Arctic (or Boreal) to Mediterranean areas.

Table 3. Frequences of lichen taxa of the main phytoclimatic groups

Temperate element	52%
Southern temperate element	18%
Northern temperate element	14%
Northern subatlantic element	5%
Oceanic element	2%
Widespread subatlantic element	2%
Others	7%

Others are species with an exceedingly limited distribution. Endemic lichens or lichenicolous fungi have not been found.

### Legend of the species list

The number after the species name means: total number of records.

#### The abbreviations for habitats are:

- af damp *Alnus Fraxinus* woodland
- ch open dry *Calluna* heathland
- da damp *Alnus* woodland
- db damp *Betula* woodland
- dm ±damp mixed woodland with *Alnus*, *Betula*, *Populus* and *Salix*
- ds damp *Salix* woodland
- eh open damp *Erica* heathland
- fh free standing tree in heathland
- mw dry mixed woodland
- pb *Pinus Betula* forest
- pf *Pinus* forest
- pq *Pinus Quercus* forest
- ra rim along forest

- rf roadside or fieldside trees  
sh stump in open heathland

### Phytogeographical abbreviations

- alp alpine  
arct arctic  
atl atlantic  
bor boreal  
mieur central European  
med mediterranean  
mo montane  
smed submediterranean  
subatl subatlantic  
s'bor subboreal

### Abbreviations of substratum

- c concrete or cement  
s acidic stone  
t terricolous  
rw rotting wood (trunk or branch)  
sf stump in or alongside a forest  
sh stump in *Calluna* heathland  
wf wood of fallen tree  
wp wood of fence post  
ws wood of dead standing tree  
An *Alnus glutinosa*  
Be *Betula* spp.  
Ca *Castanea sativa*  
Cu *Calluna vulgaris*  
Fa *Fagus sylvatica*  
Fr *Fraxinus excelsior*  
Ju *Juniperus communis*  
La *Larix decidua*  
My *Myrica gale*  
Pn *Pinus sylvestris*  
Po *Populus* spp.  
Qr *Quercus robur*  
Qa *Quercus rubra*  
Sa *Salix* spp.  
Sm *Sambucus nigra*  
So *Sorbus aucuparia*  
Ti *Tilia* spec.  
Va *Vaccinium myrtillus*  
(f) fertile  
+ not clearly lichenized species

