British Lichen Society

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British Lichen Society Bulletin no. 107

Winter 2010

Welcome to the Winter 2010 Bulletin, with notes and articles that are more varied than ever – a real reflection of the diversity of our membership. There must be something for everyone – persevere with the more erudite contributions and lighten up for the others!

The Lichens in Gardens theme has continued throughout the year, with our members hobnobbing with the great and the good (come to think of it, they *are* the great and the good!) in some of the estates and gardens for which the country is famous. The 2010 Autumn meeting surveyed lichens at the National Botanic Garden of Wales, and members inspected the Society's Library in its smart new location. The BLS is most grateful to NBGW and its library staff for hosting the collection and making it accessible to members. On a domestic note, lichen surveys of members' own gardens have been coming in – there's still time to make a list of your patch if you haven't joined in yet.

A major event over the summer was the 9th International Mycological Congress, held in Edinburgh at the beginning of August. Lichens and lichenologists featured strongly throughout much of the programme, reflecting the ever-closer links between study of lichenized and non-lichenized fungi. We do fit here more comfortably than with "cryptogamic plants" – whatever they are nowadays. The BLS awarded travel grants to a number of young lichenologists to present their work at IMC9, and short summaries of their contributions are included in this Bulletin. Special thanks to Heather Coffey for coordinating this, who was too modest to remind me that her own poster (presented with Lenore Fahrig) received a prize from the British Mycological Society. The congress was preceded by a well-watered (and well-whiskied) field meeting in Kintail and Skye, hosted by Brian and Sandy Coppins under the auspices of the IAL.

The Autumn field meeting has already been mentioned, but other events included an excursion to the Isle of Man (also well-watered at times; lichen survey on Snaefell was challenging due to low clouds – it was difficult to see lichens, let alone identify them!). The summer meeting based in the Moray region was also memorable; accounts of both will follow in future issues.

Looking forward, the AGM (on 14-16 January 2011) returns to London after its perambulations around the country. Don't be put off by the thought of boring administrative announcements – the meeting will be spiced up by four fascinating presentations on lichen matters, including the biennial Swinscow Lecture, lichen tours around the NHM facilities, dinner (very important!) and a local field meeting the following day. More information at the back of this Bulletin. Next year there will, in addition to the usual field programme, a series of affordable one-day courses on lichen identification, subsidized by a grant to the BLS from OPAL. Don't forget to put your name down – potentially the best £20 you will spend for a good while!

And finally, your 2011 subscription is due shortly: see the end pages. Make sure you pay promptly, please, before you get targeted by the Membership Secretary!

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Front cover: Lichen mosaic on a wooden bench at the National Botanic Garden of Wales

The Lichens of Sutton Park, Warwickshire

Abstract

Lichen diversity in lowland England was devastated by the effects of industrial pollution during and after the Industrial Revolution. The Midlands are now enjoying a dramatic period of re-colonisation in areas that were, until recently, considered as "lichen deserts". Fieldwork was undertaken between 2008 and 2010 to record lichens throughout Sutton Park and these records allow some comparisons to be made with a personal list made by James in 1977 from a limited area of woodland and heathland. We present an annotated list of the 156 lichen taxa recently recorded and some of the changes that have been observed are discussed. The major habitats within the park and their associated lichens are described. Areas and features of particular interest are highlighted.

Published surveys of specific sites in the Midlands and south-east England appear to be rather few and include the following papers. Brightman (1965) published an account of the lichens of Cambridge walls, Earland-Bennett (1976) and Laundon (1972, 1973 and 1977) produced several detailed surveys during the 1970s, while more recently James & Davies (2003) and Powell (2010) have published detailed accounts. Re-surveys of some of these sites have highlighted just how dramatically the lichen communities have changed and are still changing. The re-colonisation continues and it is to be hoped that many more sites will be surveyed allowing these important changes to be monitored.

Introduction

Sutton Park, the largest urban park in Europe covering 2400 acres, is situated just seven miles north of the centre of Birmingham (Coxhead, 2009). In contrast to most urban parks, which were created by town planners within the last 150 years, Sutton Park has an ancient history. A deer park was established in the twelfth century but the woodland and heathland that dominated the area were also managed to provide timber and grazing. In 1528 the Borough Charter was awarded by Henry VIII and the Corporation that was established took over responsibility for the park (Lea, 2003). This Corporation played an important role in preserving stable habitats by regulating the grazing, controlling the removal of wood and by banning ploughing. Some landscaping schemes to improve and beautify the landscape were attempted about 1800 but the park was still managed largely to give a good yield of timber and to provide grazing for cattle. During the 1800s the park became increasingly used for recreation, visitors could hire rowing boats, pay for pony rides and get refreshments. There were football and cricket pitches and a golf course was created but still the majority of the area consisted of heathland and woodland. By the second half of the twentieth century the emphasis was on the preservation of the park as a place of natural beauty. In 1997 it was designated as a National Nature Reserve, the only one in Warwickshire. The local inhabitants have had a long history of applying pressure to preserve Sutton Park. When the Corporation sold off parts of the park as farmland in the early sixteenth century the locals secured an injunction to prevent further sales.

Enclosure proposals put forward in 1778 were defeated by popular demand. Today public pressure still continues to influence the Park's maintenance and priorities. Thus, the continued history of Sutton Park has allowed large areas of semi-natural habitat to survive in a relatively stable condition for many centuries.

Methods

The majority of lichen species were identified in the field. The more critical species were collected, if present in sufficient quantity, by the removal of a suitably small sample that would not endanger the colony. Chemical tests, microscopic examination and, where necessary, thin layer chromatography, have been employed to identify critical material. Saxicolous crusts are not easy to collect when growing on surfaces that cannot be damaged. Here a knife or razor blade may be used to remove a small fragment of such crusts, including any fruiting bodies and pycnidia. It is often found helpful to glue these samples onto card, or to attach them to sellotape, to preserve their structure and assist in their determination. Specimens collected during the recent survey are housed in Herb. Powell, details of which will be entered into the British Lichen Society database. Nomenclature used in this publication follows that in Smith *et al*. (2009).

The 1977 survey and previous records

It is interesting that James recorded corticolous and terricolous lichens in a limited area of Sutton Park in the late 1970s, before the spectacular colonisation that has occurred during the last three decades. At that time Sutton Park must have seemed an unexciting site for a lichenologist to visit but the records made then do provide us with a fascinating snapshot in time against which subsequent changes can be compared. His survey was restricted to an area between the Four Oaks Gate and the Streetly Gate. The habitats studied in some detail were ancient woodland, including The Gum Slade, secondary woodland and heathland. Saxicolous communities were not examined.

Within areas of ancient woodland *Lepraria incana* was found to be very frequent. *Lecanora conizaeoides* was occasional but became abundant (and dominant) at their margins. *Chaenotheca ferruginea* was found in dry bark crevices of old *Quercus* trees, possibly as the only relic species of a pre-industrial lichen colonisation (see James & Davis, 2003). In the tree canopies, the branches were largely bare or had a more or less continuous algal cover. Species recorded from tree branches were *Lecanora conizaeoides* which was frequent, *Parmelia saxatilis* was common, while *P. sulcata*, *Hypogymnia physodes*, *H. tubulosa* and *Melanelixia subaurifera* were rare. *Physcia tenella*, *Xanthoria parietina* and *X. polycarpa* were all rare and restricted to isolated nutrient-rich wound tracks. *Cladonia coniocraea* and *C. macilenta* were frequent at the bases of trees and on rotting wood. There was a single record of *Hypocenomyce scalaris,* and *Dimerella pineti* was noted as an increasing species at the bases of shaded old trees.

The areas of secondary woodland had even poorer lichen communities. Tree bark was mostly bare, rarely with some algal crusts. Only *Lecanora conizaeoides* was abundant, with *Parmelia saxatilis* occasional and *Lepraria incana* on a few of the older, sheltered trees. No lichens were present on *Sambucus* or on *Salix* in carrs.

One area was found of regenerating *Calluna/Erica* heathland, four to five years after firing, with an extensive community of terricolous *Cladonia* species. *C. floerkeana* was common here, *C. glauca*, *C. pyxidata* and *C. furcata* were occasional, *C. fimbriata*, *C. polydactyla*, *C. diversa* and *C. chlorophaea* s.lat. were rare, *C. portentosa* occurred in one small stand and *C. subulata* in several small colonies. *Trapeliopsis flexuosa* and *T. granulosa* occurred as pioneer colonists in this heathland. Such communities have now almost disappeared due to an increased competition with grasses and bracken.

A checklist of lichens recorded from Sutton Park was published by Coxhead & Fowkes (1992). Their account lists a total of 40 species, 27 of which have been re-found during the current survey. These confirmed earlier records are incorporated in our list. Our failure to re-find *Cladonia bacillaris* (1971), *C. digitata* (1962), *C. subulata* (1990) and *Coelocaulon aculeatum* (1971) and the rarity of other Cladonia species may reflect the significant ecological change in the heathland-scrub ecology in the Park in recent years.

Without the support of voucher specimens the records of *Bacidia bagliettoana* (1971), *Calicium viride* (1883), *Caloplaca saxicola* (1903), *Peltigera rufescens* (1898), *Physconia grisea* (1883), *Scoliciosporum umbrinum* (1971), *Strangospora moriformis* (1911) and *Verrucaria margacea* (1903) must be accepted with some caution. The record of *Xanthoria corallifera* (1988) may refer to *X. ucrainica*.

An online checklist of lichens is maintained by Coxhead (2009); this includes additional records of listed taxa and includes *Tuckermanopsis chlorophylla* (1980), a species that we failed to re-find.

Habitats studied during 2008 to 2010

Woodland

The wooded areas of Sutton Park have arisen in two main ways. Some areas, such as The Gum Slade and Westwood Coppice, are ancient woodland. Other areas are secondary woodland that has developed on former heathland. The areas of ancient woodland now have a mature closed canopy beneath which thickets of *Ilex aquifolium* are common. Where *Ilex* is absent the understorey is poorly developed. *Quercus* is the dominant canopy species, both *Q. petraea* and *Q. robur* are present along with their hybrid, *Q.* x *rosacea*. There has also been extensive introduction of non-native trees such as *Castanea sativa*, *Pinus* spp. (mainly *sylvestris*) and *Larix decidua.* The areas of secondary woodland often have a large component of *Betula*; both *B. pendula* and *B. pubescens* are present. Wet areas have, in addition, *Alnus glutinosa* and *Salix* spp.

The interior of these woodland areas even today yield short lichen lists. Mature upright trunks of *Quercus* very commonly have *Lepraria incana* with occasional *Chaenotheca ferruginea* and *Dimerella pineti*. The bark of holly appears to be almost devoid of lichens, but the leaves yielded *Fellhanera bouteillei*, the only foliicolous lichen recorded within the park. The bases of some tree trunks and scattered rotting tree stumps have species of *Cladonia* growing on them. When these woodland areas are surveyed the list is greatly increased by studying the accessible, well-lit branches at the woodland edge. These communities are described in the following section on parkland trees.

Parkland trees

The non-woodland areas of Sutton Park contain a large number of trees of many different species ranging from saplings to large mature specimens. The rarity of ancient trees and pollards is perhaps surprising for such an ancient park. The species of trees present include all those listed in the previous section for woodland and with the addition of non-native species such as *Tilia* sp., *Acer pseudoplatanus* and *Aesculus hippocastanum* and native trees such as *Fraxinus excelsior, Carpinus betulus* and *Sorbus aucuparia*. It is on the young branches and twigs of these open-grown trees that the most dramatic colonisation of lichens has been observed. In the following descriptions the concept of lichen communities as described in James *et al*. (1977) is used.

In the 1970s the dominant corticolous community in the Midlands was the *Lecanoretum pityreae* which was associated with high sulphur dioxide levels. *Lecanora conizaeoides* was the dominant species and usually the sole representative in this community but it is now rather rare and decreasing on bark in Sutton Park. Although some older birch trunks still support this lichen the community on these trunks is no longer attributable to the *Lecanoretum pityreae*.

Most of the well-lit lower branches and twigs in the Park are now colonised by a significant cover of lichens, while the older bark of trunks is still relatively sparsely covered and species-poor. Species typical of mature bark may be generally less mobile than those that colonise younger bark. In addition, it has been suggested by Pedley (2005) that bark (and stone) that was subject to intense industrial pollution may to some extent retain a toxic legacy. There are many mature oak trees to the south-east of the Streetly Gate entrance (from SP088980 to SP092978) which provide low branches that are easily examined and which bear a typical lichen assemblage of young branches in the Park. The twigs have species such as *Amandinea punctata, Arthonia radiata, Candelariella reflexa, Lecanora chlarotera, L. symmicta* and *Lecidella elaeochroma.* This conforms to the *Lecanoretum subfuscae*, a pioneer community of twigs. This community grades into and gives way to alliances in which macrolichens become more abundant and tend to grow over the mosaics of crustose species. The lichen assemblage of these young branches can be assigned to the *Parmelietum revolutae* community, dominated by members of the *Parmeliaceae*. There is a tendency towards the *Xanthorion parietinae* alliance, in particular the *Physcietum adscendentis* community which typically has high frequencies of *Physcia, Physconia* and *Xanthoria* species (see James *et al*., 1977).

Superimposed on the general communities are local effects of substrate that can dramatically influence the corticolous lichens. An interesting example is a spectacular wound-track on a birch trunk at SP094977, locality (2) on the map. This tree, next to an internal park road, is noticeable from a distance due to the abundant growth of *Xanthoria parietina* in a vertical band over four metres high. Within this band is a distinctive suite of lichens that are influenced by seepage from rot holes in the upper trunk. The species involved, such as *Phaeophyscia orbicularis, Lecania cyrtella* and species of *Xanthoria*, are typical of nutrient enrichment. Also present are several species which are more commonly found on saxicolous substrates, such as *Caloplaca citrina, C. holocarpa, Candelariella vitellina, Catillaria chalybeia, Lecanora dispersa, Physcia* *caesia* and *Rinodina oleae.* Another example of extreme local modification of the bark habitat is the so-called "canine zone" of the parkland trees. Tree bases which are situated closest to the busiest car-parking areas and which are subjected to very frequent dog urination are often more or less un-vegetated and appear as if scrubbed clean. Away from the edge of these areas, but still subject to frequent visits from dogs, a dark green algal crust typically occurs along with *Lecanora dispersa*. With decreasing intensity of dog urination, a distinct zone can still be seen within the basal 45 cm of the trunks, and foliose lichen species (especially *Phaeophyscia orbicularis*) become common.

The park also contains significant areas of scrub, mainly scattered *Crataegus monogyna*, *Sambucus nigra* and thickets of *Ulex europaeus*. These shrubs add to the diversity of lichens. The only occurrence of *Pseudevernia furfuracea* was found on an exposed *Crataegus*. *Sambucus* has a rather distinctive suite of lichens favoured by the spongy bark. *Lecania cyrtella* and *Lecanora hagenii* are particularly characteristic of young elder twigs and *Caloplaca cerinella* was found exclusively on elder.

Heathland

There are large areas of relic heathland in Sutton Park but terricolous lichens there are now generally sparse. Those present belong to the following genera: *Baeomyces, Cladonia, Peltigera* and *Placynthiella.* These lichens require areas where the ground has become exposed, the most common places to find them are close to paths where trampling has suppressed the vascular vegetation or in areas which have been burnt within the past few years. There are also some areas where the heather has been managed by cutting; the exposed bare ground can be suitable for terricolous lichens for a few years before being shaded out by other vegetation, but their abundance as seen by James in 1977 is no longer a feature of the Park's heathland.

Man-made structures

a) *structures beside the pools*

There are a range of artificial banks and mortared walls along some edges of the various lakes within Sutton Park. These provide the most significant and diverse saxicolous habitats within the Park.

Some lake edges are constructed of concrete; an example is the dam that forms the eastern edge of Keeper's Pool. The top surface of the dam is enriched by bird-droppings and, being horizontal, has a community more typical of paving slabs than of concrete posts. *Aspicilia contorta* subsp. *contorta, Caloplaca crenulatella* and *Lecanora campestris* are very characteristic of this habitat. Another interesting concrete wall borders the south-east side of Longmoor Pool. This has a pioneer community of species such as *Caloplaca crenulatella*, *C. holocarpa*, *Candelariella aurella* and *Lecanora albescens*. Of particular note are the frequent and conspicuous patches of *Lecanora semipallida* on the top surface of this wall while *Xanthoria elegans* was present in small quantity on its side. A concrete structure near to Little Bracebridge Pool contains rather large lumps of siliceous material, on one of which *Lecidea fuscoatra* was found.

A few of the lake edges have walls constructed of mortared sandstone blocks. These walls have interesting lichen communities, the best example being along the south edge of Keeper's Pool. This wall yielded the only records in Sutton Park for *Clauzadea monticola* (on mortar) and *Rhizocarpon petraeum* (on sandstone).

b) bridges over railway

Four bridges cross the railway line within Sutton Park. The parapets are built of blue engineering bricks topped with large sandstone coping stones. The mortar of the brickwork has *Caloplaca citrina, C. arcis, Candelariella aurella, Lecanora albescens, Lepraria vouauxii, Sarcogyne regularis* and *Verrucaria muralis.* The sandstone copes have a rather interesting assemblage of lichens including: *Buellia aethalea, Candelariella vitellina, Lecanora polytropa, Porpidia soredizodes, P. tuberculosa* and *Stereocaulon nanodes.*

c) limestone boulders

There is an overflow structure at the east end of Powell's Pool that is constructed of large chunks of hard limestone. *Verrucaria baldensis* is plentiful on this limestone and not found elsewhere in the park. Two further species that were recorded only at this locality were *Bacidia inundata* and *Belonia nidarosiensis*.

d) wooden shingle roofs

At the Streetly Gate and Four Oaks entrances to Sutton Park there are small admittance buildings with ageing wooden shingle roofs. These coniferous shingles are beginning to rot and support interesting communities of lichens. The species present include: *Baeomyces rufus, Cladonia floerkeana, C. glauca, C. macilenta, Micarea lignaria* var. *lignaria, Placynthiella icmalea* and *Trapeliopsis flexuosa.* This assemblage has a similar composition to that which colonises favourable areas of heathland and which would have been much more common in that habitat in Sutton Park in the 1970s.

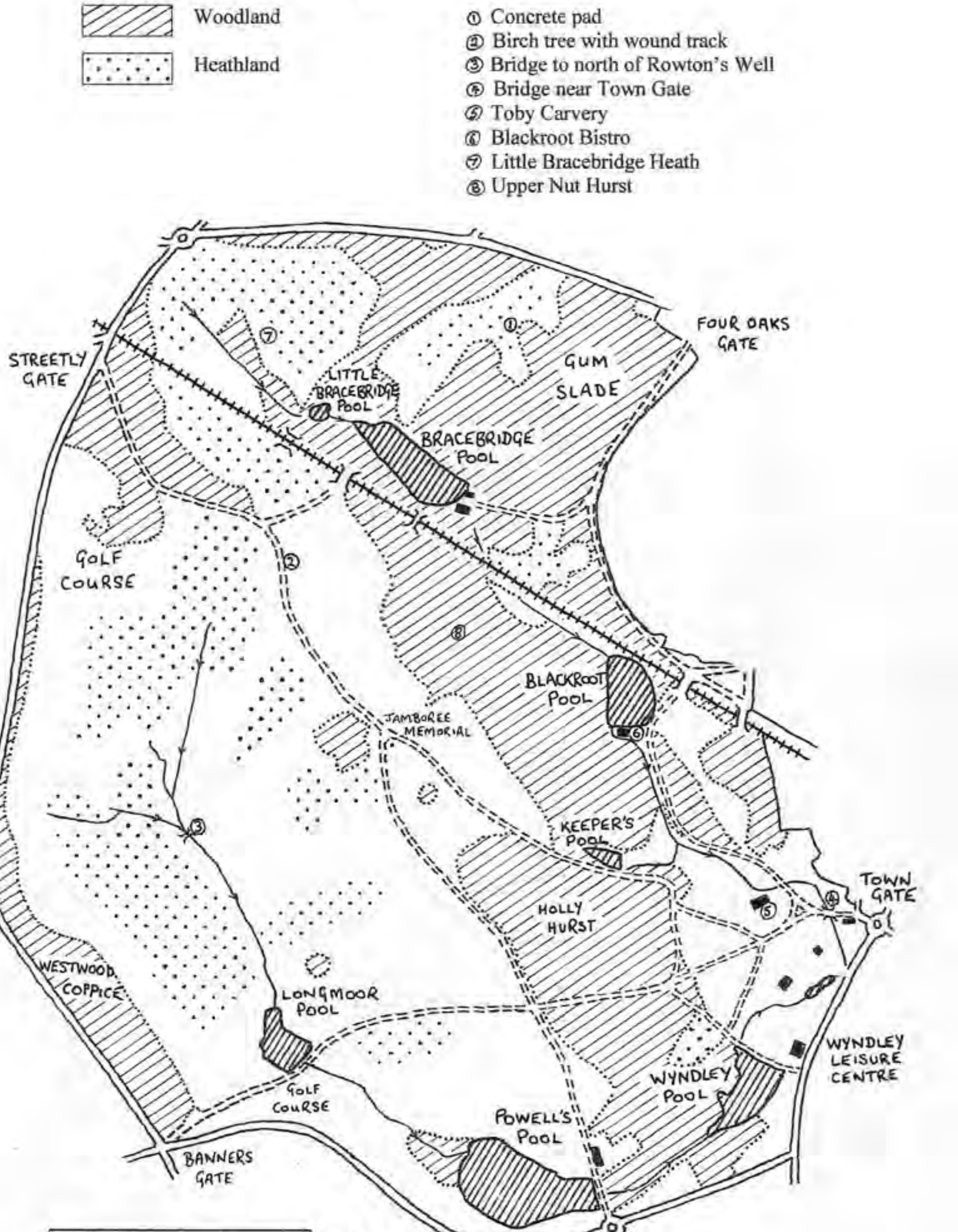
e) parapets of bridges over streams

A small stream flows beneath the internal park road approximately 100 metres west of Town Gate. The sandstone slabs of the bridge parapets here, locality (4) on the map, have an interesting community. *Caloplaca chlorina* was found nowhere else in the Park. The southern parapet is much richer than the northern one, which is shaded by branches of *Alnus*. To the north of Rowton's Well, locality (3) on the map, there is a bridge with parapets of mortared engineering bricks on which *Acarospora rufescens* grows. Both bridges support *Buellia badia*.

f) concrete pads

Scattered in the Park are occasional small disused concrete pads which may formerly have formed the bases for huts. An example was studied at the western edge of The Gum Slade, locality (1) on the map, where sixteen species were identified including *Aspicilia contorta* subsp. *contorta*, *A. contorta* subsp. *hoffmaniana*, *Clauzadea monticola*, *Lecanora semipallida* and *Sarcogyne regularis*.

MAP OF SUTTON PARK



Lichen taxa recorded in Sutton Park, 2008 to 2010

The statement of abundance for each species reflects how often it was found in the Park, it gives no indication of the status in a regional or national context. Previous confirmed records in Coxhead & Fowkes (1992) are cited: (r) = recorded plus earliest, often the only, recorded date.

Acarospora rufescens. Rare. Brick parapet of bridge north of Rowton's Well.

Amandinea punctata. Frequent. On twigs and young bark of *Quercus* and others, occasionally on the smooth older bark of mature tree trunks. Also on weathered sawn wood of posts and benches close to Town gate.

Arthonia lapidicola. Rare. On iron-stained concrete blocks of baseball court at youth facility, east of Wyndley Leisure Centre.

Arthonia punctiformis. Rare. On *Crataegus* twigs north of Longmoor Pool.

A. radiata. Rare. Corticolous, on *Quercus* twigs south of Streetly Gate.

Arthopyrenia punctiformis. Rare. On *Crataegus* twigs north of Longmoor Pool.

Aspicilia contorta subsp. *contorta*. Rare. On concrete dam at east end of Keeper's Pool and brick wall at east end of Wyndley Pool.

A. contorta subsp. *hoffmaniana*. Rare. On concrete dam at east end of Keeper's Pool.

Bacidia adastra. Rare. At base of *Betula* near the Toby Carvery.

B. inundata. Rare. On shaded rock at overflow structure at east end of Powell's Pool.

B. saxenii. Rare. On treated fence posts, north-west corner of The Gum Slade. Distinguished microscopically by the remarkable exciple structure with large vesicle-like cells.

B. sulphurella. Rare. On shaded *Quercus* trunk south-east of Streetly Gate. Pycnidia always present, the conidia always with one end strongly hooked (like a walking stick).

Baeomyces rufus. Rare. On sparsely vegetated soil beside a path to the west of Keeper's Pool and on wooden shingle roof at Streetly Gate.

Belonia nidarosiensis. Rare. On shaded limestone of overflow structure at east end of Powell's Pool.

Bilimbia sabuletorum. Rare. Mosses on mortar of wall by Four Oaks entrance and east end of Powell's Pool.

Buellia aethalea. Rare. On brick wall at east end of Powell's Pool and sandstone coping stones of parapets of bridges over railway.

B. badia. Rare. On horizontal sandstone coping-stones of small bridge parapet approximately 100 metres west of Town Gate.

B. griseovirens. Occasional. On smooth bark of *Acer*, on old bark of mature *Quercus* and on wooden notice board, Bracebridge.

Caloplaca arcis. Rare. Saxicolous. On concrete beside Bracebridge Pool and on brick wall at east end of Wyndley Pool.

C. cerinella. Occasional. On *Sambucus* twigs. Asci 12- to 16-spored.

C. cerinelloides. Rare. On mature trunk of ?*Populus* to south of Wyndley Leisure Centre. Asci 8-spored. May be confused with small yellow forms of *C. holocarpa* growing on bark. The best way to separate them is by the hypothecium which is 10 to 45 µm thick in *cerinelloides* and normally 50 to 80 µm thick in *holocarpa*.

C. citrina. Occasional. On mortar, and in one instance on *Betula* trunk in wound track. (r) 1904

C. chlorina. Rare. On sandstone coping-stone of bridge parapet approximately 100 metres west of Town Gate.

C. crenulatella. Occasional. Saxicolous. On concrete beside Longmoor and Keeper's Pools and on brick wall beside Wyndley Pool.

C. flavocitrina. Occasional. Usually on brickwork including mortar, also on large limestone rocks at overflow of Powell's Pool.

C. holocarpa. Occasional. Saxicolous. On concrete beside Keeper's Pool and on brick wall beside Wyndley Pool.

C. obscurella. Rare. On damp branch, and mature *Salix* trunk, south of Wyndley Leisure Centre.

Candelaria concolor. Rare, On *Acer pseudoplatanus* trunk near Blackroot Bistro.

Candelariella aurella. Occasional. On mortar. (r) 1990

C. reflexa. Abundant. Corticolous. On nutrient-enriched twigs, branches and tree bases.

C. vitellina. Occasional. On sandstone blocks in walls, and in one instance on *Betula* trunk in a wound track. (r) 1986

Catillaria chalybeia. Rare. On sandstone blocks in walls, and in one instance on *Betula* trunk in a wound track.

Chaenotheca ferruginea. Occasional. On dry shaded bark of mature trunks, mainly *Quercus* in old woodland.

Chrysothrix flavovirens. Rare. On mature *Quercus* trunks near Bracebridge Pool.

Cladonia chlorophaea s.lat. Occasional. Rotting stumps, mature bark and sandy soil. (r) 1903

C. coniocraea. Rare. Rotting stumps and on shaded wall to south of Keeper's Pool. Material from the Gum Slade has squamules that bear granular soredia on their margins and which could be easily confused with *C. parasitica*. (r) 1971

C. diversa. Rare. Terricolous, Little Bracebridge Heath. (r) 1971 as *C. coccifera* s.lat.

C. fimbriata. Rare. Terricolous, Little Bracebridge Heath. (r) 1990

C. floerkeana. Rare. Shingle roof, Streetly Gate entrance, and heathland south-east of Bracebridge Pool. (r) 1971

C. furcata. Occasional. Heathland south-east of Bracebridge Pool.

C. glauca. Rare. Shingle roof, Four Oaks entrance. Medulla is UV+ vivid white (squamatic acid).

C. humilis. Rare. Terricolous and base of mature *Quercus* outside Streetly Gate.

C. macilenta. Rare. Rotting stump, terricolous, Little Bracebridge Heath, and shingle roof, Town Gate entrance. (r) 1986

C. ochrochlora. Rare. On humus-rich soil of bank at north-east end of Blackroot railway bridge.

C. parasitica. Rare. On lignum of dead *Quercus* trunk in The Gum Slade.

C. polydactyla. Rare. Base of *Betula* trunk and on rotting wood at edge of Bracebridge Pool.

Clauzadea monticola. Rare. On mortar of wall beside Keeper's Pool.
Cliostomum griffithii. Rare. Young *Quercus*, Little Bracebridge Heath.
Collema tenax. Rare. On basic sandy soil of old gravel pits east of Keeper's Pool.
Cyrtidula quercus. Occasional. Smooth bark of *Quercus* twigs.
Dimerella pineti. Frequent. On shaded bark, especially bases of *Quercus* trunks.
Evernia prunastri. Occasional. Corticolous.
Fellhanera bouteillei. Rare. On *Ilex* leaves near Bracebridge Pool.
F. viridisorediata. Occasional. Most occurrences were near the base of *Betula* trunks, these trunks were probably visited by urinating dogs. Confirmed by thin layer chromatography (roccellic acid).
Flavoparmelia caperata. Occasional. Corticolous. Medulla K-.
F. soredians. Rare. Corticolous. On *Quercus* branch south-east of Streetly Gate. Medulla K+ yellow turning red.
Fuscidea lightfootii. Occasional. Corticolous, often in boggy areas, most common on *Salix*.
Hypocenomyce scalaris. Rare. On bark of ancient *Quercus* trunk west of Town Gate, also on wood near Four Oaks gate where it was recorded by James in 1977. (r) 1904
Hypogymnia physodes. Frequent. Corticolous. (r) 1885
H. tubulosa. Frequent. Corticolous.
Hypotrachyna revoluta. Occasional. Corticolous.
Jamesiella anastomosans. Frequent. Corticolous and on rotting lignum of tree stump.
Lecania cyrtella. Occasional. On *Sambucus* twigs.
L. erysibe. Rare. Saxicolous. On brick walls, Toby Carvery.
L. naegelii. Rare. On shaded *Sambucus* bark west of Longmoor Pool.
Lecanora albescens. Occasional. On mortar.
L. campestris. Occasional. On concrete.
L. carpinea, Rare. On *Fraxinus*, just north of Powell's Pool and north west of Upper Nut Hurst.
L. chlarotera. Occasional. Corticolous.
L. compallens. Rare. On *Acer* near Toby Carvery.
L. confusa. Rare. On young *Castanea sativa* trunk, north of Wyndley Pool.
L. conizaeoides. Rare. *Betula* bark and sawn cladding of outbuilding north of Powell's Pool. (r) 1885
L. dispersa. Occasional. Saxicolous (mainly concrete) and a feature of highly eutrophicated tree bases visited by dogs. (r) 1904
L. expallens. Occasional. Corticolous.
L. farinaria. Rare. On weathered plank of wooden roof near Town Gate. Confirmed by thin layer chromatography (roccellic acid).
L. jamesii. Rare. At base of isolated *Quercus* near Four Oaks gate.
L. muralis. Occasional. On concrete and walls, often much damaged by browsing molluscs. (r) 1971
L. hagenii. Occasional. On *Sambucus* and *Salix* twigs.
L. polytropa. Rare. On sandstone of wall beside Keeper's Pool and parapet of bridge over railway. Also on wooden seating near Town Gate.

L. pulicaris. Rare. On *Quercus* twig south-east of Bracebridge Pool. Thallus Pd+ orange red.

L. semipallida. Rare. On concrete structures including wall along south-east side of Longmoor Pool. Apothecial margin UV+ yellow-orange (vinetorin).

L. symmicta. Occasional. On twigs, especially *Quercus*. Also on wooden seating.

L. varia. Rare. On weathered wooden fence near Town Gate.

Lecidea fuscoatra. Rare. On siliceous material within concrete structure near Little Bracebridge Pool.

L. grisella. Rare. On brick wall at east end of Powell's Pool and beside Wyndley Pool.

Lecidella elaeochroma. Occasional. Corticolous.

L. scabra. Occasional. On sandstone of mortared walls.

L. stigmatea. Occasional. Calcareous and base-enriched rocks, cement and concrete. (r) 1990

Lepraria incana. Frequent. On shaded bark in both ancient and secondary woodland. (r) 1971

L. lobificans. Occasional. On shaded bark south of Streetly Gate.

L. vouauxii. Rare. Mortar courses of low walls at north-east corner of Powell's Pool.

Leptogium schraderi. Rare. In mortar course of wall at south side of Keeper's Pool.

Melanelixia fuliginosa subsp. *glabratula*. Rare. Corticolous, east of Bracebridge Pool. (r) 1988

M. subaurifera. Frequent. Corticolous.

Melanohalea elegantula. Rare. On *Quercus* east of Westwood Coppice.

M. exasperata. Rare. On *Quercus* twig south of Streetly Gate and fertile on *Quercus* near the Donkey Sanctuary north of the Toby Carvery.

M. exasperatula. Rare. On *Quercus*, south of Streetly Gate and east of Westwood Coppice.

Micarea denigrata. Rare. On sawn cladding of outbuilding north of Powell's Pool.

M. lignaria var. *lignaria*. Rare. On shingle roof at Streetly Gate.

M. micrococca. Rare. On *Ilex* stems north of Wyndley Pool.

Parmelia saxatilis. Rare. Corticolous, often poorly developed.

P. sulcata. Frequent. Corticolous. (r) 1904

Parmotrema perlatum. Occasional. Corticolous.

Peltigera hymenina. Rare. Terricolous, on sandy bank south-east of Bracebridge Pool and well-developed on fallen rotting trunk south of Little Bracebridge Pool.

Phaeophyscia nigricans. Rare. On plastic roof tiles of small building at south east corner of Westwood Coppice.

P. orbicularis. Frequent. Corticolous and saxicolous.

Phlyctis argena. Rare. Corticolous, near the Toby Carvery.

Physcia adscendens. Abundant. Corticolous.

P. aipolia. Occasional. Corticolous.

P. caesia. Rare. On concrete slab west of The Gum Slade and on tarmac north of Wyndley Pool.

P. stellaris. Rare. Corticolous, on *Quercus* twig south-east of Blackroot Pool.

P. tenella. Abundant. Corticolous.

Physconia enteroxantha. Rare. Mature *Salix* trunk near Wyndley Leisure Centre.

Placynthiella dasaea. Rare. On upturned root plate of wind-blown tree south-east of Bracebridge Pool.

P. icmalea. Rare. Terricolous (Little Bracebridge Heath), wooden shingles and on wooden seating. (r) 1990

P. uliginosa. Rare. Terricolous (Little Bracebridge Heath) and on wooden seating. (r) 1902

Platismatia glauca. Rare. On *Quercus* branch south of Streetly Gate. (r) 1906

Porina aenea. Rare. On peeling bark at base of *Acer pseudoplatanus* trunk near Keeper's Pool.

P. chlorotica. Rare. On pebble beside parking area south-east of Streetly Gate.

Porpidia soredizodes. Rare. On sandstone coping stones of railway bridge parapet, also brick wall beside Wyndley Pool.

P. tuberculosa. Rare. On sandstone coping stones of railway bridge parapet.

Protoblastenia rupestris. Rare. On concrete pavers of culvert close to Wyndley Leisure Centre.

Pseudevernia furfuracea. Rare. On a single *Crataegus* at SP098970. (r) 1887

Psilolechia clavulifera. Rare. On peaty soil and dead rootlets of upturned root plate of wind-blown tree south-west of Bracebridge Pool.

P. lucida. Rare. On wall near the Toby Carvery.

Punctelia jeckeri. Occasional. Corticolous.

P. subrudecta. Occasional. Corticolous.

Ramalina farinacea. Occasional. Corticolous.

R. fastigiata. Rare. *Quercus* twig south of Streetly Gate.

Rhizocarpon petraeum. Rare. On sandstone in mortared wall beside Keeper's Pool.

R. reductum. Rare. On brick wall on north side of Wyndley Pool.

Rinodina oleae. Rare. On brick wall beside Wyndley Pool and on *Betula* bark in wound track. (r, as *gennarii*) 1990

R. sophodes. Rare. Found twice on *Quercus* twigs, south of Streetly Gate and east edge of Westwood Coppice.

Sarcogyne regularis. Rare. On concrete slab west of The Gum Slade and on mortar.

Scoliciosporum chlorococcum. Occasional. On twigs.

S. sarothamni. Rare. On *Quercus* twigs near the Toby Carvery.

Stereocaulon nanodes. Rare. On the parapets of two bridges over the railway, on mortar and sandstone.

Trapelia coarctata. Rare. On sandstone, including a pebble lying in heathland south east of Bracebridge Pool.

T. placodioides. Rare. On sandstone of wall beside Keepers Pool and on tarmac north of Wyndley Pool.

Trapeliopsis flexuosa. Rare. On weathered, fallen *Quercus* branch, on *Betula* bark and on wooden roof shingles. (r) 1988

T. granulosa. Rare. On lignum of large dead *Quercus* trunk in The Gum Slade. (r) 1889

Usnea cornuta. Rare. On *Quercus* branches south-east of Streetly Gate.

U. flammea. Rare. On branch of *Quercus* near Four Oaks Gate.

U. flavocardia. Rare. On dead lower branch of a mature *Quercus* north of Wyndley Pool. Medulla pale yellow. Confirmed by thin-layer chromatography (psoromic acid).
U. subfloridana. Rare. On *Quercus* branches south-east of Streetly Gate.
Verrucaria baldensis. Rare. On large limestone rocks at overflow of Powell's Pool.
V. hochstetteri. Rare. Mortar of buildings near the Toby Carvery.
V. macrostoma. Rare. Mortar of buildings near the Toby Carvery.
V. muralis. Rare. Mortar of buildings near the Toby Carvery.
V. nigrescens. Rare. Mortar of buildings near the Toby Carvery.
V. viridula. Rare. Mortar of buildings near the Toby Carvery. (r) 1971
Xanthoria calcicola. Rare. On wall at east end of Wyndley Pool.
Xanthoria elegans. Rare. Brick wall beside Wyndley Pool and on concrete wall beside Longmoor Pool.
X. parietina. Frequent. On enriched bark and man-made structures. (r) 1891
X. polycarpa. Occasional. Corticolous, locally frequent on twigs.
X. ucrainica. Occasional. Corticolous.

Discussion

The recent survey of all habitats within Sutton Park has produced a list of 156 lichen taxa, 55 of which are entirely or predominantly saxicolous on man-made substrates. The paucity of the lichen communities in 1977 is hinted at by James' survey (27 species) which was restricted to woodland and heathland in a small area of the Park. There has undoubtedly been a dramatic increase in lichen diversity in the wake of declining sulphur dioxide levels and the increased influence of nutrient levels, but other factors must also be considered. The recent survey has explored many of the man-made saxicolous habitats; these were not studied by James in 1977. Another factor that must be taken into account is the increased knowledge of lichen taxonomy since the 1970s. At that time species such as *Bacidia adastra* and *Chrysothrix flavovirens* were undescribed and would not have been listed even if they had been present. *Caloplaca flavocitrina* has been separated from *Caloplaca citrina* sens. str., leading to the possibility now of two records that would formerly have been recorded as the single un-split *Caloplaca citrina.* A better analysis of the colonisation is obtained by separating out the corticolous species for consideration. Saxicolous species are more complex in their response to declining sulphur dioxide levels. Calcareous substrates are alkaline in nature and served to buffer the habitat when sulphur dioxide was at greater concentrations. The change in the lichens of calcareous substrates thus tends to be less dramatic than that for bark. This phenomenon was demonstrated when the lichens of Wicken Fen were surveyed in detail in 2008 and compared to a similar survey from 1972. There the corticolous lichen species had increased dramatically while the lichens on a particular concrete post were almost identical (Powell, 2010).

When we consider the corticolous lichens, the recent decades have seen a dramatic increase in the number of species and in their abundance in the Park. One lichen that contradicts this trend and which has declined considerably is *Lecanora conizaeoides.* This species was tolerant of sulphur dioxide pollution and benefited from the lack of competition from other species when sulphur dioxide levels were higher. The behaviour of this species in Sutton Park is similar to that observed at Wicken Fen where Laundon (1973) described *L. conizaeoides* as "abundant, the most common epiphyte, occurs also on wooden posts". The detailed survey of Wicken in 2008 failed to find *L. conizaeoides* as an epiphyte, it survives only on sawn wood habitats (Powell, 2010). *L. conizaeoides* can still be found growing on bark in Sutton Park but it is rather uncommon and most frequent on old *Betula*.. The gradual retreat in distribution of this lichen from widespread bark coverage to sawn wood is well demonstrated in Sutton Park, the largest colony by far was found on the wooden cladding of a building north of Powell's Pool.

The corticolous lichen communities of the Park have not fully recovered from past industrial pollution and the re-colonisation is not a simple reverse of the order in which lichens are lost with increasing sulphur dioxide. Nationally the distribution of some species has changed spectacularly in the past couple of decades. The distribution of *Flavoparmelia soredians* was, until recently, concentrated near the south coast while *Physcia stellaris* was found mainly in the north and west of England. Both have spread across the Midlands and have recently been found in Sutton Park. By contrast many species of *Pertusaria* appear to be poor re-colonisers and no species of this genus have been recorded in Sutton Park. Similar observations were made by James and Davies (2003) for Epping Forest where, importantly, a considerable number of lichen records, supported by relevant herbarium specimens, go back to the eighteenth century. At Burnham Beeches, Purvis *et al*. (2010) document the decline of acidophyte lichens and rapid increase in total lichen species between 1988 and 2008. In contrast to Sutton Park and Epping Forest, Burnham Beeches retained several ancient woodland indicator species throughout the period of high concentrations of sulphur dioxide pollution. Birds may be an influential factor in increasing the spread of many species in trees; studies by James at Slimbridge in 1982 showed that lichen propagules occurred on the feet of almost all songbirds temporarily caught there for a ringing project. Wind and rain-water run off, mites and possibly mollusca, are further agents assisting in the dispersal of lichen propagules. The larvae and pupae of psocid mites are often coated in lichen propagules which they use for protection and food. The dispersal of lichen propagules is an important area of research which is in need of critical study. Now that the levels of sulphur dioxide have dropped considerably, the influence of other atmospheric factors are becoming apparent, though the effects are complicated and still incompletely understood. Nitrogen compounds are significant; ammonia has alkaline properties and can raise bark pH while nitrogen oxides increase acidity. Both increase the nitrogen available as a nutrient. Some lichens such as *Candelariella reflexa* thrive in highly eutrophicated environments; it is sometimes a feature of the "canine zone" at the base of tree trunks frequented by urinating dogs. This lichen is now widespread and rather frequent in Sutton Park. It is likely that the amount of nitrogenous nutrient input has not greatly increased in recent decades; rather that this fertilising effect was negated when high sulphur dioxide levels caused acid conditions. Global warming has been postulated as a further factor that may be influencing the distribution of lichens. It has been suggested that *Candelaria concolor*, a member of a largely subtropical genus, may be spreading in part due to a warmer climate. It has recently been found on a sycamore trunk near the Blackroot Bistro.

