DRIZZLE, MIDGES misery and MOSS

Welcome to the rainforests of Britain and Ireland!

Ben Averis 2☹2☹

DRIZZLE, MIDGES misery and MOSS

Welcome to the rainforests of Britain and Ireland!

Ben Averis

2020

ben.averis@gmail.com / www.benandalisonaveris.co.uk / www.benaverisart.co.uk

Welcome to the rainforests of Britain and Ireland!

Welcome to the miserable, drizzle-soaked, midge-infested, glasses-steamed-up, can't-wait-to-get-out-of-this-damn-place world of British and Irish rainforest! Well – just look at it. Steep (always a bad start). Rocky. Mossy. Mosses covering everything, so you trip over hidden rocks – if you haven't already tripped over some of that fallen dead wood or got in a tangled mess trying to push your way through a barricade of dense branches, tall ferns, brambles and loose logs in a steep, slippery gully where your progress is a case of two steps forwards and one step backwards…

This document is an informal introduction to that mossy and often miserably drizzly world: the rainforests of Britain and Ireland. It's a world I've spent a lot of time in, so I've put together this mix of writing, artwork, photos and maps to present the rainforest world that I know to other people who might be interested. They might not be interested! Fair enough. We can't expect everyone to be interested in everything. In fact, thinking about it, they might have good reason to be not interested, especially if they got soaked in a rainforest somewhere or if they've tried to read through any of those nature writings of current times that are so tediously peppered with words and phrases like *iconic, jewel in the crown*, *raise awareness, heritage,* and so on… People who write like that might not like my comparatively casual or conversational style, but anyway, here is an introduction to British and Irish rainforests, written and illustrated by me, for you, whoever you are. I hope you like it.

Where it is

It's in lots of places **in the west, where it rains a lot.**

Here is a map showing the main areas where you can find rainforest not just in Britain and Ireland but in the whole of Europe. It's in SW Norway, W Scotland, the Lake District, Wales, SW England, Ireland, NW France and NW Spain. The blue shading is very rough, especially for Norway, France and Spain because I don't have detailed information about exactly where there is and isn't rainforest in those countries.

A lot of the European rainforest is here in Britain and Ireland, and it seems that the greatest amount of it, perhaps especially the greatest amount of really good quality rainforest (whatever 'good quality' means), is in the west Highlands and Inner Hebrides of Scotland.

What it looks like

Basically, these rainforests are woods. Some large, others small. As you approach them, you won't be thinking they look so unbelievably different that they might not even be woods. No. They don't look *that* different. (And you're not *that* stupid.) Here is a view looking from open hill ground across to valley side rainforest in Wester Ross, in July. The trees are mostly downy birch.

Here is a wood that **isn't rainforest.** How would you know? You can't tell if it's rainforest or not just from this photo. This wood and the last one just look like woods. They are both on slopes, and most of their trees are the same species – downy birch. But *where* they are makes a difference. The wood shown on the previous page is in the wet west; this one here is much further east, in Caithness, where the climate is **too dry** for rainforest.

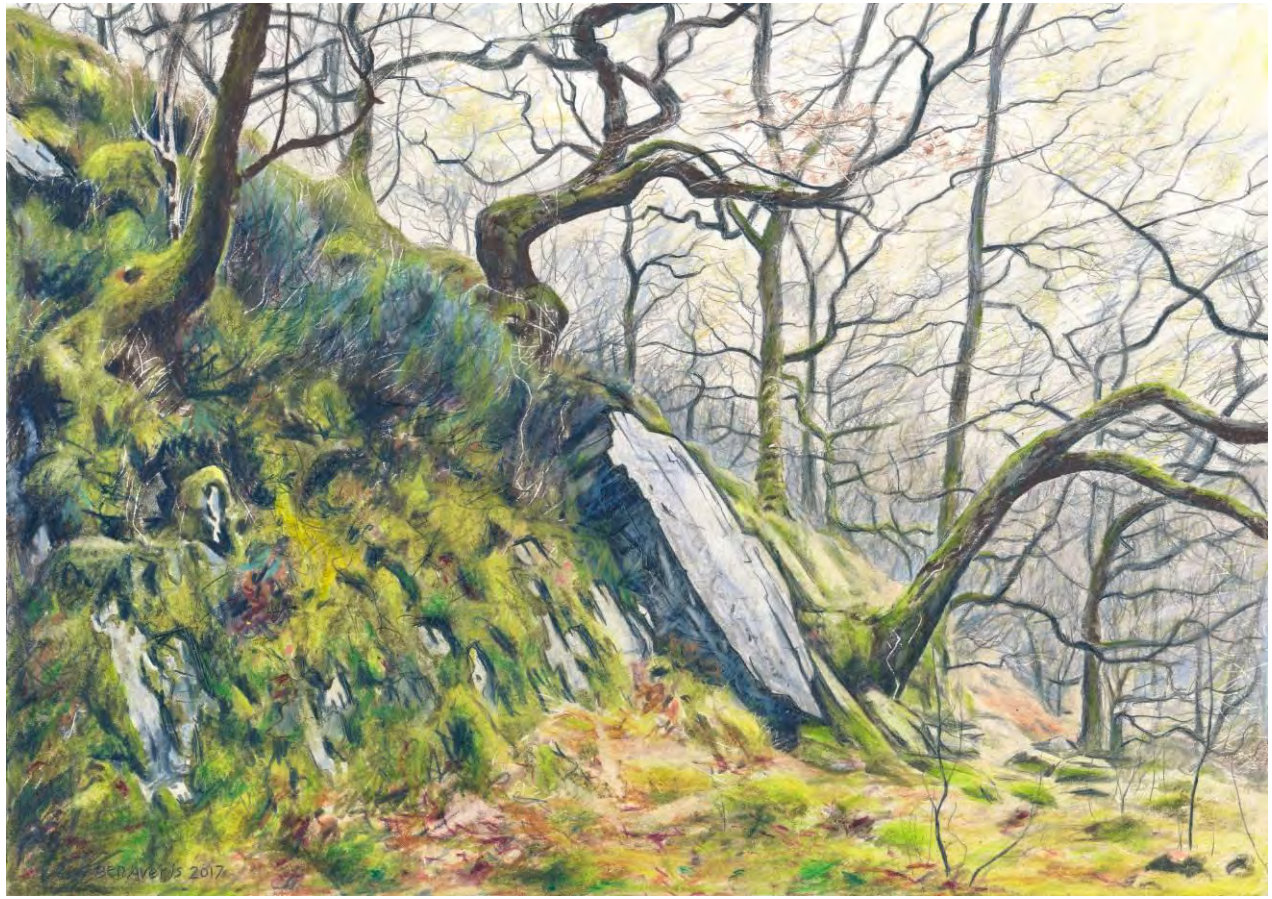
Rain

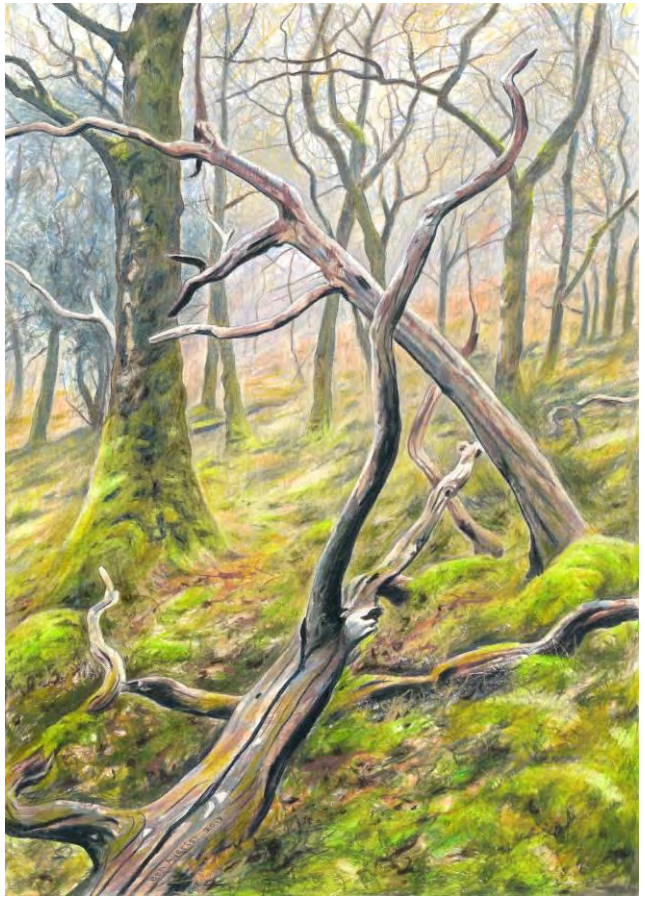
Rainforests in Britain and Ireland are in areas **where it rains a lot** – say, an average of at least 2 metres of rainfall in a year, or, for a slightly better but still quite approximate climatic definition, areas with an average of at least 200 days per year with 1 mm or more of rain. Little and **often** seems better for rainforest than having the same total annual amount of rain falling on fewer days as occasional big soakings with longer dry times in between. The kind of continual, relentless, day-after-day drizzly stuff that makes people miserable is just what the things in the rainforests like.

Mountain slopes with rainforest in rainforest weather, in Glen Coe in February

The things that like this miserable wet climate

Lots of things like this climate, but especially **mosses, liverworts, lichens** and **ferns.** Here is the inside of some rainforest in the west Highlands of Scotland in winter. Flowers and grasses from the previous summer have died back and are brown or some other dull colour, or gone altogether, so most of the green here on the ground and on rocks and trees is moss. Some of the moss is a darkish or olive green. Some is paler. Some is actually more yellow or gold than green. As British woodland colours go, these sorts of scenes are quite bright and that's largely down to the mosses – or, to be more correct, **mosses and liverworts**.

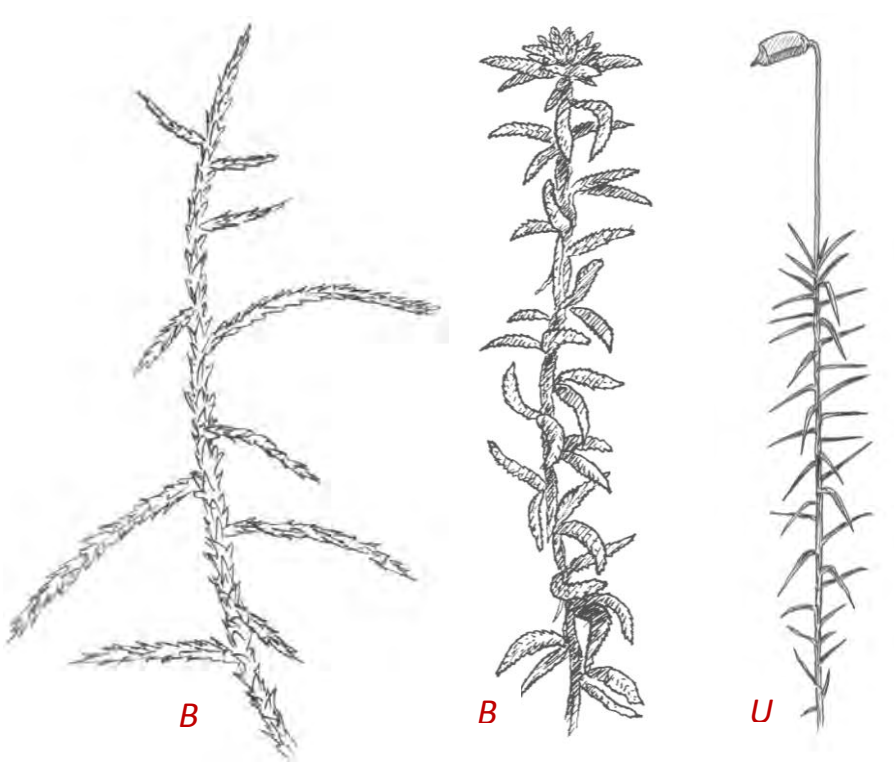




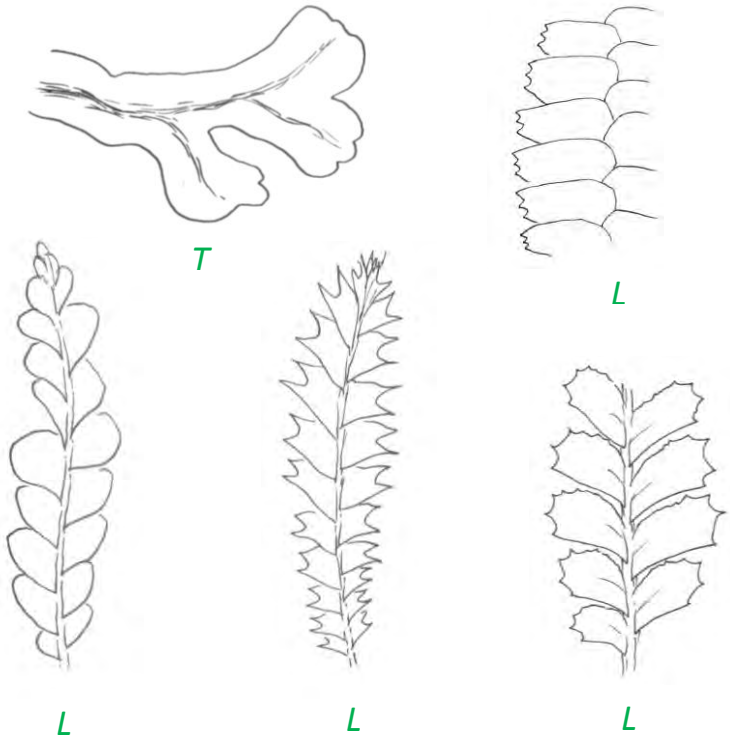
Coloured pencil drawings of rainforest in Morvern, in the west Highlands, in January; the trees here are mostly oaks.

