A field key to Common Churchyard Lichens

(and to commoner species found elsewhere on stone, fences and gates)

Frank S. Dobson

This book is dedicated to the memory of Tom Chester who did so much to advance the study of churchyard lichens and also to Ishpi blatchley who has made sure that churchyard lichens continue to get noticed by the public

Acknowledgements:

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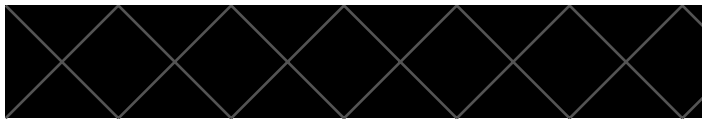

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Contents and scope

This book contains illustrated keys to enable the identification of most of the lichens which are likely to be found on gravestones, on the church or on wooden structures such as fences or benches. It also includes a key to the most common species which occur on soil and mosses. For other habitat based keys that can assist in identifying churchyard lichens see the bibliography.

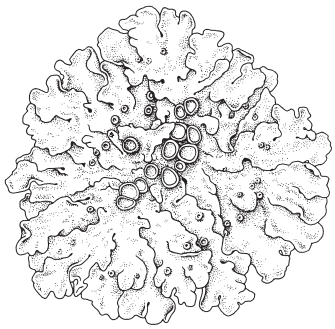
This book contains three methods of identification:

(Method 1) The simplest method is just to use the ***coloured photographs*** (see page 9).

(Method 2) The identification may be confirmed by using the ***table of characters*** to 60 of the most common lichens (see page 9).

(Method 3) A more ***advanced key*** to about 190 taxa. This key uses characters that are visible in the field, by eye, or with a x10 hand lens (see page 12). Some information in this book is repeated in order to make the instructions to each type of key more or less independent. However, this information is often given in a slightly different form in each section. If a meaning is not clear, try looking it up in another section.

A limited number of lichenological words are used and these are explained in the text and glossary. Use of the keys and an understanding of these words should greatly assist in the ability to understand more complex books on lichens.



Alan Orange

Illus. 1 *Xanthoria parietina* x2

What is a lichen?

Despite their appearance, lichens are not a single organism but a mutual relationship (symbiosis) between a fungus and an alga (or rarely a blue-green bacterium).

In most species the alga is located within a thallus (the body of the lichen) of which over 90% is composed of the fungus with the alga positioned so that it is best able to obtain the light, moisture and other substances that it requires to produce sugars by photosynthesis. Inside the lichen, the alga gets protection from extremes of climate so enabling it to thrive in situations in which it would otherwise be impossible for it to survive. The other partner, like all fungi, is unable to photosynthesise and, in lichens, is entirely dependent on the alga for its survival and nourishment. It achieves this by causing the alga to leak much of the sugars that it makes. This usually seems to render the alga incapable of sexual reproduction so they only reproduce by dividing, allowing the two partners to grow at a similar rate thus producing a stable relationship in which the lichen may live to a considerable age. It is the interaction between the partners that gives a consistent shape to the lichen, thus enabling identification in the field.

Only a limited number of species of algae can survive being incorporated into a lichen. Conversely every lichen species has a different fungus and it is just to this fungus that we give the lichen name. None of these fungi are capable of free-living. The fruiting bodies of a lichen are produced solely by the fungus and therefore only contain fungal spores. This means that when spores germinate they must quickly find a suitable algal partner or die. An exception is that in a few species, very small algal cells may be found in the fruiting bodies. It is possible that some of these algal cells may adhere to the spores as they are discharged. In some species, if a suitable alga is not

present they may survive by taking over the alga of an already existing lichen on which the spore has come to rest.

Many species avoid this problem of a spore having to find a suitable alga in order to develop into a lichen by producing structures that contain both partners. These can become detached and distributed to new potential sites by a number of means such as animals, wind or rain. Species that use this vegetative means of reproduction and dispersal usually have few or no fruiting bodies.

Why are churchyards important for lichens?

The church is often the oldest building found in a community and this can be important as some lichens will only grow on very old undisturbed stone. It also has many varied aspects which suit the needs of different species of lichen. For instance, some lichens prefer the damp, shaded north, whilst others, the warm sunlit south.

The churchyard frequently has many gravestones and memorials which are made from types of stone imported from elsewhere and not otherwise found in the neighbourhood. In addition, like the outside of the church, these stones may well not have been cleaned for several hundred years, making them good sites for the slow-growing lichens and ideal for their study.

Fieldwork in churchyards

If you are making a list for the whole site, work in a systematic way around the church and yard so that no area is overlooked. Do not forget to examine any wooden structures such as fences, gates, benches or memorials as these often have interesting lichens. The boundary wall is also important as it has many different aspects and often has a unique flora along its top. If you are confident of your lichen identification, a list should be given to the church wardens, noting any special stones or sites that appear important.

Churchyards are excellent places in which to study lichens as they are usually quiet places, safe from the dangers of traffic. When working in a churchyard great care should be taken to avoid tripping over objects such as kerbs that may be hidden in the grass. Care should also be taken if you are near a leaning or otherwise insecure stone. These stones are very heavy and could cause serious injury if they were to fall on anyone.

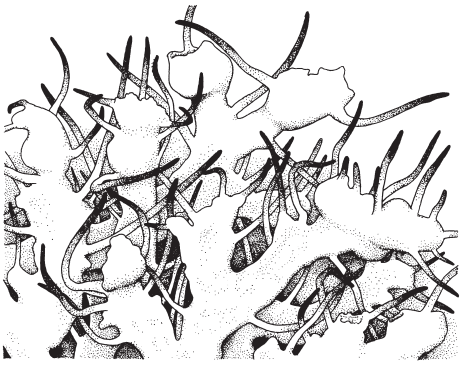
Remember that the church and churchyard are places of great significance to the local inhabitants and should be treated with respect. If possible, ask permission before working in a churchyard. Always respect any services, weddings and funerals that may be taking place. If there is a service in progress it is often best to leave and return at another time. Many churches have wildlife conservation areas and it is important that these are not damaged by careless trampling.

Collecting

This key has been written in such a way that collecting should not be required. It is obviously not permissible to damage the church buildings or gravestones in any way but if, for some important reason, a lichen must be collected, powdery, leafy and bushy lichens may be carefully scraped off the surface of the stone. It can be very difficult to collect crustose lichens but by using the point of a knife, and without damaging the stone, it is often possible to remove a small portion containing the fruiting body which is all that is needed for microscopical examination. This minute piece can then be collected onto clear sticky tape which, in turn can be stuck onto a piece of paper or card. This will enable the fragment to be checked through the clear tape and be safely taken away for later examination.

Method 1. Quick start to identification using the photographs

The photographs are arranged according to the lichen growth forms and the type of stone on which the lichen is growing. In addition, the lichens shown on the last two photographs on Plate 3 grow mainly on the ground or amongst mosses.



Alan Orange

Illus. 2 *Physcia tenella* x12

Basic stone e.g. limestone or marble, fizzes slightly with lemon juice (use a hand-lens to observe this). It also normally has orange, ***crustose*** lichens as shown on Plate 1. Be aware that the orange leafy lichen *Xanthoria parietina* (Illus. 1) may grow on basic stone but is more usually found on acid stone. The minute *Physcia adscendens* (Illus. 2) is also a very common species on basic stone. It may be recognised by the strap shaped lobes with eyelash-like hairs with darker tips

Acid stone e.g. granite or slate, frequently has the foliose lichens shown on Plate 4 Figs. 5-13 and the crustose species illustrated on plate 3. Shaded acid stones often have the yellow-green powdery *Psilolechia lucida*. More information on how to identify stone types is given on page 5. Plate 1 Fig. 1 shows typical acid and basic gravestones.

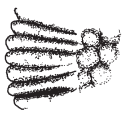
The growth forms included in the photographs of lichens are:

approx. x8

Leprose – Just a green powdery mass with little or no structure. Plate 2 Fig. 1.

approx. x1

Crustose – Crust lichens are firmly attached to the stone and cannot be easily detached with the finger nail. Plate 2 Figs. 3-15.



approx. x4

Crustose, placodioid – In this growth form the margins of a crustose lichen sometimes have lobes. Plate 1 Figs. 3, 5-7, 9 and Illus. 3.

approx. x1

Foliose – Leafy lichens may be lifted away from the stone with a finger nail and are frequently attached by root-like hairs. Plate 4.

Confirmation of the identification may be assisted by use of the notes in the table of characters.

Method 2. Using the table of characters (pages 15 to 17)

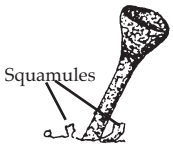
Introduction to the table of characters

Before using the table it is intended that the first means of identification should be the coloured illustrations. The photographs are broadly arranged by grouping those of a similar growth form together and then by the type of stone on which the lichen grows. It is important that any tentative naming should be confirmed by using the additional details given in the table. Magnifications greater than about x15 will not be visible under a hand lens and diagrams are given to help explain the structure of a lichen.

The columns in the table are arranged as follows:

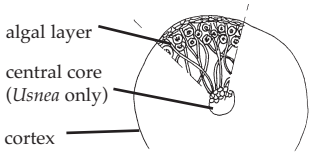
(1) Growth form: (left edge of table)

Fruticose: bushy lichens usually only attached at one point and having a continuous ring of alga (visible in a cross section). In *Cladonia* species (Plate 3 Fig. 11) there are fruticose fruiting bodies growing up from the minute, leaf-like (squamules) or granular base. Other genera sometimes found (illustrated overleaf but not by photograph or in table) are *Ramalina* with rather flattened lobes and *Usnea* which has a central core which becomes visible if a main branch of the lichen is pulled apart.

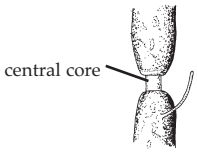


Cladonia x3

Ramalina species x1



Cross-section of a fruticose lichen x25

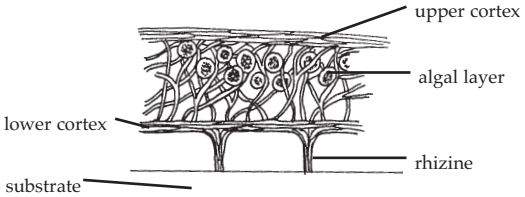


Branch of *Usnea* x6

Usnea x1

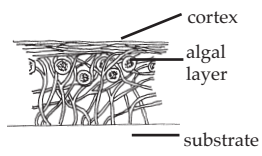
Foliose: leafy lichens which have both an upper and lower skin-like cortex. These lichens are often attached by root-like rhizines. It is therefore possible to remove them from the substrate when the lower cortex will be visible.

Foliose lichen x3

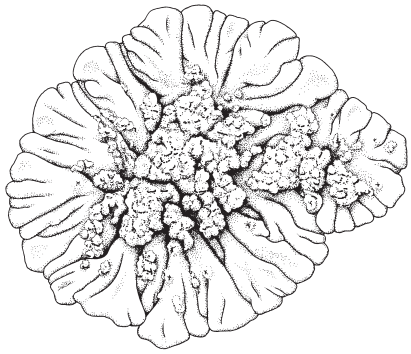


Cross-section of a foliose lichen x20

Crustose: crusty lichens only have an upper cortex and on the lower surface the fungal threads grow directly into small cracks in the surface of the substrate. It is not possible to easily detach the lichen without removing some of the stone on which it is growing. Sometimes the margin of the lichen has lobes (for example see Plate 2 Fig. 2 and *Caloplaca* species on Plate 1 and Illus. 3.) This growth form is known as ***placodioid***. Care must be taken with the separation between crustose and foliose as the centre of some crustose species such as *Diploicia canescens* (Illus. 3) may become detached and removable.



Crustose lichen x20



Alan Orange

Illus. 3 *Diploicia canescens* x3

A common, crustose species with placodioid lobes and soredia. It occurs on nutrient enriched stones such as under bird perching sites.

Leprose: powdery lichens consisting of a loose mixture of fungal threads and algal cells. This growth form usually has very little structure and is either powdery or finely granular. Some species have a slightly lobed margin and/or a white centre, visible if the surface is scratched away. Most of these species are not found with fruiting bodies but rely on vegetative methods of distribution.

Leprose lichen viewed from above x 10

Cross-section of a leprose lichen x 25

(2) Colour:

The colour of lichens can be very variable often depending on whether they are growing in bright sunlight or deep shadow. When they become wet, the cortex may become translucent and the green algae then become visible, tinting the lichens green. The colours given in the table are those that are normally present when dry.

(3) Substrate:

This is the surface on which the lichen normally grows. If a lichen grows on several different substrates the commonest is given first. 'Wood' means sawn wood or a tree after the bark has been lost.

A very important aid to identification is the type of stone on which the lichen is growing as many lichens will grow only on one of the two main groups:

Basic stone such as limestone, marble or mortar. These fizz slightly when lemon juice is applied. It is easier to see these bubbles forming and swelling by looking at them through a hand lens. Basic stones normally have orange, ***crustose*** lichens as shown on Plate 1. Be aware that the orange leafy lichen *Xanthoria parietina* (Illus. 1) may grow on basic stone but is more usually found on acid stone. The minute *Physcia adscendens* (Illus. 2) is a very common species on basic stone. It may be recognised by the strap-shaped lobes with eyelash-like hairs with darker tips.

Acid stone such as granite, slate and many sandstones are unaffected by the application of lemon juice but beware of air bubbles on the stone. These will not grow, neither will new bubbles form. Acid stone frequently supports the foliose lichens shown on Plate 4 Figs. 5-13 and the crustose species illustrated on Plate 3. Shaded acid stones often have the yellow-green powdery *Psilolechia lucida*.

The differences between these two types of stone will (after a little practice) soon become obvious, this knowledge will greatly speed the identification of lichens. The stone type is usually obvious but rarely, an intermediate stone may be found and it is suggested that if its type cannot be ascertained another stone is chosen until more experience is gained!

(4) Soredia/isidia:

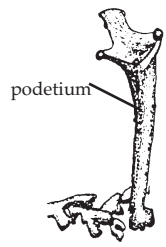
Many lichens do not produce any fruiting bodies but rely for distribution on small pieces breaking off and being transported to a suitable situation where the fragment can grow into another complete lichen. A number of lichens produce specialised structures to assist distribution. **Soralia** are splits in the surface of the lichen through which the mixture of fungal and algal cells escapes. **Soredia** are the minute powdery or granular pieces which liberated from the soralia are then carried away by the wind, rain, insects etc. **Isidia** are firm out-growths from the surface of the lichen where the cortex and algal layer remain unbroken. Isidia may sometimes break down into soredia.

Soralium with soredia x 15


Isidia x 10

(5) Fruits:

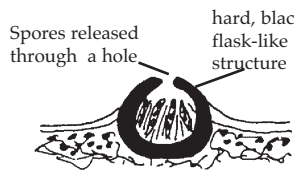
Both the colour and the type of fruiting body is important in the identification of lichens.



Cladonia podetium x2

Podetia are found in *Cladonia* and some other genera. These are stalks or cup-shaped bodies which carry the fruits on their tips (Plate 3 Fig. 11). Apart from these, there are two main types of fruiting body:

Perithecia (perith. in the table) are black, globose bodies usually with a hard case forming the outer wall. They may be almost sitting on the surface of the lichen or buried in its thickness so that only a small black swelling is visible (e.g. Plate 1 Fig. 13).

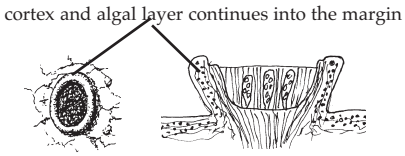


Section through a perithecium x15


View of a perithecium from above x12

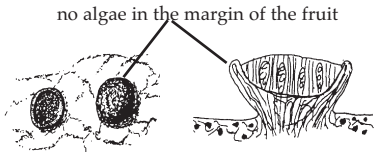
Apothecia, are disc or 'jam tart'-like fruits which may be sitting on the surface or sometimes within the thickness of the lichen. Apothecia are of two main types:

Lecanorine (lecan. in the table), in these fruits the cortex and algal layer continue up into the margin of the fruit (the margin is like the pastry edge of a 'jam tart'). This means that the margin of the fruit is more or less the same colour as the body of the lichen (e.g. Plate 3 Fig. 7).



Lecanorine apothecia x5
cross-section x15

Lecideine (lecid. in the table), in these fruits the cortex and algal layer do not extend into the margin of the fruit. The margin is therefore a different colour from the body of the lichen (e.g. Plate 3 Fig. 9).



Lecideine apothecia x5
cross-section x15

(6) Notes:

These contain important additional information about the species and should always be consulted before a final identification is made.

Method 3. Using the main key to identify churchyard lichens

The keys includes over 250 lichen species which frequently occur on stonework, memorials, fences, gates and benches in lowland churchyards as well as some of those that commonly grow on soil and mosses. This includes virtually all churchyard species which may be identified without specialised knowledge. The keys also may be used to identify many of the lichens found on rock, wood, mosses and soil elsewhere. If the main keys do not give a result, try key 'J' as lichens may sometimes grow on less usual substrates.

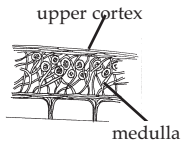
Equipment required

1. A hand lens with a magnification of x 8 to x 15.
2. **C** = fresh domestic bleach (sodium hypochlorite). Some bleaches contain other substances. It should *not* give a reaction (yellow) if tested on the medulla of *Parmelia sulcata* or *P. saxatilis.*
3. **K** = 5-10% solution of potassium hydroxide (1/2 to one level teaspoon of caustic soda dissolved in 100 ml of water gives a similar reaction but test it as it should give a red reaction on a *Xanthoria* species).
4. Lemon juice or dilute acid (e.g. 5% solution of hydrochloric acid).
5. A knife for removing foliose lichens, but care should be taken in its use.
6. rule with 1/2 mm divisions.

Chemical spot tests

'C' and 'K' chemicals are used in identification as they are able to produce colour changes in parts of the lichen. ***These chemicals should be handled with great care. Hands should always be washed after handling them. Carefully follow all the manufacturer's warnings on the packaging. They should be carried in small, clearly labelled bottles and care should be taken to avoid spillage on eyes, skin or clothes. They must not be swallowed and also kept out of reach of children.***

Only a minute drop is necessary and this should be placed *on the surface* of the lichen unless the couplet in the key says otherwise.



Position of medulla

In some leafy lichens the reaction does not take place on the surface but in the medulla (the inner part below the algal layer). In order to test the medulla an area of the upper cortex should be scraped away with a finger nail or knife to expose the white medulla. The chemical

should be dropped on to this white area. A colour change obtained with K usually appears in a few seconds and then persists. In a few cases (clearly mentioned in the key) the colour changes over about 1 minute, usually starting as yellow immediately and then slowly turning red.

