What are lichens? Lichens are made up of two or more different organisms living together, a fungus and an alga. The fungus provides the body (thallus) in which the algal partner can live, protected from damaging conditions such as high levels of ultraviolet light and drought. The algal partner provides the essential carbohydrates (food for the fungus) from carbon dioxide and water, with the aid of sunlight. This close, interdependent relationship is referred to as a symbiosis. They occur in three forms.

1. Crustose lichens cover the bark surface and cannot be removed without cutting the bark.
2. Foliose lichens are leaf-like lichens attached from the lower surface.
3. Fruticose lichens are branched and shrub-like and attached at the base.

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A mature orchard in Eastern England typically contains thirty to forty species of lichen; few orchards support less than a dozen or more than fifty. The most commonly encountered epiphytic lichens have been selected for this guide to orchards in the East of England. If you find specimens that do not fit any of the species included here, you may wish to consult the resources listed in the further reading and information section.

In addition, you may want to remember that orchard biodiversity is of increasing interest in light of the Habitat Action Plan for Traditional orchards and the increasing number of community orchards that are being planted or restored in the East of England. A companion OPAL guide to a selection of mosses that grow on orchard trees in the East of England is also available.

Lichens as natural indicators Lichen diversity in lowland England was devastated by the effects of industrial pollution during and after the Industrial Revolution, creating the well-known ‘lichen deserts’ recognised in the nineteenth century. In past decades, levels of sulfur dioxide pollution have fallen dramatically and there has been a spectacular re-colonisation by lichens. Many of the colonists are tolerant of nitrogen compounds which are emitted from vehicles and agricultural practices. Some of the lichens involved in this re-colonisation have only recently been described as new to science. A great deal of useful recording can be performed by amateur lichenologists. Until very recently, the only species of Flavoparmelia likely to be found in the East of England was F. caperata but there has been a rapid spread of F. solandri to its former stronghold along the south coast of England. Monitoring these changes is important for understanding how our environment is changing. The study of this intriguing group of organisms is not easy, but with a few months experience all sorts of discoveries are possible.

Why orchard surveys of lichens are interesting If you are planting a new orchard, you may be interested in seeing how the biodiversity develops over time and how lichens and other organisms colonise the new habitat. Surveys in well-established orchards, where lichens are known, can contribute to knowledge about orchard ecosystems. If you are restoring an existing orchard you may wish to monitor how changes in the management are affecting the species in it.

Conducting an orchard survey It is a good idea to make a plan and then record the lichens on a tree by tree basis so that you can find a particular tree in future (e.g. Row 3 Tree 6), ensuring that you record the position of each row within the orchard. A GPS can be used to record the grid reference for the start and end of the rows. It is also useful to record tree age and the variety of the fruit (if known).

In a large orchard, it will be impossible to look at every tree, so it is best to sample a limited number in detail.

Equipment needed To use this key, you will need at least a x10 hand lens. If you cannot identify the lichen specimen in the field, you may wish to collect a small sample for further investigation. You should collect this in a fully labelled paper packet, which includes information such as lichen name, tree variety, orchard location and date.

Is the lichen CRUSTOSE? Lichens that cover the bark (crustose) cannot be removed without cutting the bark.

Is the lichen FRUTICOSE? A branched shrub-like lichen that is attached to the tree by a holdfast.

Is the lichen FOLIOSE? Leaf-like lichens attached from the lower surface.

Using a hand-lens. Place the hand-lens close to your eye and bring the specimen in to approximately 3 to 4cm. Adjust the distance between the specimen and the lens until the specimen is in focus.

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Why orchard surveys of lichens are interesting

If you are planting a new orchard, you may be interested in seeing how the biodiversity develops over time and how lichens and other organisms colonise the new habitat. Surveys in well-established orchards, where varieties are known, can contribute to knowledge about orchard ecosystems. If you are restoring an existing orchard you may wish to monitor how changes in the management are affecting the species in it.

Conducting an orchard survey

It is a good idea to make a plan and then record the lichens on a tree by tree basis so that you can re-find a particular tree in future (e.g. Row 3 Tree 6), ensuring that you record the position of each tree within the orchard. A GPS can be used to record the grid reference for the start and end of the rows. It is also useful to record tree age and the variety of the fruit (if known).

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Is the lichen CRUSTOSE?

The characters that distinguish crustose lichens from foliose lichens are structure, structure and structure. However, the main characters that differentiate these two forms of lichens are the presence or absence of a crust.

Is the lichen FRUTICOSUS?

The characters that distinguish fruticose lichens from foliose lichens are structure, structure and structure. However, the main characters that differentiate these two forms of lichens are the presence or absence of a crust.

If you find a very shrubby lichen with branches which are round in cross section it is probably a species of Usnea.

Using a hand-lens: Place the hand-lens close to your eye and bring the specimen to within approximately 2cm. Adjust the distance between the specimen and the lens until the specimen is in focus.