Mosses and liverworts

What are liverworts? They're a bit like mosses (which I assume you're familiar with in some way – small greenish plants growing on the ground, rocks, trees, logs, and so on). Here are examples of different growth forms of mosses (L) and liverworts (R):



***Mosses**: B = with side branches; U = unbranched*

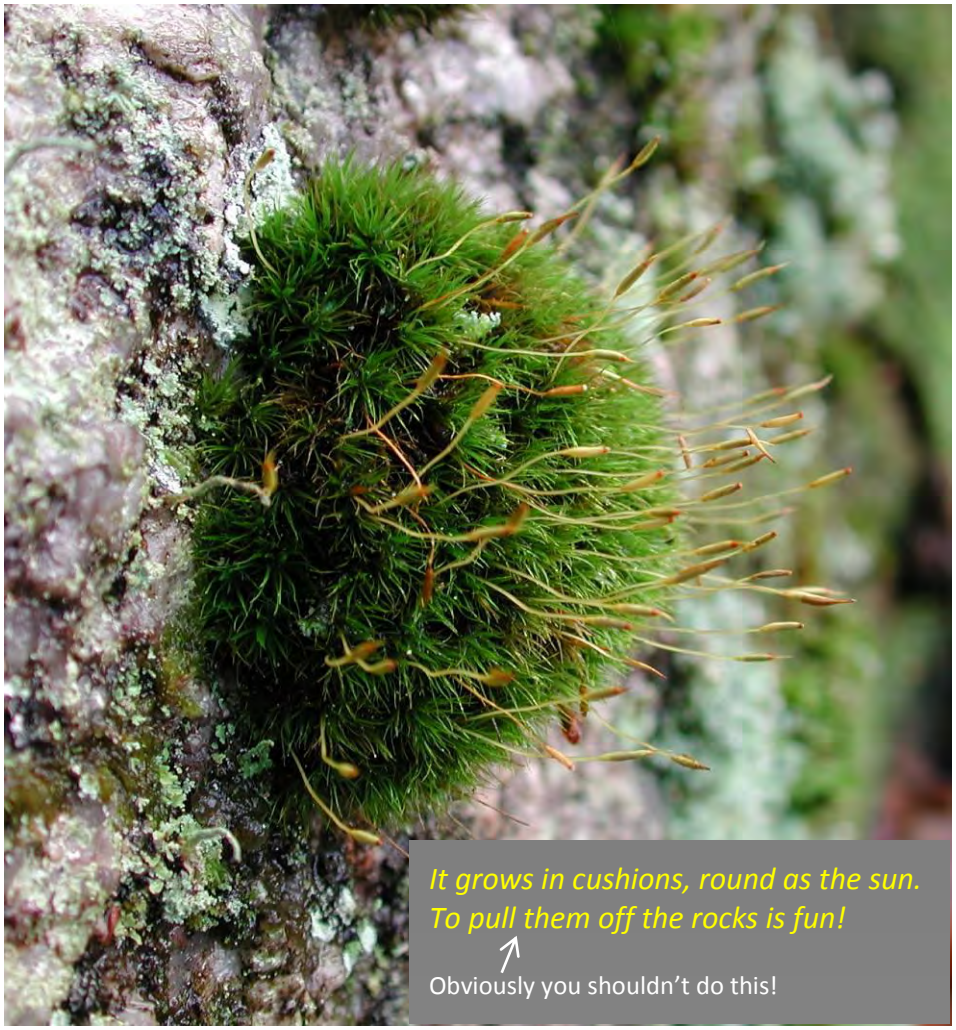


***Liverworts:** L = leafy; T = thalloid*

Mosses and leafy liverworts have stems and leaves, like 'ordinary' plants but in miniature and without flowers. On most mosses the leaves grow out from all sides of the stem or branch, but in leafy liverworts they are arranged in two rows, on the left and right sides. Leaf shape is more varied in leafy liverworts than in mosses. Thalloid liverworts have no separate stems and leaves – just a boringly simple, flattened thing called a thallus.

Those drawings on the previous page just showed individual shoots, but what you usually see are whole patches or cushions of massed shoots all growing together, like these two **mosses with very contrasting growth forms**:

Hyocomium armoricum – a branched moss, forming patches on wet rocks by streams in western woods.



Dicranum scottianum – the massed unbranched shoots form dense cushions. Scarce on rocks and trees in western woods.

Here are photos of two **liverworts**, to show examples of the **leafy** (L) and **thalloid** (R) growth forms.

Plagiochila punctata – a leafy liverwort that grows on trees and rocks in western woods. The leaves have distinctive spiny-looking teeth along their edges.

Metzgeria leptoneura – an uncommon thalloid liverwort found on steep, moist banks in western woods. The thalli are narrow and parallel-sided, and many of them are branched, but there are no separate leaves and stems.

Fussy about water

Mosses and liverworts are unlike ‘ordinary’ plants in that they don’t have flowers or a system to bring food and drink (nutrients and water) up from the ground through roots, through stems, through leaf veins and so on. They have things that look like tiny roots but are only for attachment to whatever they’re growing on and can’t carry food and drink. Their stems and leaves are thin and flimsy, without the extra strong outer layer (called a cuticle) that we see on other plants. That outer layer on other plants helps to keep water inside. Without it water can seep straight in and out of stems and leaves, and that’s exactly what happens with mosses and liverworts and is how they get their food and drink (the food comes mixed in with the drink). That’s why so many mosses and liverworts grow in places with plenty of water around: water dripping down onto them, raining on them, flowing down to them on a rock surface or a tree trunk, seeping into them from very wet ground, and so on.

Tiny little plants which like it when it rains,
‘cos you see they ain’t got no proper veins
like the grasses and the trees or the flowers and the ferns
which suck up water from the ground even when the sunshine burns.

Daltonia splachnoides – a rare moss of western woods, growing here on a fallen branch by a stream on the island of Arran, Scotland

Some more fussy than others

Some mosses and liverworts are more fussy than others when it comes to water. Many species can grow reasonably well in some of the drier eastern parts of Britain (which, incidentally, are still damp to fairly wet by total European standards) but much better in the wetter west where they can form such big patches and deep cushions on the ground, on rocks and well up the trunks of trees: the rainforest look. Some species are more fussy, though, and just cannot grow in the drier areas, and even in the rainy west they make up only a small amount of the total mass of moss and liverwort growth that you see in the British and Irish rainforests. A very rough breakdown of all that green, yellow and golden moss and liverwort cover is as follows:

- **Mostly** mosses that are common throughout much of Britain and Ireland.
- **Smaller amounts** of:

  (1) liverworts that are common throughout much of Britain and Ireland

  (2) mosses that are very fussy and need lots of rain, so they're more confined to the wetter west

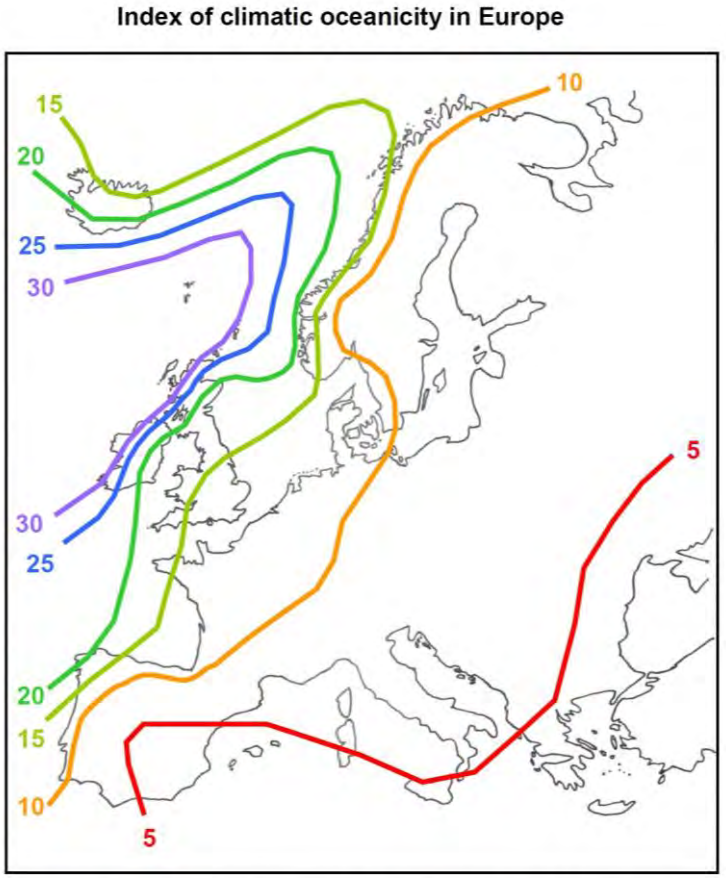
  (3) liverworts that are very fussy and need lots of rain, so they're more confined to the wetter west

Fussy about temperature

You know how people who are fussy about one thing are also hard to please about other stuff too? Some folk are generally more fussy; others more relaxed. Well, most of those mosses that ask for plenty of rain also make quite exacting demands with regard to temperature. Basically that amounts to **not too hot and not too cold**. Let's be fair – that's understandable really, because if you need to keep wet for so much of the time and you're of flimsy construction, you'll be vulnerable to some pretty scary drying out and shrivelling up in very hot weather and also to equally nasty freezing (which can damage your frail leaf cells) when it's very cold.

Fortuitously, the rainy western areas happen to coincide reasonably well with those where summers don't get very hot and winters are mild. In other words, the annual temperature range is small. If we devise a mathematical index based on frequency of rain combined with amount of annual variation in temperature, and we do it in such a way that the index value gets pushed up by each of (a) more frequent rainfall and (b) smaller annual temperature range, we can call it an index of **oceanicity**, because large areas of the oceans are among the main parts of the world where you get frequent rainfall combined with mild winters and relatively cool summers.

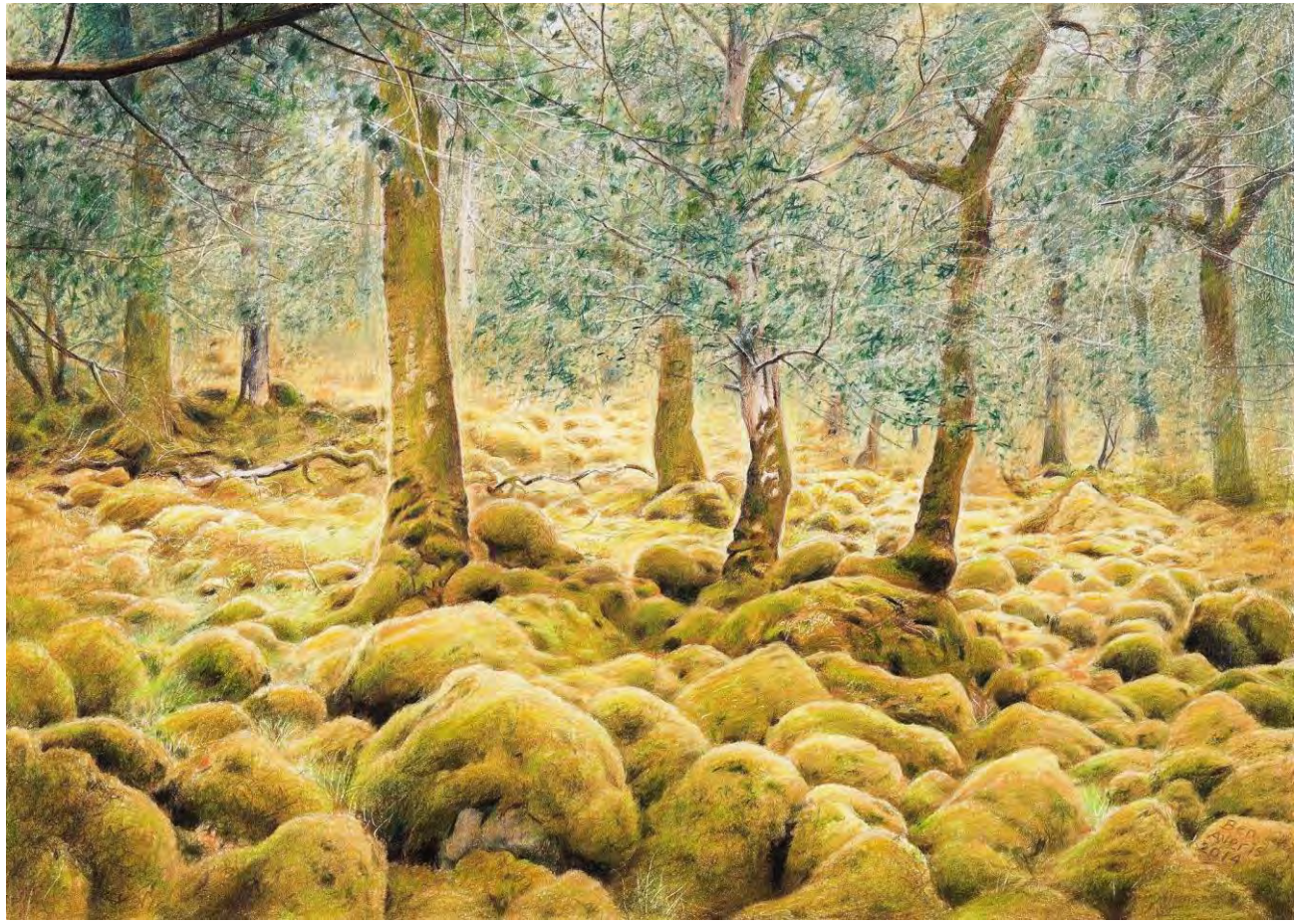
This map shows that western Scotland and western Ireland (+ Orkney, Shetland and Faroes) have **the most oceanic climate in Europe**: frequent rain + mild winters + summers that don't get very hot. This is what those fussy mosses and liverworts like (which is why we call them **oceanic species**), so it follows that in this zone we can find really good rainforest. In contrast, areas further east or south-east in Europe, with much lower index values, have a more 'continental' climate: drier, with colder winters and/or hotter summers.



Mean annual number of rain-days (days with >0 mm rain) divided by range of monthly mean temperatures (°C). Based on data from various sources, for late 20th C / early 21st C.

Tropical and temperate rainforests

You might be thinking "Surely rainforests are tropical things?" Yes, they are in the tropics of course. **Tropical rainforest = hot and wet** (Amazon, central Africa, etc). **Temperate rainforest = cool and wet** (e.g. Britain, Ireland, W Canada/USA, Chile, New Zealand, Tasmania and high altitude areas nearer the equator, in places such as the Himalayan foothills and mountains in SE Australia, Indonesia and tropical and subtropical islands in the Atlantic and Pacific Oceans). In between there is **subtropical rainforest = warm and wet**. Our warmest (but still temperate) rainforests are in SW Ireland; our coldest are in Scotland.

