

An inventory of lichens and lichenicolous fungi in northern Belgium (area of Stramprooierbroek)

by

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Abstract: A detailed lichenological survey of some nature reserves and their surrounding areas in one of the most northern parts of Belgium has been undertaken from 2002 to 2004. This survey provided an inventory of the terricolous, corticolous, lignicolous and saxicolous lichens, as well as lichenicolous fungi of two IFBL squares (each 4×4 km²). In all, 41 sites, mainly damp woodland habitats, were investigated, making this the most extensive lichenological survey ever made in this part of Belgium. During the survey, 159 taxa (143 lichens and 16 lichenicolous fungi) were recorded, including *Caloplaca phlogina*, *Cercidospora macrospora*, *Lecanora persimilis*, *Lichenocnium xanthoriae*, *Trichonectria rubefaciens* and *Tubeufia heterodermiae*, which are new to Belgium, and *Physcia clementei*, considered to be extinct since 1954.

1. Introduction

Detailed inventories of lichens and lichenicolous fungi in two IFBL squares (C7.34 and C7.35), situated between 51°23'-51°25'N and 5°35'-5°40'E (Fig. 1), were undertaken. These two squares are part of the phytogeographical district Campine. The major habitat of the study area (c. 30 km²), which lies mainly between 30 and 40 m.s.m., is a damp forest, Stramprooierbroek. The study area, delimited by the Dutch border to the north, a secondary road to the south, an open agriculture landscape to the west and a small village, Molenbeersel, to the east, is situated within a highly urbanized region. Stramprooi, a village with 5000 inhabitants, lies c. 5 km NE of the area and there are two villages (Bocholt and Bree), within a distance of c. 3 km, each with 2000-3000 inhabitants.

According to local history sources (unpublished report), hunting and fishing provided the local people with their most important means of living at the end of 18th century. Formerly, to the east of Stramprooierbroek was a peat area, and to the west an inaccessible damp forest, with only one small *Pinus* forest existing nearby. Drainage of the area commenced in 1860. Since that time, grasslands developed throughout the area, and the local economy involved examples of felling trees, collecting sawdust, mowing grass and cutting peat.

The major habitat, Stramprooierbroek, is situated in the valley of the stream 'A-beek', where a wide range of vascular plants, including *Carex lasiocarpa*, *Menyanthes trifoliata* and *Ranunculus lingua*, birds and mammals exist (unpublished lists). However, there is no history in lichenology in this area.

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Today, epiphytic and lignicolous lichens are well represented, but saxicolous or terricolous species are less frequent, being found on tombstones, concrete bridges, posts and brick walls scattered throughout the area, as well as in small heathland relicts. The 159 taxa of lichens and lichenicolous fungi listed below were compiled by the authors over a two-year period. Some undescribed lichenicolous fungi have been found and are in need of further study.

This is the first survey of lichens and lichenicolous fungi ever made in this part of Belgium. All records published here are first records for the two IFBL squares, and many are new for northern Belgium.

2. Methods

Parts of the study area, 'Stramprooierbroek', 'Grootbroek', 'Zig' and 'Luysen', have the status of nature reserve. The former three are more or less damp woodland, and the latter is an open landscape with several small lakes associated with smaller woodlands. On 11 days during more than two years, from the middle of 2002 until the end of 2004, the different habitats in the agriculture area were sampled, including major damp woodlands, small scattered mixed woodlands, roadside trees, wooden fence posts, concrete posts, stones, brick walls, concrete bridges and tombstones.

Lichens and lichenicolous fungi were recorded from two IFBL squares C7.34 and C7.35 (each 4×4 km²). Forty-one sites were comprehensively investigated (Fig. 2), from which 143 lichens and 16 lichenicolous fungi were recorded, together with details of the substrata on which they occurred. About 600 records of lichens and lichenicolous fungi were made, and c. 325 specimens were collected and deposited in the herbarium of the first author. For each locality, a species list and ecological notes were made and accessed onto a database.

Air dried specimens were examined with a stereo-microscope and a light microscope, and standard microchemical methods used according Orange et al. (2001). Specimens were mainly studied with the aid of Wirth (1995) and Purvis et al. (1992), and nomenclature follows Coppins (2002), Diederich and Sérusiaux (2000), Hafellner and Türk (2001), Hawksworth (2003) and Sérusiaux et al. (2003, 2004).

3. Study area

The northern central part of Belgium (Limburg province) has an oceanic climate with mild winters and cool summers, without extremes of temperature. Frost days average 10-12 for the months December to February with temperatures at least below 0°C. The annual rainfall is less than c. 700 mm and the annual temperature averages 9-10°C. From May until August, the number of days with a temperature above 25°C is more than 25. The mean annual wind velocity is less than 4 m/s. Snowfall occurs throughout the country, but it is usually light in the study area. On rare occasions, snow may lie in November or December, but it is mostly recorded in January and February, and never for a long time.