Colours obtained with C may disappear after a few seconds. Bleach should be replenished after a few weeks as it quickly loses its active ingredient. If does not have a strong 'bleach' smell, replace it.

Arrangement of the key

The primary separation for lichens on stone or mortar is between basic or acidic stone. (See also page 5)
Basic stone such as limestone, marble or mortar. These fizz with dilute hydrochloric acid or slightly with lemon juice or, alternatively they often have yellow *crustose* K+ crimson lichens and 'black dot' lichens).
Acidic stone such as granite, slate and many sandstones are unaffected by dilute acid or lemon juice and usually have more leafy lichens and yellow *crustose* species that are K–.

The next division is into growth forms and these are explained in the glossary and pages 3 and 4.

Both halves of a couplet must be carefully read and compared before deciding which is the more appropriate course to consider next. Remember every word of the text is important and the decision has to made by comparing each phrase in the couplet to see which contains the closest match with the lichen being examined. The more important characters usually come first in the couplet.

When a species name is reached in the key, there is sometimes a comment in square brackets [ ]. This is only a confirmatory statement and, if the correct identification has been achieved, the bracketed statement should describe your specimen. However, it must not be used to exclude the other half of a couplet as later species in the key may also have some of these characters. The statements in square brackets, therefore, differ from all the rest of the key as they relate only to that species and are not used to compare two alternatives.

Microscopic spore details

Microscopic details of spores are not necessary in the use of this key but, in some cases, for confirmation they are given in round brackets ( ). Mainly, unless otherwise stated, the spores are assumed to be simple, colourless and 8 per ascus (the sack-like body holding the spores).

Making a squash

How to use a microscope is beyond the scope of this key but the 'squash' technique is described below as it an important method for the examination of spores:

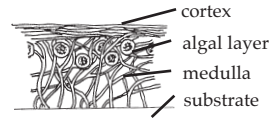
Dampen the specimen to be squashed in order to make it soft and pliable. Choose one of the largest fruiting bodies and using a razor blade or very sharp, thin bladed knife (taking great care not to cut yourself as this is easy to do whilst concentrating on making the squash), cut out as thin a vertical slice as possible from the centre of the fruit. This is then placed on a microscope slide in a drop of water. A cover slip is put over it. Gentle pressure is applied, either with a cloth covered finger tip or by gently tapping the cover slip with the end of a pencil. Examine the slide under the microscope at about x400 when the spores should be apparent. If the squash is still too thick to see the spores, apply further pressure. The types of spores are shown in the glossary.

Other useful illustrations

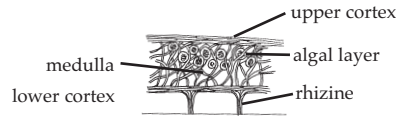
Further illustrations are to be found on the cards produced by The Field Studies Council: *Guide to common urban lichens* has more photographs of species included in this book. Especially useful for species that are occur in coastal sites is the *Guide to rocky shore lichens* and for lichens that occur on trees: *A key to lichens on twigs*.

Glossary

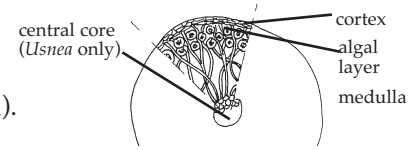
Agg. aggregate. A group of closely related species and forms
Apothecium (pl. **ia)**, disc-shaped fruiting body.
Areoles, **(areolate)**, paving-like islands which together form the thallus.
Ascus (pl. **asci)**, bag-shaped body containing the spores.
Cilia, 'eye lash'-like hairs, usually on the margin of lobes.
Cortex, outer layer of a thallus.
Crustose, no lower cortex, and is not easily removed from the substrate (see diagram).
Disc, the central area of an apothecium.
Excluded, disappearing at maturity.
Fertile, having fruiting bodies e.g. apothecia or perithecia.
Foliose, leaf-like with both an upper and lower cortex, easily removed from the substrate (see diagram).
Fruit, the fruiting body of the fungus containing the spores.
Fruticose, bushy, with a continuous ring of algae (see diagram).
Hypha (pl. **ae)**, very thin fungal filament.
Isidium (pl. **ia)**, detachable outgrowth of the thallus.
Lecanorine, apothecium with a thalline margin: a margin which is of similar colour to the thallus.
Lecideine, apothecium lacking a thalline margin: a margin different in colour from the thallus.
Lirellate, long, thin black fruits like strange writing.
Leprose, a more or less unstructured mixture of fungal strands and algal cells (see diagram). *Note that in this key only it includes other lichens that appear to be powdery or granular.*
Margin, may refer to the edge of a fruit or the edge of the whole lichen.
Medulla, inner part of a thallus below the algae.
Perithecium (pl.**ia)**, flask-shaped fruiting body.
Placodioid, crustose with marginal lobes (see diagram).
Podetium (pl. **ia),** stalk-like structure bearing the fruiting body e.g. *Cladonia.*
Proper margin, The margin of the disc containing fungal but not algal cells.
Prothallus, area lacking algae at the edge of a crustose lichen.
Pruina, **pruinose**, powdery substance like the bloom on a plum.
Rhizine, root-like outgrowth of fungal threads.
Sessile, more or less sitting on the surface.
Soralium (pl. **ia)**, structure producing soredia.
Soredia, small powdery granules containing both fungus and algae.
Spore, a reproductive structure produced by the fungus. In some ways similar to a seed in flowering plants.
Squamule, small leaf-like forms often occurring in *Cladonia*.
Substrate, the surface on which the lichen is growing.
Thalline margin, margin of a fruit containing alga (see diagram).
Thallus, the body of a lichen.



Cross-section of crustose thallus x20



Cross-section of foliose thallus x20

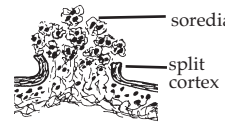


Fruticose thallus x15

Cross-section of isidium x20

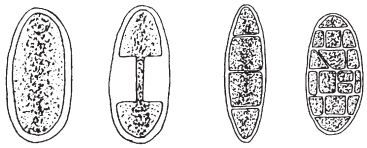

Cross-section of leprose thallus x20

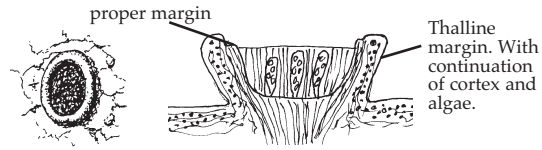

Placodioid crustose thallus x3



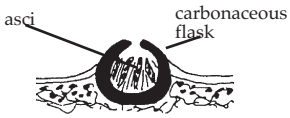
Cross-section of a soralium showing soredia being released x15

Spore types x1000 approx.


Simple Polarilocular Septate Muriform



Lecanorine apothecium x5 and cross-section x20



Cross-section of Perithecium x10


Perithecium viewed from above x10

Lecideine apothecia x5 and cross-section x20

Under 'Notes' in this table: 'margin' refers the edge of the lichen. 'Nutrient enriched' is caused by bird droppings etc.

	Name	Colour	Substrate	Soredia /isidia	Fruits	Notes
FOLIOSE	*Xanthoria parietina*	Yellow to orange. Greyer in shade	Basic/ acid	None	Lecan. Orange	To 15 cm diam. Lobes to 7 mm wide. Mainly occurs where it is nutrient enriched. Usually very fertile. **Pl. 4/13.**
	Xanthoria calcicola	Yellow to orange. Greyer in shade	Basic/ acid	Knobbly isidia	Lecan. Orange	To 15 cm diam Lobes to 7 mm wide. Usually not or slightly fertile. Mainly occurs where it is nutrient enriched. **Pl. 4/12**
	Xanthoria ucrainica	Yellow to orange	Basic/ acid Wood	Soredia on lobe edges	Lecan. Orange	Lobes about 1 mm wide, erect at tips. Rarely fertile. Often on tops of fence posts. **Pl. 4/11**
	Flavoparmelia caperata	Green to grey	Acid	Coarse soredia	Lecan. Brown	Large. Apple green when wet. Lobes finely ridged. **Pl. 4/7**
	Xanthoparmelia mougeotii	Brown/ yellow-green	Acid	Soredia	Lecan. Brown-black	To 4 cm diam. Sometimes almost black in centre. Soredia globose, yellowish grey. **Pl. 4/9**
	Melanelixia fuliginosa	Brown	Acid	Isidia	Lecan. Brown	Can become covered in fine, dark isidia, like velvet. **Pl. 4/8**
	Phaeophyscia orbicularis	Brown to grey Green when wet	Basic or bark	Soredia	Lecan. Black	Soredia in centre and on lobe margins. **Pl. 4/5**
	Physconia grisea	Brown to grey	Basic or bark	Coarse Soredia	Lecan. Black	Occurs on nutrient enriched sites. Lobe tips pruinose. Greenish when wet. **Pl. 4/2**
	Peltigera membranacea	Grey to brownish	Soil or grass	None	Lecan. Brown	Large, to 20 cm across. Lower surface white with prominent rhizines. **Pl. 3/12**
	Physcia adscendens	Grey	Basic or bark	Soredia	Lecan. Black	Lobe tips erect and hollow, lobe tips bursting to reveal soredia. **Pl. 4/1**
	Physcia caesia	Grey	Basic	Soredia	Lecan. Black	Fruits rare. Bluish soredia towards centre of thallus. **Pl. 4/3**
	Physcia dubia	Grey	Acid	Soredia	None	Soredia near tips of inner lobes. **Pl. 4/6**
	Parmelia saxatilis	Grey	Acid or bark	Isidia	Lecan. Brown	Lobe tips with faint white marks. Finger-like isidia. **Pl. 4/10**
	Collema auriforme	Black	Basic	Isidia globose	Lecan. Brown	Rounded lobes. Papery when dry, swollen when wet. **Pl. 4/4**
CRUSTOSE-PLACODIOID	*Caloplaca saxicola*	Yellow to orange	Basic	None	Lecan. orange	Often pruinose. Lobes short wider than *C. flavescens*. **Pl. 1/7**
	Caloplaca flavescens	Orange	Basic	None	Lecan. Orange	Sometimes pruinose. Often with a white ring just inside the marginal lobes. **Pl. 1/6**
	Caloplaca aurantia	Creamy orange-yellow	Basic	None	Lecan. Orange	Lobes flat. Often paler just inside marginal lobes and darker in centre. **Pl. 1/3**
	Caloplaca decipiens	Orange/ yellow	Basic	Granular soredia	Lecan. Orange	Lobes very pruinose. Soredia mainly on inner lobes. **Pl. 1/5**
	Candelariella medians	Yellow Greyer in centre	Basic	None or granular isidia	Lecan. Yellow	Occurs in shade or sun. Rarely fertile. Marginal lobes to 1 mm wide. **Pl. 1/9**

	Name	Colour	Substrate	Soredia /isidia	Fruits	Notes
CRUSTOSE-PLACODIOID	*Lecanora muralis*	Green to buff	Basic/ man-made	None	Lecan. Buff	Often on asphalt and concrete. Usually very fertile with fruits in centre only. Outer lobes with pale edges. **Pl. 3/1**
	Diploicia canescens	White to grey	Basic	Yellowish soredia	Lecid. Black	Rarely fertile. Nutrient enriched sites. Pruinose. Centre of thallus often falls out. **Pl. 2/2**
CRUSTOSE	*Trapelia glebulosa*	Grey to pinkish	Acid	None	Lecan. Brown	Rounded areoles about 0.3 mm diam. Often infertile. **Pl. 3/10**
	Acarospora fuscata	Reddish brown	Acid	None	Lecid. Black	Fruits minute, immersed in wide-cracked thallus. **Pl. 2/10**
	Caloplaca citrina	Yellow to orange	Basic	Granular soredia	Lecan. Orange	Becomes covered in soredia. Frequently fertile. **Pl. 1/4**
	Candelariella vitellina	Yellow, orange	Acid	None	Lecan. Yellow	Thallus of clumped granules like the top of a cauliflower . **Pl. 2/12**
	Rhizocarpon geographicum	Yellow to green	Acid	None	Lecid. Black	Thallus intersected with black lines. The 'map lichen'. **Pl. 3/9**
	Psilolechia lucida	Yellow/ greenish	Acid	Soredia yellow	Lecid. crusts.	Fruits rare. Powdery thallus Found mainly in shade. **Pl. 1/1**
	Lecanora sulphurea	Yellow to green	Acid	None	Lecid. Green/ black	Occurs in well-lit sites. Often grows on crustose lichens when young. **Pl. 3/3**
	Lecanora polytropa	Green to yellow	Acid	None	Lecan. Green to buff	Usually very fertile. Thallus shiny and forming a flat crust, but sometimes inconspicuous. **Pl. 3/2**
	Lecidella scabra	Green to grey	Acid	Soredia	Lecid. Black	Rarely fertile. Soredia grey-green but scratches yellow-green. **Pl. 3/5**
	Haematomma ochroleucum	Greenish grey to grey	Acid/ basic	Soredia greenish	Lecan. Scarlet	Pale, cottony, fringed margin. Very sorediate. **Pl. 2/13**
	Rinodina oleae	Grey to greenish	Basic	None	Lecan. Black	Often tinged green or brown. Fruits to 0.6 mm diam. **Pl. 2/9**
	Lecania erysibe	Grey to greenish	Basic/ brick	None	Lecan. Black	Thallus covered in minute granules. Fruits to 0.4 mm diam. **Pl. 2/5**
	Lecidella stigmatea	White to grey-brown	Basic	None	Lecid. Black	Thallus colour very variable to grey-green or brownish. Fruits prominent to 1.5 mm diam. **Pl. 3/6**
	Protoblastenia rupestris	Pale buff	Basic	None	Lecid. Orange	Fruits become domed and up to 0.9 mm diam. **Pl. 1/10**.
	Lecidea grisella	Grey to brownish	Acid	None	Lecid. Black	Fruits to 2 mm diam, immersed in lichen, often pruinose. **Pl. 3/4**
	Buellia aethalea	Grey to brownish	Acid	None	Lecid. Black	Fruits to 0.5 mm diam, immersed in lichen. **Pl. 2/11**
	Rhizocarpon reductum	Grey to brownish	Acid	None	Lecid. Black	Fruits to 0.8 mm diam, immersed in lichen. **Pl. 3/9**
	Ochrolechia parella	White to cream	Acid	None	Lecan. Pink	Fruits to 2 mm diam. Sugar-like granules on fruit disc. **Pl. 3/7**
	Dirina massiliensis	Grey/ pinkish	Basic/ acid	Soredia or None	Lecan. Grey	Fruits pruinose, 0.5–3 mm diam. Form *sorediata* covered in paler soredia. **Pl. 2/4**

	Name	Colour	Substrate	Soredia	Fruits	Notes
CRUSTOSE	*Porpidia tuberculosa*	White/ grey	Acid	Soredia	Lecid. Black	Dark prothallus. Rarely fertile. Soredia grey. **Pl. 3/8**
	Diplotomma alboatrum	White/ pale grey	Mortar/ basic	None	Lecid. Black	Fruits very white, pruinose when young. **Pl. 2/3**
	Lecanora gangaleoides	White/ pale grey	Acid	None	Lecan. Black	Often with white margin. Thallus lumpy. **Pl. 2/15**
	Lecanora campestris	White/ pale grey	Acid/ basic	None. Soredia very rare	Lecan. Dark brown	White margin. Thallus lumpy. Fruit discs almost black when very dry. **Pl. 2/14**
	Lecanora albescens	White/ pale grey	Basic	None	Lecan. Pale brown	Abundant fruits sometimes with a greenish shade, ± pruinose. Lichen diameter to 2 cm. **Pl. 2/6**
	Lecanora dispersa group including *L. semipallida*	Absent or grey	Basic/ cement	None	Lecan. Brown	Lichen black in polluted areas Disc often greenish, ± pruinose. **Pl. 2/7**
	Aspicilia calcarea	White to grey	Basic	None	Lecan. Black	Forms extensive patches. Fruits often pruinose. **Pl. 1/2**
	Caloplaca teicholyta	White to grey	Basic/mortar	Soredia	Lecan. Red	Rarely fertile. Cottony margin. Centre granular. **Pl. 1/8**
	Placynthium nigrum	Brown to black	Basic	Isidia	Lecid. Black	Blue-black margin. Fruits common. **Pl. 2/8**
	Verrucaria baldensis	Absent/white	Basic	None	Perith. Black	Perithecia about 0.3 mm diam in pits in substrate. **Pl. 1/11**
	Verrucaria fuscella	Grey	Basic/ mortar	None	Perith. Black	Perithecia not easily seen. Areoles edged in black. **Pl. 1/12**
	Verrucaria nigrescens	Brown to black	Basic/ mortar	None (If soredia *V. macrostoma*)	Perith. Black	Margin black. Perithecia partially immersed in lichen. **Pl. 1/13**. If brown margin with fully immersed perithecia *V. viridula.*
LEPROSE	*Lepraria/ Leproloma*	Greenish	Basic/ acid	Powdery granules	None	Almost unstructured, powdery to finely granular. **Pl.2/1**
	Psilolechia lucida	Yellow/ greenish	Acid	Soredia	Lecid. Yellow	Often in shaded lettering on gravestones. **Pl. 1/1**
	Caloplaca citrina	Yellow to orange	Basic	Granular soredia	Lecan. Orange	Becomes covered in the granular soredia. Frequently fertile. **Pl. 1/4**
	Candelariella vitellina	Yellow-orange	Acid	None	Lecan. Yellow	Lichen of clumped granules like top of a cauliflower. **Pl. 2/12**
	Lecidella scabra	Green to grey	Acid	Soredia	Lecid. Black	Rarely fertile. Soredia grey-green that become yellow-green when scratched. **Pl. 3/5**
	Haematomma ochroleucum	Greenish grey/ grey	Acid/ basic	Soredia greenish	Lecan. Scarlet	Pale, cottony, fringed margin. Very sorediate. **Pl. 2/13**
	Dirina massiliensis	Grey/ pinkish	Basic/ acid	Soredia or None	Lecan. Grey	Fruits pruinose, 0.5–3 mm diam. Form *sorediata* covered in paler soredia. **Pl. 2/4**
FRUTICOSE	*Cladonia* species	Green to grey-green	Humus, soil, or among mosses	Usually with coarse or fine soredia	Brown or red at tips of podetia	Fruticose fruiting body. Often growing from minute 'leaves' (squamules). Several common species including – with red tips, *C. macilenta* – with brown tips, the *C. pyxidata* group including *C. chlorophaea.* **Pl. 3/11**

