

Special Small Plants of the Celtic Rainforest



Here you can learn more about these lesser known but special plants of the Celtic rainforest.

In the video Discovering Moss and Lichen you will see examples of special small plants including lichens, bryophytes and ferns with information about how you can study them yourselves.



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What types of small plants are there?



[Moss](#)



[Liverworts](#)

[Bryophytes](#)



Fern



Lichens

Lichens, bryophytes and ferns are simple plants – they have a different way of reproducing to the flowering plants (angiosperm) and seed plants (gymnosperm) like trees, roses, grasses and bluebells. This means they produce ‘spores’ rather than seeds but tend to reproduce vegetatively.

[Click here to find out more about how they reproduce.](#)

Or, click on the different types of plant pictured to learn more about them.

Mosses and liverworts are both types of bryophyte.



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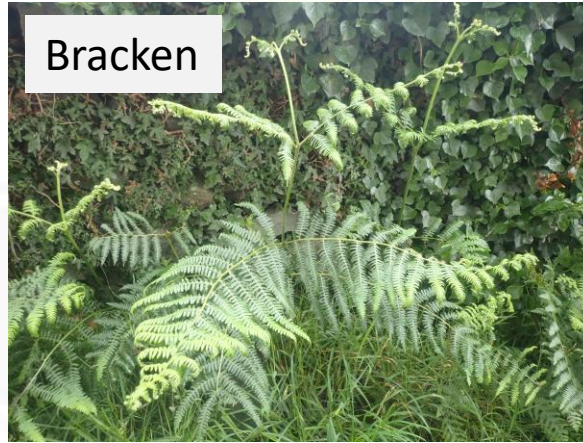


Fern



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What are ferns?



Fern is the general term for these species in the pictures. In Welsh, the term 'rhedyn' is used for fern. But be careful we also commonly use 'rhedyn' for the specific type of fern called bracken in English.

Bracken is one of the easiest to identify as it is the only large fern (>50cm) in Wales that has one stem and branches growing from that one stem.

[Click here to see a video in which scientists explain how ferns are named](#)



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Fern patterns ...friend?... no frond!



A fern frond is different to the leaves of other plants as the reproductive part of the plant that produces the spores are on them.

The frond is often divided into different parts as you can see.

The number of times the frond is divided is an important aspect of their identification.

They are also pretty plants that are interesting to study!

Why don't you go and see how many different frond shapes can you find in a woodland?

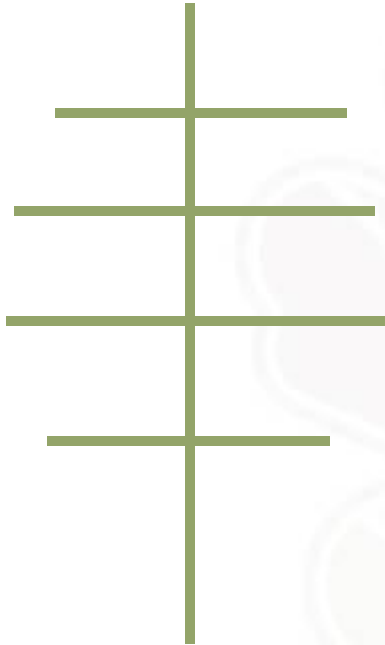


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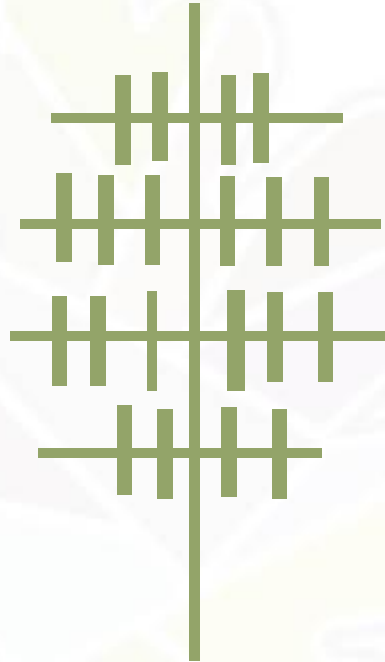
Fern patterns ...friend?... or frond!?!