**List of species**

- Abscuditella pauxilla* VĚZDA & VIVANT 1 ds; Sa; mieur.atl-smed  
*Amandinea punctata* (HOFFM.) COPPINS & SCHEID. 48 af, ch, da, dw, fh, pb, pf, ra, rf, An, Be, Fr, Ju, La, Pn, Po, Qr, Sa, Sm; (arkt-)bor-med  
*Anisomeridium polypori* (ELLIS & EVERH.) M. E. BARR 7 af, dm, ds; Po, Sa; mieur.subatl-med  
 +*Arthonia punctiformis* ACH. 1 ch; So; s'bor-med  
*Arthonia radiata* (PERS.) ACH. 2 af, da; An, Po; (s')bor-med  
*Arthonia spadicea* LEIGHT. 3 af, da, pq; An, Fr, Po, Qr; s'bor-smed.mo  
*Bacidia brandii* COPPINS & VAN DEN BOOM 4 ch; sh; mieur.subatl  
*Bacidia saxenii* ERICHSEN 1 da; Be; (exposed roots) mieur?  
*Bacidina arnoldiana* (KÖRB.) V. WIRTH & VĚZDA 19 af,da,ds,dm; An, Po, Sa; mieur-med  
*Bacidina caligans* (NYL.) A. L. SM. 1 ch; sh; mieur-med  
*Bacidina chlorotricula* (NYL.) VĚZDA & POELT 7 ch, ra; sh, wp; (s'bor-)smed  
*Bacidina delicata* (LEIGHT.) V. WIRTH & VĚZDA 15 da, dm, ds; Po, Sa; mieur-smed  
*Bacidina neosquamulosa* (APTROOT & VAN HERK) EKMAN 6 af, dm, ds, mw, rf, An, Fr, Po, Sa, Va; mieur.atl  
*Bryoria fuscescens* (GYELN.) BRODO & D. HAWKSW. 1 ch; sh; bor-med.mo  
*Buellia aethalea* (ACH.) TH. FR. 1 ra; s; (s')bor-mieur-med  
*Buellia griseovirens* (TURNER & BORRER ex SM.) ALMB. 9 dm, ds, rf; Po, Qr, Sa; s'bor-mieur.subatl-med  
*Caloplaca citrina* (HOFFM.) TH. FR. 5 ch, ra; c; bor-med  
*Caloplaca flavocitrina* (NYL.) H. OLIVIER 2 ra; c; s'bor-med  
*Caloplaca lithophila* H. MAGN. 2 ra; c; arkt-med  
*Caloplaca obscurella* (J. LAHM) TH. FR. 3 af, dm; Fr, Po; (s'bor)mieur-med  
*Caloplaca phlogina* (ACH.) FLAGEY 1 rf; Po; mieur-med?  
*Candelaria concolor* (DICKS.) STEIN 10 af, ch, ds, fh, ra; An, Be, Fr, Po, Qr; s'bor-med (mo)  
*Candelariella aurella* (HOFFM.) ZAHLBR. 3 ch; c; arkt-med  
*Candelariella reflexa* (NYL.) LETTAU 63 af, cd, da, dm, ds, fh, pb, pq, ra, rf, sh; Fr, Po, Qr, Sa, So, sh; mieur-med  
*Candelariella vitellina* (HOFFM.) MÜLL. ARG. 2 ch, rf; Fr, sh; arkt-med  
*Catillaria nigroclavata* (NYL.) SCHULER 1 dm; Po; s'bor-med  
*Cetraria aculeata* (SCHREB.) FR. 18 ch; t; bor-med.mo  
*Cetraria muricata* (ACH.) ECKFELDT 5 ch; t; arkt-bor-med.alp  
*Chaenotheca ferruginea* (TURNER ex ACH.) MIG. 2 pq; Qr; bor-med.mo  
*Cladonia borealis* S. STENROOS 3 ch; t; arkt-mieur(mo)  
*Cladonia caespiticia* (PERS.) FLÖRKE 3 ra; t; mieur.subatl-smed(-med.mo)  
*Cladonia cervicornis* (ACH.) FLOTOW 18 ch; t; bor-med.subatl  
*Cladonia chlorophaea* (FLÖRKE ex SOMMERF.) SPRENGEL s.s. 5 ch, pf; t; arkt-med  
*Cladonia coccifera* (L.) WILLD. 37 ch; t; (s')bor(subatl)-mieur(subatl)-med.mo  
*Cladonia coniocraea* (FLÖRKE) SPRENGEL 15 ch, ds, pf, ra; Be, Sa, t, sh, wf, ws; bor-smed(-med)  
*Cladonia crispata* (ACH.) FLOTOW var. *cetrariiformis* (DELISE ex DUBY) VAIN. 29 ch; t; arkt-mieur  
*Cladonia cryptochlorophaea* ASAH. 23 ch, ds; Be, Pn, Qr, sh, t, wf; s'bor-mieur.subatl