The bark of trees and shrubs provides the most extensive substrate for lichens in the Park, but much of it is inaccessible. The canopies of mature trees remain largely unexplored and we can only speculate whether there are extra species awaiting discovery there; the few dislodged canopy branches that were studied added little to the basic corticolous list. The increased number of corticolous species has caused a corresponding increase in the problems of identification. This is especially true of sorediate crusts. In the 1970s the only corticolous sorediate species in the Park was *Lecanora conizaeoides* which was often fertile and readily recognised. Even poorly developed material of this species could be easily confirmed by its Pd+ rust-red reaction. The new corticolous communities involve various sterile sorediate species such as *Bacidia adastra* and *Fellhanera viridisorediata* which give no positive reactions to the common reagents. Specimens of these species have been collected as it is important to preserve voucher specimens so that records can be verified in the future.

Some recorders in the Midlands have assumed that only the most common members of various genera are likely to occur in the area. An example is the genus *Usnea* in which *U. subfloridana* is by far the most commonly recorded species in the region. It would be inappropriate however to assume that this is the only member of the genus that is likely to be encountered. *U. subfloridana* <u>is</u> the most frequently found species in Sutton Park, but *U. cornuta* has also been seen several times and *U. flammea* has recently been recorded. A more remarkable discovery was that of *U. flavocardia* on a dead lower branch of a mature oak tree to the north of Wyndley Pool. This is considered a rare species and previous British records have been restricted to south-west England (Cornwall), Wales (Pembroke) and western Scotland.

The man-made structures of Sutton Park add considerably to the diversity of lichens present. Of special note are the mortared sandstone wall along the west side of Keeper's Pool, a concrete structure near Little Bracebridge, the parapets of the railway bridges and of a small bridge approximately 100m west of Town Gate.

The present paucity of the heathland lichens has been described; the extensive areas of mature heather tantalise from a distance but generally disappoint the lichenologist on closer inspection. The structure of the heathland appears to have changed since the 1970s and has become much poorer for heathland lichens. The remaining heather is mainly even-aged and over-mature. In the past, sporadic burning would have created patches where the soil was periodically exposed. Even in areas previously burnt conditions now appear to be generally unsuitable for lichens. The availability of exposed soil appears to now be further restricted by the increasing abundance of vascular vegetation, particularly grasses, and in some cases bracken (*Pteridium aquilinum*) in between the heather plants. Purple Moor-grass (*Molinia caerulea*), a notable plant in Warwickshire (Falk, 2009), is becoming dominant in some areas to the detriment of both *Calluna* and associated heathland lichens. This change in vegetation may have been caused, in part, by the fertilising effects of anthropogenic nitrogen pollution. The terricolous lichens of heathland are untypical of lichens in general in that they were not significantly damaged by former higher levels of atmospheric sulphur dioxide, indeed many of the species of *Cladonia* involved may have benefited from the more acid conditions resulting from industrial pollution. It is interesting to note that the most spectacular heathland-type communities are now to be observed with the aid of a ladder, on the rotting conifer wood shingle roofs of two small kiosks at the Streetly Gate and Four Oaks entrances to the Park.

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The Rt. Rev. James Hannington, D.D., F.L.S., F.R.G.S., collector, missionary and martyr 1847-1885

While compiling a list of tropical *Pertusaria* species, two species from tropical East Africa were noted in a paper by Müller (Müller 1890). In this paper Müller listed a total of 39 taxa with 11 new taxa (listed below, with the current names in brackets) including two new *Pertusaria* species. All had been collected by the Rev. J. Hannington. Further investigation revealed that Hannington, in the course of his missionary work in East Africa, had collected and sent to Kew a total of 236 botanical specimens (Anon. 1901).

New lichen species collected by J. Hannington and described by Müller

Arthopyrenia planipes Müll. Arg. [*Verrucaria planipes* (Müll. Arg.) Stizenb.]
Buellia cinereocincta Müll. Arg. [*Baculifera cinereocincta* (Müll. Arg.) Marbach]
Chiodecton minutulum Müll. Arg.
Lecanora fuscula Müll. Arg.
Lecanora fuscula var. *pruinosa* Müll. Arg. [*Maronea fuscula* (Müll. Arg.) J. Steiner]
Lecidea carneorufa Müll. Arg.
Lecanora flavidonigrans Müll. Arg.
Parmelia hanningtoniana Müll. Arg. [*Parmotrema hanningtonianum* (Müll. Arg.) Hale]
Parmelia hildebrandtii Kremp. f. *nuda* Müll. Arg.
Pertusaria subareolata Müll. Arg.
Pertusaria xanthothelia Müll. Arg.


BISHOP HANNINGTON

James Hannington was born in Hurstpierpoint, a few miles north of Hove, on Sept. 3rd. 1847 and as a young boy he developed an interest in botany and entomology. In 1868 he entered St. Mary's Hall, Oxford and was ordained on March 1st 1874. After serving as curate-in-charge at St. Georges, Hurstpierpoint, he left England for Uganda in 1882 but as a result of serious illness he returned to England in 1883. By April 1884 he was well enough to return to Africa and on June 24th. he was consecrated Bishop of Eastern Equatorial Africa and returned to Uganda.

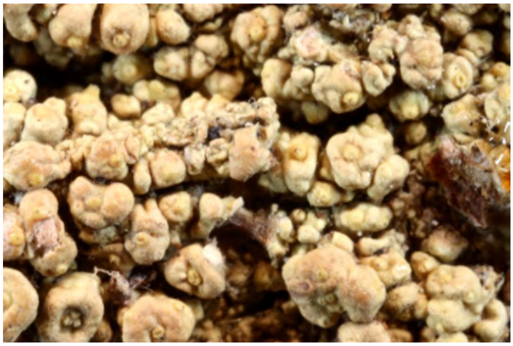
In addition to lichens, Hannington collected mosses, grasses, orchids and other flowering plants (among which are 22 type specimens) and the intriguingly named *Tinnea antiascorbica*. He also collected a new species of butterfly, Hannington's Fritillary [*Issoria hanningtoni* Elwes] which he mentioned in his diary:

We had not gone far when we came to a beautiful flowering shrub, covered in insects, and here I should have remained for the rest of the morning, had I not been disturbed by an excited summons from the others to come in pursuit of a rhinoceros that they had just sighted. "Well," I replied, rhino or no rhino, I have just sighted a new species of butterfly, and I cannot leave this spot until I have secured it"

His last expedition was into Masai territory. On October 12th. Hannington left the main party with 50 picked men to visit other missionaries in Uganda but on October 21st. his party was ambushed and, after being held captive for a week, he was speared to death on October 31st. One of the Ugandans kept Hannington's journal and sold it to a later expedition.

The year 2010 sees the 125th anniversary of the untimely death of James Hannington and serves to remind us of the difficulties and dangers faced by some early collectors. The portrait on the previous page is taken from *James Hannington: Bishop and Martyr*" by Charles D. Michael. London, ?1910, page 57.

Pertusaria subareolata, holotype



Pertusaria xanthothelia, holotype

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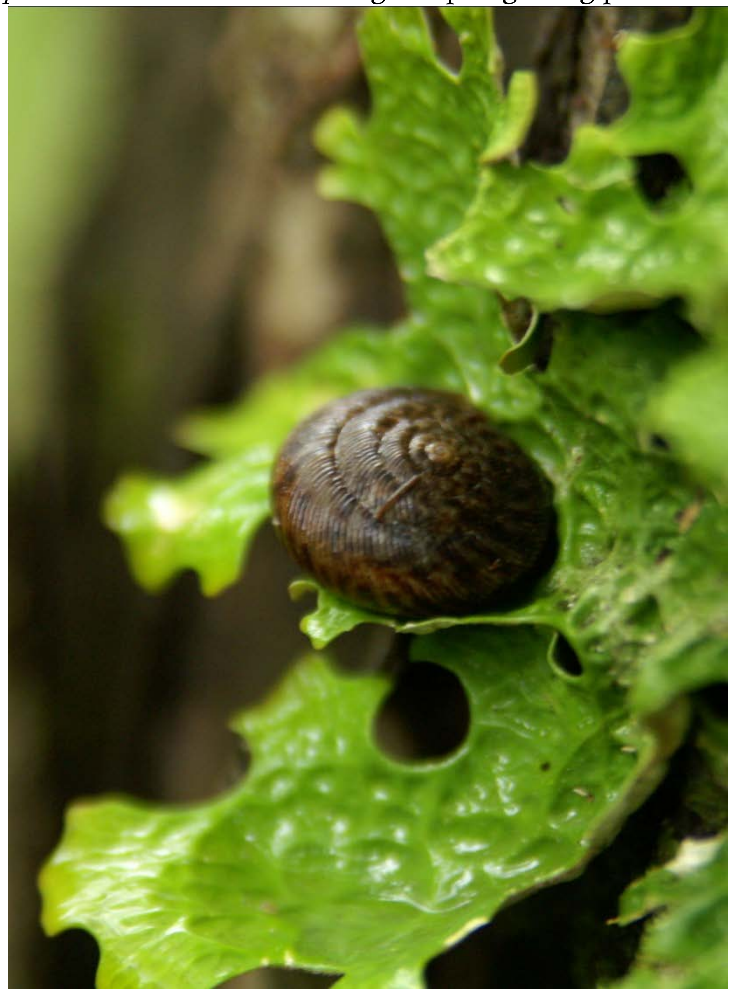
IMC9 Contributions supported by BLS travel grants

A number of the lichenological contributions to the ninth International Mycological Congress held in Edinburgh, August 1st to 6th 2010, were supported by BLS travel grants. With our thanks for your support, here is an overview of some of our contributions to the conference which we hope you find interesting!

Lichenivorous gastropods affect old-growth forest lichens

Herbivory is considered a significant factor regulating plant communities. Reindeer substantially influence lichen-dominated communities. However, the impact of invertebrate grazers on lichens is unknown. Lichens synthesize a large variety of secondary compounds with various biological roles. One of these roles is defence against predators, as has been shown in field and laboratory experiments. In general, chemical defence varies between different tissues in a lichen thallus. For example, in the tripartite *Nephroma arcticum* gastropods readily consume the compound-deficient cephalodia and avoid the green algal tissues. In *Lobaria scrobiculata*, gastropods avoid the well-defended soralia compared to less defended non-reproductive tissues. The latter finding is consistent with the optimal defence theory that predicts allocation of defence compounds in proportion to risk of a specific plant part to be attacked and its value to plant fitness.

In the old-forest lichen *Lobaria pulmonaria*, the chemical defence increases with thallus age. Consequently, lichenivorous gastropods readily feed on juvenile thalli and thus limit the early development of this lichen. Furthermore, species composition and biomass of epiphytic lichens varies vertically in forest canopies. Four old-forest *Lobaria* species were transplanted at various heights on *Fraxinus excelsior*. The grazing pressure from gastropods increased with increasing proximity to the ground. Gastropods preferred *L. scrobiculata* followed by *L. amplissima*, *L. pulmonaria* and *L. virens.* The gastropod grazing preferences mirror the distribution of the lichens in nature. The highly palatable *L. scrobiculata* occurs mainly in localities with low gastropod abundance. *Lobaria amplissima* occurs in gastropod-rich localities, above the lower parts of the trunk. The other two species frequently grow down to a level of < 1m above the ground. Hence, climbing gastropods play a role in determining the lower distribution limit of epiphytic lichens along a vertical canopy gradient and influence the spatial pattern of threatened lichen species.



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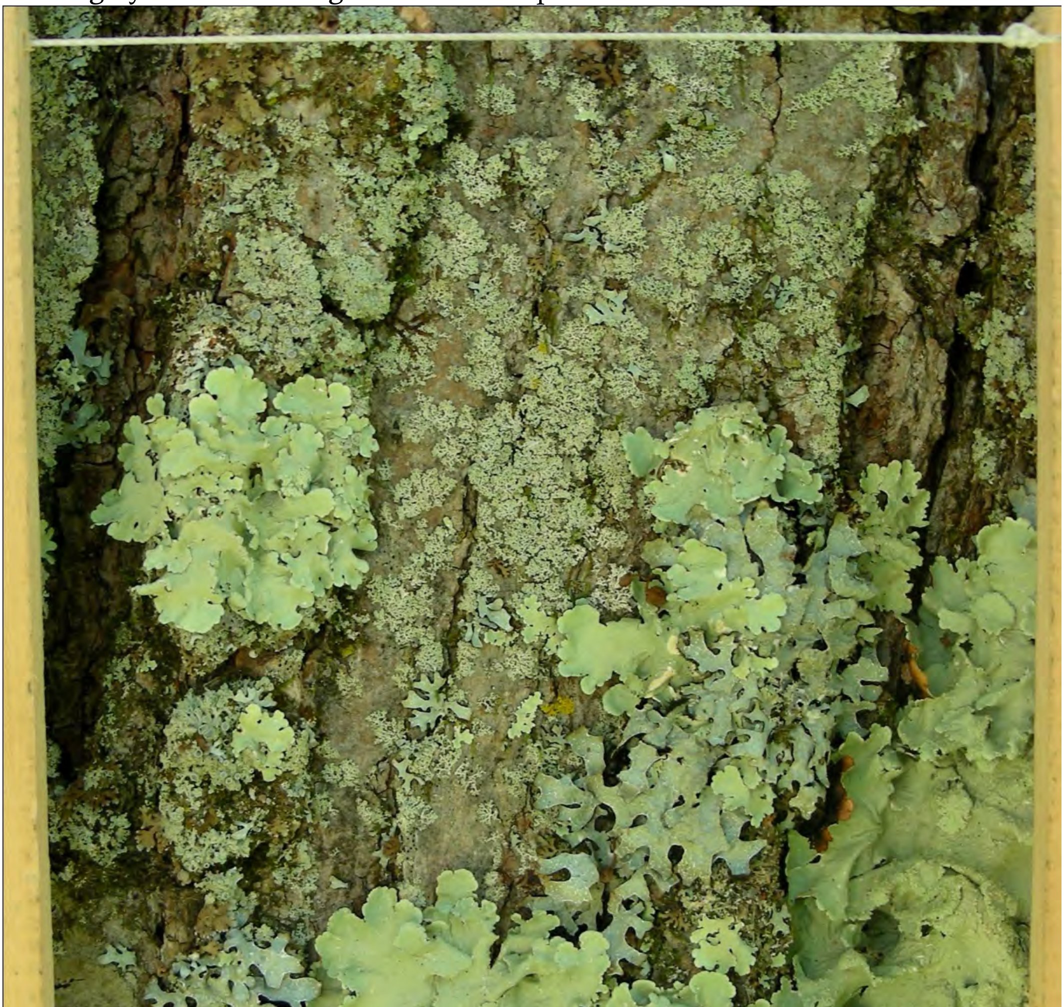
Independent effects of green space and traffic volume on urban epiphytic lichen diversity

Our research is attempting to disentangle three drivers of urban lichen diversity in Ottawa, Canada: air pollution, moisture, and colonization pressure. Using 64 sites across the city different local and landscape scale predictors are being used to understand the response of both lichen diversity and lichen cover. While analysis is still in progress, initial results suggest that:

- So far, the response to air pollution is unclear. There is no response to local bus traffic, but as the road density increases within 7km of sites, there is a decrease in lichen diversity.
- There may be a response to moisture. Urban effects on moisture levels have been roughly estimated using the cover of impervious surfaces – all areas where water



A particularly diverse microquadrat (10 x 10 cm) on the edge of the city

cannot penetrate the soil including roads, buildings, sidewalks, driveways, parking lots, etc. While there is a decrease in lichen diversity with increasing impervious surface area within 75m of sampling sites, this is correlated with road density at 7km.
- There is no response of lichen diversity to treed area, suggesting colonization pressure may not play an important role in an urban context.

Further fieldwork will involve trying to disentangle the mechanisms of moisture and air pollution. The vapour potential at sites (calculated from relative humidity and temperature) will be used to determine whether the response to impervious surfaces is indeed through moisture. A model of traffic levels, based on average annual daily traffic, will be used as a better predictor for air pollution. Hopefully, the last of our analysis and an extra set of field sites will help eliminate the correlations between predictors of air pollution and moisture, and let us answer our question:

How do air pollution, moisture, and colonization pressure affect lichen cover and diversity within urban Ottawa, Canada?

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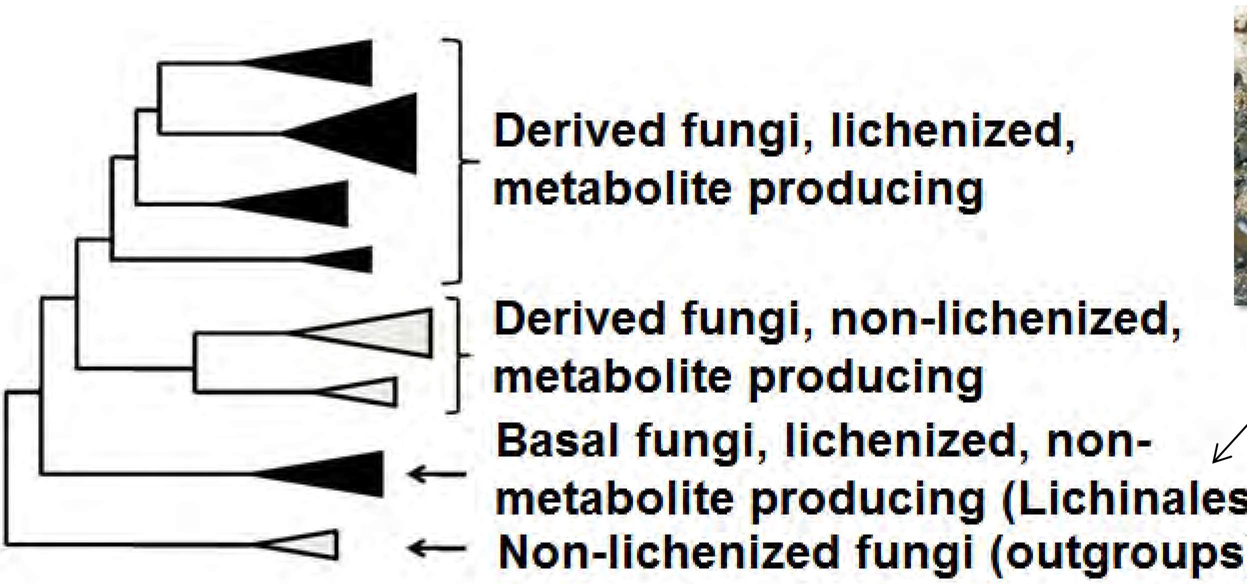
Diversity of biosynthetic genes in lichen-forming fungi

The majority of lichen-forming fungi synthesize an array of secondary metabolites. Some taxonomic groups, however, are very poor producers, or do not synthesize any typical lichen compounds at all. One such group is the order *Lichinales*. The *Lichinales* are phylogenetically not closely related to the *Lecanoromycetes*, the ascomycete class that contains the bulk of lichen-forming fungi. To gain insights into the evolution of lichen compounds we generated sequences of biosynthetic genes of members of the *Lichinales* (non-producers) and compared them to those of members of the *Lecanoromycetes* (producers) in a phylogenetic framework. Since many lichen



analyzed members of the polyketide synthase (PKS) gene family. To date, the specific genes involved in the production of lichen compounds have not been characterized. We find PKS genes in lichen-forming fungi that do not produce any typical lichen compounds.
specific genes involved in the production of lichen compounds have not been characterized. We find PKS genes in lichen-forming fungi that do not produce any typical lichen compounds. We found:

- PKS genes currently found in lichen and non-lichenized fungi do not correlate strongly to chemistry observed in lichen samples.
- *Lichinales* have PKS genes but do not make typical lichen compounds, perhaps they do not express these genes, or these gene products do not make typical lichen compounds.
- In a group of over 465 sequences we found one group of PKS genes observed only in lichenized fungi, perhaps these PKS gene products are important for lichen symbiosis.

Why do Lichinales have PKS genes if they don't use them?

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Lichen photobiont diversity patterns in three boreal *Nephroma* species

We were interested in the lichen photobiont diversity patterns in three epiphytic *Nephroma* species in a 900-ha boreal forest landscape. Our study species, *Nephroma bellum*, *Nephroma resupinatum*, and *Nephroma parile*, have *Nostoc* as their only photobiotic partner. Previous studies have shown that *Nephroma* species are associated with closely related or sequence identical *Nostoc* genotypes (e.g. Lohtander *et al.*, 2003), which has lead to the suggestion that symbiotically dispersing species may facilitate the establishment of other lichens by distributing commonly used photobionts in symbiotic diaspores (e.g. Rikkinen *et al.*, 2002). We were hence interested if there was a link between lichen species identity, reproductive strategy, and photobiont choice on the scale of a landscape and on individual trees.

Nephroma species in the old-growth forest landscape in Finland

Using cyanobacterial tRNALeu (UAA) intron sequences we found five different *Nostoc* genotypes from over 200 specimens. Two genotypes were shared by *N. bellum* and *N. resupinatum*, while *N. parile* associated with two different genotypes. One genotype was only found from specimens of *N. resupinatum*. On individual tree trunks distinct species housed only a single photobiont strain, with the exception of *N. resupinatum*. Our results indicate that reproductive strategy determines photobiont choice: species which mainly disperse with fungal diaspores and therefore need to lichenize after dispersal (*N. bellum* and *N. resupinatum*) often shared identical photobionts. Conversely, the photobiont spectrum of *N. parile* suggests that symbiotically dispersed species are more likely to maintain and disperse their own cyanobacterial symbionts.

Our study gives some new insights into the cyanobiont distribution in *Nephroma* species within a boreal forest landscape, and suggests that reproductive strategy is reflected in species photobiont choice. A research article on this topic will be published in *The Bryologist* in 2011.

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Barcoding of sterile crustose lichens in Switzerland

The similarity of *Pertusaria albescens* (on the left) and *Pertusaria amara* (on the right). [Images from *http://www.stridvall.se/lichens/gallery/Pertusaria*].

Sterile crustose lichens are a speciose group of organisms growing on the bark of trees, rocks and soil. Their identification is notoriously difficult and requires time consuming chemical analyses of secondary metabolites produced by the fungal partner. Over the past decade molecular analyses of an increasing number of sterile crustose lichens is becoming available and DNA-barcoding is likely to become an alternative approach for the identification of sterile crustose lichens at the species level.

Here we present an approach to classify Swiss crustose lichen species based on barcoding. Suitable primers for barcoding the fungal partner of the lichens were tested and specimens were classified based on sequence data amplified with specific primers. We have used the ITS region I and II and the mitochondrial marker mrSSU to sequence the lichen DNA material. The primers ITS1F-ITS4 and mtSSU1-mtSSU3R were tested.

The major difficulty encountered was the ubiquitous presence of parasymbiotic fungi growing together with the lichen mycobiont. Very small amounts of lichen material, e.g. the vegetative diaspores from on single soralium were sufficient to barcode sterile crustose lichens.

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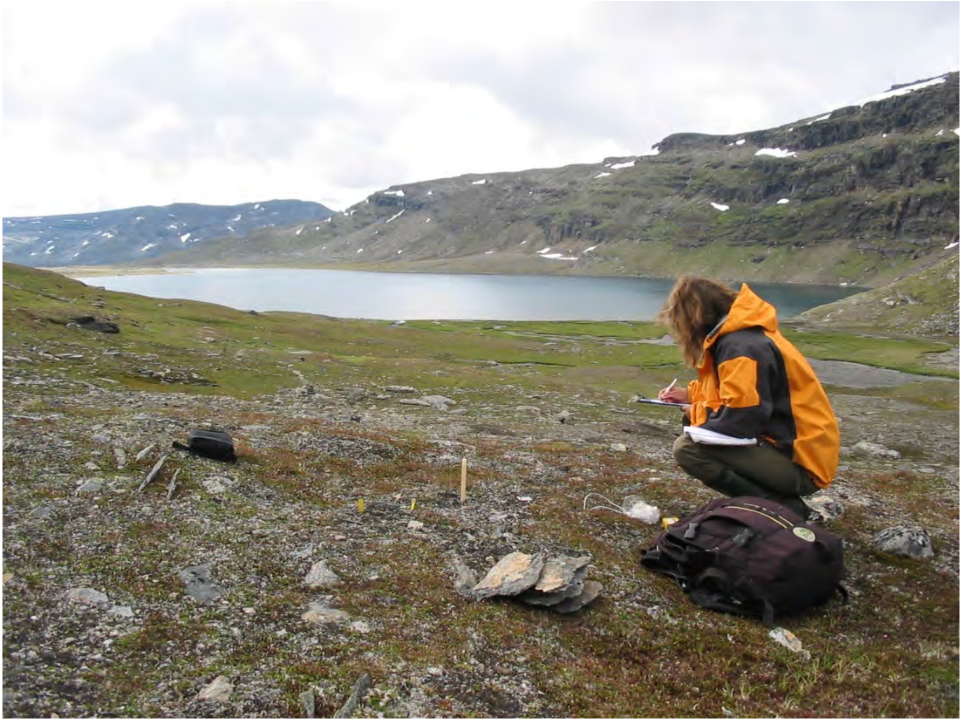
Climate change impact on lichen diversity in the (sub-)Arctic and implications for carbon and nutrient (re-)cycling

Changing temperature regimes in the (sub-)Arctic will impact on vegetation composition and diversity including those of lichen and bryophyte communities, thereby modifying litter decomposition rates and carbon (C) dynamics of these systems with possible feedbacks to climate.



Field work at Latnjajaure Field Station, Latnjajaurevagge, Sweden

We investigated changes in diversity both within *in situ* long-term warming experiments, ranging from Swedish subarctic birch forest to Alaskan arctic tussock tundra, and along their related natural climatic gradients. We furthermore studied decomposition of lichens in relation to vascular plants and bryophytes in a 2-year multi-species decomposition experiment in subarctic Sweden.

The responses of lichen diversity (Shannon Index) to increased temperatures were similar within experiments and along gradients. Lichen diversity was negatively influenced by experimental warming, with the exception of experimental manipulation in a birch forest. Along climatic gradients, lichen diversity increased with decreasing temperatures while lichen species richness along both gradients was negatively related to vascular plant abundance, probably owing to shading.

Depending on the length of the gradient, bryophyte diversity decreased with increasing temperatures while also at extremely low temperatures, bryophyte diversity decreased. Experimental data showed that bryophytes were less sensitive to warming than lichens.

Results of the garden litter experiment revealed that average 2-year litter decomposition rates of lichen and vascular plant species were higher than that of bryophytes, while within main cryptogam taxa, species identity was an important determinant of mass loss rates.

We showed that lichen diversity is likely to decrease under arctic climate warming as this group is especially sensitive to changes in climate. Together with the consistent patterns in litter decomposability among cryptogam and vascular taxa, our data will help to predict changing land surface feedback to C cycles and climate in cold biomes by understanding long-term climate effects on carbon release through shifting vegetation composition.

Acidic tussock tundra at treeline in the Brooks Range, Alaska

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Growth rates in situ in juvenile old forest lichens

Growth rates are important, but poorly known parameters in lichen population ecology. As most growth data are from mature thalli, we quantified juvenile growth, allowing estimation of generation time. We studied three old forest species, *Lobaria pulmonaria, L. scrobiculata* and *Pseudocyphellaria crocata* on twigs of *Picea abies* in boreal rainforests of Norway with a high lichen species richness (see image). Growth was monitored in summer (May-August, 106 days) and in the remaining part of the year

(260 days) for each of two consecutive years. By means of repeated photography, high resolution pictures were analysed in ArcGIS (geographic information system program) and area increments of individual thalli were obtained. Absolute growth is highly size biased and therefore growth was expressed in relative thallus area growth rate. Mean annual growth rates were 0.53±0.02, 0.41±0.02 and 0.57±0.04 $mm^2\ mm^{-2}\ year^{-1}$ (mean±SE) in the three species respectively, equivalent to the following annual growth rates 101±5, 70±6 and 121±12%. The relative thallus area growth rate was size-dependent, with fastest growth in small thalli sizes. The seasonal variation was strong with growth rates during winter at 37-48 % of the summer level. Estimated generation times expressed as onset of soralia formation was calculated using size specific relative growth rates in relation to soralia production and thallus size. The generation time in *Lobaria scrobiculata* was 15-22 and 9-13 years in *P. crocata*. Studied *L. pulmonaria* thalli produced no soralia during experiment, meaning that the estimated generation time was >17 years. Given these generation times present logging probably occurs too frequently to support vital populations of these species in managed forest landscapes.

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Net diversification rates in *Lecanoromycetidae* (*Lecanoromycetes*, *Ascomycota*)

The species richness of families in *Lecanoromycetidae* varies widely, however, it is unknown whether these differences are due to their ages (for instance, older clades might be expected to be more diverse than younger clades) or their net diversification rates (differences in speciation and extinction rates among families). To examine this, relative clade age was regressed against the species richness of most families in *Lecanoromycetidae*. Net diversification rates assuming no extinction (ε=0.0) and an extremely high relative extinction rate (ε=0.9) were calculated for these

Evernia mesomorpha, a member of the family *Parmeliaceae* families. Net divers-ification rates for families were compared to one another as well as to the background rate in *Lecanoromycetidae*. Additionally, 95% confidence intervals were generated to identify families with exceptionally high or low diversification rates, relative to the background diversification rate of *Lecanoromycetidae*.

Older families were not necessarily more diverse than younger families. The families *Parmeliaceae*, *Cladoniaceae* and *Stereocaulaceae* were among those with the highest diversification rates (under no and high relative extinction), while *Massalongiaceae*, *Letrouitiaceae*, *Scoliciosporaceae* and *Gypsoplacaceae* had the lowest diversification rates (under both no and high relative extinction). Two different analyses suggested that the diversification rate for *Parmeliaceae* was exceptionally high, relative to the background rate for *Lecanoromycetidae*. Additionally, the lack of a strong positive correlation between family age and species richness may be suggestive of factors prohibiting or slowing the continued growth of some families.

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The lichen genus *Usnea* Adans. in the neotropics: species with red-orange, cortical or subcortical pigmentation

The genus *Usnea* is widely represented in the neotropical mountains, especially in habitats associated with the occurrence of fog, and more than 150 species names have been cited. However, because of their high phenotypic plasticity modulated by various environmental conditions, the identification of the species remains difficult and a revision of the genus taxonomy is badly needed. In this study, species occurring in the neotropical Andes (Bolivia, Colombia, Ecuador, Peru and Venezuela) and the Galapagos Islands were described using morphological, anatomical and chemical (by thin layer chromatography) characters. The chemical and pigmentation characters were tested with phylogenetic markers (ITS sequences) for their validity in species delimitation.

Montane cloud forest near Machu Picchu - a typical habitat in Peru for *Usnea* species

Thirteen *Usnea* species with a red-orange cortical or subcortical pigmentation were identified, three being newly described (including one Galapagos endemic) and three being new for South America. Tri-terpenoids played an important role in the taxonomy of this group of species. Surprisingly, a relatively strong relationship was found between the tropical Andes and the Galapagos Islands, but influences from the Caribbean, Macaronesia, tropical Africa or the Pacific range were also observed. This demonstrates the importance of taxonomic studies being conducted over a large geographic area for this worldwide genus.

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Names for Lichens. 1. The Basics

This is the first in a series of short articles in which I will try to explain the principles that underly the giving of names to lichens (and to all other organisms treated as plants). I will also discuss why names sometimes have to change (there are several reasons, some good, some not), and why nomenclatural matters can occasionally become rather arcane (basically it is because the Real World can be a messy place, and any set of rules guiding the choice of names has to be able to deal with the resulting complexity).

The rules setting out how to name plants are contained in the International Code of Botanical Nomenclature. This does not have any legal status, but it is generally followed by botanists since the alternative, of everyone following his or her own ideas, would be chaos. The Code is not fixed for all time but can, and does, change in response to advances in biology. Anyone can propose changes to the Code, and these proposals are voted on by botanists at the next International Botanical Congress; these Congresses are held regularly, usually every six years[1]. A change that is accepted become part of the next version of the Code. Zoologists, incidentally, have an entirely different Code, which is an unfortunate result of history; it is probably now too late to change this, though there have been recent proposals for an independent Mycological Code of Nomenclature, a BioCode that covers naming of all living organisms, and a PhyloCode that abandons the traditional nomenclatural system altogether in favour of a naming system for the branches of the phylogenetic tree. The present version of the Botanical Code runs to 568 pages and is not for the faint-hearted, so let's start with simpler matters.

People give *names* to *things*. So before you can start choosing *names* you have to decide what are the *things* you want to name. This is not always simple, either in biology or elsewhere. As a non-biological example, a speaker of English might sit on an *armchair*, *bench*, *chair*, *sofa*, *stool*, or *throne*, and would regard most, at least, of these as different things. A speaker of Norwegian sits on *en stol* and (if the little I know of Norwegian is reliable) on nothing else. Who is right? How many different kinds of things are there to sit on? Philosophers have debated whether discrete categories really exist in the external world, or whether people project their internal ideas onto the external world. The short answer seems to be that a bit of both generally takes place, but that the relative importance of the two varies from one situation to another.

In biology we are usually closer to the "discrete categories really exist" sort of situation. However, it is always worth remembering that "species", and many of the other biological "things" we choose to recognise, are in part human creations. Remembering that can avoid a lot of pointless arguments.

In biology the most basic things we want to recognise are usually individuals and species. We don't often want to give names to individual organisms, except in the case of other people and sometimes our pets, so nomenclature is not much concerned with that aspect of names. (It does not ignore it entirely: typification,

1 At the recent International Mycological Congress in Edinburgh in August 2010, proposals to devolve the decision-making relevant only to fungal nomenclature (including the lichens) to the IMCs were accepted by those present; these would need to be ratified by the next IBC. In addition to the principle of devolution [actually an inappropriate term as it implies that fungi are part of the plant kingdom] proposals to allow English diagnoses as an alternative to Latin for fungi, and to set up a registration system for fungal names (in effect a system to ensure Code-compliant names at the pre-publication stage) were approved.

which I will discuss in a later article, gives a name to a single individual.) Usually we start with species.

The English word "species" is from the Latin word *species* which can mean a *kind* or *type*. This was, as it happens, only one of its meanings in classical Latin - and a subsidiary meaning at that. Its primary meaning was either the *act of seeing* or the *outward appearance* of a thing. Ultimately, it comes from the verb *specio*, I look at.

A species is a group of individuals that have enough in common that we find it convenient to regard all those individuals as being of the same basic kind. At least that is my, practical, common-sense definition. Acres of forests have been felled to provide paper for interminable discussions on the topic of what is a species. I like trees too much to wish to add to that debate.

The process of recognising which species exist is one part of the science of taxonomy. Another part of taxonomy consists of grouping similar species together, and in fact the word comes from this aspect (Greek τάξις - an arrangement, or ordering). To a considerable extent, nomenclature and taxonomy are kept separate from each other. They can not be completely divorced, but keeping them at arms length tends to simplify things. In particular, the rules of nomenclature do not constrain taxonomy in any way. If our learned colleague A. N. Idiot decides, after many years of careful study, that the lichens most of us know as *Xanthoria parietina* and *Verrucaria nigrescens* are actually the same species, and, moreover, that this species belongs in the genus *Diploschistes*, nothing in the rules of nomenclature will disagree with him. The rules merely stipulate that he can't call his species by any name he chooses. He must call it *Diploschistes parietinus*, or, more formally, *Diploschistes parietinus* (L.) A. N. Idiot.

What kind of names should we use for lichens? This is entirely a matter of convenience. We could, if we wished, call our species 1, 2, 3... etc., but most people would have trouble remembering names of that sort; our brains don't work that way. A much more sensible name for, say, a little yellow lichen would be Little Yellow Lichen. This is, in fact, exactly what the earliest botanists did - except that they did it in Latin, the language that educated people then used when they wished to communicate to an international audience. Here is an example from Micheli's Nova Plantarum Genera of 1729: *Lichen pulmonarius, saxatilis, subtus nigricans, desuper oliviae conditae colore, receptaculis floram concoloribus*. [Olive lichen resembling a lung, with olive fruiting bodies and a black lower surface, living on rock.] Judging more from the drawing that Micheli thoughtfully provided than from his description, this may be *Lasallia pustulata*.

These descriptive names worked quite well so long as the number of species known was small. As the number increased the descriptions got longer. Also, a new species, as well as needing a new name of its own, might also necessitate a change in an existing name, to make clearer the distinction between the new speces and an old one similar to it. Linnaeus, who used descriptive names (sometimes called multinomial or polynomial names) in the earlier part of his career, gradually realised the problems, and eventually started to use a short two-part name alongside the longer descriptive one. In other words, he began to separate the name from the description. The two-part, or binomial, name was conceived of basically as an abbreviation, not some totally new concept, so naturally it remained in Latin. Linnaean binomial names came to be generally adopted partly because of their obvious convenience, but three other factors also played a part: (1)Linnaeus was a prolific (though not particularly subtle) worker, and described a huge number of plants and animals; (2)the system that Linnaeus used to classify flowering plants, based on the number of stamens and pistils, though artificial, was easy and convenient to use, and so soon proved popular, and the binomial names came with it; and (3)Linnaeus was never a man to blow his own trumpet *forte* if he could blow it *fortissimo*, and he made sure that he got noticed.

Most of Linnaeus's binomial names were still intended to be descriptive to some extent, e.g. *Lichen saxatilis* [rock lichen], now *Parmelia saxatilis*, but there is a limit to how much description can be put into two words. Today, it is no longer considered essential for a lichen name to be descriptive, though when choosing a name for a new species it is still good practice (in my view) to choose a name that fits the lichen well.

Linnaeus recognised - and he was by no means the first to do so - that one can often recognise groups of species that are similar to each other but clearly different from other such groups. As an aid to memory, the first part of a Linnaean name refers to the group, the second to the species within that group. For Linnaean names of lichens this is not very apparent, since Linnaeus placed nearly all lichens in the group *Lichen*, so I will draw my examples from a slightly later period, after other botanists had started to divide up Linnaeus's large group *Lichen* into smaller groups. The lichen *Parmelia saxatilis* belongs to the group of species that we now call *Parmelia*. It has a lot in common with, but is not the same as, the lichen that we now call *Parmelia sulcata*. ('The adjective 'sulcata' comes ultimately from the Latin noun *sulcus*, meaning a furrow, and refers to the linear patterns of white pseudocyphellae on the upper surface of this lichen.) The advantage of this sort of binomial nomenclature is fairly obvious; there is a lot of useful information in the first part of the name. Most readers will not have seen the lichen *Parmelia pseudolaevior*, which is endemic to Japan and Korea. I haven't seen it either. However, we all know at least roughly what it must look like because it was placed in the genus *Parmelia*; it can't be *very* different from *P. saxatilis* and *P. sulcata*.

A group of species to which the first part of a binomial name refers is called a genus (plural genera). As far as Linnaeus was concerned, this was, again, a somewhat secondary meaning of a Latin noun; in classical Latin the word *genus* can mean a group of living things of the same kind, e.g. *omnis generis homines* [all kinds of people]. However, its primary, and original, meaning was more particularly a group of people related by birth or genealogical descent, ultimately from the archaic Latin verb *geno*, I beget. Both meanings happen to be relevant to the modern concept of genus.

Groups of genera can also often be recognised. A group of genera is called a family. Families have their own names, which are not binomials, but they always end in *-aceae*. For example, the family *Parmeliaceae* contains the genus *Parmelia*, as you might expect, but it also contains many other genera. Even larger groupings can be, and are, recognised. However, in this series of articles I don't propose to discuss names above the rank of genus.

We now realise, as Linnaeus and his contemporaries did not, that the reason species in a genus (and genera in a family, etc.) resemble each other is that they are descended, with modification, from a common ancestor. As a result, it has become common in some quarters to insist that each of our genera *must be* a group of all (and only) those species descended from some common ancestor. Insisting that this apply without exception may be, in my view, a case of taking a good idea a bit too far.

The reader will, by now, have observed that we are expecting our names to do rather a lot. Names are supposed to: (1) uniquely identify our species; (2) group together those species that resemble another; and (3) contain information about the evolutionary history of our species. Isn't this expecting too much? Well, yes, sometimes it is. The main source of tension is between (2) and (3). Genera defined on the basis of resemblance between species, and genera defined by hypotheses about evolution do not always match. In some groups of lichens, such as the *Verrucariaceae*, this is proving to be a real problem. How best to deal with this sort of problem is not at all clear at present. The answer probably depends on what we most want to actually *do* with names of lichens.

In the next article I will look at the practical matter of creating a new name. How does one go about it? In other words I will discuss *effective publication* and *valid publication*.

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Bark surface area in English woodlands- how much is there and how much do we sample?

Lichenologists are well used to close encounters with trees, searching their bark and exposed wood for the large number of lichen species that occur on this substratum. In the case of large trees, it is obvious that only a small part of the trunk is available for direct study. Low branches occasionally provide opportunities for further investigation, but for most of us, and most of our mature trees, we have to be content with examining the lower 2m of trunk unless laddering or climbing is attempted. So how much of the tree bark is available for direct examination? This is not easily answered but inspection soon reveals some relationships. For example, small trees will have a larger proportion of their surface available for study than larger ones, and rough-barked trees will have a greater surface area than smooth-barked ones, assuming a similar architecture and size.
While preparing a review on subaerial blue-green algae, the question concerning relative surface areas of rocks and trees for colonisation arose. Algae, like lichens, can grow on a wide range of substrata and from an evolutionary standpoint it is desirable to have an estimate of not just the nature of surfaces they colonise but their relative extent as well. During the study it was clear that an extension of the work would allow an estimate of the 'available' bark area that could be of interest to

lichenologists and bryologists. Thus, the measurements were extended in an attempt to determine the surface area of trees in relation to their age and girth.
For bark, the estimation of surface area appears fraught with difficulties. The tree surface, approximated to a smooth circular cone, may be satisfactory for the trunk, but when branches and twigs are included, the problem is more complex. Adding the difference in the nature of bark as it clothes the tree from trunk to twig, and the fifty of more native trees in the country then the problem appears overwhelming. However, a number of simplifications soon become apparent and it hoped that the results of this short (10 day) study will at least provide some groundwork upon which more detailed investigations could be made.
There is little previous work on bark surface area that is relevant to English woodlands. Estimates of tree surface areas were pioneered in the United States by Whittacker (1966) and Whittacker & Woodwell (1967) with further developments by Yoneda, (1993) in Japan and Gregoire & Valentine (1996) in tropical forests. All of these studies ignored bark roughness and concentrated on relationships for smooth cylinders or cones using a wide range of statistical techniques.

Methods
Calculations and estimates were undertaken in three steps: a) relationship between bark surface area and tree girth; b) calculation of surface areas of trunks, branches and twigs of particular trees; c) basal girth measurements in discrete random samples of some 'representative' deciduous woodland.

A) Relationsbip between oak bark surface area and tree girth.

If bark were smooth and clothed trees evenly, bark area per tree would not be difficult to estimate. The beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*) may ssem to approximate this model, but on close inspection even these trees possess many irregularities in the bark. Other common British trees have rough bark, particularly as they age, well-known examples being oak (*Quercus petraea/robor*) and ash (*Fraxinus excelsior*). It was therefore decided to investigate the extremes, concentrating on a smooth-barked example, the beech but with most attention paid to the common oak, *Q. robor*. As an oak grows, the bark, which is initially smooth, soon develops vertical cracks that become wider and deeper with age. Initially the cracks are separated by areas of smooth bark termed plateaux, but as the trees age, the area of smooth bark declines and eventually disappears altogether. In our review of blue-green algae, we were interested in the colonisation of small cells onto surfaces. Coccoid blue-greens approximate to spheres about 10 μm across, so a measure of surface area at this resolution was considered suitable. It remained to find the area of bark surface that would allow a single layer of such cells to form a continuous film. One solution to the problem is based upon the well-known coast-length conundrum. The coast-length increases rapidly as the measuring stick (metric) declines in length. Providing a suitable metric is chosen, a solution is obtainable for rough surface area estimation in a manner similar to coast-length estimates with certain assumptions (see Mandelbrot, 1983 for methods and discussion).