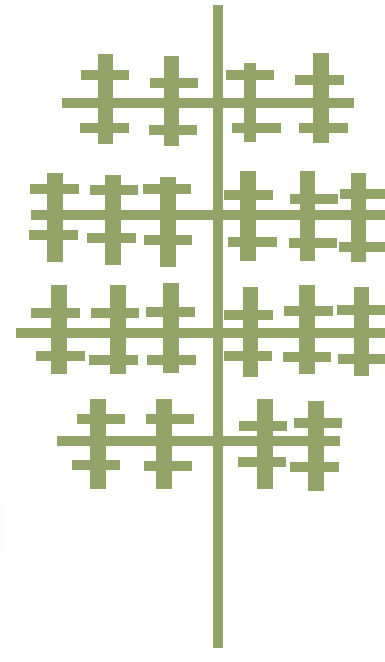
Undivided



Pinnate



Bipinnate



Tripinnate

Undivided

Divide once: Pinnate

Divided twice:
Bipinnate

Divided three times:
Tripinnate

[Here is a video that explains how you can work out how many times a frond has been divided – go to minute 5:50](#)



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Fern patterns...friend?... or frond!?!



Undivided



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Divide once:
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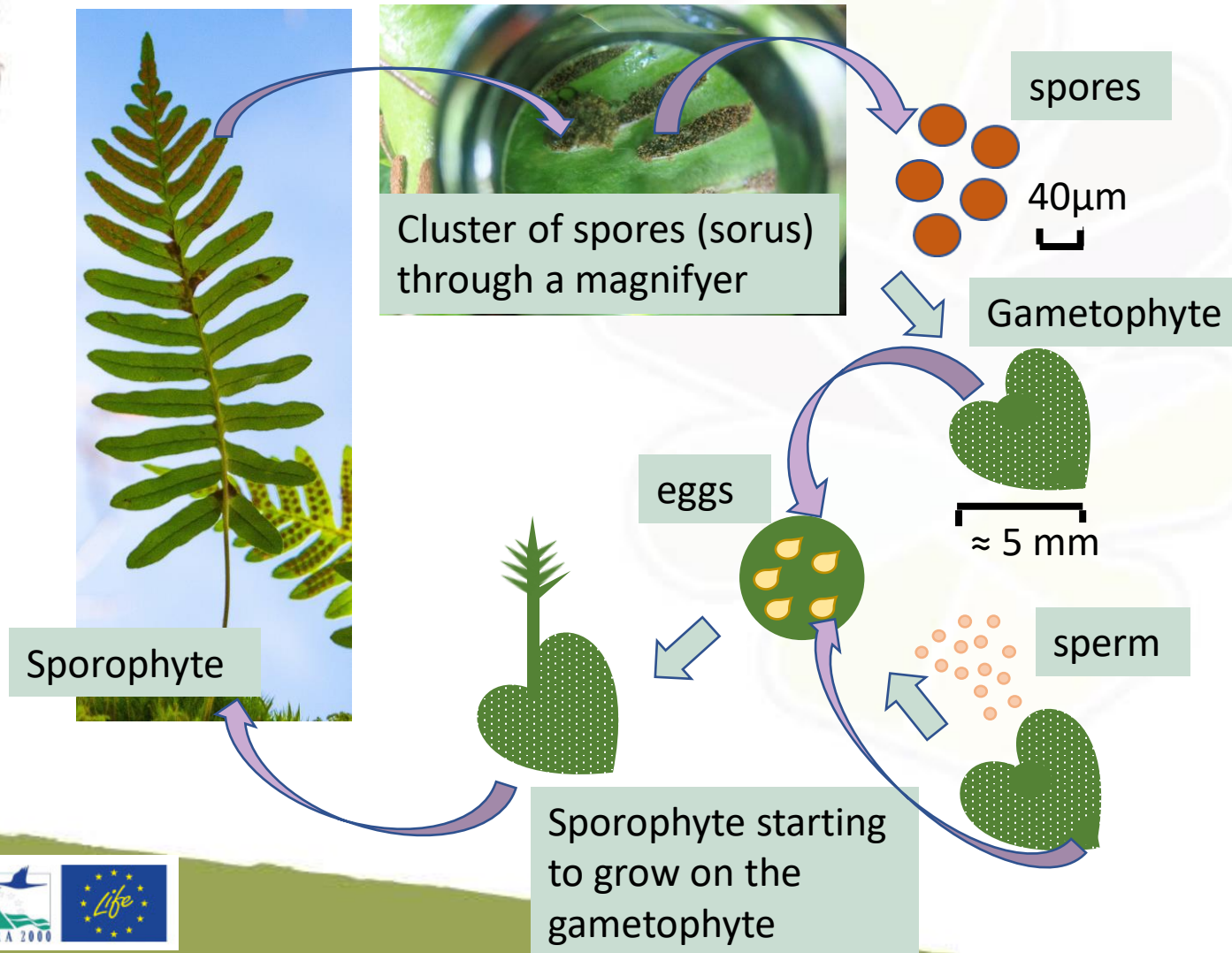
Divided three
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How do ferns reproduce?