- Cladonia digitata* (L.) HOFFM. 2 pq; Be; bor-med  
*Cladonia fimbriata* (L.) FR. 14 ch, da, da, ds, eh, fh; Be, Qr, t, wf; (arkt-)bor-med  
*Cladonia floerkeana* (FR.) FLÖRKE 44 ch, ra; sh, t, wf; s'bor-smed  
*Cladonia foliacea* (HUDS.) WILLD. 16 ch; t; mieur.subatl-med  
*Cladonia furcata* (HUDS.) SCHRAD. 1 ra; t; bor-med  
*Cladonia glauca* FLÖRKE 24 ch, sh; sh, t; (s'bor-)mieur  
*Cladonia gracilis* (L.) WILLD. 30 ch, ra; t; arkt-smed.mo  
*Cladonia humilis* (WITH.) J. R. LAUNDON 1 ds; Sa; mieur-med, subatl  
*Cladonia incrassata* FLÖRKE 1 ra; t; mieur.subatl(-smed)  
*Cladonia macilenta* HOFFM. s. l. ch, db, ds, pb, ra, sh; Be, sh, t, wf, ws; s'bor-smed(-med)  
    *Cladonia bacillaris* (LEIGHT.) ARNOLD 52  
    *Cladonia macilenta* HOFFM. s. str. 7  
*Cladonia merochlorophaea* ASAH. 19 ch, ds; Be, sh, t, wf; arkt-mieur(-smed)  
*Cladonia mitis* (SANDST.) HUSTICH 8 ch, pq; t; arkt-mieur(-smed.mo)  
*Cladonia monomorpha* APTROOT, SIPMAN & VAN HERK 10 ch; t; mieur-med  
*Cladonia novochlorophaea* (SIPMAN) BRODO & AHTI 4 ch; t; bor-mieur(med.mo)  
*Cladonia ochrochlora* FLÖRKE 1 ch; sh; bor-med  
*Cladonia portentosa* (DUF.) FOLLM. 47 ch, pb, pf, pq, ra; sh, t; mieur(-s)med.subatl  
*Cladonia pulvinata* (SANDST.) VAN HERK & APTROOT 10 ch; t; mieur.atl-med  
*Cladonia ramulosa* (WITH.) LAUNDON 41 ch; t; (s'bor-)mieur.subatl-smed.subatl(-med)  
*Cladonia rei* SCHAERER 1 ch; t; burned place; s'bor-mieur  
*Cladonia strepsilis* (ACH.) GROGNOT 15 ch; t; (bor.atl-)mieur.subatl-smed  
*Cladonia subulata* (L.) WEBER ex WIGG. 23 ch; sh, t; bor-med  
*Cladonia uncialis* (L.) WEBER ex WIGG. subsp. *biuncialis* (HOFFM.) CHOISY 5 ch; t; arkt-mieur(-smed.alp)  
*Cladonia verticillata* (HOFFM.) SCHAER. 3 ch; t; arkt-med  
*Cladonia zopfii* VAIN. 27 ch; t; bor-mieur.subatl  
+*Cyrtidula quercus* (A. MASSAL.) MINKS 5 fh; Qr; mieur-smed  
*Dimerella pineti* (ACH.) VĚZDA 10 af, da, ds, dm, pf, ra; An, Be, Pn, Po, Qr, Sa, Va; bor.atl-med  
*Diploicia canescens* (DICKS.) ANZI 3 fh, ra, rf; Po, Qr; mieur,subatl-med  
+*Epigloea pleiospora* DÖBB. 1 ch; rw; mieur  
+*Epigloea soleiformis* DÖBB. 1 pf; t; mieur.subatl  
*Evernia prunastri* (L.) ACH. 43 ds, fh, mw, ra, sh; Be, Pn, Qr, Sa, sh; bor-med  
*Fellhanera viridisorediata* APROOT, BRAND & SPIER 22 af, ch, da, dm, ds, ra; An, Cu, Ju, La, Po, Ps, Sa, Va, wf; mieur.atl  
*Flavoparmelia caperata* (L.) HALE 35 af, ch, da, fh, ds, pf, ra; An, Be, Fr, Qr, Sa, rw, sh; mieur.(subatl)-mieur  
*Flavoparmelia soredians* (NYL.) HALE 19 af, ch, ds, fh, ra; An, Be, Ju, Qr, Sa; mieur-med  
*Fuscidea lightfootii* (SM.) COPPINS & P. JAMES 1 ch; Qr; mieur.atl(subatl)-smed(-med)  
*Gyalideopsis anastomosans* P. JAMES & VĚZDA 16 ds, fh, ra; Be, Fa, Qr, Sa; mieur-med, (sub-)atl  
*Halecania viridescens* COPPINS & P. JAMES 1 dm; Po; mieur.atl-smed.atl  
*Hyperphyscia adglutinata* (FLÖRKE) H. MAYRHOFER & POELT 5 af, ch, ra, rf; An, Fr, Po, Qr, Sm; mieur.subatl-med  
*Hypocenomyce scalaris* (ACH.) CHOISY 5 ch, pf, ra; Be, Pn, sh, ws; bor-med(.mo)  
*Hypogymnia farinacea* ZOPF 9 ch, da; Be, Qr, Sa; s'bor-med.h'mo