Taxa included in the main key

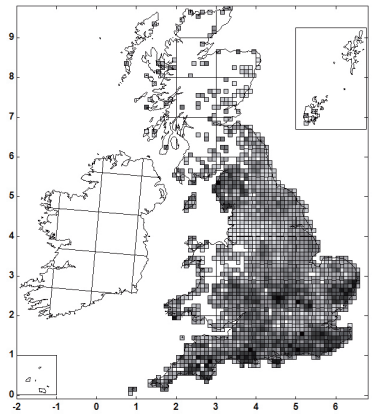
Acarospora fuscata
Acarospora impressula
Acrocordia conoidea
Acrocordia salweyi
Agonimia tristicula
Amandinea punctata
Anaptychia ciliaris
Aspicilia caesiocinerea
Aspicilia calcarea
Aspicilia contorta
Aspicilia radiosa
Bacidia bagliettoana
Belonia nidarosiensis
Bilimbia sabuletorum
Botryolepraria lesdainii
Buellia aethalea
Buellia griseovirens
Buellia ocellata
Buellia stellulata
Caloplaca arcis
Caloplaca aurantia
Caloplaca chalybaea
Caloplaca chlorina
Caloplaca chrysodeta
Caloplaca citrina agg.
Caloplaca crenularia
Caloplaca crenulatella
Caloplaca dalmatica
Caloplaca decipiens
Caloplaca flavescens
Caloplaca flavocitrina
Caloplaca flavovirescens
Caloplaca holocarpa
Caloplaca oasis
Caloplaca marmorata (lactea)
Caloplaca ruderum
Caloplaca saxicola
Caloplaca teicholyta
Caloplaca variabilis
Caloplaca xantholyta
Candelaria concolor
Candelariella aurella
Candelariella medians
Candelariella vitellina
Catillaria chalybeia
Cladonia chlorophaea
Cladonia coniocraea
Cladonia diversa
Cladonia fimbriata
Cladonia floerkeana
Cladonia furcata
Cladonia humilis
Cladonia macilenta
Cladonia ocracea
Cladonia portentosa
Cladonia pyxidata
Clauzadea metzleri
Clauzadea monticola
Collema auriforme
Collema crispum
Collema tenax
Cyphelium inquinans
Dermatocarpon miniatum
Diploicia canescens
Diploschistes scruposus
Diplotomma alboatrum
Dirina massiliensis
Evernia prunastri
Flavoparmelia caperata
Flavoparmelia soredians
Fuscidea cyathoides
Haematomma ochroleucum var. ochroleucum
Haematomma ochroleucum var. porphyrium
Hypocenomyce scalaris
Hypogymnia physodes
Hypogymnia tubulosa
Hypotrachyna afrorevoluta
Hypotrachyna britannica
Hypotrachyna revoluta
Lecania erysibe
Lecania erysibe f. sorediata
Lecania turicensis
Lecanora aitema
Lecanora albescens
Lecanora caesiosora
Lecanora campestris
Lecanora chlarotera
Lecanora conferta
Lecanora confusa
Lecanora conizaeoides
Lecanora crenulata
Lecanora dispersa
Lecanora expallens
Lecanora gangaleoides
Lecanora intricata
Lecanora muralis
Lecanora orosthea
Lecanora polytropa
Lecanora pulicaris
Lecanora rupicola
Lecanora saligna
Lecanora soralifera
Lecanora sulphurea
Lecanor subpallida
Lecanora symmicta
Lecanora varia
Lecidea fuscoatra
Lecidia grisella
Lecidella carpathica
Lecidella scabra
Lecidella stigmatea
Lepraria incana
Lepraria vouauxii
Leptogium gelatinosum
Llimonaea sorediata
Melanelixia fuliginosa
Melanelixia glabratula
Micarea denigrata
Myriospora rufescens
Myriospora smaragdula
Ochrolechia parella
Opegrapha sp.
Opegrapha gyrocarpa
Parmelia omphalodes
Parmelia saxatilis
Parmelia sulcata
Parmelina pastillifera
Parmelina tiliacea
Parmotrema perlatum
Peltigera didactyla
Peltigera hymenina
Peltigera membranacea
Peltigera praetextata
Pertusaria corallina
Pertusaria pseudocorallina
Phaeophyscia nigricans
Phaeophyscia orbicularis
Physcia adscendens
Physcia caesia
Physcia dubia
Physcia tenella
Physconia distorta
Physconia grisea
Physconia perisidiosa
Placynthiella icmalea
Placynthium nigrum
Polysporina simplex
Porpidia sp.
Porpidia soredizodes
Porpidia tuberculosa
Protoblastenia calva
Protoblastenia rupestris
Pseudevernia furfuracea
Psilolechia leprosa
Psilolechia lucida
Punctelia subrudecta
Ramalina canariensis
Ramalina farinacea
Ramalina lacera
Ramalina siliquosa
Ramalina subfarinacea
Rhizocarpon distinctum
Rhizocarpon geographicum
Rhizocarpon petraeum
Rhizocarpon reductum
Rinodina oleae
Rinodina teichophila
Roccella phycopsis
Sarcogyne regularis
Sarcopyrenia gibba
Scoliciosporum umbrinum
Solenopsora candicans
Sphaerophorus globosus
Stereocaulon vesuvianum
Tephromela atra
Thelidium sp.
Toninia aromatica
Trapelia coarctata
Trapelia glebulosa
Trapelia obtegens
Trapelia placodioides
Trapeliopsis flexuosa
Trapeliopsis granulosa
Verrucaria baldensis
Verrucaria fuscella
Verrucaria hochstetteri
Verrucaria macrostoma
Verrucaria muralis
Verrucaria nigrescens
Verrucaria viridula
Xanthoparmelia conspersa
Xanthoparmelia mougeotii
Xanthoparmelia verruculifera
Xanthoria aureola
Xanthoria calcicola
Xanthoria candelaria
Xanthoria parietina
Xanthoria polycarpa
Xanthoria ucranica

Taxa included in lichens in Key J 'lichens on sawn wood' but not the main key

Arctoparmelia incurva
Bryoria fuscescens
Calicium glaucellum
Calicium salicinum
Calicium viride
Caloplaca flavovirescens
Caloplaca marina
Chaenotheca brachypoda
Chaenotheca brunneola
Chaenotheca chrysocephala
Chaenotheca ferruginea
Chaenotheca furfuracea
Chaenotheca trichialis
Cladonia caespiticia
Cladonia carneola
Cladonia digitata
Cladonia incrassata
Cladonia cornuta
Cladonia glauca
Cladonia ochrochlora
Cladonia parasitica
Cladonia polydactyla
Cladonia ramulosa
Cladonia squamosa
Cladonia sulphurina
Cladonia subulata
Cladonia subsquamosa
Cliostomum corrugatum
Cliostomum griffithii
Cyphelium notarisii
Hypocenomyce caradocensis
Hypocenomyce scalaris
Imshaugia aleurites
Lecanora compallens
Lecanora zosterae
Lecidella elaeochroma
Lecidella elaeochroma
f. sorediata
Micarea cinerea
Micarea leprosula
Micarea melaena
Ochrolechia turneri
Opegrapha atra
Parmeliopsis ambigua
Physcia aipolia
Physcia clementii
Physcia leptalea
Ramalina cuspidata
Ramalina pollinaria
Ramalina portuensis
Sphaerophorus globosus
Steinia geophana
Stenocybe pullatula
Stenocybe septata
Strangospora pinicola
Trapeliopsis pseudogranulosa
Usnea cornuta
Usnea flammea
Usnea subfloridana
Usnea hirta
Usnea subfloridana
Verrucaria maura
Xanthoria elegans
Xylographa parallela
Xylographa trunciseda
Xylographa vitiligo

Recording Churchyards and the British Lichen Society

Churchyards form one of the most important sites for lichens in the British Isles. They contain many different habitats such as trees and gravestones which are made from a range of differing types of stone. The church itself may be built of still other types of materials and provide many surfaces exposed to different amounts of light and humidity to suit a wide variety of different species. In addition many churchyards have been little disturbed, often for centuries, allowing the lichens to flourish. It is only through recording this richness that we have been able to realize their importance. The British lichen Society have had a mapping scheme to do this on a 10 km. square basis for the last 50 years and with the increase in computing power it now records on a single site basis with much detail of microhabitat etc. A dedicated group of churchyard recorders have produced a large amount of valuable information on this habitat. They have provided nearly 450,000 records from over 8,000 churchyards in England, Scotland and Wales. The map below shows the extent of these surveys of Britain's churchyards. More than 40% of lichens on the British list have been recorded in churchyards and this includes over 40% of the nationally rare or scarce species and about 11% of the very rare or, now extinct species. It is important to continue this recording and if you can help, and you are certain of your identifications, please send your lists to J. Simkin, 41 North Road, Ponteland, Newcastle on tyne, NE20 9UN, Email *datamanager@britishlichensociety.org.uk*. Details of how to do this (together with much other useful information) can be found on the BLS website at *britishlichensociety.org.uk*. Do not worry that a chuchyard may have already been recorded, there have been nearly 3,000 repeat visits and these are of particular value as they enable the BLS to monitor changes over time.



Sites recorded in each 10 km. square. The darker the colour the more sites and richer the number of species present

A Field key to Common Churchyard Lichens

1. On stone, mortar or mortar wash-down on to acid rock **3**
– On sawn wood, moss or soil (These keys contain only the commoner species found in these habitats) **2**

2. Lichens growing directly on moss or soil **Key I** (page 31)
– Lichens growing on sawn wood (e.g. fences, gates and benches) **Key J** (page 33)

3. On basic stone, mortar or mortar wash-down on to acid rock (Substrate reacts to the application of weak acid. See introduction) **4**
– On acid stone (Substrate does not react to the application of weak acid. See introduction) **7**

4. Fruticose: bushy lichens (Fig. 1) *or* foliose: leafy lichens (Fig. 2) **5**
– Crustose: firm crust-like lichens (Fig. 3) *or* leprose: almost without structure and powdery (Fig. 5) **6**

5. Fruticose: bushy lichens, erect or pendent from base. No rhizines (Fig. 8)
Key A – Basic substrates and fruticose (page 21)
– Foliose: leafy lichens. More or less flat, or strap-like. Often with rhizines on margins or underside. (Figs. 2 and 16)
Key B – Basic substrates and foliose (page 21)

6. Crustose: (may have lobe-like margins. Placodioid, (Fig. 4)
Key C – Basic substrates and crustose (page 22)
Leprose: powdery lichens, more or less without any under-lying structure (Fig. 5)
Key D – Basic substrates and leprose or powdery (page 22)

7. Fruticose: bushy lichens (Fig. 1) or foliose, leafy lichens (Fig. 2) **8**
– Crustose: firm crust-like lichens (Fig. 3) *or* leprose, almost without structure and powdery (Fig. 5) **9**

8. Fruticose: bushy lichens, erect or pendent from base *includes foliose with these features*. No rhizines (Figs. 2 and 16)
Key E – Acid substrates, fruticose or erect to pendent foliose (page 29)
– Foliose, leafy lichens. More or less flat, at least at base. Often with rhizines on margins or underside (Fig. 2)
Key F – Acid substrates, foliose, not erect or pendent (page 24)

9. Crustose, may have lobe-like margins (placodioid, Fig. 4)
Key G – Acid substrates and crustose (page 301)
– Leprose, powdery lichens, more or less without an under-lying structure (Fig. 5)
Key H - Acid substrates and leprose or powdery (page 36)

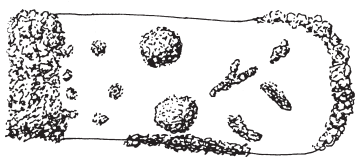


Fig. 6 Possible positions on a lobe for powdery soredia

Fig. 1 Fruticose lichen (*Ramalina* sp.) x1

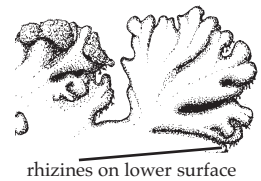


Fig. 2 Foliose lichen (*Parmelia* sp.) x2

Fig. 3 Crustose species x2. These lichens may, or may not, have a coloured margin.

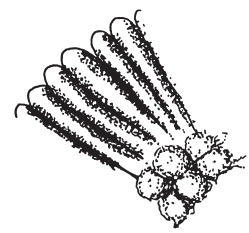


Fig. 4 Part of the edge of a crustose, placodioid lichen (*Caloplaca* sp.) x5

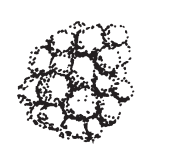


Fig. 5 Leprose lichen (*Lepraria* sp.) x12

Key A – Basic substrates and fruticose

1. Thallus bluish grey, whitish soredia **Roccella phycopsis** (rare)
– Thallus green to green-grey. Soredia greenish **2**

2. Not swollen towards tips. Oval-shaped splits on sides of branches containing fine powdery soredia (Fig. 7) **3**
– Swollen areas towards tips burst to reveal internal soredia (Fig. 8) **Ramalina canariensis**

3. Grows from a single basal holdfast **Ramalina farinacea**
– Grows from a multiple base, forming swards, mainly coastal **R. subfarinacea**

Fig. 7 *Ramalina farinacea* x5

Fig. 8 *Ramalina canariensis* x4

Key B – Basic substrates and foliose

1. With marginal eyelash-like cilia (Fig. 9). Strap-like. Thallus pale grey to pale brownish grey. (Spores brown 1-septate) **2**
– No long marginal eyelash-like cilia. Not strap-shaped **4**

2. Lobes 0.3–1 mm wide. Swollen lobe tips or the back of the lobes with powdery soredia **3**
– Lobes 1–5 mm wide. Lobe tips not swollen. No soredia **Anaptychia ciliaris**

3. Lobe tips swollen, helmet-shaped, bursting open to reveal powdery soredia (Fig. 10) **Physcia adscendens** (pl 4)
– Lobe tips not swollen, lip-shaped with powdery soredia on back surface of lobe tip (Fig. 11) **Physcia tenella**

Fig. 9 *Physcia tenella/adscendens* x5

4. Thallus papery when dry, much swollen when wet, dark brown to black **5**
– Thallus not swelling noticeably when wet, colours various **8**

5. Lobes rounded, ear-like. Globose (Fig. 12) or flattened (Fig. 13) minute outgrowths (isidia). Not, or sparingly, fertile **7**
– Lobes in rosettes *or* erect, ridged and often with ragged tips **6**

6. Lobes erect, dominant, often with ragged tips. Fruits brown centred to 2 mm diam **Leptogium gelatinosum**
– Lobes in rosettes. Rarely with globose isidia. Thallus usually covered in orange-centred fruits to 3 mm diam **Collema tenax**

7. Isidia globose (Fig. 12) **Collema auriforme** (pl 4)
– Isidia become flattened when mature (Fig. 13) **Collema crispum**

Fig. 10 Lobe tip of *Physcia adscendens* x7

8. Yellow to orange **9**
– Grey, greenish or brown to almost black **13**

9. K–. Lobes 0.1–0.5 mm wide, flat. Lobe tips may be powdery sorediate (Spores simple) **Candelaria concolor**
– K+ crimson. Lobes 0.5–7 mm wide. Sorediate or not. (Spores polarilocular) **10**

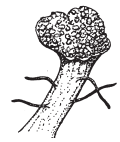


Fig. 11 *Physcia tenella* x7

10. Lobes about 1 mm wide, upright with sorediate tips and forming swards. Usually not fertile **Xanthoria ucrainica** (pl 4)
If lobes almost round in section, not fan shaped, probably **X. candelaria**
– Lobes to 7 mm wide, flat, not forming swards. Fertile or not. Fruits to 4 mm diam **11**

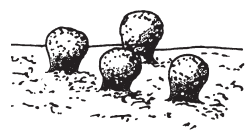


Fig. 12 Globose isidia x15

Fig. 13 Flattened isidia x15

11. Lobes 0.5–1 mm wide, radiating, separate, convex, orange. Often fertile with fruits to 1.5 mm diam **Xanthoria aureola**
– Lobes to 7 mm wide, not widely separated, not convex, yellow to orange. Fertile or not **12**

12. Knobby outgrowths 0.1–0.7 mm near centre, few or no fruits **Xanthoria calcicola** (pl 4)
– No knobby outgrowths, usually with numerous fruits (Fig. 14) **Xanthoria parietina** (pl 4)

13. Without soredia **14**
– With powdery or granular soredia (Fig. 6) **15**

14. Attached by a central holdfast (Fig. 15). Grey to brown-grey, pruinose, often plate-like (spores colourless) **Dermatocarpon miniatum**
– Attached by many rhizines (Fig 16). Grey to dark brown, flat, pruinose lobe tips (spores brown) **Physconia distorta**

15. Lobes with pruinose tips. Marginal and/or central coarse soredia. **16**
– Lobes not pruinose. Powdery or coarse soredia/isidia **17**

16. Lobes grey to brown to 2 mm wide. Coarse soredia on margins and central. Rhizines simple, mainly pale **Physconia grisea** (pl 4)
– Lobes brown often with purple tinge to 1 mm wide. Coarse soredia/isidia mainly central. Rhizines black, bottle-brush-like **Physconia perisidiosa**

17. Globose masses of soredia, often blue-flecked, in centre or apex of lobes. Lobes pale grey to grey, grey-green when wet **Physcia caesia** (pl 4)
– Coarse soredia, dark grey to blackish, along margins of lobes. Lobes grey to brown-black, green when wet **18**

18. Lobes only 0.05 mm to 0.3 mm wide with upturned tips. Underside pale **Phaeophyscia nigricans**
– Lobes 1–2 mm wide, rather flat and spread out. Underside dark **Phaeophyscia orbicularis** (pl 4)

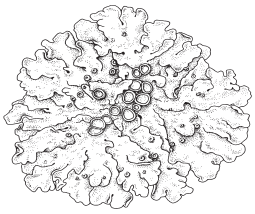


Fig. 14 *Xanthoria parietina* x1

Fig. 15 Lichen with central holdfast x3

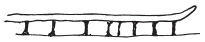


Fig. 16 Lichen with rhizines x5

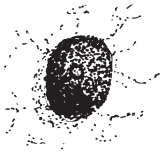


Fig. 17 Perithecium from above x10

Fig. 18a Sections through superficial perithecia x12

Fig. 18b Perithecia in pits x12

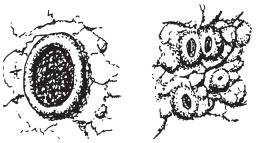


Fig. 19 Types of fruits (apothecia)

Fig. 20 *Opegrapha* species x6

Key C – Basic substrates and crustose

1. Fruits disc- or button-shaped, various colours including black. No minute central opening (***apothecia***) (Fig. 19) **14**
– Fruits not disc-or button-shaped, black only. Minute central opening often visible, *or without fruits* **2**

2. Fruits black, flask-shaped (Figs. 17 and 18) or very much longer than wide **3**
– *Fruits absent*. At times, many species may appear to be, or are, without fruits.Try going to **14** first if this fails try **8**.