Simple plants have a special way of reproducing which consists of two parts.

The part we can see is called the sporophyte because they create the spores that fall to the ground.

The spores grow into a gametophyte which is so small we can rarely find it.

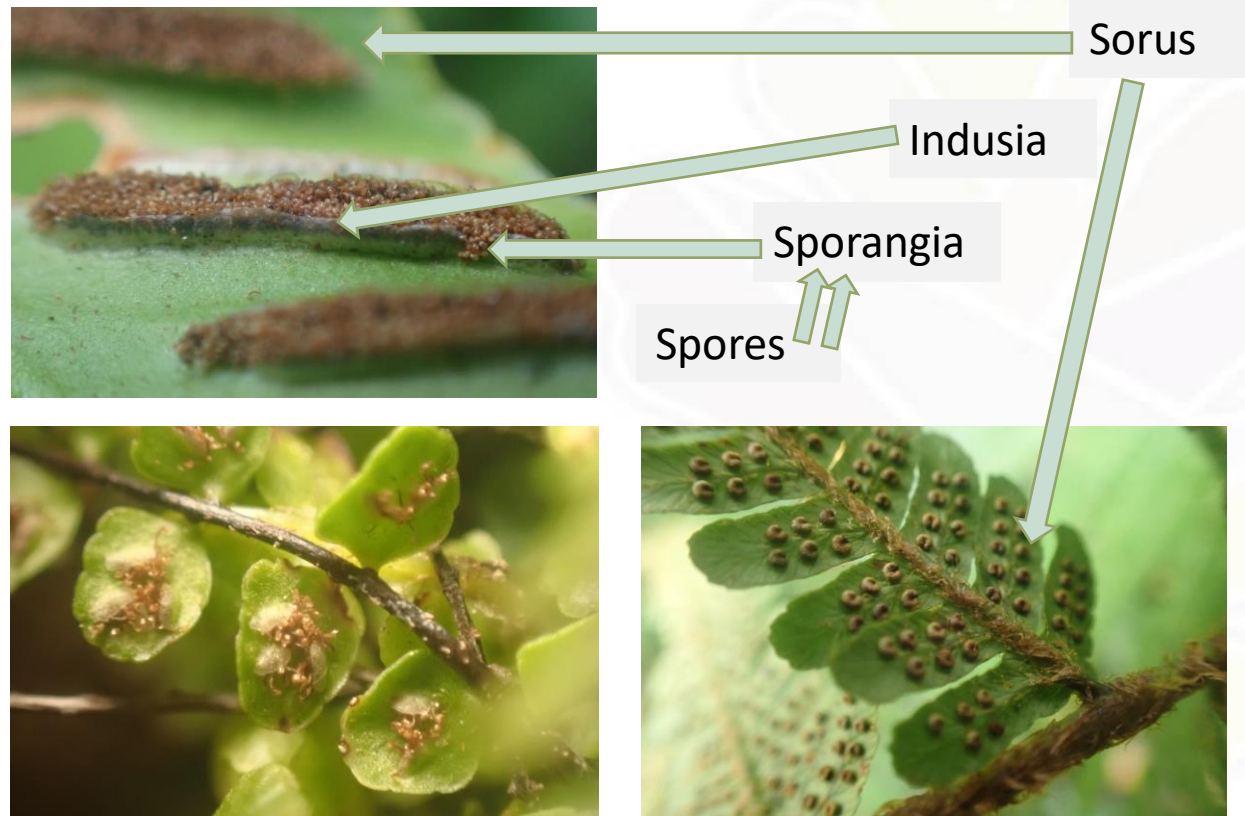
The gametophyte reproduces by producing sperm that swim to eggs on another gametophyte when it's wet enough.

The sporophyte grows on the gametophyte.