- Hypogymnia physodes* (L.) NYL. 70 af, ch, da, ds, pf, An, Be, Ju, Pi, Qr, Sa, So, sh, wf, wp, t; arkt-med
- Hypogymnia tubulosa* (SCHAER.) HAV. 33 ch, ds; Be, Ju, Qr, Sa, sh; bor-med
- Hypotrachyna revoluta* (FLÖRKE) HALE 35 af, ch, da, dm, ds, ra; An, Be, Ca, Pn, Po, Qr, Sa, sh, wf; mieur.subatl-med
- Lecania cyrtella* (ACH.) TH. FR. 6 dm, fh, sh; Po, Sm, sh; s'bor-med
- Lecania erysibe* (ACH.) MUDD 2 af; c; s'bor-med
- Lecania naegelii* (HEPP) DIEDERICH & VAN DEN BOOM 2 dm, rf; Po, Sm; s'bor-med
- Lecania rabenhorstii* (HEPP) ARNOLD 4 ch, rf; c; s'bor-mieur.subatl(-med)
- Lecanora aitema* (ACH.) HEPP 1 ra; Be; bor-mieur.mo
- Lecanora albescens* (HOFFM.) BRANTH & ROSTR. 4 ra; c; bor-med
- Lecanora barkmaniana* APTROOT & VAN HERK 9 ds, fh; Po, Qr, Sa; mieur.atl
- Lecanora campestris* (SCHAERER) HUE 2 ra; c; bor-med
- Lecanora carpinea* (L.) VAIN. 13 fh, ra; Be, Po, Qr, Sa; bor-med
- Lecanora chlorotera* NYL. 13 dm, fh, ra; Po, Qa, Qr, Sa; bor-med
- Lecanora conizaeoides* CROMB. 32 ds, fh, pf, ra; Be, Ju, Pn, Qr, Sa, sh, wf, ws; (bor-)mieur-smed
- Lecanora dispersa* (PERS.) SOMMERF. 17 ds, fh, ra, rf, sh; Be, Po, Sa, c, sh; arkt-med
- Lecanora expallens* ACH. 16 af, fh, ds, ra; An, Fr, Qr, Pn, Sa; s'bor.subatl-med
- Lecanora flotowiana* SPRENG 1 ra; c; mieur?
- Lecanora muralis* (SCHREB.) RABENH. 7 ch; c, sh, wp; arkt-med
- Lecanora pulicaris* (PERS.) ACH. 1 ch; So; bor-med.mo
- Lecanora saligna* (SCHRAD.) ZAHLBR. 45 ch, fh, sh; Be, Pn, Qr, sf, sh, wf, wp, ws; bor-med.mo
- Lecanora symmicta* (ACH.) ACH. 19 ds, fh, ra; Qr; bor-med
- Lecanora umbrina* (ACH.) A. MASSAL. 17 af, ch, fh, sh; Be, Fr, Po, Qr, Sa, Sm, So, sh, c; bor-med
- Lecanora varia* (HOFFM.) ACH. 1 ch; wood of lock; bor-med.mo
- Lecanora xanthostoma* CL. ROUX ex FRÖBERG 1 ra; c; mieur?
- Lecidella achrostotera* (NYL.) HERTEL & LEUCKERT 20 af, ds, fh, ra; An, Be, Po, Qr, Sa, So; mieur?
- Lecidella stigmata* (ACH.) HERTEL & LEUCKERT 2 ch; c; arkt-med
- Lepraria incana* (L.) ACH. 51 af, ch, da, db, dm, fh, ds, mw, pb, pf, pq, ra, rf, sh; An, Pn, Qr, Sa, sf, sh, wf, ws; bor-mieur-med
- Lepraria lobificans* NYL. 16 af, da, ds; An, Sa; bor-mieur(subatl)-med
- Lepraria rigidula* (B. DE LESD.) TØNSBERG 4 ds, pf, Pn, Sa; s'bor-med
- Melanelia elegantula* (ZAHLBR.) ESSL. 2 fh; Qr, ws; mieur-med
- Melanelia exasperatula* (NYL.) ESSL. 13 ch, ds; Qr, Sa; bor-med
- Melanelia glabratula* (LAMY) NYL. 9 ch, ds; Be, Sa; bor-med
- Melanelia subaurifera* (NYL.) ESSL. 48 af, ch, da, dm, ds, fh, pb, ra, rf; Be, Fr, Qr, Sa, So, wf; bor-smed
- Micarea confusa* COPPINS & VAN DEN BOOM 1 ra; t; mieur.atl
- Micarea botryoides* (NYL.) COPPINS 1 ra; t; (s'bor-)mieur.subatl(-med)
- Micarea denigrata* (FR.) HEDL. 53 ch, ds, eh, fh, mw, ra; Be, Ju, Qr, Sa, rw, sh, sf, wf, ws, wp; bor-med
- Micarea leprosula* (TH. FR.) COPPINS & A. FLETCHER 1 ch; t; s'bor-mieur.mo
- Micarea micrococca* (KÖRB.) GAMS ex COPPINS 6 da, pf, ra; An, Po, Sa, rw; s'bor-mieur?