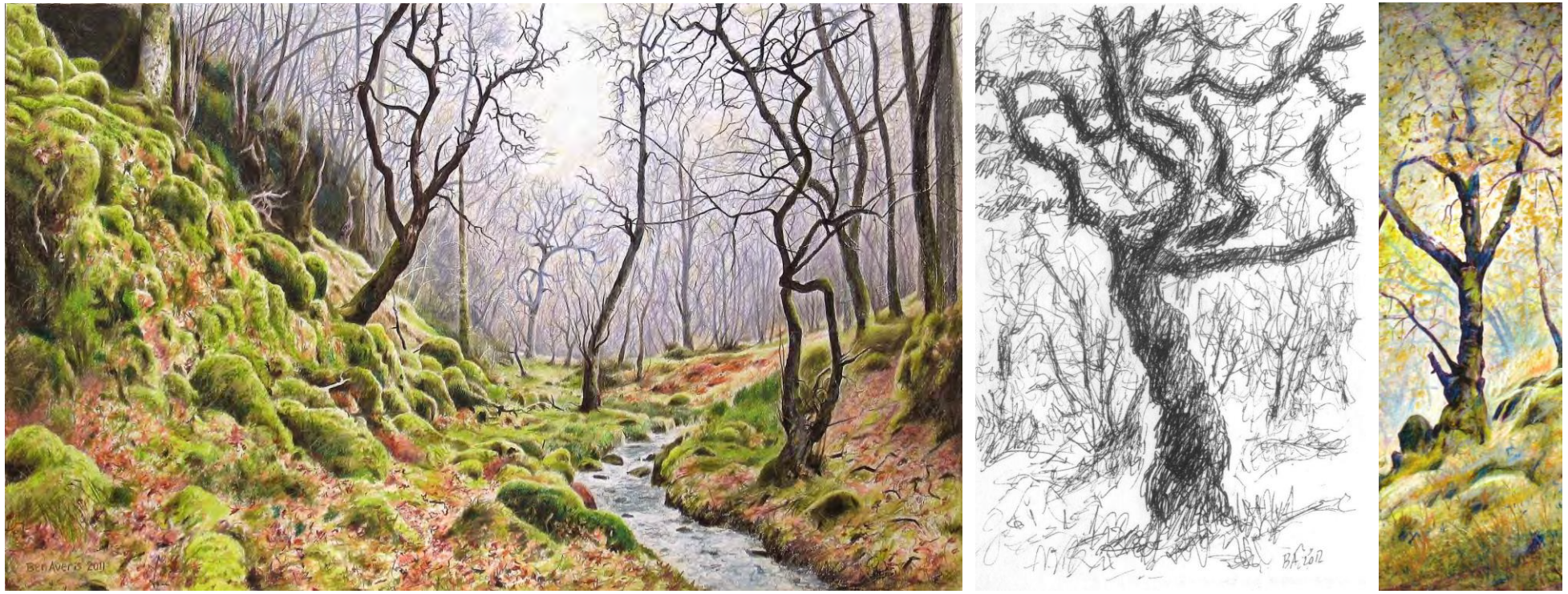


One of our warmer temperate rainforests – oak, holly and moss in Tomies Wood, SW Ireland

Cool temperate rainforest in Glen Coe, Scotland

Tropical rainforests can be miserable too!

Just in case you thought the misery was confined to our temperate rainforests in boringly grey-skied countries like Britain, I'm happy to be able to say that it is shared worldwide and can be found in the tropical rainforests too. Yes, those famous and amazing tropical rainforests that are so important on a world scale ('lungs of the earth' as some people put it) can, apparently, be very dark and dingy down near ground level, because everything there is in a lot of shade from the tall, dense tree canopies above. They (people who've been there) also say that a lot of the plant life is way up the trees and harder to see than in forests in Britain. We also hear about all sorts of creepy crawly things on the ground in tropical rainforests, including leeches, which don't sound very nice. Yes I know they are wonderful places, but I'm not in a great rush to go to a tropical rainforest. Such a long way to go, such a lot of practical difficulties and such potentially horrid dangers there. So, for the time being anyway, I'm quite happy to stick with the safer and more familiar kinds of misery in our temperate rainforests, thank you very much.

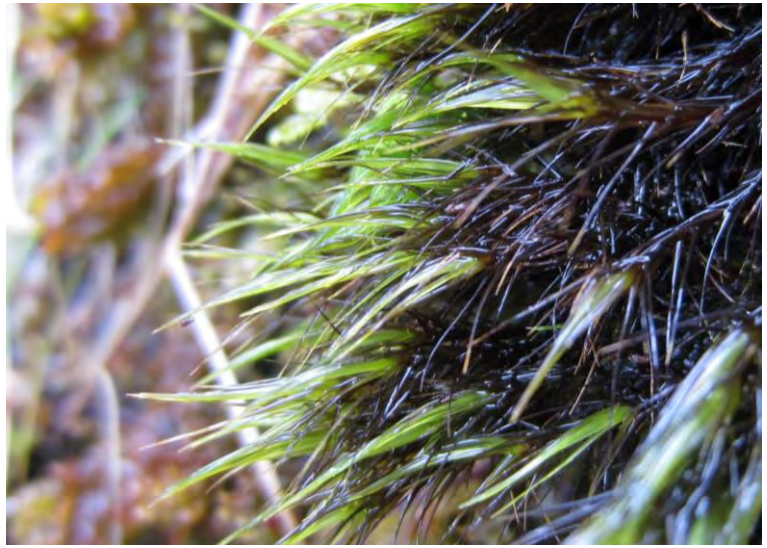


Safe and homely misery in temperate rainforest in The Trossachs (L), on Skye (middle) and in Morvern (R)

Time for some moss photo shoots!

Some would say *"time to get up close and personal with mosses"*. To me there's something really creepy about that phrase *"up close and personal"*. I thinks it's a bit of a buzz-word phrase that gets said or written by a certain type of person (not me!) – the type who might also say *"touchy feely"* when talking about things like mosses. Anyway, here are photos of some fine-looking common mosses that grow all over the place in our rainforests. Clockwise from top left: *Dicranum majus; Rhytidiadelphus loreus; Plagiothecium undulatum; Thuidium tamariscinum; Hylocomium splendens*.

Here are some mosses that are more restricted in Europe to the western, oceanic areas such as Britain and Ireland (including rainforests). Top L: *Breutelia chrysocoma*. Bottom L: *Campylopus setifolius*. Middle: *Ulota phyllantha*. R: *Zygodon conoideus*.



Here are two western (oceanic) liverworts that are common in British and Irish rainforests.

Scapania gracilis

Plagiochila spinulosa

They grow on rocks, banks, trees and logs. They're reasonably large – well, as liverworts go anyway – and can grow into patches or cushions about the size of… hang on, just looking around the kitchen… OK, maybe about the size of an apple upwards… to a Selkirk Bannock, and even beyond that. The Selkirk Bannock is a pretty good comparison actually, because its shape is quite similar – a kind of dome-shape with a flat base (the flat base corresponding to the underneath of the liverwort patch). You don't know what a Selkirk Bannock is? It's a kind of fruit bread/loaf sort of thing. I reckon it's the best of all those fruit bread sorts of things myself. Hey – I'll take a photo to show you… just finding a few other things to give some scale…

Selkirk Bannock, banana, egg, cutlery and mug

This western liverwort is called *Saccogyna viticulosa* and is common on rocks and banks in rainforest woods in Britain and Ireland. The individual shoots are just a few millimetres across, but lots of them together can form quite big patches, maybe about the size of a slice of bread or even more. A slice (of bread or Selkirk Bannock) is better than a whole bannock for comparison with this species, which creeps low over rock and bank surfaces, forming flattish patches that aren't very deep. Is bread better than a Selkirk Bannock? It would need to be seriously good bread. Talking of slices, and not wanting to give you the wrong idea about how we eat Selkirk Bannocks, I should say that we wouldn't tuck into the whole thing with that knife and fork in the photo on the previous page. They were just there for scale. We cut a slice off the bannock and maybe toast it, put butter on it (though it's quite rich and has butter in it anyway) or just eat it plain, or with cheese…

Those last three liverworts are some of the larger ones in these rainforests. Now for some tiny ones on rocks and trees in shaded, sheltered places with a very humid atmosphere: places such as ravines where rocks are kept wet by splashing from streamwater, by spray from waterfalls and by evaporation of water vapour from the stream surface, and where there isn't too much sun or wind to dry things out. These tiny liverworts are easily smothered by larger liverworts and mosses, so they do well on rocks that are too steep and too splashed for the bigger species to grow well (they fall off because of their weight). Here are two drawings: L = a rocky wooded ravine in the west Highlands; R = a close-up of a smaller-than-postage-stamp area with the yellow-green shoots of a very rare leafy liverwort called *Acrobolbus wilsonii* growing on the steep rock face in the first drawing.

Here are photos of some tiny uncommon western liverworts found on rocks and trees in very humid places in rainforest ravines. Top: *Harpalejeunea molleri*; middle: *Drepanolejeunea hamatifolia;* bottom left: *Aphanolejeunea microscopica*; bottom right: *Colura calyptrifolia*. The height of each photo corresponds to the width of a pencil, which shows how small these liverworts are.

Here are two west Highland rainforest ravines, and a close-up of *Radula aquilegia* – another uncommon western liverwort that grows on rocks and trees in these very humid places. That would have been one of those times of snooping around checking out steep rocky banks along a rocky stream… all starting to get a bit mundane… and then *"OMG! I've found Radula aquilegia!"*. That's real living, that is. Gives you a feeling of purpose. You're not just anyone. You're someone who's found *Radula aquilegia*.

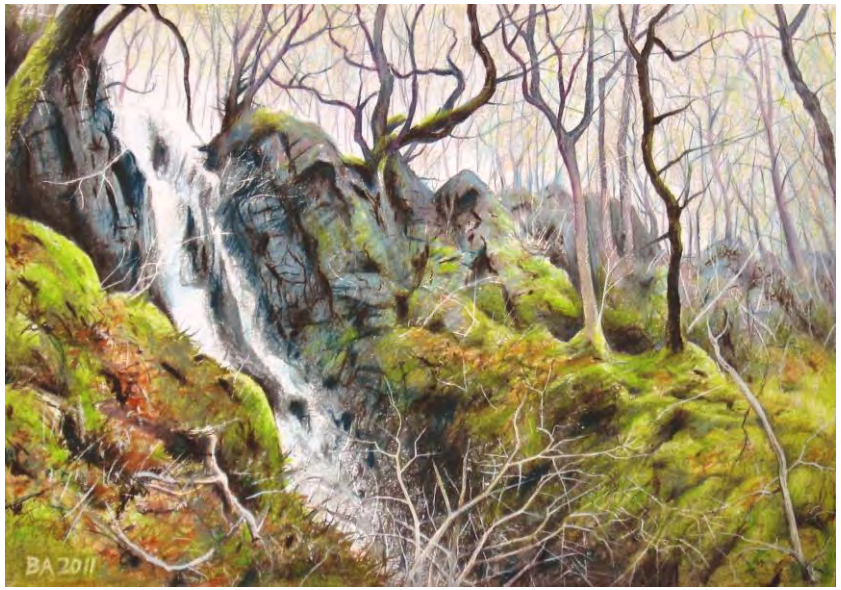
Some mosses and liverworts grow on rocks right in the streams, or at the very edges. Here are photos of some uncommon rainforest species that like water splashing, seeping or dripping around or through them for much of the time. Clockwise from top left: *Isothecium holtii* (moss)*, Radula voluta, R. holtii, Jubula hutchinsiae, Dumortiera hirsuta* (all liverworts).



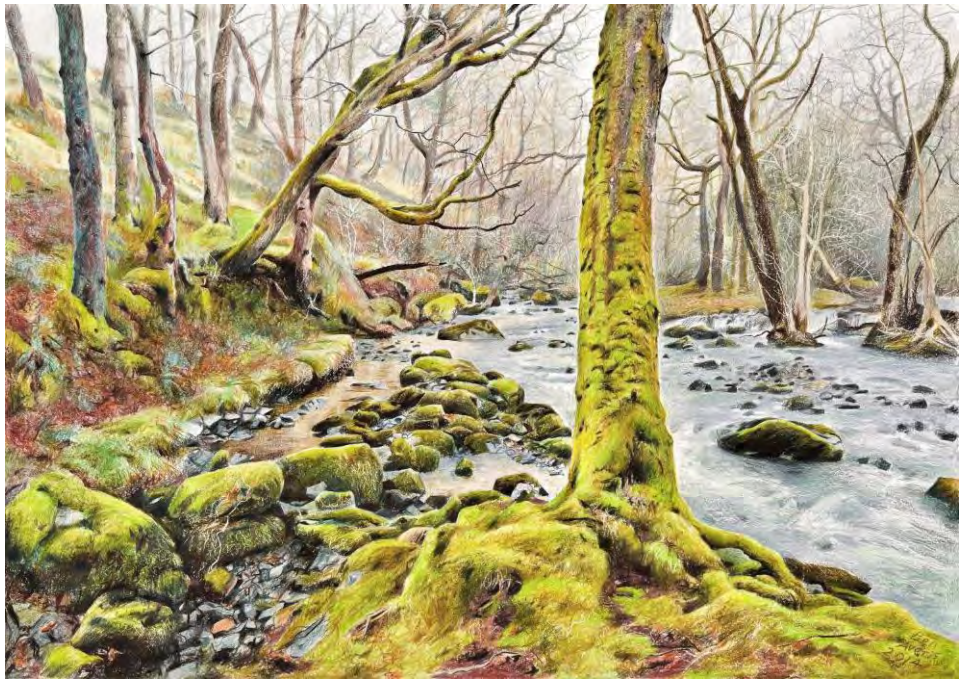


A mossy rainforest scene near Loch Sunart in the west Highlands.