3. Fruits flask-shaped with small, central opening (use hand-lens) (***perithecia***). (Figs. 17 and 18). May only be visible as small, dark swellings on the surface of the lichen **4**
– Fruits looking like lines made with a pen (***lirellate***) (Fig. 20) **Opegrapha** species (not treated further in this key)

4. Perithecia not in pits in the substrate (Fig. 18a) **5**
– Perithecia in pits in substrate (Fig. 18b).
Verrucaria species (spores simple) **12**
or **Thelidium** species not separable in the field (spores septate)

5. Thallus absent or very thin, often only a stain on the surface. Perithecia not immersed in the thallus **6**
– Thallus thick. Perithecia ± immersed in thallus **8**

6. Perithecia to 0.7 mm diam. Often occuring in groups in areas which are devoid of other lichens. Ostiole tube-like or sunken (Fig. 21). (Spores propeller-shaped) **Sarcopyrenia gibba**
– Perithecia to 1.5 mm diam. (Spores 1- to 3-septate) **7**

Fig. 21 *Sarcopyrenia gibba* x12

7. Hard limestone. Thallus pinkish grey or absent. Fruits to 1 mm diam, conical. (Fig. 18a right) **Acrocordia conoidea**
– Mortar and soft limestone. Thallus pale brownish grey or absent. Fruits to 1.5 mm diam, rather spherical. (Fig. 18a left) **Acrocordia salweyi**

8. Thallus green, pale brown to chocolate-brown or black **9**
– Thallus white, grey or bluish to leaden grey **11**

Fig. 22 Perithecia in pits x12

9. Thallus green to brown, widely cracked. Edge of lichen brown. Perithecia to 1 mm diam ± immersed in thallus **Verrucaria viridul**a
– Thallus dark brown to black. Edge of lichen black. Perithecia to 0.6 mm diam $^1/_2$ to $^3/_4$ immersed in the thallus **10**

10. Thallus brown to olive-green, sometimes sorediate. Perithecia to 0.6 mm diam. (Spores 25–37 μm long) **Verrucaria macrostoma**
– Thallus dark brown to black, not sorediate. Perithecia to 0.4 mm diam. (Spores 20–28 μm long) **Verrucaria nigrescens** (pl 1)
If with sorediate margins **Verrucaria nigrescens** f. **tectorum**

11. Thallus leaden grey. Edge of lichen and between the areoles outlined by black lines **Verrucaria fuscella** (pl 1).
– Thallus white, pale grey or absent. Areoles not separated by a thin black line **12**

12. Perithecia to 0.25 mm diam, closely dispersed [leaving empty pits when dead and the black 'lids' fall off (Fig. 22 right). Thallus white, pale grey or absent]**Verrucaria baldensis** (pl 1)
– Perithecia 0.6–0.8 mm diam, widely dispersed leaving empty pits, or not **13**

13. Thallus brown-grey or absent. Perithecia mostly remaining in the pits when they die (Fig. 22 left) **Verrucaria hochstetteri**
– Thallus white to brown-grey or absent. Perithecia leaving empty pits when they die **Verrucaria muralis**

14. Clearly visible thallus **23**
– Little or no visible thallus, often just a stain small granules or a thin powder, or only fruits **15**

15. Fruit disc and margin red-brown to almost black, yellow, or orange (Fig. 23). Fruit margin similar colour to disc **16**
– Fruit disc pale brown to dark brown, sometimes pale greenish or pinkish, often pruinose. Fruit margin white to grey **45**

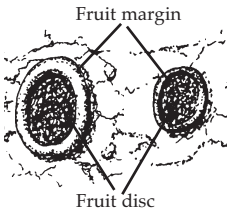


Fig. 23 Margin and disc of fruits (apothecia) x5

16. Disc and fruit margin dark red-brown to almost black **17**
– Disc and fruit margin yellow to any shade of orange **19**

17. Fruits green-black when wet **Lecidella stigmatea** (pl 3)
– Fruits red-black when wet **18**

18. Disc grey-violet pruinose. (100 or more simple spores per ascus) **Sarcogyne regularis**
– Disc not pruinose (8 spores per ascus) **Clauzadea monticola** (*if fruits partially immersed in substate* **C. metzleri**)

19. Disc yellow to orange, margin same colour, paler or absent K+ crimson. (spores polarilocular or simple) **20**
– Disc mustard-yellow or greenish, margin bright yellow, K– (Spores simple) **Candelariella aurella**

20. Fruit margins disappear early. Fruits orange to dirty orange-brown **21**
Fruit margins persistent in most fruits. Fruits yellowish to bright orange-brown or orange **22**

21. Any thallus present khaki to greenish grey. Fruits dull orange, domed, 0.3-0.9 mm diam **Protoblastenia rupestris** (pl 1)
– Thallus not visible or pale grey. Fruits almost globose, often dirty orange-brown up to 1.6 mm diam **Protoblastenia calva**

22. Fruit margin yellowish, smooth or sorediate **Caloplaca citrina agg.** (pl 1)
– Fruit margin orange to orange brown, glossy **Caloplaca holocarpa group**
(Most specimens on limestone, mortar or concrete and the fruits are crowded with a very narrow margin. Yellow to yellow grey thallus of minute areoles or granules **Caloplaca oasis**)

23. Thallus white, cream, grey, black or greenish **24**
– Thallus yellow, orange, brown or khaki **66**

24. Thallus with prominent marginal lobes (placodioid) (Fig. 24), white or pale grey **25**
– Thallus lacking distinct marginal lobes, of various colours including white, pale or bluish grey and black **27**

25. No soredia or scurfy granules. Usually fertile with many fruits.
[Fruits with white margins and black centres but may be white pruinose. Thallus K–.] **Solenopsora candicans**
– Thallus sorediate or scurfy with granules in centre of thallus. Rarely fertile **26**

26. Thallus strongly lobed with pale grey or yellowish soredia. Often loosely attached in centre. Rarely fertile. K+ yellow (Fig. 24) **Diploicia canescens** (pl 2)
– Thallus only weakly lobed, flat, white to grey, powdery granules in centre. K– **Caloplaca teicholyta** (pl 1)

27. Thallus white to pale grey, mid-grey, bluish grey or black **28**
– Thallus greenish yellow or greenish grey **47**

28. Thallus white to pale grey (may have some darker areas) **29**
– Thallus mid grey to bluish grey, or black **52**

29. Mature (largest) fruits often irregular in shape, mostly within the thickness of the thallus **30**
– Mature fruits almost circular in shape, sitting on the surface of the thallus *or absent* **31**

30. Thallus white or grey, cracked, continuous, rather flat, large, frequently edged in dark grey (Fig. 25) **Aspicilia calcarea** (pl 1)
– Thallus grey consisting of rounded, separate areoles with a fruit in the centre of each (Fig. 26) **Aspicilia contorta**

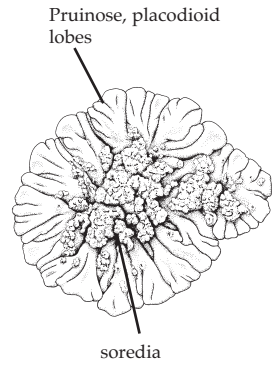


Fig. 24 *Diploicia canescens* x1


Fig. 25 *Aspicilia calcarea* x6


Fig. 26 *Aspicila contorta* x6

31. Thallus K+ yellow (fruits may be K+ purple, red *or absent*) **32**
– Thallus K– (fruits may be K+ purple *or absent*) **34**

32. Discs and margin green-black (Fig. 27) but inner part of margin paler next to disc. Edge of thallus black or has no different coloured edge **Lecidella stigmatea** (pl 3)
(if margin is not paler next to disc **Lecidella carpathica**)
– Discs scarlet to brown-black. Fruit margins grey. Edge of thallus with a white, often cottony margin or *fruits absent* **33**

33. Thallus warted, not powdery. Discs brown to very dark brown and K– (Fig. 28) **Lecanora campestris** (pl 2)
– Thallus powdery in centre. Discs scarlet and K+ red **Haematomma ochroleucum** (pl 2)

34. Fruits to 1 mm diam *or absent*. Thallus areoles less than 2 mm wide **35**
– Fruits to 2 mm diam. Thallus areoles to 4 mm wide, often pruinose. (Spores 3-septate). [Frequently grows in cracks in the substrate.] **Toninia aromatica**

35. Thallus C+ yellow, orange or red **36**
– Thallus C– **38**

36. Occurs beneath copper and iron in the run-off from rain. Powdery, greenish grey. C+ red. Fruits to 0.5 mm diam, pale pink, domed **Psilolechia leprosa**
– Not in rain run-off from metal, often shaded E. and N. walls. Thallus not powdery but may have soredia. C+ yellow or red. Fruits 0.5-3 mm diam, not domed or pale pink **37**

37. Thallus cream to pinkish grey, edge of thallus with a narrow dark brown border. Upper surface of thallus scratches to show orange. C+ red. Often with soredia (form **sorediata)**. (Spores 3 septate) **Dirina massiliensis**
(*If white to pale pinkish, with black prothallus* **Llimonaea sorediata**)
– Thallus pale creamy grey, upper surface not orange if scratched. C+ yellow to orange. Never with soredia (Spores simple) **Lecanora conferta**

38. Fruit disc yellow-orange to red-brown [K+ red] *or absent* **39**
– Fruit discs (Fig. 27) pale grey to dark brown or black **40**

39. Thallus white, thin, smooth, not powdery in centre. Fruits yellow-orange, often in shallow pits **Caloplaca marmorata (lactea)**
– Thallus white to pale grey. Weakly lobed, powdery in centre. Disc orange to red-brown. Fruits not in pits in the substrate **Caloplaca teicholyta** (pl 1)

40. Fruits with very dark brown to black discs (may be covered in whitish pruina and so appearing paler). (Fig. 27) **41**
– Fruits with pale coloured discs, pruinose or not **45**

41. Fruit disc and/or margin of disc pruinose **42**
– Fruit disc and/or margin not pruinose **43**

42. Disc very domed, margin excluded. Often on mortar. Older fruits may have the pruina rubbed off revealing a black disc (Fig. 29) (Spores to 3-septate) **Diplotomma alboatrum** (pl 2)
– Disc flat, looks pale as it is very white-pruinose. Margin persistent. (Spores 1-septate) **Lecania turicensis**

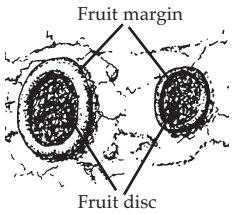


Fig. 27 Margin and disc of fruit (apothecium) x5

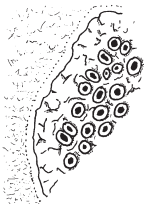


Fig. 28 *Lecanora campestris* x2

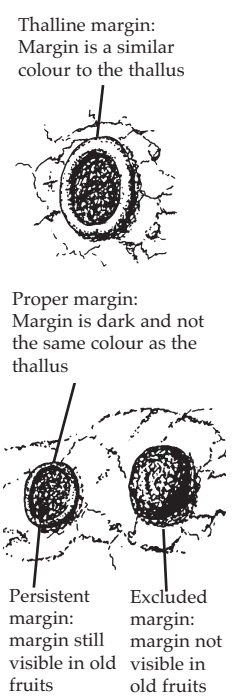


Fig. 29 Types of fruit margins x5

43. Margins of fruits very dark brown to black, or absent. Without a pale thalline margin (Fig. 29) **44**
– Margins of fruits white to pale grey. With a thalline margin **45**

44. Fruits dark red-brown when wet **Clauzadea monticola**
– Fruits green-black when wet **Lecidella stigmatea** (pl 3)

45. Thallus white, thick and continuous. Fruits to 0.8 mm, very crowded. Fruit margin often wavy **Lecanora albescens** (pl 2)
– Thallus white to grey, thin, scattered granules or absent. Fruits not very crowded **46**

46. Thallus grey, usually absent. Fruits to 0.6 mm diam, margin deeply notched **Lecanora crenulata**
– Thallus pale grey, or black in pollution, granular. Fruits to 1 mm diam, margin entire or slightly notched **Lecanora dispersa**
If in compact groups with a dark thallus **L. subpallida** (pl 2)

47. Thallus greenish grey consisting of rounded, separate areoles with a fruit in the centre of each (Fig. 26) **Aspicilia contorta**
– Thallus various shades of grey but not consisting of rounded separate islands with a central fruit. **48**

48. Thallus pale grey to greenish grey
Haematomma ochroleucum var. **porphyrium** (pl 2)
– Thallus yellow-green to yellow-grey or greenish grey-brown **49**

49. Thallus K– or pale brown **50**
– Thallus K+ pale yellow. Thallus pale yellow-green, powdery. Fruit disc scarlet or absent. (Spores simple to 1-septate)
Haematomma ochroleucum var. **ochroleucum** (pl 2).

50. Disc dark brown-black to black. Thallus cracked to granular **51**
– Disc greenish yellow. Thallus greenish yellow, granular. (Spores simple) **Candelariella aurella.**

51. Thallus cracked, grey to greenish brown-grey. Disc dark brown-black (Spores brown 1-septate) **Rinodina oleae**
– Thallus, scurfy, ± areolate, grey to brown. Disc black. (Spores colourless, 1-septate) **Lecania erysibe** (pl 2)

52. Disc-shaped fruits deeply immersed in thallus. [Thallus lead-grey to brown-grey. Dark zoned margin to thallus]
Caloplaca chalybaea
– Disc or domed fruits not very immersed in thallus *or absent* **53**
(*If fruits larger than 1.0 mm diam, an indistinct margin to the thallus, ± immersed fruits, probably a pale* **Rinodina teichophila**)

53. Thallus K+ yellow. [Thallus grey to brown. Fruits to 1 mm diam, green-black when wet] **Lecidella stigmatea** (pl 3)
– Thallus K– or K+ pale violet **54**

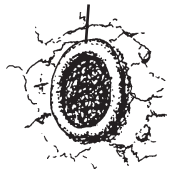
54. Thallus covered in minute finger-like (Fig. 30), or granular isidia bluish grey or bluish black **55**
– Thallus not covered in isidia, shades of grey or black **56**

55. Thallus bluish grey, cracked. Isidia granular. Discs K+ violet-red. (Spores polarilocular) **Caloplaca chlorina**
– Thallus bluish black, often with a wide, bright, blue-black margin. Isidia minutely finger-like. Discs K–
(Spores to 3-septate) **Placynthium nigrum** (pl 2)

56. Thalline pale margin persistent (Fig. 31) **57**
– Thalline margin absent **61**

Fig. 30 coralloid isidia x10

Thalline margin: Margin is a similar colour to the thallus



Proper margin: Margin is dark and not the same colour as the thallus

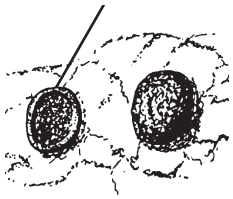


Fig. 31 Types of fruit margins x5

57. Fruits about 1 mm diam, margin bluish grey and pruinose (Spores polarilocular) **Caloplaca variabilis**
– Fruits less than 1 mm diam, margin colours various but not pruinose **58**

58. Thallus areolate or almost absent, greenish to brown-grey (Spores brown, polarilocular) **Rinodina oleae** (pl 2)
– Thallus granular to cracked. Grey-brown to black **59**

59. Thallus, scurfy, ± areolate, grey to brown. [Thalline margin narrow]. (Spores 1-septate) **Lecania erysibe** (pl 2)
– Thallus grey to black, continuous or thin **60**

60. Thallus black. Disc yellow or green. K–. (Spores simple) **Candelariella aurella**
– Thallus warm grey to black. Disc orange, K+ crimson. (Spores polarilocular) **Caloplaca holocarpa** group

61. Thallus C+ red **Psilolechia leprosa**
– Thallus C– **62**

62. Fruits to 1.5 mm diam **63**
– Fruits to 0.8 mm diam **64**
(The species in couplets 63–65 can be difficult to separate in the field. If the fruit diameter is near 0.8 mm look at all three couplets.)