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Fern patterns ...Sorry .. Oh no ...sori!?!



As you can see [here](#) ferns reproduce by creating spores.

The spores tend to be on the underneath side of the frond (the name for fern leaves).

The **spores** inside the **sborangia** are held together in a cluster that is held together by a membrane called an **indusia** to create a **sorus** (sori in plural).

There are many sori patterns on ferns.

Visit minute [12:57](#) for an explanation of this by Plantlife.

Why not see how many different patterns of sori can you find on the underside of fronds?



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An iconic fern of the Celtic Rainforest



This pinnate fern called **polypody** is common in Celtic rainforests.

It delights in growing on big oak trees – look at the big branches that extend out horizontally. You'll see them growing amongst the moss.

Epiphyte is the name of the plants that grow on other plants; just like this polypody is doing.



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Special ferns of the Celtic rainforest



Sori



Here are two little ferns (<10cm) that are easy to confuse with bryophytes due to their size and that they tend to be found growing on wet rocks and trees amongst mosses and liverworts.

The Wilson's Filmy Fern and the Tunbridge Filmy Fern are rainforest specialists due to their need for humid conditions.

They are very similar to each other, so don't worry if you don't know your Wilson from your Tunbridge!

Whichever one you have found; you have found a rare, pretty and special fern – enjoy!



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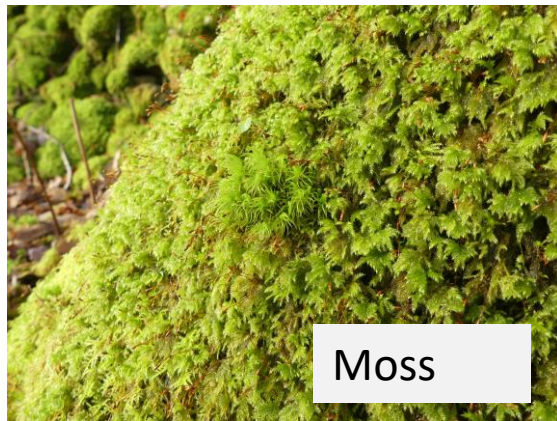
What are bryophytes?



Moss



Liverwort



Moss



Liverwort

Bryophyte is the name we use for mosses and liverworts.

Why do we join them together in one group?
... What do they have in common?

Well, they are unable to regulate the water within them...

So how do they cope?
How do other plants regulate water within them?



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Why do bryophytes like rain and wet places?



Most plants have a system that is similar to two pipes that move water (xylem) and nutrients (phloem) around the plants. You can learn more [here](#).

Bryophytes don't have any pipes, so when the air is dry they dry out.

Notice on a dry day they look different to how they do when it has been raining.

If a bryophyte is dry then it can't produce food.

This is why they like to live in the rainforest.



Pour some water on a dry bryophyte to see how it absorbs the water through its leaves and changes its form within seconds!

[Watch this!](#)



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Did you know? .. 5 bryophyte facts!