- Micarea misella* (NYL.) HEDL. 4 ch, ds, eh, ra; rw, sh; bor-smed.mo(-med.mo)  
*Micarea nitschkeana* (J. LAHM ex RABENH.) HARM. 25 ch, ds, pq; Cu, My, Po, Sa; (s'bor)mieur(-smed.mo)  
*Micarea peliocarpa* (ANZI) COPPINS & R. SANT. 1 mw; Qr; s'bor(atl)-med.mo, subatl  
*Micarea prasina* FR. 9 ch, ds, pb, pf, Be, Qr, Sa, sh; bor-med(.mo)  
*Micarea subcinerea* BRAND & VAN DEN BOOM 3 db, ra; on exposed roots of *Betula*; mieur.atl  
*Micarea viridileprosa* COPPINS & VAN DEN BOOM 32 ds, eh, pb, pf, pq, ra, sh; Be, Pn, Qr, sh, wf, t; mieur-smed  
*Normandina pulchella* (BORRER) NYL. 2 ds, ra; Qr, Sa; s'bor-med  
*Opegrapha atra* PERS. 1 dm; Po; s'bor-med.(subatl)  
*Parmelia saxatilis* (L.) ACH. 15 fh, ds; Qr, Sa; arkt-mieur-med.mo  
*Parmelia sulcata* TAYLOR 75 af, ch, da, dm, ds, fh, pf, ra, rf, sh; An, Be, Ca, Fr, Ju, Pn, Qa, Qr, Sa, Sm, So, sh, wf, ws; arkt-med  
*Parmelina tiliacea* (HOFFM.) HALE 1 ds; Sa; (s'bor-)mieur-med  
*Parmeliopsis ambigua* (WULFEN) NYL. 5 ch, ds, fh; Sa, wp, ws; bor-med.h'mo(-med.mo)  
*Parmotrema chinense* (OSBECK) HALE & AHTI 30 af, fh, da, ds, ra; An, Be, Qr, Sa; mieur.subatl-med(mo/subatl)  
*Parmotrema reticulatum* (TAYLOR) M. CHOISY 2 fh, ds; Qr, Sa; mieur-med?  
*Peltigera didactyla* (WITH.) J. R. LAUNDON 4 ch; t; arkt-med  
*Phaeophyscia nigricans* (FLÖRKE) MOBERG 1 dm; Sm; bor-med  
*Phaeophyscia orbicularis* (NECK.) MOBERG 29 af, ch, da, ds, fh, ra; An, Be, Po, Qr, Sa, wf, sh, c; bor-med  
*Phlyctis argena* (SPRENG.) FLOT. 3 ds, rf; Qr, Sa; s'bor-med  
*Physcia adscendens* (FR.) H. OLIVIER 41 af, fh, da, ds, dm, pb, pf, ra, rf; An, Be, Pn, Po, Qr, So, Sa, Sm; bor-med  
*Physcia caesia* (HOFFM.) FÜRNR. 7 ds, fh, rf; Po, Qr, Sa, sh; arkt-med  
*Physcia dubia* (HOFFM.) LETTAU 1 fh; Pn; arkt-smed  
*Physcia stellaris* (L.) NYL. 6 fh; Qr, sh; bor-med(.mo)  
*Physcia tenella* (SCOP.) DC. 81 af, ch, da, db, dm, ds, fh, mw, pb, pf, ra, rf; An, Be, Fr, Ju, Pn, Po, Qr, Sa, So, Sm, wf, ws, sh; (arkt-)bor-med  
*Physconia grisea* (LAM.) POELT 7 af, fh, dm, ds; Fr, Po, Qr, Sa; mieur-med  
*Placynthiella dasaea* (STIRTON) TØNSBERG 39 af, ch, dm, ds, eh, ra, sh; Be, Po, Sa, wf, ws, sh, t; bor-med  
*Placynthiella icmalea* (ACH.) COPPINS & P. JAMES 34 ch, ds, pb; Be, sh, wf, t; bor-med  
*Placynthiella oligotropha* (LAUNDON) COPPINS & P. JAMES 21 ch, ra; t; bor-mieur  
*Placynthiella uliginosa* (SCHRADER) COPPINS & P. JAMES 14 ch, ra, wf, t; arkt-med.mo  
*Platismatia glauca* (L.) CULB. & C. CULB. 9 ch, ds; Sa, sh; bor-mieur-med.mo  
*Porina aenea* (WALLR.) ZAHLBR. 2 af, da; An; (s'bor-)mieur(subatl)-med(mo)  
*Protoparmelia hypotremella* VAN HERK, SPIER & V. WIRTH 1 fh; Qr; s'bor-mieur  
*Pseudevernia furfuracea* (L.) ZOPF 19 ch, ds, fh, ra, sh; Be, Qr, Sa, sh; bor-med.mo  
*Psilolechia clavulifera* (NYL.) COPPINS 6 da, db, ds; exposed roots of *Betula*; s'bor-mieur  
*Psilolechia lucida* (ACH.) M. CHOISY 2 ra; t; s'bor-mieur.subatl-smed(-med)  
*Punctelia borreri* (SM.) KROG 11 da, ds, fh; An, Qr, Sa; mieur-med(.subatl)  
*Punctelia subrudecta* (NYL.) KROG 43 af, ch, dm, ds, fh, ra, sh; An, Be, Fr, Ju, Qr, Sa, So, Sm, sh; mieur-med(.subatl)