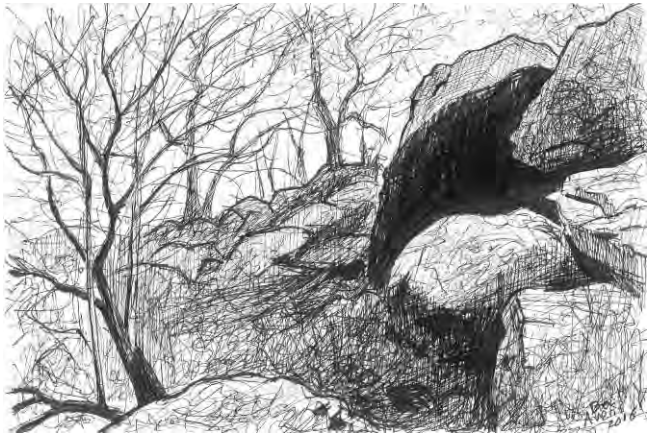
Rainforest scenes with rocky streams in Morvern, in the west Highlands (coloured pencil drawings)

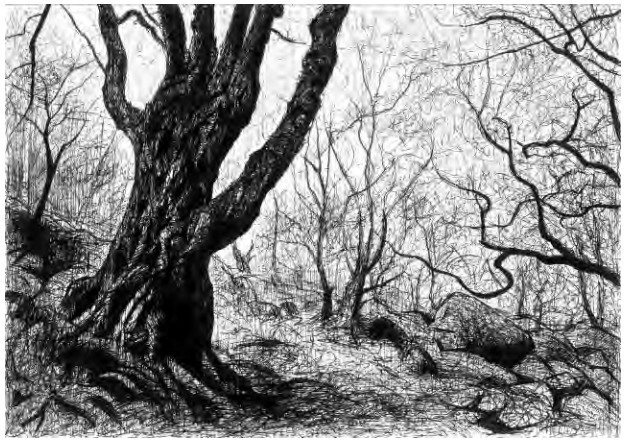


… And something similar further south in the Lake District (left) and NW Wales (right):



Hey, all this colour is getting too bright and happy! Time to tone down in monochrome in the Lake District:





Why look at these mosses and liverworts and other ‘boring’ things?

Why would anyone want to look at mosses and liverworts? Wouldn’t you be some kind of boring or unsociable saddo? Understandable questions, especially if you’ve been faced with some of the more unimaginative and depressing stuff said and written about nature. It’s amazing how people can make interesting things seem boring! And then the reverse – making boring things sound interesting. But so many things in this world are actually neither interesting nor boring. They just are. Interesting or boring are of our making – for example the way we talk or write. Mosses, liverworts, lichens and so on cannot be inherently interesting or boring. They just simply exist, which is OK. So why look at them? Why be interested in them or anything else in nature? Some might say *“because nature is important, because we depend on it and it helps us to understand it better, because it’s threatened”* and so on. To me that kind of reasoning is too coldly logical as a basis for real personal interest. I’ve always been interested in nature, but for no reasons that I can define in logical terms. Don’t you find that being really interested and involved in something seems too important to need defining reasons? You’re interested in it because… you are. I think my interests in nature, and art and music and skyscrapers and so on, have always been like that. Wild nature such as mossy temperate rainforest; big busy cities with skyscrapers and other urban stuff – you might think they’re so different that one couldn’t like both. But I do. I am drawn to and identify with both, equally. They have things in common, just by being physical environments. I always feel very aware of and affected by the physical environments around me. Before I went to New York City, someone asked *“are you going there to do the galleries?”* No! I went there to be there, to walk the streets, to see and feel what it was all like, to find out – in ways that I couldn’t predict. My interest in nature has a similar kind of basis.

Is this what happens to people who look at things like mosses and liverworts and lichens in the rainforests?

No – it's what happens when someone's hand was proving a bit tricky to draw, and a decision was made to white it out and make a feature of it. Don't worry – this won't happen to you (unless you've got a right hand like his).

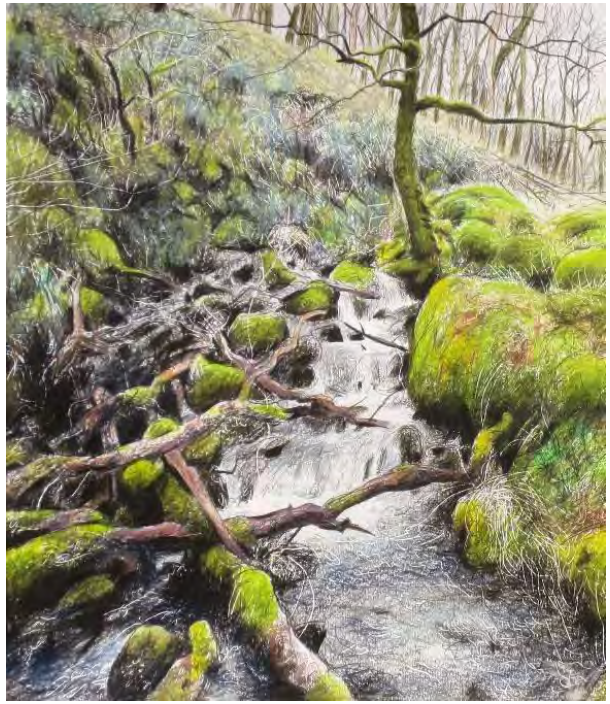
Streams and streets

Exploring ravines can have something in common with exploring city streets. They are both rather linear environments, with steep sides with things on them.

Streamside banks with rocks, mosses, liverworts, lichens, ferns, grasses and so on.

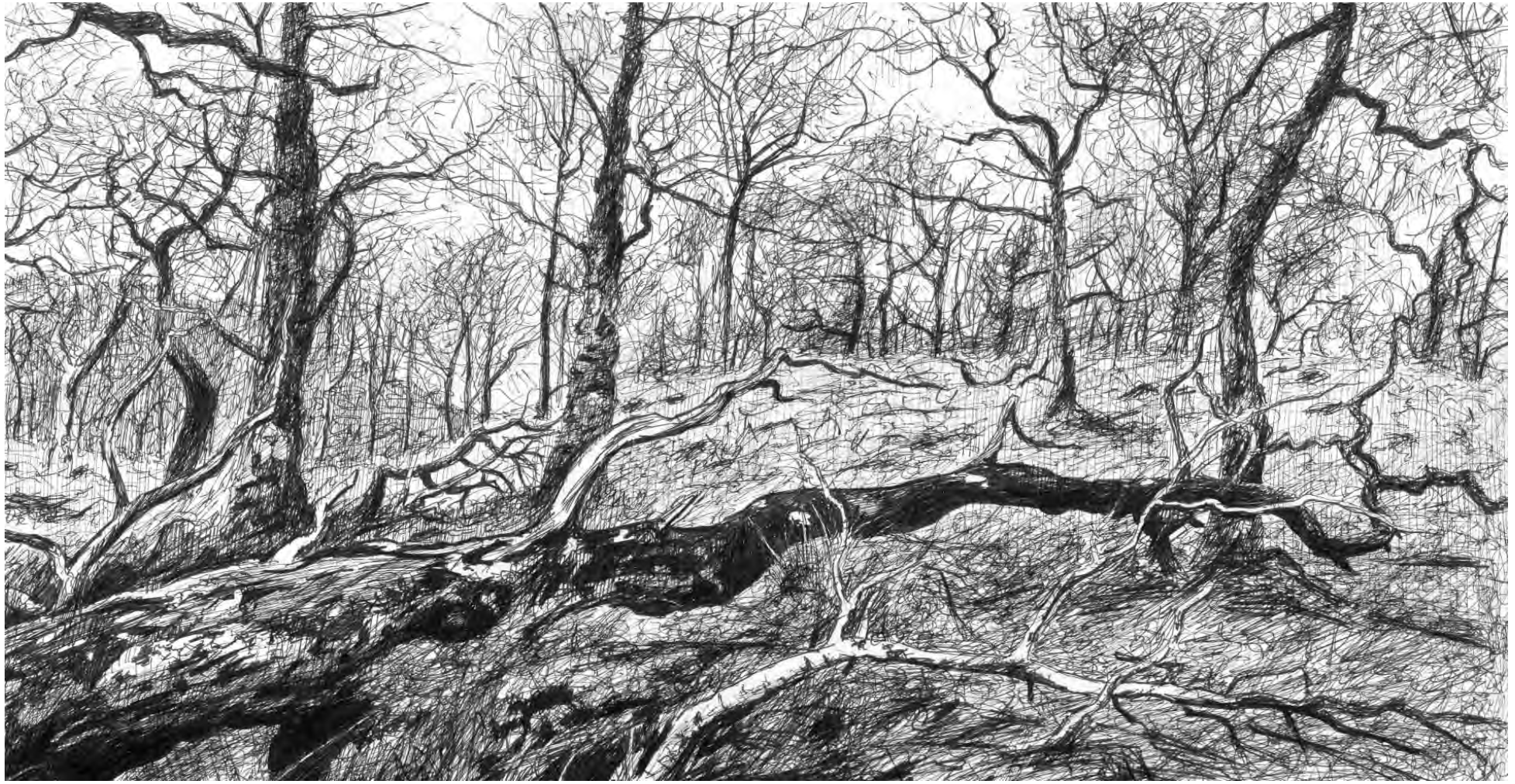
Streetside walls, doors, windows, shop fronts, people, noises, smells…

I guess one can have a kind of nosy curiosity that is a motivation for the exploration of all sorts of places, from a rocky stream in temperate rainforest by Loch Sunart in west Scotland (left) to 21st Street in Manhattan (right).



Let’s leave the stream and the deep ravine for easier ground in the woods around

Away from the rocky streams and ravines, we can head out (or, rather, scramble and stagger out) into the surrounding woodland habitat that makes up the greater part of the total extent of British and Irish rainforest. It’s very varied. What it’s like depends on things such as rocks and soils (especially how acidic they are) and slope aspect (S-facing = warmer; N-facing = cooler and more humid). Easier ground? OK, it’s still not always what they call a ‘walk in the park’. Fallen timber, for example:



We're just about to move on to lichens, but first – BREAKING NEWS: The world has just seen the surprise appearance of a new Selkirk Bannock of a <u>different shape</u>!

OK – thank you for your time and attention. We can go on to lichens now…

Lichens

In woodland away from shady streams and ravines, mosses and liverworts can still be common, but the extra light here is better for many lichens like this *Lobaria pulmonaria* on an oak in Sutherland. That's a big generalisation, because mosses, liverworts and lichens all grow throughout these rainforest woods, but mosses and liverworts tend to be in bigger quantity where it's more shaded and humid, and many lichens don't seem to like much shade.

Mosses and liverworts look soft, and of at least a reasonably saturated colour: green, yellow, gold, red, brown, purple or whatever. Lichens look very different. More about them on the next lot of pages…

What lichens look like: *“not very nice!”*

A colleague and I were discussing some botanical stuff a few years ago, and when I mentioned a kind of lichen called *Peltigera* he was thoughtfully silent for a few seconds before saying *“… is that the stuff that looks… sort of… not very nice?”*

Why did he say that?

I’d show you a photo of one of these sorts of lichen, but I don’t have one. I’ve got photos of lots of plants and lots of lichens but none at all of these particular types of lichen, even though they’re very common and I’ve seen them so many times.

Why haven’t I photographed them yet?

Hmm – I wonder why. And they really are so common… there’s even some… hang on… just getting my camera…

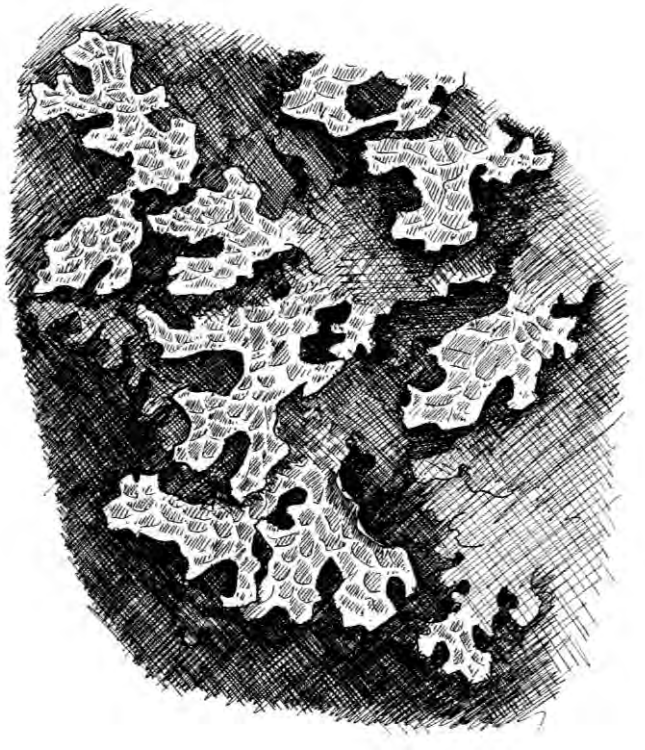
Peltigera – on the ground in our garden

Maybe you, coming afresh to this matter, might be able to help me out. Any idea why he might have said what he said, or why, over so many years, I hadn’t taken a photo?