The study area includes the nature reserves 'Stramprooier broek', 'Grootbroek', 'Zig' and 'Luysen', each of which has its own characteristics, particularly in respect of the damp (alluvial) *Salix* woodlands (*Salicion cinereae* communities). However, they are mostly characterized by *Alnus glutinosa* (*Alnetea* community) at the woodland margins, while the central part of the *Salix* woodland is permanently swampy. These

brookdale habitats often include rich lichen communities, but they are rather disturbed and accompanied by the extensive *Urtica dioica* and *Rubus fruticosus* s.l. This kind of habitat is treated in detail by Stortelder et al. (1999).

According to the Dutch Red List of Threatened Lichen Species, *Salicion cinereae* communities can be very rich in lichens (Aptroot et al. 1998), as is the case in the study area which possesses important habitats supporting 38 species of lichens and 5 species of lichenicolous fungi.

The lichen flora at the margins of most of the damp woodlands is mainly composed of the conspicuous *Xanthorion* community, caused by heavy eutrophication derived from agricultural and urban sources. A dozen of the commonest nitrophytic species are recognized in such situations.

Roadside trees, scattered trees in meadows or along grasslands etc. such as *Betula* sp., *Castanea sativa*, *Quercus robur* and *Sorbus aucuparia*, are important phorophytes for corticolous lichen communities, but *Pinus sylvestris* trees are often devoid of lichens. For an impression of one of the localities see Fig. 3.

The saxicolous lichen flora is most well developed at the churchyard of Molenbeersel, where 27 species were recorded from man-made substrata such as brick walls and gravestones. A number of records, usually reduced pioneer lichen vegetations, are from concrete fence posts, widely distributed in the area. Several concrete bridges and

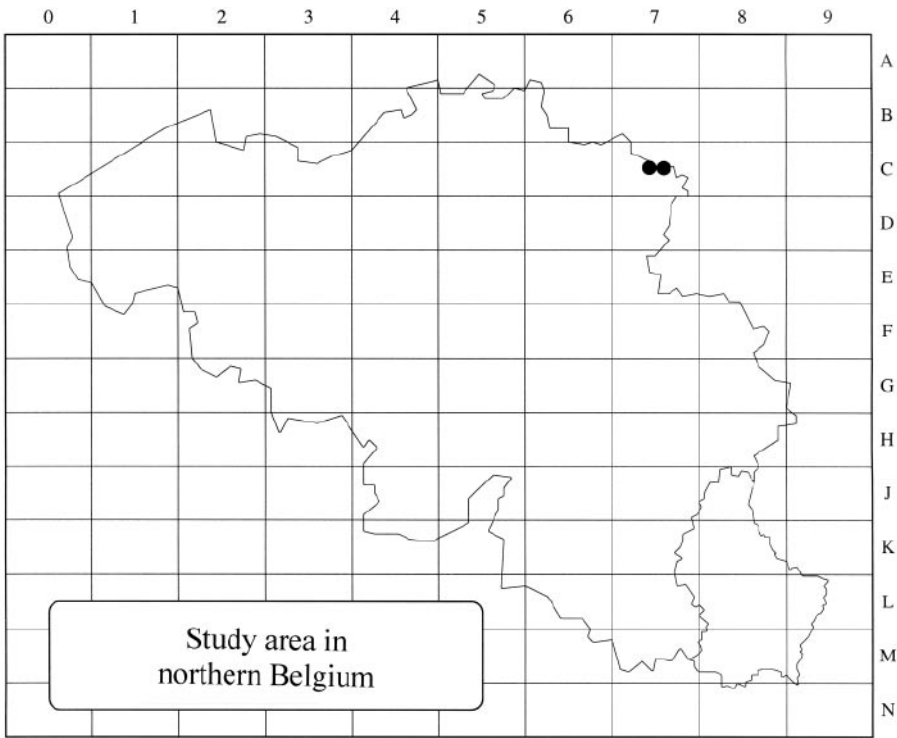


Fig. 1. Study area in northern Belgium.



Fig. 2. Detailed map of the study area.

brick walls were also investigated, and some important records were obtained from an old building in the centre of Grootbroek.

Only a few heathland relicts exist in the study area. However, in one small heathland, situated in the north-western part of the study area, a poorly developed lichen flora of a few common *Cladonia* species together with some crustose species was found among *Calluna vulgaris*.

4. Results

4.1. Major lichens communities

Epiphytic communities in damp woodlands

During this survey, 45 species (including 5 lichenicolous fungi) were found on living or dead *Salix* trunks or branches. At the edge of damp woodlands, some species of the Xanthorion are commonly present, such as *Candelariella reflexa*, *Phaeophyscia orbicularis*, *Physcia tenella*, *Xanthoria parietina* and *X. polycarpa*. Floristic composition inside these woodlands is rather interesting: macrolichens such as *Flavoparmelia caperata*, *Hypotrachyna revoluta* and *Parmotrema perlatum* are not rare, populations of these are sometimes rather rich and well-developed, and specimens of c. 10 cm diam. for the latter two have been found. *Hypogymnia farinacea*, *Normandina pulchella*, *Platismatia glauca* and *Pseudevernia furfuracea* are rare in these habitats. One of the most interesting microlichens is *Fellhanera viridisorediata*, a species which is known only since 1984 from the southern Netherlands, where it was only recorded as sterile for a long time; since 2001, it has been found fertile in different sites (van den Boom 2004), even in the study area.