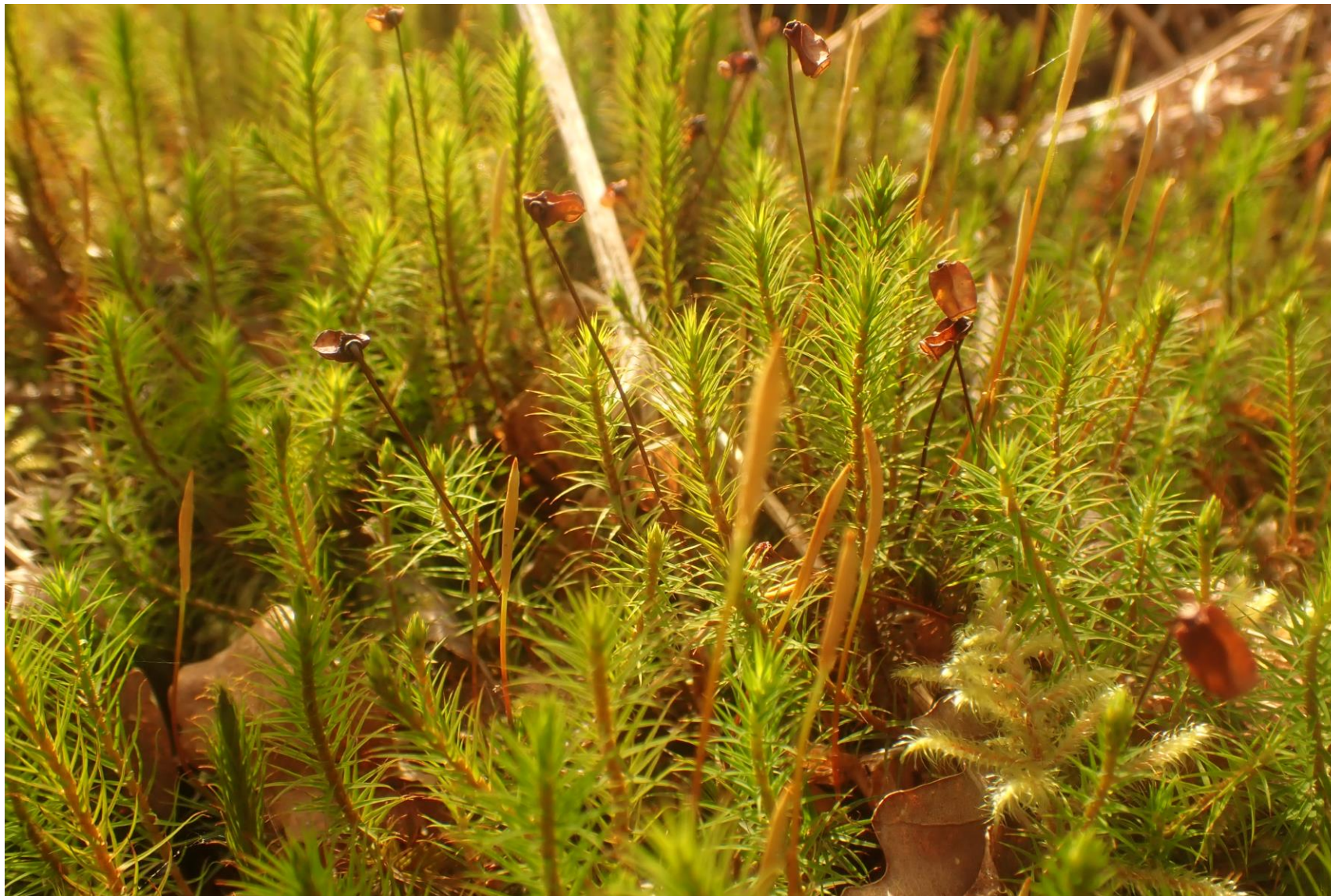
1. They are ancient plants – they date to over 450 million years
2. They are found on every continent and in every ecosystem
3. They have rhizomes rather than roots to anchor them to soil.
4. They are adapted to live in places other plants can't survive including on mountain rocky ledges.
5. They are one of the first plants to colonise bare ground; they create and stabilise soil for other plants.



Can you find out how rhizomes differ from roots?



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moss



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What is moss?



Mosses with one stem



Mosses have little leaves that grow the all the way round the stem i.e they are not in distinct rows.

They may have one stem (acrocarpous) or they might be branched (pleurocarpous).

Look at the moss carefully and see if you can work out which sort it is



Branched mosses



The leaves form all kinds of different shapes – how many different sorts can you find?

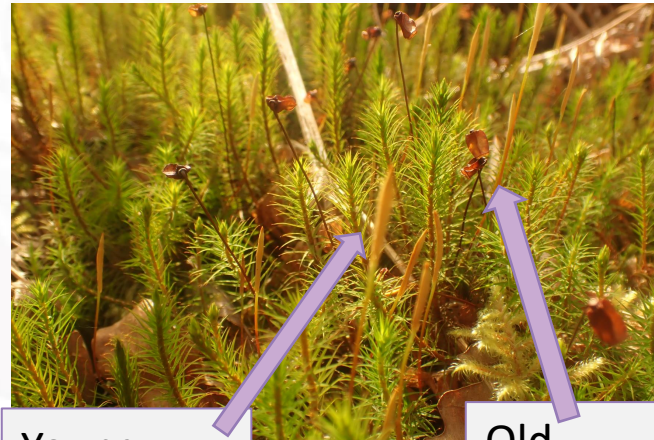


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What other aspects of moss can we look for?



Mature capsules



Young capsule

Old capsule



Keep an eye out for capsules they are full of spores.

They can look extremely pretty!