What lichens actually are

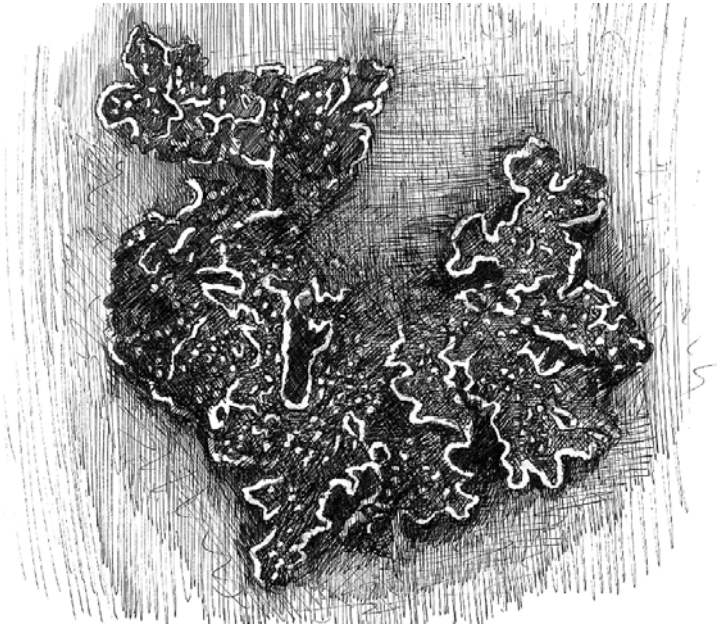
Every little bit's really two, 'cos it's made from a fungus and an alga doin' pretty good trade
See, a fungus gives a home to an algal cell who does all the fancy cooking so the deal works well

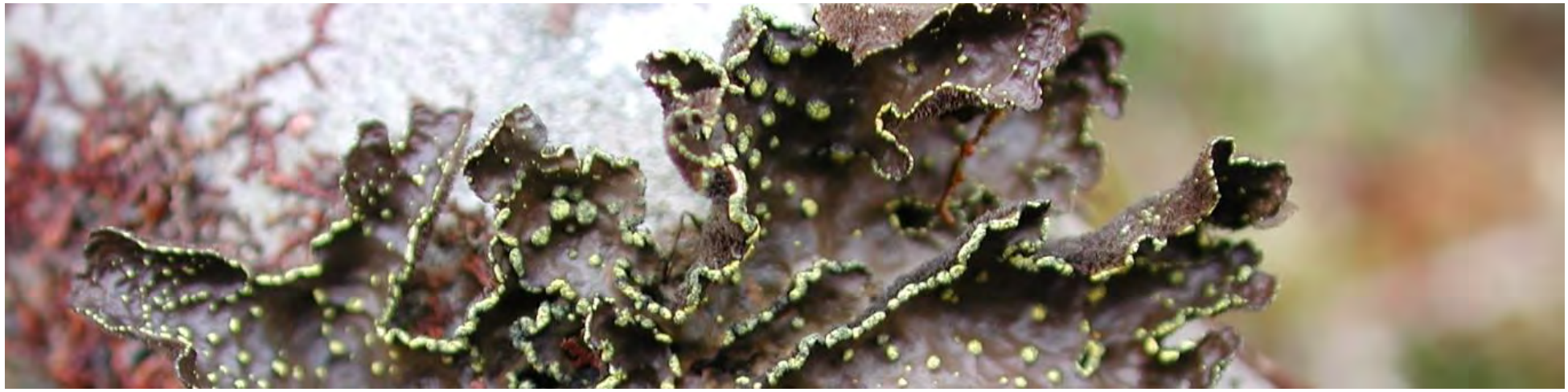
Weird things, lichens. Hard-textured, crispy and brittle when dry, and, as you've just read, each one is made up of a mix of two totally different kinds of organism. Not so much host and parasite as host and helper. What you see is mostly **fungus** material. The **alga** cells are tiny, scattered within the fungus stuff. The fungus stuff (for want of a better term) wouldn't look the same if it didn't have the alga stuff inside it. And it probably wouldn't be able to grow so well and in so many places either. Here is a big, conspicuous lichen called *Lobaria pulmonaria*: it grows on trees and rocks in temperate rainforests in Britain and Ireland.



Some photos showing variation in lichen growth forms. Clockwise from top left: *Usnea rubicunda* on birch; *Flavoparmelia caperata* on oak; the dark lines of one of the many 'script lichens', on a smooth hazel stem; *Hypogymnia physodes* on willow.

Top left: an uncommon western lichen assemblage called the *Lobarion*, seen here on sycamore in the west Highlands. Top right and below: close-ups of two uncommon lichens found on trees and rocks in western rainforests: top right = *Pseudocyphellaria norvegica* (dark brown + whitish spots and edges) and at the bottom; below = *P. crocata* (dark brown + yellow spots and edges).





The four species of *Lobaria*: large lichens, sensitive to atmospheric pollution and uncommon on a British/Irish scale. Found mainly on trees, but also on rocks. Clockwise from top left: *L. pulmonaria, L. scrobiculata, L. amplissima* and *L. virens*.

And look – here are better photos of the same four species! They have just been sent to me by my friend Sandy Coppins. She's taken loads of good photos of lichens, because she and her husband Brian are **lichenologists** (people who study lichens).

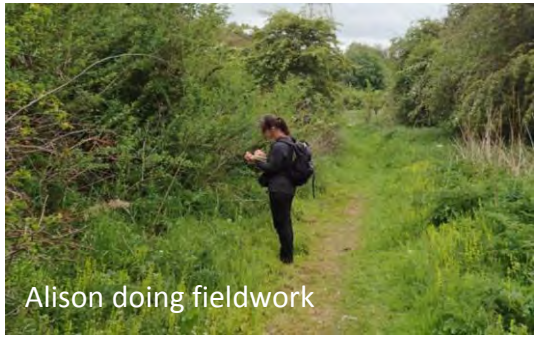
Top = *Lobaria virens*; bottom = *L. pulmonaria*

Top = *L. scrobiculata*; bottom = *L. amplissima*

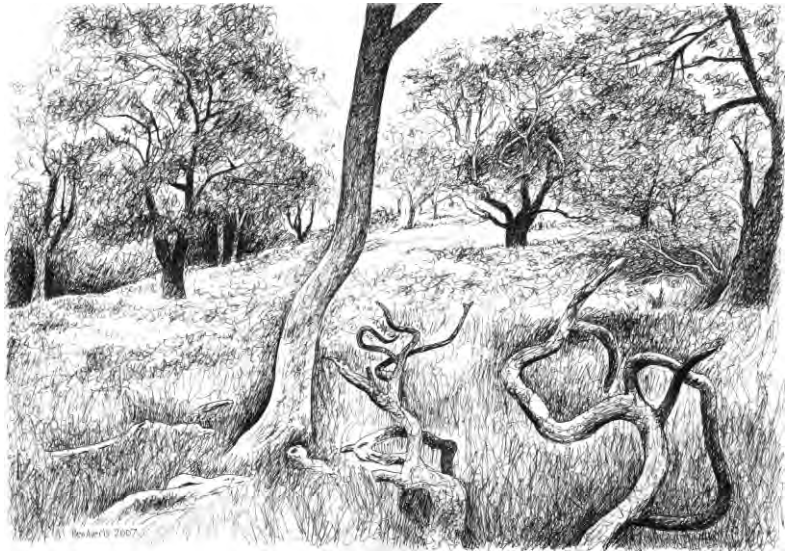
I don’t have a photo of Sandy or Brian, but here’s a drawing I did of Brian many years ago. He’s looking at lichens on an ash trunk. Why can’t we see the lichens? Because they’re small. That’s why he’s using a magnifying glass. He doesn’t really use *that* kind of magnifying glass. Those of us who look at mosses, liverworts and lichens often want to see small details (‘cos we’re nosy) so we use hand lenses like the ones in the photos at the right. These magnify things up about 10 times, or, for something really fiddly, 20 times. If we need more power than that we’ll take a wee specimen back and look at it through a microscope at, say, 40x, 100x, 400x or even 1000x. Big magnifying glasses like the one in the drawing can look impressive but their magnification is actually pretty low – way below 10. Sherlock Holmes would have loved one of these little hand lenses. But then he might have spent more and more time looking at lichens and mosses and liverworts through it, and not solved so many cases and not become so famous. People don’t tend to become very famous for studying lichens and mosses and liverworts.

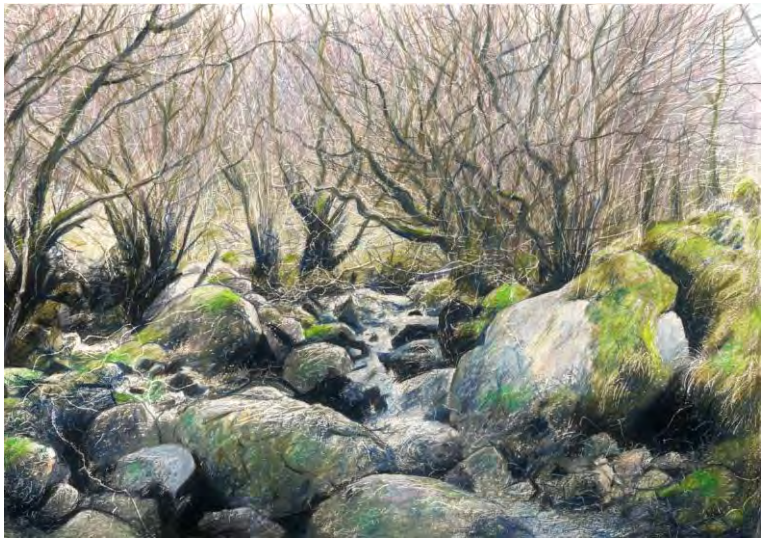
Oh, actually I do have a photo with Sandy in it. Here she is, with my wife Alison (who, as I really should have said earlier, made that 'different' Selkirk bannock), in some woods near our house (near Edinburgh). Alison is half hidden behind a tree in that photo, so here's a photo of her not half hidden behind a tree and a photo of her doing botanical fieldwork and one of me doing botanical fieldwork (because that's what we do for work – well, someone's got to do it, I suppose). And here's our daughter Elen too, for completeness. She's an artist (and I am too – hence the drawings in this document).

So, there we are – introductions all done! Yes, they usually put introductions like that at the beginning… which reminds me of a particular meeting I once attended. I arrived halfway through, as was actually planned (because the rest of them – almost all of whom I had never met before – were dealing first with other stuff not relevant to my attendance). They didn't introduce themselves, but just got straight into the botanical matters that I was there to discuss. Eventually, as the meeting was drawing to a close, one of them looked around and asked everyone: *"Any other matters?"* How could one not take that opportunity to say, at such an obviously late stage in the proceedings: *"Yes. Who are you all?"*

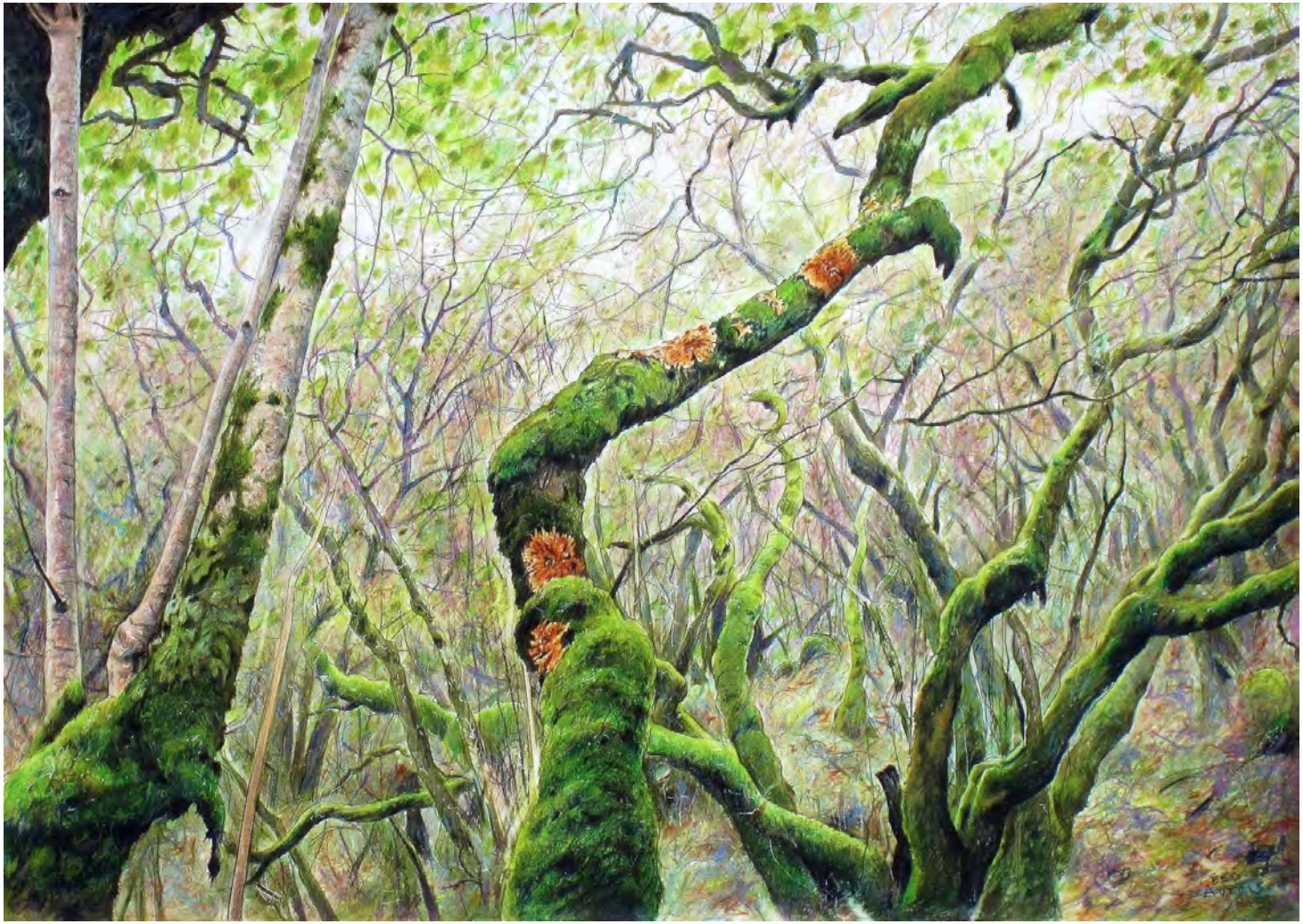


Those *Lobaria* and *Pseudocyphellaria* lichens and the *Lobarion* lichen community (all on pages 36-38) like trees with neutral to alkaline bark: for example ash, hazel, willow and rowan. Places like these can be really good for them. Top: wide-spaced old ash trees (L = Rassal; R = near Kentallen). Bottom: hazel woodland (L = Ballachuan, on the island of Seil; R = near Kentallen).





More of Ballachuan hazelwood in Argyll. A great type of rainforest for lichens. Good for mosses and liverworts too. The orange discs look like lichens but are actually a rare western fungus called *Hypocreopsis rhododendri*. There can be many species of mosses, liverworts and lichens on hazels like these, that have been left undisturbed for a long time and have a varied mix of rough old bark, smooth young bark, slanting stems, upright stems, and so on – lots of variation in what they call microhabitats ('they' being lichenologists, ecologists and so on... actually, I should really say 'we' instead of 'they').