Another rarity is the lichenicolous fungus *Marchandiobasidium aurantiacum*, of which a rather small anamorph population was found on one trunk of *Quercus*. A common lichenicolous fungus in this habitat is *Paranectria oropensis*; at some sites it is abundant, mostly on *Candelariella reflexa*, but other hosts are *Bacidina* sp. *Lepraria* sp. and *Normandina pulchella*. A remarkable species is *Tubeufia heterodermiae*, a lichenicolous fungus growing mainly on *Physcia tenella*. It was previously unknown in Belgium, but it has now been recorded six times in the study area, mainly from branches of *Quercus*.

Epiphytic communities on free-standing or roadside trees

Over 100 free-standing or roadside trees, mainly *Castanea*, *Quercus* and *Populus*, were examined and some interesting lichens such as *Bacidina egenula*, *Caloplaca phlogina*, *C. vitellinula*, *Halecania viridescens*, *Lecanora barkmaniana* and *Parmelina tiliacea* recorded. Roadside trees, scattered throughout the area, carry rather conspicuous lichen communities, often dominated by nitrophytic species such as *Physcia tenella*, *P. adscendens*, *Xanthoria parietina* and *X. polycarpa*. Some rare species such as *Caloplaca obscurella*, *Catillaria nigroclavata*, *Lecania naegeli* and *Rinodina pityrea* are also encountered. Among the lichenicolous fungi, *Licheniconium xanthoriae*, found on a roadside *Castanea sativa* tree on apothecia of *Xanthoria polycarpa*, is the most important species.



Fig. 3. View at one of the localities.

Saxicolous and terricolous communities

A limited variety of saxicolous substrata and a low rate of colonization resulted in only 30 additional species, growing on brick, mortar or concrete, being added to the inventory. An important site is an old building with brick walls in the Grootbroek reserve, on which *Bacidina egenula* has been found, growing close to *Psilolechia leprosa*. The churchyard around the Molenbeersel church supports 27 common species.

The terricolous flora is poorly developed. A small *Calluna* heathland hosted a few common *Cladonia* species, together with the rare *Micarea lithinella* and *Psilolechia clavulifera*.

Other habitats

Small *Pinus sylvestris* woodlands are scattered throughout the study area, but the trunks and branches of *P. sylvestris* are extremely poor in lichen vegetation, with only *Buellia punctata*, *Lecanora conizaeoides* and *Lepraria incana* recorded.

Mixed forests are frequently found; *Populus* trees are often present, mostly planted and therefore in rows. Sometimes small woodlands contain mixtures of *Alnus*, *Betula*, *Pinus*, *Prunus* and *Quercus*, but several other combinations are known. Two *Punctelia* species are common in the study area, *P. subrudecta* and *P. ulophylla*; however, despite of seriously searching for *P. borrieri*, it was discovered only once. This species is widespread but rather rare in Belgium (Sérusiaux et al. 2004). The most important record in this habitat was *Physcia clementei*, which was found on a small *Quercus robur*. This is a most unexpected discovery as the species was thought to be extinct in the country since 1954 (Diederich & Sérusiaux 2000).

4.2. Data and comments on interesting species

Diederich and Sérusiaux (2000) and Sérusiaux et al. (2003) were consulted for biogeographical information in Belgium, Luxemburg and northern France. The abbreviation VDB is used for ‘leg. P. & B. van den Boom’.

Bacidina egenula (Nyl.) Vězda

Grootbroek, open place in mixed forest with a.o. *Betula*, *Pseudotsuga* and *Populus* (C7.35), on vertical N exposed brick of wall, 14 Sept. 2002, VDB 29712; Luysmolen, along Abeek (C7.34), on *Juglans*, 13 June 2004, VDB 32702.

Previously, this species was known from southern Luxemburg (Lorraine district) and once recorded from the province of Antwerpen (Campine district) by van den Broeck et al. (2005).

Caloplaca phlogina (Ach.) Flagey

Stramrooierbroek, *Populus* trees at rim of *Picea* woodland (C7.34), on *Populus*, 6 Dec. 2003, VDB 31871; Brandven, mixed forest around fen, along meadow (C7.35), on decorticated trunk of *Alnus glutinosa*, 10 Dec. 2004, VDB 34063; Luysen, open area with trees along path and fen (C7.34), on *Populus*, 20 May 2004, VDB 32619.

Only once recorded from northern France (Lorraine district).

Cercidospora macrospora (Uloth) Hafellner & Nav.-Ros.

Molenbeersel centre, churchyard (C7.35), on concrete and brick wall, lichenicolous on *Lecanora muralis*, VDB 34061, 34062.

According to Diederich & Sérusiaux (2000) and Sérusiaux et al. (2003), this species is new for the checklist of Belgium, Luxemburg and northern France.