Examination of oak bark samples soon revealed that the surface areas of the plateaux and fissures differed significantly using the chosen 10 μm metric. It was also found that the surface characteristics of the two forms were not correlated to the diameter of the branch or trunk. As a result, seven oaks with girths ranging from 5 cm to 600 cm were sampled and the relative surface area of cracks and plateaux determined. Details of the method are provided in the appendix. The metric was then applied and the surface areas determined and presented as a dimensionless multiple (F) of the surface area of the corresponding smooth cylinder (for example, if F=2 then the total surface area is twice that of the surface area of the corresponding smooth cylinder). The results are shown in Figure 1 with the F values in Table 1. The relationship between F and girth is non-linear and characterised by an initial rapid rise which then declines slowly as the trees age. A logarithmic curve ($F = 1.153 \mathrm{Ln} G + 4.46$, where the girth G is measured in metres) has been fitted to the data using a Microsoft Excel trendline routine. This relationship works with girths > 5cm but fails below. This is not a problem since in practice, girths below 5 cm need to be measured directly as they cannot be determined using the yardstick technique that will be described below. Integration of the above expression and multiplication by πL (where L is the trunk/branch length of interest in metres) provides an estimate of bark surface area that is readily extended to the entire tree with the exception of the twigs. These calculations were made on an Excel spreadsheet.

Fig. 1. Relationship between oak tree girth (G) and relative bark surface area (F)

Tree girth (m)	F
0.15	1.65
0.20	3.49
0.50	4.84
1.05	4.50
2.09	4.96
2.94	5.37
5.97	7.38

Table 1. Relationship between factors F for oak (*Quercus robur*) and girth. Bark samples taken 1 m above ground.

B) Surface areas of trunks, branches and twigs

Having obtained a relationship between bark surface area and girth for oak, it was necessary to determine the surface area of individual trees. Again a range of trees was examined. Ideally, a series of trees would need to be felled so that all of the twigs and branches could be made accessible for measurement. This was impracticable for trees with girths exceeding 20 cm so remote sampling was used employing a yardstick and the method of similar triangles (Fig 2). The yardstick was set about 20 m from the chosen tree and the observer placed a fixed distance behind it. The trunk, and all

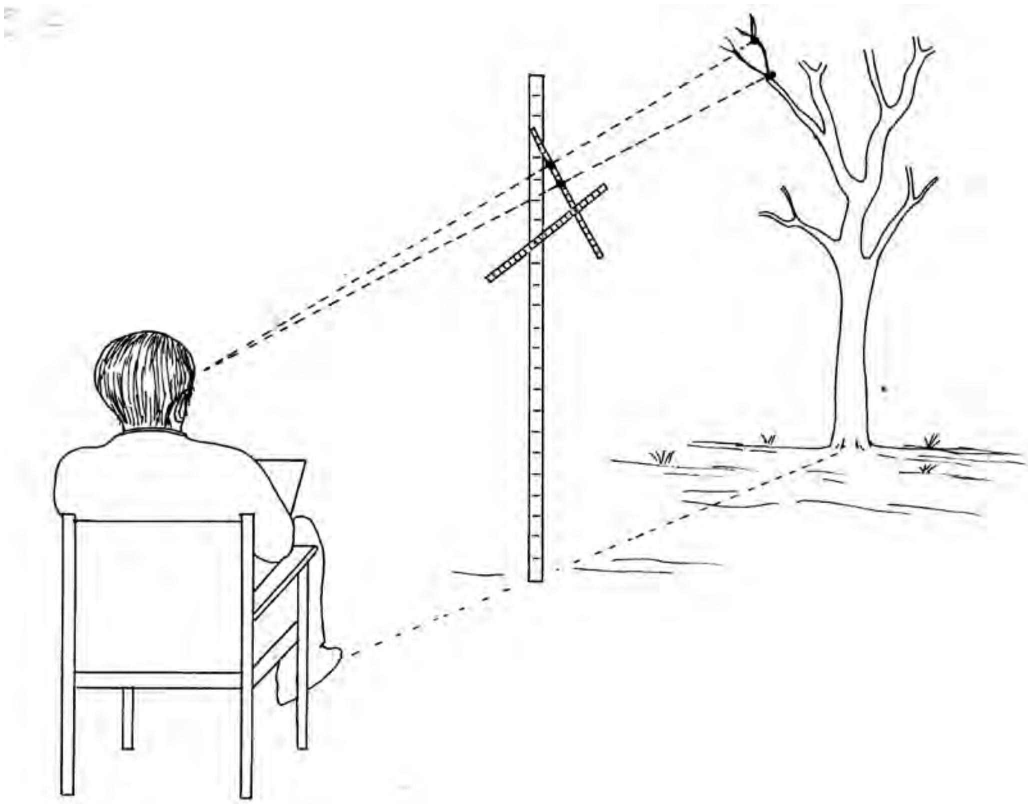

Fig. 2. Triangulation method employed to estimate branch width and length

branches running in a vertical and perpendicular plane (±15°) to the imaginary vertical plane between observer and tree centre were then placed in the sights of the graduated yardstick and the measurement read off the scale. This set-up was moved around the tree so that all branches could be measured. Errors resulting from branches inclined from the plane up to about 15° opposed those caused by branch deviations from a cone at branch points so no correction was made. This method was not practicable for twigs and small branches. For these, a sample of 5 branches whose diameter at the base was 3 cm were removed from trees and direct measurements made using tape and ruler. The appropriate F value was applied and the branch surface area averaged. The mean surface area was applied to all such branches recognised through the yardstick. Even employing this shortcut required 3-5 hours work on individual trees of large girth. Measurements were taken in winter to improve visibility and twelve oaks with girths ranging from 3 cm to 3.4 m were examined in Haverbrack Wood in south Cumbria. Integrations were performed for each branch segment and the total bark surface area obtained. A quartic best-fit curve was then fitted to the resulting scattergraph using Microsoft Excel (Fig. 3) so that a relationship between bark surface area and tree girth was obtained. The integration was then repeated using a fixed F value of 1.65. This approximates the bark of a smooth-barked tree such as beech and a second quartic was fitted (Fig. 3) providing an envelope within which most English trees should plot. The equations cannot be used outside the girth range 0.2-3.2 m and linear interpolation was used for girths in the range 0-0.2 m. Exposed root bark is not included in these estimates.

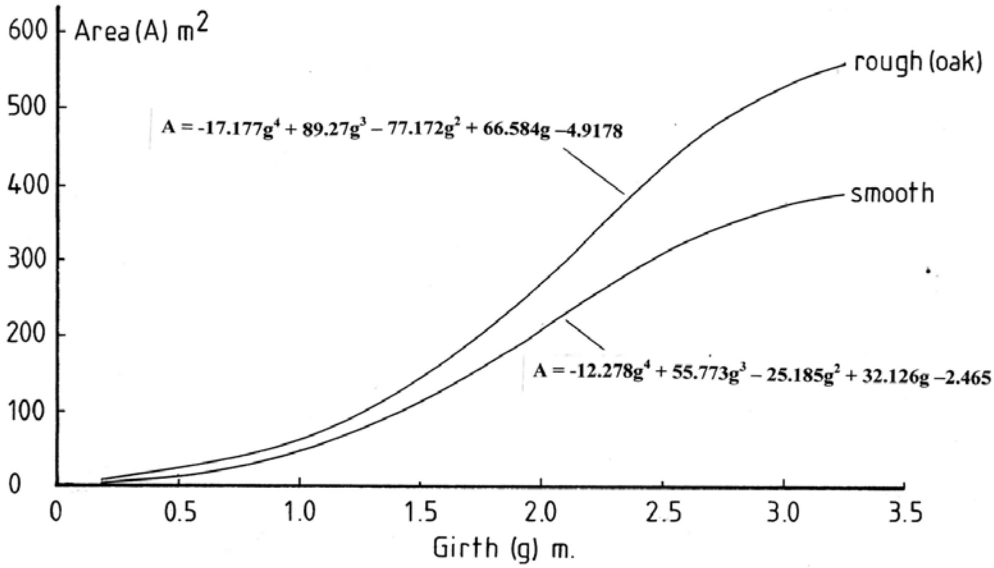

Fig. 3. Quartic equations relating tree girth to bark area

c) Bark area in 'average' deciduous woodland

The main objective of this study was to estimate bark surface areas of mature deciduous woodland. To this end, five 400 m^2 quadrats were chosen within England ranging from Cornwall to Cumbria. They include three areas designated as 'ancient woodland' (Marren, 1992) and two secondary woodlands with a closed canopy. What constitutes a mature woodland will no doubt provoke debate among readers but the aim here is simply obtain data for an 'average' English deciduous woodland. This is no simple task, but for the data presented, all woods investigated contained at least two trees with girths exceeding 1.5 m but there were no trees with girths >3.2 m. The results are presented in Table 2. The bark data are also cast as an index in columns 5 and 7 showing the ratio bark area/ground area. They show that bark surface area, measured at the 10 µm metric is substantial within woodland and equivalent to about 3-4 times the plane woodland area. Measurements taken in ancient woodland do not appear to differ much from mature but presumably younger forest. This should not be surprising since in woods containing large old trees, the extent of self-shading is sufficient to prevent much woodland growing beneath them, whereas younger forest has larger numbers of saplings all struggling for light.

Location	Nat. grid. Ref.	Main trees	Smooth model total surface area m²	Smooth bark index*	Rough model total surface area m²	Rough bark index*
Cabilla Wood, Cornwall	20/130651	Oak, ash, sycamore	1190	3.0	1470	3.7
Hagg Wood, Cumbria*	34/433863	Ash, oak, birch	750	1.9	910	2.3
New Beechenhurst Inclosure, Glos.*	32/612128	Oak	920	2.3	1140	2.8
Russell Inclosure, Glos.*	32/608097	Oak, beech	1650	4.1	2060	5.1
Hyning Scout, Lancs	34/503739	Ash, sycamore	1870	4.7	2290	5.7
Means			***1276***	***3.2***	***1574***	***3.9***

Table 2. Bark surface area in deciduous English woodland plots of 400 m^2 using a 10 µm metric employing the smooth and rough bark model. *Classified as ancient woodland by Marren (1992).

The data set can be used to determine the bark surface area in particular parts of the tree. Of interest is that occurring within easy reach of the lichenologist, say the lower 2m of the trunk. The estimates, as a function of tree girth are shown in Figure 4. Although there is considerable scatter and no smoothing has been attempted, it is evident that the area of bark available for study is less than 20% for rough-barked trees with girths exceeding about 1 m, with a steady decline as the girth increases. It falls to about 10% or less for mature trees with girths exceeding about 2 m. For smooth-barked trees the proportions are obviously higher, but even here, mature trees, with girths exceeding 1.5 m it is still less than about 15% of the total.

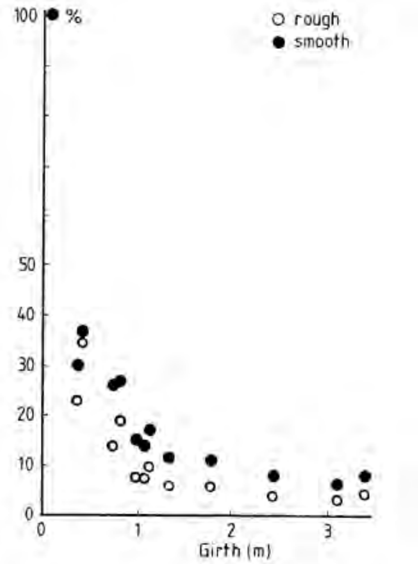

Fig. 4. Relationship between the girth of rough- and smooth-barked trees and the percentage of the bark surface available for examination in the lower 2m of the trunk using a 10 µm metric.

Two further estimates of interest can be made with the data. First, it is possible to determine how the bark surface area is distributed over an entire tree as a function of branch diameter. The calculations are tedious so a single example of mature oak is presented in Fig. 5. In this case it can be seen that most of the bark surface area (c. 30%) occurs on branches and twigs less than 10 cm in diameter. The remaining area is fairly equally distributed between the other size classes with a suggestion of a dip at intermediate diameters.

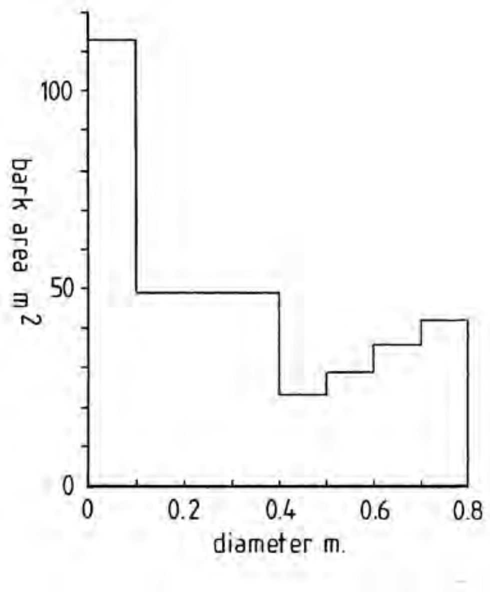

Fig. 5. The proportion of bark surface area (in m^2) in 10 cm diameter classes of a mature oak (*Quercus robor*) from Haverbrack Wood, Cumbria. The tree diameter at 1 m height was 0.77 m (girth 2.4 m).

If it is assumed that the girth of a tree is a simple function of its age, it is also possible to estimate the rate of appearance of new bark over time. The girth of oak trees increases by an average of 30 mm per year in the UK according to Mitchell (1996). Using this figure for a guide, and neglecting the competing effects of nearby trees, an estimate of bark increment per year is easy to obtain from the data of Figure 3. The results are presented for oak in Table 3 where it is apparent that the rate of increases rises at the tree matures. Eventually the rate will become zero and then become negative as the tree dies. The rate for smooth-barked trees will be less than that of oak and can be estimated from the data presented in Figure 3. Information of this kind could be useful in modelling epiphyte colonisation rates and strategies on growing trees.

It is not possible to assign figures for accuracy or precision of these data owing to the small sample size and complexity of the problem, but the above results can be compared with those obtained by Whittacker & Woodwell (1967). They undertook a detailed study of broadleaf woodland in the Unites States but used a different method employing standard regression equations and confined themselves to calculations of smooth rather than rough bark. They described a surface area index identical to that employed here and obtained values of 2-2.2 for closed mature forest. Multiplication of these values by 1.65 provides a direct comparison with the ‘smooth’ bark estimates for English woodland above. The resulting values of 3.3-3.6 are close to the mean figure of 3.2 given in Table 2 above. Whittacker & Woodwell also estimated the area of bark in tree trunks as opposed to branches and twigs. Although they did not specify the height of their trunks, they obtained figures of 20-25% for mature trees, again similar to those obtained here. Bark is therefore seen to exhibit a large surface area within deciduous woodland, and it is an important substratum for epiphytes. The surface area of bark however is usually subordinate to leaf surface area. Whittacker & Woodwell (1967) estimated a leaf index of 4-6 for closed forests, and this applies to only one side of the leaf. Similar values have been estimated for temperate grassland. During summer, the leaf surface area is far greater in the UK as a whole when compared with bark, although most leaves are too short-lived in the UK to attract epiphytes. In the tropics they are of more importance.

The above method could be adapted to find the surface area of rock outcrops allowing a further set of area indices to be made for different rock types. Preliminary measurements indicate that F values for rock exposures are similar to those of bark. Estimates could then be made of the relative importance of rock and tree surfaces for epiphytes within designated areas.

Age of tree yr	**Approximate girth m**	**Rate of increase in bark area m^2/yr**
25	0.75	3.2
50	1.5	6.0
75	2.25	6.5
100	3.0	7.5

Table 3. The rate of increase in oak bark area using a 10 μm metric for a single tree.

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Appendix

Bark was embedded in wax, and thin slices cut at right angles to the surface removed with a razor. These were examined under a light microscope fitted with a cross-graticule and the 'coastlength' of the surface determined at 10 μm steps at x250 magnification. Five sets of measurements were made and the mean taken. The mean was then compared with the direct 'crow fly' measurement from the start point to the finish point of the chosen section of 'coast'. This was usually determined by noting specific features in the surface that could serve as reference points. The above procedure was then repeated, this time under a dissection microscope with a 200 µm metric and finally with a 5 mm metric. Measurements were taken both horizontally across the bark and vertically. Another identical series of measurements were taken across the bark plateaux. A measure of the relative area of the plateaux and the depth and width of the crevices provided all the necessary data to estimate the surface area of the bark at 10 µm resolution. The vertical and horizontal measurements were fairly consistent, suggesting that a reasonable estimate had been made.

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New scalpel warning

The acute tip of a No. 9 disposable Swann Morton scalpel can be put to many uses in lichenology, such as the removal of small ascocarps for microscopic examination and the preparation of thin sections. Scalpels are also recommended as a means of exposing the medulla of lichens for the application of chemical tests.

I have noticed that there is also a temptation to use these fine tips to apply small quantities of chemical test reagents when lichens are being examined under a dissection microscope. Under some circumstances, such an application allows better control of the spot test and avoids flooding the sample with reagent. However, two problems have emerged in employing the technique. First, the reagents can flow by surface attraction and capillarity up the scalpel blade and become lodged between the blade and holder. This results in corrosion, and in the case of Pd, undesirable contamination. Second, aqueous iodine solutions, such as Melzers Iodine, attack the iron in the blade and are capable of giving false negatives in lichen tests. In one experiment, a strong solution (c. 1% I_2 in KI solution) was applied by scalpel blade to the cortex of *Porpidia tuberculosa* but failed to give the charactistic iodine reaction of that species. The solution was discoloured in less than 30 seconds, probably due to the formation of ferrous iodide.

This warning is posted as it does not appear to be mentioned in the new British lichen flora nor the BLS microchemical methods booklet (Orange *et al.*, 2001).

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Allan Pentecost

Species discrimination and the distribution of *Placopsis gelida* and *P. lambii* in Great Britain

Introduction

The genus *Placopsis* (Nyl.) Linds. is primarily a Southern Hemisphere genus, but is represented in the British Isles by two species: *P. gelida* (L.) Lindsay and *P. lambii* Hertel & V. Wirth. Despite easy discrimination of the genus, compared to other British lichen genera, the recognition of species within *Placopsis* is problematic; as a consequence *P. gelida* may have been confused with and recorded as *P. lambii* (Smith *et al.*, 2009). This paper aims to clarify key aspects in the identification and distribution of *P. gelida* and *P. lambii*, providing a base-line assessment for future studies into these intriguing species.

Placopsis gelida: image © Einar Timdal, http://www.nhm.uio.no/lav/web/index.html

Taxonomic Background

Placopsis gelida was recognised by Linnaeus (1767a, b) who used the epithet *Lichen gelidus* to describe a specimen collected in Iceland by König. Following this early description various generic names were subsequently applied by various authors: *Lecanora*, *Parmelia*, *Parmularia*, *Patellaria*, *Placodium*, *Psoroma* and *Squamaria*. *Placopsis* was first circumscribed as a subgenus of *Squamaria* by Nylander in 1861, but soon after elevated to generic rank by Lindsay (1866a, b, c), who used the generic name *Placopsis* in his descriptions of *P. gelida* and *P. perrugosa* (Nyl.) Nyl. as part of his study of the New Zealand lichen flora.

Lamb (1947) stated in his monograph of *Placopsis* that the original König specimen could not be located, and that it was probably collected in Iceland between 1765 and 1766. For his description of *P. gelida*, Lamb used a specimen from Iceland "collected probably near to the type locality by B. Lynge in 1937". Lamb does not explicitly designate his selected specimen as a neotype, though it was formally confirmed as such by Jorgensen *et al*. (1994).

Placopsis lambii was described as a new species by Wirth (1987), and was differentiated from *P. gelida* primarily by the absence of cephalodia. Moberg & Carlin (1996) examined the type specimen of *P. lambii* in **STU**, and found that: (i) the type belonged to the more common of the two species and (ii) the absence of cephalodia was not a sound character for species discrimination. However, they recognised a suit of morphological and chemical differences between *P. gelida* and *P. lambii*. Both *P. gelida* and *P. lambii* contain gyrophoric acid (Rf. 24 in C) as a major substance, and sometimes traces of lecanoric and hiascic acids (Moberg & Carlin, 1996). *P. lambii* in addition contains 5-*O*-methylhiascic acid (Rf. 29 in C) as a major substance and thus can be positively distinguished by TLC. Molecular studies on the genus *Placopsis* and its allies by Schmitt *et al*. (2003) supported the separation of *P. gelida* and *P. lambii*; they did not form a sister relationship but appear on independent statistically supported branches.

Material and Methods

We examined 170 herbarium specimens of *P. gelida* and *P. lambii* from **E**, **BM** and **NMW**, in addition to several private herbaria and field samples collected by the first author in Great Britain. Specimens were recognised as *P. gelida* and *P. lambii* using thin-layer chromatography performed with solvent 'system C' (Orange *et. al*., 2003).

As a complement to their chemical taxonomy, samples were scored according to qualitative and quantitative character states, as previously recognised by Wirth (1987) and Moberg & Carlin (1996). Qualitative traits were scored as: (i) upper cortex (shiny / dull), (ii) lobe tips (maculate / not maculate), (iii) lobes (truncate / indistinctly truncate), (iv) cephalodia (present / absent), (v) apothecia (present / absent). We calculated the proportion of specimens from each species with distinct character traits. As a quantitative trait we measured, for each thallus, the length of all soralia measured along a radius from the centre of the thallus to the lobe margin (*cf.* Fig. 1 in Moberg & Carlin, 1996). Soralia were measured using a Motic dissecting microscope and under × 120 magnification: (i) we compared the length measurements for all sampled soralia, using species as a factor and treating individual thalli as a random effect in a linear mixed model; (ii) we calculated the upper 75^{th} and 90^{th} percentile values for length, for each individual thallus, and we compared these values between species using a two-tailed *t*-test. The percentile approach is a less conservative test, as it favours the larger and more mature soralia from an individual thallus, while the random-effects approach will include potentially confounding length values for smaller and less mature thalli. All statistics were implemented in R (2008), using the package nlme for mixed-modelling.

Independent Test of Trait Characters

For quantitative trait characters (length of soralia) we performed a separate test to determine a practical value in species identification. A set of 28 specimens was sampled from the Isle of Skye (northwest Scotland): an area known to contain both species. We then compared soralia length measurements for Skye specimens, to the standard normal distribution (Z-distribution) derived using the 'main sample set' (MSS) of 170 specimens. We could thus assign a value to each of the Skye specimens, as the number of standard deviation units away from the MSS mean. We selected an identification which minimised the standard deviation away from this mean, either for *P. gelida* or *P. lambii*.

Results and Discussion

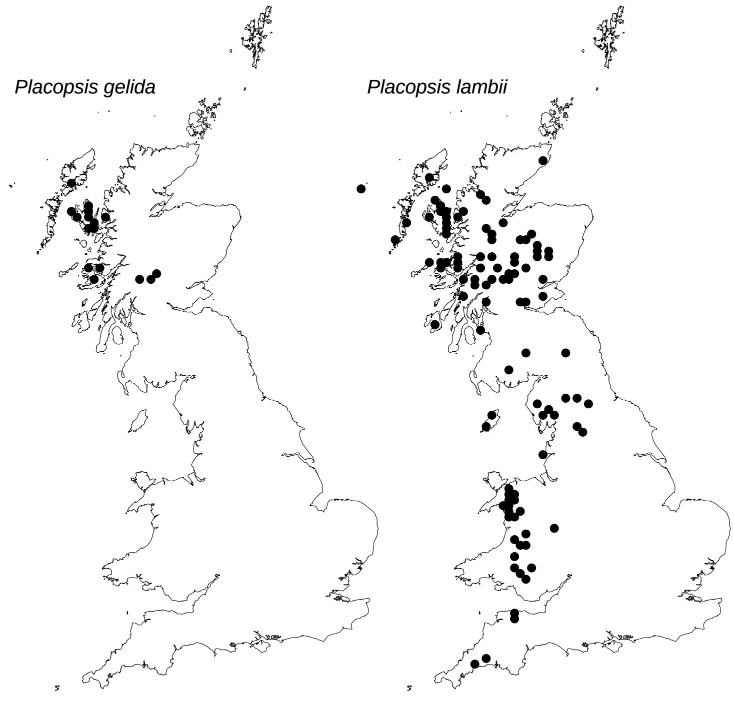

Figure 1. The distribution of *Placopsis gelida* and *P. lambii* in Britain, based on 170 specimens identified from the major national herbaria and ancillary collections.

Of the 166 specimens critically determined using TLC, 30 were identified as *P. gelida* and the remaining 136 as *P. lambii*. Assuming this is a representative sample, *P. lambii* is 4.5 times more common in Britain than *P. gelida*. However, the two species were not equally distributed in the landscape; while *P. lambii* occurred extensively throughout western and northern Britain, *P. gelida* appeared to be restricted to western Scotland and the central Highlands (Fig. 1).

The species could not easily be distinguished based on the qualitative characters measured. Cephalodia were observed in all specimens of *P. gelida*, and

96% of *P. lambii* specimens, while 7% and 4% of specimens had apothecia for *P. gelida* and *P. lambii*, respectively. Scoring qualitative characters as ‘true’, ‘partial’ or false’ (Fig. 2) our results partly support the morphological species limits presented by Moberg & Carlin (1996), though we find that these same characters are useful for a positive identification in a limited number of cases. Thus, it may be possible to cautiously infer that a specimen is *P. lambii* if the upper cortex is strongly shiny, and the lobe tips are distinctively maculate (all *P. gelida* specimens scored as false or partial for these characters). Likewise, *P. gelida* tends more often to have lobes that are distinctly truncate. However, the subjective nature of these characterisations, and the spread of values, indicates that caution should be exercised (Fig. 2).

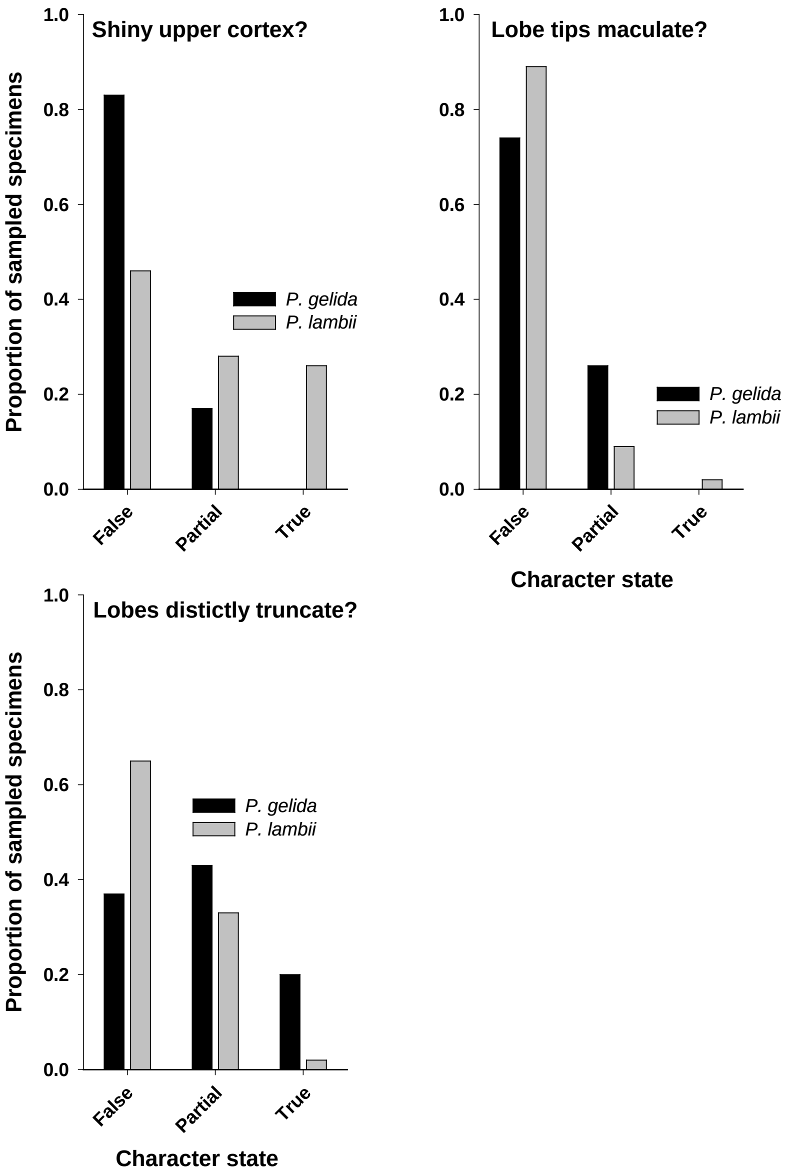

Figure 2. Graphical scores for three qualitative character states, used to compare *P. gelida* and *P. lambii*.

The species showed significant differences in the length of their soralia aligned along the radius of the thallus: *P. gelida* tended to have soralia that were more elongate, and *P. lambii* had soralia that were shorter and rounded. These shape differences were significant when tested for soralia of all sizes within thalli of different species (AIC = 615.11, P < 0.00001), as well as considering the mature soralia which occupied the upper 75th and 90th percentiles: for the 75th percentile, t = 4.72, P < 0.00001 with 35 df; and for the 90th percentile, t = 4.36, P = 0.0001 with 30 df. Despite statistical significance, the spread of size values is strongly over-lapping between species (Fig. 3). Considering a cohort of the largest (most mature) soralia on a thallus may improve the accuracy of identification, as opposed to an average for all soralia. However, when we applied this to an identification of Skye specimens using the Z-distribution, we correctly identified 8 out of 11 *P. gelida* specimens (*c.* 73 % success rate) but only 9 out of 17 *P. lambii* specimens (*c.* 53 % success rate).

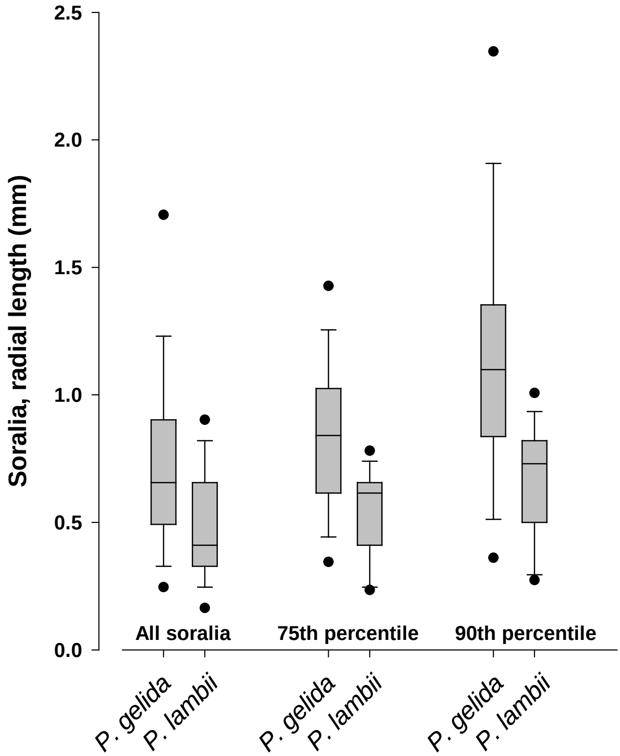

Figure 3. Box-plots to compare the radial length of soralia for *P. gelida* and *P. lambii*, showing values accumulated for all soralia, and for soralia occupying the upper 75th and 90th percentiles on each thallus.

Summary

Based on their chemical taxonomy, this study has identified contrasting distributions for *P. lambii* and *P. gelida*, showing that *P. gelida* is the rarer and more geographically restricted of the two species in the British Isles. Occurring in north-west Britain, *P. gelida* is largely an upland species – e.g. it occurs high on the Breadalbane mountains such as Ben Lawers, Ben Challum, and Creag Calliach, as well as the basaltic areas of the North West Highlands on the Isles of Skye and Mull

– however, it has been found on the Isle of Skye at much lower altitudes, with at least two sites < 100 m.

Our study also emphasises the difficulties in field identification of these two species. Several characters might be considered diagnostic if they are present, though they are present in only a proportion of individuals of the respective species. For quantitative traits (e.g. length of soralia), statistically significant differences can be demonstrated between the two species, but in practical application the same character may not be reliably indicative. The identification problems highlighted here for *Placopsis* cut across a far greater range of lichen species: such problems usefully demonstrate the requirement for a mosaic of information in making a field identification (balancing the weight of various lines of evidence, against the location and physical condition of a specimen) as well as a guarded approach to the many specimens which present conflicting evidence.

Acknowledgements

We thank the curators of **NMW** and **BM** and other individuals for the loan of material, and Rebecca Yahr for reviewing the manuscript and making many helpful suggestions.

It is with deep sadness that we learnt recently of the death of Susan Walkinshaw on 1st September 2010. She will be remembered by many at RBGE and we would like to dedicate this paper to her memory. We offer our sympathies to her family.

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Converting Mudd into Microns

William Mudd (1830-1879) published *A manual of British Lichens* (1861), an important book in the history of British and English-speaking lichenology. Mudd used microscopic characters for lichen identification, an advance in the science of his day. The species were illustrated 130 drawing of ascospores. But it has long been a mystery how to convert Mudd's ascospore measurements in "inches" into modern metric measurements (Hawksworth & Seaward, 1977).

Recently, Mudd's measurements became a critical problem for us. We were engaged in a study of a North American *Stigmidium* on *Aspicilia* species that occurs from eastern North America to Yosemite in California. The taxon, which has "type b" periphysoids (Kocourková & Knudsen, 2009) was probably new to science but our ascospore measurements were similar to the size of the measurements given for *Stigmidium aggregatum* which was originally collected on *Aspicilia calcarea* by Admiral Jones in Ireland and described by Mudd as a *Thelidium* (Hawksworth, 1983; based on Vouaux, 1912). We looked for both the Mudd type of *Stigmidium aggregatum* and *Stigmidium* specimens on *Aspicilia* collected in Europe. We found neither. David Hawksworth could not find any notes that he had actually seen the Mudd type and he could not personally find the type in the Natural History Museum in London or at the Royal Botanic Gardens in Kew.

After a year of trying to locate material of *Stigmidium aggregatum* on *Aspicilia,* we were exasperated. It was obvious we would not be able to resolve our problem. We could not identify our specimens as *Stigmidium aggregatum* and report the species new for North America because we did not know what kind of hamathecium the holotype of *S. aggregatum* had, an important character in our analysis. And, because the American taxon was a possible synonym of *S. aggregatum*, we could not describe it as a species new to science either.

We decided to try to figure out how to convert Mudd's measurements. He said the ascospores of *Stigmidium aggregatum* were "large" so we decided to compare Mudd's measurements of other species which we consider to have large ascospores: *Dacampia hookeri*, *Pertusaria leioplaca, P. pustulata*, and *P. velata* with modern measurements in the literature. We generated a conversion factor by dividing the modern measurements by those reported by Mudd. Although the size of this value is variable (2000–7600x), the average (4345) when multiplied by Mudd's measurements for *Stigmidium aggregatum* provides an approximation of the reported size in terms we can understand today (22–30 × 4.5–9 μm). (Kocourková & Knudsen, 2010; free for download at *http://sweetgum.nybg.org/philolichenum/biblio_detail.php?irn=247699*).

With this new measurement we were able to recognize the *Stigmidium* on *Aspicilia* from North America as a new species (Kocourkova & Knudsen, in prep.) We were also able to reject the synonymy of *Stigmidium eucline* with *S. aggregatum* because the specimens commonly collected on *Pertusaria* species in Europe and in the U.K. have smaller ascospores than those reported by Mudd for *S. aggregatum* on *Aspicilia calcarea* (Kocourková & Knudsen, 2010).

Recently David Hawksworth tested the Mudd conversion factor on *Sphaeria leucomelaria* which put its ascospore size nicely into the *Pyrenidium actinellum* s. lat. range and it is now considered a possible synonym.

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World distribution and ecology of *Degelia plumbea s.l.*

Introduction

Degelia plumbea (Lightf.) P.M.Jørg.& P.James, sensu lato, is a large, blue-grey, foliose cyanolichen with a prominent blue-black hypothallus and longitudinal ridges and crescent-shaped curves which often give it a scallop-like appearance (Figure 1). It is an interesting cyanolichen because it occurs in both eastern North America and western Europe. Others with a similar distribution include *Coccocarpia palmicola*, *Lobaria scrobiculata*, *Protopannaria pezizoides* as well as the rare *Erioderma pedicellatum*

Figure 1. Thallus of *Degelia plumbea* on the trunk of *Acer rubrum* at Tidney Meadows, Nova Scotia, Canada

and *Leptogium hibernicum* (Neily & Anderson, 2010). Such lichens are termed amphi-Atlantic lichen taxa *(*Galloway, 2008*)*. Recently in Northern Europe, it was recognized that populations of *D. plumbea s.l.* are comprised of *D plumbea s.str*. and a second closely related species *D cyanoloma* (Blom & Lindblom, 2010). To date this second species has not been found in North America. *D. plumbea s.l.* populations are declining in many parts of Europe. The species seems to be particularly sensitive to a reduction in humidity in its environment caused by habitat disturbance such as forestry operations or developments related to human activity (Gauslaa & Solhaug, 1998). It is sufficiently rare in North America for the Committee on the Status of Wildlife in Canada to commission a status report. The short account below summarizes what is known about the distribution and habitat of *D. plumbea* s.l. on both sides of the Atlantic.

Distribution

Europe

D. plumbea has a sporadic distribution in most of Europe but it is quite common and locally abundant in parts of Norway, Sweden, Scotland and Ireland and the Iberian Peninsula (Fig. 2) (e.g. Carballal *et al.*, 2007; Jørgensen, 2007). It also occurs off Africa on the islands of the Azores, Canaries and Madeira, as well as on the islands of Corfu, Corsica, Crete and Sardinia in the Mediterranean (Tonsberg, 1999; Coppins, *pers. comm.*). *D. plumbea* is known from as far east as Georgia and Turkey (Elenkin, 1901; Nakhutsrishvili, 1986; Tufan *et al.*, 2006). It is recorded from other countries bordering the Mediterranean (Spain, Portugal, Italy, Greece and Syria) as well as from Croatia, Slovenia, Montenegro, Bosnia and Herzegovina (Bilovitz *et al.*, 2008; Savić, 2001; Mayrhofer, *pers. comm.*). *D. plumbea* has been reported from North Africa, Tunisia, Algeria and Morocco but is very rare there, most of the collections being made between 1909 and 1930 (Degelius, 1935: 140; Jørgensen, 1978).

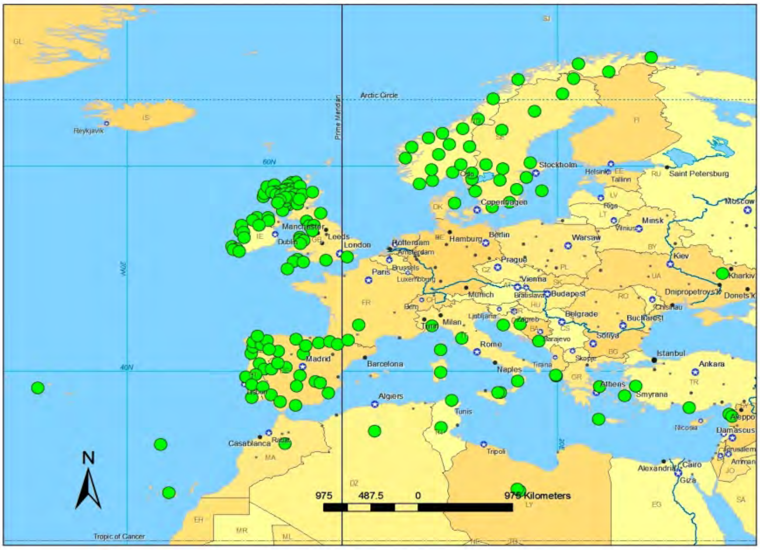

Figure 2. The distribution of *Degelia plumbea* in Europe (Carballal *et al.*, 2007, Jørgensen 2007; BLS Mapping Scheme database, etc.)

North America

Historical records

D. plumbea is the only species of the genus known from North America (Hinds & Hinds, 2007) and is restricted to the northeastern part of the continent. This lichen was first reported from the USA by Tuckerman (1882) from an oak on Newport (now Champlain) Mountain on Mount Desert Island in Maine and from trees and rocks near Cliff Cottages, Seal Harbour, Mount Desert Island by Wilson (1889). Early records from Canada are from Grand Manan Island, New Brunswick, by Henry Willey in 1879. The specimens are in the Farlow Herbarium in Boston. Between 1885 and 1888 Ernest Delamare also collected specimens of *D. plumbea* at Coal River (now Coal Brook) in the west and at Whitbourne in east of Newfoundland as well as from Langlade on the nearby French Islands (St Pierre et Miquelon). These specimens are now in the herbarium at Munich (Beck, *pers. comm.*). Further collections from Newfoundland were by Waghorne in 1895 from Whitbourne which are deposited in the Natural History Museum London in 1896 as part of a collection of Newfoundland lichens and were incorporated in a catalogue by Macoun (1902). The earliest collection of *D. plumbea* from Nova Scotia was by Mackenzie Lamb 1952, who collected it from Cape Breton Island (Lamb, 1954). The specimen is in Ottawa (**CANL** 2881). There appear to be no historical collections from mainland New Brunswick.

Current distribution

D. plumbea is common in Nova Scotia, rare in Newfoundland, and very rare in New Brunswick and Maine. Recent surveys have shown that there are 88 occurrences in Nova Scotia, ten in Newfoundland, three in New Brunswick and two in Maine. An occurrence is defined as a place where this lichen occurs that is more than 1km from a second occurrence (Figure 3).

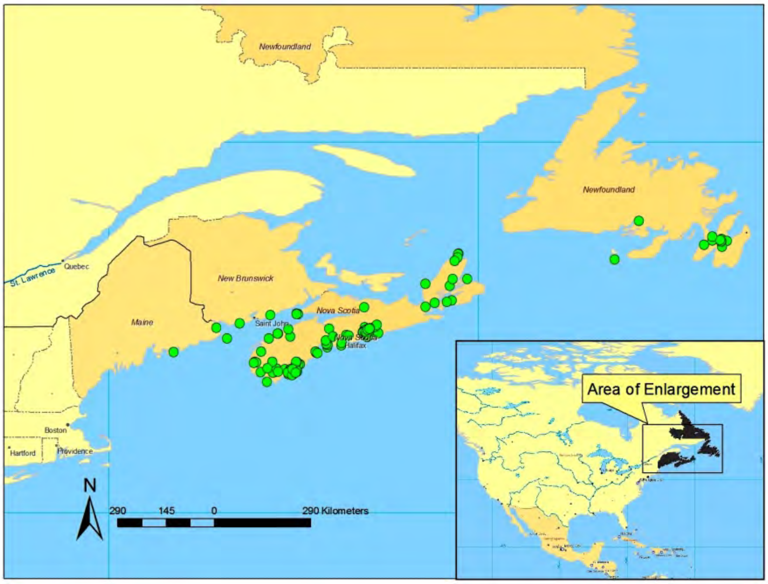

Figure 3. The distribution of *Degelia plumbea* in North America.

In Nova Scotia, *D. plumbea* is most common in forests bordering the Atlantic coast, especially toward the southern end of the peninsula. Its occurrences on Cape Breton Island and along the Bay of Fundy are also primarily near the coast. Its most common host tree is red maple (*Acer rubrum*) but it also occurs on several other deciduous trees. Many of the current sites were discovered in the course of surveys for the rare *Erioderma pedicellatum* Hue which also occurs near the coast.