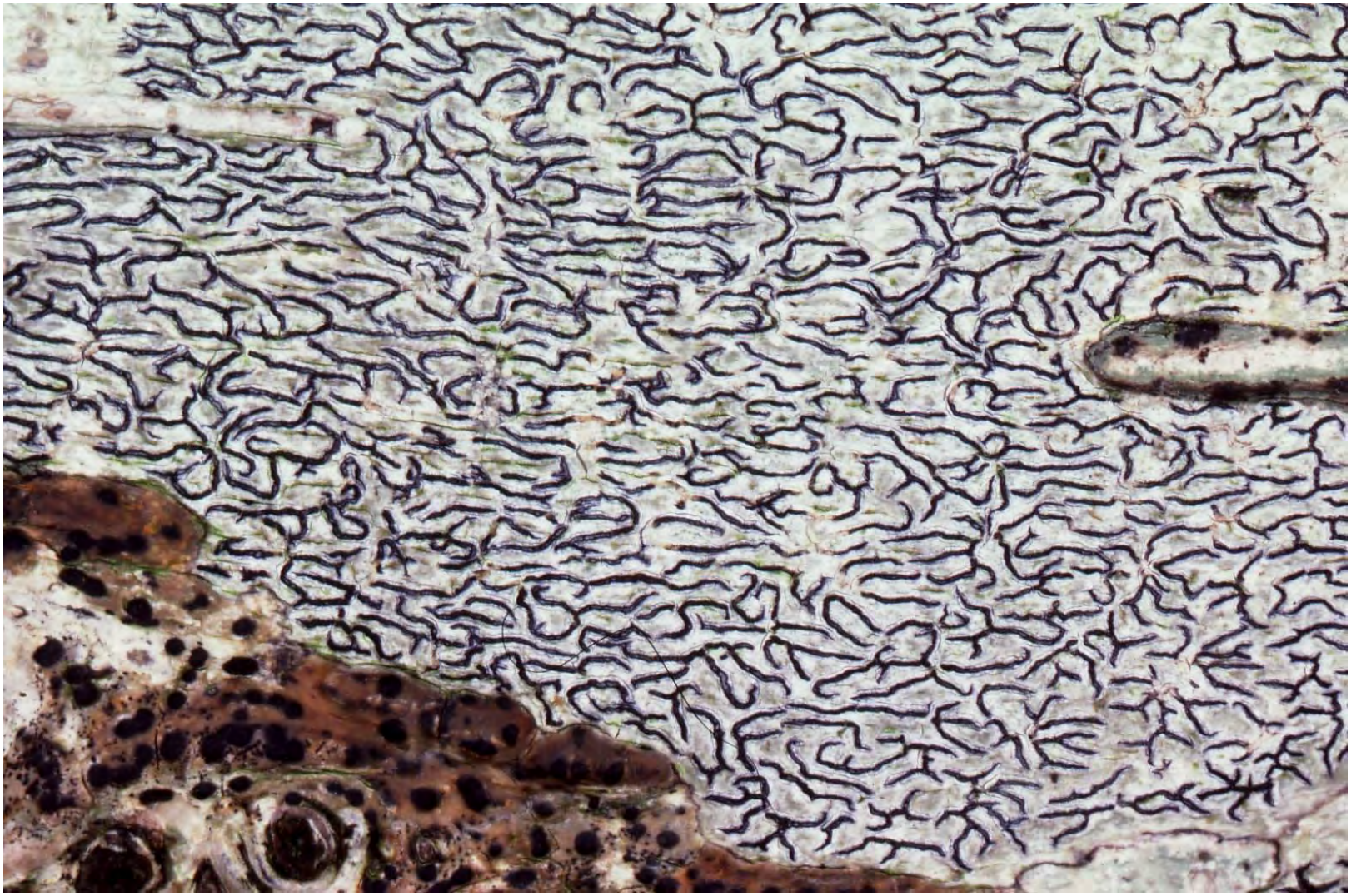
Here are some of the many western rainforest lichens that prefer acid-barked trees such as birch, alder and oak, and are mostly greyish or grey-green, creamy-white, etc. L-R: *Hypotrachyna laevigata; Bunodophorum melanocarpon; Menegazzia terebrata*.

And here's another photo of *Menegazzia terebrata* – this one from Sandy. It's a lichen with black holes in it. I've just noticed a strange optical effect in this photo! If you look it from a particular distance there's an illusion of a kind of shaking or juddering movement, mainly in the lower-central to lower-left part. I thought it might just be me, but Alison saw it too.

I’ve seen it before, with this ‘vibrating’ corrugated metal sheet that I came across while surveying mosses and liverworts in some woods near Greenock:

Here are photos I took of some more of those greyish to creamy coloured lichens of acid bark. They are growing here on birch. The pale hanging ones are *Usnea* species. Everything here is very different from the *Lobarion* assemblage shown on page 36.

Another photo from Sandy. This is a close view of ***Graphis scripta*** – one of the 'script lichens' that form dark lines on a pale background (also seen in a photo on page 35). They grow on smooth bark.



Taking the rough with the smooth

So, more sunlight, and the extra daytime warmth that comes along with it, is:

☺ Good for species that like the light and the warmth and who don't mind that the light and warmth makes it a bit drier in the daytime (i.e. good for a lot of lichens, and fine for many mosses and liverworts too).

☹ Not so good for those mosses and liverworts that need a really moist atmosphere – but that's OK because they're grateful for the ravines where the extra shade and cool temperatures keep everything humid. Problem solved!

It's just as well that the species needing damp air are happy with the cool and the shade that provide that dampness. Imagine if they wanted damp air *and* quite a bit of light and warmth! For damp you accept that you pay the price in being cooler and shaded, even if that makes you a bit miserable; for light and warmth you gear up and learn to cope with being drier sometimes, even if it makes you thirsty. That's the deal – OK? But there's always one, isn't there. There's always one who just won't have it. You know the type. They'll eat only this, not that, even when this is available and that isn't (or is obviously way too expensive). We put it to them clearly and reasonably, but no – they want what they want because they want it and they must have it and they won't accept anything short of their exact specifications… And we complain about them, which is perhaps hypocritical because we (or at least some of us) have already paid great respect to others who are equally fussy. Who are those 'others'? They are things in nature that we see as special because their fussiness makes them rare or vulnerable. Let's be fair – many of those really fussy people don't really need to be so: they've chosen to be stubborn and fussy (and, understandably, irritating). But vulnerable things in nature (probably including a minority of those fussy people) didn't have that choice. It's not their fault. Here's *Plagiochila heterophylla* – one of a small bunch of western mosses and liverworts who, for reasons beyond their control, need their light and their warmth *and* their damp air.

Ancient woodland indicators

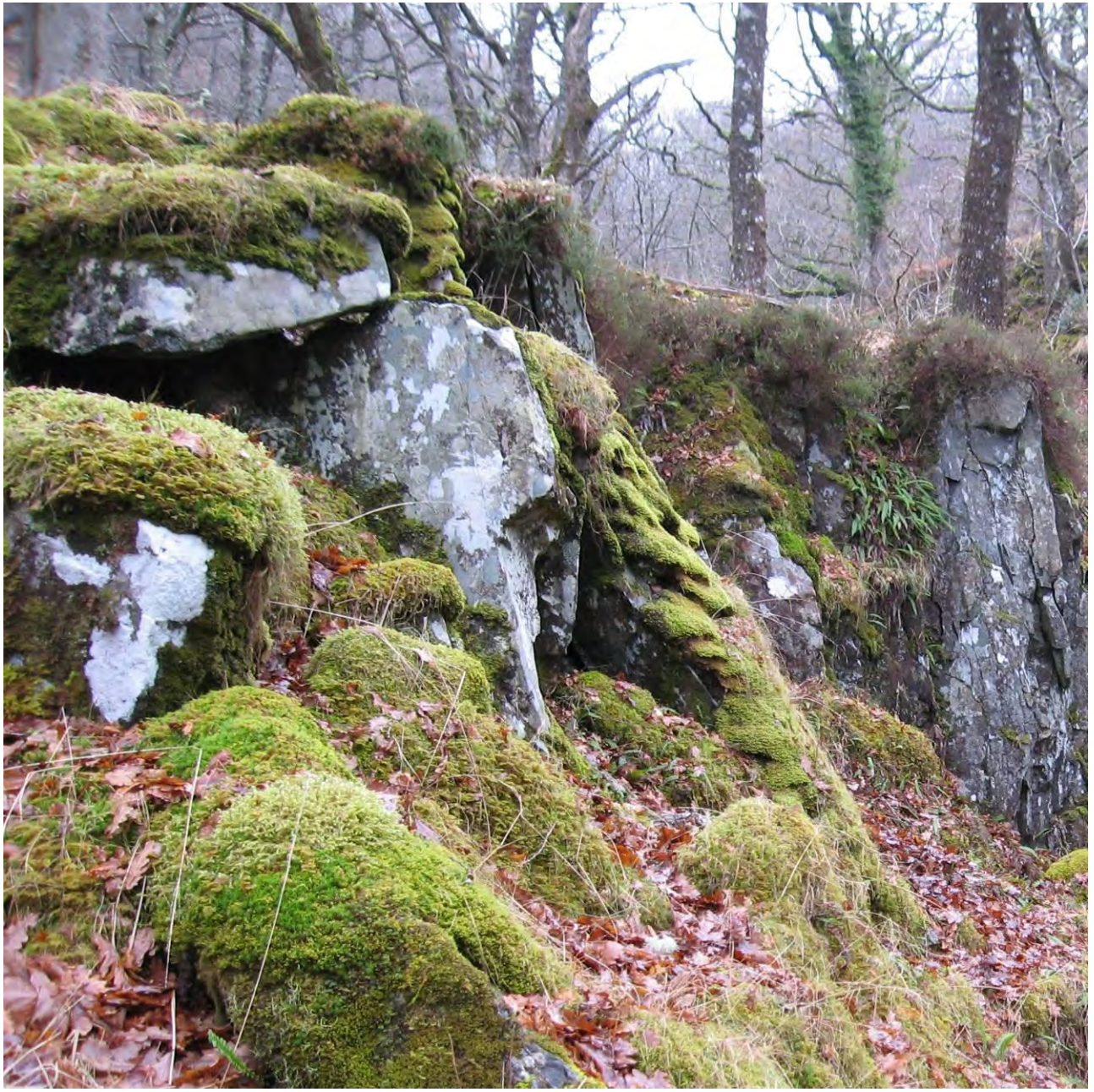
OK guys, you can have your light and your warmth *and* your damp air, but I'm afraid there's a price to be paid, which is that you can't grow everywhere and become common. This is all because there's a limited amount of your kind of 'select' accommodation:

- ***In light shade cast by a tree canopy in woodland on a slope facing between south and east; must also be in a western area where the climate is very rainy with winters that are not too cold and summers not too hot, and where everything's fitted this description for hundreds of years.***

A north-facing slope would give more guaranteed humidity but is too cold. A west-facing slope would be in the teeth of the prevailing wind, which would blow in through the trees and have too much of a drying effect. A south-east-facing slope gets a decent amount of sunlight but is sheltered from the prevailing wind. It also receives its maximum sunlight in the morning, when, on a dry (non-rainy) day, there is at least some dew around to keep things from really drying out, whereas a west-facing slope on a dry day gets maximum sunlight in the afternoon, by which time dew has evaporated and the sun and wind can have a more intense drying effect. So, south-to east-facing is good.

But there are lots of woods on S-E-facing slopes in the rainy west of Britain and Ireland, so surely these species can be really common! Well no, because it depends on the history of the wood. In many of these woods, people cut some or perhaps even most of the trees down at some time in the past, so that they could use the timber. When that happened, it seems, is that the light came in big time – too much for these fussy species, which then died out, and when new trees eventually grew back these moss and liverwort species didn't return because, for various reasons, they're just not much good at quickly colonizing new places. The woodland seems OK, but looking close you find these species aren't there. So, the places where they can carry on growing are mainly the ones where people probably didn't cut down trees in the first place (or if they did, then not many), so woodland has been there for hundreds and hundreds of years. People such as ecologists and woodland historians call these places ancient woods. It follows that these fussy mosses and liverworts are 'ancient woodland indicators'. Here's a photo of one: the liverwort *Adelanthus decipiens*.

Plagiochila heterophylla: this liverwort, from a couple of pages back, shows a particularly strong association with ancient woodland. Its European headquarters are in the west Highlands, where this photo on the right was taken (the patches on the steep rock face in the middle of the photo are of this species). It's also in the Lake District, Wales, Ireland and NW France, but is very rare in those areas. Oh – and in South/Central America too (as you'd expect). Below is a closer view.



Here's a whole page for ***Adelanthus decipiens***. This liverwort is most common in ancient woods in the west Highlands, but also in W Ireland, Wales and, much less so, in Galloway, the Lake District and SW England. This photo, taken at one of its few sites in the Lake District, shows the plant in the moist, happy state. When dry – and presumably miserable – it is almost unrecognizably dark (see below).

Another ancient woodland indicator: the moss ***Hageniella micans***. Its little shoots, with very small leaves, grow massed together into bright golden sheets on moist rock faces that slope at about 45 degrees. Well, they look like about 45° but I haven't measured them, and of course people say things like *"OMG, it was a 45° slope!"* when actually it was more like 30°. Anyway, *H. micans* actually likes north-facing woods, but only if they're not heavily shaded, so it does need a fair amount of light. It's a rare moss of western rainforest woods. Each one of its little leaves is not flat but concave, and the way the light catches the curve of the middle of each leaf adds a glistening twinkle (for want of a better word!) to the golden colour of each shoot of this moss – hence the name *micans*, which refers to the shiny mineral called mica that is in many rocks.

Another photo of *Hageniella micans*, showing those glistening golden shoots all growing downwards on a sloping rock in rainforest woodland in the Lake District. Sometimes we can find it on rocks at the edges of streams too, and even in ravines, but not where there is heavy dark shade. The shoots in the lower photo were growing on a streamside rock in the west Highlands.

One last ancient woodland species: the liverwort ***Jamesoniella autumnalis***. This one's different in that it's not so strictly western in Europe, though within Britain it is mostly in western rainforests, especially those on slopes facing south-ish. It grows on rocks, tree trunks and rotting logs. It is one of those things that we can recognize quite quickly when we see them, yet when we think about it there's actually not much at all distinctive about their features. For example in this case the growth form – creeping shoots with round, green or brown leaves – is shared by several other liverwort species and in theory should perhaps not stand out. Maybe we notice more than we think?