63. Thallus flat to granular, no pale flecks. Fruits dark green-black when wet. (Spores simple) **Lecidella stigmatea** (pl 3)
– Thallus of domed areoles with small white flecks. Fruits stay black when wet. (Spores mainly 3 septate) **Toninia aromatica**

64. Thallus ochre to brownish grey. [Fruits dark red-brown when wet] (Spores simple) **Clauzadea monticola**
– Thallus grey, green-brown to almost black. (Spores septate) **65**

65. Thallus grey to almost black, limited by a dark edge. Fruits to 0.6 mm diam, flat to convex. (Spores 1-septate) **Catillaria chalybeia**
– Thallus green-brown to black, not limited by a dark edge. Fruits to 0.7 mm diam, domed. (Spores 3- to 7-septate, twisted) **Scoliciosporum umbrinum**

66. Thallus with marginal lobes (placodioid Figs. 33 to 35) **77**
– Thallus without distinct marginal lobes **67**

67. Thallus granular to powdery, yellow. [Fruits with yellow margins and slightly darker discs.] **Caloplaca citrina agg.** (pl 1)
– Thallus areolate or cracked or almost squamulose **68**

68. Thallus grey-brown to brown, cracked to granular. Fruits K–. (Spores brown, 1-septate) **Rinodina teichophila**
– Thallus cream, yellow, orange or khaki, smooth to areolate. Fruits K+ crimson (Spores simple or polarilocular) **69**

69. Thallus and fruits K+ crimson. (Spores polarilocular) **70**
– Thallus K–, only the fruits K+ crimson. (Spores simple) **76**

70. Thallus of rather flat-topped areoles, rarely pruinose **71**
– Thallus of coarse, rounded, convex, very pruinose areoles (Fig. 32) [occurs mainly in the East on south-facing walls] **Caloplaca ruderum**

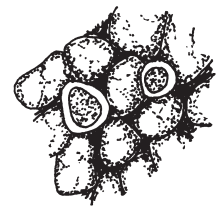


Fig. 32 *Caloplaca ruderum* x5

71. Margin of thallus light to dark grey. Thallus not sorediate **75**
– Margin of thallus orange to brown or not apparent. Thallus sorediate or not **72**

72. Thallus sorediate **73**
– Not sorediate. On concrete and mortar **Caloplaca crenulatella**

73. Thallus yellow, Areoles ringed with brighter yellow soredia-like granules **Caloplaca arcis**
– Thallus yellow to yellow-green. Areoles become covered in pale fine soredia **74**

74. Soredia originate on margins of the convex areoles **Caloplaca citrina agg.**(pl. 1)
– Very fine soredia originate at the tips of the almost minutely squamulose thallus **Caloplaca flavocitrina**

75. Edge of thallus pale grey. Disc ± convex, brownish to red-brown. Large isolated thalli of flat-topped, often greenish orange areoles **Caloplaca flavovirescens**
– Edge of thallus dark grey [also visible between areoles]. Disc ± flat, yellow to pale brownish. Mosaic-forming. Areoles pale to clear orange (Spores 2 celled) **Caloplaca dalmatica**
If thallus thin and finely felt-like (Spores 4 celled) **C. ochracea**

76. Thallus khaki to greenish grey. Fruits dull orange, domed, 0.3-0.9 mm diam **Protoblastenia rupestris** (pl 1)
– Thallus not visible or pale grey. Fruits almost globose, often reddish orange up to 1.6 mm diam **Protoblastenia calva**

77. Thallus yellow becoming grey in centre and often granular towards the centre. K–. Never pruinose. (Spores simple) **Candelariella medians** (pl 1)
– Thallus yellow to orange, not becoming grey in centre. K+ crimson. Lobes frequently pruinose. (Spores polarilocular) **78**

78. Powdery-sorediate towards centre. [Lobe tips pruinose] **Caloplaca decipiens** (pl 1)
– Not sorediate **79**

79. Marginal lobes very flattened, bright, creamy orange often with a paler area inside the outer lobes, not pruinose (Fig. 33) **Caloplaca aurantia** (pl 1)
– Marginal lobes convex, yellow to orange, with or without paler area at base of lobes, often pruinose **80**

80. Marginal lobes to 10 mm long. Orange, often a white ring inside lobes. Thallus not granular (Fig. 34) **Caloplaca flavescens** (pl 1)
– Marginal lobes to 3 mm long. Yellow to brownish yellow, much wider at tips, (usually pruinose), lacking a white ring. Thallus centre, often of large, smooth-surfaced granules, visible between the numerous fruits (Fig. 35) **Caloplaca saxicola (**pl 1)

Fig. 33 Lobes of *Caloplaca aurantia* x5

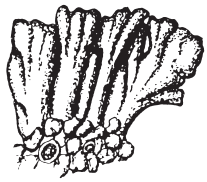


Fig. 34 Lobes of *Caloplaca flavescens* x5

Fig. 35 Lobes of *Caloplaca saxicola* x5

Key D – Basic substrates and leprose or powdery

1. Thallus orange, yellow or red **2**
– Thallus white, grey or greenish **4**

2. Thallus deep orange to red, often with white flecks. Occurs in shade especially on north walls **Belonia nidarosiensis**
– Thallus yellow to orange **3**

3. Thallus not lobed at margin. Dull orange-yellow to greyish yellow **Caloplaca (Leproplaca) chrysodeta**
– Thallus weakly lobed at margin. Thallus vivid mustard to yellow-green **Caloplaca (Leproplaca) xantholyta**

4. Thallus C+ red **5**
– Thallus C– **7**

5 Greenish to yellowish grey. In copper washdown such as below lightning conductors. No prothallus **Psilolechia leprosa**
– White, cream or pinkish. Vertical rock. Dark prothallus **6**

6 White to pale pink thallus and soredia **Llimonaea sorediata**
– Brownish cream thallus and soredia **Dirina massiliensis** f. **sorediata**

7. Thallus green, thick, minutely granular, without lobes (covered in projecting hyphae) **Botryolepraria lesdainii**
– Thallus white to greenish grey, powdery with weak lobes (often showing white areas) **Lepraria vouauxii** (pl. 2)

Fig. 36 isidia x10

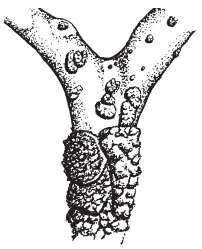


Fig. 36a soredia on *Roccella phycopsis* x5

Fig. 37 *Ramalina siliquosa* x1

Fig. 38 *Ramalina canariensis* x7

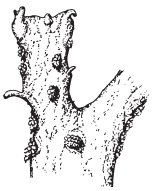


Fig. 38a *Ramalina lacera* x5

Fig. 39 *Ramalina farinacea* x5

ACID STONE OR ON MOSSES AND SOIL

Key E – Acid substrates, fruticose or erect to pendent foliose

1. Grey with white or black under-surface. Upper surface with finger-like isidia (Fig. 36) when mature. (Foliose) **Pseudevernia furfuracea**
– Yellow-green, grey-green, green or mauvish. Sorediate **2**

2. C+ red. Mauve-grey thallus, White soredia (Fig. 36a) **Roccella phycopsis** (rare, do not collect)
– C–. Yellow-green, grey-green or green thallus. Greenish soredia **3**

3. Under surface white but often with green patches. When mature, upper surface with granular soredia on ridges. (Foliose) **Evernia prunastri**
– Green to yellow-green or grey-green, colour continuous on under surface. Upper surface without soredia along ridges **4**

4. Yellow-green. Often fertile with disc-shaped fruits. No swollen branch tips or powdery soredia (Mainly coastal). (Fig 37) **Ramalina siliquosa**
– Grey-green. Rarely fertile. Powdery soredia in swollen tips or in oval splits in sides of the branches or on eroded patches of the cortex (Figs. 38, 38a and 39) **5**

5. Not swollen towards tips of branches. Soredia in splits on the edges of branches or on eroded patches of the cortex **6**
– Swollen areas towards tips of branches burst to reveal soredia (Fig. 38) **Ramalina canariensis**

6. Soralia oval, marginal and delimited 7
Soralia irregular, in centre and marginal **Ramalina lacera**

7. Grows from a single basal holdfast. Coastal or inland (Fig. 39) **Ramalina farinacea**
– Grows from a multiple base, forming swards. Mainly coastal **Ramalina subfarinacea**

Key F – Acid substrates, foliose, not completely erect or pendent

Note: Where there is very strong nutrient-enrichment from bird dropping, yew pollen etc., some species such as *Physcia caesia* and *Phaeophyscia orbicularis* (illustrated on plate 4), which are normally only found on basic substrates, may occur on the tops of more acid stones. These will be found in key 'C'.

1. Upper surface grey, grey-green or yellowish green to green **2**
– Upper surface brown to green-brown (use hand lens, some species may appear grey at a distance), yellow or orange **14**

2. Upper surface grey to grey-green **3**
– Upper surface yellow-green to green **22**

3. Under surface dark brown to black almost to edge **5**
– Under surface pale but may be darker towards centre. **4**

4. Lobes 0.2–1 mm wide. Faint (or not visible) white speckling on upper surface. Interior of thallus (medulla) C–
Physcia dubia (pl 4)
– Lobes up to 1 cm wide. Distinct pinhead white marking on upper surface. Interior of thallus (medulla) C+ red (fleetingly)
Punctelia subrudecta

5. Lobes hollow in cross section (Fig. 40). Attached to substrate by patches of fungal hairs **6**
– Lobes solid in cross section. Attached to substrate by root-like rhizines (Fig. 41) **7**

6. Lobes flat with tips splitting to show powdery soredia on back of upper surface (Fig. 42) **Hypogymnia physodes**
– Lobes finger-like with soredia on tips (Fig. 43)
Hypogymnia tubulosa

7. Interior of thallus (medulla, Fig. 44) C+ red **8**
– Medulla C– **11**

8. With firm outgrowths (isidia) (Figs. 45 and 46) on upper surface of thallus **9**
– With powdery or granular soredia on the upper surface and towards tips of the lobes **10**

9. Isidia, black, bun-shaped, about 0.2 mm diam, on upper surface (Fig. 45) **Parmelina pastillifera**
– Isidia brown to black, coralloid or finger-like, 0.1 mm diam, on upper surface (Fig. 46) **Parmelina tiliacea**

10. Soredia slightly darker than lobes. Extreme lobe tips downturned. Inland and coastal **Hypotrachyna revoluta**
(Ifthe soredia arise in pustules **H. afrorevololuta**)
– Soredia blue-black. Lobe tips usually ascending. Mainly coastal **Hypotrachyna britannica**

11. Medulla K+ yellow-orange. **12**
– Medulla K–. [Lobes finely wrinkled towards centre. Coarsely sorediate]– **Flavoparmelia caperata** (pl 4)

12. No white lines or marks on lobes. Lobe tips turned up, often with black 'eye-lash' cilia on edges. [Sorediate margins on lobes.] **Parmotrema perlatum** (pol 4)
– Distinct white lines and marks on marginal lobes (Fig. 47). Lobe tips not turned up or with black 'eye-lashes' **13**


Fig. 40 *Hypogymnia* lobe cut to show hollow centre

Fig. 41 Lobe with rhizines


Fig. 42 *Hypogymnia physodes* x3


Fig. 43 Lobe tip of *Hypogymnia tubulosa* x3

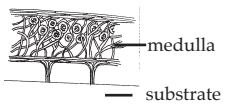


Fig. 44 Position of medulla


Fig. 45 Isidia of *Parmelina pastillifera* x10


Fig. 46 Coralloid isidia x10

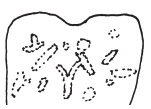


Fig. 47 Lobe tip showing white marks.

13. White lines and dots on lobes develop into powdery soredia (Fig. 47) **Parmelia sulcata**
– Centre of thallus develops coralloid isidia (Fig. 46) **Parmelia saxatilis** (pl 4)

14. Thallus brown to green-brown or blackish. Medulla K– or K+ yellow-red **15**
– Thallus yellow or orange. Thallus and medulla K+ crimson. **18**

15. Lobe tips with numerous pale marks and dots (Fig. 47). Medulla K+ yellow-red **Parmelia omphalodes**
– Lobe tips without numerous pale marks and dots. Medulla K– **16**

16. Dark brown. Lobes transversely wrinkled. Isidiate clusters (like broccoli, Fig. 48). Medulla C– or C+ pink **Xanthoparmelia verruculifera**
– Reddish to green-brown or near black. Lobes not transversely wrinkled. Isidia not clustered. Medulla C+ red (Fig. 50) **17**

17. Reddish brown to green-brown. Numerous coralloid isidia (Fig. 46) **Melanelixia glabratula**
– Dark brown to near black. Densely coralloid isidiate, can look almost like velvet **Melanelixia fuliginosa**

18. Lobe tips to 7 mm wide. Thallus to 15 cm diam **19**
– Lobe tips only to 1.5 mm wide. Thallus to 4 cm diam **20**

19. Knobby outgrowths 0.1–0.7 mm diam. near centre. Few or no fruits **Xanthoria calcicola** (pl 4)
– No knobby outgrowths. Usually very fertile with fruits to 4 mm diam (Fig. 49) **Xanthoria parietina** (pl 4)

20. Lobes leaf-like, becoming upright with powdery soredia on frilly tips. Sparingly fertile **Xanthoria ucrainica** group (pl 4)
– Lobes convex in section, not sorediate. Usually fertile **21**

21. Lobes small, finger-like, yellow-orange. Many fruits to 4 mm diam, usually covering small thallus **Xanthoria polycarpa**
– Lobes radiating, convex, bright, deep orange. Often fertile with fruits to 1.5 mm diam **Xanthoria aureola**

22. Coralloid isidia (Fig. 46). Lobes shiny. [Medulla K+ yellow-orange. Lobes overlapping to 3 mm wide] **Xanthoparmelia conspersa**
– No isidia but with powdery or granular soredia. Lobes not very shiny **23**

23. Lobes separate, to 3 mm wide, radiating, yellow-grey. Thallus darker in centre, globose piles of powdery soredia. [K+ orange] **Xanthoparmelia mougeotii** (pl 4)
– Lobes overlapping to 15 mm wide. Thallus not much darker in centre. Coarse granular soredia **24**

24. Lobes to 15 mm wide, finely wrinkled towards centre. Medulla (Fig. 50). K– **Flavoparmelia caperata** (pl 4)
– Lobes to 7 mm wide, flattened, as if ironed. Medulla K+ yellow slowly turning to red **Flavoparmelia soredians**

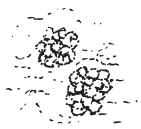


Fig. 48 *Xanthoparmelia verruculifera* isidia x8

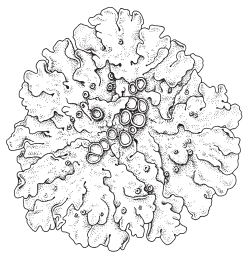


Fig. 49 *Xanthoria parietina* x1

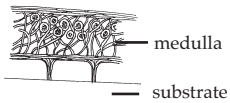


Fig. 50 Position of medulla

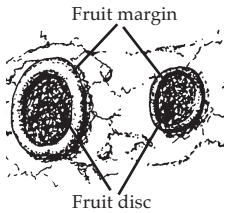


Fig. 51 Margin and disc of fruit (apothecium) x5
left: lecanorine
right: lecideine

Key G – Acid substrates and crustose

Note: Where there is very strong nutrient-enrichment from bird dropping, yew pollen etc. or wash-down from mortar, some species which are normally only found on basic substrates, may occur on more acid stones. These will be found in key 'C'.

1. Disc or whole fruit (Fig. 51), green, green-grey to green-black, tan, pink, pale brown to mid brown, yellow to orange or red **43**
– Disc or whole fruit white, cream, dark brown, black, grey *or absent* **2**

2. Disc or whole fruit white or cream **3**
– Disc or whole fruit dark brown, black, grey (may be pale pruinose) *or absent* **4**

3. Thallus white. Fruits ± immersed in thallus, powdery, white pruina. Discs C+ yellow/orange **Lecanora rupicola**
– Thallus creamy white to deep cream. Fruits not immersed, with wide margins, discs covered in granular pruina. Pruina C+ red **Ochrolechia parella** (pl 3)

4. Disc or fruit dark brown, black or grey (may be pale pruinose) **5**
– *Fruits absent* (These groups only include species that are frequently infertile. Try going to **32** first, if unsuccessful then try going to **7** or **Key H**)

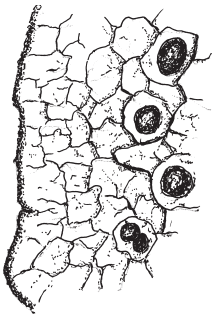


Fig. 51a *Lecidea grisella* x3

5. Fruits immersed in thallus sometimes becoming slightly raised when fully mature **6**
– Fruits mainly sitting on surface of thallus **20**

6. Thallus vivid yellow to yellow-green [divided by black lines] (Spores muriform, greenish brown)
Rhizocarpon geographicum (pl 3)
– Thallus white, creamy, grey, yellowish grey or brown **7**

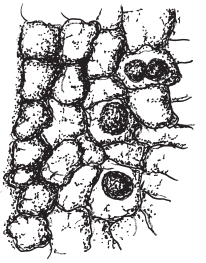


Fig. 51b *Lecidea fuscoatra* x3

7. Thallus C+ orange or red **8**
– Thallus C– **11**

8. C+ red. **9**
– C+ orange. [Fruits 0.15-0.5 mm diam, not pruinose. Rarely without fruits.] (Spores brown, 1-septate) **Buellia ocellata**

9 Thallus areolate, hard. Grey, coppery or brown to red-brown **10**
– Thallus lumpy, soft. White to cream-grey. (Spores 20-40 x 10-20 μm, brown, muriform) **Diploschistes scruposus**

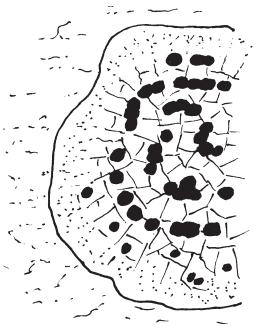


Fig. 52 *Rhizocarpon petraeum* x3

10. Thallus areoles widely cracked, like dried mud. Red-brown or yellow-brown. Fruits 0.2-0.8mm diam, not pruinose (Spores 4-6 x 1-2μm. 50+ per ascus) **Acarospora fuscata** (pl 2)
– Thallus narrowly cracked, thin near margin. Grey to coppery brown. Fruits 0.5-2 mm diam, usually pruinose but often without fruits (Spores 9-15 x 4-7. 8 per ascus)
Lecidea grisella (pl. 3) Fig.51a.
If thick and areolate right to the margin of the thallus, upland sites **L. fuscoatra** Fig. 51b)

11. Thallus white-grey. (Fig. 52) (Spores muriform)
[Fruits in ± concentric rings] **Rhizocarpon petraeum**
– Thallus grey, tan, yellowish green or brown (Spores various) **12**

12. Thallus K+ yellow, red or brownish **17**
– Thallus K– (Medulla may be K+ yellow, fruits K+red) **13**

13. Thallus light to mid or brownish grey. Fruits with a thin, grey margin. (Spores simple, colourless, 8 per ascus)
Aspicilia caesiocinerea
– Thallus dark brown, red-brown or grey, fruit margins various, not thin and grey (spores septate, muriform or simple and colourless and 50+ per ascus) **14**

14. Distinct, black margin to the thallus. Cracks between areoles very narrow **16**
– No black margin to thallus. Areoles widely cracked **15**

15. Thallus red-brown to 2 cm diam **Acarospora impressula**
– Thallus dark brown, often extensive
Myriospora (**Acarospora**) **rufescens**

16. Fruits 0.3-0.6 mm diam. Fruits K+ red, medulla K+ yellow (Spores colourless but a few may become greenish brown, 3-septate) **Rhizocarpon distinctum**
– Fruits 0.6-1 mm diam. All parts K –. (Spores colourless but a few may become greenish brown, muriform)
Rhizocarpon reductum (pl 3)

17. Thallus pale tan to yellowish green. Thallus often of separate areoles up to 2 mm wide. (Spores simple, colourless, minute 2-5 x 1-2μm) **Myriospora** (**Acarospora**) **smaragdula**
– Grey, brownish grey to dark brown. Thallus cracked or compacted areoles, each less than 1 mm wide. **18**

18. Fruits to 1.5 mm diam. Dark brown to almost black margin to the thallus. [K+ brownish yellow]. (Spores colourless, simple, bean-shaped, 9-14 x 5-6 μm) **Fuscidea cyathoides**
– Largest fruits to 0.5 mm diam. Pure black margin to the thallus. (Spores brown 1-septate) *The species in 19 are hard to separate* **19**