In nearby New Brunswick, distribution records are from the island of Grand Manan and from the coastal forests on the mainland. On Grand Manan, *Degelia plumbea* was re-discovered close to the airport in 2002 by Maxwell. It had disappeared by 2008, but was found again a few km away the same year (Richardson & Seaward, unpublished data). On the mainland, there are two current locations along the Fundy coast: Maces Bay, Charlotte County and Ten Mile Creek, Bains Corner, Saint John County. These coastal occurrences were discovered during recent research on cedar swamps (*Thuja occidentalis)* carried out by the New Brunswick Museum. The Maces Bay occurrence was discovered in 2005 (Sabine, *pers. comm*.) and the Ten Mile Creek occurrence was found in 2006. The specimens are in **NBM** (Clayden, *pers. comm*.).

In Newfoundland, *D. plumbea* is currently only known from the southeast corner of the province. It occurs at the Sir Robert Bond Park, Whitbourne; Hall's Gullies; a rock cut on the Argentia Access Rd; Murphy's Pond; and St Catherines on St Mary's Bay on the Avalon Peninsula. It has also been found, with the help of the Miawpukek First Nation, at three locations in the Bay d'Espoir area, close to where it was recorded by Ahti (1983). It is generally found on yellow birch, *Betula alleghaniensis,* but has been recorded very occasionally on conifers.

In the USA, *Degelia plumbea* is currently known only from two coastal locations. The first is close to the historical site on Mount Desert Island, Maine. A single thallus was found in 2005 on ash (*Fraxinus americana*) about 10m from a stream (Werier, *pers. comm*.). The second location near Cobscook Bay State Park, Maine on eastern white cedar (*Thuja occidentalis)*, was discovered in 1981 by Maass, but the specimen only came to light in 2010 (Anderson, *pers. comm*.). It still (2010) occurs at this site (Richardson & Seaward, unpublished data). Searches for additional occurrences on islands off the Maine coast, including Bois Bubert Island, Head Harbour Island and Roque Island, have failed to find it (Richardson & Seaward, unpublished data).

Habitat requirements

D. plumbea is usually found on the trunks of old broad-leaved trees growing in moist habitats. In northern Europe, *D. plumbea* is closely associated with ancient deciduous woodlands where the summers are cool, winters moderate and the rainfall high. *D. plumbea* is found as a component of the Lobarion community on mature trees in forests with a high humidity and which provide considerable moisture-retaining shade in the warmest months. In Canada, *D. plumbea* occurs in coastal suboceanic areas but also at some distance inland in damp valleys. It prefers cool, humid woodlands that may be mixed coniferous/hardwood or dominated by deciduous trees. It colonizes mature deciduous trees such as maple (*Acer* sp.), ash (*Fraxinus* sp.), oak (*Quercus* sp.) and yellow birch (*Betula alleghaniensis)*. In New Brunswick, at two of the three known occurrences (and at one location in the USA), it is found on white cedar (*Thuja occidentalis)*. In Newfoundland it is most common on yellow birch (*Betula alleghaniensis*), but has been found on spruce (*Picea* sp.). In both Europe and

North America, *D. plumbea* has been reported very occasionally to colonize moss-covered rocks near the sea.

Northern Europe

A recent study in Scotland showed that *D. plumbea* was most frequent from sea level up to about 150m elevation, in the hyper-oceanic temperate rainforests. The lichen was more often found on trees in proximity to streams, especially at the margins of its range. There, it had a strong association with *Fraxinus excelsior*, its preferred host (Lisewski, 2008). The requirement for moist humid conditions seems also to obtain elsewhere. Thus, in Western France, it was formerly found near Cherbourg and Vire, in moist narrow valleys on stunted *Quercus pubescens* at altitudes of c. 200m (Coppins, *pers. comm*.). In Scandinavia it is mainly a lowland species, but is found up to 1000m in Norway

The Mediterranean

Around the Mediterranean, *D. plumbea* is mainly found at altitudes of 500-900m and occasionally up to 1500m (Jørgensen, 1978; Zedda, *pers. comm*.), much higher than in northern Europe, especially on the islands, where it is found in shaded gorges and in closed humid woodlands between 170 and 1600m (Spribille *et al*., 2006; Grube, 2008; Codogno & Puntillo, 1993; Nimis & Poelt, 1987; Zedda, 2002; von Brackel, 2008; Beck, *pers. comm*.; Coppins, *pers. comm*.). The climate of Mediterranean countries at lower elevations is generally too warm and dry for *D. plumbea* except in the mountains where cloud cover is usually more extensive. Around the Mediterranean, *D. plumbea* is found on mature deciduous trees with coarse bark in humid, old forests (Martinez *et al*., 2003; Carballal *et al*., 2007), or in undisturbed valleys where streams keep the humidity high (Puntillo & Ottonello, 1997). In Slovenia, it is still frequent in the remote forests of the Dinaric Mountains (Suppan *et al*., 2000) in woodlands made up of *Sorbus, Fagus* and *Acer* that are subject to periodic heavy rainfall and exposed to the flow of cool humid air (Grube, *pers. comm*.). By contrast, in Croatia, it can be found in grazed, open forests (pasture woodland) consisting mainly of *Quercus ilex* and *Q. pubescens* (Komposch, *pers. comm*.) In the mountains of Montenegro, part of the Dinaric system, it occurs on old growth *Castanea sativa* forests with trees over 200 years old (Savič, 2001; Bilovitz, *et al*. 2008). In southwestern Turkey, it occurs at 960m in a steep-sided canyon, while in Syria it occurs at elevations of 500-1400m (Sipman & Zedda, *pers. comm*.). In Tunisia, it has been recorded at 760m (Beck, *pers. comm*.).

North America

Maritime Canada and Maine mark the boundary between deciduous-dominated Alleghenian forests of the south and the coniferous dominated boreal forests of the north and Newfoundland. The Acadian Forests in between are a mixture of deciduous and coniferous species (McMullin *et al*., 2008). *D. plumbea* thrives in such forests where there is a strong maritime influence, i.e. within 30km of the coast, or when very near the coast, in forests that surround sheltered bays or inlets. It can be found from sea level to just over 300m. Annual precipitation generally exceeds

1200mm and much of this falls as rain. Marine advection fog occurs up to 2000 hours per year along the Atlantic and Fundy coasts (Clayden, 2009) and is also common in Newfoundland.

On mainland New Brunswick, where no historical records of it exist, both current occurrences of *D. plumbea* are within 5 km of the Bay of Fundy in the fog belt in low-lying, mossy, forests dominated by eastern white cedar (*Thuja occidentalis*). Some of the cedars are nearly 400 years old and the stands are dark all year-round (mostly 75-90% crown closure). They are generally humid, with deep moss cover on the ground and an open understory with scattered balsam fir (*Abies balsamea*), occasional red spruce (*Picea rubens*), and mountain paper birch (*Betula cordifolia* (Clayden *pers. comm.*). On Grand Manan Island, New Brunswick, *Degelia plumbea* was recorded by Maxwell in 2002 on beech (*Fagus grandifolia*) and more recently by Richardson and Seaward on sugar maple (*Acer saccharum*).

In Nova Scotia, *D. plumbea* thrives in the Atlantic coastal forests in mixed forests containing red maple (*Acer rubrum*) that are in wet depressions or adjacent to streams, rivers or lakes. These wet habitats are referred to as red maple swales (Golet *et al.*, 1993). Red maple can make up 50% of the tree species composition while balsam fir (*Abies balsamea*) is also a common component, up to 30%. The age of red maples, in sites where *D. plumbea* is frequent, can exceed 90-100 years, though the stem size may be as small as 10cm dbh (diameter at breast height). Despite the relatively young age of these trees, the woodlands may be very ancient due to wave/gap replacement occurring on a local and movable patch scale in the landscape (Mosseler *et al.*, 2003). On the Atlantic coast, *D. plumbea* is also found near rivers and streams or adjacent to wetlands. It occurs less frequently in deciduous forests on rich soil on hillside slopes as in the Cape Breton Highlands, on the North Mountain on the Fundy coast, and in the Cobequid Hills. These forests are dominated by sugar maple (*Acer saccharum)*, yellow birch (*Betula alleghaniensis*) and beech (*Fagus grandifolia*).

In Newfoundland, the woodlands where *D. plumbea* occurs are characterized by scattered mature yellow birch (*Betula alleghaniensis*) within wet boreal forests dominated by balsam fir (*Abies balsamea*) (Thompson *et al.*, 2003). Though trees are little more than a century old, such forests may also be ancient due to wave/gap replacement (Mosseler *et al.*, 2003) In Southeast Placentia it has been found on *Picea glauca* and occasionally on *Picea mariana*. Most of the Avalon Peninsula occurrences are within 25 km of the sea. At Lockyer's Waters and Fox Marsh, *Degelia plumbea* occurs in woodlands that are gently sloping and near small lakes or streams at elevations of c. 200m. The Conne River occurrences are c. 5 km from the head of Bay d'Espoir, some 150 km to the northwest of the Avalon Peninsula occurrences.

In Newfoundland, the population of *D. plumbea* at Whitbourne Park and Salmonier River (St Catherines) is unusual in that this lichen along with the Lobarion community, such as *Lobaria pulmonaria, L. quercizans, L. scrobiculata, Nephroma laevigatum* and *Dendriscocaulon intriculatum,* colonizes a range of non-native *Acer* species, including Norway maple (*Acer platanoides*).

Threats

Forestry

In New Brunswick, the occurrence of *D. plumbea* on Grand Manan Island and the other two on the mainland have no legal protection from harvesting activity. Harvesting can increase wind and drying effects in adjacent forests (Hunter, 1990). In Nova Scotia, there is considerable forestry activity in areas near to the locations where *D. plumbea* occurs. To date, direct harvest has been less of a threat to *D. plumbea* than the reduction in habitat humidity from edge effects. In the last 10 years clear cuts have avoided wet habitats and focused on coniferous species. Recent regulatory changes allow the harvesting of woodlands for biomass energy production which may well create a market for trees including red maple that were previously considered unmarketable.

In Newfoundland, the area with the largest known population of *D. plumbea* is scheduled for harvesting. The effectiveness of proposed buffers in this area for protecting two other rare lichens *Erioderma mollissimum* and *E. pedicellatum* are unknown. Buffer zones (~20m) have been of mixed success in maintaining lichen species (Cameron & Neily, 2008). In some areas where the balsam fir (*Abies balsamea*) has been harvested, yellow birch (*Betula alleghaniensis*), the host for *D. plumbea,* have been left as seed trees. However, mature trees of this species tend not to adapt well to the open environment and die or are blown down (Hanel, *pers. comm*.). In addition, regeneration of yellow birch (*Betula alleghaniensis)* is inhibited by browsing moose. These are an introduced species in Newfoundland, and their populations have increased dramatically in recent years (Goudie, 2008).

Development

Road building can affect the micro-climate of nearby forests by concentrating water flow and diverting natural water drainage systems (Cameron, 2006) which can change the moisture regimes in nearby moist deciduous or mixed woodlands where *D. plumbea* is typically found. The Newfoundland and Labrador Department of Natural Resources (Anon., 2006) estimates a conversion rate of forest to other uses (cottages, agriculture, residential housing, roadways and other) to be c. 1200 ha per 5 years in the Avalon Peninsula. Developments in New Brunswick and in Nova Scotia also pose a threat to this lichen as they are largely unregulated or complicated by overlapping jurisdictions; a problem especially in areas near the coast where it is common.

Air Pollution and Climate Change

Cyanolichens are extremely sensitive to air pollution and acid rain (Richardson & Cameron, 2004; Cameron & Richardson, 2006). Despite declines in eastern Canada and western Europe, large areas continue to receive significant acid deposition. Continued exposure to acid rain eventually results in the buffering capacity of the substratum being exceeded so that it becomes too acid for sensitive cyanolichens to survive or more importantly for very young thalli to thrive (Nieboer *et al*., 1984).

Preliminary analyses of fog frequency along the Atlantic coast of Nova Scotia and the Avalon Peninsula of southeastern Newfoundland suggest that a significant decline has occurred over the past several decades (Beauchamp *et al.*, 1998, Muraca *et al.*, 2001). *D. plumbea*, like several other cyanolichens occurring mainly in coastal fog forests, is a very drought-sensitive species (Gauslaa & Solhaug, 1998). The reported declines in fog frequency and climate change are ongoing (Walmsley, 2010) and could negatively affect the survival of sensitive cyanolichens in the medium to long term.

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New Frontiers for Lichenology in Sri Lanka

Introduction

Sri Lanka is one of the smallest, but most biologically diverse countries in Asia. Together with the Western Ghats of India, Sri Lanka is recognized as a biodiversity hotspot for its unique assemblages of endemic plant and animal communities. The wide range of topographic and climatic variation and separation from the Indian subcontinent as an island since the late Mesozoic era has contributed to special features of its biodiversity in Sri Lanka.

The endemic flora of the country is represented by a variety of taxonomic groups including 23% of the flowering plants as endemics. However, lower plant groups have not received much attention, and knowledge with regards to diversity and distribution is rather incomplete.

Earlier records of lichens

G.H.K.Thwaites was a director of the Botanical Gardens in Sri Lanka from 1849-1880 and made the first collection of lichens in Sri Lanka with duplicates sent to the British Museum and other European herbaria. Leighton (1870) described 196 species from this collection including 43 species new to science. A visit by Almquist in 1879 (Stockholm NRM) produced a collection of lichens that formed the basis of Nylander's *Lichenese Ceylonenses* (Nylander, 1900). A.G.H. Alston, who wrote the "Kandy Flora", a supplement to Trimen's handbook, made the third lichen collection which included lichen species collected during 1926-1931. Other collectors included S. Kurokawa and M. Mineta in 1966 and 1968 who provided accounts of *Anaptychia* and the *Parmeliaceae*. Under the Flora of Ceylon project conducted by the Smithsonian Institution (1970-1976), lichens were collected from a range of sites including the drier lowlands areas of the country by Rolf Santesson, Anders Tehler and Louis Wheeler. During the 1970's Roland Moberg and Mason Hale visited Sri Lanka, where Hale collected lichens from the canopies of giant Dipterocarp trees while the logging was taking place in the largest pristine rainforest – Sinharaja. These collections resulted in regional accounts of *Relicina* (Hale, 1980) and "A revision of the lichen family *Thelotremataceae* in Sri Lanka" which was published in the *Bulletin of the Natural History Museum* in 1981.

Following a botanical excursion from the University of Vienna in 1984, Brunnbauer (1984-1987) compiled an account of the literature on lichens in Sri Lanka in 15 fascicles (unpublished), which included 546 species together with synonymy. In 1984, Jayasooriya donated his collection of lichens which included 17 specimens to the National Herbarium of Sri Lanka from Ritigala – a unique mountain habitat. Further publications by Moberg (1986, 1987), Awasthi (1991), Makhija & Patwardhan (1992), Breuss & Brunnbauer (1997) and Vezda *et al*. (1997) have brought the number up to 659 species.

The first workshop on lichenology at Peradeniya was conducted by P.A. Wolseley and G.N. Hariharan in 1999. During this workshop 98 taxa were collected and deposited at the National Herbarium of Sri Lanka. Collections made for extracting the secondary products of lichens following this workshop contributed to papers on *Usnea* and a description of two new species of leprarioid lichens by Orange *et al*. (2001). During a five year survey of lichens carried out by S.C.Wijeyaratne (1999-2003) in Ritigala Mountains 35 new records for Sri Lanka were described.

Since then several other lichenological excursions have been carried out by botanists in Sri Lanka which brought the number of lichens up to 696 (Nayanakantha & Gajemeragedara, 2003; Karunaratne, 2006). Udeni Jayalal and his research team carried out a survey in Horton Plains from years 2004- 2009. Results from his PhD thesis suggest that the total lichen number could be *ca* 1000 species. When all vegetation types are included, ongoing research suggests that this number will be exceeded.

Significance of the present research project

In the tropics, environmental techniques using lichens are less developed owing to a lack of knowledge of the taxonomy and ecology of the organisms themselves (Coppins & Wolseley, 2002). The present lichenological survey is being carried out in Knuckles mountain range in Sri Lanka. This pioneer study focuses on the diversity and species distribution of the lichen flora in the mountain range, where lichens have not been systematically inventoried and documented. This study will also assess the variation in species and diversity of lichens under different forest management regimes and environmental conditions in order to establish their potential as bioindicators of environmental alteration in habitats in the Knuckles mountain range.

Study site

The Knuckles mountain range, known as smoky misty mountains, covers an area of 2100 ha in the central mountain regions of Sri Lanka. The aggregation of spectacular peaks is a unique feature in the Knuckles range, found nowhere else in the island. This area was named as 'Knuckles' due to a prominent landscape feature - a group of five peaks that resemble the knuckles of a clenched fist, where the general landscape is extremely rugged with more than 35 peaks rising above 900 m. The location and topography of the mountain region has resulted in a wide range of rainfall and temperature in different parts of the area. Average annual rain fall ranges from 2500 mm to 5000 mm from driest to wettest areas and the region is exposed to strong winds during the monsoons. Therefore, this is a natural laboratory that encompasses all five climatic zones on the island within five major forest formations (Bambaradeniya & Ekanayake, 2003).

Spectacular view of the Knuckles Mountain Range (image ©Vimukthi Ambuldeniya)

The ecological zones include montane forests, sub-montane forest and semi-evergreen forest types. Extensive strips of riverine forest flank the streams and rivers, giving way to extensive grasslands. Above 1300 m, the so-called 'pygmy' forests occur, a mesmerizing world of stunted wind-sculpted trees on a rocky substratum with only a thin layer of soil. Man-influenced semi-natural vegetation types present in the area include wet patana grasslands and extensive dry patana grasslands interspersed with savanna. Man-influenced secondary vegetation types that are located near forest edge areas include scrublands, home gardens, agricultural lands of tea, rice and chena cultivation and plantations of trees such as *Pinus*, *Eucalyptus* and *Acacia*.

Wet patana grassland (image © Nilantha Vishvanath)

The variety of habitats and vegetation types in Knuckles range harbours very rich communities of endemic fauna and flora. 15% of the island's endemic flowering plants and 38% of inland vertebrate species are present in this region.

Whilst the peaks remain uninhabited and covered with forest, human settlement has been established in the river valleys for over 2500 years. These villages in the mountain range form a unique bio-cultural landscape hidden in the forest due to poor access where the communities co-exist with the forest maintaining and sustaining their cultural heritage.

Methodology

Taxonomic sampling has been correlated with microhabitat conditions to assess the diversity and distribution in relation to a range of environmental gradients in disturbed and natural habitats. Quantitative sampling was done by laying plots of 100 m^2 randomly in different forest types and disturbed habitats at different altitudes. GPS locations of all the plots were recorded. Ten trees were sampled randomly in each plot. Samples of lichens were collected for identification. Trees that were used to register lichens were identified from herbarium specimens. The bark pH of every sampled tree was measured using a standard method. Environmental parameters such as aspect, elevation, light intensity, canopy cover and DBH and bark characters were recorded for each sampled tree (Wolseley *et al*., 2007).

Surveying lichen diversity on riverine boulders

Lichen samples were preserved using standard methods and identification work is in progress. More than 1000 lichen specimens have been deposited in the lichen herbarium of the Department of Botany, USJP from field visits. The research work carried out was done under the supervision of Prof. S.C.Wijeyaratne of the University of Sri Jayewardenepura. 400 lichen specimens were taken to the Natural History Museum, UK and identified using different methods. For those genera, where conventional identification methods failed, thin layer chomotography and molecular studies were conducted (Prado *et al*., 2006, Campo *et al*., 2010).

For preliminary statistical analyses, alpha diversity (H') was estimated for each forest type using the Shannon-Wiener function. Principal component analysis (PCA) was used to extract the important parameters which contribute to the compositional differences among sites. The collected data were analyzed to assess the relationship between lichen diversity and environmental conditions in different forest management regimes using one-way analysis variance, least significant difference - LSD (mean comparison) (Crawley, 2005, Maguran, 2007) and regression tree analysis (Breiman *et al*., 1984). Preliminary statistical analyses were carried out using SPSS version 13.

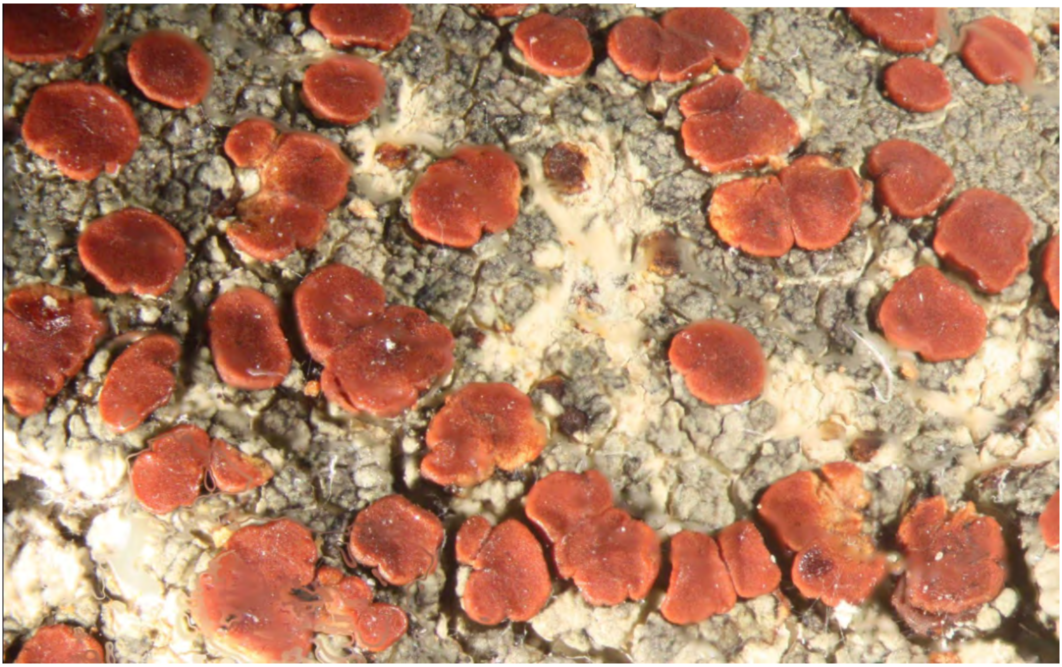
Results

A grant from the British Lichen Society enabled me to come and work with Pat Wolseley and Holger Thüs to identify around 400 specimens that I had collected on this project, using the facilities at the Natural History Museum. These included access to state of the art microscopy including photography of specimens and microscopic features using the advanced technology at the Sackler Laboratory. I also used HPTLC to identify compounds in critical groups and completed a project with Cecile Gueidan on molecular analysis of some Sri Lankan pyrenocarps.

More than 500 lichen specimens are now identified to their species and/or generic levels. Some specimens were sent to specialists abroad for confirmation. Among these there are *ca* 150 new records for Sri Lanka and several taxa that are new to science.

↑ *Usnea* spp. are only frequent in the montane forests and are as yet unidentified

↓ *Pyrrhospora russula*, a colourful lichen found on trees in drier forest sites



Sticta spp. on shade trees in cardamom plantation

Preliminary statistical analysis of the data indicates that:

- Three important variables determine the lichen diversity of the study area; type of vegetation, altitude and association with other cryptogamic communities.
- Micro ecological factors play an important role in lichen distribution & diversity in different habitats.
- There are distinct lichen communities associated with vegetation types.
- Bark pH plays an important role in the lichen distribution where many species prefer slightly acidic barks.
- Species richness was negatively related to DBH.
- The diversity and distribution of lichen species in Knuckles mountain range shows considerable spatial variation within different vegetation types and with disturbed and undisturbed habitats.
- The results showed that pristine forests contain highest lichen diversity where certain species occurred predominantly.
- This may be due to the heterogeneity of microclimatic conditions and specialist lichen communities associated with pristine tropical forests.

- The high lichen diversity in tea plantation indicates that loss of lichen diversity is not occurring at the selective logging stage, but following complete clearance of the forest and conversion to agriculture or plantation.
- Low diversity recorded from *Pinus* and *Acacia* plantations indicated that when the natural vegetation has been removed and replaced by exotic species, there is no source of lichen propagules or suitable substrata for colonization.
- The definition of lichen communities associated with pristine and disturbed or managed forest habitats will enable their use as indicators of pristine forests in the tropics and of disturbance factors that may be determine for sustaining tropical diversity.

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Derbyshire Field Meeting, October 2009 – a DNA postscript

The mystery of the *Usnea* collected by Viv Lisewski in Lathkill Dale NNR has been solved. This specimen featured in the report of the October 2009 Derbyshire Field Meeting (see BLS Bulletin no 106, p113).

The detective work undertaken at the Royal Botanic Garden Edinburgh is reported as follows: "Viv's specimen from October 2009 (SK16126616) was morphologically too juvenile to identify, without any of the development of isidia/soredia required. Two separate TLCs showed it to have no compounds aside from usnic, and this would leave few options except *U. hirta* or *U. wasmuthii* (some British material we now know has nothing but usnic). However, the DNA analysis found good, well-supported matches with *U. filipendula*, for which there is little ambiguity in sequence data. So, I think we must assume that it is immature *filipendula*, with no chemistry. Strange but true."

There are historic records of *U. filipendula* from Derbyshire: one site in the north of the county where Oliver Gilbert had reported it as having disappeared; and one from Chatsworth Old Park (something to re-find in October 2011?). So it is back. The partners in crime on the project were Rebecca Yahr with Laura Kelly (sequencing and analysis) and Paul Harrold (TLCs and morphology). Paul is working at RBGE as a research associate and has a special interest in *Usnea* going way back to when he did a project with Peter James in the 1970s, and he is especially interested in *Usnea* and TLC. He and Rebecca both verified all morphological determinations, and they worked together in the rare cases where Paul couldn't identify a spot on a TLC plate.

Derbyshire's (and Natural England's) thanks go to the RBGE.

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Calcium accumulation in lichens of Bhimbetka rock shelter - World Heritage Zone, India

Abstract

The Bhimbetka rock shelters situated in Madhya Pradesh, India are comprised of natural sandstone and bear a luxuriant growth of lichens belonging to genera *Buellia, Caloplaca, Diploschistes, Endocarpon, Peltula, Dirinaria* and *Parmotrema.* The concentrations of calcium were estimated in five lichen species to estimate the damage to the rock shelter caused by lichen growth. Of the five lichen species *Endocarpon subrosettum* and *Peltula euploca* accumulated the most calcium i.e. 99.41±1.8 and 95.89±2.6 μg g^{-1}dry weight respectively, while lesser accumulations were observed in *Dirinaria aegialita, Diploschistes gypsaceus* and *Parmotrema praesorediosum* with 87.66±1.3, 77.45±2.1 and 41.27±0.9 μg g^{-1}dry weight respectively. The growth form and the closeness of their contact with the substrate apparently influence the quantity of calcium accumulation in lichens.

Introduction

Lichens are pioneer organisms in colonization of newly exposed rock surfaces. Lichens contribute to weathering of rock physically (mechanically) and/or chemically. The physical deterioration of rocks by lichens proceeds by the penetration of hyphae, expansion and contraction of thalli, freezing and thawing of thalli along with the associated microenvironment, swelling action of salts and incorporation of mineral fragments into thalli. The chemical weathering action of lichens is characterized by different solubilization mechanisms of mineral elements, by generation of respiratory CO_2, excretion of oxalic acid and production of biochemical compounds with complexing ability (Chen *et al.,* 2000). Lichens commonly produce secondary chemicals, including various weak organic acids, which actively chelate substrate cations, and thus modify the chemical and physical structure of substrata (Jones, 1988). Oxalic acid present in the lichen thallus reacts with rock substrata containing calcium and magnesium to form the insoluble compound of calcium as well as magnesium oxalates (Seaward & Edward, 1997). Calcareous rocks are believed to suffer more severe weathering induced by lichens. Oxalic acid plays a particularly active role in dissolution of the primary minerals of calcareous rocks (Edward *et al*., 1993). Calcium oxalate generally accumulates within and immediately beneath the lichen thallus leaving prominently white or pale deposits on the substrate (Chen *et al*., 2000). In some cases however, the presence of calcium oxalate on the surface of the lichens has also been observed (Edward *et al*., 1993). The presence of lichens on buildings, statues and other man made substrata is an indicator of the health of the environment (Seaward & Richardson, 1989). They also alter the aesthetic appearance of the monuments. However, the significance biodeterioration of monuments by lichen has been a matter of debate.

The Bhimbetka rock shelters are situated in the Raisen district of Madhya Pradesh were recently declared as a third World Heritage Zone in the state, in addition to Khajuraho and Sanchi. The Bhimbetka rock shelters consist of caves where man is believed to have inhabited for more than 100,000 years. The caves have several Stone Age rock paintings and some of them have been dated to approximately 30,000 years old (Yashodhra, 1984). The rock shelters are composed of natural sandstone and bear a luxuriant growth of lichen genera such as *Acarospora, Buellia, Caloplaca, Dirinaria, Endocarpon, Lecanora, Peltula, Physcia* and *Parmotrema*. The main emphasis of this study is to identify lichen species and growth forms causing most damage to the rock shelters chemically by formation of calcium oxalate.

Materials and methods

More than 200 lichen samples belonging to 11 families, 18 genera and 43 species were collected from the Bhimbetka rock shelters, from which the five most common taxa (*Diploschistes gypsaceus* (Ach.) Nyl., *Endocarpon subrosettum* A. Singh & Upreti, *Peltula euploca* (Ach.) Poelt ex Pisut, *Dirinaria aegialita* (Afz. in Ach.) Moore and *Parmotrema praesorediosum* (Nyl.) Hale) were selected for estimation of calcium accumulation. The lichen thallus was moistened with water and scraped from the rock surface with the help of a sharp blade. The lichen samples were washed with ionized double distilled water and oven dried at 60°C to constant weight. About 10 samples of each lichen species were collected in this way and mixed together to make cumulative samples, from which triplicates (n=3) were drawn for the analysis. The dried lichen samples were powdered to fragments of about 1.0 g in weight and digested in a mixture of concentrated HNO_3 and $HCLO_4$ (3:1) for three hours on a hot plate. Residues were filtered through Whatman filter paper no. 40 after diluting to 10 ml with double distilled water. The calcium in solution was analyzed using an air-acetylene flame in an atomic absorption spectrophotometer (*Perkin Elmer 300 Analyst, Australia*).

Results and discussion

All five species of lichen (*Diploschistes gypsaceus, E. subrosettum, Peltula euploca*, *Dirinaria aegialita* and *Parmotrema praesorediosum*) exhibited high accumulation of calcium (Table 1). *Pe. euploca* and *E. subrosettum* that have thick lobed squamulose thalli, tightly adpressed to the substrate by tufts of fungal hyphae, showed higher concentrations of Ca with 95.89±2.6 and 99.41±1.8 μg g^{-1}dry weights respectively (Table 1 overleaf). *Di. gypsaceus* contained 77.45±2.1 μg g^{-1}dry weight of Ca; it has an adpressed crust forming thalli with a thick medullary region and lacks a lower cortex. However, both the foliose lichen species *Pa. praesorediosum* and *Di. aegialita* showed lower accumulations of Ca salts. The thallus in *Pa. praesorediosum*, loosely attached to the substratum with few rhizines, accumulated 41.27±0.9 μg g^{-1} dry weight of Ca whereas *Di. aegialita* which is closely adpressed to the substrata and devoid of rhizines accumulated 87.66±1.3 μg g^{-1} dry weight of Ca. The present study indicates that close contact of lichens with substratum is responsible for higher accumulation of calcium.

According to Prieto *et al.* (1999) lichens are capable of producing calcium oxalate on various substrates, and warmer and drier sites are more conducive for its production. *Cryptothecia punctulata* Makh. & Patw., a crustose lichen collected from South India found growing on *Areca* nut trees which are exposed to several sprays of the fungicide Bordeaux mixture accumulated 10,000 μg g^{-1} of calcium (Nayaka *et al.,* 2005).

Table 1: Calcium accumulation in different lichen species growing over rock

Species	**Growth form**	**Calcium in μg g^{-1} dry weight** (Mean ± Standard deviation, n=3)
Diploschistes gypsaceus	Crustose	77.45±2.1
Endocarpon subrosettum	Squamulose	99.41±1.8
Peltula euploca	Squamulose	95.89±2.6
Dirinaria aegialita	Foliose	87.66±1.3
Parmotrema praesorediosum	Foliose	41.27±0.9

The foliose lichen *Pa. praesorediosum* has bigger thallus lobes than *Di. aegialita* but accumulated less calcium, presumably because the lobes are loosely attached to the substratum while *D. aegialita* is closely adpressed to substrate and hence more efficiently accumulates calcium.

The thickness of the medullary region and amount of oxalic acid present in thallus greatly influences the accumulation of calcium. Oxalic acid secreted by the mycobiont is extremely soluble in water and acts as a chelator of metal ions and oxalate formed at the thallus-substratum interface is closely associated with the chemical decomposition of the rock. In case of crustose lichens with ecorticated lower surfaces, the hyphal strands of the medullary region penetrate into the stone through intercrystalline spaces or by dissolution. The oxalic acid excreted by the hyphae reacts with the carbonates of the substrate, and the calcium in the form of calcium mono- and dihydrate is incorporated into the thallus in the medulla, algal or upper cortex regions. The thicker the medullary region, the higher would be the expected calcium accumulations (Seaward, 2003).

Garty (2001) considered that non-anthropogenic factors such as topography, aspect, climate and canopy play an important role in accumulation of most of the metals, metalloids and salts. The production of calcium oxalate dihydrate by lichen thalli, which is a measure of a lichen's capacity to cause deterioration of its substratum is also related to microclimatic conditions such as temperature and humidity of air as well as the chemical and physical nature of the substratum (Seaward, 2003). Though all the samples in the study area experienced similar climatic conditions and have similar substratum (exposed, hard sandstone), but lichens nevertheless exhibited wide variation in accumulation of calcium salt. Garty (2001) also found that lichen thallus morphology plays a major role in metal deposition in the thallus. *Endocarpon subrosettum* and *Peltula euploca* lack chelating lichen compounds but accumulated amounts of calcium similar to taxa with chelating capacity. According to Jones & Wilson (1985), many species of lichens do not produce any oxalic acid, but can still exert significant chemical effects on their substrate rocks. This is because lichen fungi can secrete other simple organic acids, such as citric and gluconic, which can also lead to the weathering of rocks through acidic attack and chelation.

According to the present study *Peltula euploca* and *Endocarpon subroserrum* with their dominance on the rock shelter of the Bhimbetka world heritage zone appear to be the most harmful biodeteriorating agents as they accumulated most calcium content when compared to the other lichen species. The present communication provides baseline data for conducting detailed biodeterioration studies on the monuments and also to plan conservation strategies.

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Entrance to one of the caves of Bhimbetka


Stone Age rock paintings on the wall of Bimbetka cave depicting animals


Stone Age rock paintings on the wall of Bimbetka cave depicting warriors


Lichens (*Dirinaria aegialata*) growing over rock shelters of Bhimbetka

Making Space for Nature: a review of England's Wildlife Sites and Ecological Network

Based on a report submitted to the Secretary of State, DEFRA, 16 September 2010

In September 2009, the then Secretary of State in the Department for Environment, Food and Rural Affairs, Hilary Benn, invited Sir John Lawton to chair a review of England's wildlife and ecological network. As the Secretary of State pointed out : *With the effects of climate change and other pressures on our land, now is the time to see how we can enhance ecological England further. Linking together areas to make ecological corridors and a connected network, could have real benefits in allowing nature to thrive.* The new Secretary of State, Caroline Spelman, instructed the review to proceed.

The report acknowledges that England has a special responsibility to ensure the conservation of internationally important populations of oceanic lichens. The network of wildlife sites should support the full range of England's biodiversity and must be of sufficient size to adapt to climate change.

Only 6.0% of the land-area of England is designated as SSSI for biological purposes, significantly less than the 10% protected area coverage for all biomes recommended as a minimum by the International Union of Conservation. For the network to meet the objective of halting and reversing biodiversity loss, it should include sites that protect, as far as possible, representative occurrences of all of England's semi-natural habitats and native species.

There are known gaps in the SSSI series for certain types of species. A number of notably rare species lie outside the SSSI series, including the endemic lichen *Lecidea subspeira* which is known globally only from a single churchyard in West Sussex. There are a number of species that are not known to occur in any SSSIs, but which are found in other types of sites. For example, Millook Valley in Cornwall contains several rare and threatened lichens and is not an SSSI but is both owned by the Woodland Trust and within Cornwall AONB. Nearby Lanhydrock Park is another important non-SSSI lichen site, in this instance owned by the National Trust. Natural England is believed to be planning to review the SSSI series which may lead to some of the remaining gaps being filled.

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Looking out for lichens

Emma and Nathan are relatively new members of the British Lichen Society, and are joint chairs of the Education and Promotions Committee. They have always been aware of our symbiotic friends, but were more formally introduced to lichens through attending an FSC course with John Skinner and, along with the BLS, helping with the inception, design, R&D and delivery of the OPAL Air Survey which used fungi as indicators of air quality. From this they have developed a real interest in all things Lichen. Their identification may be a little wobbly, but they make up for this with copious amounts of enthusiasm and always being on the lookout for lichens.

This fervour is far reaching; during their recent trip to Colombia they saw some fantastic examples and found they could not walk too far without taking a closer look at the exuberant displays and capture them in a photograph. Colombia possesses some of the most splendid pristine natural environments in the Americas. The country claims to have more plant and animal species per square kilometre than any other country in the world and they were lucky enough to travel through many different habitats ranging from the Caribbean coast, busy and polluted cities such as Bogota through to the clean air of the foot hills of the Andes and intense heat of the Tatacoa desert.

The abundance and variety of the lichens they encountered reflected Colombia's varied climatic zones and microclimates. They got very excited about a single *Usnea* in Bogota (elevation 2600m, average temperature 14ºC) only to see them dripping off trees while walking along the ‘Camino Real’, a Royal Road declared a national monument in 1997. This links the towns of Barichara to Guane (elevation 1340m, average temperature 22ºC) in the mountainous department of Santander. It was along this path, with very clean air that they also saw the ‘Christmas’ lichen *Cryptothecia* and *Rhizocarpon*. *Teloschistes flavicans* was spotted whilst walking along a canyon in the rolling foothills at the southern end of the Valle de Cauca in the Cauca and Hulia Department (see image above). This area was home to a pre-Colombian civilization, but all that is left now are many enthralling statues (elevation 1695m, average temperature 18ºC).

With the success of the OPAL Air Survey, they feel sure that many other people become as interested in lichens as they have, and hope that is an interest they will have for life.

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Treasures of the Backlog Boxes and voyages of discovery

It is not advisable to start a new project with a broken arm. I was just going to look for Suffolk records in the Churchill Babington herbarium; which had come to the Natural History Museum (**NHM**) via Birmingham University. I was told that far from a few folders there were twenty boxes in the backlog (reputed to be two thousand boxes) that had material from Babington's personal herbarium. Galloway (1991) has written a paper on Babington, drawing attention to this important historical collection, much of which has been incorporated; but I wish to draw attention to the fact that there are still many exciting specimens to find and much of interest of those times to explore. The most exciting find probably were four specimens collected by Darwin on the Beagle, two of which came from the Falkland Islands. There are however other people and other voyages so I have listed some of these and their botanists.

People

Sir Joseph Banks, who died in 1820, left a legacy of interest in natural history discovery. He had been enormously influential as advisor on Kew Gardens and botanist on Cook's first voyage, on HMS *Endeavour* (1768-71). Spring Grove, Isleworth, the house where he died, is now part of a campus; and surprisingly, for such a public man, he is buried in an unmarked grave in St Lawrence, Heston. It was he who persuaded Sir James Smith to buy Linnaeus's collection and Smith founded the Linnean Society, an important meeting place for naturalists. At the turn of the eighteenth/nineteenth century *English Botany* was being published by Smith and Sowerby (a family of illustrators and naturalists). It covered not only flowers but cryptogams. Most of the lichens were written up by William Borrer, who encouraged Spruce and was a friend of Mitten. Banks encouraged Robert Brown (21 Dec 1773 – 10 Jun 1858 at Soho Square) to set off to Western Australia on HMS *Investigator* in 1801, returning in 1805 to work on material for 5 years. In 1810 Brown succeeded Dryander as Bank's librarian and on Banks' death inherited his library and herbarium which he transferred to the British Museum (**BM**) in 1827, becoming the first keeper of the Botanical Collection. He is known for Brownian movement and in 1831 (published 1833) named the cell nucleus. In 1868 Hooker proposed the BM botanical collection come to Kew; this did not happen. This is the background to the period when Churchill Babington flourished, publishing his first paper in 1839 and his last in 1859; which covers a period from the publication of the *Beagle* voyage until the publication of *Origins*.

In the 1850s things began to change as Leighton published his *Angiocarpous Lichens* and the microscope became essential. William Mudd (1829-79), a self educated Yorkshireman, became Curator of Cambridge Botanical Garden 1964-79 (having in 1861 published *A Manual of British Lichens* and an exsiccate) but did not carry lichenology further after his *British Cladoniae* (1865). There is a whole collection, mostly 1864 from Cleveland, which appears related to Mudd in the Babington collection, amongst which the two Darwin specimens from the Falklands were found. The publishing of floras and exsiccate was popular but not all saw the light of day - there is a manuscript in the NHM by Deakin, who wrote most of the accounts of Bohler's exsiccatae, and probably there were others trying to create a suitable Flora. Leighton won the day with his 1871 edition, and especially the 3rd, 1879 edition, which was to be the standard until Crombie came to the NHM. Leighton published various exsiccate which are in many collections. These are represented in the Babington collection, as in most nineteenth century collections. Another name that appears in the collection is Sir Thomas Gage of Hengrave Hall, Suffolk – after whom the greengage is named. Other luminaries of the time appear such as Berkeley, better known as a mycologist, and Bloxam, who was an early collaborator, Salwey, a friend of Leighton's and Stirton, who was based in Scotland. John Marten Cripps (1780-1853) who made a private journey to Norway, Sweden and Russia is also represented; although he is probably better known for introducing the kohlrabi from Russia.

The relationship with overseas lichenologists is interesting. Boistel Alphonse Barthele (1836 -1908), a Parisian judge and lichenologist, published a lichen guide without microscopic or chemical characters following Bonner's flora. He made trips around Inverness. Jean Pierre Francois Camille Montagne (1784-1866) was a correspondent and authority who he admired. Nylander is another correspondent as was Müller Argoviensis in Geneva, Massalongo in Verona and Fries in Upsala. He also had specimens from Mougeot and Nestler's exsiccatae.

Churchill Baington's cousin, Charles Cardale Babington (1808-95), Professor of Botany Cambridge 1861-95, FRS in 1851, was probably the person who influenced him to take up lichens. Two other very influential people were Sir William Jackson Hooker, (1785-1865) first Director of Kew Gardens and friend of Borrer, who published Beechey's Botany; and his son, Sir Joseph Dalton Hooker (1817-1911) who, after his own voyages of discovery in HMS *Erebus* and *Terror* and in the Himalayas, became the next Director of Kew. Darwin's voyage on the *Beagle* was obviously a topic of the time. They carried on encouraging young men to go to far flung places such as Richard Spruce (1817-1893), born at Ganthorpe, near Castle Howard, Yorkshire; he was encouraged by Borrer to go to the Pyrenees in 1845-6, and in 1849 to the Amazon and Andes. Churchill Babington named Spruce's lichens from the Pyrenees.

William Mitten (1819-1906).
Most lichenologists when they see the initials W.M. on nineteenth century material think of William Mudd but, especially if it is Sussex material, think again. Whilst I was databasing the Borrer collection I came across his name as he was a friend and neighbour. It was probably William Borrer who introduced him to William Hooker, who offered him the job of curator at Kew in 1849. However Mitten decided to return to his birthplace, Hurstpierpoint in Sussex, with his young wife and carry on with his pharmacy shop. They had four daughters; the eldest, Annie, married Alfred Russel Wallace, the co-founder with Darwin of the theory of evolution by natural selection; the third, Flora, succeeded her father in his business.