Lecanora persimilis (Th. Fr.) Nyl.

Kreielerbos, open grassy place with *Calluna vulgaris* and scattered *Quercus robur* (C7.34), on *Quercus robur* branches (lopped), 19 June 2004, VDB 32719.

Previously known from Luxemburg (Ardenne and Lorraine districts).

Lichenocodium xanthoriae M. S. Christ.

Opwinkel, 'Winkelstraat' (C7.35), on a roadside *Castanea* tree, on *Xanthoria polycarpa*, 27 Dec. 2004, VDB 34096.

At this locality 20 roadside trees were investigated, but only one tree carried a rather rich population. Previously known from Luxemburg (Lorraine district).

Physcia clementei (Turner) Maas Geest.

ENE of Molenbeemden, S of boundary post 152, mixed woodland with *Betula*, *Pinus*, *Quercus* and *Sambucus* (C7.35), on trunk of young *Quercus robur*, 10 Dec. 2004, VDB 34045.

This species was thought to be extinct in Belgium since 1954 (Diederich & Sérusiaux 2000). It was found on only one tree.

Trichonectria rubefaciens (Ellis & Everh.) Diederich & Schroers

S side of Luysen nature reserve, Urlobroek, path in mixed forest (C7.34), on *Salix*, on *Parmelia sulcata*, 3 Oct. 2004, VDB 33758; E side of Stramprooierbroek, along forest and field (C7.35), on *Quercus robur*, on *P. sulcata*, 27 Dec. 2004, VDB 34093.

Previously known from Luxemburg (Lorraine district). New to Belgium.

Tubeufia heterodermiae Etayo

Stramprooierbroek, margin of damp *Salix* woodland (C7.35), on *Quercus robur* branch, on *Physcia tenella*, 20 Sept. 2003, VDB 31542; Luysen, open area with trees along field and fen (C7.34), on *Q. robur*, on *P. tenella*, 20 May 2004, VDB 32635; ENE of Eppel, small mixed woodland (C7.34), on *Prunus*, 13 June 2004, VDB 32686; Kreielerbos, open grassy place with *Calluna vulgaris* shrubs and scattered *Q. robur* trees (C7.34), on *Q. robur* branches (lopped), 19 June 2004, VDB 32722; S side of Luysen nature reserve, Urlobroek, path in mixed forest (C7.34), on *Salix*, on *P. tenella*, 3 Oct. 2004, VDB 33760; S of Grootbroek, near brooklet 'Zuurbeek' (C7.34), on an unidentified fallen trunk, on *P. tenella*, 27 Dec. 2004, VDB 34112.

This species is new to the area covered by the checklist of Belgium, Luxemburg and northern France (Diederich and Sérusiaux 2000; Sérusiaux et al. 2003).

4.3. Species list

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

L = recorded in IFBL C7.34

R = recorded in IFBL C7.35

Abbreviations for habitats:

bw = brick and stone walls

cb = concrete of bridge, gravestone or fence

da = damp *Alnus* woodland

ds = damp *Salix* woodland

ft = free-standing tree

mw = mixed woodland with a.o. *Alnus*, *Betula*, *Populus*, *Quercus* and *Salix*

qr = *Quercus* trees in small forest or along path

rf = margin of forest

tb = terricolous on banks along woodlands or shrubland

th = terricolous in heathland

tr = trees or wooden fence along road, path and/or stream

Abbreviations for substrata:

c concrete or cement/mortar

b brick

t terricolous on sandy soil

rw rotting wood (trunk or branch)

wf wood of fallen tree

wp wood of fence post or stump

ws wood of dead standing tree

Ac *Acer* sp.

Ae *Aesculus*

An *Alnus glutinosa*

Be *Betula* sp.

Ca *Castanea sativa*

Co *Corylus*

Cu *Calluna vulgaris*

Fa *Fagus sylvatica*

Fr *Fraxinus excelsior*

Ju *Juglans nigra*

La *Larix decidua*

Pc *Picea* sp.

Pn *Pinus sylvestris*

Po *Populus* sp.

Pr *Prunus* sp.

Pp *Pyrus* sp.

Qr *Quercus robur*

Sa *Salix* sp.

Sm *Sambucus nigra*

So *Sorbus aucuparia*

Ti *Tilia* sp.