- Punctelia ulophylla* (ACH.) VAN HERK & APTROOT 32 af, ch, dm, ds, ra; An, Be, Ju, Qr, Sa, So; mieur-med
- Ramalina farinacea* (L.) ACH. 34 af, ds, dm, fh, ra; Be, Fr, Po, Qr, Sa, So, sh, wf; bor-med
- Ramonia interjecta* COPPINS 2 af, dm; Po, Sm; mieur?
- Rinodina gennarii* BAGL. 1 rf; Po; s'bor-med
- Rinodina pityrea* ROPIN & H. MAYRHOFER 1 rf; Po; s'bor-med?
- Sarcogyne regularis* KÖRB. 1 ch; c; arkt-med
- Scoliciosporum chlorococcum* (GRAEWE ex STENH.) VĚZDA 1 ds; Sa; bor-med
- Scoliciosporum galluræ* VĚZDA & POELT 8 af, ds, fh, rf; An, Po, Qr, Sa; mieur-med?
- Scoliciosporum umbrinum* (ACH.) ARNOLD 1 fh; Qr; bor-med
- Strangospora ochrophora* (NYL.) R. A. ANDERSON 3 ds; Sm; bor-med
- Strangospora pinicola* (A. MASSAL.) KÖRB. 14 af, ch, ra, rf; Be, Ju, Po, Pn, Qr, ws; mieur
- Thelocarpon epibolum* NYL. 1 ra; sf; bor-med
- Thelocarpon lichenicola* (FUCKEL) POELT & HAFELLNER 2 ra; t; s'bor-mieur
- Trapeliopsis flexuosa* (FR.) COPPINS & P. JAMES 27 ch, ds, ra, rf; Pn, Sa, sh, t; bor-med
- Trapeliopsis granulosa* (HOFFM.) LUMBSCH 43 ch, db, ds, fh, ra, rf; Be, Ju, Pn, Qr, Sa, sh, t; arkt-smed.mo(-med.mo)
- Trapeliopsis percrenata* (NYL.) G. SCHNEIDER 1 ds; wf; s'bor-mieur
- Trapeliopsis pseudogranulosa* COPPINS & P. JAMES 1 da; sf; bor-smed
- Usnea hirta* (L.) F. H. WIGG. 3 ds; Sa; bor-mieur(med.mo)
- Verrucaria maculiformis* KREMPELH. 1 ra; c; mieur-smed
- Verrucaria muralis* ACH. 5 ch; c; (arkt-)bor-med
- Verrucaria nigrescens* PERS. 1 ch; c; bor-med
- Vezeada acicularis* COPPINS 2 ch; t; mieur
- Vezeada retigera* POELT & DÖBBELER 1 ra; t; mieur
- Xanthoria candelaria* (L.) TH. FR. 16 af, ch, ds, fh, pb; Be, Fr, Ju, Qr, wp; arkt-med
- Xanthoria parietina* (L.) TH. FR. 50 af, ch, dm, ds, fh, ra; Be, Fr, Po, Qr, Sa, Sm, So, c, ws; bor-med
- Xanthoria polycarpa* (HOFFM.) TH. FR. ex RIEBER 46 ch, ds, fh, pf, rf; An, Pn, Qr, Sa, So; mieur