Is the lichen FOLIOSE?

The characters that distinguish foliose lichens from crustose lichens are structure, structure and structure. However, the main characters that differentiate these two forms of lichens are the presence or absence of a crust.

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The characters that distinguish paredo lichens from foliose lichens are structure, structure and structure. However, the main characters that differentiate these two forms of lichens are the presence or absence of a crust.

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Lichens are made up of two or more organisms living together, a fungus and an alga. The fungus provides the body (thallus) in which the algal partner can live, protected from damaging conditions such as high levels of ultraviolet light and drought. The algal partner provides the essential carbohydrates (food for the fungus) from carbon dioxide and water, with the aid of sunlight. This close, interdependent relationship is referred to as a symbiosis. They may be pale or bright coloured and commonly occur in three forms:

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Is the lichen CRUSTOSE?

<table>
<thead>
<tr>
<th>Colour of crust</th>
<th>Form of crust</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale to yellow-green or grey</td>
<td>Dark to medium</td>
<td>Crustose lichens can be difficult to interpret or not always present</td>
</tr>
<tr>
<td>Light brown to dark brown</td>
<td>Usually with expanded apothecia</td>
<td></td>
</tr>
</tbody>
</table>

Is the lichen FRUTICEOUS?

<table>
<thead>
<tr>
<th>Colour</th>
<th>Texture (feature rather subtle)</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Light brown to dark brown</td>
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<td></td>
</tr>
<tr>
<td>Light brown to dark brown</td>
<td>Similar at all mounds and cannot be separated without cutting the bark</td>
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Using a hand-lens. Place the hand-lens close to your eye and bring the specimen to within approximately 1 cm. Adjust the distance between the specimen and the lens until the specimen is in focus.

The OPAL guide to epiphytic lichens in orchards in the East of England

<table>
<thead>
<tr>
<th>Species</th>
<th>Colour</th>
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<tr>
<td>Flavoparmelia caperata</td>
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<table>
<thead>
<tr>
<th>Species</th>
<th>Upper and lower surfaces</th>
<th>Upper and lower surfaces</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amandinea punctata</td>
<td>Brownish-green</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Arthonia radiata</td>
<td>Pale-brown to grey</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Lecanora chlorotera</td>
<td>Pale-brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Lecanora expallens</td>
<td>Pale-brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Lecidella elaeochroma</td>
<td>Pale-brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Lepraria incana</td>
<td>Pale-brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Scoliciosporum chlorococcum</td>
<td>Pale-brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Flavoparmelia caperata</td>
<td>Light brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Hypotrachyna revoluta</td>
<td>Light brown</td>
<td>Light brown</td>
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</tr>
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<td>Melanelixia tubulosa</td>
<td>Light brown</td>
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<td>Light brown</td>
</tr>
<tr>
<td>Ramalina farinacea</td>
<td>Dark brown to dark brown</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Xanthoria polycarpa</td>
<td>Brownish-red</td>
<td>Light brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Xanthoria ucrainica</td>
<td>Yellow-orange</td>
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<td>Light brown</td>
</tr>
<tr>
<td>Xanthoria parietina</td>
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<td>Light brown</td>
</tr>
<tr>
<td>Xanthoria aurea</td>
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Orchard biodiversity is of increasing interest in the East of England. A companion OPAL guide to a wider range of orchard biodiversity in the East of England will be published in 2013. Orchard surveys can contribute to knowledge about orchard ecosystems. If you are interested in seeing how the biodiversity develops over time and how lichens and other organisms colonise the new habitat. Surveys in well-established orchards, where lichens are known, can provide the essential carbohydrates (food for the fungus) from carbon dioxide and water, with the aid of sunlight. This close, interdependent relationship is referred to as a symbiosis. They may be pale or bright coloured and commonly occur in three forms.

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5. Lecanora chlorotera
6. Lecanora expallens
7. Lecanora incana
8. Scoliciosporum chlorococcum
9. Cladonia chlorophaea
10. Flavoparmelia caperata
11. Hypogymnia physodes
12. Hypotrachyna revoluta
13. Melanelixia subaurifera
14. Micromeria subulata
15. Parmelia sulcata
16. Phaeophyscia orbicularis
17. Physcia adscendens
18. Physcia tenella
19. Punctelia jeckeri
20. Xanthoria parietina
21. Xanthoria polycarpa
22. Ramalina farinacea
23. Evernia prunastri
24. Xanthoria ucrainica

Further reading and information

British Lichen Society (BLS)  
www.britishlichen.org.uk

Field Studies Council (FSC)  
www.field-studies-council.org

National Biodiversity Network (NBN)  
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Open Air Laboratories (OPAL)  
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Crustose
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Foliose
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Please note that lichen colour may vary when wet or dry.
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19. Rambelliella gigantea
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