+ not clearly lichenized species

* lichenicolous fungus

Anisomeridium polypori (Ellis & Everh.) M. E. Barr 9 L,R; ds,mw,tr; Fr,Po,Sa,Sm

Arthonia muscigena Th. Fr. 1 R; bw; b

**Arthonia phaeophysciae* Grube & Matzer 7 L,R; cb,mw,tr; Po,Sa,c; on *Phaeophyscia orbicularis*

Arthonia radiata (Pers.) Ach. 2 L; mw,tr; An,Po

Arthonia spadicea Leight. 4 L,R; mw,tr; An,Qr

Aspicilia contorta (Hoffm.) Kremp. 6 L,R; bw,cb; c

**Athelia arachnoidea* (Berk.) Jülich 4 L,R; ds,ft; Qr,Sm; on *Bacidina* spp., *Lecanora conizaeoides*, *Physcia* spp.

Bacidina arnoldiana (Körb.) V. Wirth & Vězda 3 L,R; ds,mw,rf; Co,Qr,Sa

Bacidina chlorotricula (Nyl.) Vězda & Poelt 1 L; tr; wp

Bacidina delicata (Leight.) V. Wirth & Vězda 3 L; da,mw,rf; Sa,wp

Bacidina egenula (Nyl.) Vězda 2 L,R; bw,ft; Ju,b

Bacidina neosquamulosa (Aptroot & van Herk) Ekman 6 L,R; mw,tr; An,Po,Qr,Sa
Baeomyces rufus (Huds.) Rebut. 1 L; tb; t
Bilimbia sabuletorum (Schreb.) Arnold 1 R; cb; c
Buellia griseovirens (Turner & Borrer ex Sm.) Almb. 5 L; mw,rf,tr; Po,Sa,wp
Buellia punctata (Hoffm.) A. Massal. 20 L,R; ds,ft,mw,qr,rf,tr;
 An,Ca,Pc,Pn,Po,Qr,Sa,Sm,Ti
Caloplaca citrina (Hoffm.) Th. Fr. 7 L,R; bw,cb; b,c
Caloplaca decipiens (Arnold) Blomb. & Forssell 3 L,R; bw; b,c
Caloplaca flavocitrina (Nyl.) H. Olivier 4 L,R; cb; Po,c
Caloplaca flavovirescens (Wulfen) Dalla Torre & Samth. 3 L,R; cb; c
Caloplaca lithophila H. Magn. 5 L; cb; c
Caloplaca obscurella (J. Lahm) Th. Fr. 3 L,R; rf,tr; Po
Caloplaca phlogina (Ach.) Flagey 3 L,R; rf,tr; An,Po
Caloplaca ruderum (Malbr.) J. R. Laundon 1 R; cb; c
Caloplaca saxicola (Hoffm.) Nordin 4 L,R; cb; c
Caloplaca teicholyta (Ach.) J. Steiner 2 R; cb; c
Caloplaca vitellinula auct. non (Nyl.) H. Olivier 1 R; tr; An
Candelaria concolor (Dicks.) Stein 12 L,R; ds,mw,rf,tr; Fr,Po,Qr,Sa,Sm
Candelariella aurella (Hoffm.) Zahlbr 8 L,R; cb,tr; Po,c
Candelariella reflexa (Nyl.) Lettau 18 L,R; ds,ft,mw,rf,tr; Fr,Po,Pr,Qr,Sa
Candelariella vitellina (Hoffm.) Müll. Arg. 4 L,R; ft,tr; Qr,wp
Catillaria chalybeia (Borrer) A. Massal. 4 L,R; bw,ft,tr; Po,b
Catillaria nigroclavata (Nyl.) Schuler 5 L,R; ft,mw,tr; Fr,Po,Qr
**Cercidospora macrospora* (Uloth) Hafellner & Nav.-Ros. 1 R; bw; c; on *Lecanora muralis*
Chaenotheca ferruginea (Turner ex Ach.) Mig. 3 L,R; ds,mw; La,Qr
Chaenotheca stemonea (Ach.) Müll. Arg. 1 L; rf; Qr
Chaenotheca trichialis (Ach.) Th.Fr. 2 L; rf; Qr,wp
Cladonia caespiticia (Pers.) Flörke 1 L; mw; Be
Cladonia chlorophaea (Florke ex Sommerf.) Sprengel s.l. [*Cladonia merochlorophaea*
 Asah.] 2 L,R; th; Qr,t
Cladonia coniocraea (Flörke) Sprengel 6 L,R; ds,rf,th; Po,t,wp
Cladonia fimbriata (L.) Fr. 8 L,R; ds,ft,rf,tr; Po,Qr,Sa,wp
Cladonia floerkeana (Fr.) Flörke 1 L; th; t
Cladonia humilis (With.) J. R. Laundon 1 L; th; t
Cladonia macilenta Hoffm. s.l. [*Cladonia bacillaris* (Leight.) Arnold] 3 L; ft,rf,th; t,wp
Cladonia ramulosa (With.) Laundon 1 L; th; t
Cladonia rei Schaerer 1 L; th; t
Cladonia subulata (L.) Weber ex Wigg. 1 L; th,tr; t
Dimerella pineti (Ach.) Vězda 11 L,R; ds,mw,rf,tr; An,Po,Qr,Sa
Evernia prunastri (L.) Ach. 9 L,R; ds,ft,mw,tr; Po,Qr,Sa,wp
Fellhanera viridisorediata Aptroot, Brand & Spier 7 L,R; ds,ft,rf,tr; An,Co,Po,Qr,Sa
Flavoparmelia caperata (L.) Hale 12 L,R; ds,ft,ds,mw,tr; An,Po,Qr,Sa
Flavoparmelia soredians (Nyl.) Hale 5 L,R; tr; Po,Qr
Gyalideopsis anastomosans P. James & Vězda 3 L,R; da,ds; Qr,Sa
Halecania viridescens Coppins & P. James 2 L; ft,mw; Qr,wp
Hyperphyscia adglutinata (Flörke) H. Mayrhofer & Poelt 8 L,R; tr; Po,Sa,Sm
Hypocenomys scalaris (Ach.) Choisy 1 L; mw; wp
Hypogymnia farinacea Zopf 1 R; ds; Qr
Hypogymnia physodes (L.) Nyl. 8 L,R; ds,mw,th,tr; Po,Pr,Qr
Hypogymnia tubulosa (Schaer.) Hav. 2 L,R; da,ds; Sa