[Click here to learn more about how these plants reproduce.](#)



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Natural sponge?



Sphagnum

Sphagnum mosses live in very wet places and can hold so much water they act like a sponge.

On a wet day, and if there is plenty of sphagnum moss around, you can take a handful of moss and squeeze it to watch the water flowing out.

Did you know?

In the first world war sphagnum mosses were used on soldiers wounds.

Why? ...

Because it is so absorbent, and, because it is so acidic it stops bacteria from growing.

Sphagnum mosses can hold as much as 20 times their weight in water!



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liverworts



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What are liverworts?

There are two types of liverworts.

Leafy liverworts have rows of leaves either side of the main stem. They may also have smaller leaves on the underside of the stem. You will need a magnifier to see them!

Thallose liverworts don't have an obvious stem. They look leafy.

Look at them carefully to work out which one they are!

They form unique patterns and shapes – how many different types can you find?



Leafy liverworts



Thallose liverwort



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What are fungi? Are they plants?



Fungi are their own distinct type of organism. They are not animals or plants. They have their own kingdom. But...

Lichens are made up of an alga (a plant) or cyanobacteria growing together with a fungi!
[To learn more about lichens click here!](#)



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Would you like to learn more about woodland fungi?



Ffwng Coedwigoedd Glaw Celtaidd

Gyda:

Cynan Jones
Nigel Brown
Ed Midmore
Kylie Jones Mattock
Anita Daimond
Richard Gallon
Kirsten Manley

Why not watch our fungi foray video
filmed in the Woodland Trust's
Llennyrch woodland in September 2020

Welsh

<https://youtu.be/wJLdBOD9KPs>

English

<https://youtu.be/AFOycV5uyR0>



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cofnod
Gwasanaeth Gwybodaeth Amgylcheddol Gogledd Cymru
North Wales Environmental Information Service



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lichens



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What are lichens?



Lichens are a combination of fungi and algae or a cyanobacteria.

The algae provide food through photosynthesis and the fungi protects the alga or cyanobacteria e.g from UV light and from drying up.

They can grow on all types of surfaces including tree trunks and branches, and on rocks and soil and sometimes cars!

There are hundreds of species of lichen growing in our woodlands



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Different types of lichen?



Crusty



Leafy



Bushy

Lichens grow in a range of different colours and shapes.

It is possible to arrange them into three different growth form types which helps us identify them.

1. **Crusty:** Flat, crusty and stuck to the bark.
2. **Leafy:** Fairly flat with small parts that look like leaves.
3. **Bushy:** They look like small bushes with many branches on the stem



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What are the parts that look like jam tarts?



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In order to survive and reproduce they must have extremely special conditions. Reproduction can happen in different ways.

Asexual / Vegetative – They produce a clone of themselves or release small bundles of algae and fungi into the air which then produces new lichen.

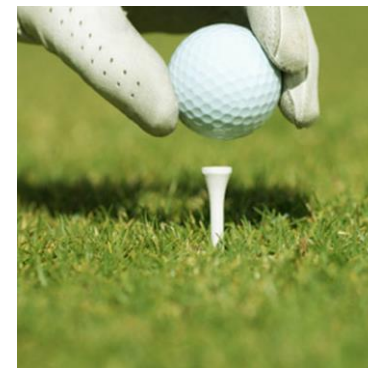
Sexual – They release fungal spores into the air, and they must find algal spores or cyanobacteria in the atmosphere in order to create lichen.

The reproductive parts of lichen can take different forms – one of these forms resemble a jam tart on the upper surface of the lichen.



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What other form can the reproductive parts take?



The form of the reproductive parts of a lichen can vary and includes a shape which similar to a golf tee or a hunting horn, to lines that resemble old-fashioned writing.

Why not go and see how many different shapes and forms you can find on lichen?

Use a magnifier so you can see the growth forms better.



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Special lichens of the Celtic rainforest



Here is a bushy lichen that likes sheltered damp locations. It delights in being in the Celtic rainforest and can only be found in a few sites.

It's common name is 'Black eyed Susan'. However, not many lichens have common names in English or Welsh.

As in this example; often people refer to a notable feature of a plant to create common names, sometimes it relates to food e.g chocolate chip or blobby jelly – skin!

Why not create your own common names for the lichens you find?