There are **ancient woodland indicator lichens** too. Lichenologists call them **“old forest species”**. Some of them grow especially on old trees, but others can be on younger tree trunks or branches in woodland that is old. The *Lobaria* and *Pseudocyphellaria* species shown earlier in this document are among those old forest species. Let’s see some more, starting with ***Degelia atlantica*** on a willow on the island of Skye.

… and its relative ***Degelia cyanoloma***, on hazel in Argyll:

… and these ***Sticta*** species, which **smell like fish** when they're moist. That smell cause panic one day in the late 1980s in the Edinburgh office of the then Nature Conservancy Council. I had a dry *Sticta* specimen and soaked it with water for the purpose of examining it closely. But then I had to go out and was away for longer than I'd expected. The lichen was left on my desk, in a room shared with two or three other people who, on my return, were clearly in confusion about something. When I enquired about this, they said there had been a strange smell. No-one could pin it down. People were worried. They thought it might be burning Bakelite. They had the caretaker come around and check all the electric sockets and fuses… which looked OK… perhaps even more worrying! Still unidentified! And then, slowly, it diminished, away and away, as mysteriously as it had appeared…

Sticta fuliginosa in Stirlingshire

S. limbata (pale) + ***S. sylvatica*** (darker) in Argyll

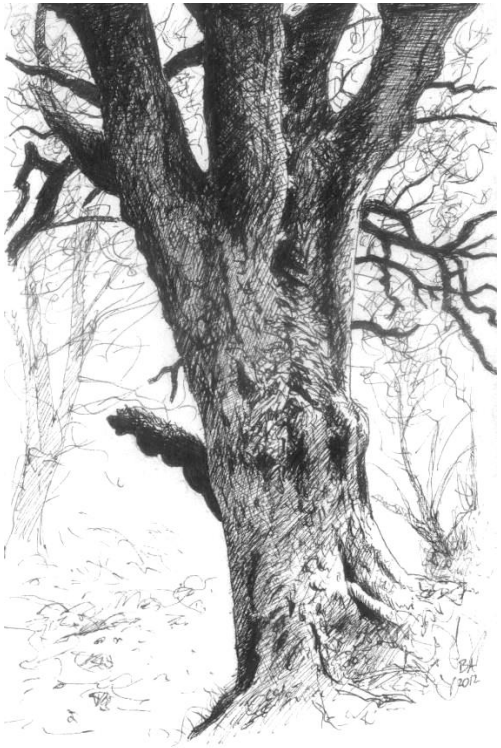
… and ***Parmotrema crinitum***, in the mid-western Highlands.

And two more photos from Sandy Coppins. Both of them showing us some ‘old forest’ lichens growing on trees:

Left: a big population of ***Lobaria pulmonaria*** (a species also in photos on pages 32 and 36-38) growing on hazel. Look at the size of it! This lichen ain’t taking “no” for an answer. This lichen means business. As does the photographer. Great photo!

Below: a grey splodge of ***Pannaria conoplea***. What more to say? Well, there will be more to say. We see a grey splodge. People like Sandy and Brian see more than that, because there is more than that. (And because S & B are very clever!)

In some of these places where it seems there's been woodland of some kind for a very long time, the old forest lichens aren't confined to old trees like the oak in the drawing on the left (near Loch Sunart, in the west Highlands). Some of them can be on younger trees too, such as the two nearest trees (both ash) in in the drawing on the right (in Morvern, in the west Highlands; there's also an older ash in the distance in the same picture).



Look – an old house! People have been living in and around these rainforests for a very long time. I could try to build a human side to what I'm saying about rainforests in this document, but I think that might miss the point because (a) the kind of human activities that have been going on and that have affected the rainforests in some way (cutting down some of the trees and using the timber for various things, putting sheep on the land, growing some crops here and there… and just general day to day living of course) appear broadly similar to what people have done in other (non-rainforest) parts of Britain and Ireland, and (b) the real defining features of the rainforests are non-human: rain, temperature, mosses, liverworts, lichens, ferns…

A couple of pages about things people have done in British and Irish rainforests

The things we've done in our rainforests are much like what we've done in woods elsewhere in Britain and Ireland, really...

We've cut trees down to clear land for growing crops and to use as pasture for cattle and sheep, and also to use the timber for various purposes. We've also cut branches off trees and shrubs (= **coppicing** and **pollarding**) to make things with them.

We brought cattle and sheep in, adding to the grazing already being done by wild deer. These animals eat ground vegetation and tree seedlings and saplings. This changes the mix of species in the ground layer, reduces the amount of flowering of some species and reduces the numbers of young trees that could grow to eventually form a tree canopy in future.

And then we put fences around some woods, to keep sheep, cattle and deer out. People have been doing a lot of this in recent decades to remove grazing **so that young trees can grow better**. It's often intended that when the young trees are tall enough to withstand browsing by animals (maybe in 20-30 years) the fence will be removed. The absence of grazing is not natural, and allows some plant species to grow so tall and dense that they outcompete smaller plants. So, while young trees might benefit, there can also be a downside.

We've brought in trees and shrubs that don't naturally grow here. It can be OK to bring some trees and shrubs in from other parts of the country or the world, unless those 'non-native' or 'alien' trees or shrubs misbehave and multiply and take over at the expense of trees, shrubs and other plants that grow here naturally ('native' species). Some of the species we've brought in do just that, and by far the worst of these 'invasives' in our rainforests is rhododendron *Rhododendron ponticum*: more on the next page.

We've taken some of those aliens out. Good work! Especially when it's rhododendron being removed.

We use stream water to make electricity. Some water is taken away and piped downslope to go through a turbine to generate electricity before being returned to the stream near the turbine house. The length of stream between the place from where water is taken (intake) down to where it is piped back into the stream (outfall) has less water in it than would naturally be the case, and this can reduce the amounts of splash, spray and overall humidity around the stream, and could affect mosses, liverworts, insects, fish, and so on.

We've polluted air, ground and water. Air pollution from industry, agriculture and vehicles has blown through to some rainforest areas (and been brought down in rain), affecting various things. For example pollution-sensitive mosses, liverworts and lichens: *even though they're tiny, they can help to tell us stuff like if the air is dirty from what cars and lorries puff*. These effects are both direct (e.g. damage from sulphur dioxide) and indirect (e.g. nitrates encouraging algal growth that can outcompete small mosses, liverworts and lichens on rocks, trees and shrubs). Agricultural fertiliser has seeped down from fields into streams where it can cause algae to increase and outcompete small mosses and liverworts on rocks. Something positive: in recent decades, some forms of air pollution have declined.

We've made nature trails in some woods. So that people like you and me can go and look around. Yep – I'm all for that. What? There's no-one like you? No, of course there isn't. Each of us is unique, so you're right: *"people like you and me"* was a bit silly! Let's just say *"people"*. Or *"the wider public"?* Ah – how about: *"enabling access to this flagship site to raise awareness, among stakeholders and the wider public, of this unique jewel in the crown of our natural heritage…"?* That should be OK, yes? Got that kind of topline feel to it?...

"Help! There's a big dark beast in the woods!"

And it's getting bigger. And its big leathery evergreen leaves cast such heavy shade, and then they fall and cover the ground and obliterate what was there before. And if what was there before was a real rainforest mix of lots of different plants, mosses, liverworts, lichens, insects and so on – the kind of mix we have in western Britain and Ireland but not elsewhere in Europe – then it's a lot to lose.

Getting rid of **rhododendron** is hard work. You can cut stems low down, taking them away and burning them, but in subsequent years new shoots sprout from the cut ones. Better methods take more time and effort but can do the job properly: stem injection (injecting toxic stuff into stem bases so the bush eventually dies) and Lever and Mulch (breaking bushes apart, pulling stems off low down and then pulling up the base and roots of the bush, and finally piling all that material over the place where it grew, followed up by a much shorter visit on each of the next few years, to pull out any sparse new shoots that happen to have been able to grow).

Lots of people are putting up big fences to keep animals out of open hill ground (and some woods), to try to get young trees to grow, but they're doing this while rhododendron is still spreading in the proper old rainforest woods. It's easier to do fencing and new woodland stuff than to get rid of rhododendron. It would of course be good to have more native woodland, though the new woods 'thing' seems to have become, at least in part, a bit of an 'eco-fashion' and isn't always the best way for open ground. Why try to grow new woods when old rainforests are being destroyed more and more each year by rhododendron? Help! My view is: rhododendron first; new woods second, because in the western oceanic zone with rainforests I don't think the 'reduce grazing and have more young trees and new woods' thing is quite as urgent as getting rid of rhododendron. Some people probably won't agree, but for the sake of the old rainforests and the mosses and liverworts and lichens and everything else in them, I think that for rhododendron we need to bring the end on. Perhaps we can get loads more people into the woods and make a competitive sport out of rhododendron removal! Well, anything might help. In one glen in Argyll there was a big rhododendron eradication project in which all the local people were involved, and it actually brought the local community together more than before. So – time to say *"goodbye"* to our differences, and time for us all to get together to fight off that big dark beast of the forest! And then *"hello"* to a new world: *"come with me, fellow rhododendron slayers; come with me and see the light!"*

That’s the ‘people’ bit done, so now it’s back to nature: some ferns of the rainforest

Mosses, liverworts and lichens aren’t the only plants you see in the rainforests. (Actually, lichens aren’t really plants; as they are a mix of fungi and algae they are outside the plant kingdom.) There are also grasses, sedges, rushes, herbs and ferns, just like there are in other types of woodland in Britain and Ireland and the rest of Europe. But the ones that really stand out and show us that the habitat is a type of rainforest are the mosses, liverworts, lichens and ferns. So let’s check out the ferns. Most of the species of fern that we get in our rainforests are species that also grow in non-rainforest parts of Europe, but a few species are restricted to these rainy western areas. Only one of them is something that most people would recognize as a fern, and that one is **hay-scented buckler fern *Dryopteris aemula***. It grows on the ground and on steep, rocky banks in western rainforest woods, and although there can be a lot of it in some places it isn’t very common at the scale of the whole of Britain and Ireland. You can identify it by the way the many little divisions (pinnules) are turned up along parts of their edges, making it look a bit ‘crinkly’. These photos were taken in woodland in Argyll (L) and in a wooded ravine just south of Gourock (L).

Filmy ferns

See all the mosses and liverworts covering these rocks by some hazels in this coastal rainforest in Morvern, in the west Highlands? OK – see the darkest ones, in the middle of the photo? Those are ferns! They are a type of fern called filmy fern, and they grow mainly in western rainforests. Each individual shoot (or 'frond', as fern people say) is small, but where lots of them grow close together they can make big dark green patches on rocks, on banks, on trees and on logs. Next page: a closer look…

Wilson's filmy fern *Hymenophyllum wilsonii* (dark green areas in middle of photo) with mosses and liverworts in Morvern, W Highlands

There are two species: **Wilson's filmy fern *Hymenophyllum wilsonii*** (L + photo on previous page) and **Tunbridge filmy fern *H. tunbrigense*** (R). Both of them grow in woods from W Scotland right down to SW England and SW Ireland, but *H. tunbrigense* is the more southern of the two and appears to need a bit more warmth (even though it likes shady north-facing slopes). *H. tunbrigense* has been found as far north as Raasay, but *H. wilsonii* grows right up to the far north and beyond (to Shetland, the Faroe Islands and Norway). The fronds of *H. tunbrigense* are flatter, more divided, and bluer-green than those of *H. wilsonii*. Both of them could be looked upon as 'honorary oceanic mosses or liverworts' because they look like big, dark mosses or liverworts, they have western oceanic distributions, and they grow with western oceanic mosses and liverworts in many woods in the west of Britain and Ireland. *H. wilsonii* also grows on rocky mountainsides, especially on north-facing slopes.

Wilson's filmy fern *Hymenophyllum wilsonii*

Tunbridge filmy fern *Hymenophyllum tunbrigense*

There's also **Killarney fern *Trichomanes speciosum***: a rare filmy-ish fern of very wet places such as waterfalls in western rainforests where the climate is mild – for example SW Ireland. It is bigger than the filmy ferns on the previous page, with fronds more intricately divided to look more like a rather small (but thin-textured and translucent) 'normal' fern. I'm afraid this photo of it in a waterfall in Wales is blurry, maybe because of dim light (sorry), or water movement (grr!). But maybe there can be something positive about the blurry-ness? Imagine that for some reason (obviously a seriously intellectual one, probably beyond our grasp) it is *meant* to be like this.

Here is a photo of **hard fern *Blechnum spicant*** – a common plant on acid soils in western rainforests and also in woods and heaths in most other parts of Britain and Ireland too (except large parts of central and eastern England, where it is rare). Its tough, leathery-textured fronds stay green through the winter and well into the following year, and in some very humid, sheltered places in western woods this duration of evergreen-ness is long enough for some tiny liverworts to grow fast enough to colonize while the fern frond is still green and living. That's what's happened here: this photo shows *Colura calyptrifolia* (C) and *Microlejeunea ulicina* (M) on the fern in a wood in Argyll. The bigger moss doesn't count because it is 'anchored' to the ground and has just crept up onto the fern from there, but the *Colura* and *Microlejeunea* are 100% on the fern frond. Little liverworts or mosses growing as **epiphylls** (= on the living leaves of bigger plants) is something that happens mainly in tropical and subtropical parts of the world where the climate is so mild and humid that those mosses and liverworts can grow and reproduce more quickly than in colder or drier places, so they can colonize the relatively short-lived, temporary surface of a leaf. To see this happening in Scotland shows how mild the microclimate can be in some places here, and is a kind of ecological link with tropical/subtropical environments. We don't need planted palm trees to show the mildness of our west coast, because we've actually got our very own natural tropical affinities!

Here is another example of epiphyllous liverworts: tiny yellowish young plants of the liverworts *Metzgeria violacea* and *Colura calyptrifolia* scattered over the surface of a bramble leaf in Argyll.

I’ve found tiny liverworts growing as epiphylls on the living leaves of bigger plants as far north as the NW Highlands and the Outer Hebrides. These are not the sorts of places where most people would expect to find nature that links us with tropical/subtropical parts of the world; even at sea level in summer we’ll often need to wear warm and waterproof coats and hats there, as protection from the chill of wind and rain coming in off the Atlantic.