Hypotrachyna revoluta (Flörke) Hale 9 L,R; cb,ds,mw,tr; Po,Qr,Sa
**Illosporopsis christiansenii* (B. L. Brady & D. Hawksw.) D. Hawksw. 1 R; tr; Po;
on *Xanthoria parietina*
Lecania cyrtella (Ach.) Th. Fr. 7 L,R; mw,tr; Po,Sa,Sm
Lecania erysibe (Ach.) Mudd 3 L,R; cb; c
Lecania naegelii (Hepp) Diederich & van den Boom 5 L,R; rf; Fr,Po,Sm
Lecania rabenhorstii (Hepp) Arnold 2 R; cb; c
Lecanora albescens (Hoffm.) Branth & Rostr. 7 L,R; bw,cb; c
Lecanora barkmaniana Aptroot & van Herk 4 L,R; ds,tr; Po,Qr,Sa
Lecanora campestris (Schaerer) Hue 3 L,R; bw,cb; b,c
Lecanora carpinea (L.) Vain. 4 L,R; ft,tr; An,Ca,Qr
Lecanora chlarotera Nyl. 5 L,R; ft,tr; Ca,Po,Qr
Lecanora conizaeoides Cromb. 4 L,R; rf,tr; Pn,wp
Lecanora dispersa (Pers.) Sommerf. 12 L,R; cb,tr; Po,c
Lecanora expallens Ach. 13 L,R; ft,mw,rf,tr; An,Co,Qr,Po,Py
Lecanora flotoviana Spreng. 3 L; cb; c
Lecanora horiza (Ach.) Linds. 2 R; ft,mw; Po
Lecanora muralis (Schreb.) Rabenh. 10 L,R; bw,cb; b,c
Lecanora persimilis (Th. Fr.) Nyl. 1 L; rf; Qr (lopped branch)
Lecanora pulicaris (Pers.) Ach. 1 R; tr; Po
Lecanora saligna (Schrad.) Zahlbr. 7 L,R; ft,rf; Qr,wp
Lecanora symmicta (Ach.) Ach. 2 L,R; ds,ft; Qr
Lecanora umbrina (Ach.) A. Massal. 7 L,R; cb,tr; Fa,Po,c
Lecidella elaeochroma (Ach.) Choisy 13 L,R; ft,mw,tr; Ac,Ca,Po,Qr
Lecidella scabra (Taylor) Hertel & Leuckert 1 R; bw; c
Lecidella stigmatea (Ach.) Hertel & Leuckert 8 L,R; bw,cb; c
Lepraria incana (L.) Ach. 15 L,R; ft,da,ds,mw,rf,tr; An,Pn,Po,Qr,Sa
Lepraria lobificans Nyl. 5 L,R; ds,mw,tr; Co,Ju,Sa
**Lichenocodium erodens* M. S. Christ. & D. Hawksw. 1 L; tr; Po; on *Parmelia sulcata*
**Lichenocodium xanthoriae* M. S. Christ. 1 R; tr; Ca; on *Xanthoria polycarpa*
**Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw. 3 L,R; ft; Qr,Ti; on *Buellia punctata*, *Lecanora saligna*, *Strangospora pinicola*
**Marchandiobasidium aurantiacum* Diederich & Schultheis (anamorph) 1 L; tr; Qr;
on *Physcia tenella*
Melanohalea exasperatula (Nyl.) O. Blanco et al. 1 L; mw; Sa
Melanelixia fuliginosa (Duby) O. Blanco et al. ssp. *glabratula* (Lamy) comb. ined. 4
L; da,ds,tr; Qr,Sa
Melanelixia subaurifera (Nyl.) O. Blanco et al. 11 L,R; ds,ft,mw,tr; An,Po,Qr,Sa,wf
Micarea botryoides (Nyl.) Coppins 1 R; mw; Po
Micarea denigrata (Fr.) Hedl. 3 L; rf,tr; wp
Micarea lithinella (Nyl.) Hedl. 1 L; tb; t
Micarea micrococca (Körb.) Th.Fr. 2 L,R; ds,ft; Pc,Sa
Micarea nitschkeana (Rabenh.) Harm. 1 L; rf; Pc (dead trunk)
Micarea prasina Fr. 3 L,R; ft,mw,tr; An,Po,Qr,wp
Micarea viridileprosa Coppins & van den Boom 2 L,R; ds,tb; t,wf
+*Naetrocymbe punctiformis* (Pers.) R.C. Harris 1 R; tr; An
**Nectriopsis micareae* Diederich, van den Boom & Ernst 1 R; ds; Sa; on *Micarea viridileprosa*
Normandina pulchella (Borrer) Nyl. 2 L; ds,tr; Co,Sa