Borrer also introduced him to Richard Spruce whose South American bryophytes he determined. Mitten was considered the premier British bryologist of the second half of the nineteenth century and his collections are now in the New York Botanic Gardens. He is less well known as a lichenologist but he did publish on lichens (Knight & Mitten, 1860). I like to think of him going out lichenising with Borrer and finding the rare *Aspicilia tuberculosa* and perhaps giving it to the visiting Larbalestier. The last paper that Babington published was with Mitten (1859) on Tasmanian lichens. Another bryologist who contributed to lichenology was Thomas Taylor (1786-1848) who also worked on Hooker's lichens from his Antarctic voyage of 1839-43. His herbarium is now at the Farlow, Harvard.

Voyages of Discovery
This was a time of exploration and discovery, of exploitation and describing. Voyages were made on sailing ships before steam came in and the shallow bottomed colliers of the east coast were ideal. The surgeon was an important character in this discovery as not only did he mend broken bones but often collected geological or zoological specimens. The surgeon on HMS Beagle left in high dudgeon when he discovered Darwin was to be the naturalist. All doctors would have some botanical knowledge as part of their herbal training. The public at home could not get enough of daring voyages and descriptions of new places and objects; it was a way to make your name.

HMS *Investigator*
An ex collier from Sunderland considered not good enough to use in the war against the French set off, commanded by Lt. Flinders in 1801, to chart the Australian coast. Robert Brown, botanist, Ferdinand Bauer, artist and William Westall, landscape artist were on board. The first ship to circumnavigate Australia but in 1803 abandoned as unfit. *Porpoise*, the replacement was wrecked off Great Barrier Reef in August 1803 with the loss of most of Brown's plants. *Investigator* was refitted and returned in 1805.

HMS *Mermaid*
Made a hydrographic survey of North and North West Australia between 1817-22 under Phillip Parker King, accompanied by Allan Cunningham (1791-1839) as botanist; he wrote the botanical appendix to King's Narrative of a survey of the

intertropical and western coasts of Australia (1827). Cunningham, from Kew, was in New Zealand between 1826-7 and Norfolk Island in 1830.

HMS *Blonde*
Sailed to Hawaii 1824-26 under George Anson, Lord Byron, to take back the bodies of the King and Queen of Hawaii who had died in England, with Andrew Bloxam as naturalist, his eldest brother as chaplain and Robert Dampier as artist.

HMS *Blossom*
Sailed the Pacific and Bering Straits 1825-28, captained by Frederick William Beechey (1796-1856), with botanists Lay and Collie. *The Botany of Captain Beechey's Voyage* (published in 1841 by Hooker), comprising an account of the plants collected by Messrs. Lay and Collie, and other officers of the expedition, during the voyage to the Pacific and Behring's Strait, performed in His Majesty's ship Blossom, under the command of Captain F.W. Beechey, in the years 1825-1828. JDH is scathing about Lay and Collie and their collections have little data.

HMS *Beagle*
27 Dec 1831 -2 October 1836 captained by Fitzroy, with the young Charles Darwin on board. 1833 in Falklands.

HMS *Erebus* and HMS *Terror*
1839-43 Joseph Hooker's first voyage to Australia and the southern seas including Antarctica.

HMS *Herald*
Under Capt. Kellett, carried out a hydrographical survey in the Pacific from 1845 to 1851. Berthold Carl Seeman, born Hanover 1825, joined it in Panama in January 1847, having been trained at Kew under John Smith (1798-1888) curator. Besides exploring inland in South America he was on board up the West coast of America and the three voyages into the Arctic in search of Franklin, before heading home via Hong Kong, Singapore, St Helena and Ascension. *Botany of the Voyage* published 1852-7. *Narrative of the Voyage* published 1853.

HMS *Rattlesnake*
Left 3 December 1946 for Australia with Thomas Huxley aboard, returning in 1850. I have found no lichens collected but include it as an important voyage.

HMS *Challenger*
Left Portsmouth on 21 December 1872, returning on Queen Victoria's birthday in May 1876. With a crew of 225 naval personnel and 8 civilians, six of them scientists she sailed almost 70,000 miles through the major oceans. 50 volumes of scientific reports were produced to form the basis of the science of the seas. There is a specimen from Kerguelen's Land Jany 1874. This is after Babington gave up lichenology so possibly a later addition.

There were also personal voyages such as that of Hugh Cuming (1791-1865) who was chiefly interested in shells and in 1827 sailed in the schooner *Discoverer*, specially designed to store natural history specimens, to Polynesia. He also went to the Philippines in 1836-40. There are specimens in the collection.

A simple project can turn into a fascinating voyage of discovery. I am grateful to Mark Spencer for getting me a pass and providing space in the Angela Marmont Centre to start my exploration. A muddled dirty job punctuated by breaks to do my physio. Unfortunately an enthusiastic porter threw away the first six empty boxes and a full one – no one will know what is now in landfill. Then I slipped and broke my hand. A move up to the top floor of the east wing gave more space but the heat was a distraction. The realisation dawned that there were no Suffolk records as Babington had given up lichenology, despite a youthful, bright talented start. He found microscopy not to his taste and took to birds. There are specimens collected in July 1843 on a trip to Rotterdam, Switzerland, Austria, France, and Germany; and in May 1846 to Malta, as well as visits to Lucca in Italy where he had an uncle. Although it is difficult to piece together his original herbarium it has provided a fascinating intellectual journey. My project had taken a different turn and became more historical but I also learnt that an arbitrary system, such as box numbering, can become more important than collating together a collection. By the time this comes out all the backlog boxes will have been transferred to folders but this collection will still be scattered across several with very distant numbers. There will, however, be a database of collectors and places. This does not convey the rich network of relationships that has interested me but I hope I have whetted your appetite for exploration.

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The vertical distribution of lichens on the tower of St Stephens Church, Bath and the effect of scaffolding and air pollution

Summary
The aim of this project was to find out if scaffolding erected 11 months previously had a damaging effect on the lichen flora of the stone work of the tower. The lichens of the south face of the tower of St Stephens Church, Bath were sampled to find out species richness and cover with 10 × 10 cm quadrats and lobes of *Caloplaca flavescens* and *Xanthoria paretina* were taken for microscopic examination to determine the viability of the algal (photobiont) cells. The results do not indicate that the scaffolding caused any damage to the lichen flora although this is not conclusive as there was a marked change in the populations and the photobiont cells of *Caloplaca flavescens* down the tower. The species richness and cover of lichens was less at the lower levels, where air pollution might be greater, than at the upper levels and the top above the scaffolding. The viability of photobiont cells in *Caloplaca flavescens* appeared to be better at the top than at the bottom as assessed by methylene blue staining. However these differences down the tower did not match the location of the scaffolding.

Introduction
The tower of St Stephen's Church, Lansdown, Bath was under repair with scaffolding covering the entire tower. The scaffolding had been erected in June 2006 and consequently could have adversely affected the lichen flora on the tower due to shading of the stonework and protecting it from rain, so significantly affecting the microclimate of the lichens occurring on the stonework.

A brief study was made with the aim of recording the lichens present, estimating their diversity (species richness) and checking the health of a common species, *Caloplaca flavescens* (photobiont *Trebouxia sp.*) found at all points up the tower. The health of the thalli is seriously affected by the state of the photobiont cells which would be most likely to be affected by shading of the scaffolding. The vital stain methylene blue can differentiate viable cells which it does not stain and was used to check the viability of the photobiont (Corradi & Corbi, 1993). The correlation between staining and cell viability is well known and can be quantified (Cifti *et al.*, 1980; Bapat *et al.*, 2006). Explanations of the mechanism of methylene blue staining for viability tests are published (Bapat *et al.*, 2006). The evidence of the effect of the scaffolding had to be considered with any vertical differences that could be caused by pollution or other environmental factors. The main basis of this approach was that the emergent spires at the top of the tower were unaffected by the scaffolding. It was assumed that the lichen colonies on these spires could be compared with those on the tower immediately below that was covered by scaffolding. Other environmental changes would be expected to be gradual up the tower. Therefore sampling strategy was to take samples at several points spaced up the tower. This is of importance in that the lichens are of conservation importance in themselves and buildings are an important habitat for them, especially in the now extensively built-over landscapes of southern Britain. In urban environments, lichens play an important part in contributing as primary producers to the ecological environment for the benefit of other wildlife. Lichens also influence the appearance of the buildings by their texture and colour and may also protect some building materials from weathering, although in some cases they may themselves contribute to the weathering processes.

Methods
The site was visited on 2 May 2007 and sampling points were chosen on the south face of the tower looking over the city of Bath where the scaffold permitted access. The main diversity of species (Table 1) was found on the sloping surfaces (samples 1-7) rather than vertical ones (sample 1a). The locations on the tower chosen were consequently drip sills, window sills and wall tops. Five small wire quadrats (10cm x 10cm) were held against the stone face with "BluTack" and the species present listed with percentage cover (Figures 5 and 6). Dry samples of lobes of *Caloplaca flavescens* (selected because it occurred from top to bottom of the tower) and *Xanthoria parietina* (selected because it is an abundant macrolichen) were taken from each sampling point where they occurred. In the laboratory small fragments were soaked briefly in water to hydrate them and sections removed at the tip and at 0.8mm from the tip of these thalli. The sections were mounted on a microscope slide and coverslip in methylene blue stain (dissolved in distilled water) and crushed with light pressure and movement on the coverslip to release the photobiont cells from the section. The methylene blue concentration was that required to stain all the cells. Where conglomerations of cells and remnants of the thallus tissue occurred, the methylene blue concentration was reduced (it appeared colourless) and cells in those locations appeared unstained (and were excluded from cell counts). For each of 2-3 lobes at each sampling point, over 100 (150-500) photobiont cells were counted and recorded according to their appearance. Four categories were distinguished based on preliminary observations: empty cells, plasmolysed stained cells, unplasmolysed stained cells and unstained cells (Figures 7 and 8). Stained cells were defined as those whose colour was predominantly blue and unstained those whose colour was predominantly green. Empty cells were defined as those with less than 50% of the space within the cell wall being occupied by cell contents. Plasmolysed cells were defined as those whose cell wall could be seen as separate from the cell contents. Statistical tests used were regression, 't'-test and Spearman Rank Correlation.

Results
About 25 species were found in the quadrat samples (Table 1) and these data formed the basis of investigating the lichen communities present.

The number of species present in the quadrats at the different sampling points (Figure 1) was not significantly correlated with height up the tower (Spearman's rank). However there were fewer species at the lower levels and the number at and below the roof tops of neighbouring buildings (which were below 15m) was significantly less than the number above (t-test $p=0.0239$ using individual quadrat data). This lower diversity was caused by lack of macrolichens below 15m. The cover was even more markedly lower below this level with the cover below 15m (t-test $p=0.0055$ using mean quadrat data for each sample point) being about half that above 15m (Figures 2, 5 and 6). For both diversity and cover, there was no difference between the scaffolded and unscaffolded parts of the tower.

The methylene blue stain test results for photobiont cell viability indicated no difference in the staining of the cells in *X. parietina* between the top of the tower and 21.8m (within the scaffolded area) which was the lowest point that this species was found on the tower. Nearly all the cells were apparently unstained and healthy looking without any plasmolysis. The staining of the photobiont cells of *C. flavescens* was variable although the proportion of unstained cells was greater towards the upper part of the tower (Figure 3). The problem with methylene blue staining is that the dye is chemically reduced to a colourless form by viable cells so that viable cells to appear unstained (Bapat *et al.*, 2006). With algal cells under the microscope, the light used to illuminate the slide can cause active photosynthesis and the evolution of oxygen. This possible complication needs further investigation which was not attempted in this study. However, methylene blue staining revealed another quite different viability feature, that of plasmolysis. Whether this was caused by the methylene blue or just revealed by it is not clear because it was not possible to observe any plasmolysis without staining with the same acuity as with the staining. However, when observed without staining, photobiont cells from the lobe tips did not appear to be plasmolysed. The proportion of the photobiont cells in thalli of *C. flavescens* recorded as unplasmolysed when stained with methylene blue decreased with height down the tower (Figure 4)(linear regression p= 0.0002 based on means). This might be considered as evidence of lower photobiont health in the lower parts of the tower. However, the result is not easy to interpret in terms of photobiont health since the lobe tips, where the more healthy cells might be expected to occur, showed, unexpectedly, a much higher proportion of plasmolysed cells than those 0.8mm from the tip, especially in the samples from the top of the tower. The scaffold parts of the tower did not appear to be demarcated.

The proportion of empty cells is a measure of photobiont mortality; high mortality would lead to additional empty cell walls. In a theoretically actively growing population, in which there is no mortality and the only empty cells are those of mother cell walls after division, the proportion of empty cells rises from 20% after the first division (one mother cell wall to four daughter cells) to a theoretical maximum of 25% after many divisions. The proportion of empty cells was not significantly correlated with height up the tower (linear regression) but lack of significance may have been due to the high variability in the data. The overall proportion of empty cells at the tip of the lobe was 19.4% and at 0.8mm 26.0% which is close to the theoretical figure for a population of cells dividing by autospore formation. These results indicate that the population of photobiont cells appears to be healthy and without a large number of cells dying.

The appearance of the lichen communities on the stonework below 15m was markedly different that above 15m. Below 15m the thalli appeared in general to be smaller, and closer to the surface of the stone giving the impression of an impoverished flora. As these variables were difficult to measure owing to the variability of thallus size and the roughness of the stone, it was not practicable to collect numerical data on these attributes.

Discussion

The investigation clearly showed that there is no marked difference between the lichen species and lichen health in the scaffolded part of the tower and the top of the tower above the level of scaffolding. However there are differences in the flora and the photobiont of *C. flavescens* lower down the tower. The cover and diversity appear to be reduced below 15m and the trend of plasmolysis observed in the photobiont of *C. flavescens* is a surprising result. Methylene blue staining may indicate a physiological stress experienced by the photobiont cells on the lower parts of the tower possible caused by air pollution.

The biological effects of methylene blue together with other similar dyes have been reviewed by Tuite & Kelly (1993) who concluded that these dyes bind weakly to membranes and in the light produce singlet oxygen which causes damage to proteins and other biological molecules. They also enter the cytoplasm and here the leuco-form of the dyes are formed by reduction by various cellular reductants such as NADH and the leuco-dyes react with oxygen in the light to become violent oxidizing agents causing damage by iron catalysed reactions. Their review does not include effects on algae or other photosynthetic organisms. But, in applying this property of toxicity, McCullagh & Robertson (2006a, b) have devised a method of killing the cyanobacterium *Synechoccus leopoliensis* and the alga *Chlorella vulgaris* with methylene blue and hydrogen peroxide for application on stone surfaces but they only used chlorophyll fluorescence to monitor cell viability. Sikaily *et al*. (2006) found that methylene blue absorption by the alga *Ulva lactuca* was not very sensitive to pH which is relevant to any possible acidifying effects of air pollution. Despite its toxicity Corradi & Gorbi (1993) and Gorbi *et al*. (2001) used methylene blue staining on microscope slides satisfactorily as a viability test for cells of the alga *Scenedesmus acutus*, viable cells remaining unstained under these conditions. Clearly, although the approach taken by this study was reasonable in its aims, any interpretation of the results presented here will require more observations on the effects of methylene blue on lichen photobionts.

The results do indicate that the lichen flora of the tower varies with height. The most likely cause is air pollution but there are also many other ecological variables that will have differential effects with height above the ground. The height at which the flora changed the most was about the same level as the roof tops of the surrounding buildings which could have trapped a pollution blanket arising from traffic and chimneys (Figure 9). There are few studies where lichens have been used to detect vertical zonation of air pollution and none were similar to this study so it not possible to compare the results here with those from elsewhere. The most relevant other study has been by Pirintsos *et al*. (2006) who found that, using absorption by lichen thalli, pollution by a range of heavy metals in an urban setting (Athens, Greece) was not significantly zoned vertically up to 12 m except for lead where the concentration was greater higher up than at ground level.

The fact that no detrimental effect of the scaffolding has been detected suggests that there may be little impact of scaffolding during building repairs on the lichen flora. But the results of this investigation were confounded with other effects probably air pollution. Without comparing samples at the time of the erection of the scaffold and immediately before removal, definite conclusions are not possible.

Confirmation of the present findings would only be possible by carrying out similar projects as indicated on other buildings.

The results of this study also suggest that tall buildings in urban areas where the top of the building pokes through a pollution blanket, roof top lichens can be useful primary producers in the ecological communities such as in green roofs. Invertebrates browsing lichens become prey for predators such as other invertebrates, birds and small mammals. Choosing suitable substrates such as porous limestones like oolite can see relatively rapid colonisations and lichen cover can develop in just a few years.

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Table 1. List of lichen species recorded in 10 x 10 cm quadrats on the tower of St Stephens Church, Bath with mean percentage cover of 5 samples. Stonework sampled: (h) = less than 45°, (v) = more than 45°, to the horizontal.

Sampling point	1 (h)	1a (v)	2.0(h)	3(h)	4(h)	5(h)	6(h)	7(h)
Height from tower base (m)	33.5	34.5	31.9	24	21.8	14	6.7	1.1
Caloplaca arcis	8	0	0.8	0	0	0.2	0	0
Caloplaca citrina	9	1.2	9.2	4	2.4	0	0	0.6
Caloplaca decipiens	0	0.2	1.0	9	6.4	2.6	2.4	0.4
Caloplaca flavescens	2.4	4.4	4.5	9	9	2.4	3.4	7
Caloplaca teicholyta	0	2	2.0	7	23	12	13	11
Candelariella aurella	0.2	0	0.5	0	0.2	0.2	0.4	0
Candelariella medians	17	0.4	11.0	10	1.2	0.6	1.8	0.4
Catillaria lenticularis	0	2.6	0.0	0	0	0	0	0
Lecanora albescens	11	3	5.2	1	0	0.2	0	0
Lecanora campestris	0	0	0.0	0	6	4	0	0
Lecanora dispersa	0	0	0.0	6.2	3.2	0	1.6	0.8
Phaeophyscia orbicularis	9.2	0	0.2	1.6	0	0	0	0
Physcia adscendens	0	0	0.0	11	1	0	0	0
Physcia caesia	0.6	0	0.0	0	0	0	0	0
Protobastenia rupestris	0	5	0.0	0	0	0	0	0
Sarcogyne regularis	0	0	0.0	0	5	0	0	3
Toninia araomatica	0	8.2	0.8	0	8	0	0.6	0
Verrucaria ?baldensis	0	0	0.0	0	1	0	0	0
Verrucaria macrostoma	0	3	0.0	0	0	0	0	0
Verrucaria nigrescens	2	0	13.3	6	11.4	9	9	20
Verrucaria sp.	0	0	0.0	0	1.2	0	0	0
Xanthoria parietina	10	0	4.2	1	2.4	2	0	0
sterile crust	0.6	0	0.0	0	0	0	0	0
Total percent cover	70	30	52.7	65.8	81.4	33.2	32.2	43.2
no. of spp.	6	4.6	6.0	7.4	8.4	5	5.6	5.4

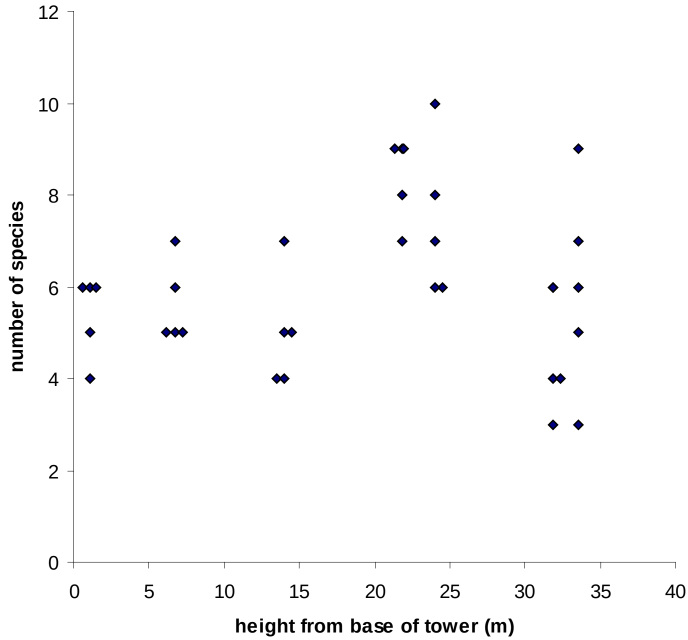

Figure 1. Species density (number of species in 10 x 10 cm quadrat) at different heights up the tower of St Stephens Church, Bath. (Some height values have been off-set to separate data points.)

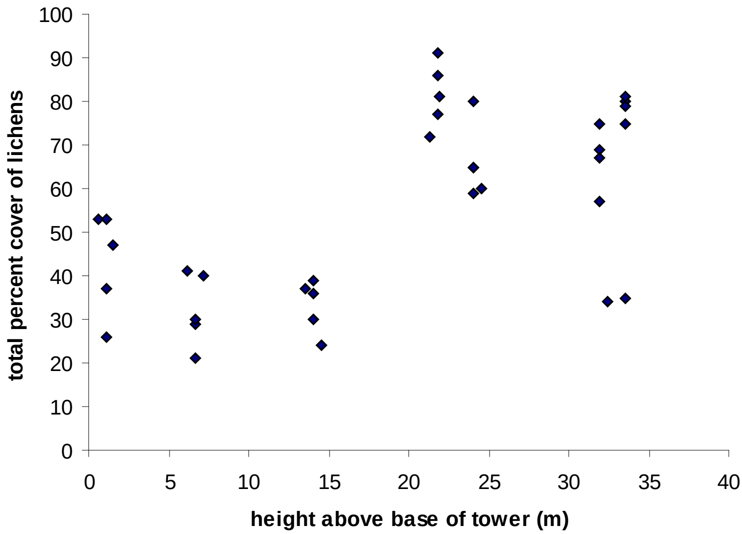

Figure 2. Percentage cover of lichens within 10 x10 cm quadrats on the stone work at different height up the tower of St Stephens Church, Bath. (Some height values have been off-set to separate data points.)

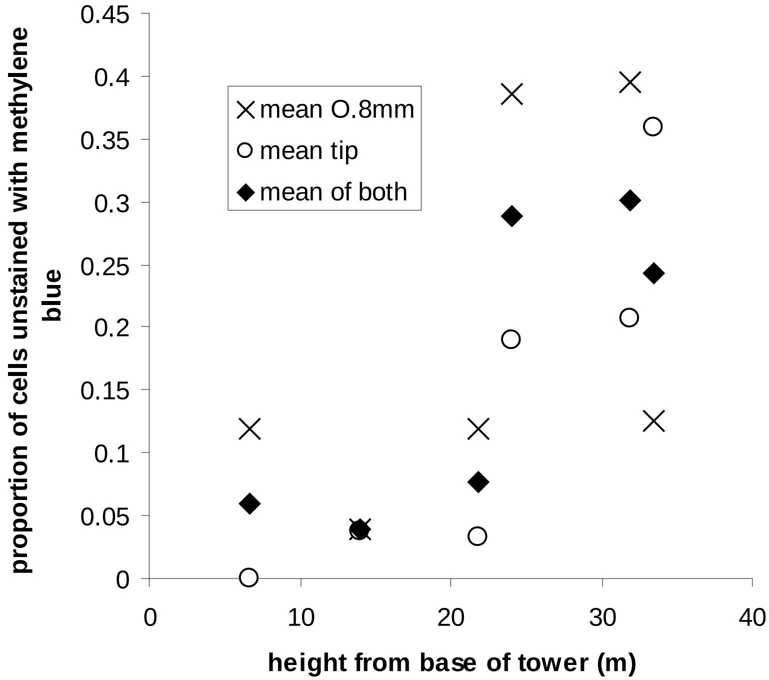

Figure 3. The proportion of *C. flavescens* photobiont cells unstained with methylene blue with height up tower of St Stephens Church, Bath.

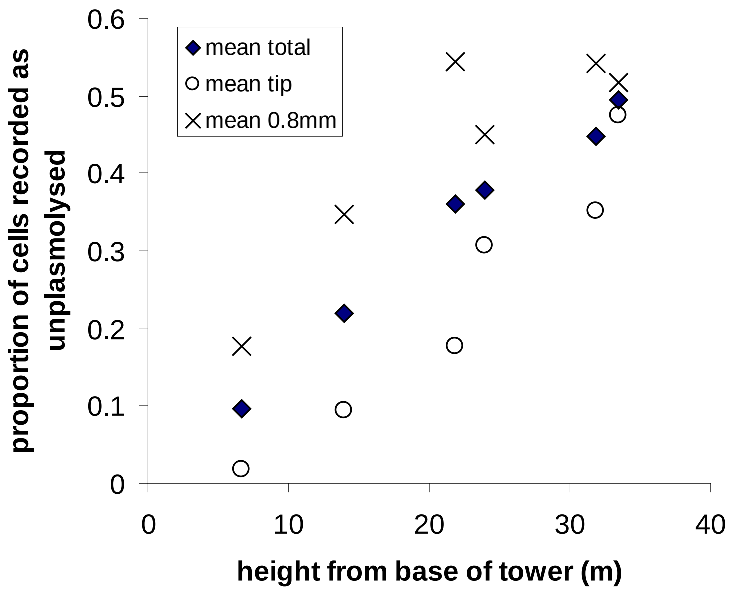

Figure 4. The proportion of *C. flavescens* photobiont cells unplasmolysed when stained with methylene blue with height up the tower of St Stephens Church, Bath.

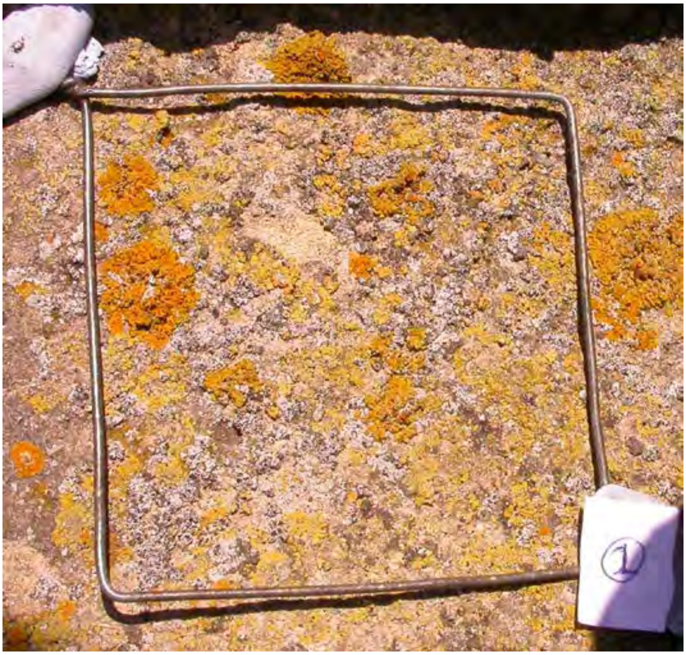

Figure 5. Lichen community at sample point 2 31.9m up tower of St Stephens Church, Bath (wire quadrat 10 cm x 10 cm).

Figure 6. Lichen Community at sample point 7 1.1m from base of the tower of St Stephens Church, Bath.

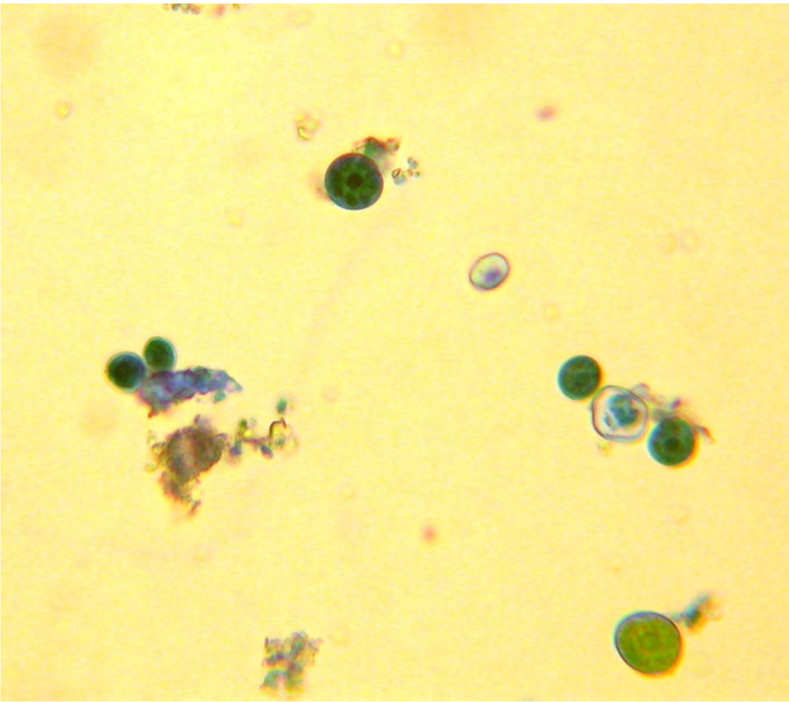

Figure 7. Showing photobiont cells (1 unstained cell (green), 3 unplasmolysed stained (bluish green), 2 plasmolysed cells (on left) and 2 empty cell walls).

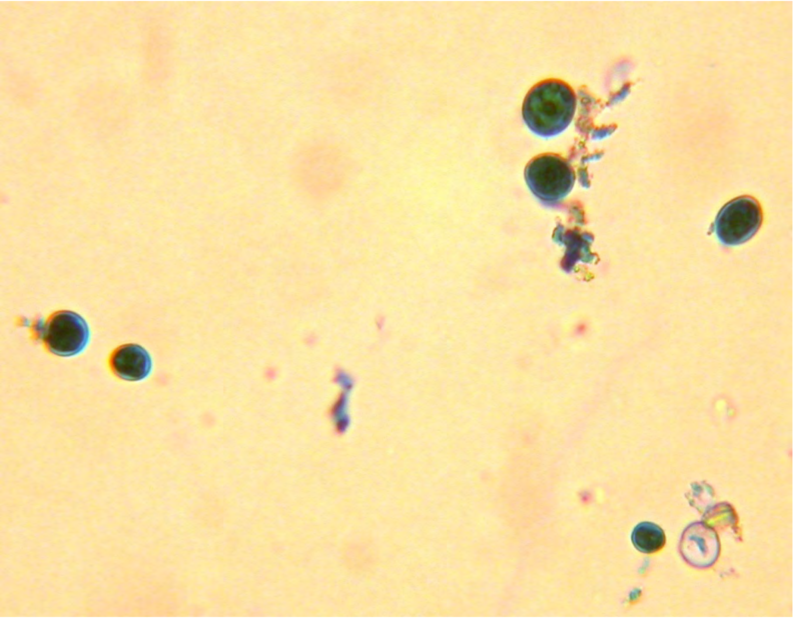

Figure 8. Photobiont cells (1 stained unplasmolysed (top), 5 plasmolysed and 1 empty cell wall).

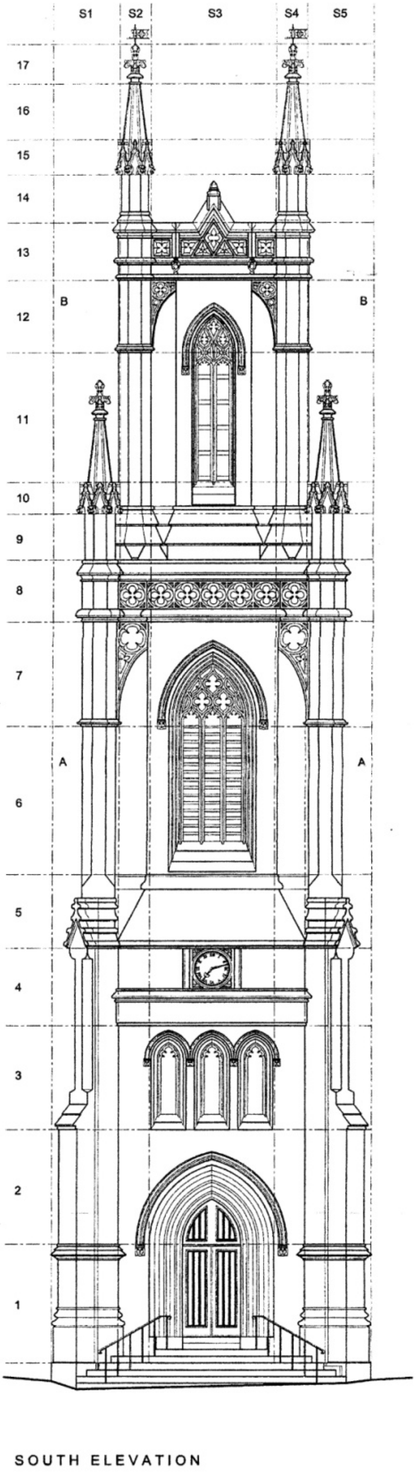

Figure 9. Elevation drawing of St Stephens Church, Bath. Sample point #2 is in zone 13 and sample point #7 is in zone 1.

The surrounding buildings stand up to approximately zone 5 (15m).

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Attadale ash keeps IAL group guessing

The 9th International Mycological Conference was held in Edinburgh during the first week of August. The week before the main event, some of the group visited Wester Ross and Skye to relax amongst the lichens. As an occasional lichenologist living in Skye, I was fortunate enough to be invited along.

I remember the start of the day at Attadale. Everyone poured out of the minibus and pulled on boots, over-trousers, jackets, rucksacks, complete with packed lunch and full provisions – and "we'll meet back here at 2'oclock", and away we go – moving off at speed … a distance of fifteen metres to the nearest ash, to walk around it several times and peer at every crevice and orifice and ostiole and perithecium, before someone wets their finger and rubs it down the white crust covering the bark, and touches their tongue before pronouncing that it isn't *Pertusaria amara* after all, but *Pertusaria albescens*!

Members of the IAL group puzzle over the Attadale ash

Most visitors to the Attadale Estate would miss all this. They would miss the fact that the white crust grows around the base of the tree but ends one and a half metres above ground level. Why the precise cut-off?

“Could it be sheep,” someone asked, “or cattle rubbing away the leafier lichens, allowing the growth of the more resistant crust?” But the lack of wool and cattle hair said not. Perhaps it was the amount of shade and sunlight, for the canopy on this tree appeared to cast its shadow on the trunk at a precise, critical height.

This is the first large tree you meet after leaving the car park. Was this significant?

Someone suggested that the white band might be a ‘canine zone’ indicating nitrogen from dogs that use it as a marking post. But one-and-a-half metres? … I don’t want to meet the dog that did that!

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Taken from Chris Mitchell’s ‘nature notes’ published in The West Highland Free Press, 20th August 2010

IYB garden diversity: what are we finding?

The invitation to survey lichens in gardens was given prominence (page 2) in the Summer 2010 Bulletin. Described as 'havens of habitats', gardens were ventured upon by intrepid lichenologists looking outside their own windows – and around local stately piles. The survey is BLS's contribution to a global initiative to celebrate biodiversity, and already results are coming in. But so far, though we have more than a handful of surveys, we would welcome more. So, while the leaves are down and twigs can be seen, take out your lenses and scrutinise them, as well as trunks, paving, benches and fences, and send lists of lichens in your garden (and those nearby) to Barbara Hilton (*bphilton@eclipse.co.uk*).

Surveys from gardens across the British Isles and overseas are all of interest. At the beginning of October the majority of returns are from gardens in England – particularly lowland England and the south-west – with responses from Wales and the Channel Islands also. It has been wonderful to receive lichen lists from New Zealand (Dunedin) and Czechoslovakia (Litomerice). Both are from gardens of about thirty years old in fairly urban locations and they report the richest habitats to be *Prunus* trees. From Dunedin is reported (among 22 lichens in this preliminary survey) *Teloschistes chrysophthalmus*: if only, we Brits might say.

Fruit trees, traditionally grown in older gardens, have provided some of the best finds in England in places as far apart as Formby and Somerset. Recently, at the BLS field meeting in Carmarthenshire, *Usnea articulata* and *Usnea florida* were both found on aged trees in the walled garden at Glynhir Mansion. A preliminary list for this walled garden showed 45 lichens, supplemented by a further 40 in the rest of the garden. In this garden most attention was given to the trees, but in Gloucestershire a garden wall with weathered old bricks showed *Hypocenomyce scalaris* alongside

Trapelia placodiodes and, on a different aspect, bright splashes of *Psilolechia lucida* near *Diploicia canescens*. Thus in many gardens with paths, patios and walls, saxicolous lichens can outshine the rest. For example, concrete is the favourite lichen-substrate in Bromley and in Kettering (where *Aspicilia contorta* is the most common lichen).

Results received by 31 March 2011 will be used to compile a report on the biodiversity of lichens in gardens. What are we finding so far?

Of the large public gardens, RHS Rosemoor (north Devon) takes the lead with 162 species, but an extensive private garden in Gloucestershire with many micro-habitats almost equals this – with a very different suite of lichens. The highest number of lichens recorded in an old private garden of more usual size (one acre) in east Devon is 104. The many different substrates in this garden contribute to its high lichen diversity which includes five *Cladonias* on thatch.

While diversity of lichens is related to the variety of available substrates, it is influenced also by the drivers of climate, geography and past history. For example, on a recent visit to RHS Wisley in Surrey, a small group of BLS members frequently recorded nitrophytes such as *Xanthoria parietina*, *Physcia adscendens* and *P. tenella* on trees, together with *Evernia prunastri*, *Lecanora chlarotera*, *Parmelia sulcata*, *Punctelia subrudecta* and *Ramalina farinacea*, but *Hypogymnia physodes* and *Melanelixia subaurifera* were not far behind. Many of these lichens were repeated on lignicolous surfaces (eg benches and notice boards). Are these lichens – and lichens in other gardens – telling a story? Send in your results, for gardens great and small, to help us find out.

See *www.thebls.org* for more information and to download a garden record form (or contact Barbara Hilton, *bphilton@eclipse.co.uk* for a copy).

Below and on the following pages are a few images of lichens from gardens to encourage you to do the survey!

Lichens on an old hardwood bench, Hampshire. The bench also harbours a population of the moss *Dicranoweisia cirrata*, a western species of acid rocks that is now declining after spread eastwards linked with SO_2 levels. Image by Bill Syratt.

Lichens colonizing a car tyre swing in a secluded unvisited part of the wooded farmland of Polhilsa Farm, near Callington, Cornwall in July 2010. The swing was hung from a mature oak tree. Image courtesy of Sandra Hunt [*sandradhunt212@btinternet.com*].

Lichen surveying at the National Botanic Garden of Wales, October 2010. Who can identify the behinds?

Usnea species from the orchard at Glynhir Mansion, Carmarthenshire, October 2010.

Left, *U. articulata* (thanks to Ann Allen and Barbara Hilton). Note the classic sausage-shaped thallus segments.

Below, abundantly fertile *Usnea florida*

A Participant's view of the Lichen Identification Course at Kindrogan Field Centre 5–12 April 2010

April 5th 2010 (Evening)

The introductory lecture, by course tutor Rebecca Yahr, began with the warning that 'lichens do funny things when they are about to perish'. This stressed the need to look for healthy material when doing fieldwork. I also learned that there were approximately 35,000 lichens worldwide and that nearly 2000 of them occur in Scotland. 37% of Europe's lichen flora is found in just 0.75% of the available land – making Scotland one of the richest places for lichens in Europe. The lecture finished with the advice that a good lichenologist searches every possible microhabitat and makes very precise notes about where a specimen was found.

April 6th 2010

Following another lecture (this time fleshing out some basic terms in order to get us started) we embarked on our first field excursion. Ten paces to the nearest sycamore and we were occupied for hours. All of us recognised *Evernia prunastri*, and we were able to compare the large, strap-like lobes of *Ramalina fraxinea* with the smaller *R. farinacea. Parmelia sulcata* was abundant and we were taught that the genus *Parmelia* could be distinguished as medium-sized, foliose lichens with white-cracking lines above (pseudocyphellae) and black below with rhizines. The two big families of foliose lichens were discussed - the *Physciaceae* characterised by a smaller thallus and quite narrow lobes and the *Parmeliaceae* which are larger with lobes >2mm wide. An example of the latter seen on the sycamore was *Melanelia fuliginosa* subsp. *glabratula* – with a brownish-green, rather shiny thallus. To represent the *Physiaceae* we were shown *Physconia perisidiosa* (distinguished from *P. enteroxantha* by the white rather than yellow medulla). The genus *Physconia* usually has a very frosted or grey-looking thallus due to the presence of pruina (a covering of crystals over the thallus) but can turn much greener when wet.

My attention was drawn to *Phlyctis argena* – an abundant white powdery, crustose lichen with lots of soredia in pustulate clusters and commonly found on well-lit nutrient-rich trees. Its thallus gave a K+ yellow to red reaction. As a bryologist I was a bit put out to learn that it can grow over innocent mosses and liverworts. However, my spirits rose when I was shown two species of pinhead lichens on a neighbouring sycamore. In a dry crevice within the bark, on a greyish, granular thallus, there were hundreds of little black stalks and on top of each was an orangey-pale-brown spore mass. This was *Chaenotheca trichialis*. On bark outside of the crevice was *Calicium viride* with a well-developed, granular thallus and lots of black stalks with a black spore mass.

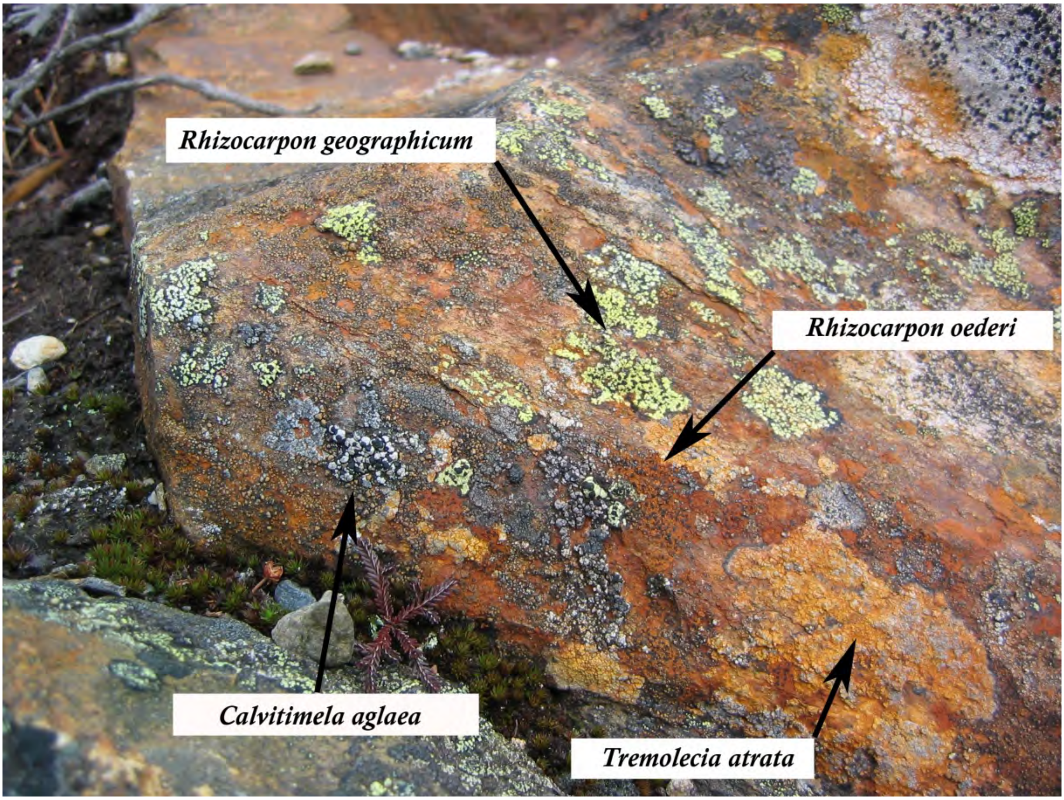

Calicium viride on sycamore

We briefly looked at a rowan and admired all of the *Pseudevernia furfuracea* and *Hypogymnia physodes*, collected a piece of the abundant *Usnea* for keying out later and returned to the laboratory. A lecture on lichen chemistry followed before we examined our specimens. In the evening, we were primed with slides of what to look out for during the excursion on the morrow. The day was not complete without another look at the two sycamores – this time in pitch darkness at 10pm using a UV lamp. A few of us hardcore marvelled at the fluorescence and reflectance given by the different species. By now Brian Coppins had joined us and the combined effect of his expertise and the UV lamp enabled us to detect three more species on the sycamores and correct an earlier misidentification. A tiny yellow foliose lichen had initially been named *Candelaria concolor*, but its beautiful orange fluorescence aroused our curiosity and using their illuminated hand-lenses Rebecca and Brian identified it as *Xanthoria ulophyllodes*. The absurdity of studying epiphytic lichens (in pitch darkness) appealed to my imagination and made for a perfect end to the first day.