### Lichenicolous fungi

- Arthonia phaeophysciae* GRUBE & MATZER 3 af, dm, ds; Po, Sa, ws; on *Phaeophyscia orbicularis*
- Athelia arachnoidea* (BERK.) JÜLICH 15 ch, ds, fh, rf; Po, Sa, So; on *Bacidia* spp., *Lecanora conizaeoides*, *Physcia* spp.
- Cladoniicola staurospora* DIEDERICH, VAN DEN BOOM & APTROOT 18 ch; t, ws, on *Cladonia* spp.
- Cornutispora ciliata* KALB. 1 ds; Sa; on *Physcia tenella*
- Illosporiopsis christiansenii* (B. L. BRADY & D. HAWKSW.) D. HAWKSW. 1 rf; Po; on *Physcia tenella*
- Lichenocodium erodens* M. S. CHRIST. & D. HAWKSW. 12 ch, ds; Be, Pn, t; on *Cladonia* spp., *Lecanora conizaeoides*, *Parmelia sulcata*, *Punctelia subrudecta*
- Lichenocodium xanthoriae* M. S. CHRIST. 4 fh; Be, Qr, Sm, So; on *Xanthoria parietina*, *X. polycarpa*
- Lichenodiplis lecanorae* (VOUAUX) DYKO & D. HAWKSW. 10 ch, fh; Be, Ju, Qr, ra, sh, wf, ws; on *Lecanora saligna*

- Marchandiobasidium aurantiacum* DIEDERICH & SCHULTHEIS 1 ds; Sa; on *Bacidina arnoldiana*, *Physcia tenella*  
*Nectriopsis micareae* DIEDERICH, VAN DEN BOOM & ERNST 11 ds, pb, pf, pq, ra; Be, Sa, wf; on *Micarea viridileprosa*  
*Paranectria oropensis* (CES.) D. HAWKSW. & PIROZ. 7 ds, rf; Po, Sa; on *Candelariella reflexa*, *Fellhanera viridisorediata*, *Hypotrachyna revoluta*, *Melanelia exasperatula*, *Physcia tenella*  
*Pronectria oligospora* LOWEN & ROGERSON var. *octospora* ETAYO 7 ds; Sa; on *Punctelia subrudecta*  
*Psammia stipitata* SACC. & ROUSSEAU ex E. BOMMER & M. ROUSSEAU 1 ds; Sa; on *Fellhanera viridisorediata*  
*Szygospora physciacearum* DIEDERICH 1 ds; Sa; on *Physcia tenella*  
*Trichonectria hirta* (BLOXAM) PETCH 3 fh, ra; La, Qr, So; on *Physcia tenella*  
*Trichonectria rubefaciens* (ELLIS & EVERH.) DIEDERICH & SCHROERS 3 ds; Sa; on *Parmelia sulcata*  
*Tubeufia heterodermiae* ETAYO 9 af, ds, fh; An, Qr, Sa; on *Physcia adscendens*, *P. tenella*  
*Xanthoriicola physciae* (KALCHBR.) D. HAWKSW. 3 ch, ds; Sa, Sm; on *Xanthoria parietina*

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