**Paranectria oropensis* (Ces.) D. Hawksw. & Piroz. 5 L,R; ds,mw; Po,Sa; on *Bacidina* sp., *Candelariella reflexa*, *Lepraria* sp., *Normandina pulchella*
Parmelia saxatilis (L.) Ach. 3 L,R; ds,tr; Sa,wp
Parmelia sulcata Taylor 22 L,R; ds,ft,mw,rf,tr; Ac,Ca,Po,Py,Qr,Sa,Ti,wp
Parmelina tiliacea (Hoffm.) Hale 1 L; tr; Qr
Parmotrema perlatum (Huds.) M. Choisy 8 L,R; ds,mw,tr; Be,Co,Po,Qr,Sa
Phaeophyscia nigricans (Flörke) Moberg 7 L,R; cb,tr; Sm,Ti,c
Phaeophyscia orbicularis (Neck.) Moberg 16 L,R; bw,cb,da,ds,ft,mw,tr; Ae,An,Ju,Po,Sa, Sm,Ti,b,c
Phlyctis argena (Spreng.) Flot. 5 L,R; ds,ft,tr; Ca,Qr,Sa
Physcia adscendens (Fr.) H. Olivier 20 L,R; ft,mw,rf,tr; Ac,Ae,An,Ca,Fr,Po,Qr,Sa,Sm, Ti
Physcia caesia (Hoffm.) Fűrnr. 9 L,R; cb,rf,tr; Ca,Po,Pr,Qr,c
Physcia clementei (Turner) Maas Geest. 1 R; mw; Qr
Physcia stellaris (L.) Nyl. 4 L,R; rf,tr; Ca,Po,Sa
Physcia tenella (Scop.) DC. 21 L,R; rf,mw,tr; Ac,Ae,An,Ca,Fr,Po,Pr,Qr,Sa,Sm,Ti,c
Physconia grisea (Lam.) Poelt 8 L,R; cb,mw,rf,tr; Po,Sa,Sm,Ti,c
Placynthiella dasaea (Stirton) Tønsberg 7 L,R; ds,mw,rf,tb,tr; An,Ti,t,wp
Placynthiella icmalea (Ach.) Coppins & P. James 1 L; th; t
Placynthiella uliginosa (Schrader) Coppins & P. James 1 L; th; t
Platismatia glauca (L.) Culb. & C. Culb. 1 L; ds; Sa
Porina aenea (Wallr.) Zahlbr. 6 L,R; ds,mw,tr; An,Sa,So
Porpidia soredizodes (Lamy ex Nyl.) J. R. Laundon 1 R; bw;b
**Pronectria oligospora* Lowen & Rogerson var. *octospora* Etayo 3 L,R; mw,tr; Po,Qr;
on *Punctelia subrudecta*
Protoblastenia rupestris (Scop.) J. Steiner 1 R; cb; c
Pseudevernia furfuracea (L.) Zopf 1 R; ds; Qr
Psilolechia clavulifera (Nyl.) Coppins 1 L; th; t
Psilolechia leprosa Coppins & Purvis 1 R; bw; b
Psilolechia lucida (Ach.) M. Choisy 3 L,R; bw,rf,th; La,b,t.
Punctelia borrieri (Sm.) Krog 1 L; mw; Sa
Punctelia subrudecta (Nyl.) Krog 16 L,R; ds,ft,mw,tr; Ca,Po,Pr,Qr,Sa
Punctelia ulophylla (Ach.) van Herk & Aptroot 12 L,R; ds,mw,tr; An,Po,Pr,Qr,Sa
Ramalina farinacea (L.) Ach. 7 L,R; ds,mw,rf,tr; Ac,Ca,Fr,Po,Qr,Sa
Ramonia interjecta Coppins 4 L,R; ds,mw; Sa,Sm
Rinodina gennarii Bagl. 3 L,R; bw,cb; c,b
Rinodina oleae Bagl. 1 L; tr; Po
Rinodina pityrea Ropin & H. Mayrhofer 2 L; tr; Po
Sarcogyne regularis Körb. 3 L,R; cb; c
Scoliosporum gallurae Vězda & Poelt 1 L; ft; Qr
Strangospora ochrophora (Nyl.) R. A. Anderson 2 L,R; mw,tr; Sm
Strangospora pinicola (A. Massal.) Körb. 3 L,R; ft,tr; Po,Qr,wp
**Syzygospora physciacearum* Diederich 1 R; ds; Sa; on *Physcia tenella*
**Taeniolella phaeophysciae* D. Hawksw. 2 L,R; bw,tr; Ju,c; on *Phaeophyscia orbicularis*
Trapeliopsis flexuosa (Fr.) Coppins & P. James 1 L; tr; wp
Trapeliopsis granulosa (Hoffm.) Lumbsch 3 L,R; cb,tr; Po,wp
Trapeliopsis pseudogranulosa Coppins & P. James 1 L; mw; Be
**Trichonectria rubefaciens* (Ellis & Everh.) Diederich & Schroers 4 L,R; ds,mw;
Qr,Sa; on *Parmelia sulcata*
**Tubefia heterodermiae* Etayo 6 L,R; mw,tr; Pr,Qr,wf; on *Physcia tenella*
Verrucaria macrostoma Dufour ex DC. f. *furfuracea* de Lesd. 1 R; bw; c

