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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Received 25. 6. 2004, in revised version 15. 8. 2004

Key words: Lichens, Lichenicolous fungi. – Survey, heathland, woodlands. – Lichen flora of southeastern Netherlands.

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 Plazierung 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 20th 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 *Marchandiobasidium 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 inhabits), within a radius of 20 km around this city (c. 1250 km²). 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 km² 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)

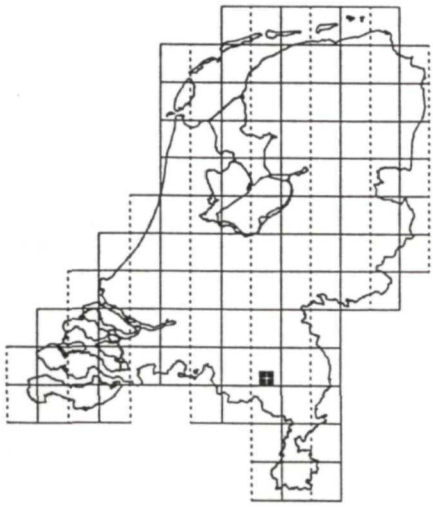
The study area has the status of a nature reserve and can be regarded as a uniformity, a heathland area mostly bordered by different, rather small woodlands. The area is divided into two parts, belonging to different municipalities: "Strabrechtse Heide" (Heeze) and "Lieropse Heide" (Someren). They are situated in the southeastern part of the country, with a general altitude between 20 and 25 m s. m. The study area measures 20 km² 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 inhabits 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.



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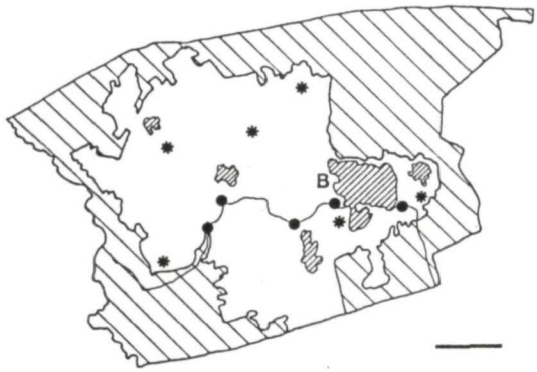

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Fig. 1. Map showing the study area in southeastern Netherlands. Fig. 2. Schematic map of the survey area, showing the position of the best collecting sites; asterisk = most important Corynephoretum communities, dot = damp *Salix* woodlands, B = Beuven. Broadly hatched area = mainly forests. Bar: 500 m. Fig. 3. Heathland with Corynephoretum 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* heatlands, 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 in 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. International 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 acivities are concentrated very close (southeastern) of the area. Ammonia (NH_3) 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 km² 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

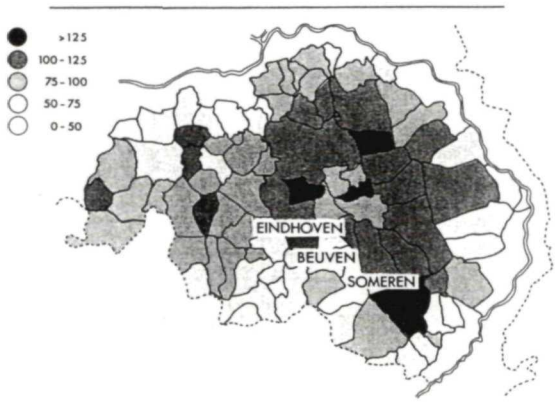
In the study area, at least 15 localities represent well-developed terricolous lichen communities. The most important site is situated in the north, "Galgeberg" a hilly site with low sand dunes, covered with *Agrostis vinealis*, *Corynephorus canescens*, *Deschampsia flexuosa*, *Nardus stricta*, *Polytrichum 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-km² 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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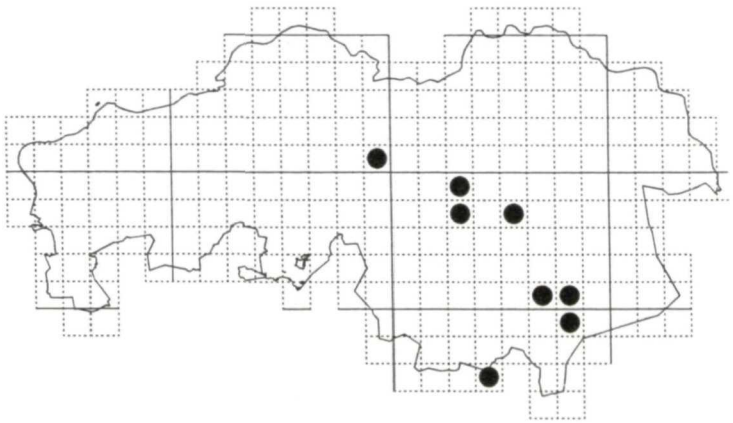

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Fig. 6. Emission of ammonia from cattle manure in the southeastern part of the province Noord-Brabant, including the study area. Ammonia-emission in kg/ha/year (BUIJSMAN 1983). Fig. 7. Known distribution of *Tubeufia heterodermiae* in The Netherlands (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 lenght. Two species from southern Europe, never found in the first part of the survey, *Punctelia borreri* and *Flavoparmelia soredians* increased rapidly in abundancy. 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. occurried 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 *Lichenoconium xanthoriae* were present. *Juniperus communis*, a threathened 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 foothpath 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 *Absconditella 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*, *Psammina 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 loality, 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*. *Lichenoconium 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 Corynephoretum communities, and four species found exclusively in woodlands.

The most remarkable missing species is *Cetraria islandica*. In the middle of the 20th century it was a very common species in heathlands or open forests not more then 10 km from the study area. *Cetraria islandica* was the most dominating species, covering sometimes many m², 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

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

Absconditella 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 chloroticula (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 chlarotera 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 achristotera (NYL.) HERTEL & LEUCKERT 20 af, ds, fh, ra; An, Be, Po, Qr, Sa, So; mieur?
Lecidella stigmatea (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 gallurae 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
Vezdaea acicularis COPPINS 2 ch; t; mieur
Vezdaea 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*
Lichenoconium erodens M. S. CHRIST. & D. HAWKSW. 12 ch, ds; Be, Pn, t; on *Cladonia* spp., *Lecanora conizaeoides*, *Parmelia sulcata*, *Punctelia subrudecta*
Lichenoconium 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*

Psammina stipitata SACC. & ROUSSEAU ex E. BOMMER & M. ROUSSEAU 1 ds; Sa; on *Fellhanera viridisorediata*

Syzygospora 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*

I am grateful to the following lichenologists and friends for the help with identifying some selected specimens: MAARTEN BRAND (Leiden), BRIAN COPPINS (Edinburgh), PAUL DIEDERICH (Luxembourg), JAVIER ETAYO (Pamplona), HARRIE SIPMAN (Berlin). JAP SMITS (Heeze) is thanked for his helpful information about the study area. I am indebted to my wife BERN, for the contribution to the fieldwork and the many interesting additional findings.

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