19. Thallus K+ yellow turning red. Inland or coastal. (Spores 12-18 x 5-10 μm) **Buellia aethalea** (pl 2)
– Thallus K+ persistent yellow. Coastal. **Buellia stellulata**

20. Thallus with marginal lobes (placodioid Figs. 53 and 54) **21**
– Thallus without marginal lobes **22**

21. Fruits lecanorine (fig. 56). Thallus not sorediate or pruinose. (spores colourless, simple) **Aspicilia radiosa**
– Fruits lecideine. Thallus with yellowish soredia and pruinose. (Fig. 54) (spores brown 1-septate) **Diploicia canescens** (pl 2)

22. Fruits drawn-out like writing (lirellate) (Fig. 55). (Spores multi-septate, colourless) **Opegrapha species**
– Fruits disc-shaped. (Spores various) **23**

23. Thallus sorediate **24**
– Thallus not sorediate **25**

24. Thallus grey with dark blue-grey, K– soredia. Fruits to 1.5 mm diam. (Spores colourless, simple) **Porpidia tuberculosa** (*if soredia K+ yellow and soralia usually oval* **P. soredizodes**)

– Thallus grey-green. Soredia grey (scratches paler). Fruits to 0.8 mm diam. (Spores colourless, simple) **Lecidella scabra (**pl 3)

25. Disc-shaped fruits with a margin of similar colour to the thallus (lecanorine) (Fig. 56) **26**
– Disc-shaped fruits with a dark margin which is not the same colour as the thallus (lecideine) (Fig. 56) **29**

26. Thallus cream to dark grey, thick, warted, uneven. C+ red. Fruit disc pruinose, deeply sunken in fruit (Fig. 57)
Diploschistes scruposus
– Thallus white to grey. K+ yellow, C–. Fruit disc neither pruinose nor very deeply sunk in fruit **27**

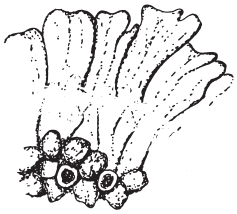


Fig. 53 Lobed, placodioid margin on a crustose lichen

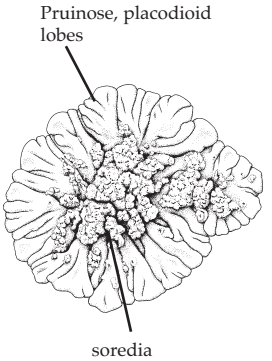


Fig. 54 *Diploicia canescens* x1

Fig. 55 *Opegrapha* species x6

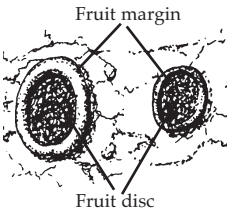


Fig. 56 Margin and disc of fruit (apothecium) x5
left: lecanorine
right: lecideine

Fig. 57 Section through fruit of *Diploschistes scruposus* x12

27. Disc chestnut to very dark brown or almost black (Fig. 58) **Lecanora campestris** (pl 2)

– Disc black **28**

28. Thallus white to pale grey, knobbly. Many fruits have a thin, wavy pale margin (Fig. 59) **Tephromela atra**
Cut through a fruit vertically. Cut edge has a dark purple-red tinge, especially when wet (Fig. 61). *Base of thallus next to substrate not orange and not K+ purple* (Fig. 61)

– Thallus white to greenish grey. Fruits neat, with thick, pale, smooth margin (Fig. 60) **Lecanora gangaleoides** (pl 2)
Cut edge of vertical fruit section has a greenish black tinge (Fig. 61). *Base of thallus next to substrate often orange and K+ purple* (Fig. 61)

29. Fruit margin very contorted, notched, disc ridged. [Thallus grey scurfy to areolate or not visible. Fruits to 0.6 mm diam] (Spores minute 3-5 x 1-2μm) **Polysporina simplex** (Fig. 61a)

– Fruit margin not very notched and contorted or the disc ridged (Spores larger 8-40 x 3-8μm) **30**

30. Thallus white to grey, [cracked, areolate or absent. Fruits large to 1.5 mm.] (Spores simple, colourless). (Fig. 62) **Porpidia** species

– Thallus brown-grey to dark green-black **31**

31. Thallus thin to areolate. Usually with a dark edge to thallus. (Spores colourless, 1-septate) **Catillaria chalybeia**

– Thallus scurfy to very cracked. No dark edge to thallus. (Spores colourless, 3- to 7-septate, twisted in ascus) **Scoliciosporum umbrinum**

32. Thallus and/or soredia or granular pruinose disc C+ yellow, orange or red **33**

– Neither thallus nor soredia C+ yellow, orange or red **36**

33. Thallus tan to chocolate-brown. Scattered or patches of yellow- or orange-grey soredia, C+ red **Opegrapha gyrocarpa**

– Thallus white or grey, C– or C+ yellow to red
In some species yellow soredia cover the thallus **34**

34. Thallus white, often with pinkish or cream tinge, areolate. Any part C+ red or all parts C– **49**

– Thallus grey without pinkish or cream tinge, Smooth, cracked, Thallus and soredia C+ orange or yellow-orange **35**

35 Thallus thin, often covered in yellow-green powdery soredia. Soredia C+ yellow-orange **Lecanora expallens**

– Thallus thin, often covered in coarse grey soredia (scratching to pale green). Soredia C+ orange **Lecidella scabra** (pl 3)

36. Thallus with marginal lobes (placodioid). Thallus white to pale grey. Yellowish soredia. (Fig. 63). [Thallus K± yellow] **Diploicia canescens** (pl 2)

– Not placodioid. Thallus yellow, yellow-green to grey-green, white, or pale to dark grey. With grey, cream or no soredia **37**

37. Thallus white or pale grey to dark grey or brownish grey **38**

– Thallus yellow or yellow-green to grey-green ***(Leprose Key H)***

38. Thallus areolate with soredia paler than the thallus. Thallus usually with minute brown granules **Lecanora caesiosora**

– Thallus isidiate or powdery or with bluish grey soredia **39**

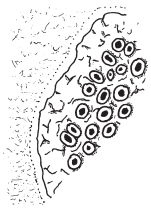


Fig. 58 *Lecanora campestris* x2

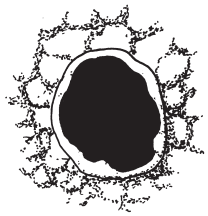


Fig. 59 *Tephromela atra* x10

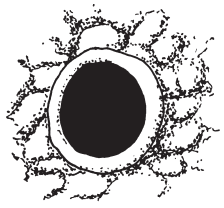


Fig. 60 *Lecanora gangaleoides* x10

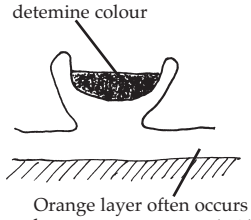


Fig. 61 Section through a fruit of *Lecanora gangaleoides*/ *Tephromela atra*

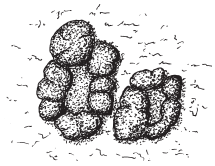


Fig. 61a *Polysporina simplex* x8

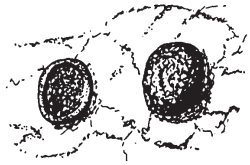


Fig. 62 *Porpidia* fruits x5

39. Thallus powdery or with patches of bluish grey soredia **41**
– Thallus not powdery, not sorediate but isidiate **40**

40 Thallus K+ yellow turning red. Isidia with brown tips
Pertusaria pseudocorallina
– Thallus persistently K+ yellow. No brown tips to isidia
Pertusaria corallina

41. Edge of thallus with wide pale, fringed, cottony margin. Thallus pale grey, powdery, [K+ pale yellow]
Haematomma ochroleucum var. **porphyrium**(pl 2)
– No wide, pale, fringed, cottony margin to thallus. Thallus with bluish grey soredia in discrete patches. **42**

42. Thallus white to bluish grey. Speckled with pin-head, blue-grey to black, soredia which are K–, which may become merged **Porpidia tuberculosa** (pl 3)
– Thallus white to brownish grey. Scattered oval hollows containing the blue-grey to black soredia which are K+ yellow
Porpidia soredizodes

43. Disc or whole fruit, green to green-grey yellow-brown or tan. Thallus placodioid or not **55**
– Discs or whole fruit pink, pale brown to mid brown, yellow, orange or red. Thallus not placodioid **44**

44. Disc or whole fruit yellow, orange or red **45**
– Disc or whole fruit pink or shades of brown **47**

45. Thallus bright greenish yellow **Psilolechia lucida** (pl 1)
– Thallus grey or yellow to orange **46**

46. Thallus pale to dark grey, continuous to cracked. Fruits rust-orange, K+ violet-red **Caloplaca crenularia**
– Thallus yellow to orange, granular, cracked. Fruits shades of yellow, K– or K+ pale brown **Candelariella vitellina** (pl 2)

47. Thallus C–. **48**
– Thallus or coarse pruina and disc C+ red **49**

48. Thallus white to pale grey. Fruits crowded, white margins, brown to very dark brown discs (Fig. 64)
Lecanora campestris (pl 2)
– Thallus shades of brown. Fruits scattered, brown (often paler) margins to brown discs **Fuscidea cyathoides**

49. Thallus C+ red. Any fruits 0.2-0.8 mm diam. **50**
Thallus C– or C+ yellow, never C+ red. Coarse, granular pruina (like sugar) on fruit disc, C+ red. Fruits to 2 mm diam.
Ochrolechia parella

50. Thallus C+ rose red. Thallus scratches orange **51**
– Thallus C+ bright red. Thallus scratches green **52**

51. White to pale pink thallus and soredia **Llimonaea sorediata**
– Brownish cream thallus and soredia
Dirina massiliensis f. **sorediata**

52. Thallus with greenish buff, greenish or yellow soredia **53**
– Thallus not sorediate **54**

53. Thallus pale green to brownish of scattered areoles with greenish buff soredia. Fruits 0.2–0.5 mm diam. **Trapelia obtegens**

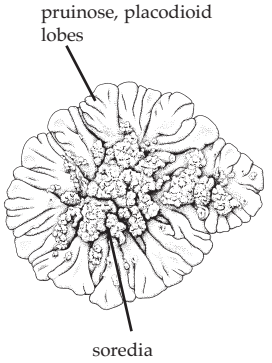


Fig. 63 *Diploicia canescens* x1

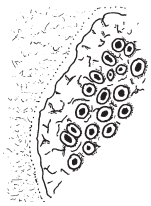


Fig. 64 *Lecanora campestris* x2

– Thallus white or pinkish, forms large crusts, soredia greenish or yellowish. Fruits 0.2–0.8 mm diam **Trapelia placodioides**

54. Thallus white or pinkish. A cracked crust or scattered areoles. Fruits 0.2–0.8 mm diam **Trapelia coarctata**
– Thallus white but often tinged brown with overlapping, heaped areoles. Fruits 0.2–0.5 diam **Trapelia glebulosa** (pl 3)

55. Thallus lobed at edges (placodioid, Fig. 53). [Yellow-green to yellow-brown, marginal lobes pale edged, not sorediate] **Lecanora muralis** (pl 3)
– Thallus not placodioid **56**

56. With granular or fine, powdery soredia **57**
– Not sorediate **59**

57. Thallus green-grey covered in granular soredia. Fruits with granular, persistent margins **Lecanora conizaeoides**
– Thallus yellowish green with powdery soredia. Fruit margins smooth or becoming overgrown by the disc **58**

58. Thallus yellowish green of flat-topped, often separate, areoles, with powdery soredia in centre of each (Fig. 65). Thallus K– **Lecanora soralifera**
– Thallus yellow, continously areolate. Areoles with sorediate margins. The soredia may eventually cover the surface. Thallus K+ yellow-brown **Lecanora orosthea**

59. Fruits sitting on the surface, disc yellow-green to brownish. [Thallus cracked crust, yellowish green or absent] **Lecanora polytropa** (pl 3)
– Fruits more or less immersed in the thallus, brown to shades of green and green-black **60**

60. Thallus areoles with notched edges, grey- to yellow-green, Fruits ± immersed in thallus. Disc brown-green to dark green **Lecanora intricata**
– Thallus a cracked crust, yellowish green. Fruits immersed. Disc yellowish to green-black, grey pruinose **Lecanora sulphurea** (pl 3)

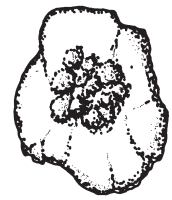


Fig. 65 Areole of *Lecanora soralifera* x10

Key H – Acid substrates and leprose or powdery

1. Thallus and/or soredia K+ yellow or brownish yellow **2**
– Thallus and/or soredia K– **5**

2. Soredia C+ yellow-orange. Thallus thin, becoming covered in yellow-green powdery soredia **Lecanora expallens**
– Thallus and soredia C– **3**

3. Thallus green-grey, thick, coarsely granular. K+ pale yellow. [Occurs in polluted areas] **Lecanora conizaeoides**
– Thallus yellowish green, powdery in centre. K+ yellow or brownish yellow **4**

4. Edge of thallus wide, pale, fringed and cottony. Thallus yellow-green, powdery. K+ yellow **Haematomma ochroleucum** var. **ochroleucum** (pl 2)
– No wide, fringed, cottony edge to thallus. Bright, yellowish green. K+ yellow-brown. Powdery soredia **Lecanora orosthea**

5. Thallus and soredia C+ orange or rose red **6**
– Thallus and or soredia C– **8**

6. Thallus and soredia C+ orange. [Thallus thin becoming covered in coarse grey soredia.] Soredia scratches to pale green **Lecidella scabra** (pl 3)
– Thallus and soredia C+ rose red. Thallus scratches orange **7**

7 White to pale pink thallus and soredia **Llimonaea sorediata**
– Brownish cream thallus and soredia **Dirina massiliensis** f. **sorediata**

8. Thallus vivid yellow to bright greenish yellow **Psilolechia lucida** (pl.1)
– Thallus green-grey, bluish grey, pale yellowish green or yellow to brownish yellow **9**

9. Thallus smooth-surfaced granules, yellow to brownish yellow. (Rarely green-yellow f. **flavovirella**) **Candelariella vitellina**
– Thallus finely sorediate or with rough, coarse granules **10**

10. Thallus of smooth, flat topped areoles, yellowish green. Soredia in centres of areoles. (Fig.65) **Lecanora soralifera**
– Thallus granular or of minute fluffy spheres **11**

11. Thallus covered in grey-green granules which become green when *lightly* scratched **Lecania erysibe** f. **sorediata**
– Thallus does not become green when *lightly* scratched **12**

12. Thallus green-grey, thick, coarsely granular. Occurs mainly in polluted areas **Lecanora conizaeoides**
– Thallus greenish to bluish grey, fluffy spheres 0.1 mm diam. Occurs in all areas **Lepraria incana**

Key I – Common lichens found on soil and mosses

1. Thallus of green to grey, leaf-like scales to 3 mm wide. Often with stalked (to 4 cm high), hollow, fruit-bearing bodies (podetia, figs. 72-75). The leaf-like scale may disappear to leave just the podetia (*Cladonia* species) **or** thallus grey to brownish and bushy with solid branches **8**
– Thallus various but not of green to grey, small, separate, leaf-like scales or podetia **2**

2. Thallus of minute areoles to 0.3 mm wide, green to green-brown. Perithecia black, 0.5 mm diam (Fig. 66) **Agonimia tristicula**
– Thallus not of minute green areoles. Fruits apothecia **3**

3. Thallus, granular, pale grey **4**
– Thallus leaf-like, grey, brown or almost black **5**

4. Fruits black. Disc remaining flat or almost so. [Often on mosses on ledges on north side of churches] **Bacidia bagliettoana**
– Fruits pinkish to black. Disc soon becoming domed **Bilimbia sabuletorum**

5. Thallus brown or grey, lobes to 2 cm wide, smooth or matt. Lower-surface pale with prominent rhizines (**Peltigera** sp. see plate 3/12) **6**
– Thallus brown, papery when dry, but swelling when wet, ridged, lobes erect 1–3 mm wide. Lower surface brown, no rhizines. (This is the commonest species found in this situation

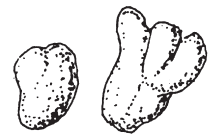


Fig. 66 Areoles of *Agonimia tristicula* x30


Fig. 67 Rhizines of *Peltigera hymenina* x10


Fig. 68 Tall fruit of *P. hymenina* and *P didactyla* x3

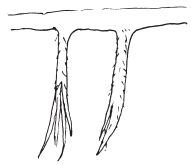


Fig. 69 Rhizines of *Peligera didactyla* x10

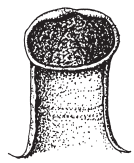


Fig. 70 Broad fruit of *P. membranacea* x3

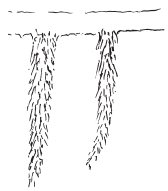


Fig. 71 Rhizines of *Peltigera membranacea* x 10

but other species of *Leptogium* and *Collema* may occur)
Leptogium gelatinosum

6. Upper surface matt to glossy, not with felt-like surface. Rhizines separate with split ends (Fig. 67).
[Fruits longer than wide] (Fig. 68) **Peltigera hymenina**
– Upper surface covered in fine white hairs like felt. (Visible when dry and at least near the margins). Rhizines various **7**

Fig. 72 *Cladonia floerkeana* x4

7. Thallus of a few lobes to 3 mm wide (sorediate only when young). Rhizines separate downy with divided tips (Fig. 69). Fruits usually wider than long (Fig. 70) **Peltigera didactyla**
– Thallus large to 30 cm diam. Never sorediate. Rhizines bottle-brush like. (Fig. 71) Fruits wider than long (Fig. 70)
Peltigera membranacea (Pl. 3)
If with minute leaf-like lobes on margins and in cracks in lobes, probably **Peltigera praetextata**

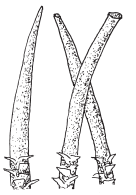


Fig. 73 *Cladonia coniocrea* x3

8. Podetia tips rather pointed, not terminated in a cup (Figs. 72 and 73) and hollow **or** thallus bushy with solid branches **9**
– Podetia widening at the tip to form a cup (Figs. 74 and 75) **14**

9. Thallus with hollow podetia **10**
– Thallus bushy with all branches solid **13**

10 Podetia, grey, granular surface and with bright red tips [forked or single]. Normally K– **Cladonia floerkeana**
(*if K+ yellow and in parts finely sorediate* **Cladonia macilenta**)
– Podetia grey to green or brown, smooth or powdery towards tips. Single stem to bushy. No red tips. Terminating in a point not a cup **11**