Verrucaria muralis Ach. 3 L,R; bw,cb; c
Verrucaria nigrescens Pers. 3 L,R; cb; c
Verrucaria ochrostoma (Borrer ex Leight.) Trevis. 1 L; cb; c
Verrucaria viridula (Schr.) Ach. 3 L,R; cb; c
Vezdaea acicularis Coppins 1 L; tb; t
Xanthoria candelaria (L.) Th. Fr. 7 L,R; ft,mw,tr; Ac,Po,Qr,Sa
Xanthoria elegans (Link) Th. Fr. 4 L,R; cb; c
Xanthoria parietina (L.) Th. Fr. 25 L,R; cb,ft,mw,rf,tr; Ac,An,Ca,Fr,Po,Pr,Qr,Sa,Sm,
 Ti,c,wp
Xanthoria polycarpa (Hoffm.) Th. Fr. ex Rieber 10 L,R; ft,mw,tr; Ae,Ca,Po,Qr,Sm,wp
**Xanthoriicola physciae* (Kalchbr.) D. Hawksw. 1 R; tr; Po; on *Xanthoria parietina*.

5. Discussion

A total of 46 species of macrolichens, 97 microlichens and 16 lichenicolous fungi were recorded in the study area. Amongst the 143 lichen taxa, 96 are epiphytic, 43 saxicolous, 17 terricolous and 25 lignicolous (including stumps). Several species are not substrate specific, for example *Placynthiella dasaea* has been found epiphytic, lignicolous as well as terricolous.

Two lichen species, *Caloplaca phlogina* and *Lecanora persimilis*, are new for Belgium. Lichen species rare for the northern part of the country occurring in the study area are *Bacidina egenula*, *Caloplaca vitellinula*, *Hypogymnia farinacea*, *Lecania naegelii*, *Lecanora horiza*, *Psilolechia clavulifera*, *Ramonia interjecta* and *Strangospora ochrophora*. Some species, previously found exclusively as saxicolous in Belgium (Diederich & Sérusiaux 2000, Sérusiaux et al. 2003) have been found epiphytic: *Caloplaca vitellinula* and *Catillaria chalybeia*, on *Alnus* and on *Populus* respectively.

Regarding the lichenicolous fungi, *Cercidospora macrospora*, *Licheniconium xanthoriae*, *Trichonectria rubefaciens* and *Tubeufia heterodermiae* are first recorded here for Belgium (Diederich & Sérusiaux 2000, Sérusiaux et al. 2003). *Arthonia phaeophysciae*, *Illosporopsis christiansenii*, *Marchandiobasidium aurantiacum*, *Paranectria oropenis*, *Syzygospora physciacearum*, *Taeniolella phaeophysciae* and *Xanthoriicola physciae* are rarely recorded for Belgium and so far not from the Campine district. Previously, *M. aurantiacum* was known only from southeastern Belgium and southern Luxembourg where it is a very common species. Recently it has also been found nearby, in the southern Netherlands (van den Boom 2003). The teleomorph, recently described by Diederich et al. (2003), is known only from two localities in southern Belgium and Luxembourg. *Tubeufia heterodermiae*, a species recently described from south-western Europe (Etayo 2002), previously known only from the type locality and a few localities in southern Netherlands (van den Boom 2004), is inconspicuous, containing perithecia 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* and *Salix* spp. There are no really common lichenicolous fungi in the study area, except *Arthonia phaeophysciae* which seems to be an overlooked species; in adjacent southern Netherlands this species appears to be very common.

The environmental influence on the study area caused by adjacent pollution sources such as intensive factory farming and industrial activities is significant. Air pollution

by ammonia and other pollutants has a negative effect on the vegetation, although many nitrophilous species are extremely common in the area. Recreation is another factor with a negative influence: areas indicated as 'reserve' are not accessible for motor traffic, but there are several tourist trails which impact the flora throughout the year.

There is no Red List for Lichens in Belgium, but the Dutch checklist (Aptroot et al. 1998), which covers the bordering area, is compared with the species list for this study; red list species found during our study are listed in Table 1.

Table 1. Lichen species included in the Dutch Red List (Aptroot et al. 1998), with numbers of records given in the present survey.

<i>Catillaria nigroclavata</i>	5
<i>Lecania naegelii</i>	5
<i>Normandina pulchella</i>	2
<i>Parmelina tiliacea</i>	1
<i>Phycia clementei</i>	1
<i>Psilolechia clavulifera</i>	1
<i>Rinodina pityrea</i>	2

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