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Creative lichen artwork



Julie Ann Sheridan

Fiona Campbell

Welcome Work Commissions Community



<https://fionacampbellart.co.uk/commissions/lichen/uvw2llqb20ld1w8xi1xrfr9ep025ot>

<https://julieannsheridan.co.uk/paintings/>



Bronwen Jenkins

<https://botanicgarden.wales/blogs/2020/04/new-lichen-exhibition-planned-for-2021/>

Why not create some artwork inspired by lichens... follow the links to find out about a planned lichen artwork exhibition and to see some examples of lichen artwork that might give you some inspiration for what you could do.



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Creative lichen digital artwork



... or take a photo of a part of a lichen to make a fun image you can adapt using a digital package.

There are many software packages you could use to create and present your own digital artwork.



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What conditions do lichens need?

Lichen bioindicators

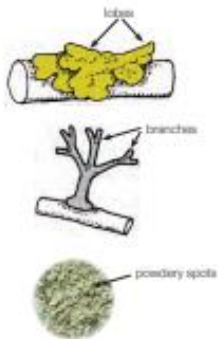
Why lichens? Lichens that are highly sensitive to air quality have been used to detect sources of pollution. In the past, when the air in many places was highly polluted by sulphur dioxide, few lichens could survive, creating lichen deserts around many industrial and urban areas. Lichens are now returning to towns and cities in the UK, and they can still provide a great deal of information about air quality.

Nitrogen-sensitive lichens are outlined in blue

Intermediate lichens can be found in clean and polluted conditions and are outlined in grey

Nitrogen-loving lichens are outlined in red

Important lichen terms



Lichens are sensitive to changes in their environment. Many species of rainforest lichen are sensitive to pollution.

The yellow leafy lichens you tend to see in cities and car parks as well as in the countryside are quite pollution tolerant.

OPAL have run a citizen science survey that used lichens as bio- indicators in order to assess air quality across the country.

You can find details [here](#).



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Shortage of specialists!



Filmy fern icicle

There is a shortage of specialists in ferns, bryophytes, lichens and fungi.

Why do you think this is?

Would you like to learn more about these species – perhaps you could become a specialist in your field!

What other questions do you have?



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Useful links

- <https://www.britishbryologicalsociety.org.uk/> (bryophytes)
- <https://www.britishlichensociety.org.uk/> (lichen)
- <https://ebps.org.uk/> (ferns)
- <https://www.britmycolsoc.org.uk/> (fungi)

It's easy to make mistakes when trying to identify lower plants – how can we make sure our sources of information are reliable?



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Useful resources



- <https://www.plantlife.org.uk/uk/our-work/publications/wild-about-welsh-woodlands>
(available in Welsh and English)
- <https://www.plantlife.org.uk/uk/our-work/publications/woodland-keys-wales>
(available in Welsh and English)
- [Plantlife :: Branching Out: Discover Forest Ferns](#) (English only)
- <https://www.field-studies-council.org/shop/publications/ferns-guide/> (English only)
- <https://www.britmycolsoc.org.uk/education/primary/> (English)
- <https://www.plantlife.org.uk/uk/our-work/publications/lichens-of-welsh-atlantic-woodlands-guide-3-graphidion-lichens>
- [Plantlife :: Parmelion Lichens of Welsh Atlantic Woodlands](#)
- <https://www.plantlife.org.uk/uk/our-work/publications/lobarion-lichens-welsh-atlantic-woodlands>



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Interesting resources for investigations



- <https://www.earthisland.org/journal/index.php/magazine/entry/the-little-fern-that-could>
- <http://wales-lichens.org.uk/>
- <https://www.plantlife.org.uk/uk/our-work/publications/we-need-to-talk-about-nitrogen-welsh-report>



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Useful videos



[Woodland ferns by Plantlife - In English](#)

[Lichen forms by Plantlife – In English](#)

[Moss shapes by Plantlife – In English](#)

[Ancient Woodland lichens - In English](#)



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Links useful for secondary school pupils



- <https://www.plantlife.org.uk/uk/our-work/publications/comiswn-ar-gyfer-coedwigaeth-newydd-adfywio-coetiroedd-cymru>
- <https://www.plantlife.org.uk/uk/our-work/publications/we-need-to-talk-about-nitrogen-welsh-report>
- <https://ebps.org.uk/> (fern)
- <https://www.britmysoc.org.uk/> (fungi)

Can you find some other reliable sources of information? Why do you think these sources are reliable?



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