April 7th 2010

Our field trip was to Braemar - to become familiar with some common pinewood species and then have a look at some granite rocks towards the summit of Creag Choinnich (NO156914). We were delayed for 30 minutes at a wall with an apple tree beyond, on the edge of the village, to take in *Melanelia subaurifera* (with its rather matt thallus), *M. fuliginosa* ssp. *fuliginosa* (darker olive in colour and shiny compared to the former) and *Parmelia saxatilis* (with hundreds of isidia). The egg-yellow thallus of *Xanthoria parietina* was growing close to the reddish-orange *X. elegans* enabling an easy comparison. The pale lime-green fruits of *Lecanora polytropa* were admired growing near the rather dirty yellow (organic mustard) corticated granules of *Candelariella vitellina*. *Rhizocarpum reductum* provided a contrast with its matt, darkish-grey adpressed thallus with black apothecia.

Into the pine forest and the lichens soon distracted our attention from the copious dog mess. *Mycoblastus sanguinarius* entertained us with its blood-red spots beneath the scraped-away black apothecia on a mint-green thallus and somehow it held on in the canine-zone on the root of the first pine we encountered. *Ochrolechia androgyna* formed a substantial green crust with yellowish soredia – on pine bark. Other species on the pine bark included *Usnea hirta* (with its bunched habit and absence of soralia), *Imshaugia aleurites* (with its blueish-green thallus and paler isidia), *Parmeliopsis ambigua* (similar but yellowish-green and with soredia) and *Ochrolechia microstictoides* (to a beginner resembling *Phlyctis argena* but with little hollow-rings of soredia on a white thallus). *Hypocenomyce scalaris* grew as attractive pale brownish-green patches, comprised of scales that looked like tiny clams. In drier crevices of the pine bark were the numerous black-stalked pinheads of *Chaenotheca ferruginea* with a dark brown spore mass and a greyish thallus that was rusted in places. *Protoparmelia ochrococca* showed up as a dark brownish-green patch on pines from a distance but close up the globose, shiny chestnut-brown globules looked like glistening balls when moist.



Granite boulder with a few lichens pointed out – see following page

The highlight of the day came when two of the more experienced participants found a new location for *Cladonia botrytes*. I was struck by its small stature. It grew on top of an old pine stump with a variety of other lichens. To Brian's credit, he finished helping some of us out with identifying a common species before racing off to check out this far more exciting find. Of the many *Cladonia* spp. seen today, *C. carneola* was another highlight with its bright yellow colouration and relatively smooth appearance. This species seems to be almost entirely Scottish – elsewhere it is rare in the Cheviots (Smith *et al*, 2009).

After lunch we turned our attention to the granite rocks above the pinewood. This was when it became really tricky with so many similar looking crusts. Prior to this course, I was merrily naming any rusty-red crust, with black apothecia and prominent black prothallus, on granite as *Lecidea dicksonii*. I am now aware that not only has this species long been known as *Tremolecia atrata*, there are also lots of other similar-looking lichens. As well as this species, *Miriquidica atroflava* (with black soralia on flat orange warts) and the darker red *Rhizocarpum oederi*, were identified by Brian in the field. Black crusts that were pointed out included *Schaereria fuscocinerea* appearing as dark brown-grey smudges on the rock, *Rimularia intercedens* had a pinkish hue when seen from above and at close quarters papillae could be seen sticking out from the rim of the apothecia, *Clauzadeana macula* had a really neat appearance and resembled a *Verrucaria* sp., and *Orphniospora moreopsis* looked similar but had a thicker thallus and *Caloplaca*-like fruits. *Pertusaria corallina* formed white crusts with lots of coral-like isidia and *Fuscidea cyathoides* had a brownish hue to a dirty-white thallus with black apothecia. Five *Umbilicaria* species were found and we marvelled at their Cumberland sausage-like apothecia showing well on *U. proboscidea*. I was rather taken with a lichen that had a puffed-up, bright, white thallus and large black apothecia, known as *Calvitimela aglaea*. *Parmelia discordans* and *P. saxatilis* were common foliose species on the rocks. A small quantity of *Cetraria muricata* was found with *Cladonia furcata* amongst scree and the stiff, shiny, branched thallus of *Cornicularia normoerica* was occasional on the coarse-grained granite rocks. Masses of entangled black threads of *Pseudephebe pubescens* were found on a large rock nearer the summit.

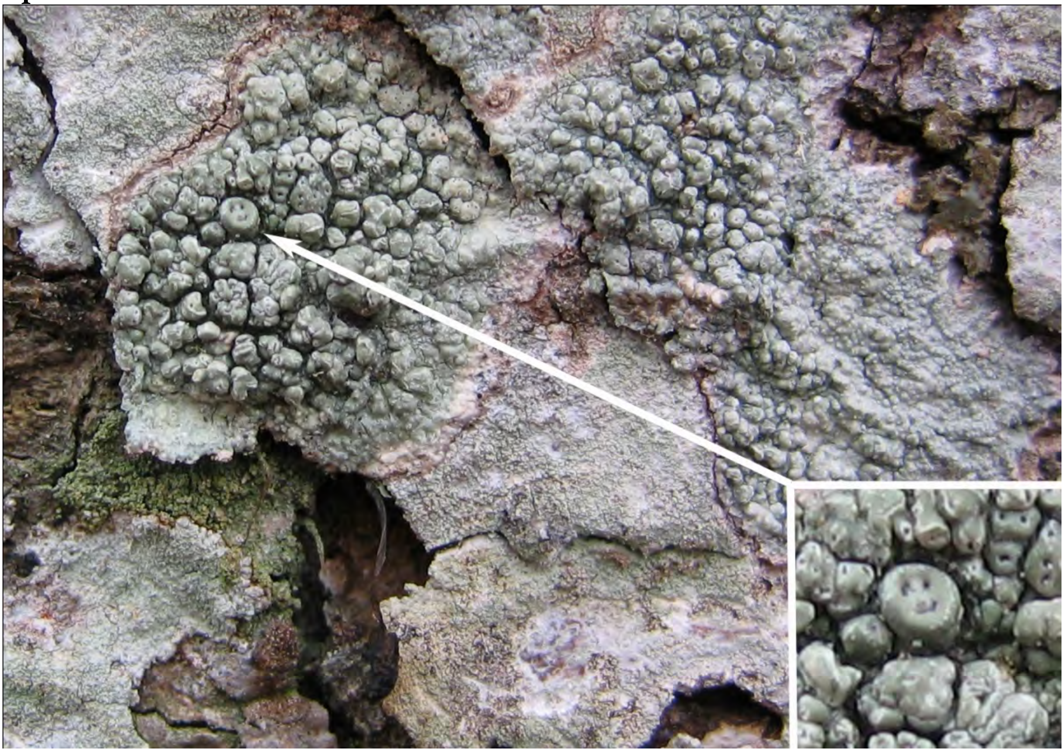
On a small outcrop of limestone, the deep orange fruits of *Caloplaca holocarpa* and the pale yellow thallus with black apothecia of *Lecanora sulphurea* were admired. By now my brain was stuffed full of lichens and an evening to catch up with my notes was welcome.

April 8th 2010

The Black Wood of Rannoch (NN561560) was our destination today and along with the commoner species encountered yesterday we hoped to see some lichens associated with an older growth native pinewood. *Hypocenomyce friesii* was one of those and it was distinguished from *H. scalaris* by its smaller scales with contorted black apothecia. Species such as *Hypogymnia physodes*, *Pseudevernia furfuracea* and *Bryoria fuscescens* were often abundant on the pines. On a rowan branch there grew *Bryoria subcana* and it was observed to be much lighter, with tuberculate soralia and a wider angle in the branches than its congener. *Usnea subfloridana* was seen fruiting (the presence of soralia distinguished it from *Usnea florida*). On the smooth twigs of rowan, Rebecca showed me *Arthonia radiata* with its lirellate, sometimes stellate, apothecia. Its smaller cousin, *Arthonia didyma*, was also present. On acidic bark, *Lecanactis abietina* was common with its subtle raspberry-milkshake thallus and whiteish soredia on top of well-spaced pycnidia. Brian proudly showed me the parasite that had been named after him – *Tremella coppinsii* that grew as reddish swellings on *Platismatia glauca*. On a rotten decorticated log we encountered *Xylographa parallela* growing with *Mycoblastus fucatus* (that had caught my eye with its prominent black prothallus and blueish-black apothecia). Other delights for us beginners were the rather showy lichens *Icmadophila ericetorum*, *Ochrolechia tartarea*, and *Sphaerophorus globosus* (with black apothecia abundant) found in an older part of the forest. Here also was *Nephroma laevigata* – a species found more commonly in the west of Scotland. On the bark of a tall stump, I was shown pinhead heaven where hundreds of brown blobs rested on the relatively long stalks of *Chaenotheca brunneola*. *Chrysothrix flavovirens* was a bright yellow, powdery or leprose lichen seen on the acid bark of pines and *C. candelaris* was an even brighter yellow on the dry side of birch trees. We saw *Thelotrema lepadinum* on rowan bark with its barnacle-like apothecia on a white crustose thallus. The best species of *Cladonia* I saw today was *C. parasitica* that Brian had found on a decorticated fallen pine. It had really small podetia. Sticking with a small theme but ending the excursion on a high note, I was shown an extremely tiny-stalked pinhead (with a greenish spore mass) known as *Microcalicium disseminatum*. It had been spotted since the very thin thallus had made the pine bark much paler where it occurred. By now my packets were full and I regret to have lost the sterile crust of another pinhead that I stuffed in a handkerchief for inspection later.

Ochrolechia tartarea seen in The Black Wood of Rannoch

April 9th 2010



This day had been ear-marked for microscope work and gave me a chance to catch up with some of my notes. I was also grateful for the opportunity to prepare sections of apothecia and perithecia and work through some keys with Rebecca available for expert guidance. We did go out briefly to look at some sycamores by the river and the highlight for me was *Pertusaria pertusa*. It is described as having pepper-pot apothecia although I mostly saw rather angry-looking faces staring back at me. However, one of our group, managed to find a specimen with a rather different physiognomy that bucked the trend and had us all laughing in delight. Fortunately, my photograph came out reasonably well.

April 10th 2010

Today we visited mixed deciduous woodland on the east side of a gorge at Glen Tilt near Blair Atholl (NN881686). We resisted the temptation to stop the minibus along the narrow track, with a precipitous drop down the gorge, for permit-holders only, in order to ask passers-by if we were going the right way for Balmoral. An old mossy wall, made out of base-rich rocks, was inspected on our arrival and Rebecca found some *Baeomyces rufus*. This species looked like 'lichen-sick' over moss with its 'lumpy, bumpy' greenish thallus and shortly-stalked fruits. We were also able to compare a few species of *Peltigera* that grew here. *P. membranacea* had a web-like tomentum over its upper surface and simple rhizines. *P praetextata* differed by having rather more frilly margins to its thallus. *P. horizontalis* had wonderful fluffy, fasciculate brownish-rhizines, a shiny thallus, dark network of veins below and its apothecia were in the same plane as the lobe margins.

Lobaria amplissima on ash with *Sticta fuliginosa* and *Lobaria pulmonaria* at Glen Tilt

On some of the trees with a less acidic bark reaction, there were several species associated with the Lobarion community (unusual this far east) and species seen included *Lobaria pulmonaria*, *L. scrobiculata*, *Nephroma parile*, *N. laevigata* and *Peltigera collina*. I ambled further down the slope to get closer to the river and found what proved to be *Sticta fuliginosa*. I had smelt its fishy aroma before actually seeing it. I also found a dull blueish-brown 'lichen-sick' affair growing over bryophytes on a fallen tree. It had persistent segmented margins to its orangey apothecia and I keyed it out later to be *Protopannaria pezizoides*. This would be a new species for the site if it is confirmed when Brian has had a look at it. Wandering off again after lunch I found another promising tree, with plenty of goodies, including something I had not seen before but knew it could be quite exciting. I clambered back for the rest of the group to come look and Rebecca identified the new find as *Lobaria amplissima*. It was dry and quite bright cream-white with several cephalodia (out-growths of the nitrogen-fixing blue-green symbiont). This lichen had not previously been recorded for Glen Tilt. It grew with the jelly-lichen *Leptogium lichenoides* (with its crazy isidia forming very frilly margins), *Lobaria pulmonaria* and *Sticta fuliginosa*.

The smooth bark of hazel was another habitat explored here and Rebecca urged us to become familiar with *Lecidella elaeochroma* since it is an awkward species to key out apparently. It grew with *Lecanora chlarotera* (recognised by its lumpy thalline margins), *Graphis scripta* (distinguished from *G. elegans* by its non-grooved margins to the apothecia), *Pertusaria leioplaca* (with well-defined individual yellowish-thalli) and *Porina aenea* (clustered perithecia on a very thin poorly-delimited, chestnut-coloured thallus). Another twig community of interest was found on larch trees along the edge of the track. Species included *Melanelia exasperatula*, *Melanelia laciniatula*, *Ramalina farinacea* and *Xanthoria parietina* – unusual in that these are all associated with more

Graphidion community on hazel at Glen Tilt nutrient-rich bark. Rebecca explained that the fertilizer drift from the farm opposite must be the reason for this phenomenon.

Sitting outside the Moulin Hotel later that afternoon provided welcome respite from a day of hard learning. We were entertained by an inebriated, camera-toting local who was dismayed by people using the car park by his house. Walking with carefully placed steps he uttered in his drunken stupor that the world had gone mad. (He should have come out on a night with us looking at lichens on trees in pitch darkness).

April 11th 2010

A morning spent on the microscopes, sorting out our specimens and catching up with notes was followed with a leisurely excursion up to Kindrogan Hill. The fallen trees hindered our navigation and much of this stroll involved a clamber through forestry. In a clear-felled section, I was shown a burgundy-coloured lichen called *Placynthiella icmalea* with a thallus described as coralloid-isidiate. It grew on top of old dry stumps with the greyish-green 'picnic-table lichen' *Trapeliopsis flexuosa*. Rebecca spotted an interesting moss – *Buxbaumia aphylla* – growing on peaty-humus over an old wall in forestry. In the same habitat we saw *Trapeliopsis pseudoflexuosa* (which had a more yellowish-green thallus than others I had seen on this trip). At the summit, species on the rocks included *Parmelia omphalodes*, *Pertusaria corallina*, *Umbilicaria polyphylla*, *U. cylindrica*, *Ophioparma ventosum*, *Tephromela atra* and *Sphaerophorus globosus*. The cemetery had proved an interesting diversion with some spectacular growths of *Parmelia saxatilis*. Seeing the wealth of unknown (to me) crustose species (on the gravestones) made it clear that whilst this may have been the last day of the course it was only just the beginning. There is **so much** to learn - but also to enjoy.

Parmelia saxatilis on a gravestone at Kindrogan

Acknowledgements

I wish to express my gratitude to the British Lichen Society for their generous award (from the Wallace-Burnett-Gilbert fund) that enabled me to attend this course. Thanks also to Rebecca Yahr for her excellent tuition and to Brian Coppins, who joined the course for a couple of days out of the goodness of his own heart. His knowledge is incredible. The FSC Kindrogan staff were as helpful and friendly as ever.

Reference

Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W., & Wolseley, P.A. (2009). *The Lichens of Britain and Ireland*. British Lichen Society, London.

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Tom Chester Awards 2010

The Tom Chester award commemorates the man of that name, a much respected and admired member of the Society who pioneered interest in churchyard lichens among BLS members. The award is from a bequest made by Tom, who died in 2003. He developed his interest in churchyard lichens while a headteacher of a Northamptonshire primary school and took subsequent opportunities, as a primary advisor and later when retired, to engender interest among others.

The award, value up to £250, is for schools and colleges for successful fieldwork involving lichens by an individual or group of students from Year 1 to Year 13 (aged 5 to 19 years). In 2009 the successful school was Ponsbourne St Mary's Primary School (Hertfordshire) and they purchased a digital camera to help them record their findings in their local churchyard. In 2010 two schools received awards because of their outstanding projects. Both schools were participating in the OPAL air quality project and benefited from support by local OPAL Community Scientists:

Baskerville School, Harborne, Birmingham
Baskerville School is rated nationally as an 'outstanding' school in which science is a 'strength'. Their adventurous approach and the many opportunities they provide help their students, who cover the full age and ability range and are autistic, to overcome challenges which for many are complex.

For their Tom Chester project students looked closely at very old apple trees in the remains of an old orchard in the school grounds. Each student was given a dedicated apple twig on which to identify the lichen types and start to map lichen species. The trees lie along a path and when Barbara Hilton visited she was introduced to the project by the labels students had hung from boughs naming (using scientific names) the lichen species. With their prize money a digital camera was purchased enabling students to record their twigs and lichens. A group of teenage students talked with Barbara about their project and some had started to map them, aiming to calculate lichen cover and free twig space which could be correlated with factors such as position and light.

Nottingham Girls' High School, Nottingham
Students at NGHS aimed to show the sensitivity of lichens to nitrogen pollutants along transects from rural Nottinghamshire to inner-city Nottingham, starting from sources such as pig farms and power stations. Working in small groups they showed exceptional enthusiasm for lichens which they recorded in term-time and holidays. With the help of local 'experts', they built on their experience with the OPAL air quality survey .

The school used their prize money to purchase two flat-bed electronic pH meters, to enable accurate measurement of bark pH. The students enrolled to gain Silver CREST awards at the end of their research and write-up. (CREST awards are run by the British Science Association and involve a minimum of 40 hours work by each student.) Their overall results are being presented as a poster, to be displayed at the forthcoming BLS AGM, outside the Flett Lecture Theatre.

The Tom Chester Award 2011
The Award is very much in the spirit of the Society's status as a charity seeking to promote and advance the study of lichens. In 2010 students in both the award-winning schools gained much by participating in their lichen projects, learning about research methods and team-work, as well as gaining understanding of lichens and their sensitivity to the quality of the environment. Soon we will be hoping for entries for 2011. If you know of schools and colleges with students aged between 5 to 19 years, encourage them to find out about lichens and gain a Tom Chester Award (see *www.thebls.org.uk*, click on The Society, then on Funds and Grants, and scroll down)

Barbara Hilton

Database progress

The project to build a database of lichen records for England and Wales finally got under way early last year, and since then we have been very busy inputting records and sorting out data quality issues. We are about two thirds of the way through and now have some 988,000 records in the database. It will be released in phases to the NBN Gateway over the next year or so.

Churchyards
Initially we concentrated on the churchyards survey, as the records were all fairly recent and had been recorded in a standard way on record cards. This made it easier for the inputters, although the level of detail recorded on some of the cards gave them a few problems! There are now more than 400,000 churchyard records in the database, and we hope to get them onto the NBN by the end of the year.

Recent records and surveys
The next priority was to input records for important lichen sites, including repeat visits which give us important information on changes in lichen habitats and distribution over time. All the survey reports that were sent in to me have now been done, but there must be more and it is not too late to let me have them. Several people have been sorting out and inputting the records for their local areas, particularly the Scillies, Lundy, Exmoor, the New Forest, Sussex, Norfolk and Suffolk, and this has been a great help. We have also received substantial datasets for the Channel Isles and Wales that have been input by the local centres. These have to be reviewed before we can use them, but it still saves us a lot of effort.

Old records
Mark Seaward's archive of records sent in to the Mapping Scheme contains about 8,000 record cards that can be identified to a particular location, recorder and date, and so can be put into the database. We started with the north of England and have now done about half the country. It's a slow job as many of the cards are old and difficult to read, and of course a lot of the names have changed over the years, but these are important records and well worth the effort.

Threatened Lichens
Our next task, which should be well under way by the time you read this, is to bring the threatened lichens database up to date. It is now part of the main database but the BAP and nationally rare species records can easily be extracted and will be put onto the NBN in the near future. Before that happens they will be reviewed to sort out any redeterminations, incorrect grid references and other details. Updates to these records are always welcome, particularly repeat visits to sites that either confirm that a species is still present or has been lost, so do keep sending them in. At the moment the TLDB gives a misleading impression of the distribution of some species.

Scotland
Although the main Scottish project finished some time ago, Brian Coppins is still adding records and sorting out queries and duplicates. It will be updated on the NBN

Mapping Scheme

A copy of Mark Seaward's Mapping Scheme database was added to the database last year, partly for safe keeping but also to make it available for use on the NBN. Since then there has been a lot of recording activity in Ireland so we will be updating that part of the dataset sometime soon.

Legal matters, and who does what

I've said all this before, but it is important and worth repeating so please note …

a) In sending records in to the BLS, you are implicitly giving the society permission to use them in the database and to make them publicly available through the NBN Gateway, GBIF, and our own or related websites. Records are supplied from the database to the country agencies, academics, local record centres, and others who request data for conservation or research purposes, and to the authors of local floras. We have no control over the use of records from the internet.
b) Recorder's names may form part of the information supplied, but it is not always possible to acknowledge all the recorders or suppliers of records.
c) It is your responsibility as a data supplier to the BLS to get any agreement needed from landowners or clients, the BLS can't do this for you. If there is an issue please make me aware of it by email. Sometimes we can disguise records by putting them in at 1km or 10km resolution but usually they have to be left out of the database altogether.
d) No database can ever be complete or fully accurate, and although we try to check the most important records it is not possible for the BLS to verify all the records sent in to it. The BLS can accept no liability for the consequences of any inaccuracies.

Database enquiries

The database is there to be used, and it is becoming an increasingly valuable resource for the society and our members. Requests for data are always welcome and I try to respond to them quickly. Most queries are answered with a distribution map (as a .emf image that can be inserted to a Word document) or a spreadsheet of records for a particular species, site, 10km square or vice county. Email is the best way to contact me.

This project will not be the end of our database work. We are already looking into ways to make the records more accessible and easier to use, and modern technology is opening up exciting possibilities of online recording and the use of notebook computers in the field. We will keep adding records and sorting out issues as the years go on. Perhaps we should think of the database as a living creature, domesticated and fairly well house-trained, but needing constant nurturing to keep it healthy and a regular diet of new and interesting records.

Keep sending those records in!

Janet Simkin
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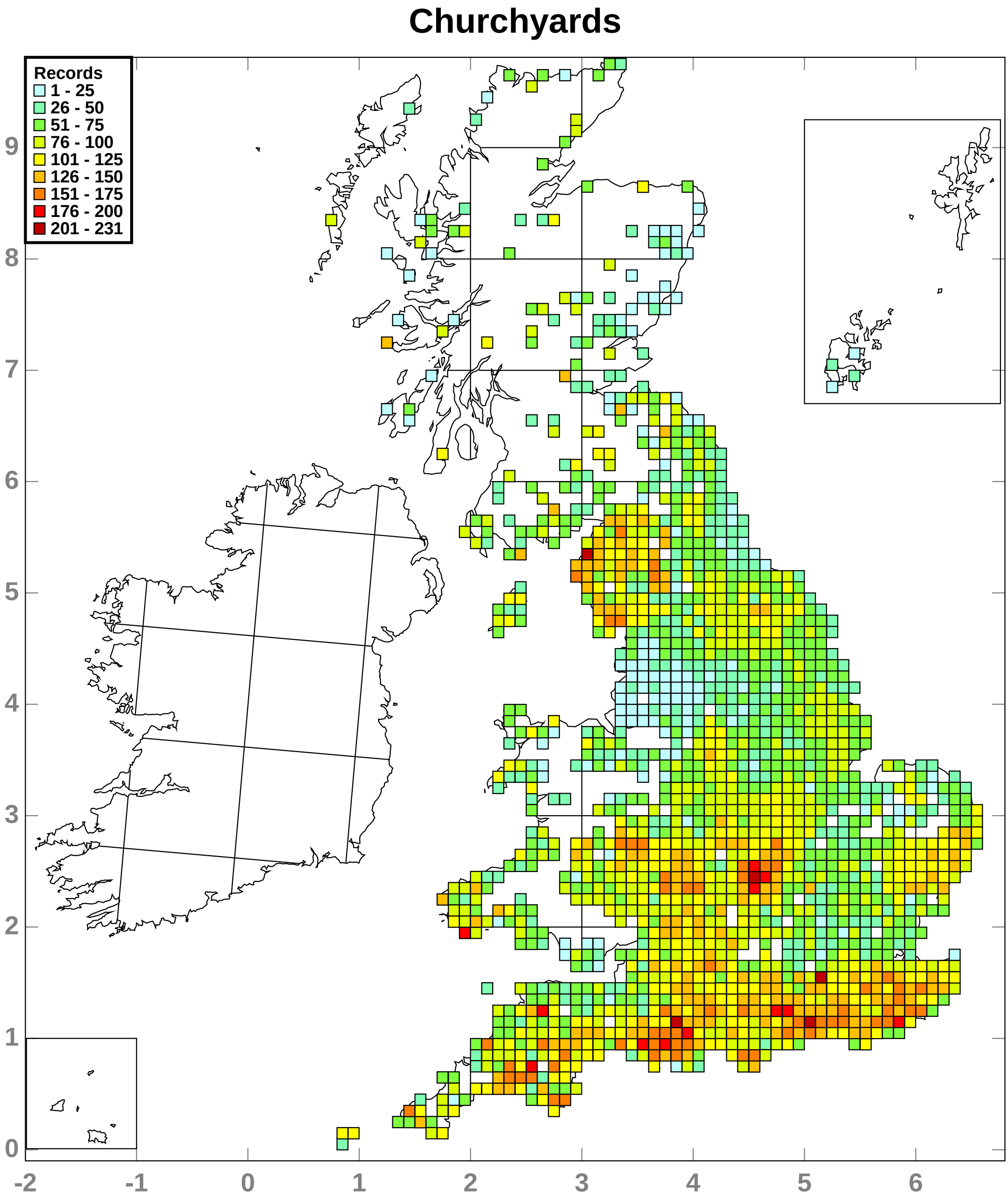
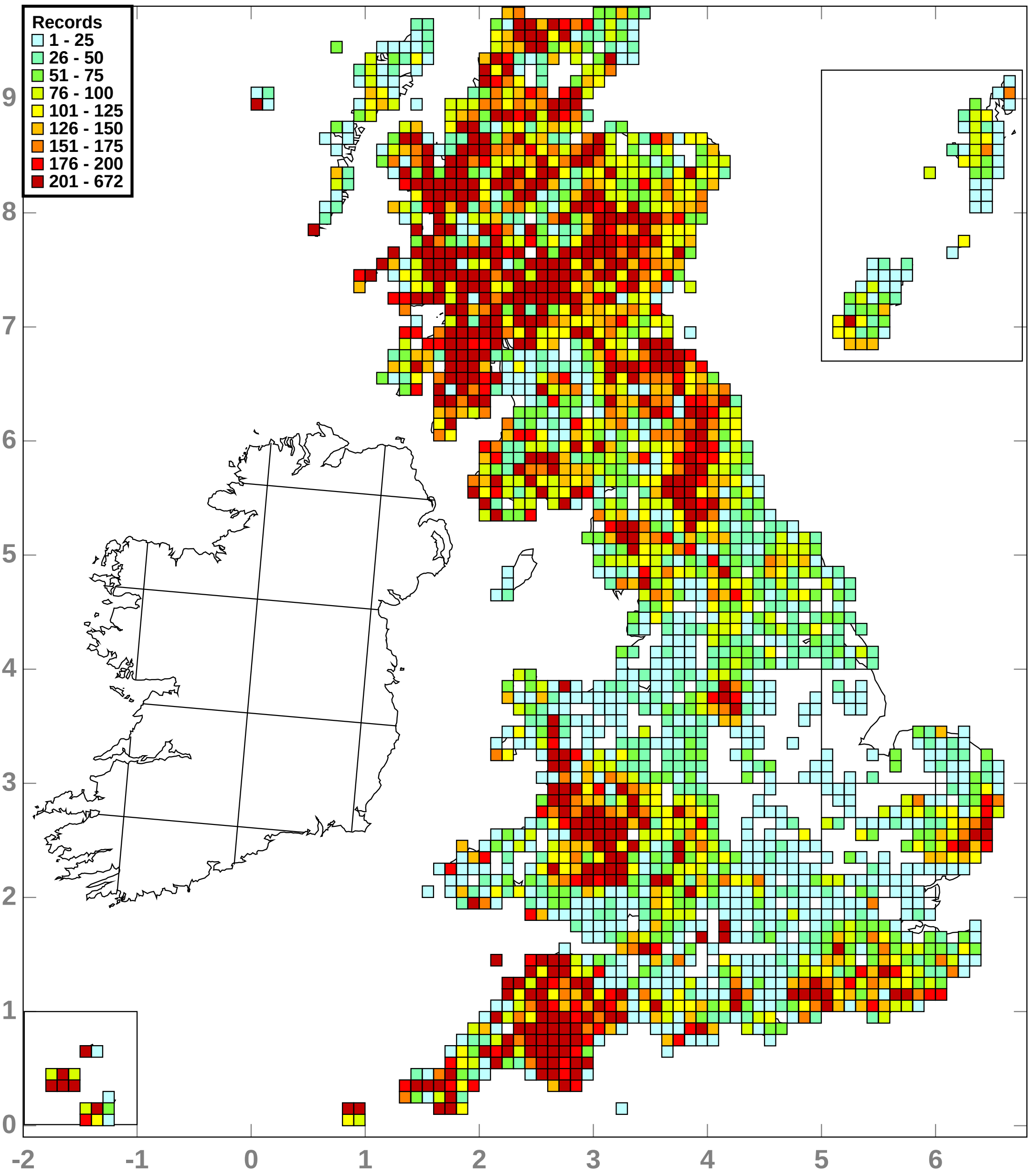


Churchyard records, as at 14/10/2010. The dots represent 10km squares. The colour scale ranges from light blue 1-25 records per square) to dark red (>200 records per square).

General



General records, as at 14/10/10. The dots represent 10km squares. The colour scale is the same, ranging from light blue (1-25 records per square) to dark red (>200 records per square).

IAL awards Acharius medals

At a dinner hosted by the International Association for Lichenology one evening during the International Mycological Congress at Edinburgh in August 2010, a number of awards were made. Full details will appear in the IAL Bulletin (and do join the Association if you want to know more! – contact Christian Printzen (*cprintzen@senckenberg.de*) or visit the IAL website - *http://www.lichenology.org*). The IAL field excursion to the Kintail area and Skye will also feature in a forthcoming Bulletin.

The honours include the Mason Hale award for outstanding work resulting from doctoral dissertations or similar studies, presented to Suzanne Joneson (Duke University) for her thesis on The Molecular Biology of Lichen Symbiosis and Development. Even more prestigious, though, are the Acharius medals, awarded as lifetime achievement honours. This year two awards were made. One was to Tom Nash for his outstanding contributions to lichenology over almost 40 years, culminating in publication of the three-volume Lichens of the Greater Sonoran Desert region – an absolutely essential work for anyone with an interest in the lichens of the south-western United States and northern Mexico. The another award was presented to that great stalwart of the British Lichen Society (and of systematic lichenology globally) Brian Coppins, partially to mark Brian's formal retirement from the Royal Botanic Garden, Edinburgh. Tom was not present to receive his award, but the image below shows Brian (complete with flamboyant waistcoat!) being presented with his Acharius medal by the IAL president, Peter Crittenden.

The gathering to celebrate Peter James's 80th birthday, at Sutton Park on 28 April 2010. Peter could be forgiven for slowing down a little by now, but the first article in this Bulletin is a major account of the lichens of Sutton Park, authored by Peter and Mark Powell. A breakaway group wished Peter well from afar, on the BLS field meeting on the Isle of Man at the same time.

Literature Pertaining to British Lichens - 47

Lichenologist **42**(3) was published on 12 April 2010, **42**(4) on 21 June 2010, and **42**(5) on 16 August 2010.

ACTON, A. 2009. *Lichens of Scottish Pinewoods. Guide 1: Leafy and shrubby lichens on pine, birch, alder and deadwood.* Stirling: Plantlife Scotland. ISBN 978-1-907141-10-2. A superbly illustrated, 8-page, laminated field guide.

ACTON, A. 2009. *Lichens of Scottish Pinewoods. Guide 2: Crustose and scaly lichens on pine, birch and alder, and on trees with less acidic bark*. Stirling: Plantlife Scotland. ISBN 978-1-907141-11-9. A companion, 8-page, laminated field guide to the above. [Note that the photo of *Degelia plumbea* is actually of the recent segregate, *D. cyanoloma*].

BENFIELD, B. 2009. The lichen habitat of some clay tips in Devon and Cornwall. *Rep. Trans. Devon. Ass. Advmt. Sci.* **141:** 287–304. Results of a study on two china clay areas in Cornwall and one in Devon, and two ball clay areas in Devon. The terricolous lichen flora, including several nationally important species, is in many places under threat from 'landscaping' with the mine spoil being fertilized and reseeded. This flora includes the lichens *Absconditella celata*, *A. trivialis*, *Collemopsidium arenisedum*, *Coppinsia minutissima*, *Gregorella humida*, *Leptogium palmatum* and *Moelleropsis nebulosa*, and lichenicolous fungi such as *Arthrorhaphis muddii*, *Micarea inquinans* and *Gelatinopsis* [= *Rhymbocarpus*] *ericetorum* on *Dibaeis*, and *Pronectria tenuispora* on *Peltigera hymenina*.

BENFIELD, B. 2009. Lichens. *Rep. Trans. Devon. Ass. Advmt. Sci.* **141:** 335–338. Report on new and noteworthy finds in Devon, mostly in 2008. These include a find of fertile *Lecanora alboflavida* (syn. *Ochrolechia inversa*), and the third British record of *Chaenothecopsis retinens*, parasitic on *Schismatomma cretaceum*.

BLATCHLEY, I. 2010. In "Reports of outdoor meetings 2009". *Bull. Kent Field Club* **55:** 14–51: Small Hythe Church (p 15).

BLATCHLEY, I. 2010. Lichen report 2009. *Annual Report of the Orpington Field Club* **50:** 9–12. Report of finds and observations in the Orpington area of West Kent in SE England, including some notable records from veteran oaks at Little Scotland, and of *Diploschistes muscorum* on a soft-wood post and rail fence at High Elms.

DIEDERICH, P., ERTZ, D. & ETAYO, J. 2010. An enlarged concept of *Llimoniella* (lichenicolous *Helotiales*), with a revised key to the species and notes on related genera. *Lichenologist* **42:** 253–269. A revised circumscription of *Llimoniella* means that *Unguiculariopsis groenlandiae* is now treated as *Llimoniella groenlandiae* (Alstrup & D. Hawksw.) Triebel & Hafellner (1993). A revised key to species of *Llimoniella* is provided. *Gelatinopsis ericetorum* is transferred to *Rhymbocarpus* as *R. ericetorum* (Körb.) Etayo, Diederich & Ertz.

ETAYO, J. & TRIEBEL, D. 2010. New and interesting lichenicolous fungi at the Botanische Staatssammlung München. *Lichenologist* **42:** 231–240. The correct

name for *Clypeococcum epicrassum* is shown to be *C. psoromatis* (A. Massal.) Etayo.

FLETCHER, A. (2010) Natural History. In BOYLAN, P.J. (2010) (ed.) *Exchanging Ideas Dispassionately and without Animosity: The Leicester Literary and Philosophical Society 1835–2010*. Leicester: Leicester Literary and Philosophical Society. ISBN 978-0-9565400-03, pp 65-83. Availability see website *http://leicesterlitandphil.org.uk*. The article reviews the achievements of the LLPS Natural History Section, 1849–2010 and includes many references to Leicestershire and Rutland lichenologists.

GIRALT, M., VAN DEN BOOM, P.P.D, & ELIX, J.A. 2010. *Endohyalina*, the genus in the *Physciaceae* to accommodate the species of the *Rinodina ericina* group. *Mycological Progress* **9:** 37–48. The genus *Endohyalina* Marbach (2000) is adopted for *E. ericina* (Nyl.) Giralt, van den Boom & Elix (syn. *Rinodina ericina*) and *E. insularis* (Arnold) Giralt, van den Boom & Elix (syn. *Rinodina insularis*). [See also Nadyeina *et al.* in *Lichenologist* **42:** 521–531 (2010).

HILL, D.J. 2010. Lichens on the stonework of the Bishop's Palace, Wells. In DUNNING, R. *Jocelin of Wells: Bishop, Builder, Courtier*. Woodbridge: The Boydell Press. ISBN 978-1-84383-556-1, pp 154–168. An investigation of the lichens on ancient walls, with an attempt to age the length of exposure of the stonework using a comparison with data of lichens occurring on dated gravestones. About 90 species were recorded, and the length of exposure of stonework on different parts of the palace was estimated at 150 to 250+ years.

KANTVILAS, G. & FRYDAY, A.M. 2010. Two additions to the lichen genus *Cliostomum* Fr. (Ramalinaceae) with broad ascospores. *Lichenologist* **42:** 539–545. *Cliostomum coppinsii* Fryday & Kantvilas is described from Wester Ross in Scotland, where it was collected on large *Calluna* stems. In the field it resembles *Lecanora symmicta*, but its thallus is C– and Pd+ orange, and its ascospores are 1-septate with a thick septum.

NORDIN, A., TIBELL, L. & SAVIĆ, S. 2010. Phylogeny and taxonomy of *Aspicilia* and *Megasporaceae*. *Mycologia* **102:** 1339–1349. Phylogenetic analysis of a selection of *Aspicilia* species has resulted in the resurrection of two old generic names, The genus *Aspicilia* is restricted to species closely related to *A. cinerea*, including also *A. laevata* and *A. epiglypta*. *Circinaria* Link (1809) includes *C. caesiocinerea* (Nyl. ex Malbr.) A. Nordin, S. Savić & Tibell (syn. *A. caesiocinerea*), *C. calcarea* (L.) A. Nordin, S. Savić & Tibell (syn. *A. calcarea*), *C. contorta* (Hoffm.) A. Nordin, S. Savić & Tibell (syn. *A. contorta*), *C. leprosescens* (Sandst.) A. Nordin, S. Savić & Tibell (syn. *A. leprosescens*). *Aspicilia recedens* is transferred to *Lobothallia* as *L. recedens* (Taylor) A. Nordin, S. Savić & Tibell. [So far, the genus *Sagedia* Ach. (1809), typified by *A. zonata* Ach., is not represented by a British species, but more species remain to be analyzed. These names will not be adopted for the British checklist until all species of our *Aspicilia* s. lat. can be assigned].

PALMER, K. 2010. In "Reports of outdoor meetings 2009". *Bull. Kent Field Club* **55:** 14–51: Woodchurch churchyard and Warehorne churchyard (p 51).

PALMER, K. 2010. Lichen report 2009. *Bull. Kent Field Club* **55:** 63–65. A summary of finds in the county during the year, with some comparisons to some sites not visited since the 1990s.

SANDERSON, N.A. 2010. Lichens. In NEWTON, A.C. (ed.) *Biodiversity in the New Forest*. Newbury: Pisces Publications. ISBN 978-1-874357-42-1, pp 84–111. A detailed overview of lichen biodiversity and conservation in one of Europe's premier lichen sites.

SEAWARD, M.R.D. 2010. *Census Catalogue of Irish Lichens*. Holywood, Co. Down: National Museums of Northern Ireland. ISBN 978-1-905989-62-1, hardback, pp i–xiii, 1–64. This replaces the previous census catalogue of 1994. About 120 taxa have been added to the Irish list, and most vice-counties have seen at least a 20–40% increase in records; this reflecting the increased activity by the many lichenologists contributing to the hugely successful LichenIreland project.

SÉRUSIAUX, E., BRAND, A.M., MOTIEJUNAITE, J., ORANGE, A. & COPPINS, B.J. 2010. *Lecidea doliiformis* belongs to *Micarea*, *Catillaria alba* to *Biatora*, and *Biatora ligni-mollis* occurs in western Europe. *Bryologist* **113:** 333–344. Based on molecular and morphological data, *Lecidea doliiformis* is transferred to *Micarea* as *M. doliiformis* (Coppins & P. James) Coppins & Sérus., and *Catillaria alba* is transferred to *Biatora* as *B. veteranorum* Coppins & Sérus. [there already being a *Biatora alba*].

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NEW, RARE AND INTERESTING LICHENS

Contributions to this section are always welcome. Submit entries to Chris Hitch, Orchella Lodge, 14, Hawthorn Close, Knodishall, Saxmundham, Suffolk, IP17 1XW, in the form of species, habitat, locality, VC no, VC name, (from 1997, nomenclature to follow that given in the appendix, see BLS *Bulletin* 79, which is based on the Biological Record Centre for instructions for Recorders, ITE, Monks Wood Experimental Station, Abbots Ripton, PE17 2LS, 1974). Grid Ref (GR) (please add letters for the 100km squares to aid BioBase and Recorder 2000 users), altitude (alt), where applicable in metres (m), date (month and year). NRI records should now include details of what the entry represents, eg specimen in Herb. **E**, Hitch etc., with accession number where applicable, field record or photograph, to allow for future verification if necessary or to aid paper/report writing. Determined/confirmed by, Comments, New to/the, Finally recorder. An authority with date after species is only required when the species is new to the British Isles. Records of lichens listed in the RDB are particularly welcome, even from previously known localities. In the interests of accuracy, the data can be sent to me on e-mail, my address is *cjbh.orchldge@freeuk.com*, or if not, then typescript. Copy should reach the subeditor at least a fortnight before the deadline for the *Bulletin*. *Please read these instructions carefully*.