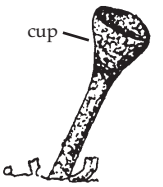


Fig. 74 *Cladonia fimbriata* x3

11. Podetia not sorediate, branched to bushy, **12**
– Powdery soredia towards the tips. Podetia simple, green to green-grey (Fig. 73) **Cladonia coniocraea**

12. Podetia long, smooth surfaced in the upper parts, often divided towards the top, grey to brown-grey **Cladonia furcata**
– Podetia bushy, branching in all directions. White to yellowish green-grey **Cladonia portentosa**

13. Thallus smooth, grey, tinged red-brown, numerous finger-like side branches. (commonest species) **Sphaerophorus globosus**
– Thallus covered in grey, minute, protruding, hand-like plates which are darker in centre **Stereocaulon vesuvianum**

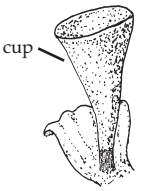


Fig. 75 *Cladonia humilis* x3

14. Podetia golf-tee shaped. Green to grey-green. [Very finely sorediate] (Fig. 74) **Cladonia fimbriata**
– Podetia expand from base, green to grey-green. Fine or coarse soredia or with smooth-surfaced granules (especially inside the cup) (Fig. 75) **15**

15. Podetia to 5 mm tall, finely sorediate but bare near base. Thallus K+ yellow (Fig. 75) **Cladonia humilis**
– Podetia to 15 mm tall, coarsely sorediate or with smooth-surfaced granules. Thallus K– **16**

16. Coarsely sorediate podetia **Cladonia chlorophaea** (pl 3)
– Large, often smooth granules on podetia and in cup **17**

17. Grey-green, fruits, if present, brown **Cladonia pyxidata**
– Yellowish grey-green. Fruits bright red **Cladonia diversa**

Key J – Lichens growing directly on sawn wood (e.g. fences, gates and benches)

(When wood is becoming well rotted
it may often support the species found in Key I)

1. Fruticose (Fig. 76) and *Cladonia* (Figs. 81, 82) or foliose (Fig.77) **2**
– Crustose (Fig. 78) including species with pin-like fruits (Fig. 83), placodioid (Fig. 79) or squamulose (Fig. 80) **75**

2. Fruticose or erect to pendent foliose **3**
– Foliose, more or less flat attached over whole lower surface **45**

3. Contains a central core if main stem or branch is pulled (*Usnea*) (Fig. 84) **4**
– No central core **8**

4. Black on or just above holdfast (Fig. 85) **5**
– Not black at basal holdfast **6**

5. Branches not constricted at junction with main stem. Rather bushy. Medulla K+ yellow or K– **Usnea subfloridana**
– Branches constricted at junction with main stem. Becomes pendulous when mature. K+ orange. **Usnea fragilescens**

6. Main branches angular in section, ridged, pitted and covered in long, thin isidia **Usnea hirta**
– Main branches rounded, not covered in long isidia **7**

7. Branches constricted where they join the main stem (Fig. 86) No pale annular rings . Olive-green **Usnea cornuta**
– Branches not strongly constricted at junction with main stem. Often with pale annular rings (Fig. 86). Yellow-green to green **Usnea flammea**

8. Main stems brownish with numerous short, finger-like side branches [all branches solid] **Sphaerophorus globosus**
– Various colours. Not with short, finger-like branches **9**

9. Fruiting bodies hollow, often growing from granules or squamules on the substratum (*Cladonia* species e.g. Figs. 81, 82)**10**
– Strap-like or hair-like lobes, fruiting bodies (if present) solid but the lobes may be hollow especially near the tip. **30**

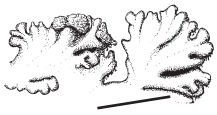
10. Red tipped podetia **11**
– Brown tipped or no coloured tips to podetia **17**

11. Primary squamules dominant, to 1 cm diam, sorediate on lower surface, often orange at base **Cladonia digitata**
– Primary squamules not dominant, smaller, not sorediate **12**

12. Podetia cup-shaped **C. diversa** (Fig. 81)
– Podetia not cup-shaped and/or extensions growing from tip **13**

13. Yellow to yellow grey. Basal squamules to 1 cm diam **14**
– Grey to grey-green. Basal squamules much smaller **15**

Fig.76. Fruticose lichen (*Ramalina* sp.) x1



rhizines on lower surface

Fig. 77. Foliose lichen (*Parmelia* sp.) x2

Fig. 78 Crustose species x2. These may, or may not, have a coloured margin.

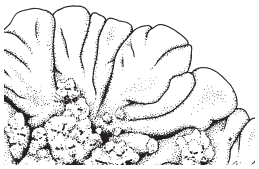


Fig. 79. Placodioid lichens
Above: Edge of wide lobed placodioid lichen (*Diploicia canescens*) x4
Below: Part of the edge of a crustose, placodioid lichen (*Caloplaca* sp.) x4

Fig. 80 Squamules x4 (above).
Section through squamule showing lack of lower cortex (below)

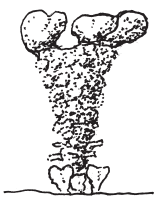


Fig. 81. *Cladonia diversa* x3

Fig. 82. *Cladonia polydactyla* x3

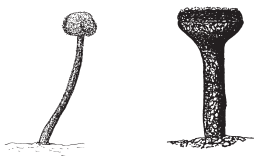


Fig.83. Pin-like fruits x 10

14. Podetia 2–5 mm tall. Basal squamules dominant, to 4 mm long **C. incrassata**
– Podetia to 5 cm tall, often with split in side **C. sulphurina**

15. Extentions on tip of podetia **C. polydactyla** (Fig. 82)
– No extensions to tips of podetia **16**

16. Podetia squamulose to granular, usually K– **C. floerkeana** (Fig. 87))
– Podetia partially sorediate, K+ yellow **C. macilenta**

17. Podetia if present not dominant to primary thallus **18**
– Podetia large and dominant **19**

18. Podetia with squamules and granules. Primary squamules sorediate. K+yellow **C. parasitica**
– Podetia without squamules or granules, almost colourless, no soredia. K– **C. caespiticia**

19. Podetia terminate in a wide cup **20**
– Podetia do not terminate in a definite wide cup **23**

20. Podetia expand widely just below the tip. Finely sorediate **21**
– Podetia expand from the base. Coarsely sorediate **22**

21. Yellow-green, translucent when wet **C. carneola**
– Grey to green, not translucent **C. fimbriata** (Fig. 88)

22. Podetia with medium size soredia **C. chlorophaea** (Fig. 89)
– Podetia with corticate granules/squamules **C. pyxidata**

23. Podetia not squamulose except sometimes near the base **24**
– Podetia with numerous squamules **27**

24. Podetia brownish green or grey **C. cornuta**
Podetia grey-green or green **25**

25. Podetia with antler-like tips (resembles Fig. 82), occurs on rotting wood) **C. subulata**
– Podetia with no or narrow cups, no antler-like tips **26**

26. Podetia to 2.5 cm tall, do not widen near tip **C. coniocraea** (Fig. 90)
– Podetia to 5 cm tall, slightly wider at the tip **C. ochrochlora**

27. Thallus K+ yellow. Podetia almost covered in squamules formed by a peeling cortex **C. subsquamosa**
– Thallus K– **28**

28. Podetia almost covered in squamules formed by a peeling cortex **C. squamosa**
– Squamules not formed by peeling cortex, squamules brittle or podetia have a split in the side **29**

29. Squamules on podetia break off easily when dry. No slit in side **C. ramulosa** (Fig. 91)
– Squamules flexible. Podetia usually with slit in the side **C. glauca**

30. Not sorediate or isidiate **31**
– Sorediate or isidiate when mature **32**

31. Thallus K–. Fawn-grey lobes **Anaptychia ciliaris**
– Thallus K+ yellow. Grey lobes **Physcia leptalea**

Fig. 84. *Usnea* with central core x4

Fig.85. Black holdfast x5

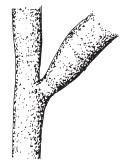


Fig. 86. Pale rings on *U. flammea* x7

Fig.87. *Cladonia floerkeana* x3

Fig. 88. *Cladonia fimbriata* x3

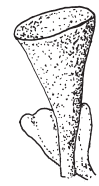


Fig. 89. *Cladonia chlorophaea* x3

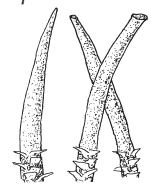


Fig. 90. *Cladonia coniocrea* x3

32. Soralia marginal or laminal, not in inflated lobe tips **33**
– Lobe tips inflated and split to reveal soredia
Ramalina canariensis (Fig.92)

33. Grey with white or black under-surface. Upper surface with numerous isidia when mature **Pseudevernia furfuracea**
– Yellowish to grey-green, green, brown or mauvish. Not isidiate **34**

34. C+ red cortex. Mauve-grey thallus. White soredia
Roccella phycopsis (rare, do not collect))
– C–. Yellowish to grey-green, green or brown thallus **35**

35. Strap-shaped at least near the base. Thallus yellow-green to grey-green or green **36**
– Not strap-shaped. Thallus brown, hair-like to 1mm diam. Pale soredia in splits **Bryoria fuscescens (**Fig. 93)

36. Numerous marginal, eyelash-like cilia (pale with dark tips, Fig. 94). Thallus pale grey to pale brownish grey. (Spores brown 1-septate) **37**
– No cilia. Thallus yellowish to grey-green, green. (Spores simple)**38**

37. Lobe tips swollen, helmet-shaped, bursting open to reveal powdery soredia (Fig. 95) **Physcia adscendens**
– Lobe tips not swollen, lip-shaped with powdery soredia on under surface (Fig. 94, 95) **Physcia tenella** (Similar to Pl. 4/1)

38. Under surface white often with green patches. Mature upper surface with soredia on ridges **Evernia prunastri**
– Green to yellow-green or grey-green, colour continuous on under surface. Upper surface without soredia on ridges **39**

39. Often fertile, not powdery, often glossy, sorediate
Ramalina siliquosa
(If matt, blackened at the base and at the pycnidia , rare on wood.
Ramalina cuspidata)
– Rarely fertile. Powdery soredia in swollen tips or in oval splits in sides of the branches **40**

40. Swollen areas towards tips of branches which open to reveal soredia (Fig. 92) **41**
– Not swollen towards tips of branches. Soredia in splits on the edges of branches **43**

41. Towards the tips of the lobes the upper and lower cortex splits to show the soredia **Ramalina canariensis** (Fig.92)
– Soredia not in splits in cortex but discrete soralia **42**

42. Lobes to 1 cm wide with ridges **Ramalina lacera** (Fig.98)
– Lobes to 0.5 cm wide without ridges **Ramalina pollinaria**

43. Lobes flattened towards the base, becoming rounded above and hollow, lobes shiny, to 1 mm wide, splitting to show soredia [K+ yellow turning red]**.** Very rare, SW and W **Ramalina portuensis**
– Lobes not hollow **44**

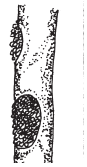


Fig. 97. *Ramalina farinacea* x5

Fig.98 Lobe tip of *Ramalina lacera* x5

Fig. 91. *Cladonia ramulosa* x3

Fig. 92. Lobe tip of *Ramalina canariensis*

Fig.93. *Bryoria fuscescens* x2

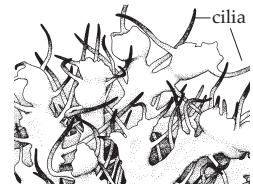


Fig. 94. *Physcia tenella* x1

Fig.95. Lobe tip of *Physcia adscendens* x6

Fig. 96. Lobe tip of *Physcia tenella* x5

Fig.99. Lobe tip showing white marks

44. Grows from single basal holdfast **Ramalina farinacea** (Fig. 87)
– Grows from a multiple base, forming swards **Ramalina subfarinacea**

Fig. 100 Coralloid isidia x10

Foliose

45. Sorediate or isidiate **46**
– Not sorediate or isidiate **72**

46. Isidiate or with knobby outgrowths **47**
– Sorediate **54**

47. Upper surface grey **48**
– Upper surface orange-yellow, pale yellow-grey or shades of brown to near black **50**

48. White lines and dots on lobes (Fig. 99) develop into coralloid isidia (Fig. 100) **Parmelia saxatilis** (Pl. 4/10)
– No white lines or dots. **49**

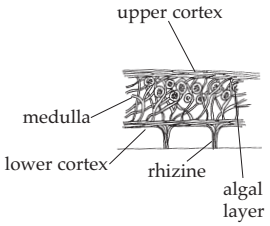


Fig. 101. Cross-section of foliose thallus x20

49. Lobes to 0.8 mm wide, widening at tips, often wrinkled. Centre covered in granular to wart-like isidia. Rare **Physcia clementii**
– Lobes to 3 mm wide.Very coralloid isidiate **Imshaugia aleurites**

50. Upper surface orange-yellow. Knobby outgrowths 0.1–0.7 mm diam. towards the centre, few or no fruits **Xanthoria calcicola** (If very fertile probably *Xanthoria parietina* (see couplet 74)
– Upper surface pale yellow-grey or brown or near black **51**

51. Upper surface pale yellow-grey to green. Lobes shiny. Coralloid isidia. [Medulla K+ yellow-orange. Lobes overlapping to 2 mm wide] **Xanthoparmelia conspersa**
– Upper surface brown to near black **52**

52. Dark brown. Lobes transversely wrinkled. Isidiate clusters (like broccoli). Medulla C– or C+ pink (rare on wood) **Xanthoparmelia verruculifera**
– Reddish to green-brown or near black. Lobes not transversely wrinkled. Coralloid isidia (Fig. 100). Medulla C+ red (Fig. 101) **53**

53. Green-brown often with reddish tinge, green when wet. Numerous coralloid isidia **Melanelixia glabratula**
(If lobe surface matt not glossy, isidia coarse and rather globose and erode to pale areas, ***Melanelixia subaurifera*** *is probable. These two species are difficult to separate without experience).*
– Dark brown to near black. Densely coralloid isidiate, can look almost like velvet. Rare on wood **Melanelixia fuliginosa** (Pl. 4/8)

54. Upper surface grey, yellowish grey, brown or black when dry. Often greener when wet **55**
– Upper surface yellowish green to green (at least near the margin. Centre may be blackish), yellow or orange. Usually little changed when wet **68**

55. Under surface pale but may be darker towards centre **56**
– Under surface dark brown to black almost to the edge **62**

56. Thallus K+yellow **57**
– Thallus K– **60**

57. Lobes with dark tipped cilia (Fig. 94) **58**
– Lobes lack cilia **59**

58. Lobe tips swollen, helmet-shaped, bursting open to reveal powdery soredia (Fig. 95) **Physcia adscendens** (Pl. 4/1)
– Lobe tips not swollen, lip-shaped with powdery soredia on back surface of lobe tip (Fig. 94, 96) **Physcia tenella**

59. Globose soredia (often blue-flecked) in centre and apex of lobes. Lobes adpressed. Medulla/cortex K+ yellow **Physcia caesia**
– Soredia towards the tips, not blue flecked. Lobes separate, slightly convex. Medulla K–. Cortex K+ yellow **Physcia dubia**

60. Medulla (Fig. 101) C+ red (fleetingly). Lobes up to 1 cm wide. Grey to grey-green. Distinct pinhead, white markings on upper surface that become sorediate **Punctelia subrudecta**
– Medulla C–. Lobes to 4 mm wide **61**

61. Lobes overlapping with pruinose tips, to 2 mm wide. Thallus grey to brown, adpressed. Marginal and/or central coarse soredia, grey when dry, greenish when wet **Physconia grisea**
– Lobes sometimes pruinose, to 4 mm wide. Thallus grey, lobes separate, convex. Soralia on inner lobe tips **Arctoparmelia incurva**

62. Lobes hollow in cross section (Fig. 102). Attached to substrata by patches of fungal hairs **63**
– Lobes solid in cross section. Attached to substrata by root-like rhizines **64**

Fig. 102 *Hypogymnia* lobe cut to show hollow centre

63. Lobes flat with tips splitting to show powdery soredia on back of upper surface (Fig. 103) **Hypogymnia physodes**
– Lobes finger-like with soredia on tips (Fig. 104) **Hypogymnia tubulosa**

Fig. 103 *Hypogymnia physodes* x3

64. Interior of thallus (medulla, Fig. 101) C+ red. Lobe tips down-turned **Hypotrachyna revoluta**
– Medulla C– **65**

65. Lobes to 1.5 mm wide, grey, grey-brown to almost black when dry, bright green when wet **Phaeophyscia orbicularis**
Lobes larger than 1.5 mm wide, grey to green when dry **66**

Fig. 104 Lobe tip of *Hypogymnia tubulosa* x4

66. Medulla K+ yellow-orange **67**
– Medulla K–. [Towards the centre it is finely wrinkled across the lobes. Coarsely sorediate] **Flavoparmelia caperata** (Pl. 4/7)

67. No white lines or marks on lobes. Lobe tips turned up, sometimes with black 'eye lash' cilia on edges. Sorediate margins on lobes **Parmotrema perlatum**
– White lines and dots on lobes that develop powdery soredia along them. No cilia **Parmelia sulcata**

68. Thallus orange, yellow to yellow-green, apple-green, yellow-grey or green. More or less flat, not upright **69**
– Thallus yellow-orange to orange. Lobes leaf-like to 2 mm long, becoming upright with powdery soredia on frilly tips **Xanthoria ucrainica** group inc. **X. candelaria** (Pl. 4/11)

69. Thallus orange-red. Lobes to 1 mm wide, separated, strap-like, convex **Xanthoria elegans**
– Thallus yellow-grey to green. Lobes to 15 mm wide variously shaped **70**

70. Thallus to 3 cm diam. Lobes 0.2–0.5 mm wide, elongated and separated **Parmeliopsis ambigua**
– Thallus to 20 cm diam. Lobes to 15 mm wide, overlapping flattened **71**

71. Medulla K–. Lobes to 15 mm wide, finely wrinkled towards centre **Flavoparmelia caperata** (Pl. 4/7)
– Medulla K+ yellow slowly turning to red. Lobes to 7 mm wide, rather flattened, as if ironed **Flavoparmelia soredians**

72. Thallus grey to dark brown **73**
– Thallus orange **74**

73. Lower surface dark. Attached by many dark, 'bottle-brush' rhizines (Fig. 105). Pruinose lobe tips. K– **Physconia distorta**
– Lower surface pale. Attached by simple or branched rhizines. Lobe tips not pruinose. K+ yellow **Physcia aipolia**

Fig. 105 'Bottle-brush' rhizines

74. Knobby outgrowths 0.1–0.7 mm diam. towards the centre. Few or no fruits **Xanthoria calcicola**
– No knobby outgrowths. Usually very fertile with fruits to 4 mm diam **Xanthoria parietina** (Pl. 4/13)

75. Lobed (placodioid Fig. 106) or scale-like (squamulose Fig. 107) **76**
– Crustose **80**

Squamulose or placodioid.