NW Sutherland in July

And along much of the extreme western seaboard of Scotland and Ireland you don't have to go very far uphill or inland to find a landscape in which the effects of cold and wind are evident. Trees are sparse. This is partly because of a history of land use, and grazing by sheep and deer, but the short and wind-shaped form of many of the trees that are present, combined with the low altitude of the apparent 'tree line' (for example trees appearing to be naturally rare or absent above 200-300 metres above sea level in the NW Highlands) shows the effect of frequent wind and the shortage of summer warmth. **Windy + cool**: these are the **harsh** elements of the oceanic climate of the far west. This is why we can find mountain plants and montane types of vegetation (some of which even has subarctic characteristics) at low altitudes here, especially if we're on ground whose topography makes it exposed to that westerly wind.

The cool, windy seaboard of NW Scotland: top = by Loch Inchard, Sutherland (looking inland to Arkle); bottom = Inverpolly, Wester Ross.

But the oceanic climate is a two-sided coin. Windy + cool is the harsh side. **Calm, mild and humid** is the **kind** side. We switch from one to the other as we go from topographically exposed ground such as hilltops, ridges and W-facing slopes, to more sheltered places such as valleys, ravines, gullies and steep N-E-facing rocky slopes. The latter are better for tree growth, and as we head into the trees we say “goodbye” to the cooling effect of wind and its montane feel or subarctic affinities, and “hello” to shelter, milder temperatures, more humidity, and vegetation that can show affinities with subtropical rainforests. The harsh side is more common at higher altitudes and the kind side is mostly low down, but there is a lot of altitudinal overlap and in some areas you can go from kind to harsh in a short distance. In the landscape shown in this photo, taken in Wester Ross, variation in topography leads to a mix of the ‘harsh’ and ‘kind’ sides of the climatic coin. On Harris in the Outer Hebrides I once found epiphyllous liverworts (subtropical affinity) on ferns among tall heather in a sheltered gully, within shouting distance of ground so exposed to the wind that it had little other than stones and scattered little patches of the moss *Racomtrium ellipticum* – a habitat that is more subarctic in nature and common on very wind-exposed ground in the Faroe Islands.

Just a small patch of rocky woodland like this one shown in the photo to the right (birches among boulders on a hillslope in Sutherland) can be enough to bring out the kind side of the oceanic climate. That's how mosses and liverworts, including western oceanic species, have been able to cover so much of the rock and tree trunk surfaces there. Woodland birds can live here too, even in small and scrubby patches of trees like this.

Not far upslope from there and you're into the scene shown in the bottom photo – windswept heath of a more montane nature, with vegetation height kept short by the wind and with some of the heather and other dwarf shrubs growing low with their shoots aligned in the direction of the prevailing westerlies. Here we're seeing the oceanic climate's harsh side taking over. This harshness is not 'bad' or 'wrong': it's just nature doing what is normal on this kind of ground at this extreme NW edge of Europe.

Here are photos of low, scrubby hazelwood on windy western Scottish islands: Eigg (top) and Seil (bottom).

Windswept outside

Sheltered inside

Along this extreme western oceanic edge of Britain and Ireland, winters and summers aren't hugely different from each other. The weather can be cool/mild, windy and wet at any time of year and variation from exposed to sheltered topography is really significant in the way it brings out different sides ('harsh' and 'kind') of that climate.

Further east in Europe at the same latitude as Britain and Ireland it's all very different. In the 'continental' climate there, winters are colder, summers are hotter and there's less wind and less rain. Their climate is a two-sided coin too, but with the two sides being winter and summer, while the two sides of the oceanic climate's coin are non-seasonal and are related to landform.

In those eastern continental areas, trees can grow taller and straighter and further up the mountains. In Norway there is woodland up to well over 1000 metres above sea level at the same latitude as Shetland, and there's even some scrubby woodland there at 1300 m, which is about the same as the top of Ben Nevis. Despite the winter cold and snow, trees can grow well in many continental places and their straight growth form there shows how much less windy it is compared with western Scotland and Ireland. In those continental areas lots of snow isn't such a problem as we might think. A deep cover of snow can protect plants from the extremes of cold. This allows some delicate-looking plants to survive in parts of the world where winters are much colder and more snowy than ours. For example these beautiful ferns in a north Japanese mountain forest (L-R: *Adiantum myriosorum, Coniogramme intermedia* and *Hymenophyllum wrightii*) probably benefit from winter snow cover.



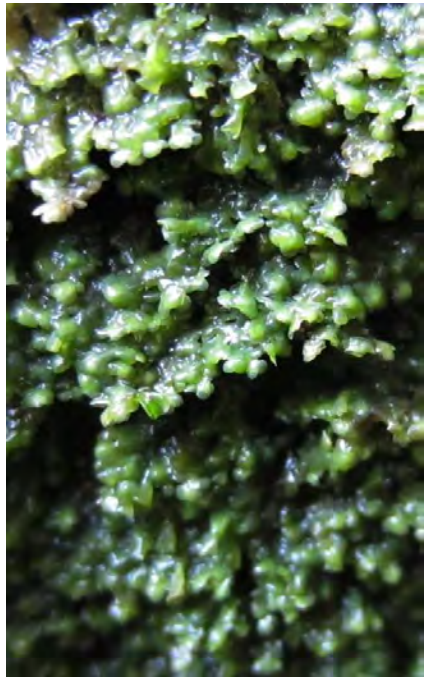
Yes, those Japanese ferns are nice and the forest there is fantastic, but their climate is still too dry and continental for mosses and liverworts to grow there in such quantities as in British and Irish rainforests, and for oceanic species to grow there at all.

Scotland is split! Woodland vegetation in parts of eastern Scotland shows similarities to boreal birch and conifer forests found in areas with a cold boreal climate (= blue in map to right). Travel west for only 100 km across the Highlands and you've crossed a divide of global significance and entered 'temperate rainforest land' (= red on map) which has a very different world distribution, being split up into lots of bits scattered all over the world. (Map colouring based mainly on information from https://en.wikipedia.org/.)

The rainforests in Britain and Ireland are of course in places that get the ‘kind’ side of the oceanic climate: sheltered and humid.

Down in SW Ireland, SW England and Wales the temperatures are warmer than in Scotland, and this difference is shown by some details of the species in the rainforests. They are all very mossy, with most of the mosses, liverworts, lichens and ferns being species found throughout the whole British and Irish rainforest zone, but some of the western oceanic species are more southern because they need more warmth, and some others are more northern because it seems they prefer cooler conditions (maybe they genuinely like it cooler, or maybe they would be just as happy in warmer places but can’t compete against the other species that grow there – we don’t know for sure).

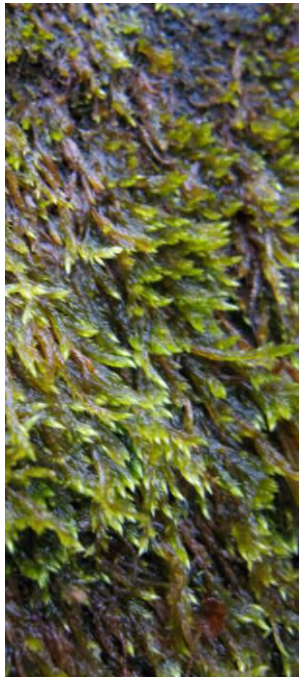
Here are some species that grow in British and Irish rainforests and are mainly in the warmer south or on south-facing slopes:



Radula holtii
Leafy liverwort

Cololejeunea minutissima
Leafy liverwort

Dumortiera hirsuta
Thalloid liverwort



Sematophyllum demissum
Moss

Sticta canariensis
Lichen

Many tree and shrub species are common in northern and southern British and Irish rainforests.

Oak (*Quercus robur, Q. petraea* and hybrids between the two) and downy birch *Betula pubescens* are particularly common, but in the west Highlands downy birch is the commonest tree and oak becomes less common and more restricted to low altitudes and south-facing slopes as one progresses northwards.

Native Scots pine *Pinus sylvestris* is common in some woods in the rainforest areas of the west Highlands (as well as in less oceanic areas of the central and eastern Highlands). Here is a photo of northern pine/birch rainforest woodland in Wester Ross.

And here’s some birch rainforest woodland toward the upper, cooler limits of woodland in the mountains of Glen Coe.

You can see from that photo shown on the previous page that moss/liverwort growth is everywhere. Here is a closer view of some of it. What we're looking at here, among the blaeberry *Vaccinium myrtillus*, are deep, soft patches of rare northern oceanic liverworts ***Bazzania pearsonii*** (yellow-green, in foreground) and ***Scapania ornithopodioides*** (more shiny and purplish-brown, behind and slightly left of centre).

Here’s another northern oceanic liverwort of cool, humid, north-facing woods: ***Herbertus hutchinsiae***, photographed here in Wester Ross:

There are several other uncommon northern oceanic liverworts found on north-facing slopes, mainly in the west Highlands but also in other western mountain areas of Ireland, the Lake District and NW Wales. They also grow in **heaths** outside and higher up than the woods, so these heaths could be thought of as 'rainforest heaths' – an upslope ecological counterpart of the rainforests. Here is a photo of such a heath, in Sutherland. The orange colour is the liverwort ***Herbertus hutchinsiae***.

Here are close-ups of rare northern oceanic liverwort species in ‘rainforest heaths’ in Wester Ross. L-R: ***Bazzania pearsonii; Scapania nimbosa; Plagiochila carringtonii; Anstrophyllum joergensenii***.

Some of these uncommon northern oceanic species grow in NW Europe (mainly W Scotland) and **very distant parts of the world** with a rather similar climate to ours: for example the forests of British Columbia and the upper forest zone in the Himalayas. Another oceanic species with a similarly 'disjunct' world distribution is the very rare moss ***Campylopus subporodictyon***. It grows on wet rocks and banks in the NW Highlands and also in British Columbia and Yunnan (Himalaya).

Talking of uncommon northern species, here is ***Platismatia norvegica***. It's one of my favourite lichens. Why? Well, look at it. There's just something about it, isn't there. It's a decent size, easy enough to recognize and, being quite rare, is always a good find. It grows on rocks and acid bark (birch, pine, etc) in some northern rainforests and also in other northern woods and in higher places in the mountains. It's also in Scandinavia, Newfoundland and British Columbia. Something of a lichen counterpart of those northern oceanic mosses and liverworts.

A few things I'd forgotten until just now…

Midges. They were in the title at the very beginning, but it all went quiet after that. Well, they've been here all along. Too small to show up in photos and drawings but still there alright, make no mistake. Actually, even though they bite and can be irritating in large numbers (=part of the misery we've seen), we can have – or at least try to have – some sympathy for them. They're actually very delicate little things. And you can swish them away with your hands or just keep walking away if – or, rather, when – you've *really* had enough. Irritating but innocent. (And, not all year; mainly May to September.)

Some numbers. Just in case you're interested. Total number of species in Britain and Ireland (of course not all of these grow in rainforests): over 750 mosses + nearly 300 liverworts = total of more than 1050 mosses + liverworts, of which about 18% have western, oceanic distributions in Europe as a whole; about 1900 lichens; at least 1885 other plants ('proper plants' = trees, shrubs, grasses, sedges, rushes, herbs, ferns, etc), of which about 12% have western, oceanic distributions in Europe as a whole; about 54 of those 'proper plant' species are ferns.

Names. In botanists language those 'proper plants' that I just mentioned are called **vascular plants**, and mosses and liverworts together are **bryophytes**. Strictly speaking, bryophytes also include hornworts, which look like thalloid liverworts, but there are only four species and they're uncommon and grow on artificially disturbed ground on paths, tracks, fields, etc, and not in rainforests. So for current purposes let's forget hornworts and just say bryophytes = mosses + liverworts. And as for the names of all those mosses and liverworts and lichens – they have **English names** as well as Latin ones (at least all mosses and liverworts do, but not all lichens). The moss and liverwort ones are not the product of human history as are those of vascular plants (e.g. birch, oak, ash, wych elm, violet, stitchwort, primrose, yellow pimpernel, bugle, thrift), birds, mushrooms and so on (including the English names of lichens too). No, they were made up by a committee in the 1990s to fulfil some official/administrative requirement. The late Professor A.J.E. (Tony) Smith, in the Introduction section of *The Moss Flora of Britain and Ireland*, wrote: *"I have not given English names of mosses in the text as they are more difficult to remember and often more cumbersome than Latin names."* I agree. Some of them just seem wrong too. 'Rusty Bow-moss' (*Campylopus subporodictyon*) doesn't look rusty. *Harpalejeunea, Drepanolejeunea* and *Aphanolejeunea* are 'Pounceworts' but they don't pounce! I've seen them loads of times and I can safely say they've never pounced on me. *Eurhynchium striatum* is lumbered with 'Common Striated Feather-moss': too long, and it doesn't look feathery. And so on… and the Latin names are OK anyway. Grrr! More misery to add to that of rain and midges and slippy rocks and logs... You might say *"oh but Glittering Wood-moss [Hylocomium splendens] and Deceptive Featherwort [Adelanthus decipiens] are quite nice English names, aren't they?"* Yes, I know they are, dammit. But *Adelanthus* isn't feathery, so there. And the *Hylocomium*… er… oh dear… hmm, give me time and I might think of something… Thinking of names, we could say ***'Atlantic'*** *or* ***'Celtic'*** rainforest as some people do, but: (1) Atlantic – west, east, north, south…? Which continent? It's too vague. (2) Celtic – it's to do with culture, not nature. Yes I know we're part of nature too, but trees and rocks and rain and mosses and lichens are not Celtic – they just *are*.

Yes, those mosses and liverworts and other things just *are* – which is OK. What more should we expect them to be? What more can they or anything else be in order to qualify for our attention, appreciation and respect? And what could be more profound than just being?

With birds, flowers, butterflies and other nice things, mainland Europe has so much more than we do in Britain and Ireland. But the tables are turned (so we're the winners!) when it comes to the dull oceanic drizzle. The drizzle of the places where humid, clammy subtropical comes so close to wind-chilled subarctic. The places where we stumble and slip among rocks and logs and streams and wet banks. The places where mosses and liverworts and lichens and ferns and other things are, unknown to most of us, minding their own business in a very different world – the temperate rainforests of Britain and Ireland.