New to the British Isles

Arthonia caerulescens (Almq.) R. Sant. (2004): (i) in apothecia of *Lecanora varia* on fence posts, Wide Hope, Lammermuir Hills, VC 82, East Lothian, GR 36(NT)/7134.6982, alt 200 m, July 2006. Herb. B.J. Coppins 22065 (**E**); (ii) east of Deuchrie Dod, southeast of Stenton, VC 82, East Lothian, GR 36(NT)/632.721, alt 270 m, May 2010. Herb. B.J. Coppins 23107 (**E**). Similar to *A. apotheciorum*, which grows mainly on *Lecanora albescens*, but distinguished by a stronger greenish pigmentation in the epithecium, and smaller ascospores (10–12 vs. 11–15 µm long). Previously reported from Sweden. **NB:** the first collection was erroneously reported as *A. apotheciorum* in *British Lichen Society Bulletin* **100**: 75 (Summer 2007). **BLS no. 2563.** *B.J. Coppins*

Arthonia destruens Rehm in Rabenh. (1868): on thallus cortex of moribund, fertile *Physcia tenella* on small branch lying on woodland floor, Coed Nant Llolwyn SSSI, VC 46, Cardiganshire, GR 22(SN)/586.769, alt 45 m, May 2010. Herb. SPC. Confirmed by B.J. Coppins. Superficially similar to *A. epiphyscia*, which also grows on *Physcia* spp., but distinguished by having an internal yellowish, K+ purple-lilac pigment and longer ascospores (10.5–17 vs. 10–14 µm). Previously known from Austria and Germany on *P. aipolia* and *P. stellaris*, so this Welsh collection probably represents a new host record. For full description and illustration of ascospores see Grube *et al.* in *Lichenologist* **27:** 34–36 (1995). These authors give the asci as being 4- to 8-spored, but only 4-spored asci were seen in the Welsh specimen. **BLS no. 2564.** *S.P. Chambers & H.F. Clow*

Lichenopeltella pannariacearum Diederich (1997): on thallus of *Parmeliella triptophylla*, Cladagh Glen, Marble Arch Woods, VC H33, Fermanagh, GR 23(H)/12-35-, April 2010. Herb. A.M. & B.J. Coppins 23051 (**E**). Seen as numerous, tiny black ascomata (catothecia), 0.1–0.15 mm diameter, amongst the isidia of the host, but causing no obvious discoloration of the host thallus. Distinguished by having convergent, subulate setae forming a raised cone around the ostiole, and rather large, 1-septate ascospores (15.5–18 × 4.9–5.5 µm in the Irish specimen) that have 3 pairs of lateral setulae arising from near the septum in the upper cell. Originally described from Papua New Guinea on *Psoroma pannarioides* [= *Pannaria papuana* (Aptroot & Diederich) P.M. Jørg. & Sipman] and *Parmeliella* spp. For a full description and illustrations see Aptroot *et al.*, *Bibliotheca Lichenologica* **64:** 95–96 (1997). **BLS no. 2562.** *A.M. & B.J. Coppins*

Other Records

Acarospora moenium (Syn: *Aspicilia moenium*): on old concrete parapet at head of Blackbrook Reservoir, near Shepshed, VC 55, Leicestershire, GR 43(SK)/457.177, October 2003. Recognised as tiny white squamules on a black crust of soredia which resembles algal scum. The gathering was compared with specimens at **E**. Recent molecular work suggests that this entity is closer to *Acarospora* than *Aspicilia,* but mature ascocarps are unknown. See *British Lichen Society Bulletin* **105**: 38 (Winter 2009). New to the Vice-county and second British record. *A. Fletcher*

Acarospora moenium: abundant on asbestos roofing of Nissen hut in garden of Keeper's Cottage, Horton Woods, VC 32, Northamptonshire, GR 42(SP)/823.524, (February 2009). The hut collapsed under the weight of snow during the winter of 2008/2009 and as, sadly, the asbestos could not be transferred to a nearby barn, herbarium material was collected on the said date and distributed to lichenologists. New to the Vice-county. *M. Powell*

Acarospora moenium: on rough concrete surround of a manhole cover, Cooper's Hill, Ampthill, VC 30, Bedfordshire, GR 52(TL)/028.378, May 2010. New to the Vice-county. *M. Powell*

Agonimia globulifera: in mossy dry cranny on low, northeast-facing coastal rock outcrop, with fertile *Leptogium britannicum,* Duart Point, Mull, VC 103, Mid Ebudes, GR 17(NM)/747.353, alt *c.* 2 m, August 2010. Herb. SPC. New to the Vice-county. *S.P. Chambers*

Anaptychia ciliaris subsp. ***ciliaris***: on large, leaning *Fraxinus* in parkland, east of Colstoun House, Lennoxlove Estate, south of Haddington, VC 82, East Lothian, GR 36(NT)/5172.7093, alt 71 m, May 2010. Herb. B.J. Coppins 23096 (**E**). First modern record for the Lothians, consisting of about 12 thalli, all without apothecia, on southeast side of trunk at 1.6–2.8 m from the base. *B.J. Coppins*

Anisomeridium robustum: on *Ulmus* by cliff at bottom of ravine, Cladagh River, VC H33, Fermanagh, GR23(H)/119.333, alt 175 m, April 2010. Herb. B.J. Coppins 23070 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Arthonia excipienda: on young *Corylus* branches in stands of lichen-rich old *Corylus*, within *Corylus – Fraxinus* pasture woodland, Coille Thogabhaig SSSI, Sleat, VC 104, North Ebudes, GR 18(NG)/6155.1273, 18(NG)/6188.1273 and 18/(NG)/ 615120, May 2010. Herb. Sanderson 1487 & 1490. New to Skye. *N.A. Sanderson & A.M. Cross*

Arthonia invadens: extensively parasitising *Schismatomma quercicola* on *Betula*, in deer-grazed *Quercus – Ilex – Corylus* woodland, Reilly Wood, Crom Estate, VC H33, Fermanagh, GR 23(H)/3414.2536. Herb. Sanderson 1501. First record of this BAP species for Northern Ireland and a major extension in its range, with previous records confined to the south coast of Ireland. *N.A. Sanderson*

Arthonia molendoi: on *Xanthoria parietina* on *Populus tremula*, west of Torcroy, Insh Marshes Nature Reserve, Strathspey, VC 96, East Inverness-shire, GR 27(NN)/774. 997, alt 240 m, June 2009. Herb. B.J. Coppins 23027 (**E**). New to East Inverness-shire and sixth record for Scotland. *B.J. Coppins & C.J. Ellis*

Arthopyrenia carneobrunneola: with *Mycomicrothelia confusa* on branch of *Corylus avellana* in bouldery wet oakwood, southeast of Llyn Cwm Bychan, Artro Valley, VC

48, Merionethshire, GR 23(SH)/648.310, alt 200 m, September 2010. Herb. SPC. Second Welsh record. *S.P. Chambers, A. Seddon & A. Hotchkiss*.

Bacidia incompta: abundant on lignum in large, hollow *Acer pseudoplatanus* in parkland northeast of Colstoun House, Lennoxlove Estate, south of Haddington, VC 82, East Lothian, GR 36(NT)/5148.7126, alt 52 m, May 2010. Herb. B.J. Coppins 23094 (**E**). Apothecia not seen, but plentiful pycnidia present on collected material. Only the second Scottish record not on *Ulmus*. *B.J. Coppins*

Bacidia phacodes: on base of *Acer pseudoplatanus* at edge of ravine, Tower Dean, near Cockburnspath Tower, Cockburnspath, VC 81, Berwickshire, GR 36(NT)/7850.6983, alt 90 m, January 2010. Herb. B.J. Coppins 23044 (**E**). New to southeast Scotland. *B.J. Coppins*

Bacidia subincompta: on *Acer platanoides* in narrow wooded strip by road, Strathbran Lodge, Strath Bran, VC 106, East Ross, GR 28(NH)/245.614, alt 125 m, June 2009. Herb. B.J. Coppins 23029 (**E**). *B.J. Coppins*

Bacidia sulphurella: corticolous, Flitwick Moor, VC 30, Bedfordshire, GR 52(TL)/04-35-, July 2009. Herb. Powell 1178. This is the first confirmed record of this lichen in Bedfordshire, but it has been found several times since on shaded bark. New to the Vice-county. *M. Powell*

Biatora britannica: fertile on mature *Quercus*, Inishmakill NNR, Lower Loch Erne, VC H33 Fermanagh, GR 23(H)/1563.5864, alt 50 m, April 2010. Herb. B.J. Coppins 23078 (**E**). A previous collection of *Biatora efflorescens*, on *Salix*, Marble Arch Woods, near Cladagh Bridge, August 1990, A.M. O'Dare (**E**), is sterile, but certainly belongs here, as strongly suggested by Printzen *et al*. [*Lichenologist* **33**: 181–187, 2001]. Confirmed as new to the Vice-county and Ireland. *B.J. Coppins*

Biatora britannica: sterile thalli on *Fraxinus* & *Corylus*, within *Corylus – Fraxinus* pasture woodland, Coille Thogabhaig SSSI, Sleat, VC 104, North Ebudes, GR 18(NG)/6183.1288, 18(NG)/6188.1273 & 18(NG)/6165.1279, May 2010. Field records. New to Skye. *N.A. Sanderson & A.M. Cross*

Blarneya hibernica: an extensive stand overgrowing *Lecanactis abietina* on the dry side of a ravine edge, within old *Quercus*, pasture woodland in former ancient deer park, Glenarm Great Deer Park, VC H39, Antrim, GR 34(D)/3018.0979, July 2010. Herb Sanderson 1502. Photograph at *www.uklichens.co.uk*. First record of this BAP species for Northern Ireland and a major extension in range, with previous records confined to the far south of Ireland. *N.A. Sanderson*

Buellia badia: on sandstone windowsill on south side of church, Clapham, VC 13, West Sussex, GR 51(TQ)/096.066, October 1992. Herb. leg. F. Rose, K. Sandell & H.W. Matcham (**E**). Determined by B.J. Coppins. New to Sussex. *B.J. Coppins*

Calicium hyperelloides: in crevices of dry bark on old *Quercus*, in parkland, Castle Archdale County Park, VC H33, Fermanagh, GR 23(H)/1791.5891, June 2010. Herb. Sanderson 1458. Photograph at *www.uklichens.co.uk*. New to Ireland.
N.A. Sanderson

Caloplaca cerinella: frequent on pendent twigs and small branches of field-bank *Fraxinus excelsior*, Gwernafield, east of Cilcain, VC 51, Flintshire, GR 33(SJ)/191.649, alt 90 m, May 2010. Herb. SPC. New to the Vice-county.

S. P. Chambers

Caloplaca dichroa: on dressed limestone base of memorial cross, Ampthill Park, VC 30, Bedfordshire, GR 52(TL)/025.383, May 2010. Confirmed by the characteristic thick-walled spores. New to the county but probably common on limestone monuments and previously confused with *C. flavocitrina*. *M. Powell*

Caloplaca obscurella: fertile on *Sambucus*, Riseley, VC 30, Bedfordshire, GR 52(TL)/033.622, February 2010. Herb. Powell 1175. New to the Vice-county.

M. Powell

Cetrelia cetrarioides: On plum tree in mixed orchard, Arthur's Craigs, Hazelbank, VC 77, Lanarkshire, GR 26(NS)/8385.4463, September 2009. Confirmed by B.J. Coppins. New to the Vice-county. *Vivyan Lisewski-Hobson*

Chaenotheca chlorella: on lignum of large, fallen decorticate *Pinus* in area of old-growth pine and birch, Blackwood of Rannoch, VC 88, Mid Perthshire, GR 27(NN)/5615.5596, April 2010. Herb. B.J. Coppins 23106 (**E**). Sixth record for Scotland and apparently first British record from a conifer. New to the Vice-county.

B.J. Coppins

Chaenothecopsis nigra: on lignum on the underside of a gigantic, ravine edge *Quercus* stool, within pasture woodland in former ancient deer park, Glenarm Great Deer Park, VC H39, Antrim, GR 34(D)/3027.1097, July 2010. Herb. Sanderson 1499. New to Ireland. *N.A. Sanderson*

Collema cristatum var. ***marginale:*** on limestone outcrop, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/11-34-, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Collema dichotomum: an extensive population above and below water level in bend of River Spey at Bridge of Sowden, VC 95, Moray, GR 38(NJ)/290.508, alt 70 m, June 2010. Herb. - confirmed by V. J. Giavarini and retained in VJG.

S.D. Bosanquet, R.V. Lansdown & D. Bell

Collema fragile: on ± vertical surface of limestone outcrop, Killykeegan Nature Reserve, VC H33, Fermanagh, 23(H)/11-34-, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Cresponea premnea: in VC 81, Berwickshire, February 2010, (i) on seven trees (4 *Quercus*, 2 *Acer pseudoplatanus* and 1 *Carpinus*), near Dunglass New Bridge, Dunglass Burn, GR 36(NT)/76-72-, alt 45 m. Herb. B.J. Coppins 23100 (**E**); (ii) nearby on buttress roots of *Fagus* by sunken path, GR 36(NT)/76-71-, alt 43 m. Herb. B.J. Coppins 23101 (**E**). New to southeast Scotland. *B.J. Coppins*

Degelia atlantica: on mature *Salix* surrounded by young stand of planted woodland, on banks of River Clyde, Parklea, Port Glasgow, VC 76, Renfrewshire, GR 26(NS)/349.740, February 2010. Identification confirmed by B.J. Coppins.
Vivyan Lisewski-Hobson

Endococcus rugulosus: in pits of moribund foveolate pyrenocarpous lichen on limestone, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/11-34-, alt 180 m, April 2010. Herb. B.J. Coppins 23087 (**E**). The 'host' is unusual, such that this is a 'best fit' determination. New to the Vice-county. *B.J. & A.M. Coppins*

Enterographa elaborata: a few small thalli on east- to northwest-facing sides of three *Fraxinus* (two fairly small, but strongly leaning of 1.32m and 1.06m girth and one large and upright, of 2.55m girth), growing with *Enterographa hutchinsiae*, *Pertusaria hymenea*, *Pyrenula macrospora* and *Opegrapha varia*, in *Enterographa crassa* dominated communities on the underside of the leaning trees and in a flushed area on the upright tree, in open area of scree, below a massive limestone cliff, within *Fraxinus* – *Corylus* former pasture woodland, Hanging Rock NNR, VC H33, Fermanagh, GR 23(H)/10878.3647, 23(H)/1105.3646 & 23(H)/1108.3642, June 2010. Field records. First sightings for Ireland since this BAP species was found on a single tree in 1990 in the same site. Searching similar limestone cliff woods in west Fermanagh failed to find more sites. Most sites seemed too damp and shaded with moss covering the *Fraxinus* trunks. The community is identical to that in which *Enterographa elaborata* is found in the New Forest on *Fagus*, though *Pyrenula chlorospila* replaces *Pyrenula macrospora* in the English sites. *N.A. Sanderson*

Enterographa hutchinsiae: on trunk of mature *Fagus,* Inishmakill NNR, Lower Loch Erne, VC H33 Fermanagh, 23(H)/1576.5855, alt 50 m, April 2010. Herb. B.J. Coppins 23080 (**E**). New to the Vice-county. *B.J. Coppins*

Fellhanera bouteillei: on leaves of *Prunus laurocerasus* at bottom of ravine, Dunglass Burn, VC 81, Berwickshire, GR 36(NT)/765.716, alt 50 m, February 2010. Herb. B.J. Coppins 23098 (**E**). New to Berwickshire. *B.J. Coppins*

Fellhanera bouteillei: fertile on *Calluna* in heathland, Cooper's Hill, Ampthill, VC 30, Bedfordshire, GR 52(TL)/029.377, May 2010. Herb. Powell 1235. New to the Vice-county. *M. Powell*

Fellhaneropsis myrtillicola: on leaves of *Prunus laurocerasus* at bottom of ravine, Dunglass Burn, VC 81, Berwickshire, 36(NT)/765.716, alt 50, February 2010. Herb. B.J. Coppins 23099 (**E**). New to the Vice-county. *B.J. Coppins*

Fuscidea lygaea: on sandstone erratics, Killykeegan Nature Reserve, VC H33, Fermanagh, 23(H)/110341, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Fuscidea lygaea: on Millstone Grit below Curbar Edge, VC 57, Derbyshire, GR 43(SK)/25-74-, May 2010. Herb. Powell 1241. Confirmed by B.J. Coppins. New to the Vice-county. *I. Pedley & M. Powell*

Graphina pauciloculata: parasitising *Graphina ruiziana* on old *Ilex*, surviving from previous native woodland in *Larix* plantation, about St Patrick's Chair, Altadaven Wood, VC H36, Tyrone, GR 23(H)/590.4960, 23(H)/5970.4958, 23(H)/ 5973.4957 & 23(H)/5963.49318, July 2010. First records of this BAP species for Northern Ireland and a major extension in its range. *N.A. Sanderson*

Gyalideopsis muscicola: on moss on 18th century sandstone headstone in graveyard, Killesher, VC H33, Fermanagh, 23(H/)122.358, alt 90 m, April 2010. Herb. B.J. Coppins 23092 (**E**). Possibly the first churchyard record for this species. *B.J. & A.M. Coppins*

Halecania spodomela: on top of sandstone erratic, Killykeegan Nature Reserve, VC H33, Fermanagh, 23(H)/110.341, alt 180 m, April 2010. Herb.B.J. Coppins 23083 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Heterodermia obscurata: *see corrigendum entry at end of article.* *C.J.B. Hitch*

Lecanactis subabietina: on large *Quercus* on steep west side of valley woodland, Tower Dean, Cockburnspath, VC 81, Berwickshire, GR 36(NT)/7846.6993, alt 75 m, January 2010. Herb. B.J. Coppins 23042 (**E**). New to southeast Scotland. *B.J. Coppins*

Lecania chlorotiza: on mature *Quercus*, Inishmakill NNR, Lower Loch Erne, VC H33 Fermanagh, GR 23(H)/154.584, alt 50 m, April 2010. Herb. B.J. Coppins 23077 (**E**). New to the Vice-county. *B.J. Coppins*

Lecania chlorotiza: see corrigendum entry at end of article. *C.J.B.Hitch*

Lecania inundata: on bare rusty metal of wheel rim, North Quarry, Holwell, VC 55, Leicestershire, GR 43(SK)/741.237, March 2009. Herb. Powell. Determined by B.J. Coppins. *L. Knight, S. Knight & M. Powell*

Lecania inundata: on bare rusty sheet steel of old trailer, Flints Wood, Riseley, VC 30, Bedfordshire, GR 52(TL)/041.640, January 2010. Herb. Powell 1081. Confirmed by B.J. Coppins. Rusty steel may be an overlooked substrate for this species. *M. Powell*

Lecania naegelii: on twig of roadside *Sambucus*, VC 57, Derbyshire, GR 43(SK)/25-74-, May 2010. Herb. Powell 1253. New to the Vice-county. *I.Pedley & M. Powell*

Lecanora aitema: on rotting soft-wood fence rail, Whipsnade Tree Cathedral, VC 30, Bedfordshire, GR 52(TL)009.180, July 2010. Herb. Powell 1398(b). Confirmed by B.J. Coppins. This record, with *Lecanora albella* and *Punctelia reddenda,* which see, illustrates the importance of old fences for lichens.The fence was due for replacement, but the owners (The National Trust) now plan to retain and strengthen it in situ. New to the Vice-county. *M. Powell*

Lecanora albella: on rotting soft-wood fence rail, Whipsnade Tree Cathedral, VC 30, Bedfordshire, GR 52(TL)/009.180, July 2010. Herb. Powell 1398(a). New to the Vice-county. *M. Powell*

Lecanora cinereofusca: single thalli on three old *Corylus* bushes, within *Corylus* – *Fraxinus* pasture woodland, Coille Thogabhaig SSSI, Sleat, VC 104, North Ebudes, GR 18(NG)/6132.1213, & 18(NG)/6156.1274, May 2010. Herb. Sanderson 1492. One bush was in a long ungrazed exclosure, where the stem with *Lecanora cinereofusca* had died, as a result of over abundant sun shoots draining the life from the old stem. Photograph at *www.uklichens.co.uk*. New to Skye. *N.A. Sanderson & A.M. Cross*

Lecanora farinaria: on weathered wooden plank of roof near Town Gate, Sutton Park, VC 38, Warwickshire, GR 42(SP)/115.962, April 2010. Herb. Powell 1229. Confirmed by Paul Harrold using tlc. New to the Vice-county.
B.J. Coppins & M. Powell

Lecanora pruinosa: several thalli scattered over the east wall of the church, on Dorset limestone/hamstone or mortar pointing, Membury, VC 3, South Devon, GR 31(ST)/276.029, August 2010. Herb. Benfield and Herb Hitch H43. New to Devon.
B. Benfield & C.J.B. Hitch

Lecanora sarcopidoides: on hard well-lit lignum on southeast-facing side of large *in situ* stump of felled *Querc*us, Parc Caerhun, west bank of Afon Conwy, VC 49, Caernarfonshire, GR 23(SH)/777.706, alt 20 m, October 2009. Herb SPC & duplicate in Herb v.d. Boom. Determined by P.P.G. van den Boom. New to Wales.
S.P. Chambers

Leptogium pulvinatum: on limestone outcrop, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/11-34-, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Lichenopeltella ramalinae: on *Ramalina farinacea*, in woodland near Glenuig Hall, Glenuig, VC 97, West Inverness-shire, 17(NM)/669.774, October 2009. Herb. B.J. Coppins 23102 (**E**). Second British record. *B.J. Coppins*

Lichenopeltella ramalinae: on *Ramalina farinacea* on *Prunus spinosa*, at edge of abandoned meadow, east side of River Isla, Den of Airlie NNR, VC 90, Angus, GR 37(NO)/29-52-, December 2009. Herb. B.J. Coppins 23103 (*E*). New to the Vice-county and third British record. *B.J. Coppins & P. Harrold*

Lithothelium phaeosporum: on mature *Fraxinus* by bridge, in sheltered corner of parkland, northeast of Colstoun House, Lennoxlove Estate, south of Haddington, VC 82, East Lothian, GR 36(NT)/5144.7130, alt 53 m, May 2010. Herb. B. J Coppins 23095 (**E**). New to the Lothians. *B.J. Coppins*

Micarea alabastrites: on lignum on leaning and propped *Quercus* snag and locally abundant on gently sloping sandrock outcrops on top of cliff, within relic *Quercus* – *Ilex* pasture, Eridge Rocks, VC 14, East Sussex, GR 51(TQ)/5548.3560 & 51(TQ)/5535.3607, April 2010. Herb Sanderson 1403 & 1404. Photograph at *www.uklichens.co.uk*. First record for the Sussex sandrocks, adding another record of a disjunct oceanic species to this important habitat. *N.A. Sanderson*

Micarea pycnidiophora: on two old *Ilex*, within *Betula – Ilex* pasture woodland, Correl Glen NNR, VC H33, Fermanagh, GR 23(H)/0775.5438 & 23(H)/0793.5436, June 2010. Herb. Sanderson 1443. New to Ireland. *N.A. Sanderson*

Micarea ternaria: on stones by track at edge of conifer plantation, with *M. lithinella*, north of Corse Law, VC 77, Lanarkshire, GR 36(NT)/020.515, alt 260 m, April 2009. Herb. B.J. Coppins 23038 (**E**). New to southern Scotland. *B.J. Coppins*

Micarea xanthonica: for details, see under *Opegrapha fumosa*.

Multiclavula vernalis: on an area of bare sand created by a tracked vehicle turning, on the south side of the grassy fire-break, in wet heath, Hawley Common, near Yateley, VC 12, North Hampshire, GR 41(SU)/8380.5801, May 2010. Herb. **K**(M) 165961. Collected by Leif Goodwin, Keith Blackmore and Alex Cruickshank. Determined by L. Goodwin & M. Waterman. Confirmed by B. M. Spooner. A second gathering was made by A.M. Ainsworth, June 2010. Herb. **K**(M) 166021. First records for England for this lichenised basidiomycete. This species should be looked out for in damp heathland soils well away from the previously known range in the far north and west of Scotland. *N.A. Sanderson*

Opegrapha fumosa: on acid ravine edge *Quercus*, with *Micarea xanthonica*, within pasture woodland in former ancient deer park, Glenarm Great Deer Park, VC H39, Antrim, GR 34(D)/3008.1031, July 2010. Field identification. New to Northern Ireland and rarely recorded from Ireland in general. *N.A. Sanderson*

Opegrapha herbarum: corticolous, Galsey Wood, Bletsoe, VC 30, Bedfordshire, GR 52(TL)/03-60-, July 2010. Herb. Powell 1381. Confirmed by B.J. Coppins. New to the Vice-county. *M. Butler & M. Powell*

Opegrapha lithyrga: several thalli on north facing, red-brick ha-ha, Stanford Park. VC 55 Leicestershire, GR 42(SP)/58750. 79372, July 2010. Herb. Smith. Confirmed by A. Fletcher. The park is designated an SSSI for its lichen flora. New to site and Vice-county. *P.L. Smith*

Opegrapha rufescens: on smooth bark of *Fraxinus* at east edge of Galsey Wood, Bletsoe, VC 30, Bedfordshire, GR 52(TL)/037.608, July 2010. Herb. Powell 1378. Confirmed by B.J. Coppins. *M. Butler & M. Powell*

Opegrapha saxigena: in depression at base of large sandstone erratic [? dolmen], Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/110.341, alt 180 m, April 2010. Herb. B.J. Coppins 23084 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Parmotrema perlatum: two thalli on low, dolerite rampart, partly under canopy of *Sambucus*, Corstorphine Hill LNR, Edinburgh, VC 83, Midlothian, GR 36(NT)/2103.7331, alt 120 m, July 2010. Field record. New to Midlothian. *B.J. Coppins & B. Moffat*

Parmotrema pseudoreticulatum: on well-lit south-facing *Salix cinerea* trunk in humid carr at north end of Rhos Rydd, Llanddeiniol, VC 46, Cardiganshire, GR

22(SN)/576.746, alt 135 m, May 2010. Herb. SPC. Of the two other VC 46 *P.reticulatum s.l.* collections in herb SPC, one from Parc Pont-faen SSSI, GR 22(SN)/49-59-, October 1998 (see New Rare and Interesting, in British Lichen Society *Bulletin* **84**: 46 [Summer 1999]) is also ***P. pseudoreticulatum,*** while the other from *Fraxinus excelsior* in Parc Avenue, Aberystwyth, GR 22(SN)/58-81-, March 2002, is *P.reticulatum s.s.* New to Wales. *S.P. Chambers*

Perigrapha superveniens: on *Parmelia sulcata* on fallen *Fraxinus* branch, by A890 road, near level crossing, Balnacra, VC 105, West Ross, GR 18(NG)/9864.4659, alt 35 m, April 2010. Herb. B.J. Coppins 23104 (**E**). Second record for the Vice-county and third for UK. *B.J. Coppins*

Pertusaria lactescens: fertile, at base of sheltered rock-face on coastal headland, Craig Caerllan, Cwmtydu, VC 46, Cardiganshire, GR 22(SN)/358.758, alt 50 m, July 2010. Herb SPC. First fertile Vice-county collection. *S.P. Chambers*

Phylloblastia inexpectata: on *Rhododendron* sp. leaf in Ivan Pedley's garden, Groby, VC 55, Leicestershire, GR 43(SK)/516.075, August 2010. Herb. Powell 1404. New to the Vice-county. *B.J. Coppins & M. Powell*

Phylloblastia inexpectata: on *Ilex aquifolium* leaves, Flitwick Moor, VC 30, Bedfordshire, GR 52(TL)/049.354, August 2010. Herb. Powell 1405. This inconspicuous lichen may be rather common on evergreen leaves. It is often mistakenly passed over as an un-lichenized species. New to the Vice- county. *M. Powell*

Piccolia ochrophora: on bark of *Sambucus* within Harlestone Firs, Northampton, VC 32, Northamptonshire, GR 42(SP)/722.637, July 2010. Herb. Powell 1387. This record taken together with two recent occurrences on *Sambucus* in Cambridgeshire suggest that this species may be more frequent in eastern England than is generally realised. New to the Vice-county. *M. Powell & J. Smeathers*

Piccolia ochrophora: on bark of *Sambucus* near Cobb's Wood, Wimpole Estate, VC 29, Cambridgeshire, GR 52(TL)/346.512, July 2010. Herb. Powell 1397. New to the Vice-county. *M. Powell*

Placynthiella dasaea: on upturned root-plate of wind-blown tree, southeast of Bracebridge Pool, Sutton Park, VC 38, Warwickshire, GR 42(SP)/101.978, April 2010. Herb. Powell 1227. Confirmed by B.J. Coppins. New to the Vice-county. *M. Powell*

Placynthium subradiatum: on vertical surface of limestone outcrop, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 12(H)/11-34-, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Porina byssophila: on limestone outcrop, with *P. linearis* and *Merismatium deminutum*, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/110.341, alt 180 m, April 2010. Herb. B.J. Coppins 23081 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Porina rosei: on base rich old *Quercus* and *Fraxinus* in old woodlands, VC H33, Fermanagh, (i) Cleenishgarve Island, GR 23(H)/15-60-; (ii) Hanging Rock, GR 23(H)/10-36-; (iii) Cottage Wood, Florence Court, GR 23(H)/18-33-; (iv) Reilly Wood, Crom Estate, GR 23(H)/33-25-; (v) Crom Wood, Crom Estate GR 23(H)/35-24-; VC H39, Antrim, (vi) Glenarm Great Deer Park, GR 34(D)/30-10-, June & July 2010. Herb Sanderson 1427 & field records. New to Northern Ireland, but appears widespread if rare in lichen-rich woods. *N.A. Sanderson*

Porpidia islandica: occasional on hard damp basalt exposures, with *Amygdalaria pelobotryon,* north side of Beinn na h-Uamha, north of Loch Arienas, Morvern, VC 97, West Inverness-shire, GR 17(NM) 677.535, alt 370 m, June 2010. Herb SPC. New to the Vice-county. *S.P. Chambers*

Psilolechia clavulifera: on upturned root-plate of wind-blown *Larix* within ancient woodland, Horton Woods, VC 32, Northamptonshire, GR 42(SP)/824.521, April 2010. Herb. Powell 1188. New to the Vice-county. *M. Powell*

Psilolechia clavulifera: on upturned root-plate of wind-blown tree, west end of The Mire, Cooper's Hill, Ampthill, VC 30, Bedfordshire, GR 52(TL)/025.378, May 2010. Herb. Powell 1234. New to the Vice-county. *M. Powell*

Psilolechia clavulifera: on upturned root-plate of fallen tree in woodland below Curbar Edge, VC 57, Derbyshire, GR 43(SK)/25.75, May 2010. Herb. Powell 1243. Confirmed by B.J. Coppins. *I. Pedley & M. Powell*

Psorotichia schaereri: on limestone outcrop, Killykeegan Nature Reserve, VC H33, Fermanagh, GR 23(H)/110.341, alt 180 m, April 2010. Herb. B.J. Coppins 23085 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Ptychographa xylographoides: on lignum on a standing dead *Quercus*, within open *Quercus – Betula* pasture woodland, Coille Thogabhaig SSSI, Sleat, VC104, North Ebudes, GR 18(NG)/6112.1211, May 2010. Herb. Sanderson 1492. New to Skye. *N.A. Sanderson & A.M. Cross*

Punctelia reddenda: on rotting soft-wood fence rail, round car park for Whipsnade Tree Cathedral, VC 30, Bedfordshire, GR 52(TL)/009.180, June 2010. Herb. Powell 1264. Determined by B.J. Coppins. A considerable extension to its known range and on an unusual substrate. New to the Vice-county. *M. Powell*

Pyrenula acutispora: on *Corylus* in ravine, Dearg Abhainn, Gleann Salach, VC 98, Argyll Main, GR 17(NM)/9680.4032, alt 80 m, May 2010. Herb. B.J. Coppins 23105 (**E**). Second record for the Vice-county and sixth for Scotland. *B.J. Coppins*

Ramonia chrysophaea: on bare spongy and base rich bark with *Agonimia allobata*, in parkland, Insherk Park, Crom Estate, VC H33, Fermanagh GR 23(H)/3586.2398, July 2010. First record of this BAP species for Northern Ireland and second Irish record. *N.A. Sanderson*

Rhizocaron oederi: on sandstone erratics, northeast of Gortmaconnell Rock, VC H33, Fermanagh, GR 23(H)/13-33-, alt 200–250 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Rinodina occulta: locally abundant, with *Ramalina siliquosa*, on southwest-facing basalt outcrop, 0.5 km west of Whitekirk, VC 82, East Lothian, GR 36(NT)/5908.8159, alt 65 m, May 2010 Herb. B.J. Coppins 23097 (**E**). New to southeast Scotland. *B.J. Coppins*

Ropalospora viridis: on *Alnus* in sheltered valleys, VC 14, East Sussex, (i) Old Lodge Warren, GR 51(TQ)/5472.3119; (ii) Broadwater Warren GR 51(TQ)/5470.3707, May 2010. Herb. Sanderson 1408. New to the Vice-county *N.A. Sanderson*

Ropalospora viridis: on *Betula* in recent *Betula* woodland, on a cut over raised bog, Peatlands County Park, VC H37, Armagh, GR 23(H)8964.6125 & 23(H)/ 9034.6158, July 2010. Herb Sanderson 1500. Fertile at this location. This species is likely to be quite widespread, but overlooked in Ireland. New to Ireland *N.A. Sanderson*

Ropalospora viridis: on *Alnus*, within flushed *Alnus* stand in pasture woodland in former ancient deer park, Glenarm Great Deer Park, VC H39, Antrim, GR 34(D)/3013.1128, July 2010. Field identification. *N.A. Sanderson*

Skyttea lecanorae: in VC H33, Fermanagh, (i) on *Lecanora chlarotera*, in woodland on east side of Cladagh River, Pollawaddy, GR 23(H)/12-33-, alt 180–190 m, April 2010. Field record; (ii) west of Legnabrocky Rock, GR 23(H)/12-34-, alt 180 m, April 2010. Field record. New to the Vice-county. *B.J. & A.M. Coppins*

Solorina bispora* var. *bispora: locally frequent on vertical north-facing friable damp basalt outcrops, Beinn na h-Uamha, north of Loch Arienas, Morvern, VC 97, West Inverness-shire, GR 17(NM)/677.535, alt 370 m, June 2010. Herb. SPC. New to the Vice-county. *S.P. Chambers*

Stenocybe nitida: on *Plagiochila* on two *Betula* trees within *Betula – Corylus – Ilex* pasture woodland, Correl Glen NNR, VC H33, Fermanagh, GR 23(H)/0722.5441 & 23(H)/0756.5434, June 2010. Field records. New to Northern Ireland and first record in Ireland outside Killarney. *N.A. Sanderson*

Strangospora microhaema: frequent, with *Parmeliella parvula,* on *Hypnum andoi* on south to southeast-facing trunk of mature *Fraxinus excelsior* in pasture fronting Ystradlyn, by Dol-y-cae, Cadair Idris, VC 48, Merionethshire, GR 23(SH)/729.115, alt 100 m, October 2009. Herb SPC. New to the Vice-county. *S.P. Chambers*

Strangospora pinicola: on wooden fence post, Thurleigh Airfield, VC 30, Bedfordshire, GR 52(TL)/038.607, July 2010. Herb. Powell 1383. New to the Vice-county. *M. Butler & M. Powell*

Strigula taylorii: extensive patches on smooth, flushed, mesic bark of *Acer pseudoplatanus* trunk in old woodland, Coed Llynlloedd, Machynlleth, VC 47, Montgomeryshire, GR 23(SH)/744.003, alt 50 m, January 2010. Herb.SPC. New to the Vice-county. *S.P. Chambers, A. Seddon & A. Hotchkiss*

Telogalla olivieri: on *Xanthoria parietina* on *Populus tremula*, with *Arthonia molendoi,* west of Torcroy, Insh Marshes Nature Reserve, Strathspey, VC 96, East Inverness-shire, GR 27(NN)/ 774.997, alt 240 m, June 2009. Herb. B.J. Coppins 23027, see under *Arthonia molendoi* (**E**). New to East Inverness-shire, and third record for Scotland. *B.J. Coppins & C.J. Ellis*

Tephromela atra var. ***torulosa***: on *Fraxinus*, west end of island, Inishmakill NNR, Lower Loch Erne, VC H33 Fermanagh, GR 23(H)/15-58-, alt 50 m, April 2010. Field record. New to the Vice-county. *B.J. Coppins*

Thelidium fontigenum: on decaying mortar on flat top of boundary wall of precambrian tuff in acid grassland, Altar Stones Lane, bordering Blacksmith's Field local nature reserve., Markfield, VC 55, Leicestershire, GR 43(SK)/ 483.108, April 2002. Readily recognised as a wide-spreading, purple-red stain with small, scattered perithecia, immersed in pits. Confirmed by Alan Orange. *A. Fletcher*

Thelotrema macrosporum: on *Corylus*, in ravine woodland on limestone, Cladagh River, VC H33, Fermanagh, GR 23(H)/11-33-, alt 180 m, April 2010. Herb. B.J. Coppins 23071 (**E**). New to the Vice-county. *B.J. & A.M. Coppins*

Umbilicaria deusta: a small colony of about 15 thalli over *c.* 30 x 10 cm on two adjacent flat coping stones on top of old hill boundary wall, Mynydd yr Ychen, southeast of Ponterwyd, VC 46, Cardiganshire, GR 22(SN)/765.795, alt 435m, July 2010. Herb SPC. New to the Vice-county. *S.P. Chambers*

Usnea articulata: single thallus on branch of old *Abies* about 5 m up, in mixed plantation in parkland, Florence Court, VC H33, Fermanagh, GR 23(H)/1674.3437, July 2010. Field record using binoculars. First modern record of this BAP species from Northern Ireland, and a considerable extension on the recorded Irish range. *N.A. Sanderson*

Verrucaria bulgarica: on flint under trees in disused chalk quarry in cattle-grazed pasture, Furley, VC 3, South Devon, GR 31(ST)/276.043, August 2010. Herb. B. Benfield. New to Devon. *B. Benfield & C.J.B. Hitch*

Verrucaria nigrescens* f. *tectorum: on shaded limestone outcrop at upper edge of ravine, Cladagh River, VC H33, Fermanagh, GR 23(H)/11-33-, alt *c.* 200 m, April 2010. F ield record. New to the Vice-county. *B.J. & A.M. Coppins*

Wadeana dendrographa: on fallen large *Fraxinus*, Ebbor gorge NNR, VC 6, North Somerset, GR 31(ST)/54.28, January 2008. Herb. B.J. Coppins 23050 (**E**). Initially recorded on this tree in 1970 by Francis Rose, though observed several times since. The last, on the tree, while it was still alive, was in 1994 by B.J. Coppins. Although some of the apothecia in the 2008 collection were still viable, the supporting bark was beginning to fall away, such that the species can now probably be considered extinct at this, the only site in North Somerset. *B.J. & A.M. Coppins*

Weddellomyces epicallopisma: on the central parts of mature *Caloplaca flavescens* thalli on north wall of Eglwys Llanbadarn Odwyn, Llangeitho, VC 46, Cardiganshire, GR 22(SN) 634 605, alt 230m, April 2010. Herb SPC. New to the Vice-county.
S.P. Chambers

Xerotrema quercicola: on lignum on standing dead *Quercus*, within open *Quercus* – *Betula* pasture woodland, Coille Thogabhaig SSSI, Sleat, VC104, North Ebudes, GR 18(NG)/6112.1211, May 2010. Herb. Sanderson 1492. New to Skye.
N.A. Sanderson & A.M. Cross

Corrigendum

Due to a misunderstanding, two records in *British Lichen Society Bulletin* **106**: 70 (Summer 2010), under *Heterodermia obscurata* were amalgamated into one entry. The correct inclusions should be:-

Heterodermia obscurata: 12 thalli on horizontal branch of old *Quercus* in *Pteridium* stand, near a mire, in rough grazing, south of Mount Fancy Farm, Ruttersleigh SSSI, Black Down Hills, VC 5, South Somerset, GR 31(ST)/2543.1606, February 2010. Field Record. *N.A. Sanderson*

Lecania chlorotiza: on three *Quercus* and one *Fraxinus* pollards, as old boundary trees and pasture woodland trees in sheltered situations, Ruttersleigh Common and Bransclose Copse, Ruttersleigh SSSI, Black Down Hills, VC 5, South Somerset, GR 31(ST)/2642.1647, 31(ST)/2650.1639, 31(ST)/2644.1628 & 31(ST)2590.1653, February 2010. Herb Sanderson 1382, 1384 & 1387. New to the Black Down Hills and a new site for this Near Threatened and BAP lichen. *N.A. Sanderson*

BLS Field Meetings & Workshops Programme 2011

note: All members of whatever level of experience are welcomed on all BLS Field Meetings. No member should feel inhibited from attending by the fact that some meetings are associated with BLS Council meetings or the AGM. Workshops, on the other hand, may be aimed at members who have some level of experience. If so this fact will be specified in the meeting notice.

ASHTEAD COMMON NNR (day meeting)

Sunday 16 January 2011

This field trip is associated with the BLS AGM. For details see the notice for AGM.

USING MICROSCOPES FOR IDENTIFYING LICHENS ON LIMESTONE, Bristol

Friday 18 – Sunday 20 February 2011

Tutors: Dr B.J. Coppins and Dr D.J. Hill

This will be a weekend from 7.30-9.00pm on Friday 18 February at the University Botanic Garden, Stoke Bishop (BS9 1JG). (Saturday am in the field.). Then 1.00-7.00pm on Saturday to 4.00pm on Sunday February 2010 in the School of Biological Sciences, Woodland Rd., University of Bristol (BS8 1UG). The University Botanic Garden is located in Stoke Bishop where there is plenty of nearby parking. (Held in conjunction with the Bristol University Botanic Garden).

The course will help lichenologists who want to get to know how to use microscopes better and become more confident at examining species and identifying them reliably. The programme will start with an introduction to the field site we will visit to collect fresh material. Then we will consider how the habitats can be divided up into niches and their ecological characteristics with examples of the key species to be found. In the field we will learn how to approach these habitats in practice with the provisional identification of characteristic species that occur in these niches. The emphasis will be on linking an ecological understanding to the habitats in the field with laboratory work with material collected. The Laboratory work will learn how to set up a microscope for optimal resolution and how to use the features of the microscope to help in discerning different structural features. We will learn how to make slides for various parts of a lichen and different types of lichen and how to stain sections and examine them. Where appropriate we will look at any other methods such as those for lichen substances. The course will centre on developing specific field and lab skills rather than be a general field meeting. Microscopes will be provided for each participant.

Fee: £50.00 (excluding any board and lodging and catering) (payable to the British Lichen Society)

Come and hone your identification skills. Please contact David as soon as possible as. If you have been on it already, you are very welcome to come again! *D.J.Hill@bris.ac.uk*. Tel 01761 221576. Fuller details will be sent out later to all those expressing an interest.

BLS SPRING 2011 FIELD MEETING, Islay & Jura, Scotland
Saturday 30 April - Saturday 7 May 2011

The Inner Hebridean islands of Islay and Jura offer a good range of very interesting sites for lichens. In addition to the varied geology of the coastal rock outcrops, there are good coastal woodlands, lochs on the limestone and some nice churchyards.

The BLS has booked (and paid a deposit) for sole use of the Youth Hostel in Port Charlotte, Islay (grid ref NR259584). Located in an old whisky warehouse the hostel sits by the beach on the shore of Loch Indaal. To keep the accommodation uncrowded we plan to use a maximum of 22 of the 30 bed-spaces available in the hostel. These beds are in a number of small rooms.

Breakfast will be self-catered and there are two hotels very close-by where restaurant and bar meals and other refreshment can be taken and there are local food shops in Port Charlotte. Because we have sole use of the hostel the lounge and or dining room can be used for microscope work.

The cost of bed accommodation will be in the region of £150 per person for the week. This amount depends upon the 22 bed spaces being occupied. The maximum cost should not exceed £165 per person. These figures do not include the cost of any food. Other types of accommodation can be found by looking at *www.islayinfo.com* or contacting the Islay Tourist Information on 01496 810254.

The ferry to Islay is operated by Caledonian MacBrayne (contact 08000 66 5000) and runs from Kennacraig on mainland Scotland. Citylink coaches from Glasgow and buses on Islay all connect with the ferry. Flights to Islay operate from Glasgow International Airport. More details of the above transport can be found through *www.islayinfo.com.*

Please book with the Field Meetings Secretary, Steve Price (email *lichenrecords@sorby.org.uk*) and also advise the local organiser Vince Giavarini (email *v.giavarini@sky.com*) if you plan to attend. Bookings for accommodation in the hostel will be taken on a first-come first-served basis, and a booking is secured on receipt of a deposit of £30 per person. Cheques made payable to the BLS, please, should be sent to Steve Price, the Field Meetings Secretary, Woodlands, Combs Road, Combs, High Peak, Derbyshire SK23 9UP. Please note that the balance of the accommodation cost will be required by March 2011.