76. Squamulose. Squamules brown to green-grey **77**
– Placodioid. Thallus grey to green **79**

77. Thallus C+ red. Squamules to 2 mm diam, numerous and often overlapping, sorediate margins. Fruits often pruinose **Hypocenomyce scalaris** (Fig. 108)
– Thallus C–. Squamules not overlapping. Not sorediate **78**

78 Squamules convex, sometimes ascending with incised margins, matt **Hypocenomyce caradocensis**
– Squamules mainly adpressed, entire margins, shiny **Hypocenomyce friesii**

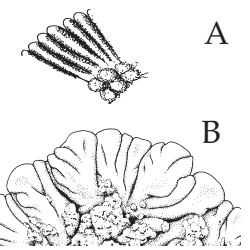


Fig. 106. Placodioid lichens
A: Part of the edge of a crustose, placodioid lichen (*Caloplaca* sp.) x4
B: Edge of wide lobed placodioid lichen (*Diploicia canescens* x3)

79. White to pale grey lobes. Cream to yellow soredia. Fruits black but rare. (Fig. 106b) **Diploicia canescens** (Pl. 2/2)
– Grey to green lobes with pale edges. No soredia. Yellow to reddish brown fruits **Lecanora muralis** (Pl. 3/1)

Crustose, not placodioid

80. Without fruits, may have minute pycnidia 0.1-0.2 mm diam. (commonly infertile species) **81**
– With fruits which may be on stalks **96**

81. Thallus brown, minutely coralloid (Fig. 100). Often on post tops [Thallus C+ red, best seen in a squash] **Placynthiella icmalea**
– Thallus not brown or coralloid **82**

82. Soredia C+ yellow. Thallus grey. Soralia grey in lines or covering thallus **Ochrolechia turneri**
– Thallus and/or soredia C– or C+ orange to red **83**

83. Thallus and/or soredia K+ yellow or yellowish red **84**
– Thallus and/or soredia K– **89**

84. Thallus not sorediate, pale grey, numerous black pycnidia 0.1-0.2 mm diam **Cliostomum griffithii**

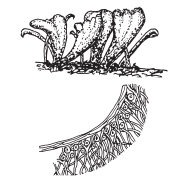


Fig. 107. Squamules x4 (above).
Section through squamule showing lack of lower cortex (below)

Fig. 108 *Hypocenomyce scalaris* showing squamules x5

(If pycnidia 0.2–0.5 mm diam, E. Anglia on old barns, jetties and fences, mainly coastal, possibly the very rare **C. corrugatum**

– Thallus sorediate **85**

85. Thallus grey-green, granular [becoming covered in coarse soredia which scratch to a paler colour] **Lecidella scabra**

– Thallus grey to yellow-green, smooth wrinkled or cracked **86**

86. Soredia grey to bluish green-grey, indigo or brown; may become pale yellow when scratched **87**

– Soredia pale yellow to yellow-green throughout **88**

87. Soredia bluish green-grey scratching to yellowish **Buellia griseovirens**

– Soredia brown to indigo, scratching to cream (Fig.114) **Xylographa vitiligo**

88. Thallus yellowish green, C– **Lecanora orosthea**

– Thallus grey. C+ yellow, orange or red **Lecanora expallens**

89 . Thallus C– **90**

– Thallus at least in parts C+ orange to red. **93**

90. Thallus membranous, gelatinous when wet **Steinia geophana**

– Thallus not gelatinous or membranous **91**

91. Thallus white to black, thin or just a dark stain. Frequently with white-tipped minute pycnidia. No soredia **Micarea denigrata**

– Thallus grey to green or yellowish. Thallus rather granular or sorediate **92**

92. Coarse grey-green granules. **Lecanora conizaeoides**

– Pale grey thallus becoming covered with yellow-green soredia except at thallus margin. Not fertile **Lecanora compallens**

93. Soredia bluish green to dark blue green. Thallus blue-grey to green-grey of flattened granules **Trapeliopsis flexuosa**

– Soredia yellowish to grey. Thallus grey to pinkish, or thin and black. [Frequently on slightly decayed wood] **94**

94. Thallus with orange patches that are K+ purple **Trapeliopsis pseudogranulosa**

– No K+ purple orange patches **95**

95. Thallus grey to pinkish, of rounded granules. Yellowish clumps of soredia frequently present **Trapeliopsis granulosa**

– Thallus pale grey to brown-grey. Becomes covered in yellowish green soredia with brown surface **Micarea leprosula**

96. Fruits pin-like, indian club or golf-tee shaped (Figs.109-112). **97**

– Fruit types various, not stalked **107**

Stalked fruits

97. Fruits on a thin stalk or almost stalkess with a powdery, brown spore mass on tip of stalk (*Chaenotheca* species Fig. 109) **98**

– Fruits indian club or golf tee shaped. With or without powdery black spore mass (Figs. 110–112) **103**

98. Thallus yellow to yellow-grey **99**

– Thallus orange, grey, green or absent **100**

Fig. 109. Apothecium of *Chaenotheca brunneola* x5

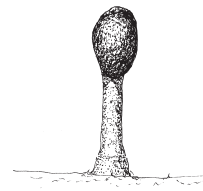


Fig. 110. Apothecium of *Stenocybe septata* x10

Fig.111. Apothecium of *Calicium viride* x8

Fig. 112. Apothecium of *Calicium salicinum* x8

99. Thallus granular to warted, bright yellow. Apothecia 0.6–1.3 mm tall **Chaenotheca chrysocephala**
– Thallus powdery, bright yellow-green. Apothecia 1.6–2.6 mm tall **Chaenotheca furfuracea**

100. Thallus pale grey to orange grey with orange patches (K+ red). Fruit stalks often very short **Chaenotheca ferruginea**
– Thallus green or grey or immersed **101**

101. Thallus granular to almost squamulose, greenish grey. White pruina on upper stalk and apothecial rim **Chaenotheca trichialis**
– Thallus immersed or a few granules **102**

102. Stalk to 1.4 mm tall. Stalk, apothecium spore mass covered in a greenish yellow pruina **Chaenotheca brachypoda**
– Stalk to 2 mm tall. Shiny black **Chaenotheca brunneola** (Fig. 109)

103. Fruits are indian-club shaped, without a loose spore mass **104**
– Fruits are golf tee shaped with a loose spore mass **105**

104. Fruits to 2 mm high. Mainly on holly **Stenocybe septata** (Fig.110)
– Fruits to 1 mm high. On alder **Stenocybe pullatula**
(Other similar but rarer genera are difficult to separate in the field, *Stenocybe* has 3-septate spores and *Phaeocalicium* and *Chaenothecopsis* has simple or 1-septate spores).

105. Thallus bright green to sulphur yellow, thick, granular. Often in cracks on rough bark **Calicium viride** (Fig 111)
– Thallus thin or absent, greyish **106**

106. Apothecia black or pale grey, open **Calicium glaucellum**
(*Calicium glaucellum* spores 9–13 x 5–7 µm. *Calicium abietinum* is similar but with spores 11.5–15 x 5–7 µm)
– Apothecia light to dark brown, almost globose
Calicium salicinum (Fig 112)
(*Microcalicium* species are difficult to identify in the field but have green-black spore masses, *Calicium* have black spore masses)

Fruit types various, not stalked

107. Fruits stretched out in lines; lirellate (Figs. 113, 114) **108**
– Fruits perithecia (Figs. 115, 116) or more rounded apothecia **111**

108. Fruits densely crowded, often branched
Opegrapha atra (Fig.113)
– Fruits separated, usually following the grain of wood **109**

109. Thallus sorediate **Xylographa vitiligo** (Fig. 114)
– Thallus not sorediate **110**

110. Fruits persistently brown **Xylographa trunciseda**
– Fruits becoming black as they mature **Xylographa parallela**

111. Thallus brown or black **112**
– Thallus white, grey, yellow, orange, yellow-green or green **113**

112. Thallus black. Fruits perithecia (Figs. 115, 116). Occurs on or very near the coast **Verrucaria maura**
– Thallus and fruits brown to almost black. Thallus rather coralloid. Fruits apothecia (Figs. 117) **Placynthiella icmalea**

113. Fruits yellow or orange **114**
– Fruit colours various not yellow or orange **117**

114. Thallus and fruits K– **Candelariella vitellina**
– Thallus and/or fruits K+ crimson/purple **115**

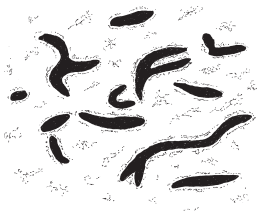


Fig. 113. *Opegrapha atra* x10

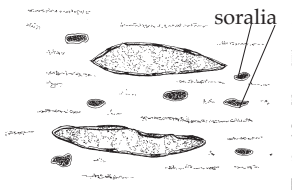


Fig. 114. *Xylographa vitiligo* x8

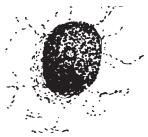
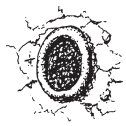


Fig. 115. Perithecium viewed from above x10

Fig. 116. Cross-section of perithecium x10



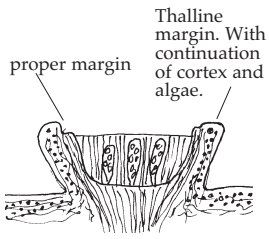


Fig. 117. Lecanorine apothecium x5 and cross-section x20

115. Disc margin grey. Fruit disc K+ crimson **Caloplaca cerina**
– Disc margin yellow-grey to deep orange. Thallus K+ crimson **116**

116. Thallus deep orange, granular, coastal **Caloplaca marina**
– Thallus whitish to yellow-green, areolate. Often a large isolated single thallus **Caloplaca flavovirescens**

117. Fruits lack a thalline margin (Fig. 117) **118**
– Fruits with a thalline margin (Fig.118) **127**

118. Sorediate. C+ orange **119**
– Not sorediate. Reactions various **120**

119. Densely sorediate. Thallus grey-green **Lecidella scabra**
– Soredia in discrete patches. Thallus yellow-grey to yellow-green to grey-green **Lecidella elaeochroma** f. **sorediata**

120. Spores loose in fruit. (Usually rub off as a black mark on the finger) **121**
Fruits firm, young fruits with a margin. Spores not loose **122**

121. Thallus white to dark grey **Cyphelium inquinans**
– Thallus bright yellow-green **Cyphelium notarisii** (Fig. 119)

122. Thallus C+ red. Thallus granular green to black crust **123**
– Thallus C– or C+ orange. Thallus variable **124**

123. Thallus cream to dark green, often just a black crust. Fruits 0.1– 0.4 mm diam. black **Micarea melaena**
– Thallus pale green to bluish grey. Fruits 0.3–1.3 mm diam cream to grey-black **Micarea cinerea**

124. Thallus yellow-grey to yellow-green, more grey-green in shade. C+ orange, K+ yellow **Lecidella elaeochroma**
– Thallus white, grey, brownish or green-grey. Spot reactions negative **125**

125. Fruits orange to red–brown, 0.2–0.5 mm diam. Thallus green-grey to dark grey (100–200 spores per ascus) **Strangospora pinicola**
– Fruits black, 0.2–1 mm diam (8 spores per ascus) **126**

126. Thallus greenish grey to dark grey, smooth to areolate. Fruits 0.2– 0.5 mm diam. **Amandinea punctata**
– Thallus white to grey, warted or granular. Fruits 0.5–1 mm diam **Lecidella carpathica**

127. With granular or fine, powdery soredia **128**
– Not sorediate or thallus absent **131**

128. Thallus green-grey covered in granular soredia. Fruits with granular, persistent margins **Lecanora conizaeoides**
– Thallus grey or yellowish green with powdery soredia. Fruit margins smooth or becoming excluded by the disc **129**

129. Thallus/soredia K+ yellow to orange or yellow-brown **130**
– Thallus/soredia K–. Thallus yellowish green of flat-topped, often separate, areoles with powdery soredia in centre of each. (Fig. 120) **Lecanora soralifera**

130. Thallus continously areolate with sorediate yellow margins, the soredia spreading out over the surface. K+ yellow turning brownish **Lecanora orosthea**
– Thallus grey becoming covered with with yellow-green soredia. K+ orange-yellow **Lecanora expallens** (Ph. 98)

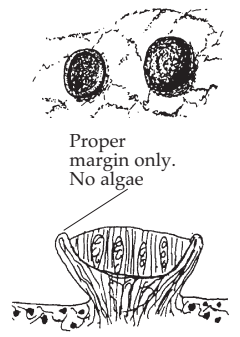


Fig. 118. Lecideine apothecia x5 and cross-section x20

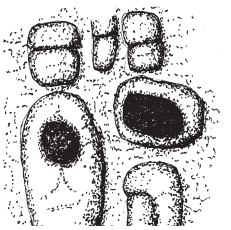


Fig. 119 *Cyphelium notarisii* x6

131. Fruit disc brown, black, emerald, bluish green or brownish green or yellow turning blackish or black **132**
– Fruit disc persistently yellow to green **142**

132. Fruit disc green-brown to brown. Fruit margin persistent **133**
– Fruit disc black, bluish green, emerald, yellowish green turning blackish or black. Fruit margin persistent or not **139**

133. Thallus absent or yellowish to grey-green **Lecanora polytropa**
– Thallus white to creamy or fawn to grey **134**

134. Thallus with a white fimbriate, cottony margin **Lecanora campestris** (Fig. 121)
– No white fimbriate, cottony margin **135**

135. Thallus continuous, smooth to rough. Fruit margin circular except where distorted by pressure from other fruits (difficult to separate in this key and in the field) **136**
– Thallus granular, often thin but may form a crust. Fruit margin wavy, crenulate or excluded **137**

136. No prothallus. Fruit margins usually smooth and rounded **Lecanora chlarotera**
– White or dark prothallus often present, at least in parts. Fruit margins often slightly contorted **Lecanora pulicaris**

137. Fruits attached at centre up to 3.5 mm diam. Coastal on thrift and sawn wood **Lecanora zosterae**
– Fruits attached by the base up to 1.5 mm diam **138**

138. Discs pink to greenish brown. Fruits scattered to abundant.(*If some fruit discs are black, these are probably a parasitic lichen* ***Ramboldia insidiosa***) **Lecanora varia**
– Discs pale reddish brown. Fruits usually cover the thallus **Lecanora saligna**

139. Thallus creamy white to grey or absent. Fruit disc green-black to black **140**
– Thallus yellow to yellow-green, or grey-green. Areoles with notched edges. Fruits rather immersed in thallus. Disc brown-green to emerald-green **Lecanora intricata**

140. Fruits 0.2–0.5 mm diam. Green, red-brown turning black **Lecanora aitema**
– Fruits to 2mm diam. Black **141**

141. Thallus light to mid-grey. Disc margins often thin and irregular (Fig. 122, 124) **Tephromela atra**
– Thallus mid-grey to green-grey. Disc margins smooth and entire. (Fig. 123) **Lecanora gangaleoides**

142. Fruit margin persistent, except in mature fruits **143**
– Fruit margin absent or disappears very early in all fruits **Lecanora symmicta**

143. Fruits and thallus C– **Lecanora polytropa**
– Fruits and thallus C+ yellow to orange-red **144**

144. Fruit margin rarely excluded, paler than disc **Lecanora confusa**
– Fruit margin becomes excluded, not paler than disc **Lecanora expallens**

Fig. 120. Areole of *Lecanora soralifera* x6

Fig.121. *Lecanora campestris* x3

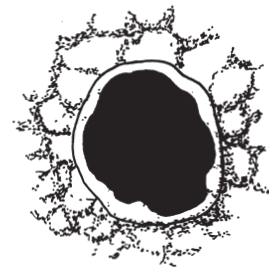


Fig.122. *Tephromela atra* x10

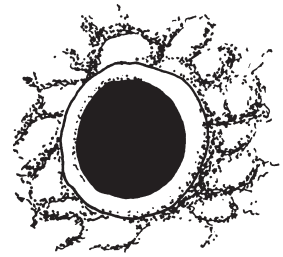
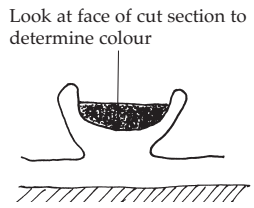


Fig. 123. *Lecanoa gangaleoides* x10



Orange layer often occurs at base of thallus in *Lecanora gangaeioides*

Fig.124. Section through *Lecanora gangaleoides*/ *Tephromela atra*

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This book covers most areas of lichenology including lichen communities, uses, botanical classification and has an extensive bibliography.

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Generic and species keys, distribution maps, many line drawings and about 850 species described and illustrated with colour photographs.

DOBSON Frank S. *Lichen-identifier* (Ver. 3) Frank S. Dobson. 57 Acacia Grove, New Malden, Surrey, KT3 3BU.

A multi-access computer key to over 1800 species of the lichens of Great Britain and Ireland, including distribution maps to all the species and over 750 colour photographs.

DOBSON Frank S. *A Field Guide to Lichens on Trees*. (2013) Frank S. Dobson. 57 Acacia Grove, New Malden, Surrey, KT3 3BU.

If a churchyard contains trees this guide will help you identify them. It includes 128 colour photographs and keys to over 500 species.

DOBSON Frank S. *A Field Guide to Coastal and Seashore Lichens*. (2010) Frank S. Dobson. 57 Acacia Grove, New Malden, Surrey, KT3 3BU.

A guide to lichens found on rocky sea-shores. The book includes 96 colour photographs and keys over 500 species. Many of the species included are found in coastal churchyards .

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A folded card illustrating in colour, 60 species of lichen occuring on twigs. It also includes a key to the species. A useful guide to lichens on trees in churchyards.

The British Lichen Society

The British Lichen Society is the main lichenological organisation in Britain and has many overseas members. Membership is open to all and it particularly welcomes newcomers to lichenology. Information regarding the Society and membership may be obtained from: The Secretary, The British Lichen Society, c/o The Natural History Museum, Cromwell Road, London SW7 5BD.

The BLS website is at http://www.britishlichensociety.org.uk This website contains information about the Society including a prospectus and a printable application form and much other lichen information including links to other sites that, between them, cover most aspects of lichenology catering for all levels of knowledge.