Vince Giavarini will be arranging the details of the sites to be visited and more information will be sent out to attendees as plans develop.

p.s. Islay is pronounced 'eye-la';
p.p.s. Between them the islands of Islay and Jura boast 10 whisky distilleries.

BLS SUMMER WORKSHOP 2011

The Identification and Ecology of Amphibious Lichens from Freshwater Habitats
Sunday 14 – Sunday 21 August 2011

A BLS residential workshop for intermediate and experienced lichenologists (Some level of competency in microscope work is required)

Tutor : Holger Thüs, The Natural History Museum
Location: Orielton Field Centre, Pembroke, Pembrokeshire

This workshop will study the identification and ecology of amphibious lichens from freshwater habitats, and will consist of indoor tutor sessions and field visits to the excellent range of freshwater habitats available in Pembrokeshire. These include areas with limestone, sandstone and volcanic geology. A wide range of genera will be studied: from *Aspicilia* to *Verrucaria* by way of *Collema, Ionapsis* & *Rhizocarpon.*

So that all attendees will have the opportunity to learn whilst both indoors and outdoors **the number of participants will be strictly limited to 14** and therefore booking is essential.

The cost will be £290 per attendee for full board (bed, breakfast, packed lunch, dinner, teas and coffees). This cost will include the hire of the work / tutor room for the group. The cost has been calculated on the basis of all attendees staying at the Centre. The workshop is therefore being run as a residential course.

Attendees wishing to, will be able to bring partners to stay at Orielton. The same charge will apply as for workshop attendees.

Please book with the Field Meetings Secretary, Steve Price by email (*lichenrecords@sorby.org.uk*) or by post to Woodlands, Combs Road, Combs, High Peak, Derbyshire SK23 9UP.
Places will be allocated on a first-come first-served basis. Booking for attendees is secured on receipt of a deposit of £30 per person with cheques made payable to the 'The British Lichen Society', being sent to the Field Meetings Secretary.

The balance of the cost will be required by the end of May 2011.

Details of the location of Orielton and travel there can be found on the Field Studies Council website *www.field-studies-council.org*

Individual's arrangements for transport to and during the workshop can be made nearer the time.

BLS AUTUMN 2011 FIELD MEETING, Derbyshire

Thursday 6th - Monday 10th October 2011

One highlight of this meeting is a full-day of a specially arranged visit to continue the recording on the splendid ancient oaks in the Old Park, Chatsworth. The meeting base will be in the village of Hartington giving access to a range of other superb habitats in the Peak District. The focus of this meeting is away from the limestone, however for the addicts of 'little black dots' there will be plenty of the stuff around.

Outline programme:

Thursday 6 evening:	Assemble, dinner and introduction;
Friday 7:	Lead mines and heathland;
Saturday 8:	Gritstone outcrops, boulders and streams;
Sunday 9:	The Old Deer Park, Chatsworth;
Monday 10 morning:	Lichens on basalt & an optional churchyard.

Meeting base:
YHA Hartington Hall, Hall Bank, Hartington, Derbyshire SK17 0AT tel 01298 84223 (grid ref SK132 603). This is a return visit for the Society (having previously stayed here in October 2009) to a very luxurious hostel with a café, a restaurant and a bar that sells the locally brewed Hartington beer. Further details of the hostel can be found on *www.yha.org.uk*.

30 beds in a number of single, twin and triple en-suite rooms (some with bunk beds) have been reserved for us - the cost b&b is around £32.00 per night. Double rooms and dormitory rooms are also available in the hostel but no beds in these have been reserved.

Booking arrangements:
Rooms should be booked (and paid for) direct with the hostel on 01298-84223 quoting **booking reference 17561.** *Do not book via the central YHA booking system.* Advise the hostel before-hand if an evening meal is required on the day of arrival. The rooms will be held until 6 weeks before the meeting, after which they will become available for public booking. Other types of local accommodation can be found through the website *www.visitpeakdistrict.com*.

The nearest rail station is in Buxton, 20mins car drive to the north. This station is the end of a branch line from Manchester and Stockport. There is a bus service (no 199) from Manchester Airport to Buxton. There are infrequent bus services from Buxton which call at Hartington. See *www.derbyshire.gov.uk/transport_roads* for current timetables. If you have particular problems with transport please contact Steve Price (see below).

If you plan to attend please advise Steve Price, the BLS Field Meetings Secretary, by email to: *lichenrecords@sorby.org.uk*, or by post to: Woodlands, Combs Road, Combs, High Peak, Derbyshire SK23 9UP. More detailed information will be sent out to attendees shortly before the meeting.

Introducing Lichens 1 and 2

Success by the British Lichen Society in its bid for OPAL (Big Lottery Funds) for £3,000 is enabling the Society to offer, jointly with the Field Studies Council, introductory courses in 2011.

Introducing Lichens 1 and 2 are two one-day courses that can be taken together, or as stand-alones, at the very moderate fee of £20 per day.

Introducing Lichens 1 presents lichens to anyone keen to learn what they are and how to recognise some of the more common species. The day includes an introductory talk, a field excursion and use of simple charts and keys to help you identify species with confidence.

Introducing Lichens 2 helps participants develop their interest in and knowledge of lichens. Lichens will be investigated in their local habitats along with characters to aid field identification. The biology and many uses of lichens, including as pollution indicators, will be introduced. If time allows, participants may be able to use microscopes to study lichens further or to undertake a small project.

This innovative programme, planned by Pat Wolseley (BLS) and Sue Townsend (FSC), builds on interest in lichens generated by the OPAL air survey. BLS members who have offered to act as tutors are warmly thanked. We hope that other BLS members, who are welcome to enrol themselves if they wish, will:

- Let their friends interested in natural history know of these opportunities
- Volunteer to act as assistant-tutor on courses at a centre local to them (travel expenses paid by the BLS) - contact Barbara Hilton or Pat Wolseley to arrange this.

Booking arrangements are through the local FSC centre (information correct at end-September): *http://www.field-studies-council.org/*

Centre	**Tutor**	**Title**	**Date 2011**
Epping Forest	John Skinner	Introducing lichens 1	19 February Sat
	John Skinner	Introducing lichens 2	2 April Sat
Flatford Mill	John Skinner	Introducing lichens 1	17 May Tues
	John Skinner	Introducing lichens 2	22 September Thur

Centre	**Tutor**	**Title**	**Date 2011**
Juniper Hall	David Hawksworth	Introducing lichens 1	12 March Sat
	David Hawksworth	Introducing lichens 2	21 May Sat
Kindrogan	Rebecca Yahr	Introducing lichens 1	7 April Thur
	Rebecca Yahr	Introducing lichens 2	19 September Mon
Malham Tarn	Allan Pentecost	Introducing lichens 1	16 April Sat
	Allan Pentecost	Introducing lichens 2	10 September Sat
Nettlecombe	Pat Wolseley	Introducing lichens 1	19 February Sat
	Pat Wolseley	Introducing lichens 2	TBC
Orielton	Pat Wolseley	Introducing lichens 1	18 March Sat
	Robin Crump and Pat Wolseley	Introducing lichens on the seashore	27 August Sat
Preston Montford	Ivan Pedley	Introducing lichens 1	21 May Sat
	Ivan Pedley	Introducing lichens 2	2 August Tues
Slapton Ley	David Hawksworth	Introducing lichens 1	10 April Sun
	David Hawksworth	Introducing lichens 2	28 August Sun
Natural History Museum (Angela Marmont centre)*	H Thüs / P Wolseley	Introducing lichens 1	26 February Sat
	H Thüs / P Wolseley	Introducing lichens 2	2 April Sat

*For booking contact Holger Thüs (*h.thues@nhm.ac.uk*)

Barbara Hilton and Pat Wolseley

Churchyard sub-committee report for the Education and Promotions and Conservation Committees October 2010

God's Acre Project in Kent

This is a joint initiative between Canterbury and Rochester dioceses and the Kent Wildlife Trust. The launch of the project at Detling Church on 19 June during Cherishing Churchyards Week was the culmination of a year of hard work which included three workshops on various aspects of churchyard management and use. The Churchyards sub-committee is a key partner in this initiative. A further four workshops over the coming nine months are being arranged in different areas of Kent.

Ishpi Blatchley discusses lichens with the Bishop of Dover, the Right Revd Trevor Willmott at the launch of Kent's God's Acre Project, Detling Church. Photo by Richard Bartley.

Churchyard Recording meeting in Clwyd

Every year the churchyards sub-committee meets to record lichens in churchyards in an area which is under-recorded. This year we were based in Wrexham and visited churchyards in VCs Denbighshire (50), Flintshire (51), and Cheshire (58). We were delighted to be joined by Steve Chambers whose knowledge and expertise were appreciated by us all. Thirteen yards were surveyed; in most the number of lichens was low (40-50) due to the nature of the stone (mostly sandstone) and they were often in poor condition, being very well grazed! We were delighted to come across Derwen church which had a richer variety of stone including hard limestone!

Caloplaca alociza was found here (second record for a churchyard - the other is at Warren Church, Pembrokeshire recorded by Peter James) and Steve found *Scoliciosporum curvatum* on yew, which is almost certainly a 'first' for a churchyard. *Acarospora umbilicatum* found at Acton, Cheshire (Ivan Pedley) and at Hawarden, Flintshire were new county records. *Candelariella medians* found at Wrexham Cemetery and at Llanfwrog, whilst leaving the 'southerners' unmoved, excited Steve as it is very scarce in the area. One yard surveyed, Minera, has an issue with the laying down of unsafe headstones (including one supporting a good colony of *Stereocaulon vesuvianum*) which Ivan Pedley will follow up.

It is hoped that now most churchyard records are on Recorder 6 we will be able to identify the best yards both in terms of numbers and rarities. A preliminary discussion on an objective way to evaluate yards will be followed up when data is available from Recorder 6.

Talks and workshops

Barbara Hilton and Ann Allen have sent this report of two public talks:

A talk on churchyard lichens was given to members of the Women's Institute at Tawstock, North Devon on 9 June. The date had been specially chosen as part of the summer programme, in the hope of having a sunny walk around the churchyard but after having a fine day (in an otherwise damp week) it rained! However, the indefatigable WI members, most of whom are also churchgoers, turned up in good numbers, sensibly clothed and viewed the lichens on granite, sandstone, slate and limestone memorials. Braced with tea and custard creams, everyone enjoyed looking at lichens, which grow here in moderate abundance both on saxicolous and corticolous surfaces. People realised that the different types of stone in their churchyard have distinctive and easily recognised differences in their lichen flora.

On 5 June an enterprising group of members of the St John's Wood Society enjoyed finding out about lichens - and what they tell us. Starting in the churchyard and garden behind St John's Wood Church, a limestone memorial to a Private in the Life Guards who died in the Battle of Waterloo, January 1832 was viewed first. On its sloping top surface it has a light cover of *Physcia* spp. and several spots of *Xanthoria parietina*. That any lichen is present here is remarkable in many ways as not long ago the area was subject to much SO2 pollution and the church is on a prominent corner of Finchley Road which carries much heavy traffic.

After looking at a wooden bench and several trees the group compared the lichens in the churchyard with those on fastigiate oak trees along an adjacent road, where they found abundant *Phaeophyscia orbicularis.* More revealing was comparison with the lichens growing on the *Catalpa* tree in front of St Marylebone Almshouses, about 1 km away. On its trunk and branches five 'indicator' lichens are growing: three of these are nitrogen-loving - *Xanthoria parietina, X. polycarpa* and *Physcia spp.* - and two are found in both polluted and clean air - *Parmelia sulcata* and *Melanelixia subaurifera*. The group saw for themselves that more lichens grow in the cleaner air in quieter parts of the St John's Wood, away from the very heavy traffic and resulting pollution of Finchley Road.

Ivan Pedley has led 'churchyard days' for an Oxford group and for Worcestershire Wildlife Trust. Both were follow-ups to very successful events held earlier in the year.

Ishpi Blatchley met Jeremy Townsend an interested member from South Africa who had contacted the E&P Committee to see whether he could meet up with a lichenologist while visiting his family in England. An interesting day was spent studying the lichens in Clayton churchyard (Sussex) and a nearby park.

Data collection/Resurveying of yards
Members of the sub-committee are involved in surveying or resurveying yards in Warks, Staffs, Leics (Ivan Pedley), Wilts (Lesley Balfe and Ken Sandell), Kent (including those with *Anaptychia ciliaris* and *Physcia clementei*) (Ishpi Blatchley).

Barbara Hilton and Ann Allen have embarked on a project, assessing distribution of lichens on limestone headstones in churchyards in small villages in North Devon.

Mapping card
A new churchyard mapping card has been produced and was trialled successfully at the Wrexham weekend. Thanks are due to Ivan Pedley for his initial input and to William Blatchley for finalizing the card. It is hoped that the card will soon be available on the BLS website.

Habitat page for the Conservation section of the BLS website
A 'draft' page has been circulated to sub-committee members and to the Conservation Committee for comment but no final decision can be made until the format for the Habitat pages has been agreed by the Conservation Committee.

Society business

The British Lichen Society is now on Facebook!

At the last EPC meeting, committee members discussed ways of making the society more accessible to our newer members and decided that we should be brought into the 21st century with our very own Facebook page.

The idea is that this webpage will be a place for our members to come together (albeit through cyberspace) for discussions, chats and to find out what's going on in the society, as well as being a place for photographs from field outings and meetings to be uploaded and shared. It is hoped that the page will be a place for newer members to get more acquainted with each other and existing members, and that as a result that they will be encouraged to get more involved with the society.

In the short term, we need as many BLS members as possible to join the site. You can do this in a number of ways. If you are not already using Facebook you need to go to *http://www.facebook.com/* and sign in, providing your name, email address and date of birth - if you have a photo of yourself to hand then that's even better! Once you've signed up, or if you are already using Facebook, then you can simply search for The British Lichen Society page and once you're on it click 'Like'. Once you are a friend of the BLS Facebook page you can post messages, event notifications, photos and even videos for all other members to see, as well as starting discussions for all to get involved with.

The key to making this work is ensuring that as many existing members as possible join and use the site, that way when a new member or unassuming member of the public takes a peek at our site, they'll be overwhelmed by what a friendly, active and up-to-the-minute bunch we really are!

Notice of Annual General Meeting

Venues

The 2011 Winter Meeting, comprising Committees, Council, the Swinscow Lecture, Annual General Meeting and lectures will be held at the Natural History Museum, Cromwell Road, London, SW7 5BD over the period Thursday 13th to Saturday 15th January 2011.

The Swinscow Lecture, AGM and lectures will be held in the Flett Lecture Theatre. There will be space for exhibits in the foyer of the Flett Lecture Theatre. Access to the Flett Lecture Theatre is by the Exhibition Road entrance.

The Winter Field Meeting will be held at Ashtead Common NNR, Ashtead, Surrey on Sunday 16th January 2011. See below for further details.

Accommodation

Accommodation close to the Natural History Museum is available nearby at Baden-Powell House, 65-67 Queens Gate, SW7 5JS. See *www.bph.conferences@scout.org.uk* or 'phone 020 7590 6909.

There are also reasonably priced hotels nearby:

Abcone Hotel 020 7460 3400	Eden Plaza Hotel 020 7370 6111
Montana Hotel 020 7584 7654	Acacia Hostel 020 7823 7103

There is also an NHM accommodation list which will be put on the BLS website.

Timetable

Friday 14th January:

17.30 – Drinks & nibbles available in the foyer of the Flett Lecture Theatre.
18.00 – Swinscow Lecture – Flett Lecture Theatre.
19.30 – Society Dinner to be held at Baden-Powell House across the road (Queens Gate) from the NHM.

Saturday 15th January:

10.00 – Coffee / tea / shortbread available in the foyer of the Flett Lecture Theatre.
10.30 – Annual General Meeting.
12.45 – Lunch at own expense in the Staff Restaurant.
14.00 – Conducted tour of new lichenological facilities in the NHM – 3 groups led by Pat Wolseley, Holger Thüs and Cécile Gueidan.
15.00 – First of three lectures (see details below) reflecting on 2010 as *International Year of Biodiversity*.
15.30 – Coffee / tea.
16.00 – Second & third lectures
17.00 – Discussion
17.30 – Close.

Exhibition

Exhibits can be put up in the Foyer of the Flett theatre from 2.30 on Friday and should be ready for viewing by 5.00 pm on Friday 14th. They can remain up until the end of the programme on Saturday 15th. Please advise Pat Wolseley by e-mail of your requirements for tables or display stands before Monday 3rd January as these have to be ordered in advance.

Swinscow Lecture

The Swinscow Lecture is delivered every second year in honour of Dougal Swinscow, the founding father of the Society. This year it will take place at 6.00 p.m. on Friday 14th January in the Flett Lecture Theatre in the Natural History Museum. We are privileged to welcome **Dr Robert Lücking** from The Field Museum of Natural History, Chicago whose talk is entitled:

Lichenology in the 21st Century: is nothing the same?

Abstract: Molecular phylogeny has revolutionized our understanding of the evolution and classification of living organisms. Of the three higher kingdoms Plantae, Animalia, and Fungi, the Fungi including the lichens have undergone the most drastic systematic changes.

Classifications published before the new millenium have been contradicted almost entirely by molecular evidence gathered in the past decade. This profoundly affects how we deal with lichen fungi on a daily basis, from the lack of consistency in naming them, to the widely disparate species concepts that might recognize just one taxon where others distinguish ten, to our ideas about how lichens evolved and diversified.

This presentation draws a picture of what lichenology entails in the 21st century; how we can face the challenges of incorporating new data and concepts into our accustomed views of what lichens are and how they should be classified, without neglecting the importance of traditional approaches involving solid taxonomy and field experience.

Society Dinner

This will be held at Baden-Powell House across the road from the NHM (at the junction of Cromwell Rd with Queens Gate) and will comprise a hot fork buffet with vegetarian option, followed by dessert and coffee or tea. A pay-bar is available. To secure a place please complete the enclosed form and send a cheque **made payable to the British Lichen Society (not BLS)** to cover the required number of dinners (@ £20) to John Skinner, BLS Treasurer, 28 Parkanour Avenue, Southend-on-Sea, Essex, SS1 3HY.

Annual General Meeting

10.00 Coffee will be served in the Foyer of the Flett theatre (entrance from Exhibition Rd at 10.00 a.m.) to enable members to view exhibits and meet each other

10.30 Annual General Meeting

Nominations

Nominations for Officers for 2011 and two members of Council for the period 2011-2014 should be sent by e-mail or in writing to the Secretary, Dr. Chris Ellis, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, Scotland *C.Ellis@rbge.ac.uk* at least 2 weeks before the AGM. No person may be nominated without their consent. Ivan Pedley and Steve Price are due to retire from Council and are not eligible for re-election. Peter Lambley will also stand down, following his term of one year as Past President. We thank all three for their service.

AGM Agenda

Please sign attendance list and write your own name badge.

1. Apologies for absence
2. Minutes of the Annual General Meeting held at Norwich January 2010.
3. Matters arising.
4. Officers and Committee Chair Reports.
5. Field Meetings 2011-2012
6. Election of Officers and two members of Council including Chair of Education & Promotions Committee.
7. Amendment of Constitution
8. Ursula Duncan Award
9. Any other business
10. Date and place of AGM 2012.

14.00 – 15.00 **Guided tour of new facilities for lichenologists in the NHM** – -led by Pat Wolseley, Holger Thüs and Cécile Gueidan. Please assemble in the Foyer of the Flett theatre (entrance from Exhibition Rd at 2.00 p.m.)

Lectures reflecting on 2010 as *International Year of Biodiversity*

15.00 – 15.30

Neil Sanderson: *The Conservation of Lichen-Rich Woodlands*

Abstract: Woodlands are the richest habitat in Britain for rare and threatened lichens. Lichen-rich woods can occur in all climatic zones that support woodland and have a history of clean air. However, the density of lichen-rich woodlands is very variable and reflects local land use history. Threatened lichens occupy numerous different habitats within woodlands, often with very narrow niches and occurring at low densities. Individual species conservation is a daunting prospect and unlikely to be effective. Fortunately, there are common habitat requirements shared by most threatened woodland lichens; they are largely species of old growth stands and require both reasonably high light levels and shelter. Lichen-rich woods typically have areas of old growth with open canopies, but which are failing to regenerate. Such stands are generally maintained by the browsing of large mammals. These woodlands are typically a product of past non-intensive multiuse woodland management.

In modern Britain such habitats are not proving easy to maintain, with rapidly changing threats. Many traditionally grazed woodlands were overgrazed in the 20th century, and much conservation policy is still influenced by this. The prevailing threat now, however, is undergrazing. There is a great need for lichenologists to communicate the vital need to maintain long term openness within lichen-rich woodlands, including quite dense woods (pasture woodland) that do not conform to general concepts (wood pasture) of what grazed woodlands should look like.

15.30 – Coffee / tea.

16.00 – 16.30

Vince Giavarini: *Lichens of the Killarney National Park*

Abstract: Divided neatly between Carboniferous limestone in the north and Devonian sandstone in the south, Killarney is Ireland's first National Park. From Loch Leane in the east, steep, boggy mountains threaded with lakes run its entire length. At the heart of Killarney are its Atlantic woodlands, prized habitats bursting with Lobarion and Graphidion lichens.

The 'evil' here of course is *Rhododendron* infestation but Killarney knows all about *Rhododendron*: for 40 years ground teams have been tackling it head on. The talk will explore how the LichenIreland project has enabled work to begin on mapping the

lichen interest of this extraordinary area. In the wake of so much displacement by *Rhododendron* what are the prospects for the future of Killarney's lichen treasures?

16.30 – 17.00
Bryan Edwards: *Important Plant Areas & Important Areas for Fungi*
Abstract: *Important Plant Areas* and *Important Areas for Fungi* are areas recognised by *Plantlife International* as centres of plant and fungal biodiversity and are key to meeting Objective 2 – that of Conserving Plant Diversity – as part of *Plant Diversity Challenge*.

In the UK 75 areas have been identified as being of International Importance for Lichens within the Atlantic Europe, either for supporting rare and threatened species or for exceptional assemblages of indicators for example those associated with Oceanic woodland or coastal rocks..

17.00 – 17.30 **Discussion**

Saturday evening
There are no formal events in the evening but if there is sufficient interest arrangements can be made for a reservation at a nearby restaurant for dinner or gathering at a local pub.

Winter Field Meeting, Ashtead Common NNR, Ashtead, Surrey
16 January 2011

Ashtead is located between Epsom and Leatherhead, close to junction 9 of the M25. Ashtead Station can be reached by direct train from either Waterloo or Victoria stations. Please assemble in the station car park grid reference TQ 180589 at 10.30AM. At the time of writing the winter timetable is not available so **CHECK THESE TIMES** but a train should leave Waterloo at 9.32 arriving at 10.12, and from Victoria at 09.38 arriving at 10.25. There is ample free car parking on a Sunday, and the station is immediately adjacent to the common.

Ashtead Common is owned by the City of London. It has a website (*http://www.cityoflondon.gov.uk/Corporation/LGNL_Services/Environment_and_planning/Parks_and_open_spaces/Ashtead_Common/)* – you will find it easier to google "Ashtead Common" – on which various information including a map and and guide leaflet are posted. I will attempt to acquire copies of these for the day. The Common staff are enthusiastic to support our visit, and will hopefully join us on the day.

Much of the following information has been gathered from the Common's website. Ashtead Common is an ancient area of park woodland with over 2,300 ancient oak pollards providing a stable habitat for many rare and endangered deadwood species.

It has been part of the Epsom and Ashtead Commons Site of Special Scientific Interest since 1955 due to its rich community of breeding birds. It has also been a National Nature Reserve since 1995 due to the decaying wood of ancient trees and the rare invertebrates that live in it. The site includes two scheduled Ancient Monuments - a Roman villa and a triangular earthwork.

Ashtead Common's diverse habitats support a wide variety of plant and animal species, including several hundred species of fungi, lichen and mosses (only several hundred….? PFC). Some 50 different species of trees and shrubs and more than 300 other species of plants can also be found here, including the greater yellow rattle, bluebell, wood anemone and the southern marsh orchid. The Common is a mosaic of woodland, grassland, scrub and various wetland habitats - ponds, streams, ditches, springs and a well.

The large area of oak pollards (relic woodland pasture) provides an important habitat for specialised plants (aaaargh…. PFC) such as lichens, mosses and liverworts, as well as attracting bats, woodpeckers, owls and nuthatches, together with butterflies such as the purple emperor and purple hairstreak. The woodland in spring is scattered with bluebells, anemones and wood sorrel. Wood spurge, butcher's broom and giant fescue are also found here. The lower slopes of the Common towards the Rye and Woodfield were periodically used for crops until 1956. Nowadays, they are ~~now~~ dominated by shrubs and bushes, such as willow, sallow, blackthorn, hawthorn and oak. Often described as scrub / grassland, this area provides an intermediate stage between grassland and woodland.

The Common is renowned for its invertebrates. Over 1,000 species of beetle have been recorded, of which more than 150 are internationally rare ~~species~~. The list of butterflies and moths is equally impressive. Ashtead is home to a variety of amphibians and reptiles, as well as mammals such as bats, voles, foxes and roe deer. Non-lichenized fungi have been reasonably well surveyed with specialities such as the BAP-listed oak polypore (*Piptoporus quercinus*) and the area was surveyed for microfungi quite extensively in the past by IMI staff, but there does not seem to have been a systematic attempt to record the lichens.

If you're delayed or need further information contact me at *p.cannon@cabi.org* (beforehand) or on 07597 551059 on the day.

BLS Microscopes at Field Meetings

The BLS has recently acquired two microscopes for communal use by members at field meetings. They are a dissecting microscope (10× & 30×) and a binocular compound microscope (40×, 100×, 400× and 1000×-oil). Bob Town of GT Vision Ltd (*www.gxoptical.com*) kindly provided the microscopes to the Society at a substantial discount.

Note that whilst all efforts will be made to transport the Society microscopes to every field meeting it may not always be practicable to do so. Attendees will be told before hand about the availability of this equipment at the meetings. Members using this equipment will be expected to provide their own consumables, e.g. microslides, cover-slips, petri-dishes, razor blades, chemicals etc.

30% Discount Offer to BLS Members

GT Vision Ltd are also offering a **30% discount** on any GX Microscopes product from their website to all members of The British Lichen Society. This offer is open until 1st June 2011. See *www.gxoptical.com* and phone GT Vision on +44 (0)1440 714737.

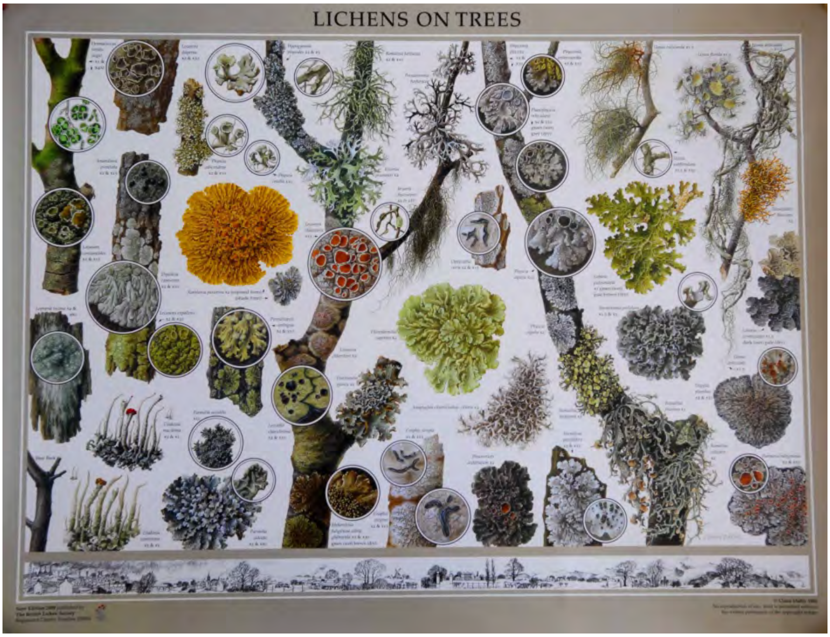
Steve Price
Field Meetings Secretary

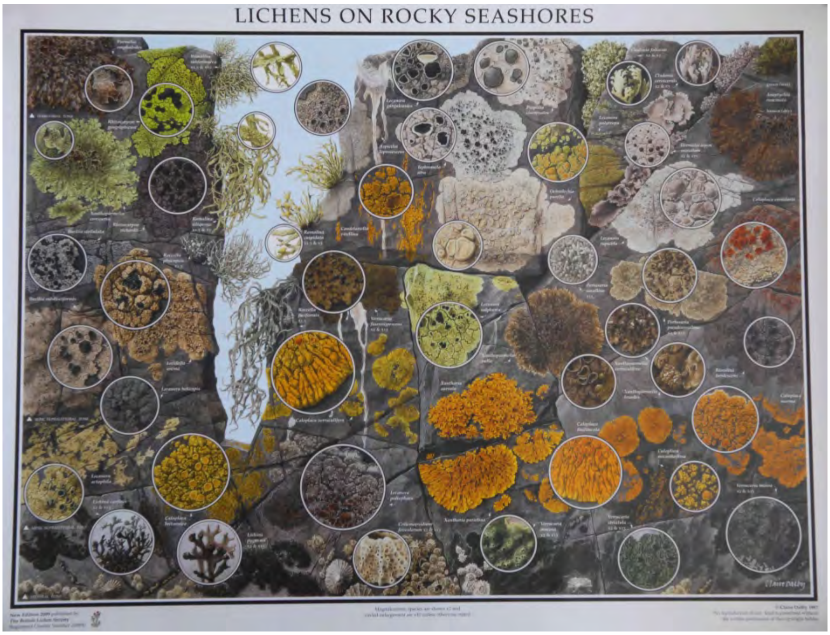
NEW MEMBERS May to October 2010

Welcome to the following new members of the British Lichen Society….

Ms C. Bauvet, Ucel, FRANCE
Mr M. Bertrand, Viens, FRANCE
Mrs S. Clark, Victoria, AUSTRALIA
Miss H.M.P. Coffey, Ottawa, CANADA
Mr R. Coulson, Reading, UK
Mr B. Dilhan, Ragama, SRI LANKA
Ms D. Flück, Hofstetten, SWITZERLAND
Mr J.S. Harrison, Kent, UK
Mrs J. Heaney, Shropshire, UK
Dr F. Högnabba, Helsinki, FINLAND
Dr K. Kinalioglu, Giresun, TURKEY
Mrs S.-A. Lister, Bristol, UK
Mr L. Ludwig, Bad Langensalza, GERMANY
Mrs J. Macpherson, Inverness, UK
Dr A.E. Marples, Cumbria, UK
Mr J. McIlroy, Co. Down, UK
Mr G.S. Motley, Monmouthshire, UK
Dr K. Papong, Kantarawichai, THAILAND
Mr O. Pescott,21 Sheffield, UK
Mrs S. Spurling, Dorset, UK
Ms R. Takeda, Tokyo, JAPAN
Mr I. Taylor, Cumbria, UK
Miss C. Wallace, Cumbria, UK
Dr M. Westberg, Stockholm, SWEDEN

New Lichen Wall Charts illustrated by Claire Dalby





These beautifully illustrated colour wall charts: Lichens on Trees and Lichens on Rocky Seashores have been updated with the new species names. Ideal as learning aids, with over 40 different species per poster. Size: A1, 80cm width x 60cm height. Price: £5 each plus £2 P & P for purchases of less than 8 or £4 per poster plus P & P for purchases of 8 or more. Please contact John Douglass: *jrdouglass@hotmail.com*

PUBLICATIONS AND OTHER ITEMS FOR SALE

(Subject to availability)

For publications and other items please send orders to:
Brian Green, 3 Tyn y Coed, Carneddi, Bethesda, Gwynedd LL57 3SF, UK (email brian@mrgreen.org.uk). Cheques in Sterling should be made payable to **'The British Lichen Society**', and drawn on a UK bank or on a bank with a UK branch or agent. All prices include postage and packing. Purchases in US$ can be made through the Americas Treasurer: US Dollar rates are double the Sterling Rate. Cheques in US$ should be made out to 'British Lichen Society' and sent to J W Hinds, 254 Forest Avenue, Orono, Maine 04473-3202, USA. *Overseas members may also pay by direct transfer into the Society's UK bank account. Please contact Brian Green for details if you wish to pay by this method.*
The BLS is negotiating with a company to take over distribution of BLS products. For the moment, please email or write to Brian before sending money.

PUBLICATIONS

Lichen Atlas of the British Isles (ed. M.R.D. Seaward)
Fascicle 2 (*Cladonia* Part 1: 59 species): members £7.50; non-members £10.00.
Fascicle 3: The Foliose Physciaceae (*Anaptychia, Heterodermia, Hyperphyscia, Phaeophyscia, Physcia, Physconia, Tornabea*), *Arctomia, Lobaria, Massalongia, Pseudocyphellaria, Psoroma, Solorina, Sticta, Teloschistes*: members £7.50; non-members £10.00.
Fascicle 4: *Cavernularia, Degelia, Lepraria, Leproloma, Moelleropsis, Pannaria, Parmeliella*: members £7.50; non-members £10.00.
Fascicle 5: *Aquatic lichens and Cladonia* (part 2): members £8.00; non-members £10.00.
Fascicle 6: *Caloplaca*: members £8.00; non-members £10.00.

Identification of Parmelia Ach. [UK species] on CD-Rom - ISBN 0 9523049 4 5. Members £8.00; non-members £13.00; multiple users at one site £24.00.
Microchemical Methods 2nd edition with additions and corrections and 2 colour chromatograms for *Lepraria* species ISBN 978 0 9540418 9 2. Price non-members £12.00, Members £9.00 (Airmail, additional at cost).
Lichens & Air Pollution (James): 28 page Booklet; £1.50.
Key to Lichens and Air Pollution (Dobson): £2.00.
Lichens on Rocky Shores. A4 laminated Dalby 'Wallchart' £1.50.
Key to Lichens on Rocky Shores (Dobson): £2.00.
Taxonomy, Evolution and Classification of Lichens and related Fungi Proceedings of the symposium, London 10-11 January 1998 (reprinted from *The Lichenologist* Vol. 30): members £8.00; non-members £13.00.
Bibliographic Guide to the Lichen Floras of the World (Edn 2; Hawksworth & Ahti (reprint from *The Lichenologist* Vol. 22 Part 1): £2.00.
Checklist of British Lichen-forming, Lichenicolous and Allied Fungi (Hawksworth, James & Coppins, 1980): £2.00.

Checklist of Lichens of Great Britain and Ireland (Coppins, 2002): members £7.00; non-members £9.00.

Lichen Habitat Management Handbook: members £10; non-members £15.00.

Surveying and report writing for Lichenologists (Guidelines for surveyors, consultants and commissioning agencies): members £10.00; non-members £15.00.

The Lichen Hunters (Gilbert, 2004): £8.50.

Horizons in Lichenology (Dalby, Hawksworth & Jury, 1988): £3.50.

Aide Mémoire: Usnea (James): members £3.90; non-members £5.90.

A Field Key to Common Churchyard Lichens (Dobson): members £7.00; non-members £8.00.

A Guide to common churchyard Lichens (Dobson): £2.50.

A Conservation Evaluation of British Lichens (Woods & Coppins): members £4.00; non-members £6.00.

Indices of Ecological Continuity for Woodland Epiphytic Lichen Habitats Of the British Isles **(**Coppins & Coppins): members £3.50; non-members £6.00.

Lichen Photography (Dobson, 1977): £1.00 [Photocopies of A4 sheets].

Mapping Cards: General, Churchyard, Woodland, Mines, Coastal, Urban, Chalk and Limestone, Moorland: free.

BLS leaflets: Churchyard lichens - Lichens on man-made surfaces (encouragement and removal): free.

Lichen Society Postcards: Lichens in full colour in assorted packs of 16. £3.00 [Orders for more than five packs are available at a reduced rate.]

British Lichen Society Car Sticker: 5 colour 4" diam. self-adhesive plastic: £1.50

OTHER ITEMS

All the following items have the British Lichen Society logo in three colours - black outline, silver podetia and red apothecia.

Woven ties with below-knot motif of BLS logo: £7.00. Colours available: maroon, navy blue, brown, black and charcoal.

Sweatshirts with breast pocket size embroidered motif of BLS logo: £16.00. Colours available: light grey, navy blue, bottle green, red.

Sweaters, wool with breast pocket size embroidered motif of BLS logo: £14.00. Colours available: maroon, bottle green and navy (various sizes).

T-shirts with screen-printed full chest motif of BLS logo encircled by the words 'British Lichen Society': £10.00. Colours available: light grey, navy blue, bottle green, tangerine (one old stock yellow - small). Please specify size *and* colour options.

Earthenware mugs (white) with coloured logo on both sides and encircled by the words 'British Lichen Society' below: £3.00

Hand lenses

Gowland x10 plastic lens - a useful spare or second lens, handy when taking a friend with you! £3.00.

x10 glass lens in metal body, lens diam 18mm £8.50.

x30 lens, diam 21mm. A new top quality lens £14. This lens is not suitable for general field work, a x10 lens is necessary for this and the x30 for more detailed examination later.

NEW FOR LOAN: For UK members only
A microscope stage-micrometer slide for the calibration of eye-piece graticules in 10µm divisions is available for loan. A deposit of £40 is required.

When ordering items through the post, please allow a month for delivery, as many items have to be ordered specially, or in bulk.

BACK NUMBERS OF *THE LICHENOLOGIST*
Cambridge University are pleased to announce that from 2006 all BLS members will be able to purchase back numbers of the Lichenologist (ISSN 0024-2829) at £10.00 per back issue and back volumes at £40.00. Cambridge holds issues back to and including Volume 33 (2001).
Contact:
Tel. 0044 1 233 326070; Fax 0044 1 223 325150; E-mail: *journals@cambridge.org*

Back stock is also held at SWETS. For details see:
http://backsets.swets.com/web/show/id=47067/dbid=16908/typeofpage=47001
A complete volume from SWETS costs 200 euros.

SUBMISSION DEADLINE

Please would intending contributors to the Summer 2011 issue of the *Bulletin* submit their copy to the Editor by 21 April. These can be sent by e-mail to *p.cannon@cabi.org* as an attachment. Alternatively they can be sent on a CD to the Editor (for address see inside front cover). Colour images are welcomed but for reasons of economy it may not always be possible to use them. Please send these as separate high-resolution (at least 500 kb) .jpg or .tif files; do not embed them in a Word document as they are difficult to edit without losing much resolution. For the style of references see past *Bulletin*s.

Renewal of Membership for 2011

Subscriptions are due on 1st January 2011!

Please be aware that members who do not renew their subscription for 2011 will be removed from our mailing lists in spring.

We have members with a credit on their membership account (mainly foreign members who make 3-year payments in order to save bank charges). Unfortunately, it is not practical to send individual reminders to those members once their renewal is due.
Therefore, **if you don't know** whether you need to renew for 2011, **check the anonymous list** placed on our website, *http://www.thebls.org.uk/content/renewals.html*. In order to use this list you will need to know your membership number – it is printed on the envelope in which you receive the Bulletin.

There will be no individual reminders sent when your membership expires, but in accordance with our constitution mailing of journals will be suspended.

UK members are encouraged to pay by Standing Order to ensure timely annual renewal of their membership (We are looking into Direct Debit options and will inform you when the system is operating).

Subscriptions rates for 2011 remain the same as 2010. They are given on the inside of the back cover of the *Bulletin* and can be found on our website.

Payment methods and contact details are also listed on the **inside covers of the *Bulletin*** and on our **website**. A few comments regarding payments are given below.

Please do not hesitate to contact the Membership Secretary should you have any query regarding your membership status, need more information about how to pay or any other membership matters.

Please keep us informed! It is very important that you keep the Membership Secretary informed of any change of address as we have to arrange the mail-outs of literature. Updates on changing email addresses are helpful as well.

For UK Members

If you pay by cheque

Cheques should be made payable to 'The British Lichen Society' and should be sent to the Membership Secretary. Please note your membership number (or post code) on the back of the cheque.

If you would like to set up a Standing Order
Our UK bank details are as follows (but see below for international transfers):

Bank – CAF Bank Ltd
Address: 25 Kings Hill Avenue, Kings Hill, West Malling, Kent, ME19 4JQ
Sort Code – 40-52-40
Account Name – British Lichen Society
Account Number – 00012363

For NON-UK Members
If you pay by International bank transfer
Make your payment in £ Sterling. The bank charge should be paid by you, the payer. Send advance warning of foreign payments to the Membership Secretary - it helps us to make sure that these have gone through safely and to amend our database. Our bank details for are as follows (but see above for within UK payments):

Bank – HSBC City Corporate Banking Centre
Account Name – CAF Bank Ltd
Account Number – 72138549
Sort Code – 40-05-30
Swift BIC Code – MIDLGB2141W
IBAN Number – GB48MIDL40053072138549
Address: 25 Kings Hill Avenue, Kings Hill, West Malling, Kent, ME19 4JQ
For Credit to (field 72 on payment form) : British Lichen Society (account no. 00012363)

For all Members
If you prefer to pay by Credit Card use Paypal
Instructions and links are on the BLS website, *http://www.thebls.org.uk/content/renewals.html*. You do not need to register with Paypal, although the link for a single transaction is somewhat hidden on the Paypal pages. No fees for using your credit card will occur, as they are covered by the BLS.

BRITISH LICHEN SOCIETY - 2010 MEMBERSHIP DETAILS

Applications for membership should be made to The Membership Secretary, The British Lichen Society: Dr Heidi Döring, Mycology Section, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, email h.doring@kew.org, or through the Society's Web site: http://www.theBLS.org.uk

Queries on membership matters and subscription payments and **Changes of address** should be sent to: The Membership Secretary at the address above.

CATEGORIES OF MEMBERSHIP AND SUBSCRIPTION RATES
Ordinary Membership for individuals (not available to institutions) who have signed the Application Form and paid the subscription. Ordinary Members are entitled to all publications and facilities of the Society.
Rate for 2010: **£30 / $60** Three year rate for 2010-2012 (for non-UK members only): **£85 / $170**

Electronic Membership, as Ordinary Members but access to 'The Lichenologist' online only (no hard copy). Rate for 2010: **£25 / $50**

Life Membership is available to persons over 65 years of age at **£300 / $600**. Life Members have the same entitlement as Ordinary Members.

All three categories of **Associate Member** listed below are entitled to all the facilities of the Society, including the *Bulletin*, but excluding *The Lichenologist*.

Associate Membership. Rate for 2010: **£22 / $44**
Senior Associate Membership, for persons over 65 years of age. Rate for 2010: **£10 / $20**
Junior Associate Membership, for persons under 18 years of age, or full-time students. Rate for 2010: **£5 / $10**

Family Membership is available for persons living in the same household as a Member. They are entitled to all the facilities of the Society, but receive no publications and have no voting rights. Rate for 2010: **£5 / $10**

Bulletin only subscriptions are available to institutions only. Rate for 2010: **£22 / $44**

PAYMENT OF SUBSCRIPTIONS *Members may pay their subscriptions, as follows:*

Sterling cheques, drawn on a UK bank, or on a bank with a UK branch or agent, should be made payable to *The British Lichen Society*. Payment by **Standing Order** is especially welcome; the Assistant Treasurer can supply a draft mandate.

Internet (credit card) payments using PayPal: Please see the Society's website for the full details: http://www.theBLS.org.uk/

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Overseas members may also pay by direct transfer into the Society's UK bank account. However, please contact the Membership Secretary if you wish to pay in this way, ***and before you make any payment***. Her contact details are given above.

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